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UNIVERSITY  
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# **Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Uni-Directional Slit Tape (0.25 inch) Qualification Material Property Data Report**

**NCAMP Project Number: NPN 052101**

**NCAMP Test Report Number: CAM-RP-2023-002 Rev B**

**Report Date: January 2, 2026**

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|     |             |           |                                                                                                                                                                                                                                                                                                                                                                                                                 |
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## 1. Introduction

### 1.1 Scope

The test methods and results described in this document are intended to provide basic composite properties essential to most methods of analysis and are consistent with CMH-17 Volume 1—Composite Materials Handbook for Polymer Matrix Composites. This report contains material property data of common usefulness to wide range of projects. The lamina and laminate material property data have been generated with NCAMP oversight in accordance with NSP 100 NCAMP Standard Operating Procedures; the test panels and test specimens have been inspected by NCAMP Authorized Inspection Representatives (AIR) and the testing has been witnessed by NCAMP Authorized Engineering Representatives (AER). However, the data may not fulfill all the needs of any specific company's program; specific properties, environments, laminate architecture, and loading situations may require additional testing.

The use of NCAMP material and process specifications do not guarantee material or structural performance. Material users should be actively involved in evaluating material performance and quality including, but not limited to, performing regular purchaser quality control tests, performing periodic equivalency/additional testing, participating in material change management activities, conducting statistical process control, and conducting regular supplier audits.

The applicability of NCAMP material property data, material allowables, and specifications must be evaluated on case-by-case basis by aircraft companies and certifying agencies. NCAMP assumes no liability whatsoever, expressed or implied, related to the use of the material property data, material allowables, and specifications.

This report contains material property data only. Statistical analysis of the data including the calculations of b-basis values is given in a separate report Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Uni-Directional Slit Tape (0.25 inch) Material Allowables Statistical Analysis Report NCP-RP-2023-002 Rev B. The qualification material was utilizing NCAMP Material Specification NMS 397/3 Rev - dated January 24, 2024, NMS 397/3 lists the information for procurement. The qualification test panels were cured in accordance with NCAMP Process Specification NPS 83961AFP Rev - dated January 25, 2023 using cure cycle "C". The NCAMP Test Plan NTP 3963Q1 Rev C was used for this qualification program.

Part fabricators that wish to utilize the material property data, allowables, and specifications may be able to do so by demonstrating the capability to reproduce the original material properties; a process known as equivalency. More information about this equivalency process including the test statistics and its limitations can be found in Section 6 of DOT/FAA/AR-03/19 and Section 8.4.1 of CMH-17 Volume 1. The applicability of equivalency process must be evaluated on program-by-program basis by the applicant and certifying agency. The applicant and certifying agency must agree that the equivalency test plan along with the equivalency process described in Section 6 of

DOT/FAA/AR-03/19 and Section 8.4.1 of CMH-17 Volume 1 are adequate for the given program.

Aircraft companies should not use the data published in this report without specifying NCAMP Material Specification NMS 397/3. NMS 397/3 may have additional requirements that are listed in its prepreg process control document (PCD), fiber specification, fiber PCD, and other raw material specifications and PCDs which impose essential quality controls on the raw materials and raw material manufacturing equipment and processes. *Aircraft companies and certifying agencies should assume that the material property data published in this report is not applicable when the material is not procured to NMS 397/3.* NMS 397/3 is a free, publicly available, non-proprietary aerospace industry material specification.

The data in this report is intended for general distribution to the public, either freely or at a price that does not exceed the cost of reproduction (e.g. printing) and distribution (e.g. postage).

## 1.2 Symbols

|                                |                                                              |
|--------------------------------|--------------------------------------------------------------|
| $\nu_{12}^t$                   | major Poisson's ratio, tension                               |
| $\nu_{12}^c$                   | major Poisson's Ratio, compression                           |
| $\mu\epsilon$                  | micro-strain                                                 |
| $E_1^c$                        | compressive modulus, longitudinal / warp direction           |
| $E_1^t$                        | tensile modulus, longitudinal / warp direction               |
| $E_2^c$                        | compressive modulus, transverse / fill direction             |
| $E_2^t$                        | tensile modulus, transverse / fill direction                 |
| $F_1^{cu}$                     | ultimate compressive strength, longitudinal / warp direction |
| $F_1^{tu}$                     | ultimate tensile strength, longitudinal / warp direction     |
| $F_2^{cu}$                     | ultimate compressive strength, transverse / fill direction   |
| $F_2^{tu}$                     | ultimate tensile strength, transverse / fill direction       |
| SBS                            | short beam strength                                          |
| $F_{12}^{su}$                  | in-plane shear ultimate peak strength                        |
| $F_{12}^{s5\% \text{ strain}}$ | in-plane shear strength at 5% strain                         |
| $F_{12}^{s0.2\%}$              | in-plane shear strength at 0.2% offset                       |
| $G_{12}^s$                     | in-plane shear modulus                                       |

### Superscripts

|    |                      |
|----|----------------------|
| c  | compression          |
| cu | compression ultimate |
| s  | shear                |
| su | shear ultimate       |
| t  | tension              |
| tu | tension ultimate     |

**Subscripts**

|    |                                                                                   |
|----|-----------------------------------------------------------------------------------|
| 1  | axis; longitudinal / warp direction (parallel to warp direction of reinforcement) |
| 2  | axis; transverse / fill direction (parallel to fill direction of reinforcement)   |
| 12 | in-plane                                                                          |

**Acronyms and Definitions**

|           |                                                                                      |
|-----------|--------------------------------------------------------------------------------------|
| ASTM      | American Society for Testing and Materials                                           |
| B – Basis | 95% lower confidence limit on the tenth population percentile                        |
| CV        | Coefficient of variation                                                             |
| CTA       | cold temperature ambient                                                             |
| CPT       | cured ply thickness                                                                  |
| ETA       | elevated temperature ambient                                                         |
| ETW       | elevated temperature wet                                                             |
| Gr/Ep     | graphite/epoxy                                                                       |
| norm      | normalized                                                                           |
| RTA       | room temperature ambient                                                             |
| SACMA     | Suppliers of Advanced Composite Materials Association                                |
| SRM       | SACMA Recommended Method                                                             |
| Tply      | thickness divided by the number of plies provides the thickness average per specimen |
| wet       | specimen with an “equilibrium” moisture content                                      |
| T, RH     | temperature, relative humidity                                                       |

### 1.3 NIAR–Specimen Naming Format

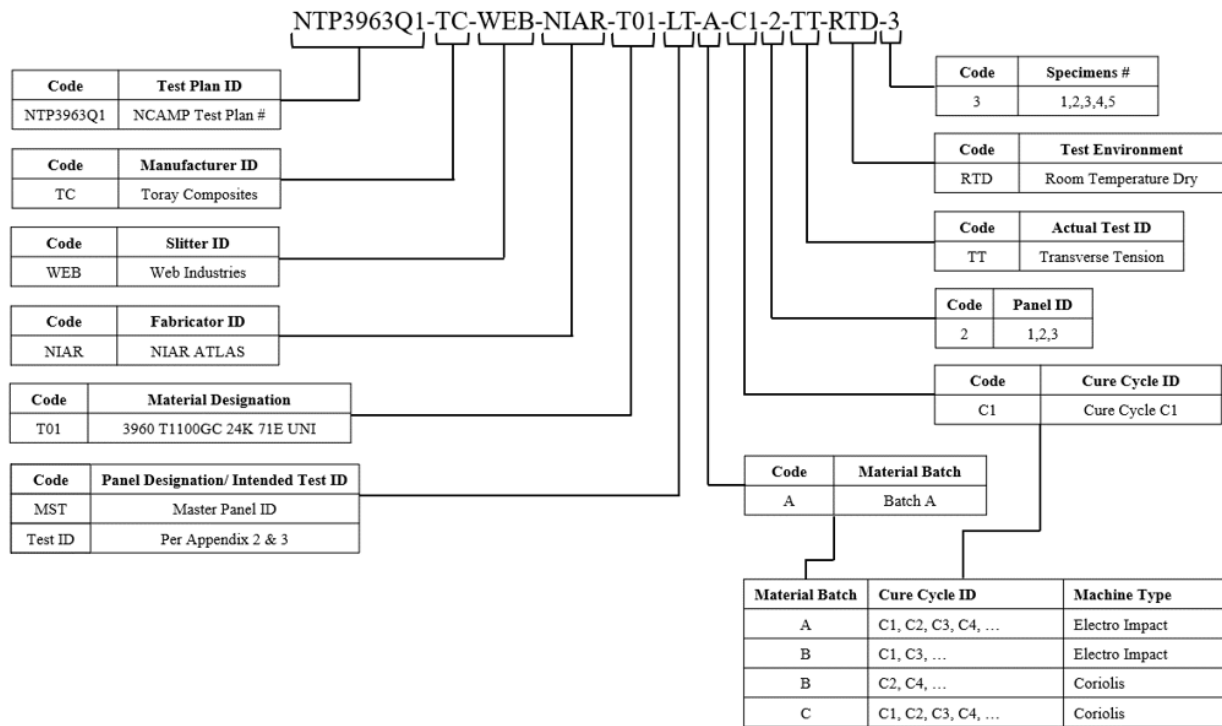


Figure 1-1: Naming Format

## 1.4 References

### ASTM Standards

All testing was in accordance with nationally recognized standards, methods and procedures. Specific mechanical property test methods applicable to the test program in this document include:

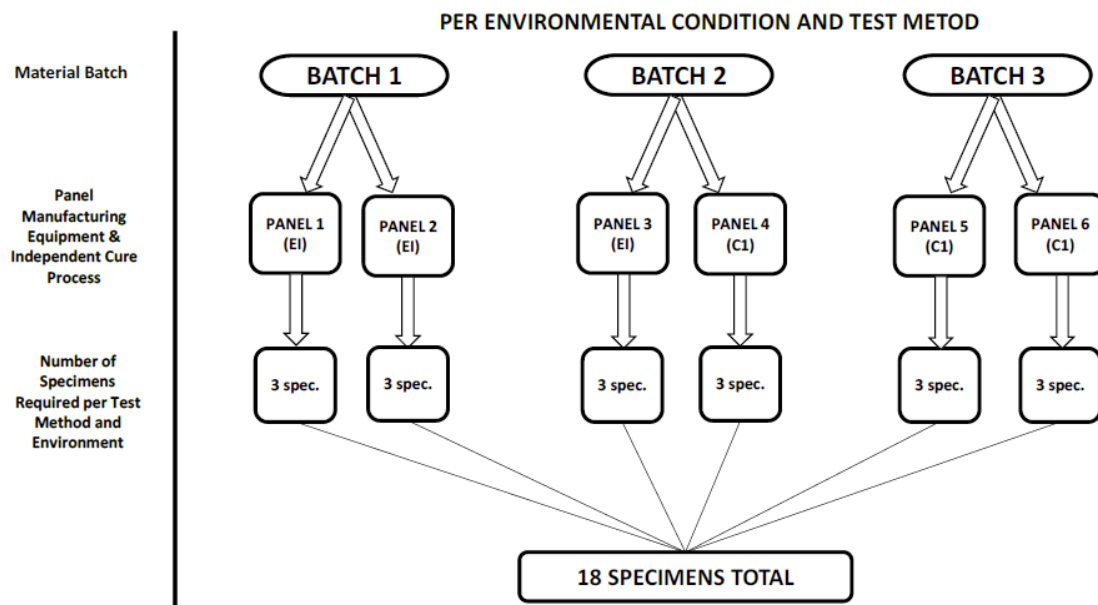
- ASTM D2344/D2344M-16 – Standard Test Method for Short-Beam Strength of Polymer Matrix Composite Materials and Their Laminates
- ASTM D3039/D3039M-17 – Standard Test Method for Tensile Properties of Polymer Matrix Composite Materials
- ASTM D3418-21 - Standard Test Method for Transition Temperatures and Enthalpies of Fusion and Crystallization of Polymers by Differential Scanning Calorimetry
- ASTM D3518/D3518M-18 – Standard Test Method for In-Plane Shear Response of Polymer Matrix Composite Materials by Tensile Test of a  $\pm 45^\circ$  Laminate In-Plane Shear Strength and Modulus
- ASTM D5766/D5766M-11(2018) – Standard Test Method for Open Hole Tensile Strength of Polymer Matrix Composite Laminates
- ASTM D5961/D5961M-17 – Standard Test Method for Bearing Response of Polymer Matrix Composite Laminates
- ASTM D6415/D6415-06a(2013) – Standard Test Method for Measuring the Curved Beam Strength of a Fiber-Reinforced Polymer-Matrix Composite
- ASTM D6484/D6484M-20 – Standard Test Method for Open-Hole Compressive Strength of Polymer Matrix Composite Laminates
- ASTM D6641/D6641M-16e2 – Standard Test Method for Determining the Compressive Properties of Polymer Matrix Composite Laminates Using a Combined Loading Compression (CLC) Test Fixture
- ASTM D6742/D6742M-17 – Standard Practice for Filled-Hole Tension and Compression Testing of Polymer Matrix Composite Laminates
- ASTM D7028-07(2015) – Standard Test Method for Glass Transition Temperature (DMA Tg) of Polymer Matrix Composites by Dynamic Mechanical Analysis (DMA)
- ASTM D7136/D7136M-20 – Standard Test Method for Measuring the Damage Resistance of a Fiber-Reinforced Polymer Matrix Composite to a Drop-Weight Impact Event
- ASTM D7137/D7137M-17 – Standard Test Method for Compressive Residual Strength Properties of Damaged Polymer Matrix Composite Plates Methodology

- ASTM D792-20 – Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement
- ASTM D3171-15– Standard Test Methods for Constituent Content of Composite Materials
- ASTM D910-21 – Standard Specification for Leaded Aviation Gasolines
- ASTM E2580-17 – Standard Practice for Ultrasonic Testing of Flat Panel Composites and Sandwich Core Materials Used in Aerospace Applications

## 1.5 Methodology

### 1.5.1 Process Definition

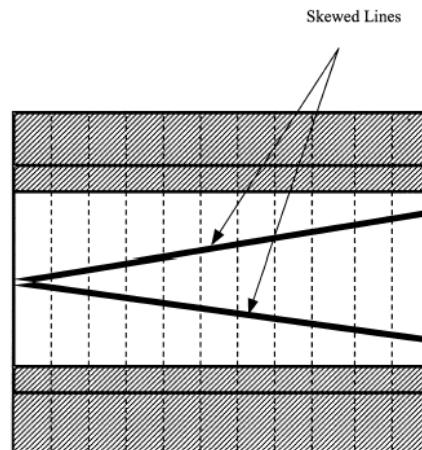
For each combination of test, batch and condition, the specimens were selected from minimum two separate panels cured separately as shown in Figure 1-2 unless otherwise specified. Fabrication equipment variability assessed by fabricating panel utilizing both Electroimpact (EI) and Coriolis (C1) AFP machines. Panels 1, 2, and 3 were fabricated using EI AFP machine and panels 4, 5, and 6 were fabricated using C1 AFP machine. Unless otherwise specified, panels 1, 3, and 5 were cured in a single cure cycle. Panels 2, 4, and 6 were cured in a single cure cycle separate from panels 1, 3, and 5. The term "cure cycle" means a single run through the autoclave or oven, with same processing parameters. The specimen selection methodology in Figure 1-2 are presented in "Number of Batches x Number of Cure Process x Number of Specimens" format throughout this document. Specifically, Figure 1-2 depicts a 3x2x3 specimen selection methodology.



**Figure 1-2: Specimen Selection Methodology**

All panels were fabricated in accordance with NCAMP Process Specification NPS 83961AFP Rev - using cure cycle "C".

In order to facilitate individual specimen trace ability, individual specimen numbering and/or skewed lines were written or drawn across each sub-panel as shown in Figure 1-3.



**Figure 1-3: Specimen Traceability Line**

## 1.5.2 Specimen & Testing Details

### 1.5.2.1 Tabbing

#### 1.5.2.1.1 Longitudinal Tension (LT)

|                     |                                        |                               | Longitudinal Tension (LT)    |                      |      |                      |
|---------------------|----------------------------------------|-------------------------------|------------------------------|----------------------|------|----------------------|
|                     |                                        |                               | Batch No. and Cure Cycle No. |                      |      |                      |
| Tabbing Material    | Adhesive Type                          | Cure Temperature and Duration | CTA                          | RTA                  | ETW1 | ETW2                 |
| Epoxyglass™ G10/FR4 | Solvay FM300-2M Film Adhesive*         | 250°F for 90 minutes          | A-C2                         | A-C2                 | A-C2 | A-C2                 |
|                     | Henkel Loctite EA9394 Paste Adhesive   | 150°F for 60 minutes          | C-C1<br>C-C2                 | B-C1<br>C-C2         |      | C-C1<br>C-C2         |
|                     | Henkel Loctite EA9359.3 Paste Adhesive | 150°F for 60 minutes          | A-C1<br>B-C1<br>B-C2         | A-C1<br>B-C2<br>C-C1 | A-C1 | A-C1<br>B-C1<br>B-C2 |

\*Preferred

#### 1.5.2.1.2 Transverse Tension (TT) / Transverse Compression (TC)

|                     |                                        |                               | Transverse Tension (TT) / Transverse Compression (TC) |                      |      |                      |
|---------------------|----------------------------------------|-------------------------------|-------------------------------------------------------|----------------------|------|----------------------|
|                     |                                        |                               | Batch No. and Cure Cycle No.                          |                      |      |                      |
| Tabbing Material    | Adhesive Type                          | Cure Temperature and Duration | CTA                                                   | RTA                  | ETW1 | ETW2                 |
| Epoxyglass™ G10/FR4 | Solvay FM300-2M Film Adhesive*         | 250°F for 90 minutes          | A-C2                                                  | A-C2                 | A-C2 | A-C2                 |
|                     | Henkel Loctite EA9394 Paste Adhesive   | 150°F for 60 minutes          | C-C1<br>C-C2                                          | C-C1<br>C-C2         |      | C-C1<br>C-C2         |
|                     | Henkel Loctite EA9359.3 Paste Adhesive | 150°F for 60 minutes          | A-C1<br>B-C1<br>B-C2                                  | A-C1<br>B-C1<br>B-C2 | A-C1 | A-C1<br>B-C1<br>B-C2 |

\*Preferred

**1.5.2.1.3 Longitudinal Compression (LC)**

|                        |                                              |                               | Longitudinal Compression (LC)        |                                      |              |              |                      |                      |
|------------------------|----------------------------------------------|-------------------------------|--------------------------------------|--------------------------------------|--------------|--------------|----------------------|----------------------|
|                        |                                              |                               | Batch No. and Cure Cycle No.         |                                      |              |              |                      |                      |
| Tabbing Material       | Adhesive Type                                | Cure Temperature and Duration | CTA                                  | RTA                                  | ETA1         | ETA2         | ETW1                 | ETW2                 |
| Epoxyglass™<br>G10/FR4 | Solvay<br>FM300-2M<br>Film Adhesive*         | 250°F for 90 minutes          | A-C3<br>B-C3<br>B-C4<br>C-C3<br>C-C4 | A-C3<br>B-C3<br>B-C4<br>C-C3<br>C-C4 | B-C1<br>B-C2 | B-C1<br>B-C2 | A-C2                 | A-C2                 |
|                        | Henkel Loctite<br>EA9394<br>Paste Adhesive   | 150°F for 60 minutes          |                                      |                                      |              |              | C-C1<br>C-C2         | C-C1<br>C-C2         |
|                        | Henkel Loctite<br>EA9359.3<br>Paste Adhesive | 150°F for 60 minutes          | A-C1                                 | A-C1                                 |              |              | A-C1<br>B-C1<br>B-C2 | A-C1<br>B-C1<br>B-C2 |

\*Preferred

**1.5.2.1.4 Unnotched Compression 0/90 (UNC0)**

|                        |                                              |                               | Unnotched Compression 0/90 (UNC0) |                              |      |      |      |                                      |
|------------------------|----------------------------------------------|-------------------------------|-----------------------------------|------------------------------|------|------|------|--------------------------------------|
|                        |                                              |                               | Batch No. and Cure Cycle No.      |                              |      |      |      |                                      |
| Tabbing Material       | Adhesive Type                                | Cure Temperature and Duration | CTA                               | RTA                          | ETA1 | ETA2 | ETW1 | ETW2                                 |
| Epoxyglass™<br>G10/FR4 | Henkel Loctite<br>EA9394<br>Paste Adhesive   | 150°F for 60 minutes          | A-C2<br>C-C1                      | A-C2<br>C-C1                 | A-C2 | A-C2 | A-C2 | A-C2                                 |
|                        | Henkel Loctite<br>EA9359.3<br>Paste Adhesive | 150°F for 60 minutes          | A-C1<br>B-C1<br>B-C2<br>C-C2      | A-C1<br>B-C1<br>B-C2<br>C-C2 | A-C1 | A-C1 | A-C1 | A-C1<br>B-C1<br>B-C2<br>C-C1<br>C-C2 |

**1.5.2.1.5 Unnotched Compression (UNC1, UNC2, UNC3)**

|                         |                                              |                                      | <b>Unnotched Compression 1<br/>(UNC1)</b> |              |                      |
|-------------------------|----------------------------------------------|--------------------------------------|-------------------------------------------|--------------|----------------------|
|                         |                                              |                                      | <b>Batch No. and Cure Cycle No.</b>       |              |                      |
| <b>Tabbing Material</b> | <b>Adhesive Type</b>                         | <b>Cure Temperature and Duration</b> | <b>RTA</b>                                | <b>ETW1</b>  | <b>ETW2</b>          |
| Epoxyglass™<br>G10/FR4  | Solvay<br>FM300-2M<br>Film Adhesive*         | 250°F for 90 minutes                 | A-C1<br>A-C2                              | A-C1<br>A-C2 | A-C1<br>A-C2         |
|                         | Henkel Loctite<br>EA9394<br>Paste Adhesive   | 150°F for 60 minutes                 | C-C2                                      |              | C-C2                 |
|                         | Henkel Loctite<br>EA9359.3<br>Paste Adhesive | 150°F for 60 minutes                 | B-C1<br>B-C2<br>C-C1                      |              | B-C1<br>B-C2<br>C-C1 |

\*Preferred

|                         |                                              |                                      | <b>Unnotched Compression 2<br/>(UNC2)</b> |                              |
|-------------------------|----------------------------------------------|--------------------------------------|-------------------------------------------|------------------------------|
|                         |                                              |                                      | <b>Batch No. and Cure Cycle No.</b>       |                              |
| <b>Tabbing Material</b> | <b>Adhesive Type</b>                         | <b>Cure Temperature and Duration</b> | <b>RTA</b>                                | <b>ETW2</b>                  |
| Epoxyglass™<br>G10/FR4  | Solvay<br>FM300-2M<br>Film Adhesive*         | 250°F for 90 minutes                 | A-C1<br>A-C2<br>C-C1<br>C-C2              | A-C1<br>A-C2<br>C-C1<br>C-C2 |
|                         | Henkel Loctite<br>EA9394<br>Paste Adhesive   | 150°F for 60 minutes                 | B-C1                                      |                              |
|                         | Henkel Loctite<br>EA9359.3<br>Paste Adhesive | 150°F for 60 minutes                 | B-C2                                      | B-C1<br>B-C2                 |

\*Preferred

|                        |                                              |                               | Unnotched Compression 3<br>(UNC3) |                                              |
|------------------------|----------------------------------------------|-------------------------------|-----------------------------------|----------------------------------------------|
|                        |                                              |                               | Batch No. and Cure Cycle No.      |                                              |
| Tabbing Material       | Adhesive Type                                | Cure Temperature and Duration | RTA                               | ETW2                                         |
| Epoxyglass™<br>G10/FR4 | Solvay<br>FM300-2M<br>Film Adhesive*         | 250°F for 90 minutes          | A-C1<br>A-C2                      | A-C1<br>A-C2<br>B-C1<br>B-C2<br>C-C1<br>C-C2 |
|                        | Henkel Loctite<br>EA9394<br>Paste Adhesive   | 150°F for 60 minutes          | B-C1<br>C-C1<br>C-C2              |                                              |
|                        | Henkel Loctite<br>EA9359.3<br>Paste Adhesive | 150°F for 60 minutes          | B-C2                              |                                              |

\*Preferred

**1.5.2.1.6 Unnotched Tension (UNT1, UNT2, UNT3)**

|                        |                                      |                               | Unnotched Tension<br>(UNT1, UNT2, UNT3) |      |              |        |
|------------------------|--------------------------------------|-------------------------------|-----------------------------------------|------|--------------|--------|
|                        |                                      |                               | Batch No. and Cure Cycle No.            |      |              |        |
| Tabbing Material       | Adhesive Type                        | Cure Temperature and Duration | CTA                                     | RTA  | ETW1         | ETW2** |
| Epoxyglass™<br>G10/FR4 | Solvay<br>FM300-2M<br>Film Adhesive* | 250°F for 90 minutes          | A-C1                                    | A-C1 | A-C1<br>A-C2 | A-C1   |
|                        |                                      |                               | A-C2                                    | A-C2 |              | A-C2   |
|                        |                                      |                               | B-C1                                    | B-C1 |              | B-C1   |
|                        |                                      |                               | B-C2                                    | B-C2 |              | B-C2   |
|                        |                                      |                               | C-C1                                    | C-C1 |              | C-C1   |
|                        |                                      |                               | C-C2                                    | C-C2 |              | C-C2   |
|                        |                                      |                               |                                         |      |              |        |

\*Preferred

\*\*ETW2 UNT3 Redo test specimens tested without tabbed.

### 1.5.2.2 Specimen Dimensions & Test Configuration

For SBS specimens, a span of 4T was used where T was the average thickness of six qualification panels. The same T was used to compute the width and length of the specimen.

For filled-hole tension specimens, the fasteners were installed at a torque of 85±5 in-lb beyond the prevailing torque of the fastener. For filled-hole compression and bearing specimens, the fasteners were installed 30±5 in-lb beyond the prevailing torque of the fastener. For moisture conditioned specimens, fasteners were installed after moisture conditioning.

Unless otherwise specified, a tolerance of ±5°F applied to all temperature conditions specified in this document.

For filled-hole and bearing specimens, the hole diameter was 0.25 in -0.000 +0.003 in. The fasteners used for filled-hole and bearing testing are listed in Table 1-1.

| Test Method | Bolt            | Countersink Washer (Head-Side) | Flat Washer (Nut-Side)           | Nut        |
|-------------|-----------------|--------------------------------|----------------------------------|------------|
| FHT1        | NAS6304U-4      | MS21206-C4                     | NAS1149C04063R<br>NAS1149C04032R | MS21084L04 |
| FHT2        |                 |                                |                                  |            |
| FHT3        |                 |                                |                                  |            |
| FHC1        | NAS6304U-4      | MS21206-C4                     | NAS1149C04063R<br>NAS1149C04032R | MS21084L04 |
| FHC2        |                 |                                |                                  |            |
| FHC3        |                 |                                |                                  |            |
| SSB1        | NASM21297-04017 | MS21206-C4                     | NAS1149C04063R<br>NAS1149C04032R | MS21084L04 |
| SSB2        |                 |                                |                                  |            |
| SSB3        |                 |                                |                                  |            |

**Table 1-1: Fastener Identifications**

### 1.5.2.3 Specimen Strain Device Used

Corresponding Gage ID can be obtained from Appendix 1 of NTP 3963Q1.

**Uniaxial gages** were used on:

- All conditions of Tension specimens except Longitudinal Tension specimens.

- All conditions of combined loading compression specimens except Longitudinal Compression specimens.

- One CAI un-impacted specimen for balancing.

**Biaxial gages** were used on:

- All conditions of IPS specimens.

- All conditions of Longitudinal Tension specimens.

- All conditions of Longitudinal Compression specimens.

### 1.5.3 Test Matrix

The tables below show the lay-ups and test matrices used for lamina and laminate level testing.

| Layup                  | Test Type Code | Test Type and Direction                | Property                                                              | Number of Batches x No. of Panels x No. of Specimens |            |              |              |              |              |
|------------------------|----------------|----------------------------------------|-----------------------------------------------------------------------|------------------------------------------------------|------------|--------------|--------------|--------------|--------------|
|                        |                |                                        |                                                                       | Test Temperature/Moisture Condition                  |            |              |              |              |              |
|                        |                |                                        |                                                                       | CTA (-65°F)                                          | RTA (70°F) | ETA1 (180°F) | ETW1 (180°F) | ETA2 (250°F) | ETW2 (250°F) |
| [0] <sub>6</sub>       | LT             | ASTM D3039<br>0° Tension               | Strength, Modulus & Poisson's Ratio                                   | 3x2x3                                                | 3x2x3      |              | 1x2x3        |              | 3x2x3        |
| [0] <sub>14</sub>      | LC             | ASTM D6641<br>0° Compression           | Strength, Modulus & Poisson's Ratio                                   | 3x2x3                                                | 3x2x3 (1)  | 1x2x3        | 1x2x3        | 1x2x3        | 3x2x3        |
| [90] <sub>12</sub>     | TT             | ASTM D3039<br>90° Tension              | Strength & Modulus                                                    | 3x2x3                                                | 3x2x3      |              | 1x2x3        |              | 3x2x3        |
| [90] <sub>14</sub>     | TC             | ASTM D6641<br>90° Compression          | Strength & Modulus                                                    | 3x2x3                                                | 3x2x3 (1)  | 1x2x3        | 1x2x3 (3)    | 1x2x3        | 3x2x3 (3)    |
| [90/0/90] <sub>5</sub> | UNC0           | ASTM D6641<br>0° Compression (4)       | Strength & Modulus                                                    | 3x2x3                                                | 3x2x3 (1)  | 1x2x3        | 1x2x3 (3)    | 1x2x3        | 3x2x3 (3)    |
| [45/-45] <sub>4s</sub> | IPS            | ASTM D3518<br>In-Plane Shear (2)       | 0.2% Offset Strength, 5% Strain Strength & Modulus                    | 3x2x3                                                | 3x2x3      |              | 1x2x3        |              | 3x2x3        |
| [0/90] <sub>5s</sub>   | VNS            | ASTM D5379<br>In-Plane Shear V-Notched | 0.2% Offset Strength, 5% Strain Strength, Ultimate Strength & Modulus | 3x2x3                                                | 3x2x3      |              | 1x2x3        |              | 3x2x3        |
| [0] <sub>14</sub>      | SBS            | ASTM D2344<br>Short Beam               | Strength                                                              | 3x2x3                                                | 3x2x3      | 1x2x3        | 1x2x3        | 1x2x3        | 3x2x3        |

**Table 1-2: Lamina Level Test Matrix**

**Note 1:** Back-to-back strain gages are needed on the first two specimens. If no buckling is observed, the remaining modulus specimens will require a strain gage on one side of the specimens only. An appropriate extensometer may be used in place of the strain gage.

**Note 2:** Gripped (tab) length is 1.50±0.50 inch on each end of the 10 inch long specimen. Once the samples have reached the 5% strain level, the actuator/crosshead displacement rate can be increased by four times the initial rate. Continue testing at the higher strain rate until ultimate failure is observed.

**Note 3:** At least two specimens must be gaged to obtain full stress-strain curve to failure. An appropriate extensometer may be used in place of the strain gage for the remaining specimens.

**Note 4:** Derive the 0° lamina compressive strength  $F_{0^\circ \text{ plies}}^{cu}$  as follows

$$F_{0^\circ \text{ plies}}^u = BF \frac{P^f}{wh}$$

$$BF = \frac{E_1[V_0 E_2 + (1 - V_0) E_1] - (\nu_{12} E_2)^2}{[V_0 E_1 + (1 - V_0) E_2][V_0 E_2 + (1 - V_0) E_1] - (\nu_{12} E_2)^2}$$

Where:

$BF$  = Back-out factor obtained using linear classical lamination theory

$P^f$  = Peak load carried by the test specimen (usually at failure)

$w$  = specimen gage width, mm [in.]

$h$  = specimen gage thickness, mm [in.]

$V_0$  = fraction of  $0^\circ$  plies in the cross-ply laminate (1/2 for  $[0/90]_n$ s and 1/3 for  $[90/0/90]_n$ )

$E_1$  = axial tensile or compressive stiffness of  $0^\circ$  plies, from an average of all batches

$E_2$  = transverse tensile or compressive stiffness of  $0^\circ$  plies, from an average of all batches

$\nu_{12}$  = major Poisson's ratio of  $0^\circ$  plies, from an average of all batches

Table 1-3 below summarizes the laminate level tests carried out. The layup angles  $0^\circ$ ,  $45^\circ$ ,  $-45^\circ$ , and  $90^\circ$  refer to the orientation of the warp/longitudinal fiber direction. The laminate stacking sequences in this program are not specific to any design. Therefore, careful consideration should be given to the validity of properties derived from this program based on the design specific laminates in a structure to be certified.

Table 1-3 also emphasizes those properties and test condition combinations believed to constitute the worst case, which in general is cold dry for tension and hot wet for compression and other matrix dominated properties. For the single shear bearing test, the ASTM D5961-17 stabilized single shear single fastener bearing test setup (Procedure C) shall be used.

| (%0°/%±45°/%90°)<br>Actual Test Type | Test Type and Layup (5)                                                              | Property                       | Number of Batches x Number of Panels<br>x Number of Test Specimens |                  |                |                |
|--------------------------------------|--------------------------------------------------------------------------------------|--------------------------------|--------------------------------------------------------------------|------------------|----------------|----------------|
|                                      |                                                                                      |                                | Test Temperature/Moisture Condition                                |                  |                |                |
|                                      |                                                                                      |                                | CTA<br>(-65F)                                                      | RTA<br>(70F)     | ETW1<br>(180F) | ETW2<br>(250F) |
| (25/50/25 - QI)<br>UNT1              | ASTM D3039 Un-notched Tension<br>[45/0/-45/90]2S                                     | Strength &<br>Modulus          | 3x2x3                                                              | 3x2x3<br>(6)     | 1x2x3          | 3x2x3          |
| (10/80/10 - SO)<br>UNT2              | ASTM D3039 Un-notched Tension<br>[45/-45/90/45/-45/45/-45/0/45/-45]S                 | Strength &<br>Modulus          | 3x2x3                                                              | 3x2x3<br>(6)     |                | 3x2x3          |
| (50/40/10 - HD)<br>UNT3              | ASTM D3039 Un-notched Tension<br>[45/90/-45/0/0/45/0/0/-45/0]S                       | Strength &<br>Modulus          | 3x2x3                                                              | 3x2x3<br>(6)     |                | 3x2x3          |
| (25/50/25 - QI)<br>UNC1              | ASTM D6641 Un-notched Compression<br>[45/0/-45/90]2S                                 | Strength &<br>Modulus          |                                                                    | 3x2x3<br>(4 & 6) | 1x2x3          | 3x2x3          |
| (10/80/10 - SO)<br>UNC2              | ASTM D6641 Un-notched Compression<br>[45/-45/90/45/-45/45/-45/0/45/-45]S             | Strength &<br>Modulus          |                                                                    | 3x2x3<br>(4 & 6) |                | 3x2x3          |
| (50/40/10 - HD)<br>UNC3              | ASTM D6641 Un-notched Compression<br>[45/90/-45/0/0/45/0/0/-45/0]S                   | Strength &<br>Modulus          |                                                                    | 3x2x3<br>(4 & 6) |                | 3x2x3          |
| (25/50/25 - QI)<br>SBS1              | ASTM D2344 Short Beam<br>[45/0/-45/90]3S                                             | Strength                       |                                                                    | 3x2x3            |                | 3x2x3          |
| (25/50/25 - QI)<br>OHT1              | ASTM D5766 Open Hole Tension (1)<br>[45/0/-45/90]2S                                  | Strength                       | 3x2x3                                                              | 3x2x3            | 1x2x3          | 3x2x3          |
| (10/80/10 - SO)<br>OHT2              | ASTM D5766 Open Hole Tension (1)<br>[45/-45/90/45/-45/45/-45/0/45/-45]S              | Strength                       | 3x2x3                                                              | 3x2x3            |                | 3x2x3          |
| (50/40/10 - HD)<br>OHT3              | ASTM D5766 Open Hole Tension (1)<br>[45/90/-45/0/0/45/0/0/-45/0]S                    | Strength                       | 3x2x3                                                              | 3x2x3            |                | 3x2x3          |
| (25/50/25 - QI)<br>FHT1              | ASTM D6742 Filled Hole Tension (2)<br>[45/0/-45/90]2S                                | Strength                       | 3x2x3                                                              | 3x2x3            | 1x2x3          | 3x2x3          |
| (10/80/10 - SO)<br>FHT2              | ASTM D6742 Filled Hole Tension (2)<br>[45/-45/90/45/-45/45/-45/0/45/-45]S            | Strength                       | 3x2x3                                                              | 3x2x3            |                | 3x2x3          |
| (50/40/10 - HD)<br>FHT3              | ASTM D6742 Filled Hole Tension (2)<br>[45/90/-45/0/0/45/0/0/-45/0]S                  | Strength                       | 3x2x3                                                              | 3x2x3            |                | 3x2x3          |
| (25/50/25 - QI)<br>OHC1              | ASTM D6484 Open Hole Compression (1)<br>[45/0/-45/90]3S                              | Strength                       |                                                                    | 3x2x3<br>(4)     | 1x2x3          | 3x2x3          |
| (10/80/10 - SO)<br>OHC2              | ASTM D6484 Open Hole Compression (1)<br>[45/-45/90/45/-45/45/-45/0/45/-45]S          | Strength                       |                                                                    | 3x2x3<br>(4)     |                | 3x2x3          |
| (50/40/10 - HD)<br>OHC3              | ASTM D6484 Open Hole Compression (1)<br>[45/90/-45/0/0/45/0/0/-45/0]S                | Strength                       |                                                                    | 3x2x3<br>(4)     |                | 3x2x3          |
| (25/50/25 - QI)<br>FHC1              | ASTM D6742 Filled Hole Compression (2)<br>[45/0/-45/90]3S                            | Strength                       |                                                                    | 3x2x3            | 1x2x3          | 3x2x3          |
| (10/80/10 - SO)<br>FHC2              | ASTM D6742 Filled Hole Compression (2)<br>[45/-45/90/45/-45/45/-45/0/45/-45]S        | Strength                       |                                                                    | 3x2x3            |                | 3x2x3          |
| (50/40/10 - HD)<br>FHC3              | ASTM D6742 Filled Hole Compression (2)<br>[45/90/-45/0/0/45/0/0/-45/0]S              | Strength                       |                                                                    | 3x2x3            |                | 3x2x3          |
| (25/50/25 - QI)<br>SSB1              | ASTM D5961 Proc.C Single Shear Bearing (3)<br>[45/0/-45/90]2S                        | Strength &<br>Chord<br>Modulus |                                                                    | 3x2x3            | 1x2x3          | 3x2x3          |
| (10/80/10 - SO)<br>SSB2              | ASTM D5961 Proc.C Single Shear Bearing (3)<br>[45/-45/90/45/-45/45/-45/0/45/-45]S    | Strength &<br>Chord<br>Modulus |                                                                    | 3x2x3            |                | 3x2x3          |
| (50/40/10 - HD)<br>SSB3              | ASTM D5961 Proc.C Single Shear Bearing (3)<br>[45/90/-45/0/0/45/0/0/-45/0]S          | Strength &<br>Chord<br>Modulus |                                                                    | 3x2x3            |                | 3x2x3          |
| (100/0/0)<br>ILT                     | ASTM D6415 Interlaminar Tension<br>[0]22                                             | Strength                       | 1x1x6                                                              | 1x1x6            |                | 1x1x6          |
| (25/50/25 - QI)<br>CAI1              | ASTM D7136 & D7137 Compression After<br>Impact (1500 in.lb/in)(7)<br>[45/0/-45/90]3S | Strength                       |                                                                    | 1x1x6            |                |                |

Table 1-3: Laminate Level Test Matrix

**Note 1:** Open-hole test configuration: 0.25 inch hole diameter, 1.5 inch width.

**Note 2:** Filled-hole test configuration: 0.25 inch hole diameter, 1.5 inch width, see section 1.5.2.2 for fastener callout.

**Note 3:** Single shear bearing test configuration: 0.25: hole diameter, 1.5 inch width, see section 1.5.2.2 for fastener callout,  $e/D=3$ , ASTM D5961-17 Procedure C

**Note 4:** Back-to-back strain gages needed on the first two specimens. If no buckling is observed, the remaining modulus specimens will require strain gage on one side of the specimens only. Appropriate extensometer may be used in place of the strain gage.

**Note 5:** Loading direction is generally along the 0-degree direction

**Note 6:** At least six specimens must be gaged to obtain full stress-strain curve to failure, as appropriate.

**Note 7:** Back-to-back strain gages on two locations (a total of four strain gages) are needed on the first specimen. The specimen should be equivalent to the test specimens in terms of material, layup, and geometry, shall be un-damaged.

### 1.5.4 Cured Laminate Physical Testing

The properties in Table 1-4 were determined for each panel used for test coupons with the exception of Tg by DMA which were conducted on one laminate per batch from each oven cure conducted where that batch is present. The tests were performed by the National Institute for Aviation Research (NIAR) Composites Laboratory under the supervision of NCAMP.

| Property                                                    | Condition/Method<br>(Note 1) | Min Replicates per<br>panel                   |
|-------------------------------------------------------------|------------------------------|-----------------------------------------------|
| Cured Ply Thickness                                         | ASTM D3171-15                | All data from<br>mechanical test<br>specimens |
| Laminate Density                                            | ASTM D792-20                 | Per Note 5                                    |
| Fiber Volume, % by Volume                                   | ASTM D3171-15 (Note 2)       | 3                                             |
| Resin Content, % by Weight                                  | ASTM D3171-15 (Note 2)       | 3                                             |
| Void Content, % by Volume                                   | ASTM D3171-15                | Per Note 5                                    |
| Ultrasonic Through Transmission,<br>C-Scan                  | ASTM E2580-17 (Note 3)       | 1                                             |
| Glass Transition Temperature, Tg<br>by DMA Flexural Loading | Dry and Wet – ASTM D7028     | 1 Dry, 1 Wet<br>(Note 4)                      |

**Table 1-4: Physical Testing Matrix**

**Note 1:** Where the applicable standard allows variations in specimen form or test method, the specific parameters to be used will be specified in the test work instructions and reported in the final test report.

**Note 2:** Method II. In order to verify Method II is accurate, a minimum of 12 samples (extracted from 4 panels) per batch shall be tested by Method I, Procedure B. If the average fiber volume results of Method I and Method II are within 2%, Method II may be deemed accurate and the remaining panels may use Method II only. Otherwise, use Method I, Procedure B for all panels.

**Note 3:** Five MHz is preferred for solid laminates. Panels with anomaly should be segregated. Microscopy images may be taken from questionable areas. NCAMP must be involved in the review of all C-scans.

**Note 4:** Minimum total of 24 dry and 24 wet for each material system.

**Note 5:** Test repetitions are the same as fiber volume test.

### 1.5.5 Environmental Conditioning

The following tests were performed by the NIAR Composites Laboratory under the supervision of NCAMP.

Specimen dimensions were taken before moisture conditioning.

Test environments are defined as:

CTA = -65±5°F, ambient  
RTA = 70±10°F, ambient  
ETA1 = 180±5°F, ambient  
ETW1 = 180±5°F, wet (equilibrium moisture content per section 1.5.5)  
ETA2 = 250±5°F, ambient  
ETW2 = 250±5°F, wet (equilibrium moisture content per section 1.5.5)

Within each test method and test environment, the failure mode was evaluated immediately after each test by an NCAMP/ATLAS staff engineer or NCAMP AER. Obvious improper failure modes was logged. If a second improper failure mode occurs, testing was cease until the test setup and test data was reviewed by NCAMP/ATLAS. Retain the samples until data review was completed and the test report was finalized. All tested specimens were digitally photographed after each test in order to pictorially document failure modes.

For ambient testing, specimens were tested as-fabricated and stored at ambient condition prior to testing.

For DMA dry testing, specimens were dried at 250°F±5°F for a minimum of 24 hours. After drying, specimens were kept in a desiccator until mechanical testing. Alternatively, the specimens may have been left ambient laboratory condition for a maximum of 14 days until mechanical testing. The specimens shall be re-dried if the specimens were not tested within 14 days period after drying.

Ambient laboratory condition is defined as 70°F±10°F. Since moisture absorption and desorption rate for epoxy is very slow at ambient temperature, there was no requirement to maintain relative humidity levels.

For wet conditioning, specimens were being conditioned to equilibrium at 160°F±5°F and 85% ± 5% RH. Effective moisture equilibrium is achieved when the average moisture content of the traveler specimen changes by less than 0.02% for two consecutive determinations which are 7 ±0.5 days apart and may be expressed by:

$$\frac{W_i - W_{i-1}}{W_b} < 0.0002$$

Where:

$W_i$  = weight at current time

$W_{i-1}$  = weight at previous time

$W_b$  = baseline weight prior to conditioning

When representative specimens could not be measured to determine the moisture content (due to size, fastener and tab effects), traveler coupons of at least 1" by 1" by specimen thickness and weighing at least 15 grams were used to establish weight gain measurements. If the specimens or traveler coupons pass the criteria for two consecutive readings which are  $7 \pm 0.5$  days apart, the specimens were kept in the environmental chamber for up to an additional 60 days. Alternatively, the specimens may have been removed from the environmental chamber and placed in a sealed plastic bag along with a moist cotton towel for a maximum of 14 days until mechanical testing. Strain-gaged specimens were removed from the controlled environment for a maximum of 2 hours for application of gages in ambient laboratory conditions.

### 1.5.6 Non-ambient Testing

The chamber was of adequate size so that all test fixtures and load frame grips were contained within the chamber.

For elevated temperature testing, the temperature chamber, test fixture, and grips were preheated to the specified temperature. Each specimen was heated to the required test temperature as verified by a thermocouple in direct contact with and taped to the specimen gage section. The heat-up time of the specimen did not exceed 5 minutes, unless otherwise specified in individual test summary sheets. The test was started  $2^{+1}_{-0}$  minutes after the specimen reached the test temperature. During the test, the temperature, as measured on the specimen, was within  $\pm 5^\circ\text{F}$  of the required test temperature.

For subzero temperature testing, each specimen was cooled to the required test temperature as verified by a thermocouple in direct contact with and taped to the specimen gage section. The test started  $5^{+1}_{-0}$  minutes after the specimen reached the test temperature. During the test, the temperature, as measured on the specimen, was within  $\pm 5^\circ\text{F}$  of the required test temperature.

For wet specimens, the moisture loss was determined by subjecting representative specimens to the same amount of time required to heat-up and fail the specimens. For filled-hole or bearing specimens, fasteners were removed prior to conducting moisture loss measurements. For tabbed specimens, representative coupons without tabs and having the same number of plies were used to conduct the moisture loss measurements. A minimum of one specimen or representative coupon was used to measure the moisture loss for every combination of test temperature and stacking sequence.

### 1.5.7 Fluid Sensitivity Screening

Table 1-5 lists the requirements for fluid sensitivity screening, which requires ASTM D2344 Short Beam Strength testing on  $[0^\circ]_{14}$  lamina level specimens dried at  $250^\circ\text{F} \pm 5^\circ\text{F}$  for  $120_{-0}^{+48}$  hours before being subjected to the conditions indicated in the test matrix. Five replicates with a single cure cycle per each fluid type was subjected to fluid exposure. Specimens were cleaned with a dry towel prior to the tests. In addition to short beam strength, load versus displacement curves were plotted to aid in the identification of matrix/resin softening. Since load versus displacement curves are influenced by test machine and fixture compliance, all the tests were performed with the identical machine and fixture, preferably through a single setup. It was intended that the fluid resistance testing was performed on a limited number of reinforcement types and that engineering judgement was used to determine the necessity of repetition for other reinforcement configurations.

Experience suggested that for the vast majority of epoxy resins, water is the fluid with the most deleterious effect on properties. Should screening tests for fluid sensitivity indicate this to be the case, further testing of this type might be unnecessary since exposure to water moisture to equilibrium level is an inherent part of the multi batch allowables test program. However, users must evaluate the applicability of the exposure conditions and time on case-by-case basis.

| <b>Extended Contact:</b>                                       | <b>Exposure</b>                             | <b>Test Condition</b> | <b>Code</b> |
|----------------------------------------------------------------|---------------------------------------------|-----------------------|-------------|
| 100 Low Lead Aviation Fuel (ASTM D910)                         | 90 days min. @ 70°F±10°F                    | 70°F                  | FS11RT      |
|                                                                | 90 days min. @ 70°F±10°F                    | 180°F                 | FS11ET      |
| ASTM D1655 Jet A Fuel                                          | 90 days min. @ 70°F±10°F                    | 70°F                  | FS12RT      |
|                                                                | 90 days min. @ 70°F±10°F                    | 180°F                 | FS12ET      |
| MIL-PRF-5606 Hydraulic Oil                                     | 90 days min. @ 70°F±10°F                    | 70°F                  | FS13RT      |
|                                                                | 90 days min. @ 70°F±10°F                    | 180°F                 | FS13ET      |
| MIL-PRF-83282 Hydraulic Oil                                    | 90 days min. @ 70°F±10°F                    | 70°F                  | FS14RT      |
|                                                                | 90 days min. @ 70°F±10°F                    | 180°F                 | FS14ET      |
| MIL-PRF-7808 Engine Oil                                        | 90 days min. @ 70°F±10°F                    | 70°F                  | FS15RT      |
|                                                                | 90 days min. @ 70°F±10°F                    | 180°F                 | FS15ET      |
| MIL-PRF-23699, Class STD Engine Oil                            | 90 days min. @ 70°F±10°F                    | 70°F                  | FS16RT      |
|                                                                | 90 days min. @ 70°F±10°F                    | 180°F                 | FS16ET      |
| Salt Water (ASTM D1141 or equiv.)                              | 90 days min. @ 70°F±10°F                    | 70°F                  | FS17RT      |
|                                                                | 90 days min. @ 70°F±10°F                    | 180°F                 | FS17ET      |
| Skydrol LD-4 (SAE AS1241, Type IV, Class 1)                    | 90 days min. @ 70°F±10°F                    | 70°F                  | FS18RT      |
|                                                                | 90 days min. @ 70°F±10°F                    | 180°F                 | FS18ET      |
| 50% Water with 50% Skydrol LD-4 (SAE AS1241, Type IV, Class 1) | 90 days min. @ 70°F±10°F                    | 70°F                  | FS19RT      |
|                                                                | 90 days min. @ 70°F±10°F                    | 180°F                 | FS19ET      |
| Degreasing Solvent per MIL-PRF-680, Type III (2)               | 90 days min. @ 70°F±10°F                    | 70°F                  | FS09RT      |
|                                                                | 90 days min. @ 70°F±10°F                    | 180°F                 | FS09ET      |
| Preservation Oil per MIL-PRF-6081 (2)                          | 90 days min. @ 70°F±10°F                    | 70°F                  | FS10RT      |
|                                                                | 90 days min. @ 70°F±10°F                    | 180°F                 | FS10ET      |
| <b>Short Duration Contact:</b>                                 |                                             |                       |             |
| MEK Washing Fluid. ASTM D740                                   | 90 minutes min. @ 70°F±10°F                 | 70°F                  | FS21RT      |
|                                                                | 90 minutes min. @ 70°F±10°F                 | 180°F                 | FS21ET      |
| Polypropylene Glycol Deicer (Type I) SAE AMS 1424              | 90 minutes min. @ 70°F±10°F                 | 70°F                  | FS22RT      |
|                                                                | 90 minutes min. @ 70°F±10°F                 | 180°F                 | FS22ET      |
| Detergent per MIL-D-16791, Type I (2)                          | 90 minutes min. @ 70°F±10°F                 | 70°F                  | FS24RT      |
|                                                                | 90 minutes min. @ 70°F±10°F                 | 180°F                 | FS24ET      |
| Isopropyl Alcohol Deicing Agent (TT-I-735)                     | 48±4 hours @70°F±10°F                       | 70°F                  | FS23RT      |
|                                                                | 48±4 hours @70°F±10°F                       | 180°F                 | FS23ET      |
| <b>Control Tests:</b>                                          |                                             |                       |             |
| Distilled Water                                                | 90 days min. at 70°F±10°F                   | 70°F                  | FS31RT      |
|                                                                | 90 days min. at 70°F±10°F                   | 180°F                 | FS31ET      |
| Dry                                                            | Dry per section 6.2<br>Test Plan NTP 3963Q1 | 70°F                  | FS32RT      |
|                                                                | Dry per section 6.2<br>Test Plan NTP 3963Q1 | 180°F                 | FS32ET      |
| 85% Relative Humidity                                          | Per section 6.2 (1)<br>Test Plan NTP 3963Q1 | 70°F                  | FS33RT      |
|                                                                | Per section 6.2 (1)<br>Test Plan NTP 3963Q1 | 180°F                 | FS33ET      |

**Note 1:** Data from Table 1-2 can be used for fluid sensitivity studies when exposure configurations are identical.

**Note 2:** Specimens were extracted from the same panel as NTP 3963Q1 Rev B (MST10-A-C1).

**Table 1-5: Fluid Sensitivity Matrix**

### 1.5.8 Normalization Procedures

Most lamina level tension and compression strength and modulus properties, and all laminate level properties were normalized according to nominal cured ply thickness. Lamina and Laminate level properties that were not normalized include:

- 90° Tensile strength and modulus
- 90° Compressive strength and modulus
- In-Plane Shear strength and modulus
- In-Plane Shear V-Notched strength and modulus
- Poisson's ratio
- SBS
- ILT

After normalizing, data scatter reduced or remained the same. If data scatter increased significantly after normalizing, the reason was investigated. Wherever properties are normalized, both measured and normalized data were reported.

The cured ply thickness of 0.007000 inches based on actual panel thickness average has been used as the nominal cured ply thickness (CPT) for normalization purpose. The following normalization formula was used:

$$\text{Normalized Value} = \text{Measured Value} \times \text{Measured CPT} / \text{Nominal CPT}.$$

For Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Uni-Directional Slit Tape (0.25 inch) material the anticipated theoretical calculated CPT was 0.007200 inches. The average as measured CPT of the qualification panels was 0.007005 inches. The lowest and highest CPT measured were 0.006705 inches and 0.007400 inches respectively.

### 1.5.9 Inspection Verification

The 3-batch qualification panels have been fabricated according to the requirements of the test plan and conformed by an NCAMP AIR. The test specimens and test setup have also been conformed by an NCAMP AIR.

Testing was witnessed by NCAMP. Test setup and witnessing was delegated to an NCAMP AER. Mechanical testing was carried out at the National Institute for Aviation Research, Wichita State University. The inspection documentation, with required approval signatures are stored in hard copy as well as electronically.

### 1.5.10 Material Pedigree Information

The PMC Data Collection Template includes the material pedigree information required, such as material and batch information, as well as panel fabrication record, environmental conditioning, test equipment, and test procedures. This template in Microsoft Excel file format.

## 2. Test Results

### 2.1 Lamina Level Test Summary

|                                                                                                                                                                                                                      |                  |                       |                 |                       |                   |                        |                   |                                                                                                                 |                   |          |                   |          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-----------------------|-----------------|-----------------------|-------------------|------------------------|-------------------|-----------------------------------------------------------------------------------------------------------------|-------------------|----------|-------------------|----------|
| Prepreg Material: Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)<br>Material Specification: NMS 397/3<br>Process Specification: NPS 83961<br>Fiber: T1100G-24000-71E<br>Resin: 3960 |                  |                       |                 |                       |                   |                        |                   | Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K<br>Unidirectional Slit Tape (0.25 inch)<br>Lamina Properties Summary |                   |          |                   |          |
| Tg(dry): 373.37°F                                                                                                                                                                                                    |                  | Tg(wet): 306.95°F     |                 | Tg METHOD: ASTM D7028 |                   |                        |                   |                                                                                                                 |                   |          |                   |          |
| Fiber Lot                                                                                                                                                                                                            |                  | Lot #1 (A)            | Lot #2 (B)      | Lot #3 (C)            |                   |                        |                   |                                                                                                                 |                   |          |                   |          |
| Date of fiber manufacture                                                                                                                                                                                            |                  | A1120K2               | A1120K2         | A1120J1               |                   | Date of testing        |                   | 8/23/2022 to 6/1/2023                                                                                           |                   |          |                   |          |
| Resin Lot                                                                                                                                                                                                            |                  | 10/31/2020            | 10/31/2020      | 9/30/2020             |                   | Date of data submittal |                   | 6/26/2023                                                                                                       |                   |          |                   |          |
| Date of resin manufacture                                                                                                                                                                                            |                  | Multiple              | Multiple        | Multiple              |                   |                        |                   |                                                                                                                 |                   |          |                   |          |
| Prepreg Lot                                                                                                                                                                                                          |                  | Multiple              | Multiple        | Multiple              |                   |                        |                   |                                                                                                                 |                   |          |                   |          |
| Date of prepreg manufacture                                                                                                                                                                                          |                  | A5210392              | A5210797        | A3201290              |                   |                        |                   |                                                                                                                 |                   |          |                   |          |
| Date of composite manufacture                                                                                                                                                                                        |                  | 3/11/2021             | 7/30/2021       | 12/8/2020             |                   |                        |                   |                                                                                                                 |                   |          |                   |          |
|                                                                                                                                                                                                                      |                  | 6/3/2022 - 11/29/2022 |                 |                       |                   |                        |                   |                                                                                                                 |                   |          |                   |          |
| LAMINA MECHANICAL PROPERTY SUMMARY<br>Data reported as: Normalized & Measured<br>(Normalized by CPT=0.007000 inch)                                                                                                   |                  |                       |                 |                       |                   |                        |                   |                                                                                                                 |                   |          |                   |          |
| Properties                                                                                                                                                                                                           | CTA (-65°F) Mean |                       | RTA (70°F) Mean |                       | ETA1 (180°F) Mean |                        | ETA2 (250°F) Mean |                                                                                                                 | ETW1 (180°F) Mean |          | ETW2 (250°F) Mean |          |
|                                                                                                                                                                                                                      | Normalized       | Measured              | Normalized      | Measured              | Normalized        | Measured               | Normalized        | Measured                                                                                                        | Normalized        | Measured | Normalized        | Measured |
| F <sub>1</sub> <sup>tu</sup> [ksi]                                                                                                                                                                                   | 518.2            | 518.2                 | 527.7           | 528.7                 |                   |                        |                   |                                                                                                                 | 504.5             | 505.0    | 489.2             | 483.2    |
| E <sub>1</sub> <sup>t</sup> [Msi]                                                                                                                                                                                    | 24.51            | 24.58                 | 24.67           | 24.73                 |                   |                        |                   |                                                                                                                 | 25.54             | 25.58    | 25.59             | 25.31    |
| ν <sub>12</sub> <sup>t</sup>                                                                                                                                                                                         |                  | 0.3217                |                 | 0.3344                |                   |                        |                   |                                                                                                                 |                   | 0.3365   |                   | 0.3715   |
| F <sub>2</sub> <sup>tu</sup> [ksi]                                                                                                                                                                                   |                  | 8.094                 |                 | 9.399                 |                   |                        |                   |                                                                                                                 |                   | 6.684    |                   | 3.921    |
| E <sub>2</sub> <sup>t</sup> [Msi]                                                                                                                                                                                    |                  | 1.476                 |                 | 1.330                 |                   |                        |                   |                                                                                                                 |                   | 1.111    |                   | 0.6996   |
| F <sub>1</sub> <sup>cu</sup> [ksi]                                                                                                                                                                                   | 300.0            | 299.3                 | 280.7           | 280.8                 | 259.2             | 260.4                  | 250.4             | 252.3                                                                                                           | 256.5             | 257.8    | 200.8             | 200.8    |
| from UNC0*                                                                                                                                                                                                           |                  |                       |                 |                       |                   |                        |                   |                                                                                                                 |                   |          |                   |          |
| E <sub>1</sub> <sup>c</sup> [Msi]                                                                                                                                                                                    | 21.63            | 21.72                 | 21.62           | 21.71                 | 21.78             | 22.15                  | 21.51             | 21.90                                                                                                           | 21.46             | 21.87    | 21.52             | 21.64    |
| ν <sub>12</sub> <sup>c</sup>                                                                                                                                                                                         |                  | 0.3383                |                 | 0.3492                |                   | 0.3646                 |                   | 0.3730                                                                                                          |                   | 0.3943   |                   | 0.4157   |
| F <sub>2</sub> <sup>cu</sup> [ksi]                                                                                                                                                                                   |                  | 49.11                 |                 | 38.01                 |                   | 29.13                  |                   | 22.92                                                                                                           |                   | 23.87    |                   | 15.45    |
| E <sub>2</sub> <sup>c</sup> [Msi]                                                                                                                                                                                    |                  | 1.495                 |                 | 1.386                 |                   | 1.279                  |                   | 1.201                                                                                                           |                   | 1.198    |                   | 0.9105   |
| (0/90) UNC0 Strength [ksi]                                                                                                                                                                                           | 113.7            | 113.4                 | 105.4           | 105.4                 | 96.45             | 96.70                  | 92.70             | 93.24                                                                                                           | 94.93             | 95.24    | 72.55             | 72.52    |
| (0/90) UNC0 Modulus [Msi]                                                                                                                                                                                            | 8.023            | 8.000                 | 8.033           | 8.028                 | 7.903             | 7.924                  | 7.979             | 8.024                                                                                                           | 8.202             | 8.231    | 8.231             | 8.231    |
| (IPS) F <sub>12</sub> <sup>s0.2%</sup> [ksi]                                                                                                                                                                         |                  | 10.76                 |                 | 8.119                 |                   |                        |                   |                                                                                                                 |                   | 5.678    |                   | 3.261    |
| (IPS) F <sub>12</sub> <sup>s5%strain</sup> [ksi]                                                                                                                                                                     |                  | 16.42                 |                 | 13.43                 |                   |                        |                   |                                                                                                                 |                   | 8.473    |                   | 5.253    |
| (IPS) G <sub>12</sub> <sup>s</sup> [Msi]                                                                                                                                                                             |                  | 0.8492                |                 | 0.7338                |                   |                        |                   |                                                                                                                 |                   | 0.5418   |                   | 0.3310   |
| (VNS) F <sub>12</sub> <sup>s0.2%</sup> [ksi]                                                                                                                                                                         |                  | 11.77                 |                 | 9.185                 |                   |                        |                   |                                                                                                                 |                   | 6.490    |                   | 4.113    |
| (VNS) F <sub>12</sub> <sup>s5%strain</sup> [ksi]                                                                                                                                                                     |                  | 19.21                 |                 | 15.35                 |                   |                        |                   |                                                                                                                 |                   | 10.08    |                   | 6.420    |
| (VNS) F <sub>12</sub> <sup>su</sup> [ksi]                                                                                                                                                                            |                  | 29.32                 |                 | 24.53                 |                   |                        |                   |                                                                                                                 |                   | 16.72    |                   | 11.39    |
| (VNS) G <sub>12</sub> <sup>s</sup> [Msi]                                                                                                                                                                             |                  | 0.8960                |                 | 0.7615                |                   |                        |                   |                                                                                                                 |                   | 0.5709   |                   | 0.4036   |
| SBS [ksi]                                                                                                                                                                                                            |                  | 22.01                 |                 | 16.83                 |                   | 12.88                  |                   | 10.44                                                                                                           |                   | 11.39    |                   | 7.865    |

\*Derived from cross-ply using back-out factor.

In-Plane Shear (IPS) data was calculated per ASTM D3518.

In-Plane Shear V-Notched (VNS) data was calculated per ASTM D5379.

**Table 2-1: Lamina Summary Data**

## 2.2 Laminate Level Test Summary

|                                                                                                   |                |                  |                   |                 |                        |                               |            |
|---------------------------------------------------------------------------------------------------|----------------|------------------|-------------------|-----------------|------------------------|-------------------------------|------------|
| Prepreg Material: Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch) |                |                  |                   |                 |                        | Toray 3960/T1100GC 71E Gr 192 |            |
| Material Specification: NMS 397/3                                                                 |                |                  |                   |                 |                        | RC 33.5% 24K Unidirectional   |            |
| Process Specification: NPS 83961                                                                  |                |                  |                   |                 |                        | Slit Tape (0.25 inch)         |            |
| Fiber: T1100G-24000-71E                                                                           |                |                  |                   | Resin: 3960     |                        | Laminate Properties Summary   |            |
| Tg(dry): 373.37°F                                                                                 |                |                  | Tg(wet): 306.95°F |                 |                        | Tg METHOD: ASTM D7028         |            |
| Fiber Lot                                                                                         |                | Lot #1 (A)       | Lot #2 (B)        | Lot #3 (C)      |                        |                               |            |
| Date of fiber manufacture                                                                         |                | A1120K2          | A1120K2           | A1120J1         | 8/23/2022 to 6/1/2023  |                               |            |
| Resin Lot                                                                                         |                | 10/31/2020       | 10/31/2020        | 9/30/2020       | Date of testing        |                               |            |
| Date of resin manufacture                                                                         |                | Multiple         | Multiple          | Multiple        | Date of data submittal |                               | 6/26/2023  |
| Prepreg Lot                                                                                       |                | Multiple         | Multiple          | Multiple        | UNT3 ETW2 (Retest)     |                               |            |
| Date of prepreg manufacture                                                                       |                | A5210392         | A5210797          | A3201290        | Date of testing        |                               | 11/20/2025 |
| Date of composite manufacture                                                                     |                | 3/11/2021        | 7/30/2021         | 12/8/2020       | Date of data submittal |                               | 12/4/2025  |
| 6/3/2022 - 11/29/2022                                                                             |                |                  |                   |                 |                        |                               |            |
| LAMINATE MECHANICAL PROPERTY SUMMARY                                                              |                |                  |                   |                 |                        |                               |            |
| Data reported as: Normalized & Measured                                                           |                |                  |                   |                 |                        |                               |            |
| (Normalized by CPT=0.007000 inch)                                                                 |                |                  |                   |                 |                        |                               |            |
| Properties                                                                                        | Layup          | 25/50/25 (Quasi) |                   | 10/80/10 (Soft) |                        | 50/40/10 (Hard)               |            |
|                                                                                                   | Test Condition | Normalized       | Measured          | Normalized      | Measured               | Normalized                    | Measured   |
| OHT Strength [ksi]                                                                                | CTA (-65°F)    | 83.15            | 83.02             | 58.92           | 58.83                  | 138.3                         | 137.2      |
|                                                                                                   | RTA (70°F)     | 91.82            | 91.68             | 58.42           | 58.34                  | 152.8                         | 151.7      |
|                                                                                                   | ETW1 (180°F)   | 98.66            | 98.88             |                 |                        |                               |            |
|                                                                                                   | ETW2 (250°F)   | 116.4            | 116.4             | 52.89           | 52.80                  | 223.7                         | 222.1      |
| OHC Strength [ksi]                                                                                | RTA (70°F)     | 49.63            | 49.77             | 43.60           | 43.50                  | 71.33                         | 71.04      |
|                                                                                                   | ETW1 (180°F)   | 42.02            | 42.48             |                 |                        |                               |            |
|                                                                                                   | ETW2 (250°F)   | 35.74            | 35.87             | 26.99           | 26.93                  | 49.09                         | 48.89      |
|                                                                                                   | CTA (-65°F)    | 149.7            | 149.5             | 85.87           | 85.69                  | 264.5                         | 263.3      |
| UNT Strength [ksi]                                                                                | RTA (70°F)     | 161.2            | 160.9             | 84.03           | 83.76                  | 284.1                         | 282.7      |
|                                                                                                   | ETW1 (180°F)   | 167.6            | 168.0             |                 |                        |                               |            |
|                                                                                                   | ETW2 (250°F)   | 158.5            | 158.4             | 67.92           | 67.84                  | 279.9                         | 277.2      |
|                                                                                                   | CTA (-65°F)    | 9.265            | 9.253             | 5.909           | 5.897                  | 14.52                         | 14.46      |
| UNT Modulus [Msi]                                                                                 | RTA (70°F)     | 9.122            | 9.106             | 5.669           | 5.651                  | 14.34                         | 14.26      |
|                                                                                                   | ETW1 (180°F)   | 9.007            | 9.031             |                 |                        |                               |            |
|                                                                                                   | ETW2 (250°F)   | 8.626            | 8.625             | 4.464           | 4.459                  | 14.02                         | 13.93      |
|                                                                                                   | RTA (70°F)     | 111.2            | 111.1             | 74.78           | 74.72                  | 168.1                         | 167.6      |
| UNC Strength [ksi]                                                                                | ETW1 (180°F)   | 94.69            | 94.98             |                 |                        |                               |            |
|                                                                                                   | ETW2 (250°F)   | 66.92            | 66.87             | 45.09           | 45.10                  | 103.1                         | 102.8      |
|                                                                                                   | RTA (70°F)     | 8.088            | 8.078             | 5.046           | 5.041                  | 12.53                         | 12.50      |
|                                                                                                   | ETW1 (180°F)   | 7.839            | 7.864             |                 |                        |                               |            |
| UNC Modulus [Msi]                                                                                 | ETW2 (250°F)   | 7.810            | 7.804             | 4.365           | 4.367                  | 12.64                         | 12.61      |
|                                                                                                   | CTA (-65°F)    | 87.50            | 87.53             | 64.96           | 64.82                  | 134.9                         | 134.5      |
|                                                                                                   | RTA (70°F)     | 93.35            | 93.29             | 62.59           | 62.44                  | 148.1                         | 147.4      |
|                                                                                                   | ETW1 (180°F)   | 101.9            | 102.1             |                 |                        |                               |            |
| FHT Strength [ksi]                                                                                | ETW2 (250°F)   | 106.3            | 106.2             | 49.55           | 49.39                  | 176.4                         | 175.9      |
|                                                                                                   | RTA (70°F)     | 74.94            | 75.03             | 63.58           | 63.35                  | 97.69                         | 97.21      |
|                                                                                                   | ETW1 (180°F)   | 66.31            | 66.92             |                 |                        |                               |            |
|                                                                                                   | ETW2 (250°F)   | 50.52            | 50.65             | 36.75           | 36.65                  | 62.96                         | 62.65      |
| SBS1 Strength [ksi]                                                                               | RTA (70°F)     |                  | 13.03             |                 |                        |                               |            |
|                                                                                                   | ETW1 (180°F)   |                  | 8.527             |                 |                        |                               |            |
|                                                                                                   | ETW2 (250°F)   |                  | 4.059             |                 |                        |                               |            |
|                                                                                                   | SSB Proc. C    | RTA (70°F)       | 109.2             | 108.8           | 114.2                  | 113.6                         | 113.1      |
| 2% Offset Strength [ksi]                                                                          | ETW1 (180°F)   | 111.6            | 111.6             |                 |                        |                               |            |
|                                                                                                   | ETW2 (250°F)   | 93.67            | 93.31             | 93.16           | 92.73                  | 87.34                         | 86.77      |
|                                                                                                   | RTA (70°F)     | 153.1            | 152.6             | 147.6           | 146.8                  | 147.8                         | 146.8      |
|                                                                                                   | ETW1 (180°F)   | 130.2            | 130.3             |                 |                        |                               |            |
| SSB Proc. C Ultimate Strength [ksi]                                                               | ETW2 (250°F)   | 112.0            | 111.5             | 109.4           | 108.9                  | 105.9                         | 105.2      |
|                                                                                                   | RTA (70°F)     | 1.878            | 1.872             | 1.318           | 1.310                  | 1.768                         | 1.756      |
|                                                                                                   | ETW1 (180°F)   | 2.060            | 2.061             |                 |                        |                               |            |
|                                                                                                   | ETW2 (250°F)   | 1.721            | 1.715             | 1.260           | 1.254                  | 1.682                         | 1.671      |
| CBS* [lb]                                                                                         | CTA (-65°F)    |                  | 640.3             |                 |                        |                               |            |
|                                                                                                   | RTA (70°F)     |                  | 482.2             |                 |                        |                               |            |
|                                                                                                   | ETW2 (250°F)   |                  | 111.4             |                 |                        |                               |            |
|                                                                                                   | CTA (-65°F)    |                  | 21.89             |                 |                        |                               |            |
| ILT* [ksi]                                                                                        | RTA (70°F)     |                  | 16.37             |                 |                        |                               |            |
|                                                                                                   | ETW2 (250°F)   |                  | 3.423             |                 |                        |                               |            |
|                                                                                                   | RTA (70°F)     | 49.52            | 50.24             |                 |                        |                               |            |
|                                                                                                   | CAI [ksi]      |                  |                   |                 |                        |                               |            |

\*The actual layup for ILT is [0]22, (100/0/0).

Table 2-2: Laminate Summary Data

## 2.3 Fluid Sensitivity Test Summary

| <b>Fluid Sensitivity Screening</b><br><b>Short Beam Strength Properties (SBSFS)--RT(70°F) Strength</b><br>Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch) |  |  |  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|

| Exposure                             | Type of Fluid                                     | Fluid Code | Average Strength [ksi] |
|--------------------------------------|---------------------------------------------------|------------|------------------------|
| 90 days min @ 70°F±10°F              | 100 Low Lead Fuel (ASTM D910)                     | FS11RT     | 17.57                  |
|                                      | Jet A Fuel (ASTM D1655)                           | FS12RT     | 16.51                  |
|                                      | MIL-PRF-5606 Hydraulic Oil                        | FS13RT     | 16.78                  |
|                                      | MIL-PRF-83282 Hydraulic Oil                       | FS14RT     | 17.20                  |
|                                      | MIL-PRF-7808 Engine Oil                           | FS15RT     | 16.52                  |
|                                      | MIL-PRF-23699, Class STD Engine Oil               | FS16RT     | 16.77                  |
|                                      | Salt Water (ASTM D1141 or equiv.)                 | FS17RT     | 16.52                  |
|                                      | Skydrol LD-4 (SAE AS1241, Type IV, Class 1)       | FS18RT     | 17.08                  |
|                                      | 50% Water with 50% Skydrol                        | FS19RT     | 16.43                  |
|                                      | Degreasing Solvent per MIL-PRF-680, Type III      | FS09RT     | 17.23                  |
|                                      | Preservation Oil per MIL-PRF-6081                 | FS10RT     | 16.94                  |
|                                      | Distilled Water                                   | FS31RT     | 16.60                  |
| 90 mins @ 70°F±10°F                  | MEK Washing Fluid (ASTM D740)                     | FS21RT     | 17.80                  |
|                                      | Polypropylene Glycol Deicer (Type I) SAE AMS 1424 | FS22RT     | 17.75                  |
|                                      | Detergent per MIL-D-16791, Type I                 | FS24RT     | 17.42                  |
| 48±4 hrs @ 70°F±10°F                 | Isopropyl Alcohol Deicing Agent (TT-I-735)        | FS23RT     | 17.85                  |
| Per section 6.2 Test Plan NTP 3963Q1 | Dry                                               | FS32RT     | 17.88                  |
| Per section 6.2 Test Plan NTP 3963Q1 | 85% Relative Humidity                             | FS33RT     | 16.27                  |

**Table 2-3: SBS Fluid Sensitivity Summary Data – RT(70°F)**

| <b>Fluid Sensitivity Screening</b><br><b>Short Beam Strength Properties (SBSFS)--ET(180°F) Strength</b><br>Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch) |  |  |  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|

| Exposure                             | Type of Fluid                                     | Fluid Code | Average Strength [ksi] |
|--------------------------------------|---------------------------------------------------|------------|------------------------|
| 90 days min @ 70°F±10°F              | 100 Low Lead Fuel (ASTM D910)                     | FS11ET     | 13.68                  |
|                                      | Jet A Fuel (ASTM D1655)                           | FS12ET     | 13.63                  |
|                                      | MIL-PRF-5606 Hydraulic Oil                        | FS13ET     | 12.01                  |
|                                      | MIL-PRF-83282 Hydraulic Oil                       | FS14ET     | 13.26                  |
|                                      | MIL-PRF-7808 Engine Oil                           | FS15ET     | 12.08                  |
|                                      | MIL-PRF-23699, Class STD Engine Oil               | FS16ET     | 12.37                  |
|                                      | Salt Water (ASTM D1141 or equiv.)                 | FS17ET     | 12.34                  |
|                                      | Skydrol LD-4 (SAE AS1241, Type IV, Class 1)       | FS18ET     | 13.89                  |
|                                      | 50% Water with 50% Skydrol                        | FS19ET     | 11.93                  |
|                                      | Degreasing Solvent per MIL-PRF-680, Type III      | FS09ET     | 14.05                  |
|                                      | Preservation Oil per MIL-PRF-6081                 | FS10ET     | 13.69                  |
|                                      | Distilled Water                                   | FS31ET     | 11.81                  |
| 90 mins @ 70°F±10°F                  | MEK Washing Fluid (ASTM D740)                     | FS21ET     | 14.04                  |
|                                      | Polypropylene Glycol Deicer (Type I) SAE AMS 1424 | FS22ET     | 13.99                  |
|                                      | Detergent per MIL-D-16791, Type I                 | FS24ET     | 14.32                  |
| 48±4 hrs @ 70°F±10°F                 | Isopropyl Alcohol Deicing Agent (TT-I-735)        | FS23ET     | 13.83                  |
| Per section 6.2 Test Plan NTP 3963Q1 | Dry                                               | FS32ET     | 14.06                  |
| Per section 6.2 Test Plan NTP 3963Q1 | 85% Relative Humidity                             | FS33ET     | 11.51                  |

**Table 2-4: SBS Fluid Sensitivity Summary Data – ET(180°F)**

## 2.4 Cured Laminate Physical Test Summary

### 2.4.1 DMA

| DMA Results Summary                                      |                       |                     |                       |                     |
|----------------------------------------------------------|-----------------------|---------------------|-----------------------|---------------------|
| Toray T1100G/3960 Unidirectional Slit Tape Qualification |                       |                     |                       |                     |
| Test Temperature                                         | Mean                  |                     |                       |                     |
|                                                          | Onset Storage Modulus |                     | Peak of Tangent Delta |                     |
|                                                          | T <sub>g</sub> [°C]   | T <sub>g</sub> [°F] | T <sub>g</sub> [°C]   | T <sub>g</sub> [°F] |
| DMA Tg (Dry)                                             | 189.65                | 373.37              | 202.95                | 397.31              |
| DMA Tg (Wet)                                             | 152.75                | 306.95              | 166.24                | 331.24              |

Table 2-5: DMA Summary Data

## 2.5 Individual Test Summaries

### 2.5.1 Longitudinal Tension Properties (LT)

|                                                           |                      |                                                                                 |                 |                                                   |                 |                                            |                 |                     |                 |
|-----------------------------------------------------------|----------------------|---------------------------------------------------------------------------------|-----------------|---------------------------------------------------|-----------------|--------------------------------------------|-----------------|---------------------|-----------------|
| <b>Material:</b>                                          |                      | Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch) |                 |                                                   |                 | <b>Tension, 1-axis</b>                     |                 |                     |                 |
| <b>Resin content:</b>                                     |                      | 34.05 %wt                                                                       |                 | <b>Comp. density:</b> 1.572 g/cc                  |                 | Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K |                 |                     |                 |
| <b>Fiber volume:</b>                                      |                      | 57.86 %vol                                                                      |                 |                                                   |                 | Unidirectional Slit Tape (0.25 inch)       |                 |                     |                 |
| <b>Ply count:</b>                                         |                      | 6                                                                               |                 |                                                   |                 | [0]6                                       |                 |                     |                 |
| <b>Test method:</b>                                       |                      | ASTM D3039-17                                                                   |                 | <b>Modulus calculation:</b> 1000-3000 microstrain |                 |                                            |                 |                     |                 |
| <b>Normalized by:</b>                                     |                      | 0.007000                                                                        |                 | in. CPT                                           |                 |                                            |                 |                     |                 |
|                                                           |                      | <b>CTA</b>                                                                      |                 | <b>RTA</b>                                        |                 | <b>ETW1</b>                                |                 | <b>ETW2</b>         |                 |
| <b>Test Temperature [°F]</b>                              |                      | -65                                                                             |                 | 70                                                |                 | 180                                        |                 | 250                 |                 |
| <b>Moisture Conditioning</b>                              |                      | Ambient                                                                         |                 | Ambient                                           |                 | Equilibrium                                |                 | Equilibrium         |                 |
| <b>Equilibrium at T, RH</b>                               |                      |                                                                                 |                 |                                                   |                 | 160F,85%                                   |                 | 160F,85%            |                 |
| <b>Source code prefixed by:</b> NTP3963Q1-TC-WEB-NIAR-T01 |                      | MSTX-X-CX-LT-CTA-X                                                              |                 | MSTX-X-CX-LT-RTA-X                                |                 | MSTX-X-CX-LT-ETW1-X                        |                 | MSTX-X-CX-LT-ETW2-X |                 |
|                                                           |                      | <b>Normalized</b>                                                               | <b>Measured</b> | <b>Normalized</b>                                 | <b>Measured</b> | <b>Normalized</b>                          | <b>Measured</b> | <b>Normalized</b>   | <b>Measured</b> |
| <b>F<sub>1</sub><sup>tu</sup> [ksi]</b>                   | <b>Mean</b>          | 518.2                                                                           | 518.2           | 527.7                                             | 528.7           | 504.5                                      | 505.0           | 489.2               | 483.2           |
|                                                           | <b>Minimum</b>       | 477.4                                                                           | 476.5           | 444.8                                             | 449.6           | 460.4                                      | 467.3           | 438.7               | 446.5           |
|                                                           | <b>Maximum</b>       | 553.0                                                                           | 562.6           | 580.4                                             | 576.7           | 566.5                                      | 559.6           | 536.4               | 537.0           |
|                                                           | <b>C.V.(%)</b>       | 3.982                                                                           | 4.312           | 6.696                                             | 6.243           | 8.447                                      | 7.371           | 5.135               | 4.403           |
|                                                           | <b>No. Specimens</b> | 20                                                                              |                 | 18                                                |                 | 7                                          |                 | 19                  |                 |
| <b>No. Prepreg Lots</b>                                   |                      | 3                                                                               |                 | 3                                                 |                 | 2                                          |                 | 3                   |                 |
| <b>E<sub>1</sub><sup>t</sup> [Msi]</b>                    | <b>Mean</b>          | 24.51                                                                           | 24.58           | 24.67                                             | 24.73           | 25.54                                      | 25.58           | 25.59               | 25.31           |
|                                                           | <b>Minimum</b>       | 23.68                                                                           | 23.46           | 24.21                                             | 23.83           | 24.86                                      | 25.08           | 24.97               | 24.69           |
|                                                           | <b>Maximum</b>       | 25.07                                                                           | 25.28           | 25.17                                             | 25.29           | 26.23                                      | 26.07           | 27.28               | 26.17           |
|                                                           | <b>C.V.(%)</b>       | 1.328                                                                           | 2.260           | 1.069                                             | 1.800           | 2.129                                      | 1.374           | 1.988               | 1.753           |
|                                                           | <b>No. Specimens</b> | 18                                                                              |                 | 18                                                |                 | 7                                          |                 | 18                  |                 |
| <b>No. Prepreg Lots</b>                                   |                      | 3                                                                               |                 | 3                                                 |                 | 2                                          |                 | 3                   |                 |
| <b>ν<sub>12</sub><sup>t</sup></b>                         | <b>Mean</b>          | 0.3217                                                                          |                 | 0.3344                                            |                 | 0.3365                                     |                 | 0.3715              |                 |
|                                                           | <b>Minimum</b>       | 0.2221                                                                          |                 | 0.3181                                            |                 | 0.3042                                     |                 | 0.3332              |                 |
|                                                           | <b>Maximum</b>       | 0.3680                                                                          |                 | 0.3505                                            |                 | 0.3575                                     |                 | 0.4102              |                 |
|                                                           | <b>C.V.(%)</b>       | 10.13                                                                           |                 | 2.993                                             |                 | 5.907                                      |                 | 5.401               |                 |
|                                                           | <b>No. Specimens</b> | 18                                                                              |                 | 18                                                |                 | 7                                          |                 | 18                  |                 |
| <b>No. Prepreg Lots</b>                                   |                      | 3                                                                               |                 | 3                                                 |                 | 2                                          |                 | 3                   |                 |

## 2.5.2 Transverse Tension Properties (TT)

|                                                                                                  |                         |                                                                                                                        |                 |                    |                 |                     |                 |                     |                 |
|--------------------------------------------------------------------------------------------------|-------------------------|------------------------------------------------------------------------------------------------------------------------|-----------------|--------------------|-----------------|---------------------|-----------------|---------------------|-----------------|
| <b>Material:</b> Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch) |                         | <b>Tension, 2-axis</b><br>Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K<br>Unidirectional Slit Tape (0.25 inch)<br>[90]12 |                 |                    |                 |                     |                 |                     |                 |
| <b>Resin content:</b>                                                                            | 34.14 %wt               |                                                                                                                        |                 |                    |                 |                     |                 |                     |                 |
| <b>Fiber volume:</b>                                                                             | 57.64 %vol              |                                                                                                                        |                 |                    |                 |                     |                 |                     |                 |
| <b>Ply count:</b>                                                                                | 12                      |                                                                                                                        |                 |                    |                 |                     |                 |                     |                 |
| <b>Test method:</b> ASTM D3039-17                                                                |                         | <b>Modulus calculation:</b> 1000-3000 microstrain                                                                      |                 |                    |                 |                     |                 |                     |                 |
| <b>Normalized by:</b> NA                                                                         |                         |                                                                                                                        |                 |                    |                 |                     |                 |                     |                 |
|                                                                                                  |                         | <b>CTA</b>                                                                                                             |                 | <b>RTA</b>         |                 | <b>ETW1</b>         |                 | <b>ETW2</b>         |                 |
| <b>Test Temperature [°F]</b>                                                                     |                         | -65                                                                                                                    |                 | 70                 |                 | 180                 |                 | 250                 |                 |
| <b>Moisture Conditioning</b>                                                                     |                         | Ambient                                                                                                                |                 | Ambient            |                 | Equilibrium         |                 | Equilibrium         |                 |
| <b>Equilibrium at T, RH</b>                                                                      |                         |                                                                                                                        |                 |                    |                 | 160F,85%            |                 | 160F,85%            |                 |
| <b>Source code prefixed by:</b> NTP3963Q1-TC-WEB-NIAR-T01                                        |                         | MSTX-X-CX-TT-CTA-X                                                                                                     |                 | MSTX-X-CX-TT-RTA-X |                 | MSTX-X-CX-TT-ETW1-X |                 | MSTX-X-CX-TT-ETW2-X |                 |
|                                                                                                  |                         | <b>Normalized</b>                                                                                                      | <b>Measured</b> | <b>Normalized</b>  | <b>Measured</b> | <b>Normalized</b>   | <b>Measured</b> | <b>Normalized</b>   | <b>Measured</b> |
| <b>F<sub>2</sub><sup>tu</sup> [ksi]</b>                                                          | <b>Mean</b>             |                                                                                                                        | 8.094           |                    | 9.399           |                     | 6.684           |                     | 3.921           |
|                                                                                                  | <b>Minimum</b>          |                                                                                                                        | 6.168           |                    | 5.838           |                     | 6.365           |                     | 3.396           |
|                                                                                                  | <b>Maximum</b>          |                                                                                                                        | 9.622           |                    | 12.64           |                     | 7.090           |                     | 4.451           |
|                                                                                                  | <b>C.V.(%)</b>          |                                                                                                                        | 8.813           |                    | 18.98           |                     | 4.279           |                     | 6.691           |
|                                                                                                  | <b>No. Specimens</b>    |                                                                                                                        | 18              |                    | 18              |                     | 6               |                     | 18              |
|                                                                                                  | <b>No. Prepreg Lots</b> |                                                                                                                        | 3               |                    | 3               |                     | 1               |                     | 3               |
| <b>E<sub>2</sub><sup>t</sup> [Msi]</b>                                                           | <b>Mean</b>             |                                                                                                                        | 1.476           |                    | 1.330           |                     | 1.111           |                     | 0.6996          |
|                                                                                                  | <b>Minimum</b>          |                                                                                                                        | 1.284           |                    | 1.292           |                     | 1.076           |                     | 0.6489          |
|                                                                                                  | <b>Maximum</b>          |                                                                                                                        | 1.623           |                    | 1.357           |                     | 1.146           |                     | 0.7847          |
|                                                                                                  | <b>C.V.(%)</b>          |                                                                                                                        | 5.232           |                    | 1.431           |                     | 3.261           |                     | 6.136           |
|                                                                                                  | <b>No. Specimens</b>    |                                                                                                                        | 18              |                    | 18              |                     | 6               |                     | 18              |
|                                                                                                  | <b>No. Prepreg Lots</b> |                                                                                                                        | 3               |                    | 3               |                     | 1               |                     | 3               |

## 2.5.3 Longitudinal Compression Properties (LC)

|                                                                                                                                                                     |               |                     |       |                     |       |                     |       |                     |       |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|---------------------|-------|---------------------|-------|---------------------|-------|---------------------|-------|
| <b>Material:</b> Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)                                                                    |               |                     |       |                     |       |                     |       |                     |       |
| <b>Resin content:</b> 34.27 %wt<br><b>Fiber volume:</b> 57.47 %vol<br><b>Ply count:</b> 14<br><b>Test method:</b> ASTM D6641-16e2<br><b>Normalized by:</b> 0.007000 |               |                     |       |                     |       |                     |       |                     |       |
| <b>Comp. density:</b> 1.567 g/cc<br><b>Modulus calculation:</b> 1000-3000 microstrain<br>in. CPT                                                                    |               |                     |       |                     |       |                     |       |                     |       |
| <b>Compression, 1-axis</b><br>Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)<br>[0]14                                              |               |                     |       |                     |       |                     |       |                     |       |
|                                                                                                                                                                     |               | CTA                 |       | RTA                 |       | ETA1                |       | ETA2                |       |
| Test Temperature [°F]                                                                                                                                               |               | -65                 |       | 70                  |       | 180                 |       | 250                 |       |
| Moisture Conditioning                                                                                                                                               |               | Ambient             |       | Ambient             |       | Ambient             |       | Ambient             |       |
| Equilibrium at T, RH                                                                                                                                                |               |                     |       |                     |       |                     |       | 180                 |       |
| Source code prefixed by: NTP3963Q1-TC-WEB-NIAR-T01                                                                                                                  |               | MSTX-X-CX-LC-CTA-X  |       | MSTX-X-CX-LC-RTA-X  |       | MSTX-X-CX-LC-ETA1-X |       | MSTX-X-CX-LC-ETA2-X |       |
|                                                                                                                                                                     |               | Normalized Measured |       | Normalized Measured |       | Normalized Measured |       | Normalized Measured |       |
| E <sub>c</sub> [Msi]                                                                                                                                                | Mean          | 21.63               | 21.72 | 21.62               | 21.71 | 21.78               | 22.15 | 21.51               | 21.90 |
|                                                                                                                                                                     | Minimum       | 20.30               | 20.74 | 20.41               | 20.87 | 20.86               | 21.31 | 20.42               | 20.86 |
|                                                                                                                                                                     | Maximum       | 23.10               | 22.72 | 22.83               | 23.28 | 22.28               | 22.86 | 22.30               | 22.75 |
|                                                                                                                                                                     | C.V.(%)       | 2.634               | 2.101 | 2.776               | 2.499 | 1.835               | 1.987 | 2.834               | 2.874 |
|                                                                                                                                                                     | No. Specimens | 36                  |       | 36                  |       | 12                  |       | 12                  |       |
| No. Prepreg Lots                                                                                                                                                    |               | 3                   |       | 3                   |       | 1                   |       | 1                   |       |
| ν <sub>12</sub> °                                                                                                                                                   | Mean          | 0.3383              |       | 0.3492              |       | 0.3646              |       | 0.3730              |       |
|                                                                                                                                                                     | Minimum       | 0.2972              |       | 0.3230              |       | 0.3474              |       | 0.3310              |       |
|                                                                                                                                                                     | Maximum       | 0.3655              |       | 0.3714              |       | 0.3843              |       | 0.3908              |       |
|                                                                                                                                                                     | C.V.(%)       | 4.486               |       | 4.608               |       | 3.760               |       | 6.177               |       |
|                                                                                                                                                                     | No. Specimens | 18                  |       | 18                  |       | 6                   |       | 6                   |       |
| No. Prepreg Lots                                                                                                                                                    |               | 3                   |       | 3                   |       | 1                   |       | 1                   |       |

## 2.5.4 Longitudinal Compression Back-out Factor Properties

|                                                                                                                                                           |               |                      |       |                      |       |                       |       |                       |       |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|----------------------|-------|----------------------|-------|-----------------------|-------|-----------------------|-------|
| <b>Material:</b> Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)                                                          |               |                      |       |                      |       |                       |       |                       |       |
| <b>Compression, 1-axis, Back-out Factor</b><br>Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)<br>UNCO Layout: [90/0/90]5 |               |                      |       |                      |       |                       |       |                       |       |
|                                                                                                                                                           |               | CTA                  |       | RTA                  |       | ETA1                  |       | ETA2                  |       |
| Test Temperature [°F]                                                                                                                                     |               | -65                  |       | 70                   |       | 180                   |       | 250                   |       |
| Moisture Conditioning                                                                                                                                     |               | Ambient              |       | Ambient              |       | Ambient               |       | Ambient               |       |
| Equilibrium at T, RH                                                                                                                                      |               |                      |       |                      |       |                       |       | 180                   |       |
| Source code prefixed by: NTP3963Q1-TC-WEB-NIAR-T01                                                                                                        |               | MSTX-X-CX-UNCO-CTA-X |       | MSTX-X-CX-UNCO-RTA-X |       | MSTX-X-CX-UNCO-ETA1-X |       | MSTX-X-CX-UNCO-ETA2-X |       |
|                                                                                                                                                           |               | Normalized Measured  |       | Normalized Measured  |       | Normalized Measured   |       | Normalized Measured   |       |
| F <sub>c</sub> <sup>co</sup> [ksi]<br>from UNCO                                                                                                           | Mean          | 300.0                | 299.3 | 280.7                | 280.8 | 259.2                 | 260.4 | 250.4                 | 252.3 |
|                                                                                                                                                           | Minimum       | 209.4                | 209.5 | 232.6                | 230.8 | 249.0                 | 252.9 | 224.3                 | 223.0 |
|                                                                                                                                                           | Maximum       | 323.6                | 320.2 | 303.8                | 302.8 | 265.9                 | 270.8 | 275.2                 | 274.7 |
|                                                                                                                                                           | C.V.(%)       | 8.659                | 8.575 | 6.637                | 7.227 | 2.768                 | 2.619 | 8.427                 | 8.547 |
|                                                                                                                                                           | No. Specimens | 20                   |       | 18                   |       | 6                     |       | 6                     |       |
| No. Prepreg Lots                                                                                                                                          |               | 3                    |       | 3                    |       | 1                     |       | 1                     |       |

## 2.5.5 Transverse Compression Properties (TC)

|                                                    |               |                                                                                 |          |                                            |          |                     |          |                                                                                                                                                        |          |                     |          |                     |          |
|----------------------------------------------------|---------------|---------------------------------------------------------------------------------|----------|--------------------------------------------|----------|---------------------|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------|----------|---------------------|----------|
| Material:                                          |               | Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch) |          |                                            |          |                     |          | <div>Compression, 2-axis</div> <div>Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K</div> <div>Unidirectional Slit Tape (0.25 inch)</div> <div>[90]14</div> |          |                     |          |                     |          |
| Resin content:                                     |               | 34.27 %wt                                                                       |          | Comp. density: 1.569 g/cc                  |          |                     |          |                                                                                                                                                        |          |                     |          |                     |          |
| Fiber volume:                                      |               | 57.56 %vol                                                                      |          |                                            |          |                     |          |                                                                                                                                                        |          |                     |          |                     |          |
| Ply count:                                         |               | 14                                                                              |          |                                            |          |                     |          |                                                                                                                                                        |          |                     |          |                     |          |
| Test method:                                       |               | ASTM D6641-16e2                                                                 |          | Modulus calculation: 1000-3000 microstrain |          |                     |          |                                                                                                                                                        |          |                     |          |                     |          |
| Normalized by:                                     |               | NA                                                                              |          |                                            |          |                     |          |                                                                                                                                                        |          |                     |          |                     |          |
|                                                    |               | CTA                                                                             |          | RTA                                        |          | ETA1                |          | ETA2                                                                                                                                                   |          | ETW1                |          | ETW2                |          |
| Test Temperature [°F]                              |               | -65                                                                             |          | 70                                         |          | 180                 |          | 250                                                                                                                                                    |          | 180                 |          | 250                 |          |
| Moisture Conditioning                              |               | Ambient                                                                         |          | Ambient                                    |          | Ambient             |          | Ambient                                                                                                                                                |          | Equilibrium         |          | Equilibrium         |          |
| Equilibrium at T, RH                               |               |                                                                                 |          |                                            |          |                     |          |                                                                                                                                                        |          | 160F,85%            |          | 160F,85%            |          |
| Source code prefixed by: NTP3963Q1-TC-WEB-NIAR-T01 |               | MSTX-X-CX-TC-CTA-X                                                              |          | MSTX-X-CX-TC-RTA-X                         |          | MSTX-X-CX-TC-ETA1-X |          | MSTX-X-CX-TC-ETA2-X                                                                                                                                    |          | MSTX-X-CX-TC-ETW1-X |          | MSTX-X-CX-TC-ETW2-X |          |
|                                                    |               | Normalized                                                                      | Measured | Normalized                                 | Measured | Normalized          | Measured | Normalized                                                                                                                                             | Measured | Normalized          | Measured | Normalized          | Measured |
| F <sub>2</sub> <sup>cu</sup> [ksi]                 | Mean          | 49.11                                                                           |          | 38.01                                      |          | 29.13               |          | 22.92                                                                                                                                                  |          | 23.87               |          | 15.45               |          |
|                                                    | Minimum       | 44.84                                                                           |          | 36.40                                      |          | 28.13               |          | 21.71                                                                                                                                                  |          | 23.67               |          | 14.21               |          |
|                                                    | Maximum       | 52.39                                                                           |          | 39.85                                      |          | 29.72               |          | 24.00                                                                                                                                                  |          | 24.27               |          | 16.95               |          |
|                                                    | C.V.(%)       | 4.702                                                                           |          | 2.417                                      |          | 2.149               |          | 3.764                                                                                                                                                  |          | 0.8927              |          | 4.464               |          |
|                                                    | No. Specimens | 18                                                                              |          | 19                                         |          | 6                   |          | 6                                                                                                                                                      |          | 6                   |          | 18                  |          |
| No. Prepreg Lots                                   |               | 3                                                                               |          | 3                                          |          | 1                   |          | 1                                                                                                                                                      |          | 1                   |          | 3                   |          |
| E <sub>c</sub> <sup>c</sup> [Msi]                  | Mean          | 1.495                                                                           |          | 1.386                                      |          | 1.279               |          | 1.201                                                                                                                                                  |          | 1.198               |          | 0.9105              |          |
|                                                    | Minimum       | 1.447                                                                           |          | 1.314                                      |          | 1.227               |          | 1.160                                                                                                                                                  |          | 1.176               |          | 0.8394              |          |
|                                                    | Maximum       | 1.552                                                                           |          | 1.429                                      |          | 1.316               |          | 1.237                                                                                                                                                  |          | 1.218               |          | 0.9823              |          |
|                                                    | C.V.(%)       | 1.979                                                                           |          | 1.975                                      |          | 2.612               |          | 2.867                                                                                                                                                  |          | 1.410               |          | 4.773               |          |
|                                                    | No. Specimens | 18                                                                              |          | 19                                         |          | 6                   |          | 6                                                                                                                                                      |          | 6                   |          | 18                  |          |
| No. Prepreg Lots                                   |               | 3                                                                               |          | 3                                          |          | 1                   |          | 1                                                                                                                                                      |          | 1                   |          | 3                   |          |

## 2.5.6 In-Plane Shear Properties (IPS)

|                                                                                                  |                      |                                                                                                                           |                 |                     |                 |                      |                 |                      |                 |
|--------------------------------------------------------------------------------------------------|----------------------|---------------------------------------------------------------------------------------------------------------------------|-----------------|---------------------|-----------------|----------------------|-----------------|----------------------|-----------------|
| <b>Material:</b> Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch) |                      | <b>In-Plane Shear</b><br>Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K<br>Unidirectional Slit Tape (0.25 inch)<br>[45/-45]4S |                 |                     |                 |                      |                 |                      |                 |
| <b>Resin content:</b>                                                                            | 34.19 %wt            | <b>Comp. density:</b> 1.564 g/cc                                                                                          |                 |                     |                 |                      |                 |                      |                 |
| <b>Fiber volume:</b>                                                                             | 57.45 %vol           |                                                                                                                           |                 |                     |                 |                      |                 |                      |                 |
| <b>Ply count:</b>                                                                                | 16                   |                                                                                                                           |                 |                     |                 |                      |                 |                      |                 |
| <b>Test method:</b> ASTM D3518-18                                                                |                      | <b>Modulus calculation:</b> 2000-6000 microstrain                                                                         |                 |                     |                 |                      |                 |                      |                 |
| <b>Normalized by:</b> NA                                                                         |                      |                                                                                                                           |                 |                     |                 |                      |                 |                      |                 |
|                                                                                                  |                      | <b>CTA</b>                                                                                                                |                 | <b>RTA</b>          |                 | <b>ETW1</b>          |                 | <b>ETW2</b>          |                 |
| <b>Test Temperature [°F]</b>                                                                     |                      | -65                                                                                                                       |                 | 70                  |                 | 180                  |                 | 250                  |                 |
| <b>Moisture Conditioning</b>                                                                     |                      | Ambient                                                                                                                   |                 | Ambient             |                 | Equilibrium          |                 | Equilibrium          |                 |
| <b>Equilibrium at T, RH</b>                                                                      |                      |                                                                                                                           |                 |                     |                 | 160F,85%             |                 | 160F,85%             |                 |
| <b>Source code prefixed by:</b> NTP3963Q1-TC-WEB-NIAR-T01-                                       |                      | MSTX-X-CX-IPS-CTA-X                                                                                                       |                 | MSTX-X-CX-IPS-RTA-X |                 | MSTX-X-CX-IPS-ETW1-X |                 | MSTX-X-CX-IPS-ETW2-X |                 |
|                                                                                                  |                      | <b>Normalized</b>                                                                                                         | <b>Measured</b> | <b>Normalized</b>   | <b>Measured</b> | <b>Normalized</b>    | <b>Measured</b> | <b>Normalized</b>    | <b>Measured</b> |
| <b>F<sub>12</sub><sup>s0.2%</sup> [ksi]</b>                                                      | <b>Mean</b>          |                                                                                                                           | 10.76           |                     | 8.119           |                      | 5.678           |                      | 3.261           |
|                                                                                                  | <b>Minimum</b>       |                                                                                                                           | 10.35           |                     | 7.943           |                      | 5.564           |                      | 2.924           |
|                                                                                                  | <b>Maximum</b>       |                                                                                                                           | 11.09           |                     | 8.267           |                      | 5.741           |                      | 3.678           |
|                                                                                                  | <b>C.V.(%)</b>       |                                                                                                                           | 1.901           |                     | 1.149           |                      | 1.071           |                      | 5.898           |
|                                                                                                  | <b>No. Specimens</b> |                                                                                                                           | 18              |                     | 18              |                      | 6               |                      | 18              |
| <b>No. Prepreg Lots</b>                                                                          |                      |                                                                                                                           | 3               |                     | 3               |                      | 1               |                      | 3               |
| <b>F<sub>12</sub><sup>s5% strain</sup> [ksi]</b>                                                 | <b>Mean</b>          |                                                                                                                           | 16.42           |                     | 13.43           |                      | 8.473           |                      | 5.253           |
|                                                                                                  | <b>Minimum</b>       |                                                                                                                           | 15.79           |                     | 13.11           |                      | 8.276           |                      | 4.755           |
|                                                                                                  | <b>Maximum</b>       |                                                                                                                           | 16.81           |                     | 13.70           |                      | 8.574           |                      | 5.584           |
|                                                                                                  | <b>C.V.(%)</b>       |                                                                                                                           | 1.989           |                     | 1.373           |                      | 1.304           |                      | 5.350           |
|                                                                                                  | <b>No. Specimens</b> |                                                                                                                           | 18              |                     | 18              |                      | 6               |                      | 18              |
| <b>No. Prepreg Lots</b>                                                                          |                      |                                                                                                                           | 3               |                     | 3               |                      | 1               |                      | 3               |
| <b>G<sub>12</sub><sup>s</sup> [Msi]</b>                                                          | <b>Mean</b>          |                                                                                                                           | 0.8492          |                     | 0.7338          |                      | 0.5418          |                      | 0.3310          |
|                                                                                                  | <b>Minimum</b>       |                                                                                                                           | 0.8094          |                     | 0.7146          |                      | 0.5324          |                      | 0.2936          |
|                                                                                                  | <b>Maximum</b>       |                                                                                                                           | 0.8793          |                     | 0.7537          |                      | 0.5514          |                      | 0.3784          |
|                                                                                                  | <b>C.V.(%)</b>       |                                                                                                                           | 2.490           |                     | 1.594           |                      | 1.141           |                      | 7.212           |
|                                                                                                  | <b>No. Specimens</b> |                                                                                                                           | 18              |                     | 18              |                      | 6               |                      | 18              |
| <b>No. Prepreg Lots</b>                                                                          |                      |                                                                                                                           | 3               |                     | 3               |                      | 1               |                      | 3               |

In-Plane Shear (IPS) data was calculated per ASTM D3518.

## 2.5.7 In-Plane Shear V-Notched Properties (VNS)

|                                                                                                  |                  |                                                                                                                                   |                 |                     |                 |                      |                 |                      |                 |
|--------------------------------------------------------------------------------------------------|------------------|-----------------------------------------------------------------------------------------------------------------------------------|-----------------|---------------------|-----------------|----------------------|-----------------|----------------------|-----------------|
| <b>Material:</b> Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch) |                  | <b>In-Plane Shear V-Notched</b><br>Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K<br>Unidirectional Slit Tape (0.25 inch)<br>[0/90]5S |                 |                     |                 |                      |                 |                      |                 |
| <b>Resin content:</b>                                                                            | 33.77 %wt        | <b>Comp. density:</b> 1.567 g/cc                                                                                                  |                 |                     |                 |                      |                 |                      |                 |
| <b>Fiber volume:</b>                                                                             | 57.91 %vol       |                                                                                                                                   |                 |                     |                 |                      |                 |                      |                 |
| <b>Ply count:</b>                                                                                | 20               |                                                                                                                                   |                 |                     |                 |                      |                 |                      |                 |
| <b>Test method:</b> ASTM D5379-19                                                                |                  | <b>Modulus calculation:</b> 2000-6000 microstrain                                                                                 |                 |                     |                 |                      |                 |                      |                 |
| <b>Normalized by:</b> NA                                                                         |                  |                                                                                                                                   |                 |                     |                 |                      |                 |                      |                 |
|                                                                                                  |                  | <b>CTA</b>                                                                                                                        |                 | <b>RTA</b>          |                 | <b>ETW1</b>          |                 | <b>ETW2</b>          |                 |
| <b>Test Temperature [°F]</b>                                                                     |                  | -65                                                                                                                               |                 | 70                  |                 | 180                  |                 | 250                  |                 |
| <b>Moisture Conditioning</b>                                                                     |                  | Ambient                                                                                                                           |                 | Ambient             |                 | Equilibrium          |                 | Equilibrium          |                 |
| <b>Equilibrium at T, RH</b>                                                                      |                  |                                                                                                                                   |                 |                     |                 | 160F,85%             |                 | 160F,85%             |                 |
| <b>Source code prefixed by:</b> NTP3963Q1-TC-WEB-NIAR-T01-                                       |                  | MSTX-X-CX-VNS-CTA-X                                                                                                               |                 | MSTX-X-CX-VNS-RTA-X |                 | MSTX-X-CX-VNS-ETW1-X |                 | MSTX-X-CX-VNS-ETW2-X |                 |
|                                                                                                  |                  | <b>Normalized</b>                                                                                                                 | <b>Measured</b> | <b>Normalized</b>   | <b>Measured</b> | <b>Normalized</b>    | <b>Measured</b> | <b>Normalized</b>    | <b>Measured</b> |
| (IPS V-Notched)<br>$F_{12}^{50.2\%}$ [ksi]                                                       | Mean             |                                                                                                                                   | 11.77           |                     | 9.185           |                      | 6.490           |                      | 4.113           |
|                                                                                                  | Minimum          |                                                                                                                                   | 9.316           |                     | 8.929           |                      | 6.358           |                      | 3.678           |
|                                                                                                  | Maximum          |                                                                                                                                   | 12.93           |                     | 9.408           |                      | 6.641           |                      | 4.402           |
|                                                                                                  | C.V.(%)          |                                                                                                                                   | 8.287           |                     | 1.415           |                      | 1.644           |                      | 4.216           |
|                                                                                                  | No. Specimens    |                                                                                                                                   | 18              |                     | 18              |                      | 6               |                      | 18              |
|                                                                                                  | No. Prepreg Lots |                                                                                                                                   | 3               |                     | 3               |                      | 1               |                      | 3               |
| (IPS V-Notched)<br>$F_{12}^{5\% \text{ strain}}$ [ksi]                                           | Mean             |                                                                                                                                   | 19.21           |                     | 15.35           |                      | 10.08           |                      | 6.420           |
|                                                                                                  | Minimum          |                                                                                                                                   | 18.66           |                     | 14.90           |                      | 9.795           |                      | 5.942           |
|                                                                                                  | Maximum          |                                                                                                                                   | 19.90           |                     | 15.68           |                      | 10.30           |                      | 6.924           |
|                                                                                                  | C.V.(%)          |                                                                                                                                   | 1.738           |                     | 1.477           |                      | 1.885           |                      | 4.052           |
|                                                                                                  | No. Specimens    |                                                                                                                                   | 18              |                     | 18              |                      | 6               |                      | 18              |
|                                                                                                  | No. Prepreg Lots |                                                                                                                                   | 3               |                     | 3               |                      | 1               |                      | 3               |
| (IPS V-Notched)<br>$F_{12}^{su}$ [ksi]                                                           | Mean             |                                                                                                                                   | 29.32           |                     | 24.53           |                      | 16.72           |                      | 11.39           |
|                                                                                                  | Minimum          |                                                                                                                                   | 27.85           |                     | 24.08           |                      | 16.48           |                      | 10.47           |
|                                                                                                  | Maximum          |                                                                                                                                   | 30.80           |                     | 25.12           |                      | 17.20           |                      | 12.19           |
|                                                                                                  | C.V.(%)          |                                                                                                                                   | 2.261           |                     | 1.219           |                      | 1.597           |                      | 4.758           |
|                                                                                                  | No. Specimens    |                                                                                                                                   | 18              |                     | 18              |                      | 6               |                      | 18              |
|                                                                                                  | No. Prepreg Lots |                                                                                                                                   | 3               |                     | 3               |                      | 1               |                      | 3               |
| (IPS V-Notched)<br>$G_{12}^s$ [Msi]                                                              | Mean             |                                                                                                                                   | 0.8960          |                     | 0.7615          |                      | 0.5709          |                      | 0.4036          |
|                                                                                                  | Minimum          |                                                                                                                                   | 0.8096          |                     | 0.7386          |                      | 0.5559          |                      | 0.3761          |
|                                                                                                  | Maximum          |                                                                                                                                   | 1.230           |                     | 0.7938          |                      | 0.5860          |                      | 0.4372          |
|                                                                                                  | C.V.(%)          |                                                                                                                                   | 11.03           |                     | 2.013           |                      | 2.081           |                      | 4.214           |
|                                                                                                  | No. Specimens    |                                                                                                                                   | 18              |                     | 18              |                      | 6               |                      | 18              |
|                                                                                                  | No. Prepreg Lots |                                                                                                                                   | 3               |                     | 3               |                      | 1               |                      | 3               |

In-Plane Shear V-Notched (VNS) data was calculated per ASTM D5379.

## 2.5.8 “25/50/25” Unnotched Tension 1 Properties (UNT1)

|                                                                                                  |                         |                                                                                                                                     |                 |                      |                 |                         |                 |                         |                 |
|--------------------------------------------------------------------------------------------------|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------|-----------------|----------------------|-----------------|-------------------------|-----------------|-------------------------|-----------------|
| <b>Material:</b> Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch) |                         | <b>Unnotched Tension 1</b><br>Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K<br>Unidirectional Slit Tape (0.25 inch)<br>[45/0/-45/90]2S |                 |                      |                 |                         |                 |                         |                 |
| <b>Resin content:</b>                                                                            | 33.89 %wt               | <b>Comp. density:</b> 1.567 g/cc                                                                                                    |                 |                      |                 |                         |                 |                         |                 |
| <b>Fiber volume:</b>                                                                             | 57.82 %vol              |                                                                                                                                     |                 |                      |                 |                         |                 |                         |                 |
| <b>Ply count:</b>                                                                                | 16                      |                                                                                                                                     |                 |                      |                 |                         |                 |                         |                 |
| <b>Test method:</b> ASTM D3039-17                                                                |                         | <b>Modulus calculation:</b> 1000-3000 microstrain                                                                                   |                 |                      |                 |                         |                 |                         |                 |
| <b>Normalized by:</b> 0.007000                                                                   |                         | in. CPT                                                                                                                             |                 |                      |                 |                         |                 |                         |                 |
|                                                                                                  |                         | <b>CTA</b>                                                                                                                          |                 | <b>RTA</b>           |                 | <b>ETW1</b>             |                 | <b>ETW2</b>             |                 |
| <b>Test Temperature [°F]</b>                                                                     |                         | -65                                                                                                                                 |                 | 70                   |                 | 180                     |                 | 250                     |                 |
| <b>Moisture Conditioning</b>                                                                     |                         | Ambient                                                                                                                             |                 | Ambient              |                 | Equilibrium<br>160F,85% |                 | Equilibrium<br>160F,85% |                 |
| <b>Equilibrium at T, RH</b>                                                                      |                         |                                                                                                                                     |                 |                      |                 |                         |                 |                         |                 |
| <b>Source code prefixed by:</b> NTP3963Q1-TC-WEB-NIAR-T01-                                       |                         | MSTX-X-CX-UNT1-CTA-X                                                                                                                |                 | MSTX-X-CX-UNT1-RTA-X |                 | MSTX-X-CX-UNT1-ETW1-X   |                 | MSTX-X-CX-UNT1-ETW2-X   |                 |
|                                                                                                  |                         | <b>Normalized</b>                                                                                                                   | <b>Measured</b> | <b>Normalized</b>    | <b>Measured</b> | <b>Normalized</b>       | <b>Measured</b> | <b>Normalized</b>       | <b>Measured</b> |
| <b>UNT1 Strength</b><br>[ksi]                                                                    | <b>Mean</b>             | 149.7                                                                                                                               | 149.5           | 161.2                | 160.9           | 167.6                   | 168.0           | 158.5                   | 158.4           |
|                                                                                                  | <b>Minimum</b>          | 137.4                                                                                                                               | 136.1           | 147.8                | 147.4           | 165.0                   | 165.6           | 147.5                   | 148.5           |
|                                                                                                  | <b>Maximum</b>          | 161.0                                                                                                                               | 161.4           | 173.4                | 171.6           | 172.3                   | 172.5           | 166.3                   | 166.3           |
|                                                                                                  | <b>C.V.(%)</b>          | 4.019                                                                                                                               | 4.076           | 4.175                | 4.196           | 1.695                   | 1.684           | 3.438                   | 3.221           |
|                                                                                                  | <b>No. Specimens</b>    | 18                                                                                                                                  |                 | 18                   |                 | 6                       |                 | 18                      |                 |
|                                                                                                  | <b>No. Prepreg Lots</b> | 3                                                                                                                                   |                 | 3                    |                 | 1                       |                 | 3                       |                 |
| <b>UNT1 Modulus</b><br>[Msi]                                                                     | <b>Mean</b>             | 9.265                                                                                                                               | 9.253           | 9.122                | 9.106           | 9.007                   | 9.031           | 8.626                   | 8.625           |
|                                                                                                  | <b>Minimum</b>          | 9.080                                                                                                                               | 9.037           | 8.855                | 8.819           | 8.918                   | 8.950           | 8.308                   | 8.296           |
|                                                                                                  | <b>Maximum</b>          | 9.469                                                                                                                               | 9.426           | 9.276                | 9.303           | 9.045                   | 9.078           | 8.965                   | 8.963           |
|                                                                                                  | <b>C.V.(%)</b>          | 1.226                                                                                                                               | 1.325           | 1.347                | 1.607           | 0.5151                  | 0.5141          | 1.800                   | 2.060           |
|                                                                                                  | <b>No. Specimens</b>    | 18                                                                                                                                  |                 | 18                   |                 | 6                       |                 | 18                      |                 |
|                                                                                                  | <b>No. Prepreg Lots</b> | 3                                                                                                                                   |                 | 3                    |                 | 1                       |                 | 3                       |                 |

## 2.5.9 “10/80/10” Unnotched Tension 2 Properties (UNT2)

|                                                                                                  |                           |                                                                                                                                                         |                 |                      |                 |                       |                 |
|--------------------------------------------------------------------------------------------------|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|----------------------|-----------------|-----------------------|-----------------|
| <b>Material:</b> Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch) |                           | <b>Unnotched Tension 2</b><br>Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K<br>Unidirectional Slit Tape (0.25 inch)<br>[45/-45/90/45/-45/45/-45/0/45/-45]S |                 |                      |                 |                       |                 |
| <b>Resin content:</b>                                                                            | 33.80 %wt                 |                                                                                                                                                         |                 |                      |                 |                       |                 |
| <b>Fiber volume:</b>                                                                             | 57.89 %vol                |                                                                                                                                                         |                 |                      |                 |                       |                 |
| <b>Ply count:</b>                                                                                | 20                        |                                                                                                                                                         |                 |                      |                 |                       |                 |
| <b>Test method:</b> ASTM D3039-17                                                                |                           | <b>Modulus calculation:</b> 1000-3000 microstrain                                                                                                       |                 |                      |                 |                       |                 |
| <b>Normalized by:</b>                                                                            | 0.007000                  | in. CPT                                                                                                                                                 |                 |                      |                 |                       |                 |
|                                                                                                  |                           | <b>CTA</b>                                                                                                                                              |                 | <b>RTA</b>           |                 | <b>ETW2</b>           |                 |
| <b>Test Temperature [°F]</b>                                                                     | -65                       | -65                                                                                                                                                     |                 | 70                   |                 | 250                   |                 |
| <b>Moisture Conditioning</b>                                                                     | Ambient                   | Ambient                                                                                                                                                 |                 | Ambient              |                 | Equilibrium           |                 |
| <b>Equilibrium at T, RH</b>                                                                      |                           |                                                                                                                                                         |                 |                      |                 | 160F,85%              |                 |
| <b>Source code prefixed by:</b>                                                                  | NTP3963Q1-TC-WEB-NIAR-T01 | MSTX-X-CX-UNT2-CTA-X                                                                                                                                    |                 | MSTX-X-CX-UNT2-RTA-X |                 | MSTX-X-CX-UNT2-ETW2-X |                 |
|                                                                                                  |                           | <b>Normalized</b>                                                                                                                                       | <b>Measured</b> | <b>Normalized</b>    | <b>Measured</b> | <b>Normalized</b>     | <b>Measured</b> |
| <b>UNT2 Strength [ksi]</b>                                                                       | <b>Mean</b>               | 85.87                                                                                                                                                   | 85.69           | 84.03                | 83.76           | 67.92                 | 67.84           |
|                                                                                                  | <b>Minimum</b>            | 81.84                                                                                                                                                   | 81.36           | 81.41                | 80.60           | 60.80                 | 60.84           |
|                                                                                                  | <b>Maximum</b>            | 89.50                                                                                                                                                   | 89.79           | 85.95                | 85.41           | 70.98                 | 70.26           |
|                                                                                                  | <b>C.V.(%)</b>            | 2.508                                                                                                                                                   | 2.860           | 1.225                | 1.428           | 3.331                 | 3.157           |
|                                                                                                  | <b>No. Specimens</b>      | 18                                                                                                                                                      |                 | 18                   |                 | 18                    |                 |
| <b>No. Prepreg Lots</b>                                                                          |                           | 3                                                                                                                                                       |                 | 3                    |                 | 3                     |                 |
| <b>UNT2 Modulus [Msi]</b>                                                                        | <b>Mean</b>               | 5.909                                                                                                                                                   | 5.897           | 5.669                | 5.651           | 4.464                 | 4.459           |
|                                                                                                  | <b>Minimum</b>            | 5.650                                                                                                                                                   | 5.588           | 5.516                | 5.511           | 4.348                 | 4.347           |
|                                                                                                  | <b>Maximum</b>            | 6.235                                                                                                                                                   | 6.255           | 5.816                | 5.813           | 4.602                 | 4.555           |
|                                                                                                  | <b>C.V.(%)</b>            | 2.333                                                                                                                                                   | 2.756           | 1.435                | 1.580           | 1.484                 | 1.426           |
|                                                                                                  | <b>No. Specimens</b>      | 18                                                                                                                                                      |                 | 18                   |                 | 18                    |                 |
| <b>No. Prepreg Lots</b>                                                                          |                           | 3                                                                                                                                                       |                 | 3                    |                 | 3                     |                 |

## 2.5.10 “50/40/10” Unnotched Tension 3 Properties (UNT3)

|                                                                                                  |                      |                                                                                                                                                   |                 |                      |                 |                       |                 |
|--------------------------------------------------------------------------------------------------|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|----------------------|-----------------|-----------------------|-----------------|
| <b>Material:</b> Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch) |                      | <b>Unnotched Tension 3</b><br>Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K<br>Unidirectional Slit Tape (0.25 inch)<br>[45/90/-45/0/0/45/0/0/-45/0]S |                 |                      |                 |                       |                 |
| <b>Resin content:</b>                                                                            | 33.96 %wt            |                                                                                                                                                   |                 |                      |                 |                       |                 |
| <b>Fiber volume:</b>                                                                             | 57.71 %vol           |                                                                                                                                                   |                 |                      |                 |                       |                 |
| <b>Ply count:</b>                                                                                | 20                   |                                                                                                                                                   |                 |                      |                 |                       |                 |
| <b>Test method:</b> ASTM D3039-17                                                                |                      | <b>Modulus calculation:</b> 1000-3000 microstrain                                                                                                 |                 |                      |                 |                       |                 |
| <b>Normalized by:</b>                                                                            | 0.007000             | in. CPT                                                                                                                                           |                 |                      |                 |                       |                 |
|                                                                                                  |                      | <b>CTA</b>                                                                                                                                        |                 | <b>RTA</b>           |                 | <b>ETW2</b>           |                 |
| <b>Test Temperature [°F]</b>                                                                     |                      | -65                                                                                                                                               |                 | 70                   |                 | 250                   |                 |
| <b>Moisture Conditioning</b>                                                                     |                      | Ambient                                                                                                                                           |                 | Ambient              |                 | Equilibrium           |                 |
| <b>Equilibrium at T, RH</b>                                                                      |                      |                                                                                                                                                   |                 |                      |                 | 160F,85%              |                 |
| <b>Source code prefixed by:</b> NTP3963Q1-TC-WEB-NIAR-T01                                        |                      | MSTX-X-CX-UNT3-CTA-X                                                                                                                              |                 | MSTX-X-CX-UNT3-RTA-X |                 | MSTX-X-CX-UNT3-ETW2-X |                 |
|                                                                                                  |                      | <b>Normalized</b>                                                                                                                                 | <b>Measured</b> | <b>Normalized</b>    | <b>Measured</b> | <b>Normalized</b>     | <b>Measured</b> |
| <b>UNT3 Strength [ksi]</b>                                                                       | <b>Mean</b>          | 264.5                                                                                                                                             | 263.3           | 284.1                | 282.7           | 279.9                 | 277.2           |
|                                                                                                  | <b>Minimum</b>       | 246.4                                                                                                                                             | 247.4           | 251.8                | 252.2           | 267.0                 | 265.0           |
|                                                                                                  | <b>Maximum</b>       | 285.3                                                                                                                                             | 282.0           | 296.5                | 296.8           | 289.9                 | 286.0           |
|                                                                                                  | <b>C.V.(%)</b>       | 4.581                                                                                                                                             | 4.211           | 3.589                | 3.533           | 2.288                 | 2.311           |
|                                                                                                  | <b>No. Specimens</b> | 18                                                                                                                                                |                 | 18                   |                 | 18                    |                 |
| <b>No. Prepreg Lots</b>                                                                          |                      | 3                                                                                                                                                 |                 | 3                    |                 | 3                     |                 |
| <b>UNT3 Modulus [Msi]</b>                                                                        | <b>Mean</b>          | 14.52                                                                                                                                             | 14.46           | 14.34                | 14.26           | 14.02                 | 13.93           |
|                                                                                                  | <b>Minimum</b>       | 14.20                                                                                                                                             | 14.05           | 14.09                | 13.99           | 13.62                 | 13.46           |
|                                                                                                  | <b>Maximum</b>       | 14.82                                                                                                                                             | 14.74           | 14.57                | 14.45           | 14.51                 | 14.43           |
|                                                                                                  | <b>C.V.(%)</b>       | 1.064                                                                                                                                             | 1.262           | 0.8935               | 1.002           | 1.683                 | 1.883           |
|                                                                                                  | <b>No. Specimens</b> | 18                                                                                                                                                |                 | 18                   |                 | 36                    |                 |
| <b>No. Prepreg Lots</b>                                                                          |                      | 3                                                                                                                                                 |                 | 3                    |                 | 3                     |                 |

## 2.5.11 “33/0/67” Unnotched Compression 0/90 Properties (UNC0)

|                                                                                           |               |                      |          |                                            |          |                       |          |                       |          |                       |          |                                                                                                                                                                   |          |  |  |
|-------------------------------------------------------------------------------------------|---------------|----------------------|----------|--------------------------------------------|----------|-----------------------|----------|-----------------------|----------|-----------------------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|--|--|
| Material: Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch) |               |                      |          |                                            |          |                       |          |                       |          |                       |          | <div>Unnotched Compression 0/90</div> <div>Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K</div> <div>Unidirectional Slit Tape (0.25 inch)</div> <div>[90/0/90]5</div> |          |  |  |
| Resin content:                                                                            |               | 33.97 %wt            |          | Comp. density: 1.566 g/cc                  |          |                       |          |                       |          |                       |          |                                                                                                                                                                   |          |  |  |
| Fiber volume:                                                                             |               | 57.71 %vol           |          |                                            |          |                       |          |                       |          |                       |          |                                                                                                                                                                   |          |  |  |
| Ply count:                                                                                |               | 15                   |          |                                            |          |                       |          |                       |          |                       |          |                                                                                                                                                                   |          |  |  |
| Test method:                                                                              |               | ASTM D6641-16e2      |          | Modulus calculation: 1000-3000 microstrain |          |                       |          |                       |          |                       |          |                                                                                                                                                                   |          |  |  |
| Normalized by:                                                                            |               | 0.007000             |          | in. CPT                                    |          |                       |          |                       |          |                       |          |                                                                                                                                                                   |          |  |  |
|                                                                                           |               | CTA                  |          | RTA                                        |          | ETA1                  |          | ETA2                  |          | ETW1                  |          | ETW2                                                                                                                                                              |          |  |  |
| Test Temperature [°F]                                                                     |               | -65                  |          | 70                                         |          | 180                   |          | 250                   |          | 180                   |          | 250                                                                                                                                                               |          |  |  |
| Moisture Conditioning                                                                     |               | Ambient              |          | Ambient                                    |          | Ambient               |          | Ambient               |          | Equilibrium           |          | Equilibrium                                                                                                                                                       |          |  |  |
| Equilibrium at T, RH                                                                      |               |                      |          |                                            |          |                       |          |                       |          | 160F,85%              |          | 160F,85%                                                                                                                                                          |          |  |  |
| Source code prefixed by: NTP3963Q1-TC-WEB-NIAR-T01-                                       |               | MSTX-X-CX-UNC0-CTA-X |          | MSTX-X-CX-UNC0-RTA-X                       |          | MSTX-X-CX-UNC0-ETA1-X |          | MSTX-X-CX-UNC0-ETA2-X |          | MSTX-X-CX-UNC0-ETW1-X |          | MSTX-X-CX-UNC0-ETW2-X                                                                                                                                             |          |  |  |
|                                                                                           |               | Normalized           | Measured | Normalized                                 | Measured | Normalized            | Measured | Normalized            | Measured | Normalized            | Measured | Normalized                                                                                                                                                        | Measured |  |  |
| (0/90) UNC0<br>Strength [ksi]                                                             | Mean          | 113.7                | 113.4    | 105.4                                      | 105.4    | 96.45                 | 96.70    | 92.70                 | 93.24    | 94.93                 | 95.24    | 72.55                                                                                                                                                             | 72.52    |  |  |
|                                                                                           | Minimum       | 79.36                | 79.33    | 87.36                                      | 86.63    | 92.65                 | 93.94    | 83.03                 | 82.39    | 86.54                 | 88.35    | 52.35                                                                                                                                                             | 51.70    |  |  |
|                                                                                           | Maximum       | 122.6                | 121.3    | 114.1                                      | 113.7    | 98.92                 | 100.6    | 101.9                 | 101.5    | 98.92                 | 99.77    | 85.64                                                                                                                                                             | 86.12    |  |  |
|                                                                                           | C.V.(%)       | 8.659                | 8.575    | 6.637                                      | 7.227    | 2.768                 | 2.619    | 8.427                 | 8.547    | 4.803                 | 4.071    | 10.02                                                                                                                                                             | 10.28    |  |  |
|                                                                                           | No. Specimens | 20                   |          | 18                                         |          | 6                     |          | 6                     |          | 6                     |          | 22                                                                                                                                                                |          |  |  |
| No. Prepreg Lots                                                                          |               | 3                    |          | 3                                          |          | 1                     |          | 1                     |          | 1                     |          | 3                                                                                                                                                                 |          |  |  |
| (0/90) UNC0<br>Modulus [Msi]                                                              | Mean          | 8.023                | 8.000    | 8.033                                      | 8.028    | 7.903                 | 7.924    | 7.979                 | 8.024    | 8.202                 | 8.231    | 8.231                                                                                                                                                             | 8.231    |  |  |
|                                                                                           | Minimum       | 7.464                | 7.462    | 7.780                                      | 7.759    | 7.704                 | 7.762    | 7.752                 | 7.855    | 8.087                 | 7.994    | 7.778                                                                                                                                                             | 7.917    |  |  |
|                                                                                           | Maximum       | 8.694                | 8.976    | 8.294                                      | 8.343    | 8.054                 | 8.091    | 8.307                 | 8.243    | 8.352                 | 8.361    | 8.559                                                                                                                                                             | 8.548    |  |  |
|                                                                                           | C.V.(%)       | 3.813                | 4.355    | 2.094                                      | 2.321    | 1.499                 | 1.805    | 2.381                 | 1.612    | 1.273                 | 1.591    | 3.053                                                                                                                                                             | 2.570    |  |  |
|                                                                                           | No. Specimens | 19                   |          | 18                                         |          | 6                     |          | 6                     |          | 6                     |          | 18                                                                                                                                                                |          |  |  |
| No. Prepreg Lots                                                                          |               | 3                    |          | 3                                          |          | 1                     |          | 1                     |          | 1                     |          | 3                                                                                                                                                                 |          |  |  |

## 2.5.12 “25/50/25” Unnotched Compression 1 Properties (UNC1)

|                                                                                                  |                           |                                                                                                                                         |                 |                         |                 |                       |                 |
|--------------------------------------------------------------------------------------------------|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|-----------------|-------------------------|-----------------|-----------------------|-----------------|
| <b>Material:</b> Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch) |                           | <b>Unnotched Compression 1</b><br>Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K<br>Unidirectional Slit Tape (0.25 inch)<br>[45/0/-45/90]2S |                 |                         |                 |                       |                 |
| <b>Resin content:</b>                                                                            | 33.89 %wt                 | <b>Comp. density:</b> 1.567 g/cc                                                                                                        |                 |                         |                 |                       |                 |
| <b>Fiber volume:</b>                                                                             | 57.82 %vol                |                                                                                                                                         |                 |                         |                 |                       |                 |
| <b>Ply count:</b>                                                                                | 16                        |                                                                                                                                         |                 |                         |                 |                       |                 |
| <b>Test method:</b>                                                                              | ASTM D6641-16e2           | <b>Modulus calculation:</b> 1000-3000 microstrain                                                                                       |                 |                         |                 |                       |                 |
| <b>Normalized by:</b>                                                                            | 0.007000                  | in. CPT                                                                                                                                 |                 |                         |                 |                       |                 |
|                                                                                                  |                           | <b>RTA</b>                                                                                                                              |                 | <b>ETW1</b>             |                 | <b>ETW2</b>           |                 |
| <b>Test Temperature [°F]</b>                                                                     | 70                        | 180                                                                                                                                     |                 | 250                     |                 |                       |                 |
| <b>Moisture Conditioning</b>                                                                     | Ambient                   | Equilibrium<br>160F,85%                                                                                                                 |                 | Equilibrium<br>160F,85% |                 |                       |                 |
| <b>Equilibrium at T, RH</b>                                                                      |                           |                                                                                                                                         |                 |                         |                 |                       |                 |
| <b>Source code prefixed by:</b>                                                                  | NTP3963Q1-TC-WEB-NIAR-T01 | MSTX-X-CX-UNC1-RTA-X                                                                                                                    |                 | MSTX-X-CX-UNC1-ETW1-X   |                 | MSTX-X-CX-UNC1-ETW2-X |                 |
|                                                                                                  |                           | <b>Normalized</b>                                                                                                                       | <b>Measured</b> | <b>Normalized</b>       | <b>Measured</b> | <b>Normalized</b>     | <b>Measured</b> |
| <b>UNC1 Strength</b><br>[ksi]                                                                    | <b>Mean</b>               | 111.2                                                                                                                                   | 111.1           | 94.69                   | 94.98           | 66.92                 | 66.87           |
|                                                                                                  | <b>Minimum</b>            | 100.8                                                                                                                                   | 101.5           | 91.32                   | 91.64           | 61.16                 | 60.69           |
|                                                                                                  | <b>Maximum</b>            | 119.4                                                                                                                                   | 118.9           | 97.52                   | 97.74           | 79.19                 | 79.35           |
|                                                                                                  | <b>C.V.(%)</b>            | 4.435                                                                                                                                   | 4.415           | 2.591                   | 2.443           | 7.149                 | 7.393           |
|                                                                                                  | <b>No. Specimens</b>      | 18                                                                                                                                      |                 | 6                       |                 | 18                    |                 |
| <b>No. Prepreg Lots</b>                                                                          |                           | 3                                                                                                                                       |                 | 1                       |                 | 3                     |                 |
| <b>UNC1 Modulus</b><br>[Msi]                                                                     | <b>Mean</b>               | 8.088                                                                                                                                   | 8.078           | 7.839                   | 7.864           | 7.810                 | 7.804           |
|                                                                                                  | <b>Minimum</b>            | 7.726                                                                                                                                   | 7.696           | 7.695                   | 7.703           | 7.413                 | 7.446           |
|                                                                                                  | <b>Maximum</b>            | 8.293                                                                                                                                   | 8.302           | 7.969                   | 7.998           | 8.048                 | 8.074           |
|                                                                                                  | <b>C.V.(%)</b>            | 1.791                                                                                                                                   | 2.145           | 1.145                   | 1.240           | 2.130                 | 2.276           |
|                                                                                                  | <b>No. Specimens</b>      | 18                                                                                                                                      |                 | 6                       |                 | 18                    |                 |
| <b>No. Prepreg Lots</b>                                                                          |                           | 3                                                                                                                                       |                 | 1                       |                 | 3                     |                 |

## 2.5.13 “10/80/10” Unnotched Compression 2 Properties (UNC2)

|                                                           |                         |                                                                                 |                 |                                                   |                 |                                                                                                                                                             |  |  |  |
|-----------------------------------------------------------|-------------------------|---------------------------------------------------------------------------------|-----------------|---------------------------------------------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|
| <b>Material:</b>                                          |                         | Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch) |                 |                                                   |                 | <b>Unnotched Compression 2</b><br>Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K<br>Unidirectional Slit Tape (0.25 inch)<br>[45/-45/90/45/-45/45/-45/0/45/-45]S |  |  |  |
| <b>Resin content:</b>                                     |                         | 33.80 %wt                                                                       |                 | <b>Comp. density:</b> 1.567 g/cc                  |                 |                                                                                                                                                             |  |  |  |
| <b>Fiber volume:</b>                                      |                         | 57.89 %vol                                                                      |                 |                                                   |                 |                                                                                                                                                             |  |  |  |
| <b>Ply count:</b>                                         |                         | 20                                                                              |                 |                                                   |                 |                                                                                                                                                             |  |  |  |
| <b>Test method:</b>                                       |                         | ASTM D6641-16e2                                                                 |                 | <b>Modulus calculation:</b> 1000-3000 microstrain |                 |                                                                                                                                                             |  |  |  |
| <b>Normalized by:</b>                                     |                         | 0.007000                                                                        |                 | in. CPT                                           |                 |                                                                                                                                                             |  |  |  |
|                                                           |                         | <b>RTA</b>                                                                      |                 | <b>ETW2</b>                                       |                 |                                                                                                                                                             |  |  |  |
| <b>Test Temperature [°F]</b>                              |                         | 70                                                                              |                 | 250                                               |                 |                                                                                                                                                             |  |  |  |
| <b>Moisture Conditioning</b>                              |                         | Ambient                                                                         |                 | Equilibrium                                       |                 |                                                                                                                                                             |  |  |  |
| <b>Equilibrium at T, RH</b>                               |                         |                                                                                 |                 | 160F,85%                                          |                 |                                                                                                                                                             |  |  |  |
| <b>Source code prefixed by:</b> NTP3963Q1-TC-WEB-NIAR-T01 |                         | MSTX-X-CX-UNC2-RTA-X                                                            |                 | MSTX-X-CX-UNC2-ETW2-X                             |                 |                                                                                                                                                             |  |  |  |
|                                                           |                         | <b>Normalized</b>                                                               | <b>Measured</b> | <b>Normalized</b>                                 | <b>Measured</b> |                                                                                                                                                             |  |  |  |
| <b>UNC2 Strength</b><br>[ksi]                             | <b>Mean</b>             | 74.78                                                                           | 74.72           | 45.09                                             | 45.10           |                                                                                                                                                             |  |  |  |
|                                                           | <b>Minimum</b>          | 70.86                                                                           | 70.72           | 38.33                                             | 38.22           |                                                                                                                                                             |  |  |  |
|                                                           | <b>Maximum</b>          | 78.12                                                                           | 78.56           | 48.42                                             | 48.66           |                                                                                                                                                             |  |  |  |
|                                                           | <b>C.V.(%)</b>          | 3.064                                                                           | 3.169           | 6.013                                             | 6.189           |                                                                                                                                                             |  |  |  |
|                                                           | <b>No. Specimens</b>    | 18                                                                              |                 | 19                                                |                 |                                                                                                                                                             |  |  |  |
|                                                           | <b>No. Prepreg Lots</b> | 3                                                                               |                 | 3                                                 |                 |                                                                                                                                                             |  |  |  |
| <b>UNC2 Modulus</b><br>[Msi]                              | <b>Mean</b>             | 5.046                                                                           | 5.041           | 4.365                                             | 4.367           |                                                                                                                                                             |  |  |  |
|                                                           | <b>Minimum</b>          | 4.866                                                                           | 4.881           | 4.153                                             | 4.131           |                                                                                                                                                             |  |  |  |
|                                                           | <b>Maximum</b>          | 5.187                                                                           | 5.182           | 4.654                                             | 4.659           |                                                                                                                                                             |  |  |  |
|                                                           | <b>C.V.(%)</b>          | 1.805                                                                           | 1.709           | 2.862                                             | 2.958           |                                                                                                                                                             |  |  |  |
|                                                           | <b>No. Specimens</b>    | 18                                                                              |                 | 18                                                |                 |                                                                                                                                                             |  |  |  |
|                                                           | <b>No. Prepreg Lots</b> | 3                                                                               |                 | 3                                                 |                 |                                                                                                                                                             |  |  |  |

## 2.5.14 "50/40/10" Unnotched Compression 3 Properties (UNC3)

|                                                                                                  |                      |                                                                                                                                                       |                 |                   |                 |
|--------------------------------------------------------------------------------------------------|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-------------------|-----------------|
| <b>Material:</b> Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch) |                      | <b>Unnotched Compression 3</b><br>Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K<br>Unidirectional Slit Tape (0.25 inch)<br>[45/90/-45/0/0/45/0/0/-45/0]S |                 |                   |                 |
| <b>Resin content:</b>                                                                            | 33.96 %wt            | <b>Comp. density:</b> 1.566 g/cc                                                                                                                      |                 |                   |                 |
| <b>Fiber volume:</b>                                                                             | 57.71 %vol           |                                                                                                                                                       |                 |                   |                 |
| <b>Ply count:</b>                                                                                | 20                   |                                                                                                                                                       |                 |                   |                 |
| <b>Test method:</b> ASTM D6641-16e2                                                              |                      | <b>Modulus calculation:</b> 1000-3000 microstrain                                                                                                     |                 |                   |                 |
| <b>Normalized by:</b>                                                                            | 0.007000             | in. CPT                                                                                                                                               |                 |                   |                 |
|                                                                                                  |                      | <b>RTA</b>                                                                                                                                            |                 | <b>ETW2</b>       |                 |
| <b>Test Temperature [°F]</b>                                                                     | 70                   | 250                                                                                                                                                   |                 |                   |                 |
| <b>Moisture Conditioning</b>                                                                     | Ambient              | Equilibrium                                                                                                                                           |                 |                   |                 |
| <b>Equilibrium at T, RH</b>                                                                      |                      | 160F,85%                                                                                                                                              |                 |                   |                 |
| <b>Source code prefixed by:</b> NTP3963Q1-TC-WEB-NIAR-T0                                         | MSTX-X-CX-UNC3-RTA-X | MSTX-X-CX-UNC3-ETW2-X                                                                                                                                 |                 |                   |                 |
|                                                                                                  |                      | <b>Normalized</b>                                                                                                                                     | <b>Measured</b> | <b>Normalized</b> | <b>Measured</b> |
| <b>UNC3 Strength</b><br>[ksi]                                                                    | <b>Mean</b>          | 168.1                                                                                                                                                 | 167.6           | 103.1             | 102.8           |
|                                                                                                  | <b>Minimum</b>       | 154.7                                                                                                                                                 | 154.0           | 90.82             | 90.97           |
|                                                                                                  | <b>Maximum</b>       | 176.2                                                                                                                                                 | 177.6           | 120.2             | 119.8           |
|                                                                                                  | <b>C.V.(%)</b>       | 3.494                                                                                                                                                 | 3.774           | 8.777             | 8.546           |
|                                                                                                  | <b>No. Specimens</b> | 18                                                                                                                                                    |                 | 21                |                 |
| <b>No. Prepreg Lots</b>                                                                          |                      | 3                                                                                                                                                     |                 | 3                 |                 |
| <b>UNC3 Modulus</b><br>[Msi]                                                                     | <b>Mean</b>          | 12.53                                                                                                                                                 | 12.50           | 12.64             | 12.61           |
|                                                                                                  | <b>Minimum</b>       | 12.24                                                                                                                                                 | 12.19           | 11.95             | 11.99           |
|                                                                                                  | <b>Maximum</b>       | 12.73                                                                                                                                                 | 12.75           | 14.31             | 14.38           |
|                                                                                                  | <b>C.V.(%)</b>       | 0.8722                                                                                                                                                | 1.211           | 3.616             | 3.773           |
|                                                                                                  | <b>No. Specimens</b> | 18                                                                                                                                                    |                 | 21                |                 |
| <b>No. Prepreg Lots</b>                                                                          |                      | 3                                                                                                                                                     |                 | 3                 |                 |

## 2.5.15 Lamina Short-Beam Strength Properties (SBS)

|                                                                                           |               |                           |  |                           |  |                        |                                                                                                                    |                        |  |                                        |  |                                        |  |                      |  |          |  |
|-------------------------------------------------------------------------------------------|---------------|---------------------------|--|---------------------------|--|------------------------|--------------------------------------------------------------------------------------------------------------------|------------------------|--|----------------------------------------|--|----------------------------------------|--|----------------------|--|----------|--|
| Material: Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch) |               |                           |  |                           |  |                        | Short-Beam Strength<br>Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K<br>Unidirectional Slit Tape (0.25 inch)<br>[0]14 |                        |  |                                        |  |                                        |  |                      |  |          |  |
| Resin content:                                                                            |               | 34.27 %wt                 |  | Comp. density: 1.569 g/cc |  |                        |                                                                                                                    |                        |  |                                        |  |                                        |  |                      |  |          |  |
| Fiber volume:                                                                             |               | 57.56 %vol                |  |                           |  |                        |                                                                                                                    |                        |  |                                        |  |                                        |  |                      |  |          |  |
| Ply count:                                                                                |               | 14                        |  |                           |  |                        |                                                                                                                    |                        |  |                                        |  |                                        |  |                      |  |          |  |
| Test method:                                                                              |               | ASTM D2344-16             |  |                           |  |                        |                                                                                                                    |                        |  |                                        |  |                                        |  |                      |  |          |  |
| Normalized by:                                                                            |               | NA                        |  |                           |  |                        |                                                                                                                    |                        |  |                                        |  |                                        |  |                      |  |          |  |
| Test Temperature [°F]                                                                     |               | CTA<br>-65<br>Ambient     |  | RTA<br>70<br>Ambient      |  | ETA1<br>180<br>Ambient |                                                                                                                    | ETA2<br>250<br>Ambient |  | ETW1<br>180<br>Equilibrium<br>160F,85% |  | ETW2<br>250<br>Equilibrium<br>160F,85% |  |                      |  |          |  |
| Moisture Conditioning<br>Equilibrium at T, RH                                             |               |                           |  |                           |  |                        |                                                                                                                    |                        |  |                                        |  |                                        |  |                      |  |          |  |
| Source code prefixed by:                                                                  |               | NTP3963Q1-TC-WEB-NIAR-T01 |  | MSTX-X-CX-SBS-CTA-X       |  | MSTX-X-CX-SBS-RTA-X    |                                                                                                                    | MSTX-X-CX-SBS-ETA1-X   |  | MSTX-X-CX-SBS-ETA2-X                   |  | MSTX-X-CX-SBS-ETW1-X                   |  | MSTX-X-CX-SBS-ETW2-X |  |          |  |
|                                                                                           |               | Normalized                |  | Measured                  |  | Normalized             |                                                                                                                    | Measured               |  | Normalized                             |  | Measured                               |  | Normalized           |  | Measured |  |
| SBS<br>[ksi]                                                                              | Mean          | 22.01                     |  | 16.83                     |  | 12.88                  |                                                                                                                    | 10.44                  |  | 11.39                                  |  | 7.865                                  |  |                      |  |          |  |
|                                                                                           | Minimum       | 20.63                     |  | 16.28                     |  | 12.68                  |                                                                                                                    | 10.22                  |  | 11.01                                  |  | 7.156                                  |  |                      |  |          |  |
|                                                                                           | Maximum       | 23.70                     |  | 17.35                     |  | 13.23                  |                                                                                                                    | 10.96                  |  | 11.80                                  |  | 8.738                                  |  |                      |  |          |  |
|                                                                                           | C.V.(%)       | 4.398                     |  | 2.033                     |  | 1.488                  |                                                                                                                    | 2.556                  |  | 3.113                                  |  | 6.329                                  |  |                      |  |          |  |
|                                                                                           | No. Specimens | 18                        |  | 18                        |  | 6                      |                                                                                                                    | 6                      |  | 6                                      |  | 18                                     |  |                      |  |          |  |
| No. Prepreg Lots                                                                          |               | 3                         |  | 3                         |  | 1                      |                                                                                                                    | 1                      |  | 1                                      |  | 3                                      |  |                      |  |          |  |

## 2.5.16 Laminate Short-Beam Strength Properties (SBS1)

|                                                                                                  |                      |                                                                                                                                              |                 |                       |                 |                       |                 |
|--------------------------------------------------------------------------------------------------|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-----------------------|-----------------|-----------------------|-----------------|
| <b>Material:</b> Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch) |                      | <b>Laminate Short-Beam Strength</b><br>Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K<br>Unidirectional Slit Tape (0.25 inch)<br>[45/0/-45/90]3S |                 |                       |                 |                       |                 |
| <b>Resin content:</b>                                                                            | 33.93 %wt            |                                                                                                                                              |                 |                       |                 |                       |                 |
| <b>Fiber volume:</b>                                                                             | 57.71 %vol           |                                                                                                                                              |                 |                       |                 |                       |                 |
| <b>Ply count:</b>                                                                                | 24                   |                                                                                                                                              |                 |                       |                 |                       |                 |
| <b>Test method:</b> ASTM D2344-16                                                                |                      |                                                                                                                                              |                 |                       |                 |                       |                 |
| <b>Normalized by:</b> NA                                                                         |                      |                                                                                                                                              |                 |                       |                 |                       |                 |
|                                                                                                  |                      | <b>RTA</b>                                                                                                                                   |                 | <b>ETW1</b>           |                 | <b>ETW2</b>           |                 |
| <b>Test Temperature [°F]</b>                                                                     |                      | 70                                                                                                                                           |                 | 180                   |                 | 250                   |                 |
| <b>Moisture Conditioning</b>                                                                     |                      | Ambient                                                                                                                                      |                 | Equilibrium           |                 | Equilibrium           |                 |
| <b>Equilibrium at T, RH</b>                                                                      |                      |                                                                                                                                              |                 | 160F,85%              |                 | 160F,85%              |                 |
| <b>Source code prefixed by:</b> NTP3963Q1-TC-WEB-NIAR-T01-                                       |                      | MSTX-X-CX-SBS1-RTA-X                                                                                                                         |                 | MSTX-X-CX-SBS1-ETW1-X |                 | MSTX-X-CX-SBS1-ETW2-X |                 |
|                                                                                                  |                      | <b>Normalized</b>                                                                                                                            | <b>Measured</b> | <b>Normalized</b>     | <b>Measured</b> | <b>Normalized</b>     | <b>Measured</b> |
| <b>SBS1 Strength</b><br>[ksi]                                                                    | <b>Mean</b>          |                                                                                                                                              | 13.03           |                       | 8.527           |                       | 4.059           |
|                                                                                                  | <b>Minimum</b>       |                                                                                                                                              | 12.30           |                       | 7.604           |                       | 3.687           |
|                                                                                                  | <b>Maximum</b>       |                                                                                                                                              | 13.41           |                       | 9.036           |                       | 4.690           |
|                                                                                                  | <b>C.V.(%)</b>       |                                                                                                                                              | 2.072           |                       | 6.716           |                       | 7.913           |
|                                                                                                  | <b>No. Specimens</b> |                                                                                                                                              | 18              |                       | 6               |                       | 18              |
| <b>No. Prepreg Lots</b>                                                                          |                      |                                                                                                                                              | 3               |                       | 1               |                       | 3               |

## 2.5.17 “25/50/25” Open-Hole Tension 1 Properties (OHT1)

|                                                                                                  |                      |                                                                                                                                     |                 |                      |                 |                         |                 |                         |                 |
|--------------------------------------------------------------------------------------------------|----------------------|-------------------------------------------------------------------------------------------------------------------------------------|-----------------|----------------------|-----------------|-------------------------|-----------------|-------------------------|-----------------|
| <b>Material:</b> Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch) |                      | <b>Open-Hole Tension 1</b><br>Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K<br>Unidirectional Slit Tape (0.25 inch)<br>[45/0/-45/90]2S |                 |                      |                 |                         |                 |                         |                 |
| <b>Resin content:</b>                                                                            | 33.89 %wt            | <b>Comp. density:</b> 1.567 g/cc                                                                                                    |                 |                      |                 |                         |                 |                         |                 |
| <b>Fiber volume:</b>                                                                             | 57.82 %vol           |                                                                                                                                     |                 |                      |                 |                         |                 |                         |                 |
| <b>Ply count:</b>                                                                                | 16                   |                                                                                                                                     |                 |                      |                 |                         |                 |                         |                 |
| <b>Test method:</b>                                                                              | ASTM D5766-11(2018)  |                                                                                                                                     |                 |                      |                 |                         |                 |                         |                 |
| <b>Normalized by:</b>                                                                            | 0.007000             | in. CPT                                                                                                                             |                 |                      |                 |                         |                 |                         |                 |
|                                                                                                  |                      | <b>CTA</b>                                                                                                                          |                 | <b>RTA</b>           |                 | <b>ETW1</b>             |                 | <b>ETW2</b>             |                 |
| <b>Test Temperature [°F]</b>                                                                     |                      | -65                                                                                                                                 |                 | 70                   |                 | 180                     |                 | 250                     |                 |
| <b>Moisture Conditioning</b>                                                                     |                      | Ambient                                                                                                                             |                 | Ambient              |                 | Equilibrium<br>160F,85% |                 | Equilibrium<br>160F,85% |                 |
| <b>Equilibrium at T, RH</b>                                                                      |                      |                                                                                                                                     |                 |                      |                 |                         |                 |                         |                 |
| <b>Source code prefixed by:</b> NTP3963Q1-TC-WEB-NIAR-T01-                                       |                      | MSTX-X-CX-OHT1-CTA-X                                                                                                                |                 | MSTX-X-CX-OHT1-RTA-X |                 | MSTX-X-CX-OHT1-ETW1-X   |                 | MSTX-X-CX-OHT1-ETW2-X   |                 |
|                                                                                                  |                      | <b>Normalized</b>                                                                                                                   | <b>Measured</b> | <b>Normalized</b>    | <b>Measured</b> | <b>Normalized</b>       | <b>Measured</b> | <b>Normalized</b>       | <b>Measured</b> |
| <b>OHT1 Strength [ksi]</b>                                                                       | <b>Mean</b>          | 83.15                                                                                                                               | 83.02           | 91.82                | 91.68           | 98.66                   | 98.88           | 116.4                   | 116.4           |
|                                                                                                  | <b>Minimum</b>       | 79.39                                                                                                                               | 79.70           | 85.99                | 86.34           | 91.13                   | 91.35           | 113.2                   | 113.8           |
|                                                                                                  | <b>Maximum</b>       | 85.83                                                                                                                               | 86.11           | 97.38                | 96.66           | 105.6                   | 105.7           | 120.0                   | 119.9           |
|                                                                                                  | <b>C.V.(%)</b>       | 2.112                                                                                                                               | 2.249           | 3.341                | 3.114           | 5.769                   | 5.870           | 1.630                   | 1.581           |
|                                                                                                  | <b>No. Specimens</b> | 18                                                                                                                                  |                 | 18                   |                 | 6                       |                 | 18                      |                 |
| <b>No. Prepreg Lots</b>                                                                          |                      | 3                                                                                                                                   |                 | 3                    |                 | 1                       |                 | 3                       |                 |

## 2.5.18 “10/80/10” Open-Hole Tension 2 Properties (OHT2)

|                                                                                                  |                            |                                                                                                                                                      |                 |                      |                 |                       |                 |
|--------------------------------------------------------------------------------------------------|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|----------------------|-----------------|-----------------------|-----------------|
| <b>Material:</b> Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch) |                            | <b>Open-Hole Tension 2</b><br>Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K<br>Unidirectional Slit Tape (0.25 inch)<br>[45/-45/90/45/-45/-45/0/45/-45]S |                 |                      |                 |                       |                 |
| <b>Resin content:</b>                                                                            | 33.80 %wt                  | <b>Comp. density:</b> 1.567 g/cc                                                                                                                     |                 |                      |                 |                       |                 |
| <b>Fiber volume:</b>                                                                             | 57.89 %vol                 |                                                                                                                                                      |                 |                      |                 |                       |                 |
| <b>Ply count:</b>                                                                                | 20                         |                                                                                                                                                      |                 |                      |                 |                       |                 |
| <b>Test method:</b>                                                                              | ASTM D5766-11(2018)        |                                                                                                                                                      |                 |                      |                 |                       |                 |
| <b>Normalized by:</b>                                                                            | 0.007000                   | in. CPT                                                                                                                                              |                 |                      |                 |                       |                 |
|                                                                                                  |                            | <b>CTA</b>                                                                                                                                           |                 | <b>RTA</b>           |                 | <b>ETW2</b>           |                 |
| <b>Test Temperature [°F]</b>                                                                     | -65                        | -65                                                                                                                                                  |                 | 70                   |                 | 250                   |                 |
| <b>Moisture Conditioning</b>                                                                     | Ambient                    | Ambient                                                                                                                                              |                 | Ambient              |                 | Equilibrium           |                 |
| <b>Equilibrium at T, RH</b>                                                                      |                            |                                                                                                                                                      |                 |                      |                 | 160F,85%              |                 |
| <b>Source code prefixed by:</b>                                                                  | NTP3963Q1-TC-WEB-NIAR-T01- | MSTX-X-CX-OHT2-CTA-X                                                                                                                                 |                 | MSTX-X-CX-OHT2-RTA-X |                 | MSTX-X-CX-OHT2-ETW2-X |                 |
|                                                                                                  |                            | <b>Normalized</b>                                                                                                                                    | <b>Measured</b> | <b>Normalized</b>    | <b>Measured</b> | <b>Normalized</b>     | <b>Measured</b> |
| <b>OHT2 Strength [ksi]</b>                                                                       | <b>Mean</b>                | 58.92                                                                                                                                                | 58.83           | 58.42                | 58.34           | 52.89                 | 52.80           |
|                                                                                                  | <b>Minimum</b>             | 55.82                                                                                                                                                | 56.13           | 56.52                | 56.51           | 48.96                 | 49.18           |
|                                                                                                  | <b>Maximum</b>             | 60.97                                                                                                                                                | 60.89           | 60.46                | 60.55           | 56.83                 | 56.55           |
|                                                                                                  | <b>C.V.(%)</b>             | 1.970                                                                                                                                                | 2.000           | 1.805                | 1.931           | 3.963                 | 3.890           |
|                                                                                                  | <b>No. Specimens</b>       | 18                                                                                                                                                   |                 | 18                   |                 | 18                    |                 |
| <b>No. Prepreg Lots</b>                                                                          |                            | 3                                                                                                                                                    |                 | 3                    |                 | 3                     |                 |

## 2.5.19 “50/40/10” Open-Hole Tension 3 Properties (OHT3)

|                                                                                                  |                                  |                                                                                                                                                   |                   |                       |                   |                 |       |
|--------------------------------------------------------------------------------------------------|----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-----------------------|-------------------|-----------------|-------|
| <b>Material:</b> Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch) |                                  | <b>Open-Hole Tension 3</b><br>Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K<br>Unidirectional Slit Tape (0.25 inch)<br>[45/90/-45/0/0/45/0/0/-45/0]S |                   |                       |                   |                 |       |
| <b>Resin content:</b> 33.96 %wt                                                                  | <b>Comp. density:</b> 1.566 g/cc |                                                                                                                                                   |                   |                       |                   |                 |       |
| <b>Fiber volume:</b> 57.71 %vol                                                                  |                                  |                                                                                                                                                   |                   |                       |                   |                 |       |
| <b>Ply count:</b> 20                                                                             |                                  |                                                                                                                                                   |                   |                       |                   |                 |       |
| <b>Test method:</b> ASTM D5766-11(2018)                                                          |                                  |                                                                                                                                                   |                   |                       |                   |                 |       |
| <b>Normalized by:</b> 0.007000                                                                   | in. CPT                          |                                                                                                                                                   |                   |                       |                   |                 |       |
|                                                                                                  |                                  | <b>CTA</b>                                                                                                                                        |                   | <b>RTA</b>            |                   | <b>ETW2</b>     |       |
| <b>Test Temperature [°F]</b>                                                                     | -65                              | 70                                                                                                                                                |                   | 250                   |                   |                 |       |
| <b>Moisture Conditioning</b>                                                                     | Ambient                          | Ambient                                                                                                                                           |                   | Equilibrium           |                   |                 |       |
| <b>Equilibrium at T, RH</b>                                                                      |                                  |                                                                                                                                                   |                   | 160F,85%              |                   |                 |       |
| <b>Source code prefixed by:</b> NTP3963Q1-TC-WEB-NIAR-T01-                                       | MSTX-X-CX-OHT3-CTA-X             | MSTX-X-CX-OHT3-RTA-X                                                                                                                              |                   | MSTX-X-CX-OHT3-ETW2-X |                   |                 |       |
|                                                                                                  | <b>Normalized</b>                | <b>Measured</b>                                                                                                                                   | <b>Normalized</b> | <b>Measured</b>       | <b>Normalized</b> | <b>Measured</b> |       |
| <b>OHT3 Strength [ksi]</b>                                                                       | <b>Mean</b>                      | 138.3                                                                                                                                             | 137.2             | 152.8                 | 151.7             | 223.7           | 222.1 |
|                                                                                                  | <b>Minimum</b>                   | 131.8                                                                                                                                             | 130.6             | 145.4                 | 144.4             | 215.9           | 216.1 |
|                                                                                                  | <b>Maximum</b>                   | 148.1                                                                                                                                             | 145.3             | 159.0                 | 159.4             | 231.1           | 227.5 |
|                                                                                                  | <b>C.V.(%)</b>                   | 2.971                                                                                                                                             | 2.779             | 2.367                 | 2.517             | 1.841           | 1.461 |
|                                                                                                  | <b>No. Specimens</b>             | 18                                                                                                                                                |                   | 18                    |                   | 18              |       |
|                                                                                                  | <b>No. Prepreg Lots</b>          | 3                                                                                                                                                 |                   | 3                     |                   | 3               |       |

## 2.5.20 “25/50/25” Filled-Hole Tension 1 Properties (FHT1)

|                                                                                                  |                      |                                                                                                                                       |                 |                      |                 |                       |                 |                       |                 |
|--------------------------------------------------------------------------------------------------|----------------------|---------------------------------------------------------------------------------------------------------------------------------------|-----------------|----------------------|-----------------|-----------------------|-----------------|-----------------------|-----------------|
| <b>Material:</b> Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch) |                      | <b>Filled-Hole Tension 1</b><br>Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K<br>Unidirectional Slit Tape (0.25 inch)<br>[45/0/-45/90]2S |                 |                      |                 |                       |                 |                       |                 |
| <b>Resin content:</b>                                                                            | 33.89 %wt            | <b>Comp. density:</b> 1.567 g/cc                                                                                                      |                 |                      |                 |                       |                 |                       |                 |
| <b>Fiber volume:</b>                                                                             | 57.82 %vol           |                                                                                                                                       |                 |                      |                 |                       |                 |                       |                 |
| <b>Ply count:</b>                                                                                | 16                   |                                                                                                                                       |                 |                      |                 |                       |                 |                       |                 |
| <b>Test method:</b>                                                                              | ASTM D6742-17        |                                                                                                                                       |                 |                      |                 |                       |                 |                       |                 |
| <b>Normalized by:</b>                                                                            | 0.007000             | in. CPT                                                                                                                               |                 |                      |                 |                       |                 |                       |                 |
|                                                                                                  |                      | <b>CTA</b>                                                                                                                            |                 | <b>RTA</b>           |                 | <b>ETW1</b>           |                 | <b>ETW2</b>           |                 |
| <b>Test Temperature [°F]</b>                                                                     |                      | -65                                                                                                                                   |                 | 70                   |                 | 180                   |                 | 250                   |                 |
| <b>Moisture Conditioning</b>                                                                     |                      | Ambient                                                                                                                               |                 | Ambient              |                 | Equilibrium           |                 | Equilibrium           |                 |
| <b>Equilibrium at T, RH</b>                                                                      |                      |                                                                                                                                       |                 |                      |                 | 160F,85%              |                 | 160F,85%              |                 |
| <b>Source code prefixed by:</b> NTP3963Q1-TC-WEB-NIAR-T01-                                       |                      | MSTX-X-CX-FHT1-CTA-X                                                                                                                  |                 | MSTX-X-CX-FHT1-RTA-X |                 | MSTX-X-CX-FHT1-ETW1-X |                 | MSTX-X-CX-FHT1-ETW2-X |                 |
|                                                                                                  |                      | <b>Normalized</b>                                                                                                                     | <b>Measured</b> | <b>Normalized</b>    | <b>Measured</b> | <b>Normalized</b>     | <b>Measured</b> | <b>Normalized</b>     | <b>Measured</b> |
| <b>FHT1 Strength [ksi]</b>                                                                       | <b>Mean</b>          | 87.50                                                                                                                                 | 87.53           | 93.35                | 93.29           | 101.9                 | 102.1           | 106.3                 | 106.2           |
|                                                                                                  | <b>Minimum</b>       | 82.79                                                                                                                                 | 83.22           | 87.61                | 87.87           | 99.75                 | 99.89           | 99.08                 | 98.76           |
|                                                                                                  | <b>Maximum</b>       | 89.52                                                                                                                                 | 90.30           | 99.75                | 99.75           | 105.6                 | 106.0           | 112.8                 | 112.1           |
|                                                                                                  | <b>C.V.(%)</b>       | 2.155                                                                                                                                 | 2.233           | 3.548                | 3.399           | 2.357                 | 2.455           | 3.302                 | 3.175           |
|                                                                                                  | <b>No. Specimens</b> | 18                                                                                                                                    |                 | 18                   |                 | 6                     |                 | 18                    |                 |
| <b>No. Prepreg Lots</b>                                                                          |                      | 3                                                                                                                                     |                 | 3                    |                 | 1                     |                 | 3                     |                 |

## 2.5.21 “10/80/10” Filled-Hole Tension 2 Properties (FHT2)

|                                                                                                  |                      |                                                                                                                                                           |                 |                      |                 |                       |                 |
|--------------------------------------------------------------------------------------------------|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|----------------------|-----------------|-----------------------|-----------------|
| <b>Material:</b> Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch) |                      | <b>Filled-Hole Tension 2</b><br>Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K<br>Unidirectional Slit Tape (0.25 inch)<br>[45/-45/90/45/-45/45/-45/0/45/-45]S |                 |                      |                 |                       |                 |
| <b>Resin content:</b>                                                                            | 33.80 %wt            | <b>Comp. density:</b> 1.567 g/cc                                                                                                                          |                 |                      |                 |                       |                 |
| <b>Fiber volume:</b>                                                                             | 57.89 %vol           |                                                                                                                                                           |                 |                      |                 |                       |                 |
| <b>Ply count:</b>                                                                                | 20                   |                                                                                                                                                           |                 |                      |                 |                       |                 |
| <b>Test method:</b> ASTM D6742-17                                                                |                      |                                                                                                                                                           |                 |                      |                 |                       |                 |
| <b>Normalized by:</b> 0.007000                                                                   |                      | in. CPT                                                                                                                                                   |                 |                      |                 |                       |                 |
|                                                                                                  |                      | <b>CTA</b>                                                                                                                                                |                 | <b>RTA</b>           |                 | <b>ETW2</b>           |                 |
| <b>Test Temperature [°F]</b>                                                                     |                      | -65                                                                                                                                                       |                 | 70                   |                 | 250                   |                 |
| <b>Moisture Conditioning</b>                                                                     |                      | Ambient                                                                                                                                                   |                 | Ambient              |                 | Equilibrium           |                 |
| <b>Equilibrium at T, RH</b>                                                                      |                      |                                                                                                                                                           |                 |                      |                 | 160F,85%              |                 |
| <b>Source code prefixed by:</b> NTP3963Q1-TC-WEB-NIAR-T01-                                       |                      | MSTX-X-CX-FHT2-CTA-X                                                                                                                                      |                 | MSTX-X-CX-FHT2-RTA-X |                 | MSTX-X-CX-FHT2-ETW2-X |                 |
|                                                                                                  |                      | <b>Normalized</b>                                                                                                                                         | <b>Measured</b> | <b>Normalized</b>    | <b>Measured</b> | <b>Normalized</b>     | <b>Measured</b> |
| <b>FHT2 Strength [ksi]</b>                                                                       | <b>Mean</b>          | 64.96                                                                                                                                                     | 64.82           | 62.59                | 62.44           | 49.55                 | 49.39           |
|                                                                                                  | <b>Minimum</b>       | 62.25                                                                                                                                                     | 62.36           | 60.25                | 60.29           | 48.13                 | 47.81           |
|                                                                                                  | <b>Maximum</b>       | 66.74                                                                                                                                                     | 66.67           | 63.83                | 63.98           | 52.43                 | 52.38           |
|                                                                                                  | <b>C.V.(%)</b>       | 1.972                                                                                                                                                     | 1.988           | 1.611                | 1.737           | 2.279                 | 2.463           |
|                                                                                                  | <b>No. Specimens</b> | 18                                                                                                                                                        |                 | 18                   |                 | 18                    |                 |
| <b>No. Prepreg Lots</b>                                                                          |                      | 3                                                                                                                                                         |                 | 3                    |                 | 3                     |                 |

## 2.5.22 “50/40/10” Filled-Hole Tension 3 Properties (FHT3)

|                                                                                                  |                      |                                                                                                                                                     |                 |                      |                 |                       |                 |
|--------------------------------------------------------------------------------------------------|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|----------------------|-----------------|-----------------------|-----------------|
| <b>Material:</b> Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch) |                      | <b>Filled-Hole Tension 3</b><br>Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K<br>Unidirectional Slit Tape (0.25 inch)<br>[45/90/-45/0/0/45/0/0/-45/0]S |                 |                      |                 |                       |                 |
| <b>Resin content:</b>                                                                            | 33.96 %wt            | <b>Comp. density:</b> 1.566 g/cc                                                                                                                    |                 |                      |                 |                       |                 |
| <b>Fiber volume:</b>                                                                             | 57.71 %vol           |                                                                                                                                                     |                 |                      |                 |                       |                 |
| <b>Ply count:</b>                                                                                | 20                   |                                                                                                                                                     |                 |                      |                 |                       |                 |
| <b>Test method:</b>                                                                              | ASTM D6742-17        |                                                                                                                                                     |                 |                      |                 |                       |                 |
| <b>Normalized by:</b>                                                                            | 0.007000             | in. CPT                                                                                                                                             |                 |                      |                 |                       |                 |
|                                                                                                  |                      | <b>CTA</b>                                                                                                                                          |                 | <b>RTA</b>           |                 | <b>ETW2</b>           |                 |
| <b>Test Temperature [°F]</b>                                                                     |                      | -65                                                                                                                                                 |                 | 70                   |                 | 250                   |                 |
| <b>Moisture Conditioning</b>                                                                     |                      | Ambient                                                                                                                                             |                 | Ambient              |                 | Equilibrium           |                 |
| <b>Equilibrium at T, RH</b>                                                                      |                      |                                                                                                                                                     |                 |                      |                 | 160F,85%              |                 |
| <b>Source code prefixed by:</b> NTP3963Q1-TC-WEB-NIAR-T01-                                       |                      | MSTX-X-CX-FHT3-CTA-X                                                                                                                                |                 | MSTX-X-CX-FHT3-RTA-X |                 | MSTX-X-CX-FHT3-ETW2-X |                 |
|                                                                                                  |                      | <b>Normalized</b>                                                                                                                                   | <b>Measured</b> | <b>Normalized</b>    | <b>Measured</b> | <b>Normalized</b>     | <b>Measured</b> |
| <b>FHT3 Strength [ksi]</b>                                                                       | <b>Mean</b>          | 134.9                                                                                                                                               | 134.5           | 148.1                | 147.4           | 176.4                 | 175.9           |
|                                                                                                  | <b>Minimum</b>       | 126.0                                                                                                                                               | 125.2           | 130.8                | 129.3           | 162.1                 | 162.8           |
|                                                                                                  | <b>Maximum</b>       | 143.2                                                                                                                                               | 144.4           | 157.6                | 158.0           | 214.5                 | 212.3           |
|                                                                                                  | <b>C.V.(%)</b>       | 4.263                                                                                                                                               | 4.348           | 4.644                | 4.823           | 7.600                 | 7.380           |
|                                                                                                  | <b>No. Specimens</b> | 18                                                                                                                                                  |                 | 18                   |                 | 20                    |                 |
| <b>No. Prepreg Lots</b>                                                                          |                      | 3                                                                                                                                                   |                 | 3                    |                 | 3                     |                 |

## 2.5.23 “25/50/25” Open-Hole Compression 1 Properties (OHC1)

|                                                                                                  |                      |                                                                                                                                         |                 |                       |                 |                       |                 |
|--------------------------------------------------------------------------------------------------|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------|-----------------|-----------------------|-----------------|-----------------------|-----------------|
| <b>Material:</b> Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch) |                      | <b>Open-Hole Compression 1</b><br>Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K<br>Unidirectional Slit Tape (0.25 inch)<br>[45/0/-45/90]3S |                 |                       |                 |                       |                 |
| <b>Resin content:</b>                                                                            | 33.93 %wt            |                                                                                                                                         |                 |                       |                 |                       |                 |
| <b>Fiber volume:</b>                                                                             | 57.71 %vol           |                                                                                                                                         |                 |                       |                 |                       |                 |
| <b>Ply count:</b>                                                                                | 24                   |                                                                                                                                         |                 |                       |                 |                       |                 |
| <b>Test method:</b> ASTM D6484-20                                                                |                      |                                                                                                                                         |                 |                       |                 |                       |                 |
| <b>Normalized by:</b>                                                                            | 0.007000             | in. CPT                                                                                                                                 |                 |                       |                 |                       |                 |
|                                                                                                  |                      | <b>RTA</b>                                                                                                                              |                 | <b>ETW1</b>           |                 | <b>ETW2</b>           |                 |
| <b>Test Temperature [°F]</b>                                                                     |                      | 70                                                                                                                                      |                 | 180                   |                 | 250                   |                 |
| <b>Moisture Conditioning</b>                                                                     |                      | Ambient                                                                                                                                 |                 | Equilibrium           |                 | Equilibrium           |                 |
| <b>Equilibrium at T, RH</b>                                                                      |                      |                                                                                                                                         |                 | 160F,85%              |                 | 160F,85%              |                 |
| <b>Source code prefixed by:</b> NTP3963Q1-TC-WEB-NIAR-T01-                                       |                      | MSTX-X-CX-OHC1-RTA-X                                                                                                                    |                 | MSTX-X-CX-OHC1-ETW1-X |                 | MSTX-X-CX-OHC1-ETW2-X |                 |
|                                                                                                  |                      | <b>Normalized</b>                                                                                                                       | <b>Measured</b> | <b>Normalized</b>     | <b>Measured</b> | <b>Normalized</b>     | <b>Measured</b> |
| <b>OHC1 Strength [ksi]</b>                                                                       | <b>Mean</b>          | 49.63                                                                                                                                   | 49.77           | 42.02                 | 42.48           | 35.74                 | 35.87           |
|                                                                                                  | <b>Minimum</b>       | 47.24                                                                                                                                   | 47.93           | 40.22                 | 40.88           | 33.97                 | 33.86           |
|                                                                                                  | <b>Maximum</b>       | 51.59                                                                                                                                   | 51.31           | 44.62                 | 45.38           | 39.09                 | 39.36           |
|                                                                                                  | <b>C.V.(%)</b>       | 2.363                                                                                                                                   | 2.131           | 3.406                 | 3.602           | 4.116                 | 4.036           |
|                                                                                                  | <b>No. Specimens</b> | 18                                                                                                                                      |                 | 6                     |                 | 18                    |                 |
| <b>No. Prepreg Lots</b>                                                                          |                      | 3                                                                                                                                       |                 | 1                     |                 | 3                     |                 |

## 2.5.24 “10/80/10” Open-Hole Compression 2 Properties (OHC2)

|                                                                                                  |                      |                                  |                 |                       |                 |                                                                                                                                                             |  |
|--------------------------------------------------------------------------------------------------|----------------------|----------------------------------|-----------------|-----------------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <b>Material:</b> Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch) |                      |                                  |                 |                       |                 | <b>Open-Hole Compression 2</b><br>Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K<br>Unidirectional Slit Tape (0.25 inch)<br>[45/-45/90/45/-45/45/-45/0/45/-45]S |  |
| <b>Resin content:</b>                                                                            | 33.80 %wt            | <b>Comp. density:</b> 1.567 g/cc |                 |                       |                 |                                                                                                                                                             |  |
| <b>Fiber volume:</b>                                                                             | 57.89 %vol           |                                  |                 |                       |                 |                                                                                                                                                             |  |
| <b>Ply count:</b>                                                                                | 20                   |                                  |                 |                       |                 |                                                                                                                                                             |  |
| <b>Test method:</b>                                                                              | ASTM D6484-20        |                                  |                 |                       |                 |                                                                                                                                                             |  |
| <b>Normalized by:</b>                                                                            | 0.007000             | in. CPT                          |                 |                       |                 |                                                                                                                                                             |  |
|                                                                                                  |                      | <b>RTA</b>                       |                 | <b>ETW2</b>           |                 |                                                                                                                                                             |  |
| <b>Test Temperature [°F]</b>                                                                     |                      | 70                               |                 | 250                   |                 |                                                                                                                                                             |  |
| <b>Moisture Conditioning</b>                                                                     |                      | Ambient                          |                 | Equilibrium           |                 |                                                                                                                                                             |  |
| <b>Equilibrium at T, RH</b>                                                                      |                      |                                  |                 | 160F,85%              |                 |                                                                                                                                                             |  |
| <b>Source code prefixed by:</b> NTP3963Q1-TC-WEB-NIAR-T01-                                       |                      | MSTX-X-CX-OHC2-RTA-X             |                 | MSTX-X-CX-OHC2-ETW2-X |                 |                                                                                                                                                             |  |
|                                                                                                  |                      | <b>Normalized</b>                | <b>Measured</b> | <b>Normalized</b>     | <b>Measured</b> |                                                                                                                                                             |  |
| <b>OHC2 Strength</b><br>[ksi]                                                                    | <b>Mean</b>          | 43.60                            | 43.50           | 26.99                 | 26.93           |                                                                                                                                                             |  |
|                                                                                                  | <b>Minimum</b>       | 40.45                            | 40.39           | 25.13                 | 24.97           |                                                                                                                                                             |  |
|                                                                                                  | <b>Maximum</b>       | 46.76                            | 46.52           | 28.94                 | 29.06           |                                                                                                                                                             |  |
|                                                                                                  | <b>C.V.(%)</b>       | 4.164                            | 4.243           | 3.962                 | 4.202           |                                                                                                                                                             |  |
|                                                                                                  | <b>No. Specimens</b> | 18                               |                 | 18                    |                 |                                                                                                                                                             |  |
| <b>No. Prepreg Lots</b>                                                                          |                      | 3                                |                 | 3                     |                 |                                                                                                                                                             |  |

## 2.5.25 “50/40/10” Open-Hole Compression 3 Properties (OHC3)

|                                                                                                  |                      |                                                                                                                                                       |                 |                       |                 |  |  |
|--------------------------------------------------------------------------------------------------|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-----------------------|-----------------|--|--|
| <b>Material:</b> Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch) |                      | <b>Open-Hole Compression 3</b><br>Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K<br>Unidirectional Slit Tape (0.25 inch)<br>[45/90/-45/0/0/45/0/0/-45/0]S |                 |                       |                 |  |  |
| <b>Resin content:</b>                                                                            | 33.96 %wt            | <b>Comp. density:</b> 1.566 g/cc                                                                                                                      |                 |                       |                 |  |  |
| <b>Fiber volume:</b>                                                                             | 57.71 %vol           |                                                                                                                                                       |                 |                       |                 |  |  |
| <b>Ply count:</b>                                                                                | 20                   |                                                                                                                                                       |                 |                       |                 |  |  |
| <b>Test method:</b>                                                                              | ASTM D6484-20        |                                                                                                                                                       |                 |                       |                 |  |  |
| <b>Normalized by:</b>                                                                            | 0.007000             | in. CPT                                                                                                                                               |                 |                       |                 |  |  |
|                                                                                                  |                      | <b>RTA</b>                                                                                                                                            |                 | <b>ETW2</b>           |                 |  |  |
| <b>Test Temperature [°F]</b>                                                                     |                      | 70                                                                                                                                                    |                 | 250                   |                 |  |  |
| <b>Moisture Conditioning</b>                                                                     |                      | Ambient                                                                                                                                               |                 | Equilibrium           |                 |  |  |
| <b>Equilibrium at T, RH</b>                                                                      |                      |                                                                                                                                                       |                 | 160F,85%              |                 |  |  |
| <b>Source code prefixed by:</b> NTP3963Q1-TC-WEB-NIAR-T01-                                       |                      | MSTX-X-CX-OHC3-RTA-X                                                                                                                                  |                 | MSTX-X-CX-OHC3-ETW2-X |                 |  |  |
|                                                                                                  |                      | <b>Normalized</b>                                                                                                                                     | <b>Measured</b> | <b>Normalized</b>     | <b>Measured</b> |  |  |
| <b>OHC3 Strength</b><br>[ksi]                                                                    | <b>Mean</b>          | 71.33                                                                                                                                                 | 71.04           | 49.09                 | 48.89           |  |  |
|                                                                                                  | <b>Minimum</b>       | 67.28                                                                                                                                                 | 67.08           | 44.32                 | 44.48           |  |  |
|                                                                                                  | <b>Maximum</b>       | 75.77                                                                                                                                                 | 75.40           | 52.83                 | 52.68           |  |  |
|                                                                                                  | <b>C.V.(%)</b>       | 3.348                                                                                                                                                 | 3.309           | 4.386                 | 4.139           |  |  |
|                                                                                                  | <b>No. Specimens</b> | 18                                                                                                                                                    |                 | 18                    |                 |  |  |
| <b>No. Prepreg Lots</b>                                                                          |                      | 3                                                                                                                                                     |                 | 3                     |                 |  |  |

## 2.5.26 “25/50/25” Filled-Hole Compression 1 Properties (FHC1)

|                                                                                                  |                      |                                                                                                                                           |                 |                       |                 |                       |                 |
|--------------------------------------------------------------------------------------------------|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-----------------------|-----------------|-----------------------|-----------------|
| <b>Material:</b> Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch) |                      | <b>Filled-Hole Compression 1</b><br>Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K<br>Unidirectional Slit Tape (0.25 inch)<br>[45/0/-45/90]3S |                 |                       |                 |                       |                 |
| <b>Resin content:</b>                                                                            | 33.93 %wt            |                                                                                                                                           |                 |                       |                 |                       |                 |
| <b>Fiber volume:</b>                                                                             | 57.71 %vol           |                                                                                                                                           |                 |                       |                 |                       |                 |
| <b>Ply count:</b>                                                                                | 24                   |                                                                                                                                           |                 |                       |                 |                       |                 |
| <b>Test method:</b> ASTM D6742-17                                                                |                      |                                                                                                                                           |                 |                       |                 |                       |                 |
| <b>Normalized by:</b>                                                                            | 0.007000             | in. CPT                                                                                                                                   |                 |                       |                 |                       |                 |
|                                                                                                  |                      | <b>RTA</b>                                                                                                                                |                 | <b>ETW1</b>           |                 | <b>ETW2</b>           |                 |
| <b>Test Temperature [°F]</b>                                                                     |                      | 70                                                                                                                                        |                 | 180                   |                 | 250                   |                 |
| <b>Moisture Conditioning</b>                                                                     |                      | Ambient                                                                                                                                   |                 | Equilibrium           |                 | Equilibrium           |                 |
| <b>Equilibrium at T, RH</b>                                                                      |                      |                                                                                                                                           |                 | 160F,85%              |                 | 160F,85%              |                 |
| <b>Source code prefixed by:</b> NTP3963Q1-TC-WEB-NIAR-T01-                                       |                      | MSTX-X-CX-FHC1-RTA-X                                                                                                                      |                 | MSTX-X-CX-FHC1-ETW1-X |                 | MSTX-X-CX-FHC1-ETW2-X |                 |
|                                                                                                  |                      | <b>Normalized</b>                                                                                                                         | <b>Measured</b> | <b>Normalized</b>     | <b>Measured</b> | <b>Normalized</b>     | <b>Measured</b> |
| <b>FHC1 Strength [ksi]</b>                                                                       | <b>Mean</b>          | 74.94                                                                                                                                     | 75.03           | 66.31                 | 66.92           | 50.52                 | 50.65           |
|                                                                                                  | <b>Minimum</b>       | 71.04                                                                                                                                     | 70.71           | 65.19                 | 66.27           | 45.36                 | 44.94           |
|                                                                                                  | <b>Maximum</b>       | 79.57                                                                                                                                     | 79.59           | 67.82                 | 68.08           | 54.05                 | 54.15           |
|                                                                                                  | <b>C.V.(%)</b>       | 3.440                                                                                                                                     | 3.718           | 1.811                 | 1.135           | 3.893                 | 4.180           |
|                                                                                                  | <b>No. Specimens</b> | 20                                                                                                                                        |                 | 6                     |                 | 18                    |                 |
| <b>No. Prepreg Lots</b>                                                                          |                      | 3                                                                                                                                         |                 | 1                     |                 | 3                     |                 |

## 2.5.27 “10/80/10” Filled-Hole Compression 2 Properties (FHC2)

|                                                                                                  |                      |                                  |                 |                                                                                                                                                               |                 |  |  |
|--------------------------------------------------------------------------------------------------|----------------------|----------------------------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|--|--|
| <b>Material:</b> Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch) |                      |                                  |                 | <b>Filled-Hole Compression 2</b><br>Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K<br>Unidirectional Slit Tape (0.25 inch)<br>[45/-45/90/45/-45/45/-45/0/45/-45]S |                 |  |  |
| <b>Resin content:</b> 33.80 %wt                                                                  |                      | <b>Comp. density:</b> 1.567 g/cc |                 |                                                                                                                                                               |                 |  |  |
| <b>Fiber volume:</b> 57.89 %vol                                                                  |                      |                                  |                 |                                                                                                                                                               |                 |  |  |
| <b>Ply count:</b> 20                                                                             |                      |                                  |                 |                                                                                                                                                               |                 |  |  |
| <b>Test method:</b> ASTM D6742-17                                                                |                      |                                  |                 |                                                                                                                                                               |                 |  |  |
| <b>Normalized by:</b> 0.007000                                                                   |                      | in. CPT                          |                 |                                                                                                                                                               |                 |  |  |
|                                                                                                  |                      | <b>RTA</b>                       |                 | <b>ETW2</b>                                                                                                                                                   |                 |  |  |
| <b>Test Temperature [°F]</b>                                                                     |                      | 70                               |                 | 250                                                                                                                                                           |                 |  |  |
| <b>Moisture Conditioning</b>                                                                     |                      | Ambient                          |                 | Equilibrium                                                                                                                                                   |                 |  |  |
| <b>Equilibrium at T, RH</b>                                                                      |                      |                                  |                 | 160F,85%                                                                                                                                                      |                 |  |  |
| <b>Source code prefixed by:</b> NTP3963Q1-TC-WEB-NIAR-T01-                                       |                      | MSTX-X-CX-FHC2-RTA-X             |                 | MSTX-X-CX-FHC2-ETW2-X                                                                                                                                         |                 |  |  |
|                                                                                                  |                      | <b>Normalized</b>                | <b>Measured</b> | <b>Normalized</b>                                                                                                                                             | <b>Measured</b> |  |  |
| <b>FHC2 Strength</b><br>[ksi]                                                                    | <b>Mean</b>          | 63.58                            | 63.35           | 36.75                                                                                                                                                         | 36.65           |  |  |
|                                                                                                  | <b>Minimum</b>       | 56.49                            | 56.07           | 33.48                                                                                                                                                         | 33.07           |  |  |
|                                                                                                  | <b>Maximum</b>       | 66.66                            | 66.47           | 39.49                                                                                                                                                         | 39.55           |  |  |
|                                                                                                  | <b>C.V.(%)</b>       | 3.975                            | 3.918           | 4.270                                                                                                                                                         | 4.292           |  |  |
|                                                                                                  | <b>No. Specimens</b> | 19                               |                 | 19                                                                                                                                                            |                 |  |  |
| <b>No. Prepreg Lots</b>                                                                          |                      | 3                                |                 | 3                                                                                                                                                             |                 |  |  |

## 2.5.28 “50/40/10” Filled-Hole Compression 3 Properties (FHC3)

|                                                            |                      |                                                                                 |                 |                                  |                 |                                                                                                                                                         |  |  |  |
|------------------------------------------------------------|----------------------|---------------------------------------------------------------------------------|-----------------|----------------------------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|
| <b>Material:</b>                                           |                      | Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch) |                 |                                  |                 | <b>Filled-Hole Compression 3</b><br>Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K<br>Unidirectional Slit Tape (0.25 inch)<br>[45/90/-45/0/0/45/0/0/-45/0]S |  |  |  |
| <b>Resin content:</b>                                      |                      | 33.96 %wt                                                                       |                 | <b>Comp. density:</b> 1.566 g/cc |                 |                                                                                                                                                         |  |  |  |
| <b>Fiber volume:</b>                                       |                      | 57.71 %vol                                                                      |                 |                                  |                 |                                                                                                                                                         |  |  |  |
| <b>Ply count:</b>                                          |                      | 20                                                                              |                 |                                  |                 |                                                                                                                                                         |  |  |  |
| <b>Test method:</b>                                        |                      | ASTM D6742-17                                                                   |                 |                                  |                 |                                                                                                                                                         |  |  |  |
| <b>Normalized by:</b>                                      |                      | 0.007000                                                                        |                 | in. CPT                          |                 |                                                                                                                                                         |  |  |  |
|                                                            |                      | <b>RTA</b>                                                                      |                 | <b>ETW2</b>                      |                 |                                                                                                                                                         |  |  |  |
| <b>Test Temperature [°F]</b>                               |                      | 70                                                                              |                 | 250                              |                 |                                                                                                                                                         |  |  |  |
| <b>Moisture Conditioning</b>                               |                      | Ambient                                                                         |                 | Equilibrium                      |                 |                                                                                                                                                         |  |  |  |
| <b>Equilibrium at T, RH</b>                                |                      |                                                                                 |                 | 160F,85%                         |                 |                                                                                                                                                         |  |  |  |
| <b>Source code prefixed by:</b> NTP3963Q1-TC-WEB-NIAR-T01- |                      | MSTX-X-CX-FHC3-RTA-X                                                            |                 | MSTX-X-CX-FHC3-ETW2-X            |                 |                                                                                                                                                         |  |  |  |
|                                                            |                      | <b>Normalized</b>                                                               | <b>Measured</b> | <b>Normalized</b>                | <b>Measured</b> |                                                                                                                                                         |  |  |  |
| <b>FHC3 Strength [ksi]</b>                                 | <b>Mean</b>          | 97.69                                                                           | 97.21           | 62.96                            | 62.65           |                                                                                                                                                         |  |  |  |
|                                                            | <b>Minimum</b>       | 93.50                                                                           | 93.39           | 57.25                            | 56.97           |                                                                                                                                                         |  |  |  |
|                                                            | <b>Maximum</b>       | 101.6                                                                           | 101.0           | 67.55                            | 67.11           |                                                                                                                                                         |  |  |  |
|                                                            | <b>C.V.(%)</b>       | 2.395                                                                           | 2.389           | 5.646                            | 5.561           |                                                                                                                                                         |  |  |  |
|                                                            | <b>No. Specimens</b> | 18                                                                              |                 | 18                               |                 |                                                                                                                                                         |  |  |  |
| <b>No. Prepreg Lots</b>                                    |                      | 3                                                                               |                 | 3                                |                 |                                                                                                                                                         |  |  |  |

## 2.5.29 “25/50/25” Single-Shear Bearing 1 Properties (SSB1, Proc. C)

|                                                                                                  |                      |                                                                                                                                                 |                 |                       |                 |                       |                 |  |  |
|--------------------------------------------------------------------------------------------------|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-----------------------|-----------------|-----------------------|-----------------|--|--|
| <b>Material:</b> Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch) |                      | <b>Single-Shear Bearing 1, Proc. C</b><br>Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K<br>Unidirectional Slit Tape (0.25 inch)<br>[45/0/-45/90]2S |                 |                       |                 |                       |                 |  |  |
| <b>Resin content:</b>                                                                            | 33.89 %wt            | <b>Comp. density:</b> 1.567 g/cc                                                                                                                |                 |                       |                 |                       |                 |  |  |
| <b>Fiber volume:</b>                                                                             | 57.82 %vol           |                                                                                                                                                 |                 |                       |                 |                       |                 |  |  |
| <b>Ply count:</b>                                                                                | 16                   |                                                                                                                                                 |                 |                       |                 |                       |                 |  |  |
| <b>Test method:</b> ASTM D5961-17, Procedure C                                                   |                      |                                                                                                                                                 |                 |                       |                 |                       |                 |  |  |
| <b>Normalized by:</b>                                                                            | 0.007000             | in. CPT                                                                                                                                         |                 |                       |                 |                       |                 |  |  |
|                                                                                                  |                      | <b>RTA</b>                                                                                                                                      |                 | <b>ETW1</b>           |                 | <b>ETW2</b>           |                 |  |  |
| <b>Test Temperature [°F]</b>                                                                     |                      | 70                                                                                                                                              |                 | 180                   |                 | 250                   |                 |  |  |
| <b>Moisture Conditioning</b>                                                                     |                      | Ambient                                                                                                                                         |                 | Equilibrium           |                 | Equilibrium           |                 |  |  |
| <b>Equilibrium at T, RH</b>                                                                      |                      |                                                                                                                                                 |                 | 160F,85%              |                 | 160F,85%              |                 |  |  |
| <b>Source code prefixed by:</b> NTP3963Q1-TC-WEB-NIAR-T01-                                       |                      | MSTX-X-CX-SSB1-RTA-X                                                                                                                            |                 | MSTX-X-CX-SSB1-ETW1-X |                 | MSTX-X-CX-SSB1-ETW2-X |                 |  |  |
|                                                                                                  |                      | <b>Normalized</b>                                                                                                                               | <b>Measured</b> | <b>Normalized</b>     | <b>Measured</b> | <b>Normalized</b>     | <b>Measured</b> |  |  |
| <b>SSB1, Proc. C</b><br><b>2% Offset Strength [ksi]</b>                                          | <b>Mean</b>          | 109.2                                                                                                                                           | 108.8           | 111.6                 | 111.6           | 93.67                 | 93.31           |  |  |
|                                                                                                  | <b>Minimum</b>       | 105.3                                                                                                                                           | 104.3           | 108.4                 | 108.2           | 83.37                 | 82.48           |  |  |
|                                                                                                  | <b>Maximum</b>       | 117.3                                                                                                                                           | 117.4           | 119.5                 | 119.8           | 110.2                 | 109.9           |  |  |
|                                                                                                  | <b>C.V.(%)</b>       | 2.834                                                                                                                                           | 2.986           | 3.774                 | 3.873           | 9.208                 | 9.479           |  |  |
|                                                                                                  | <b>No. Specimens</b> | 18                                                                                                                                              |                 | 6                     |                 | 18                    |                 |  |  |
| <b>No. Prepreg Lots</b>                                                                          |                      | 3                                                                                                                                               |                 | 1                     |                 | 3                     |                 |  |  |
| <b>SSB1, Proc. C</b><br><b>Ultimate Strength [ksi]</b>                                           | <b>Mean</b>          | 153.1                                                                                                                                           | 152.6           | 130.2                 | 130.3           | 112.0                 | 111.5           |  |  |
|                                                                                                  | <b>Minimum</b>       | 146.1                                                                                                                                           | 144.4           | 126.3                 | 126.7           | 104.1                 | 103.9           |  |  |
|                                                                                                  | <b>Maximum</b>       | 163.3                                                                                                                                           | 163.1           | 134.7                 | 135.0           | 124.4                 | 124.7           |  |  |
|                                                                                                  | <b>C.V.(%)</b>       | 3.299                                                                                                                                           | 3.600           | 2.234                 | 2.154           | 5.827                 | 6.131           |  |  |
|                                                                                                  | <b>No. Specimens</b> | 18                                                                                                                                              |                 | 6                     |                 | 18                    |                 |  |  |
| <b>No. Prepreg Lots</b>                                                                          |                      | 3                                                                                                                                               |                 | 1                     |                 | 3                     |                 |  |  |
| <b>SSB1, Proc. C</b><br><b>Chord Modulus [Msi]</b>                                               | <b>Mean</b>          | 1.878                                                                                                                                           | 1.872           | 2.060                 | 2.061           | 1.721                 | 1.715           |  |  |
|                                                                                                  | <b>Minimum</b>       | 1.632                                                                                                                                           | 1.623           | 1.940                 | 1.944           | 1.429                 | 1.415           |  |  |
|                                                                                                  | <b>Maximum</b>       | 2.080                                                                                                                                           | 2.078           | 2.238                 | 2.232           | 2.173                 | 2.175           |  |  |
|                                                                                                  | <b>C.V.(%)</b>       | 6.307                                                                                                                                           | 6.236           | 6.278                 | 6.080           | 13.65                 | 13.87           |  |  |
|                                                                                                  | <b>No. Specimens</b> | 18                                                                                                                                              |                 | 6                     |                 | 18                    |                 |  |  |
| <b>No. Prepreg Lots</b>                                                                          |                      | 3                                                                                                                                               |                 | 1                     |                 | 3                     |                 |  |  |

## 2.5.30 "10/80/10" Single-Shear Bearing 2 Properties (SSB2, Proc. C)

|                                                            |                      |                                                                                 |                 |                                  |                 |                                                                                                                                                                     |  |  |  |
|------------------------------------------------------------|----------------------|---------------------------------------------------------------------------------|-----------------|----------------------------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|
| <b>Material:</b>                                           |                      | Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch) |                 |                                  |                 | <b>Single-Shear Bearing 2, Proc. C</b><br>Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K<br>Unidirectional Slit Tape (0.25 inch)<br>[45/-45/90/45/-45/45/-45/0/45/-45]S |  |  |  |
| <b>Resin content:</b>                                      |                      | 33.80 %wt                                                                       |                 | <b>Comp. density:</b> 1.567 g/cc |                 |                                                                                                                                                                     |  |  |  |
| <b>Fiber volume:</b>                                       |                      | 57.89 %vol                                                                      |                 |                                  |                 |                                                                                                                                                                     |  |  |  |
| <b>Ply count:</b>                                          |                      | 20                                                                              |                 |                                  |                 |                                                                                                                                                                     |  |  |  |
| <b>Test method:</b>                                        |                      | ASTMD5961-17, Procedure C                                                       |                 |                                  |                 |                                                                                                                                                                     |  |  |  |
| <b>Normalized by:</b>                                      |                      | 0.007000                                                                        |                 | in. CPT                          |                 |                                                                                                                                                                     |  |  |  |
|                                                            |                      | <b>RTA</b>                                                                      |                 | <b>ETW2</b>                      |                 |                                                                                                                                                                     |  |  |  |
| <b>Test Temperature [°F]</b>                               |                      | 70                                                                              |                 | 250                              |                 |                                                                                                                                                                     |  |  |  |
| <b>Moisture Conditioning</b>                               |                      | Ambient                                                                         |                 | Equilibrium                      |                 |                                                                                                                                                                     |  |  |  |
| <b>Equilibrium at T, RH</b>                                |                      |                                                                                 |                 | 160F,85%                         |                 |                                                                                                                                                                     |  |  |  |
| <b>Source code prefixed by:</b> NTP3963Q1-TC-WEB-NIAR-T01- |                      | MSTX-X-CX-SSB2-RTA-X                                                            |                 | MSTX-X-CX-SSB2-ETW2-X            |                 |                                                                                                                                                                     |  |  |  |
|                                                            |                      | <b>Normalized</b>                                                               | <b>Measured</b> | <b>Normalized</b>                | <b>Measured</b> |                                                                                                                                                                     |  |  |  |
| <b>SSB2, Proc. C</b><br><b>2% Offset Strength [ksi]</b>    | <b>Mean</b>          | 114.2                                                                           | 113.6           | 93.16                            | 92.73           |                                                                                                                                                                     |  |  |  |
|                                                            | <b>Minimum</b>       | 108.2                                                                           | 107.0           | 80.04                            | 80.04           |                                                                                                                                                                     |  |  |  |
|                                                            | <b>Maximum</b>       | 119.5                                                                           | 119.1           | 102.2                            | 101.1           |                                                                                                                                                                     |  |  |  |
|                                                            | <b>C.V.(%)</b>       | 2.725                                                                           | 2.715           | 6.953                            | 6.773           |                                                                                                                                                                     |  |  |  |
|                                                            | <b>No. Specimens</b> | 18                                                                              |                 | 18                               |                 |                                                                                                                                                                     |  |  |  |
| <b>No. Prepreg Lots</b>                                    |                      | 3                                                                               |                 | 3                                |                 |                                                                                                                                                                     |  |  |  |
| <b>SSB2, Proc. C</b><br><b>Ultimate Strength [ksi]</b>     | <b>Mean</b>          | 147.6                                                                           | 146.8           | 109.4                            | 108.9           |                                                                                                                                                                     |  |  |  |
|                                                            | <b>Minimum</b>       | 141.7                                                                           | 141.3           | 100.7                            | 100.7           |                                                                                                                                                                     |  |  |  |
|                                                            | <b>Maximum</b>       | 156.5                                                                           | 156.1           | 115.3                            | 114.0           |                                                                                                                                                                     |  |  |  |
|                                                            | <b>C.V.(%)</b>       | 2.441                                                                           | 2.318           | 4.091                            | 3.826           |                                                                                                                                                                     |  |  |  |
|                                                            | <b>No. Specimens</b> | 18                                                                              |                 | 18                               |                 |                                                                                                                                                                     |  |  |  |
| <b>No. Prepreg Lots</b>                                    |                      | 3                                                                               |                 | 3                                |                 |                                                                                                                                                                     |  |  |  |
| <b>SSB2, Proc. C</b><br><b>Chord Modulus [Msi]</b>         | <b>Mean</b>          | 1.318                                                                           | 1.310           | 1.260                            | 1.254           |                                                                                                                                                                     |  |  |  |
|                                                            | <b>Minimum</b>       | 1.252                                                                           | 1.249           | 1.051                            | 1.050           |                                                                                                                                                                     |  |  |  |
|                                                            | <b>Maximum</b>       | 1.370                                                                           | 1.366           | 1.423                            | 1.414           |                                                                                                                                                                     |  |  |  |
|                                                            | <b>C.V.(%)</b>       | 2.110                                                                           | 2.191           | 10.01                            | 9.790           |                                                                                                                                                                     |  |  |  |
|                                                            | <b>No. Specimens</b> | 18                                                                              |                 | 18                               |                 |                                                                                                                                                                     |  |  |  |
| <b>No. Prepreg Lots</b>                                    |                      | 3                                                                               |                 | 3                                |                 |                                                                                                                                                                     |  |  |  |

## 2.5.31 "50/40/10" Single-Shear Bearing 3 Properties (SSB3, Proc. C)

|                                                                                                  |                                   |                                                                                                                                                               |                 |                       |                 |
|--------------------------------------------------------------------------------------------------|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-----------------------|-----------------|
| <b>Material:</b> Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch) |                                   | <b>Single-Shear Bearing 3, Proc. C</b><br>Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K<br>Unidirectional Slit Tape (0.25 inch)<br>[45/90/-45/0/0/45/0/0/-45/0]S |                 |                       |                 |
| <b>Resin content:</b>                                                                            | 33.96 %wt                         | <b>Comp. density:</b> 1.566 g/cc                                                                                                                              |                 |                       |                 |
| <b>Fiber volume:</b>                                                                             | 57.71 %vol                        |                                                                                                                                                               |                 |                       |                 |
| <b>Ply count:</b>                                                                                | 20                                |                                                                                                                                                               |                 |                       |                 |
| <b>Test method:</b> ASTM D5961-17, Procedure C                                                   |                                   |                                                                                                                                                               |                 |                       |                 |
| <b>Normalized by:</b> 0.007000                                                                   |                                   | in. CPT                                                                                                                                                       |                 |                       |                 |
|                                                                                                  |                                   | <b>RTA</b>                                                                                                                                                    |                 | <b>ETW2</b>           |                 |
| <b>Test Temperature [°F]</b>                                                                     |                                   | 70                                                                                                                                                            |                 | 250                   |                 |
| <b>Moisture Conditioning</b>                                                                     |                                   | Ambient                                                                                                                                                       |                 | Equilibrium           |                 |
| <b>Equilibrium at T, RH</b>                                                                      |                                   |                                                                                                                                                               |                 | 160F,85%              |                 |
| <b>Source code prefixed by:</b> NTP3963Q1-TC-WEB-NIAR-T01-                                       |                                   | MSTX-X-CX-SSB3-RTA-X                                                                                                                                          |                 | MSTX-X-CX-SSB3-ETW2-X |                 |
|                                                                                                  |                                   | <b>Normalized</b>                                                                                                                                             | <b>Measured</b> | <b>Normalized</b>     | <b>Measured</b> |
| <b>SSB3, Proc. C</b>                                                                             | <b>Mean</b>                       | 113.1                                                                                                                                                         | 112.3           | 87.34                 | 86.77           |
|                                                                                                  | <b>Minimum</b>                    | 107.0                                                                                                                                                         | 104.8           | 74.92                 | 73.92           |
|                                                                                                  | <b>Maximum</b>                    | 120.7                                                                                                                                                         | 119.7           | 103.6                 | 102.3           |
|                                                                                                  | <b>2% Offset Strength C.V.(%)</b> | 3.070                                                                                                                                                         | 3.162           | 10.15                 | 10.11           |
|                                                                                                  | <b>No. Specimens</b>              | 18                                                                                                                                                            |                 | 18                    |                 |
|                                                                                                  | <b>No. Prepreg Lots</b>           | 3                                                                                                                                                             |                 | 3                     |                 |
| <b>SSB3, Proc. C</b>                                                                             | <b>Mean</b>                       | 147.8                                                                                                                                                         | 146.8           | 105.9                 | 105.2           |
|                                                                                                  | <b>Minimum</b>                    | 142.8                                                                                                                                                         | 140.9           | 94.16                 | 93.30           |
|                                                                                                  | <b>Maximum</b>                    | 154.5                                                                                                                                                         | 154.6           | 116.2                 | 115.3           |
|                                                                                                  | <b>Ultimate Strength C.V.(%)</b>  | 2.719                                                                                                                                                         | 2.876           | 7.913                 | 7.963           |
|                                                                                                  | <b>No. Specimens</b>              | 18                                                                                                                                                            |                 | 18                    |                 |
|                                                                                                  | <b>No. Prepreg Lots</b>           | 3                                                                                                                                                             |                 | 3                     |                 |
| <b>SSB3, Proc. C</b>                                                                             | <b>Mean</b>                       | 1.768                                                                                                                                                         | 1.756           | 1.682                 | 1.671           |
|                                                                                                  | <b>Minimum</b>                    | 1.632                                                                                                                                                         | 1.617           | 1.451                 | 1.449           |
|                                                                                                  | <b>Maximum</b>                    | 1.860                                                                                                                                                         | 1.861           | 1.988                 | 1.972           |
|                                                                                                  | <b>Chord Modulus C.V.(%)</b>      | 3.382                                                                                                                                                         | 3.714           | 10.83                 | 10.67           |
|                                                                                                  | <b>No. Specimens</b>              | 18                                                                                                                                                            |                 | 18                    |                 |
|                                                                                                  | <b>No. Prepreg Lots</b>           | 3                                                                                                                                                             |                 | 3                     |                 |

## 2.5.32 “25/50/25” Compression After Impact 1 Properties (CAI1)

|                                                                                                  |                        |                                                                                                                                            |  |  |  |  |  |
|--------------------------------------------------------------------------------------------------|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|
| <b>Material:</b> Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch) |                        | <b>Compression After Impact 1</b><br>Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K<br>Unidirectional Slit Tape (0.25 inch)<br>[45/0/-45/90]3S |  |  |  |  |  |
| <b>Resin content:</b>                                                                            | 34.37 %wt              | <b>Comp. density:</b> 1.566 g/cc                                                                                                           |  |  |  |  |  |
| <b>Fiber volume:</b>                                                                             | 57.35 %vol             |                                                                                                                                            |  |  |  |  |  |
| <b>Ply count:</b>                                                                                | 24                     |                                                                                                                                            |  |  |  |  |  |
| <b>Test method:</b>                                                                              | ASTM D7136-20/D7137-17 |                                                                                                                                            |  |  |  |  |  |
| <b>Normalized by:</b>                                                                            | 0.007000               | in. CPT                                                                                                                                    |  |  |  |  |  |
| RTA                                                                                              |                        |                                                                                                                                            |  |  |  |  |  |
| <b>Test Temperature [°F]</b>                                                                     | 70                     |                                                                                                                                            |  |  |  |  |  |
| <b>Moisture Conditioning</b>                                                                     | Ambient                |                                                                                                                                            |  |  |  |  |  |
| <b>Equilibrium at T, RH</b>                                                                      |                        |                                                                                                                                            |  |  |  |  |  |
| <b>Source code prefixed by:</b> NTP3963Q1-TC-WEB-NIAR-T01                                        | MSTX-X-CX-CAI1-RTA-X   |                                                                                                                                            |  |  |  |  |  |
|                                                                                                  | <b>Normalized</b>      | <b>Measured</b>                                                                                                                            |  |  |  |  |  |
| <b>Mean</b>                                                                                      | 49.52                  | 50.24                                                                                                                                      |  |  |  |  |  |
| <b>Minimum</b>                                                                                   | 45.03                  | 45.66                                                                                                                                      |  |  |  |  |  |
| <b>Maximum</b>                                                                                   | 52.83                  | 53.55                                                                                                                                      |  |  |  |  |  |
| <b>CAI1 Strength [ksi] C.V.(%)</b>                                                               | 5.931                  | 5.917                                                                                                                                      |  |  |  |  |  |
| <b>No. Specimens</b>                                                                             | 6                      |                                                                                                                                            |  |  |  |  |  |
| <b>No. Prepreg Lots</b>                                                                          | 1                      |                                                                                                                                            |  |  |  |  |  |

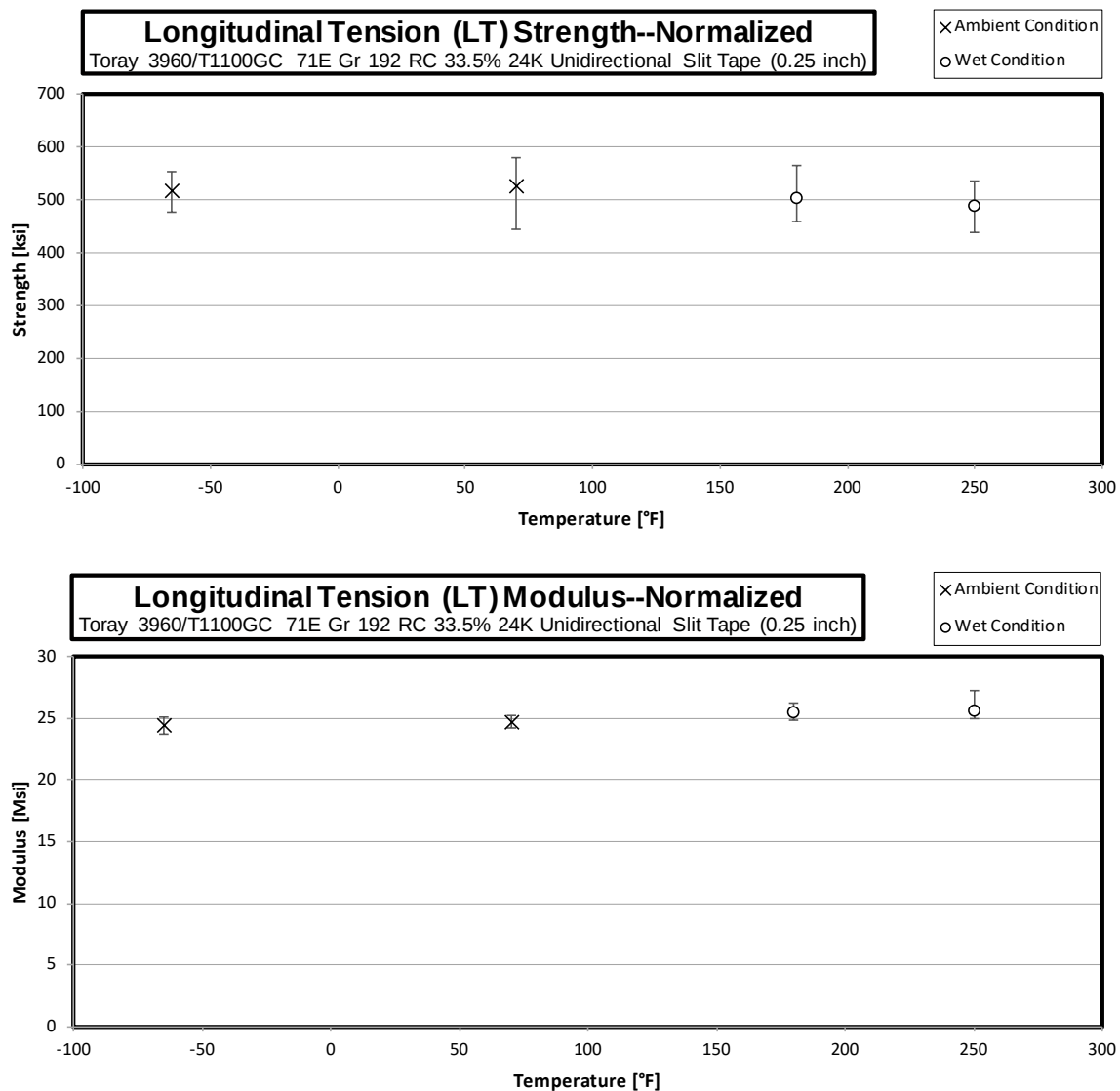
## 2.5.33 “100/0/0” Interlaminar Tension Properties (ILT)

|                                 |  |                                                                                 |  |                       |  |                                                                                                                            |  |                      |  |                   |  |
|---------------------------------|--|---------------------------------------------------------------------------------|--|-----------------------|--|----------------------------------------------------------------------------------------------------------------------------|--|----------------------|--|-------------------|--|
| <b>Material:</b>                |  | Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch) |  |                       |  | <b>Interlaminar Tension</b><br>Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K<br>Unidirectional Slit Tape (0.25 inch)<br>[0]22 |  |                      |  |                   |  |
| <b>Resin content:</b>           |  | 31.37 %wt                                                                       |  | <b>Comp. density:</b> |  | 1.588 g/cc                                                                                                                 |  |                      |  |                   |  |
| <b>Fiber volume:</b>            |  | 60.81 %vol                                                                      |  |                       |  |                                                                                                                            |  |                      |  |                   |  |
| <b>Ply count:</b>               |  | 22                                                                              |  |                       |  |                                                                                                                            |  |                      |  |                   |  |
| <b>Test method:</b>             |  | ASTM D6415-06a(2013)                                                            |  |                       |  |                                                                                                                            |  |                      |  |                   |  |
| <b>Normalized by:</b>           |  | NA                                                                              |  |                       |  |                                                                                                                            |  |                      |  |                   |  |
|                                 |  | <b>CTA</b>                                                                      |  | <b>RTA</b>            |  | <b>ETW2</b>                                                                                                                |  |                      |  |                   |  |
| <b>Test Temperature [°F]</b>    |  | -65                                                                             |  | 70                    |  | 250                                                                                                                        |  |                      |  |                   |  |
| <b>Moisture Conditioning</b>    |  | Ambient                                                                         |  | Ambient               |  | Equilibrium                                                                                                                |  |                      |  |                   |  |
| <b>Equilibrium at T, RH</b>     |  |                                                                                 |  |                       |  | 160F,85%                                                                                                                   |  |                      |  |                   |  |
| <b>Source code prefixed by:</b> |  | NTP3963Q1-TC-WEB-NIAR-T01-                                                      |  | MSTX-X-CX-ILT-CTA-X   |  | MSTX-X-CX-ILT-RTA-X                                                                                                        |  | MSTX-X-CX-ILT-ETW2-X |  |                   |  |
|                                 |  | <b>Normalized</b>                                                               |  | <b>Measured</b>       |  | <b>Normalized</b>                                                                                                          |  | <b>Measured</b>      |  | <b>Normalized</b> |  |
|                                 |  |                                                                                 |  |                       |  |                                                                                                                            |  |                      |  |                   |  |
| <b>CBS [lb]</b>                 |  |                                                                                 |  |                       |  |                                                                                                                            |  |                      |  |                   |  |
| <b>Mean</b>                     |  | 640.3                                                                           |  | 482.2                 |  | 111.4                                                                                                                      |  |                      |  |                   |  |
| <b>Minimum</b>                  |  | 513.6                                                                           |  | 463.6                 |  | 109.1                                                                                                                      |  |                      |  |                   |  |
| <b>Maximum</b>                  |  | 775.1                                                                           |  | 500.6                 |  | 113.9                                                                                                                      |  |                      |  |                   |  |
| <b>C.V.(%)</b>                  |  | 12.50                                                                           |  | 3.424                 |  | 1.819                                                                                                                      |  |                      |  |                   |  |
| <b>No. Specimens</b>            |  | 8                                                                               |  | 6                     |  | 6                                                                                                                          |  |                      |  |                   |  |
| <b>No. Prepreg Lots</b>         |  | 1                                                                               |  | 1                     |  | 1                                                                                                                          |  |                      |  |                   |  |
|                                 |  |                                                                                 |  |                       |  |                                                                                                                            |  |                      |  |                   |  |
| <b>ILT [ksi]</b>                |  |                                                                                 |  |                       |  |                                                                                                                            |  |                      |  |                   |  |
| <b>Mean</b>                     |  | 21.89                                                                           |  | 16.37                 |  | 3.423                                                                                                                      |  |                      |  |                   |  |
| <b>Minimum</b>                  |  | 17.55                                                                           |  | 15.83                 |  | 3.361                                                                                                                      |  |                      |  |                   |  |
| <b>Maximum</b>                  |  | 26.78                                                                           |  | 17.10                 |  | 3.525                                                                                                                      |  |                      |  |                   |  |
| <b>C.V.(%)</b>                  |  | 13.18                                                                           |  | 3.007                 |  | 1.809                                                                                                                      |  |                      |  |                   |  |
| <b>No. Specimens</b>            |  | 8                                                                               |  | 6                     |  | 6                                                                                                                          |  |                      |  |                   |  |
| <b>No. Prepreg Lots</b>         |  | 1                                                                               |  | 1                     |  | 1                                                                                                                          |  |                      |  |                   |  |

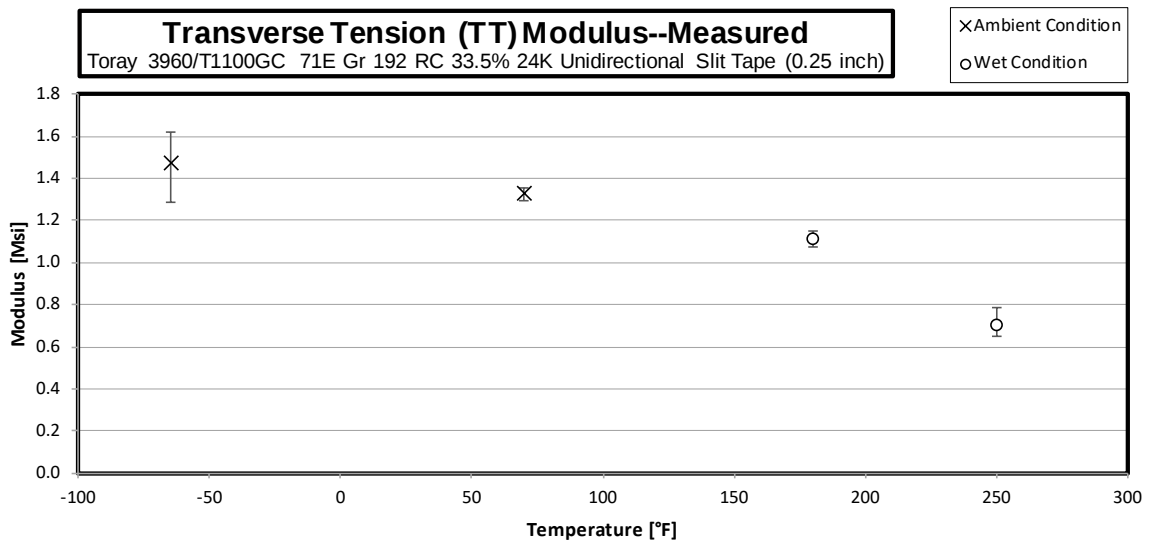
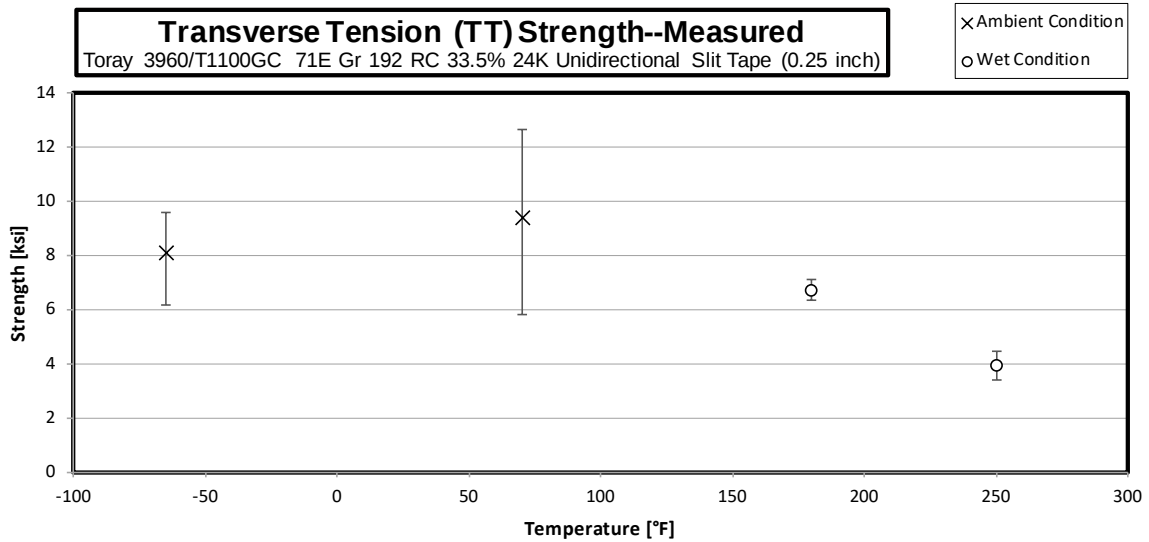
### 3. Individual Test Charts

The material property test charts display a combination of all three batches and both cure cycles for a particular property as a function of test temperature for ambient and wet test conditions. The average is plotted for each material property and the minimum to maximum range is represented by vertical bars. charts combine all three batches of data and plot the minimum and maximum modulus and strength range based on the test temperature.

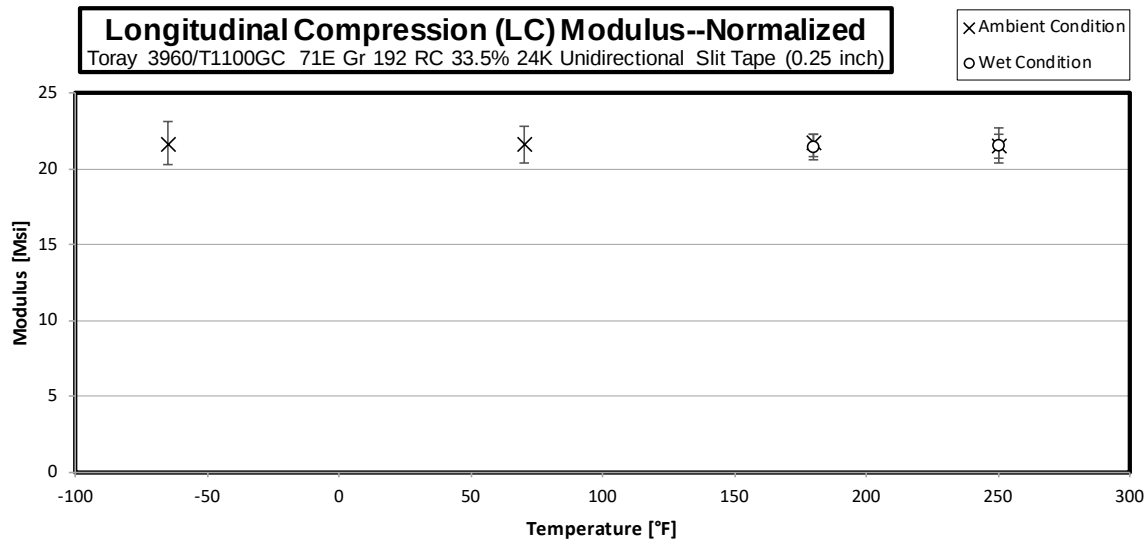
#### 3.1 Longitudinal Tension Properties (LT)



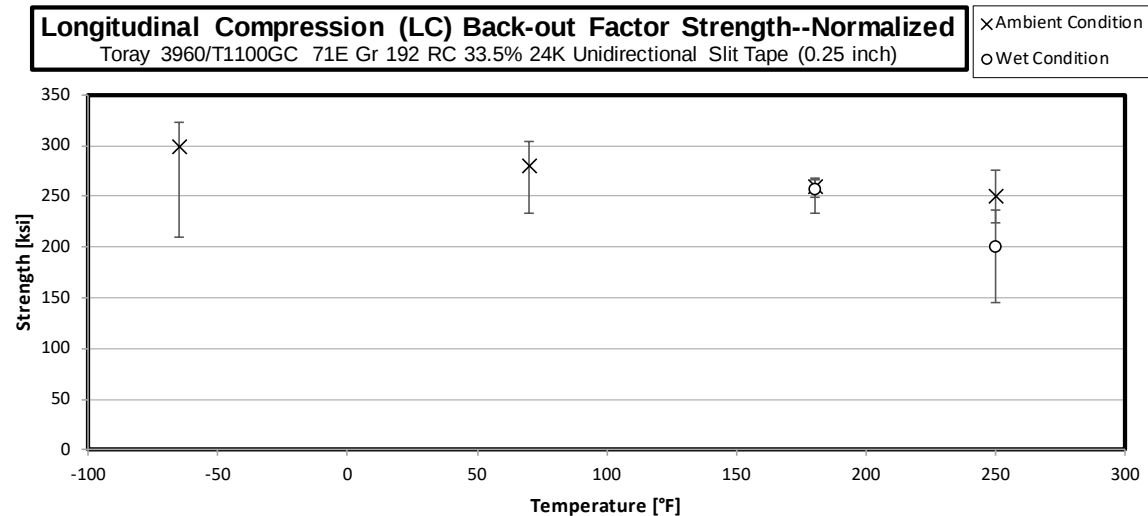
### 3.2 Transverse Tension Properties (TT)



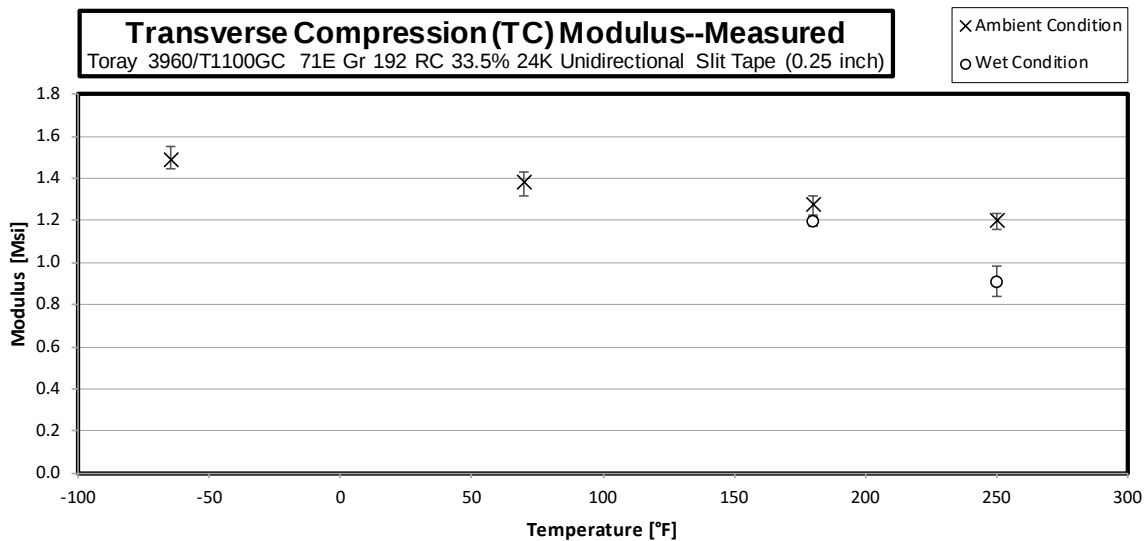
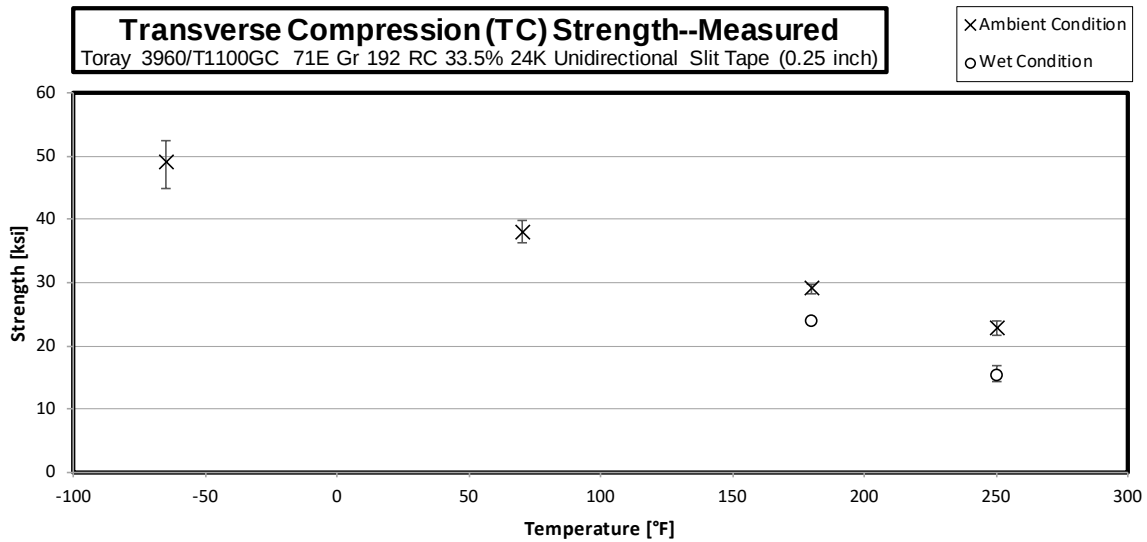
### 3.3 Longitudinal Compression Properties (LC)



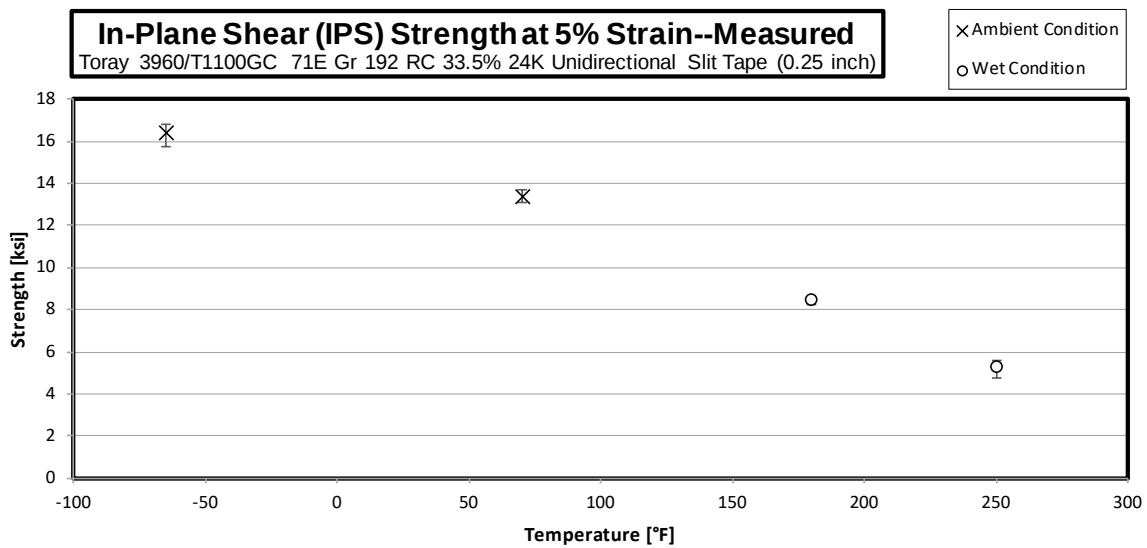
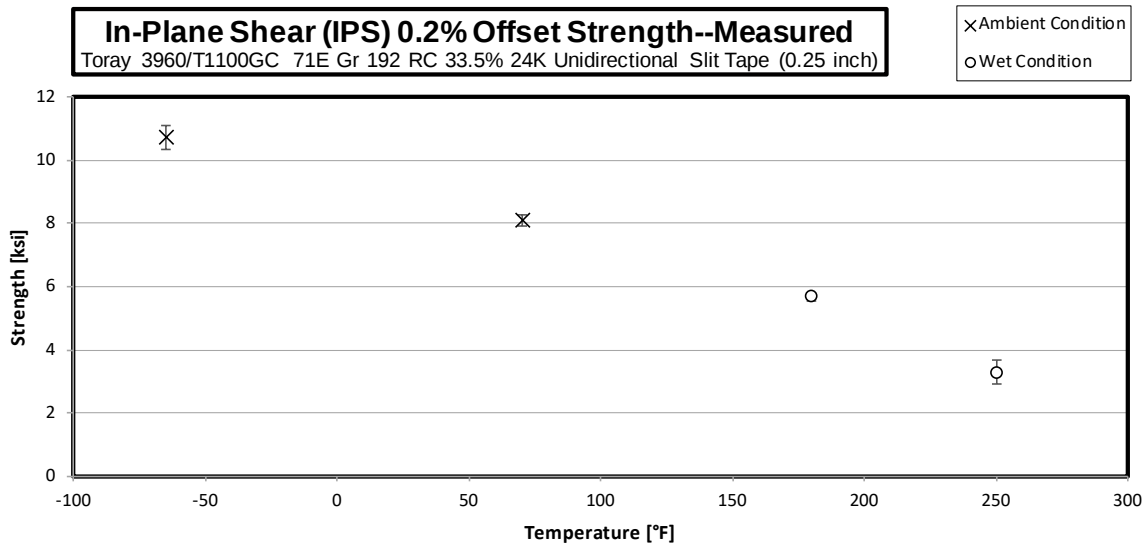
### 3.4 Longitudinal Compression Back-out Factor Properties

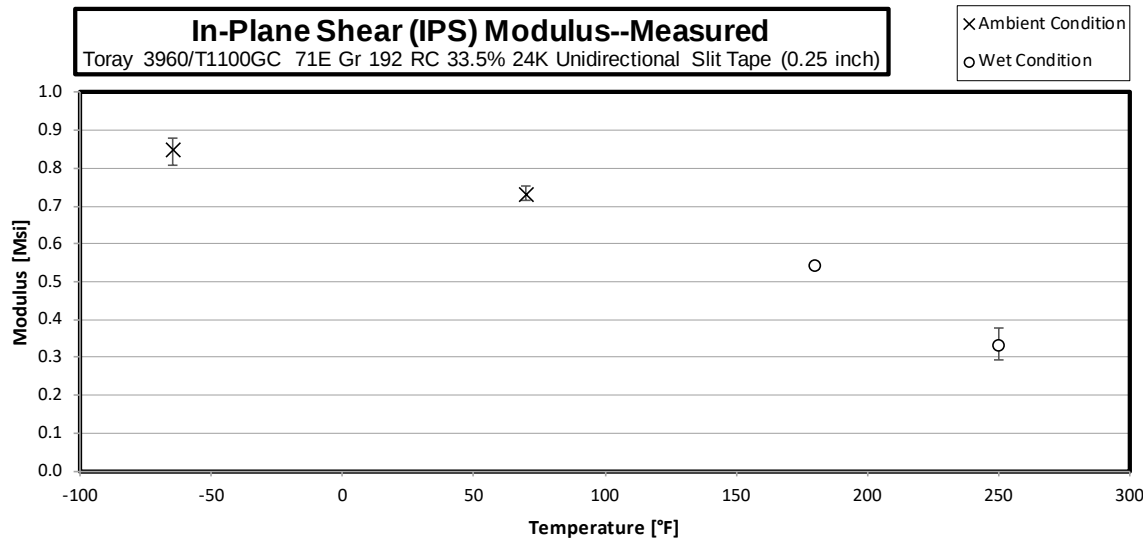


### 3.5 Transverse Compression Properties (TC)

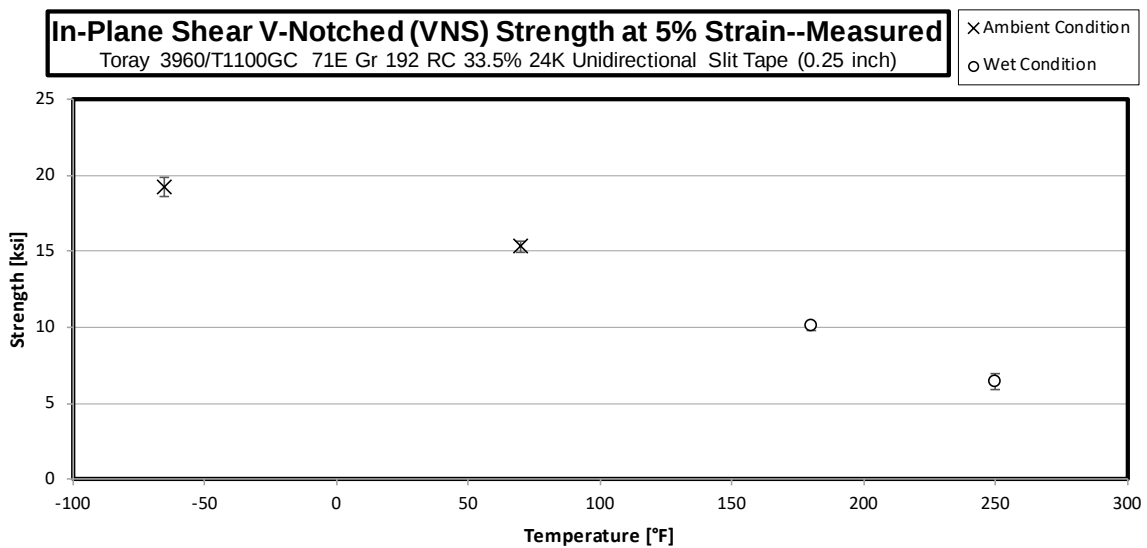
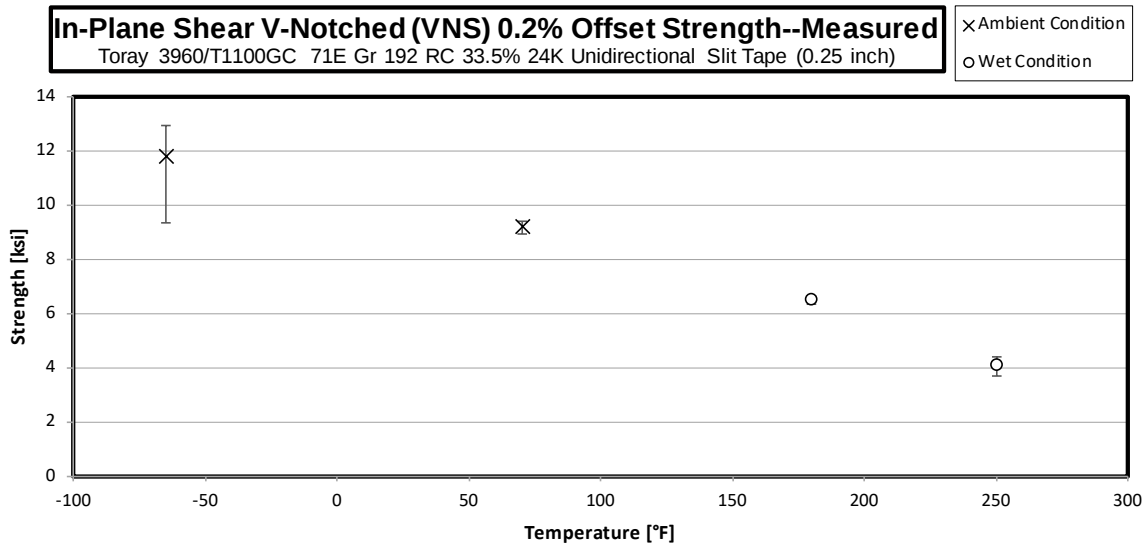


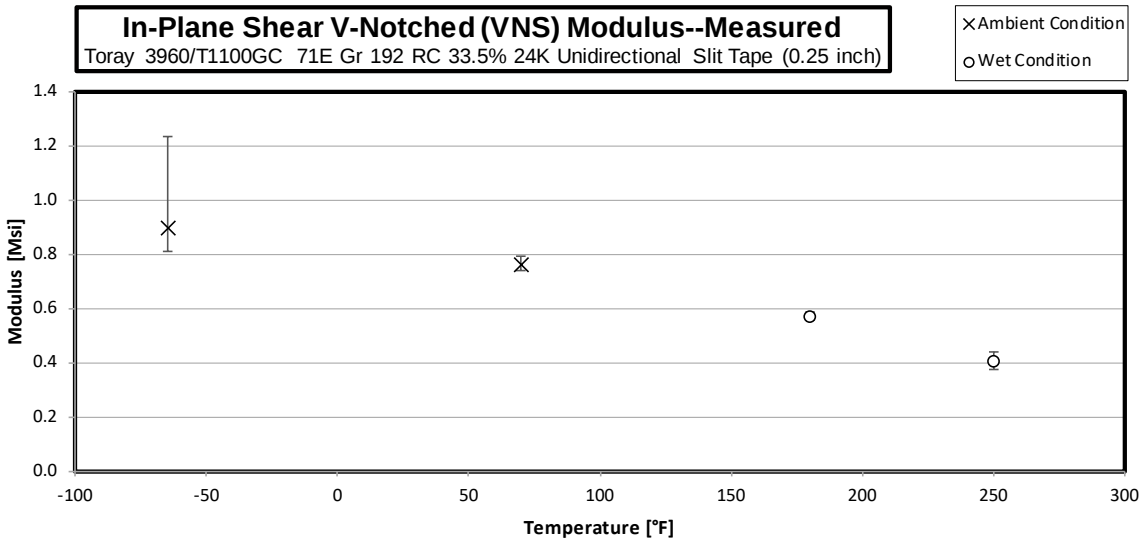
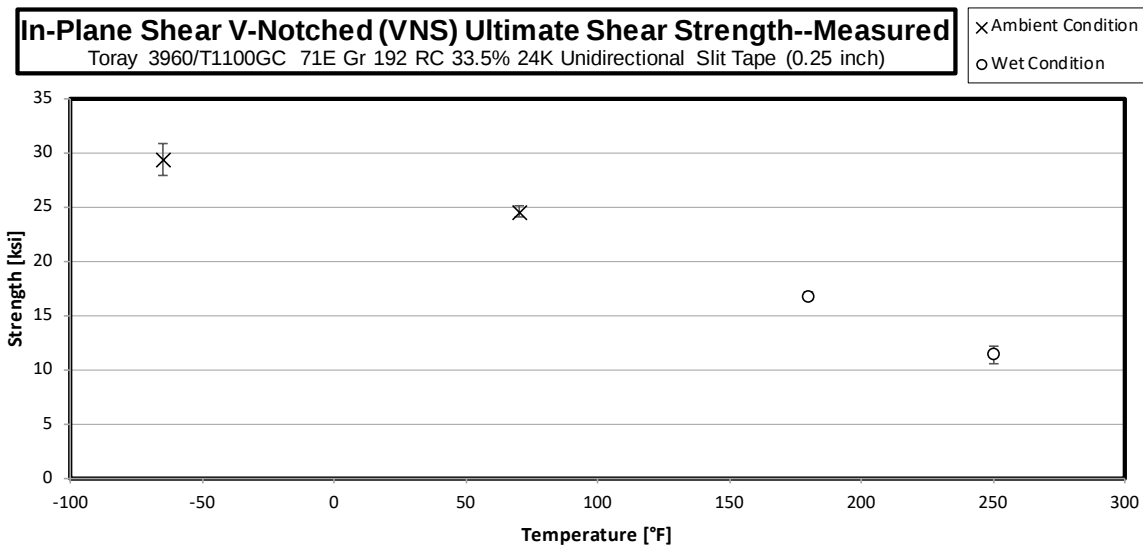
### 3.6 In-Plane Shear Properties (IPS)



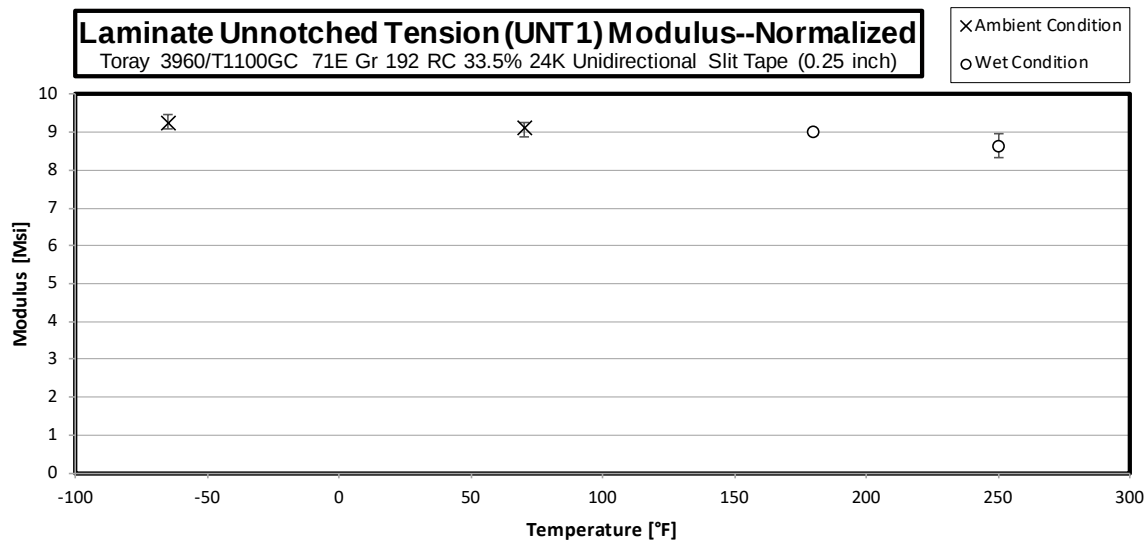
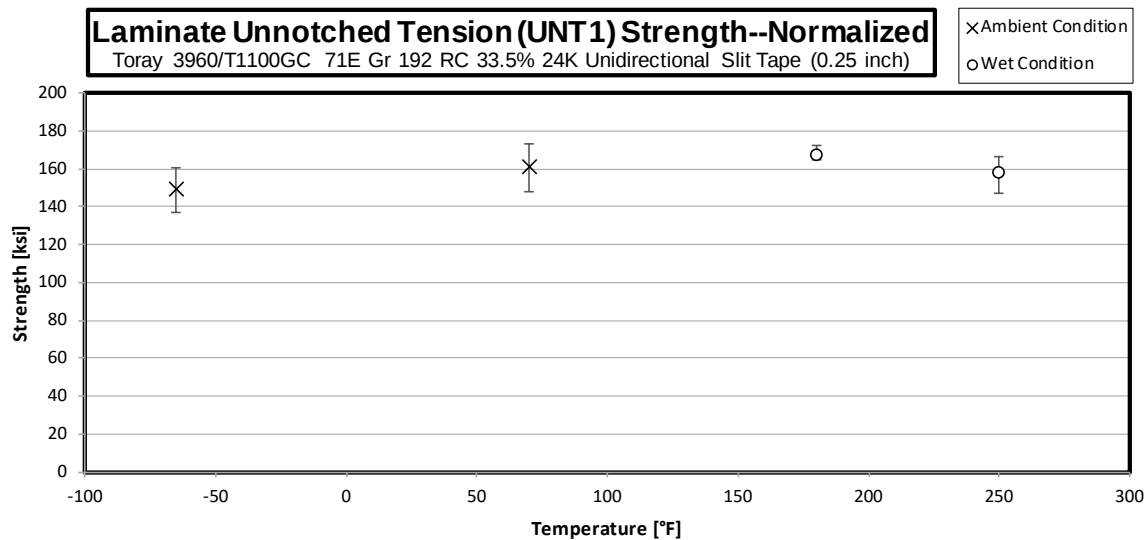


### 3.7 In-Plane Shear V-Notched Properties (VNS)

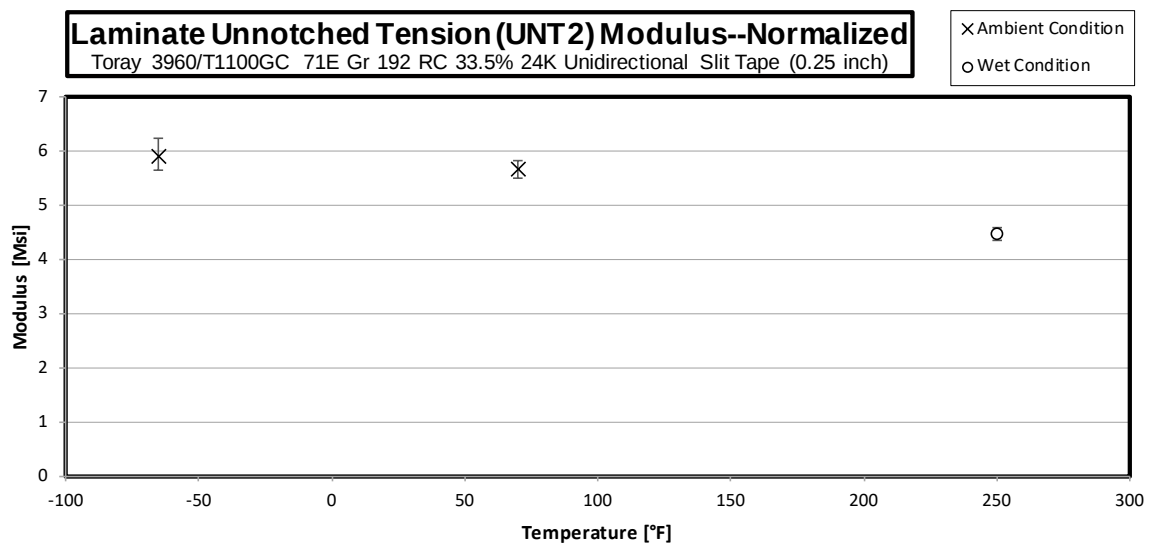
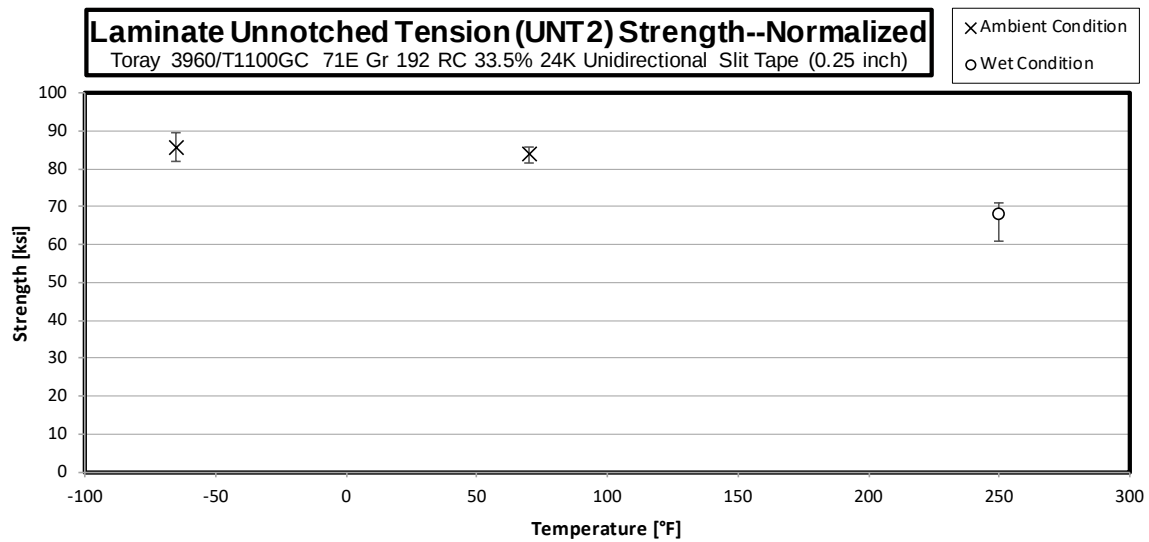




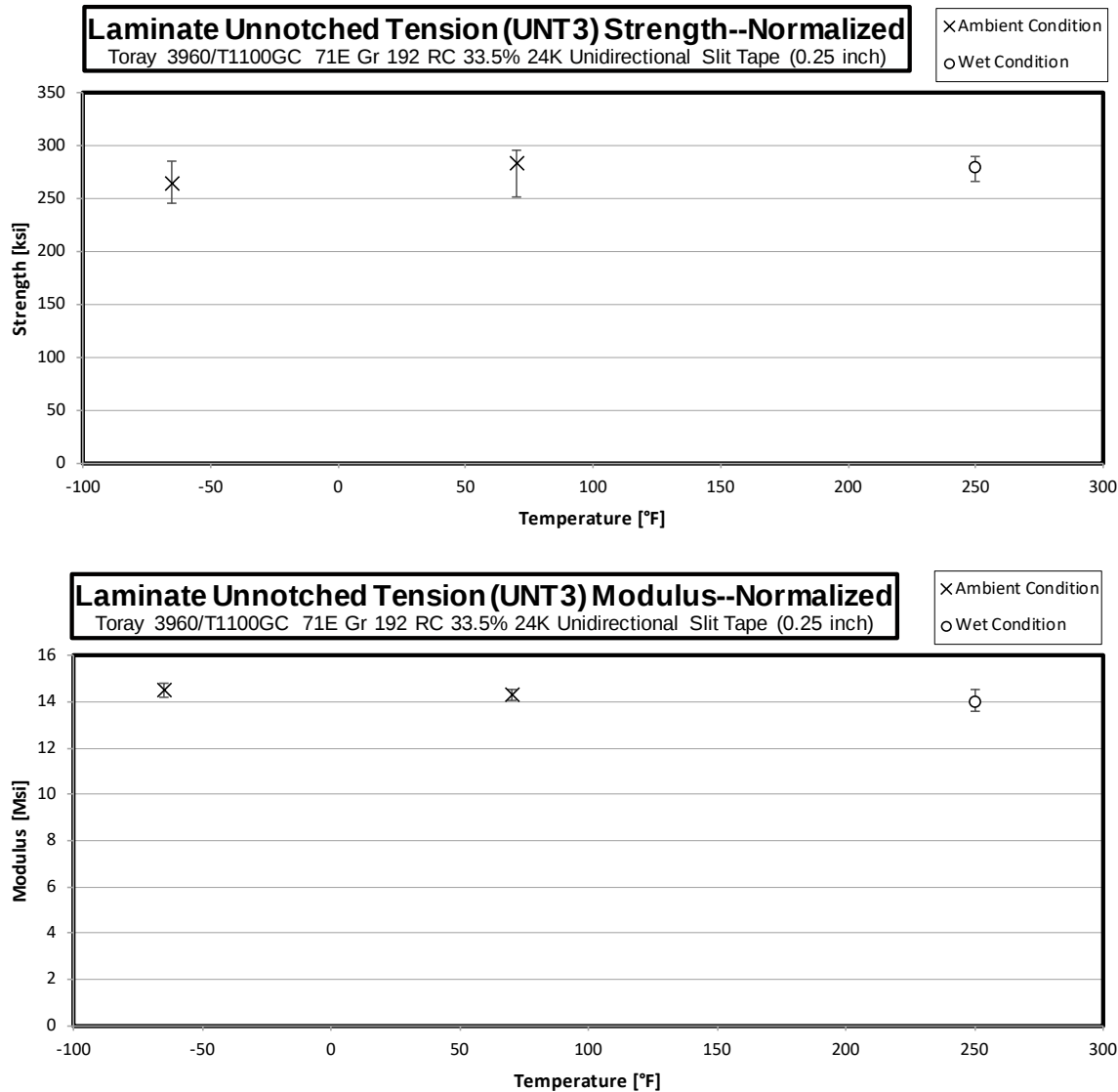
3.8 “25/50/25” Unnotched Tension 1 Properties (UNT1)



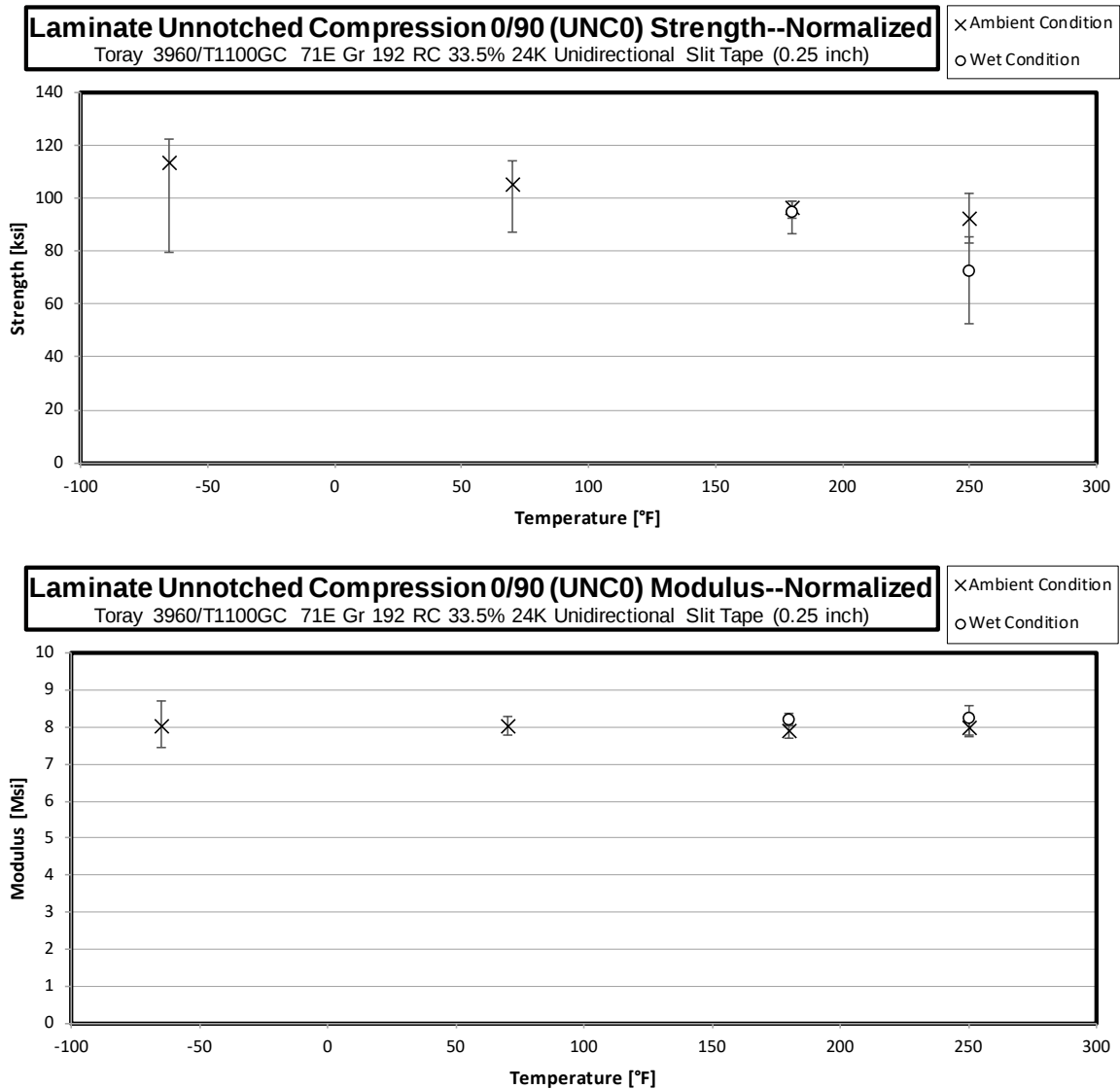
### 3.9 “10/80/10” Unnotched Tension 2 Properties (UNT2)



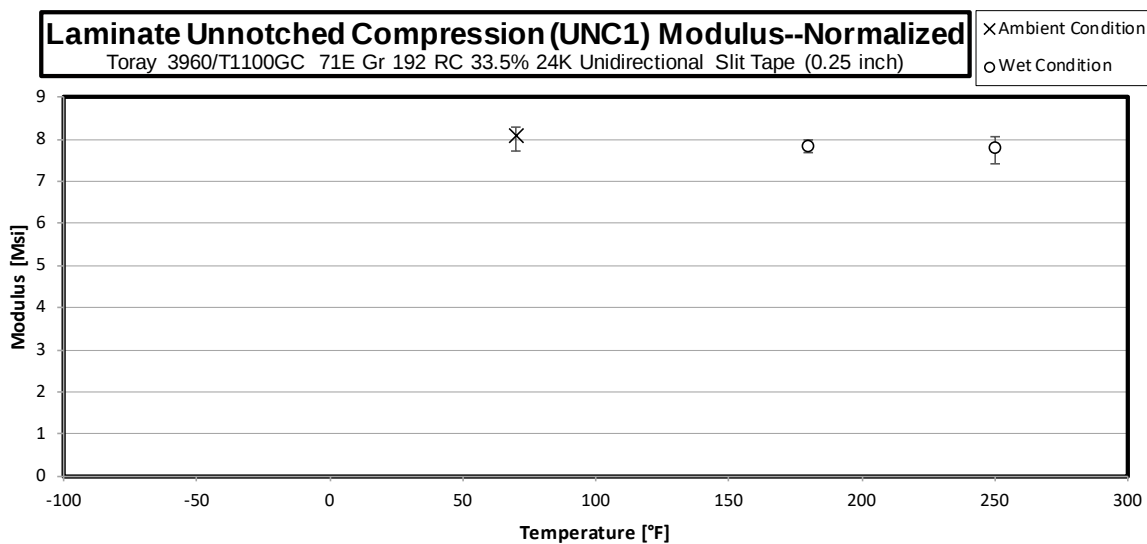
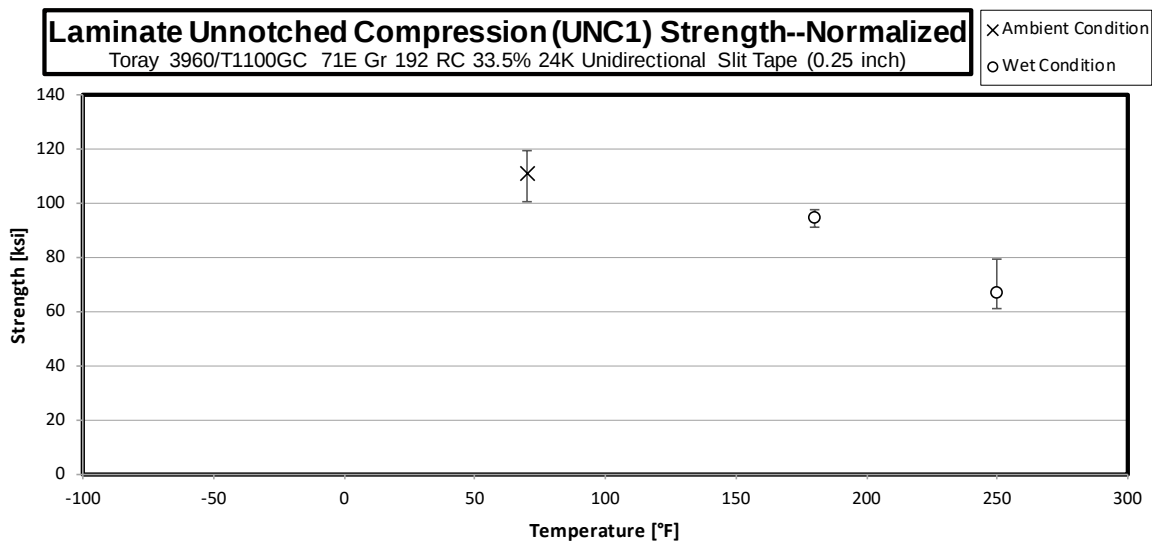
3.10 “50/40/10” Unnotched Tension 3 Properties (UNT3)



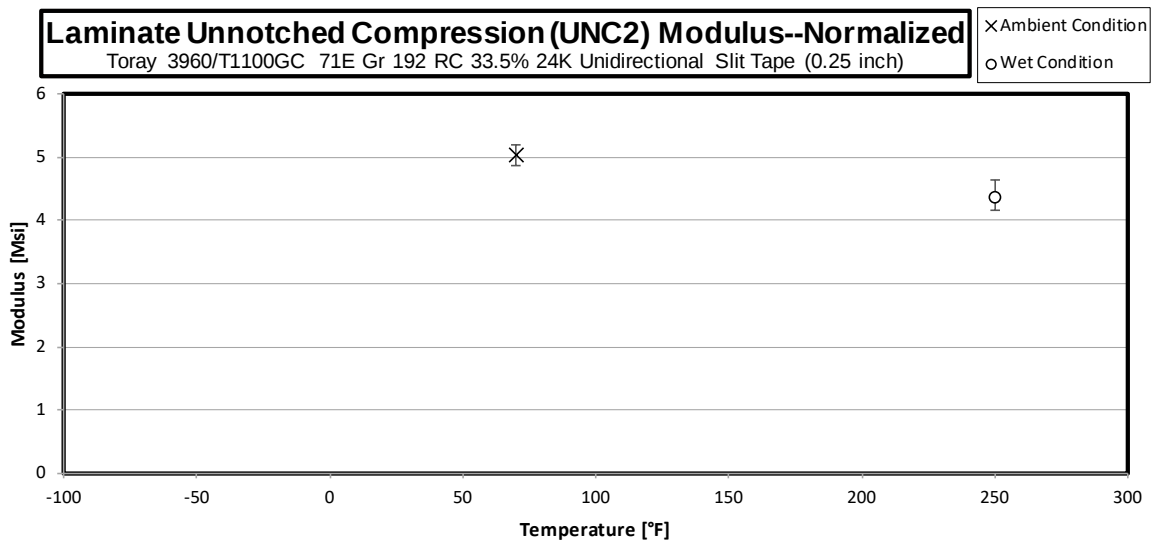
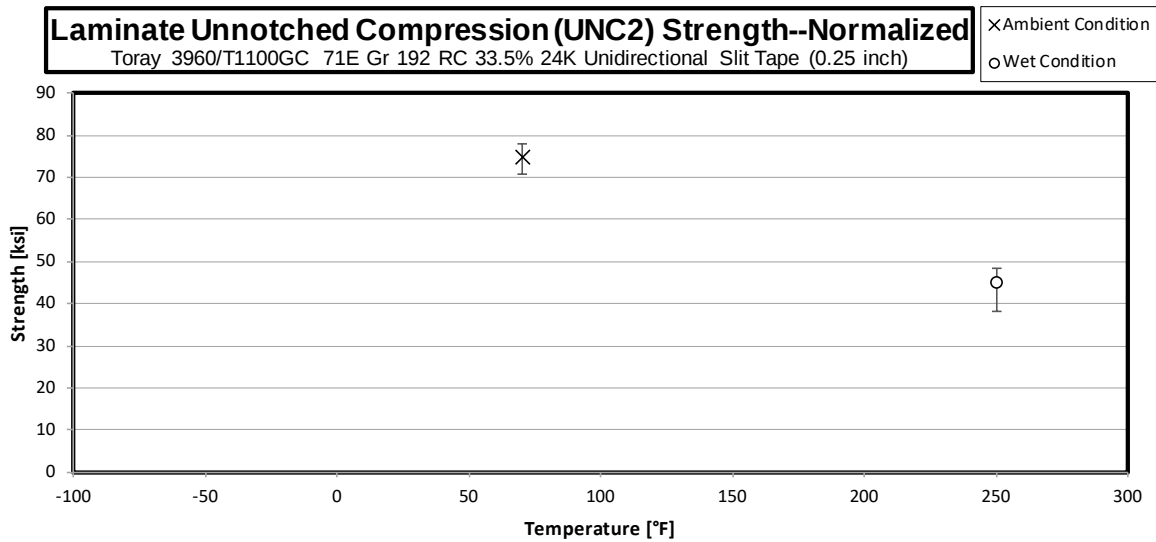
### 3.11 “33/0/67” Unnotched Compression 0/90 Properties (UNC0)



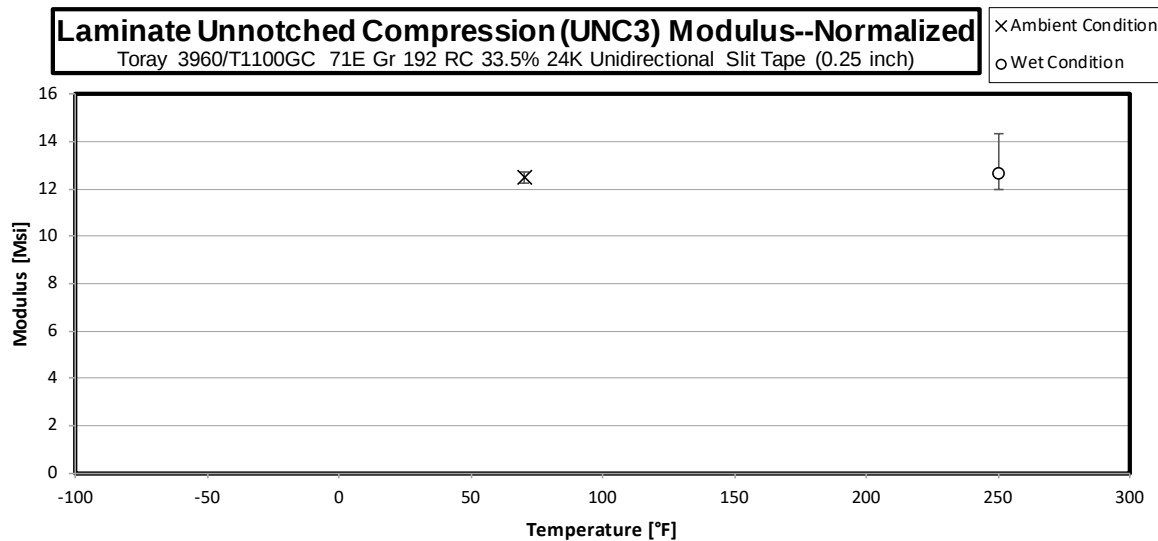
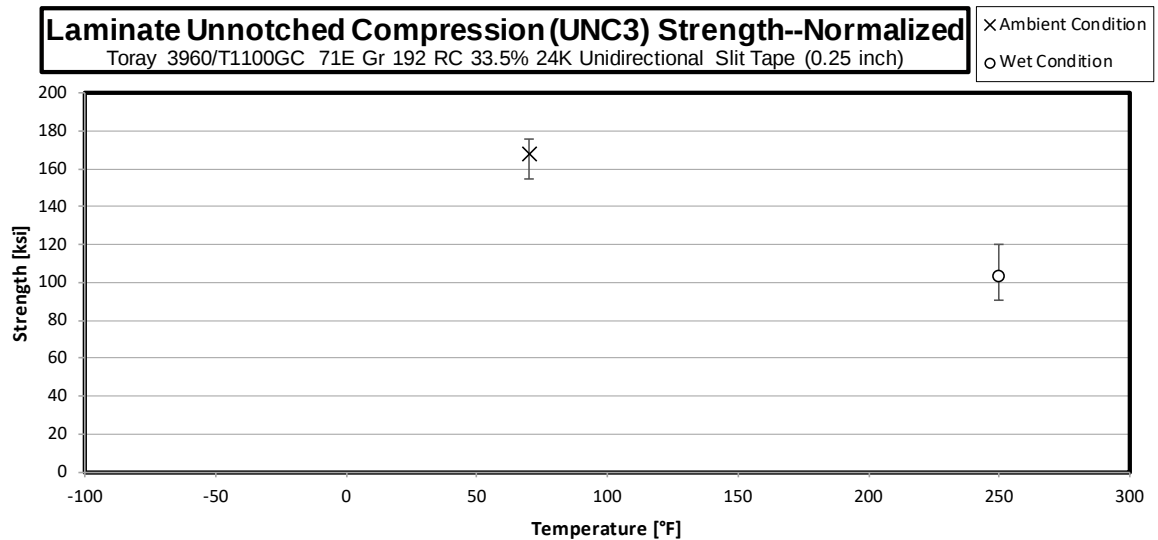
### 3.12 “25/50/25” Unnotched Compression 1 Properties (UNC1)



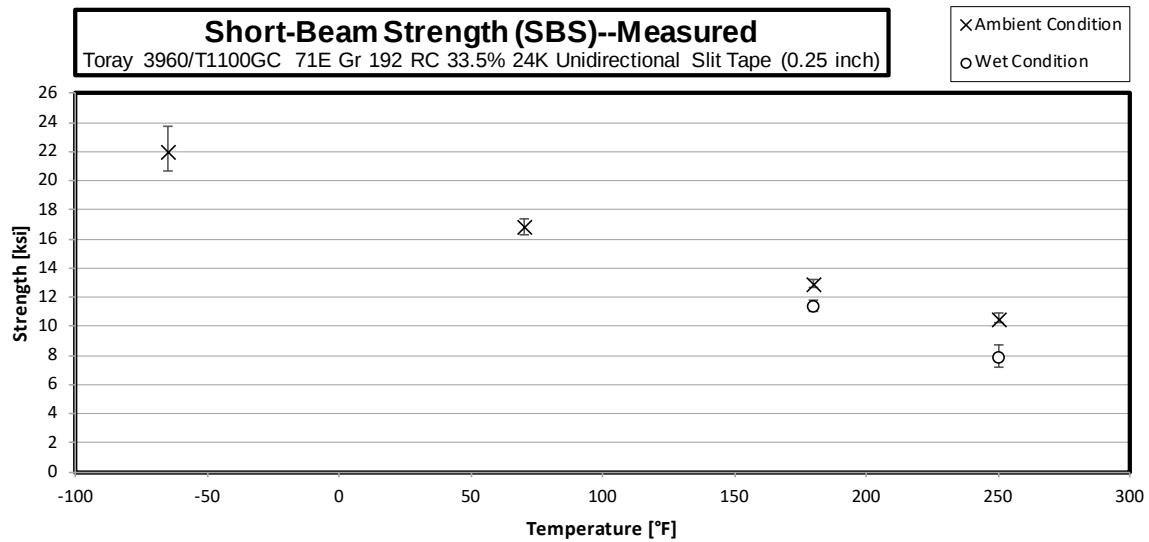
### 3.13 “10/80/10” Unnotched Compression 2 Properties (UNC2)



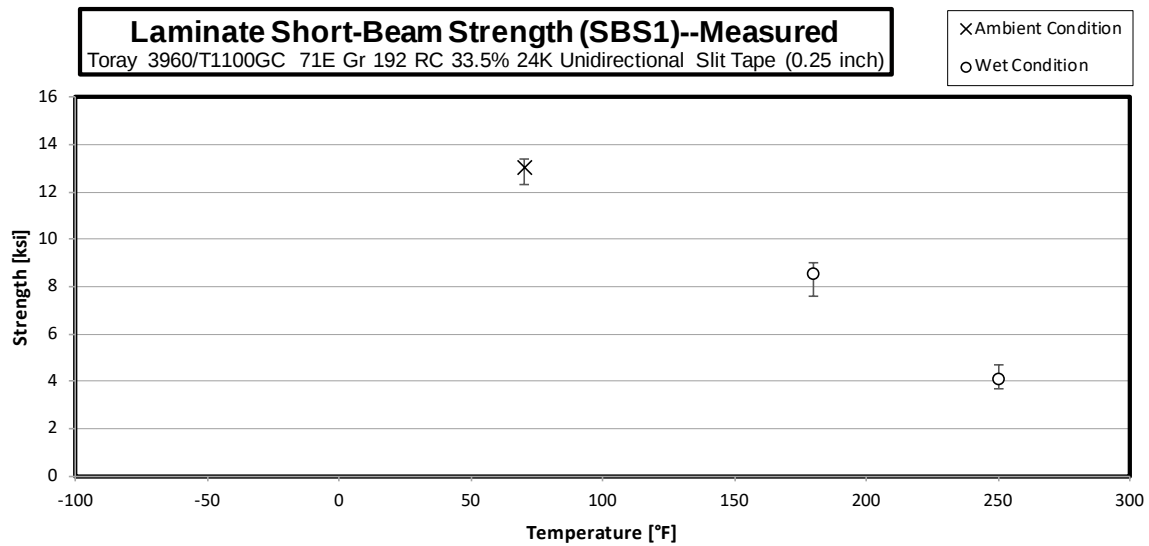
3.14 “50/40/10” Unnotched Compression 3 Properties (UNC3)



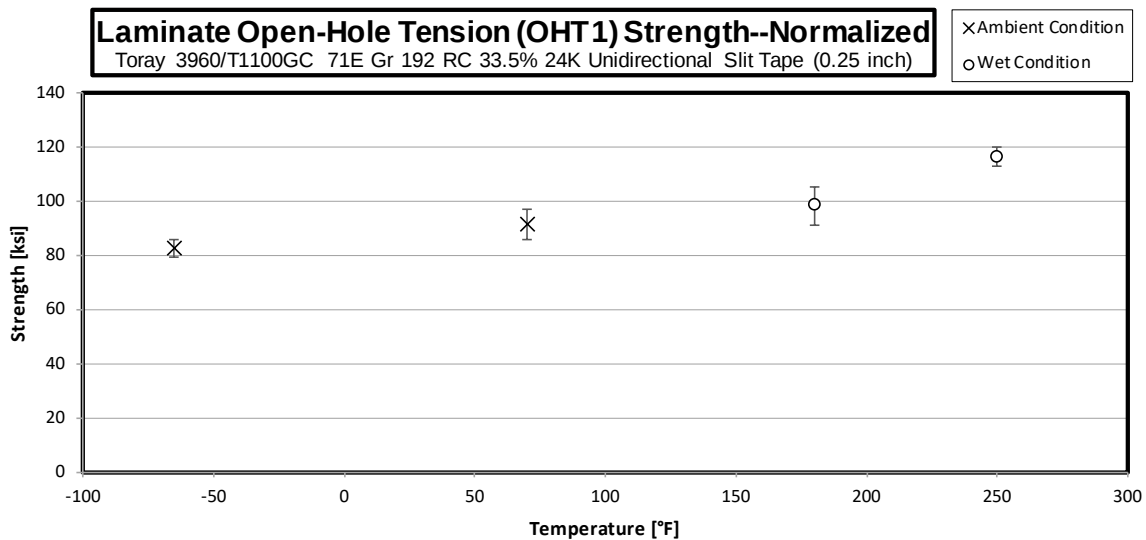
### 3.15 Lamina Short-Beam Shear Properties (SBS)



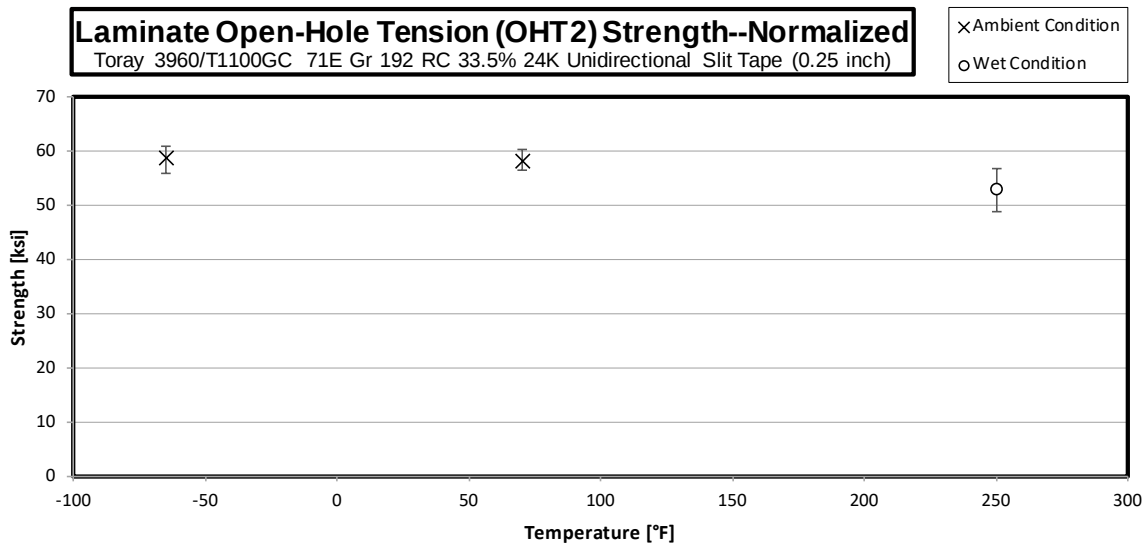
### 3.16 Laminate Short-Beam Strength Properties (SBS1)



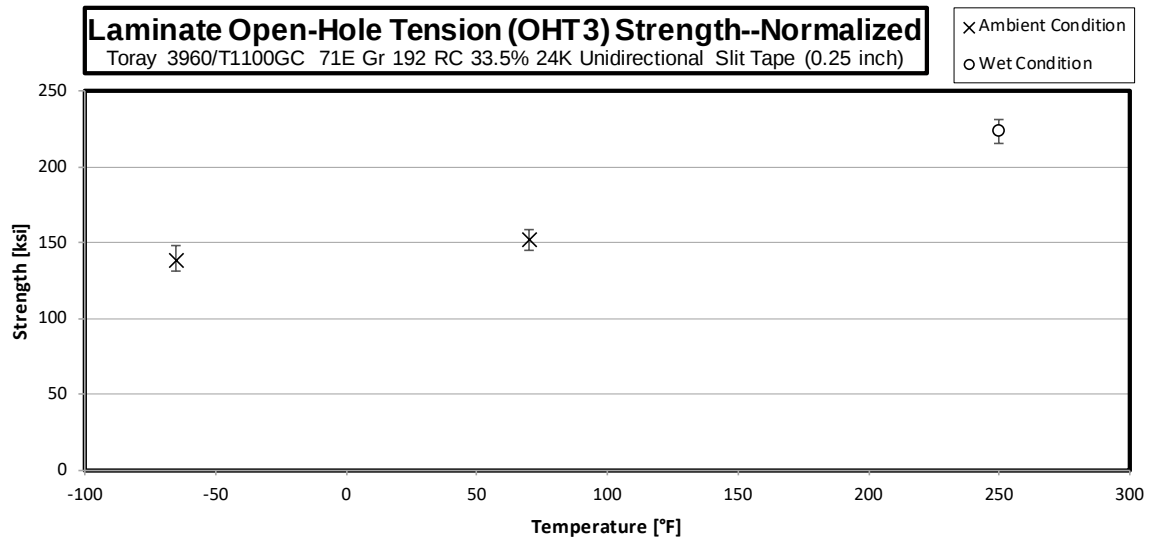
### 3.17 “25/50/25” Open-Hole Tension 1 Properties (OHT1)



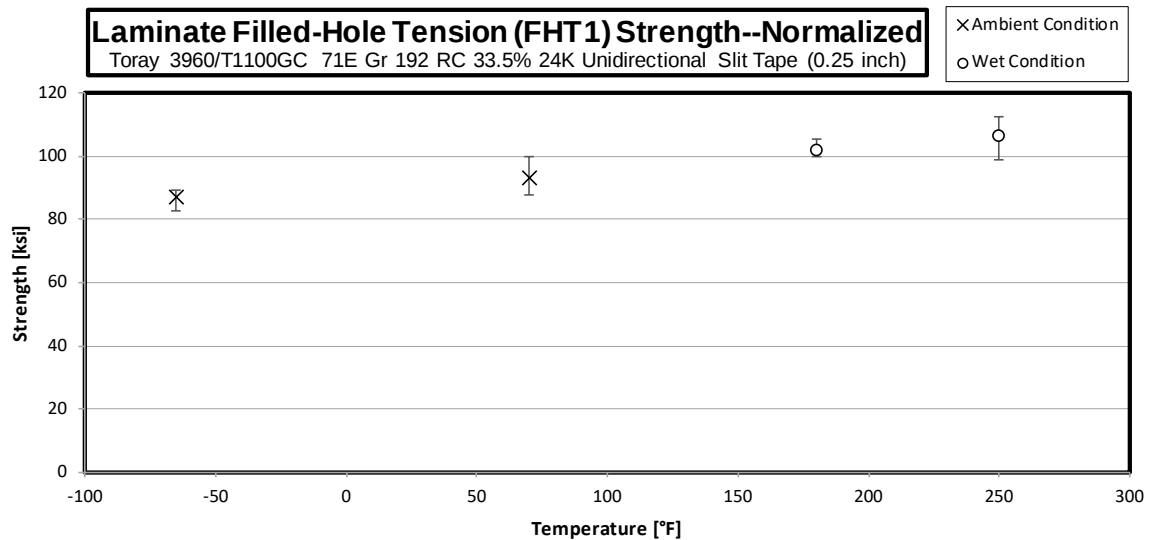
### 3.18 “10/80/10” Open-Hole Tension 2 Properties (OHT2)



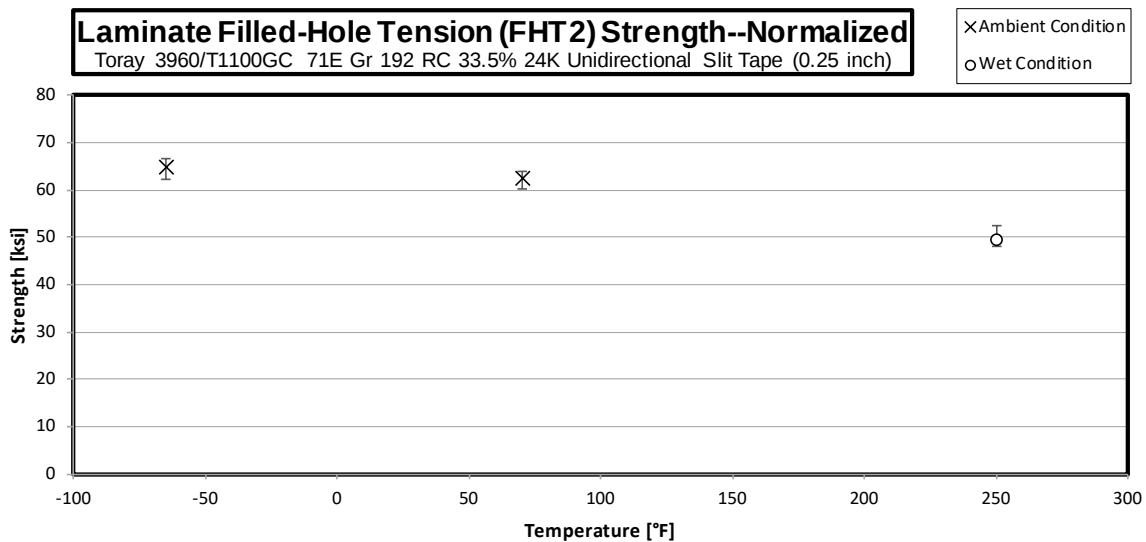
### 3.19 “50/40/10” Open-Hole Tension 3 Properties (OHT3)



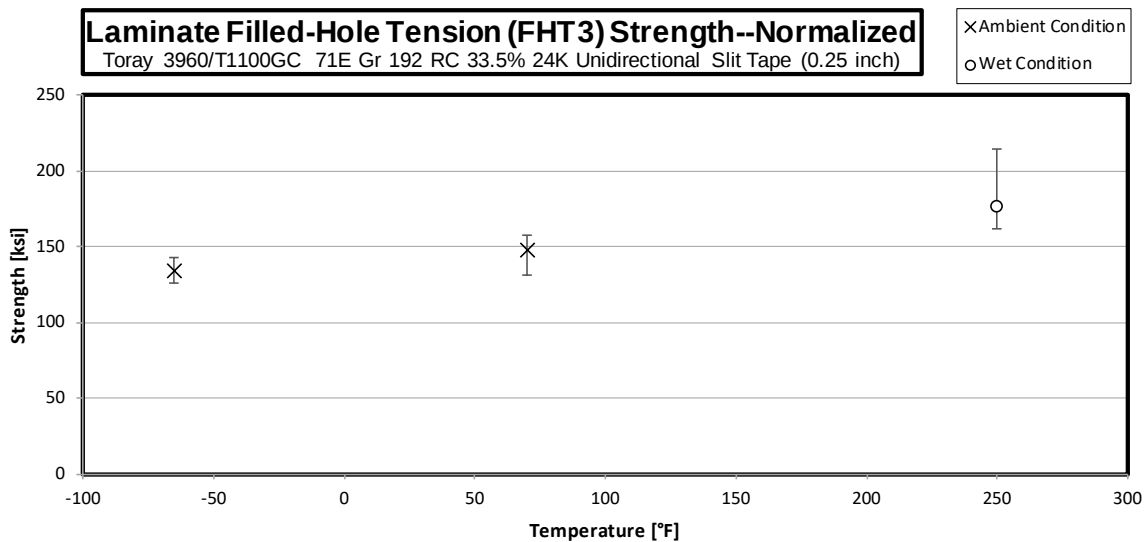
### 3.20 “25/50/25” Filled-Hole Tension 1 Properties (FHT1)



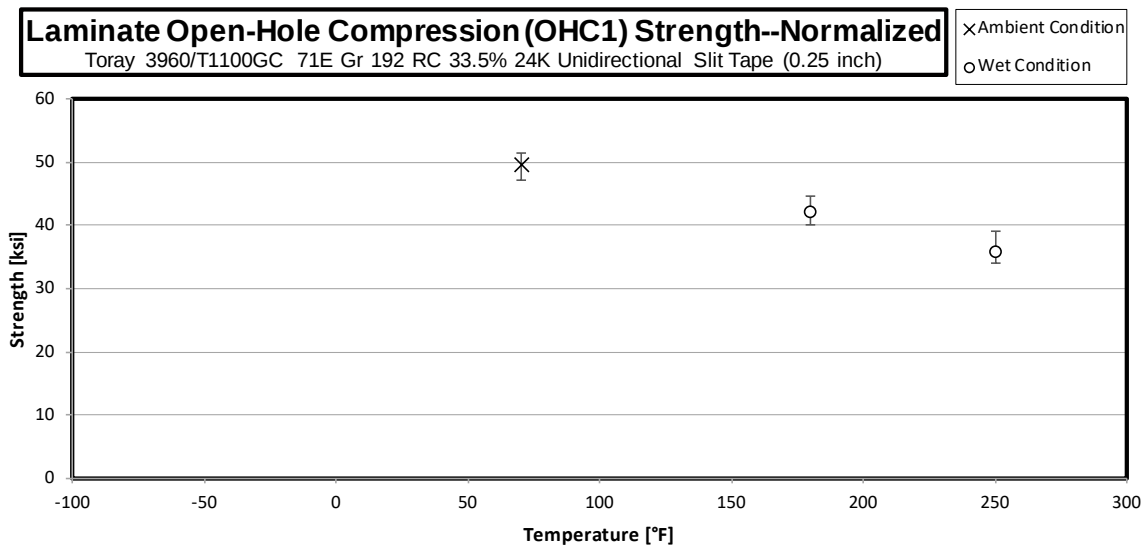
### 3.21 “10/80/10” Filled-Hole Tension 2 Properties (FHT2)



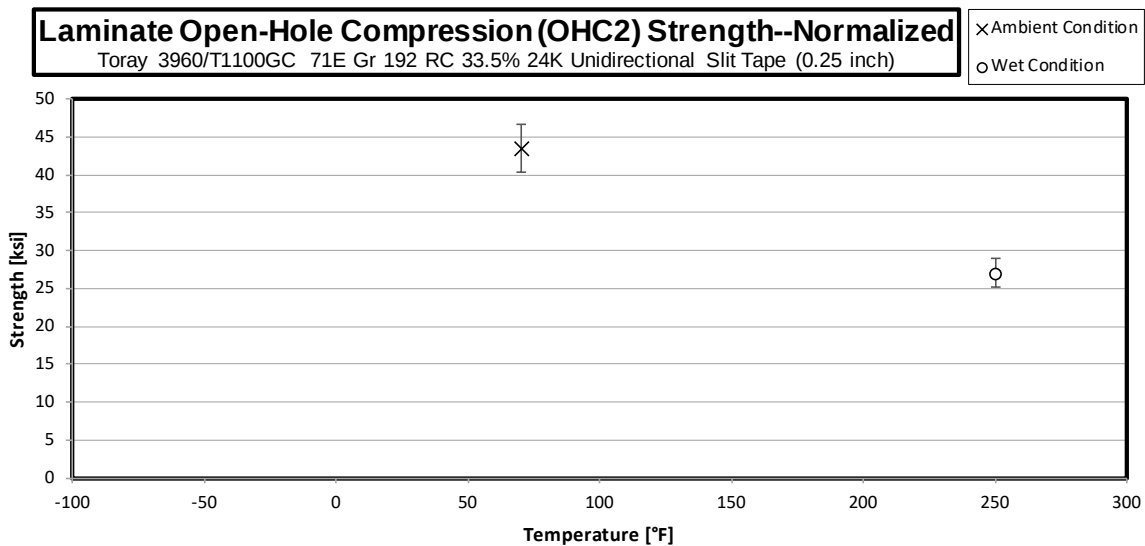
### 3.22 “50/40/10” Filled-Hole Tension 3 Properties (FHT3)



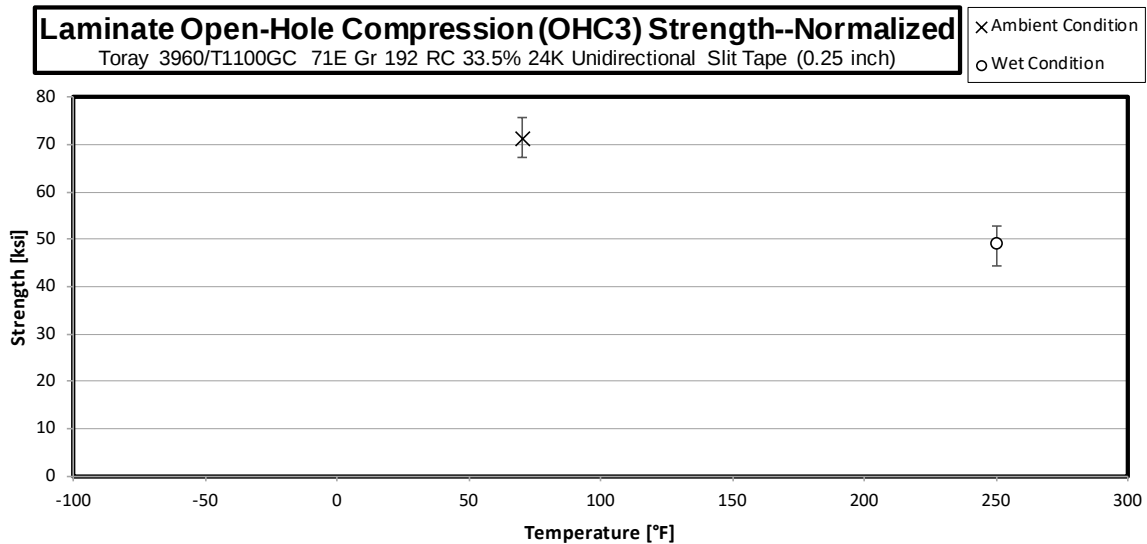
### 3.23 “25/50/25” Open-Hole Compression 1 Properties (OHC1)



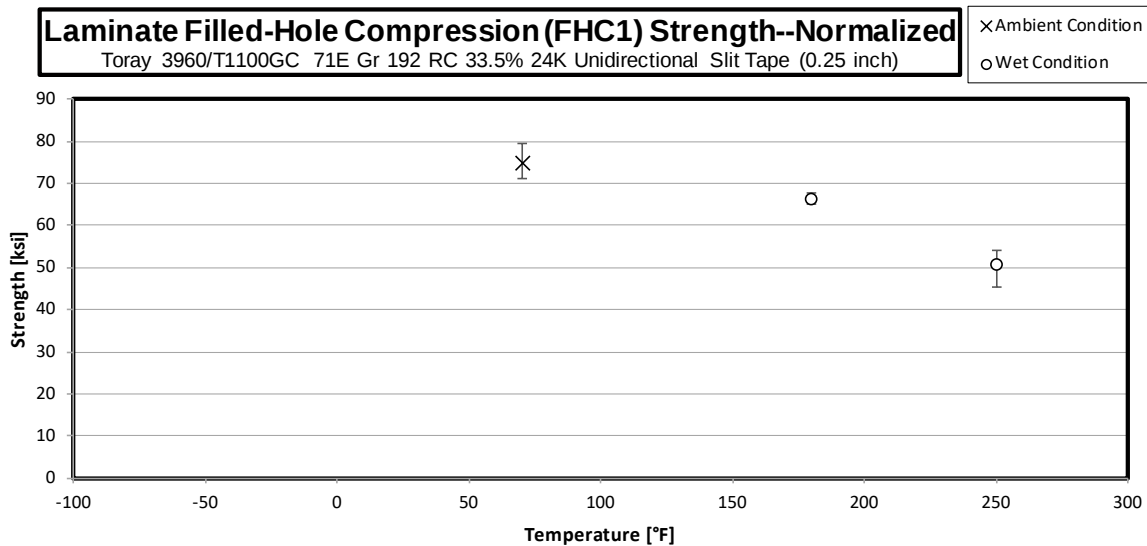
### 3.24 “10/80/10” Open-Hole Compression 2 Properties (OHC2)



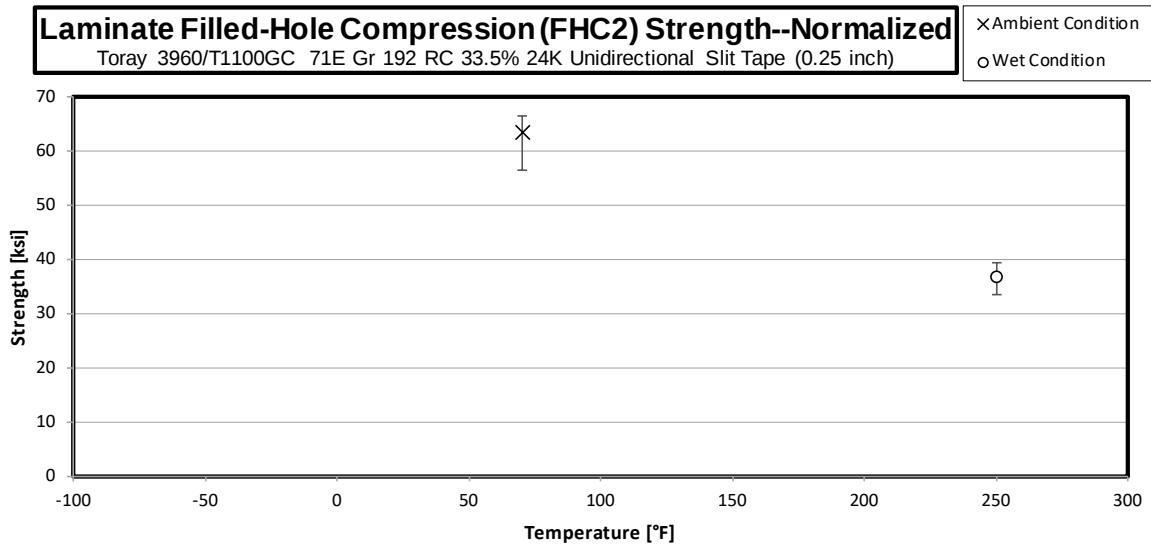
### 3.25 “50/40/10” Open-Hole Compression 3 Properties (OHC3)



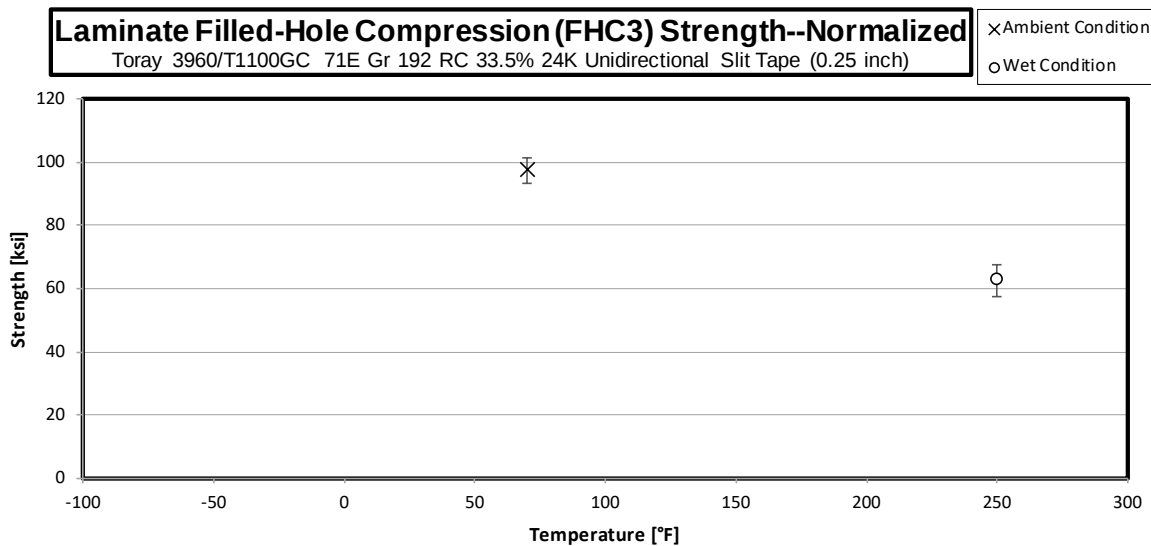
### 3.26 “25/50/25” Filled-Hole Compression 1 Properties (FHC1)



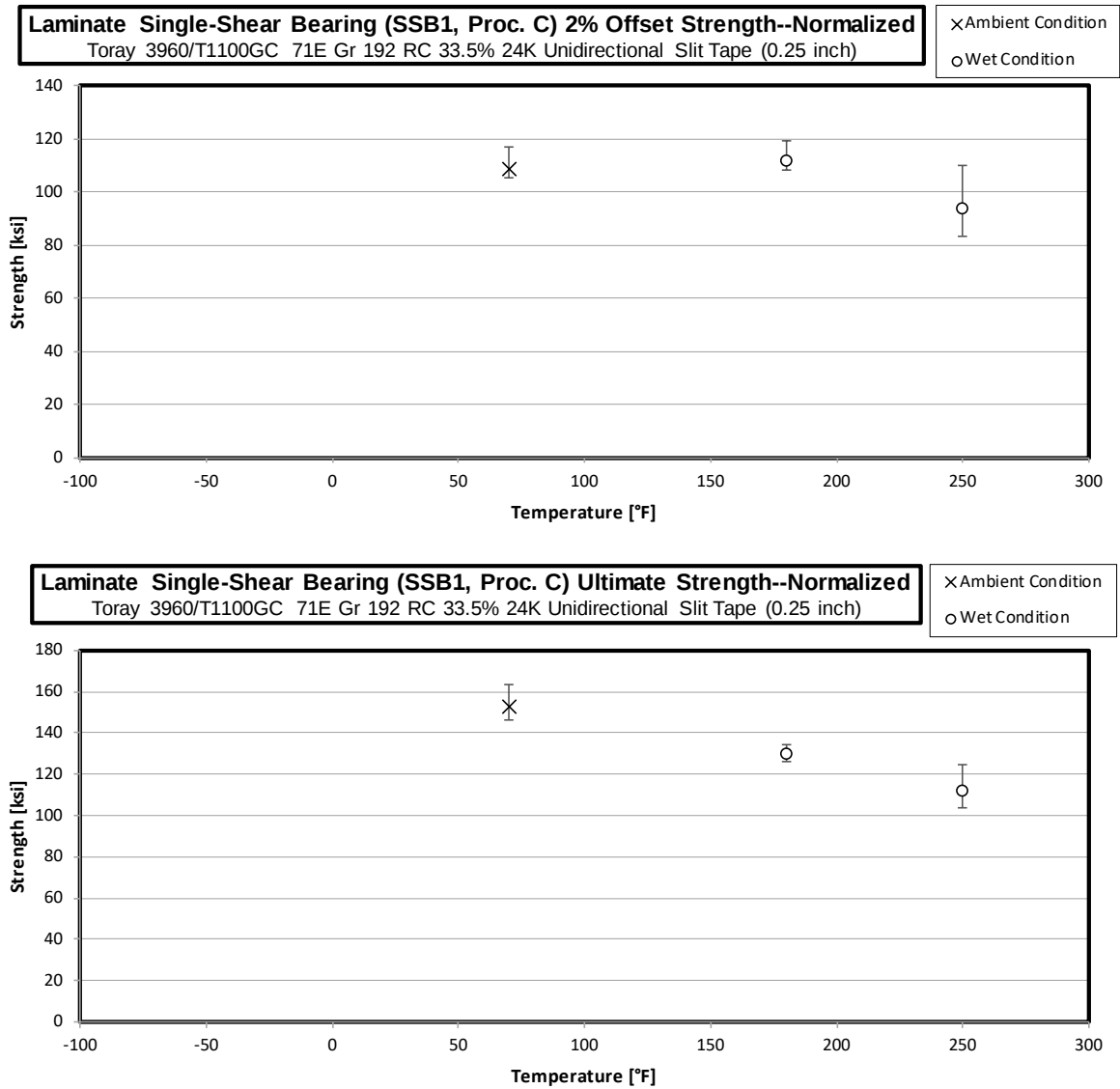
### 3.27 “10/80/10” Filled-Hole Compression 2 Properties (FHC2)

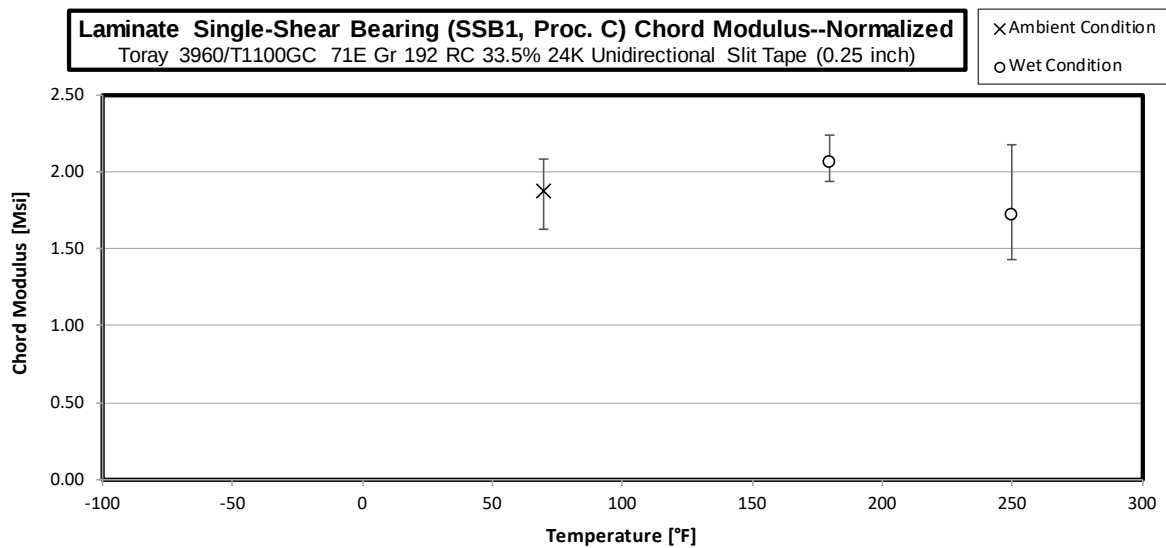


### 3.28 “50/40/10” Filled-Hole Compression 3 Properties (FHC3)

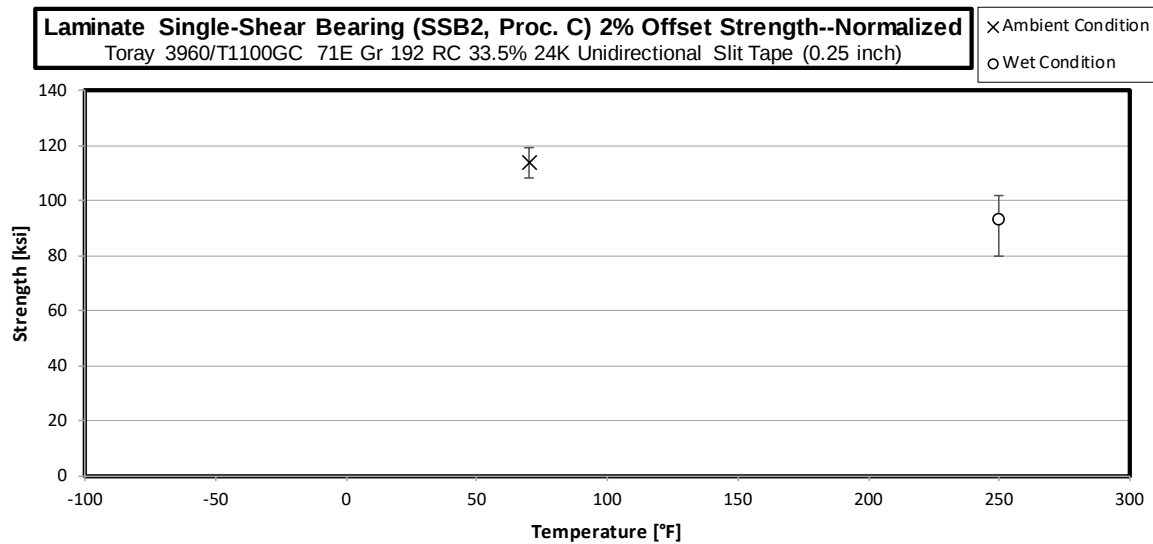


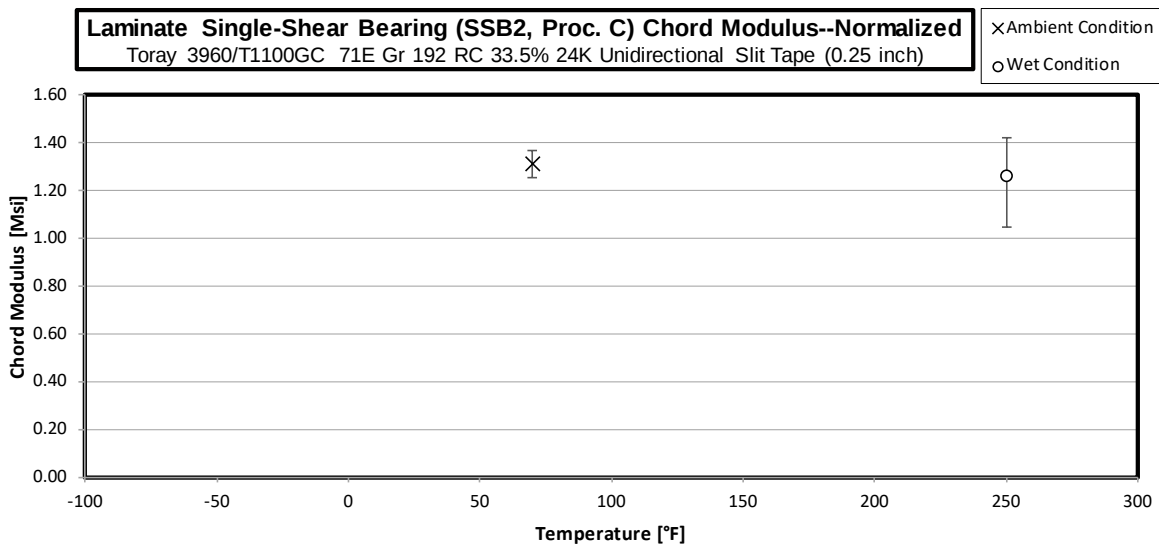
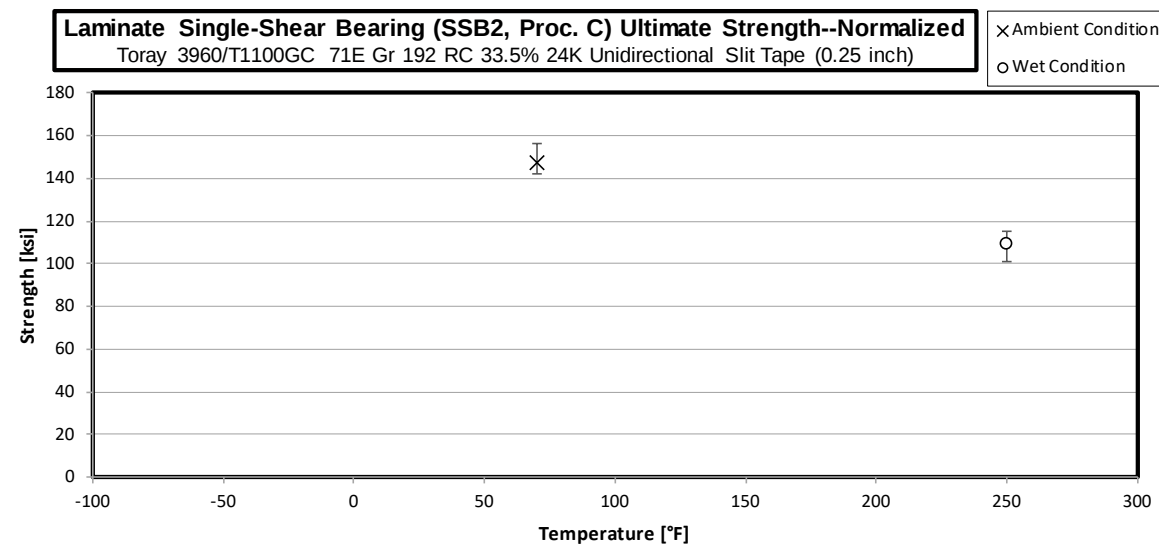
### 3.29 “25/50/25” Single-Shear Bearing 1 Properties (SSB1, Proc. C)



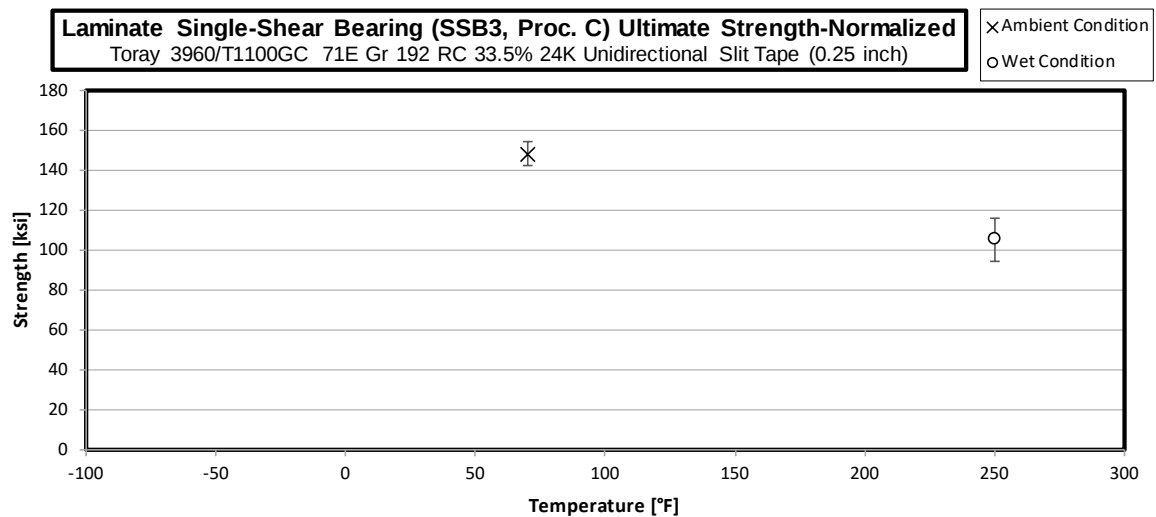
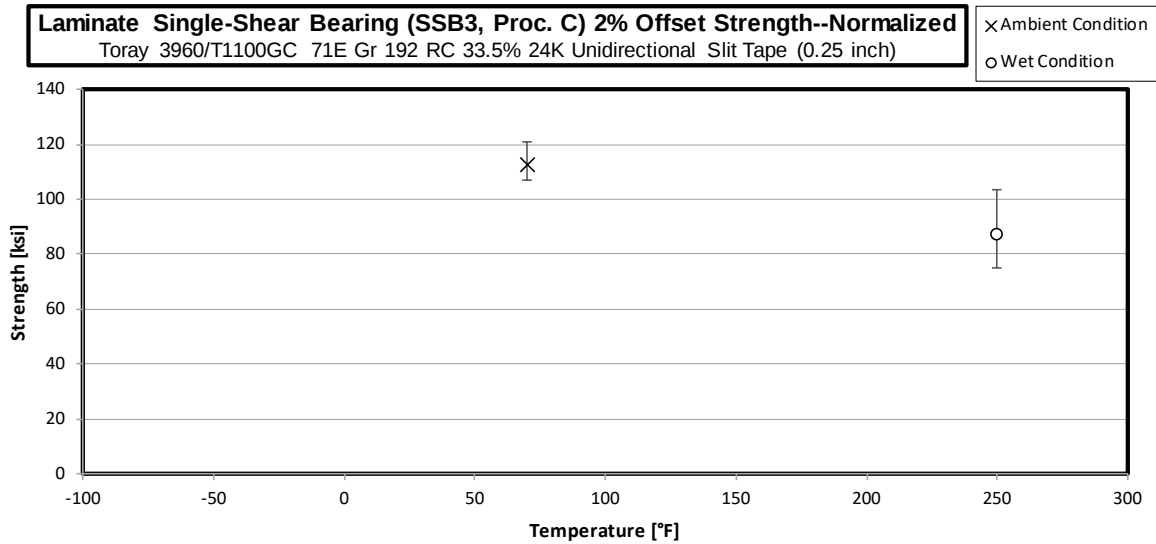


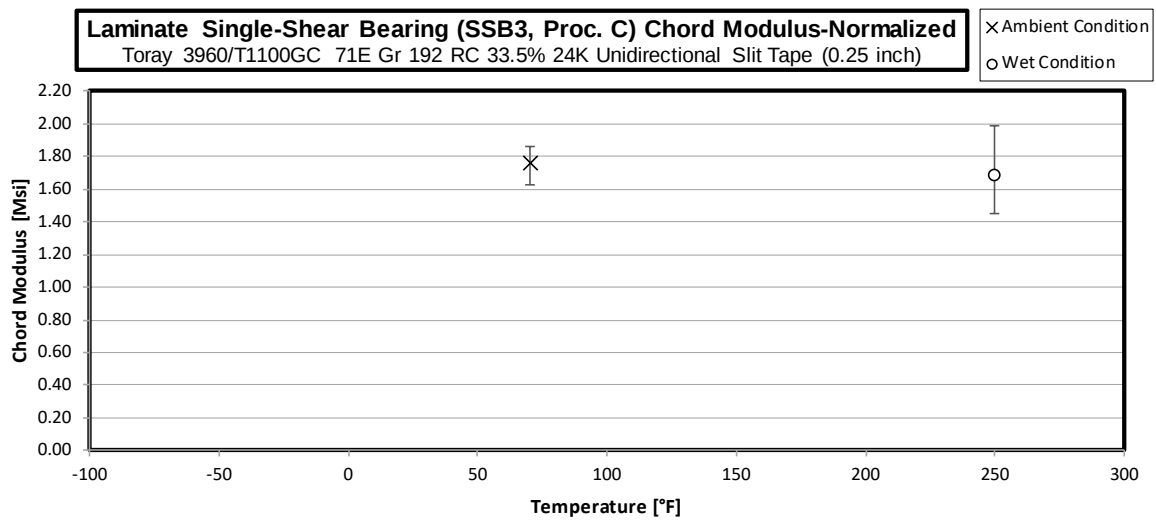
### 3.30 “10/80/10” Single-Shear Bearing 2 Properties (SSB2, Proc. C)



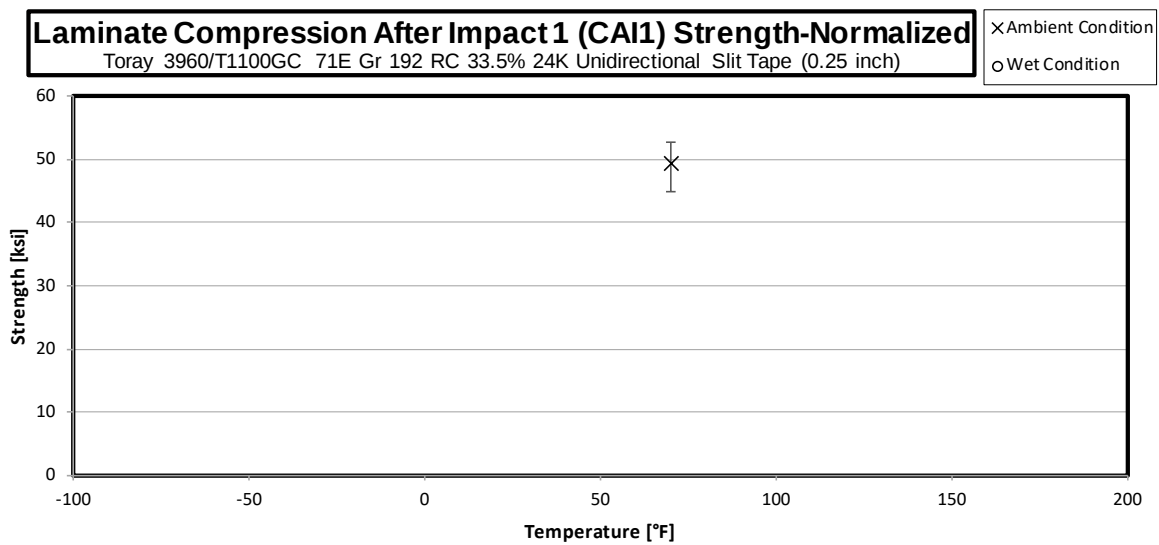


### 3.31 “50/40/10” Single-Shear Bearing 3 Properties (SSB3, Proc. C)

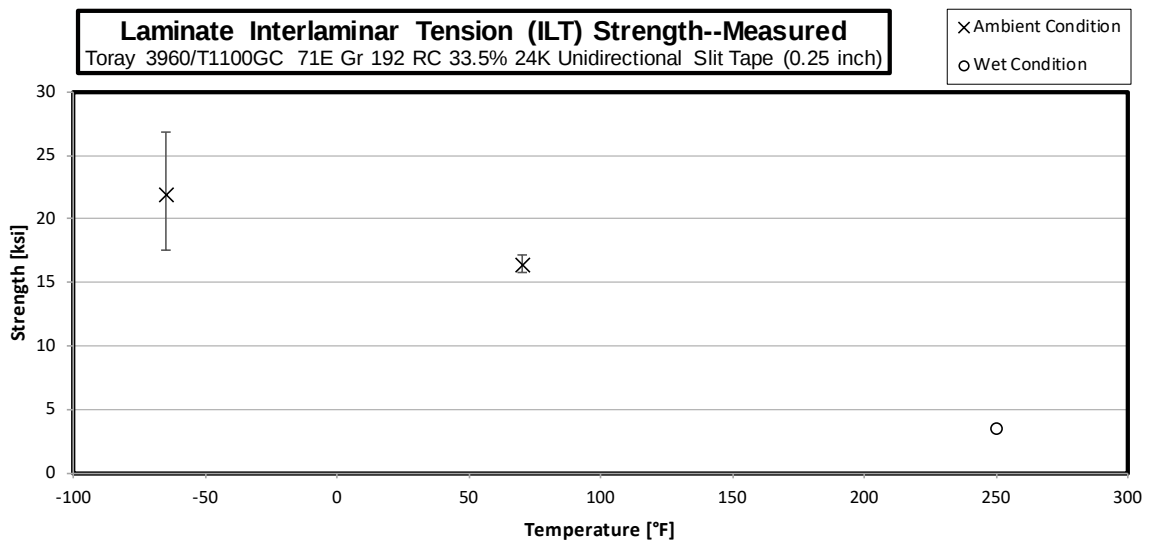
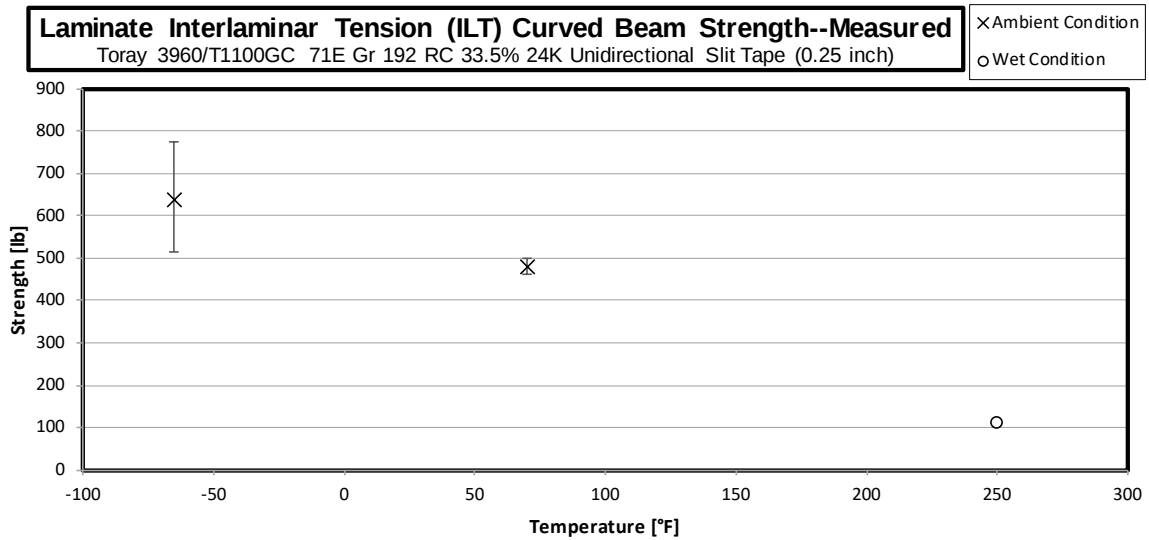




### 3.32 “25/50/25” Compression After Impact 1 Properties (CAI1)



### 3.33 “100/0/0” Interlaminar Tension Properties (ILT)



## 4. Raw Data

## 4.1 Longitudinal Tension Properties (LT)

## Longitudinal Tension Properties (LT)--CTA (-65°F)

## Strength, Modulus &amp; Poisson's Ratio

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

 $t_{ply}$  [in]

0.007000

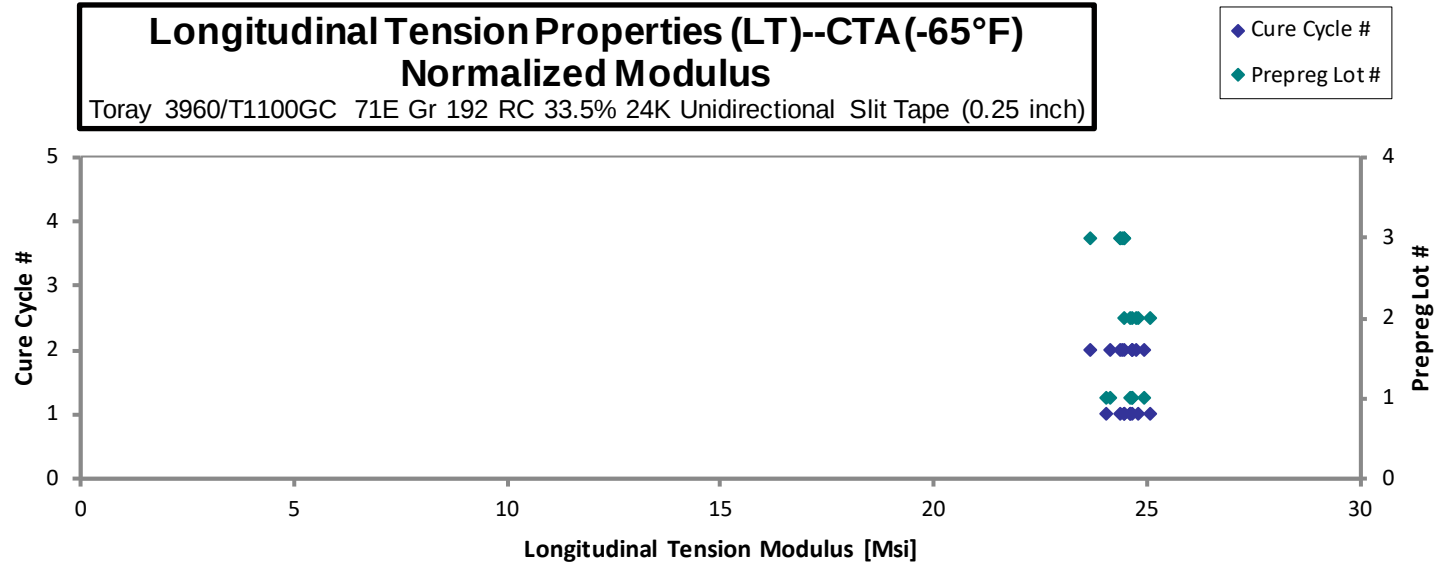
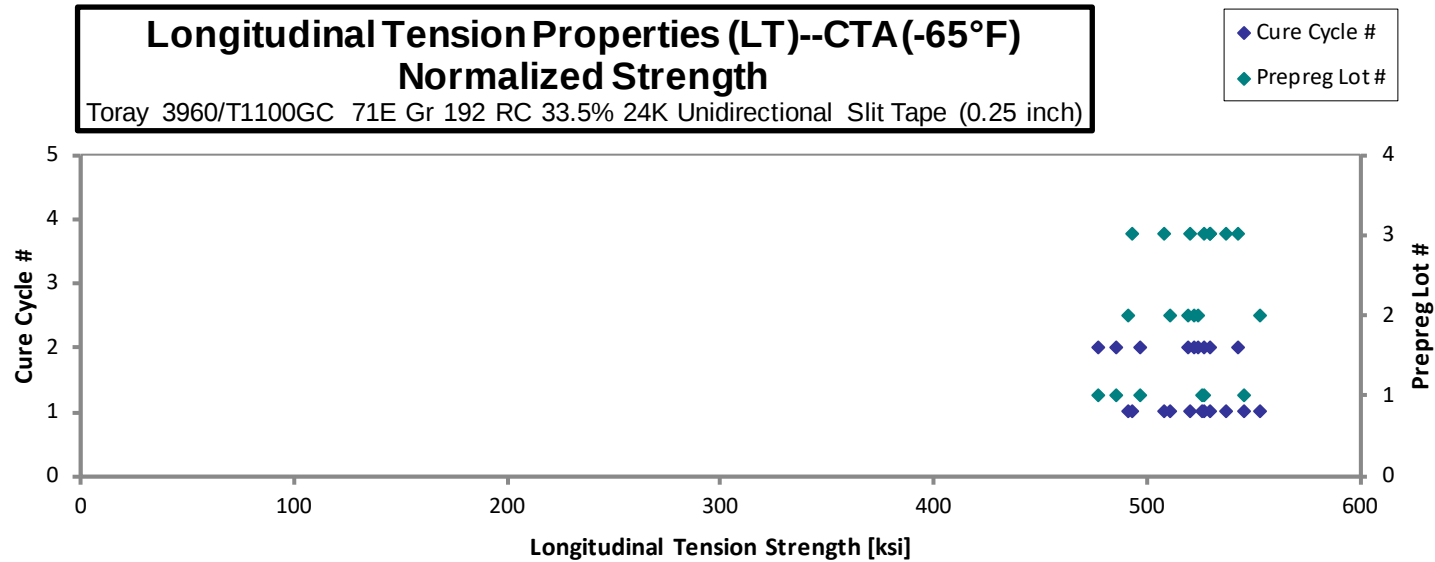
| Specimen Number                                 | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Poisson's Ratio | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | Strength <sub>norm</sub> [ksi] | Modulus <sub>norm</sub> [Msi] |
|-------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|---------------|-----------------|------------------------------|---------------------|--------------|---------------------|--------------------------------|-------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-LT-CTA-1  | A             | C1              | 1             | 1            | 531.0          | 24.89         | 0.3313          | 0.04162                      | 6                   | XGM, LWT     | 0.006936            | 526.1                          | 24.66                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-LT-CTA-2* | A             | C1              | 1             | 1            |                | 25.00         | 0.3403          | 0.04137                      | 6                   | AWB, GIT     | 0.006894            |                                | 24.62                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-LT-CTA-3* | A             | C1              | 1             | 1            |                | 24.32         | 0.3104          | 0.04153                      | 6                   | GIT          | 0.006922            |                                | 24.05                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-LT-SP-1** | A             | C1              | 1             | 1            | 534.2          |               |                 | 0.04140                      | 6                   | XGM          | 0.006900            | 526.5                          |                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-LT-SP-2** | A             | C1              | 1             | 1            | 548.6          |               |                 | 0.04175                      | 6                   | XGM          | 0.006958            | 545.3                          |                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-LT-CTA-1  | A             | C2              | 1             | 2            | 482.5          | 24.93         | 0.3294          | 0.04155                      | 6                   | XGM          | 0.006925            | 477.4                          | 24.66                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-LT-CTA-2  | A             | C2              | 1             | 2            | 490.6          | 24.37         | 0.2221          | 0.04160                      | 6                   | XGM          | 0.006933            | 486.0                          | 24.14                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-LT-CTA-3  | A             | C2              | 1             | 2            | 502.1          | 25.23         | 0.3391          | 0.04153                      | 6                   | XGM          | 0.006922            | 496.6                          | 24.95                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C1-1-LT-CTA-1  | B             | C1              | 2             | 1            | 562.6          | 25.21         | 0.3355          | 0.04128                      | 6                   | XGM          | 0.006881            | 553.0                          | 24.78                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C1-1-LT-CTA-2  | B             | C1              | 2             | 1            | 495.7          | 25.28         | 0.3337          | 0.04165                      | 6                   | XGM          | 0.006942            | 491.6                          | 25.07                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C1-1-LT-CTA-3  | B             | C1              | 2             | 1            | 509.5          | 24.53         | 0.3355          | 0.04212                      | 6                   | XGM          | 0.007019            | 510.9                          | 24.60                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C2-1-LT-CTA-1  | B             | C2              | 2             | 2            | 528.9          | 25.21         | 0.3387          | 0.04122                      | 6                   | XGM          | 0.006869            | 519.0                          | 24.74                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C2-1-LT-CTA-2  | B             | C2              | 2             | 2            | 526.5          | 24.67         | 0.2910          | 0.04167                      | 6                   | XGM          | 0.006944            | 522.3                          | 24.48                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C2-1-LT-CTA-3  | B             | C2              | 2             | 2            | 530.2          | 24.97         | 0.3380          | 0.04148                      | 6                   | XGM          | 0.006914            | 523.7                          | 24.66                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C1-1-LT-CTA-1  | C             | C1              | 3             | 1            | 525.0          | 24.26         | 0.2954          | 0.04240                      | 6                   | XGM          | 0.007067            | 530.0                          | 24.49                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C1-1-LT-CTA-2  | C             | C1              | 3             | 1            | 502.3          | 24.22         | 0.3680          | 0.04245                      | 6                   | XGM          | 0.007075            | 507.7                          | 24.48                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C1-1-LT-CTA-3  | C             | C1              | 3             | 1            | 502.4          | 23.55         | 0.3320          | 0.04347                      | 6                   | XGM          | 0.007244            | 519.9                          | 24.38                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C1-1-LT-SP-1** | C             | C1              | 3             | 1            | 476.5          |               |                 | 0.04347                      | 6                   | XGM, LGT     | 0.007244            | 493.2                          |                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C1-1-LT-SP-2** | C             | C1              | 3             | 1            | 533.9          |               |                 | 0.04222                      | 6                   | XGM          | 0.007036            | 536.7                          |                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C2-1-LT-CTA-1  | C             | C2              | 3             | 2            | 521.6          | 23.46         | 0.3189          | 0.04240                      | 6                   | XGM          | 0.007067            | 526.6                          | 23.68                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C2-1-LT-CTA-2* | C             | C2              | 3             | 2            |                | 24.24         | 0.2829          | 0.04222                      | 6                   | LWB, DIT     | 0.007036            |                                | 24.37                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C2-1-LT-CTA-3* | C             | C2              | 3             | 2            |                | 24.11         | 0.3490          | 0.04253                      | 6                   | SGM, DIB     | 0.007089            |                                | 24.42                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C2-1-LT-SP-2** | C             | C2              | 3             | 2            | 538.8          |               |                 | 0.04232                      | 6                   | XGM          | 0.007053            | 542.9                          |                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C2-1-LT-SP-3** | C             | C2              | 3             | 2            | 521.0          |               |                 | 0.04270                      | 6                   | XGM          | 0.007117            | 529.7                          |                               |

\*Strength not reported due to unacceptable failure mode.

\*\*Specimen was not gaged, only strength is tested.

|                    |       |        |         |
|--------------------|-------|--------|---------|
| Average            | 518.2 | 24.58  | 0.3217  |
| Standard Dev.      | 22.34 | 0.5556 | 0.03260 |
| Coeff. of Var. [%] | 4.312 | 2.260  | 10.13   |
| Min.               | 476.5 | 23.46  | 0.2221  |
| Max.               | 562.6 | 25.28  | 0.3680  |
| Number of Spec.    | 20    | 18     | 18      |

|                                    |          |       |        |
|------------------------------------|----------|-------|--------|
| Average <sub>norm</sub>            | 0.007000 | 518.2 | 24.51  |
| Standard Dev. <sub>norm</sub>      |          | 20.64 | 0.3255 |
| Coeff. of Var. [%] <sub>norm</sub> |          | 3.982 | 1.328  |
| Min.                               | 0.006869 | 477.4 | 23.68  |
| Max.                               | 0.007244 | 553.0 | 25.07  |
| Number of Spec.                    | 24       | 20    | 18     |



January 2, 2026

CAM-RP-2023-002 Rev B

**Longitudinal Tension Properties (LT)--RTA (70°F)  
Strength, Modulus & Poisson's Ratio**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

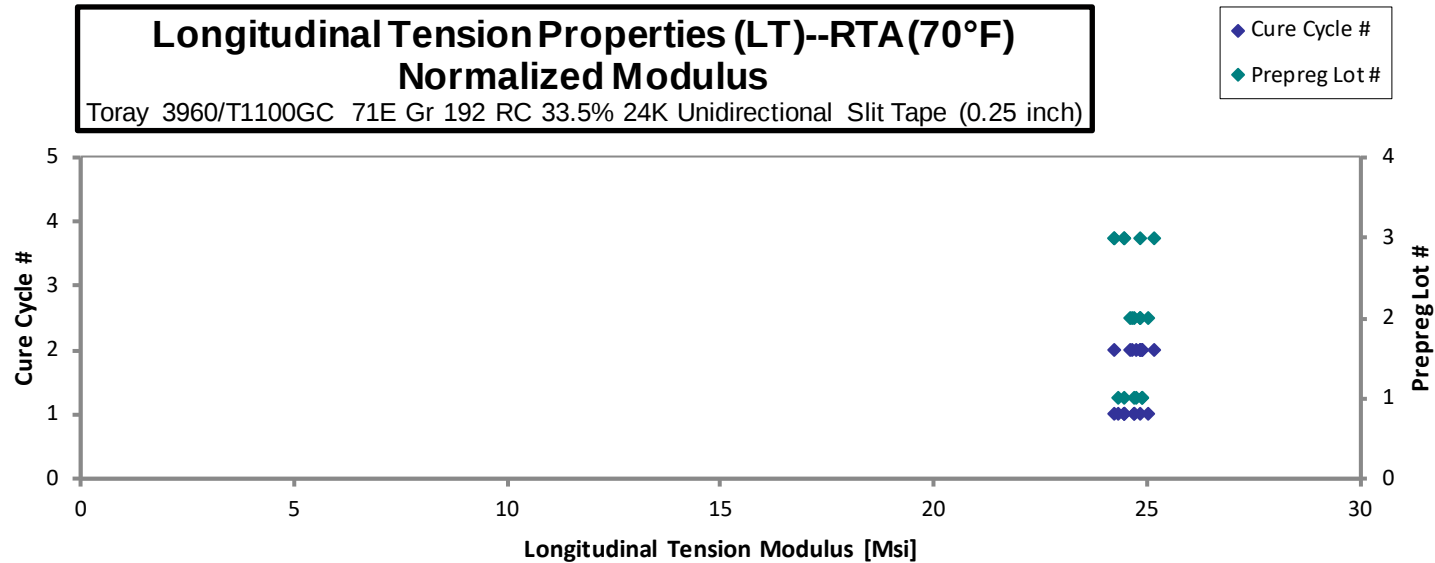
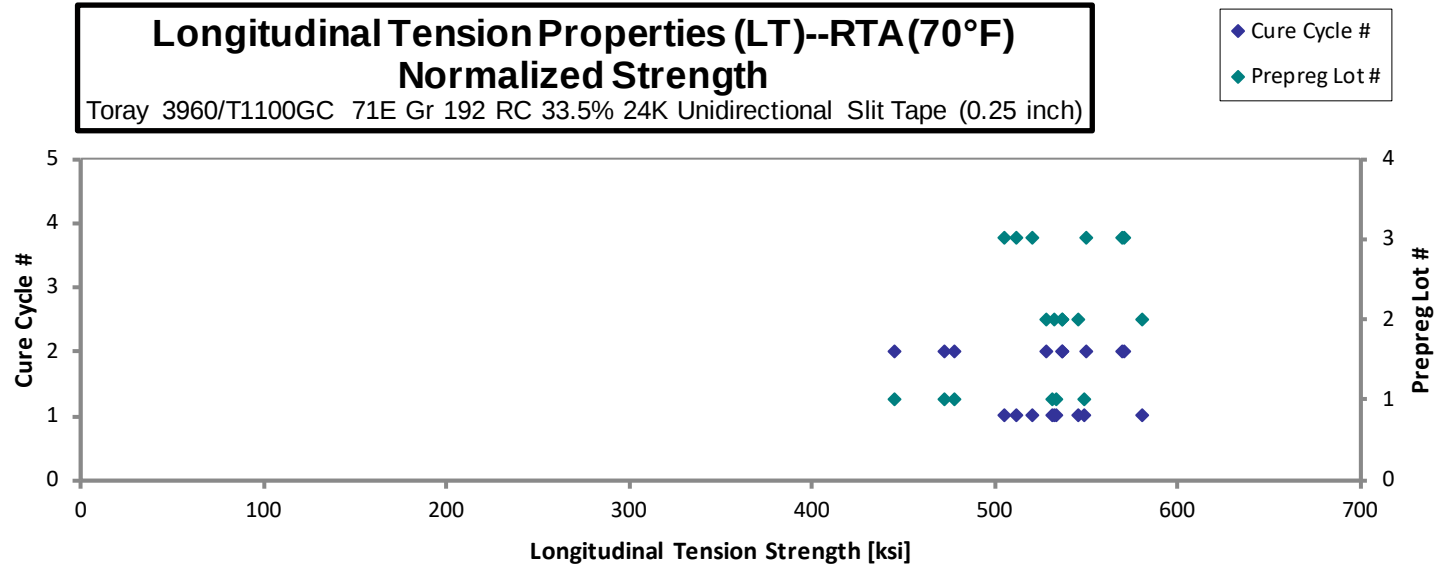
$t_{ply}$  [in]

0.007000

| Specimen Number                                | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Poisson's Ratio | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | Strength <sub>norm</sub> [ksi] | Modulus <sub>norm</sub> [Msi] |
|------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|---------------|-----------------|------------------------------|---------------------|--------------|---------------------|--------------------------------|-------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-LT-RTA-1 | A             | C1              | 1             | 1            | 553.9          | 24.91         | 0.3457          | 0.04167                      | 6                   | XGM          | 0.006944            | 549.5                          | 24.71                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-LT-RTA-2 | A             | C1              | 1             | 1            | 533.1          | 24.52         | 0.3181          | 0.04192                      | 6                   | XGM          | 0.006986            | 532.0                          | 24.47                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-LT-RTA-3 | A             | C1              | 1             | 1            | 536.4          | 24.45         | 0.3190          | 0.04182                      | 6                   | XGM          | 0.006969            | 534.0                          | 24.35                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-LT-RTA-1 | A             | C2              | 1             | 2            | 449.6          | 25.15         | 0.3214          | 0.04155                      | 6                   | XGM          | 0.006925            | 444.8                          | 24.88                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-LT-RTA-2 | A             | C2              | 1             | 2            | 484.6          | 25.25         | 0.3308          | 0.04142                      | 6                   | XGM          | 0.006903            | 477.9                          | 24.90                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-LT-RTA-3 | A             | C2              | 1             | 2            | 479.7          | 25.13         | 0.3247          | 0.04135                      | 6                   | XGM          | 0.006892            | 472.3                          | 24.74                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C1-1-LT-RTA-1 | B             | C1              | 2             | 1            | 576.7          | 24.69         | 0.3341          | 0.04227                      | 6                   | XGM          | 0.007044            | 580.4                          | 24.84                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C1-1-LT-RTA-2 | B             | C1              | 2             | 1            | 537.4          | 25.22         | 0.3379          | 0.04165                      | 6                   | XGM          | 0.006942            | 532.9                          | 25.01                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C1-1-LT-RTA-3 | B             | C1              | 2             | 1            | 544.7          | 24.65         | 0.3229          | 0.04205                      | 6                   | XGM          | 0.007008            | 545.3                          | 24.68                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C2-1-LT-RTA-1 | B             | C2              | 2             | 2            | 547.2          | 25.29         | 0.3400          | 0.04122                      | 6                   | XGM          | 0.006869            | 537.0                          | 24.82                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C2-1-LT-RTA-2 | B             | C2              | 2             | 2            | 544.5          | 24.97         | 0.3453          | 0.04140                      | 6                   | XGM          | 0.006900            | 536.7                          | 24.62                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C2-1-LT-RTA-3 | B             | C2              | 2             | 2            | 538.5          | 25.16         | 0.3505          | 0.04120                      | 6                   | XGM          | 0.006867            | 528.3                          | 24.68                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C1-1-LT-RTA-1 | C             | C1              | 3             | 1            | 514.7          | 24.19         | 0.3469          | 0.04247                      | 6                   | XGM, LWT     | 0.007078            | 520.5                          | 24.46                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C1-1-LT-RTA-2 | C             | C1              | 3             | 1            | 496.0          | 23.83         | 0.3340          | 0.04275                      | 6                   | XGM          | 0.007125            | 504.9                          | 24.25                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C1-1-LT-RTA-3 | C             | C1              | 3             | 1            | 511.8          | 24.46         | 0.3374          | 0.04202                      | 6                   | XGM, LGT     | 0.007003            | 512.0                          | 24.47                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C2-1-LT-RTA-1 | C             | C2              | 3             | 2            | 546.5          | 24.07         | 0.3338          | 0.04225                      | 6                   | XGM          | 0.007042            | 549.7                          | 24.21                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C2-1-LT-RTA-2 | C             | C2              | 3             | 2            | 562.5          | 24.80         | 0.3342          | 0.04263                      | 6                   | XGM          | 0.007106            | 571.0                          | 25.17                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C2-1-LT-RTA-3 | C             | C2              | 3             | 2            | 558.4          | 24.33         | 0.3431          | 0.04290                      | 6                   | XGM          | 0.007150            | 570.3                          | 24.85                         |

Average 528.7 24.73 0.3344  
Standard Dev. 33.01 0.4450 0.01001  
Coeff. of Var. [%] 6.243 1.800 2.993  
Min. 449.6 23.83 0.3181  
Max. 576.7 25.29 0.3505  
Number of Spec. 18 18 18

Average<sub>norm</sub> 0.006986 527.7 24.67  
Standard Dev<sub>norm</sub> 35.34 0.2639  
Coeff. of Var. [%]<sub>norm</sub> 6.696 1.069  
Min. 0.006867 444.8 24.21  
Max. 0.007150 580.4 25.17  
Number of Spec. 18 18 18



**Longitudinal Tension Properties (LT)--ETW1 (180°F)**  
**Strength, Modulus & Poisson's Ratio**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

$t_{ply}$  [in]

0.007000

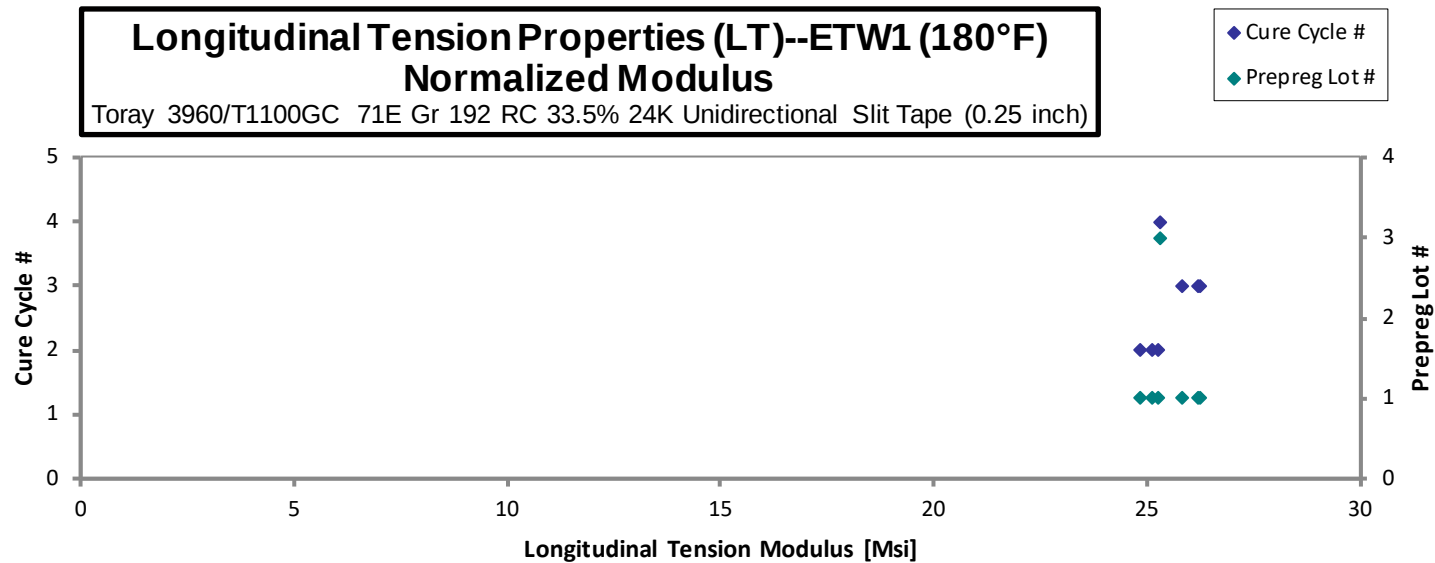
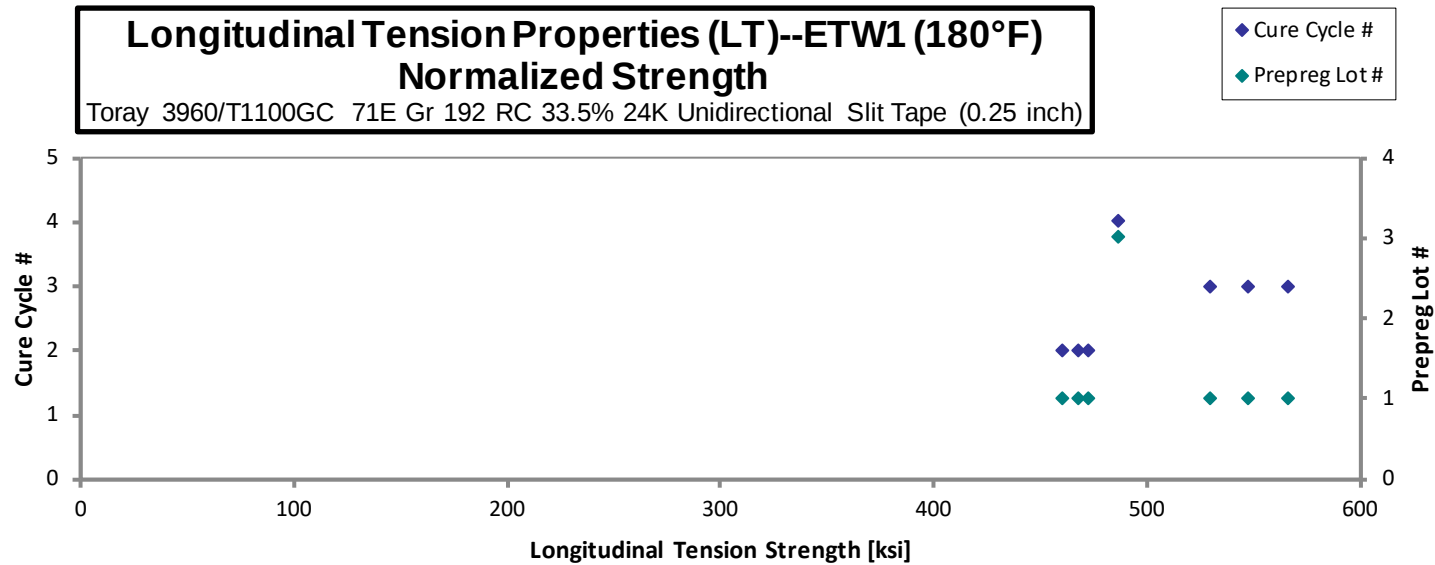
| Specimen Number                                  | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Poisson's Ratio | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode |
|--------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|---------------|-----------------|------------------------------|---------------------|--------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-LT-ETW1-1  | A             | C2              | 1             | 2            | 479.6          | 25.48         | 0.3240          | 0.04140                      | 6                   | XGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-LT-ETW1-2  | A             | C2              | 1             | 2            | 467.3          | 25.23         | 0.3575          | 0.04138                      | 6                   | XGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-LT-ETW1-3  | A             | C2              | 1             | 2            | 476.9          | 25.71         | 0.3228          | 0.04123                      | 6                   | XGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C3-1-LT-ETW1-1  | A             | C3              | 1             | 3            | 526.4          | 26.07         | 0.3425          | 0.04225                      | 6                   | XGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C3-1-LT-ETW1-2  | A             | C3              | 1             | 3            | 543.4          | 25.63         | 0.3535          | 0.04230                      | 6                   | XGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C3-1-LT-ETW1-3  | A             | C3              | 1             | 3            | 559.6          | 25.89         | 0.3513          | 0.04252                      | 6                   | XGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C4-1-LT-ETW2-2* | C             | C4              | 3             | 4            | 481.8          | 25.08         | 0.3042          | 0.04242                      | 6                   | XGM          |

\*ETW2(250°F) specimen was tested as ETW1(180°F).

| Avg. $t_{ply}$ [in] | Strength <sub>norm</sub> [ksi] | Modulus <sub>norm</sub> [Msi] |
|---------------------|--------------------------------|-------------------------------|
| 0.006900            | 472.7                          | 25.12                         |
| 0.006897            | 460.4                          | 24.86                         |
| 0.006872            | 468.2                          | 25.24                         |
| 0.007042            | 529.5                          | 26.23                         |
| 0.007050            | 547.3                          | 25.81                         |
| 0.007086            | 566.5                          | 26.21                         |
| 0.007069            | 486.6                          | 25.33                         |

Average 505.0 25.58 0.3365  
Standard Dev. 37.22 0.3515 0.01988  
Coeff. of Var. [%] 7.371 1.374 5.907  
Min. 467.3 25.08 0.3042  
Max. 559.6 26.07 0.3575  
Number of Spec. 7 7 7

Average<sub>norm</sub> 0.006988 504.5 25.54  
Standard Dev.<sub>norm</sub> 42.61 0.5438  
Coeff. of Var. [%]<sub>norm</sub> 8.447 2.129  
Min. 0.006872 460.4 24.86  
Max. 0.007086 566.5 26.23  
Number of Spec. 7 7 7



**Longitudinal Tension Properties (LT)--ETW2 (250°F)  
Strength, Modulus & Poisson's Ratio**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

$t_{ply}$  [in]

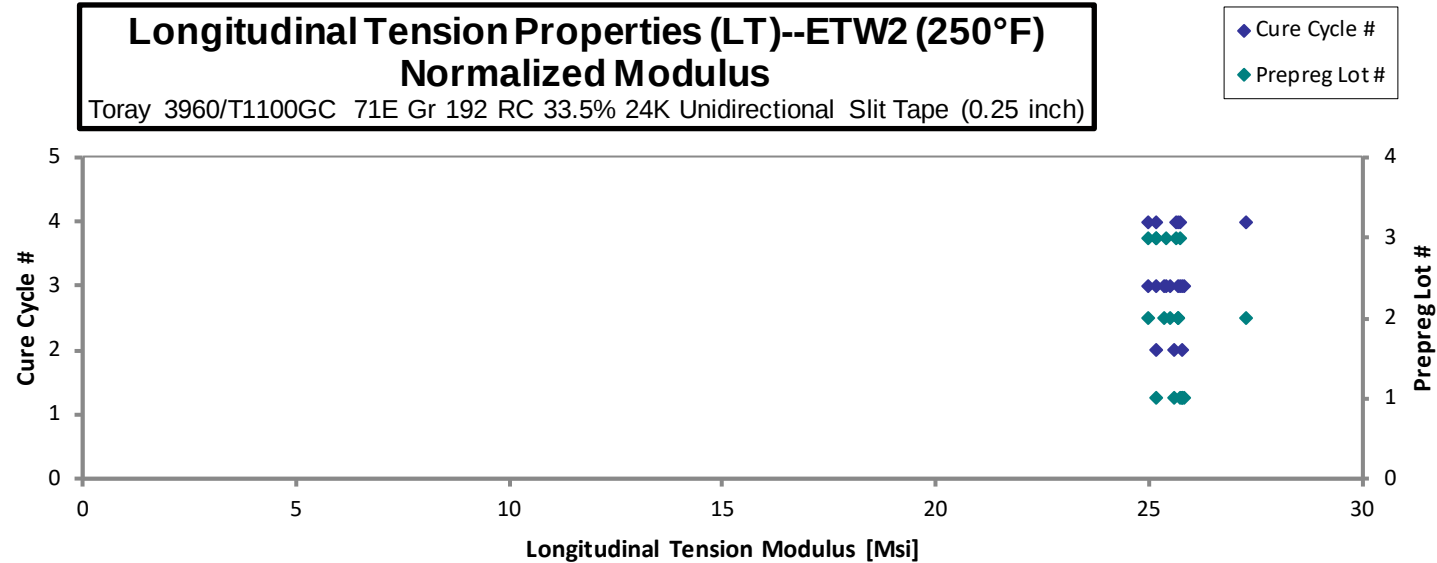
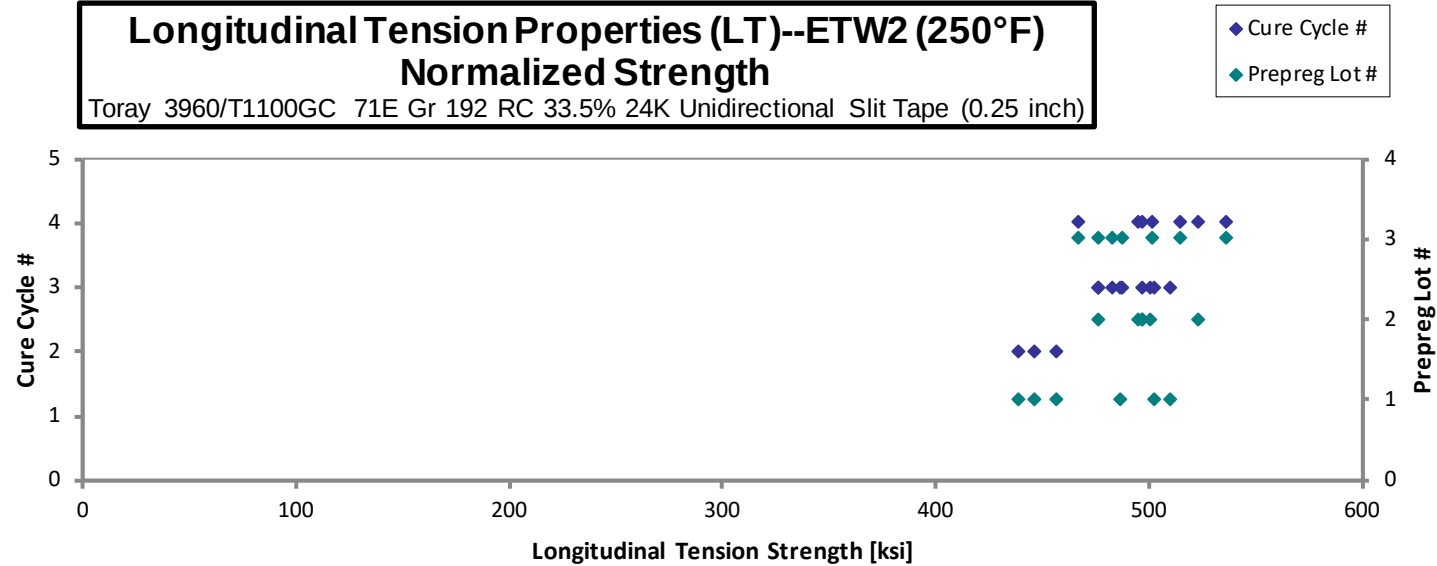
0.007000

| Specimen Number                                 | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Poisson's Ratio | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | Strength <sub>norm</sub> [ksi] | Modulus <sub>norm</sub> [Msi] |
|-------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|---------------|-----------------|------------------------------|---------------------|--------------|---------------------|--------------------------------|-------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-LT-ETW2-1 | A             | C2              | 1             | 2            | 463.0          | 26.17         | 0.3332          | 0.04140                      | 6                   | XGM          | 0.006900            | 456.4                          | 25.80                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-LT-ETW2-2 | A             | C2              | 1             | 2            | 446.5          | 26.06         | 0.3724          | 0.04127                      | 6                   | XGM          | 0.006878            | 438.7                          | 25.60                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-LT-ETW2-3 | A             | C2              | 1             | 2            | 455.5          | 25.65         | 0.3667          | 0.04118                      | 6                   | XGM          | 0.006864            | 446.6                          | 25.15                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C3-1-LT-ETW2-1 | A             | C3              | 1             | 3            | 501.6          | 25.67         | 0.4102          | 0.04207                      | 6                   | XGM          | 0.007011            | 502.4                          | 25.72                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C3-1-LT-ETW2-2 | A             | C3              | 1             | 3            | 482.8          | 25.61         | 0.3768          | 0.04233                      | 6                   | XGM          | 0.007056            | 486.6                          | 25.81                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C3-1-LT-ETW2-3 | A             | C3              | 1             | 3            | 510.3          | 25.81         | 0.3624          | 0.04198                      | 6                   | XGM          | 0.006997            | 510.1                          | 25.80                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C3-1-LT-ETW2-1 | B             | C3              | 2             | 3            | 490.3          | 25.34         | 0.3421          | 0.04258                      | 6                   | XGM          | 0.007097            | 497.1                          | 25.69                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C3-1-LT-ETW2-2 | B             | C3              | 2             | 3            | 472.1          | 25.27         | 0.3585          | 0.04238                      | 6                   | XGM          | 0.007064            | 476.4                          | 25.50                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C3-1-LT-ETW2-3 | B             | C3              | 2             | 3            | 494.9          | 25.08         | 0.3764          | 0.04247                      | 6                   | XGM          | 0.007078            | 500.4                          | 25.36                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C4-1-LT-ETW2-1 | B             | C4              | 2             | 4            | 481.8          | 25.11         | 0.3559          | 0.04562                      | 6                   | XGM          | 0.007603            | 523.3                          | 27.28                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C4-1-LT-ETW2-2 | B             | C4              | 2             | 4            | 479.1          | 24.81         | 0.3936          | 0.04352                      | 6                   | XGM          | 0.007253            | 496.4                          | 25.70                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C4-1-LT-ETW2-3 | B             | C4              | 2             | 4            | 488.9          | 24.69         | 0.3719          | 0.04250                      | 6                   | XGM          | 0.007083            | 494.7                          | 24.99                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C3-1-LT-ETW2-1 | C             | C3              | 3             | 3            | 479.7          | 24.79         | 0.3877          | 0.04230                      | 6                   | XGM          | 0.007050            | 483.1                          | 24.97                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C3-1-LT-ETW2-2 | C             | C3              | 3             | 3            | 487.2          | 25.43         | 0.3503          | 0.04198                      | 6                   | XGM          | 0.006997            | 487.0                          | 25.42                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C3-1-LT-ETW2-3 | C             | C3              | 3             | 3            | 476.0          | 25.16         | 0.3987          | 0.04205                      | 6                   | XGM          | 0.007008            | 476.6                          | 25.19                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C4-1-LT-ETW2-1 | C             | C4              | 3             | 4            | 537.0          | 25.22         | 0.3605          | 0.04195                      | 6                   | XGM          | 0.006992            | 536.4                          | 25.19                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C4-1-LT-ETW2-3 | C             | C4              | 3             | 4            | 452.0          | 24.83         | 0.3888          | 0.04337                      | 6                   | XGM          | 0.007228            | 466.7                          | 25.64                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C4-1-LT-SP-1   | C             | C4              | 3             | 4            | 484.2          | 24.86         | 0.3803          | 0.04348                      | 6                   | XGM          | 0.007247            | 501.3                          | 25.74                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C4-1-LT-SP-2*  | C             | C4              | 3             | 4            | 498.9          |               | 0.04330         |                              | 6                   | XGM          | 0.007217            | 514.3                          |                               |

\*Specimen was not gaged, only strength is tested.

|                    |       |        |         |
|--------------------|-------|--------|---------|
| Average            | 483.2 | 25.31  | 0.3715  |
| Standard Dev.      | 21.28 | 0.4436 | 0.02006 |
| Coeff. of Var. [%] | 4.403 | 1.753  | 5.401   |
| Min.               | 446.5 | 24.69  | 0.3332  |
| Max.               | 537.0 | 26.17  | 0.4102  |
| Number of Spec.    | 19    | 18     | 18      |

|                                    |          |       |        |
|------------------------------------|----------|-------|--------|
| Average <sub>norm</sub>            | 0.007085 | 489.2 | 25.59  |
| Standard Dev. <sub>norm</sub>      |          | 25.12 | 0.5087 |
| Coeff. of Var. [%] <sub>norm</sub> |          | 5.135 | 1.988  |
| Min.                               | 0.006864 | 438.7 | 24.97  |
| Max.                               | 0.007603 | 536.4 | 27.28  |
| Number of Spec.                    | 19       | 19    | 18     |



## 4.2 Transverse Tension Properties (TT)

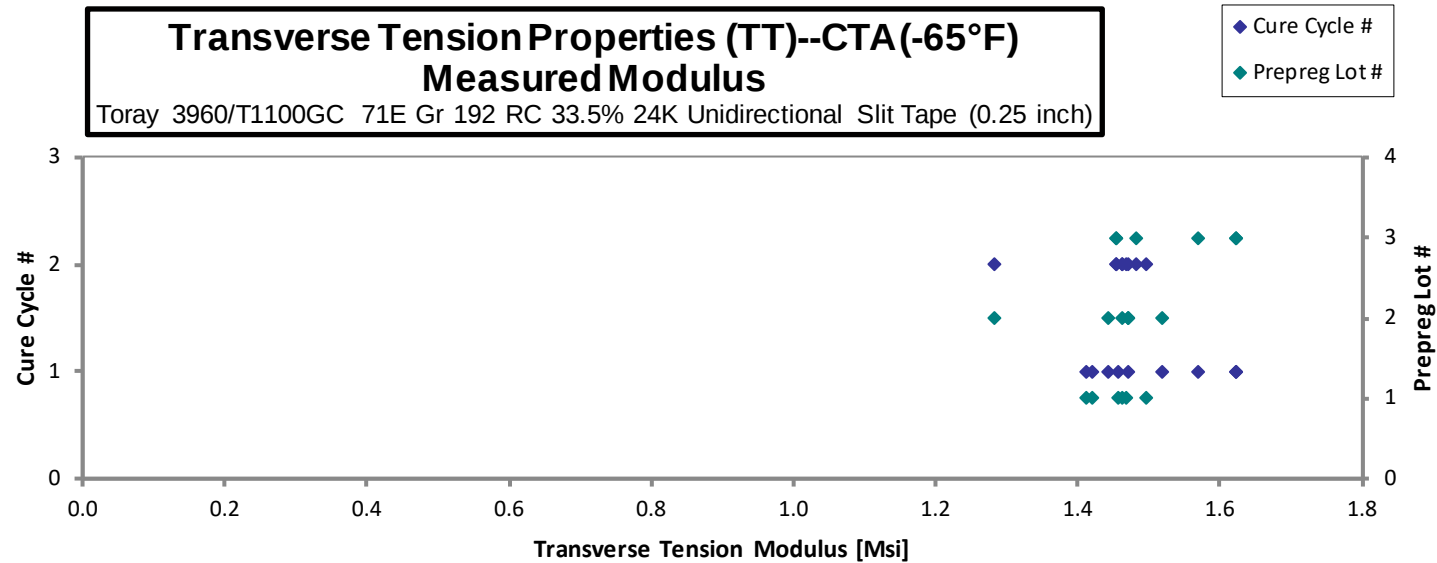
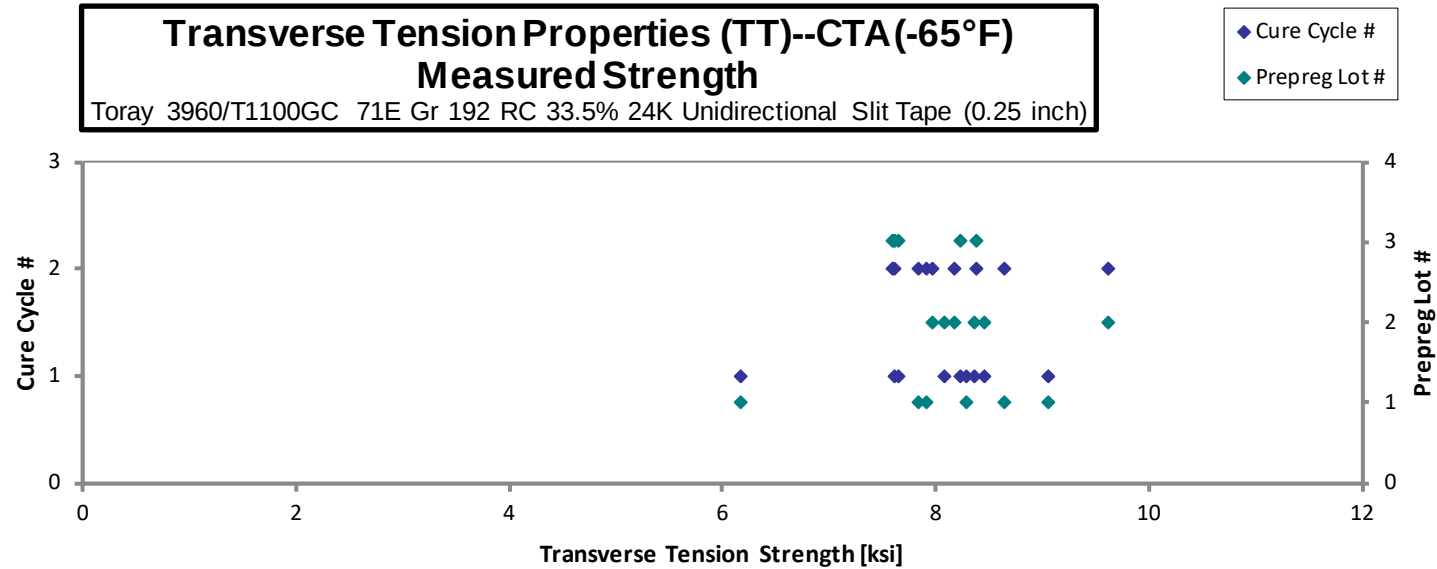
### Transverse Tension Properties (TT)--CTA (-65°F)

#### Strength & Modulus

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

| Specimen Number                                | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Avg. $t_{ply}$ [in] | Failure Mode |
|------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|---------------|------------------------------|---------------------|---------------------|--------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-TT-CTA-1 | A             | C1              | 1             | 1            | 6.168          | 1.413         | 0.08325                      | 12                  | 0.006938            | LGT          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-TT-CTA-2 | A             | C1              | 1             | 1            | 9.060          | 1.419         | 0.08205                      | 12                  | 0.006838            | LAB          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-TT-CTA-3 | A             | C1              | 1             | 1            | 8.294          | 1.456         | 0.08212                      | 12                  | 0.006843            | LAT          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-TT-CTA-1 | A             | C2              | 1             | 2            | 8.646          | 1.469         | 0.08273                      | 12                  | 0.006894            | LAB          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-TT-CTA-2 | A             | C2              | 1             | 2            | 7.916          | 1.495         | 0.08208                      | 12                  | 0.006840            | LAB          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-TT-CTA-3 | A             | C2              | 1             | 2            | 7.846          | 1.461         | 0.08260                      | 12                  | 0.006883            | LAB          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C1-1-TT-CTA-1 | B             | C1              | 2             | 1            | 8.366          | 1.520         | 0.08383                      | 12                  | 0.006986            | LAB          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C1-1-TT-CTA-2 | B             | C1              | 2             | 1            | 8.461          | 1.444         | 0.08420                      | 12                  | 0.007017            | LAT          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C1-1-TT-CTA-3 | B             | C1              | 2             | 1            | 8.086          | 1.471         | 0.08413                      | 12                  | 0.007011            | LAT          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C2-1-TT-CTA-1 | B             | C2              | 2             | 2            | 8.170          | 1.470         | 0.08373                      | 12                  | 0.006978            | LAB          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C2-1-TT-CTA-2 | B             | C2              | 2             | 2            | 7.972          | 1.284         | 0.08358                      | 12                  | 0.006965            | LAB          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C2-1-TT-CTA-3 | B             | C2              | 2             | 2            | 9.622          | 1.462         | 0.08347                      | 12                  | 0.006956            | LAT          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C1-1-TT-CTA-1 | C             | C1              | 3             | 1            | 7.617          | 1.570         | 0.08518                      | 12                  | 0.007099            | LAB          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C1-1-TT-CTA-2 | C             | C1              | 3             | 1            | 7.649          | 1.623         | 0.08440                      | 12                  | 0.007033            | LAB          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C1-1-TT-CTA-3 | C             | C1              | 3             | 1            | 8.231          | 1.623         | 0.08487                      | 12                  | 0.007072            | LAT          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C2-1-TT-CTA-1 | C             | C2              | 3             | 2            | 7.610          | 1.454         | 0.08495                      | 12                  | 0.007079            | LAB          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C2-1-TT-CTA-2 | C             | C2              | 3             | 2            | 8.373          | 1.455         | 0.08430                      | 12                  | 0.007025            | LAT          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C2-1-TT-CTA-3 | C             | C2              | 3             | 2            | 7.598          | 1.482         | 0.08478                      | 12                  | 0.007065            | LAB          |

|                    |        |         |          |
|--------------------|--------|---------|----------|
| Average            | 8.094  | 1.476   | 0.006973 |
| Standard Dev.      | 0.7133 | 0.07723 |          |
| Coeff. of Var. [%] | 8.813  | 5.232   |          |
| Min.               | 6.168  | 1.284   | 0.006838 |
| Max.               | 9.622  | 1.623   | 0.007099 |
| Number of Spec.    | 18     | 18      | 18       |

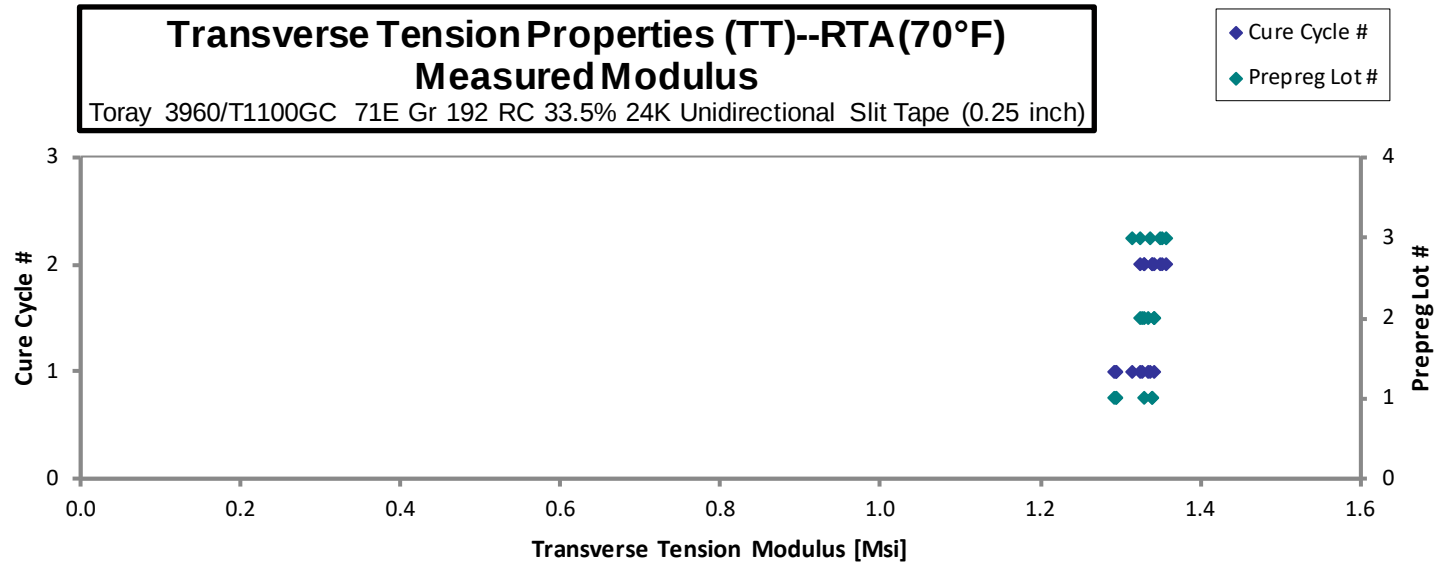
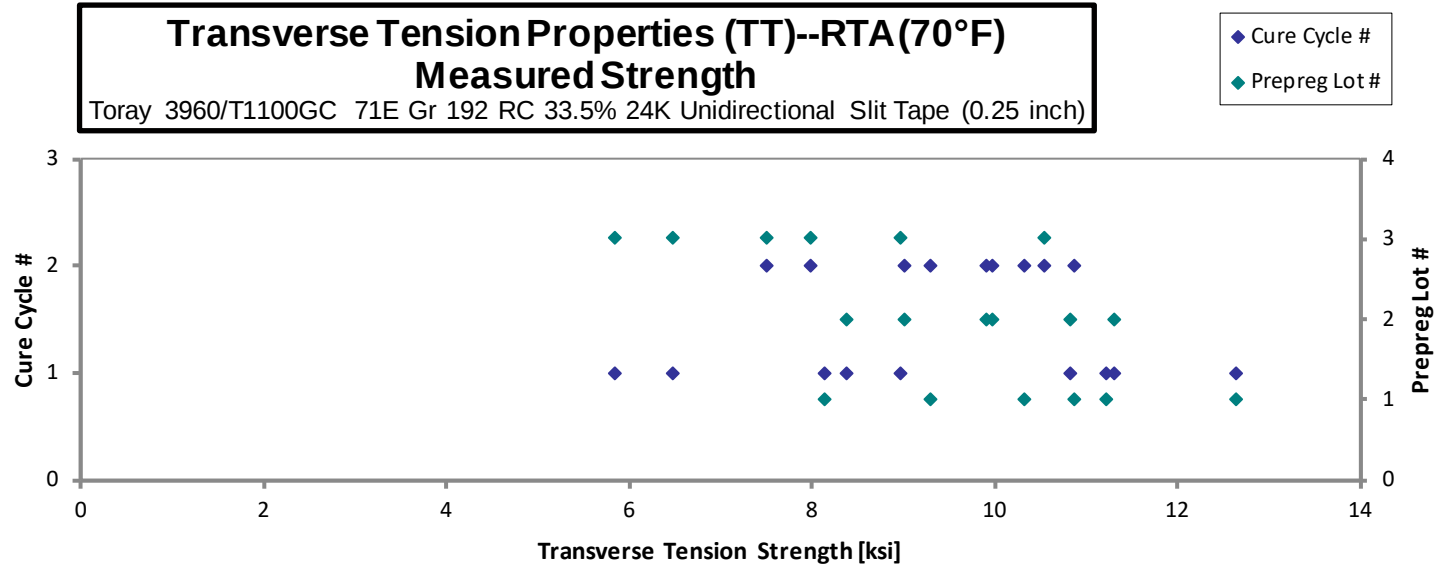


**Transverse Tension Properties (TT)--RTA (70°F)**  
**Strength & Modulus**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

| Specimen Number                                | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Avg. t <sub>ply</sub> [in] | Failure Mode |
|------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|---------------|------------------------------|---------------------|----------------------------|--------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-TT-RTA-1 | A             | C1              | 1             | 1            | 11.22          | 1.296         | 0.08270                      | 12                  | 0.006892                   | LWT          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-TT-RTA-2 | A             | C1              | 1             | 1            | 8.142          | 1.295         | 0.08260                      | 12                  | 0.006883                   | LWT          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-TT-RTA-3 | A             | C1              | 1             | 1            | 12.64          | 1.292         | 0.08253                      | 12                  | 0.006878                   | LGT          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-TT-RTA-1 | A             | C2              | 1             | 2            | 10.86          | 1.330         | 0.08290                      | 12                  | 0.006908                   | LAB          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-TT-RTA-2 | A             | C2              | 1             | 2            | 9.288          | 1.340         | 0.08222                      | 12                  | 0.006851                   | LAB          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-TT-RTA-3 | A             | C2              | 1             | 2            | 10.32          | 1.340         | 0.08272                      | 12                  | 0.006893                   | LAB          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C1-1-TT-RTA-1 | B             | C1              | 2             | 1            | 8.376          | 1.342         | 0.08402                      | 12                  | 0.007001                   | LWT          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C1-1-TT-RTA-2 | B             | C1              | 2             | 1            | 11.31          | 1.328         | 0.08420                      | 12                  | 0.007017                   | LWB, LWT     |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C1-1-TT-RTA-3 | B             | C1              | 2             | 1            | 10.83          | 1.335         | 0.08395                      | 12                  | 0.006996                   | LWT          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C2-1-TT-RTA-1 | B             | C2              | 2             | 2            | 9.904          | 1.331         | 0.08375                      | 12                  | 0.006979                   | LAB          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C2-1-TT-RTA-2 | B             | C2              | 2             | 2            | 9.968          | 1.325         | 0.08348                      | 12                  | 0.006957                   | LAT          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C2-1-TT-RTA-3 | B             | C2              | 2             | 2            | 9.013          | 1.341         | 0.08313                      | 12                  | 0.006928                   | LAT          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C1-1-TT-RTA-1 | C             | C1              | 3             | 1            | 5.838          | 1.315         | 0.08455                      | 12                  | 0.007046                   | LAT          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C1-1-TT-RTA-2 | C             | C1              | 3             | 1            | 6.481          | 1.326         | 0.08458                      | 12                  | 0.007049                   | LAT          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C1-1-TT-RTA-3 | C             | C1              | 3             | 1            | 8.961          | 1.338         | 0.08440                      | 12                  | 0.007033                   | LAT          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C2-1-TT-RTA-1 | C             | C2              | 3             | 2            | 10.53          | 1.357         | 0.08463                      | 12                  | 0.007053                   | LAB          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C2-1-TT-RTA-2 | C             | C2              | 3             | 2            | 7.986          | 1.352         | 0.08458                      | 12                  | 0.007049                   | LAB          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C2-1-TT-RTA-3 | C             | C2              | 3             | 2            | 7.506          | 1.349         | 0.08458                      | 12                  | 0.007049                   | LAT          |

|                    |       |         |          |
|--------------------|-------|---------|----------|
| Average            | 9.399 | 1.330   | 0.006970 |
| Standard Dev.      | 1.784 | 0.01902 |          |
| Coeff. of Var. [%] | 18.98 | 1.431   |          |
| Min.               | 5.838 | 1.292   | 0.006851 |
| Max.               | 12.64 | 1.357   | 0.007053 |
| Number of Spec.    | 18    | 18      | 18       |

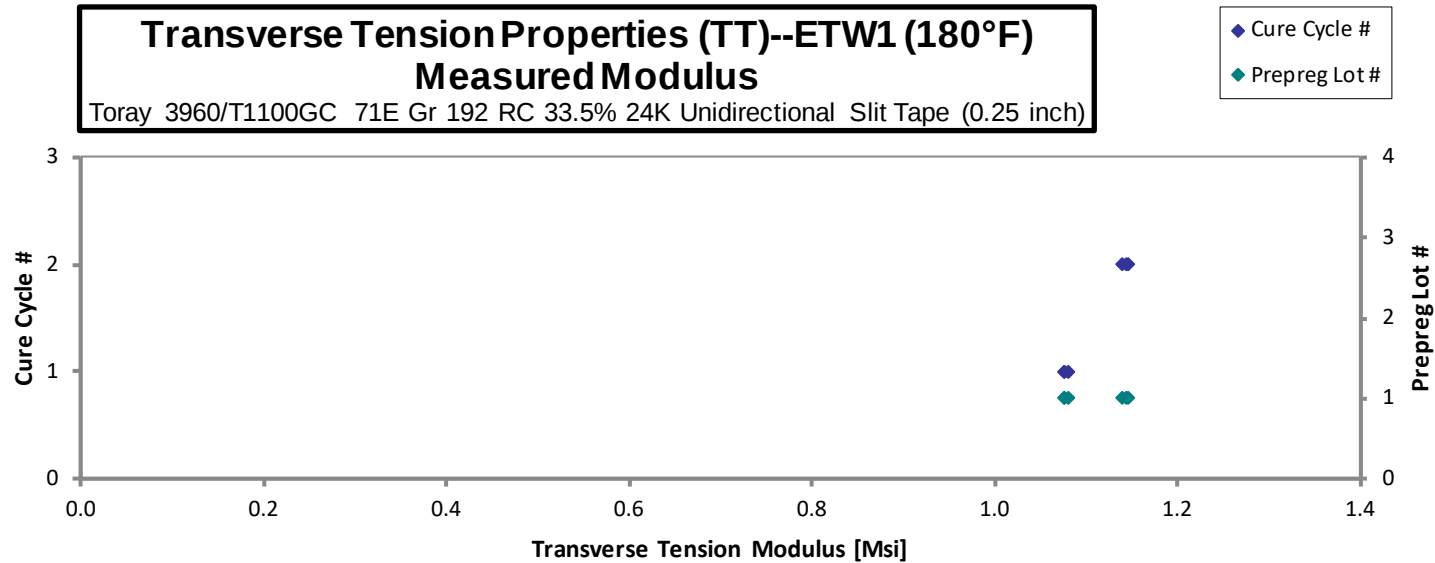
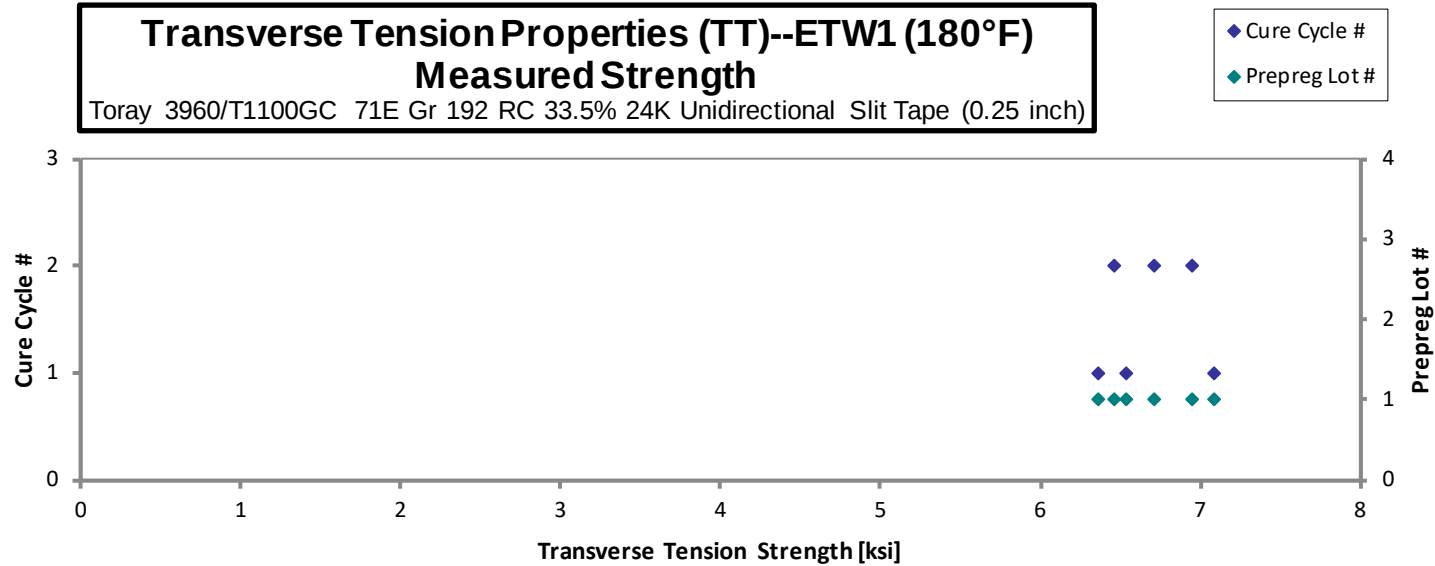


**Transverse Tension Properties (TT)--ETW1 (180°F)**  
**Strength & Modulus**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

| Specimen Number                                 | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Avg. t <sub>ply</sub> [in] | Failure Mode |
|-------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|---------------|------------------------------|---------------------|----------------------------|--------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-TT-ETW1-1 | A             | C1              | 1             | 1            | 6.365          | 1.081         | 0.08265                      | 12                  | 0.006888                   | LWB          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-TT-ETW1-2 | A             | C1              | 1             | 1            | 6.531          | 1.076         | 0.08252                      | 12                  | 0.006876                   | LGT          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-TT-ETW1-3 | A             | C1              | 1             | 1            | 7.090          | 1.076         | 0.08243                      | 12                  | 0.006869                   | LGT          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-TT-ETW1-1 | A             | C2              | 1             | 2            | 6.714          | 1.145         | 0.08268                      | 12                  | 0.006890                   | LGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-TT-ETW1-2 | A             | C2              | 1             | 2            | 6.461          | 1.139         | 0.08260                      | 12                  | 0.006883                   | LGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-TT-ETW1-3 | A             | C2              | 1             | 2            | 6.944          | 1.146         | 0.08257                      | 12                  | 0.006881                   | LGM          |

|                    |        |         |          |
|--------------------|--------|---------|----------|
| Average            | 6.684  | 1.111   | 0.006881 |
| Standard Dev.      | 0.2860 | 0.03621 |          |
| Coeff. of Var. [%] | 4.279  | 3.261   |          |
| Min.               | 6.365  | 1.076   | 0.006869 |
| Max.               | 7.090  | 1.146   | 0.006890 |
| Number of Spec.    | 6      | 6       | 6        |

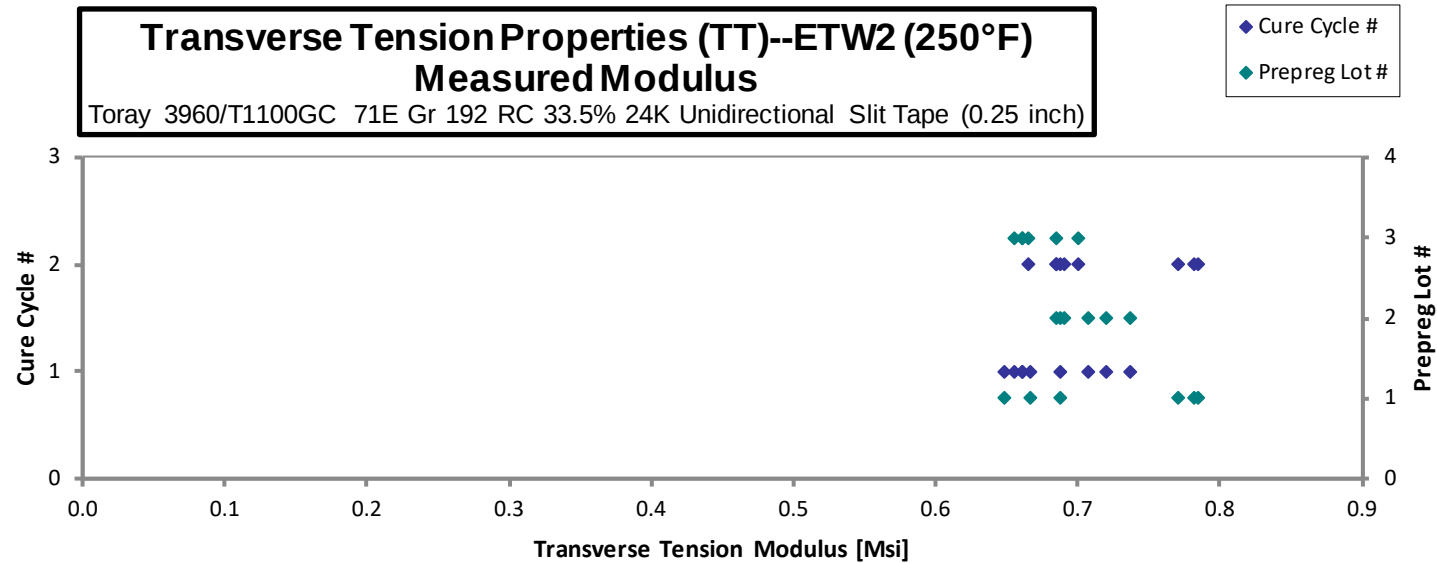
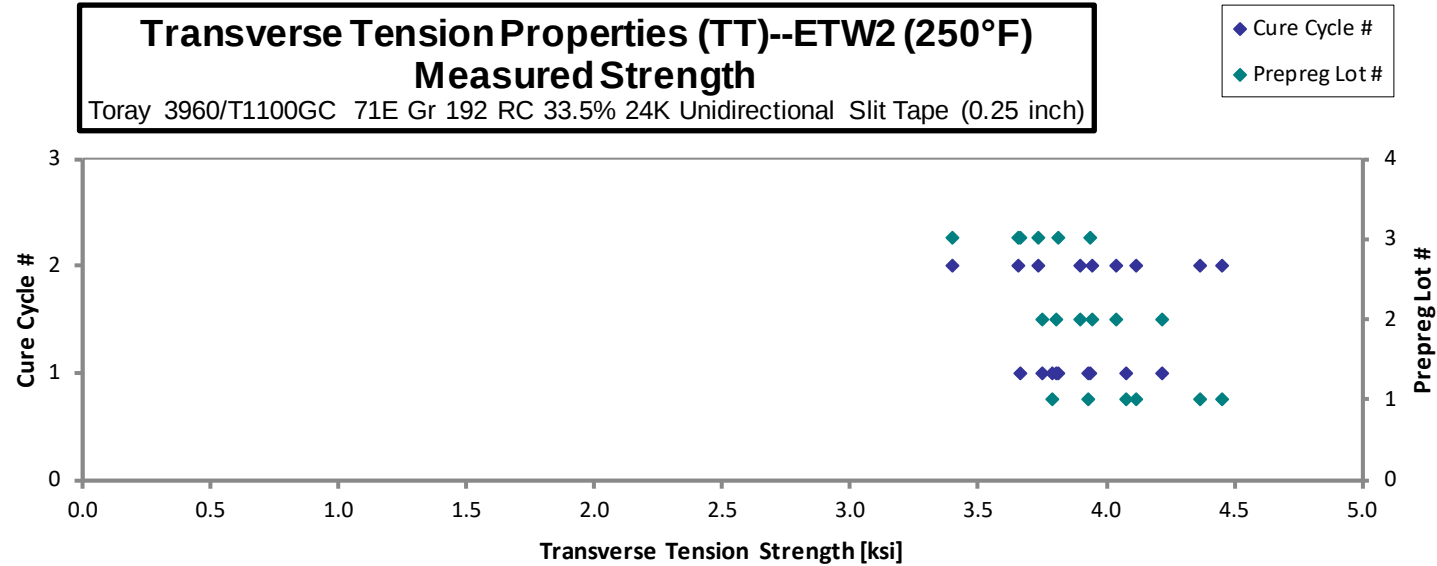


**Transverse Tension Properties (TT)--ETW2 (250°F)**  
**Strength & Modulus**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

| Specimen Number                                 | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Avg. $t_{ply}$ [in] | Failure Mode |
|-------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|---------------|------------------------------|---------------------|---------------------|--------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-TT-ETW2-1 | A             | C1              | 1             | 1            | 3.930          | 0.6672        | 0.08247                      | 12                  | 0.006872            | LGT          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-TT-ETW2-2 | A             | C1              | 1             | 1            | 4.078          | 0.6879        | 0.08242                      | 12                  | 0.006868            | LGT          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-TT-ETW2-3 | A             | C1              | 1             | 1            | 3.787          | 0.6489        | 0.08235                      | 12                  | 0.006863            | LGT          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-TT-ETW2-1 | A             | C2              | 1             | 2            | 4.370          | 0.7699        | 0.08193                      | 12                  | 0.006828            | LGT          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-TT-ETW2-2 | A             | C2              | 1             | 2            | 4.451          | 0.7812        | 0.08207                      | 12                  | 0.006839            | LGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-TT-ETW2-3 | A             | C2              | 1             | 2            | 4.117          | 0.7847        | 0.08227                      | 12                  | 0.006856            | LGT          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C1-1-TT-ETW2-1 | B             | C1              | 2             | 1            | 4.219          | 0.7073        | 0.08377                      | 12                  | 0.006981            | LGB          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C1-1-TT-ETW2-2 | B             | C1              | 2             | 1            | 3.747          | 0.7367        | 0.08375                      | 12                  | 0.006979            | LWT          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C1-1-TT-ETW2-3 | B             | C1              | 2             | 1            | 3.807          | 0.7198        | 0.08347                      | 12                  | 0.006956            | LWB          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C2-1-TT-ETW2-1 | B             | C2              | 2             | 2            | 3.895          | 0.6906        | 0.08313                      | 12                  | 0.006928            | LGB          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C2-1-TT-ETW2-2 | B             | C2              | 2             | 2            | 4.038          | 0.6871        | 0.08373                      | 12                  | 0.006978            | LGB          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C2-1-TT-ETW2-3 | B             | C2              | 2             | 2            | 3.948          | 0.6845        | 0.08330                      | 12                  | 0.006942            | LGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C1-1-TT-ETW2-1 | C             | C1              | 3             | 1            | 3.666          | 0.6609        | 0.08467                      | 12                  | 0.007056            | LGT          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C1-1-TT-ETW2-2 | C             | C1              | 3             | 1            | 3.933          | 0.6610        | 0.08442                      | 12                  | 0.007035            | LGB          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C1-1-TT-ETW2-3 | C             | C1              | 3             | 1            | 3.809          | 0.6551        | 0.08462                      | 12                  | 0.007051            | LGT          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C2-1-TT-ETW2-1 | C             | C2              | 3             | 2            | 3.396          | 0.7002        | 0.08475                      | 12                  | 0.007063            | LGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C2-1-TT-ETW2-2 | C             | C2              | 3             | 2            | 3.734          | 0.6844        | 0.08472                      | 12                  | 0.007060            | LGB          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C2-1-TT-ETW2-3 | C             | C2              | 3             | 2            | 3.654          | 0.6649        | 0.08472                      | 12                  | 0.007060            | LGM          |

|                    |        |         |          |
|--------------------|--------|---------|----------|
| Average            | 3.921  | 0.6996  | 0.006956 |
| Standard Dev.      | 0.2624 | 0.04292 |          |
| Coeff. of Var. [%] | 6.691  | 6.136   |          |
| Min.               | 3.396  | 0.6489  | 0.006828 |
| Max.               | 4.451  | 0.7847  | 0.007063 |
| Number of Spec.    | 18     | 18      | 18       |



### 4.3 Longitudinal Compression Properties (LC)

#### Longitudinal Compression Properties (LC)--CTA (-65°F)

##### Modulus & Poisson's Ratio

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

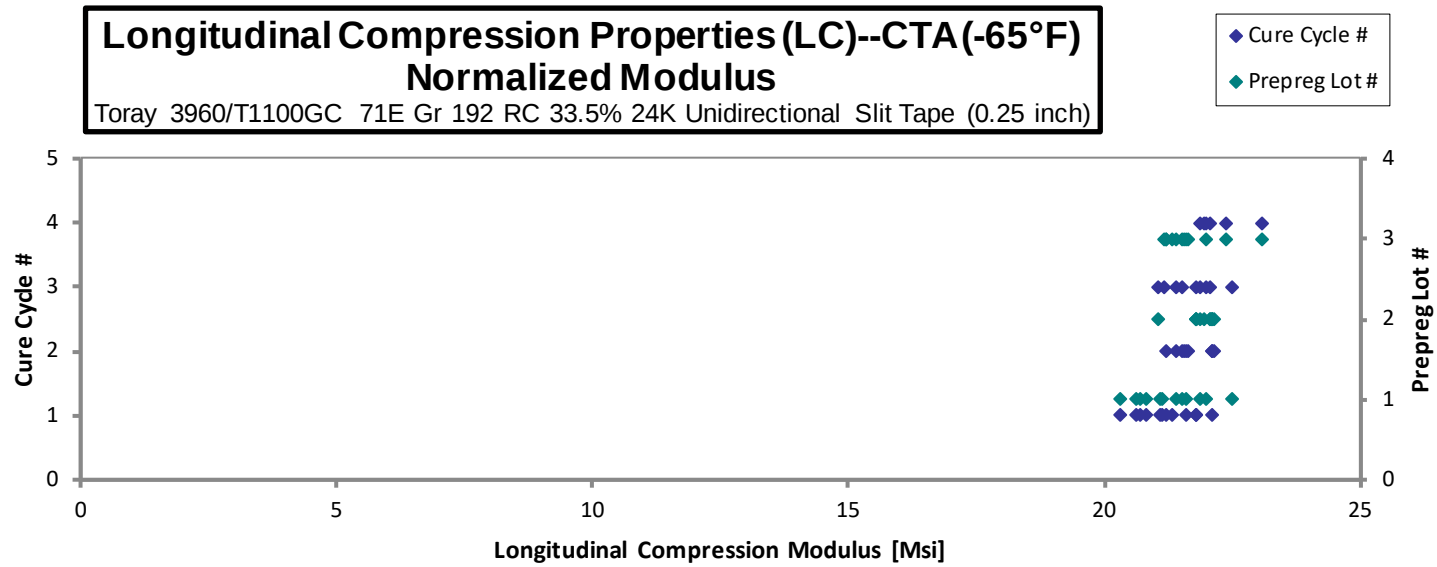
 $t_{ply}$  [in]

0.007000

| Specimen Number                                | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Modulus [Msi] | Poisson's Ratio | Avg. Specimen Thickness [in] | # Plies in Laminate | Avg. $t_{ply}$ [in] | Modulus <sub>norm</sub> [Msi] |
|------------------------------------------------|---------------|-----------------|---------------|--------------|---------------|-----------------|------------------------------|---------------------|---------------------|-------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-LC-CTA-1 | A             | C1              | 1             | 1            | 21.21         |                 | 0.09750                      | 14                  | 0.006964            | 21.10                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-LC-CTA-2 | A             | C1              | 1             | 1            | 20.93         |                 | 0.09662                      | 14                  | 0.006901            | 20.64                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-LC-CTA-3 | A             | C1              | 1             | 1            | 21.64         |                 | 0.09572                      | 14                  | 0.006837            | 21.14                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-LC-SP-6  | A             | C1              | 1             | 1            | 21.11         | 0.3436          | 0.09607                      | 14                  | 0.006862            | 20.70                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-LC-SP-9  | A             | C1              | 1             | 1            | 20.74         | 0.3221          | 0.09593                      | 14                  | 0.006852            | 20.30                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-LC-SP-10 | A             | C1              | 1             | 1            | 21.28         | 0.3378          | 0.09580                      | 14                  | 0.006843            | 20.80                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-LC-CTA-1 | A             | C2              | 1             | 2            | 21.83         |                 | 0.09612                      | 14                  | 0.006865            | 21.42                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-LC-CTA-2 | A             | C2              | 1             | 2            | 22.04         |                 | 0.09607                      | 14                  | 0.006862            | 21.60                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-LC-CTA-3 | A             | C2              | 1             | 2            | 21.97         |                 | 0.09603                      | 14                  | 0.006860            | 21.53                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C3-1-LC-CTA-1 | A             | C3              | 1             | 3            | 22.19         | 0.3415          | 0.09712                      | 14                  | 0.006937            | 21.99                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C3-1-LC-CTA-2 | A             | C3              | 1             | 3            | 22.08         | 0.3418          | 0.09712                      | 14                  | 0.006937            | 21.89                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C3-1-LC-CTA-3 | A             | C3              | 1             | 3            | 22.54         | 0.3316          | 0.09777                      | 14                  | 0.006983            | 22.49                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C1-1-LC-CTA-1 | B             | C1              | 2             | 1            | 21.73         |                 | 0.09830                      | 14                  | 0.007021            | 21.80                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C1-1-LC-CTA-2 | B             | C1              | 2             | 1            | 22.00         |                 | 0.09847                      | 14                  | 0.007033            | 22.11                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C1-1-LC-CTA-3 | B             | C1              | 2             | 1            | 21.69         |                 | 0.09845                      | 14                  | 0.007032            | 21.79                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C2-1-LC-CTA-1 | B             | C2              | 2             | 2            | 22.08         |                 | 0.09813                      | 14                  | 0.007010            | 22.11                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C2-1-LC-CTA-2 | B             | C2              | 2             | 2            | 22.01         |                 | 0.09838                      | 14                  | 0.007027            | 22.09                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C2-1-LC-CTA-3 | B             | C2              | 2             | 2            | 22.12         |                 | 0.09813                      | 14                  | 0.007010            | 22.15                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C3-1-LC-CTA-1 | B             | C3              | 2             | 3            | 21.82         | 0.3240          | 0.09462                      | 14                  | 0.006758            | 21.07                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C3-1-LC-CTA-2 | B             | C3              | 2             | 3            | 22.72         | 0.3558          | 0.09527                      | 14                  | 0.006805            | 22.08                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C3-1-LC-CTA-3 | B             | C3              | 2             | 3            | 22.23         | 0.3480          | 0.09602                      | 14                  | 0.006858            | 21.78                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C4-1-LC-CTA-1 | B             | C4              | 2             | 4            | 22.01         | 0.3488          | 0.09780                      | 14                  | 0.006986            | 21.96                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C4-1-LC-CTA-2 | B             | C4              | 2             | 4            | 21.94         | 0.3410          | 0.09775                      | 14                  | 0.006982            | 21.88                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C4-1-LC-CTA-3 | B             | C4              | 2             | 4            | 21.96         | 0.3284          | 0.09855                      | 14                  | 0.007039            | 22.08                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C1-1-LC-CTA-1 | C             | C1              | 3             | 1            | 21.11         |                 | 0.09845                      | 14                  | 0.007032            | 21.21                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C1-1-LC-CTA-2 | C             | C1              | 3             | 1            | 21.18         |                 | 0.09863                      | 14                  | 0.007045            | 21.32                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C1-1-LC-CTA-3 | C             | C1              | 3             | 1            | 21.46         |                 | 0.09858                      | 14                  | 0.007042            | 21.58                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C2-1-LC-CTA-1 | C             | C2              | 3             | 2            | 21.39         |                 | 0.09880                      | 14                  | 0.007057            | 21.57                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C2-1-LC-CTA-2 | C             | C2              | 3             | 2            | 21.02         |                 | 0.09887                      | 14                  | 0.007062            | 21.21                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C2-1-LC-CTA-3 | C             | C2              | 3             | 2            | 21.53         |                 | 0.09850                      | 14                  | 0.007036            | 21.64                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C3-1-LC-CTA-1 | C             | C3              | 3             | 3            | 22.08         | 0.3324          | 0.09548                      | 14                  | 0.006820            | 21.51                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C3-1-LC-CTA-2 | C             | C3              | 3             | 3            | 22.04         | 0.3342          | 0.09518                      | 14                  | 0.006799            | 21.41                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C3-1-LC-CTA-3 | C             | C3              | 3             | 3            | 21.65         | 0.2972          | 0.09575                      | 14                  | 0.006839            | 21.15                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C4-1-LC-CTA-1 | C             | C4              | 3             | 4            | 21.37         | 0.3407          | 0.10083                      | 14                  | 0.007202            | 21.99                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C4-1-LC-CTA-2 | C             | C4              | 3             | 4            | 21.49         | 0.3542          | 0.10208                      | 14                  | 0.007292            | 22.39                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C4-1-LC-CTA-3 | C             | C4              | 3             | 4            | 21.69         | 0.3655          | 0.10435                      | 14                  | 0.007454            | 23.10                         |

Poisson's Ratio not available because specimen was tested with uniaxial strain gage.

|                    |        |         |                                    |          |        |
|--------------------|--------|---------|------------------------------------|----------|--------|
| Average            | 21.72  | 0.3383  | Average <sub>norm</sub>            | 0.006971 | 21.63  |
| Standard Dev.      | 0.4564 | 0.01517 | Standard Dev. <sub>norm</sub>      |          | 0.5696 |
| Coeff. of Var. [%] | 2.101  | 4.486   | Coeff. of Var. [%] <sub>norm</sub> |          | 2.634  |
| Min.               | 20.74  | 0.2972  | Min.                               | 0.006758 | 20.30  |
| Max.               | 22.72  | 0.3655  | Max.                               | 0.007454 | 23.10  |
| Number of Spec.    | 36     | 18      | Number of Spec.                    | 36       | 36     |



**Longitudinal Compression Properties (LC)--RTA (70°F)**  
**Modulus & Poisson's Ratio**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

 $t_{ply}$  [in]

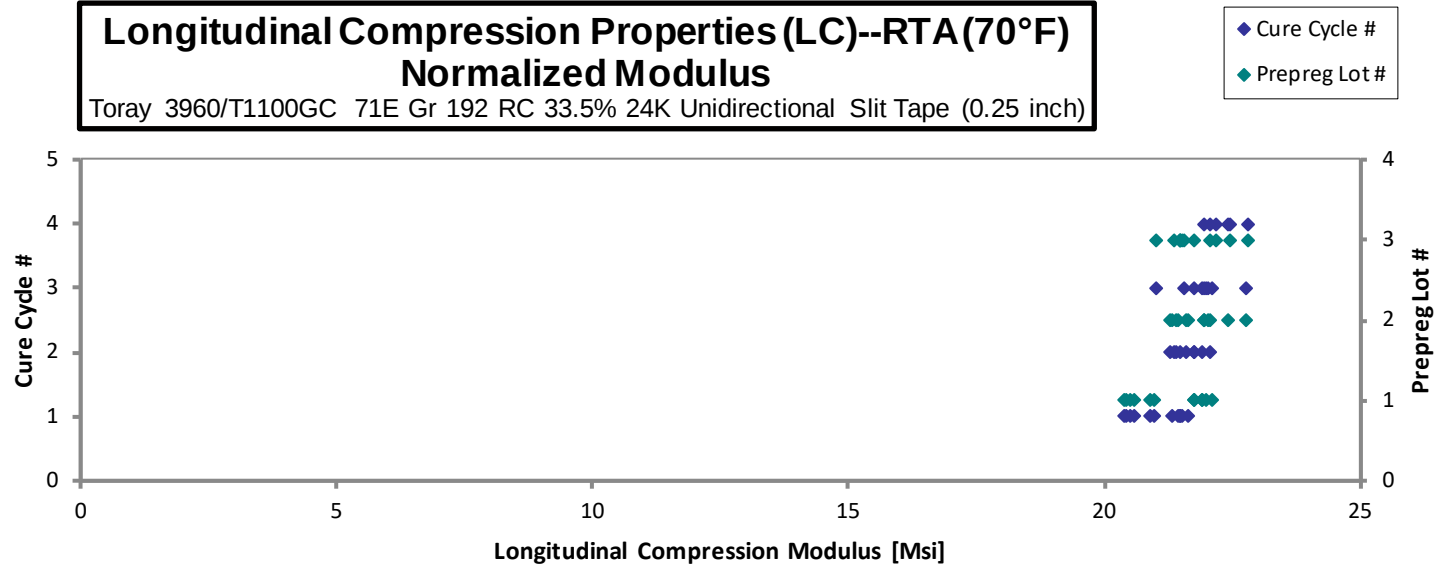
0.007000

| Specimen Number                                 | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Modulus [Msi] | Poisson's Ratio | Avg. Specimen Thickness [in] | # Plies in Laminate | Avg. $t_{ply}$ [in] | Modulus <sub>norm</sub> [Msi] |
|-------------------------------------------------|---------------|-----------------|---------------|--------------|---------------|-----------------|------------------------------|---------------------|---------------------|-------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-LC-RTA-1* | A             | C1              | 1             | 1            | 21.46         |                 | 0.09540                      | 14                  | 0.006814            | 20.89                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-LC-RTA-2* | A             | C1              | 1             | 1            | 21.10         |                 | 0.09525                      | 14                  | 0.006804            | 20.51                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-LC-RTA-3  | A             | C1              | 1             | 1            | 20.87         |                 | 0.09582                      | 14                  | 0.006844            | 20.41                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-LC-SP-1*  | A             | C1              | 1             | 1            | 21.55         | 0.3681          | 0.09542                      | 14                  | 0.006815            | 20.98                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-LC-SP-2*  | A             | C1              | 1             | 1            | 20.92         | 0.3604          | 0.09575                      | 14                  | 0.006839            | 20.44                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-LC-SP-5   | A             | C1              | 1             | 1            | 20.99         | 0.3332          | 0.09613                      | 14                  | 0.006867            | 20.59                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-LC-RTA-1* | A             | C2              | 1             | 2            | 22.37         |                 | 0.09593                      | 14                  | 0.006852            | 21.90                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-LC-RTA-2* | A             | C2              | 1             | 2            | 22.19         |                 | 0.09607                      | 14                  | 0.006862            | 21.75                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-LC-RTA-3  | A             | C2              | 1             | 2            | 22.19         |                 | 0.09600                      | 14                  | 0.006857            | 21.74                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C3-1-LC-RTA-1* | A             | C3              | 1             | 3            | 21.90         | 0.3243          | 0.09842                      | 14                  | 0.007030            | 21.99                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C3-1-LC-RTA-2* | A             | C3              | 1             | 3            | 22.00         | 0.3400          | 0.09847                      | 14                  | 0.007033            | 22.11                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C3-1-LC-RTA-3  | A             | C3              | 1             | 3            | 21.75         | 0.3230          | 0.09867                      | 14                  | 0.007048            | 21.90                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C1-1-LC-RTA-1* | B             | C1              | 2             | 1            | 21.64         |                 | 0.09792                      | 14                  | 0.006994            | 21.62                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C1-1-LC-RTA-2* | B             | C1              | 2             | 1            | 21.36         |                 | 0.09837                      | 14                  | 0.007026            | 21.44                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C1-1-LC-RTA-3  | B             | C1              | 2             | 1            | 21.20         |                 | 0.09858                      | 14                  | 0.007042            | 21.33                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C2-1-LC-RTA-1* | B             | C2              | 2             | 2            | 21.58         |                 | 0.09805                      | 14                  | 0.007004            | 21.59                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C2-1-LC-RTA-2* | B             | C2              | 2             | 2            | 21.38         |                 | 0.09802                      | 14                  | 0.007001            | 21.39                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C2-1-LC-RTA-3  | B             | C2              | 2             | 2            | 21.34         |                 | 0.09773                      | 14                  | 0.006981            | 21.28                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C3-1-LC-RTA-1* | B             | C3              | 2             | 3            | 23.28         | 0.3646          | 0.09578                      | 14                  | 0.006842            | 22.75                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C3-1-LC-RTA-2* | B             | C3              | 2             | 3            | 22.66         | 0.3284          | 0.09533                      | 14                  | 0.006810            | 22.04                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C3-1-LC-RTA-3  | B             | C3              | 2             | 3            | 22.51         | 0.3501          | 0.09550                      | 14                  | 0.006821            | 21.94                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C4-1-LC-RTA-1* | B             | C4              | 2             | 4            | 22.20         | 0.3388          | 0.09888                      | 14                  | 0.007063            | 22.40                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C4-1-LC-RTA-2* | B             | C4              | 2             | 4            | 22.01         | 0.3625          | 0.09777                      | 14                  | 0.006983            | 21.96                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C4-1-LC-RTA-3  | B             | C4              | 2             | 4            | 22.33         | 0.3530          | 0.09685                      | 14                  | 0.006918            | 22.07                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C1-1-LC-RTA-1  | C             | C1              | 3             | 1            | 21.39         |                 | 0.09838                      | 14                  | 0.007027            | 21.47                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C1-1-LC-RTA-2  | C             | C1              | 3             | 1            | 21.40         |                 | 0.09837                      | 14                  | 0.007026            | 21.48                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C1-1-LC-RTA-3  | C             | C1              | 3             | 1            | 21.45         |                 | 0.09835                      | 14                  | 0.007025            | 21.53                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C2-1-LC-RTA-1  | C             | C2              | 3             | 2            | 21.37         |                 | 0.09852                      | 14                  | 0.007037            | 21.48                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C2-1-LC-RTA-2  | C             | C2              | 3             | 2            | 21.26         |                 | 0.09840                      | 14                  | 0.007029            | 21.35                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C2-1-LC-RTA-3  | C             | C2              | 3             | 2            | 21.99         |                 | 0.09840                      | 14                  | 0.007029            | 22.08                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C3-1-LC-RTA-1  | C             | C3              | 3             | 3            | 22.32         | 0.3672          | 0.09543                      | 14                  | 0.006817            | 21.74                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C3-1-LC-RTA-2  | C             | C3              | 3             | 3            | 22.06         | 0.3546          | 0.09568                      | 14                  | 0.006835            | 21.54                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C3-1-LC-RTA-3  | C             | C3              | 3             | 3            | 21.48         | 0.3313          | 0.09593                      | 14                  | 0.006852            | 21.03                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C4-1-LC-RTA-1  | C             | C4              | 3             | 4            | 21.48         | 0.3585          | 0.10413                      | 14                  | 0.007438            | 22.83                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C4-1-LC-RTA-2  | C             | C4              | 3             | 4            | 21.34         | 0.3714          | 0.10312                      | 14                  | 0.007365            | 22.45                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C4-1-LC-RTA-3  | C             | C4              | 3             | 4            | 21.25         | 0.3561          | 0.10227                      | 14                  | 0.007305            | 22.18                         |

\*Modulus and Poisson's ratio are averaged values of 2 strain gages.

Poisson's Ratio not available because specimen was tested with uniaxial strain gage.

|                    |        |         |                                    |          |        |
|--------------------|--------|---------|------------------------------------|----------|--------|
| Average            | 21.71  | 0.3492  | Average <sub>norm</sub>            | 0.006970 | 21.62  |
| Standard Dev.      | 0.5426 | 0.01609 | Standard Dev. <sub>norm</sub>      |          | 0.6001 |
| Coeff. of Var. [%] | 2.499  | 4.608   | Coeff. of Var. [%] <sub>norm</sub> |          | 2.776  |
| Min.               | 20.87  | 0.3230  | Min.                               | 0.006804 | 20.41  |
| Max.               | 23.28  | 0.3714  | Max.                               | 0.007438 | 22.83  |
| Number of Spec.    | 36     | 18      | Number of Spec.                    | 36       | 36     |



**Longitudinal Compression Properties (LC)--ETA1 (180°F)  
Modulus & Poisson's Ratio**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

$t_{ply}$  [in]

0.007000

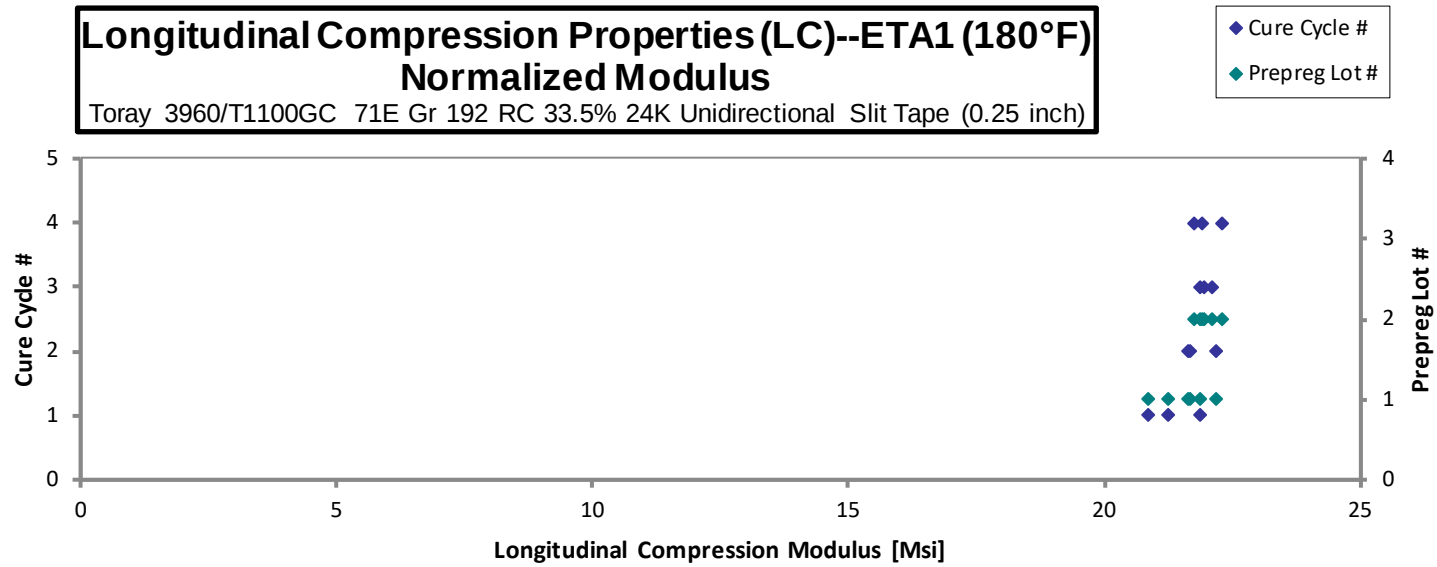
| Specimen Number                                 | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Modulus [Msi] | Poisson's Ratio | Avg. Specimen Thickness [in] | # Plies in Laminate |
|-------------------------------------------------|---------------|-----------------|---------------|--------------|---------------|-----------------|------------------------------|---------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-LC-ETA1-1 | A             | C1              | 1             | 1            | 21.31         |                 | 0.09592                      | 14                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-LC-ETA1-2 | A             | C1              | 1             | 1            | 22.32         |                 | 0.09602                      | 14                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-LC-ETA1-3 | A             | C1              | 1             | 1            | 21.70         |                 | 0.09595                      | 14                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-LC-ETA1-1 | A             | C2              | 1             | 2            | 22.59         |                 | 0.09620                      | 14                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-LC-ETA1-2 | A             | C2              | 1             | 2            | 22.05         |                 | 0.09640                      | 14                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-LC-ETA1-3 | A             | C2              | 1             | 2            | 21.97         |                 | 0.09650                      | 14                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C3-1-LC-ETA1-1 | B             | C3              | 2             | 3            | 22.86         | 0.3843          | 0.09483                      | 14                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C3-1-LC-ETA1-2 | B             | C3              | 2             | 3            | 22.43         | 0.3776          | 0.09558                      | 14                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C3-1-LC-ETA1-3 | B             | C3              | 2             | 3            | 22.56         | 0.3581          | 0.09543                      | 14                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C4-1-LC-ETA1-1 | B             | C4              | 2             | 4            | 21.78         | 0.3617          | 0.09795                      | 14                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C4-1-LC-ETA1-2 | B             | C4              | 2             | 4            | 21.94         | 0.3474          | 0.09787                      | 14                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C4-1-LC-ETA1-3 | B             | C4              | 2             | 4            | 22.33         | 0.3585          | 0.09782                      | 14                  |

| Avg. $t_{ply}$ [in] | Modulus <sub>norm</sub> [Msi] |
|---------------------|-------------------------------|
| 0.006851            | 20.86                         |
| 0.006858            | 21.87                         |
| 0.006854            | 21.25                         |
| 0.006871            | 22.17                         |
| 0.006886            | 21.69                         |
| 0.006893            | 21.64                         |
| 0.006774            | 22.13                         |
| 0.006827            | 21.88                         |
| 0.006817            | 21.97                         |
| 0.006996            | 21.77                         |
| 0.006990            | 21.91                         |
| 0.006987            | 22.28                         |

Poisson's Ratio not available because specimen was tested with uniaxial strain gage.

Average 22.15 0.3646  
Standard Dev. 0.4403 0.01371  
Coeff. of Var. [%] 1.987 3.760  
Min. 21.31 0.3474  
Max. 22.86 0.3843  
Number of Spec. 12 6

Average<sub>norm</sub> 0.006884 21.78  
Standard Dev.<sub>norm</sub> 0.3998  
Coeff. of Var. [%]<sub>norm</sub> 1.835  
Min. 0.006774 20.86  
Max. 0.006996 22.28  
Number of Spec. 12 12



**Longitudinal Compression Properties (LC)--ETA2 (250°F)**  
**Modulus & Poisson's Ratio**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

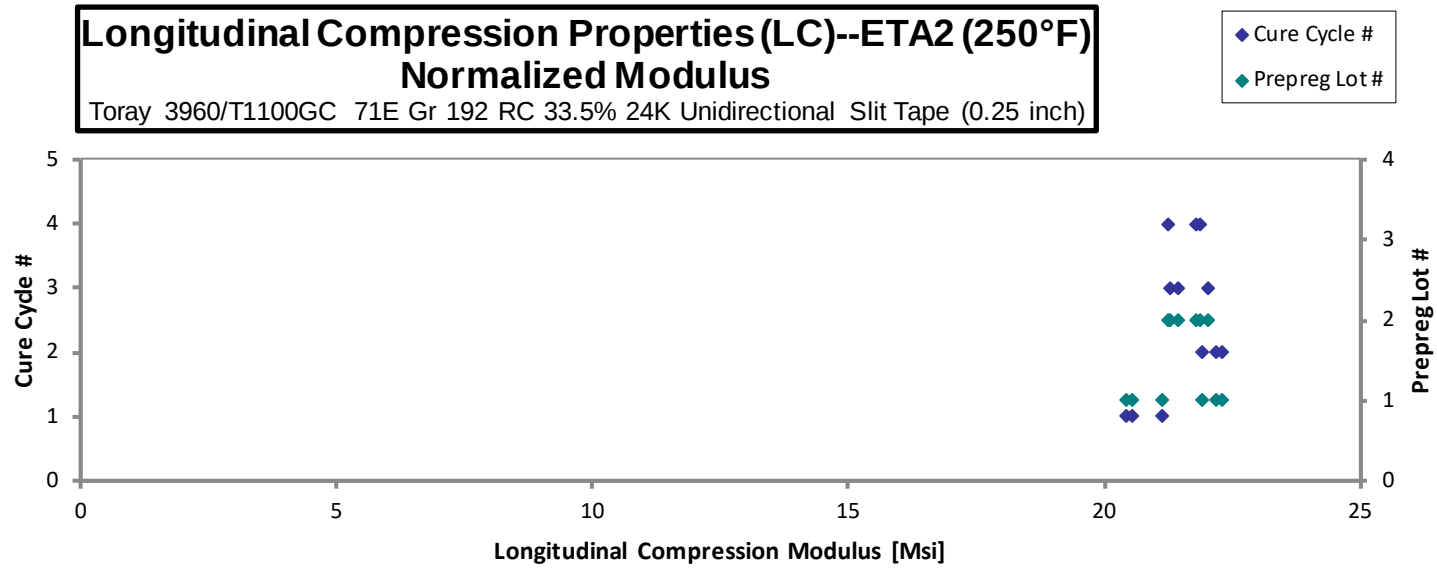
$t_{ply}$  [in]

0.007000

| Specimen Number                                 | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Modulus [Msi] | Poisson's Ratio | Avg. Specimen Thickness [in] | # Plies in Laminate | Avg. $t_{ply}$ [in] | Modulus <sub>norm</sub> [Msi] |
|-------------------------------------------------|---------------|-----------------|---------------|--------------|---------------|-----------------|------------------------------|---------------------|---------------------|-------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-LC-ETA2-1 | A             | C1              | 1             | 1            | 20.86         |                 | 0.09593                      | 14                  | 0.006852            | 20.42                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-LC-ETA2-2 | A             | C1              | 1             | 1            | 21.01         |                 | 0.09583                      | 14                  | 0.006845            | 20.55                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-LC-ETA2-3 | A             | C1              | 1             | 1            | 21.67         |                 | 0.09553                      | 14                  | 0.006824            | 21.12                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-LC-ETA2-1 | A             | C2              | 1             | 2            | 22.65         |                 | 0.09593                      | 14                  | 0.006852            | 22.17                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-LC-ETA2-2 | A             | C2              | 1             | 2            | 22.75         |                 | 0.09607                      | 14                  | 0.006862            | 22.30                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-LC-ETA2-3 | A             | C2              | 1             | 2            | 22.43         |                 | 0.09577                      | 14                  | 0.006840            | 21.92                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C3-1-LC-ETA2-1 | B             | C3              | 2             | 3            | 22.60         | 0.3657          | 0.09545                      | 14                  | 0.006818            | 22.02                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C3-1-LC-ETA2-2 | B             | C3              | 2             | 3            | 21.82         | 0.3908          | 0.09565                      | 14                  | 0.006832            | 21.29                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C3-1-LC-ETA2-3 | B             | C3              | 2             | 3            | 22.13         | 0.3721          | 0.09493                      | 14                  | 0.006781            | 21.43                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C4-1-LC-ETA2-1 | B             | C4              | 2             | 4            | 21.79         | 0.3310          | 0.09802                      | 14                  | 0.007001            | 21.79                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C4-1-LC-ETA2-2 | B             | C4              | 2             | 4            | 21.79         | 0.3878          | 0.09838                      | 14                  | 0.007027            | 21.88                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C4-1-LC-ETA2-3 | B             | C4              | 2             | 4            | 21.35         | 0.3904          | 0.09748                      | 14                  | 0.006963            | 21.24                         |

Poisson's Ratio not available because specimen was tested with uniaxial strain gage.

|                           |               |                |                                          |                 |               |
|---------------------------|---------------|----------------|------------------------------------------|-----------------|---------------|
| <b>Average</b>            | <b>21.90</b>  | <b>0.3730</b>  | <b>Average<sub>norm</sub></b>            | <b>0.006875</b> | <b>21.51</b>  |
| <b>Standard Dev.</b>      | <b>0.6296</b> | <b>0.02304</b> | <b>Standard Dev.<sub>norm</sub></b>      |                 | <b>0.6097</b> |
| <b>Coeff. of Var. [%]</b> | <b>2.874</b>  | <b>6.177</b>   | <b>Coeff. of Var. [%]<sub>norm</sub></b> |                 | <b>2.834</b>  |
| <b>Min.</b>               | <b>20.86</b>  | <b>0.3310</b>  | <b>Min.</b>                              | <b>0.006781</b> | <b>20.42</b>  |
| <b>Max.</b>               | <b>22.75</b>  | <b>0.3908</b>  | <b>Max.</b>                              | <b>0.007027</b> | <b>22.30</b>  |
| <b>Number of Spec.</b>    | <b>12</b>     | <b>6</b>       | <b>Number of Spec.</b>                   | <b>12</b>       | <b>12</b>     |



**Longitudinal Compression Properties (LC)--ETW1 (180°F)**  
**Modulus & Poisson's Ratio**

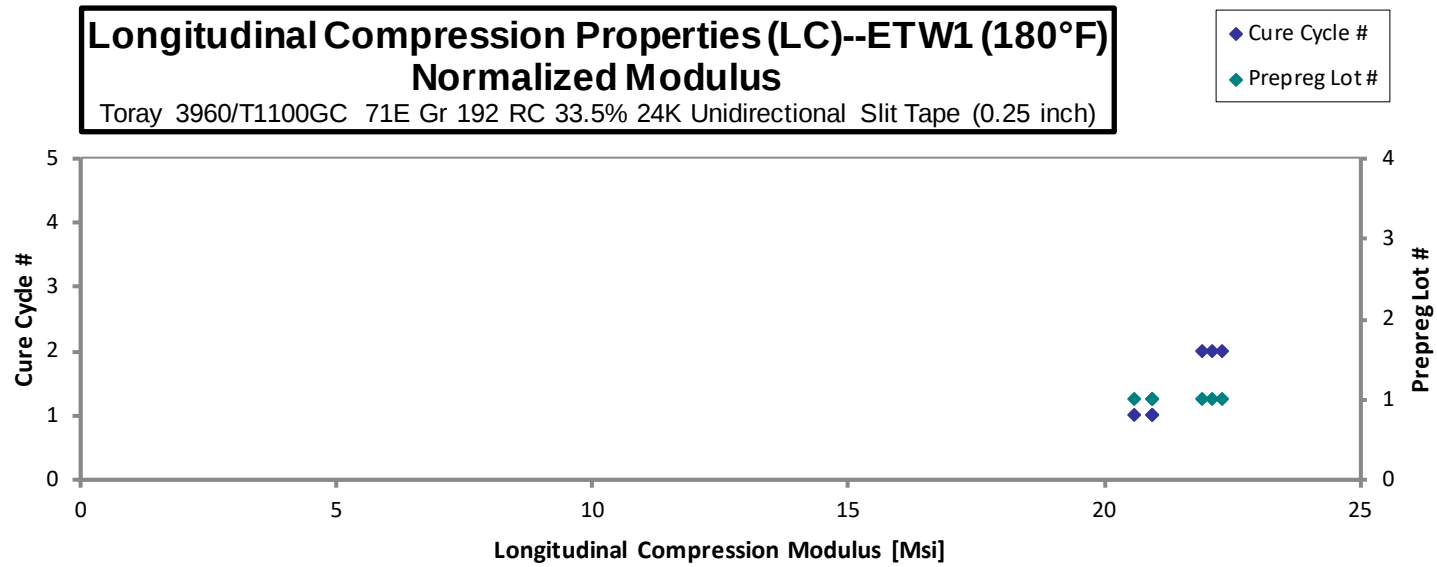
Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

$t_{ply}$  [in]  
0.007000

| Specimen Number                                 | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Modulus [Msi] | Poisson's Ratio | Avg. Specimen Thickness [in] | # Plies in Laminate | Avg. $t_{ply}$ [in] | Modulus <sub>norm</sub> [Msi] |
|-------------------------------------------------|---------------|-----------------|---------------|--------------|---------------|-----------------|------------------------------|---------------------|---------------------|-------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-LC-ETW1-2 | A             | C1              | 1             | 1            | 21.03         | 0.4138          | 0.09590                      | 14                  | 0.006850            | 20.58                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-LC-ETW1-3 | A             | C1              | 1             | 1            | 21.34         | 0.3579          | 0.09605                      | 14                  | 0.006861            | 20.92                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-LC-SP-7   | A             | C1              | 1             | 1            | 21.43         | 0.3774          | 0.09575                      | 14                  | 0.006839            | 20.94                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-LC-ETW1-1 | A             | C2              | 1             | 2            | 22.63         | 0.4284          | 0.09667                      | 14                  | 0.006905            | 22.32                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-LC-ETW1-2 | A             | C2              | 1             | 2            | 22.30         | 0.3893          | 0.09635                      | 14                  | 0.006882            | 21.93                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-LC-ETW1-3 | A             | C2              | 1             | 2            | 22.47         | 0.3989          | 0.09638                      | 14                  | 0.006885            | 22.10                         |

|                    |        |         |                                    |          |        |
|--------------------|--------|---------|------------------------------------|----------|--------|
| Average            | 21.87  | 0.3943  | Average <sub>norm</sub>            | 0.006870 | 21.46  |
| Standard Dev.      | 0.6770 | 0.02530 | Standard Dev. <sub>norm</sub>      |          | 0.7350 |
| Coeff. of Var. [%] | 3.096  | 6.418   | Coeff. of Var. [%] <sub>norm</sub> |          | 3.424  |
| Min.               | 21.03  | 0.3579  | Min.                               | 0.006839 | 20.58  |
| Max.               | 22.63  | 0.4284  | Max.                               | 0.006905 | 22.32  |
| Number of Spec.    | 6      | 6       | Number of Spec.                    | 6        | 6      |



**Longitudinal Compression Properties (LC)--ETW2 (250°F)**  
**Modulus & Poisson's Ratio**

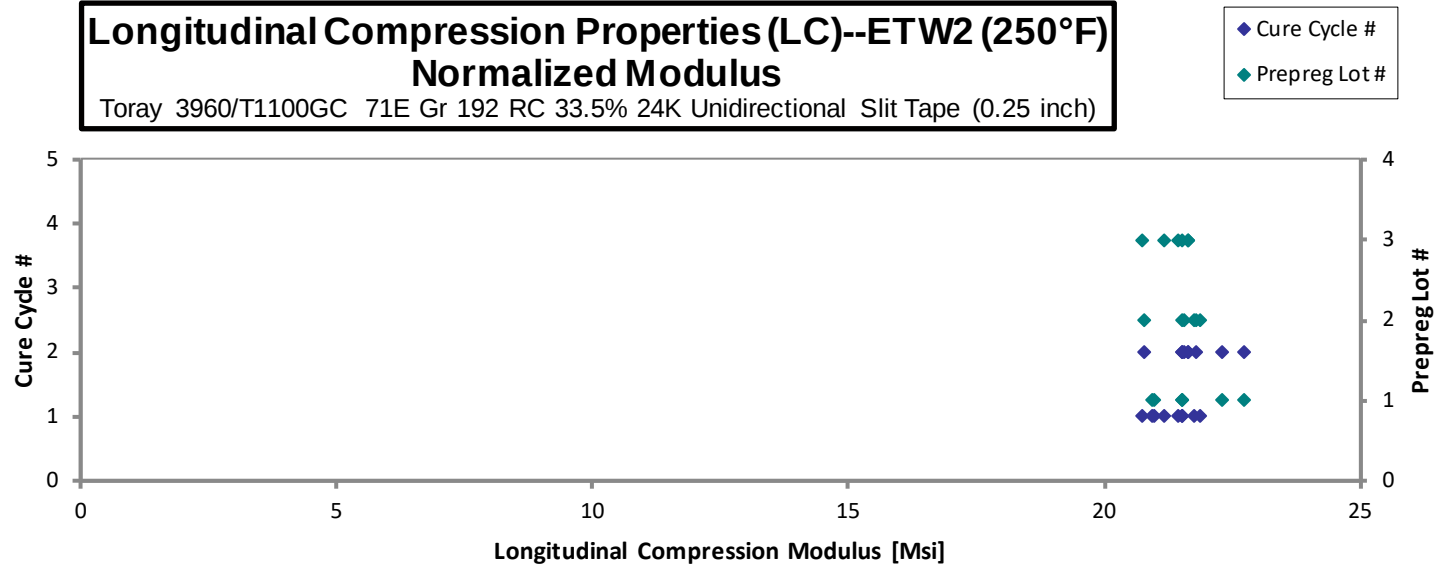
Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing  
 $t_{ply}$  [in]  
 0.007000

| Specimen Number                                 | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Modulus [Msi] | Poisson's Ratio | Avg. Specimen Thickness [in] | # Plies in Laminate | Avg. $t_{ply}$ [in] | Modulus <sub>norm</sub> [Msi] |
|-------------------------------------------------|---------------|-----------------|---------------|--------------|---------------|-----------------|------------------------------|---------------------|---------------------|-------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-LC-ETW2-1 | A             | C1              | 1             | 1            | 21.77         | 0.4019          | 0.09682                      | 14                  | 0.006915            | 21.51                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-LC-ETW2-2 | A             | C1              | 1             | 1            | 21.49         | 0.3822          | 0.09547                      | 14                  | 0.006819            | 20.94                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-LC-ETW2-3 | A             | C1              | 1             | 1            | 21.67         | 0.3787          | 0.09492                      | 14                  | 0.006780            | 20.98                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-LC-ETW2-1 | A             | C2              | 1             | 2            | 23.04         | 0.4875          | 0.09663                      | 14                  | 0.006902            | 22.72                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-LC-ETW2-2 | A             | C2              | 1             | 2            | 22.04         | 0.4574          | 0.09575                      | 14                  | 0.006839            | 21.54                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-LC-ETW2-3 | A             | C2              | 1             | 2            | 22.90         | 0.4469          | 0.09538                      | 14                  | 0.006813            | 22.29                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C1-1-LC-ETW2-1 | B             | C1              | 2             | 1            | 21.86         | 0.4497          | 0.09808                      | 14                  | 0.007006            | 21.87                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C1-1-LC-ETW2-2 | B             | C1              | 2             | 1            | 21.43         | 0.3811          | 0.09833                      | 14                  | 0.007024            | 21.51                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C1-1-LC-ETW2-3 | B             | C1              | 2             | 1            | 21.66         | 0.3741          | 0.09835                      | 14                  | 0.007025            | 21.74                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C2-1-LC-ETW2-1 | B             | C2              | 2             | 2            | 21.57         | 0.3971          | 0.09787                      | 14                  | 0.006990            | 21.54                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C2-1-LC-ETW2-2 | B             | C2              | 2             | 2            | 21.84         | 0.4172          | 0.09783                      | 14                  | 0.006988            | 21.80                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C2-1-LC-ETW2-3 | B             | C2              | 2             | 2            | 20.78         | 0.3956          | 0.09798                      | 14                  | 0.006999            | 20.78                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C1-1-LC-ETW2-1 | C             | C1              | 3             | 1            | 20.65         | 0.4245          | 0.09838                      | 14                  | 0.007027            | 20.73                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C1-1-LC-ETW2-2 | C             | C1              | 3             | 1            | 21.32         | 0.4238          | 0.09852                      | 14                  | 0.007037            | 21.43                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C1-1-LC-ETW2-3 | C             | C1              | 3             | 1            | 21.12         | 0.3930          | 0.09828                      | 14                  | 0.007020            | 21.18                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C2-1-LC-ETW2-1 | C             | C2              | 3             | 2            | 21.49         | 0.4047          | 0.09865                      | 14                  | 0.007046            | 21.64                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C2-1-LC-ETW2-2 | C             | C2              | 3             | 2            | 21.41         | 0.4317          | 0.09845                      | 14                  | 0.007032            | 21.51                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C2-1-LC-ETW2-3 | C             | C2              | 3             | 2            | 21.44         | 0.4355          | 0.09890                      | 14                  | 0.007064            | 21.63                         |

Average 21.64 0.4157  
 Standard Dev. 0.5986 0.03146  
 Coeff. of Var. [%] 2.766 7.567  
 Min. 20.65 0.3741  
 Max. 23.04 0.4875  
 Number of Spec. 18 18

Average<sub>norm</sub> 0.006963 21.52  
 Standard Dev.<sub>norm</sub> 0.4989  
 Coeff. of Var. [%]<sub>norm</sub> 2.318  
 Min. 0.006780 20.73  
 Max. 0.007064 22.72  
 Number of Spec. 18 18



#### 4.4 Longitudinal Compression Back-out Factor Properties

Note: For each test condition,  $F_1^{cu}$  [ksi] derived from cross-ply compression (UNC0) was calculated using back-out factor values. The back-out factor values were calculated using  $E_1^c$ ,  $\nu_{12}^c$  and  $E_2^c$  values from each corresponding test condition, as shown in Table 1-2. For example, CTA  $F_1^{cu}$  [ksi] derived from CTA UNC0 was calculated using CTA  $E_1^c$ ,  $\nu_{12}^c$  and  $E_2^c$ , RTA  $F_1^{cu}$  [ksi] derived from RTA UNC0 was calculated using RTA  $E_1^c$ ,  $\nu_{12}^c$  and  $E_2^c$ , etc.

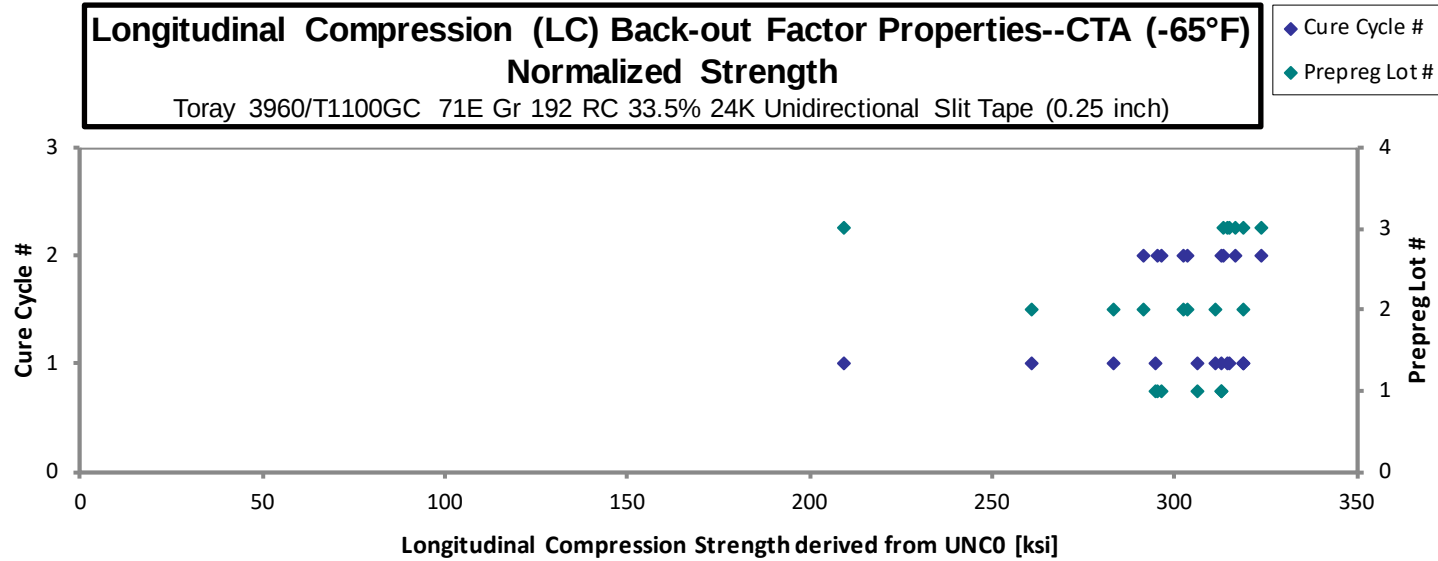
| Longitudinal Compression (LC) Back-out Factor Properties--CTA (-65°F)           |  |
|---------------------------------------------------------------------------------|--|
| Strength                                                                        |  |
| Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch) |  |

| UNC0 Specimen Number                             | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | $F_1^{cu}{}_{meas}$ [ksi] from UNC0* | $F_1^{cu}{}_{norm}$ [ksi] from UNC0** |
|--------------------------------------------------|---------------|-----------------|---------------|--------------|--------------------------------------|---------------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C1-1-UNC0-CTA-1 | A             | C1              | 1             | 1            | 291.1                                | 294.6                                 |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C1-1-UNC0-CTA-2 | A             | C1              | 1             | 1            | 307.9                                | 312.6                                 |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C1-1-UNC0-CTA-3 | A             | C1              | 1             | 1            | 301.3                                | 306.0                                 |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C2-1-UNC0-CTA-1 | A             | C2              | 1             | 2            | 314.9                                | 312.7                                 |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C2-1-UNC0-CTA-2 | A             | C2              | 1             | 2            | 300.9                                | 295.4                                 |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C2-1-UNC0-CTA-3 | A             | C2              | 1             | 2            | 306.3                                | 296.5                                 |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-B-C1-1-UNC0-CTA-1 | B             | C1              | 2             | 1            | 320.0                                | 318.9                                 |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-B-C1-1-UNC0-CTA-2 | B             | C1              | 2             | 1            | 260.4                                | 260.9                                 |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-B-C1-1-UNC0-CTA-3 | B             | C1              | 2             | 1            | 311.3                                | 311.2                                 |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-B-C1-1-UNC0-SP-1  | B             | C1              | 2             | 1            | 280.5                                | 283.0                                 |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-B-C2-1-UNC0-CTA-1 | B             | C2              | 2             | 2            | 300.9                                | 303.5                                 |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-B-C2-1-UNC0-CTA-2 | B             | C2              | 2             | 2            | 302.0                                | 302.6                                 |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-B-C2-1-UNC0-CTA-3 | B             | C2              | 2             | 2            | 291.6                                | 291.2                                 |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-C-C1-1-UNC0-CTA-1 | C             | C1              | 3             | 1            | 315.3                                | 314.6                                 |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-C-C1-1-UNC0-CTA-2 | C             | C1              | 3             | 1            | 209.5                                | 209.4                                 |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-C-C1-1-UNC0-CTA-3 | C             | C1              | 3             | 1            | 315.1                                | 314.8                                 |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-C-C1-1-UNC0-SP-1  | C             | C1              | 3             | 1            | 320.2                                | 319.0                                 |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-C-C2-1-UNC0-CTA-1 | C             | C2              | 3             | 2            | 309.3                                | 316.8                                 |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-C-C2-1-UNC0-CTA-2 | C             | C2              | 3             | 2            | 317.1                                | 323.6                                 |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-C-C2-1-UNC0-CTA-3 | C             | C2              | 3             | 2            | 311.1                                | 313.2                                 |

\* CTA Back-out factor<sub>meas</sub> = 2.640

\*\* CTA Back-out factor<sub>norm</sub> = 2.639

|                    |       |       |
|--------------------|-------|-------|
| Average            | 299.3 | 300.0 |
| Standard Dev.      | 25.67 | 25.98 |
| Coeff. of Var. [%] | 8.575 | 8.659 |
| Min.               | 209.5 | 209.4 |
| Max.               | 320.2 | 323.6 |
| Number of Spec.    | 20    | 20    |



**Longitudinal Compression (LC) Back-out Factor Properties--RTA (70°F)  
Strength**

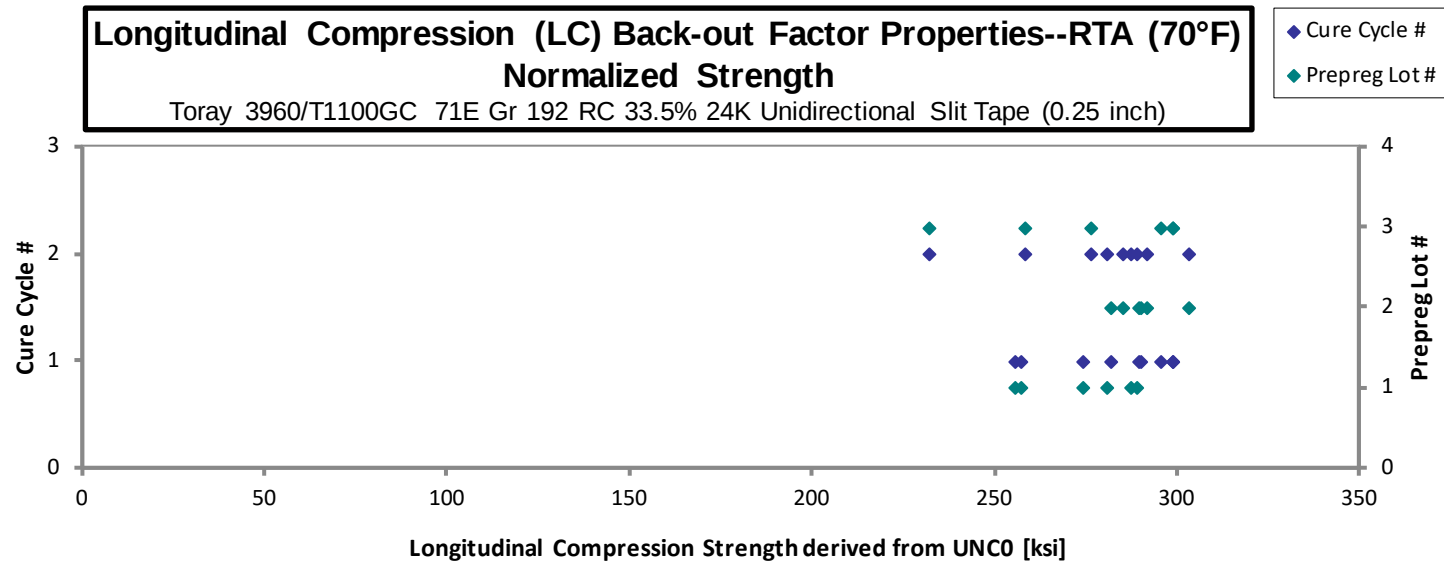
Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

| UNC0 Specimen Number                             | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | $F_1^{cu}_{meas}$ [ksi]<br>from UNC0* | $F_1^{cu}_{norm}$ [ksi]<br>from UNC0** |
|--------------------------------------------------|---------------|-----------------|---------------|--------------|---------------------------------------|----------------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C1-1-UNC0-RTA-1 | A             | C1              | 1             | 1            | 271.6                                 | 274.7                                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C1-1-UNC0-RTA-2 | A             | C1              | 1             | 1            | 252.5                                 | 257.5                                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C1-1-UNC0-RTA-3 | A             | C1              | 1             | 1            | 253.3                                 | 255.9                                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C2-1-UNC0-RTA-1 | A             | C2              | 1             | 2            | 286.6                                 | 281.0                                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C2-1-UNC0-RTA-2 | A             | C2              | 1             | 2            | 294.1                                 | 289.5                                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C2-1-UNC0-RTA-3 | A             | C2              | 1             | 2            | 294.3                                 | 287.8                                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-B-C1-1-UNC0-RTA-1 | B             | C1              | 2             | 1            | 289.7                                 | 290.3                                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-B-C1-1-UNC0-RTA-2 | B             | C1              | 2             | 1            | 279.9                                 | 282.2                                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-B-C1-1-UNC0-RTA-3 | B             | C1              | 2             | 1            | 290.8                                 | 289.9                                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-B-C2-1-UNC0-RTA-1 | B             | C2              | 2             | 2            | 291.1                                 | 291.9                                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-B-C2-1-UNC0-RTA-2 | B             | C2              | 2             | 2            | 302.8                                 | 303.8                                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-B-C2-1-UNC0-RTA-3 | B             | C2              | 2             | 2            | 284.9                                 | 285.7                                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-C-C1-1-UNC0-RTA-1 | C             | C1              | 3             | 1            | 300.0                                 | 299.5                                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-C-C1-1-UNC0-RTA-2 | C             | C1              | 3             | 1            | 301.1                                 | 299.2                                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-C-C1-1-UNC0-RTA-3 | C             | C1              | 3             | 1            | 298.0                                 | 295.7                                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-C-C2-1-UNC0-RTA-1 | C             | C2              | 3             | 2            | 275.2                                 | 276.6                                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-C-C2-1-UNC0-RTA-2 | C             | C2              | 3             | 2            | 230.8                                 | 232.6                                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-C-C2-1-UNC0-RTA-3 | C             | C2              | 3             | 2            | 257.0                                 | 259.0                                  |

\* RTA Back-out factor<sub>meas</sub> = 2.664

\*\* RTA Back-out factor<sub>norm</sub> = 2.662

|                           |              |              |
|---------------------------|--------------|--------------|
| <b>Average</b>            | <b>280.8</b> | <b>280.7</b> |
| <b>Standard Dev.</b>      | <b>20.29</b> | <b>18.63</b> |
| <b>Coeff. of Var. [%]</b> | <b>7.227</b> | <b>6.637</b> |
| <b>Min.</b>               | <b>230.8</b> | <b>232.6</b> |
| <b>Max.</b>               | <b>302.8</b> | <b>303.8</b> |
| <b>Number of Spec.</b>    | <b>18</b>    | <b>18</b>    |



**Longitudinal Compression (LC) Back-out Factor Properties--ETA1 (180°F)  
Strength**

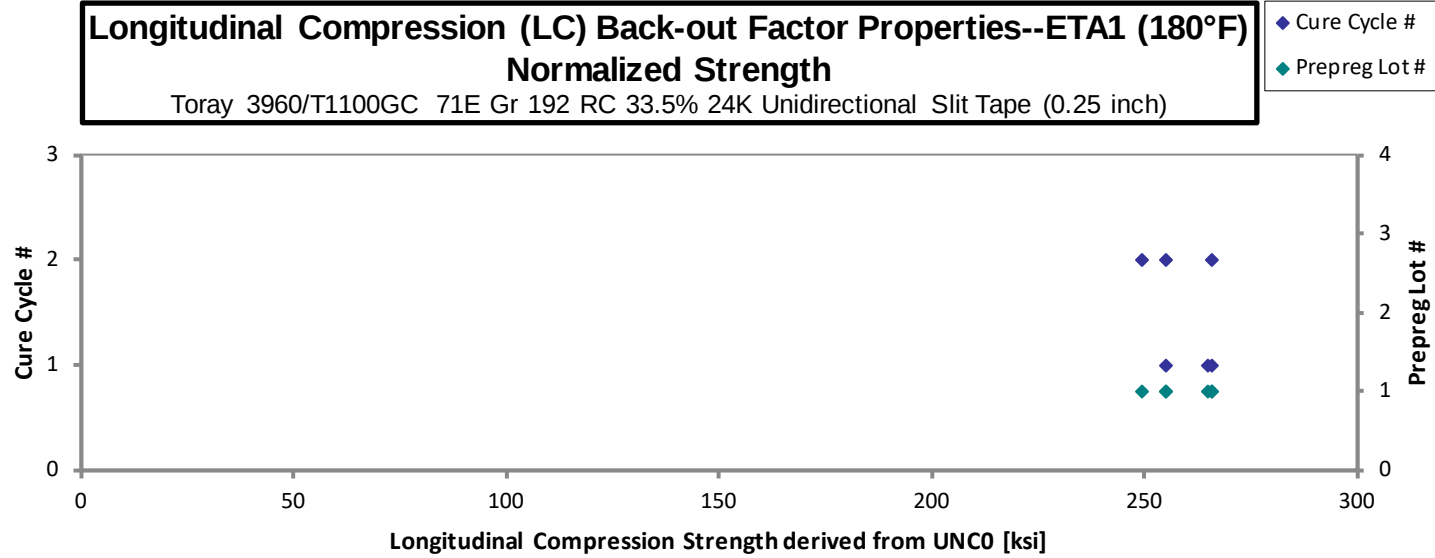
Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

| UNC0 Specimen Number                              | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | F <sub>1<sup>cu</sup> meas</sub> [ksi]<br>from UNC0* | F <sub>1<sup>cu</sup> norm</sub> [ksi]<br>from UNC0** |
|---------------------------------------------------|---------------|-----------------|---------------|--------------|------------------------------------------------------|-------------------------------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C1-1-UNC0-ETA1-1 | A             | C1              | 1             | 1            | 261.3                                                | 264.8                                                 |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C1-1-UNC0-ETA1-2 | A             | C1              | 1             | 1            | 252.9                                                | 254.9                                                 |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C1-1-UNC0-ETA1-3 | A             | C1              | 1             | 1            | 264.5                                                | 265.9                                                 |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C2-1-UNC0-ETA1-1 | A             | C2              | 1             | 2            | 253.4                                                | 249.0                                                 |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C2-1-UNC0-ETA1-2 | A             | C2              | 1             | 2            | 259.2                                                | 255.1                                                 |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C2-1-UNC0-ETA1-3 | A             | C2              | 1             | 2            | 270.8                                                | 265.7                                                 |

\* ETA1 Back-out factor<sub>meas</sub> = 2.692

\*\* ETA1 Back-out factor<sub>norm</sub> = 2.688

|                           |              |              |
|---------------------------|--------------|--------------|
| <b>Average</b>            | <b>260.4</b> | <b>259.2</b> |
| <b>Standard Dev.</b>      | <b>6.820</b> | <b>7.175</b> |
| <b>Coeff. of Var. [%]</b> | <b>2.619</b> | <b>2.768</b> |
| <b>Min.</b>               | <b>252.9</b> | <b>249.0</b> |
| <b>Max.</b>               | <b>270.8</b> | <b>265.9</b> |
| <b>Number of Spec.</b>    | <b>6</b>     | <b>6</b>     |



**Longitudinal Compression (LC) Back-out Factor Properties--ETA2 (250°F)  
Strength**

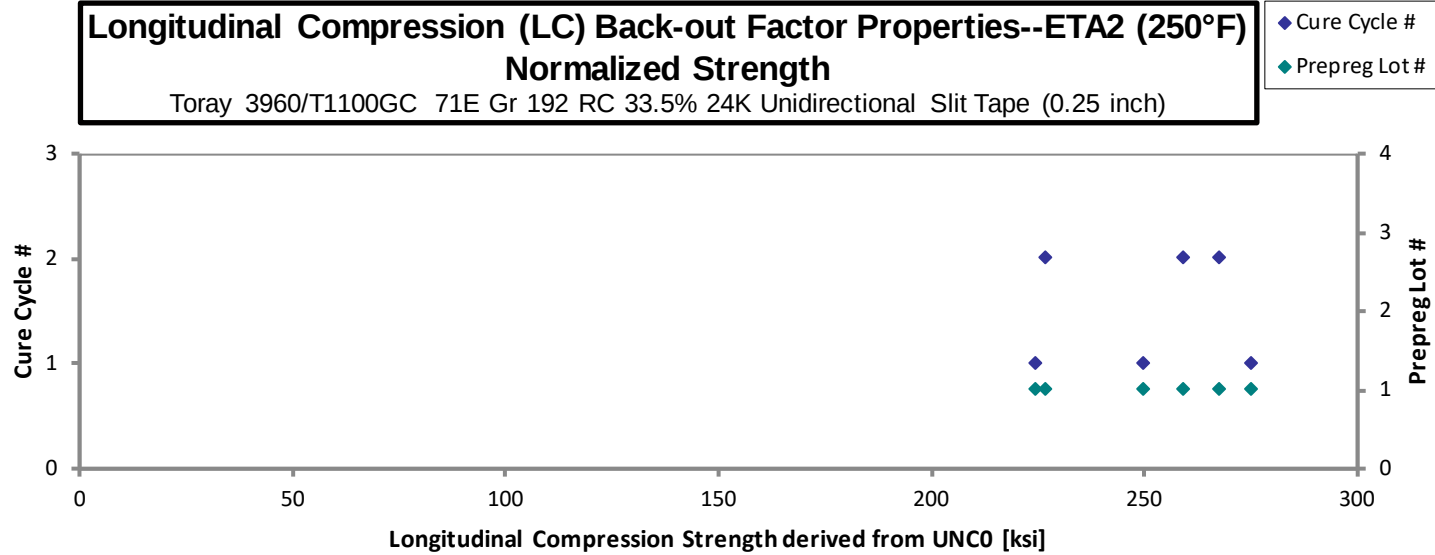
Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

| UNC0 Specimen Number                              | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | $F_1^{cu}{}_{meas}$ [ksi]<br>from UNC0* | $F_1^{cu}{}_{norm}$ [ksi]<br>from UNC0** |
|---------------------------------------------------|---------------|-----------------|---------------|--------------|-----------------------------------------|------------------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C1-1-UNC0-ETA2-1 | A             | C1              | 1             | 1            | 274.7                                   | 275.2                                    |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C1-1-UNC0-ETA2-2 | A             | C1              | 1             | 1            | 248.1                                   | 249.5                                    |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C1-1-UNC0-ETA2-3 | A             | C1              | 1             | 1            | 223.0                                   | 224.3                                    |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C2-1-UNC0-ETA2-1 | A             | C2              | 1             | 2            | 263.0                                   | 259.1                                    |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C2-1-UNC0-ETA2-2 | A             | C2              | 1             | 2            | 232.2                                   | 226.8                                    |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C2-1-UNC0-ETA2-3 | A             | C2              | 1             | 2            | 273.0                                   | 267.7                                    |

\* ETA2 Back-out factor<sub>meas</sub> = 2.706

\*\* ETA2 Back-out factor<sub>norm</sub> = 2.702

|                           |              |              |
|---------------------------|--------------|--------------|
| <b>Average</b>            | <b>252.3</b> | <b>250.4</b> |
| <b>Standard Dev.</b>      | <b>21.57</b> | <b>21.10</b> |
| <b>Coeff. of Var. [%]</b> | <b>8.547</b> | <b>8.427</b> |
| <b>Min.</b>               | <b>223.0</b> | <b>224.3</b> |
| <b>Max.</b>               | <b>274.7</b> | <b>275.2</b> |
| <b>Number of Spec.</b>    | <b>6</b>     | <b>6</b>     |



**Longitudinal Compression (LC) Back-out Factor Properties--ETW1 (180°F)  
Strength**

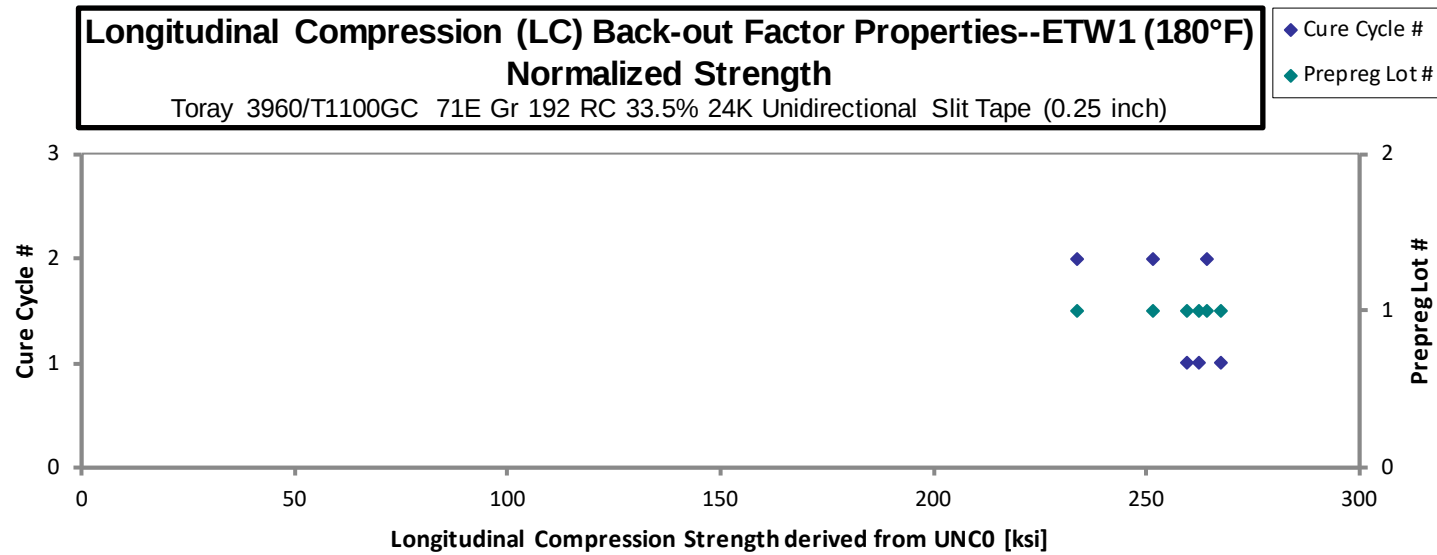
Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

| UNC0 Specimen Number                              | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | $F_1^{cu}_{meas}$ [ksi]<br>from UNC0* | $F_1^{cu}_{norm}$ [ksi]<br>from UNC0** |
|---------------------------------------------------|---------------|-----------------|---------------|--------------|---------------------------------------|----------------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C1-1-UNC0-ETW1-1 | A             | C1              | 1             | 1            | 264.3                                 | 267.3                                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C1-1-UNC0-ETW1-2 | A             | C1              | 1             | 1            | 257.0                                 | 259.5                                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C1-1-UNC0-ETW1-3 | A             | C1              | 1             | 1            | 260.3                                 | 262.5                                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C2-1-UNC0-ETW1-1 | A             | C2              | 1             | 2            | 239.2                                 | 233.8                                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C2-1-UNC0-ETW1-2 | A             | C2              | 1             | 2            | 270.1                                 | 264.3                                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C2-1-UNC0-ETW1-3 | A             | C2              | 1             | 2            | 255.9                                 | 251.6                                  |

\* ETW1 Back-out factor<sub>meas</sub> = 2.707

\*\* ETW1 Back-out factor<sub>norm</sub> = 2.702

|                           |              |              |
|---------------------------|--------------|--------------|
| <b>Average</b>            | <b>257.8</b> | <b>256.5</b> |
| <b>Standard Dev.</b>      | <b>10.50</b> | <b>12.32</b> |
| <b>Coeff. of Var. [%]</b> | <b>4.071</b> | <b>4.803</b> |
| <b>Min.</b>               | <b>239.2</b> | <b>233.8</b> |
| <b>Max.</b>               | <b>270.1</b> | <b>267.3</b> |
| <b>Number of Spec.</b>    | <b>6</b>     | <b>6</b>     |



**Longitudinal Compression (LC) Back-out Factor Properties--ETW2 (250°F)  
Strength**

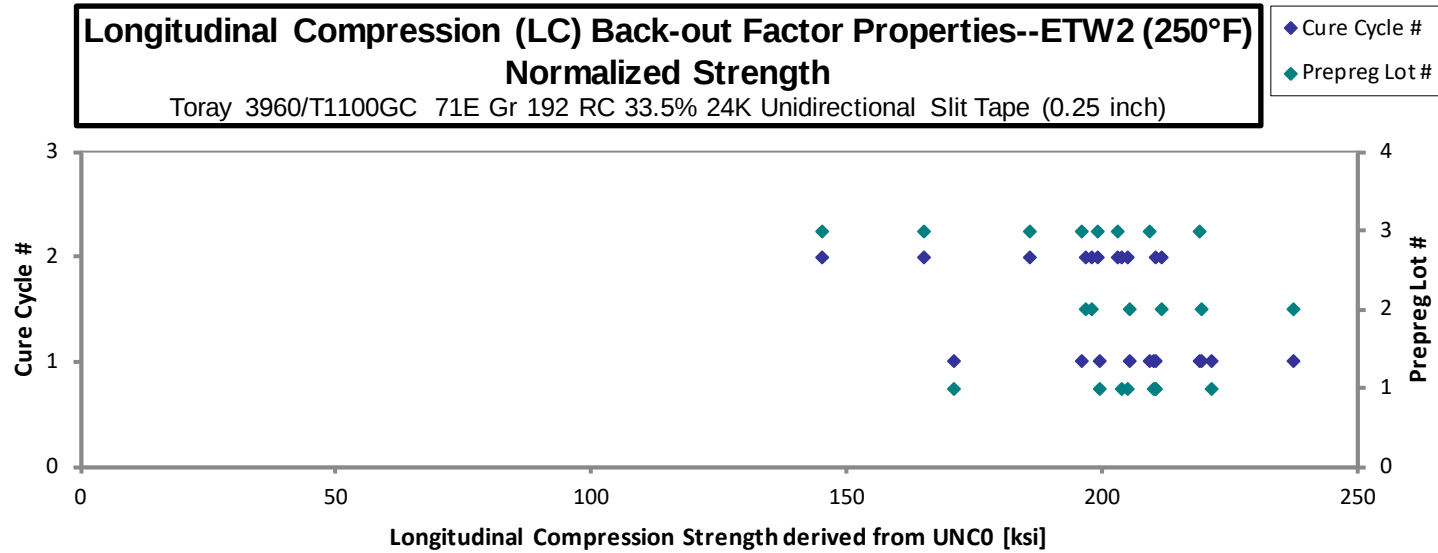
Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

| UNC0 Specimen Number                              | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | $F_1^{cu}_{meas}$ [ksi]<br>from UNC0* | $F_1^{cu}_{norm}$ [ksi]<br>from UNC0** |
|---------------------------------------------------|---------------|-----------------|---------------|--------------|---------------------------------------|----------------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C1-1-UNC0-ETW2-1 | A             | C1              | 1             | 1            | 218.6                                 | 221.3                                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C1-1-UNC0-ETW2-2 | A             | C1              | 1             | 1            | 170.4                                 | 170.8                                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C1-1-UNC0-ETW2-3 | A             | C1              | 1             | 1            | 209.1                                 | 209.8                                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C1-1-UNC0-SP-11  | A             | C1              | 1             | 1            | 208.9                                 | 210.3                                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C1-1-UNC0-SP-12  | A             | C1              | 1             | 1            | 198.3                                 | 199.4                                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C2-1-UNC0-ETW2-1 | A             | C2              | 1             | 2            | 207.3                                 | 203.6                                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C2-1-UNC0-ETW2-2 | A             | C2              | 1             | 2            | 209.9                                 | 204.9                                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C2-1-UNC0-ETW2-3 | A             | C2              | 1             | 2            | 215.9                                 | 210.3                                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-B-C1-1-UNC0-ETW2-1 | B             | C1              | 2             | 1            | 238.5                                 | 237.1                                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-B-C1-1-UNC0-ETW2-2 | B             | C1              | 2             | 1            | 205.0                                 | 205.3                                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-B-C1-1-UNC0-ETW2-3 | B             | C1              | 2             | 1            | 217.3                                 | 219.1                                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-B-C2-1-UNC0-ETW2-1 | B             | C2              | 2             | 2            | 210.3                                 | 211.4                                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-B-C2-1-UNC0-ETW2-2 | B             | C2              | 2             | 2            | 195.8                                 | 196.4                                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-B-C2-1-UNC0-ETW2-3 | B             | C2              | 2             | 2            | 196.8                                 | 197.7                                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-C-C1-1-UNC0-ETW2-1 | C             | C1              | 3             | 1            | 198.2                                 | 195.9                                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-C-C1-1-UNC0-ETW2-2 | C             | C1              | 3             | 1            | 210.8                                 | 209.3                                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-C-C1-1-UNC0-ETW2-3 | C             | C1              | 3             | 1            | 216.9                                 | 218.7                                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-C-C2-1-UNC0-ETW2-1 | C             | C2              | 3             | 2            | 163.0                                 | 164.8                                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-C-C2-1-UNC0-ETW2-2 | C             | C2              | 3             | 2            | 143.2                                 | 144.9                                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-C-C2-1-UNC0-ETW2-3 | C             | C2              | 3             | 2            | 200.7                                 | 203.0                                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-C-C2-1-UNC0-SP-5   | C             | C2              | 3             | 2            | 184.6                                 | 185.6                                  |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-C-C2-1-UNC0-SP-6   | C             | C2              | 3             | 2            | 198.8                                 | 199.0                                  |

\* ETW2 Back-out factor<sub>meas</sub> = 2.769

\*\* ETW2 Back-out factor<sub>norm</sub> = 2.768

|                           |              |              |
|---------------------------|--------------|--------------|
| <b>Average</b>            | <b>200.8</b> | <b>200.8</b> |
| <b>Standard Dev.</b>      | <b>20.65</b> | <b>20.12</b> |
| <b>Coeff. of Var. [%]</b> | <b>10.28</b> | <b>10.02</b> |
| <b>Min.</b>               | <b>143.2</b> | <b>144.9</b> |
| <b>Max.</b>               | <b>238.5</b> | <b>237.1</b> |
| <b>Number of Spec.</b>    | <b>22</b>    | <b>22</b>    |



## 4.5 Transverse Compression Properties (TC)

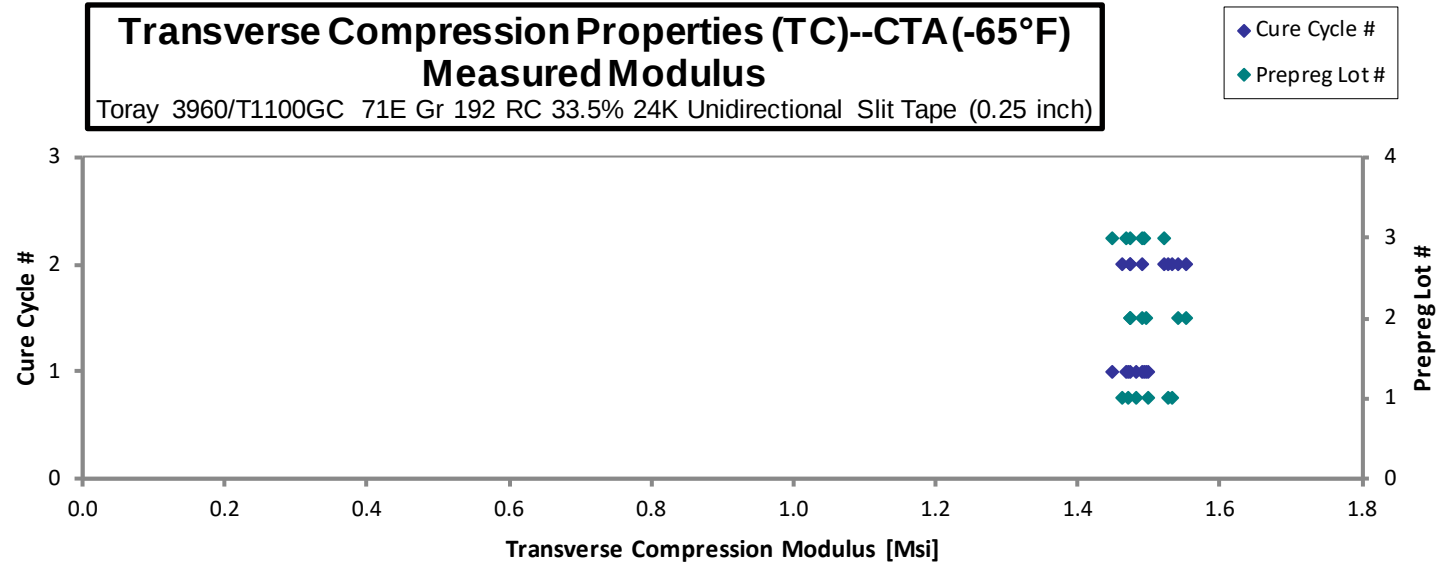
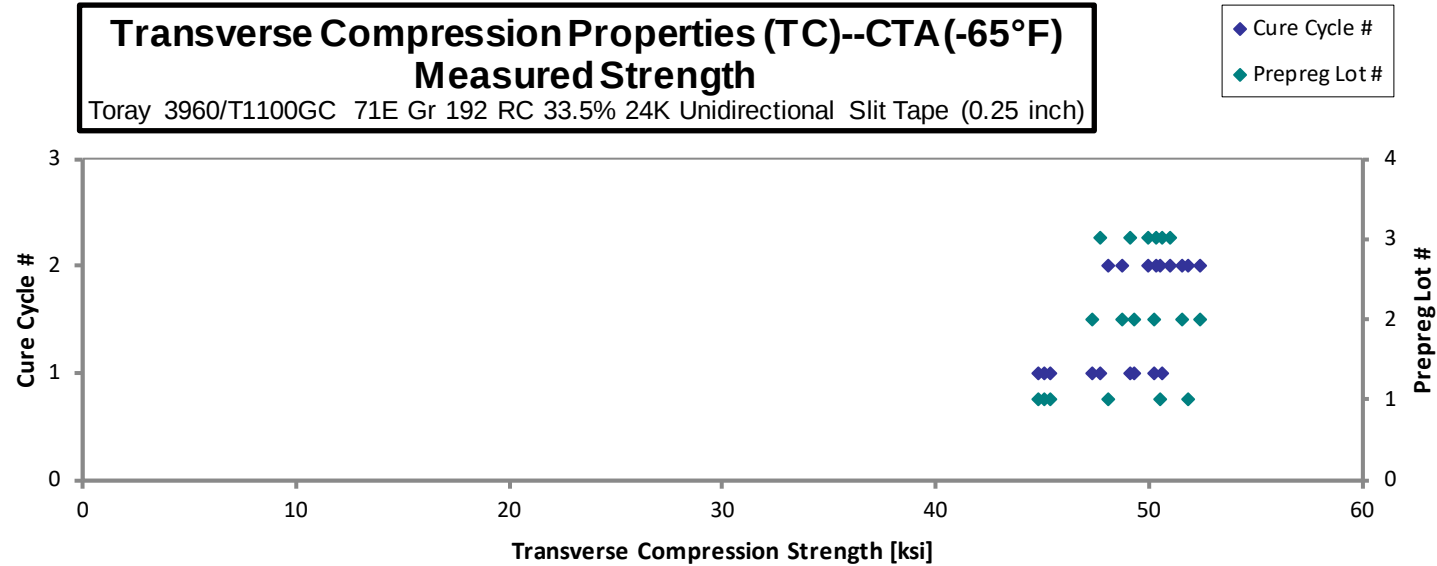
### Transverse Compression Properties (TC)--CTA (-65°F)

#### Strength & Modulus

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

| Specimen Number                                | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Avg. t <sub>ply</sub> [in] | Failure Mode |
|------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|---------------|------------------------------|---------------------|----------------------------|--------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-TC-CTA-1 | A             | C1              | 1             | 1            | 45.33          | 1.470         | 0.09662                      | 14                  | 0.006901                   | BAB          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-TC-CTA-2 | A             | C1              | 1             | 1            | 44.84          | 1.500         | 0.09605                      | 14                  | 0.006861                   | BAB          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-TC-CTA-3 | A             | C1              | 1             | 1            | 45.06          | 1.483         | 0.09525                      | 14                  | 0.006804                   | BGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-TC-CTA-1 | A             | C2              | 1             | 2            | 50.52          | 1.533         | 0.09663                      | 14                  | 0.006902                   | BGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-TC-CTA-2 | A             | C2              | 1             | 2            | 51.82          | 1.528         | 0.09678                      | 14                  | 0.006913                   | BGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-TC-CTA-3 | A             | C2              | 1             | 2            | 48.11          | 1.463         | 0.09638                      | 14                  | 0.006885                   | BGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C1-1-TC-CTA-1 | B             | C1              | 2             | 1            | 49.32          | 1.473         | 0.09862                      | 14                  | 0.007044                   | BGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C1-1-TC-CTA-2 | B             | C1              | 2             | 1            | 47.37          | 1.490         | 0.09815                      | 14                  | 0.007011                   | BGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C1-1-TC-CTA-3 | B             | C1              | 2             | 1            | 50.27          | 1.497         | 0.09773                      | 14                  | 0.006981                   | BAT          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C2-1-TC-CTA-1 | B             | C2              | 2             | 2            | 51.60          | 1.475         | 0.09857                      | 14                  | 0.007040                   | BGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C2-1-TC-CTA-2 | B             | C2              | 2             | 2            | 52.39          | 1.552         | 0.09777                      | 14                  | 0.006983                   | BGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C2-1-TC-CTA-3 | B             | C2              | 2             | 2            | 48.73          | 1.542         | 0.09777                      | 14                  | 0.006983                   | BGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C1-1-TC-CTA-1 | C             | C1              | 3             | 1            | 50.64          | 1.495         | 0.09848                      | 14                  | 0.007035                   | HGM, HAB     |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C1-1-TC-CTA-2 | C             | C1              | 3             | 1            | 47.69          | 1.447         | 0.09837                      | 14                  | 0.007026                   | HGM, HAB     |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C1-1-TC-CTA-3 | C             | C1              | 3             | 1            | 49.10          | 1.469         | 0.09845                      | 14                  | 0.007032                   | HGM, HAT     |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C2-1-TC-CTA-1 | C             | C2              | 3             | 2            | 50.33          | 1.491         | 0.09865                      | 14                  | 0.007046                   | HGM, HAT     |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C2-1-TC-CTA-2 | C             | C2              | 3             | 2            | 50.95          | 1.521         | 0.09855                      | 14                  | 0.007039                   | HGM, HAT     |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C2-1-TC-CTA-3 | C             | C2              | 3             | 2            | 49.96          | 1.474         | 0.09885                      | 14                  | 0.007061                   | HGM, HAB     |

|                    |       |         |          |
|--------------------|-------|---------|----------|
| Average            | 49.11 | 1.495   | 0.006975 |
| Standard Dev.      | 2.309 | 0.02958 |          |
| Coeff. of Var. [%] | 4.702 | 1.979   |          |
| Min.               | 44.84 | 1.447   | 0.006804 |
| Max.               | 52.39 | 1.552   | 0.007061 |
| Number of Spec.    | 18    | 18      | 18       |



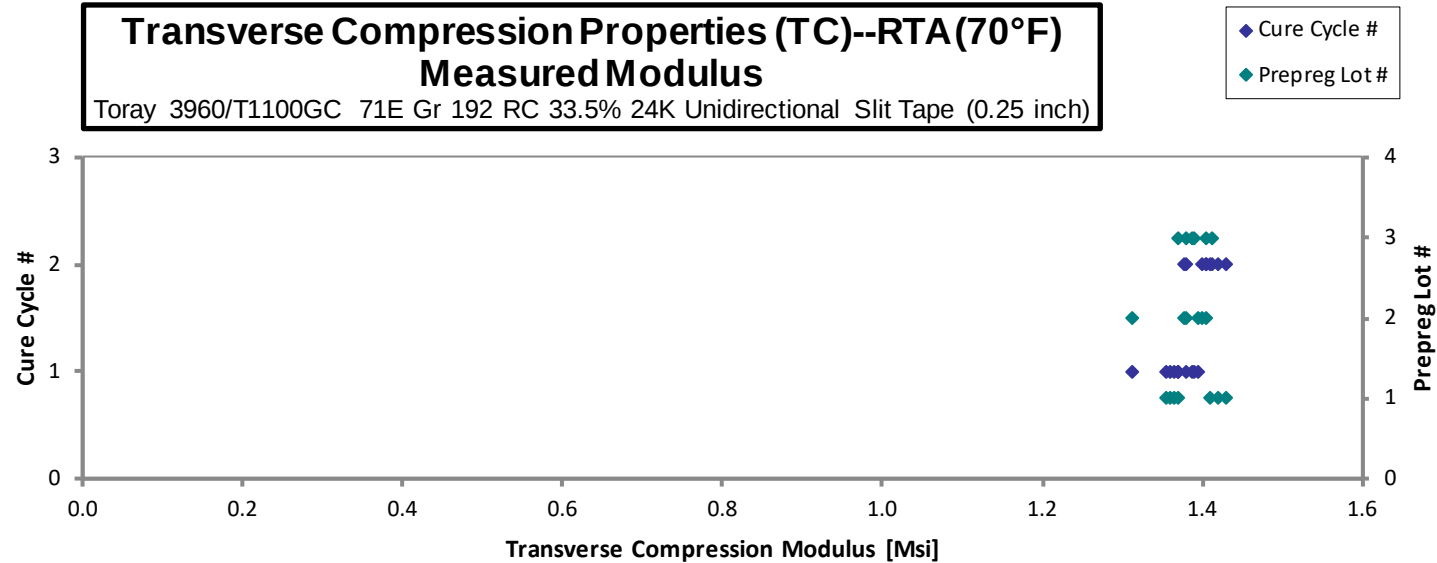
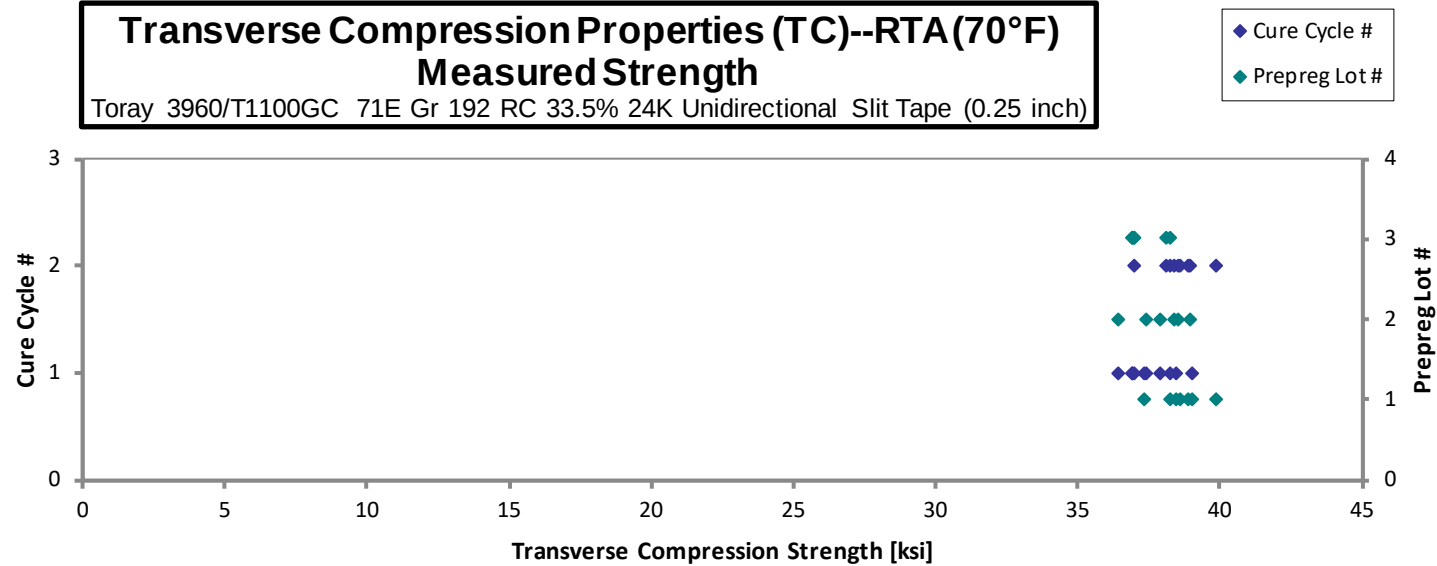
**Transverse Compression Properties (TC)--RTA (70°F)  
Strength & Modulus**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

| Specimen Number                                 | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Avg. $t_{ply}$ [in] | Failure Mode |
|-------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|---------------|------------------------------|---------------------|---------------------|--------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-TC-RTA-1* | A             | C1              | 1             | 1            | 39.02          | 1.360         | 0.09543                      | 14                  | 0.006817            | BGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-TC-RTA-2* | A             | C1              | 1             | 1            | 38.27          | 1.369         | 0.09528                      | 14                  | 0.006806            | BGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-TC-RTA-3  | A             | C1              | 1             | 1            | 38.48          | 1.365         | 0.09513                      | 14                  | 0.006795            | BGM, BAB     |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-TC-SP-4*  | A             | C1              | 1             | 1            | 37.32          | 1.354         | 0.09607                      | 14                  | 0.006862            | BGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-TC-RTA-1* | A             | C2              | 1             | 2            | 39.85          | 1.429         | 0.09580                      | 14                  | 0.006843            | HAB, HAT     |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-TC-RTA-2* | A             | C2              | 1             | 2            | 38.62          | 1.421         | 0.09627                      | 14                  | 0.006876            | BAB          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-TC-RTA-3  | A             | C2              | 1             | 2            | 38.90          | 1.411         | 0.09625                      | 14                  | 0.006875            | BGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C1-1-TC-RTA-1* | B             | C1              | 2             | 1            | 37.38          | 1.381         | 0.09762                      | 14                  | 0.006973            | M(B,H)GM     |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C1-1-TC-RTA-3  | B             | C1              | 2             | 1            | 36.40          | 1.314         | 0.09732                      | 14                  | 0.006951            | BGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C1-1-TC-SP-3*  | B             | C1              | 2             | 1            | 37.92          | 1.396         | 0.09748                      | 14                  | 0.006963            | M(B,H)GM     |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C2-1-TC-RTA-1* | B             | C2              | 2             | 2            | 38.53          | 1.405         | 0.09783                      | 14                  | 0.006988            | BGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C2-1-TC-RTA-2* | B             | C2              | 2             | 2            | 38.41          | 1.378         | 0.09817                      | 14                  | 0.007012            | M(B,H)GM     |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C2-1-TC-RTA-3  | B             | C2              | 2             | 2            | 38.92          | 1.400         | 0.09782                      | 14                  | 0.006987            | M(B,H)GM     |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C1-1-TC-RTA-1* | C             | C1              | 3             | 1            | 36.96          | 1.388         | 0.09820                      | 14                  | 0.007014            | HGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C1-1-TC-RTA-2* | C             | C1              | 3             | 1            | 36.93          | 1.389         | 0.09830                      | 14                  | 0.007021            | HGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C1-1-TC-RTA-3  | C             | C1              | 3             | 1            | 36.94          | 1.370         | 0.09845                      | 14                  | 0.007032            | HGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C2-1-TC-RTA-1* | C             | C2              | 3             | 2            | 38.28          | 1.413         | 0.09853                      | 14                  | 0.007038            | HGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C2-1-TC-RTA-2* | C             | C2              | 3             | 2            | 36.95          | 1.405         | 0.09865                      | 14                  | 0.007046            | HGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C2-1-TC-RTA-3  | C             | C2              | 3             | 2            | 38.10          | 1.380         | 0.09862                      | 14                  | 0.007044            | BGM          |

\*Modulus are averaged values of 2 strain gages.

|                    |        |         |          |
|--------------------|--------|---------|----------|
| Average            | 38.01  | 1.386   | 0.006944 |
| Standard Dev.      | 0.9188 | 0.02736 |          |
| Coeff. of Var. [%] | 2.417  | 1.975   |          |
| Min.               | 36.40  | 1.314   | 0.006795 |
| Max.               | 39.85  | 1.429   | 0.007046 |
| Number of Spec.    | 19     | 19      | 19       |

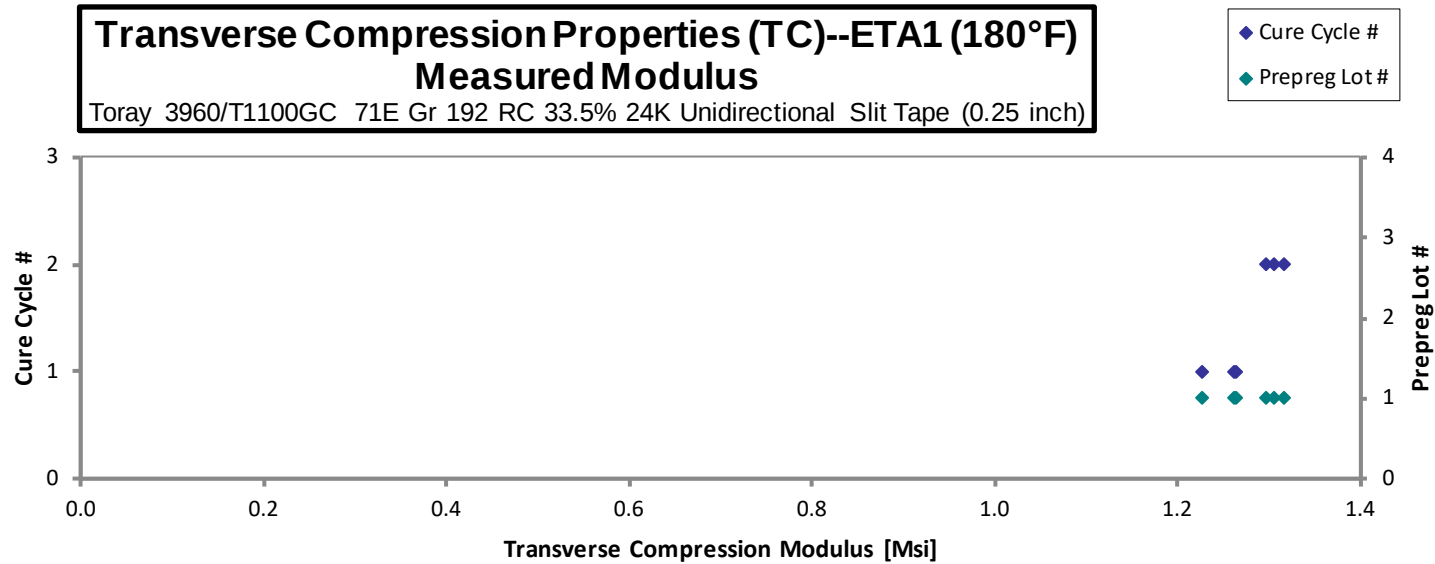
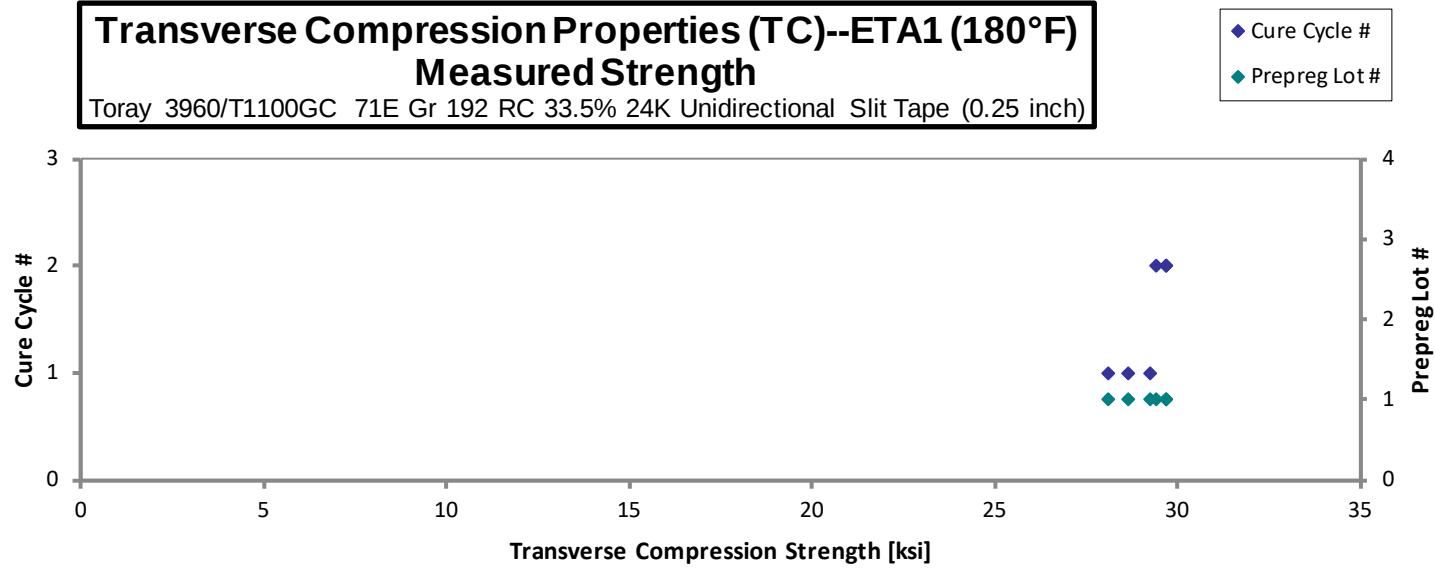


**Transverse Compression Properties (TC)--ETA1 (180°F)**  
**Strength & Modulus**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

| Specimen Number                                 | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Avg. $t_{ply}$ [in] | Failure Mode |
|-------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|---------------|------------------------------|---------------------|---------------------|--------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-TC-ETA1-1 | A             | C1              | 1             | 1            | 29.24          | 1.261         | 0.09568                      | 14                  | 0.006835            | BGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-TC-ETA1-2 | A             | C1              | 1             | 1            | 28.13          | 1.227         | 0.09623                      | 14                  | 0.006874            | BGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-TC-ETA1-3 | A             | C1              | 1             | 1            | 28.63          | 1.265         | 0.09610                      | 14                  | 0.006864            | M(B,H)GM     |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-TC-ETA1-2 | A             | C2              | 1             | 2            | 29.39          | 1.316         | 0.09635                      | 14                  | 0.006882            | BGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-TC-ETA1-3 | A             | C2              | 1             | 2            | 29.72          | 1.297         | 0.09623                      | 14                  | 0.006874            | BGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-TC-SP-5   | A             | C2              | 1             | 2            | 29.67          | 1.305         | 0.09653                      | 14                  | 0.006895            | BGM          |

|                    |        |         |          |
|--------------------|--------|---------|----------|
| Average            | 29.13  | 1.279   | 0.006871 |
| Standard Dev.      | 0.6261 | 0.03340 |          |
| Coeff. of Var. [%] | 2.149  | 2.612   |          |
| Min.               | 28.13  | 1.227   | 0.006835 |
| Max.               | 29.72  | 1.316   | 0.006895 |
| Number of Spec.    | 6      | 6       | 6        |

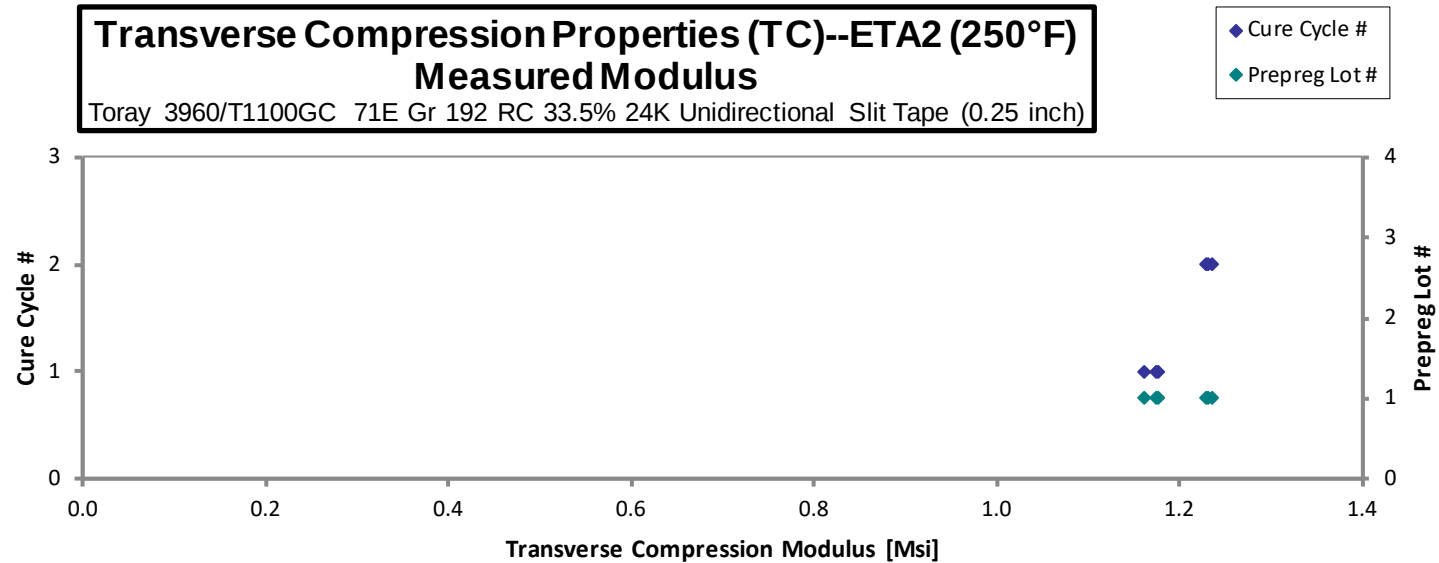
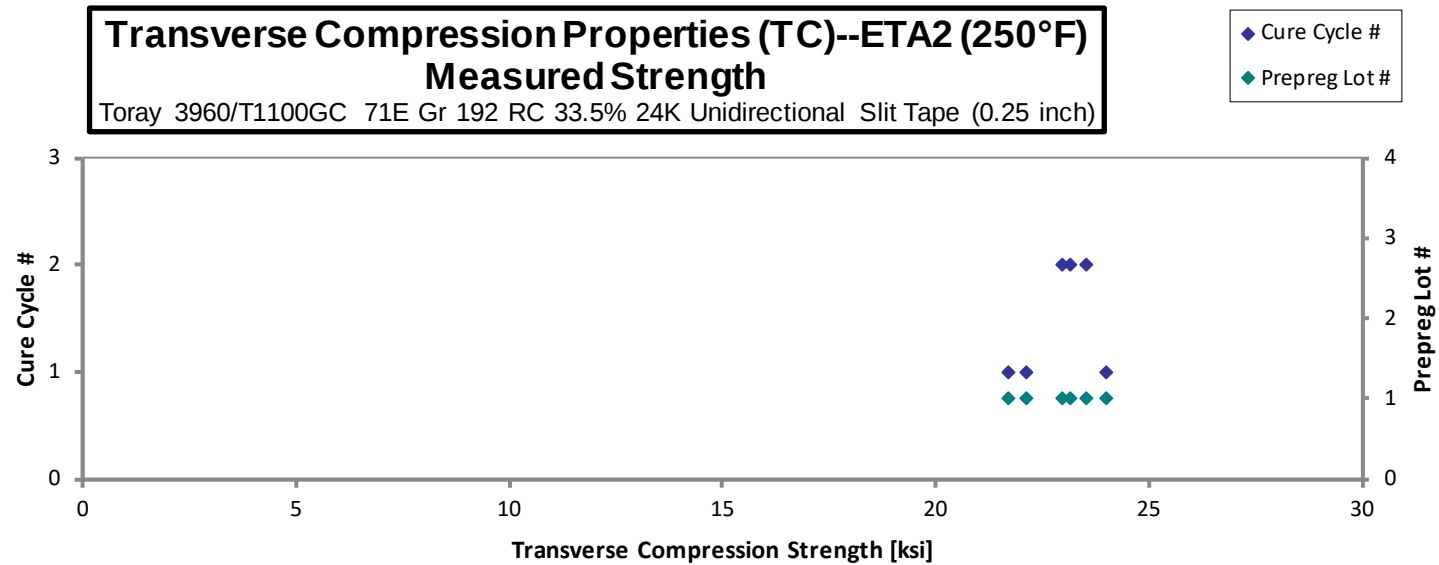


**Transverse Compression Properties (TC)--ETA2 (250°F)  
Strength & Modulus**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

| Specimen Number                                 | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Avg. $t_{ply}$ [in] | Failure Mode |
|-------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|---------------|------------------------------|---------------------|---------------------|--------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-TC-ETA2-1 | A             | C1              | 1             | 1            | 24.00          | 1.160         | 0.09642                      | 14                  | 0.006887            | BGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-TC-ETA2-2 | A             | C1              | 1             | 1            | 21.71          | 1.174         | 0.09622                      | 14                  | 0.006873            | BGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-TC-ETA2-3 | A             | C1              | 1             | 1            | 22.11          | 1.176         | 0.09580                      | 14                  | 0.006843            | BGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-TC-ETA2-1 | A             | C2              | 1             | 2            | 22.98          | 1.231         | 0.09665                      | 14                  | 0.006904            | BGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-TC-ETA2-2 | A             | C2              | 1             | 2            | 23.17          | 1.237         | 0.09617                      | 14                  | 0.006869            | BGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-TC-ETA2-3 | A             | C2              | 1             | 2            | 23.54          | 1.229         | 0.09598                      | 14                  | 0.006856            | M(B,H)GM     |

|                    |        |         |          |
|--------------------|--------|---------|----------|
| Average            | 22.92  | 1.201   | 0.006872 |
| Standard Dev.      | 0.8626 | 0.03444 |          |
| Coeff. of Var. [%] | 3.764  | 2.867   |          |
| Min.               | 21.71  | 1.160   | 0.006843 |
| Max.               | 24.00  | 1.237   | 0.006904 |
| Number of Spec.    | 6      | 6       | 6        |

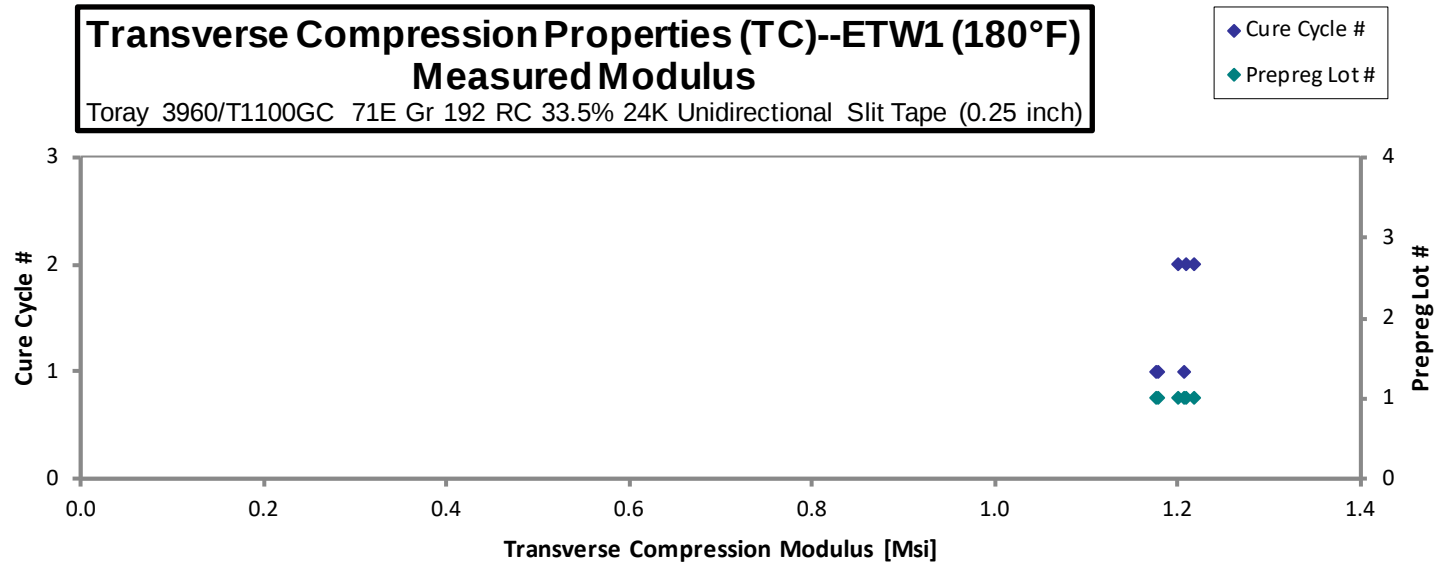
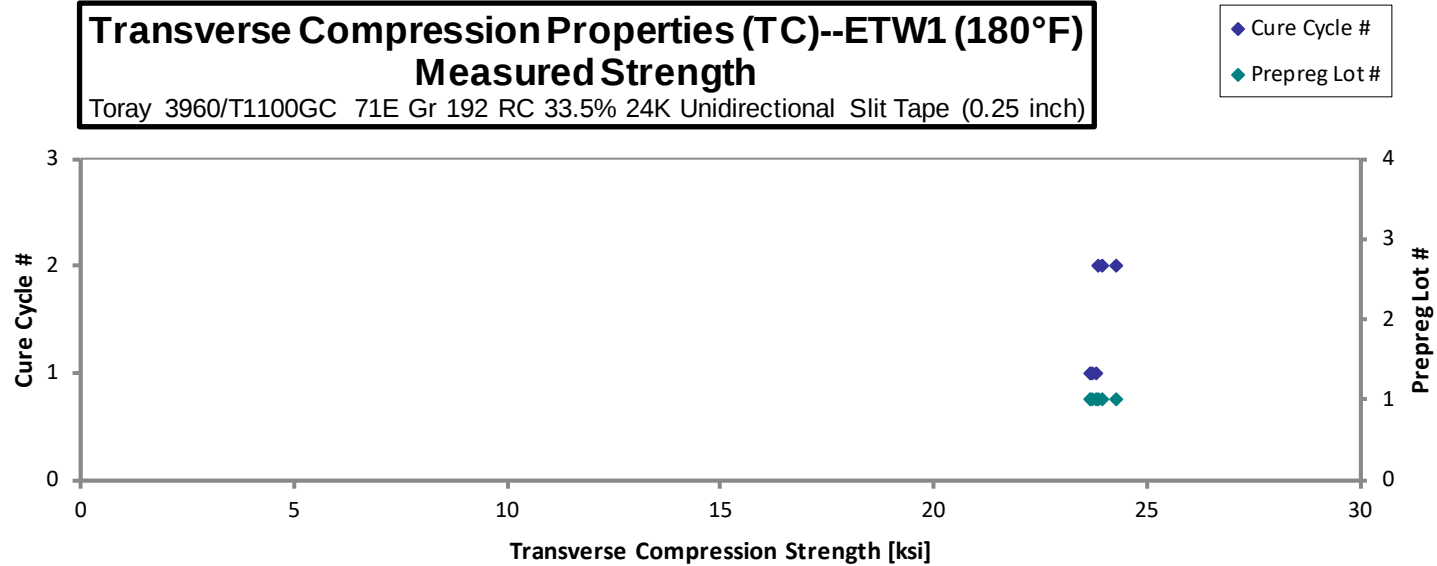


**Transverse Compression Properties (TC)--ETW1 (180°F)**  
**Strength & Modulus**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

| Specimen Number                                 | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Avg. $t_{ply}$ [in] | Failure Mode |
|-------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|---------------|------------------------------|---------------------|---------------------|--------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-TC-ETW1-1 | A             | C1              | 1             | 1            | 23.72          | 1.176         | 0.09618                      | 14                  | 0.006870            | BGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-TC-ETW1-2 | A             | C1              | 1             | 1            | 23.67          | 1.179         | 0.09620                      | 14                  | 0.006871            | BGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-TC-ETW1-3 | A             | C1              | 1             | 1            | 23.80          | 1.207         | 0.09585                      | 14                  | 0.006846            | M(B,H)GM     |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-TC-ETW1-1 | A             | C2              | 1             | 2            | 24.27          | 1.208         | 0.09635                      | 14                  | 0.006882            | BGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-TC-ETW1-2 | A             | C2              | 1             | 2            | 23.85          | 1.218         | 0.09623                      | 14                  | 0.006874            | BGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-TC-ETW1-3 | A             | C2              | 1             | 2            | 23.93          | 1.202         | 0.09635                      | 14                  | 0.006882            | BGM          |

|                    |        |         |          |
|--------------------|--------|---------|----------|
| Average            | 23.87  | 1.198   | 0.006871 |
| Standard Dev.      | 0.2131 | 0.01689 |          |
| Coeff. of Var. [%] | 0.8927 | 1.410   |          |
| Min.               | 23.67  | 1.176   | 0.006846 |
| Max.               | 24.27  | 1.218   | 0.006882 |
| Number of Spec.    | 6      | 6       | 6        |

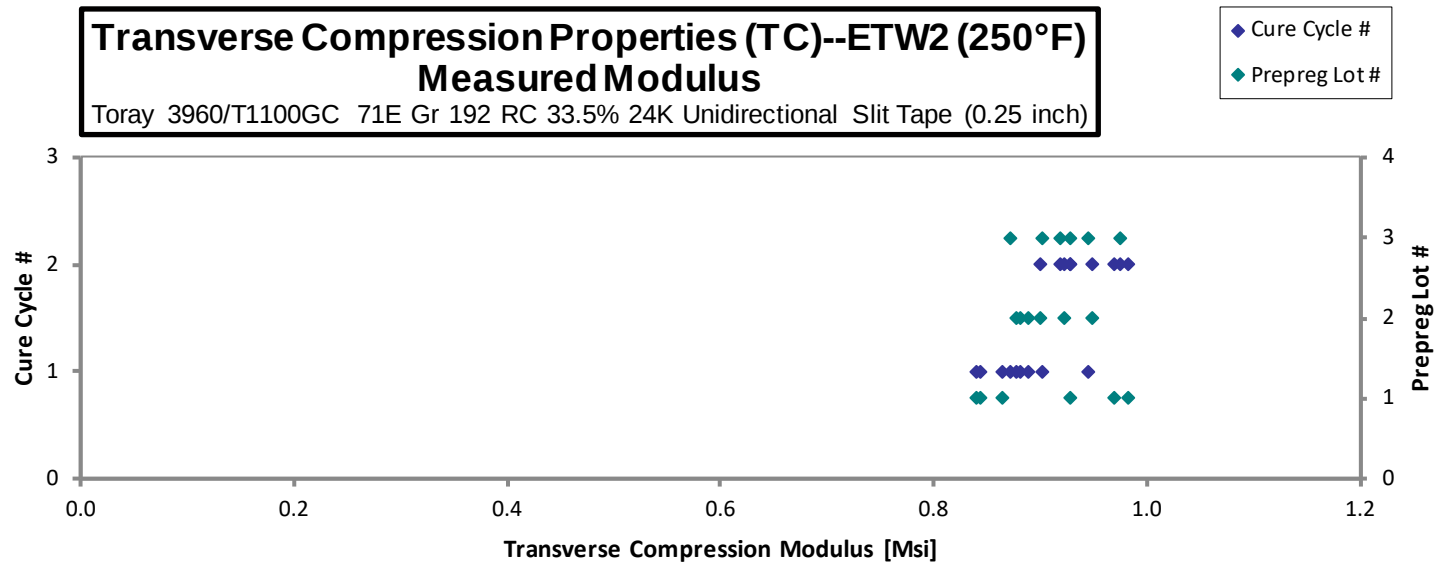
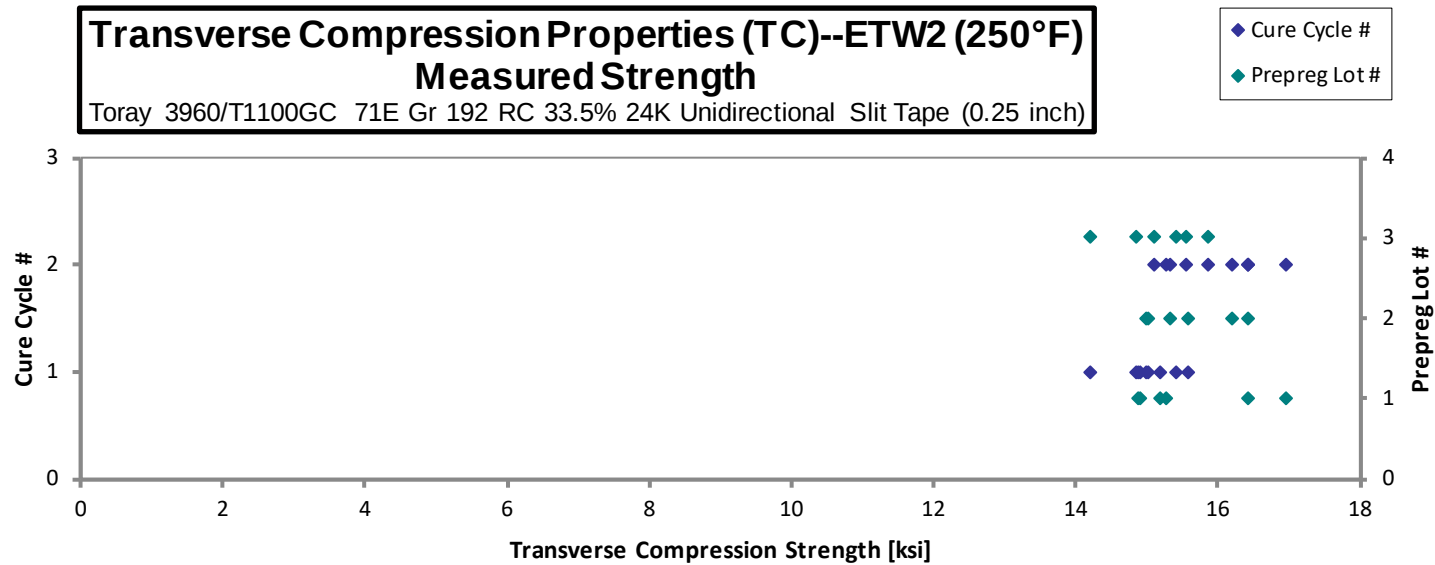


**Transverse Compression Properties (TC)--ETW2 (250°F)  
Strength & Modulus**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

| Specimen Number                                 | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Avg. $t_{ply}$ [in] | Failure Mode |
|-------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|---------------|------------------------------|---------------------|---------------------|--------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-TC-ETW2-1 | A             | C1              | 1             | 1            | 14.91          | 0.8437        | 0.09763                      | 14                  | 0.006974            | HGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-TC-ETW2-2 | A             | C1              | 1             | 1            | 15.19          | 0.8394        | 0.09708                      | 14                  | 0.006935            | HGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-TC-ETW2-3 | A             | C1              | 1             | 1            | 14.89          | 0.8649        | 0.09595                      | 14                  | 0.006854            | HGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-TC-ETW2-2 | A             | C2              | 1             | 2            | 16.95          | 0.9823        | 0.09617                      | 14                  | 0.006869            | BGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-TC-ETW2-3 | A             | C2              | 1             | 2            | 16.42          | 0.9700        | 0.09598                      | 14                  | 0.006856            | HGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-TC-SP-11  | A             | C2              | 1             | 2            | 15.27          | 0.9283        | 0.09593                      | 14                  | 0.006852            | HGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C1-1-TC-ETW2-1 | B             | C1              | 2             | 1            | 15.01          | 0.8884        | 0.09768                      | 14                  | 0.006977            | HGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C1-1-TC-ETW2-2 | B             | C1              | 2             | 1            | 15.59          | 0.8807        | 0.09775                      | 14                  | 0.006982            | BGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C1-1-TC-ETW2-3 | B             | C1              | 2             | 1            | 15.00          | 0.8768        | 0.09737                      | 14                  | 0.006955            | HGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C2-1-TC-ETW2-1 | B             | C2              | 2             | 2            | 16.21          | 0.9488        | 0.09808                      | 14                  | 0.007006            | BGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C2-1-TC-ETW2-2 | B             | C2              | 2             | 2            | 16.43          | 0.9233        | 0.09817                      | 14                  | 0.007012            | BGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C2-1-TC-ETW2-3 | B             | C2              | 2             | 2            | 15.32          | 0.9009        | 0.09800                      | 14                  | 0.007000            | M(B,H)GM     |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C1-1-TC-ETW2-1 | C             | C1              | 3             | 1            | 14.84          | 0.9025        | 0.09828                      | 14                  | 0.007020            | BGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C1-1-TC-ETW2-2 | C             | C1              | 3             | 1            | 15.42          | 0.9442        | 0.09838                      | 14                  | 0.007027            | M(B,H)GM     |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C1-1-TC-ETW2-3 | C             | C1              | 3             | 1            | 14.21          | 0.8724        | 0.09842                      | 14                  | 0.007030            | BGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C2-1-TC-ETW2-1 | C             | C2              | 3             | 2            | 15.86          | 0.9755        | 0.09897                      | 14                  | 0.007069            | HGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C2-1-TC-ETW2-2 | C             | C2              | 3             | 2            | 15.10          | 0.9188        | 0.09863                      | 14                  | 0.007045            | HGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C2-1-TC-ETW2-3 | C             | C2              | 3             | 2            | 15.54          | 0.9284        | 0.09868                      | 14                  | 0.007049            | BGM          |

|                    |        |         |          |
|--------------------|--------|---------|----------|
| Average            | 15.45  | 0.9105  | 0.006973 |
| Standard Dev.      | 0.6898 | 0.04346 |          |
| Coeff. of Var. [%] | 4.464  | 4.773   |          |
| Min.               | 14.21  | 0.8394  | 0.006852 |
| Max.               | 16.95  | 0.9823  | 0.007069 |
| Number of Spec.    | 18     | 18      | 18       |



## 4.6 In-Plane Shear Properties (IPS)

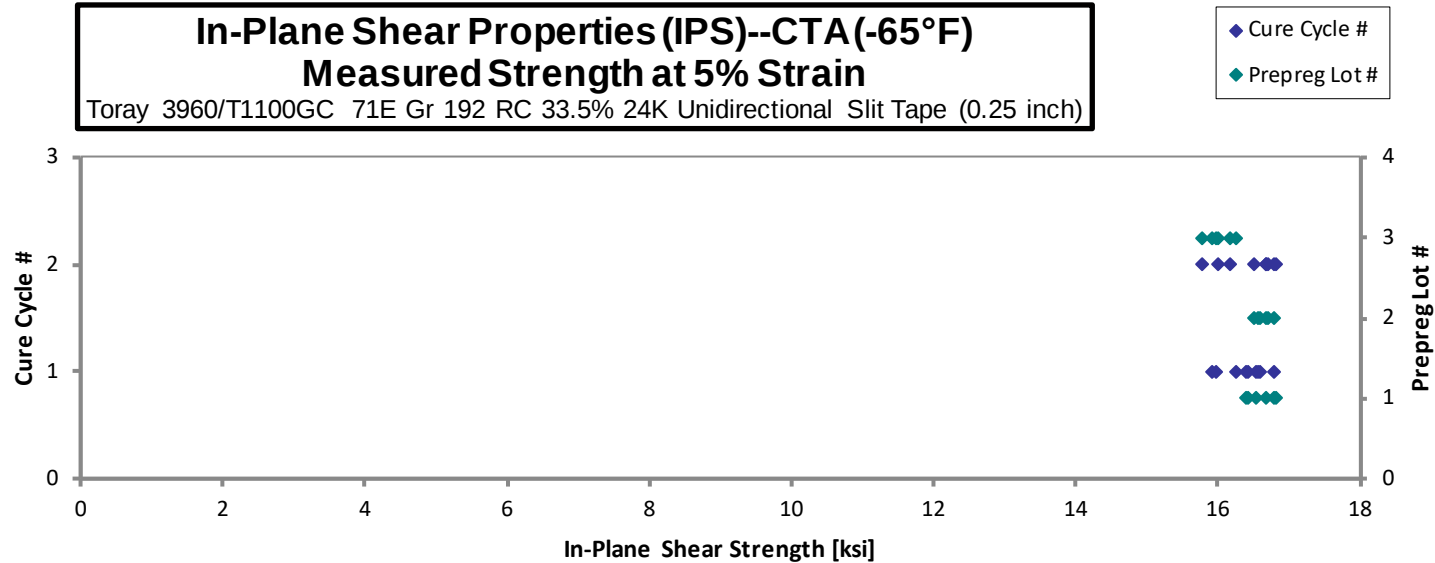
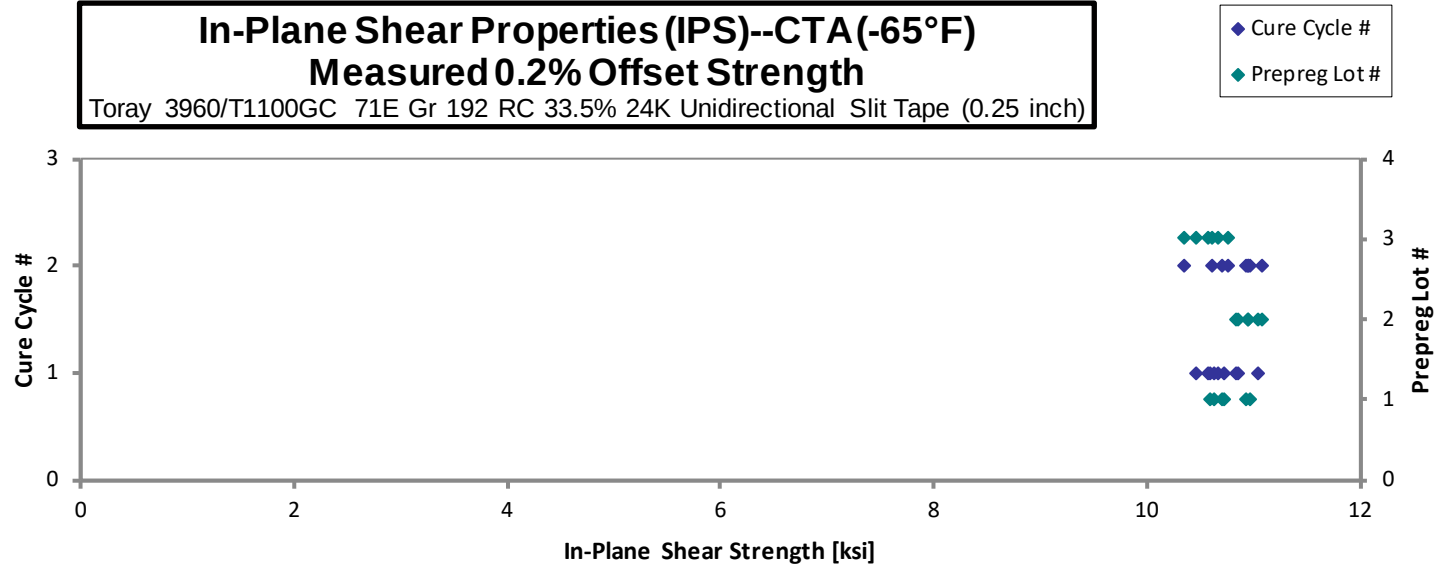
### In-Plane Shear Properties (IPS)--CTA (-65°F)

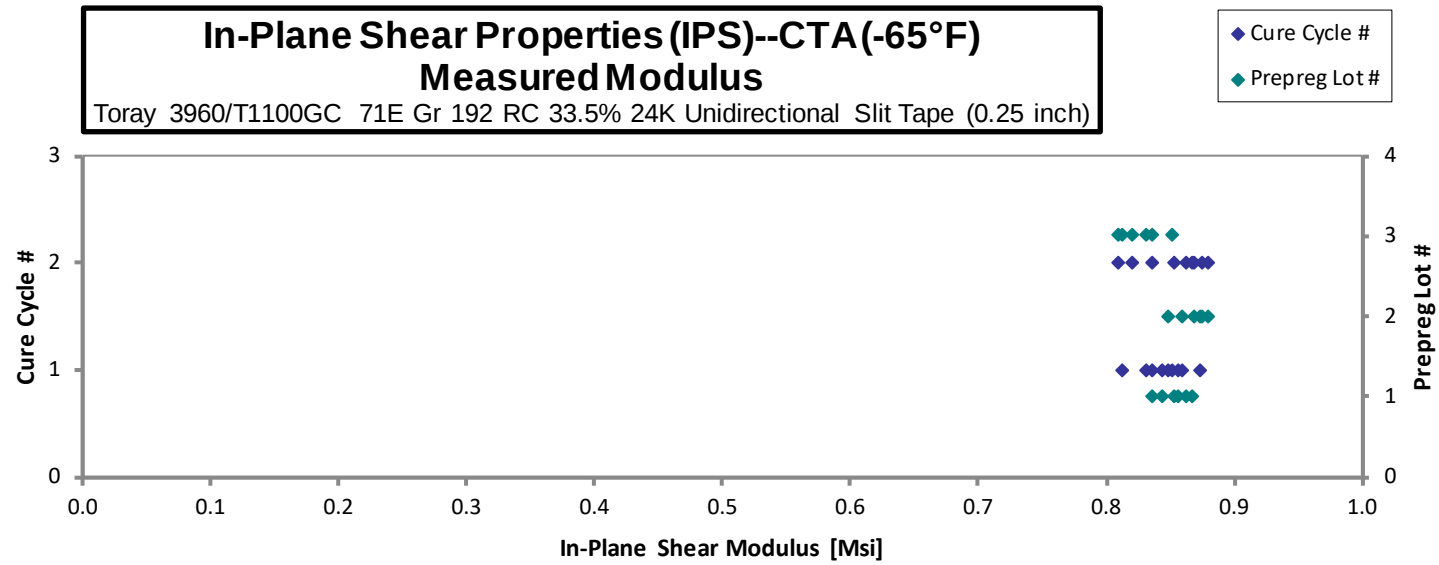
#### Strength & Modulus

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

| Specimen Number                                 | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | 0.2% Offset Strength [ksi] | Strength at 5% Strain [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Avg. $t_{ply}$ [in] |
|-------------------------------------------------|---------------|-----------------|---------------|--------------|----------------------------|-----------------------------|---------------|------------------------------|---------------------|---------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-A-C1-1-IPS-CTA-1 | A             | C1              | 1             | 1            | 10.63                      | 16.39                       | 0.8361        | 0.1140                       | 16                  | 0.007124            |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-A-C1-1-IPS-CTA-2 | A             | C1              | 1             | 1            | 10.72                      | 16.43                       | 0.8565        | 0.1118                       | 16                  | 0.006990            |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-A-C1-1-IPS-CTA-3 | A             | C1              | 1             | 1            | 10.59                      | 16.54                       | 0.8440        | 0.1131                       | 16                  | 0.007071            |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-A-C2-1-IPS-CTA-1 | A             | C2              | 1             | 2            | 10.70                      | 16.67                       | 0.8527        | 0.1115                       | 16                  | 0.006967            |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-A-C2-1-IPS-CTA-2 | A             | C2              | 1             | 2            | 10.97                      | 16.80                       | 0.8677        | 0.1104                       | 16                  | 0.006900            |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-A-C2-1-IPS-CTA-3 | A             | C2              | 1             | 2            | 10.93                      | 16.81                       | 0.8626        | 0.1113                       | 16                  | 0.006957            |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-B-C1-1-IPS-CTA-1 | B             | C1              | 2             | 1            | 10.84                      | 16.57                       | 0.8587        | 0.1133                       | 16                  | 0.007082            |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-B-C1-1-IPS-CTA-2 | B             | C1              | 2             | 1            | 11.04                      | 16.78                       | 0.8726        | 0.1113                       | 16                  | 0.006958            |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-B-C1-1-IPS-CTA-3 | B             | C1              | 2             | 1            | 10.86                      | 16.60                       | 0.8490        | 0.1123                       | 16                  | 0.007017            |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-B-C2-1-IPS-CTA-1 | B             | C2              | 2             | 2            | 10.95                      | 16.49                       | 0.8748        | 0.1122                       | 16                  | 0.007013            |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-B-C2-1-IPS-CTA-2 | B             | C2              | 2             | 2            | 11.09                      | 16.69                       | 0.8793        | 0.1121                       | 16                  | 0.007003            |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-B-C2-1-IPS-CTA-3 | B             | C2              | 2             | 2            | 10.95                      | 16.67                       | 0.8692        | 0.1133                       | 16                  | 0.007082            |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-C-C1-1-IPS-CTA-1 | C             | C1              | 3             | 1            | 10.47                      | 15.93                       | 0.8127        | 0.1160                       | 16                  | 0.007252            |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-C-C1-1-IPS-CTA-2 | C             | C1              | 3             | 1            | 10.57                      | 15.98                       | 0.8313        | 0.1143                       | 16                  | 0.007144            |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-C-C1-1-IPS-CTA-3 | C             | C1              | 3             | 1            | 10.68                      | 16.25                       | 0.8515        | 0.1138                       | 16                  | 0.007109            |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-C-C2-1-IPS-CTA-1 | C             | C2              | 3             | 2            | 10.35                      | 15.79                       | 0.8094        | 0.1158                       | 16                  | 0.007239            |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-C-C2-1-IPS-CTA-2 | C             | C2              | 3             | 2            | 10.76                      | 16.00                       | 0.8207        | 0.1143                       | 16                  | 0.007145            |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-C-C2-1-IPS-CTA-3 | C             | C2              | 3             | 2            | 10.62                      | 16.16                       | 0.8365        | 0.1143                       | 16                  | 0.007145            |

|                    |        |        |         |          |
|--------------------|--------|--------|---------|----------|
| Average            | 10.76  | 16.42  | 0.8492  | 0.007066 |
| Standard Dev.      | 0.2046 | 0.3266 | 0.02115 |          |
| Coeff. of Var. [%] | 1.901  | 1.989  | 2.490   |          |
| Min.               | 10.35  | 15.79  | 0.8094  | 0.006900 |
| Max.               | 11.09  | 16.81  | 0.8793  | 0.007252 |
| Number of Spec.    | 18     | 18     | 18      | 18       |



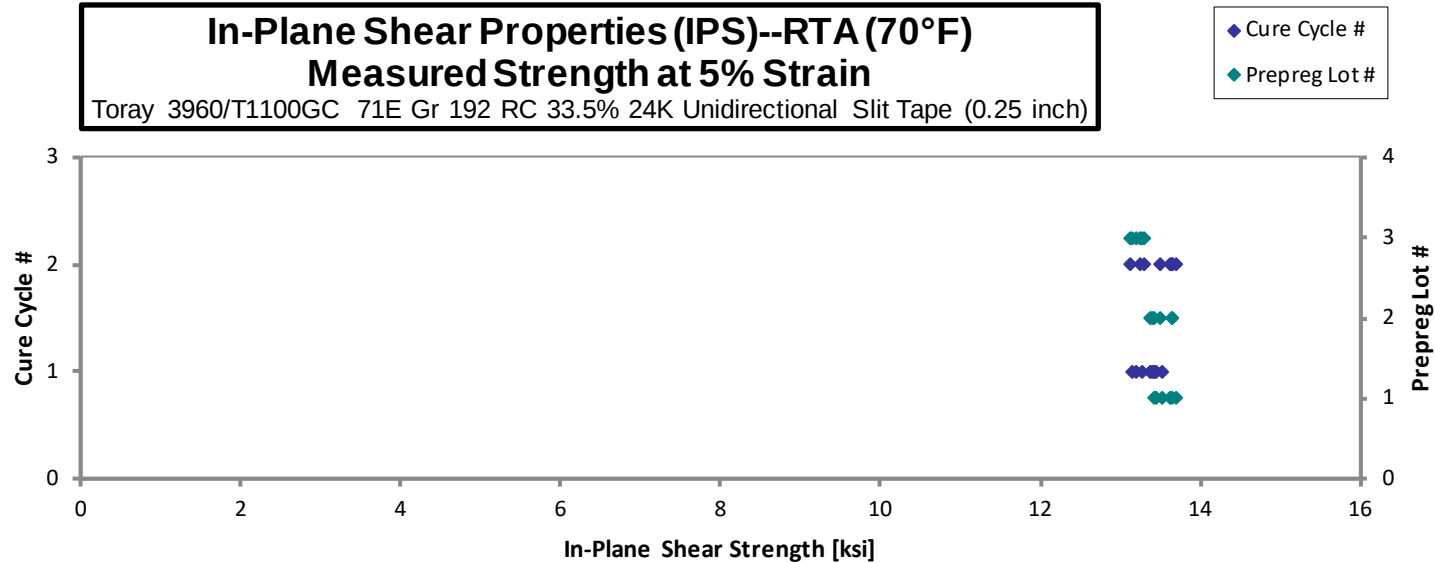
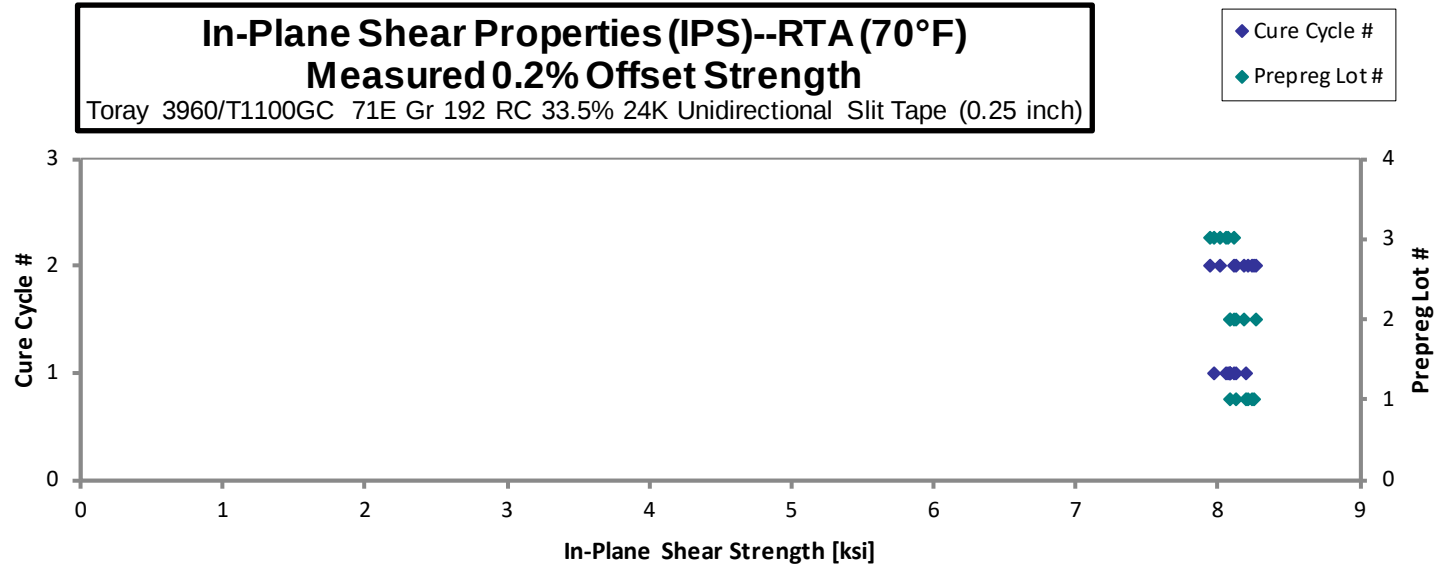


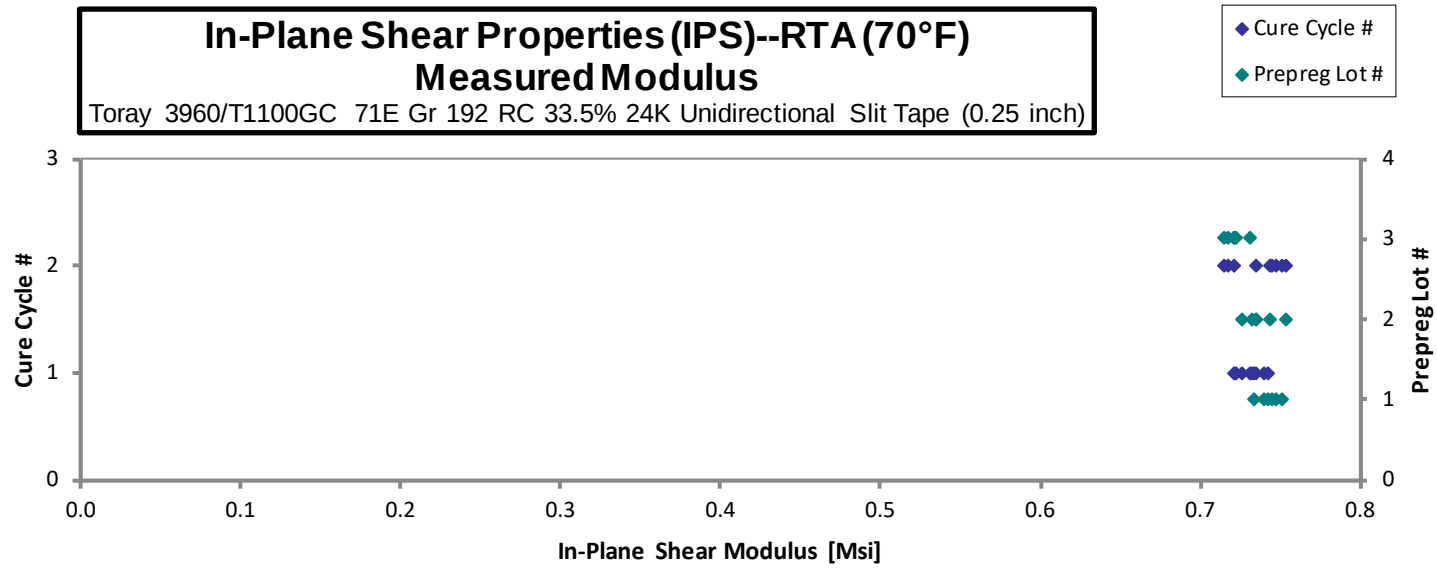
**In-Plane Shear Properties (IPS)--RTA (70°F)  
Strength & Modulus**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

| Specimen Number                                 | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | 0.2% Offset Strength [ksi] | Strength at 5% Strain [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Avg. t <sub>ply</sub> [in] |
|-------------------------------------------------|---------------|-----------------|---------------|--------------|----------------------------|-----------------------------|---------------|------------------------------|---------------------|----------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-A-C1-1-IPS-RTA-1 | A             | C1              | 1             | 1            | 8.090                      | 13.46                       | 0.7333        | 0.1133                       | 16                  | 0.007078                   |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-A-C1-1-IPS-RTA-2 | A             | C1              | 1             | 1            | 8.125                      | 13.43                       | 0.7395        | 0.1127                       | 16                  | 0.007044                   |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-A-C1-1-IPS-RTA-3 | A             | C1              | 1             | 1            | 8.193                      | 13.54                       | 0.7419        | 0.1120                       | 16                  | 0.007000                   |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-A-C2-1-IPS-RTA-1 | A             | C2              | 1             | 2            | 8.249                      | 13.70                       | 0.7468        | 0.1116                       | 16                  | 0.006973                   |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-A-C2-1-IPS-RTA-2 | A             | C2              | 1             | 2            | 8.214                      | 13.62                       | 0.7448        | 0.1114                       | 16                  | 0.006961                   |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-A-C2-1-IPS-RTA-3 | A             | C2              | 1             | 2            | 8.246                      | 13.65                       | 0.7508        | 0.1112                       | 16                  | 0.006948                   |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-B-C1-1-IPS-RTA-1 | B             | C1              | 2             | 1            | 8.111                      | 13.41                       | 0.7345        | 0.1126                       | 16                  | 0.007034                   |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-B-C1-1-IPS-RTA-2 | B             | C1              | 2             | 1            | 8.079                      | 13.39                       | 0.7259        | 0.1122                       | 16                  | 0.007014                   |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-B-C1-1-IPS-RTA-3 | B             | C1              | 2             | 1            | 8.087                      | 13.36                       | 0.7317        | 0.1121                       | 16                  | 0.007007                   |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-B-C2-1-IPS-RTA-1 | B             | C2              | 2             | 2            | 8.189                      | 13.65                       | 0.7431        | 0.1128                       | 16                  | 0.007052                   |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-B-C2-1-IPS-RTA-2 | B             | C2              | 2             | 2            | 8.267                      | 13.64                       | 0.7537        | 0.1131                       | 16                  | 0.007070                   |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-B-C2-1-IPS-RTA-3 | B             | C2              | 2             | 2            | 8.128                      | 13.49                       | 0.7350        | 0.1129                       | 16                  | 0.007058                   |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-C-C1-1-IPS-RTA-1 | C             | C1              | 3             | 1            | 8.051                      | 13.27                       | 0.7216        | 0.1146                       | 16                  | 0.007165                   |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-C-C1-1-IPS-RTA-2 | C             | C1              | 3             | 1            | 7.971                      | 13.16                       | 0.7227        | 0.1152                       | 16                  | 0.007199                   |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-C-C1-1-IPS-RTA-3 | C             | C1              | 3             | 1            | 8.069                      | 13.19                       | 0.7313        | 0.1146                       | 16                  | 0.007164                   |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-C-C2-1-IPS-RTA-1 | C             | C2              | 3             | 2            | 8.107                      | 13.30                       | 0.7206        | 0.1145                       | 16                  | 0.007158                   |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-C-C2-1-IPS-RTA-2 | C             | C2              | 3             | 2            | 8.019                      | 13.26                       | 0.7173        | 0.1146                       | 16                  | 0.007159                   |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-C-C2-1-IPS-RTA-3 | C             | C2              | 3             | 2            | 7.943                      | 13.11                       | 0.7146        | 0.1147                       | 16                  | 0.007166                   |

|                           |                |               |                |                 |
|---------------------------|----------------|---------------|----------------|-----------------|
| <b>Average</b>            | <b>8.119</b>   | <b>13.43</b>  | <b>0.7338</b>  | <b>0.007069</b> |
| <b>Standard Dev.</b>      | <b>0.09326</b> | <b>0.1843</b> | <b>0.01170</b> |                 |
| <b>Coeff. of Var. [%]</b> | <b>1.149</b>   | <b>1.373</b>  | <b>1.594</b>   |                 |
| <b>Min.</b>               | <b>7.943</b>   | <b>13.11</b>  | <b>0.7146</b>  | <b>0.006948</b> |
| <b>Max.</b>               | <b>8.267</b>   | <b>13.70</b>  | <b>0.7537</b>  | <b>0.007199</b> |
| <b>Number of Spec.</b>    | <b>18</b>      | <b>18</b>     | <b>18</b>      | <b>18</b>       |



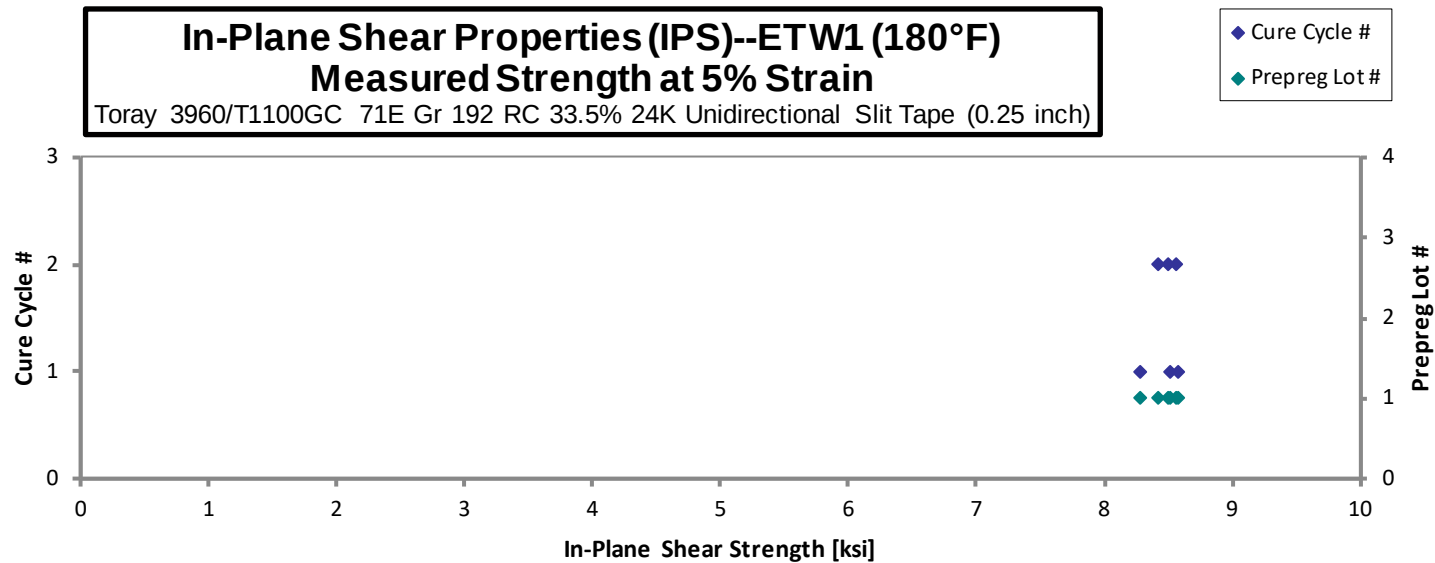
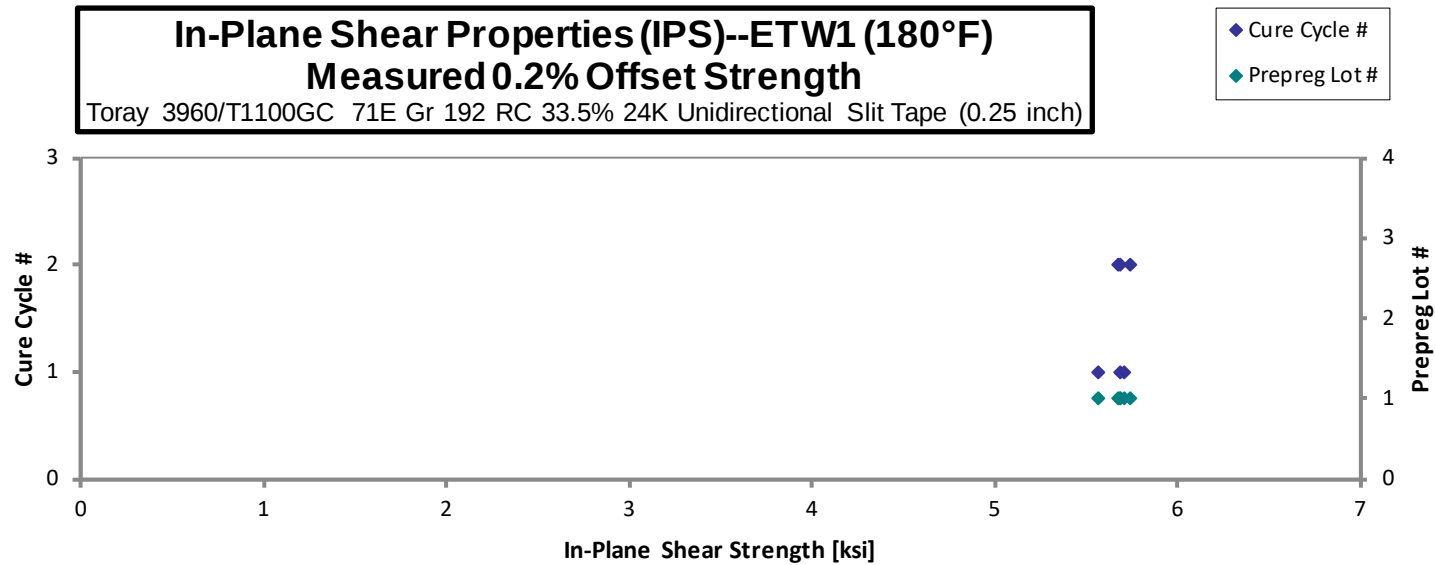


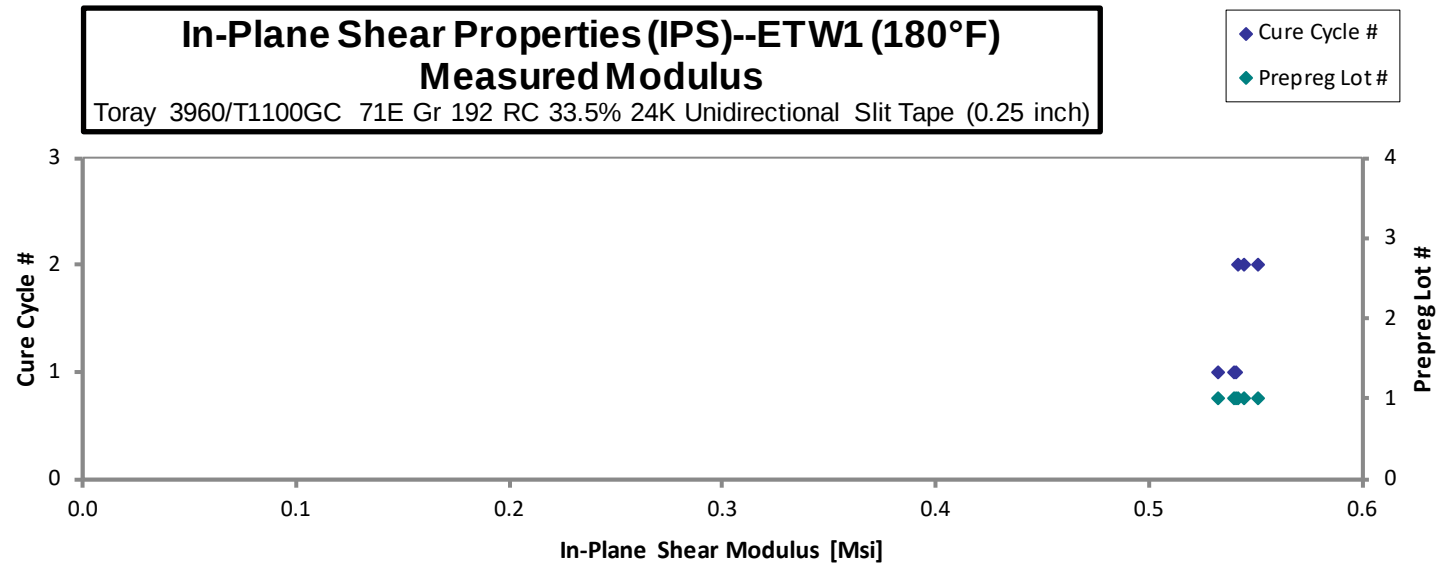
**In-Plane Shear Properties (IPS)--ETW1 (180°F)**  
**Strength & Modulus**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

| Specimen Number                                  | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | 0.2% Offset Strength [ksi] | Strength at 5% Strain [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Avg. $t_{ply}$ [in] |
|--------------------------------------------------|---------------|-----------------|---------------|--------------|----------------------------|-----------------------------|---------------|------------------------------|---------------------|---------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-A-C1-1-IPS-ETW1-1 | A             | C1              | 1             | 1            | 5.564                      | 8.276                       | 0.5324        | 0.1118                       | 16                  | 0.006988            |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-A-C1-1-IPS-ETW1-2 | A             | C1              | 1             | 1            | 5.684                      | 8.514                       | 0.5412        | 0.1123                       | 16                  | 0.007017            |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-A-C1-1-IPS-ETW1-3 | A             | C1              | 1             | 1            | 5.713                      | 8.574                       | 0.5400        | 0.1123                       | 16                  | 0.007017            |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-A-C2-1-IPS-ETW1-1 | A             | C2              | 1             | 2            | 5.688                      | 8.500                       | 0.5443        | 0.1112                       | 16                  | 0.006947            |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-A-C2-1-IPS-ETW1-2 | A             | C2              | 1             | 2            | 5.677                      | 8.418                       | 0.5417        | 0.1111                       | 16                  | 0.006942            |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-A-C2-1-IPS-ETW1-3 | A             | C2              | 1             | 2            | 5.741                      | 8.554                       | 0.5514        | 0.1113                       | 16                  | 0.006958            |

|                    |         |        |          |          |
|--------------------|---------|--------|----------|----------|
| Average            | 5.678   | 8.473  | 0.5418   | 0.006978 |
| Standard Dev.      | 0.06080 | 0.1105 | 0.006182 |          |
| Coeff. of Var. [%] | 1.071   | 1.304  | 1.141    |          |
| Min.               | 5.564   | 8.276  | 0.5324   | 0.006942 |
| Max.               | 5.741   | 8.574  | 0.5514   | 0.007017 |
| Number of Spec.    | 6       | 6      | 6        | 6        |



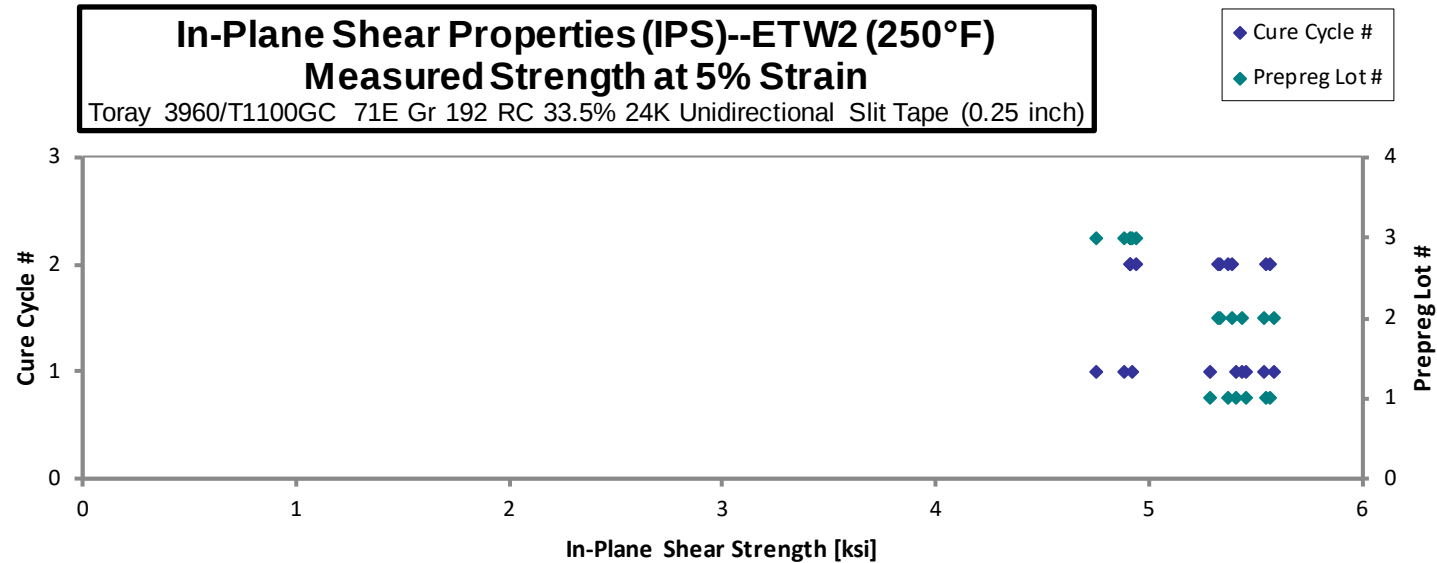
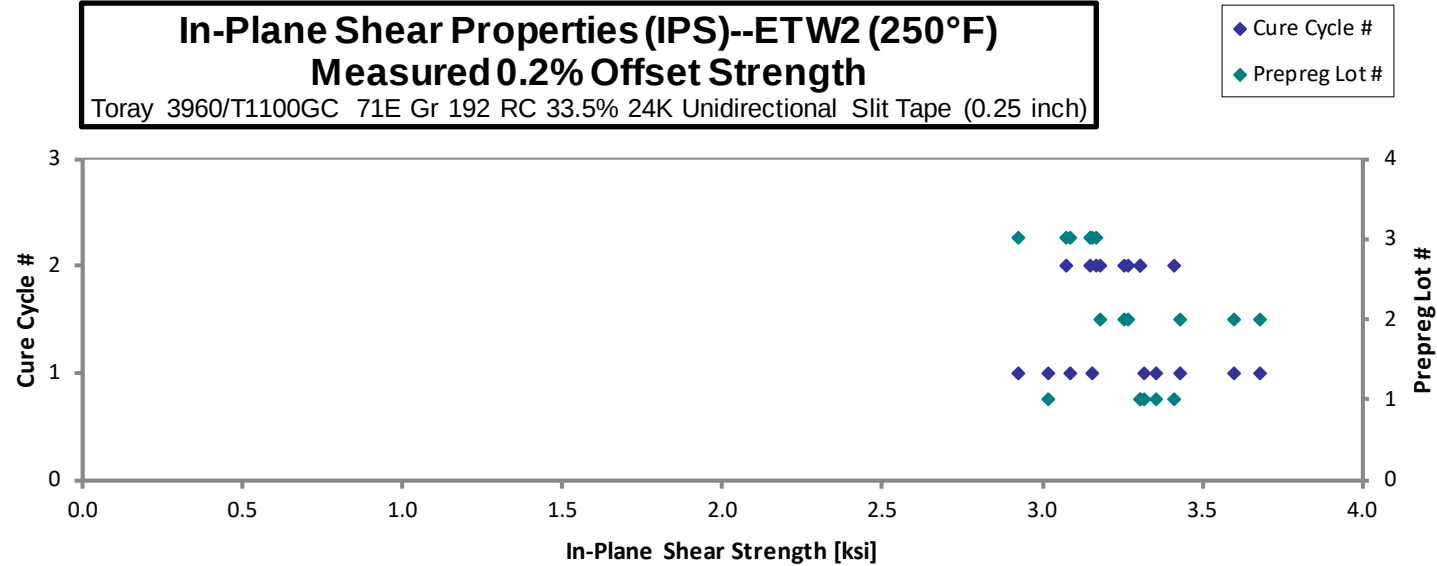


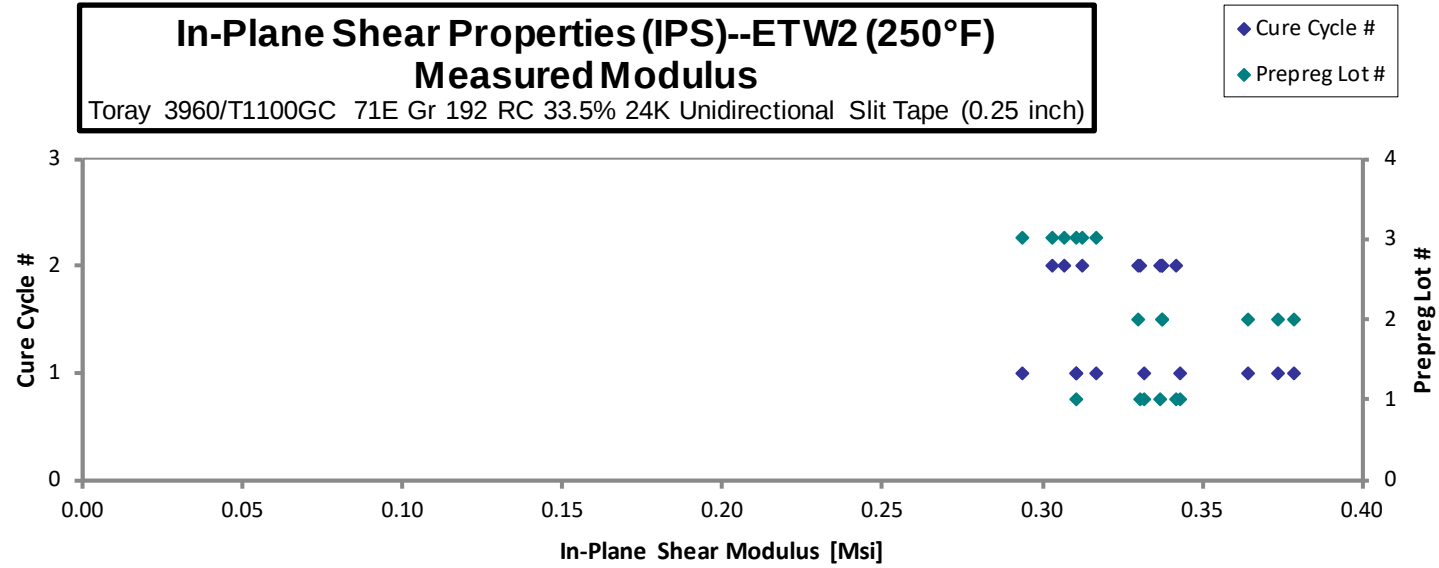
**In-Plane Shear Properties (IPS)--ETW2 (250°F)  
Strength & Modulus**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

| Specimen Number                                  | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | 0.2% Offset Strength [ksi] | Strength at 5% Strain [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Avg. $t_{ply}$ [in] |
|--------------------------------------------------|---------------|-----------------|---------------|--------------|----------------------------|-----------------------------|---------------|------------------------------|---------------------|---------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-A-C1-1-IPS-ETW2-1 | A             | C1              | 1             | 1            | 3.358                      | 5.457                       | 0.3430        | 0.1128                       | 16                  | 0.007052            |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-A-C1-1-IPS-ETW2-2 | A             | C1              | 1             | 1            | 3.317                      | 5.410                       | 0.3320        | 0.1118                       | 16                  | 0.006989            |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-A-C1-1-IPS-ETW2-3 | A             | C1              | 1             | 1            | 3.021                      | 5.288                       | 0.3104        | 0.1131                       | 16                  | 0.007066            |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-A-C2-1-IPS-ETW2-1 | A             | C2              | 1             | 2            | 3.307                      | 5.369                       | 0.3371        | 0.1113                       | 16                  | 0.006957            |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-A-C2-1-IPS-ETW2-2 | A             | C2              | 1             | 2            | 3.303                      | 5.545                       | 0.3305        | 0.1115                       | 16                  | 0.006967            |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-A-C2-1-IPS-ETW2-3 | A             | C2              | 1             | 2            | 3.411                      | 5.564                       | 0.3417        | 0.1104                       | 16                  | 0.006902            |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-B-C1-1-IPS-ETW2-1 | B             | C1              | 2             | 1            | 3.678                      | 5.536                       | 0.3784        | 0.1118                       | 16                  | 0.006990            |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-B-C1-1-IPS-ETW2-2 | B             | C1              | 2             | 1            | 3.597                      | 5.584                       | 0.3734        | 0.1117                       | 16                  | 0.006980            |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-B-C1-1-IPS-ETW2-3 | B             | C1              | 2             | 1            | 3.429                      | 5.441                       | 0.3643        | 0.1132                       | 16                  | 0.007074            |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-B-C2-1-IPS-ETW2-1 | B             | C2              | 2             | 2            | 3.256                      | 5.388                       | 0.3374        | 0.1125                       | 16                  | 0.007028            |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-B-C2-1-IPS-ETW2-2 | B             | C2              | 2             | 2            | 3.181                      | 5.337                       | 0.3297        | 0.1128                       | 16                  | 0.007047            |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-B-C2-1-IPS-ETW2-3 | B             | C2              | 2             | 2            | 3.269                      | 5.320                       | 0.3372        | 0.1125                       | 16                  | 0.007031            |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-C-C1-1-IPS-ETW2-1 | C             | C1              | 3             | 1            | 3.090                      | 4.883                       | 0.3106        | 0.1147                       | 16                  | 0.007166            |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-C-C1-1-IPS-ETW2-2 | C             | C1              | 3             | 1            | 2.924                      | 4.755                       | 0.2936        | 0.1147                       | 16                  | 0.007166            |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-C-C1-1-IPS-ETW2-3 | C             | C1              | 3             | 1            | 3.158                      | 4.920                       | 0.3169        | 0.1145                       | 16                  | 0.007157            |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-C-C2-1-IPS-ETW2-1 | C             | C2              | 3             | 2            | 3.168                      | 4.936                       | 0.3126        | 0.1146                       | 16                  | 0.007163            |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-C-C2-1-IPS-ETW2-2 | C             | C2              | 3             | 2            | 3.072                      | 4.915                       | 0.3031        | 0.1148                       | 16                  | 0.007175            |
| NTP3963Q1-TC-WEB-NIAR-T01-MST3-C-C2-1-IPS-ETW2-3 | C             | C2              | 3             | 2            | 3.150                      | 4.914                       | 0.3066        | 0.1146                       | 16                  | 0.007163            |

|                    |        |        |         |          |
|--------------------|--------|--------|---------|----------|
| Average            | 3.261  | 5.253  | 0.3310  | 0.007059 |
| Standard Dev.      | 0.1923 | 0.2810 | 0.02387 |          |
| Coeff. of Var. [%] | 5.898  | 5.350  | 7.212   |          |
| Min.               | 2.924  | 4.755  | 0.2936  | 0.006902 |
| Max.               | 3.678  | 5.584  | 0.3784  | 0.007175 |
| Number of Spec.    | 18     | 18     | 18      | 18       |





## 4.7 In-Plane Shear V-Notched Properties (VNS)

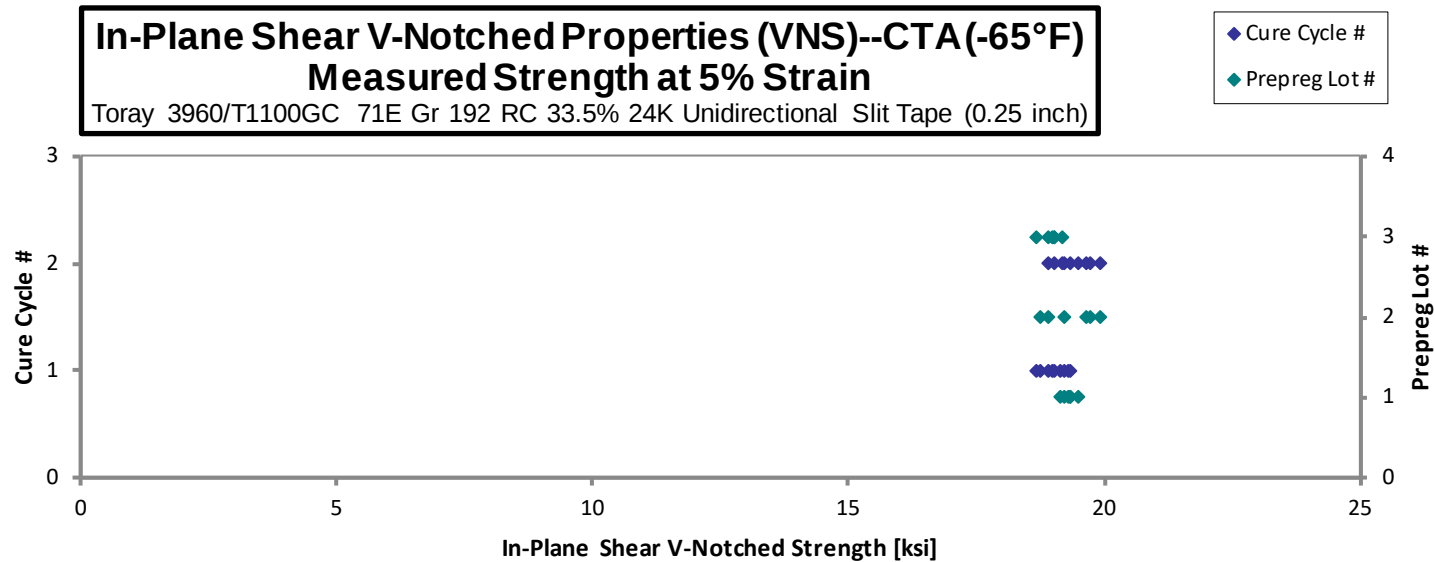
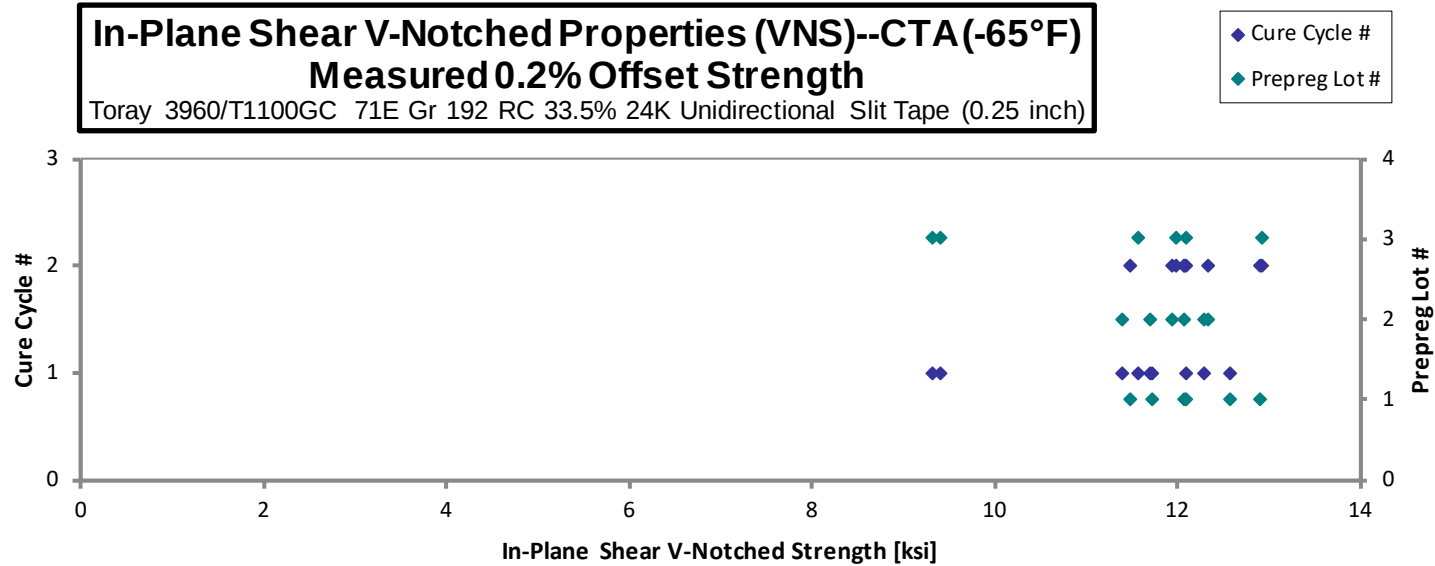
## In-Plane Shear V-Notched Properties (VNS)--CTA (-65°F)

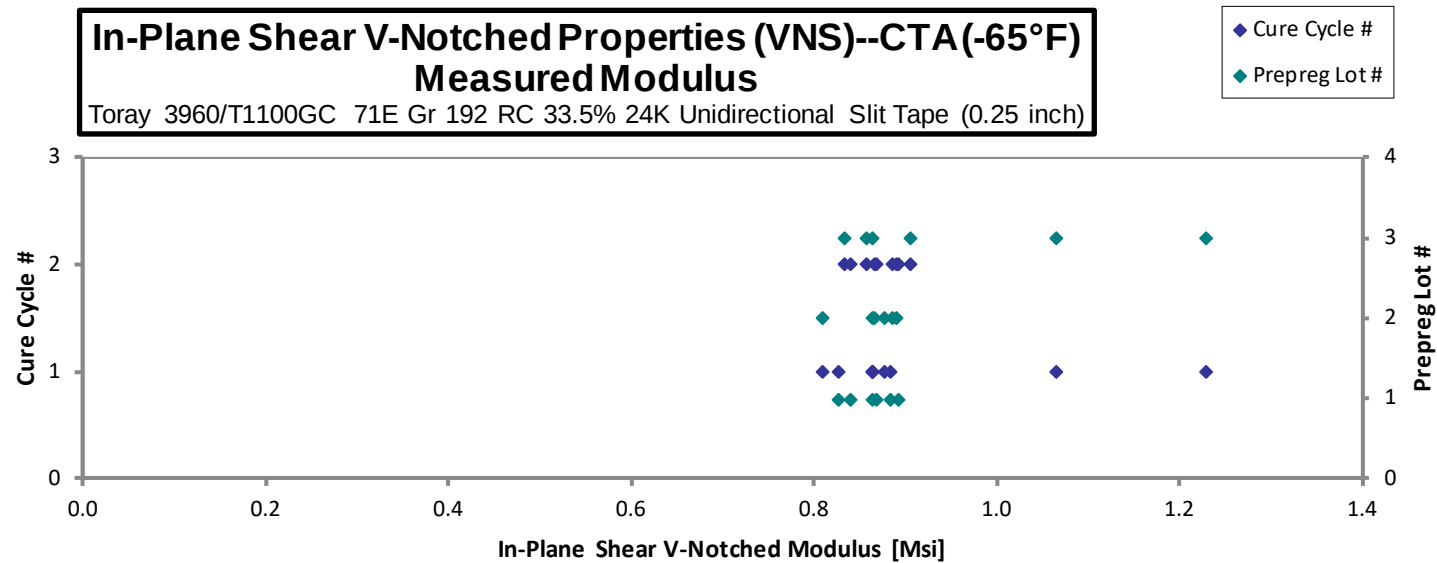
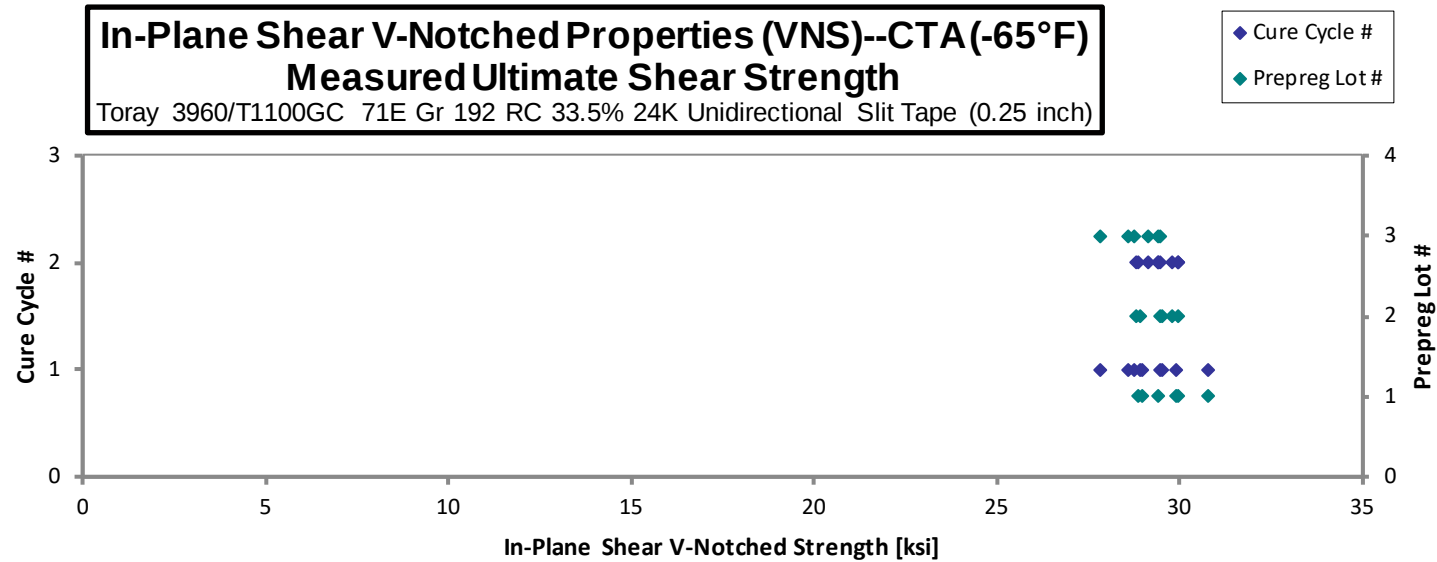
## Strength &amp; Modulus

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

| Specimen Number                                 | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | 0.2% Offset Strength [ksi] | Strength at 5% Strain [ksi] | Ultimate Shear Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Avg. $t_{ply}$ [in] | Failure Mode |
|-------------------------------------------------|---------------|-----------------|---------------|--------------|----------------------------|-----------------------------|-------------------------------|---------------|------------------------------|---------------------|---------------------|--------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-A-C1-1-VNS-CTA-1 | A             | C1              | 1             | 1            | 11.73                      | 19.35                       | 30.80                         | 0.8849        | 0.1376                       | 20                  | 0.006878            | HGN          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-A-C1-1-VNS-CTA-2 | A             | C1              | 1             | 1            | 12.57                      | 19.29                       | 28.96                         | 0.8277        | 0.1383                       | 20                  | 0.006917            | HGN          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-A-C1-1-VNS-CTA-3 | A             | C1              | 1             | 1            | 12.10                      | 19.13                       | 29.92                         | 0.8639        | 0.1383                       | 20                  | 0.006915            | HGN          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-A-C2-1-VNS-CTA-1 | A             | C2              | 1             | 2            | 12.90                      | 19.21                       | 29.96                         | 0.8402        | 0.1385                       | 20                  | 0.006926            | HGN          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-A-C2-1-VNS-CTA-2 | A             | C2              | 1             | 2            | 11.48                      | 19.48                       | 28.88                         | 0.8935        | 0.1404                       | 20                  | 0.007021            | HGN          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-A-C2-1-VNS-CTA-3 | A             | C2              | 1             | 2            | 12.08                      | 19.33                       | 29.43                         | 0.8675        | 0.1389                       | 20                  | 0.006943            | HGN          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-B-C1-1-VNS-CTA-1 | B             | C1              | 2             | 1            | 11.40                      | 19.23                       | 29.55                         | 0.8641        | 0.1413                       | 20                  | 0.007064            | M(V,H)GN     |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-B-C1-1-VNS-CTA-2 | B             | C1              | 2             | 1            | 12.29                      | 18.89                       | 28.95                         | 0.8096        | 0.1388                       | 20                  | 0.006940            | M(V,H)GN     |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-B-C1-1-VNS-CTA-3 | B             | C1              | 2             | 1            | 11.70                      | 18.76                       | 29.49                         | 0.8773        | 0.1389                       | 20                  | 0.006945            | M(V,H)GN     |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-B-C2-1-VNS-CTA-1 | B             | C2              | 2             | 2            | 11.94                      | 19.90                       | 28.83                         | 0.8667        | 0.1402                       | 20                  | 0.007011            | HGN          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-B-C2-1-VNS-CTA-2 | B             | C2              | 2             | 2            | 12.33                      | 19.74                       | 29.95                         | 0.8867        | 0.1402                       | 20                  | 0.007008            | HGN          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-B-C2-1-VNS-CTA-3 | B             | C2              | 2             | 2            | 12.07                      | 19.64                       | 29.78                         | 0.8904        | 0.1406                       | 20                  | 0.007028            | HGN          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-C-C1-1-VNS-CTA-1 | C             | C1              | 3             | 1            | 9.409                      | 18.66                       | 27.85                         | 1.230         | 0.1469                       | 20                  | 0.007347            | HGN          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-C-C1-1-VNS-CTA-2 | C             | C1              | 3             | 1            | 9.316                      | 18.97                       | 28.77                         | 1.065         | 0.1440                       | 20                  | 0.007198            | HGN          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-C-C1-1-VNS-CTA-3 | C             | C1              | 3             | 1            | 11.57                      | 19.03                       | 28.58                         | 0.8632        | 0.1422                       | 20                  | 0.007109            | HGN          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-C-C2-1-VNS-CTA-1 | C             | C2              | 3             | 2            | 11.98                      | 19.18                       | 29.15                         | 0.8578        | 0.1413                       | 20                  | 0.007063            | HGN          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-C-C2-1-VNS-CTA-2 | C             | C2              | 3             | 2            | 12.93                      | 19.01                       | 29.44                         | 0.8339        | 0.1403                       | 20                  | 0.007015            | HGN          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-C-C2-1-VNS-CTA-3 | C             | C2              | 3             | 2            | 12.09                      | 18.90                       | 29.50                         | 0.9055        | 0.1387                       | 20                  | 0.006933            | HGN          |

|                    |        |        |        |         |          |
|--------------------|--------|--------|--------|---------|----------|
| Average            | 11.77  | 19.21  | 29.32  | 0.8960  | 0.007014 |
| Standard Dev.      | 0.9755 | 0.3338 | 0.6630 | 0.09885 |          |
| Coeff. of Var. [%] | 8.287  | 1.738  | 2.261  | 11.03   |          |
| Min.               | 9.316  | 18.66  | 27.85  | 0.8096  | 0.006878 |
| Max.               | 12.93  | 19.90  | 30.80  | 1.230   | 0.007347 |
| Number of Spec.    | 18     | 18     | 18     | 18      | 18       |



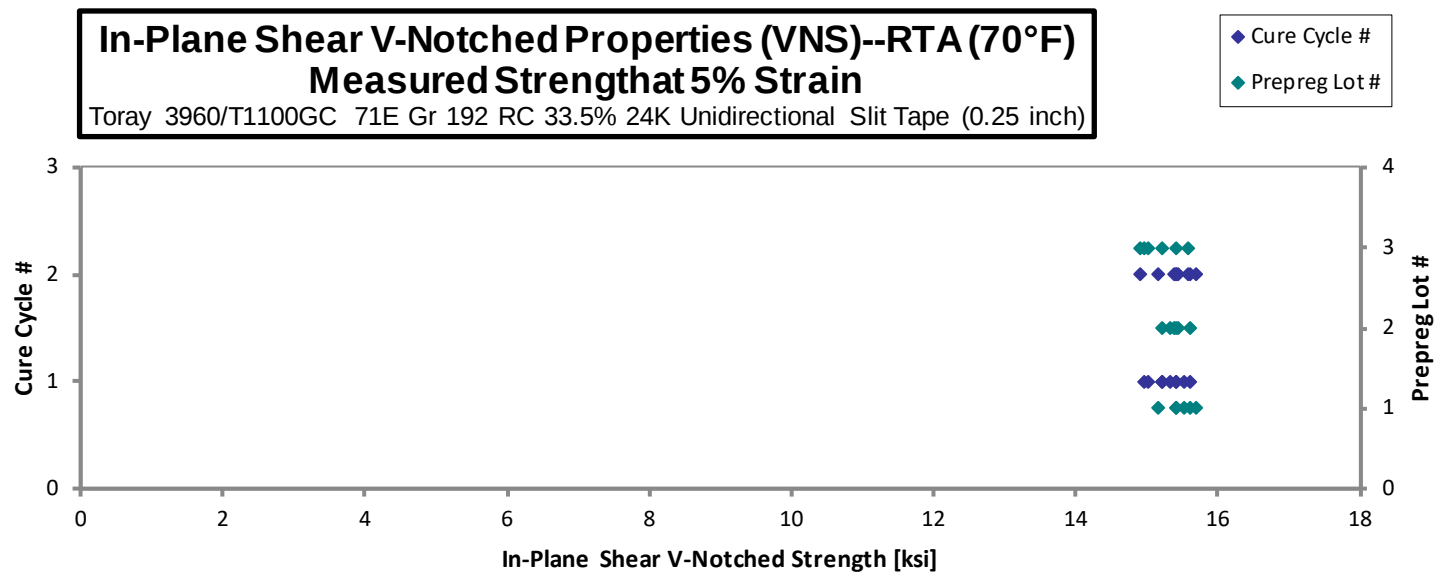
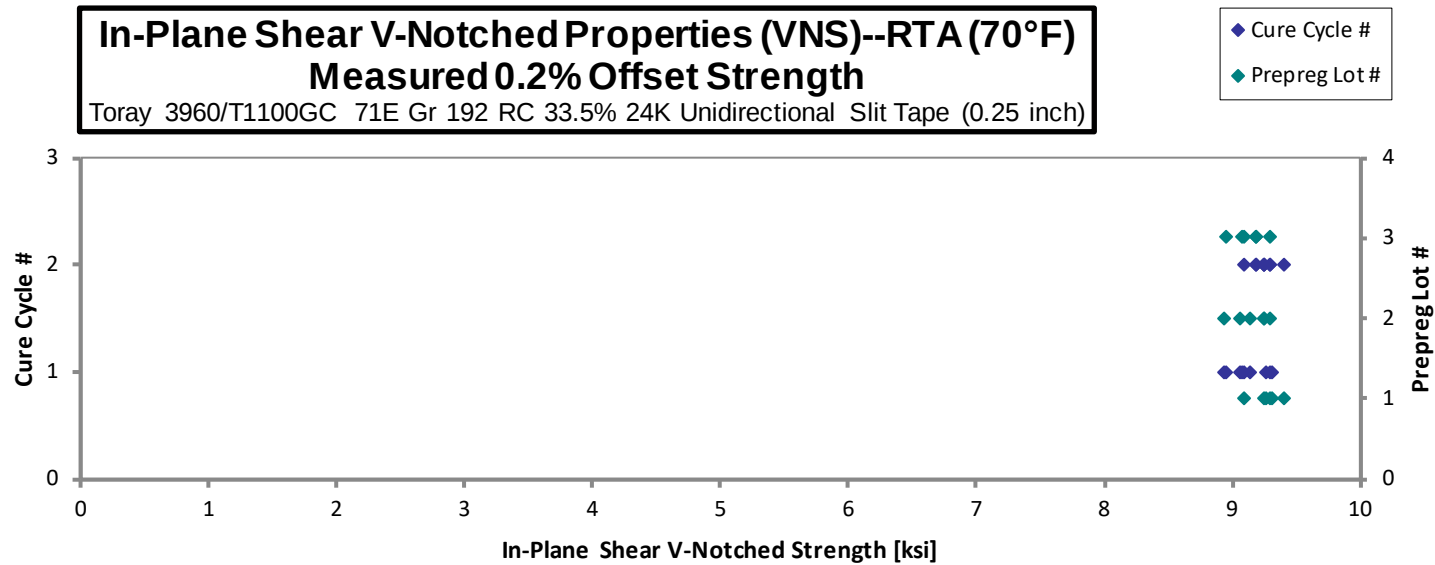


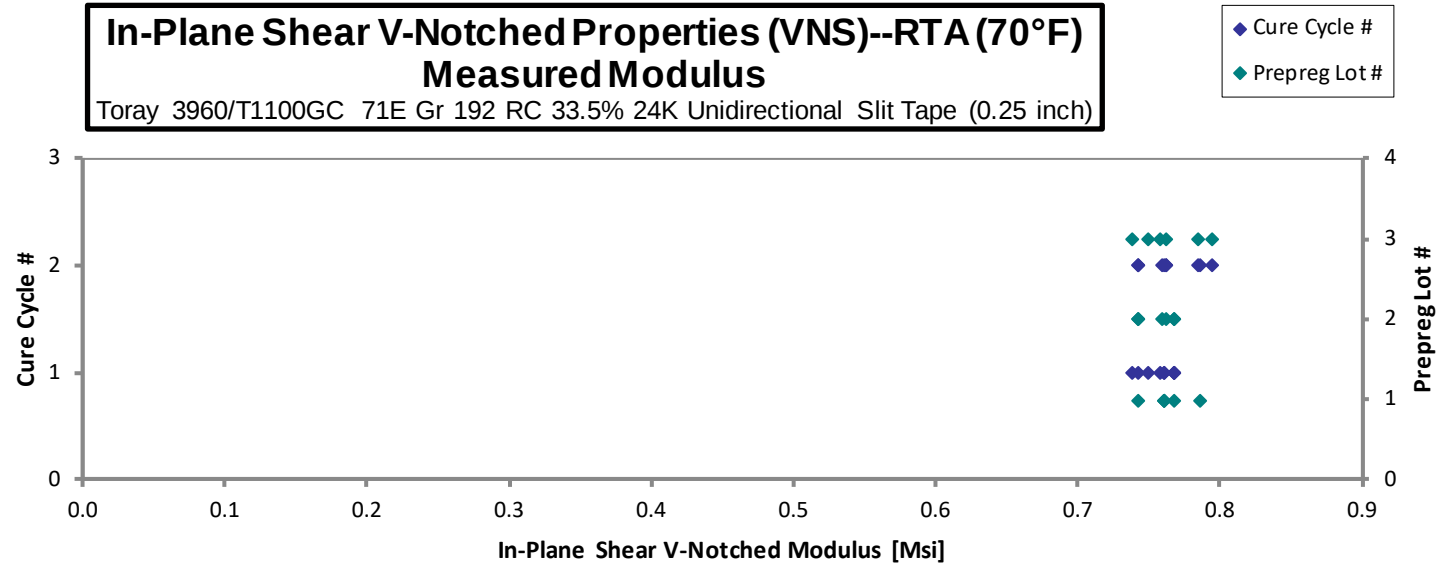
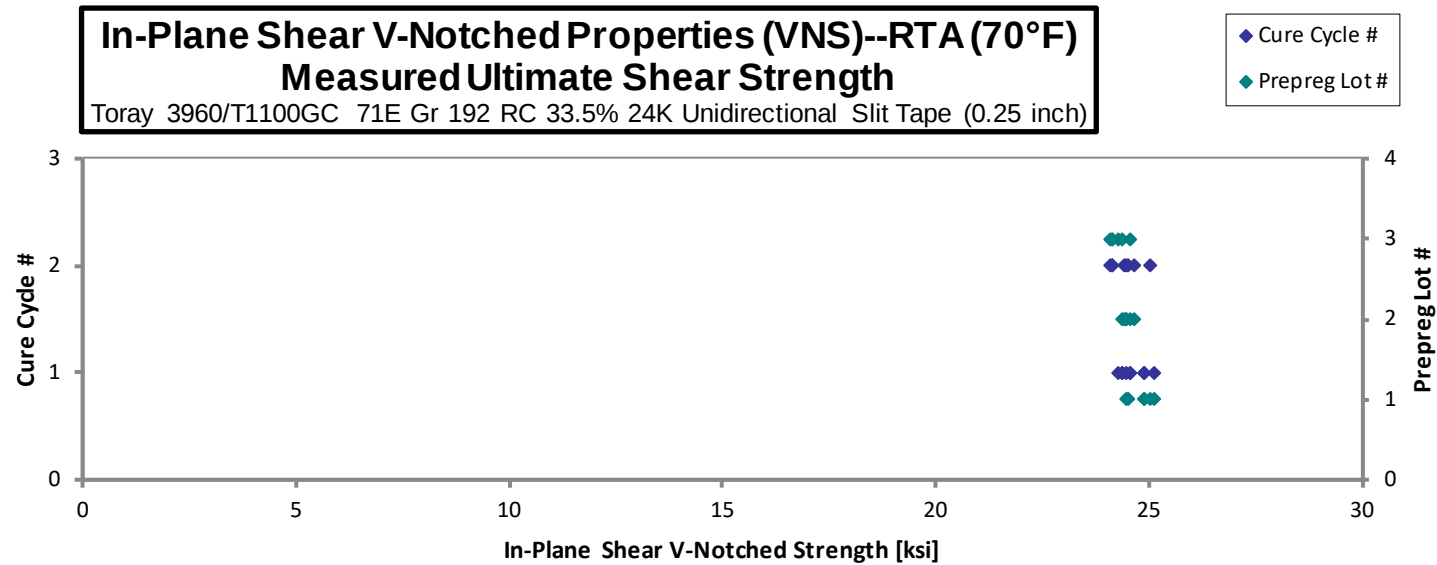
**In-Plane Shear V-Notched Properties (VNS)--RTA (70°F)****Strength & Modulus**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

| Specimen Number                                 | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | 0.2% Offset Strength [ksi] | Strength at 5% Strain [ksi] | Ultimate Shear Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Avg. $t_{ply}$ [in] | Failure Mode |
|-------------------------------------------------|---------------|-----------------|---------------|--------------|----------------------------|-----------------------------|-------------------------------|---------------|------------------------------|---------------------|---------------------|--------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-A-C1-1-VNS-RTA-1 | A             | C1              | 1             | 1            | 9.306                      | 15.40                       | 24.89                         | 0.7610        | 0.1382                       | 20                  | 0.006911            | HGN          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-A-C1-1-VNS-RTA-2 | A             | C1              | 1             | 1            | 9.300                      | 15.60                       | 25.12                         | 0.7603        | 0.1376                       | 20                  | 0.006882            | HGN          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-A-C1-1-VNS-RTA-3 | A             | C1              | 1             | 1            | 9.270                      | 15.51                       | 24.90                         | 0.7678        | 0.1371                       | 20                  | 0.006853            | HGN          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-A-C2-1-VNS-RTA-1 | A             | C2              | 1             | 2            | 9.242                      | 15.42                       | 25.05                         | 0.7610        | 0.1417                       | 20                  | 0.007086            | HGN          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-A-C2-1-VNS-RTA-2 | A             | C2              | 1             | 2            | 9.408                      | 15.68                       | 24.52                         | 0.7857        | 0.1399                       | 20                  | 0.006995            | HGN          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-A-C2-1-VNS-RTA-3 | A             | C2              | 1             | 2            | 9.092                      | 15.16                       | 24.47                         | 0.7431        | 0.1424                       | 20                  | 0.007121            | HGN          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-B-C1-1-VNS-RTA-1 | B             | C1              | 2             | 1            | 9.132                      | 15.40                       | 24.46                         | 0.7677        | 0.1395                       | 20                  | 0.006974            | M(V,H)GN     |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-B-C1-1-VNS-RTA-2 | B             | C1              | 2             | 1            | 8.929                      | 15.32                       | 24.37                         | 0.7672        | 0.1403                       | 20                  | 0.007017            | M(V,H)GN     |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-B-C1-1-VNS-RTA-3 | B             | C1              | 2             | 1            | 9.068                      | 15.20                       | 24.56                         | 0.7431        | 0.1416                       | 20                  | 0.007078            | M(V,H)GN     |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-B-C2-1-VNS-RTA-1 | B             | C2              | 2             | 2            | 9.253                      | 15.38                       | 24.48                         | 0.7620        | 0.1414                       | 20                  | 0.007071            | HGN          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-B-C2-1-VNS-RTA-2 | B             | C2              | 2             | 2            | 9.292                      | 15.60                       | 24.43                         | 0.7594        | 0.1412                       | 20                  | 0.007058            | HGN          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-B-C2-1-VNS-RTA-3 | B             | C2              | 2             | 2            | 9.251                      | 15.43                       | 24.64                         | 0.7425        | 0.1411                       | 20                  | 0.007057            | HGN          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-C-C1-1-VNS-RTA-1 | C             | C1              | 3             | 1            | 9.094                      | 15.22                       | 24.55                         | 0.7498        | 0.1413                       | 20                  | 0.007064            | HGN          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-C-C1-1-VNS-RTA-2 | C             | C1              | 3             | 1            | 9.083                      | 15.02                       | 24.29                         | 0.7580        | 0.1423                       | 20                  | 0.007114            | HGN          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-C-C1-1-VNS-RTA-3 | C             | C1              | 3             | 1            | 8.945                      | 14.96                       | 24.39                         | 0.7386        | 0.1456                       | 20                  | 0.007280            | HGN          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-C-C2-1-VNS-RTA-1 | C             | C2              | 3             | 2            | 9.294                      | 15.59                       | 24.08                         | 0.7847        | 0.1391                       | 20                  | 0.006953            | HGN          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-C-C2-1-VNS-RTA-2 | C             | C2              | 3             | 2            | 9.189                      | 15.42                       | 24.15                         | 0.7938        | 0.1401                       | 20                  | 0.007007            | HGN          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-C-C2-1-VNS-RTA-3 | C             | C2              | 3             | 2            | 9.185                      | 14.90                       | 24.14                         | 0.7617        | 0.1415                       | 20                  | 0.007075            | HGN          |

|                    |        |        |        |         |          |
|--------------------|--------|--------|--------|---------|----------|
| Average            | 9.185  | 15.35  | 24.53  | 0.7615  | 0.007033 |
| Standard Dev.      | 0.1300 | 0.2266 | 0.2990 | 0.01533 |          |
| Coeff. of Var. [%] | 1.415  | 1.477  | 1.219  | 2.013   |          |
| Min.               | 8.929  | 14.90  | 24.08  | 0.7386  | 0.006853 |
| Max.               | 9.408  | 15.68  | 25.12  | 0.7938  | 0.007280 |
| Number of Spec.    | 18     | 18     | 18     | 18      | 18       |





January 2, 2026

CAM-RP-2023-002 Rev B

**In-Plane Shear V-Notched Properties (VNS)--ETW1 (180°F)  
Strength & Modulus**

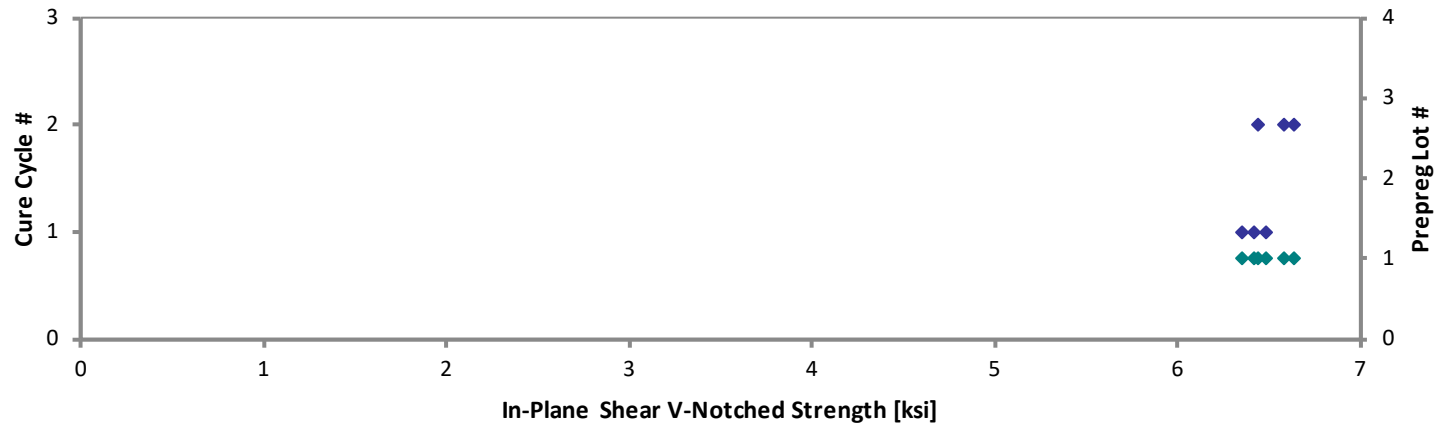
Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

| Specimen Number                                  | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | 0.2% Offset Strength [ksi] | Strength at 5% Strain [ksi] | Ultimate Shear Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Avg. $t_{ply}$ [in] | Failure Mode |
|--------------------------------------------------|---------------|-----------------|---------------|--------------|----------------------------|-----------------------------|-------------------------------|---------------|------------------------------|---------------------|---------------------|--------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-A-C1-1-VNS-ETW1-1 | A             | C1              | 1             | 1            | 6.488                      | 9.984                       | 16.56                         | 0.5670        | 0.1374                       | 20                  | 0.006870            | M(V,H)GN     |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-A-C1-1-VNS-ETW1-2 | A             | C1              | 1             | 1            | 6.358                      | 9.795                       | 16.48                         | 0.5614        | 0.1395                       | 20                  | 0.006975            | M(V,H)GN     |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-A-C1-1-VNS-ETW1-3 | A             | C1              | 1             | 1            | 6.420                      | 10.00                       | 16.60                         | 0.5723        | 0.1393                       | 20                  | 0.006964            | M(V,H)GN     |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-A-C2-1-VNS-ETW1-1 | A             | C2              | 1             | 2            | 6.444                      | 10.19                       | 16.61                         | 0.5860        | 0.1400                       | 20                  | 0.006999            | M(V,H)GN     |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-A-C2-1-VNS-ETW1-2 | A             | C2              | 1             | 2            | 6.641                      | 10.23                       | 16.85                         | 0.5559        | 0.1397                       | 20                  | 0.006985            | M(V,H)GN     |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-A-C2-1-VNS-ETW1-3 | A             | C2              | 1             | 2            | 6.588                      | 10.30                       | 17.20                         | 0.5830        | 0.1404                       | 20                  | 0.007019            | M(V,H)GN     |

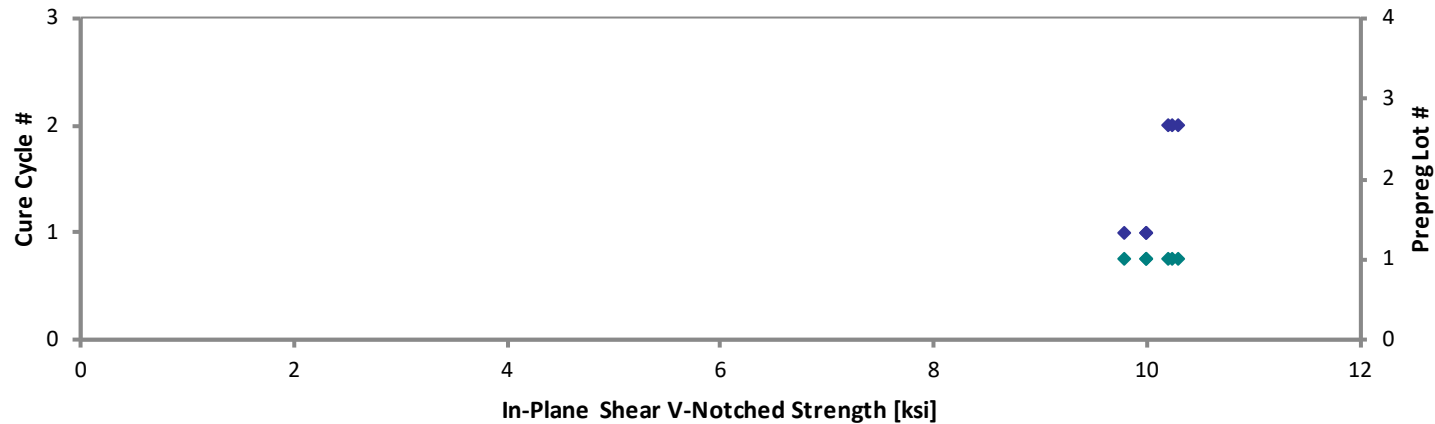
|                    |        |        |        |         |          |
|--------------------|--------|--------|--------|---------|----------|
| Average            | 6.490  | 10.08  | 16.72  | 0.5709  | 0.006969 |
| Standard Dev.      | 0.1067 | 0.1901 | 0.2670 | 0.01188 |          |
| Coeff. of Var. [%] | 1.644  | 1.885  | 1.597  | 2.081   |          |
| Min.               | 6.358  | 9.795  | 16.48  | 0.5559  | 0.006870 |
| Max.               | 6.641  | 10.30  | 17.20  | 0.5860  | 0.007019 |
| Number of Spec.    | 6      | 6      | 6      | 6       | 6        |

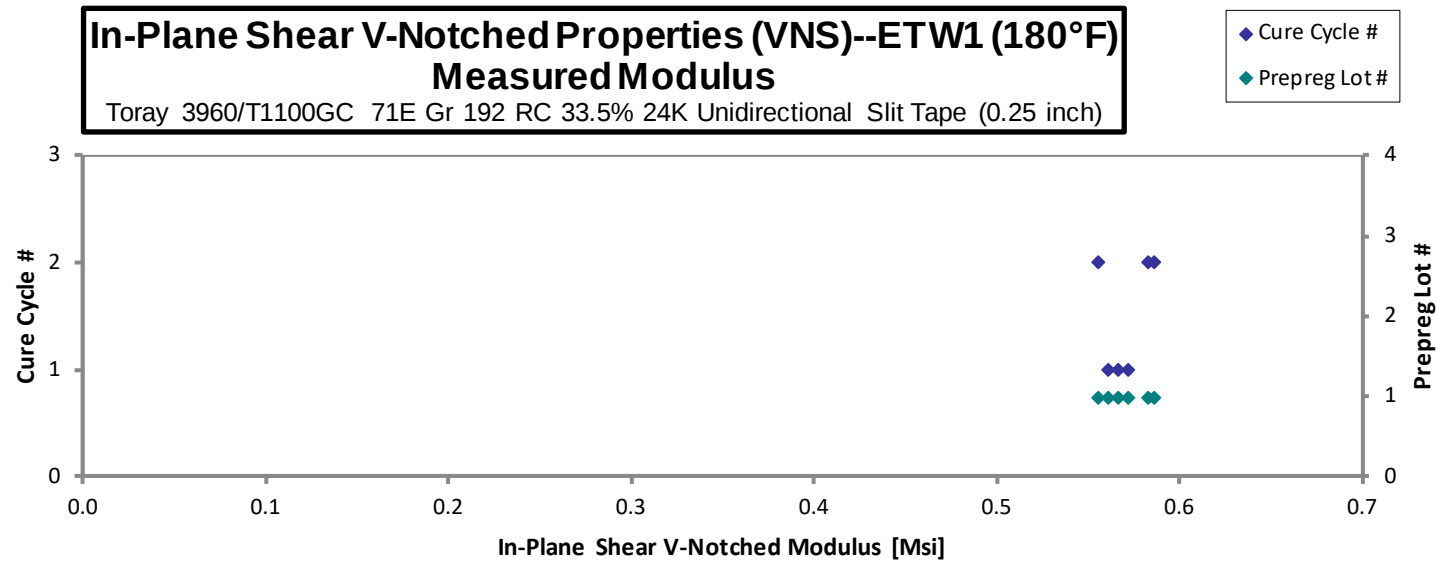
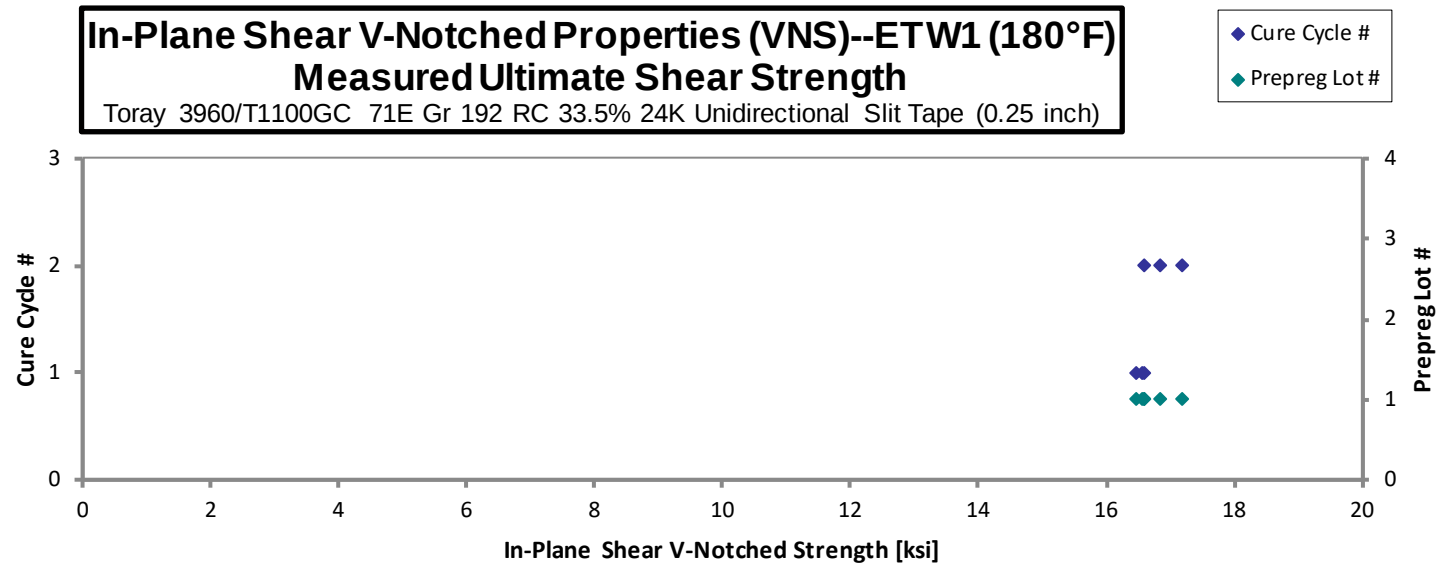
**In-Plane Shear V-Notched Properties (VNS)--ETW1 (180°F)  
Measured 0.2% Offset Strength**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

**In-Plane Shear V-Notched Properties (VNS)--ETW1 (180°F)  
Measured Strength at 5% Strain**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)



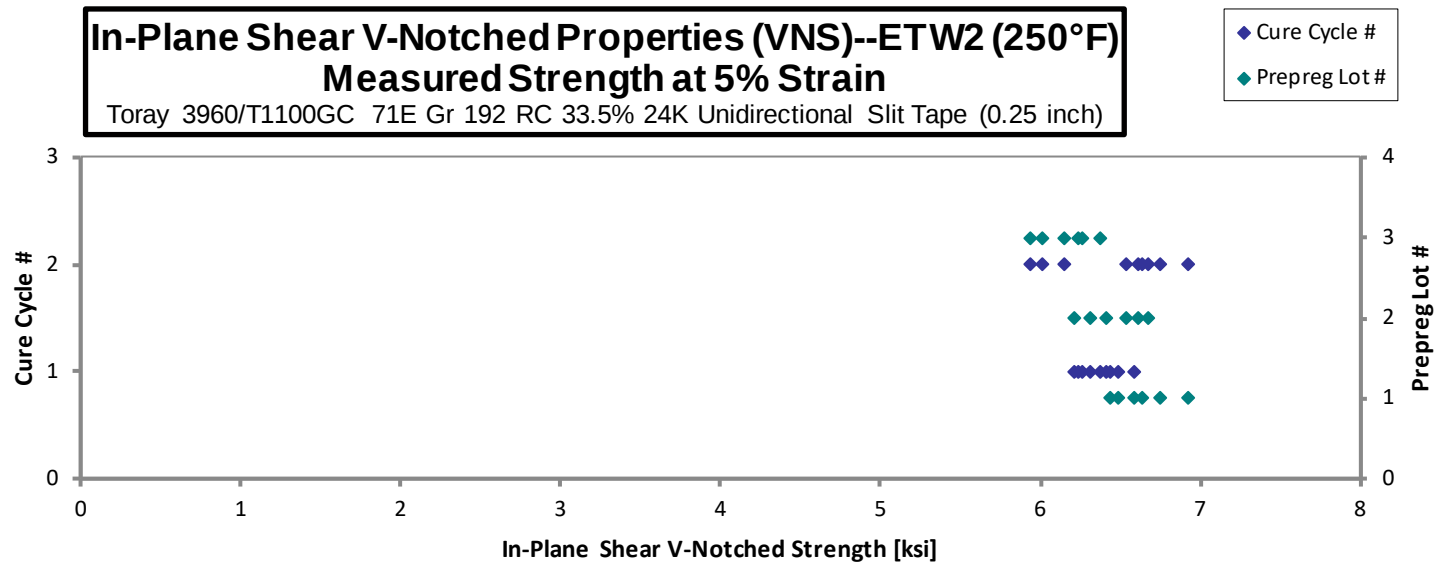
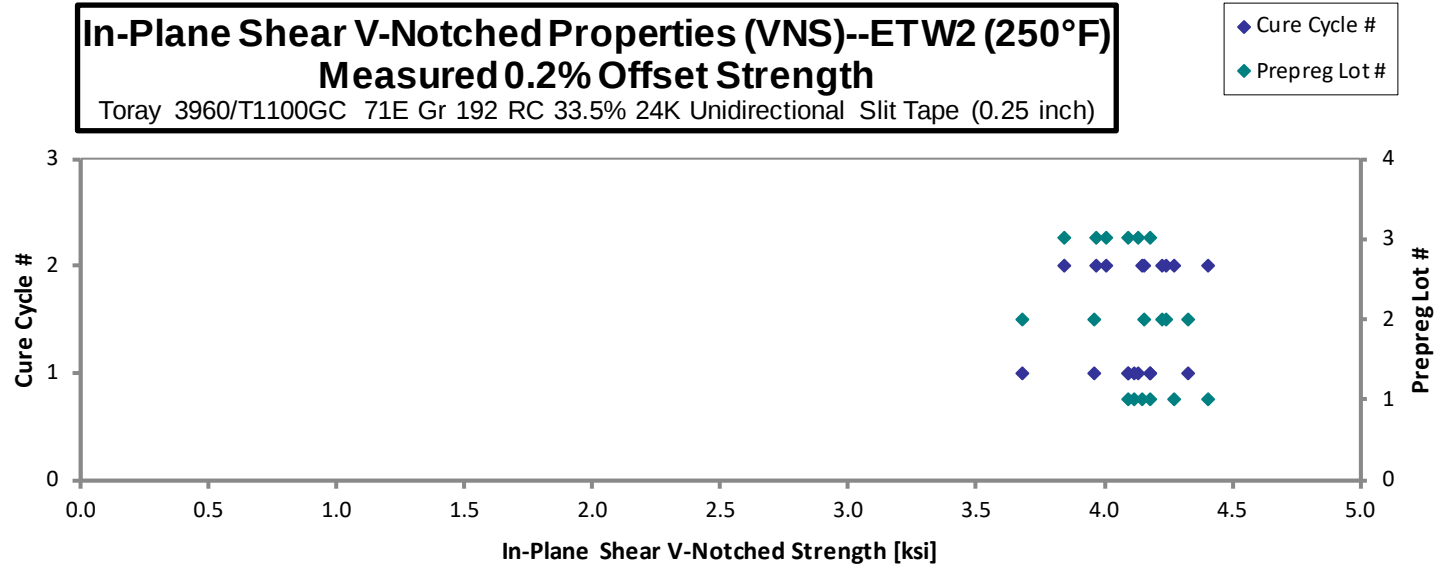


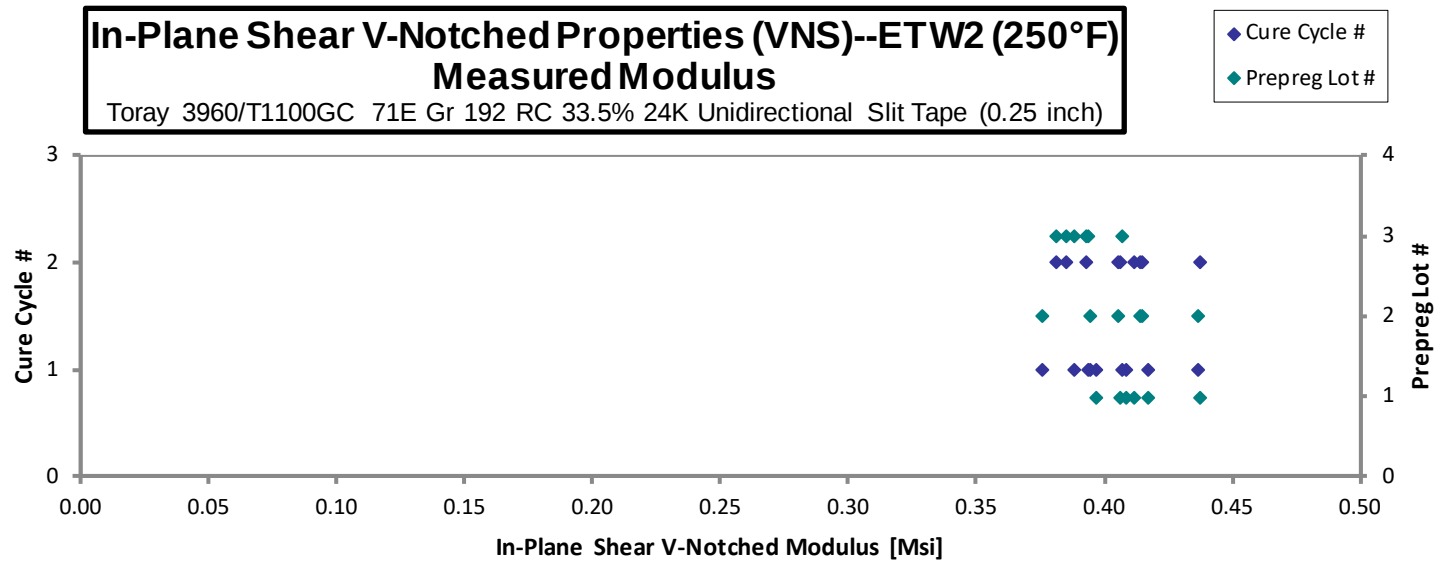
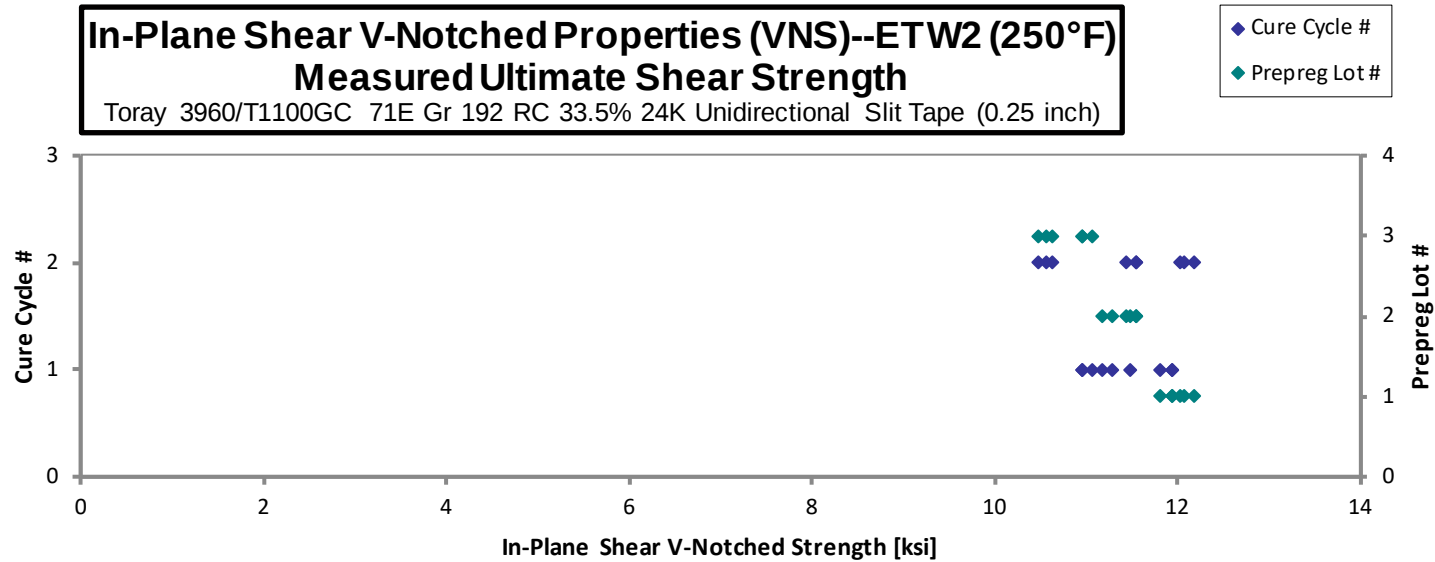
**In-Plane Shear V-Notched Properties (VNS)--ETW2 (250°F)****Strength & Modulus**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

| Specimen Number                                  | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | 0.2% Offset Strength [ksi] | Strength at 5% Strain [ksi] | Ultimate Shear Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Avg. $t_{ply}$ [in] | Failure Mode |
|--------------------------------------------------|---------------|-----------------|---------------|--------------|----------------------------|-----------------------------|-------------------------------|---------------|------------------------------|---------------------|---------------------|--------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-A-C1-1-VNS-ETW2-1 | A             | C1              | 1             | 1            | 4.097                      | 6.488                       | 11.95                         | 0.4085        | 0.1370                       | 20                  | 0.006848            | M(V,H)GN     |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-A-C1-1-VNS-ETW2-2 | A             | C1              | 1             | 1            | 4.114                      | 6.441                       | 11.82                         | 0.3968        | 0.1376                       | 20                  | 0.006880            | M(V,H)GN     |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-A-C1-1-VNS-ETW2-3 | A             | C1              | 1             | 1            | 4.177                      | 6.584                       | 11.94                         | 0.4169        | 0.1381                       | 20                  | 0.006906            | M(V,H)GN     |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-A-C2-1-VNS-ETW2-1 | A             | C2              | 1             | 2            | 4.151                      | 6.637                       | 12.02                         | 0.4064        | 0.1410                       | 20                  | 0.007048            | M(V,H)GN     |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-A-C2-1-VNS-ETW2-2 | A             | C2              | 1             | 2            | 4.270                      | 6.749                       | 12.08                         | 0.4114        | 0.1419                       | 20                  | 0.007097            | M(V,H)GN     |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-A-C2-1-VNS-ETW2-3 | A             | C2              | 1             | 2            | 4.402                      | 6.924                       | 12.19                         | 0.4372        | 0.1393                       | 20                  | 0.006963            | M(V,H)GN     |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-B-C1-1-VNS-ETW2-1 | B             | C1              | 2             | 1            | 4.325                      | 6.414                       | 11.47                         | 0.3761        | 0.1394                       | 20                  | 0.006971            | M(V,H)GN     |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-B-C1-1-VNS-ETW2-2 | B             | C1              | 2             | 1            | 3.678                      | 6.206                       | 11.29                         | 0.4365        | 0.1392                       | 20                  | 0.006962            | M(V,H)GN     |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-B-C1-1-VNS-ETW2-3 | B             | C1              | 2             | 1            | 3.964                      | 6.308                       | 11.17                         | 0.3942        | 0.1399                       | 20                  | 0.006993            | M(V,H)GN     |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-B-C2-1-VNS-ETW2-1 | B             | C2              | 2             | 2            | 4.227                      | 6.617                       | 11.55                         | 0.4145        | 0.1407                       | 20                  | 0.007036            | M(V,H)GN     |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-B-C2-1-VNS-ETW2-2 | B             | C2              | 2             | 2            | 4.244                      | 6.676                       | 11.44                         | 0.4056        | 0.1411                       | 20                  | 0.007057            | M(V,H)GN     |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-B-C2-1-VNS-ETW2-3 | B             | C2              | 2             | 2            | 4.158                      | 6.541                       | 11.54                         | 0.4137        | 0.1414                       | 20                  | 0.007072            | M(V,H)GN     |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-C-C1-1-VNS-ETW2-1 | C             | C1              | 3             | 1            | 4.096                      | 6.377                       | 10.96                         | 0.4067        | 0.1432                       | 20                  | 0.007161            | M(V,H)GN     |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-C-C1-1-VNS-ETW2-2 | C             | C1              | 3             | 1            | 4.181                      | 6.234                       | 10.96                         | 0.3881        | 0.1420                       | 20                  | 0.007099            | M(V,H)GN     |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-C-C1-1-VNS-ETW2-3 | C             | C1              | 3             | 1            | 4.135                      | 6.260                       | 11.07                         | 0.3935        | 0.1417                       | 20                  | 0.007083            | M(V,H)GN     |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-C-C2-1-VNS-ETW2-1 | C             | C2              | 3             | 2            | 4.011                      | 6.147                       | 10.63                         | 0.3933        | 0.1399                       | 20                  | 0.006996            | M(V,H)GN     |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-C-C2-1-VNS-ETW2-2 | C             | C2              | 3             | 2            | 3.969                      | 6.011                       | 10.57                         | 0.3848        | 0.1392                       | 20                  | 0.006958            | M(V,H)GN     |
| NTP3963Q1-TC-WEB-NIAR-T01-MST4-C-C2-1-VNS-ETW2-3 | C             | C2              | 3             | 2            | 3.844                      | 5.942                       | 10.47                         | 0.3810        | 0.1398                       | 20                  | 0.006989            | M(V,H)GN     |

|                    |        |        |        |         |          |
|--------------------|--------|--------|--------|---------|----------|
| Average            | 4.113  | 6.420  | 11.39  | 0.4036  | 0.007006 |
| Standard Dev.      | 0.1734 | 0.2602 | 0.5422 | 0.01701 |          |
| Coeff. of Var. [%] | 4.216  | 4.052  | 4.758  | 4.214   |          |
| Min.               | 3.678  | 5.942  | 10.47  | 0.3761  | 0.006848 |
| Max.               | 4.402  | 6.924  | 12.19  | 0.4372  | 0.007161 |
| Number of Spec.    | 18     | 18     | 18     | 18      | 18       |





## 4.8 “25/50/25” Unnotched Tension 1 Properties (UNT1)

**Laminate Unnotched Tension Properties (UNT1)--CTA (-65°F)**  
**Strength & Modulus**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

t<sub>ply</sub> [in]

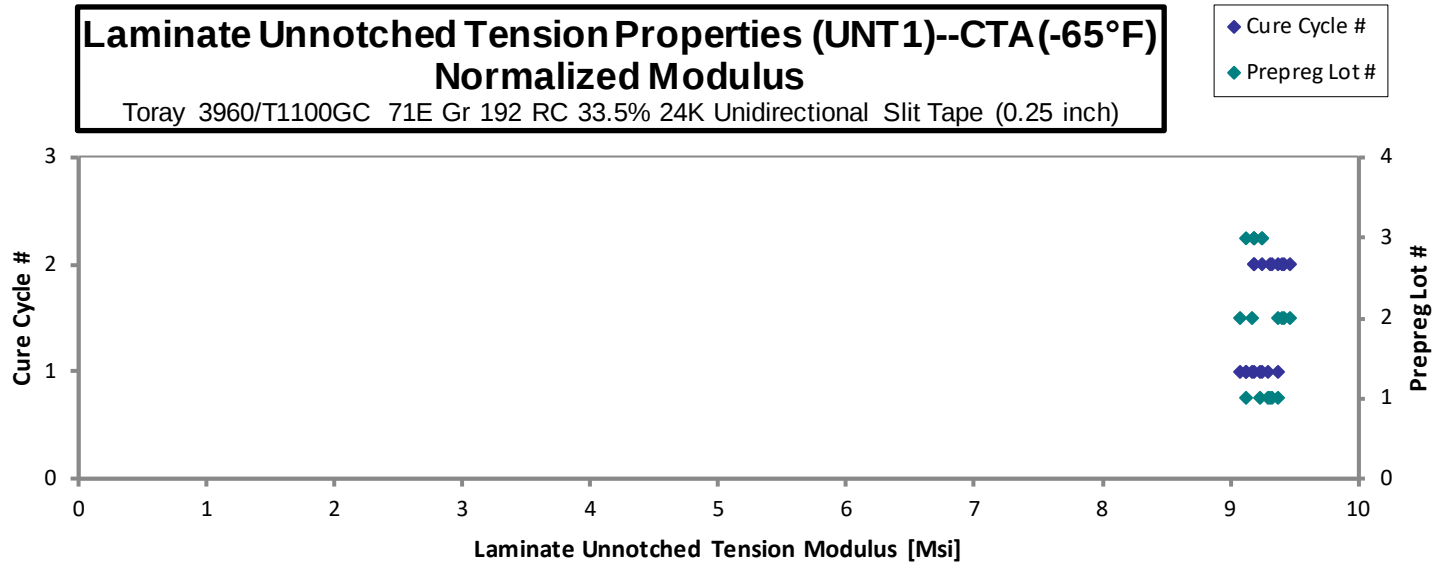
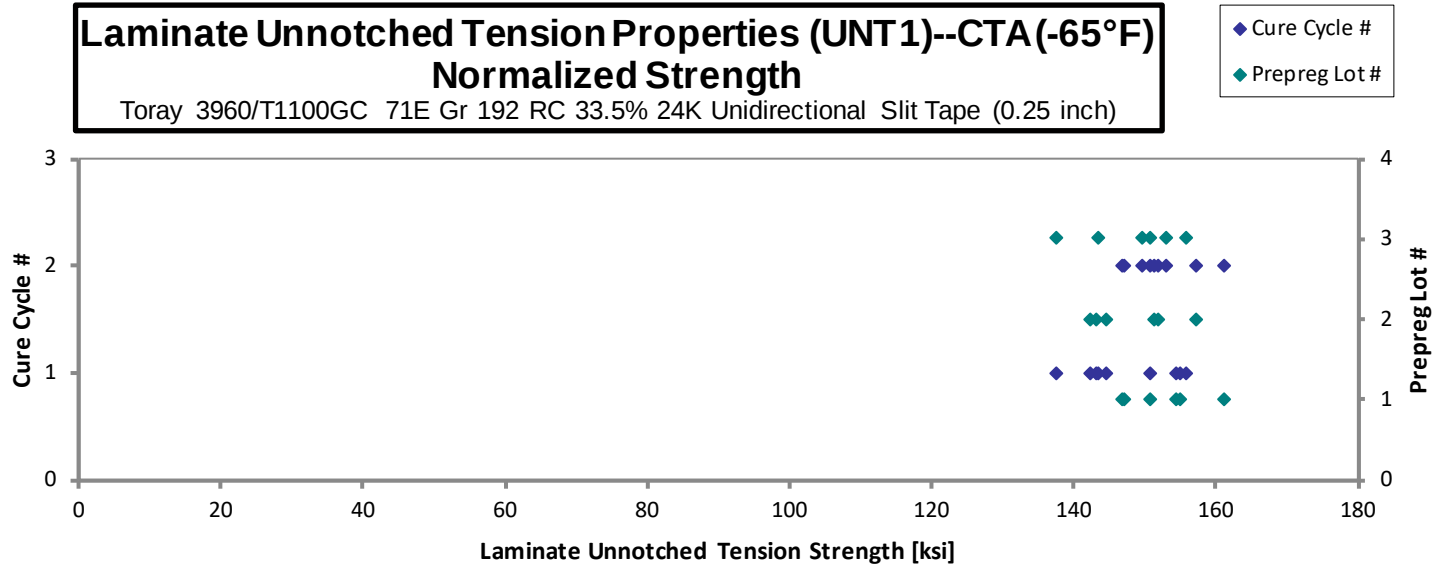
0.007000

| Specimen Number                                  | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode  |
|--------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|---------------|------------------------------|---------------------|---------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-UNT1-CTA-1 | A             | C1              | 1             | 1            | 154.5          | 9.248         | 0.1119                       | 16                  | AGB, M(A,L)WT |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-UNT1-CTA-2 | A             | C1              | 1             | 1            | 151.4          | 9.162         | 0.1115                       | 16                  | AGB, AAT      |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-UNT1-CTA-3 | A             | C1              | 1             | 1            | 154.7          | 9.296         | 0.1121                       | 16                  | AWB, AAT      |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-UNT1-CTA-1 | A             | C2              | 1             | 2            | 146.6          | 9.292         | 0.1122                       | 16                  | AAB, AAT      |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-UNT1-CTA-2 | A             | C2              | 1             | 2            | 147.5          | 9.355         | 0.1117                       | 16                  | AWB, M(A,L)WT |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-UNT1-CTA-3 | A             | C2              | 1             | 2            | 161.4          | 9.406         | 0.1117                       | 16                  | AGT, AAB      |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C1-1-UNT1-CTA-1 | B             | C1              | 2             | 1            | 143.6          | 9.202         | 0.1117                       | 16                  | AGB           |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C1-1-UNT1-CTA-2 | B             | C1              | 2             | 1            | 142.8          | 9.115         | 0.1116                       | 16                  | AGB, M(A,L)WT |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C1-1-UNT1-CTA-3 | B             | C1              | 2             | 1            | 145.1          | 9.408         | 0.1117                       | 16                  | AGT, LWB      |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C2-1-UNT1-CTA-1 | B             | C2              | 2             | 2            | 151.7          | 9.406         | 0.1122                       | 16                  | AWT, M(A,L)AB |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C2-1-UNT1-CTA-2 | B             | C2              | 2             | 2            | 151.2          | 9.385         | 0.1122                       | 16                  | AGM           |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C2-1-UNT1-CTA-3 | B             | C2              | 2             | 2            | 156.5          | 9.426         | 0.1125                       | 16                  | AGM           |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C1-1-UNT1-CTA-1 | C             | C1              | 3             | 1            | 136.1          | 9.037         | 0.1131                       | 16                  | AWT, M(A,L)WB |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C1-1-UNT1-CTA-2 | C             | C1              | 3             | 1            | 142.1          | 9.162         | 0.1130                       | 16                  | AGM, AAT      |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C1-1-UNT1-CTA-3 | C             | C1              | 3             | 1            | 154.4          | 9.099         | 0.1131                       | 16                  | AWT, M(A,L)WB |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C2-1-UNT1-CTA-1 | C             | C2              | 3             | 2            | 149.1          | 9.221         | 0.1123                       | 16                  | M(A,L)WB, AWT |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C2-1-UNT1-CTA-2 | C             | C2              | 3             | 2            | 152.3          | 9.160         | 0.1124                       | 16                  | AGM, M(A,L)AB |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C2-1-UNT1-CTA-3 | C             | C2              | 3             | 2            | 150.5          | 9.178         | 0.1122                       | 16                  | AWB           |

| Avg. t <sub>ply</sub> [in] | Strength <sub>norm</sub> [ksi] | Modulus <sub>norm</sub> [Msi] |
|----------------------------|--------------------------------|-------------------------------|
| 0.006993                   | 154.3                          | 9.238                         |
| 0.006967                   | 150.7                          | 9.118                         |
| 0.007004                   | 154.8                          | 9.302                         |
| 0.007011                   | 146.9                          | 9.307                         |
| 0.006980                   | 147.1                          | 9.329                         |
| 0.006980                   | 161.0                          | 9.379                         |
| 0.006981                   | 143.2                          | 9.177                         |
| 0.006973                   | 142.3                          | 9.080                         |
| 0.006978                   | 144.7                          | 9.379                         |
| 0.007010                   | 151.9                          | 9.420                         |
| 0.007010                   | 151.4                          | 9.399                         |
| 0.007032                   | 157.2                          | 9.469                         |
| 0.007067                   | 137.4                          | 9.123                         |
| 0.007065                   | 143.4                          | 9.246                         |
| 0.007066                   | 155.9                          | 9.184                         |
| 0.007018                   | 149.5                          | 9.245                         |
| 0.007024                   | 152.8                          | 9.191                         |
| 0.007009                   | 150.7                          | 9.190                         |

Average 149.5 9.253  
Standard Dev. 6.095 0.1226  
Coeff. of Var. [%] 4.076 1.325  
Min. 136.1 9.037  
Max. 161.4 9.426  
Number of Spec. 18 18

Average<sub>norm</sub> 0.007009 149.7 9.265  
Standard Dev.<sub>norm</sub> 6.018 0.1136  
Coeff. of Var. [%]<sub>norm</sub> 4.019 1.226  
Min. 0.006967 137.4 9.080  
Max. 0.007067 161.0 9.469  
Number of Spec. 18 18 18



**Laminate Unnotched Tension Properties (UNT1)--RTA (70°F)  
Strength & Modulus**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

$t_{ply}$  [in]  
0.007000

| Specimen Number                                  | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode  |
|--------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|---------------|------------------------------|---------------------|---------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-UNT1-RTA-1 | A             | C1              | 1             | 1            | 165.5          | 9.143         | 0.1119                       | 16                  | M(A,L)WB, AWT |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-UNT1-RTA-2 | A             | C1              | 1             | 1            | 160.9          | 9.237         | 0.1119                       | 16                  | AGM           |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-UNT1-RTA-3 | A             | C1              | 1             | 1            | 160.5          | 8.995         | 0.1120                       | 16                  | AGT, M(A,L)WB |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-UNT1-RTA-1 | A             | C2              | 1             | 2            | 155.3          | 9.149         | 0.1117                       | 16                  | AGM           |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-UNT1-RTA-2 | A             | C2              | 1             | 2            | 163.9          | 9.303         | 0.1117                       | 16                  | AGM, M(A,L)WB |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-UNT1-RTA-3 | A             | C2              | 1             | 2            | 158.8          | 9.132         | 0.1117                       | 16                  | AGT, LWB      |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C1-1-UNT1-RTA-1 | B             | C1              | 2             | 1            | 162.4          | 9.249         | 0.1116                       | 16                  | M(A,L)WT, AWB |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C1-1-UNT1-RTA-2 | B             | C1              | 2             | 1            | 169.4          | 9.259         | 0.1116                       | 16                  | AGB, LWT      |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C1-1-UNT1-RTA-3 | B             | C1              | 2             | 1            | 170.4          | 9.191         | 0.1114                       | 16                  | LWB, AWT      |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C2-1-UNT1-RTA-1 | B             | C2              | 2             | 2            | 164.8          | 9.226         | 0.1124                       | 16                  | AGB           |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C2-1-UNT1-RTA-2 | B             | C2              | 2             | 2            | 160.6          | 9.180         | 0.1126                       | 16                  | AWB, AWT      |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C2-1-UNT1-RTA-3 | B             | C2              | 2             | 2            | 156.9          | 9.147         | 0.1128                       | 16                  | AGT, LWB      |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C1-1-UNT1-RTA-1 | C             | C1              | 3             | 1            | 156.3          | 8.922         | 0.1132                       | 16                  | AGT           |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C1-1-UNT1-RTA-2 | C             | C1              | 3             | 1            | 171.6          | 8.963         | 0.1131                       | 16                  | AWB, LWT      |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C1-1-UNT1-RTA-3 | C             | C1              | 3             | 1            | 166.4          | 8.953         | 0.1133                       | 16                  | AWB, AWT      |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C2-1-UNT1-RTA-1 | C             | C2              | 3             | 2            | 149.4          | 8.819         | 0.1125                       | 16                  | AWB, LWT      |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C2-1-UNT1-RTA-2 | C             | C2              | 3             | 2            | 147.4          | 8.871         | 0.1123                       | 16                  | AGB, LWT      |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C2-1-UNT1-RTA-3 | C             | C2              | 3             | 2            | 155.4          | 9.170         | 0.1122                       | 16                  | M(D,A)GM      |

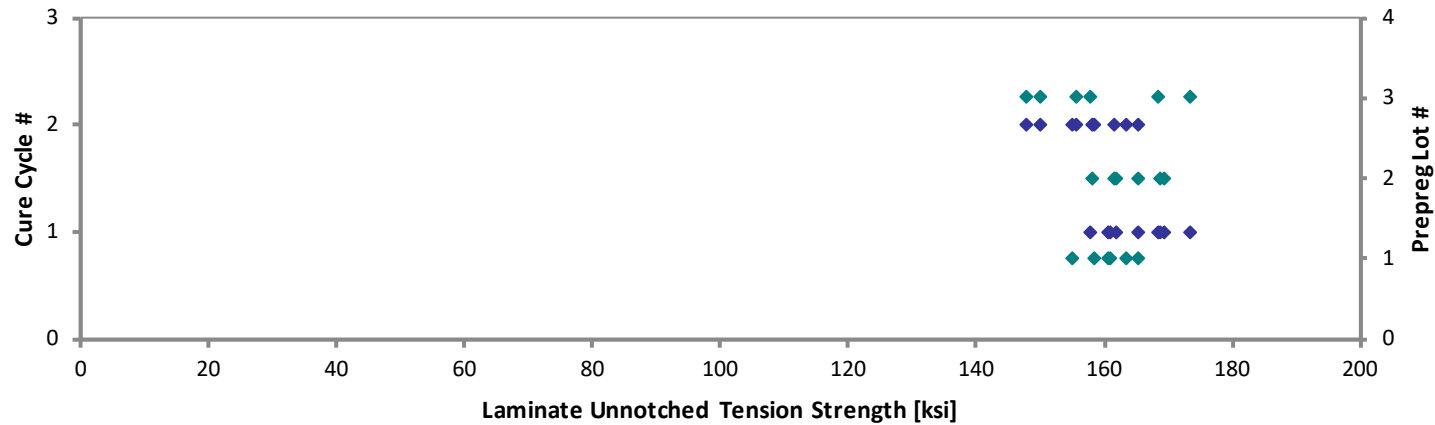
| Avg. $t_{ply}$ [in] | Strength <sub>norm</sub> [ksi] | Modulus <sub>norm</sub> [Msi] |
|---------------------|--------------------------------|-------------------------------|
| 0.006992            | 165.3                          | 9.132                         |
| 0.006995            | 160.8                          | 9.230                         |
| 0.007001            | 160.5                          | 8.996                         |
| 0.006980            | 154.9                          | 9.123                         |
| 0.006979            | 163.4                          | 9.276                         |
| 0.006978            | 158.3                          | 9.104                         |
| 0.006976            | 161.8                          | 9.218                         |
| 0.006973            | 168.8                          | 9.223                         |
| 0.006959            | 169.4                          | 9.138                         |
| 0.007024            | 165.4                          | 9.257                         |
| 0.007038            | 161.5                          | 9.229                         |
| 0.007048            | 158.0                          | 9.210                         |
| 0.007073            | 157.9                          | 9.014                         |
| 0.007071            | 173.4                          | 9.054                         |
| 0.007081            | 168.4                          | 9.057                         |
| 0.007028            | 150.0                          | 8.855                         |
| 0.007019            | 147.8                          | 8.895                         |
| 0.007015            | 155.7                          | 9.189                         |

Average 160.9 9.106  
Standard Dev. 6.751 0.1463  
Coeff. of Var. [%] 4.196 1.607  
Min. 147.4 8.819  
Max. 171.6 9.303  
Number of Spec. 18 18

Average<sub>norm</sub> 0.007013 161.2 9.122  
Standard Dev.<sub>norm</sub> 6.729 0.1228  
Coeff. of Var. [%]<sub>norm</sub> 4.175 1.347  
Min. 0.006959 147.8 8.855  
Max. 0.007081 173.4 9.276  
Number of Spec. 18 18 18

**Laminate Unnotched Tension Properties (UNT1)--RTA(70°F)  
Normalized Strength**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

**Laminate Unnotched Tension Properties (UNT1)--RTA(70°F)  
Normalized Modulus**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)



January 2, 2026

CAM-RP-2023-002 Rev B

**Laminate Unnotched Tension Properties (UNT1)--ETW1 (180°F)**  
**Strength & Modulus**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

$t_{ply}$  [in]

0.007000

| Specimen Number                                   | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode       |
|---------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|---------------|------------------------------|---------------------|--------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-UNT1-ETW1-1 | A             | C1              | 1             | 1            | 166.2          | 9.068         | 0.1117                       | 16                  | DGM, LWB, AWT      |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-UNT1-ETW1-2 | A             | C1              | 1             | 1            | 166.2          | 9.009         | 0.1119                       | 16                  | M(A,L)WT, LWB      |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-UNT1-ETW1-3 | A             | C1              | 1             | 1            | 172.5          | 9.043         | 0.1119                       | 16                  | M(A,L)GM, M(A,L)WT |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-UNT1-ETW1-1 | A             | C2              | 1             | 2            | 167.0          | 9.035         | 0.1117                       | 16                  | LWT, AWT           |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-UNT1-ETW1-2 | A             | C2              | 1             | 2            | 170.6          | 9.078         | 0.1114                       | 16                  | M(A,L)GT           |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-UNT1-ETW1-3 | A             | C2              | 1             | 2            | 165.6          | 8.950         | 0.1116                       | 16                  | M(A,L)GM, LWB      |

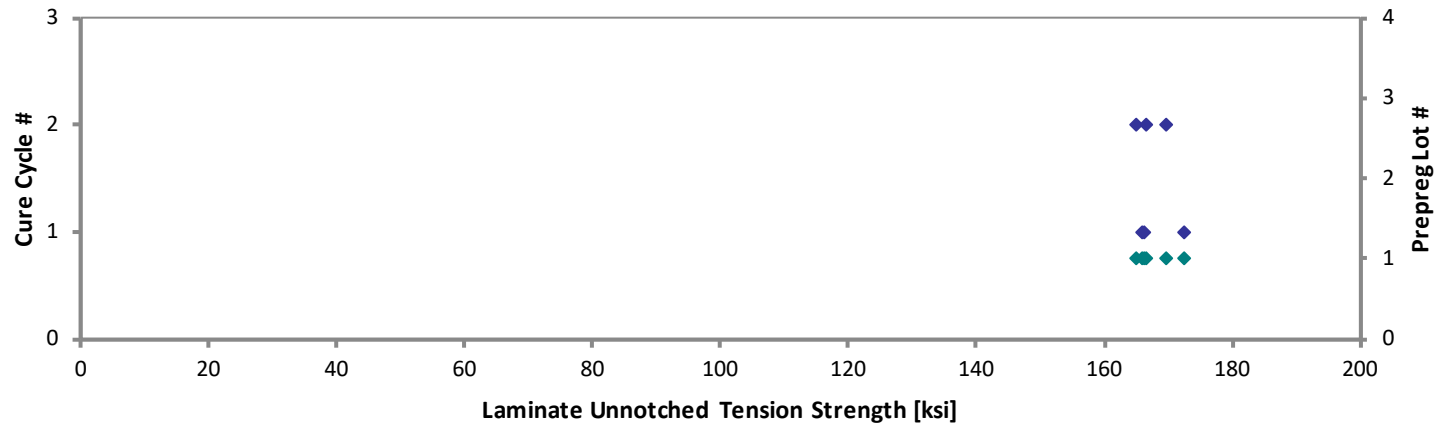
| Avg. $t_{ply}$ [in] | Strength <sub>norm</sub> [ksi] | Modulus <sub>norm</sub> [Msi] |
|---------------------|--------------------------------|-------------------------------|
| 0.006982            | 165.8                          | 9.045                         |
| 0.006995            | 166.1                          | 9.003                         |
| 0.006995            | 172.3                          | 9.037                         |
| 0.006981            | 166.5                          | 9.011                         |
| 0.006963            | 169.7                          | 9.030                         |
| 0.006975            | 165.0                          | 8.918                         |

Average 168.0 9.031  
Standard Dev. 2.830 0.04643  
Coeff. of Var. [%] 1.684 0.5141  
Min. 165.6 8.950  
Max. 172.5 9.078  
Number of Spec. 6 6

Average<sub>norm</sub> 0.006982 167.6 9.007  
Standard Dev.<sub>norm</sub> 2.841 0.04639  
Coeff. of Var. [%]<sub>norm</sub> 1.695 0.5151  
Min. 0.006963 165.0 8.918  
Max. 0.006995 172.3 9.045  
Number of Spec. 6 6 6

**Laminate Unnotched Tension Properties (UNT1)--ETW1 (180°F)  
Normalized Strength**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

**Laminate Unnotched Tension Properties (UNT1)--ETW1 (180°F)  
Normalized Modulus**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)



**Laminate Unnotched Tension Properties (UNT1)--ETW2 (250°F)  
Strength & Modulus**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

 $t_{ply} [in]$ 

0.007000

| Specimen Number                                   | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode          |
|---------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|---------------|------------------------------|---------------------|-----------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-UNT1-ETW2-1 | A             | C1              | 1             | 1            | 160.2          | 8.645         | 0.1122                       | 16                  | M(A,L)GM, LWT         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-UNT1-ETW2-2 | A             | C1              | 1             | 1            | 163.7          | 8.684         | 0.1120                       | 16                  | M(A,L)GM, M(A,L)WLB   |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-UNT1-ETW2-3 | A             | C1              | 1             | 1            | 161.4          | 8.694         | 0.1121                       | 16                  | M(A,L)GM, LWB         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-UNT1-ETW2-1 | A             | C2              | 1             | 2            | 162.0          | 8.789         | 0.1116                       | 16                  | M(A,L)GM, M(A,L)WT    |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-UNT1-ETW2-2 | A             | C2              | 1             | 2            | 165.8          | 8.838         | 0.1112                       | 16                  | M(A,L)GT              |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-UNT1-ETW2-3 | A             | C2              | 1             | 2            | 166.3          | 8.963         | 0.1120                       | 16                  | M(A,L)GM, LWT         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C1-1-UNT1-ETW2-1 | B             | C1              | 2             | 1            | 150.2          | 8.854         | 0.1110                       | 16                  | M(A,L)GT              |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C1-1-UNT1-ETW2-2 | B             | C1              | 2             | 1            | 148.5          | 8.547         | 0.1113                       | 16                  | M(D,A)GM              |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C1-1-UNT1-ETW2-3 | B             | C1              | 2             | 1            | 148.9          | 8.592         | 0.1114                       | 16                  | M(A,L)WT              |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C2-1-UNT1-ETW2-1 | B             | C2              | 2             | 2            | 157.1          | 8.559         | 0.1123                       | 16                  | M(D,A,L)GM            |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C2-1-UNT1-ETW2-2 | B             | C2              | 2             | 2            | 156.8          | 8.793         | 0.1117                       | 16                  | M(D,A,L)GM            |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C2-1-UNT1-ETW2-3 | B             | C2              | 2             | 2            | 156.2          | 8.675         | 0.1122                       | 16                  | M(D,A,L)GT, M(A,L)WLB |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C1-1-UNT1-ETW2-1 | C             | C1              | 3             | 1            | 160.1          | 8.445         | 0.1132                       | 16                  | M(A,L)WT, M(A,L)WLB   |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C1-1-UNT1-ETW2-2 | C             | C1              | 3             | 1            | 158.3          | 8.410         | 0.1135                       | 16                  | M(A,L)GB, LAT         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C1-1-UNT1-ETW2-3 | C             | C1              | 3             | 1            | 159.4          | 8.474         | 0.1133                       | 16                  | M(A,D,L)GM            |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C2-1-UNT1-ETW2-1 | C             | C2              | 3             | 2            | 158.2          | 8.296         | 0.1122                       | 16                  | M(A,L)GM, LWB         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C2-1-UNT1-ETW2-2 | C             | C2              | 3             | 2            | 159.8          | 8.466         | 0.1114                       | 16                  | M(A,L)GM              |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C2-1-UNT1-ETW2-3 | C             | C2              | 3             | 2            | 158.6          | 8.519         | 0.1122                       | 16                  | M(A,L)GB, LWT         |

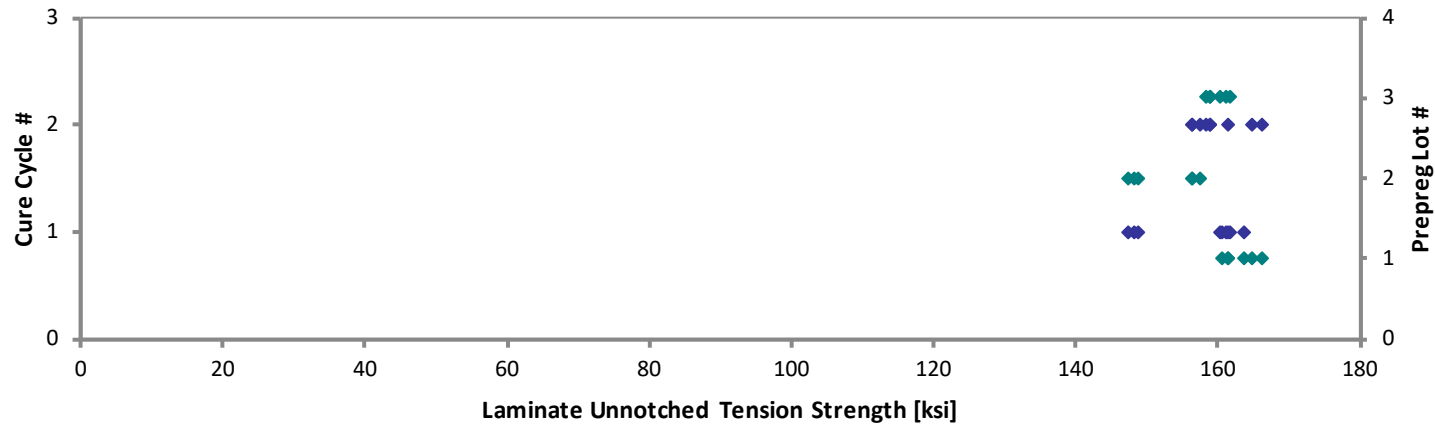
| Avg. $t_{ply} [in]$ | Strength <sub>norm</sub> [ksi] | Modulus <sub>norm</sub> [Msi] |
|---------------------|--------------------------------|-------------------------------|
| 0.007013            | 160.5                          | 8.660                         |
| 0.007002            | 163.8                          | 8.687                         |
| 0.007004            | 161.5                          | 8.700                         |
| 0.006972            | 161.4                          | 8.754                         |
| 0.006950            | 164.7                          | 8.775                         |
| 0.007001            | 166.3                          | 8.965                         |
| 0.006934            | 148.8                          | 8.771                         |
| 0.006954            | 147.5                          | 8.491                         |
| 0.006960            | 148.1                          | 8.543                         |
| 0.007016            | 157.5                          | 8.578                         |
| 0.006978            | 156.3                          | 8.765                         |
| 0.007011            | 156.4                          | 8.689                         |
| 0.007073            | 161.8                          | 8.533                         |
| 0.007091            | 160.3                          | 8.519                         |
| 0.007080            | 161.3                          | 8.571                         |
| 0.007010            | 158.4                          | 8.308                         |
| 0.006963            | 158.9                          | 8.421                         |
| 0.007013            | 158.9                          | 8.534                         |

Average 158.4 8.625  
Standard Dev. 5.102 0.1776  
Coeff. of Var. [%] 3.221 2.060  
Min. 148.5 8.296  
Max. 166.3 8.963  
Number of Spec. 18 18

Average<sub>norm</sub> 0.007001 158.5 8.626  
Standard Dev.<sub>norm</sub> 5.447 0.1553  
Coeff. of Var. [%]<sub>norm</sub> 3.438 1.800  
Min. 0.006934 147.5 8.308  
Max. 0.007091 166.3 8.965  
Number of Spec. 18 18

**Laminate Unnotched Tension Properties (UNT1)--ETW2 (250°F)  
Normalized Strength**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

**Laminate Unnotched Tension Properties (UNT1)--ETW2 (250°F)  
Normalized Modulus**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)



## 4.9 “10/80/10” Unnotched Tension 2 Properties (UNT2)

**Laminate Unnotched Tension Properties (UNT2)--CTA (-65°F)**  
**Strength & Modulus**

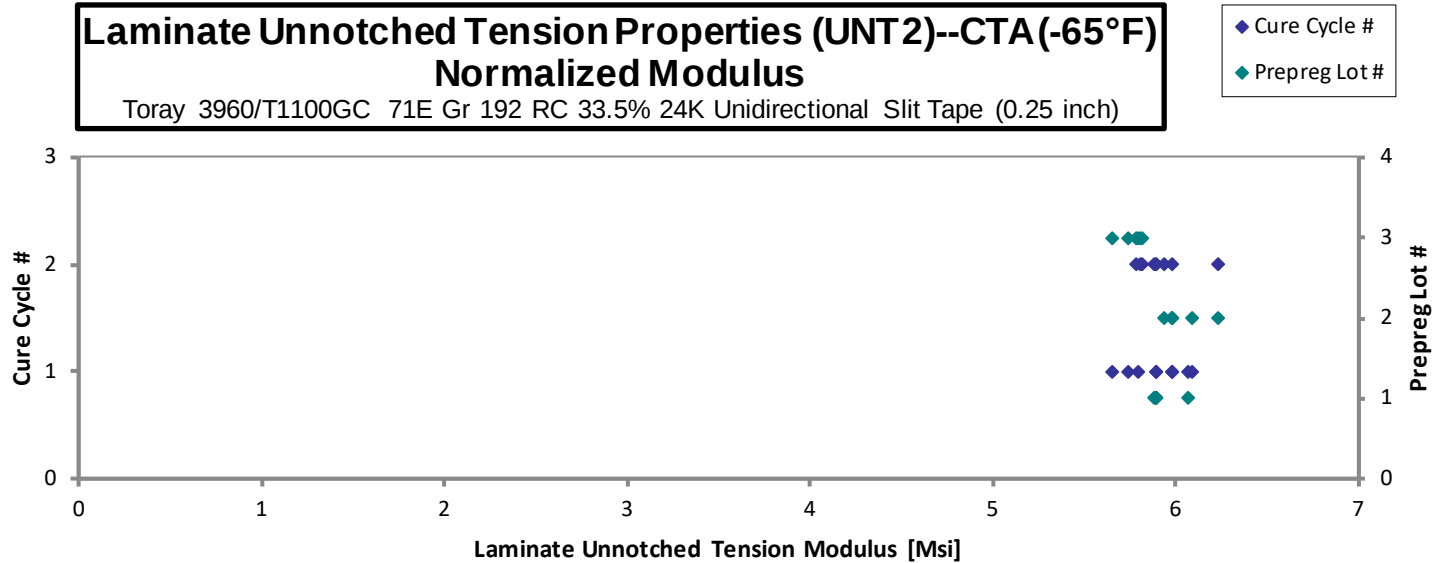
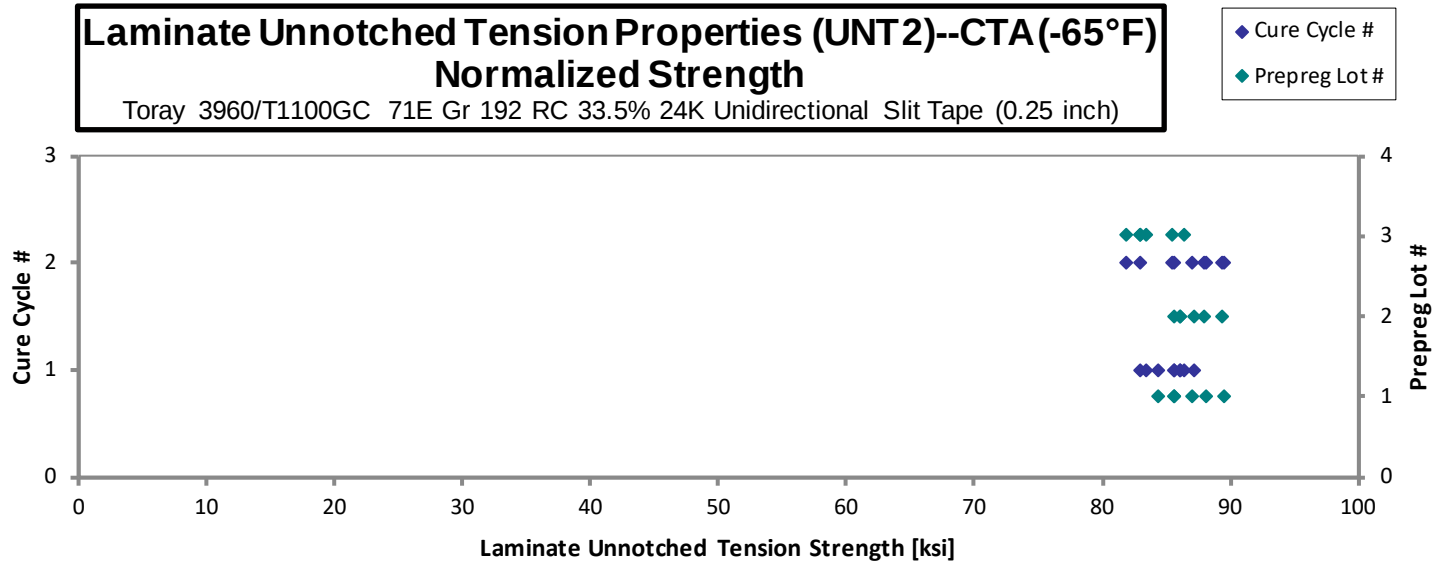
Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

 $t_{ply} [in]$ 

0.007000

| Specimen Number                                  | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in]       | # Plies in Laminate | Failure Mode | Avg. $t_{ply} [in]$ | Strength <sub>norm</sub> [ksi] | Modulus <sub>norm</sub> [Msi] |
|--------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|---------------|------------------------------------|---------------------|--------------|---------------------|--------------------------------|-------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C1-1-UNT2-CTA-1 | A             | C1              | 1             | 1            | 85.74          | 6.087         | 0.1397                             | 20                  | DGM, AGT     | 0.006984            | 85.55                          | 6.073                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C1-1-UNT2-CTA-2 | A             | C1              | 1             | 1            | 84.35          | 5.898         | 0.1400                             | 20                  | M(D,A)GM     | 0.007002            | 84.37                          | 5.899                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C1-1-UNT2-CTA-3 | A             | C1              | 1             | 1            | 85.72          | 5.896         | 0.1399                             | 20                  | DGM, AWB     | 0.006995            | 85.66                          | 5.892                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C2-1-UNT2-CTA-1 | A             | C2              | 1             | 2            | 87.28          | 5.912         | 0.1397                             | 20                  | M(D,A)WB     | 0.006985            | 87.09                          | 5.899                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C2-1-UNT2-CTA-2 | A             | C2              | 1             | 2            | 89.79          | 5.906         | 0.1395                             | 20                  | DGM, AWB     | 0.006977            | 89.50                          | 5.886                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C2-1-UNT2-CTA-3 | A             | C2              | 1             | 2            | 88.26          | 5.906         | 0.1397                             | 20                  | M(D,A)GB     | 0.006986            | 88.08                          | 5.894                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C1-1-UNT2-CTA-1 | B             | C1              | 2             | 1            | 87.14          | 6.093         | 0.1400                             | 20                  | M(D,A)WB     | 0.007000            | 87.14                          | 6.093                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C1-1-UNT2-CTA-2 | B             | C1              | 2             | 1            | 86.14          | 5.984         | 0.1398                             | 20                  | M(D,A)GB     | 0.006992            | 86.04                          | 5.977                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C1-1-UNT2-CTA-3 | B             | C1              | 2             | 1            | 85.94          | 5.976         | 0.1402                             | 20                  | DGM, AGB     | 0.007009            | 86.05                          | 5.984                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-UNT2-CTA-1 | B             | C2              | 2             | 2            | 88.09          | 5.988         | 0.1398                             | 20                  | M(D,A)WB     | 0.006988            | 87.94                          | 5.978                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-UNT2-CTA-2 | B             | C2              | 2             | 2            | 89.39          | 5.942         | 0.1400                             | 20                  | M(D,A)WB     | 0.006998            | 89.37                          | 5.940                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-UNT2-CTA-3 | B             | C2              | 2             | 2            | 85.93          | 6.255         | 0.1396                             | 20                  | M(D,A)GB     | 0.006978            | 85.66                          | 6.235                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C1-1-UNT2-CTA-1 | C             | C1              | 3             | 1            | 85.35          | 5.727         | 0.1416                             | 20                  | M(D,A)GM     | 0.007080            | 86.33                          | 5.792                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C1-1-UNT2-CTA-2 | C             | C1              | 3             | 1            | 82.52          | 5.588         | 0.1416                             | 20                  | M(D,A)GT     | 0.007078            | 83.44                          | 5.650                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C1-1-UNT2-SP-1  | C             | C1              | 3             | 1            | 82.09          | 5.681         | 0.1416                             | 20                  | M(D,A)WB     | 0.007080            | 83.03                          | 5.746                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-UNT2-CTA-1 | C             | C2              | 3             | 2            | 82.58          | 5.791         | 0.1408                             | 20                  | DGM, AWB     | 0.007038            | 83.03                          | 5.822                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-UNT2-CTA-2 | C             | C2              | 3             | 2            | 84.74          | 5.759         | 0.1413                             | 20                  | M(D,A)GM     | 0.007063            | 85.51                          | 5.811                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-UNT2-CTA-3 | C             | C2              | 3             | 2            | 81.36          | 5.755         | 0.1408                             | 20                  | M(D,A)GB     | 0.007041            | 81.84                          | 5.788                         |
| Average                                          |               |                 |               |              | 85.69          | 5.897         | Average <sub>norm</sub>            |                     |              | 0.007015            | 85.87                          | 5.909                         |
| Standard Dev.                                    |               |                 |               |              | 2.451          | 0.1625        | Standard Dev. <sub>norm</sub>      |                     |              |                     | 2.153                          | 0.1378                        |
| Coeff. of Var. [%]                               |               |                 |               |              | 2.860          | 2.756         | Coeff. of Var. [%] <sub>norm</sub> |                     |              |                     | 2.508                          | 2.333                         |
| Min.                                             |               |                 |               |              | 81.36          | 5.588         | Min.                               |                     |              | 0.006977            | 81.84                          | 5.650                         |
| Max.                                             |               |                 |               |              | 89.79          | 6.255         | Max.                               |                     |              | 0.007080            | 89.50                          | 6.235                         |
| Number of Spec.                                  |               |                 |               |              | 18             | 18            | Number of Spec.                    |                     |              | 18                  | 18                             | 18                            |



**Laminate Unnotched Tension Properties (UNT2)--RTA (70°F)**  
**Strength & Modulus**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

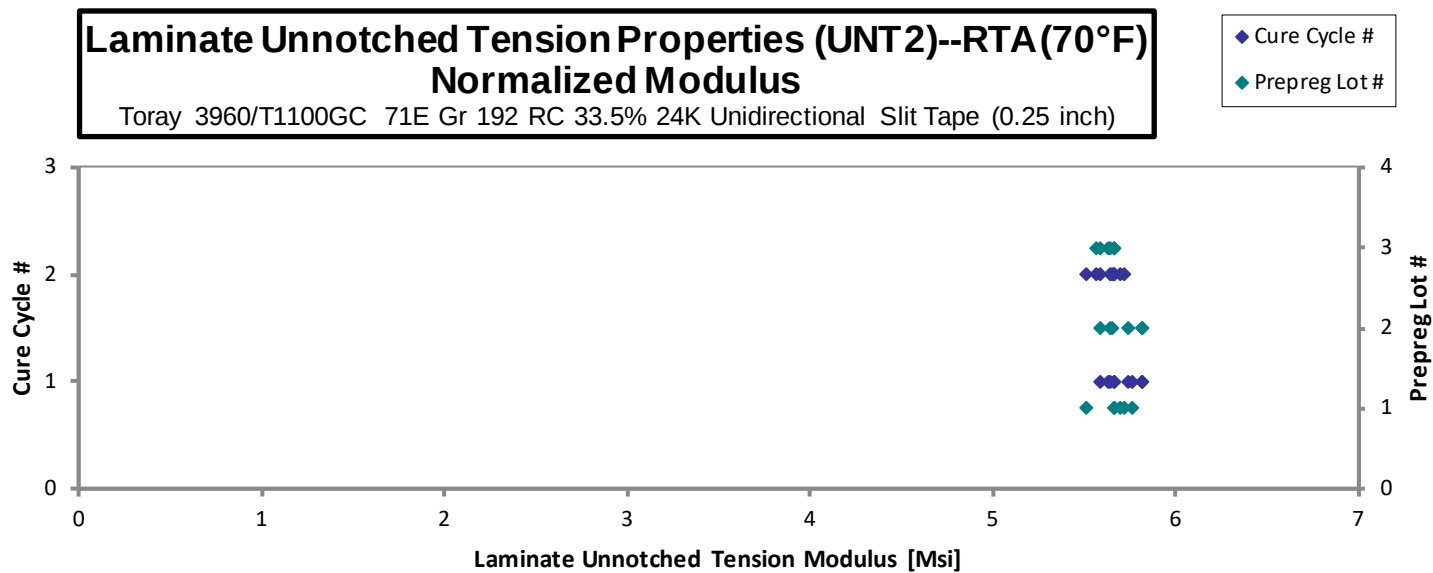
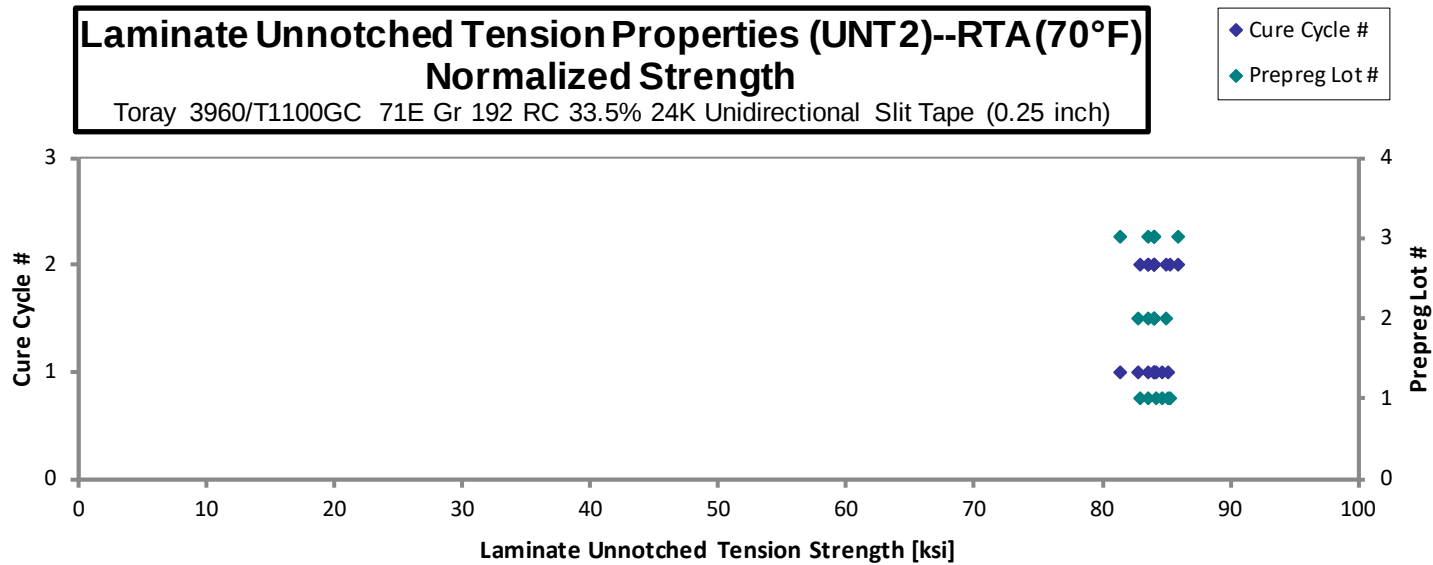
normalizing  
 $t_{ply}$  [in]

0.007000

| Specimen Number                                  | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | Strength <sub>norm</sub> [ksi] | Modulus <sub>norm</sub> [Msi] |
|--------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|---------------|------------------------------|---------------------|--------------|---------------------|--------------------------------|-------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C1-1-UNT2-RTA-1 | A             | C1              | 1             | 1            | 85.33          | 5.674         | 0.1397                       | 20                  | M(D,A)GT     | 0.006983            | 85.13                          | 5.660                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C1-1-UNT2-RTA-2 | A             | C1              | 1             | 1            | 84.35          | 5.675         | 0.1399                       | 20                  | M(D,A)GT     | 0.006994            | 84.28                          | 5.670                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C1-1-UNT2-RTA-3 | A             | C1              | 1             | 1            | 84.44          | 5.751         | 0.1403                       | 20                  | M(D,A)GT     | 0.007015            | 84.62                          | 5.763                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C2-1-UNT2-RTA-1 | A             | C2              | 1             | 2            | 83.10          | 5.523         | 0.1398                       | 20                  | M(A,D)WB     | 0.006991            | 82.99                          | 5.516                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C2-1-UNT2-RTA-2 | A             | C2              | 1             | 2            | 85.35          | 5.701         | 0.1399                       | 20                  | M(A,D)GB     | 0.006997            | 85.31                          | 5.699                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C2-1-UNT2-RTA-3 | A             | C2              | 1             | 2            | 83.52          | 5.708         | 0.1402                       | 20                  | M(A,D)GM     | 0.007008            | 83.62                          | 5.714                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C1-1-UNT2-RTA-1 | B             | C1              | 2             | 1            | 82.77          | 5.813         | 0.1401                       | 20                  | M(A,D)WB     | 0.007004            | 82.81                          | 5.816                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C1-1-UNT2-RTA-2 | B             | C1              | 2             | 1            | 83.38          | 5.773         | 0.1411                       | 20                  | M(A,D)GB     | 0.007053            | 84.00                          | 5.816                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C1-1-UNT2-RTA-3 | B             | C1              | 2             | 1            | 83.96          | 5.743         | 0.1401                       | 20                  | M(A,D)GT     | 0.007003            | 84.00                          | 5.746                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-UNT2-RTA-1 | B             | C2              | 2             | 2            | 85.37          | 5.679         | 0.1395                       | 20                  | M(A,D)GM     | 0.006975            | 85.06                          | 5.658                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-UNT2-RTA-2 | B             | C2              | 2             | 2            | 83.78          | 5.567         | 0.1405                       | 20                  | M(A,D)GM     | 0.007024            | 84.07                          | 5.586                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-UNT2-RTA-3 | B             | C2              | 2             | 2            | 83.53          | 5.638         | 0.1400                       | 20                  | M(A,D)GB     | 0.007001            | 83.54                          | 5.638                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C1-1-UNT2-RTA-1 | C             | C1              | 3             | 1            | 80.60          | 5.528         | 0.1414                       | 20                  | M(D,A)GB     | 0.007070            | 81.41                          | 5.584                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C1-1-UNT2-RTA-2 | C             | C1              | 3             | 1            | 82.93          | 5.591         | 0.1412                       | 20                  | M(D,A)GM     | 0.007058            | 83.61                          | 5.637                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C1-1-UNT2-RTA-3 | C             | C1              | 3             | 1            | 82.98          | 5.571         | 0.1418                       | 20                  | M(D,A)GT     | 0.007091            | 84.06                          | 5.643                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-UNT2-RTA-1 | C             | C2              | 3             | 2            | 85.41          | 5.635         | 0.1409                       | 20                  | M(D,A)GM     | 0.007044            | 85.95                          | 5.670                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-UNT2-RTA-2 | C             | C2              | 3             | 2            | 83.29          | 5.511         | 0.1413                       | 20                  | M(D,A)GM     | 0.007066            | 84.07                          | 5.563                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-UNT2-RTA-3 | C             | C2              | 3             | 2            | 83.62          | 5.642         | 0.1407                       | 20                  | M(D,A)GB     | 0.007033            | 84.02                          | 5.669                         |

Average 83.76 5.651  
Standard Dev. 1.196 0.08926  
Coeff. of Var. [%] 1.428 1.580  
Min. 80.60 5.511  
Max. 85.41 5.813  
Number of Spec. 18 18

Average<sub>norm</sub> 0.007023 84.03 5.669  
Standard Dev<sub>norm</sub> 1.030 0.08138  
Coeff. of Var. [%]<sub>norm</sub> 1.225 1.435  
Min. 0.006975 81.41 5.516  
Max. 0.007091 85.95 5.816  
Number of Spec. 18 18 18



**Laminate Unnotched Tension Properties (UNT2)--ETW2 (250°F)  
Strength & Modulus**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

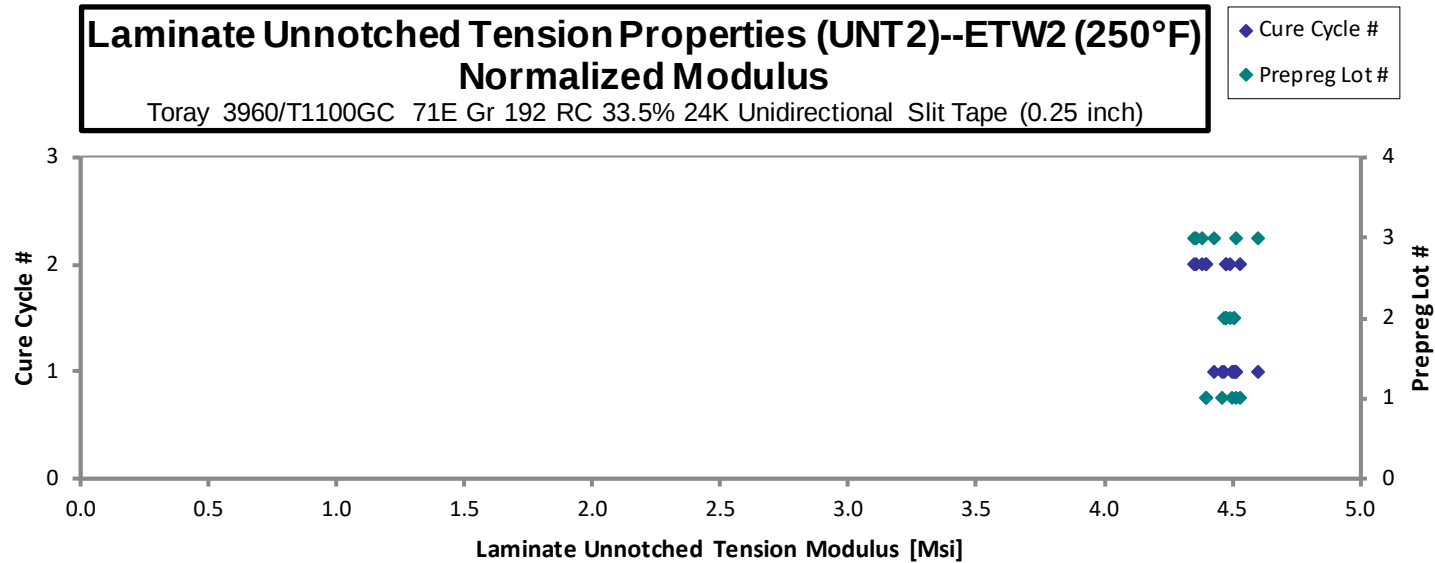
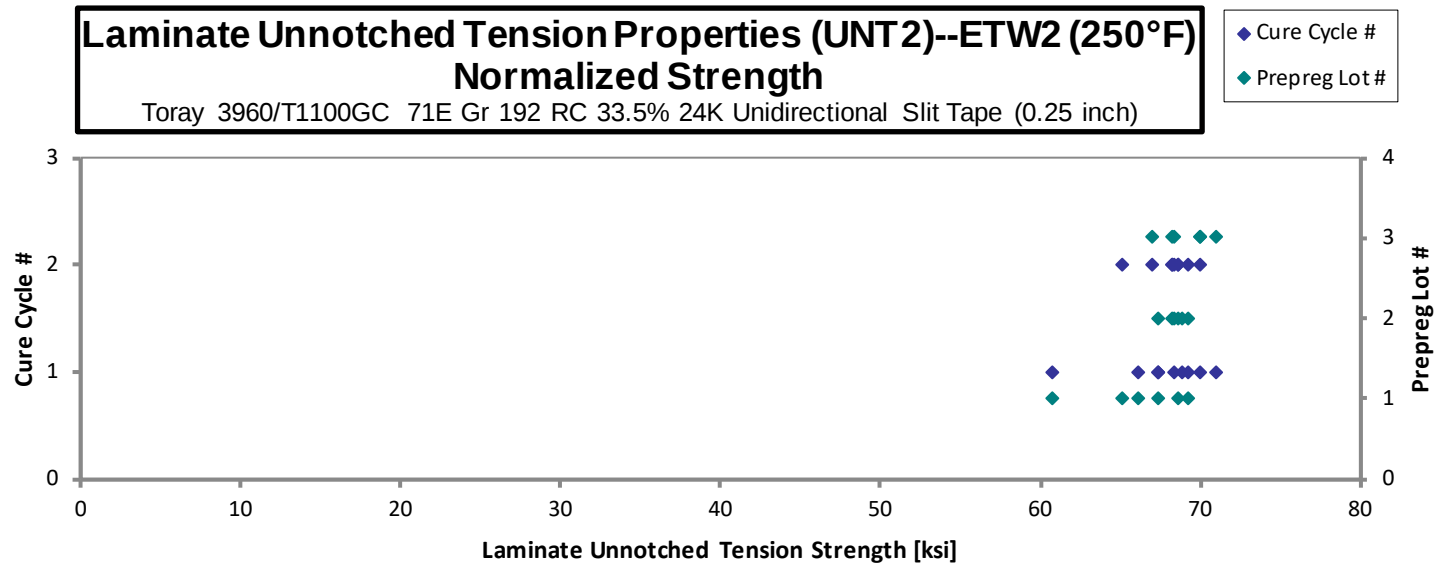
 $t_{ply} [in]$ 

0.007000

| Specimen Number                                   | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply} [in]$ | Strength <sub>norm</sub> [ksi] | Modulus <sub>norm</sub> [Msi] |
|---------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|---------------|------------------------------|---------------------|--------------|---------------------|--------------------------------|-------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C1-1-UNT2-ETW2-1 | A             | C1              | 1             | 1            | 67.39          | 4.501         | 0.1400                       | 20                  | DGM          | 0.007001            | 67.40                          | 4.501                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C1-1-UNT2-ETW2-2 | A             | C1              | 1             | 1            | 66.46          | 4.538         | 0.1393                       | 20                  | DGM          | 0.006966            | 66.14                          | 4.516                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C1-1-UNT2-ETW2-3 | A             | C1              | 1             | 1            | 60.84          | 4.464         | 0.1399                       | 20                  | DGM          | 0.006996            | 60.80                          | 4.461                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C2-1-UNT2-ETW2-1 | A             | C2              | 1             | 2            | 68.66          | 4.532         | 0.1399                       | 20                  | DGM          | 0.006996            | 68.62                          | 4.529                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C2-1-UNT2-ETW2-2 | A             | C2              | 1             | 2            | 65.29          | 4.414         | 0.1396                       | 20                  | DGM          | 0.006979            | 65.10                          | 4.401                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C2-1-UNT2-ETW2-3 | A             | C2              | 1             | 2            | 69.37          | 4.406         | 0.1397                       | 20                  | DGM          | 0.006984            | 69.21                          | 4.396                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C1-1-UNT2-ETW2-1 | B             | C1              | 2             | 1            | 67.09          | 4.489         | 0.1405                       | 20                  | DGM          | 0.007025            | 67.33                          | 4.505                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C1-1-UNT2-ETW2-2 | B             | C1              | 2             | 1            | 69.10          | 4.482         | 0.1396                       | 20                  | DGM          | 0.006982            | 68.91                          | 4.470                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C1-1-UNT2-ETW2-3 | B             | C1              | 2             | 1            | 68.80          | 4.481         | 0.1408                       | 20                  | DGM          | 0.007038            | 69.18                          | 4.506                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-UNT2-ETW2-1 | B             | C2              | 2             | 2            | 68.53          | 4.467         | 0.1402                       | 20                  | DGM          | 0.007008            | 68.61                          | 4.472                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-UNT2-ETW2-2 | B             | C2              | 2             | 2            | 68.85          | 4.533         | 0.1388                       | 20                  | DGM          | 0.006941            | 68.27                          | 4.494                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-UNT2-ETW2-3 | B             | C2              | 2             | 2            | 68.20          | 4.466         | 0.1402                       | 20                  | DGM          | 0.007011            | 68.30                          | 4.473                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C1-1-UNT2-ETW2-1 | C             | C1              | 3             | 1            | 70.26          | 4.555         | 0.1414                       | 20                  | DGM          | 0.007072            | 70.98                          | 4.602                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C1-1-UNT2-ETW2-2 | C             | C1              | 3             | 1            | 69.23          | 4.464         | 0.1416                       | 20                  | DGM          | 0.007078            | 70.00                          | 4.513                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C1-1-UNT2-ETW2-3 | C             | C1              | 3             | 1            | 67.82          | 4.394         | 0.1411                       | 20                  | DGM          | 0.007053            | 68.33                          | 4.427                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-UNT2-ETW2-1 | C             | C2              | 3             | 2            | 67.02          | 4.347         | 0.1401                       | 20                  | DGM          | 0.007003            | 67.04                          | 4.348                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-UNT2-ETW2-2 | C             | C2              | 3             | 2            | 68.28          | 4.361         | 0.1400                       | 20                  | DGM          | 0.007001            | 68.29                          | 4.362                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-UNT2-ETW2-3 | C             | C2              | 3             | 2            | 69.84          | 4.373         | 0.1404                       | 20                  | DGM          | 0.007018            | 70.01                          | 4.384                         |

Average 67.84 4.459  
 Standard Dev. 2.141 0.06361  
 Coeff. of Var. [%] 3.157 1.426  
 Min. 60.84 4.347  
 Max. 70.26 4.555  
 Number of Spec. 18 18

Average<sub>norm</sub> 0.007008 67.92 4.464  
 Standard Dev.<sub>norm</sub> 2.262 0.06625  
 Coeff. of Var. [%]<sub>norm</sub> 3.331 1.484  
 Min. 0.006941 60.80 4.348  
 Max. 0.007078 70.98 4.602  
 Number of Spec. 18 18 18



## 4.10 “50/40/10” Unnotched Tension 3 Properties (UNT3)

**Laminate Unnotched Tension Properties (UNT3)--CTA (-65°F)**  
**Strength & Modulus**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

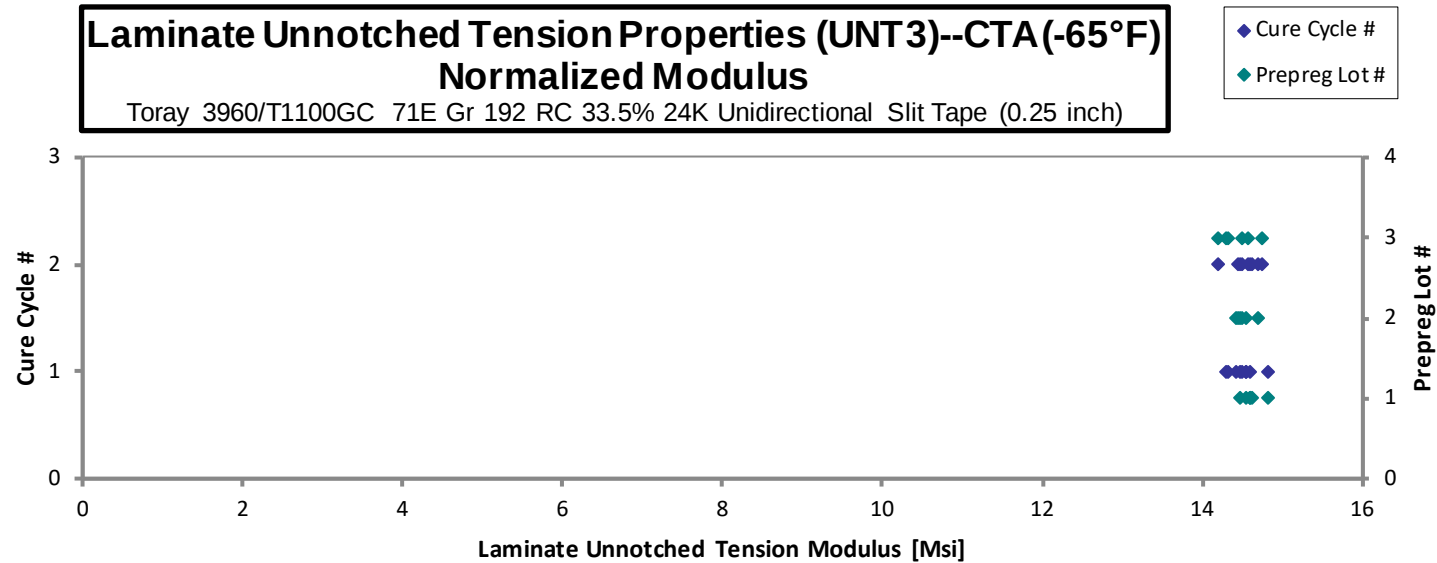
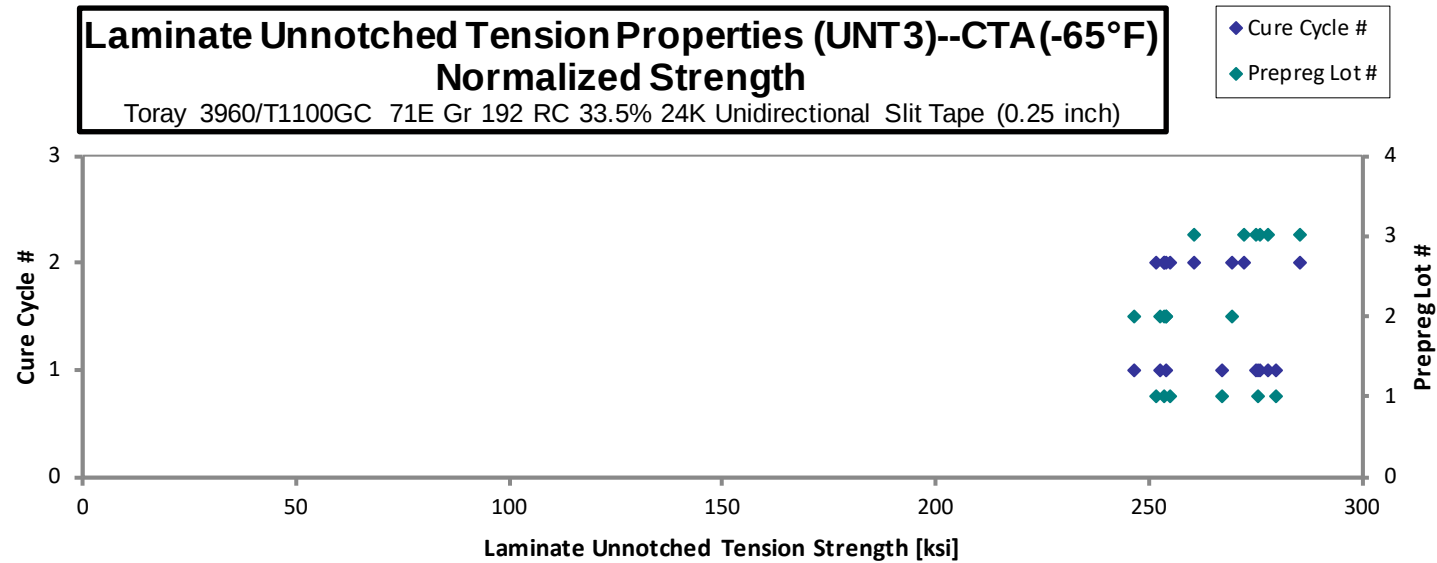
normalizing  
 $t_{ply}$  [in]

0.007000

| Specimen Number                                  | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode               | Avg. $t_{ply}$ [in] | Strength <sub>norm</sub> [ksi] | Modulus <sub>norm</sub> [Msi] |
|--------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|---------------|------------------------------|---------------------|----------------------------|---------------------|--------------------------------|-------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-UNT3-CTA-1 | A             | C1              | 1             | 1            | 273.5          | 14.48         | 0.1412                       | 20                  | AGM, AWT, AAB/AIB          | 0.007058            | 275.8                          | 14.60                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-UNT3-CTA-2 | A             | C1              | 1             | 1            | 265.6          | 14.46         | 0.1408                       | 20                  | AAT/AIT, AAB/AIB           | 0.007038            | 267.0                          | 14.54                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-UNT3-CTA-3 | A             | C1              | 1             | 1            | 278.3          | 14.74         | 0.1408                       | 20                  | AAT/AIT, AAB/AIB           | 0.007038            | 279.8                          | 14.82                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-UNT3-CTA-1 | A             | C2              | 1             | 2            | 254.0          | 14.63         | 0.1398                       | 20                  | DGM, SGT, AAT/AIT, AAB/AIB | 0.006991            | 253.7                          | 14.61                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-UNT3-CTA-2 | A             | C2              | 1             | 2            | 250.8          | 14.41         | 0.1406                       | 20                  | M(A,L,S)GT, AAB/AIB        | 0.007028            | 251.8                          | 14.47                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-UNT3-CTA-3 | A             | C2              | 1             | 2            | 253.7          | 14.54         | 0.1408                       | 20                  | M(A,L)GM, AAB/AIB          | 0.007038            | 255.0                          | 14.62                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-UNT3-CTA-1 | B             | C1              | 2             | 1            | 247.4          | 14.61         | 0.1394                       | 20                  | DGM, M(A,L)AT, AAB/AIB     | 0.006971            | 246.4                          | 14.55                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-UNT3-CTA-2 | B             | C1              | 2             | 1            | 254.4          | 14.49         | 0.1398                       | 20                  | M(A,L)AT, AAB/AIB          | 0.006988            | 254.0                          | 14.47                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-UNT3-CTA-3 | B             | C1              | 2             | 1            | 253.2          | 14.44         | 0.1397                       | 20                  | AGM                        | 0.006986            | 252.7                          | 14.41                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-UNT3-CTA-1 | B             | C2              | 2             | 2            | 254.7          | 14.50         | 0.1396                       | 20                  | M(A,S)GM, AWT, AAB/AIB     | 0.006980            | 254.0                          | 14.46                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-UNT3-CTA-2 | B             | C2              | 2             | 2            | 253.7          | 14.50         | 0.1399                       | 20                  | M(D,A)GM, AWT, AAB/AIB     | 0.006995            | 253.5                          | 14.49                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-UNT3-CTA-3 | B             | C2              | 2             | 2            | 270.4          | 14.74         | 0.1396                       | 20                  | AGM, AAT/AIT, AAB/AIB      | 0.006980            | 269.6                          | 14.70                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-UNT3-CTA-1 | C             | C1              | 3             | 1            | 275.9          | 14.23         | 0.1409                       | 20                  | AAT/AIT, AAB/AIB           | 0.007047            | 277.7                          | 14.32                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-UNT3-CTA-2 | C             | C1              | 3             | 1            | 272.1          | 14.15         | 0.1415                       | 20                  | AGB, AWT                   | 0.007073            | 275.0                          | 14.30                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-UNT3-CTA-3 | C             | C1              | 3             | 1            | 274.0          | 14.38         | 0.1411                       | 20                  | LWT, AAB/AIB               | 0.007053            | 276.0                          | 14.49                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-UNT3-CTA-2 | C             | C2              | 3             | 2            | 257.4          | 14.37         | 0.1419                       | 20                  | AWB, LAT/LIT               | 0.007093            | 260.8                          | 14.56                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-UNT3-CTA-3 | C             | C2              | 3             | 2            | 282.0          | 14.57         | 0.1416                       | 20                  | AAT, AAB/AIB               | 0.007081            | 285.3                          | 14.74                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-UNT3-SP-1  | C             | C2              | 3             | 2            | 269.1          | 14.05         | 0.1416                       | 20                  | AGT, AAT/AIT, LAB/LIB      | 0.007079            | 272.2                          | 14.20                         |

Average 263.3 14.46  
Standard Dev. 11.09 0.1825  
Coeff. of Var. [%] 4.211 1.262  
Min. 247.4 14.05  
Max. 282.0 14.74  
Number of Spec. 18 18

Average<sub>norm</sub> 0.007029 264.5 14.52  
Standard Dev.<sub>norm</sub> 12.11 0.1544  
Coeff. of Var. [%]<sub>norm</sub> 4.581 1.0635  
Min. 0.006971 246.4 14.20  
Max. 0.007093 285.3 14.82  
Number of Spec. 18 18 18



**Laminate Unnotched Tension Properties (UNT3)--RTA (70°F)**  
**Strength & Modulus**

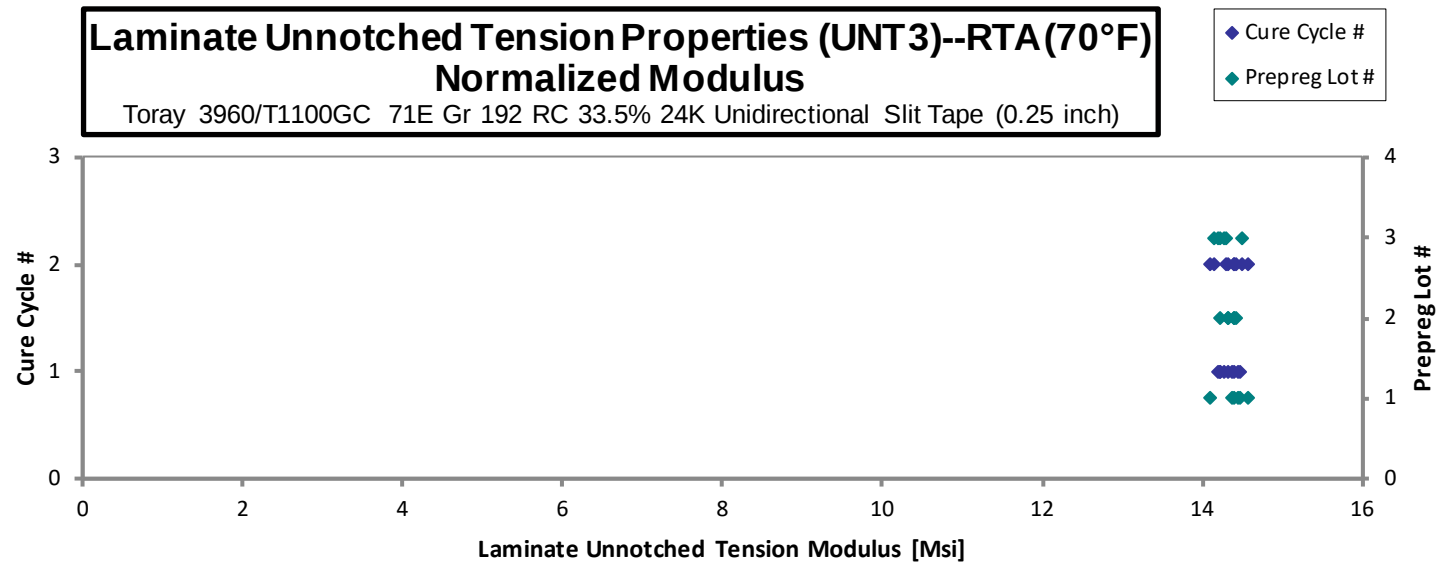
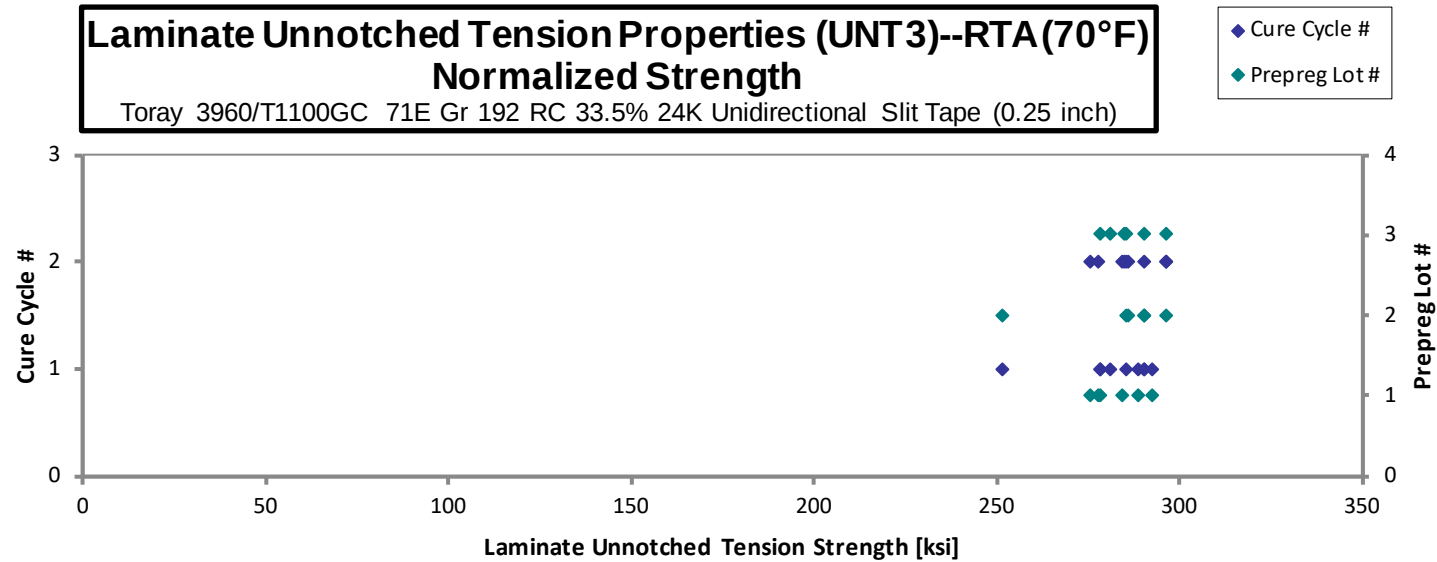
Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

 $t_{ply}$  [in]

0.007000

| Specimen Number                                  | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in]       | # Plies in Laminate | Failure Mode               | Avg. $t_{ply}$ [in] | Strength <sub>norm</sub> [ksi] | Modulus <sub>norm</sub> [Msi] |
|--------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|---------------|------------------------------------|---------------------|----------------------------|---------------------|--------------------------------|-------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-UNT3-RTA-1 | A             | C1              | 1             | 1            | 286.8          | 14.36         | 0.1408                             | 20                  | AGT, LAB/LIB               | 0.007041            | 288.5                          | 14.44                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-UNT3-RTA-2 | A             | C1              | 1             | 1            | 276.0          | 14.26         | 0.1411                             | 20                  | AGM, LAB/LIB, LAT/LIT      | 0.007057            | 278.2                          | 14.37                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-UNT3-RTA-3 | A             | C1              | 1             | 1            | 290.7          | 14.35         | 0.1410                             | 20                  | LAT/LIT, LAB/LIB           | 0.007052            | 292.8                          | 14.46                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-UNT3-RTA-1 | A             | C2              | 1             | 2            | 277.0          | 14.37         | 0.1403                             | 20                  | AGT, AWB, AAT/AIT          | 0.007017            | 277.6                          | 14.40                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-UNT3-RTA-2 | A             | C2              | 1             | 2            | 274.3          | 14.02         | 0.1407                             | 20                  | M(A,L)WT, M(A,L)WB         | 0.007033            | 275.6                          | 14.09                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-UNT3-RTA-3 | A             | C2              | 1             | 2            | 281.9          | 14.45         | 0.1411                             | 20                  | AGB, LAT/LIT               | 0.007055            | 284.1                          | 14.57                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-UNT3-RTA-1 | B             | C1              | 2             | 1            | 285.8          | 14.33         | 0.1398                             | 20                  | AAT/AIT, LAB/LIB           | 0.006991            | 285.4                          | 14.31                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-UNT3-RTA-2 | B             | C1              | 2             | 1            | 252.2          | 14.24         | 0.1398                             | 20                  | AWB, AAT/AIT               | 0.006988            | 251.8                          | 14.22                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-UNT3-RTA-3 | B             | C1              | 2             | 1            | 289.8          | 14.37         | 0.1402                             | 20                  | AAT/AIT, LAB/LIB           | 0.007011            | 290.3                          | 14.39                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-UNT3-RTA-1 | B             | C2              | 2             | 2            | 290.5          | 14.42         | 0.1399                             | 20                  | AGB, LAT/LIT               | 0.006995            | 290.3                          | 14.41                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-UNT3-RTA-2 | B             | C2              | 2             | 2            | 286.0          | 14.42         | 0.1401                             | 20                  | M(A,L)WB, AAT/AIT          | 0.007005            | 286.2                          | 14.43                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-UNT3-RTA-3 | B             | C2              | 2             | 2            | 296.8          | 14.33         | 0.1399                             | 20                  | AAT/AIT, AAB/AIB           | 0.006993            | 296.5                          | 14.31                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-UNT3-RTA-1 | C             | C1              | 3             | 1            | 276.3          | 14.12         | 0.1411                             | 20                  | LAT/LIT, AAB/AIB           | 0.007053            | 278.3                          | 14.22                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-UNT3-RTA-2 | C             | C1              | 3             | 1            | 288.9          | 14.19         | 0.1408                             | 20                  | AGM, LAB/LIB, LAT/LIT      | 0.007039            | 290.5                          | 14.27                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-UNT3-RTA-3 | C             | C1              | 3             | 1            | 278.4          | 14.07         | 0.1413                             | 20                  | AWB, AWT                   | 0.007066            | 281.0                          | 14.21                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-UNT3-RTA-1 | C             | C2              | 3             | 2            | 292.9          | 14.33         | 0.1417                             | 20                  | AWB, AAT/AIT               | 0.007086            | 296.5                          | 14.51                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-UNT3-RTA-2 | C             | C2              | 3             | 2            | 282.4          | 14.14         | 0.1415                             | 20                  | AAB/AIB, M(A,L)AT/M(A,L)IT | 0.007073            | 285.3                          | 14.29                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-UNT3-RTA-3 | C             | C2              | 3             | 2            | 281.9          | 13.99         | 0.1416                             | 20                  | AWB, AAT/AIT               | 0.007078            | 285.0                          | 14.15                         |
| Average                                          |               |                 |               |              | 282.7          | 14.26         | Average <sub>norm</sub>            |                     |                            | 0.007035            | 284.1                          | 14.34                         |
| Standard Dev.                                    |               |                 |               |              | 9.988          | 0.1429        | Standard Dev <sub>norm</sub>       |                     |                            |                     | 10.20                          | 0.1281                        |
| Coeff. of Var. [%]                               |               |                 |               |              | 3.533          | 1.002         | Coeff. of Var. [%] <sub>norm</sub> |                     |                            |                     | 3.589                          | 0.8935                        |
| Min.                                             |               |                 |               |              | 252.2          | 13.99         | Min.                               |                     |                            | 0.006988            | 251.8                          | 14.09                         |
| Max.                                             |               |                 |               |              | 296.8          | 14.45         | Max.                               |                     |                            | 0.007086            | 296.5                          | 14.57                         |
| Number of Spec.                                  |               |                 |               |              | 18             | 18            | Number of Spec.                    |                     |                            | 18                  | 18                             | 18                            |



**Laminate Unnotched Tension Properties (UNT3)--ETW2 (250°F)**  
**Strength & Modulus**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

 $t_{ply}$  [in]

0.007000

| Specimen Number                                     | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode            |
|-----------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|---------------|------------------------------|---------------------|-------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-UNT3-ETW2-1*  | A             | C1              | 1             | 1            |                | 14.02         | 0.1408                       | 20                  | DGM, LWT                |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-UNT3-ETW2-2*  | A             | C1              | 1             | 1            |                | 14.13         | 0.1409                       | 20                  | DGM, LWT                |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-UNT3-ETW2-3*  | A             | C1              | 1             | 1            |                | 14.27         | 0.1415                       | 20                  | DGM, LWT                |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-UNT3-ETW2-4   | A             | C1              | 1             | 1            | 274.0          | 13.90         | 0.1415                       | 20                  | DGM, AWB, AWT           |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-UNT3-ETW2-5   | A             | C1              | 1             | 1            | 270.9          | 13.88         | 0.1412                       | 20                  | DGM, AWB, LWT           |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-UNT3-ETW2-6   | A             | C1              | 1             | 1            | 266.5          | 13.80         | 0.1416                       | 20                  | DGM, AWB, AWT           |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-UNT3-ETW2-1*  | A             | C2              | 1             | 2            |                | 13.93         | 0.1400                       | 20                  | DGM, LWB                |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-UNT3-ETW2-2*  | A             | C2              | 1             | 2            |                | 14.43         | 0.1392                       | 20                  | DGM, LWT                |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-UNT3-ETW2-3*  | A             | C2              | 1             | 2            |                | 13.92         | 0.1400                       | 20                  | DGM, AGT                |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-UNT3-ETW2-4   | A             | C2              | 1             | 2            | 286.0          | 14.07         | 0.1414                       | 20                  | DGM, M(A,L)WT, M(A,L)WB |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-UNT3-ETW2-5   | A             | C2              | 1             | 2            | 280.5          | 13.96         | 0.1416                       | 20                  | DGM, M(A,L)WT, M(A,L)WB |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-UNT3-ETW2-6   | A             | C2              | 1             | 2            | 278.9          | 13.62         | 0.1411                       | 20                  | DGM, M(A,L)WT, M(A,L)WB |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-UNT3-ETW2-1*  | B             | C1              | 2             | 1            |                | 13.67         | 0.1399                       | 20                  | DGM                     |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-UNT3-ETW2-2*  | B             | C1              | 2             | 1            |                | 14.04         | 0.1400                       | 20                  | DGM                     |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-UNT3-ETW2-3*  | B             | C1              | 2             | 1            |                | 14.02         | 0.1399                       | 20                  | DGM, LGT                |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-UNT3-ETW2-4   | B             | C1              | 2             | 1            | 275.5          | 13.86         | 0.1407                       | 20                  | DGM, AWT, AWB           |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-UNT3-ETW2-5   | B             | C1              | 2             | 1            | 283.0          | 13.71         | 0.1411                       | 20                  | DGM, AWT, AWB           |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-UNT3-ETW2-6   | B             | C1              | 2             | 1            | 265.0          | 13.67         | 0.1411                       | 20                  | DGM, AGM, AWT           |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-UNT3-ETW2-7   | B             | C1              | 2             | 1            | 278.6          | 13.77         | 0.1407                       | 20                  | DGM, LWB, AWT           |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-UNT3-ETW2-8   | B             | C1              | 2             | 1            | 285.2          | 13.62         | 0.1407                       | 20                  | DGM, LWT, AWB           |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-UNT3-ETW2-9   | B             | C1              | 2             | 1            | 282.6          | 14.31         | 0.1406                       | 20                  | DGM, AWT, AWB           |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-UNT3-ETW2-1*  | B             | C2              | 2             | 2            |                | 14.38         | 0.1397                       | 20                  | DGM, AWT                |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-UNT3-ETW2-2*  | B             | C2              | 2             | 2            |                | 14.27         | 0.1397                       | 20                  | DGM, LWB                |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-UNT3-ETW2-3*  | B             | C2              | 2             | 2            |                | 13.99         | 0.1394                       | 20                  | DGM, LWT                |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-UNT3-ETW2-1*  | C             | C1              | 3             | 1            |                | 13.75         | 0.1409                       | 20                  | DGM                     |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-UNT3-ETW2-2*  | C             | C1              | 3             | 1            |                | 14.42         | 0.1399                       | 20                  | DGM, M(A,L)WB           |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-UNT3-ETW2-3*  | C             | C1              | 3             | 1            |                | 14.39         | 0.1412                       | 20                  | DGM, LWT                |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-UNT3-ETW2-4   | C             | C1              | 3             | 1            | 275.3          | 13.46         | 0.1417                       | 20                  | AWT, DGM                |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-UNT3-ETW2-5   | C             | C1              | 3             | 1            | 279.4          | 13.82         | 0.1420                       | 20                  | AWT, DGM                |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-UNT3-ETW2-6   | C             | C1              | 3             | 1            | 277.2          | 13.62         | 0.1416                       | 20                  | AWT, AWB, DGM           |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-UNT3-ETW2-1*  | C             | C2              | 3             | 2            |                | 13.74         | 0.1423                       | 20                  | DGM, LWB                |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-UNT3-ETW2-2*  | C             | C2              | 3             | 2            |                | 13.86         | 0.1415                       | 20                  | DGM, LWT                |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-UNT3-ETW2-3*  | C             | C2              | 3             | 2            |                | 13.66         | 0.1414                       | 20                  | DGM, LWT                |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-UNT3-ETW2-4** | C             | C2              | 3             | 2            |                | 14.02         | 0.1422                       | 20                  | DGM, DIB                |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-UNT3-ETW2-5** | C             | C2              | 3             | 2            |                | 13.58         | 0.1421                       | 20                  | DGM, DIB                |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-UNT3-ETW2-6   | C             | C2              | 3             | 2            | 268.2          | 13.90         | 0.1420                       | 20                  | AWT, AWB, DGM           |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-UNT3-SP-7***  | C             | C2              | 3             | 2            | 285.7          |               | 0.1421                       | 20                  | DGM, M(A,L)WB, M(A,L)WT |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-UNT3-SP-8***  | C             | C2              | 3             | 2            | 277.2          |               | 0.1422                       | 20                  | DGM, M(A,L)WB, M(A,L)WT |

\* Strength not reported due to premature failure mode caused by tabbing process.

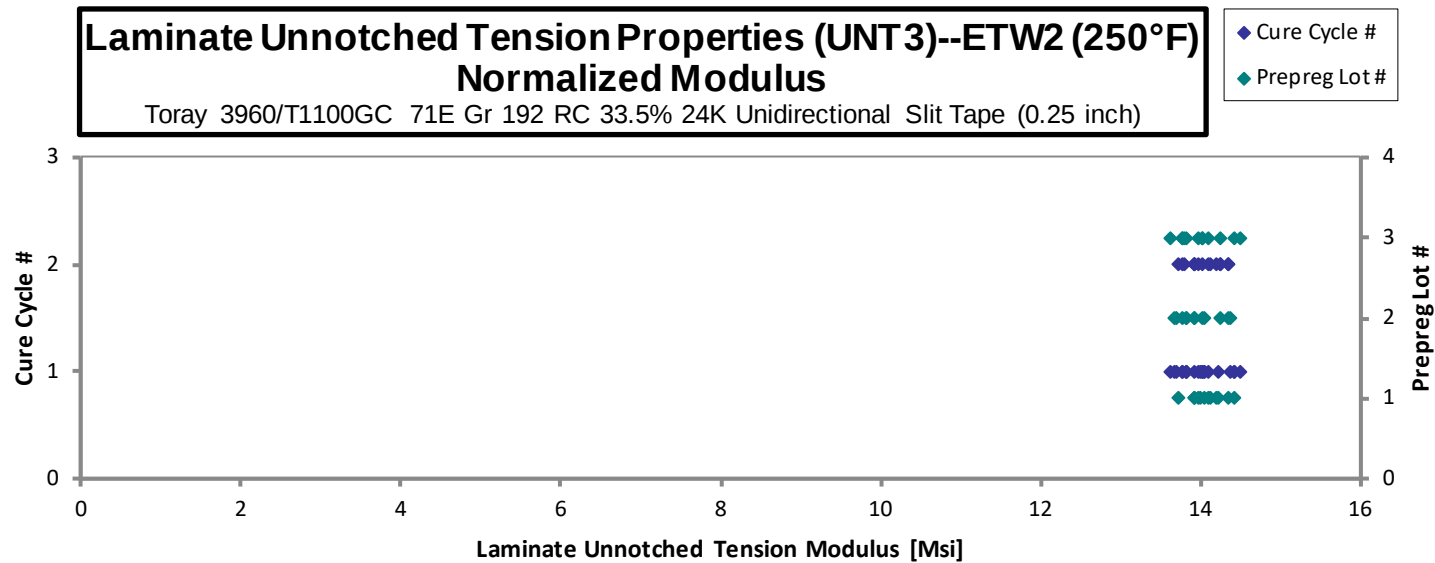
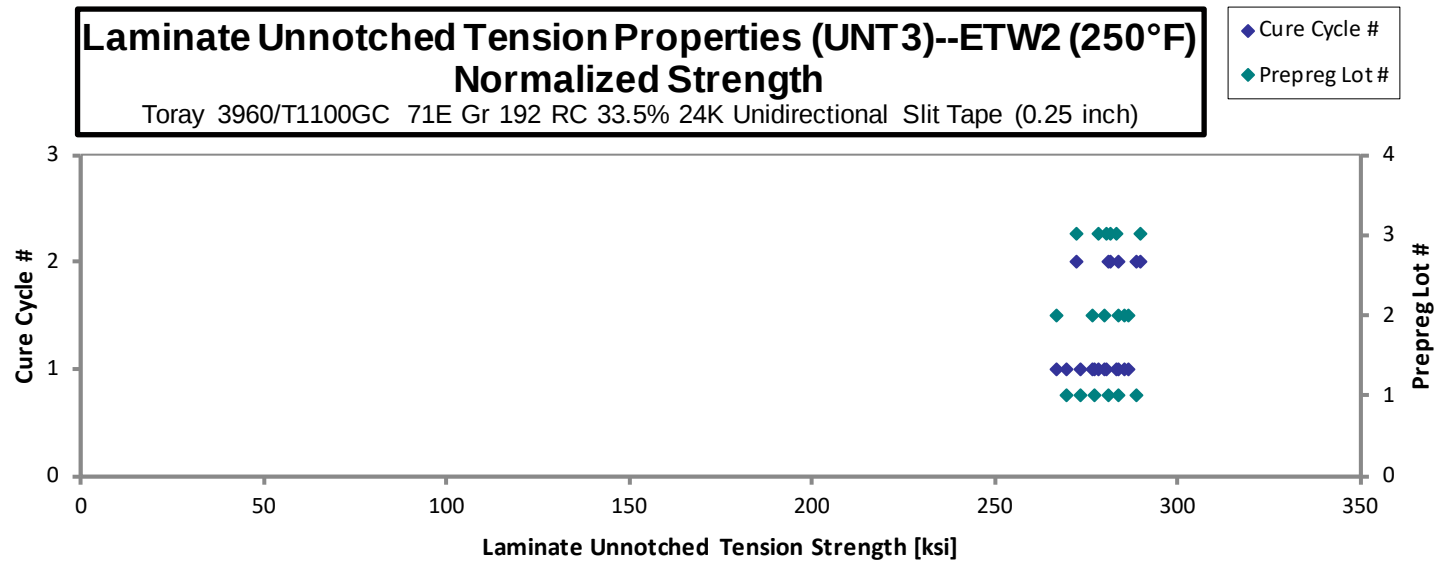
\*\* Strength not reported due to unacceptable failure.

\*\*\* Specimen was not gaged, only strength is tested.

Average 277.2 13.93  
Standard Dev. 6.407 0.2623  
Coeff. of Var. [%] 2.311 1.883  
Min. 265.0 13.46  
Max. 286.0 14.43  
Number of Spec. 18 36

Average<sub>norm</sub> 0.007049 279.9 14.02  
Standard Dev.<sub>norm</sub> 6.406 0.2359  
Coeff. of Var. [%]<sub>norm</sub> 2.288 1.683  
Min. 0.006959 267.0 13.62  
Max. 0.007116 289.9 14.51  
Number of Spec. 38 18 36

| Avg. $t_{ply}$ [in] | Strength <sub>norm</sub> [ksi] | Modulus <sub>norm</sub> [Msi] |
|---------------------|--------------------------------|-------------------------------|
| 0.007040            |                                | 14.10                         |
| 0.007044            |                                | 14.22                         |
| 0.007076            |                                | 14.42                         |
| 0.007074            | 276.9                          | 14.05                         |
| 0.007059            | 273.2                          | 14.00                         |
| 0.007081            | 269.6                          | 13.96                         |
| 0.007000            |                                | 13.93                         |
| 0.006959            |                                | 14.34                         |
| 0.007002            |                                | 13.93                         |
| 0.007069            | 288.9                          | 14.21                         |
| 0.007079            | 283.6                          | 14.12                         |
| 0.007057            | 281.2                          | 13.73                         |
| 0.006997            |                                | 13.67                         |
| 0.007000            |                                | 14.04                         |
| 0.006994            |                                | 14.01                         |
| 0.007033            | 276.8                          | 13.92                         |
| 0.007054            | 285.2                          | 13.81                         |
| 0.007053            | 267.0                          | 13.78                         |
| 0.007037            | 280.0                          | 13.83                         |
| 0.007035            | 286.7                          | 13.69                         |
| 0.007029            | 283.8                          | 14.37                         |
| 0.006984            |                                | 14.35                         |
| 0.006985            |                                | 14.24                         |
| 0.006969            |                                | 13.93                         |
| 0.007043            |                                | 13.83                         |
| 0.006993            |                                | 14.41                         |
| 0.007058            |                                | 14.51                         |
| 0.007083            | 278.5                          | 13.62                         |
| 0.007101            | 283.4                          | 14.02                         |
| 0.007082            | 280.4                          | 13.78                         |
| 0.007116            |                                | 13.97                         |
| 0.007076            |                                | 14.01                         |
| 0.007069            |                                | 13.80                         |
| 0.007111            |                                | 14.25                         |
| 0.007103            |                                | 13.78                         |
| 0.007102            | 272.1                          | 14.10                         |
| 0.007103            | 289.9                          |                               |
| 0.007108            | 281.5                          |                               |



## 4.11 “33/0/67” Unnotched Compression 0/90 Properties (UNC0)

**Laminate Unnotched Compression 0/90 Properties (UNC0)--CTA (-65°F)**  
**Strength & Modulus**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

 $t_{ply}$  [in]

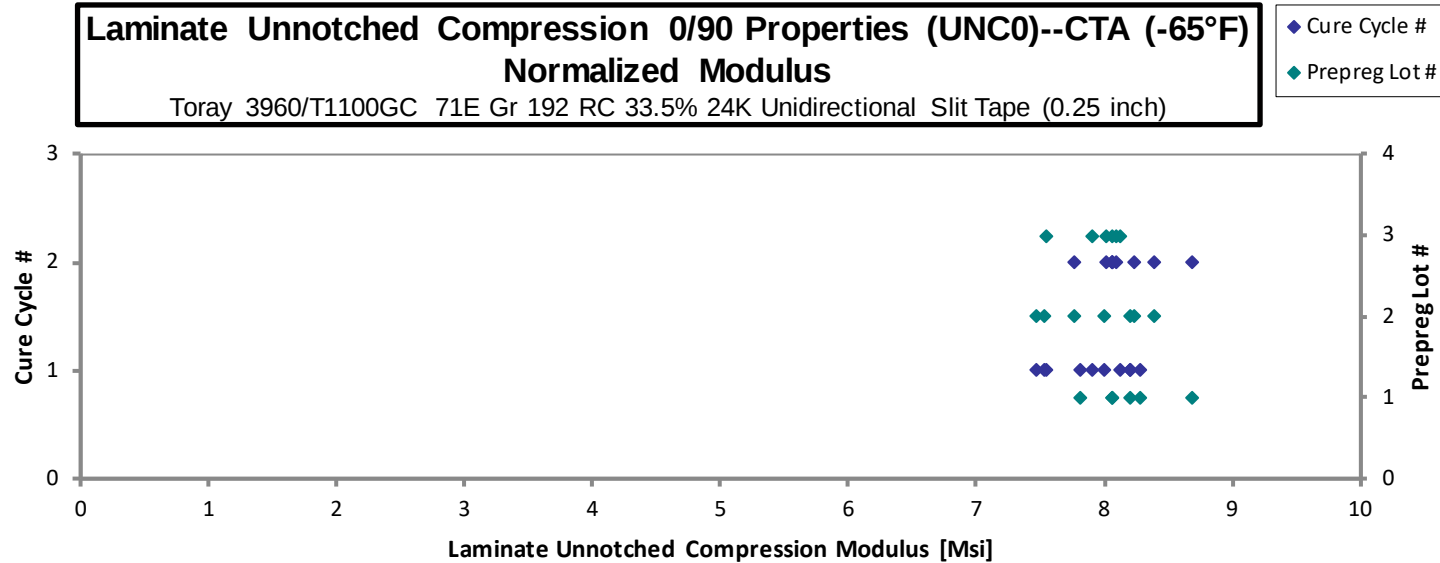
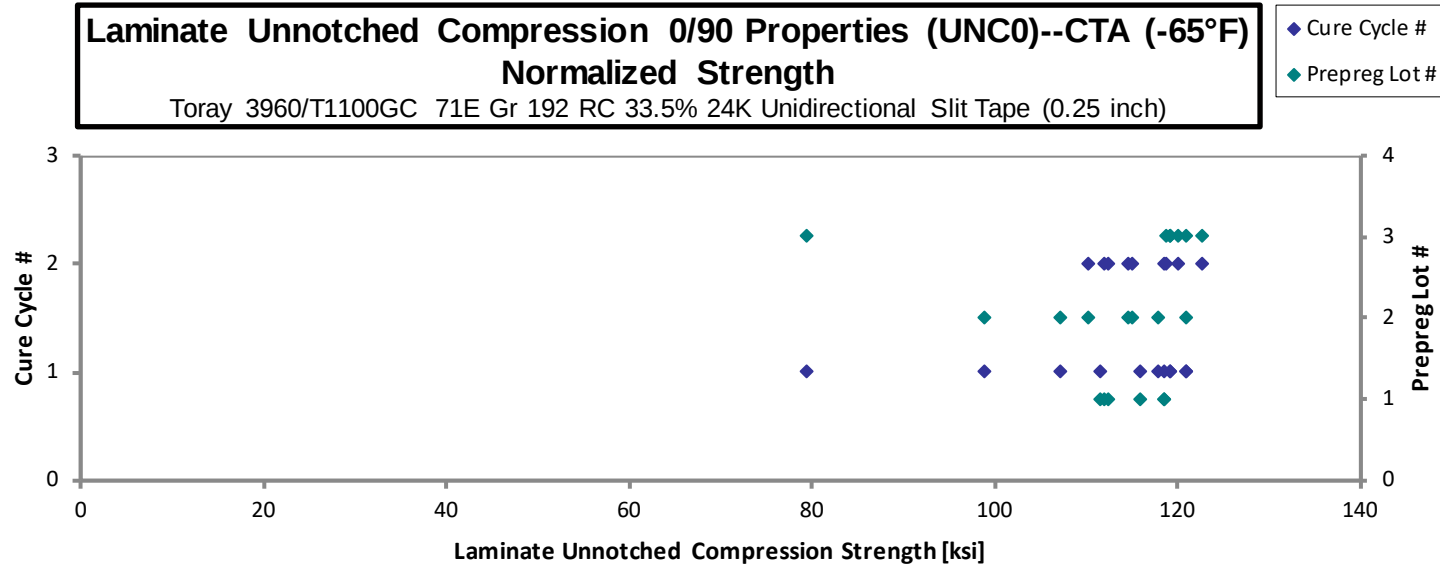
0.007000

| Specimen Number                                  | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | Strength <sub>norm</sub> [ksi] | Modulus <sub>norm</sub> [Msi] |
|--------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|---------------|------------------------------|---------------------|--------------|---------------------|--------------------------------|-------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C1-1-UNC0-CTA-1 | A             | C1              | 1             | 1            | 110.2          | 7.716         | 0.1063                       | 15                  | BGM          | 0.007089            | 111.6                          | 7.814                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C1-1-UNC0-CTA-2 | A             | C1              | 1             | 1            | 116.6          | 8.082         | 0.1067                       | 15                  | BAT          | 0.007111            | 118.5                          | 8.210                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C1-1-UNC0-CTA-3 | A             | C1              | 1             | 1            | 114.1          | 8.144         | 0.1067                       | 15                  | BAB          | 0.007111            | 115.9                          | 8.273                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C2-1-UNC0-CTA-1 | A             | C2              | 1             | 2            | 119.2          | 8.114         | 0.1043                       | 15                  | BGM          | 0.006954            | 118.5                          | 8.061                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C2-1-UNC0-CTA-2 | A             | C2              | 1             | 2            | 114.0          | 8.207         | 0.1032                       | 15                  | BGM          | 0.006877            | 111.9                          | 8.063                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C2-1-UNC0-CTA-3 | A             | C2              | 1             | 2            | 116.0          | 8.976         | 0.1017                       | 15                  | BGM          | 0.006780            | 112.4                          | 8.694                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-B-C1-1-UNC0-CTA-1 | B             | C1              | 2             | 1            | 121.2          | 8.016         | 0.1047                       | 15                  | BGM          | 0.006980            | 120.8                          | 7.993                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-B-C1-1-UNC0-CTA-2 | B             | C1              | 2             | 1            | 98.61          | 8.178         | 0.1053                       | 15                  | BGM          | 0.007017            | 98.85                          | 8.198                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-B-C1-1-UNC0-CTA-3 | B             | C1              | 2             | 1            | 117.9          | 7.464         | 0.1050                       | 15                  | BAB          | 0.007000            | 117.9                          | 7.464                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-B-C1-1-UNC0-SP-1  | B             | C1              | 2             | 1            | 106.2          | 7.462         | 0.1060                       | 15                  | BGM          | 0.007066            | 107.2                          | 7.532                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-B-C2-1-UNC0-CTA-1 | B             | C2              | 2             | 2            | 113.9          | 8.317         | 0.1060                       | 15                  | BAB          | 0.007066            | 115.0                          | 8.395                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-B-C2-1-UNC0-CTA-2 | B             | C2              | 2             | 2            | 114.4          | 7.750         | 0.1053                       | 15                  | BGM, HGM     | 0.007018            | 114.6                          | 7.770                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-B-C2-1-UNC0-CTA-3 | B             | C2              | 2             | 2            | 110.4          | 8.241         | 0.1049                       | 15                  | BGM, HGM     | 0.006996            | 110.3                          | 8.235                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-C-C1-1-UNC0-CTA-1 | C             | C1              | 3             | 1            | 119.4          | 7.562         | 0.1048                       | 15                  | BAT          | 0.006987            | 119.2                          | 7.548                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-C-C1-1-UNC0-CTA-2 | C             | C1              | 3             | 1            | 79.33          | 8.120         | 0.1050                       | 15                  | BGM, HGM     | 0.007002            | 79.36                          | 8.123                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-C-C1-1-UNC0-CTA-3 | C             | C1              | 3             | 1            | 119.3          | 7.907         | 0.1050                       | 15                  | BAT          | 0.006997            | 119.3                          | 7.903                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-C-C1-1-UNC0-SP-1* | C             | C1              | 3             | 1            | 121.3          |               | 0.1047                       | 15                  | BAT          | 0.006978            | 120.9                          |                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-C-C2-1-UNC0-CTA-1 | C             | C2              | 3             | 2            | 117.1          | 7.902         | 0.1076                       | 15                  | BGM          | 0.007173            | 120.0                          | 8.098                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-C-C2-1-UNC0-CTA-2 | C             | C2              | 3             | 2            | 120.1          | 7.890         | 0.1072                       | 15                  | BAT          | 0.007148            | 122.6                          | 8.057                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-C-C2-1-UNC0-CTA-3 | C             | C2              | 3             | 2            | 117.8          | 7.960         | 0.1057                       | 15                  | BAB          | 0.007049            | 118.7                          | 8.016                         |

\*Specimen was not gaged, only strength is tested.

Average 113.4 8.000  
Standard Dev. 9.721 0.3484  
Coeff. of Var. [%] 8.575 4.355  
Min. 79.33 7.462  
Max. 121.3 8.976  
Number of Spec. 20 19

Average<sub>norm</sub> 0.007020 113.7 8.023  
Standard Dev.<sub>norm</sub> 9.844 0.3060  
Coeff. of Var. [%]<sub>norm</sub> 8.659 3.813  
Min. 0.006780 79.36 7.464  
Max. 0.007173 122.6 8.694  
Number of Spec. 20 20 19



**Laminate Unnotched Compression 0/90 Properties (UNC0)--RTA (70°F)  
Strength & Modulus**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

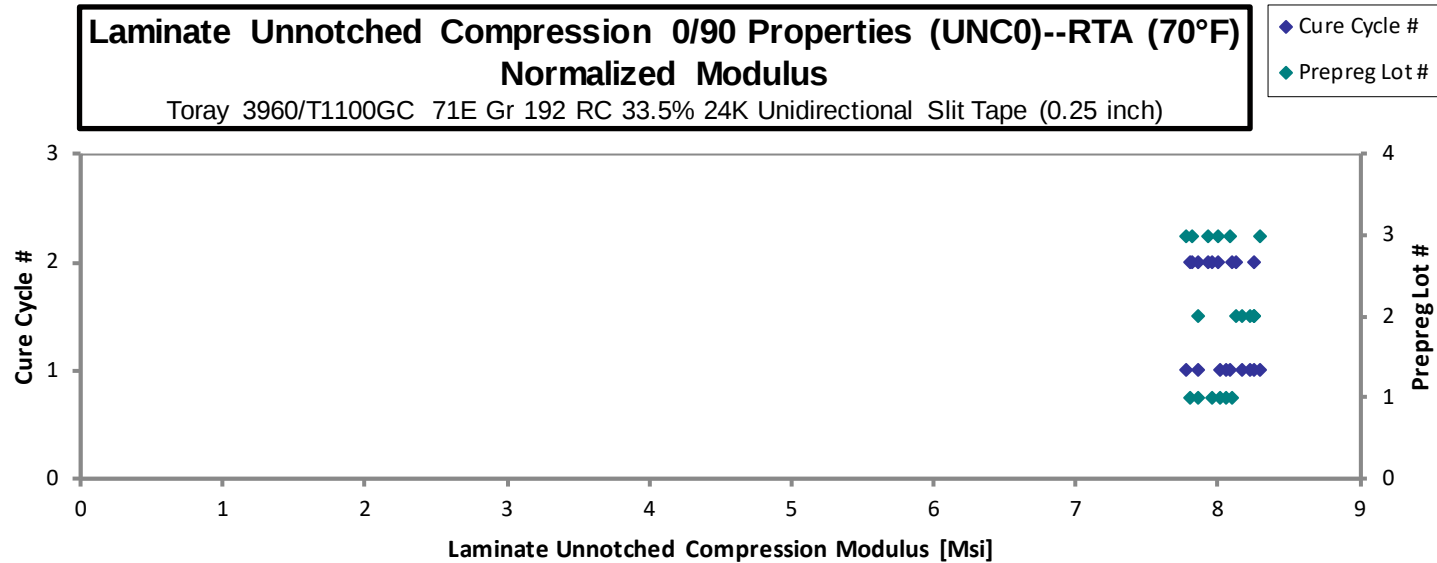
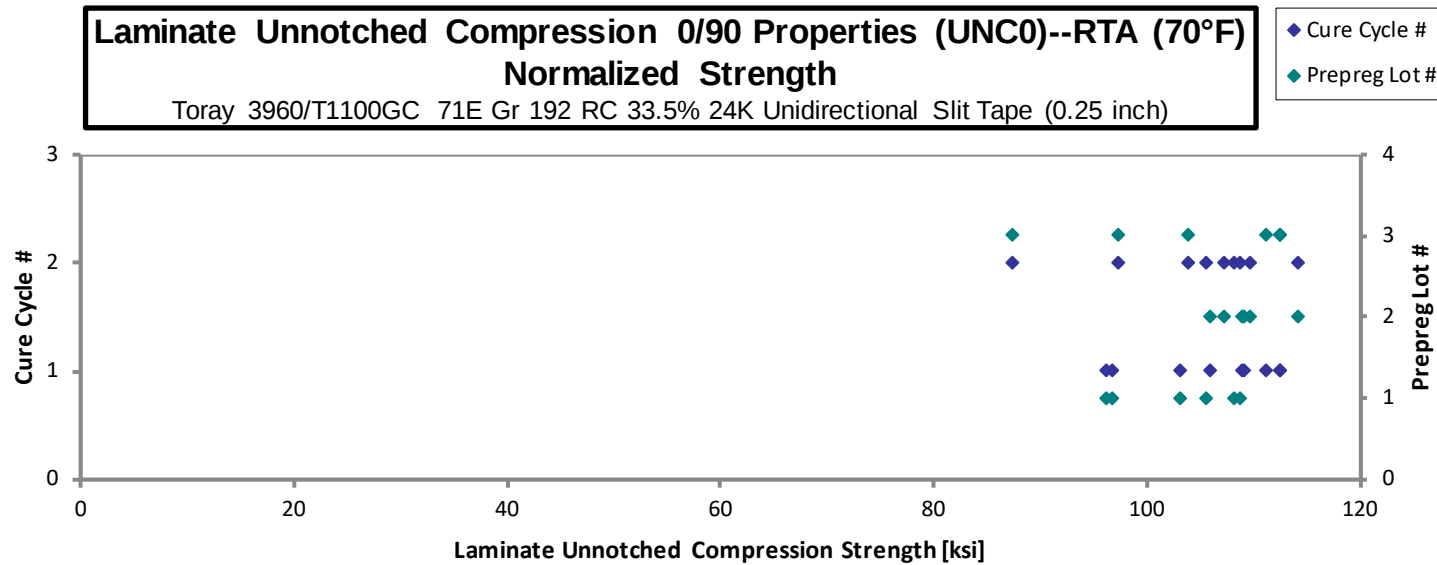
normalizing

$t_{ply}$  [in]  
0.007000

| Specimen Number                                   | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | Strength <sub>norm</sub> [ksi] | Modulus <sub>norm</sub> [Msi] |
|---------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|---------------|------------------------------|---------------------|--------------|---------------------|--------------------------------|-------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C1-1-UNC0-RTA-1* | A             | C1              | 1             | 1            | 102.0          | 7.968         | 0.1063                       | 15                  | BGM          | 0.007083            | 103.2                          | 8.063                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C1-1-UNC0-RTA-2* | A             | C1              | 1             | 1            | 94.79          | 7.853         | 0.1071                       | 15                  | BGM          | 0.007142            | 96.72                          | 8.013                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C1-1-UNC0-RTA-3  | A             | C1              | 1             | 1            | 95.09          | 7.769         | 0.1062                       | 15                  | BGM          | 0.007077            | 96.13                          | 7.854                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C2-1-UNC0-RTA-1* | A             | C2              | 1             | 2            | 107.6          | 8.114         | 0.1030                       | 15                  | BGM          | 0.006868            | 105.6                          | 7.961                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C2-1-UNC0-RTA-2* | A             | C2              | 1             | 2            | 110.4          | 7.925         | 0.1034                       | 15                  | BGM          | 0.006893            | 108.7                          | 7.804                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C2-1-UNC0-RTA-3  | A             | C2              | 1             | 2            | 110.5          | 8.279         | 0.1027                       | 15                  | BGM          | 0.006848            | 108.1                          | 8.099                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-B-C1-1-UNC0-RTA-1* | B             | C1              | 2             | 1            | 108.7          | 8.209         | 0.1053                       | 15                  | BAT          | 0.007019            | 109.0                          | 8.232                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-B-C1-1-UNC0-RTA-2* | B             | C1              | 2             | 1            | 105.1          | 8.177         | 0.1059                       | 15                  | BGM          | 0.007062            | 106.0                          | 8.250                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-B-C1-1-UNC0-RTA-3  | B             | C1              | 2             | 1            | 109.2          | 8.193         | 0.1047                       | 15                  | BAT          | 0.006982            | 108.9                          | 8.172                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-B-C2-1-UNC0-RTA-1* | B             | C2              | 2             | 2            | 109.3          | 8.229         | 0.1054                       | 15                  | BGM          | 0.007023            | 109.7                          | 8.256                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-B-C2-1-UNC0-RTA-2* | B             | C2              | 2             | 2            | 113.7          | 8.093         | 0.1054                       | 15                  | BGM          | 0.007027            | 114.1                          | 8.124                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-B-C2-1-UNC0-RTA-3  | B             | C2              | 2             | 2            | 107.0          | 7.831         | 0.1054                       | 15                  | BGM          | 0.007023            | 107.3                          | 7.857                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-C-C1-1-UNC0-RTA-1* | C             | C1              | 3             | 1            | 112.6          | 8.097         | 0.1049                       | 15                  | BGM          | 0.006991            | 112.5                          | 8.087                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-C-C1-1-UNC0-RTA-2* | C             | C1              | 3             | 1            | 113.1          | 8.343         | 0.1044                       | 15                  | BGM          | 0.006959            | 112.4                          | 8.294                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-C-C1-1-UNC0-RTA-3  | C             | C1              | 3             | 1            | 111.9          | 7.836         | 0.1043                       | 15                  | BGM          | 0.006950            | 111.1                          | 7.780                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-C-C2-1-UNC0-RTA-1* | C             | C2              | 3             | 2            | 103.3          | 7.888         | 0.1056                       | 15                  | BGM          | 0.007040            | 103.9                          | 7.933                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-C-C2-1-UNC0-RTA-2* | C             | C2              | 3             | 2            | 86.63          | 7.933         | 0.1059                       | 15                  | BGM          | 0.007059            | 87.36                          | 7.999                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-C-C2-1-UNC0-RTA-3  | C             | C2              | 3             | 2            | 96.50          | 7.759         | 0.1059                       | 15                  | BGM          | 0.007057            | 97.28                          | 7.822                         |

\*Modulus are averaged values of 2 strain gages.

|                    |       |        |                                    |          |       |        |
|--------------------|-------|--------|------------------------------------|----------|-------|--------|
| Average            | 105.4 | 8.028  | Average <sub>norm</sub>            | 0.007006 | 105.4 | 8.033  |
| Standard Dev.      | 7.617 | 0.1863 | Standard Dev. <sub>norm</sub>      |          | 6.998 | 0.1682 |
| Coeff. of Var. [%] | 7.227 | 2.321  | Coeff. of Var. [%] <sub>norm</sub> |          | 6.637 | 2.094  |
| Min.               | 86.63 | 7.759  | Min.                               | 0.006848 | 87.36 | 7.780  |
| Max.               | 113.7 | 8.343  | Max.                               | 0.007142 | 114.1 | 8.294  |
| Number of Spec.    | 18    | 18     | Number of Spec.                    | 18       | 18    | 18     |



**Laminate Unnotched Compression 0/90 Properties (UNC0)--ETA1 (180°F)  
Strength & Modulus**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

$t_{ply}$  [in]

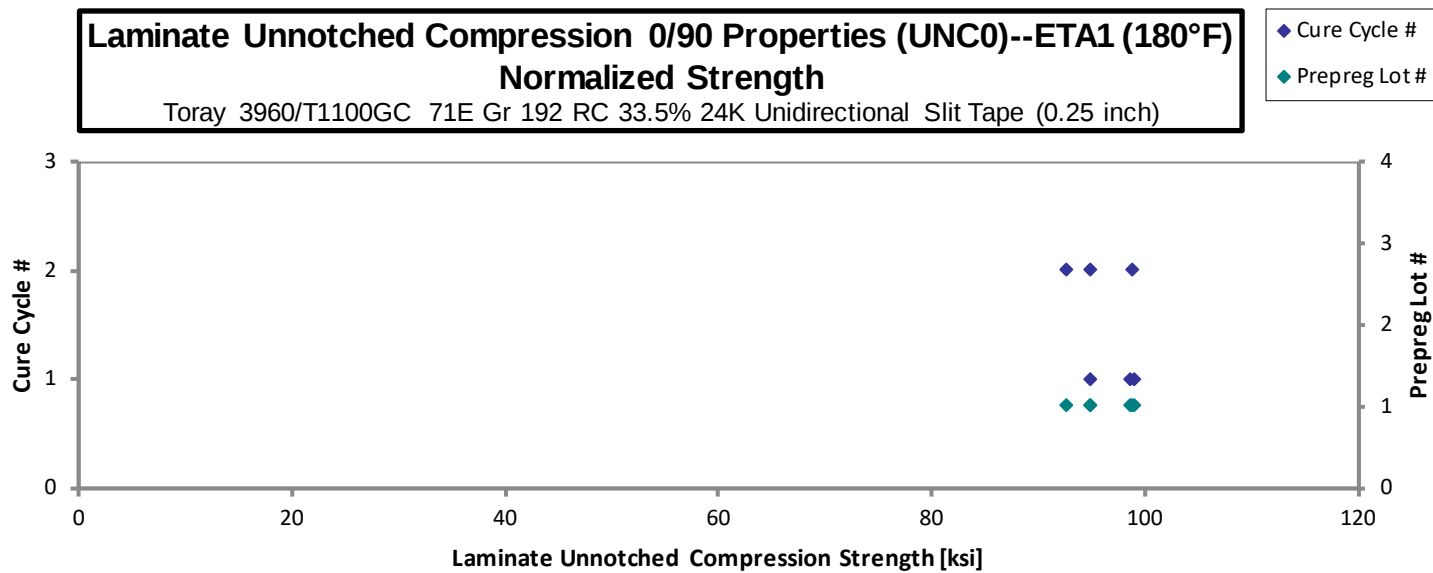
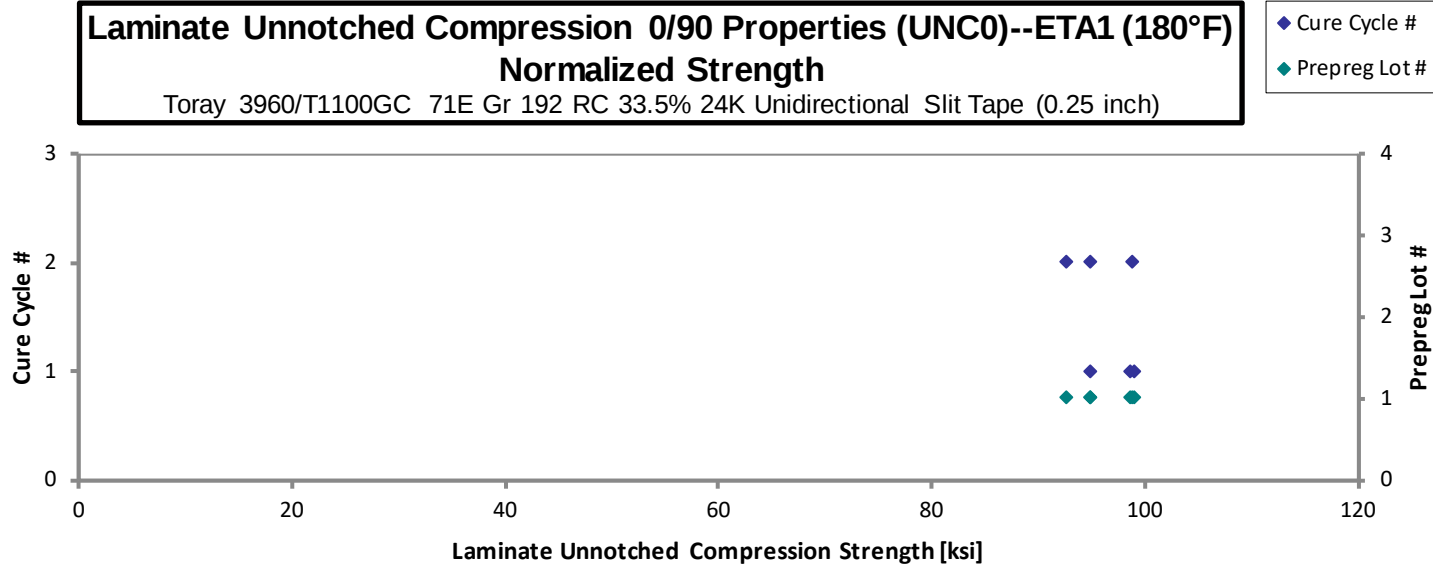
0.007000

| Specimen Number                                   | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode |
|---------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|---------------|------------------------------|---------------------|--------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C1-1-UNC0-ETA1-1 | A             | C1              | 1             | 1            | 97.06          | 7.762         | 0.1066                       | 15                  | BGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C1-1-UNC0-ETA1-2 | A             | C1              | 1             | 1            | 93.94          | 7.795         | 0.1060                       | 15                  | BGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C1-1-UNC0-ETA1-3 | A             | C1              | 1             | 1            | 98.24          | 7.999         | 0.1057                       | 15                  | BAT          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C2-1-UNC0-ETA1-1 | A             | C2              | 1             | 2            | 94.13          | 8.061         | 0.1034                       | 15                  | BAT          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C2-1-UNC0-ETA1-2 | A             | C2              | 1             | 2            | 96.26          | 8.091         | 0.1035                       | 15                  | BGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C2-1-UNC0-ETA1-3 | A             | C2              | 1             | 2            | 100.6          | 7.839         | 0.1032                       | 15                  | BGM          |

| Avg. $t_{ply}$ [in] | Strength <sub>norm</sub> [ksi] | Modulus <sub>norm</sub> [Msi] |
|---------------------|--------------------------------|-------------------------------|
| 0.007106            | 98.52                          | 7.879                         |
| 0.007068            | 94.85                          | 7.871                         |
| 0.007048            | 98.92                          | 8.054                         |
| 0.006890            | 92.65                          | 7.934                         |
| 0.006901            | 94.90                          | 7.976                         |
| 0.006880            | 98.86                          | 7.704                         |

Average 96.70 7.924  
Standard Dev. 2.533 0.1430  
Coeff. of Var. [%] 2.619 1.805  
Min. 93.94 7.762  
Max. 100.6 8.091  
Number of Spec. 6 6

Average<sub>norm</sub> 0.006982 96.45 7.903  
Standard Dev.<sub>norm</sub> 2.670 0.1185  
Coeff. of Var. [%]<sub>norm</sub> 2.768 1.499  
Min. 0.006880 92.65 7.704  
Max. 0.007106 98.92 8.054  
Number of Spec. 6 6 6



**Laminate Unnotched Compression 0/90 Properties (UNC0)--ETA2 (250°F)  
Strength & Modulus**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

$t_{ply}$  [in]

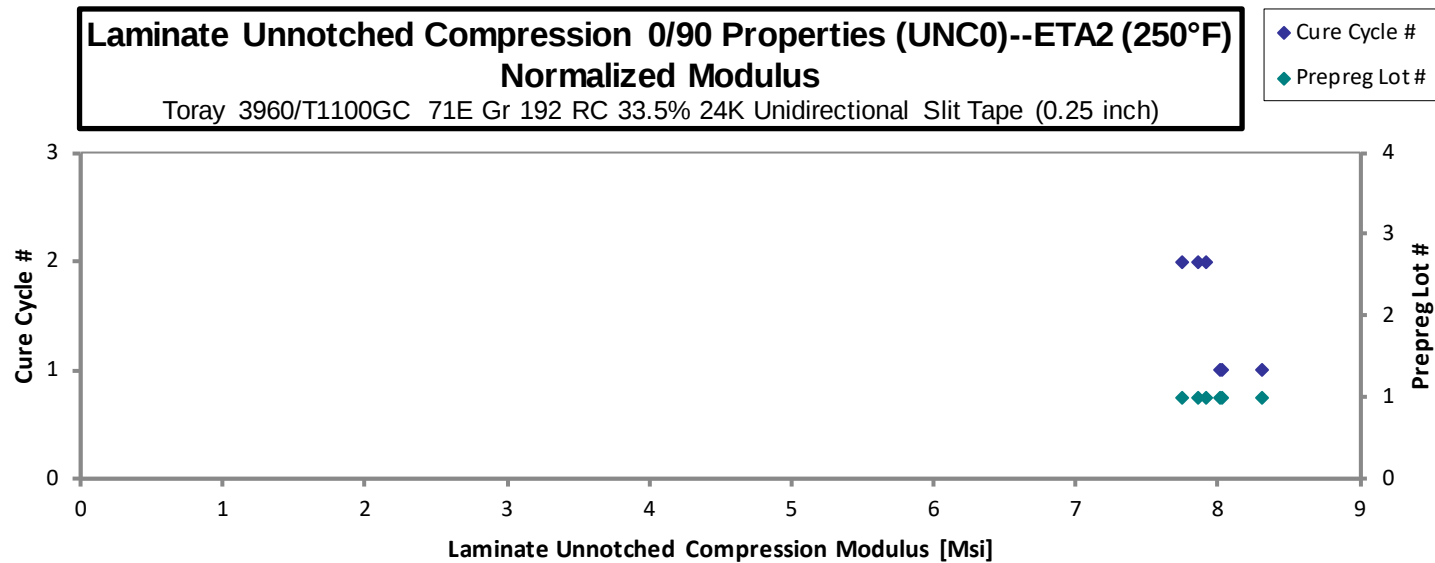
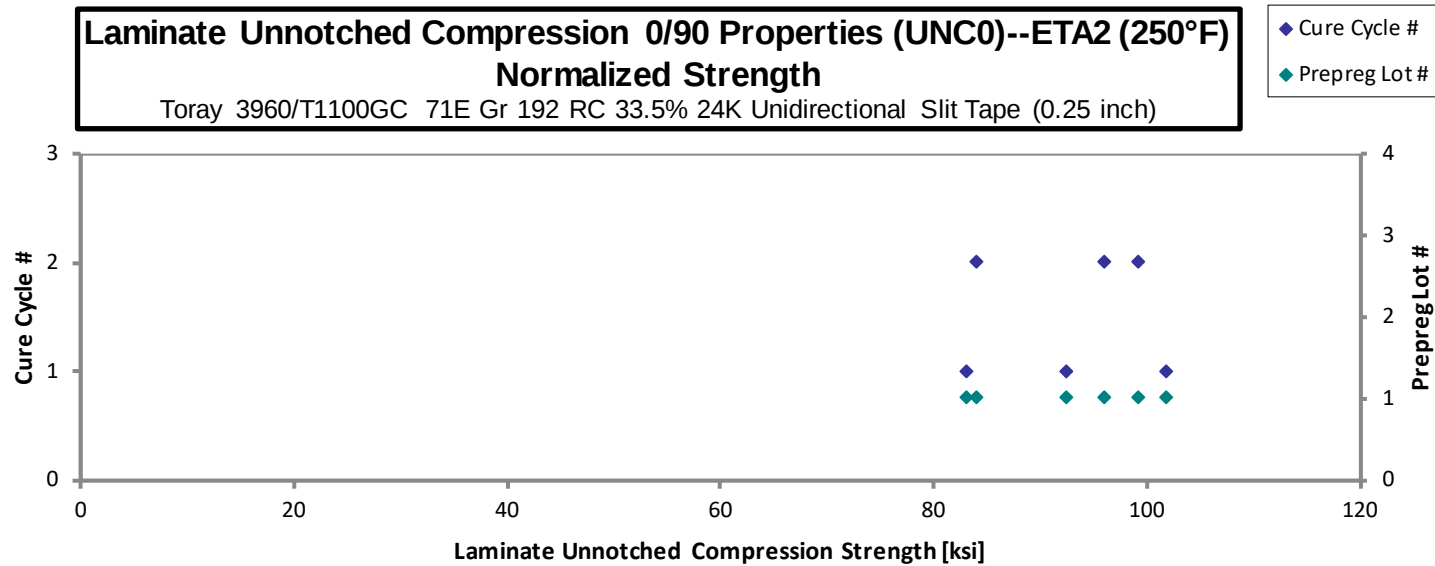
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| Specimen Number                                   | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode |
|---------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|---------------|------------------------------|---------------------|--------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C1-1-UNC0-ETA2-1 | A             | C1              | 1             | 1            | 101.5          | 7.998         | 0.1054                       | 15                  | BAB          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C1-1-UNC0-ETA2-2 | A             | C1              | 1             | 1            | 91.66          | 7.953         | 0.1058                       | 15                  | BAT          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C1-1-UNC0-ETA2-3 | A             | C1              | 1             | 1            | 82.39          | 8.243         | 0.1058                       | 15                  | BGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C2-1-UNC0-ETA2-1 | A             | C2              | 1             | 2            | 97.19          | 7.855         | 0.1036                       | 15                  | BGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C2-1-UNC0-ETA2-2 | A             | C2              | 1             | 2            | 85.81          | 8.037         | 0.1027                       | 15                  | BGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C2-1-UNC0-ETA2-3 | A             | C2              | 1             | 2            | 100.9          | 8.056         | 0.1032                       | 15                  | BAB          |

| Avg. $t_{ply}$ [in] | Strength <sub>norm</sub> [ksi] | Modulus <sub>norm</sub> [Msi] |
|---------------------|--------------------------------|-------------------------------|
| 0.007024            | 101.9                          | 8.026                         |
| 0.007053            | 92.36                          | 8.013                         |
| 0.007054            | 83.03                          | 8.307                         |
| 0.006908            | 95.91                          | 7.752                         |
| 0.006849            | 83.96                          | 7.864                         |
| 0.006877            | 99.09                          | 7.914                         |

Average 93.24 8.024  
 Standard Dev. 7.969 0.1293  
 Coeff. of Var. [%] 8.547 1.612  
 Min. 82.39 7.855  
 Max. 101.5 8.243  
 Number of Spec. 6 6

Average<sub>norm</sub> 0.006961 92.70 7.979  
 Standard Dev.<sub>norm</sub> 7.812 0.1900  
 Coeff. of Var. [%]<sub>norm</sub> 8.427 2.381  
 Min. 0.006849 83.03 7.752  
 Max. 0.007054 101.9 8.307  
 Number of Spec. 6 6 6



January 2, 2026

CAM-RP-2023-002 Rev B

**Laminate Unnotched Compression 0/90 Properties (UNC0)--ETW1 (180°F)  
Strength & Modulus**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

$t_{ply}$  [in]

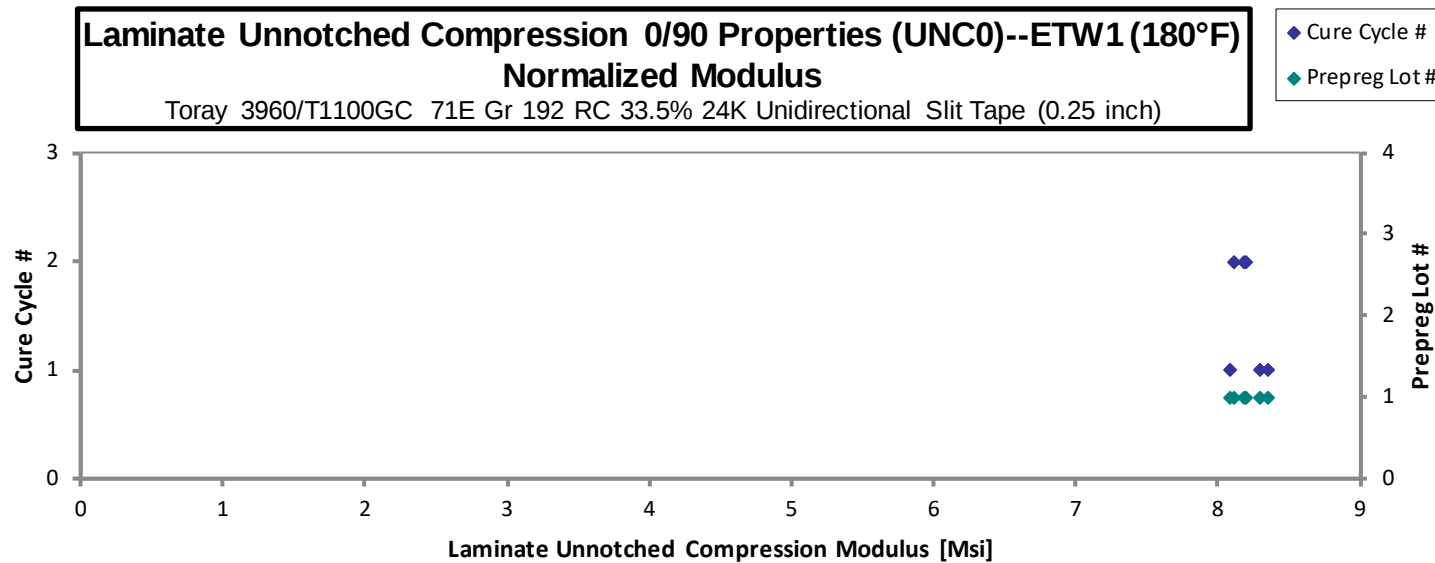
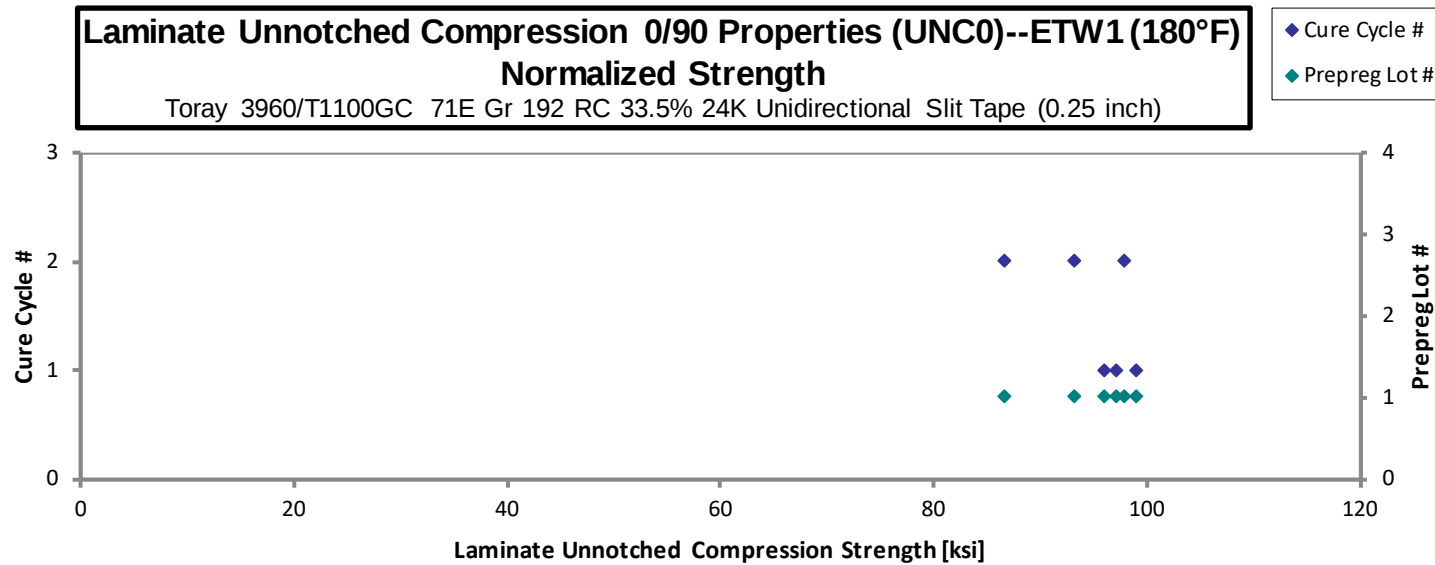
0.007000

| Specimen Number                                   | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode |
|---------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|---------------|------------------------------|---------------------|--------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C1-1-UNC0-ETW1-1 | A             | C1              | 1             | 1            | 97.65          | 8.245         | 0.1064                       | 15                  | BGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C1-1-UNC0-ETW1-2 | A             | C1              | 1             | 1            | 94.95          | 7.994         | 0.1062                       | 15                  | BGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C1-1-UNC0-ETW1-3 | A             | C1              | 1             | 1            | 96.17          | 8.214         | 0.1061                       | 15                  | BGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C2-1-UNC0-ETW1-1 | A             | C2              | 1             | 2            | 88.35          | 8.361         | 0.1029                       | 15                  | BGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C2-1-UNC0-ETW1-2 | A             | C2              | 1             | 2            | 99.77          | 8.341         | 0.1029                       | 15                  | BGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C2-1-UNC0-ETW1-3 | A             | C2              | 1             | 2            | 94.55          | 8.233         | 0.1034                       | 15                  | BGM          |

| Avg. $t_{ply}$ [in] | Strength <sub>norm</sub> [ksi] | Modulus <sub>norm</sub> [Msi] |
|---------------------|--------------------------------|-------------------------------|
| 0.007091            | 98.92                          | 8.352                         |
| 0.007081            | 96.05                          | 8.087                         |
| 0.007071            | 97.15                          | 8.297                         |
| 0.006857            | 86.54                          | 8.190                         |
| 0.006862            | 97.81                          | 8.177                         |
| 0.006894            | 93.13                          | 8.109                         |

Average 95.24 8.231  
Standard Dev. 3.878 0.1310  
Coeff. of Var. [%] 4.071 1.591  
Min. 88.35 7.994  
Max. 99.77 8.361  
Number of Spec. 6 6

Average<sub>norm</sub> 0.006976 94.93 8.202  
Standard Dev<sub>norm</sub> 4.560 0.1044  
Coeff. of Var. [%]<sub>norm</sub> 4.803 1.273  
Min. 0.006857 86.54 8.087  
Max. 0.007091 98.92 8.352  
Number of Spec. 6 6 6



**Laminate Unnotched Compression 0/90 Properties (UNC0)--ETW2 (250°F)  
Strength & Modulus**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

t<sub>ply</sub> [in]

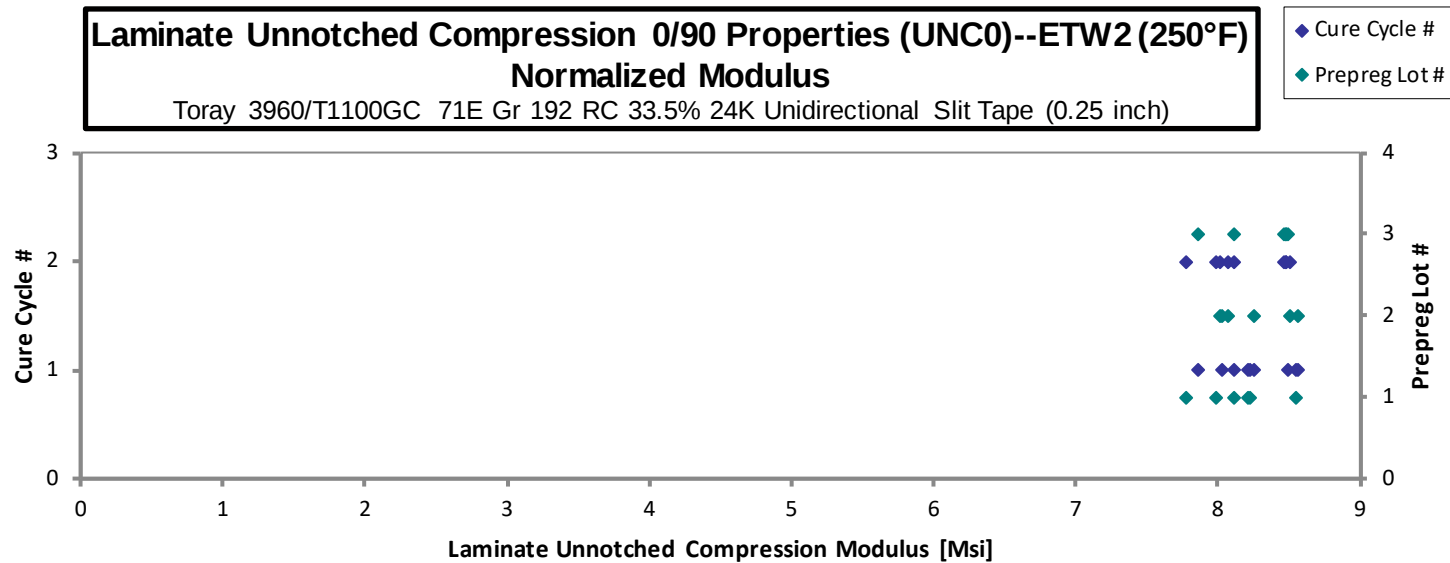
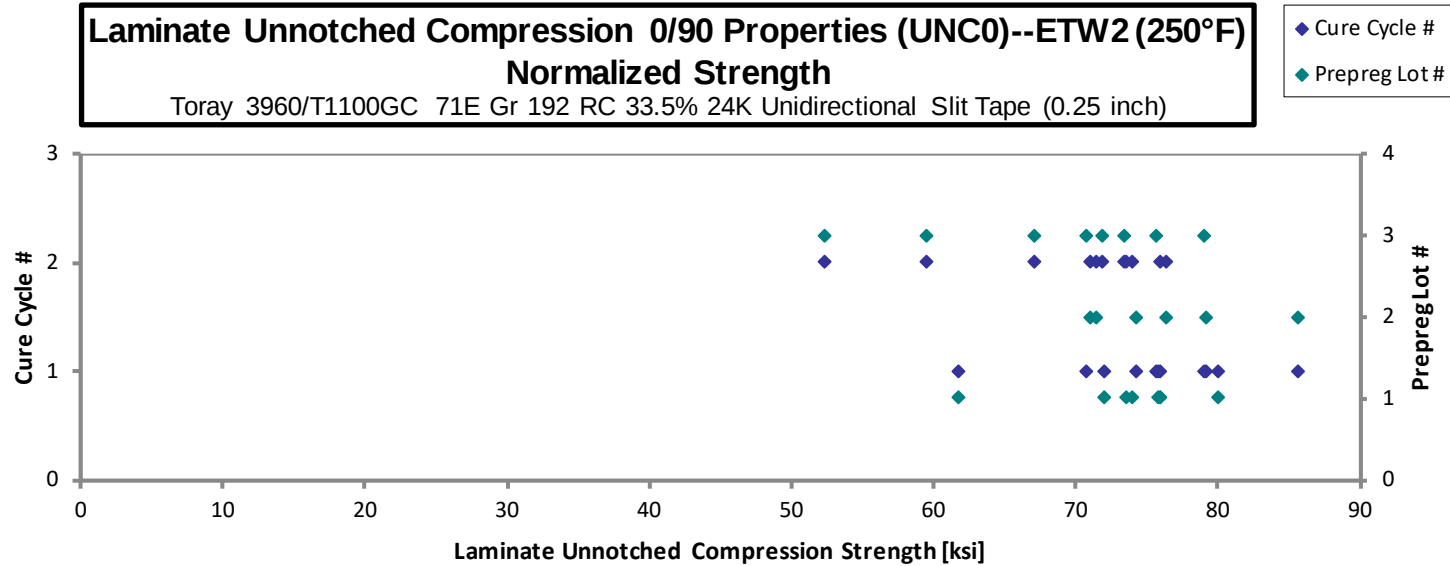
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| Specimen Number                                   | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. t <sub>ply</sub> [in] | Strength <sub>norm</sub> [ksi] | Modulus <sub>norm</sub> [Msi] |
|---------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|---------------|------------------------------|---------------------|--------------|----------------------------|--------------------------------|-------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C1-1-UNC0-ETW2-1 | A             | C1              | 1             | 1            | 78.94          | 8.116         | 0.1064                       | 15                  | BGM          | 0.007090                   | 79.96                          | 8.221                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C1-1-UNC0-ETW2-2 | A             | C1              | 1             | 1            | 61.53          | 8.186         | 0.1053                       | 15                  | BGM          | 0.007020                   | 61.70                          | 8.210                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C1-1-UNC0-ETW2-3 | A             | C1              | 1             | 1            | 75.50          | 8.514         | 0.1054                       | 15                  | BGM          | 0.007026                   | 75.78                          | 8.546                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C1-1-UNC0-SP-11* | A             | C1              | 1             | 1            | 75.42          |               | 0.1058                       | 15                  | BGM          | 0.007052                   | 75.98                          |                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C1-1-UNC0-SP-12* | A             | C1              | 1             | 1            | 71.61          |               | 0.1056                       | 15                  | BGM          | 0.007042                   | 72.04                          |                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C2-1-UNC0-ETW2-1 | A             | C2              | 1             | 2            | 74.87          | 7.917         | 0.1032                       | 15                  | BGM          | 0.006877                   | 73.55                          | 7.778                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C2-1-UNC0-ETW2-2 | A             | C2              | 1             | 2            | 75.79          | 8.180         | 0.1026                       | 15                  | BGM          | 0.006837                   | 74.02                          | 7.989                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C2-1-UNC0-ETW2-3 | A             | C2              | 1             | 2            | 77.95          | 8.327         | 0.1023                       | 15                  | BGM          | 0.006821                   | 75.96                          | 8.114                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-B-C1-1-UNC0-ETW2-1 | B             | C1              | 2             | 1            | 86.12          | 8.302         | 0.1044                       | 15                  | BGM          | 0.006961                   | 85.64                          | 8.256                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-B-C1-1-UNC0-ETW2-2 | B             | C1              | 2             | 1            | 74.01          | 8.010         | 0.1052                       | 15                  | BAB          | 0.007016                   | 74.18                          | 8.028                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-B-C1-1-UNC0-ETW2-3 | B             | C1              | 2             | 1            | 78.47          | 8.485         | 0.1059                       | 15                  | BGM          | 0.007061                   | 79.16                          | 8.559                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-B-C2-1-UNC0-ETW2-1 | B             | C2              | 2             | 2            | 75.94          | 8.030         | 0.1056                       | 15                  | BGM          | 0.007038                   | 76.35                          | 8.074                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-B-C2-1-UNC0-ETW2-2 | B             | C2              | 2             | 2            | 70.69          | 7.986         | 0.1054                       | 15                  | BGM          | 0.007026                   | 70.95                          | 8.015                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-B-C2-1-UNC0-ETW2-3 | B             | C2              | 2             | 2            | 71.07          | 8.464         | 0.1055                       | 15                  | BGM          | 0.007034                   | 71.42                          | 8.505                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-C-C1-1-UNC0-ETW2-1 | C             | C1              | 3             | 1            | 71.57          | 7.942         | 0.1038                       | 15                  | M(B,H)GM     | 0.006921                   | 70.77                          | 7.853                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-C-C1-1-UNC0-ETW2-2 | C             | C1              | 3             | 1            | 76.12          | 8.548         | 0.1043                       | 15                  | BGM          | 0.006952                   | 75.60                          | 8.490                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-C-C1-1-UNC0-ETW2-3 | C             | C1              | 3             | 1            | 78.33          | 8.037         | 0.1059                       | 15                  | BGM          | 0.007060                   | 79.00                          | 8.106                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-C-C2-1-UNC0-ETW2-1 | C             | C2              | 3             | 2            | 58.87          | 8.378         | 0.1062                       | 15                  | BGM          | 0.007079                   | 59.53                          | 8.473                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-C-C2-1-UNC0-ETW2-2 | C             | C2              | 3             | 2            | 51.70          | 8.364         | 0.1063                       | 15                  | BGM          | 0.007088                   | 52.35                          | 8.469                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-C-C2-1-UNC0-ETW2-3 | C             | C2              | 3             | 2            | 72.49          | 8.377         | 0.1062                       | 15                  | BGM          | 0.007082                   | 73.34                          | 8.476                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-C-C2-1-UNC0-SP-5*  | C             | C2              | 3             | 2            | 66.66          |               | 0.1056                       | 15                  | BGM          | 0.007039                   | 67.03                          |                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST2-C-C2-1-UNC0-SP-6*  | C             | C2              | 3             | 2            | 71.78          |               | 0.1052                       | 15                  | BGM          | 0.007011                   | 71.89                          |                               |

\*Specimen was not gaged, only strength is tested.

Average 72.52 8.231  
Standard Dev. 7.458 0.2116  
Coeff. of Var. [%] 10.28 2.570  
Min. 51.70 7.917  
Max. 86.12 8.548  
Number of Spec. 22 18

Average<sub>norm</sub> 0.007006 72.55 8.231  
Standard Dev.<sub>norm</sub> 7.267 0.2513  
Coeff. of Var. [%]<sub>norm</sub> 10.02 3.053  
Min. 0.006821 52.35 7.778  
Max. 0.007090 85.64 8.559  
Number of Spec. 22 22 18



## 4.12 “25/50/25” Unnotched Compression 1 Properties (UNC1)

**Laminate Unnotched Compression Properties (UNC1)--RTA (70°F)**  
**Strength & Modulus**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

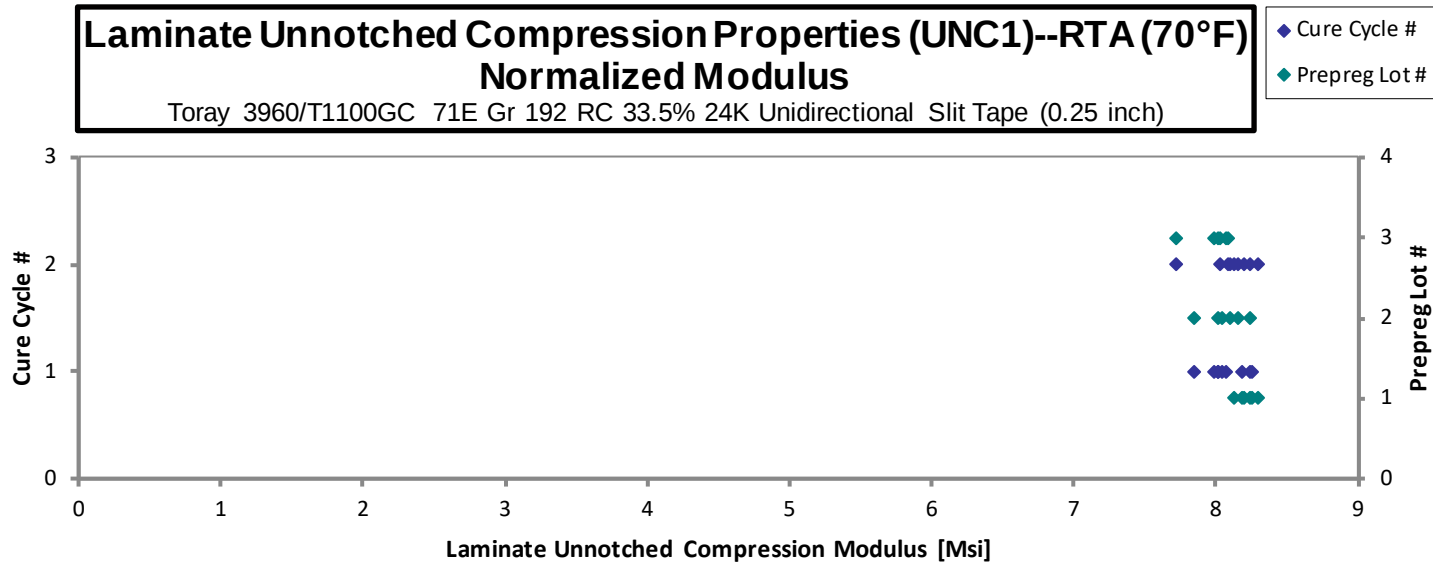
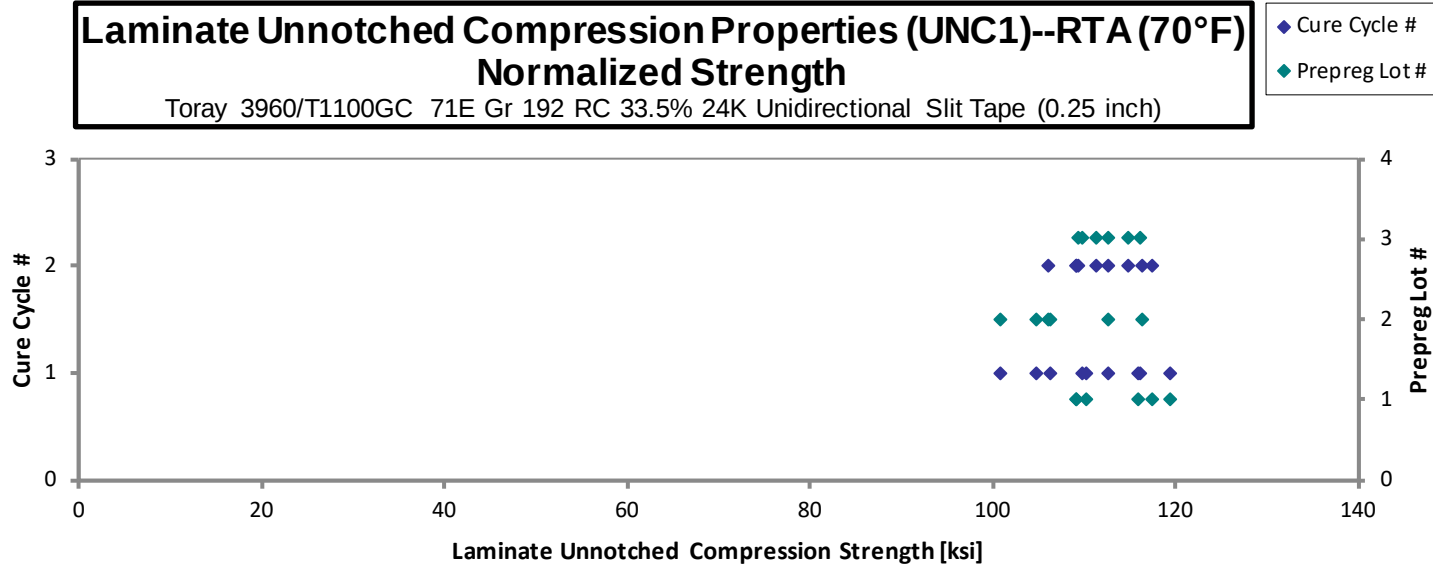
 $t_{ply}$  [in]

0.007000

| Specimen Number                                   | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | Strength <sub>norm</sub> [ksi] | Modulus <sub>norm</sub> [Msi] |
|---------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|---------------|------------------------------|---------------------|--------------|---------------------|--------------------------------|-------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-UNC1-RTA-1* | A             | C1              | 1             | 1            | 118.9          | 8.227         | 0.1124                       | 16                  | BGM          | 0.007026            | 119.4                          | 8.258                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-UNC1-RTA-2* | A             | C1              | 1             | 1            | 110.7          | 8.265         | 0.1116                       | 16                  | BGM          | 0.006972            | 110.3                          | 8.232                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-UNC1-RTA-3  | A             | C1              | 1             | 1            | 116.7          | 8.232         | 0.1113                       | 16                  | BGM          | 0.006953            | 115.9                          | 8.177                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-UNC1-RTA-1* | A             | C2              | 1             | 2            | 117.2          | 8.266         | 0.1124                       | 16                  | BGM          | 0.007023            | 117.5                          | 8.293                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-UNC1-RTA-2* | A             | C2              | 1             | 2            | 109.2          | 8.201         | 0.1119                       | 16                  | BGM          | 0.006995            | 109.1                          | 8.194                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-UNC1-RTA-3  | A             | C2              | 1             | 2            | 110.5          | 8.215         | 0.1108                       | 16                  | BGM          | 0.006924            | 109.3                          | 8.126                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C1-1-UNC1-RTA-1* | B             | C1              | 2             | 1            | 103.5          | 7.912         | 0.1134                       | 16                  | BGM          | 0.007084            | 104.8                          | 8.007                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C1-1-UNC1-RTA-2* | B             | C1              | 2             | 1            | 106.4          | 8.047         | 0.1119                       | 16                  | BGM          | 0.006991            | 106.2                          | 8.037                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C1-1-UNC1-RTA-3  | B             | C1              | 2             | 1            | 101.5          | 7.907         | 0.1112                       | 16                  | BGM          | 0.006952            | 100.8                          | 7.853                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C2-1-UNC1-RTA-1* | B             | C2              | 2             | 2            | 116.4          | 8.149         | 0.1120                       | 16                  | BGM          | 0.007002            | 116.4                          | 8.152                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C2-1-UNC1-RTA-2* | B             | C2              | 2             | 2            | 113.7          | 8.167         | 0.1110                       | 16                  | BGM          | 0.006938            | 112.7                          | 8.094                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C2-1-UNC1-RTA-3  | B             | C2              | 2             | 2            | 106.8          | 8.302         | 0.1112                       | 16                  | BGM          | 0.006952            | 106.0                          | 8.245                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C1-1-UNC1-RTA-1* | C             | C1              | 3             | 1            | 107.9          | 7.856         | 0.1139                       | 16                  | BGM          | 0.007120            | 109.7                          | 7.990                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C1-1-UNC1-RTA-2* | C             | C1              | 3             | 1            | 111.5          | 7.933         | 0.1131                       | 16                  | BGM          | 0.007071            | 112.6                          | 8.013                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C1-1-UNC1-RTA-3  | C             | C1              | 3             | 1            | 115.5          | 8.021         | 0.1127                       | 16                  | BGM          | 0.007045            | 116.2                          | 8.072                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C2-1-UNC1-RTA-1* | C             | C2              | 3             | 2            | 108.2          | 7.937         | 0.1132                       | 16                  | BGM          | 0.007075            | 109.4                          | 8.022                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C2-1-UNC1-RTA-2* | C             | C2              | 3             | 2            | 114.6          | 8.077         | 0.1122                       | 16                  | BGM          | 0.007011            | 114.8                          | 8.090                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C2-1-UNC1-RTA-3  | C             | C2              | 3             | 2            | 110.8          | 7.696         | 0.1124                       | 16                  | BGM          | 0.007027            | 111.2                          | 7.726                         |

\*Modulus are averaged values of 2 strain gages.

|                           |              |               |                                          |                 |              |               |
|---------------------------|--------------|---------------|------------------------------------------|-----------------|--------------|---------------|
| <b>Average</b>            | <b>111.1</b> | <b>8.078</b>  | <b>Average<sub>norm</sub></b>            | <b>0.007009</b> | <b>111.2</b> | <b>8.088</b>  |
| <b>Standard Dev.</b>      | <b>4.905</b> | <b>0.1733</b> | <b>Standard Dev.<sub>norm</sub></b>      |                 | <b>4.934</b> | <b>0.1448</b> |
| <b>Coeff. of Var. [%]</b> | <b>4.415</b> | <b>2.145</b>  | <b>Coeff. of Var. [%]<sub>norm</sub></b> |                 | <b>4.435</b> | <b>1.791</b>  |
| <b>Min.</b>               | <b>101.5</b> | <b>7.696</b>  | <b>Min.</b>                              | <b>0.006924</b> | <b>100.8</b> | <b>7.726</b>  |
| <b>Max.</b>               | <b>118.9</b> | <b>8.302</b>  | <b>Max.</b>                              | <b>0.007120</b> | <b>119.4</b> | <b>8.293</b>  |
| <b>Number of Spec.</b>    | <b>18</b>    | <b>18</b>     | <b>Number of Spec.</b>                   | <b>18</b>       | <b>18</b>    | <b>18</b>     |



**Laminate Unnotched Compression Properties (UNC1)--ETW1 (180°F)**  
**Strength & Modulus**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

 $t_{ply}$  [in]

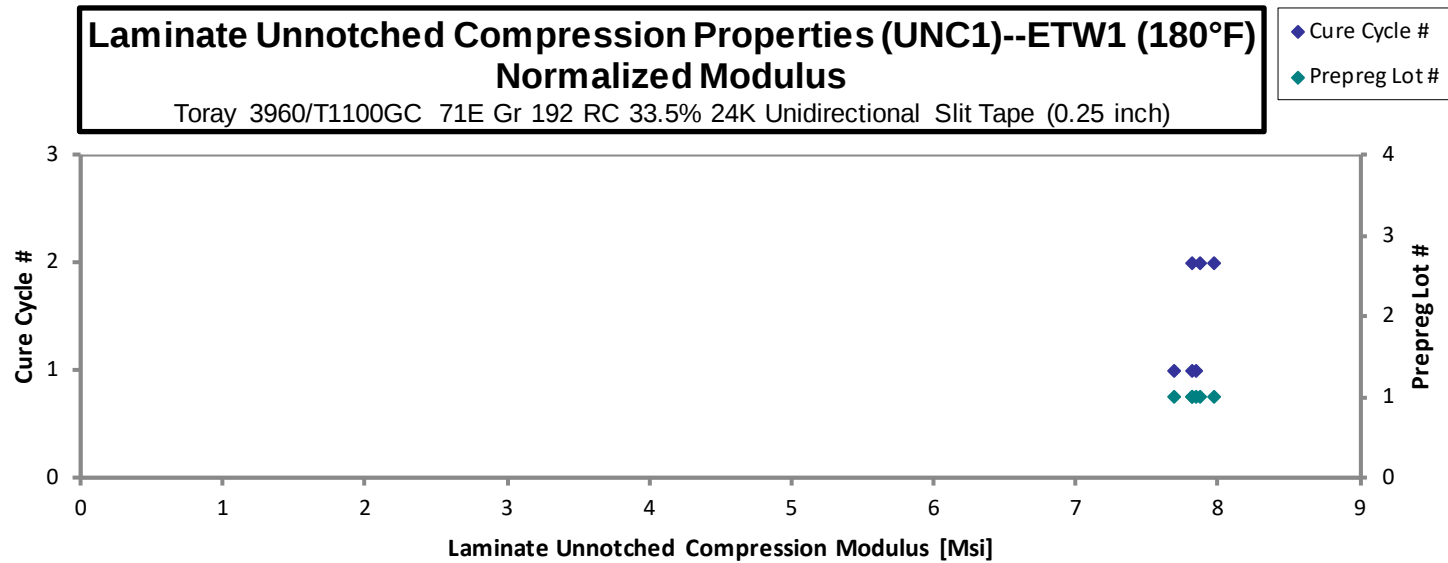
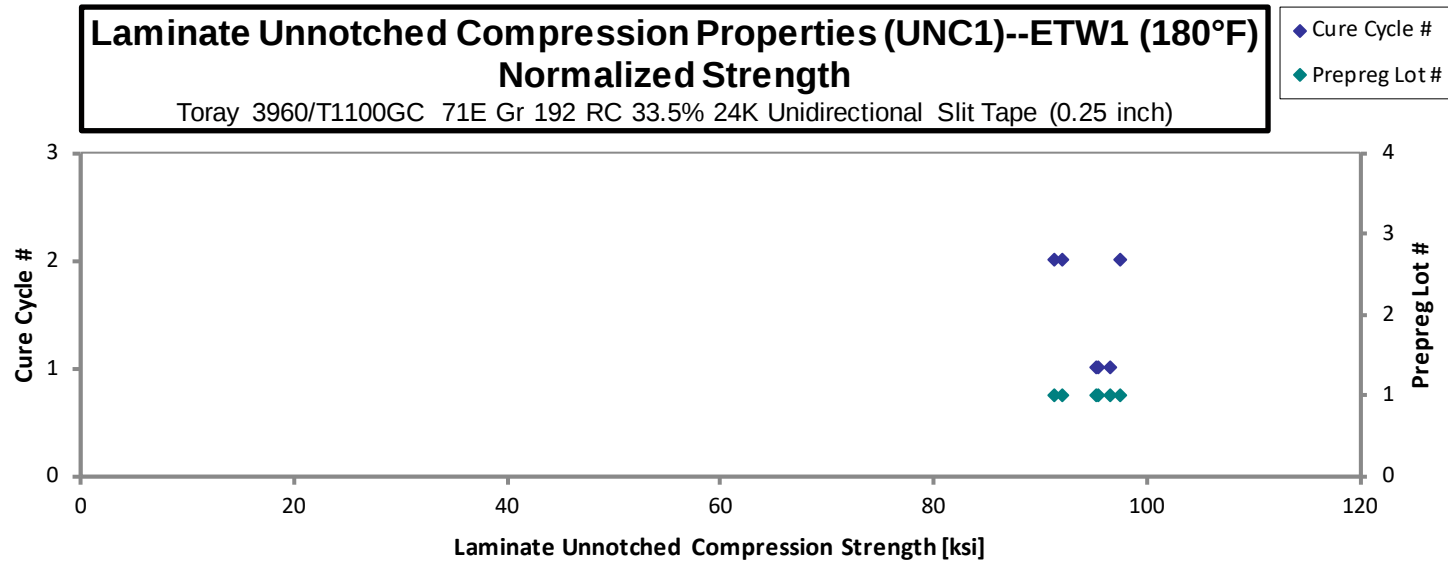
0.007000

| Specimen Number                                   | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode |
|---------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|---------------|------------------------------|---------------------|--------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-UNC1-ETW1-1 | A             | C1              | 1             | 1            | 96.87          | 7.882         | 0.1116                       | 16                  | BGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-UNC1-ETW1-2 | A             | C1              | 1             | 1            | 95.51          | 7.703         | 0.1119                       | 16                  | BGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-UNC1-ETW1-3 | A             | C1              | 1             | 1            | 95.22          | 7.819         | 0.1121                       | 16                  | BGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-UNC1-ETW1-1 | A             | C2              | 1             | 2            | 91.64          | 7.998         | 0.1116                       | 16                  | BGM          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-UNC1-ETW1-2 | A             | C2              | 1             | 2            | 92.92          | 7.882         | 0.1110                       | 16                  | BAB          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-UNC1-ETW1-3 | A             | C2              | 1             | 2            | 97.74          | 7.898         | 0.1118                       | 16                  | BGM          |

| Avg. $t_{ply}$ [in] | Strength <sub>norm</sub> [ksi] | Modulus <sub>norm</sub> [Msi] |
|---------------------|--------------------------------|-------------------------------|
| 0.006972            | 96.48                          | 7.850                         |
| 0.006993            | 95.41                          | 7.695                         |
| 0.007004            | 95.27                          | 7.823                         |
| 0.006975            | 91.32                          | 7.969                         |
| 0.006940            | 92.12                          | 7.814                         |
| 0.006984            | 97.52                          | 7.880                         |

Average 94.98 7.864  
Standard Dev. 2.320 0.09751  
Coeff. of Var. [%] 2.443 1.240  
Min. 91.64 7.703  
Max. 97.74 7.998  
Number of Spec. 6 6

Average<sub>norm</sub> 0.006978 94.69 7.839  
Standard Dev.<sub>norm</sub> 2.454 0.08973  
Coeff. of Var. [%]<sub>norm</sub> 2.591 1.145  
Min. 0.006940 91.32 7.695  
Max. 0.007004 97.52 7.969  
Number of Spec. 6 6 6



**Laminate Unnotched Compression Properties (UNC1)--ETW2 (250°F)  
Strength & Modulus**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

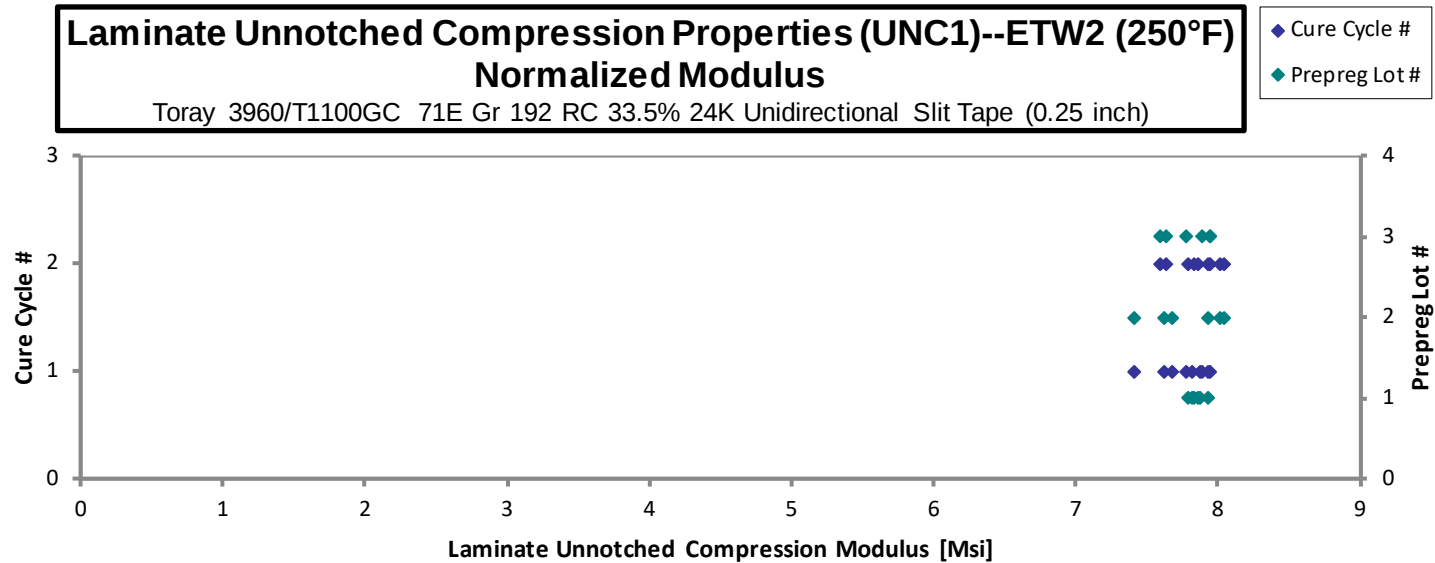
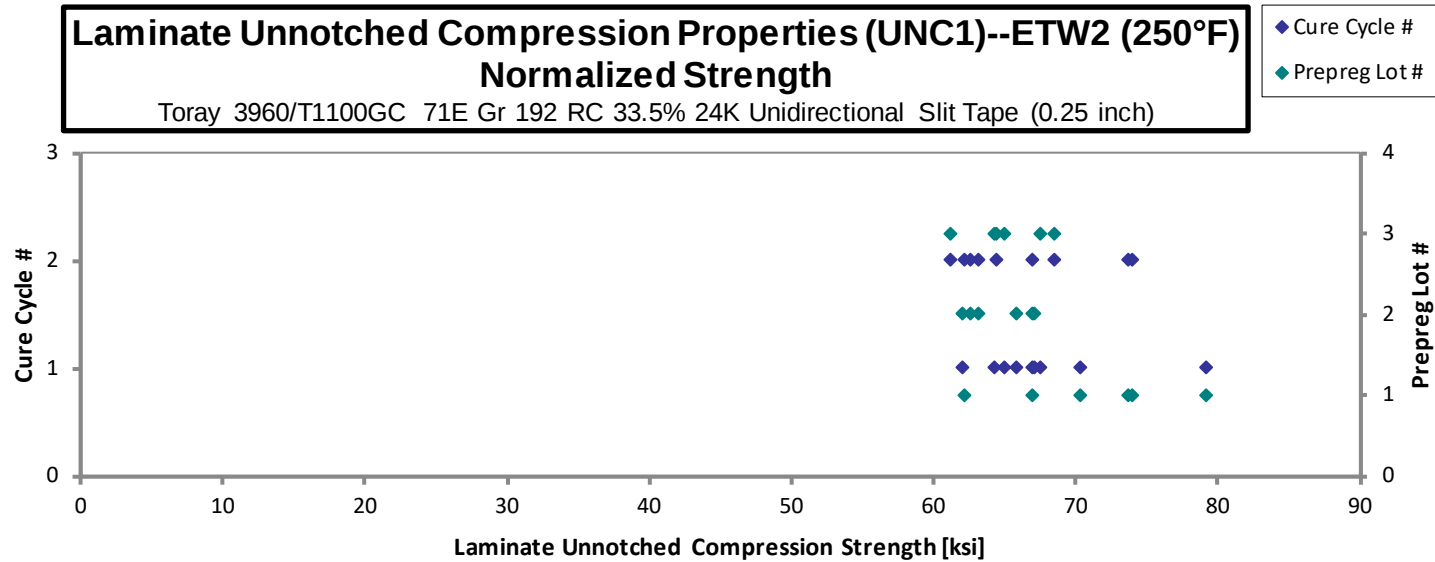
$t_{ply}$  [in]

0.007000

| Specimen Number                                   | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | Strength <sub>norm</sub> [ksi] | Modulus <sub>norm</sub> [Msi] |
|---------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|---------------|------------------------------|---------------------|--------------|---------------------|--------------------------------|-------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-UNC1-ETW2-1 | A             | C1              | 1             | 1            | 79.35          | 7.839         | 0.1118                       | 16                  | BGM          | 0.006985            | 79.19                          | 7.822                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-UNC1-ETW2-2 | A             | C1              | 1             | 1            | 67.06          | 7.881         | 0.1119                       | 16                  | BGM          | 0.006991            | 66.97                          | 7.870                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-UNC1-ETW2-3 | A             | C1              | 1             | 1            | 70.11          | 7.915         | 0.1122                       | 16                  | BGM          | 0.007015            | 70.26                          | 7.931                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-UNC1-ETW2-1 | A             | C2              | 1             | 2            | 74.13          | 7.912         | 0.1113                       | 16                  | BGM          | 0.006953            | 73.63                          | 7.859                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-UNC1-ETW2-2 | A             | C2              | 1             | 2            | 74.43          | 7.891         | 0.1112                       | 16                  | BGM          | 0.006951            | 73.91                          | 7.836                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-UNC1-ETW2-3 | A             | C2              | 1             | 2            | 62.57          | 7.828         | 0.1114                       | 16                  | BGM          | 0.006959            | 62.20                          | 7.783                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C1-1-UNC1-ETW2-1 | B             | C1              | 2             | 1            | 67.40          | 7.446         | 0.1115                       | 16                  | BGM          | 0.006969            | 67.10                          | 7.413                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C1-1-UNC1-ETW2-2 | B             | C1              | 2             | 1            | 62.06          | 7.683         | 0.1119                       | 16                  | BGM          | 0.006995            | 62.01                          | 7.677                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C1-1-UNC1-ETW2-3 | B             | C1              | 2             | 1            | 65.58          | 7.591         | 0.1124                       | 16                  | BGM          | 0.007023            | 65.79                          | 7.615                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C2-1-UNC1-ETW2-1 | B             | C2              | 2             | 2            | 67.29          | 8.060         | 0.1113                       | 16                  | BGM          | 0.006957            | 66.88                          | 8.011                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C2-1-UNC1-ETW2-2 | B             | C2              | 2             | 2            | 62.85          | 8.074         | 0.1116                       | 16                  | BGM          | 0.006977            | 62.64                          | 8.048                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C2-1-UNC1-ETW2-3 | B             | C2              | 2             | 2            | 63.16          | 7.939         | 0.1119                       | 16                  | BGM          | 0.006992            | 63.08                          | 7.930                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C1-1-UNC1-ETW2-1 | C             | C1              | 3             | 1            | 67.14          | 7.910         | 0.1126                       | 16                  | BGM          | 0.007036            | 67.49                          | 7.951                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C1-1-UNC1-ETW2-2 | C             | C1              | 3             | 1            | 63.70          | 7.710         | 0.1130                       | 16                  | BGM          | 0.007065            | 64.29                          | 7.781                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C1-1-UNC1-ETW2-3 | C             | C1              | 3             | 1            | 64.10          | 7.780         | 0.1135                       | 16                  | BGM          | 0.007093            | 64.95                          | 7.883                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C2-1-UNC1-ETW2-1 | C             | C2              | 3             | 2            | 64.02          | 7.588         | 0.1128                       | 16                  | BGM          | 0.007049            | 64.47                          | 7.641                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C2-1-UNC1-ETW2-2 | C             | C2              | 3             | 2            | 60.69          | 7.528         | 0.1129                       | 16                  | BGM          | 0.007054            | 61.16                          | 7.586                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C2-1-UNC1-ETW2-3 | C             | C2              | 3             | 2            | 68.04          | 7.894         | 0.1128                       | 16                  | BGM          | 0.007047            | 68.50                          | 7.947                         |

Average 66.87 7.804  
Standard Dev. 4.944 0.1776  
Coeff. of Var. [%] 7.393 2.276  
Min. 60.69 7.446  
Max. 79.35 8.074  
Number of Spec. 18 18

Average<sub>norm</sub> 0.007006 66.92 7.810  
Standard Dev<sub>norm</sub> 4.784 0.1664  
Coeff. of Var. [%]<sub>norm</sub> 7.149 2.130  
Min. 0.006951 61.16 7.413  
Max. 0.007093 79.19 8.048  
Number of Spec. 18 18 18



## 4.13 “10/80/10” Unnotched Compression 2 Properties (UNC2)

**Laminate Unnotched Compression Properties (UNC2)--RTA (70°F)**  
**Strength & Modulus**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

 $t_{ply}$  [in]

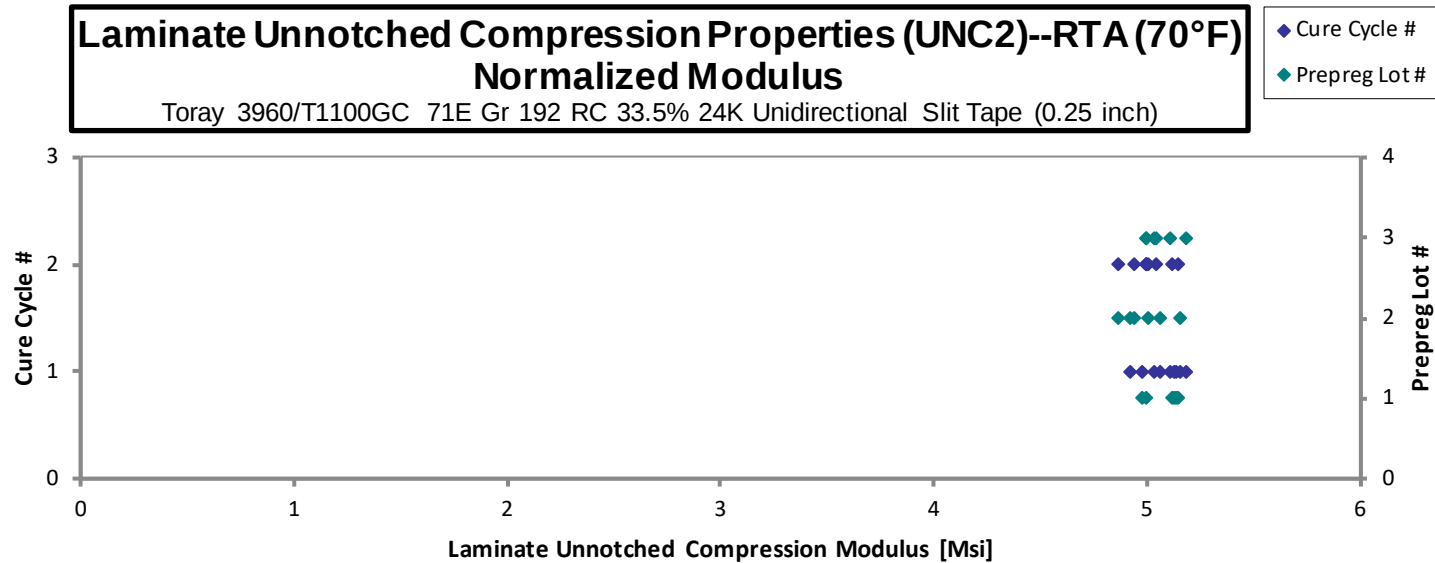
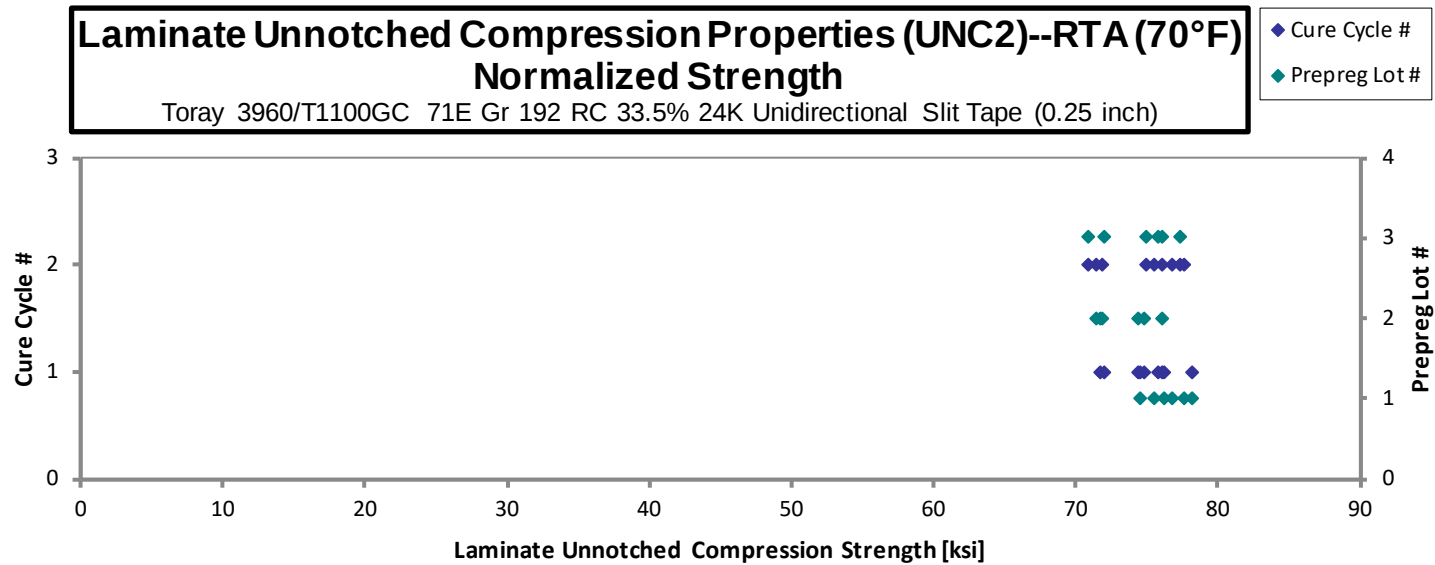
0.007000

| Specimen Number                                   | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | Strength <sub>norm</sub> [ksi] | Modulus <sub>norm</sub> [Msi] |
|---------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|---------------|------------------------------|---------------------|--------------|---------------------|--------------------------------|-------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C1-1-UNC2-RTA-1* | A             | C1              | 1             | 1            | 76.02          | 5.125         | 0.1404                       | 20                  | BGM          | 0.007018            | 76.21                          | 5.138                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C1-1-UNC2-RTA-2* | A             | C1              | 1             | 1            | 78.05          | 5.118         | 0.1401                       | 20                  | BGM          | 0.007007            | 78.12                          | 5.123                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C1-1-UNC2-RTA-3  | A             | C1              | 1             | 1            | 74.35          | 4.966         | 0.1402                       | 20                  | BGM          | 0.007011            | 74.46                          | 4.974                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C2-1-UNC2-RTA-1* | A             | C2              | 1             | 2            | 75.88          | 5.178         | 0.1393                       | 20                  | BGM          | 0.006963            | 75.48                          | 5.151                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C2-1-UNC2-RTA-2* | A             | C2              | 1             | 2            | 78.56          | 5.182         | 0.1384                       | 20                  | BGM          | 0.006919            | 77.65                          | 5.123                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C2-1-UNC2-RTA-3  | A             | C2              | 1             | 2            | 77.59          | 5.041         | 0.1386                       | 20                  | BGM          | 0.006932            | 76.83                          | 4.992                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C1-1-UNC2-RTA-1* | B             | C1              | 2             | 1            | 73.82          | 5.115         | 0.1410                       | 20                  | BGM          | 0.007050            | 74.35                          | 5.152                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C1-1-UNC2-RTA-2* | B             | C1              | 2             | 1            | 72.10          | 5.094         | 0.1392                       | 20                  | BGM          | 0.006961            | 71.70                          | 5.066                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C1-1-UNC2-RTA-3  | B             | C1              | 2             | 1            | 75.72          | 4.977         | 0.1384                       | 20                  | BGM          | 0.006918            | 74.83                          | 4.918                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-UNC2-RTA-1* | B             | C2              | 2             | 2            | 71.54          | 4.945         | 0.1399                       | 20                  | BGM          | 0.006993            | 71.48                          | 4.941                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-UNC2-RTA-2* | B             | C2              | 2             | 2            | 76.07          | 5.004         | 0.1401                       | 20                  | BGM          | 0.007004            | 76.11                          | 5.007                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-UNC2-RTA-3  | B             | C2              | 2             | 2            | 72.06          | 4.881         | 0.1396                       | 20                  | BGM          | 0.006978            | 71.84                          | 4.866                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C1-1-UNC2-RTA-1* | C             | C1              | 3             | 1            | 74.06          | 4.992         | 0.1433                       | 20                  | BGM          | 0.007165            | 75.81                          | 5.109                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C1-1-UNC2-RTA-2* | C             | C1              | 3             | 1            | 75.10          | 5.125         | 0.1417                       | 20                  | BGM          | 0.007084            | 76.00                          | 5.187                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C1-1-UNC2-RTA-3  | C             | C1              | 3             | 1            | 71.73          | 5.016         | 0.1406                       | 20                  | BGM          | 0.007031            | 72.05                          | 5.038                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-UNC2-RTA-1* | C             | C2              | 3             | 2            | 70.72          | 5.038         | 0.1403                       | 20                  | BGM          | 0.007013            | 70.86                          | 5.048                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-UNC2-RTA-2* | C             | C2              | 3             | 2            | 76.95          | 4.973         | 0.1407                       | 20                  | BGM          | 0.007035            | 77.34                          | 4.998                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-UNC2-RTA-3  | C             | C2              | 3             | 2            | 74.56          | 4.968         | 0.1408                       | 20                  | BGM          | 0.007040            | 74.98                          | 4.996                         |

\*Modulus are averaged values of 2 strain gages.

Average 74.72 5.041  
Standard Dev. 2.368 0.08613  
Coeff. of Var. [%] 3.169 1.709  
Min. 70.72 4.881  
Max. 78.56 5.182  
Number of Spec. 18 18

Average<sub>norm</sub> 0.007007 74.78 5.046  
Standard Dev.<sub>norm</sub> 2.291 0.09109  
Coeff. of Var. [%]<sub>norm</sub> 3.064 1.805  
Min. 0.006918 70.86 4.866  
Max. 0.007165 78.12 5.187  
Number of Spec. 18 18 18



**Laminate Unnotched Compression Properties (UNC2)--ETW2 (250°F)  
Strength & Modulus**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

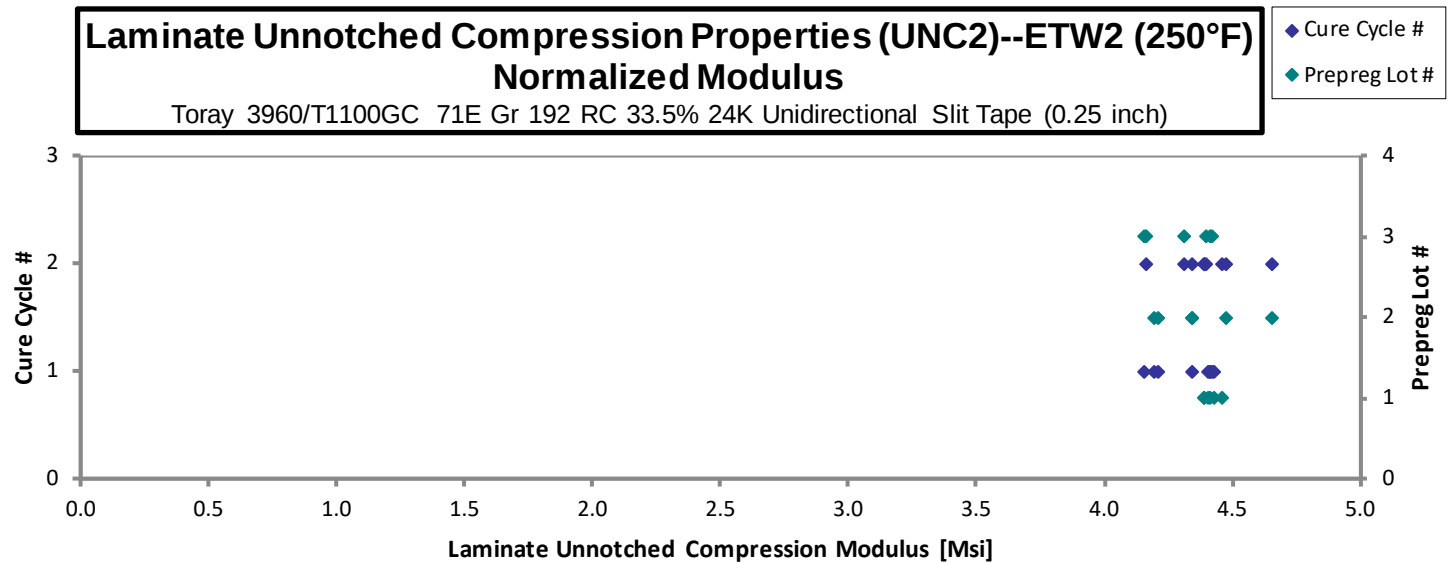
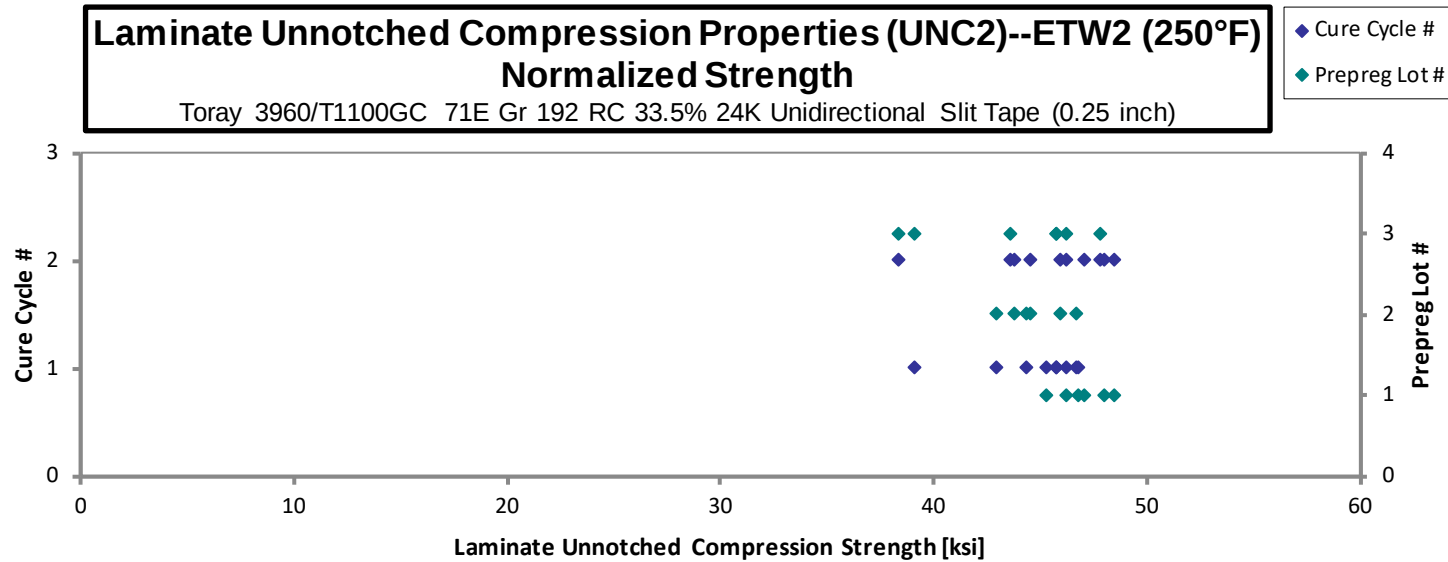
$t_{ply}$  [in]

0.007000

| Specimen Number                                   | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | Strength <sub>norm</sub> [ksi] | Modulus <sub>norm</sub> [Msi] |
|---------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|---------------|------------------------------|---------------------|--------------|---------------------|--------------------------------|-------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C1-1-UNC2-ETW2-1 | A             | C1              | 1             | 1            | 46.26          | 4.414         | 0.1400                       | 20                  | BGM          | 0.007000            | 46.26                          | 4.414                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C1-1-UNC2-ETW2-2 | A             | C1              | 1             | 1            | 46.71          | 4.422         | 0.1402                       | 20                  | BGM          | 0.007010            | 46.77                          | 4.428                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C1-1-UNC2-ETW2-3 | A             | C1              | 1             | 1            | 45.20          | 4.397         | 0.1403                       | 20                  | BGM          | 0.007017            | 45.31                          | 4.408                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C2-1-UNC2-ETW2-1 | A             | C2              | 1             | 2            | 48.24          | 4.409         | 0.1394                       | 20                  | BGM          | 0.006971            | 48.04                          | 4.390                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C2-1-UNC2-ETW2-2 | A             | C2              | 1             | 2            | 48.66          | 4.415         | 0.1393                       | 20                  | BGM          | 0.006965            | 48.42                          | 4.393                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C2-1-UNC2-ETW2-3 | A             | C2              | 1             | 2            | 47.35          | 4.482         | 0.1393                       | 20                  | BGM          | 0.006963            | 47.10                          | 4.458                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C1-1-UNC2-ETW2-1 | B             | C1              | 2             | 1            | 47.14          | 4.385         | 0.1387                       | 20                  | BGM          | 0.006935            | 46.70                          | 4.344                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C1-1-UNC2-ETW2-2 | B             | C1              | 2             | 1            | 44.41          | 4.208         | 0.1397                       | 20                  | BGM          | 0.006983            | 44.30                          | 4.198                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C1-1-UNC2-ETW2-3 | B             | C1              | 2             | 1            | 43.01          | 4.210         | 0.1399                       | 20                  | BGM          | 0.006995            | 42.98                          | 4.207                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-UNC2-ETW2-1 | B             | C2              | 2             | 2            | 46.14          | 4.496         | 0.1395                       | 20                  | BGM          | 0.006973            | 45.96                          | 4.478                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-UNC2-ETW2-2 | B             | C2              | 2             | 2            | 44.54          | 4.659         | 0.1399                       | 20                  | BGM          | 0.006993            | 44.49                          | 4.654                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-UNC2-ETW2-3 | B             | C2              | 2             | 2            | 43.82          | 4.344         | 0.1399                       | 20                  | BGM          | 0.006993            | 43.78                          | 4.340                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C1-1-UNC2-ETW2-1 | C             | C1              | 3             | 1            | 45.60          | 4.401         | 0.1405                       | 20                  | BGM          | 0.007025            | 45.76                          | 4.417                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C1-1-UNC2-ETW2-2 | C             | C1              | 3             | 1            | 38.89          | 4.131         | 0.1407                       | 20                  | BGM          | 0.007037            | 39.09                          | 4.153                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C1-1-UNC2-ETW2-3 | C             | C1              | 3             | 1            | 45.36          | 4.385         | 0.1412                       | 20                  | BGM          | 0.007061            | 45.75                          | 4.423                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-UNC2-ETW2-1 | C             | C2              | 3             | 2            | 38.22          | 4.387         | 0.1404                       | 20                  | BGM          | 0.007019            | 38.33                          | 4.399                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-UNC2-ETW2-2 | C             | C2              | 3             | 2            | 47.70          | 4.302         | 0.1404                       | 20                  | BGM          | 0.007018            | 47.82                          | 4.313                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-UNC2-ETW2-3 | C             | C2              | 3             | 2            | 43.49          | 4.153         | 0.1403                       | 20                  | BGM          | 0.007013            | 43.57                          | 4.160                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-UNC2-SP-3*  | C             | C2              | 3             | 2            | 46.14          |               | 0.1404                       | 20                  | BGM          | 0.007018            | 46.26                          |                               |

\*Specimen was not gaged, only strength is tested.

|                    |       |        |                                    |          |       |        |
|--------------------|-------|--------|------------------------------------|----------|-------|--------|
| Average            | 45.10 | 4.367  | Average <sub>norm</sub>            | 0.006999 | 45.09 | 4.365  |
| Standard Dev.      | 2.791 | 0.1292 | Standard Dev. <sub>norm</sub>      |          | 2.711 | 0.1250 |
| Coeff. of Var. [%] | 6.189 | 2.958  | Coeff. of Var. [%] <sub>norm</sub> |          | 6.013 | 2.862  |
| Min.               | 38.22 | 4.131  | Min.                               | 0.006935 | 38.33 | 4.153  |
| Max.               | 48.66 | 4.659  | Max.                               | 0.007061 | 48.42 | 4.654  |
| Number of Spec.    | 19    | 18     | Number of Spec.                    | 19       | 19    | 18     |



## 4.14 “50/40/10” Unnotched Compression 3 Properties (UNC3)

**Laminate Unnotched Compression Properties (UNC3)--RTA (70°F)**  
**Strength & Modulus**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

 $t_{ply} [in]$ 

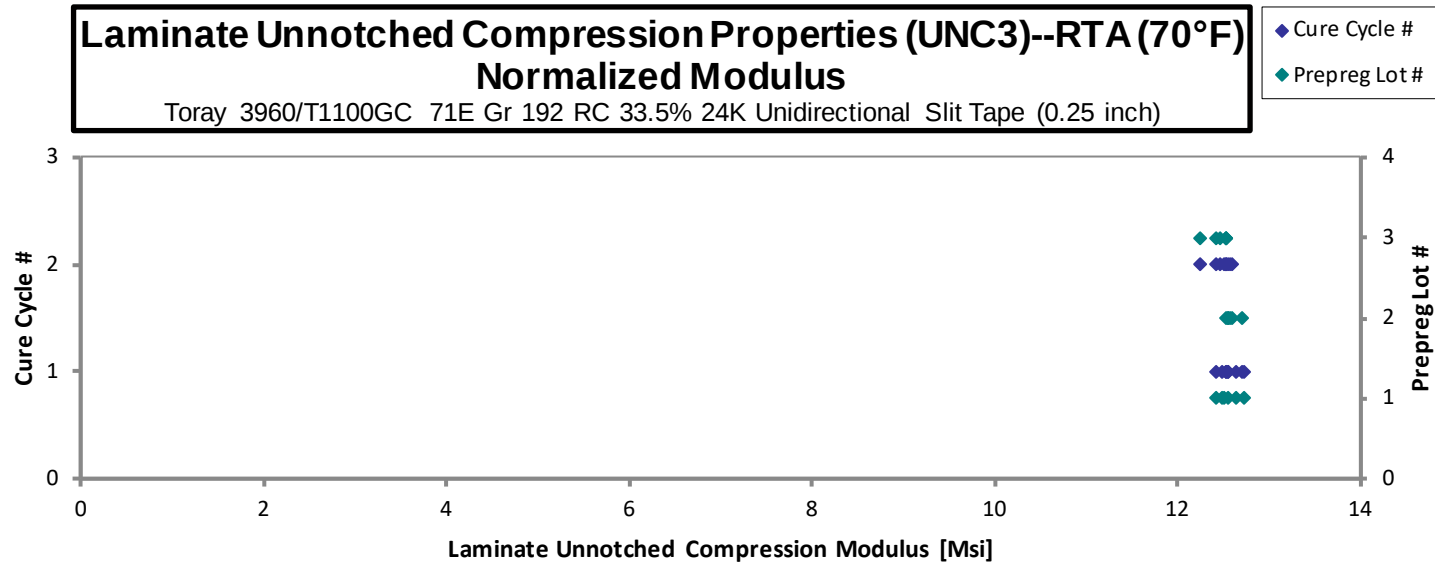
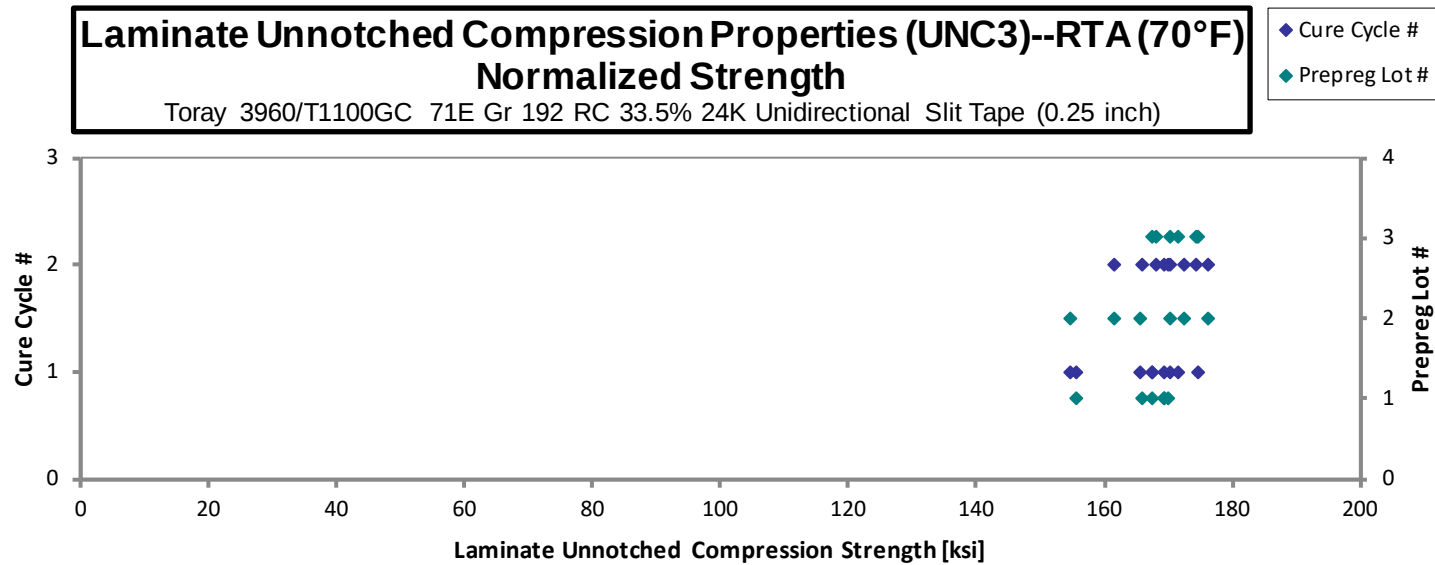
0.007000

| Specimen Number                                   | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply} [in]$ | Strength <sub>norm</sub> [ksi] | Modulus <sub>norm</sub> [Msi] |
|---------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|---------------|------------------------------|---------------------|--------------|---------------------|--------------------------------|-------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-UNC3-RTA-1* | A             | C1              | 1             | 1            | 154.8          | 12.67         | 0.1407                       | 20                  | BGM          | 0.007035            | 155.6                          | 12.73                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-UNC3-RTA-2* | A             | C1              | 1             | 1            | 168.0          | 12.55         | 0.1411                       | 20                  | BGM          | 0.007054            | 169.3                          | 12.64                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-UNC3-RTA-3  | A             | C1              | 1             | 1            | 166.0          | 12.38         | 0.1413                       | 20                  | BGM          | 0.007063            | 167.5                          | 12.49                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-UNC3-RTA-1* | A             | C2              | 1             | 2            | 168.1          | 12.38         | 0.1415                       | 20                  | BGM          | 0.007074            | 169.9                          | 12.51                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-UNC3-RTA-2* | A             | C2              | 1             | 2            | 165.5          | 12.52         | 0.1405                       | 20                  | BGM          | 0.007023            | 166.0                          | 12.56                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-UNC3-RTA-3  | A             | C2              | 1             | 2            | 169.1          | 12.40         | 0.1403                       | 20                  | BGM          | 0.007015            | 169.4                          | 12.43                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-UNC3-RTA-1* | B             | C1              | 2             | 1            | 154.0          | 12.49         | 0.1407                       | 20                  | BGM          | 0.007033            | 154.7                          | 12.55                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-UNC3-RTA-2* | B             | C1              | 2             | 1            | 165.6          | 12.57         | 0.1399                       | 20                  | BGM          | 0.006996            | 165.5                          | 12.56                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-UNC3-RTA-3  | B             | C1              | 2             | 1            | 171.0          | 12.75         | 0.1394                       | 20                  | BGM          | 0.006972            | 170.3                          | 12.70                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-UNC3-RTA-1* | B             | C2              | 2             | 2            | 161.3          | 12.50         | 0.1403                       | 20                  | BGM          | 0.007013            | 161.6                          | 12.52                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-UNC3-RTA-2* | B             | C2              | 2             | 2            | 177.6          | 12.69         | 0.1389                       | 20                  | BAT          | 0.006943            | 176.2                          | 12.58                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-UNC3-RTA-3  | B             | C2              | 2             | 2            | 173.8          | 12.70         | 0.1389                       | 20                  | BGM          | 0.006944            | 172.5                          | 12.60                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-UNC3-RTA-1* | C             | C1              | 3             | 1            | 166.4          | 12.47         | 0.1408                       | 20                  | BGM          | 0.007041            | 167.3                          | 12.54                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-UNC3-RTA-2* | C             | C1              | 3             | 1            | 172.3          | 12.59         | 0.1394                       | 20                  | BGM          | 0.006972            | 171.6                          | 12.54                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-UNC3-RTA-3  | C             | C1              | 3             | 1            | 175.5          | 12.49         | 0.1394                       | 20                  | BGM          | 0.006968            | 174.7                          | 12.43                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-UNC3-RTA-1* | C             | C2              | 3             | 2            | 164.9          | 12.28         | 0.1428                       | 20                  | BGM          | 0.007140            | 168.2                          | 12.52                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-UNC3-RTA-2* | C             | C2              | 3             | 2            | 173.2          | 12.37         | 0.1411                       | 20                  | BGM          | 0.007053            | 174.5                          | 12.46                         |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-UNC3-RTA-3  | C             | C2              | 3             | 2            | 169.6          | 12.19         | 0.1406                       | 20                  | BGM          | 0.007031            | 170.4                          | 12.24                         |

\*Modulus are averaged values of 2 strain gages.

Average 167.6 12.50  
Standard Dev. 6.326 0.1513  
Coeff. of Var. [%] 3.774 1.211  
Min. 154.0 12.19  
Max. 177.6 12.75  
Number of Spec. 18 18

Average<sub>norm</sub> 0.007020 168.1 12.53  
Standard Dev.<sub>norm</sub> 5.873 0.1093  
Coeff. of Var. [%]<sub>norm</sub> 3.494 0.8722  
Min. 0.006943 154.7 12.24  
Max. 0.007140 176.2 12.73  
Number of Spec. 18 18 18



**Laminate Unnotched Compression Properties (UNC3)--ETW2 (250°F)  
Strength & Modulus**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

t<sub>ply</sub> [in]

0.007000

| Specimen Number                                     | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode  |
|-----------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|---------------|------------------------------|---------------------|---------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-UNC3-ETW2-1   | A             | C1              | 1             | 1            | 110.5          | 12.75         | 0.1411                       | 20                  | BAB           |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-UNC3-ETW2-2   | A             | C1              | 1             | 1            | 113.3          | 12.60         | 0.1414                       | 20                  | BGM           |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-UNC3-ETW2-3   | A             | C1              | 1             | 1            | 116.9          | 12.46         | 0.1414                       | 20                  | BGM           |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-UNC3-ETW2-1   | A             | C2              | 1             | 2            | 119.8          | 12.84         | 0.1404                       | 20                  | BAB           |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-UNC3-ETW2-2   | A             | C2              | 1             | 2            | 100.0          | 12.31         | 0.1408                       | 20                  | BAB, CIB      |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-UNC3-ETW2-3   | A             | C2              | 1             | 2            | 107.7          | 12.28         | 0.1414                       | 20                  | BGM           |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-UNC3-SP-3*    | A             | C2              | 1             | 2            | 110.5          |               | 0.1405                       | 20                  | BAB, CIT      |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-UNC3-ETW2-1R  | B             | C1              | 2             | 1            | 112.4          | 12.74         | 0.1403                       | 20                  | BGM, CIB      |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-UNC3-ETW2-2R  | B             | C1              | 2             | 1            | 98.74          | 13.06         | 0.1398                       | 20                  | BGM, CIT, CIB |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-UNC3-ETW2-3R  | B             | C1              | 2             | 1            | 96.78          | 12.45         | 0.1396                       | 20                  | BGM, CIT, CIB |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-UNC3-ETW2-1** | B             | C2              | 2             | 2            |                | 12.46         | 0.1393                       | 20                  | CIT, CIB, DTT |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-UNC3-ETW2-2   | B             | C2              | 2             | 2            | 104.6          | 14.38         | 0.1394                       | 20                  | BGM, CIT      |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-UNC3-ETW2-3   | B             | C2              | 2             | 2            | 99.77          | 12.00         | 0.1395                       | 20                  | BGM, CIB      |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-UNC3-ETW2-1R  | B             | C2              | 2             | 2            | 91.16          | 12.53         | 0.1395                       | 20                  | BAB, CIT, CIB |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-UNC3-ETW2-2R  | B             | C2              | 2             | 2            | 96.96          | 12.53         | 0.1389                       | 20                  | BGM, CIT, CIB |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-UNC3-ETW2-3R  | B             | C2              | 2             | 2            | 100.8          | 12.74         | 0.1380                       | 20                  | BAB, CIT, CIB |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-UNC3-ETW2-1R  | C             | C1              | 3             | 1            | 90.97          | 12.55         | 0.1412                       | 20                  | BGM, CIT, CIB |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-UNC3-ETW2-2R  | C             | C1              | 3             | 1            | 92.67          | 12.56         | 0.1408                       | 20                  | BAB, CIT, CIB |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-UNC3-ETW2-3R  | C             | C1              | 3             | 1            | 94.74          | 12.62         | 0.1406                       | 20                  | DGM, CIT, CIB |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-UNC3-ETW2-1R  | C             | C2              | 3             | 2            | 109.6          | 11.99         | 0.1414                       | 20                  | BGM, CIB      |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-UNC3-ETW2-2R  | C             | C2              | 3             | 2            | 98.23          | 12.39         | 0.1412                       | 20                  | BAB, CIB      |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-UNC3-ETW2-3R  | C             | C2              | 3             | 2            | 93.30          | 12.61         | 0.1411                       | 20                  | BGM, CIB      |

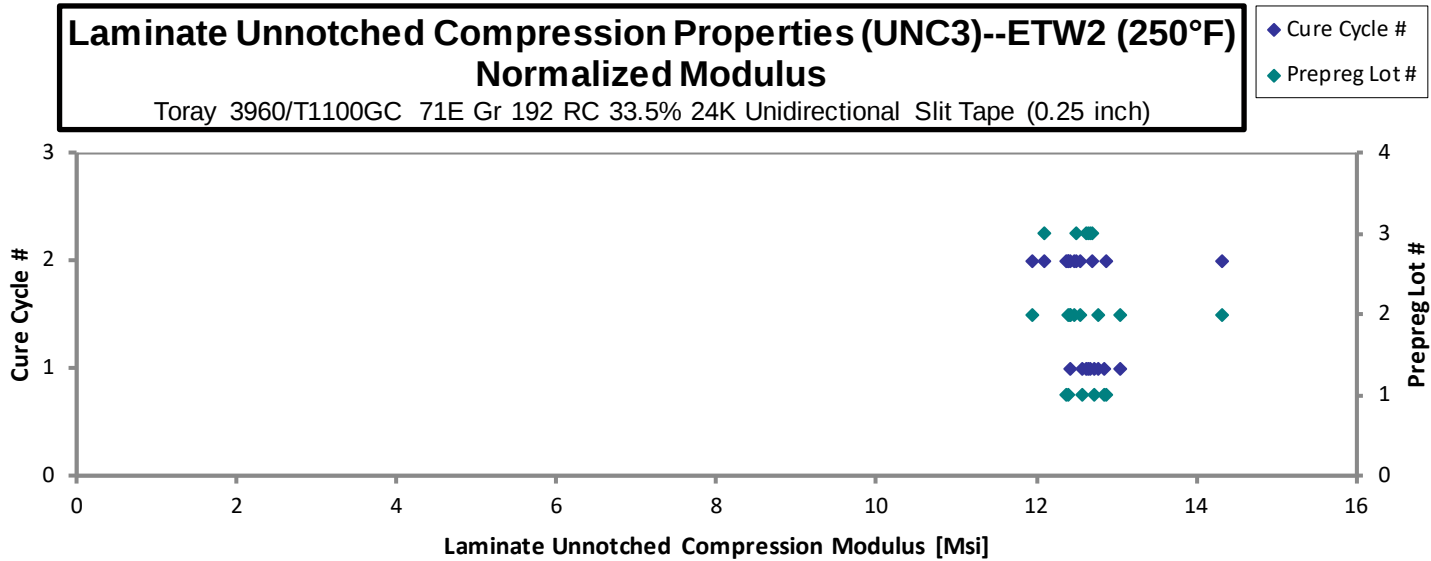
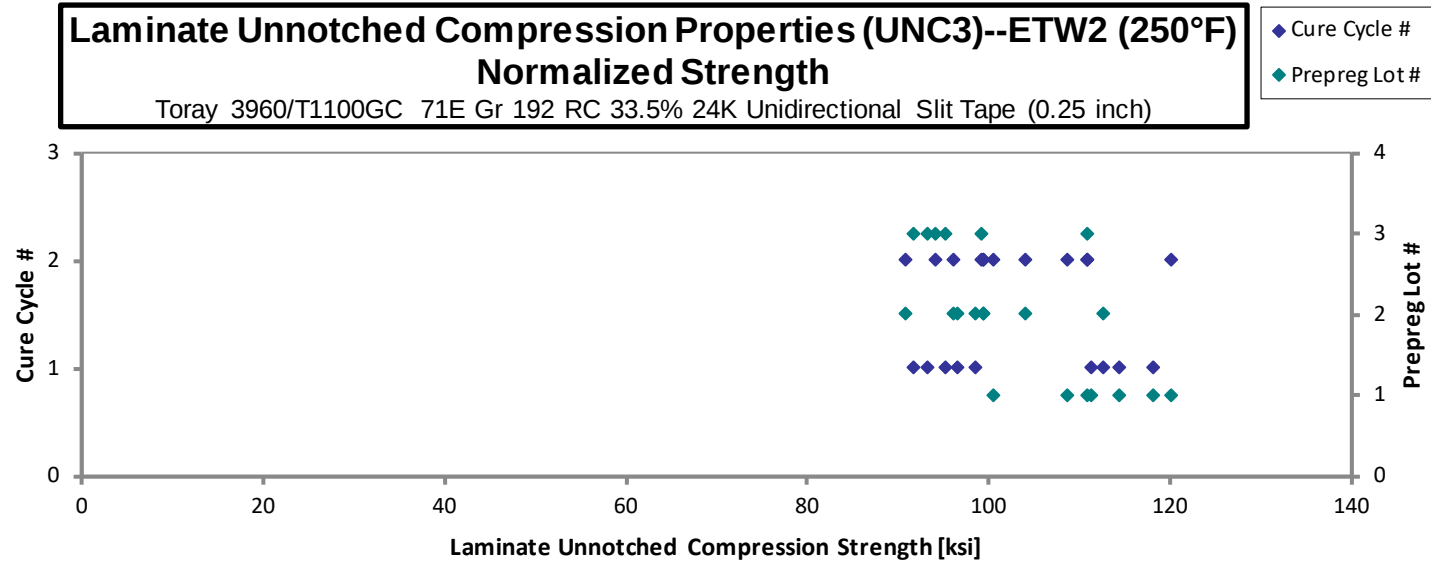
\*Specimen was not gaged, only strength is tested.

\*\*Strength not reported due to unacceptable failure mode.

**Average** 102.8 12.61  
**Standard Dev.** 8.788 0.4759  
**Coeff. of Var. [%]** 8.546 3.773  
**Min.** 90.97 11.99  
**Max.** 119.8 14.38  
**Number of Spec.** 21 21

**Average<sub>norm</sub>** 0.007017 103.1 12.64  
**Standard Dev.<sub>norm</sub>** 9.052 0.4571  
**Coeff. of Var. [%]<sub>norm</sub>** 8.777 3.616  
**Min.** 0.006898 90.82 11.95  
**Max.** 0.007071 120.2 14.31  
**Number of Spec.** 22 21 21

| Avg. t <sub>ply</sub> [in] | Strength <sub>norm</sub> [ksi] | Modulus <sub>norm</sub> [Msi] |
|----------------------------|--------------------------------|-------------------------------|
| 0.007057                   | 111.4                          | 12.85                         |
| 0.007068                   | 114.4                          | 12.72                         |
| 0.007068                   | 118.0                          | 12.58                         |
| 0.007022                   | 120.2                          | 12.88                         |
| 0.007038                   | 100.6                          | 12.38                         |
| 0.007068                   | 108.7                          | 12.40                         |
| 0.007026                   | 110.9                          |                               |
| 0.007014                   | 112.6                          | 12.76                         |
| 0.006991                   | 98.61                          | 13.04                         |
| 0.006982                   | 96.53                          | 12.42                         |
| 0.006967                   |                                | 12.40                         |
| 0.006968                   | 104.1                          | 14.31                         |
| 0.006973                   | 99.37                          | 11.95                         |
| 0.006974                   | 90.82                          | 12.48                         |
| 0.006943                   | 96.17                          | 12.43                         |
| 0.006898                   | 99.34                          | 12.55                         |
| 0.007061                   | 91.76                          | 12.66                         |
| 0.007040                   | 93.20                          | 12.64                         |
| 0.007031                   | 95.16                          | 12.68                         |
| 0.007071                   | 110.8                          | 12.11                         |
| 0.007062                   | 99.10                          | 12.50                         |
| 0.007054                   | 94.02                          | 12.71                         |



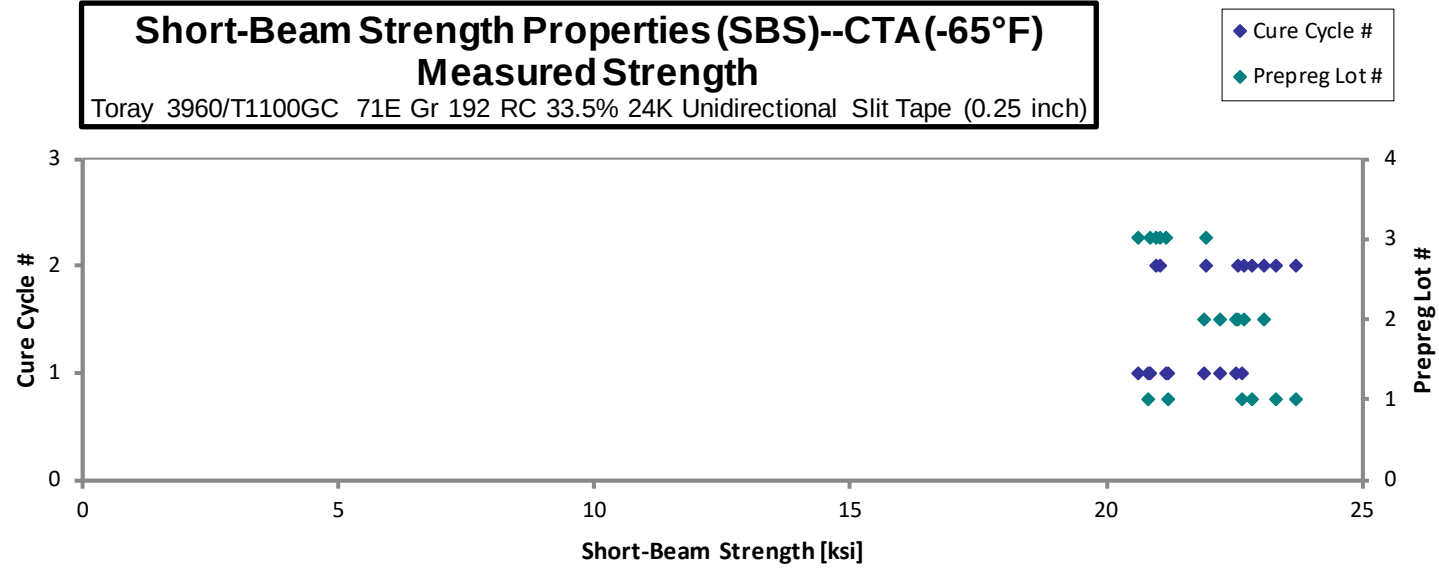
## 4.15 Lamina Short-Beam Strength Properties (SBS)

**Short-Beam Strength Properties (SBS)--CTA (-65°F)**  
**Strength**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

| Specimen Number                                 | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Avg. $t_{ply}$ [in] | Failure Mode     |
|-------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|------------------------------|---------------------|---------------------|------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-SBS-CTA-1 | A             | C1              | 1             | 1            | 20.82          | 0.09730                      | 14                  | 0.006950            | ILS, COMPRESSION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-SBS-CTA-2 | A             | C1              | 1             | 1            | 21.21          | 0.09708                      | 14                  | 0.006935            | ILS, COMPRESSION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-SBS-CTA-3 | A             | C1              | 1             | 1            | 22.67          | 0.09658                      | 14                  | 0.006899            | ILS, COMPRESSION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-SBS-CTA-1 | A             | C2              | 1             | 2            | 23.32          | 0.09640                      | 14                  | 0.006886            | ILS              |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-SBS-CTA-2 | A             | C2              | 1             | 2            | 23.70          | 0.09653                      | 14                  | 0.006895            | ILS              |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-SBS-CTA-3 | A             | C2              | 1             | 2            | 22.86          | 0.09647                      | 14                  | 0.006890            | ILS, COMPRESSION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C1-1-SBS-CTA-1 | B             | C1              | 2             | 1            | 21.93          | 0.09973                      | 14                  | 0.007124            | ILS, COMPRESSION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C1-1-SBS-CTA-2 | B             | C1              | 2             | 1            | 22.53          | 0.09800                      | 14                  | 0.007000            | ILS, COMPRESSION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C1-1-SBS-CTA-3 | B             | C1              | 2             | 1            | 22.24          | 0.09775                      | 14                  | 0.006982            | ILS, COMPRESSION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C2-1-SBS-CTA-1 | B             | C2              | 2             | 2            | 23.07          | 0.09713                      | 14                  | 0.006938            | ILS, COMPRESSION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C2-1-SBS-CTA-2 | B             | C2              | 2             | 2            | 22.56          | 0.09732                      | 14                  | 0.006951            | ILS, COMPRESSION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C2-1-SBS-CTA-3 | B             | C2              | 2             | 2            | 22.70          | 0.09722                      | 14                  | 0.006944            | ILS              |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C1-1-SBS-CTA-1 | C             | C1              | 3             | 1            | 20.84          | 0.09928                      | 14                  | 0.007092            | ILS, COMPRESSION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C1-1-SBS-CTA-2 | C             | C1              | 3             | 1            | 20.63          | 0.09843                      | 14                  | 0.007031            | ILS, COMPRESSION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C1-1-SBS-CTA-3 | C             | C1              | 3             | 1            | 21.18          | 0.09840                      | 14                  | 0.007029            | ILS, COMPRESSION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C2-1-SBS-CTA-1 | C             | C2              | 3             | 2            | 21.07          | 0.09653                      | 14                  | 0.006895            | ILS, COMPRESSION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C2-1-SBS-CTA-2 | C             | C2              | 3             | 2            | 20.98          | 0.09635                      | 14                  | 0.006882            | ILS, COMPRESSION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C2-1-SBS-CTA-3 | C             | C2              | 3             | 2            | 21.93          | 0.09615                      | 14                  | 0.006868            | ILS, COMPRESSION |

|                    |        |          |
|--------------------|--------|----------|
| Average            | 22.01  | 0.006955 |
| Standard Dev.      | 0.9683 |          |
| Coeff. of Var. [%] | 4.398  |          |
| Min.               | 20.63  | 0.006868 |
| Max.               | 23.70  | 0.007124 |
| Number of Spec.    | 18     | 18       |

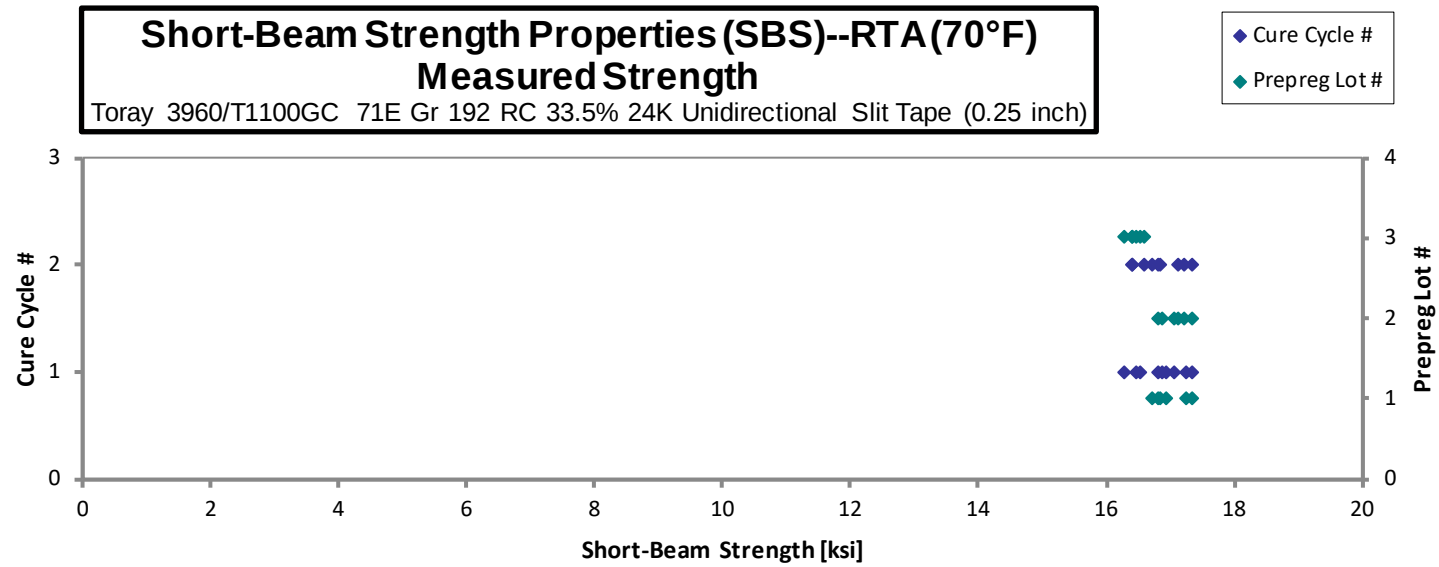


**Short-Beam Strength Properties (SBS)--RTA (70°F)  
Strength**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

| Specimen Number                                 | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Avg. $t_{ply}$ [in] | Failure Mode     |
|-------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|------------------------------|---------------------|---------------------|------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-SBS-RTA-1 | A             | C1              | 1             | 1            | 16.92          | 0.09850                      | 14                  | 0.007036            | ILS, COMPRESSION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-SBS-RTA-2 | A             | C1              | 1             | 1            | 17.35          | 0.09885                      | 14                  | 0.007061            | ILS, COMPRESSION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-SBS-RTA-3 | A             | C1              | 1             | 1            | 17.25          | 0.09828                      | 14                  | 0.007020            | ILS, COMPRESSION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-SBS-RTA-1 | A             | C2              | 1             | 2            | 16.82          | 0.09627                      | 14                  | 0.006876            | ILS              |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-SBS-RTA-2 | A             | C2              | 1             | 2            | 16.83          | 0.09630                      | 14                  | 0.006879            | ILS              |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-SBS-RTA-3 | A             | C2              | 1             | 2            | 16.71          | 0.09638                      | 14                  | 0.006885            | ILS              |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C1-1-SBS-RTA-1 | B             | C1              | 2             | 1            | 17.05          | 0.1005                       | 14                  | 0.007179            | ILS, COMPRESSION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C1-1-SBS-RTA-2 | B             | C1              | 2             | 1            | 16.82          | 0.1006                       | 14                  | 0.007182            | ILS, COMPRESSION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C1-1-SBS-RTA-3 | B             | C1              | 2             | 1            | 16.86          | 0.09912                      | 14                  | 0.007080            | ILS, COMPRESSION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C2-1-SBS-RTA-1 | B             | C2              | 2             | 2            | 17.35          | 0.09832                      | 14                  | 0.007023            | ILS, COMPRESSION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C2-1-SBS-RTA-2 | B             | C2              | 2             | 2            | 17.13          | 0.09703                      | 14                  | 0.006931            | ILS, COMPRESSION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C2-1-SBS-RTA-3 | B             | C2              | 2             | 2            | 17.21          | 0.09717                      | 14                  | 0.006940            | ILS, COMPRESSION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C1-1-SBS-RTA-1 | C             | C1              | 3             | 1            | 16.53          | 0.1012                       | 14                  | 0.007230            | ILS              |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C1-1-SBS-RTA-2 | C             | C1              | 3             | 1            | 16.48          | 0.1009                       | 14                  | 0.007210            | ILS              |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C1-1-SBS-RTA-3 | C             | C1              | 3             | 1            | 16.28          | 0.1003                       | 14                  | 0.007165            | ILS              |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C2-1-SBS-RTA-1 | C             | C2              | 3             | 2            | 16.58          | 0.09900                      | 14                  | 0.007071            | ILS              |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C2-1-SBS-RTA-2 | C             | C2              | 3             | 2            | 16.40          | 0.09797                      | 14                  | 0.006998            | ILS              |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C2-1-SBS-RTA-3 | C             | C2              | 3             | 2            | 16.39          | 0.09710                      | 14                  | 0.006936            | ILS              |

|                           |               |                 |
|---------------------------|---------------|-----------------|
| <b>Average</b>            | <b>16.83</b>  | <b>0.007039</b> |
| <b>Standard Dev.</b>      | <b>0.3421</b> |                 |
| <b>Coeff. of Var. [%]</b> | <b>2.033</b>  |                 |
| <b>Min.</b>               | <b>16.28</b>  | <b>0.006876</b> |
| <b>Max.</b>               | <b>17.35</b>  | <b>0.007230</b> |
| <b>Number of Spec.</b>    | <b>18</b>     | <b>18</b>       |

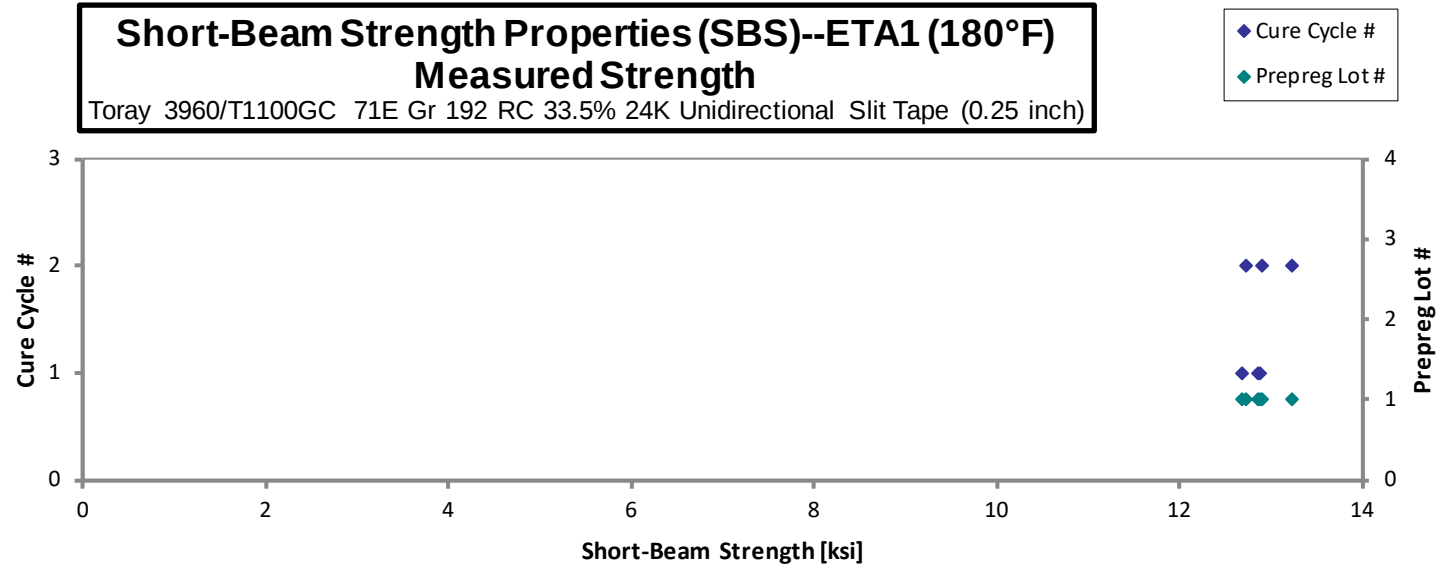


**Short-Beam Strength Properties (SBS)--ETA1 (180°F)**  
**Strength**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

| Specimen Number                                  | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Avg. $t_{ply}$ [in] | Failure Mode                            |
|--------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|------------------------------|---------------------|---------------------|-----------------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-SBS-ETA1-1 | A             | C1              | 1             | 1            | 12.87          | 0.09632                      | 14                  | 0.006880            | ILS, COMPRESSION, INELASTIC DEFORMATION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-SBS-ETA1-2 | A             | C1              | 1             | 1            | 12.68          | 0.09612                      | 14                  | 0.006865            | ILS, COMPRESSION, INELASTIC DEFORMATION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-SBS-ETA1-3 | A             | C1              | 1             | 1            | 12.88          | 0.09595                      | 14                  | 0.006854            | ILS, INELASTIC DEFORMATION              |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-SBS-ETA1-1 | A             | C2              | 1             | 2            | 12.74          | 0.09667                      | 14                  | 0.006905            | ILS, INELASTIC DEFORMATION, COMPRESSION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-SBS-ETA1-2 | A             | C2              | 1             | 2            | 12.90          | 0.09683                      | 14                  | 0.006917            | ILS, INELASTIC DEFORMATION, COMPRESSION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-SBS-ETA1-3 | A             | C2              | 1             | 2            | 13.23          | 0.09657                      | 14                  | 0.006898            | ILS, INELASTIC DEFORMATION, COMPRESSION |

|                    |        |          |
|--------------------|--------|----------|
| Average            | 12.88  | 0.006886 |
| Standard Dev.      | 0.1917 |          |
| Coeff. of Var. [%] | 1.488  |          |
| Min.               | 12.68  | 0.006854 |
| Max.               | 13.23  | 0.006917 |
| Number of Spec.    | 6      | 6        |

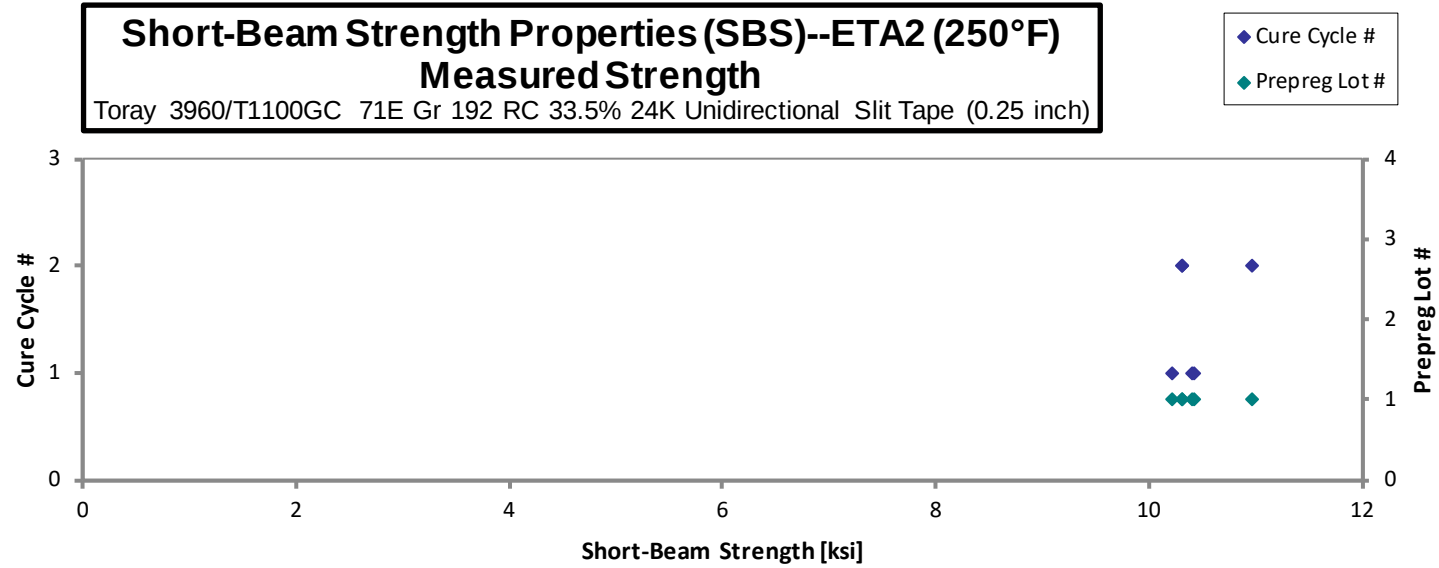


**Short-Beam Strength Properties (SBS)--ETA2 (250°F)**  
**Strength**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

| Specimen Number                                  | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Avg. $t_{ply}$ [in] | Failure Mode                            |
|--------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|------------------------------|---------------------|---------------------|-----------------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-SBS-ETA2-1 | A             | C1              | 1             | 1            | 10.42          | 0.09595                      | 14                  | 0.006854            | ILS, INELASTIC DEFORMATION              |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-SBS-ETA2-2 | A             | C1              | 1             | 1            | 10.41          | 0.09607                      | 14                  | 0.006862            | ILS, INELASTIC DEFORMATION              |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-SBS-ETA2-3 | A             | C1              | 1             | 1            | 10.22          | 0.09655                      | 14                  | 0.006896            | ILS, INELASTIC DEFORMATION              |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-SBS-ETA2-1 | A             | C2              | 1             | 2            | 10.96          | 0.09662                      | 14                  | 0.006901            | ILS, INELASTIC DEFORMATION, COMPRESSION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-SBS-ETA2-2 | A             | C2              | 1             | 2            | 10.31          | 0.09663                      | 14                  | 0.006902            | ILS, INELASTIC DEFORMATION, COMPRESSION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-SBS-ETA2-3 | A             | C2              | 1             | 2            | 10.31          | 0.09648                      | 14                  | 0.006892            | ILS, INELASTIC DEFORMATION              |

|                    |        |          |
|--------------------|--------|----------|
| Average            | 10.44  | 0.006885 |
| Standard Dev.      | 0.2668 |          |
| Coeff. of Var. [%] | 2.566  |          |
| Min.               | 10.22  | 0.006854 |
| Max.               | 10.96  | 0.006902 |
| Number of Spec.    | 6      | 6        |



January 2, 2026

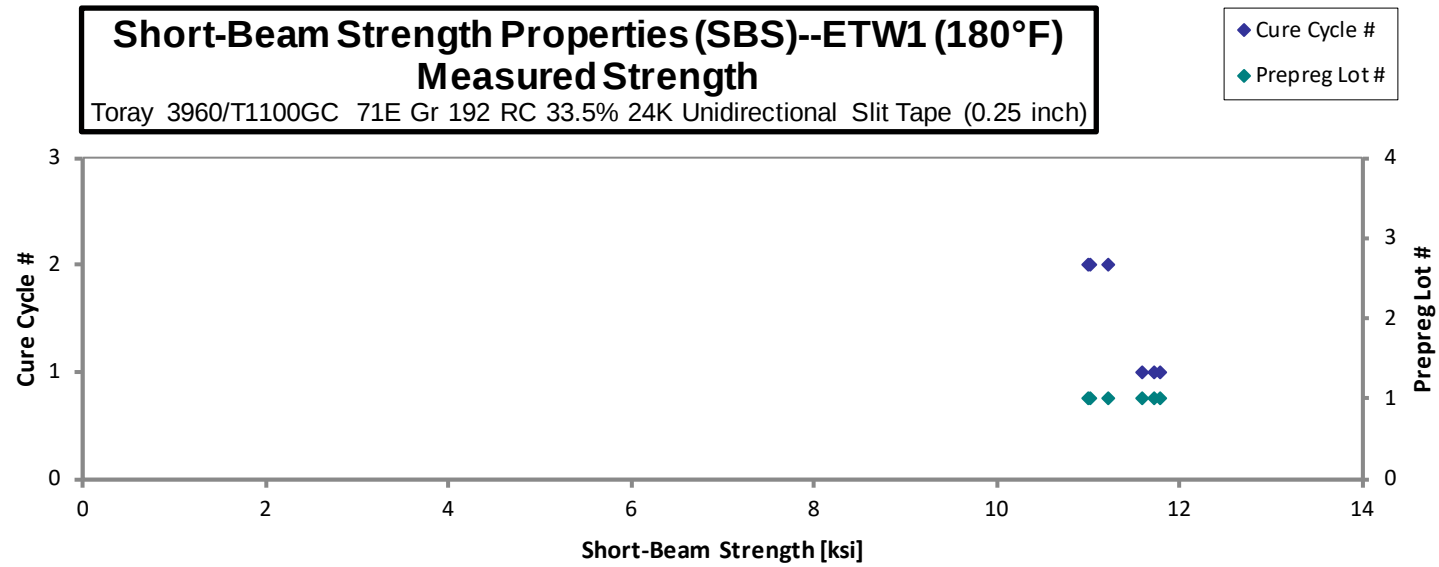
CAM-RP-2023-002 Rev B

**Short-Beam Strength Properties (SBS)--ETW1 (180°F)  
Strength**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

| Specimen Number                                  | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Avg. $t_{ply}$ [in] | Failure Mode               |
|--------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|------------------------------|---------------------|---------------------|----------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-SBS-ETW1-1 | A             | C1              | 1             | 1            | 11.58          | 0.09655                      | 14                  | 0.006896            | ILS, INELASTIC DEFORMATION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-SBS-ETW1-2 | A             | C1              | 1             | 1            | 11.80          | 0.09653                      | 14                  | 0.006895            | ILS, INELASTIC DEFORMATION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-SBS-ETW1-3 | A             | C1              | 1             | 1            | 11.72          | 0.09652                      | 14                  | 0.006894            | ILS, INELASTIC DEFORMATION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-SBS-ETW1-1 | A             | C2              | 1             | 2            | 11.22          | 0.09650                      | 14                  | 0.006893            | ILS, INELASTIC DEFORMATION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-SBS-ETW1-2 | A             | C2              | 1             | 2            | 11.02          | 0.09638                      | 14                  | 0.006885            | ILS, INELASTIC DEFORMATION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-SBS-ETW1-3 | A             | C2              | 1             | 2            | 11.01          | 0.09660                      | 14                  | 0.006900            | ILS, INELASTIC DEFORMATION |

|                    |        |          |
|--------------------|--------|----------|
| Average            | 11.39  | 0.006894 |
| Standard Dev.      | 0.3546 |          |
| Coeff. of Var. [%] | 3.113  |          |
| Min.               | 11.01  | 0.006885 |
| Max.               | 11.80  | 0.006900 |
| Number of Spec.    | 6      | 6        |

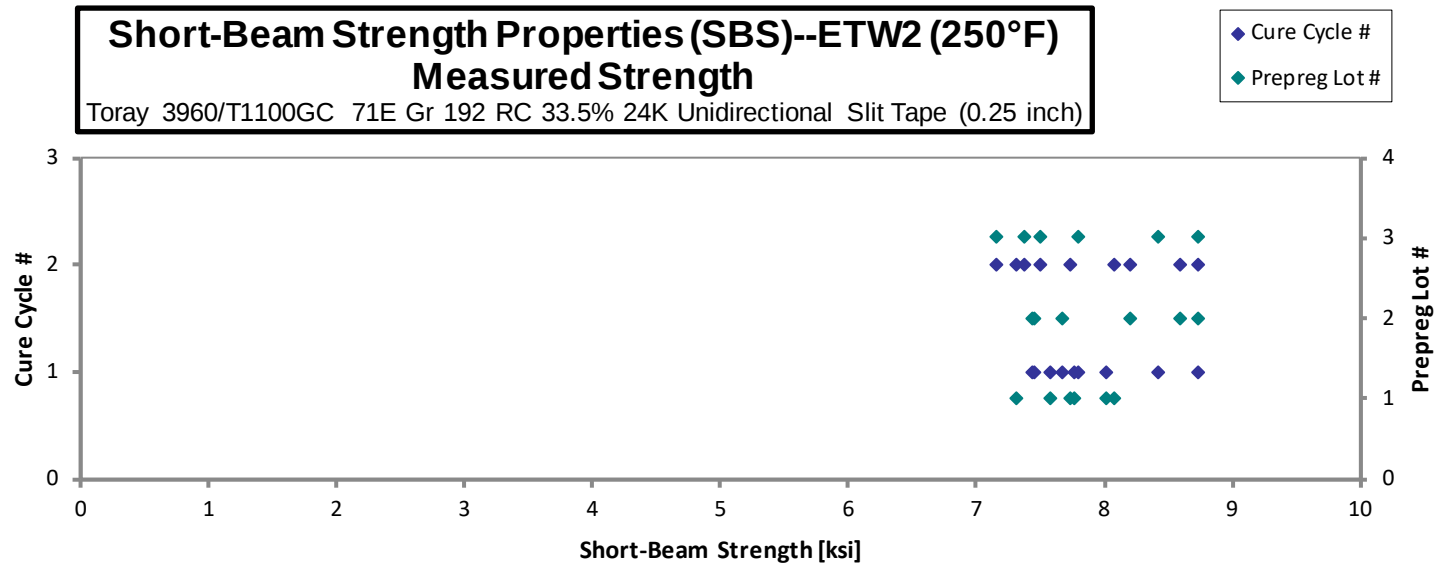


**Short-Beam Strength Properties (SBS)--ETW2 (250°F)  
Strength**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

| Specimen Number                                  | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Avg. t <sub>ply</sub> [in] | Failure Mode               |
|--------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|------------------------------|---------------------|----------------------------|----------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-SBS-ETW2-1 | A             | C1              | 1             | 1            | 8.020          | 0.09637                      | 14                  | 0.006883                   | ILS, INELASTIC DEFORMATION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-SBS-ETW2-2 | A             | C1              | 1             | 1            | 7.578          | 0.09668                      | 14                  | 0.006906                   | ILS, INELASTIC DEFORMATION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-SBS-ETW2-3 | A             | C1              | 1             | 1            | 7.766          | 0.09657                      | 14                  | 0.006898                   | ILS, INELASTIC DEFORMATION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-SBS-ETW2-1 | A             | C2              | 1             | 2            | 8.074          | 0.09657                      | 14                  | 0.006898                   | ILS, INELASTIC DEFORMATION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-SBS-ETW2-2 | A             | C2              | 1             | 2            | 7.730          | 0.09648                      | 14                  | 0.006892                   | ILS, INELASTIC DEFORMATION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-SBS-ETW2-3 | A             | C2              | 1             | 2            | 7.320          | 0.09663                      | 14                  | 0.006902                   | ILS, INELASTIC DEFORMATION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C1-1-SBS-ETW2-1 | B             | C1              | 2             | 1            | 7.431          | 0.09750                      | 14                  | 0.006964                   | ILS, INELASTIC DEFORMATION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C1-1-SBS-ETW2-2 | B             | C1              | 2             | 1            | 7.460          | 0.09763                      | 14                  | 0.006974                   | ILS, INELASTIC DEFORMATION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C1-1-SBS-ETW2-3 | B             | C1              | 2             | 1            | 7.667          | 0.09783                      | 14                  | 0.006988                   | ILS, INELASTIC DEFORMATION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C2-1-SBS-ETW2-1 | B             | C2              | 2             | 2            | 8.738          | 0.09763                      | 14                  | 0.006974                   | ILS, INELASTIC DEFORMATION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C2-1-SBS-ETW2-2 | B             | C2              | 2             | 2            | 8.593          | 0.09745                      | 14                  | 0.006961                   | ILS, INELASTIC DEFORMATION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C2-1-SBS-ETW2-3 | B             | C2              | 2             | 2            | 8.207          | 0.09737                      | 14                  | 0.006955                   | ILS, INELASTIC DEFORMATION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C1-1-SBS-ETW2-1 | C             | C1              | 3             | 1            | 8.727          | 0.09785                      | 14                  | 0.006989                   | ILS, INELASTIC DEFORMATION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C1-1-SBS-ETW2-2 | C             | C1              | 3             | 1            | 8.424          | 0.09840                      | 14                  | 0.007029                   | ILS, INELASTIC DEFORMATION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C1-1-SBS-ETW2-3 | C             | C1              | 3             | 1            | 7.790          | 0.09857                      | 14                  | 0.007040                   | ILS, INELASTIC DEFORMATION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C2-1-SBS-ETW2-1 | C             | C2              | 3             | 2            | 7.504          | 0.09648                      | 14                  | 0.006892                   | ILS, INELASTIC DEFORMATION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C2-1-SBS-ETW2-2 | C             | C2              | 3             | 2            | 7.375          | 0.09680                      | 14                  | 0.006914                   | ILS, INELASTIC DEFORMATION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C2-1-SBS-ETW2-3 | C             | C2              | 3             | 2            | 7.156          | 0.09692                      | 14                  | 0.006923                   | ILS, INELASTIC DEFORMATION |

|                    |        |          |
|--------------------|--------|----------|
| Average            | 7.865  | 0.006943 |
| Standard Dev.      | 0.4977 |          |
| Coeff. of Var. [%] | 6.329  |          |
| Min.               | 7.156  | 0.006883 |
| Max.               | 8.738  | 0.007040 |
| Number of Spec.    | 18     | 18       |



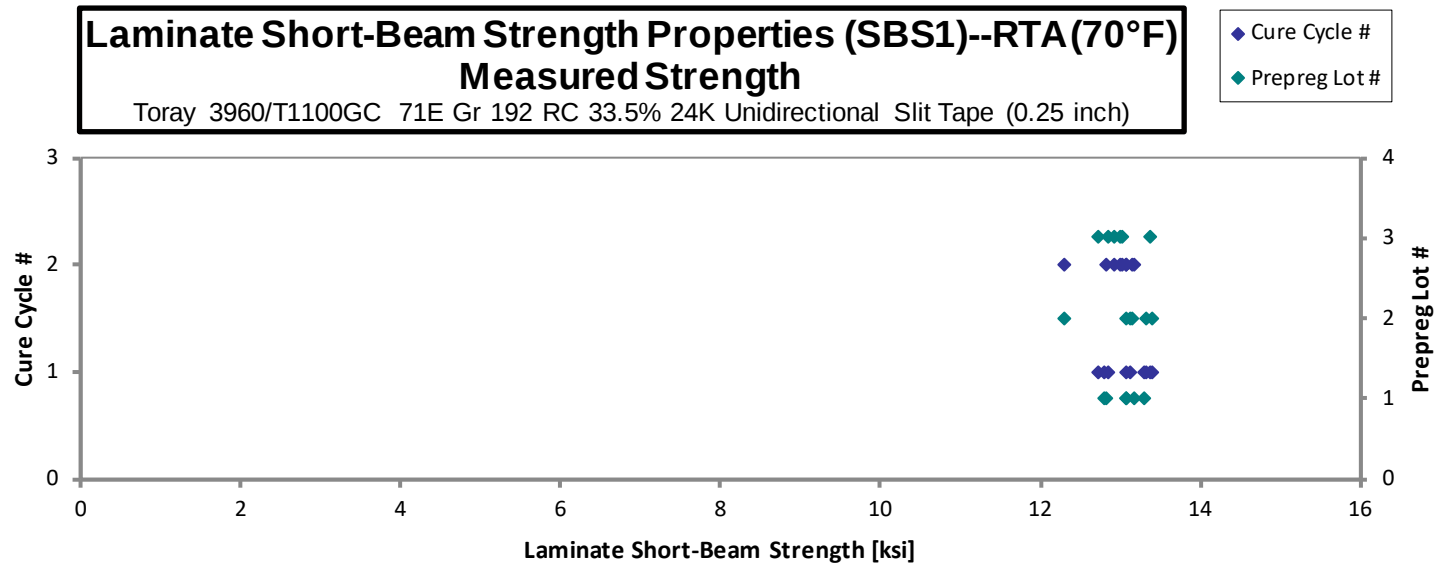
## 4.16 Laminate Short-Beam Strength Properties (SBS1)

**Laminate Short-Beam Strength Properties (SBS1)--RTA (70°F)**  
**Strength**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

| Specimen Number                                  | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Avg. t <sub>ply</sub> [in] | Failure Mode     |
|--------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|------------------------------|---------------------|----------------------------|------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C1-1-SBS1-RTA-1 | A             | C1              | 1             | 1            | 12.80          | 0.1695                       | 24                  | 0.007061                   | ILS              |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C1-1-SBS1-RTA-2 | A             | C1              | 1             | 1            | 13.30          | 0.1686                       | 24                  | 0.007026                   | ILS              |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C1-1-SBS1-RTA-3 | A             | C1              | 1             | 1            | 13.07          | 0.1669                       | 24                  | 0.006955                   | ILS              |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C2-1-SBS1-RTA-1 | A             | C2              | 1             | 2            | 13.18          | 0.1709                       | 24                  | 0.007119                   | ILS              |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C2-1-SBS1-RTA-2 | A             | C2              | 1             | 2            | 12.82          | 0.1691                       | 24                  | 0.007044                   | ILS              |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C2-1-SBS1-RTA-3 | A             | C2              | 1             | 2            | 13.06          | 0.1673                       | 24                  | 0.006970                   | ILS              |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-B-C1-1-SBS1-RTA-1 | B             | C1              | 2             | 1            | 13.31          | 0.1659                       | 24                  | 0.006912                   | ILS              |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-B-C1-1-SBS1-RTA-2 | B             | C1              | 2             | 1            | 13.41          | 0.1666                       | 24                  | 0.006940                   | ILS              |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-B-C1-1-SBS1-RTA-3 | B             | C1              | 2             | 1            | 13.13          | 0.1668                       | 24                  | 0.006949                   | ILS              |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-B-C2-1-SBS1-RTA-1 | B             | C2              | 2             | 2            | 13.16          | 0.1700                       | 24                  | 0.007084                   | ILS              |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-B-C2-1-SBS1-RTA-2 | B             | C2              | 2             | 2            | 12.30          | 0.1693                       | 24                  | 0.007052                   | ILS              |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-B-C2-1-SBS1-RTA-3 | B             | C2              | 2             | 2            | 13.07          | 0.1678                       | 24                  | 0.006992                   | ILS              |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-C-C1-1-SBS1-RTA-1 | C             | C1              | 3             | 1            | 12.85          | 0.1707                       | 24                  | 0.007112                   | ILS, COMPRESSION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-C-C1-1-SBS1-RTA-2 | C             | C1              | 3             | 1            | 12.73          | 0.1703                       | 24                  | 0.007097                   | ILS              |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-C-C1-1-SBS1-RTA-3 | C             | C1              | 3             | 1            | 13.38          | 0.1690                       | 24                  | 0.007040                   | ILS              |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-C-C2-1-SBS1-RTA-1 | C             | C2              | 3             | 2            | 13.02          | 0.1714                       | 24                  | 0.007143                   | ILS              |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-C-C2-1-SBS1-RTA-2 | C             | C2              | 3             | 2            | 12.93          | 0.1711                       | 24                  | 0.007129                   | ILS              |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-C-C2-1-SBS1-RTA-3 | C             | C2              | 3             | 2            | 13.00          | 0.1699                       | 24                  | 0.007081                   | ILS              |

|                    |        |          |
|--------------------|--------|----------|
| Average            | 13.03  | 0.007039 |
| Standard Dev.      | 0.2699 |          |
| Coeff. of Var. [%] | 2.072  |          |
| Min.               | 12.30  | 0.006912 |
| Max.               | 13.41  | 0.007143 |
| Number of Spec.    | 18     | 18       |

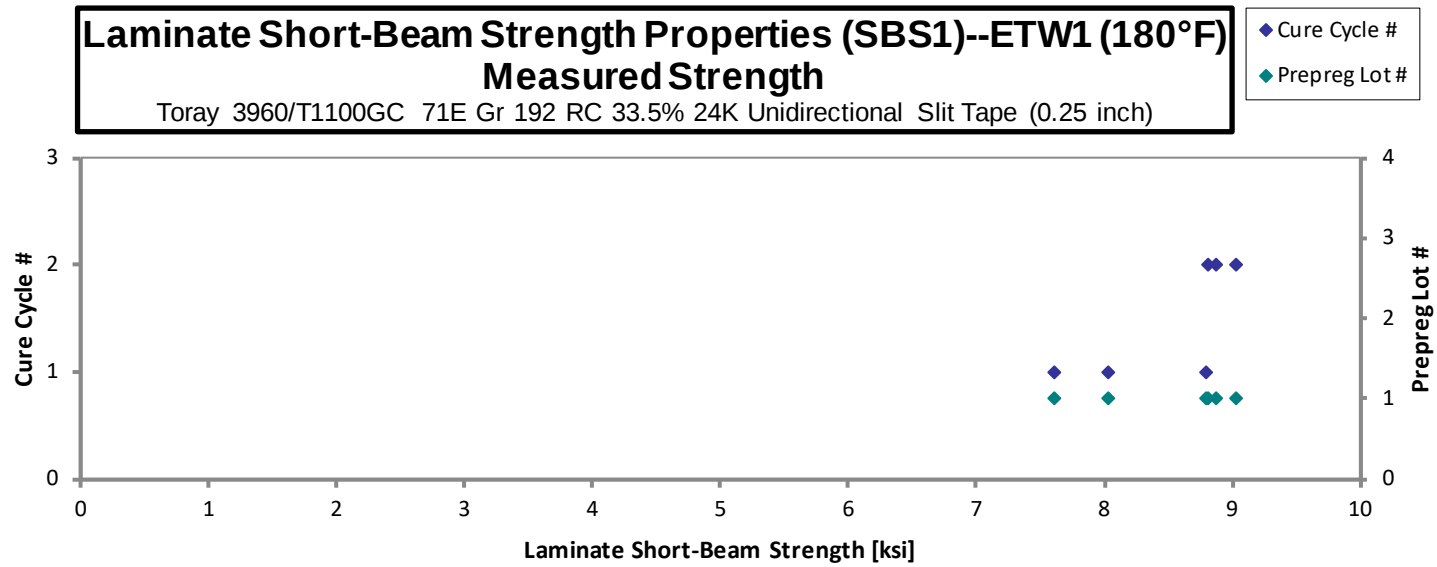


**Laminate Short-Beam Strength Properties (SBS1)--ETW1 (180°F)**  
**Strength**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

| Specimen Number                                   | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Avg. $t_{ply}$ [in] | Failure Mode |
|---------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|------------------------------|---------------------|---------------------|--------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C1-1-SBS1-ETW1-1 | A             | C1              | 1             | 1            | 8.801          | 0.1655                       | 24                  | 0.006897            | ILS          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C1-1-SBS1-ETW1-2 | A             | C1              | 1             | 1            | 7.604          | 0.1648                       | 24                  | 0.006865            | ILS          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C1-1-SBS1-ETW1-3 | A             | C1              | 1             | 1            | 8.028          | 0.1646                       | 24                  | 0.006856            | ILS          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C2-1-SBS1-ETW1-1 | A             | C2              | 1             | 2            | 8.874          | 0.1664                       | 24                  | 0.006933            | ILS          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C2-1-SBS1-ETW1-2 | A             | C2              | 1             | 2            | 8.817          | 0.1665                       | 24                  | 0.006936            | ILS          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C2-1-SBS1-ETW1-3 | A             | C2              | 1             | 2            | 9.036          | 0.1667                       | 24                  | 0.006944            | ILS          |

|                    |        |          |
|--------------------|--------|----------|
| Average            | 8.527  | 0.006905 |
| Standard Dev.      | 0.5727 |          |
| Coeff. of Var. [%] | 6.716  |          |
| Min.               | 7.604  | 0.006856 |
| Max.               | 9.036  | 0.006944 |
| Number of Spec.    | 6      | 6        |

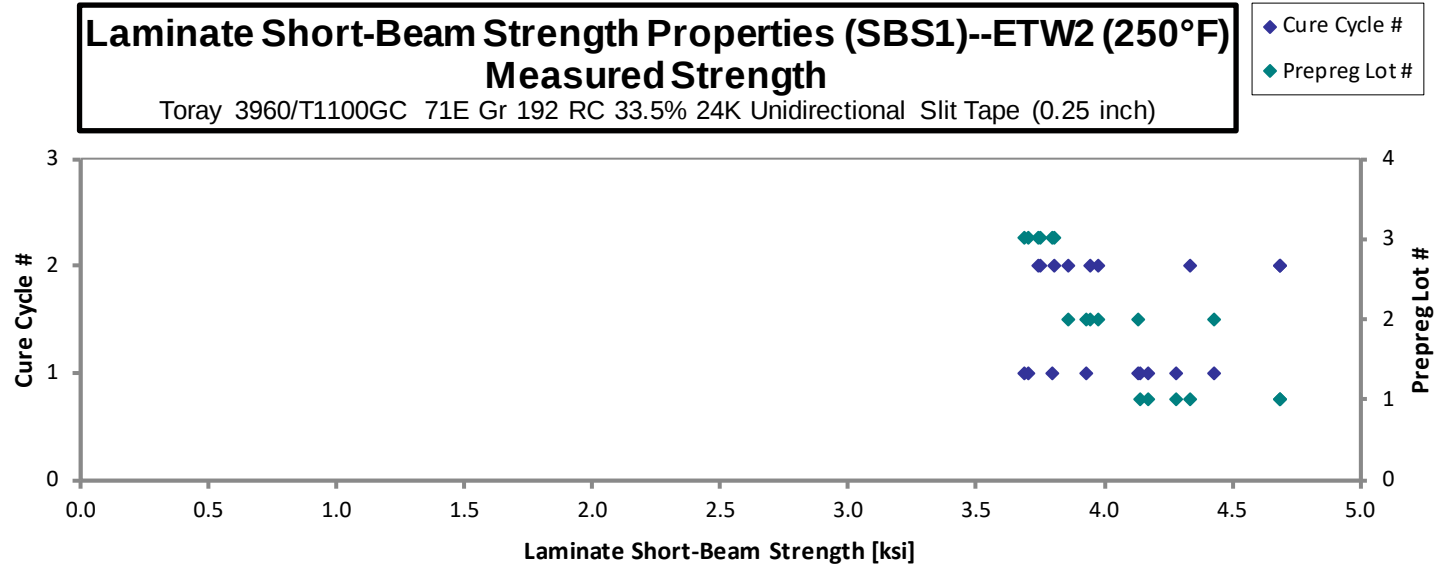


**Laminate Short-Beam Strength Properties (SBS1)--ETW2 (250°F)**  
**Strength**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

| Specimen Number                                   | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Avg. $t_{ply}$ [in] | Failure Mode               |
|---------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|------------------------------|---------------------|---------------------|----------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C1-1-SBS1-ETW2-1 | A             | C1              | 1             | 1            | 4.143          | 0.1651                       | 24                  | 0.006879            | ILS, INELASTIC DEFORMATION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C1-1-SBS1-ETW2-2 | A             | C1              | 1             | 1            | 4.278          | 0.1651                       | 24                  | 0.006880            | ILS, INELASTIC DEFORMATION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C1-1-SBS1-ETW2-3 | A             | C1              | 1             | 1            | 4.171          | 0.1655                       | 24                  | 0.006895            | ILS, INELASTIC DEFORMATION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C2-1-SBS1-ETW2-1 | A             | C2              | 1             | 2            | 4.688          | 0.1673                       | 24                  | 0.006971            | ILS, INELASTIC DEFORMATION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C2-1-SBS1-ETW2-2 | A             | C2              | 1             | 2            | 4.690          | 0.1680                       | 24                  | 0.006999            | ILS, INELASTIC DEFORMATION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C2-1-SBS1-ETW2-3 | A             | C2              | 1             | 2            | 4.337          | 0.1680                       | 24                  | 0.007000            | ILS, INELASTIC DEFORMATION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-B-C1-1-SBS1-ETW2-1 | B             | C1              | 2             | 1            | 4.429          | 0.1673                       | 24                  | 0.006970            | ILS, INELASTIC DEFORMATION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-B-C1-1-SBS1-ETW2-2 | B             | C1              | 2             | 1            | 3.926          | 0.1676                       | 24                  | 0.006981            | ILS, INELASTIC DEFORMATION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-B-C1-1-SBS1-ETW2-3 | B             | C1              | 2             | 1            | 4.134          | 0.1675                       | 24                  | 0.006977            | ILS, INELASTIC DEFORMATION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-B-C2-1-SBS1-ETW2-1 | B             | C2              | 2             | 2            | 3.945          | 0.1669                       | 24                  | 0.006953            | ILS, INELASTIC DEFORMATION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-B-C2-1-SBS1-ETW2-2 | B             | C2              | 2             | 2            | 3.858          | 0.1668                       | 24                  | 0.006951            | ILS, INELASTIC DEFORMATION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-B-C2-1-SBS1-ETW2-3 | B             | C2              | 2             | 2            | 3.976          | 0.1671                       | 24                  | 0.006962            | ILS, INELASTIC DEFORMATION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-C-C1-1-SBS1-ETW2-1 | C             | C1              | 3             | 1            | 3.702          | 0.1679                       | 24                  | 0.006995            | ILS, INELASTIC DEFORMATION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-C-C1-1-SBS1-ETW2-2 | C             | C1              | 3             | 1            | 3.687          | 0.1681                       | 24                  | 0.007004            | ILS, INELASTIC DEFORMATION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-C-C1-1-SBS1-ETW2-3 | C             | C1              | 3             | 1            | 3.800          | 0.1686                       | 24                  | 0.007024            | ILS, INELASTIC DEFORMATION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-C-C2-1-SBS1-ETW2-1 | C             | C2              | 3             | 2            | 3.746          | 0.1680                       | 24                  | 0.007000            | ILS, INELASTIC DEFORMATION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-C-C2-1-SBS1-ETW2-2 | C             | C2              | 3             | 2            | 3.744          | 0.1675                       | 24                  | 0.006980            | ILS, INELASTIC DEFORMATION |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-C-C2-1-SBS1-ETW2-3 | C             | C2              | 3             | 2            | 3.805          | 0.1684                       | 24                  | 0.007015            | ILS, INELASTIC DEFORMATION |

|                    |        |          |
|--------------------|--------|----------|
| Average            | 4.059  | 0.006969 |
| Standard Dev.      | 0.3212 |          |
| Coeff. of Var. [%] | 7.913  |          |
| Min.               | 3.687  | 0.006879 |
| Max.               | 4.690  | 0.007024 |
| Number of Spec.    | 18     | 18       |



## 4.17 “25/50/25” Open-Hole Tension 1 Properties (OHT1)

## Laminate Open-Hole Tension Properties (OHT1)--CTA (-65°F)

## Strength

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

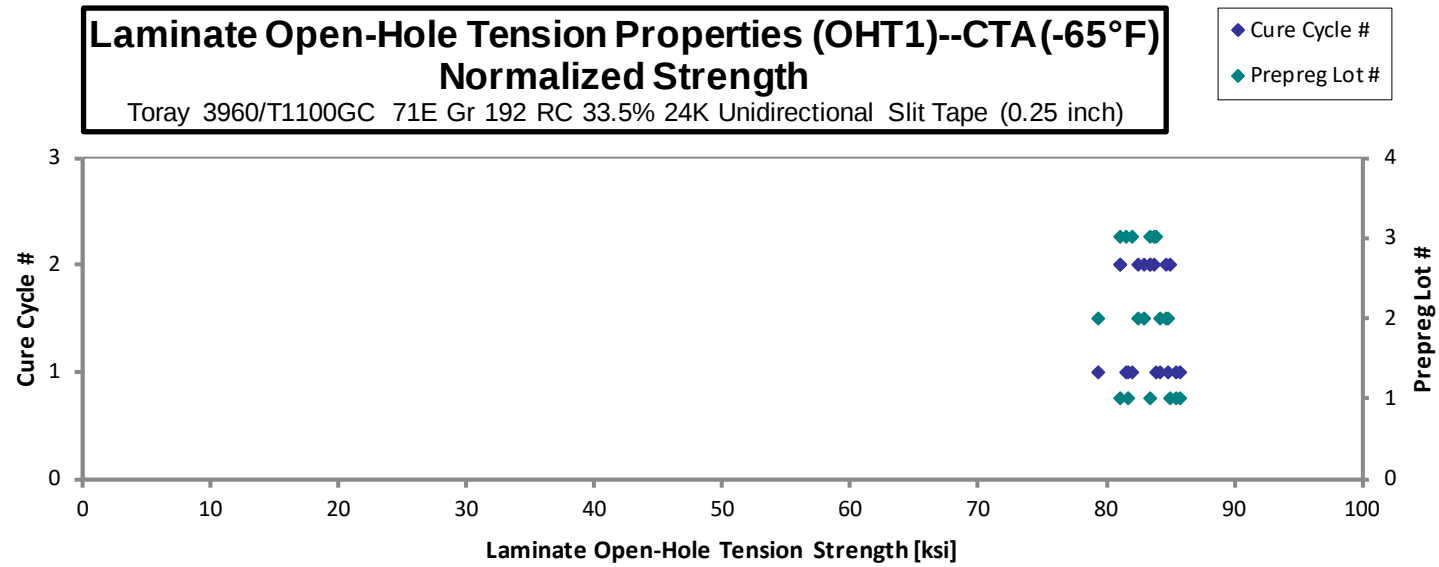
 $t_{ply}$  [in]

0.007000

| Specimen Number                                  | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | Strength <sub>norm</sub> [ksi] |
|--------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|------------------------------|---------------------|--------------|---------------------|--------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-OHT1-CTA-1 | A             | C1              | 1             | 1            | 82.41          | 0.1111                       | 16                  | AGM          | 0.006945            | 81.76                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-OHT1-CTA-2 | A             | C1              | 1             | 1            | 85.32          | 0.1121                       | 16                  | AGM          | 0.007007            | 85.41                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-OHT1-CTA-3 | A             | C1              | 1             | 1            | 86.11          | 0.1116                       | 16                  | AGM          | 0.006977            | 85.83                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-OHT1-CTA-1 | A             | C2              | 1             | 2            | 83.86          | 0.1114                       | 16                  | AGM          | 0.006960            | 83.39                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-OHT1-CTA-2 | A             | C2              | 1             | 2            | 80.92          | 0.1122                       | 16                  | AGM          | 0.007015            | 81.09                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-OHT1-CTA-3 | A             | C2              | 1             | 2            | 85.13          | 0.1118                       | 16                  | AGM          | 0.006990            | 85.01                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C1-1-OHT1-CTA-1 | B             | C1              | 2             | 1            | 79.70          | 0.1116                       | 16                  | AGM          | 0.006973            | 79.39                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C1-1-OHT1-CTA-2 | B             | C1              | 2             | 1            | 85.05          | 0.1117                       | 16                  | AGM          | 0.006981            | 84.82                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C1-1-OHT1-CTA-3 | B             | C1              | 2             | 1            | 84.68          | 0.1115                       | 16                  | AGM          | 0.006966            | 84.26                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C2-1-OHT1-CTA-1 | B             | C2              | 2             | 2            | 83.10          | 0.1117                       | 16                  | AGM          | 0.006982            | 82.89                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C2-1-OHT1-CTA-2 | B             | C2              | 2             | 2            | 82.75          | 0.1116                       | 16                  | AGM          | 0.006977            | 82.48                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C2-1-OHT1-CTA-3 | B             | C2              | 2             | 2            | 84.92          | 0.1118                       | 16                  | AGM          | 0.006985            | 84.75                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C1-1-OHT1-CTA-1 | C             | C1              | 3             | 1            | 80.80          | 0.1131                       | 16                  | AGM          | 0.007069            | 81.59                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C1-1-OHT1-CTA-2 | C             | C1              | 3             | 1            | 81.57          | 0.1126                       | 16                  | AGM          | 0.007038            | 82.00                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C1-1-OHT1-CTA-3 | C             | C1              | 3             | 1            | 82.90          | 0.1133                       | 16                  | AGM          | 0.007079            | 83.84                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C2-1-OHT1-CTA-1 | C             | C2              | 3             | 2            | 81.83          | 0.1142                       | 16                  | AGM          | 0.007138            | 83.44                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C2-1-OHT1-CTA-2 | C             | C2              | 3             | 2            | 81.06          | 0.1119                       | 16                  | AGM          | 0.006996            | 81.01                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C2-1-OHT1-CTA-3 | C             | C2              | 3             | 2            | 82.30          | 0.1140                       | 16                  | AGM          | 0.007122            | 83.73                          |

Average 83.02  
 Standard Dev. 1.867  
 Coeff. of Var. [%] 2.249  
 Min. 79.70  
 Max. 86.11  
 Number of Spec. 18

Average<sub>norm</sub> 0.007011 83.15  
 Standard Dev.<sub>norm</sub> 1.756  
 Coeff. of Var. [%]<sub>norm</sub> 2.112  
 Min. 0.006945 79.39  
 Max. 0.007138 85.83  
 Number of Spec. 18 18



**Laminate Open-Hole Tension Properties (OHT1)--RTA (70°F)**  
**Strength**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

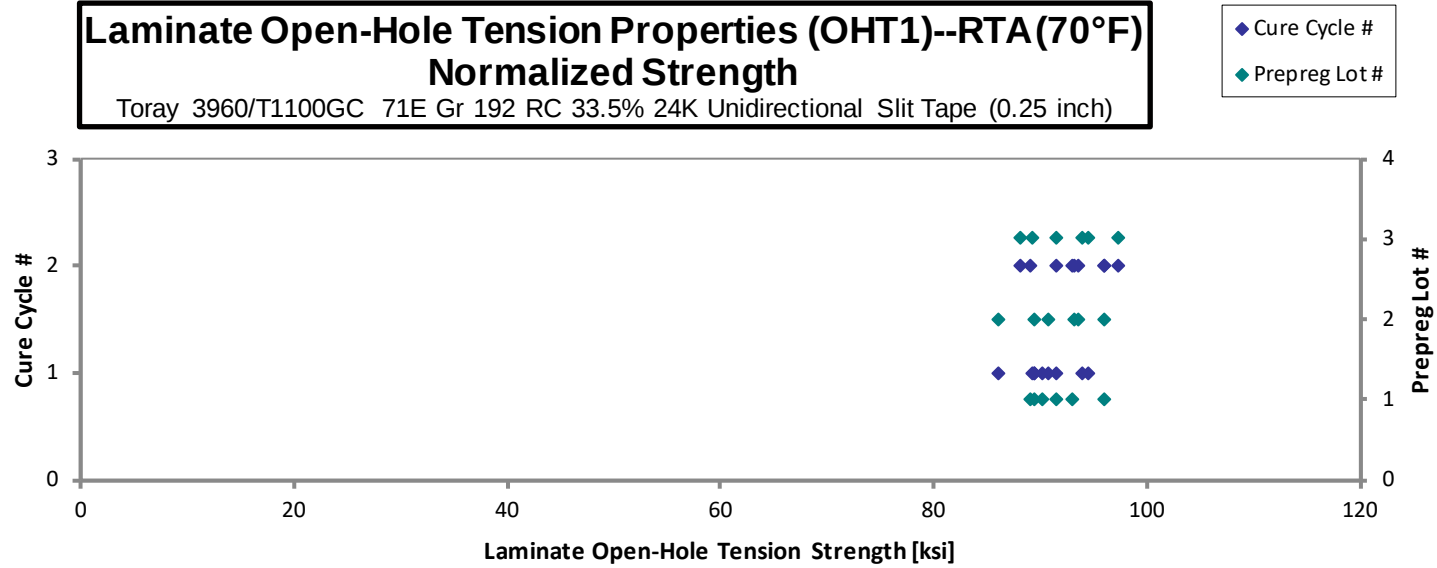
 $t_{ply}$  [in]

0.007000

| Specimen Number                                  | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | Strength <sub>norm</sub> [ksi] |
|--------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|------------------------------|---------------------|--------------|---------------------|--------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-OHT1-RTA-1 | A             | C1              | 1             | 1            | 89.61          | 0.1118                       | 16                  | AGM          | 0.006989            | 89.47                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-OHT1-RTA-2 | A             | C1              | 1             | 1            | 90.65          | 0.1115                       | 16                  | AGM          | 0.006967            | 90.22                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-OHT1-RTA-3 | A             | C1              | 1             | 1            | 91.83          | 0.1116                       | 16                  | AGM          | 0.006976            | 91.52                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-OHT1-RTA-1 | A             | C2              | 1             | 2            | 89.20          | 0.1119                       | 16                  | AGM          | 0.006992            | 89.10                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-OHT1-RTA-2 | A             | C2              | 1             | 2            | 92.98          | 0.1120                       | 16                  | AGM          | 0.006998            | 92.95                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-OHT1-RTA-3 | A             | C2              | 1             | 2            | 94.15          | 0.1141                       | 16                  | AGM          | 0.007131            | 95.91                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C1-1-OHT1-RTA-1 | B             | C1              | 2             | 1            | 91.22          | 0.1115                       | 16                  | AGM          | 0.006966            | 90.77                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C1-1-OHT1-RTA-2 | B             | C1              | 2             | 1            | 86.34          | 0.1116                       | 16                  | AGM          | 0.006972            | 85.99                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C1-1-OHT1-RTA-3 | B             | C1              | 2             | 1            | 89.88          | 0.1115                       | 16                  | AGM          | 0.006970            | 89.49                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C2-1-OHT1-RTA-1 | B             | C2              | 2             | 2            | 96.21          | 0.1118                       | 16                  | AGM          | 0.006984            | 96.00                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C2-1-OHT1-RTA-2 | B             | C2              | 2             | 2            | 94.11          | 0.1114                       | 16                  | AGM          | 0.006964            | 93.62                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C2-1-OHT1-RTA-3 | B             | C2              | 2             | 2            | 93.58          | 0.1116                       | 16                  | AGM          | 0.006976            | 93.26                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C1-1-OHT1-RTA-1 | C             | C1              | 3             | 1            | 93.40          | 0.1132                       | 16                  | AGM          | 0.007076            | 94.42                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C1-1-OHT1-RTA-2 | C             | C1              | 3             | 1            | 88.39          | 0.1130                       | 16                  | AGM          | 0.007063            | 89.18                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C1-1-OHT1-RTA-3 | C             | C1              | 3             | 1            | 93.29          | 0.1128                       | 16                  | AGM          | 0.007052            | 93.98                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C2-1-OHT1-RTA-1 | C             | C2              | 3             | 2            | 91.00          | 0.1125                       | 16                  | AGM          | 0.007033            | 91.44                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C2-1-OHT1-RTA-2 | C             | C2              | 3             | 2            | 87.72          | 0.1125                       | 16                  | AGM          | 0.007032            | 88.13                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C2-1-OHT1-RTA-3 | C             | C2              | 3             | 2            | 96.66          | 0.1128                       | 16                  | AGM          | 0.007052            | 97.38                          |

Average 91.68  
Standard Dev. 2.855  
Coeff. of Var. [%] 3.114  
Min. 86.34  
Max. 96.66  
Number of Spec. 18

Average<sub>norm</sub> 0.007011  
Standard Dev.<sub>norm</sub> 3.068  
Coeff. of Var. [%]<sub>norm</sub> 3.341  
Min. 0.006964  
Max. 0.007131  
Number of Spec. 18



**Laminate Open-Hole Tension Properties (OHT1)--ETW1 (180°F)**  
**Strength**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

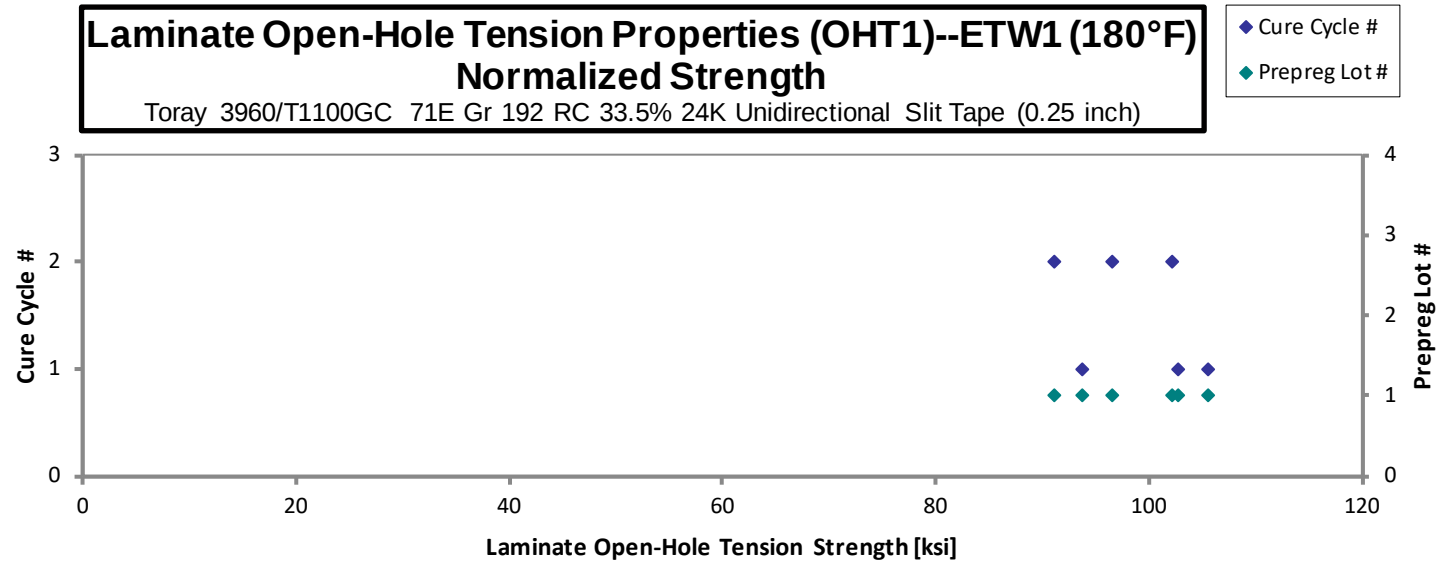
 $t_{ply}$  [in]

0.007000

| Specimen Number                                   | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | Strength <sub>norm</sub> [ksi] |
|---------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|------------------------------|---------------------|--------------|---------------------|--------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-OHT1-ETW1-1 | A             | C1              | 1             | 1            | 93.72          | 0.1121                       | 16                  | AGM          | 0.007006            | 93.80                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-OHT1-ETW1-2 | A             | C1              | 1             | 1            | 105.7          | 0.1119                       | 16                  | AGM          | 0.006993            | 105.6                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-OHT1-ETW1-3 | A             | C1              | 1             | 1            | 103.3          | 0.1114                       | 16                  | AGM          | 0.006963            | 102.7                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-OHT1-ETW1-1 | A             | C2              | 1             | 2            | 102.7          | 0.1115                       | 16                  | AGM          | 0.006971            | 102.2                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-OHT1-ETW1-2 | A             | C2              | 1             | 2            | 96.61          | 0.1119                       | 16                  | AGM          | 0.006994            | 96.52                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-OHT1-ETW1-3 | A             | C2              | 1             | 2            | 91.35          | 0.1117                       | 16                  | AGM          | 0.006983            | 91.13                          |

Average 98.88  
Standard Dev. 5.805  
Coeff. of Var. [%] 5.870  
Min. 91.35  
Max. 105.7  
Number of Spec. 6

Average<sub>norm</sub> 0.006985 98.66  
Standard Dev.<sub>norm</sub> 5.692  
Coeff. of Var. [%]<sub>norm</sub> 5.769  
Min. 0.006963 91.13  
Max. 0.007006 105.6  
Number of Spec. 6



**Laminate Open-Hole Tension Properties (OHT1)--ETW2 (250°F)**  
**Strength**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

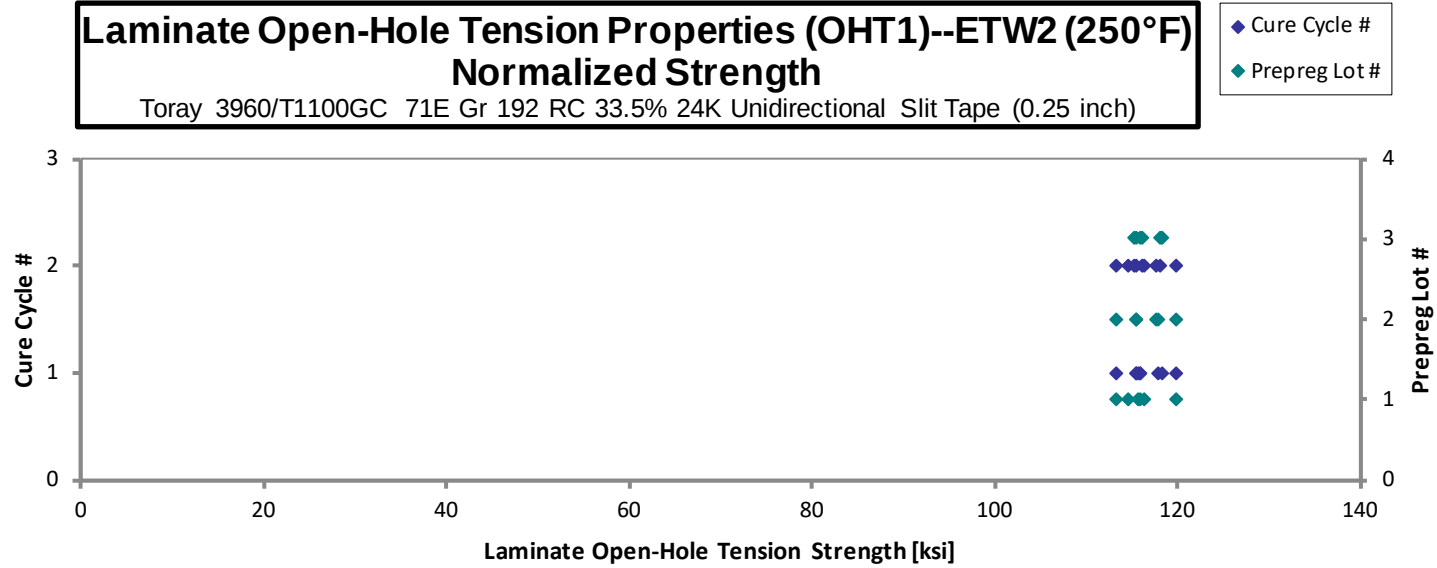
$t_{ply}$  [in]

0.007000

| Specimen Number                                   | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | Strength <sub>norm</sub> [ksi] |
|---------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|------------------------------|---------------------|--------------|---------------------|--------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-OHT1-ETW2-1 | A             | C1              | 1             | 1            | 119.9          | 0.1119                       | 16                  | M(A,L)GM     | 0.006992            | 119.8                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-OHT1-ETW2-2 | A             | C1              | 1             | 1            | 115.9          | 0.1120                       | 16                  | M(A,L)GM     | 0.006997            | 115.8                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-OHT1-ETW2-3 | A             | C1              | 1             | 1            | 116.2          | 0.1118                       | 16                  | M(A,L)GM     | 0.006985            | 116.0                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-OHT1-ETW2-1 | A             | C2              | 1             | 2            | 117.1          | 0.1114                       | 16                  | M(A,L)GM     | 0.006963            | 116.5                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-OHT1-ETW2-2 | A             | C2              | 1             | 2            | 113.8          | 0.1114                       | 16                  | M(A,L)GM     | 0.006965            | 113.2                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-OHT1-ETW2-3 | A             | C2              | 1             | 2            | 115.1          | 0.1116                       | 16                  | M(A,L)GM     | 0.006973            | 114.7                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C1-1-OHT1-ETW2-1 | B             | C1              | 2             | 1            | 114.0          | 0.1114                       | 16                  | AGM          | 0.006964            | 113.4                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C1-1-OHT1-ETW2-2 | B             | C1              | 2             | 1            | 115.9          | 0.1115                       | 16                  | AGM          | 0.006969            | 115.4                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C1-1-OHT1-ETW2-3 | B             | C1              | 2             | 1            | 118.5          | 0.1115                       | 16                  | AGM          | 0.006968            | 118.0                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C2-1-OHT1-ETW2-1 | B             | C2              | 2             | 2            | 115.3          | 0.1122                       | 16                  | AGM          | 0.007009            | 115.5                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C2-1-OHT1-ETW2-2 | B             | C2              | 2             | 2            | 117.4          | 0.1123                       | 16                  | AGM          | 0.007017            | 117.6                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C2-1-OHT1-ETW2-3 | B             | C2              | 2             | 2            | 119.9          | 0.1120                       | 16                  | AGM          | 0.007001            | 120.0                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C1-1-OHT1-ETW2-1 | C             | C1              | 3             | 1            | 114.7          | 0.1129                       | 16                  | AGM          | 0.007056            | 115.6                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C1-1-OHT1-ETW2-2 | C             | C1              | 3             | 1            | 115.1          | 0.1129                       | 16                  | AGM          | 0.007055            | 116.0                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C1-1-OHT1-ETW2-3 | C             | C1              | 3             | 1            | 117.1          | 0.1131                       | 16                  | AGM          | 0.007066            | 118.2                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C2-1-OHT1-ETW2-1 | C             | C2              | 3             | 2            | 115.5          | 0.1127                       | 16                  | M(A,L)GM     | 0.007041            | 116.2                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C2-1-OHT1-ETW2-2 | C             | C2              | 3             | 2            | 118.2          | 0.1120                       | 16                  | M(A,L)GM     | 0.007002            | 118.2                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C2-1-OHT1-ETW2-3 | C             | C2              | 3             | 2            | 115.1          | 0.1122                       | 16                  | M(A,L)GM     | 0.007011            | 115.3                          |

Average 116.4  
Standard Dev. 1.840  
Coeff. of Var. [%] 1.581  
Min. 113.8  
Max. 119.9  
Number of Spec. 18

Average<sub>norm</sub> 0.007002 116.4  
Standard Dev.<sub>norm</sub> 1.897  
Coeff. of Var. [%]<sub>norm</sub> 1.630  
Min. 0.006963 113.2  
Max. 0.007066 120.0  
Number of Spec. 18 18



## 4.18 “10/80/10” Open-Hole Tension 2 Properties (OHT2)

## Laminate Open-Hole Tension Properties (OHT2)--CTA (-65°F)

## Strength

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

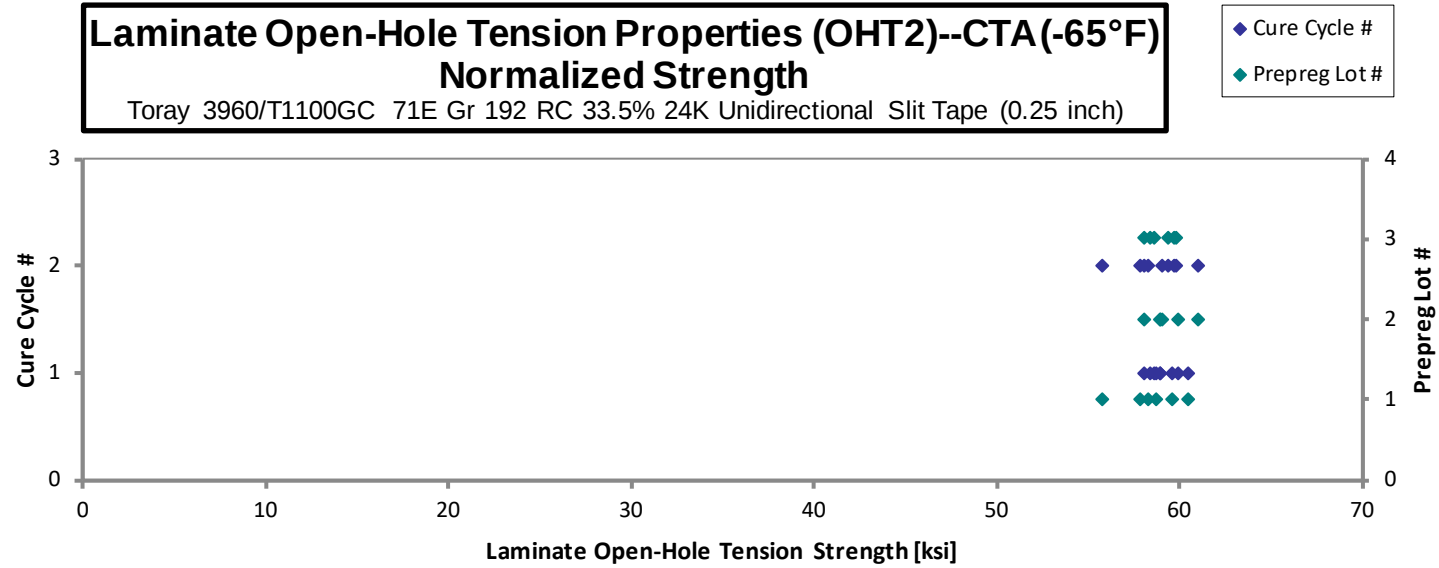
 $t_{ply}$  [in]

0.007000

| Specimen Number                                  | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | Strength <sub>norm</sub> [ksi] |
|--------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|------------------------------|---------------------|--------------|---------------------|--------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C1-1-OHT2-CTA-1 | A             | C1              | 1             | 1            | 60.59          | 0.1397                       | 20                  | AGM          | 0.006987            | 60.48                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C1-1-OHT2-CTA-2 | A             | C1              | 1             | 1            | 58.77          | 0.1400                       | 20                  | AGM          | 0.006998            | 58.75                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C1-1-OHT2-CTA-3 | A             | C1              | 1             | 1            | 59.69          | 0.1399                       | 20                  | AGM          | 0.006995            | 59.65                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C2-1-OHT2-CTA-1 | A             | C2              | 1             | 2            | 56.13          | 0.1392                       | 20                  | AGM          | 0.006961            | 55.82                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C2-1-OHT2-CTA-2 | A             | C2              | 1             | 2            | 58.36          | 0.1398                       | 20                  | AGM          | 0.006988            | 58.26                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C2-1-OHT2-CTA-3 | A             | C2              | 1             | 2            | 57.81          | 0.1400                       | 20                  | AGM          | 0.006999            | 57.81                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C1-1-OHT2-CTA-1 | B             | C1              | 2             | 1            | 58.89          | 0.1403                       | 20                  | AGM          | 0.007013            | 58.99                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C1-1-OHT2-CTA-2 | B             | C1              | 2             | 1            | 58.90          | 0.1400                       | 20                  | AGM          | 0.007001            | 58.91                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C1-1-OHT2-CTA-3 | B             | C1              | 2             | 1            | 59.66          | 0.1406                       | 20                  | AGM          | 0.007030            | 59.92                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-OHT2-CTA-1 | B             | C2              | 2             | 2            | 57.88          | 0.1404                       | 20                  | AGM          | 0.007021            | 58.05                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-OHT2-CTA-2 | B             | C2              | 2             | 2            | 59.17          | 0.1396                       | 20                  | AGM          | 0.006981            | 59.01                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-OHT2-CTA-3 | B             | C2              | 2             | 2            | 60.89          | 0.1402                       | 20                  | AGM          | 0.007009            | 60.97                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C1-1-OHT2-CTA-1 | C             | C1              | 3             | 1            | 58.11          | 0.1413                       | 20                  | AGM          | 0.007066            | 58.66                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C1-1-OHT2-CTA-2 | C             | C1              | 3             | 1            | 57.54          | 0.1413                       | 20                  | AGM          | 0.007064            | 58.07                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C1-1-OHT2-CTA-3 | C             | C1              | 3             | 1            | 57.75          | 0.1415                       | 20                  | AGM          | 0.007076            | 58.38                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-OHT2-CTA-1 | C             | C2              | 3             | 2            | 59.66          | 0.1401                       | 20                  | AGM          | 0.007003            | 59.69                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-OHT2-CTA-2 | C             | C2              | 3             | 2            | 59.81          | 0.1399                       | 20                  | AGM          | 0.006995            | 59.77                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-OHT2-CTA-3 | C             | C2              | 3             | 2            | 59.26          | 0.1404                       | 20                  | AGM          | 0.007018            | 59.41                          |

Average 58.83  
 Standard Dev. 1.177  
 Coeff. of Var. [%] 2.000  
 Min. 56.13  
 Max. 60.89  
 Number of Spec. 18

Average<sub>norm</sub> 0.007011 58.92  
 Standard Dev.<sub>norm</sub> 1.161  
 Coeff. of Var. [%]<sub>norm</sub> 1.970  
 Min. 0.006961 55.82  
 Max. 0.007076 60.97  
 Number of Spec. 18 18



**Laminate Open-Hole Tension Properties (OHT2)--RTA (70°F)**  
**Strength**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

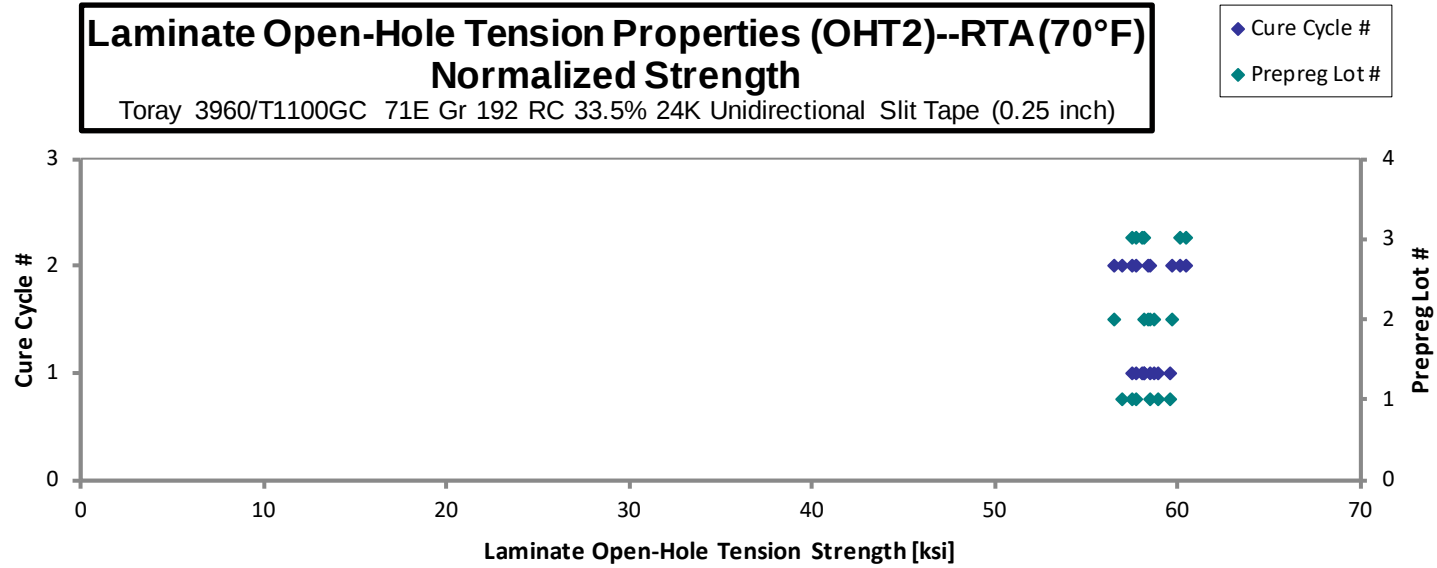
 $t_{ply}$  [in]

0.007000

| Specimen Number                                  | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | Strength <sub>norm</sub> [ksi] |
|--------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|------------------------------|---------------------|--------------|---------------------|--------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C1-1-OHT2-RTA-1 | A             | C1              | 1             | 1            | 59.70          | 0.1398                       | 20                  | AGM          | 0.006988            | 59.60                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C1-1-OHT2-RTA-2 | A             | C1              | 1             | 1            | 57.68          | 0.1397                       | 20                  | AGM          | 0.006987            | 57.57                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C1-1-OHT2-RTA-3 | A             | C1              | 1             | 1            | 58.97          | 0.1399                       | 20                  | AGM          | 0.006995            | 58.93                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C2-1-OHT2-RTA-1 | A             | C2              | 1             | 2            | 58.63          | 0.1397                       | 20                  | AGM          | 0.006985            | 58.51                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C2-1-OHT2-RTA-2 | A             | C2              | 1             | 2            | 57.85          | 0.1398                       | 20                  | AGM          | 0.006988            | 57.75                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C2-1-OHT2-RTA-3 | A             | C2              | 1             | 2            | 56.97          | 0.1400                       | 20                  | AGM          | 0.006999            | 56.96                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C1-1-OHT2-RTA-1 | B             | C1              | 2             | 1            | 58.42          | 0.1402                       | 20                  | AGM          | 0.007008            | 58.48                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C1-1-OHT2-RTA-2 | B             | C1              | 2             | 1            | 58.57          | 0.1403                       | 20                  | AGM          | 0.007017            | 58.71                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C1-1-OHT2-RTA-3 | B             | C1              | 2             | 1            | 58.03          | 0.1404                       | 20                  | AGM          | 0.007019            | 58.18                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-OHT2-RTA-1 | B             | C2              | 2             | 2            | 56.51          | 0.1400                       | 20                  | AGM          | 0.007001            | 56.52                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-OHT2-RTA-2 | B             | C2              | 2             | 2            | 58.48          | 0.1399                       | 20                  | AGM          | 0.006994            | 58.44                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-OHT2-RTA-3 | B             | C2              | 2             | 2            | 59.66          | 0.1401                       | 20                  | AGM          | 0.007006            | 59.71                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C1-1-OHT2-RTA-1 | C             | C1              | 3             | 1            | 57.55          | 0.1413                       | 20                  | AGM          | 0.007063            | 58.07                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C1-1-OHT2-RTA-2 | C             | C1              | 3             | 1            | 57.87          | 0.1408                       | 20                  | AGM          | 0.007040            | 58.20                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C1-1-OHT2-RTA-3 | C             | C1              | 3             | 1            | 57.10          | 0.1416                       | 20                  | AGM          | 0.007079            | 57.75                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-OHT2-RTA-1 | C             | C2              | 3             | 2            | 57.42          | 0.1403                       | 20                  | AGM          | 0.007013            | 57.52                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-OHT2-RTA-2 | C             | C2              | 3             | 2            | 60.55          | 0.1398                       | 20                  | AGM          | 0.006990            | 60.46                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-OHT2-RTA-3 | C             | C2              | 3             | 2            | 60.16          | 0.1399                       | 20                  | AGM          | 0.006997            | 60.13                          |

Average 58.34  
Standard Dev. 1.126  
Coeff. of Var. [%] 1.931  
Min. 56.51  
Max. 60.55  
Number of Spec. 18

Average<sub>norm</sub> 0.007009 58.42  
Standard Dev.<sub>norm</sub> 1.054  
Coeff. of Var. [%]<sub>norm</sub> 1.805  
Min. 0.006985 56.52  
Max. 0.007079 60.46  
Number of Spec. 18



**Laminate Open-Hole Tension Properties (OHT2)--ETW2 (250°F)**  
**Strength**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

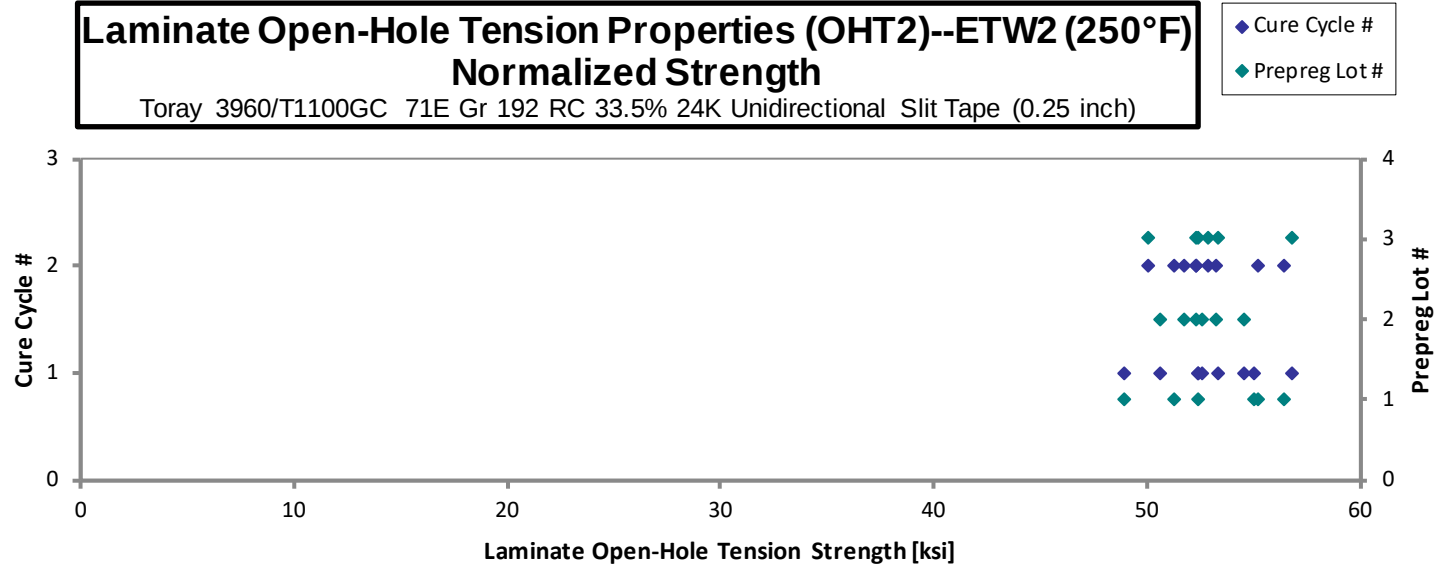
$t_{ply}$  [in]

0.007000

| Specimen Number                                   | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | Strength <sub>norm</sub> [ksi] |
|---------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|------------------------------|---------------------|--------------|---------------------|--------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C1-1-OHT2-ETW2-1 | A             | C1              | 1             | 1            | 49.18          | 0.1394                       | 20                  | AGM          | 0.006968            | 48.96                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C1-1-OHT2-ETW2-2 | A             | C1              | 1             | 1            | 55.30          | 0.1393                       | 20                  | AGM          | 0.006967            | 55.04                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C1-1-OHT2-ETW2-3 | A             | C1              | 1             | 1            | 52.58          | 0.1395                       | 20                  | AGM          | 0.006973            | 52.38                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C2-1-OHT2-ETW2-1 | A             | C2              | 1             | 2            | 55.08          | 0.1404                       | 20                  | AGM          | 0.007018            | 55.21                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C2-1-OHT2-ETW2-2 | A             | C2              | 1             | 2            | 56.35          | 0.1401                       | 20                  | AGM          | 0.007003            | 56.38                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C2-1-OHT2-ETW2-3 | A             | C2              | 1             | 2            | 51.20          | 0.1403                       | 20                  | AGM          | 0.007014            | 51.31                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C1-1-OHT2-ETW2-1 | B             | C1              | 2             | 1            | 52.45          | 0.1403                       | 20                  | AGM          | 0.007013            | 52.55                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C1-1-OHT2-ETW2-2 | B             | C1              | 2             | 1            | 50.51          | 0.1402                       | 20                  | AGM          | 0.007009            | 50.58                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C1-1-OHT2-ETW2-3 | B             | C1              | 2             | 1            | 54.48          | 0.1401                       | 20                  | AGM          | 0.007004            | 54.51                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-OHT2-ETW2-1 | B             | C2              | 2             | 2            | 53.23          | 0.1400                       | 20                  | AGM          | 0.007002            | 53.24                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-OHT2-ETW2-2 | B             | C2              | 2             | 2            | 51.80          | 0.1398                       | 20                  | AGM          | 0.006989            | 51.72                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-OHT2-ETW2-3 | B             | C2              | 2             | 2            | 51.92          | 0.1411                       | 20                  | AGM          | 0.007053            | 52.32                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C1-1-OHT2-ETW2-1 | C             | C1              | 3             | 1            | 52.58          | 0.1420                       | 20                  | AGM          | 0.007100            | 53.33                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C1-1-OHT2-ETW2-2 | C             | C1              | 3             | 1            | 51.93          | 0.1412                       | 20                  | AGM          | 0.007059            | 52.37                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C1-1-OHT2-ETW2-3 | C             | C1              | 3             | 1            | 56.55          | 0.1407                       | 20                  | AGM          | 0.007035            | 56.83                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-OHT2-ETW2-1 | C             | C2              | 3             | 2            | 50.21          | 0.1396                       | 20                  | AGM          | 0.006979            | 50.06                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-OHT2-ETW2-2 | C             | C2              | 3             | 2            | 52.77          | 0.1402                       | 20                  | AGM          | 0.007010            | 52.84                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-OHT2-ETW2-3 | C             | C2              | 3             | 2            | 52.33          | 0.1400                       | 20                  | AGM          | 0.007002            | 52.34                          |

Average 52.80  
Standard Dev. 2.054  
Coeff. of Var. [%] 3.890  
Min. 49.18  
Max. 56.55  
Number of Spec. 18

Average<sub>norm</sub> 0.007011 52.89  
Standard Dev.<sub>norm</sub> 2.096  
Coeff. of Var. [%]<sub>norm</sub> 3.963  
Min. 0.006967 48.96  
Max. 0.007100 56.83  
Number of Spec. 18 18



## 4.19 “50/40/10” Open-Hole Tension 3 Properties (OHT3)

## Laminate Open-Hole Tension Properties (OHT3)--CTA (-65°F)

## Strength

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

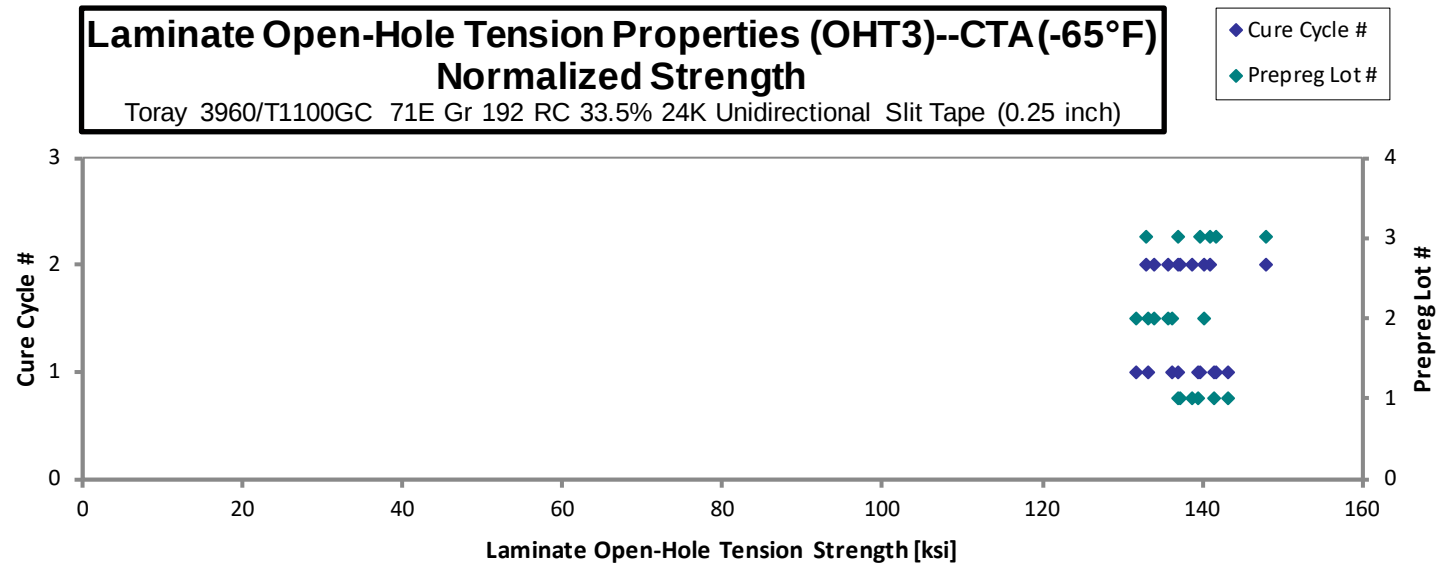
 $t_{ply}$  [in]

0.007000

| Specimen Number                                  | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | Strength <sub>norm</sub> [ksi] |
|--------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|------------------------------|---------------------|--------------|---------------------|--------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-OHT3-CTA-1 | A             | C1              | 1             | 1            | 140.0          | 0.1414                       | 20                  | AGM          | 0.007070            | 141.4                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-OHT3-CTA-2 | A             | C1              | 1             | 1            | 137.9          | 0.1416                       | 20                  | AGM          | 0.007078            | 139.5                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-OHT3-CTA-3 | A             | C1              | 1             | 1            | 141.9          | 0.1414                       | 20                  | AGM          | 0.007072            | 143.3                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-OHT3-CTA-1 | A             | C2              | 1             | 2            | 138.5          | 0.1401                       | 20                  | AGM          | 0.007006            | 138.6                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-OHT3-CTA-2 | A             | C2              | 1             | 2            | 137.2          | 0.1398                       | 20                  | AGM          | 0.006988            | 137.0                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-OHT3-CTA-3 | A             | C2              | 1             | 2            | 137.5          | 0.1397                       | 20                  | AGM          | 0.006984            | 137.2                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-OHT3-CTA-1 | B             | C1              | 2             | 1            | 131.8          | 0.1414                       | 20                  | AGM          | 0.007071            | 133.2                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-OHT3-CTA-2 | B             | C1              | 2             | 1            | 131.3          | 0.1406                       | 20                  | AGM          | 0.007028            | 131.8                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-OHT3-CTA-3 | B             | C1              | 2             | 1            | 135.0          | 0.1412                       | 20                  | AGM          | 0.007060            | 136.2                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-OHT3-CTA-1 | B             | C2              | 2             | 2            | 140.5          | 0.1396                       | 20                  | M(A,L)GM     | 0.006981            | 140.1                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-OHT3-CTA-2 | B             | C2              | 2             | 2            | 136.2          | 0.1395                       | 20                  | M(A,L)GM     | 0.006973            | 135.7                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-OHT3-CTA-3 | B             | C2              | 2             | 2            | 134.6          | 0.1394                       | 20                  | M(A,L)GM     | 0.006968            | 134.0                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-OHT3-CTA-1 | C             | C1              | 3             | 1            | 134.6          | 0.1425                       | 20                  | M(A,L)GM     | 0.007125            | 137.0                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-OHT3-CTA-2 | C             | C1              | 3             | 1            | 139.0          | 0.1408                       | 20                  | M(A,L)GM     | 0.007040            | 139.8                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-OHT3-CTA-3 | C             | C1              | 3             | 1            | 139.8          | 0.1419                       | 20                  | M(A,L)GM     | 0.007097            | 141.7                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-OHT3-CTA-1 | C             | C2              | 3             | 2            | 138.4          | 0.1426                       | 20                  | AGM          | 0.007131            | 140.9                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-OHT3-CTA-2 | C             | C2              | 3             | 2            | 145.3          | 0.1426                       | 20                  | AGM          | 0.007132            | 148.1                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-OHT3-CTA-3 | C             | C2              | 3             | 2            | 130.6          | 0.1426                       | 20                  | AGM          | 0.007132            | 133.1                          |

Average 137.2  
 Standard Dev. 3.813  
 Coeff. of Var. [%] 2.779  
 Min. 130.6  
 Max. 145.3  
 Number of Spec. 18

Average<sub>norm</sub> 0.007052 138.3  
 Standard Dev.<sub>norm</sub> 4.107  
 Coeff. of Var. [%]<sub>norm</sub> 2.971  
 Min. 0.006968 131.8  
 Max. 0.007132 148.1  
 Number of Spec. 18 18



**Laminate Open-Hole Tension Properties (OHT3)--RTA (70°F)**  
**Strength**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

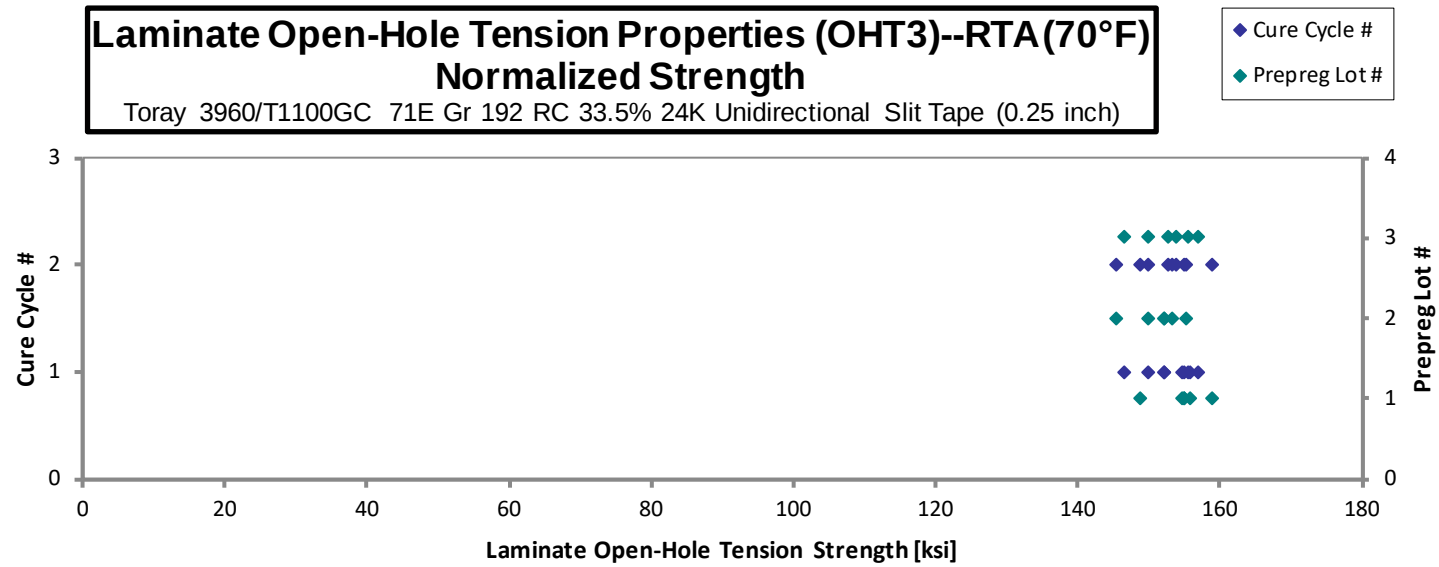
$t_{ply}$  [in]

0.007000

| Specimen Number                                  | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | Strength <sub>norm</sub> [ksi] |
|--------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|------------------------------|---------------------|--------------|---------------------|--------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-OHT3-RTA-1 | A             | C1              | 1             | 1            | 153.4          | 0.1412                       | 20                  | M(A,L)GM     | 0.007058            | 154.7                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-OHT3-RTA-2 | A             | C1              | 1             | 1            | 154.2          | 0.1414                       | 20                  | M(A,L)GM     | 0.007071            | 155.8                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-OHT3-RTA-3 | A             | C1              | 1             | 1            | 153.2          | 0.1416                       | 20                  | M(A,L)GM     | 0.007079            | 155.0                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-OHT3-RTA-1 | A             | C2              | 1             | 2            | 155.3          | 0.1397                       | 20                  | M(A,L)GM     | 0.006983            | 154.9                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-OHT3-RTA-2 | A             | C2              | 1             | 2            | 149.3          | 0.1394                       | 20                  | M(A,L)GM     | 0.006968            | 148.7                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-OHT3-RTA-3 | A             | C2              | 1             | 2            | 159.4          | 0.1396                       | 20                  | M(A,L)GM     | 0.006982            | 159.0                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-OHT3-RTA-1 | B             | C1              | 2             | 1            | 150.6          | 0.1413                       | 20                  | M(A,L)GM     | 0.007065            | 152.0                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-OHT3-RTA-2 | B             | C1              | 2             | 1            | 151.3          | 0.1407                       | 20                  | M(A,L)GM     | 0.007033            | 152.1                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-OHT3-RTA-3 | B             | C1              | 2             | 1            | 149.2          | 0.1406                       | 20                  | M(A,L)GM     | 0.007028            | 149.8                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-OHT3-RTA-1 | B             | C2              | 2             | 2            | 145.1          | 0.1404                       | 20                  | M(A,L)GM     | 0.007018            | 145.4                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-OHT3-RTA-2 | B             | C2              | 2             | 2            | 155.4          | 0.1399                       | 20                  | M(A,L)GM     | 0.006994            | 155.3                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-OHT3-RTA-3 | B             | C2              | 2             | 2            | 153.2          | 0.1401                       | 20                  | M(A,L)GM     | 0.007006            | 153.3                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-OHT3-RTA-1 | C             | C1              | 3             | 1            | 144.4          | 0.1420                       | 20                  | M(A,L)GM     | 0.007100            | 146.4                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-OHT3-RTA-2 | C             | C1              | 3             | 1            | 155.0          | 0.1416                       | 20                  | M(A,L)GM     | 0.007081            | 156.8                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-OHT3-RTA-3 | C             | C1              | 3             | 1            | 153.0          | 0.1424                       | 20                  | M(A,L)GM     | 0.007118            | 155.6                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-OHT3-RTA-1 | C             | C2              | 3             | 2            | 149.5          | 0.1429                       | 20                  | M(A,L)GM     | 0.007144            | 152.6                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-OHT3-RTA-2 | C             | C2              | 3             | 2            | 147.4          | 0.1424                       | 20                  | M(A,L)GM     | 0.007118            | 149.9                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-OHT3-RTA-3 | C             | C2              | 3             | 2            | 151.4          | 0.1423                       | 20                  | M(A,L)GM     | 0.007113            | 153.9                          |

Average 151.7  
Standard Dev. 3.819  
Coeff. of Var. [%] 2.517  
Min. 144.4  
Max. 159.4  
Number of Spec. 18

Average<sub>norm</sub> 0.007053  
Standard Dev.<sub>norm</sub> 3.617  
Coeff. of Var. [%]<sub>norm</sub> 2.367  
Min. 0.006968  
Max. 0.007144  
Number of Spec. 18



**Laminate Open-Hole Tension Properties (OHT3)--ETW2 (250°F)**  
**Strength**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

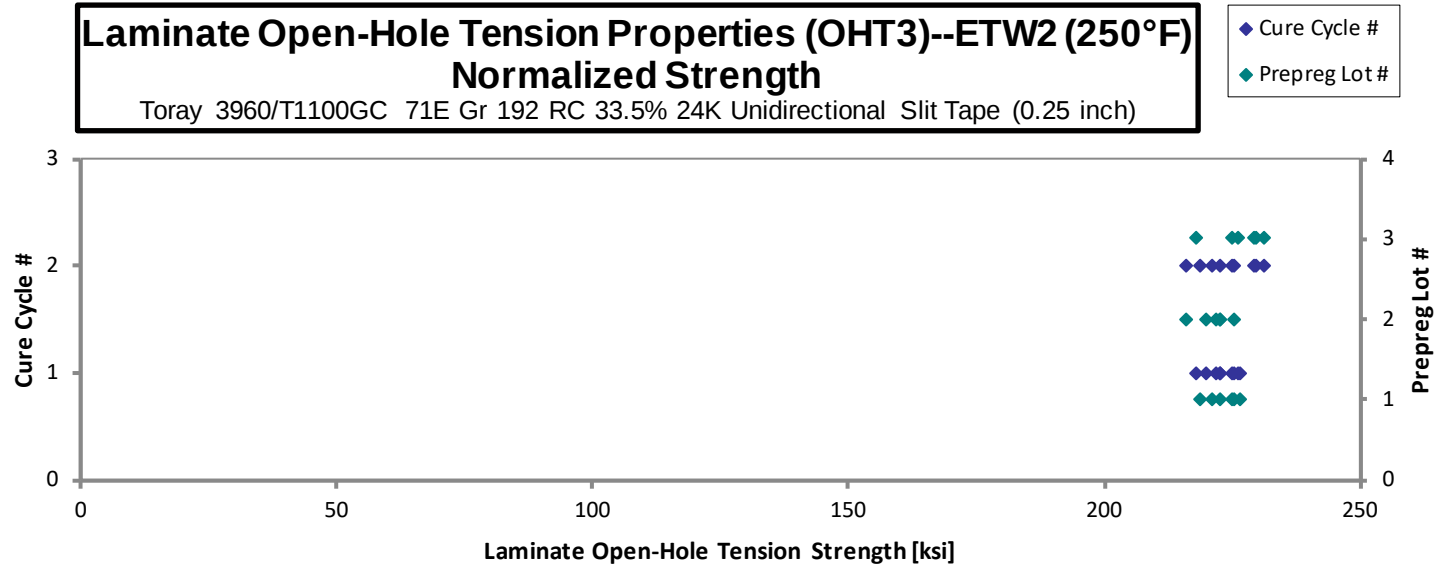
 $t_{ply}$  [in]

0.007000

| Specimen Number                                   | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | Strength <sub>norm</sub> [ksi] |
|---------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|------------------------------|---------------------|--------------|---------------------|--------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-OHT3-ETW2-1 | A             | C1              | 1             | 1            | 223.2          | 0.1413                       | 20                  | XGM          | 0.007063            | 225.3                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-OHT3-ETW2-2 | A             | C1              | 1             | 1            | 221.1          | 0.1410                       | 20                  | XGM          | 0.007052            | 222.8                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-OHT3-ETW2-3 | A             | C1              | 1             | 1            | 224.2          | 0.1414                       | 20                  | XGM          | 0.007072            | 226.5                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-OHT3-ETW2-1 | A             | C2              | 1             | 2            | 221.6          | 0.1396                       | 20                  | XGM          | 0.006981            | 221.0                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-OHT3-ETW2-2 | A             | C2              | 1             | 2            | 225.5          | 0.1398                       | 20                  | XGM          | 0.006988            | 225.1                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-OHT3-ETW2-3 | A             | C2              | 1             | 2            | 218.6          | 0.1400                       | 20                  | XGM          | 0.007001            | 218.6                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-OHT3-ETW2-1 | B             | C1              | 2             | 1            | 218.9          | 0.1407                       | 20                  | XGM          | 0.007037            | 220.1                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-OHT3-ETW2-2 | B             | C1              | 2             | 1            | 221.7          | 0.1407                       | 20                  | XGM          | 0.007034            | 222.8                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-OHT3-ETW2-3 | B             | C1              | 2             | 1            | 220.3          | 0.1411                       | 20                  | XGM          | 0.007053            | 222.0                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-OHT3-ETW2-1 | B             | C2              | 2             | 2            | 220.1          | 0.1416                       | 20                  | SGM          | 0.007078            | 222.6                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-OHT3-ETW2-2 | B             | C2              | 2             | 2            | 225.5          | 0.1400                       | 20                  | SGM          | 0.007000            | 225.5                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-OHT3-ETW2-3 | B             | C2              | 2             | 2            | 216.1          | 0.1399                       | 20                  | SGM          | 0.006995            | 215.9                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-OHT3-ETW2-1 | C             | C1              | 3             | 1            | 223.0          | 0.1411                       | 20                  | XGM          | 0.007056            | 224.8                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-OHT3-ETW2-2 | C             | C1              | 3             | 1            | 216.5          | 0.1409                       | 20                  | XGM          | 0.007045            | 217.9                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-OHT3-ETW2-3 | C             | C1              | 3             | 1            | 223.8          | 0.1414                       | 20                  | XGM          | 0.007068            | 226.0                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-OHT3-ETW2-1 | C             | C2              | 3             | 2            | 225.3          | 0.1424                       | 20                  | XGM          | 0.007121            | 229.2                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-OHT3-ETW2-2 | C             | C2              | 3             | 2            | 227.5          | 0.1422                       | 20                  | XGM          | 0.007111            | 231.1                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-OHT3-ETW2-3 | C             | C2              | 3             | 2            | 225.1          | 0.1428                       | 20                  | XGM          | 0.007142            | 229.7                          |

Average 222.1  
Standard Dev. 3.245  
Coeff. of Var. [%] 1.461  
Min. 216.1  
Max. 227.5  
Number of Spec. 18

Average<sub>norm</sub> 0.007050  
Standard Dev.<sub>norm</sub> 4.118  
Coeff. of Var. [%]<sub>norm</sub> 1.841  
Min. 0.006981  
Max. 0.007142  
Number of Spec. 18



## 4.20 “25/50/25” Filled-Hole Tension 1 Properties (FHT1)

**Laminate Filled-Hole Tension Properties (FHT1)--CTA (-65°F)****Strength**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

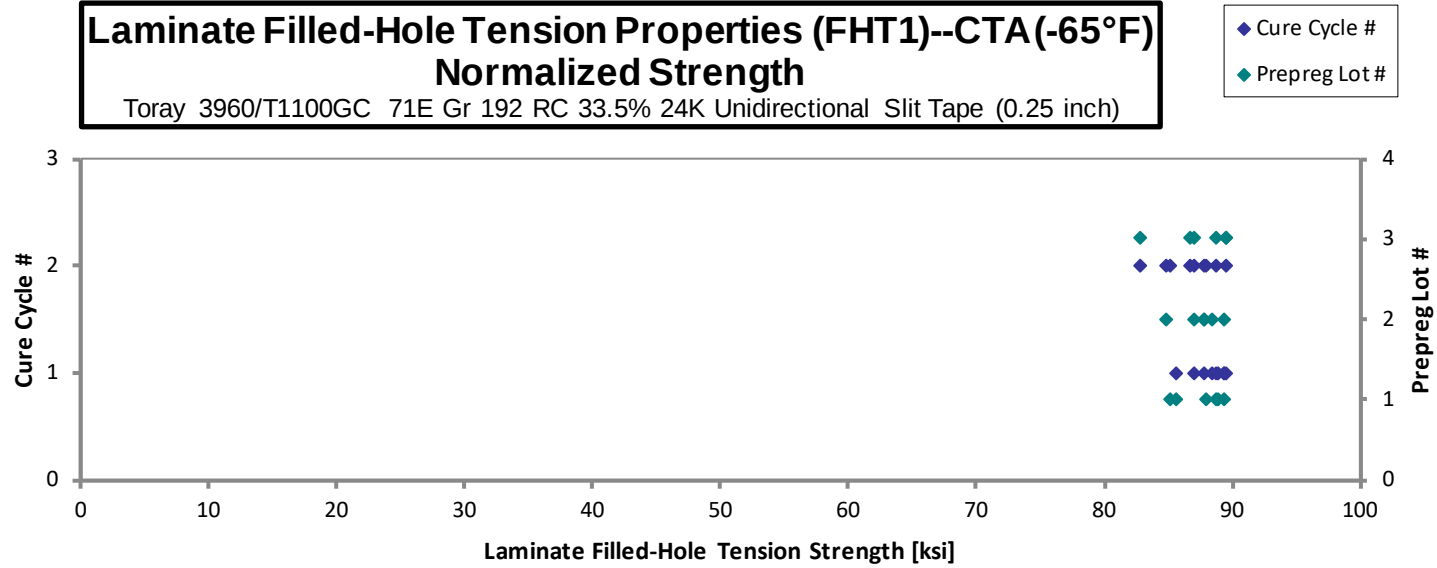
 $t_{ply}$  [in]

0.007000

| Specimen Number                                  | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | Strength <sub>norm</sub> [ksi] |
|--------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|------------------------------|---------------------|--------------|---------------------|--------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-FHT1-CTA-1 | A             | C1              | 1             | 1            | 89.40          | 0.1113                       | 16                  | AGM          | 0.006958            | 88.87                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-FHT1-CTA-2 | A             | C1              | 1             | 1            | 85.56          | 0.1120                       | 16                  | AGM          | 0.007000            | 85.56                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-FHT1-CTA-3 | A             | C1              | 1             | 1            | 89.83          | 0.1115                       | 16                  | AGM          | 0.006968            | 89.42                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-FHT1-CTA-1 | A             | C2              | 1             | 2            | 88.32          | 0.1116                       | 16                  | AGM          | 0.006974            | 87.99                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-FHT1-CTA-2 | A             | C2              | 1             | 2            | 84.78          | 0.1126                       | 16                  | AGM          | 0.007034            | 85.20                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-FHT1-CTA-3 | A             | C2              | 1             | 2            | 88.94          | 0.1117                       | 16                  | AGM          | 0.006980            | 88.69                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C1-1-FHT1-CTA-1 | B             | C1              | 2             | 1            | 89.00          | 0.1112                       | 16                  | M(A,L)GM     | 0.006950            | 88.36                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C1-1-FHT1-CTA-2 | B             | C1              | 2             | 1            | 90.30          | 0.1108                       | 16                  | M(A,L)GM     | 0.006922            | 89.30                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C1-1-FHT1-CTA-3 | B             | C1              | 2             | 1            | 88.60          | 0.1110                       | 16                  | M(A,L)GM     | 0.006935            | 87.78                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C2-1-FHT1-CTA-1 | B             | C2              | 2             | 2            | 87.74          | 0.1120                       | 16                  | AGM          | 0.006999            | 87.72                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C2-1-FHT1-CTA-2 | B             | C2              | 2             | 2            | 84.73          | 0.1121                       | 16                  | AGM          | 0.007008            | 84.83                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C2-1-FHT1-CTA-3 | B             | C2              | 2             | 2            | 86.98          | 0.1121                       | 16                  | AGM          | 0.007008            | 87.09                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C1-1-FHT1-CTA-1 | C             | C1              | 3             | 1            | 88.57          | 0.1132                       | 16                  | AGM          | 0.007075            | 89.52                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C1-1-FHT1-CTA-2 | C             | C1              | 3             | 1            | 86.65          | 0.1124                       | 16                  | AGM          | 0.007025            | 86.96                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C1-1-FHT1-CTA-3 | C             | C1              | 3             | 1            | 87.64          | 0.1135                       | 16                  | AGM          | 0.007093            | 88.81                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C2-1-FHT1-CTA-1 | C             | C2              | 3             | 2            | 86.54          | 0.1122                       | 16                  | AGM          | 0.007010            | 86.67                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C2-1-FHT1-CTA-2 | C             | C2              | 3             | 2            | 83.22          | 0.1114                       | 16                  | AGM          | 0.006964            | 82.79                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C2-1-FHT1-CTA-3 | C             | C2              | 3             | 2            | 88.76          | 0.1129                       | 16                  | AGM          | 0.007054            | 89.45                          |

Average 87.53  
 Standard Dev. 1.955  
 Coeff. of Var. [%] 2.233  
 Min. 83.22  
 Max. 90.30  
 Number of Spec. 18

Average<sub>norm</sub> 0.006998 87.50  
 Standard Dev.<sub>norm</sub> 1.885  
 Coeff. of Var. [%]<sub>norm</sub> 2.155  
 Min. 0.006922 82.79  
 Max. 0.007093 89.52  
 Number of Spec. 18 18



**Laminate Filled-Hole Tension Properties (FHT1)--RTA (70°F)**  
**Strength**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

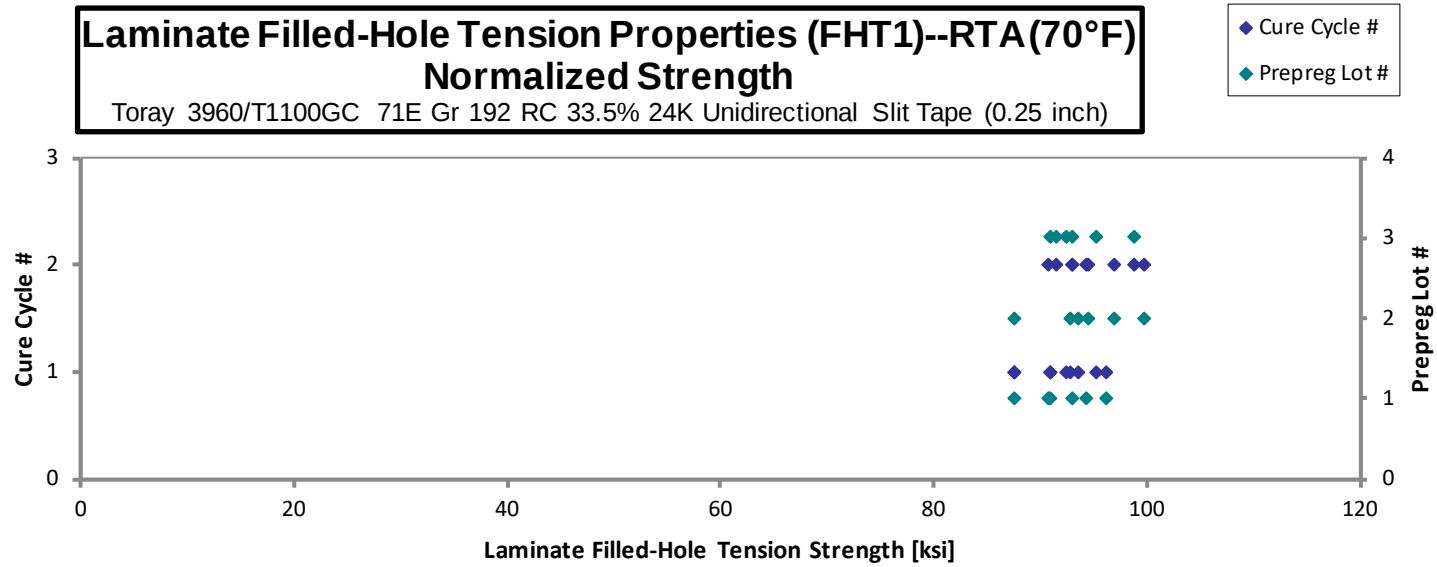
$t_{ply}$  [in]

0.007000

| Specimen Number                                  | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | Strength <sub>norm</sub> [ksi] |
|--------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|------------------------------|---------------------|--------------|---------------------|--------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-FHT1-RTA-1 | A             | C1              | 1             | 1            | 87.87          | 0.1117                       | 16                  | AGM          | 0.006979            | 87.61                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-FHT1-RTA-2 | A             | C1              | 1             | 1            | 96.34          | 0.1118                       | 16                  | AGM          | 0.006990            | 96.20                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-FHT1-RTA-3 | A             | C1              | 1             | 1            | 90.99          | 0.1120                       | 16                  | AGM          | 0.007000            | 90.99                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-FHT1-RTA-1 | A             | C2              | 1             | 2            | 90.87          | 0.1119                       | 16                  | AGM          | 0.006993            | 90.77                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-FHT1-RTA-2 | A             | C2              | 1             | 2            | 94.34          | 0.1120                       | 16                  | AGM          | 0.007001            | 94.35                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-FHT1-RTA-3 | A             | C2              | 1             | 2            | 93.03          | 0.1119                       | 16                  | AGM          | 0.006993            | 92.94                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C1-1-FHT1-RTA-1 | B             | C1              | 2             | 1            | 88.46          | 0.1110                       | 16                  | AGM          | 0.006935            | 87.64                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C1-1-FHT1-RTA-2 | B             | C1              | 2             | 1            | 94.14          | 0.1113                       | 16                  | AGM          | 0.006958            | 93.58                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C1-1-FHT1-RTA-3 | B             | C1              | 2             | 1            | 93.44          | 0.1113                       | 16                  | AGM          | 0.006954            | 92.83                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C2-1-FHT1-RTA-1 | B             | C2              | 2             | 2            | 96.76          | 0.1122                       | 16                  | AGM          | 0.007010            | 96.90                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C2-1-FHT1-RTA-2 | B             | C2              | 2             | 2            | 99.75          | 0.1120                       | 16                  | AGM          | 0.007000            | 99.75                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C2-1-FHT1-RTA-3 | B             | C2              | 2             | 2            | 94.31          | 0.1123                       | 16                  | AGM          | 0.007017            | 94.54                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C1-1-FHT1-RTA-1 | C             | C1              | 3             | 1            | 94.32          | 0.1132                       | 16                  | AGM          | 0.007072            | 95.28                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C1-1-FHT1-RTA-2 | C             | C1              | 3             | 1            | 90.07          | 0.1130                       | 16                  | AGM          | 0.007061            | 90.86                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C1-1-FHT1-RTA-3 | C             | C1              | 3             | 1            | 91.80          | 0.1128                       | 16                  | AGM          | 0.007052            | 92.48                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C2-1-FHT1-RTA-1 | C             | C2              | 3             | 2            | 93.08          | 0.1120                       | 16                  | M(A,L)GM     | 0.007000            | 93.08                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C2-1-FHT1-RTA-2 | C             | C2              | 3             | 2            | 91.46          | 0.1122                       | 16                  | M(A,L)GM     | 0.007009            | 91.59                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C2-1-FHT1-RTA-3 | C             | C2              | 3             | 2            | 98.19          | 0.1128                       | 16                  | M(A,L)GM     | 0.007047            | 98.85                          |

Average 93.29  
Standard Dev. 3.171  
Coeff. of Var. [%] 3.399  
Min. 87.87  
Max. 99.75  
Number of Spec. 18

Average<sub>norm</sub> 0.007004 93.35  
Standard Dev.<sub>norm</sub> 3.312  
Coeff. of Var. [%]<sub>norm</sub> 3.548  
Min. 0.006935 87.61  
Max. 0.007072 99.75  
Number of Spec. 18 18



**Laminate Filled-Hole Tension Properties (FHT1)--ETW1 (180°F)**  
**Strength**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

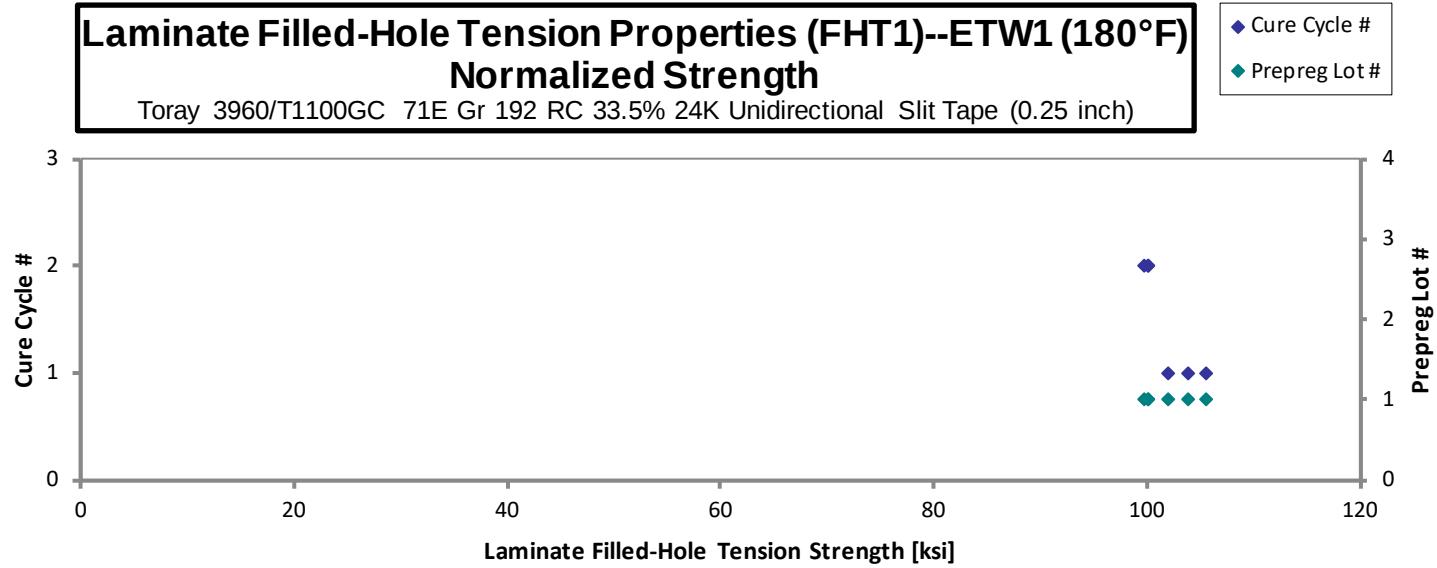
$t_{ply}$  [in]

0.007000

| Specimen Number                                   | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | Strength <sub>norm</sub> [ksi] |
|---------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|------------------------------|---------------------|--------------|---------------------|--------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-FHT1-ETW1-1 | A             | C1              | 1             | 1            | 106.0          | 0.1116                       | 16                  | AGM          | 0.006975            | 105.6                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-FHT1-ETW1-2 | A             | C1              | 1             | 1            | 104.2          | 0.1117                       | 16                  | AGM          | 0.006980            | 103.9                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-FHT1-ETW1-3 | A             | C1              | 1             | 1            | 102.3          | 0.1117                       | 16                  | AGM          | 0.006978            | 102.0                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-FHT1-ETW1-1 | A             | C2              | 1             | 2            | 100.2          | 0.1118                       | 16                  | AGM          | 0.006985            | 100.0                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-FHT1-ETW1-2 | A             | C2              | 1             | 2            | 99.89          | 0.1119                       | 16                  | AGM          | 0.006991            | 99.75                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-FHT1-ETW1-3 | A             | C2              | 1             | 2            | 100.2          | 0.1120                       | 16                  | AGM          | 0.006997            | 100.2                          |

Average 102.1  
Standard Dev. 2.507  
Coeff. of Var. [%] 2.455  
Min. 99.89  
Max. 106.0  
Number of Spec. 6

Average<sub>norm</sub> 0.006984  
Standard Dev.<sub>norm</sub> 2.402  
Coeff. of Var. [%]<sub>norm</sub> 2.357  
Min. 0.006975  
Max. 0.006997  
Number of Spec. 6



**Laminate Filled-Hole Tension Properties (FHT1)--ETW2 (250°F)  
Strength**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

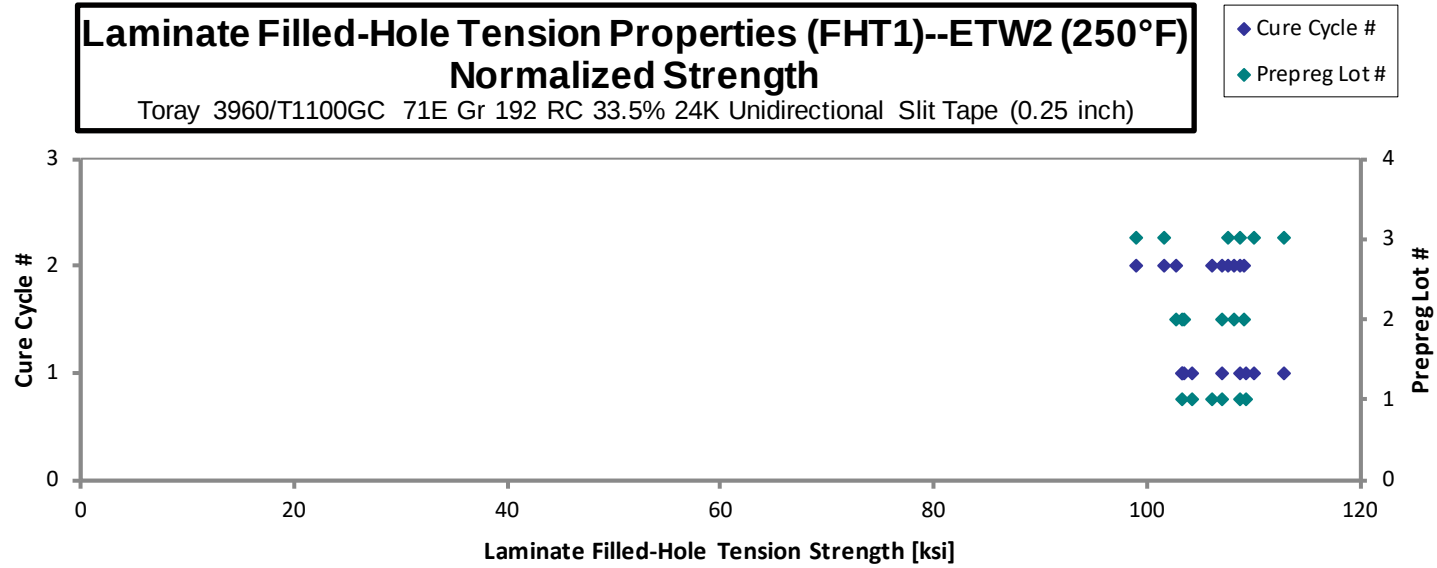
 $t_{ply} [in]$ 

0.007000

| Specimen Number                                   | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply} [in]$ | Strength <sub>norm</sub> [ksi] |
|---------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|------------------------------|---------------------|--------------|---------------------|--------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-FHT1-ETW2-1 | A             | C1              | 1             | 1            | 109.6          | 0.1118                       | 16                  | AGM          | 0.006985            | 109.3                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-FHT1-ETW2-2 | A             | C1              | 1             | 1            | 104.4          | 0.1118                       | 16                  | AGM          | 0.006984            | 104.1                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-FHT1-ETW2-3 | A             | C1              | 1             | 1            | 103.7          | 0.1116                       | 16                  | AGM          | 0.006975            | 103.4                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-FHT1-ETW2-1 | A             | C2              | 1             | 2            | 107.2          | 0.1120                       | 16                  | AGM          | 0.006997            | 107.1                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-FHT1-ETW2-2 | A             | C2              | 1             | 2            | 106.4          | 0.1117                       | 16                  | AGM          | 0.006982            | 106.1                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-FHT1-ETW2-3 | A             | C2              | 1             | 2            | 109.1          | 0.1117                       | 16                  | AGM          | 0.006980            | 108.8                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C1-1-FHT1-ETW2-1 | B             | C1              | 2             | 1            | 104.0          | 0.1115                       | 16                  | AGM          | 0.006968            | 103.5                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C1-1-FHT1-ETW2-2 | B             | C1              | 2             | 1            | 103.8          | 0.1115                       | 16                  | AGM          | 0.006966            | 103.3                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C1-1-FHT1-ETW2-3 | B             | C1              | 2             | 1            | 107.7          | 0.1113                       | 16                  | AGM          | 0.006958            | 107.1                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C2-1-FHT1-ETW2-1 | B             | C2              | 2             | 2            | 108.0          | 0.1123                       | 16                  | AGM          | 0.007018            | 108.2                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C2-1-FHT1-ETW2-2 | B             | C2              | 2             | 2            | 109.0          | 0.1121                       | 16                  | AGM          | 0.007008            | 109.1                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C2-1-FHT1-ETW2-3 | B             | C2              | 2             | 2            | 103.0          | 0.1117                       | 16                  | AGM          | 0.006982            | 102.7                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C1-1-FHT1-ETW2-1 | C             | C1              | 3             | 1            | 108.9          | 0.1132                       | 16                  | AGM          | 0.007072            | 110.0                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C1-1-FHT1-ETW2-2 | C             | C1              | 3             | 1            | 108.0          | 0.1127                       | 16                  | AGM          | 0.007044            | 108.7                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C1-1-FHT1-ETW2-3 | C             | C1              | 3             | 1            | 112.1          | 0.1127                       | 16                  | AGM          | 0.007046            | 112.8                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C2-1-FHT1-ETW2-1 | C             | C2              | 3             | 2            | 98.76          | 0.1124                       | 16                  | AGM          | 0.007023            | 99.08                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C2-1-FHT1-ETW2-2 | C             | C2              | 3             | 2            | 107.0          | 0.1126                       | 16                  | AGM          | 0.007038            | 107.5                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C2-1-FHT1-ETW2-3 | C             | C2              | 3             | 2            | 100.9          | 0.1127                       | 16                  | AGM          | 0.007044            | 101.5                          |

Average 106.2  
 Standard Dev. 3.372  
 Coeff. of Var. [%] 3.175  
 Min. 98.76  
 Max. 112.1  
 Number of Spec. 18

Average<sub>norm</sub> 0.007004 106.3  
 Standard Dev.<sub>norm</sub> 3.508  
 Coeff. of Var. [%]<sub>norm</sub> 3.302  
 Min. 0.006958 99.08  
 Max. 0.007072 112.8  
 Number of Spec. 18 18



## 4.21 “10/80/10” Filled-Hole Tension 2 Properties (FHT2)

## Laminate Filled-Hole Tension Properties (FHT2)--CTA (-65°F)

## Strength

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

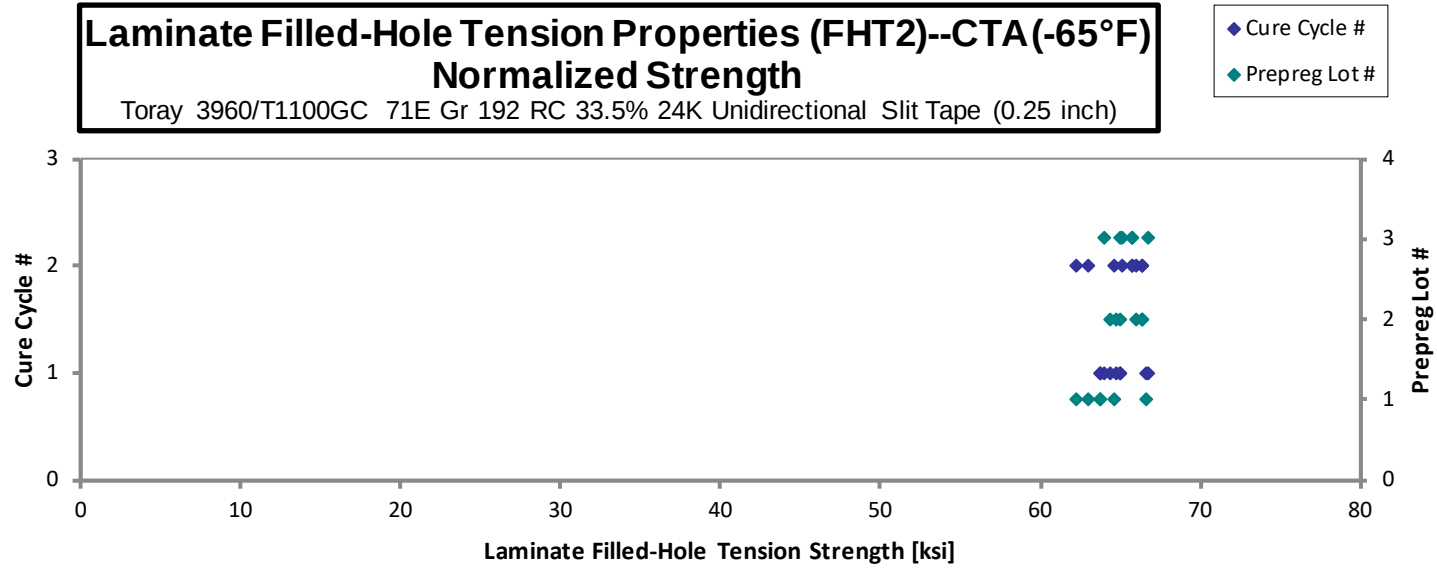
t<sub>ply</sub> [in]

0.007000

| Specimen Number                                  | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. t <sub>ply</sub> [in] | Strength <sub>norm</sub> [ksi] |
|--------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|------------------------------|---------------------|--------------|----------------------------|--------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C1-1-FHT2-CTA-1 | A             | C1              | 1             | 1            | 63.69          | 0.1403                       | 20                  | AGM          | 0.007013                   | 63.80                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C1-1-FHT2-CTA-2 | A             | C1              | 1             | 1            | 63.77          | 0.1400                       | 20                  | AGM          | 0.006998                   | 63.75                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C1-1-FHT2-CTA-3 | A             | C1              | 1             | 1            | 66.63          | 0.1399                       | 20                  | AGM          | 0.006997                   | 66.60                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C2-1-FHT2-CTA-1 | A             | C2              | 1             | 2            | 62.36          | 0.1398                       | 20                  | AGM          | 0.006988                   | 62.25                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C2-1-FHT2-CTA-2 | A             | C2              | 1             | 2            | 64.75          | 0.1398                       | 20                  | AGM          | 0.006988                   | 64.64                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C2-1-FHT2-CTA-3 | A             | C2              | 1             | 2            | 62.79          | 0.1405                       | 20                  | AGM          | 0.007023                   | 62.99                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C1-1-FHT2-CTA-1 | B             | C1              | 2             | 1            | 64.50          | 0.1398                       | 20                  | AGM          | 0.006991                   | 64.41                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C1-1-FHT2-CTA-2 | B             | C1              | 2             | 1            | 65.17          | 0.1395                       | 20                  | AGM          | 0.006975                   | 64.94                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C1-1-FHT2-CTA-3 | B             | C1              | 2             | 1            | 64.71          | 0.1400                       | 20                  | AGM          | 0.006999                   | 64.71                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-FHT2-CTA-1 | B             | C2              | 2             | 2            | 66.67          | 0.1394                       | 20                  | AGM          | 0.006969                   | 66.37                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-FHT2-CTA-2 | B             | C2              | 2             | 2            | 66.31          | 0.1402                       | 20                  | AGM          | 0.007011                   | 66.42                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-FHT2-CTA-3 | B             | C2              | 2             | 2            | 65.76          | 0.1406                       | 20                  | AGM          | 0.007029                   | 66.04                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C1-1-FHT2-CTA-1 | C             | C1              | 3             | 1            | 63.16          | 0.1418                       | 20                  | AGM          | 0.007090                   | 63.97                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C1-1-FHT2-CTA-2 | C             | C1              | 3             | 1            | 64.46          | 0.1413                       | 20                  | AGM          | 0.007064                   | 65.05                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C1-1-FHT2-CTA-3 | C             | C1              | 3             | 1            | 66.19          | 0.1412                       | 20                  | AGM          | 0.007058                   | 66.74                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-FHT2-CTA-1 | C             | C2              | 3             | 2            | 65.41          | 0.1407                       | 20                  | AGM          | 0.007033                   | 65.71                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-FHT2-CTA-2 | C             | C2              | 3             | 2            | 64.87          | 0.1406                       | 20                  | AGM          | 0.007028                   | 65.13                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-FHT2-CTA-3 | C             | C2              | 3             | 2            | 65.51          | 0.1406                       | 20                  | AGM          | 0.007030                   | 65.79                          |

Average 64.82  
 Standard Dev. 1.288  
 Coeff. of Var. [%] 1.988  
 Min. 62.36  
 Max. 66.67  
 Number of Spec. 18

Average<sub>norm</sub> 0.007016 64.96  
 Standard Dev.<sub>norm</sub> 1.281  
 Coeff. of Var. [%]<sub>norm</sub> 1.972  
 Min. 0.006969 62.25  
 Max. 0.007090 66.74  
 Number of Spec. 18 18



**Laminate Filled-Hole Tension Properties (FHT2)--RTA (70°F)**  
**Strength**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

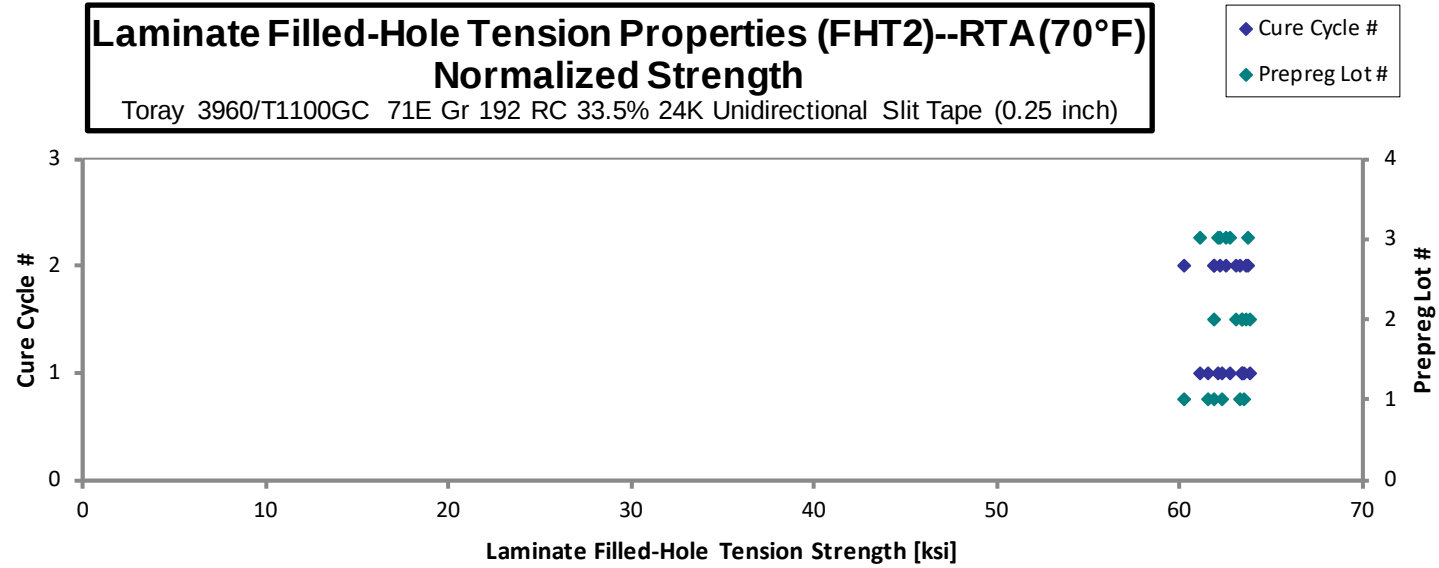
$t_{ply}$  [in]

0.007000

| Specimen Number                                  | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | Strength <sub>norm</sub> [ksi] |
|--------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|------------------------------|---------------------|--------------|---------------------|--------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C1-1-FHT2-RTA-1 | A             | C1              | 1             | 1            | 62.41          | 0.1399                       | 20                  | AGM          | 0.006994            | 62.36                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C1-1-FHT2-RTA-2 | A             | C1              | 1             | 1            | 61.47          | 0.1401                       | 20                  | AGM          | 0.007007            | 61.53                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C1-1-FHT2-RTA-3 | A             | C1              | 1             | 1            | 63.32          | 0.1404                       | 20                  | AGM          | 0.007020            | 63.50                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C2-1-FHT2-RTA-1 | A             | C2              | 1             | 2            | 60.29          | 0.1399                       | 20                  | AGM          | 0.006996            | 60.25                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C2-1-FHT2-RTA-2 | A             | C2              | 1             | 2            | 63.45          | 0.1398                       | 20                  | AGM          | 0.006991            | 63.37                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C2-1-FHT2-RTA-3 | A             | C2              | 1             | 2            | 61.91          | 0.1399                       | 20                  | AGM          | 0.006993            | 61.85                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C1-1-FHT2-RTA-1 | B             | C1              | 2             | 1            | 63.57          | 0.1398                       | 20                  | AGM          | 0.006988            | 63.46                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C1-1-FHT2-RTA-2 | B             | C1              | 2             | 1            | 63.98          | 0.1397                       | 20                  | AGM          | 0.006983            | 63.83                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C1-1-FHT2-RTA-3 | B             | C1              | 2             | 1            | 63.44          | 0.1399                       | 20                  | AGM          | 0.006994            | 63.38                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-FHT2-RTA-1 | B             | C2              | 2             | 2            | 62.94          | 0.1403                       | 20                  | AGM          | 0.007013            | 63.05                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-FHT2-RTA-2 | B             | C2              | 2             | 2            | 63.64          | 0.1400                       | 20                  | AGM          | 0.007000            | 63.64                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-FHT2-RTA-3 | B             | C2              | 2             | 2            | 61.81          | 0.1402                       | 20                  | AGM          | 0.007008            | 61.88                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C1-1-FHT2-RTA-1 | C             | C1              | 3             | 1            | 62.32          | 0.1411                       | 20                  | AGM          | 0.007056            | 62.82                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C1-1-FHT2-RTA-2 | C             | C1              | 3             | 1            | 60.51          | 0.1413                       | 20                  | AGM          | 0.007066            | 61.08                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C1-1-FHT2-RTA-3 | C             | C1              | 3             | 1            | 61.55          | 0.1414                       | 20                  | AGM          | 0.007068            | 62.15                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-FHT2-RTA-1 | C             | C2              | 3             | 2            | 61.90          | 0.1407                       | 20                  | AGM          | 0.007037            | 62.23                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-FHT2-RTA-2 | C             | C2              | 3             | 2            | 62.17          | 0.1410                       | 20                  | AGM          | 0.007048            | 62.59                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-FHT2-RTA-3 | C             | C2              | 3             | 2            | 63.29          | 0.1409                       | 20                  | AGM          | 0.007047            | 63.71                          |

Average 62.44  
Standard Dev. 1.085  
Coeff. of Var. [%] 1.737  
Min. 60.29  
Max. 63.98  
Number of Spec. 18

Average<sub>norm</sub> 0.007017 62.59  
Standard Dev.<sub>norm</sub> 1.008  
Coeff. of Var. [%]<sub>norm</sub> 1.611  
Min. 0.006983 60.25  
Max. 0.007068 63.83  
Number of Spec. 18 18



**Laminate Filled-Hole Tension Properties (FHT2)--ETW2 (250°F)**  
**Strength**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

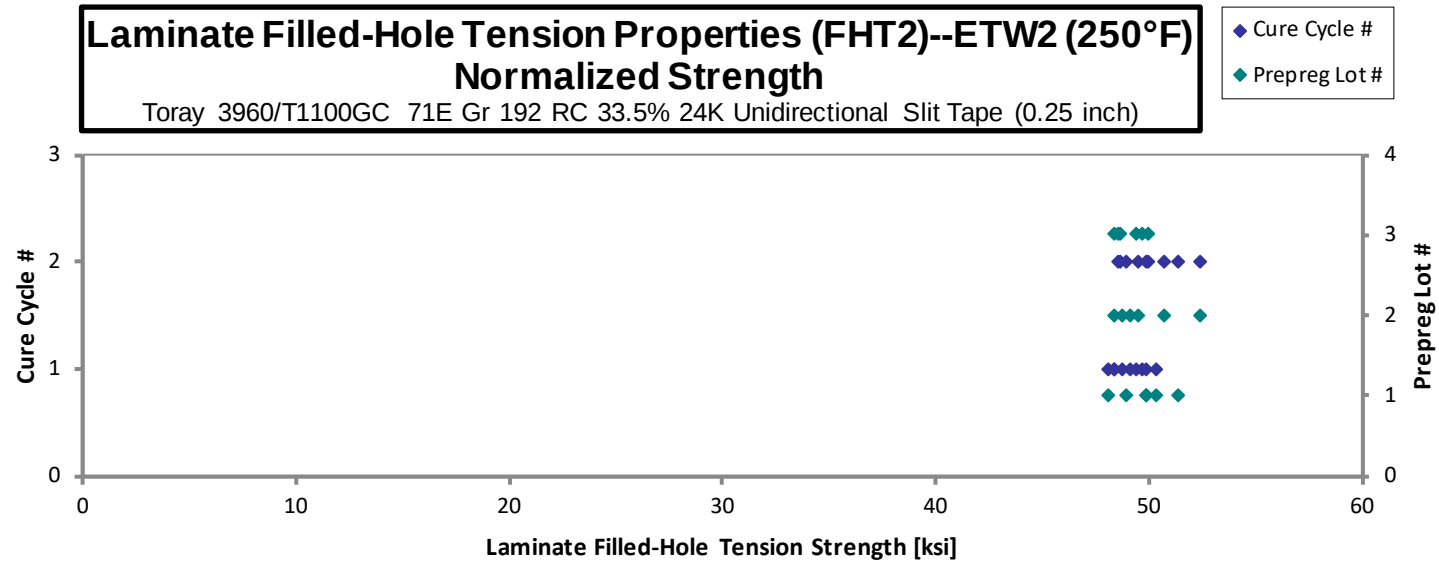
 $t_{ply} [in]$ 

0.007000

| Specimen Number                                   | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply} [in]$ | Strength <sub>norm</sub> [ksi] |
|---------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|------------------------------|---------------------|--------------|---------------------|--------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C1-1-FHT2-ETW2-1 | A             | C1              | 1             | 1            | 47.97          | 0.1405                       | 20                  | AGM          | 0.007023            | 48.13                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C1-1-FHT2-ETW2-2 | A             | C1              | 1             | 1            | 50.09          | 0.1407                       | 20                  | AGM          | 0.007033            | 50.33                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C1-1-FHT2-ETW2-3 | A             | C1              | 1             | 1            | 49.89          | 0.1399                       | 20                  | AGM          | 0.006996            | 49.86                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C2-1-FHT2-ETW2-1 | A             | C2              | 1             | 2            | 49.92          | 0.1400                       | 20                  | AGM          | 0.006998            | 49.90                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C2-1-FHT2-ETW2-2 | A             | C2              | 1             | 2            | 51.52          | 0.1395                       | 20                  | AGM          | 0.006977            | 51.35                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C2-1-FHT2-ETW2-3 | A             | C2              | 1             | 2            | 48.91          | 0.1399                       | 20                  | AGM          | 0.006997            | 48.89                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C1-1-FHT2-ETW2-1 | B             | C1              | 2             | 1            | 48.83          | 0.1398                       | 20                  | AGM          | 0.006992            | 48.77                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C1-1-FHT2-ETW2-2 | B             | C1              | 2             | 1            | 48.50          | 0.1396                       | 20                  | AGM          | 0.006979            | 48.35                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C1-1-FHT2-ETW2-3 | B             | C1              | 2             | 1            | 49.26          | 0.1396                       | 20                  | AGM          | 0.006978            | 49.11                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-FHT2-ETW2-1 | B             | C2              | 2             | 2            | 52.38          | 0.1401                       | 20                  | AGM          | 0.007007            | 52.43                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-FHT2-ETW2-2 | B             | C2              | 2             | 2            | 49.53          | 0.1400                       | 20                  | AGM          | 0.007000            | 49.53                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-FHT2-ETW2-3 | B             | C2              | 2             | 2            | 50.60          | 0.1402                       | 20                  | AGM          | 0.007009            | 50.67                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C1-1-FHT2-ETW2-1 | C             | C1              | 3             | 1            | 48.92          | 0.1413                       | 20                  | AGM          | 0.007066            | 49.38                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C1-1-FHT2-ETW2-2 | C             | C1              | 3             | 1            | 49.19          | 0.1415                       | 20                  | AGM          | 0.007073            | 49.70                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C1-1-FHT2-ETW2-3 | C             | C1              | 3             | 1            | 47.81          | 0.1416                       | 20                  | AGM          | 0.007078            | 48.34                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-FHT2-ETW2-1 | C             | C2              | 3             | 2            | 48.33          | 0.1410                       | 20                  | AGM          | 0.007051            | 48.68                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-FHT2-ETW2-2 | C             | C2              | 3             | 2            | 48.00          | 0.1417                       | 20                  | AGM          | 0.007086            | 48.59                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-FHT2-ETW2-3 | C             | C2              | 3             | 2            | 49.44          | 0.1415                       | 20                  | AGM          | 0.007075            | 49.97                          |

Average 49.39  
Standard Dev. 1.217  
Coeff. of Var. [%] 2.463  
Min. 47.81  
Max. 52.38  
Number of Spec. 18

Average<sub>norm</sub> 0.007023 49.55  
Standard Dev.<sub>norm</sub> 1.129  
Coeff. of Var. [%]<sub>norm</sub> 2.279  
Min. 0.006977 48.13  
Max. 0.007086 52.43  
Number of Spec. 18 18



## 4.22 “50/40/10” Filled-Hole Tension 3 Properties (FHT3)

## Laminate Filled-Hole Tension Properties (FHT3)--CTA (-65°F)

## Strength

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

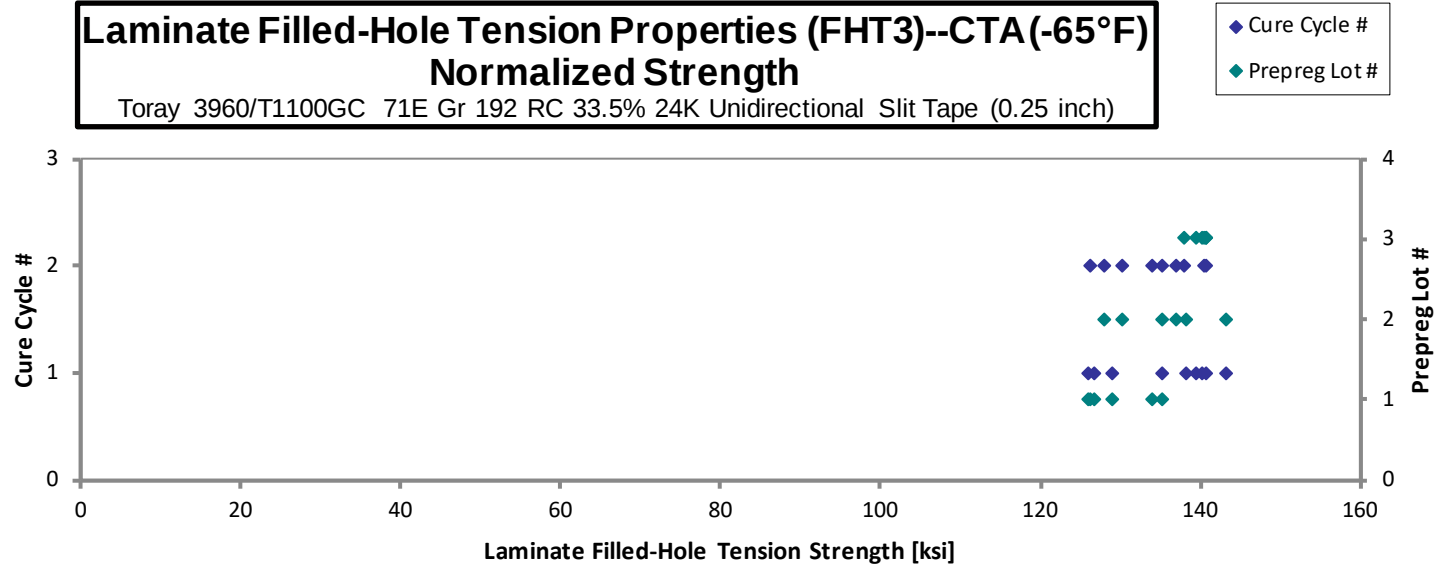
t<sub>ply</sub> [in]

0.007000

| Specimen Number                                  | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. t <sub>ply</sub> [in] | Strength <sub>norm</sub> [ksi] |
|--------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|------------------------------|---------------------|--------------|----------------------------|--------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-FHT3-CTA-1 | A             | C1              | 1             | 1            | 126.1          | 0.1406                       | 20                  | AGM          | 0.007031                   | 126.6                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-FHT3-CTA-2 | A             | C1              | 1             | 1            | 127.9          | 0.1413                       | 20                  | AGM          | 0.007065                   | 129.1                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-FHT3-CTA-3 | A             | C1              | 1             | 1            | 125.2          | 0.1410                       | 20                  | AGM          | 0.007049                   | 126.0                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-FHT3-CTA-1 | A             | C2              | 1             | 2            | 133.0          | 0.1411                       | 20                  | AGM          | 0.007053                   | 134.0                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-FHT3-CTA-2 | A             | C2              | 1             | 2            | 134.7          | 0.1407                       | 20                  | AGM          | 0.007033                   | 135.3                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-FHT3-CTA-3 | A             | C2              | 1             | 2            | 125.7          | 0.1406                       | 20                  | AGM          | 0.007032                   | 126.3                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-FHT3-CTA-1 | B             | C1              | 2             | 1            | 134.7          | 0.1405                       | 20                  | AGM          | 0.007024                   | 135.2                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-FHT3-CTA-2 | B             | C1              | 2             | 1            | 144.4          | 0.1389                       | 20                  | AGM          | 0.006943                   | 143.2                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-FHT3-CTA-3 | B             | C1              | 2             | 1            | 138.0          | 0.1401                       | 20                  | AGM          | 0.007005                   | 138.1                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-FHT3-CTA-1 | B             | C2              | 2             | 2            | 137.2          | 0.1397                       | 20                  | M(A,L)GM     | 0.006985                   | 136.9                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-FHT3-CTA-2 | B             | C2              | 2             | 2            | 130.6          | 0.1396                       | 20                  | M(A,L)GM     | 0.006982                   | 130.3                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-FHT3-CTA-3 | B             | C2              | 2             | 2            | 128.6          | 0.1394                       | 20                  | M(A,L)GM     | 0.006972                   | 128.1                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-FHT3-CTA-1 | C             | C1              | 3             | 1            | 139.1          | 0.1416                       | 20                  | AGM          | 0.007078                   | 140.7                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-FHT3-CTA-2 | C             | C1              | 3             | 1            | 139.3          | 0.1408                       | 20                  | AGM          | 0.007042                   | 140.2                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-FHT3-CTA-3 | C             | C1              | 3             | 1            | 137.8          | 0.1416                       | 20                  | AGM          | 0.007081                   | 139.4                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-FHT3-CTA-1 | C             | C2              | 3             | 2            | 136.8          | 0.1411                       | 20                  | AGM          | 0.007055                   | 137.9                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-FHT3-CTA-2 | C             | C2              | 3             | 2            | 140.9          | 0.1395                       | 20                  | AGM          | 0.006974                   | 140.4                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-FHT3-CTA-3 | C             | C2              | 3             | 2            | 140.0          | 0.1408                       | 20                  | AGM          | 0.007038                   | 140.8                          |

Average 134.5  
 Standard Dev. 5.846  
 Coeff. of Var. [%] 4.348  
 Min. 125.2  
 Max. 144.4  
 Number of Spec. 18

Average<sub>norm</sub> 0.007025 134.9  
 Standard Dev.<sub>norm</sub> 5.752  
 Coeff. of Var. [%]<sub>norm</sub> 4.263  
 Min. 0.006943 126.0  
 Max. 0.007081 143.2  
 Number of Spec. 18 18



**Laminate Filled-Hole Tension Properties (FHT3)--RTA (70°F)**  
**Strength**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

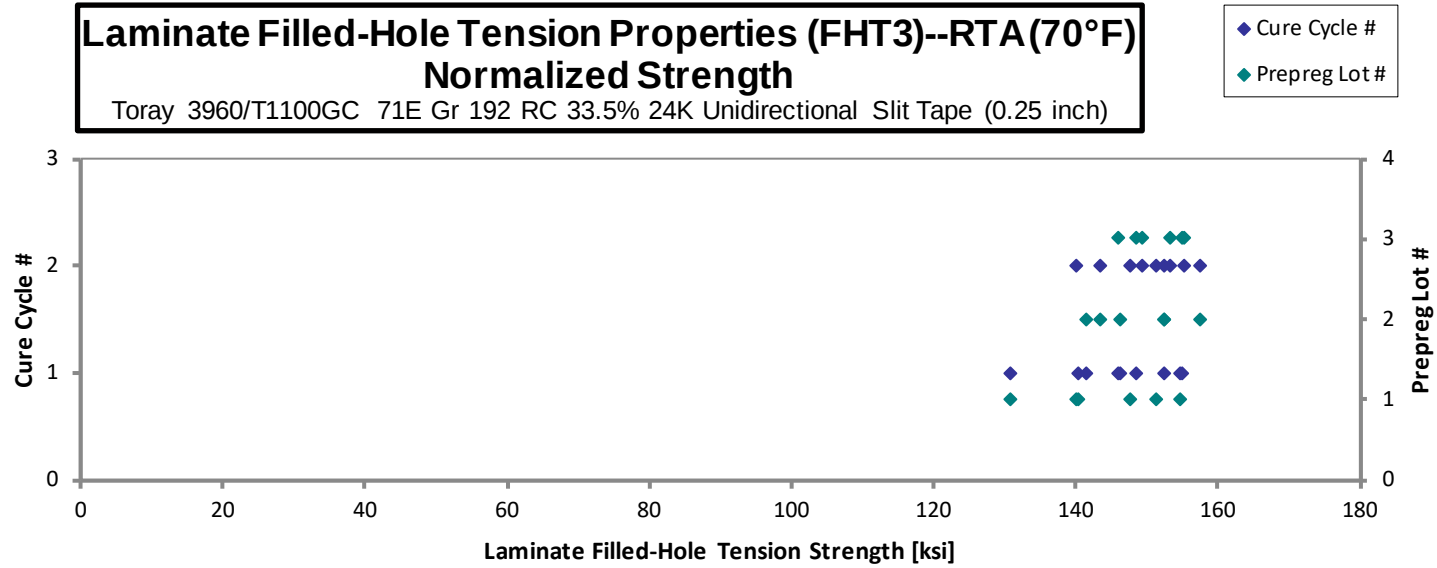
$t_{ply}$  [in]

0.007000

| Specimen Number                                  | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | Strength <sub>norm</sub> [ksi] |
|--------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|------------------------------|---------------------|--------------|---------------------|--------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-FHT3-RTA-1 | A             | C1              | 1             | 1            | 129.3          | 0.1416                       | 20                  | AGM          | 0.007079            | 130.8                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-FHT3-RTA-2 | A             | C1              | 1             | 1            | 139.2          | 0.1413                       | 20                  | AGM          | 0.007064            | 140.4                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-FHT3-RTA-3 | A             | C1              | 1             | 1            | 153.3          | 0.1412                       | 20                  | AGM          | 0.007060            | 154.6                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-FHT3-RTA-1 | A             | C2              | 1             | 2            | 147.0          | 0.1407                       | 20                  | M(A,L)GM     | 0.007037            | 147.8                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-FHT3-RTA-2 | A             | C2              | 1             | 2            | 150.3          | 0.1409                       | 20                  | M(A,L)GM     | 0.007046            | 151.3                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-FHT3-RTA-3 | A             | C2              | 1             | 2            | 139.3          | 0.1407                       | 20                  | M(A,L)GM     | 0.007033            | 139.9                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-FHT3-RTA-1 | B             | C1              | 2             | 1            | 152.9          | 0.1395                       | 20                  | M(A,L)GM     | 0.006977            | 152.3                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-FHT3-RTA-2 | B             | C1              | 2             | 1            | 142.1          | 0.1394                       | 20                  | M(A,L)GM     | 0.006971            | 141.5                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-FHT3-RTA-3 | B             | C1              | 2             | 1            | 146.7          | 0.1396                       | 20                  | M(A,L)GM     | 0.006978            | 146.3                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-FHT3-RTA-1 | B             | C2              | 2             | 2            | 158.0          | 0.1397                       | 20                  | M(A,L)GM     | 0.006983            | 157.6                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-FHT3-RTA-2 | B             | C2              | 2             | 2            | 152.6          | 0.1399                       | 20                  | M(A,L)GM     | 0.006994            | 152.5                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-FHT3-RTA-3 | B             | C2              | 2             | 2            | 144.1          | 0.1395                       | 20                  | M(A,L)GM     | 0.006975            | 143.5                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-FHT3-RTA-1 | C             | C1              | 3             | 1            | 153.3          | 0.1415                       | 20                  | M(A,L)GM     | 0.007075            | 154.9                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-FHT3-RTA-2 | C             | C1              | 3             | 1            | 142.8          | 0.1432                       | 20                  | M(A,L)GM     | 0.007159            | 146.0                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-FHT3-RTA-3 | C             | C1              | 3             | 1            | 145.5          | 0.1430                       | 20                  | M(A,L)GM     | 0.007148            | 148.6                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-FHT3-RTA-1 | C             | C2              | 3             | 2            | 152.8          | 0.1405                       | 20                  | M(A,L)GM     | 0.007026            | 153.3                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-FHT3-RTA-2 | C             | C2              | 3             | 2            | 154.8          | 0.1404                       | 20                  | M(A,L)GM     | 0.007019            | 155.2                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-FHT3-RTA-3 | C             | C2              | 3             | 2            | 148.9          | 0.1403                       | 20                  | M(A,L)GM     | 0.007015            | 149.3                          |

Average 147.4  
Standard Dev. 7.109  
Coeff. of Var. [%] 4.823  
Min. 129.3  
Max. 158.0  
Number of Spec. 18

Average<sub>norm</sub> 0.007035 148.1  
Standard Dev.<sub>norm</sub> 6.879  
Coeff. of Var. [%]<sub>norm</sub> 4.644  
Min. 0.006971 130.8  
Max. 0.007159 157.6  
Number of Spec. 18 18



**Laminate Filled-Hole Tension Properties (FHT3)--ETW2 (250°F)**  
**Strength**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

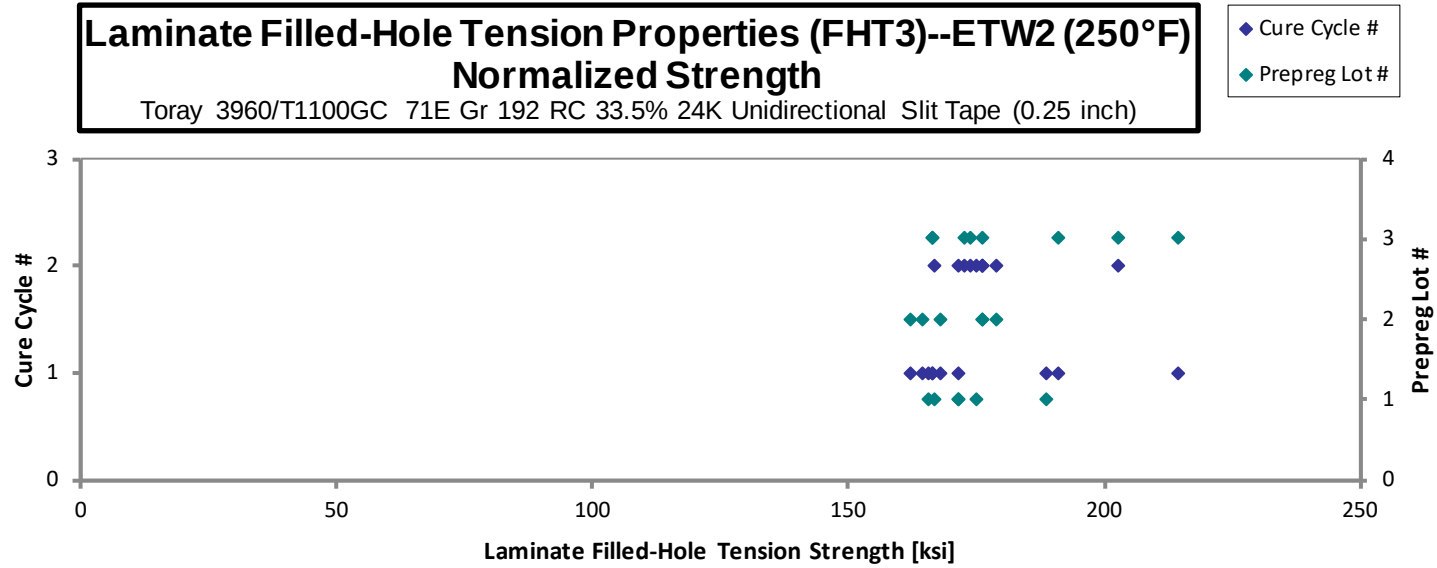
$t_{ply}$  [in]

0.007000

| Specimen Number                                   | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | Strength <sub>norm</sub> [ksi] |
|---------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|------------------------------|---------------------|--------------|---------------------|--------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-FHT3-ETW2-1 | A             | C1              | 1             | 1            | 164.4          | 0.1409                       | 20                  | AGM          | 0.007046            | 165.5                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-FHT3-ETW2-2 | A             | C1              | 1             | 1            | 170.2          | 0.1411                       | 20                  | M(A,L)GM     | 0.007053            | 171.5                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-FHT3-ETW2-3 | A             | C1              | 1             | 1            | 187.5          | 0.1409                       | 20                  | M(A,S)GM     | 0.007044            | 188.7                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-FHT3-ETW2-1 | A             | C2              | 1             | 2            | 170.3          | 0.1408                       | 20                  | AGM          | 0.007042            | 171.3                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-FHT3-ETW2-2 | A             | C2              | 1             | 2            | 174.2          | 0.1405                       | 20                  | AGM          | 0.007024            | 174.8                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-FHT3-ETW2-3 | A             | C2              | 1             | 2            | 166.2          | 0.1406                       | 20                  | AGM          | 0.007029            | 166.9                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-FHT3-ETW2-1 | B             | C1              | 2             | 1            | 168.2          | 0.1400                       | 20                  | AGM          | 0.006998            | 168.2                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-FHT3-ETW2-2 | B             | C1              | 2             | 1            | 164.6          | 0.1398                       | 20                  | AGM          | 0.006990            | 164.4                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-FHT3-ETW2-3 | B             | C1              | 2             | 1            | 162.8          | 0.1394                       | 20                  | AGM          | 0.006969            | 162.1                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-FHT3-ETW2-1 | B             | C2              | 2             | 2            | 179.4          | 0.1396                       | 20                  | AGM          | 0.006981            | 178.9                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-FHT3-ETW2-2 | B             | C2              | 2             | 2            | 177.2          | 0.1393                       | 20                  | AGM          | 0.006963            | 176.3                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-FHT3-ETW2-3 | B             | C2              | 2             | 2            | 176.6          | 0.1397                       | 20                  | AGM          | 0.006985            | 176.3                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-FHT3-ETW2-1 | C             | C1              | 3             | 1            | 165.4          | 0.1410                       | 20                  | AGM          | 0.007048            | 166.6                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-FHT3-ETW2-2 | C             | C1              | 3             | 1            | 212.3          | 0.1415                       | 20                  | XGM          | 0.007073            | 214.5                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-FHT3-ETW2-3 | C             | C1              | 3             | 1            | 189.1          | 0.1415                       | 20                  | AGM          | 0.007074            | 191.1                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-FHT3-SP-5   | C             | C1              | 3             | 1            | 165.6          | 0.1405                       | 20                  | AGM          | 0.007026            | 166.2                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-FHT3-ETW2-1 | C             | C2              | 3             | 2            | 201.7          | 0.1407                       | 20                  | DGM          | 0.007034            | 202.7                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-FHT3-ETW2-2 | C             | C2              | 3             | 2            | 172.3          | 0.1404                       | 20                  | AGM          | 0.007020            | 172.8                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-FHT3-ETW2-3 | C             | C2              | 3             | 2            | 176.0          | 0.1401                       | 20                  | AGM          | 0.007006            | 176.1                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-FHT3-SP-5   | C             | C2              | 3             | 2            | 173.0          | 0.1407                       | 20                  | AGM          | 0.007034            | 173.8                          |

Average 175.9  
Standard Dev. 12.98  
Coeff. of Var. [%] 7.380  
Min. 162.8  
Max. 212.3  
Number of Spec. 20

Average<sub>norm</sub> 0.007022 176.4  
Standard Dev.<sub>norm</sub> 13.41  
Coeff. of Var. [%]<sub>norm</sub> 7.600  
Min. 0.006963 162.1  
Max. 0.007074 214.5  
Number of Spec. 20 20



## 4.23 “25/50/25” Open-Hole Compression 1 Properties (OHC1)

**Laminate Open-Hole Compression Properties (OHC1)--RTA (70°F)****Strength**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

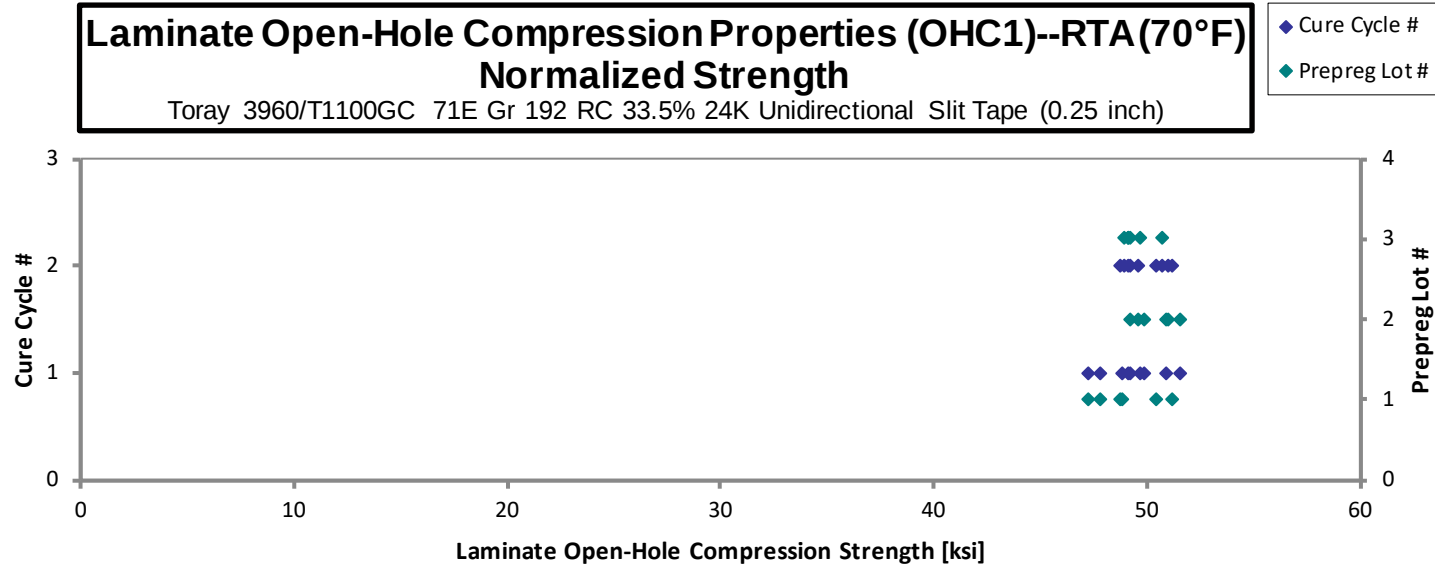
 $t_{ply}$  [in]

0.007000

| Specimen Number                                  | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | Strength <sub>norm</sub> [ksi] |
|--------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|------------------------------|---------------------|--------------|---------------------|--------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C1-1-OHC1-RTA-1 | A             | C1              | 1             | 1            | 47.93          | 0.1677                       | 24                  | LGM          | 0.006989            | 47.85                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C1-1-OHC1-RTA-2 | A             | C1              | 1             | 1            | 48.36          | 0.1641                       | 24                  | LGM          | 0.006838            | 47.24                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C1-1-OHC1-RTA-3 | A             | C1              | 1             | 1            | 49.74          | 0.1649                       | 24                  | LGM          | 0.006871            | 48.83                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C2-1-OHC1-RTA-1 | A             | C2              | 1             | 2            | 51.05          | 0.1686                       | 24                  | LGM          | 0.007024            | 51.22                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C2-1-OHC1-RTA-2 | A             | C2              | 1             | 2            | 51.03          | 0.1660                       | 24                  | LGM          | 0.006918            | 50.43                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C2-1-OHC1-RTA-3 | A             | C2              | 1             | 2            | 48.92          | 0.1675                       | 24                  | LGM          | 0.006978            | 48.77                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-B-C1-1-OHC1-RTA-1 | B             | C1              | 2             | 1            | 51.30          | 0.1690                       | 24                  | LGM          | 0.007040            | 51.59                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-B-C1-1-OHC1-RTA-2 | B             | C1              | 2             | 1            | 50.95          | 0.1679                       | 24                  | M(A,L)GM     | 0.006997            | 50.93                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-B-C1-1-OHC1-RTA-3 | B             | C1              | 2             | 1            | 49.90          | 0.1679                       | 24                  | M(A,L)GM     | 0.006994            | 49.86                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-B-C2-1-OHC1-RTA-1 | B             | C2              | 2             | 2            | 49.87          | 0.1671                       | 24                  | LGM          | 0.006963            | 49.61                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-B-C2-1-OHC1-RTA-2 | B             | C2              | 2             | 2            | 49.37          | 0.1674                       | 24                  | LGM          | 0.006976            | 49.20                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-B-C2-1-OHC1-RTA-3 | B             | C2              | 2             | 2            | 51.31          | 0.1669                       | 24                  | LGM          | 0.006953            | 50.97                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-C-C1-1-OHC1-RTA-1 | C             | C1              | 3             | 1            | 49.12          | 0.1680                       | 24                  | M(A,L)GM     | 0.007001            | 49.12                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-C-C1-1-OHC1-RTA-2 | C             | C1              | 3             | 1            | 48.98          | 0.1689                       | 24                  | M(A,L)GM     | 0.007038            | 49.25                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-C-C1-1-OHC1-RTA-3 | C             | C1              | 3             | 1            | 49.73          | 0.1680                       | 24                  | M(A,L)GM     | 0.007000            | 49.73                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-C-C2-1-OHC1-RTA-1 | C             | C2              | 3             | 2            | 50.59          | 0.1685                       | 24                  | M(A,L)GM     | 0.007022            | 50.75                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-C-C2-1-OHC1-RTA-2 | C             | C2              | 3             | 2            | 48.65          | 0.1690                       | 24                  | M(A,L)GM     | 0.007042            | 48.94                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-C-C2-1-OHC1-RTA-3 | C             | C2              | 3             | 2            | 49.03          | 0.1683                       | 24                  | M(A,L)GM     | 0.007013            | 49.12                          |

Average 49.77  
 Standard Dev. 1.061  
 Coeff. of Var. [%] 2.131  
 Min. 47.93  
 Max. 51.31  
 Number of Spec. 18

Average<sub>norm</sub> 0.006981 49.63  
 Standard Dev.<sub>norm</sub> 1.173  
 Coeff. of Var. [%]<sub>norm</sub> 2.363  
 Min. 0.006838 47.24  
 Max. 0.007042 51.59  
 Number of Spec. 18 18



**Laminate Open-Hole Compression Properties (OHC1)--ETW1 (180°F)**  
**Strength**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

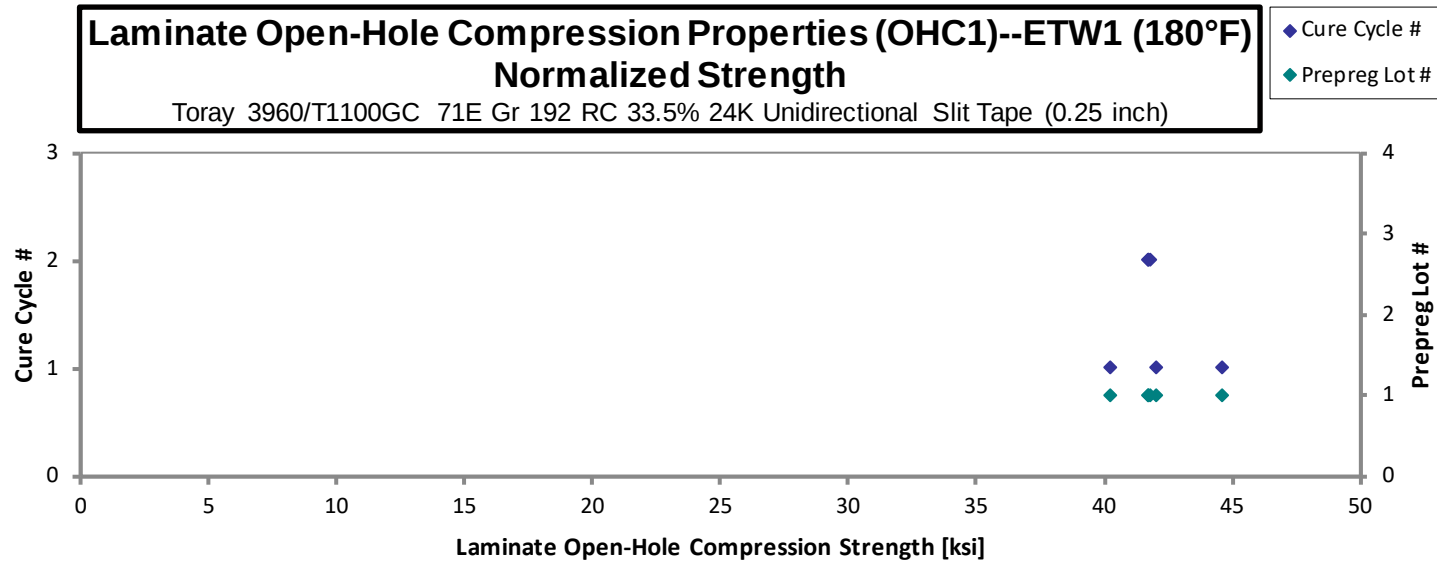
$t_{ply}$  [in]

0.007000

| Specimen Number                                   | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | Strength <sub>norm</sub> [ksi] |
|---------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|------------------------------|---------------------|--------------|---------------------|--------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C1-1-OHC1-ETW1-1 | A             | C1              | 1             | 1            | 42.62          | 0.1657                       | 24                  | LGM          | 0.006903            | 42.03                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C1-1-OHC1-ETW1-2 | A             | C1              | 1             | 1            | 45.38          | 0.1652                       | 24                  | LGM          | 0.006883            | 44.62                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C1-1-OHC1-ETW1-3 | A             | C1              | 1             | 1            | 40.88          | 0.1653                       | 24                  | LGM          | 0.006887            | 40.22                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C2-1-OHC1-ETW1-1 | A             | C2              | 1             | 2            | 41.90          | 0.1672                       | 24                  | LGM          | 0.006966            | 41.70                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C2-1-OHC1-ETW1-2 | A             | C2              | 1             | 2            | 42.03          | 0.1668                       | 24                  | LGM          | 0.006948            | 41.72                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C2-1-OHC1-ETW1-3 | A             | C2              | 1             | 2            | 42.07          | 0.1670                       | 24                  | LGM          | 0.006960            | 41.83                          |

Average 42.48  
Standard Dev. 1.530  
Coeff. of Var. [%] 3.602  
Min. 40.88  
Max. 45.38  
Number of Spec. 6

Average<sub>norm</sub> 0.006924 42.02  
Standard Dev.<sub>norm</sub> 1.431  
Coeff. of Var. [%]<sub>norm</sub> 3.406  
Min. 0.006883 40.22  
Max. 0.006966 44.62  
Number of Spec. 6 6



**Laminate Open-Hole Compression Properties (OHC1)--ETW2 (250°F)  
Strength**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

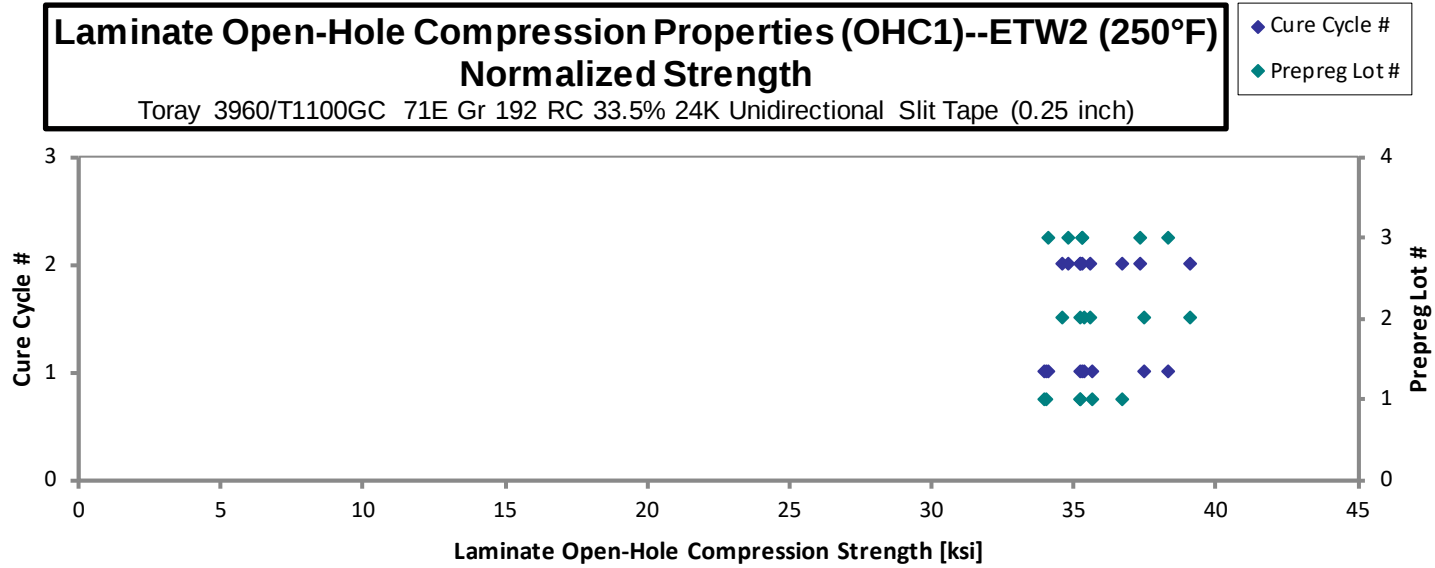
normalizing  
t<sub>ply</sub> [in]

0.007000

| Specimen Number                                   | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. t <sub>ply</sub> [in] | Strength <sub>norm</sub> [ksi] |
|---------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|------------------------------|---------------------|--------------|----------------------------|--------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C1-1-OHC1-ETW2-1 | A             | C1              | 1             | 1            | 34.53          | 0.1653                       | 24                  | LGM          | 0.006887                   | 33.97                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C1-1-OHC1-ETW2-2 | A             | C1              | 1             | 1            | 34.65          | 0.1651                       | 24                  | LGM          | 0.006879                   | 34.06                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C1-1-OHC1-ETW2-3 | A             | C1              | 1             | 1            | 36.27          | 0.1652                       | 24                  | LGM          | 0.006882                   | 35.66                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C2-1-OHC1-ETW2-1 | A             | C2              | 1             | 2            | 35.48          | 0.1668                       | 24                  | LGM          | 0.006951                   | 35.23                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C2-1-OHC1-ETW2-2 | A             | C2              | 1             | 2            | 36.91          | 0.1671                       | 24                  | LGM          | 0.006962                   | 36.71                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C2-1-OHC1-ETW2-3 | A             | C2              | 1             | 2            | 35.40          | 0.1671                       | 24                  | LGM          | 0.006961                   | 35.20                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-B-C1-1-OHC1-ETW2-1 | B             | C1              | 2             | 1            | 37.51          | 0.1680                       | 24                  | LGM          | 0.006999                   | 37.51                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-B-C1-1-OHC1-ETW2-2 | B             | C1              | 2             | 1            | 35.10          | 0.1685                       | 24                  | LGM          | 0.007019                   | 35.19                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-B-C1-1-OHC1-ETW2-3 | B             | C1              | 2             | 1            | 35.30          | 0.1682                       | 24                  | LGM          | 0.007009                   | 35.34                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-B-C2-1-OHC1-ETW2-1 | B             | C2              | 2             | 2            | 39.36          | 0.1669                       | 24                  | LGM          | 0.006952                   | 39.09                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-B-C2-1-OHC1-ETW2-2 | B             | C2              | 2             | 2            | 34.70          | 0.1674                       | 24                  | LGM          | 0.006975                   | 34.58                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-B-C2-1-OHC1-ETW2-3 | B             | C2              | 2             | 2            | 35.79          | 0.1671                       | 24                  | LGM          | 0.006962                   | 35.59                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-C-C1-1-OHC1-ETW2-1 | C             | C1              | 3             | 1            | 38.27          | 0.1682                       | 24                  | LGM          | 0.007008                   | 38.31                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-C-C1-1-OHC1-ETW2-2 | C             | C1              | 3             | 1            | 33.86          | 0.1691                       | 24                  | LGM          | 0.007044                   | 34.07                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-C-C1-1-OHC1-ETW2-3 | C             | C1              | 3             | 1            | 35.27          | 0.1682                       | 24                  | LGM          | 0.007007                   | 35.31                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-C-C2-1-OHC1-ETW2-1 | C             | C2              | 3             | 2            | 35.27          | 0.1682                       | 24                  | LGM          | 0.007009                   | 35.31                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-C-C2-1-OHC1-ETW2-2 | C             | C2              | 3             | 2            | 34.76          | 0.1682                       | 24                  | LGM          | 0.007008                   | 34.80                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-C-C2-1-OHC1-ETW2-3 | C             | C2              | 3             | 2            | 37.21          | 0.1685                       | 24                  | LGM          | 0.007020                   | 37.31                          |

Average 35.87  
Standard Dev. 1.448  
Coeff. of Var. [%] 4.036  
Min. 33.86  
Max. 39.36  
Number of Spec. 18

Average<sub>norm</sub> 0.006974 35.74  
Standard Dev.<sub>norm</sub> 1.471  
Coeff. of Var. [%]<sub>norm</sub> 4.116  
Min. 0.006879 33.97  
Max. 0.007044 39.09  
Number of Spec. 18 18



## 4.24 “10/80/10” Open-Hole Compression 2 Properties (OHC2)

## Laminate Open-Hole Compression Properties (OHC2)--RTA (70°F)

## Strength

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

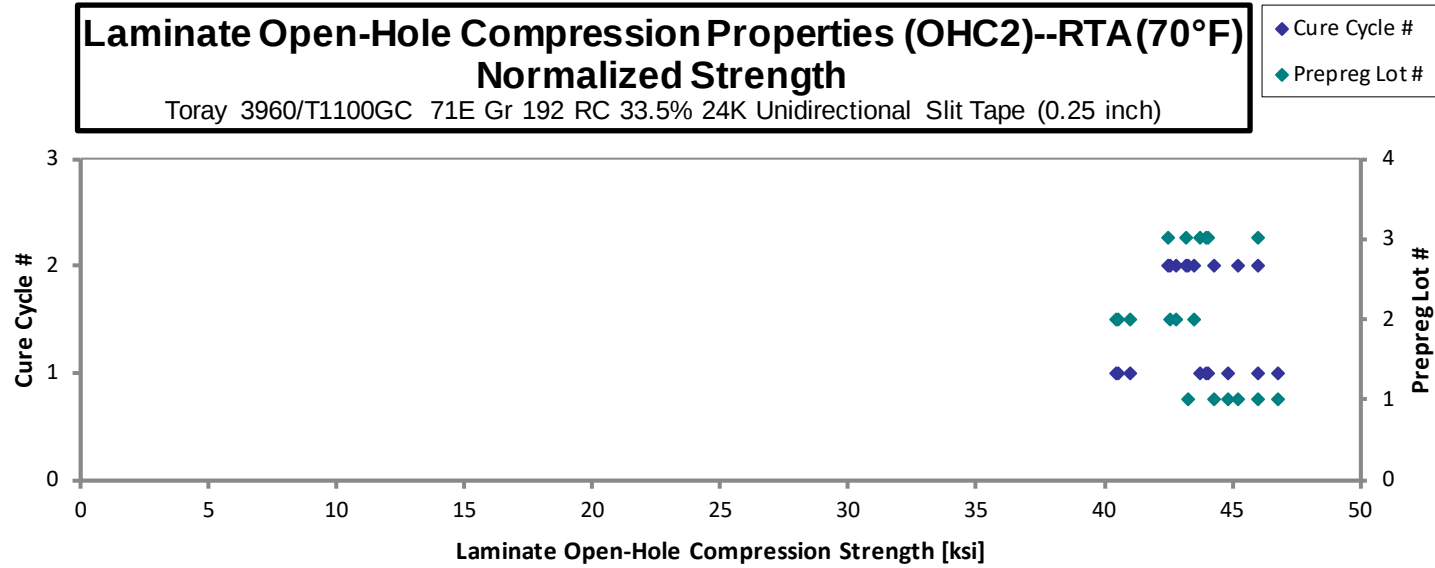
 $t_{ply}$  [in]

0.007000

| Specimen Number                                  | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | Strength <sub>norm</sub> [ksi] |
|--------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|------------------------------|---------------------|--------------|---------------------|--------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C1-1-OHC2-RTA-1 | A             | C1              | 1             | 1            | 46.19          | 0.1393                       | 20                  | M(A,L)GM     | 0.006966            | 45.97                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C1-1-OHC2-RTA-2 | A             | C1              | 1             | 1            | 45.16          | 0.1391                       | 20                  | M(A,L)GM     | 0.006954            | 44.86                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C1-1-OHC2-RTA-3 | A             | C1              | 1             | 1            | 46.52          | 0.1407                       | 20                  | M(A,L)GM     | 0.007037            | 46.76                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C2-1-OHC2-RTA-1 | A             | C2              | 1             | 2            | 45.54          | 0.1390                       | 20                  | M(A,L)GM     | 0.006952            | 45.23                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C2-1-OHC2-RTA-2 | A             | C2              | 1             | 2            | 44.40          | 0.1396                       | 20                  | M(A,L)GM     | 0.006978            | 44.26                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C2-1-OHC2-RTA-3 | A             | C2              | 1             | 2            | 43.41          | 0.1396                       | 20                  | M(A,L)GM     | 0.006979            | 43.28                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C1-1-OHC2-RTA-1 | B             | C1              | 2             | 1            | 40.93          | 0.1402                       | 20                  | M(A,L)GM     | 0.007011            | 40.99                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C1-1-OHC2-RTA-2 | B             | C1              | 2             | 1            | 40.70          | 0.1394                       | 20                  | M(A,L)GM     | 0.006968            | 40.52                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C1-1-OHC2-RTA-3 | B             | C1              | 2             | 1            | 40.39          | 0.1402                       | 20                  | M(A,L)GM     | 0.007011            | 40.45                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-OHC2-RTA-1 | B             | C2              | 2             | 2            | 42.48          | 0.1411                       | 20                  | M(A,L)GM     | 0.007053            | 42.80                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-OHC2-RTA-2 | B             | C2              | 2             | 2            | 43.52          | 0.1400                       | 20                  | M(A,L)GM     | 0.006998            | 43.51                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-OHC2-RTA-3 | B             | C2              | 2             | 2            | 42.44          | 0.1405                       | 20                  | M(A,L)GM     | 0.007023            | 42.58                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C1-1-OHC2-RTA-1 | C             | C1              | 3             | 1            | 43.24          | 0.1416                       | 20                  | M(A,L)GM     | 0.007078            | 43.72                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C1-1-OHC2-RTA-2 | C             | C1              | 3             | 1            | 43.59          | 0.1413                       | 20                  | M(A,L)GM     | 0.007064            | 43.99                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C1-1-OHC2-RTA-3 | C             | C1              | 3             | 1            | 43.71          | 0.1411                       | 20                  | M(A,L)GM     | 0.007057            | 44.06                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-OHC2-RTA-1 | C             | C2              | 3             | 2            | 42.06          | 0.1414                       | 20                  | M(A,L)GM     | 0.007072            | 42.49                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-OHC2-RTA-2 | C             | C2              | 3             | 2            | 45.73          | 0.1410                       | 20                  | M(A,L)GM     | 0.007048            | 46.04                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-OHC2-RTA-3 | C             | C2              | 3             | 2            | 42.93          | 0.1409                       | 20                  | M(A,L)GM     | 0.007046            | 43.21                          |

Average 43.50  
 Standard Dev. 1.846  
 Coeff. of Var. [%] 4.243  
 Min. 40.39  
 Max. 46.52  
 Number of Spec. 18

Average<sub>norm</sub> 0.007016 43.60  
 Standard Dev.<sub>norm</sub> 1.815  
 Coeff. of Var. [%]<sub>norm</sub> 4.164  
 Min. 0.006952 40.45  
 Max. 0.007078 46.76  
 Number of Spec. 18 18



**Laminate Open-Hole Compression Properties (OHC2)--ETW2 (250°F)  
Strength**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

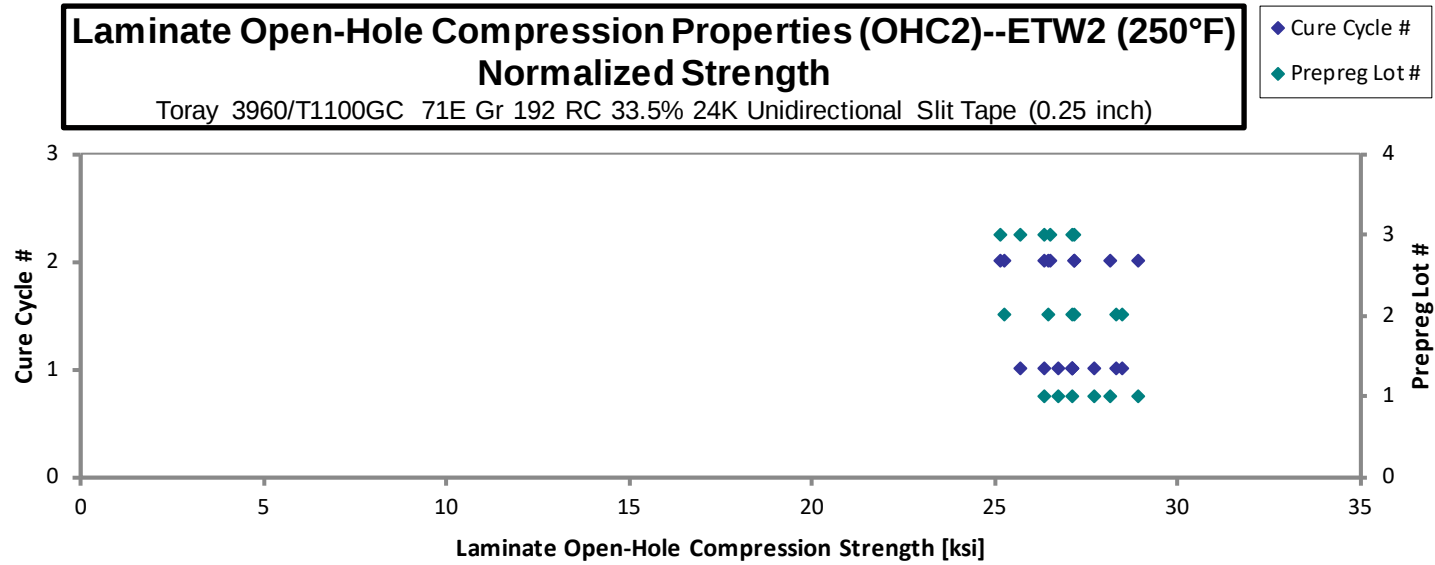
 $t_{ply}$  [in]

0.007000

| Specimen Number                                   | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | Strength <sub>norm</sub> [ksi] |
|---------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|------------------------------|---------------------|--------------|---------------------|--------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C1-1-OHC2-ETW2-1 | A             | C1              | 1             | 1            | 26.86          | 0.1395                       | 20                  | AGM          | 0.006973            | 26.75                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C1-1-OHC2-ETW2-2 | A             | C1              | 1             | 1            | 27.88          | 0.1393                       | 20                  | AGM          | 0.006963            | 27.73                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C1-1-OHC2-ETW2-3 | A             | C1              | 1             | 1            | 27.18          | 0.1396                       | 20                  | AGM          | 0.006978            | 27.10                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C2-1-OHC2-ETW2-1 | A             | C2              | 1             | 2            | 29.06          | 0.1394                       | 20                  | M(A,L)GM     | 0.006970            | 28.94                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C2-1-OHC2-ETW2-2 | A             | C2              | 1             | 2            | 28.14          | 0.1402                       | 20                  | M(A,L)GM     | 0.007008            | 28.17                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C2-1-OHC2-ETW2-3 | A             | C2              | 1             | 2            | 26.45          | 0.1395                       | 20                  | M(A,L)GM     | 0.006973            | 26.35                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C1-1-OHC2-ETW2-1 | B             | C1              | 2             | 1            | 28.31          | 0.1409                       | 20                  | M(A,L)GM     | 0.007043            | 28.48                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C1-1-OHC2-ETW2-2 | B             | C1              | 2             | 1            | 27.13          | 0.1400                       | 20                  | M(A,L)GM     | 0.006999            | 27.12                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C1-1-OHC2-ETW2-3 | B             | C1              | 2             | 1            | 28.37          | 0.1399                       | 20                  | M(A,L)GM     | 0.006993            | 28.34                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-OHC2-ETW2-1 | B             | C2              | 2             | 2            | 26.47          | 0.1399                       | 20                  | M(A,L)GM     | 0.006997            | 26.45                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-OHC2-ETW2-2 | B             | C2              | 2             | 2            | 27.19          | 0.1399                       | 20                  | M(A,L)GM     | 0.006995            | 27.17                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-OHC2-ETW2-3 | B             | C2              | 2             | 2            | 25.20          | 0.1403                       | 20                  | M(A,L)GM     | 0.007015            | 25.26                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C1-1-OHC2-ETW2-1 | C             | C1              | 3             | 1            | 26.85          | 0.1415                       | 20                  | M(A,L)GM     | 0.007073            | 27.13                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C1-1-OHC2-ETW2-2 | C             | C1              | 3             | 1            | 26.05          | 0.1416                       | 20                  | AGM          | 0.007078            | 26.34                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C1-1-OHC2-ETW2-3 | C             | C1              | 3             | 1            | 25.43          | 0.1415                       | 20                  | M(A,L)GM     | 0.007073            | 25.69                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-OHC2-ETW2-1 | C             | C2              | 3             | 2            | 26.99          | 0.1410                       | 20                  | M(A,L)GM     | 0.007048            | 27.18                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-OHC2-ETW2-2 | C             | C2              | 3             | 2            | 24.97          | 0.1409                       | 20                  | M(A,L)GM     | 0.007046            | 25.13                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-OHC2-ETW2-3 | C             | C2              | 3             | 2            | 26.29          | 0.1412                       | 20                  | M(A,L)GM     | 0.007060            | 26.52                          |

**Average** 26.93  
**Standard Dev.** 1.132  
**Coeff. of Var. [%]** 4.202  
**Min.** 24.97  
**Max.** 29.06  
**Number of Spec.** 18

**Average<sub>norm</sub>** 0.007016  
**Standard Dev.<sub>norm</sub>** 26.99  
**Coeff. of Var. [%]<sub>norm</sub>** 1.069  
**Min.** 0.006963  
**Max.** 25.13  
**Number of Spec.** 18



## 4.25 “50/40/10” Open-Hole Compression 3 Properties (OHC3)

## Laminate Open-Hole Compression Properties (OHC3)--RTA (70°F)

## Strength

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

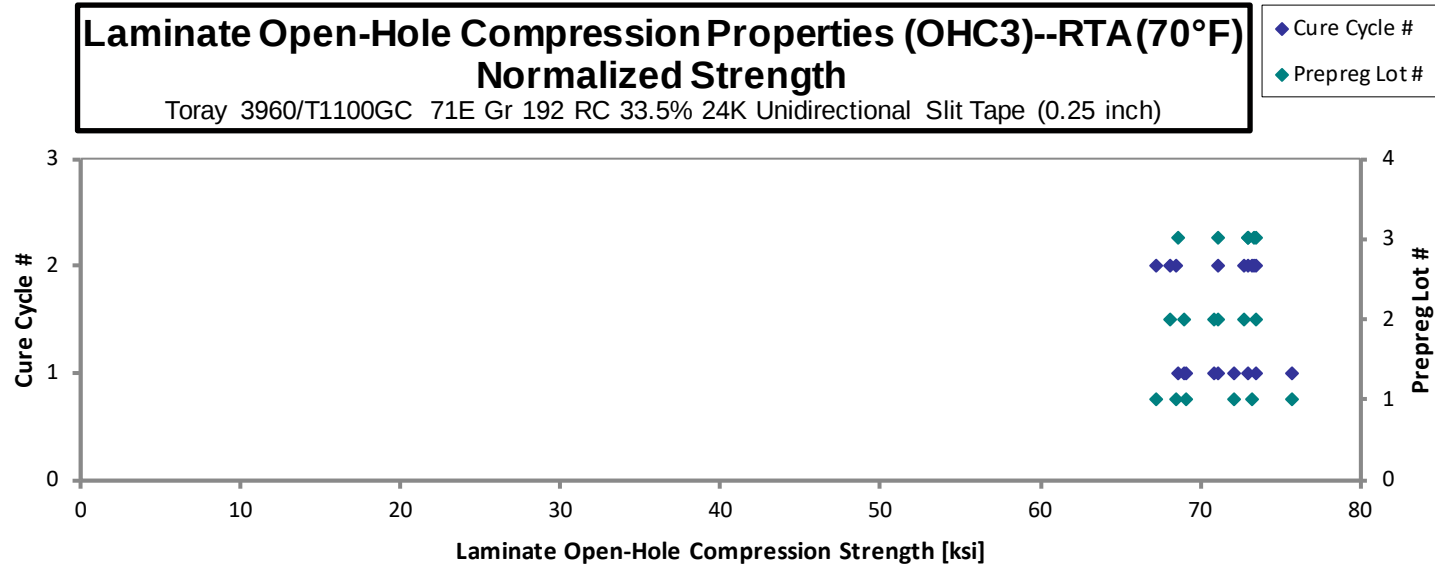
 $t_{ply}$  [in]

0.007000

| Specimen Number                                  | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | Strength <sub>norm</sub> [ksi] |
|--------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|------------------------------|---------------------|--------------|---------------------|--------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-OHC3-RTA-1 | A             | C1              | 1             | 1            | 75.40          | 0.1407                       | 20                  | M(A,L)GM     | 0.007034            | 75.77                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-OHC3-RTA-2 | A             | C1              | 1             | 1            | 72.17          | 0.1400                       | 20                  | M(A,L)GM     | 0.007000            | 72.17                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-OHC3-RTA-3 | A             | C1              | 1             | 1            | 68.94          | 0.1405                       | 20                  | M(A,L)GM     | 0.007023            | 69.17                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-OHC3-RTA-1 | A             | C2              | 1             | 2            | 68.56          | 0.1399                       | 20                  | M(A,L)GM     | 0.006995            | 68.52                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-OHC3-RTA-2 | A             | C2              | 1             | 2            | 73.28          | 0.1399                       | 20                  | M(A,L)GM     | 0.006993            | 73.20                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-OHC3-RTA-3 | A             | C2              | 1             | 2            | 67.08          | 0.1404                       | 20                  | M(A,L)GM     | 0.007022            | 67.28                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-OHC3-RTA-1 | B             | C1              | 2             | 1            | 69.31          | 0.1394                       | 20                  | M(A,L)GM     | 0.006970            | 69.01                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-OHC3-RTA-2 | B             | C1              | 2             | 1            | 71.10          | 0.1400                       | 20                  | M(A,L)GM     | 0.007001            | 71.10                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-OHC3-RTA-3 | B             | C1              | 2             | 1            | 70.53          | 0.1406                       | 20                  | M(A,L)GM     | 0.007028            | 70.81                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-OHC3-RTA-1 | B             | C2              | 2             | 2            | 68.59          | 0.1392                       | 20                  | M(A,L)GM     | 0.006958            | 68.18                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-OHC3-RTA-2 | B             | C2              | 2             | 2            | 74.07          | 0.1389                       | 20                  | M(A,L)GM     | 0.006945            | 73.49                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-OHC3-RTA-3 | B             | C2              | 2             | 2            | 73.09          | 0.1393                       | 20                  | M(A,L)GM     | 0.006963            | 72.70                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-OHC3-RTA-1 | C             | C1              | 3             | 1            | 67.56          | 0.1421                       | 20                  | M(A,L)GM     | 0.007107            | 68.59                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-OHC3-RTA-2 | C             | C1              | 3             | 1            | 73.16          | 0.1407                       | 20                  | M(A,L)GM     | 0.007033            | 73.50                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-OHC3-RTA-3 | C             | C1              | 3             | 1            | 72.26          | 0.1414                       | 20                  | M(A,L)GM     | 0.007071            | 72.99                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-OHC3-RTA-1 | C             | C2              | 3             | 2            | 70.92          | 0.1440                       | 20                  | M(A,L)GM     | 0.007198            | 72.93                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-OHC3-RTA-2 | C             | C2              | 3             | 2            | 70.50          | 0.1412                       | 20                  | M(A,L)GM     | 0.007058            | 71.08                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-OHC3-RTA-3 | C             | C2              | 3             | 2            | 72.19          | 0.1423                       | 20                  | M(A,L)GM     | 0.007117            | 73.40                          |

Average 71.04  
 Standard Dev. 2.351  
 Coeff. of Var. [%] 3.309  
 Min. 67.08  
 Max. 75.40  
 Number of Spec. 18

Average<sub>norm</sub> 0.007028 71.33  
 Standard Dev.<sub>norm</sub> 2.388  
 Coeff. of Var. [%]<sub>norm</sub> 3.348  
 Min. 0.006945 67.28  
 Max. 0.007198 75.77  
 Number of Spec. 18 18



**Laminate Open-Hole Compression Properties (OHC3)--ETW2 (250°F)  
Strength**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

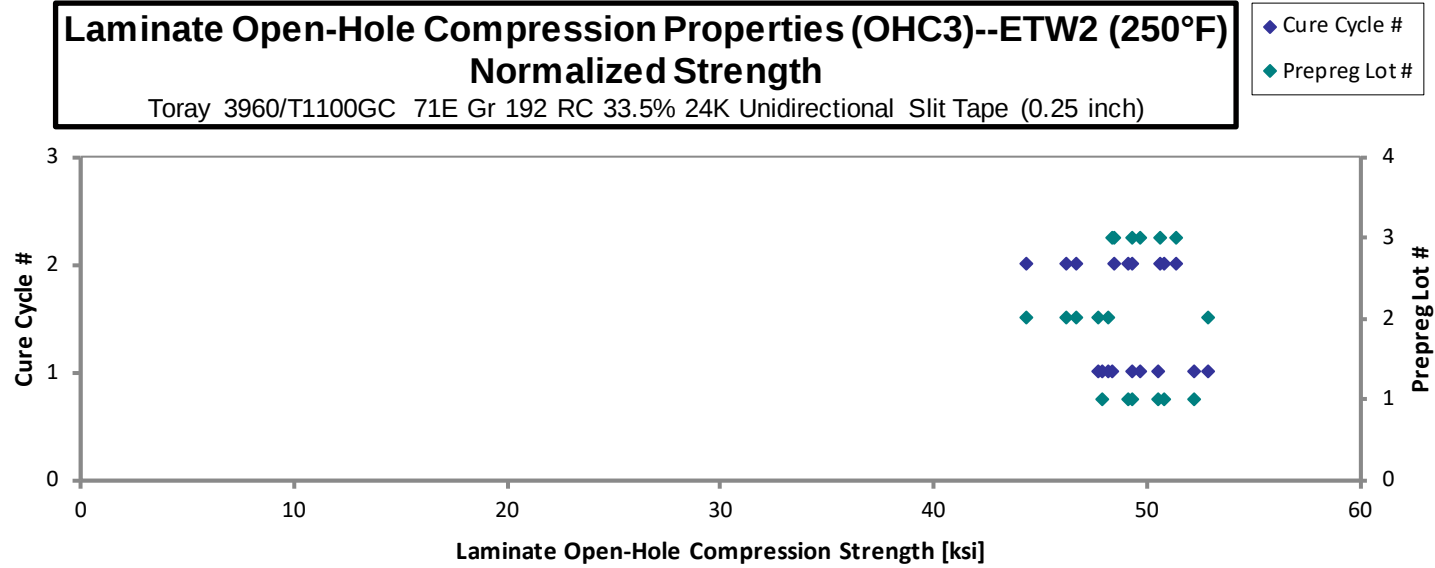
 $t_{ply}$  [in]

0.007000

| Specimen Number                                   | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | Strength <sub>norm</sub> [ksi] |
|---------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|------------------------------|---------------------|--------------|---------------------|--------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-OHC3-ETW2-1 | A             | C1              | 1             | 1            | 50.39          | 0.1403                       | 20                  | LGM          | 0.007013            | 50.49                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-OHC3-ETW2-2 | A             | C1              | 1             | 1            | 47.72          | 0.1405                       | 20                  | LGM          | 0.007026            | 47.90                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-OHC3-ETW2-3 | A             | C1              | 1             | 1            | 51.98          | 0.1406                       | 20                  | LGM          | 0.007030            | 52.21                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-OHC3-ETW2-1 | A             | C2              | 1             | 2            | 50.76          | 0.1401                       | 20                  | LGM          | 0.007005            | 50.80                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-OHC3-ETW2-2 | A             | C2              | 1             | 2            | 49.39          | 0.1398                       | 20                  | LGM          | 0.006990            | 49.32                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-OHC3-ETW2-3 | A             | C2              | 1             | 2            | 49.10          | 0.1402                       | 20                  | LGM          | 0.007008            | 49.16                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-OHC3-ETW2-1 | B             | C1              | 2             | 1            | 48.17          | 0.1400                       | 20                  | LGM          | 0.007001            | 48.17                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-OHC3-ETW2-2 | B             | C1              | 2             | 1            | 52.68          | 0.1404                       | 20                  | LGM          | 0.007021            | 52.83                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-OHC3-ETW2-3 | B             | C1              | 2             | 1            | 47.51          | 0.1405                       | 20                  | LGM          | 0.007026            | 47.69                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-OHC3-ETW2-1 | B             | C2              | 2             | 2            | 46.48          | 0.1392                       | 20                  | LGM          | 0.006959            | 46.21                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-OHC3-ETW2-2 | B             | C2              | 2             | 2            | 44.48          | 0.1395                       | 20                  | LGM          | 0.006976            | 44.32                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-OHC3-ETW2-3 | B             | C2              | 2             | 2            | 46.83          | 0.1395                       | 20                  | LGM          | 0.006973            | 46.65                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-OHC3-ETW2-1 | C             | C1              | 3             | 1            | 48.03          | 0.1410                       | 20                  | M(A,L)GM     | 0.007052            | 48.38                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-OHC3-ETW2-2 | C             | C1              | 3             | 1            | 48.93          | 0.1412                       | 20                  | LGM          | 0.007059            | 49.34                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-OHC3-ETW2-3 | C             | C1              | 3             | 1            | 49.34          | 0.1411                       | 20                  | LGM          | 0.007054            | 49.72                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-OHC3-ETW2-1 | C             | C2              | 3             | 2            | 49.93          | 0.1419                       | 20                  | LGM          | 0.007095            | 50.60                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-OHC3-ETW2-2 | C             | C2              | 3             | 2            | 47.73          | 0.1420                       | 20                  | LGM          | 0.007101            | 48.42                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-OHC3-ETW2-3 | C             | C2              | 3             | 2            | 50.61          | 0.1421                       | 20                  | LGM          | 0.007107            | 51.38                          |

Average 48.89  
 Standard Dev. 2.024  
 Coeff. of Var. [%] 4.139  
 Min. 44.48  
 Max. 52.68  
 Number of Spec. 18

Average<sub>norm</sub> 0.007028 49.09  
 Standard Dev.<sub>norm</sub> 2.153  
 Coeff. of Var. [%]<sub>norm</sub> 4.386  
 Min. 0.006959 44.32  
 Max. 0.007107 52.83  
 Number of Spec. 18 18



## 4.26 “25/50/25” Filled-Hole Compression 1 Properties (FHC1)

## Laminate Filled-Hole Compression Properties (FHC1)--RTA (70°F)

## Strength

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

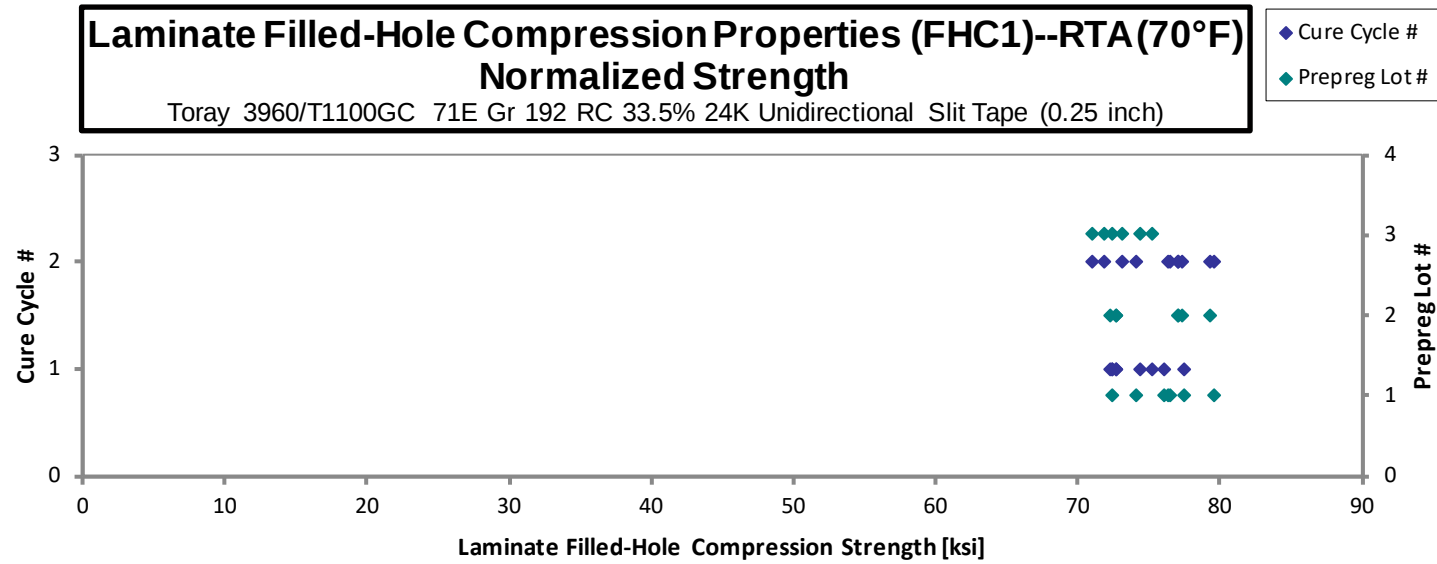
 $t_{ply}$  [in]

0.007000

| Specimen Number                                  | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | Strength <sub>norm</sub> [ksi] |
|--------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|------------------------------|---------------------|--------------|---------------------|--------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C1-1-FHC1-RTA-1 | A             | C1              | 1             | 1            | 76.28          | 0.1674                       | 24                  | LGO, LGF     | 0.006974            | 76.00                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C1-1-FHC1-RTA-2 | A             | C1              | 1             | 1            | 74.18          | 0.1640                       | 24                  | LGO, LGF     | 0.006831            | 72.39                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C1-1-FHC1-RTA-3 | A             | C1              | 1             | 1            | 78.58          | 0.1657                       | 24                  | LGF          | 0.006902            | 77.48                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C2-1-FHC1-RTA-1 | A             | C2              | 1             | 2            | 73.62          | 0.1691                       | 24                  | LGO, LGF     | 0.007044            | 74.09                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C2-1-FHC1-RTA-2 | A             | C2              | 1             | 2            | 75.90          | 0.1691                       | 24                  | LGO, LGF     | 0.007044            | 76.38                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C2-1-FHC1-RTA-3 | A             | C2              | 1             | 2            | 79.59          | 0.1680                       | 24                  | LGO, LGF     | 0.006999            | 79.57                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C2-1-FHC1-SP-1  | A             | C2              | 1             | 2            | 76.60          | 0.1678                       | 24                  | LGF          | 0.006990            | 76.50                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-B-C1-1-FHC1-RTA-1 | B             | C1              | 2             | 1            | 72.07          | 0.1685                       | 24                  | LGF          | 0.007019            | 72.27                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-B-C1-1-FHC1-RTA-2 | B             | C1              | 2             | 1            | 72.56          | 0.1683                       | 24                  | LGF          | 0.007011            | 72.67                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-B-C1-1-FHC1-RTA-3 | B             | C1              | 2             | 1            | 72.64          | 0.1682                       | 24                  | LGF          | 0.007009            | 72.73                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-B-C2-1-FHC1-RTA-1 | B             | C2              | 2             | 2            | 77.58          | 0.1674                       | 24                  | M(A,L)GF     | 0.006974            | 77.30                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-B-C2-1-FHC1-RTA-2 | B             | C2              | 2             | 2            | 79.58          | 0.1676                       | 24                  | M(A,L)GF     | 0.006981            | 79.37                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-B-C2-1-FHC1-RTA-3 | B             | C2              | 2             | 2            | 77.30          | 0.1674                       | 24                  | M(A,L)GF     | 0.006973            | 77.00                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-B-C2-1-FHC1-SP-1  | B             | C2              | 2             | 2            | 77.41          | 0.1672                       | 24                  | M(A,L)GF     | 0.006967            | 77.05                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-C-C1-1-FHC1-RTA-1 | C             | C1              | 3             | 1            | 74.51          | 0.1677                       | 24                  | M(A,L)GF     | 0.006986            | 74.37                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-C-C1-1-FHC1-RTA-2 | C             | C1              | 3             | 1            | 72.54          | 0.1678                       | 24                  | M(A,L)GF     | 0.006991            | 72.44                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-C-C1-1-FHC1-RTA-3 | C             | C1              | 3             | 1            | 75.56          | 0.1673                       | 24                  | M(A,L)GF     | 0.006970            | 75.24                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-C-C2-1-FHC1-RTA-1 | C             | C2              | 3             | 2            | 70.71          | 0.1688                       | 24                  | M(A,L)GF     | 0.007033            | 71.04                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-C-C2-1-FHC1-RTA-2 | C             | C2              | 3             | 2            | 71.05          | 0.1700                       | 24                  | M(A,L)GF     | 0.007083            | 71.90                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-C-C2-1-FHC1-RTA-3 | C             | C2              | 3             | 2            | 72.37          | 0.1697                       | 24                  | M(A,L)GF     | 0.007069            | 73.08                          |

Average 75.03  
 Standard Dev. 2.789  
 Coeff. of Var. [%] 3.718  
 Min. 70.71  
 Max. 79.59  
 Number of Spec. 20

Average<sub>norm</sub> 0.006993 74.94  
 Standard Dev.<sub>norm</sub> 2.578  
 Coeff. of Var. [%]<sub>norm</sub> 3.440  
 Min. 0.006831 71.04  
 Max. 0.007083 79.57  
 Number of Spec. 20 20



January 2, 2026

CAM-RP-2023-002 Rev B

**Laminate Filled-Hole Compression Properties (FHC1)--ETW1 (180°F)  
Strength**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

$t_{ply}$  [in]

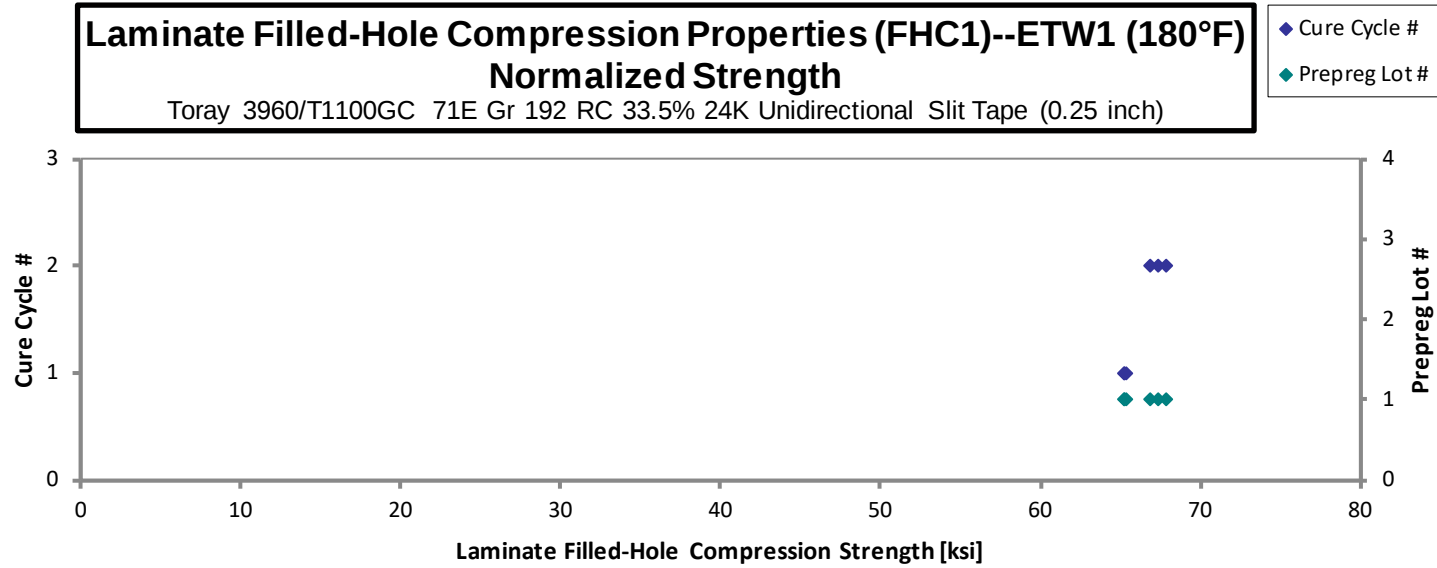
0.007000

| Specimen Number                                   | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode |
|---------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|------------------------------|---------------------|--------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C1-1-FHC1-ETW1-1 | A             | C1              | 1             | 1            | 66.40          | 0.1649                       | 24                  | LGF          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C1-1-FHC1-ETW1-2 | A             | C1              | 1             | 1            | 66.27          | 0.1653                       | 24                  | LGF          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C1-1-FHC1-ETW1-3 | A             | C1              | 1             | 1            | 66.57          | 0.1650                       | 24                  | LGF          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C2-1-FHC1-ETW1-2 | A             | C2              | 1             | 2            | 66.52          | 0.1689                       | 24                  | LGF          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C2-1-FHC1-ETW1-3 | A             | C2              | 1             | 2            | 68.08          | 0.1674                       | 24                  | LGF          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C2-1-FHC1-SP-4   | A             | C2              | 1             | 2            | 67.66          | 0.1674                       | 24                  | LGF          |

| Avg. $t_{ply}$ [in] | Strength <sub>norm</sub> [ksi] |
|---------------------|--------------------------------|
| 0.006872            | 65.19                          |
| 0.006887            | 65.20                          |
| 0.006873            | 65.36                          |
| 0.007036            | 66.86                          |
| 0.006973            | 67.82                          |
| 0.006974            | 67.41                          |

Average 66.92  
Standard Dev. 0.7594  
Coeff. of Var. [%] 1.135  
Min. 66.27  
Max. 68.08  
Number of Spec. 6

Average<sub>norm</sub> 0.006936 66.31  
Standard Dev.<sub>norm</sub> 1.201  
Coeff. of Var. [%]<sub>norm</sub> 1.811  
Min. 0.006872 65.19  
Max. 0.007036 67.82  
Number of Spec. 6 6



**Laminate Filled-Hole Compression Properties (FHC1)--ETW2 (250°F)  
Strength**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

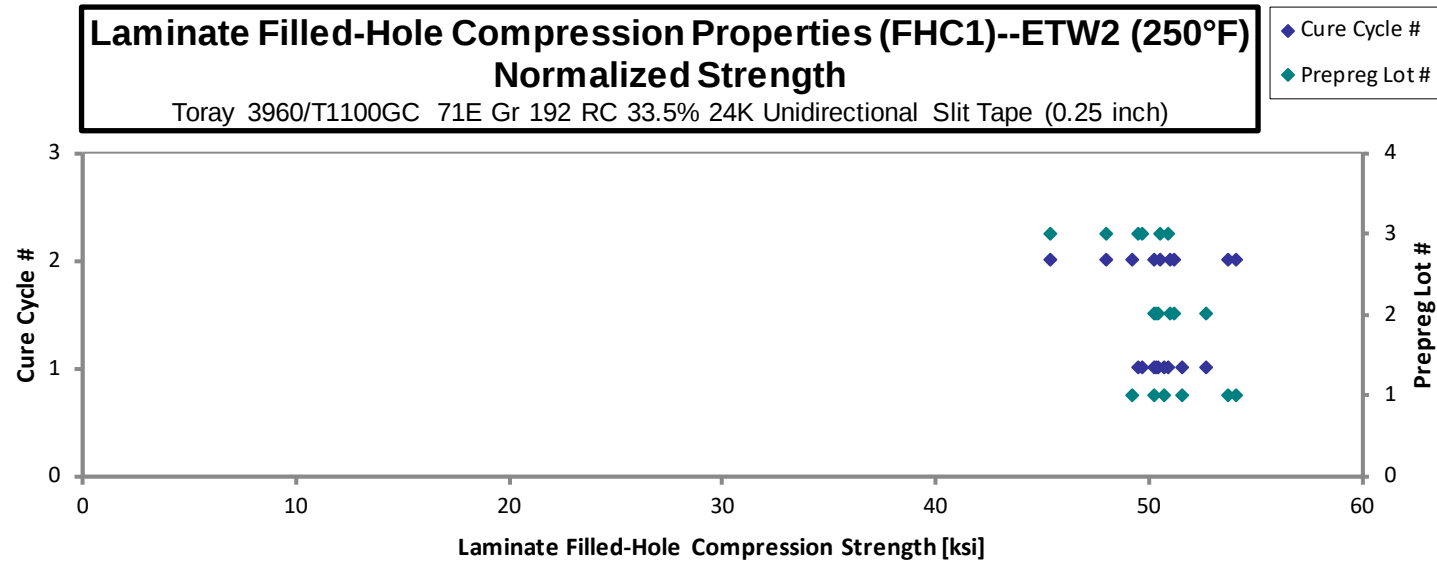
$t_{ply}$  [in]

0.007000

| Specimen Number                                   | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | Strength <sub>norm</sub> [ksi] |
|---------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|------------------------------|---------------------|--------------|---------------------|--------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C1-1-FHC1-ETW2-1 | A             | C1              | 1             | 1            | 52.38          | 0.1654                       | 24                  | LGF          | 0.006890            | 51.55                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C1-1-FHC1-ETW2-2 | A             | C1              | 1             | 1            | 51.76          | 0.1646                       | 24                  | LGF          | 0.006860            | 50.72                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C1-1-FHC1-ETW2-3 | A             | C1              | 1             | 1            | 51.21          | 0.1648                       | 24                  | LGF          | 0.006867            | 50.24                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C2-1-FHC1-ETW2-1 | A             | C2              | 1             | 2            | 49.31          | 0.1676                       | 24                  | LGF          | 0.006981            | 49.18                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C2-1-FHC1-ETW2-2 | A             | C2              | 1             | 2            | 54.15          | 0.1677                       | 24                  | LGF          | 0.006987            | 54.05                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C2-1-FHC1-ETW2-3 | A             | C2              | 1             | 2            | 53.79          | 0.1677                       | 24                  | LGF          | 0.006988            | 53.70                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-B-C1-1-FHC1-ETW2-1 | B             | C1              | 2             | 1            | 50.14          | 0.1686                       | 24                  | LGF          | 0.007024            | 50.32                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-B-C1-1-FHC1-ETW2-2 | B             | C1              | 2             | 1            | 52.40          | 0.1689                       | 24                  | LGF          | 0.007038            | 52.68                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-B-C1-1-FHC1-ETW2-3 | B             | C1              | 2             | 1            | 50.51          | 0.1678                       | 24                  | LGF          | 0.006992            | 50.46                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-B-C2-1-FHC1-ETW2-1 | B             | C2              | 2             | 2            | 51.40          | 0.1672                       | 24                  | LGF          | 0.006965            | 51.15                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-B-C2-1-FHC1-ETW2-2 | B             | C2              | 2             | 2            | 51.32          | 0.1670                       | 24                  | LGF          | 0.006958            | 51.01                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-B-C2-1-FHC1-ETW2-3 | B             | C2              | 2             | 2            | 50.45          | 0.1675                       | 24                  | LGF          | 0.006978            | 50.28                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-C-C1-1-FHC1-ETW2-1 | C             | C1              | 3             | 1            | 49.53          | 0.1679                       | 24                  | LGF          | 0.006994            | 49.49                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-C-C1-1-FHC1-ETW2-2 | C             | C1              | 3             | 1            | 49.70          | 0.1681                       | 24                  | LGF, LGB     | 0.007003            | 49.72                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-C-C1-1-FHC1-ETW2-3 | C             | C1              | 3             | 1            | 50.89          | 0.1679                       | 24                  | LGF, LGB     | 0.006994            | 50.85                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-C-C2-1-FHC1-ETW2-1 | C             | C2              | 3             | 2            | 47.75          | 0.1688                       | 24                  | LGF          | 0.007033            | 47.98                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-C-C2-1-FHC1-ETW2-2 | C             | C2              | 3             | 2            | 50.14          | 0.1693                       | 24                  | LGF          | 0.007055            | 50.53                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-C-C2-1-FHC1-ETW2-3 | C             | C2              | 3             | 2            | 44.94          | 0.1696                       | 24                  | LGF          | 0.007066            | 45.36                          |

Average 50.65  
Standard Dev. 2.118  
Coeff. of Var. [%] 4.180  
Min. 44.94  
Max. 54.15  
Number of Spec. 18

Average<sub>norm</sub> 0.006982  
Standard Dev.<sub>norm</sub> 0.006982  
Coeff. of Var. [%]<sub>norm</sub> 3.893  
Min. 0.006860  
Max. 0.007066  
Number of Spec. 18



## 4.27 “10/80/10” Filled-Hole Compression 2 Properties (FHC2)

## Laminate Filled-Hole Compression Properties (FHC2)--RTA (70°F)

## Strength

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

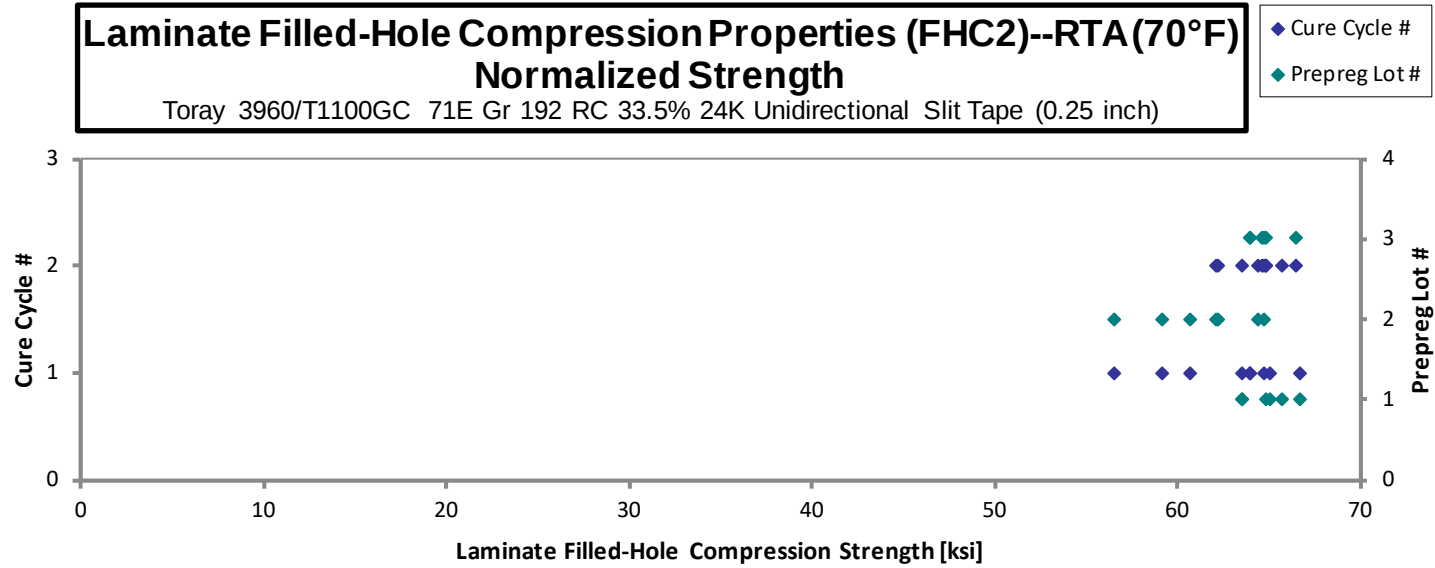
 $t_{ply}$  [in]

0.007000

| Specimen Number                                  | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode       | Avg. $t_{ply}$ [in] | Strength <sub>norm</sub> [ksi] |
|--------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|------------------------------|---------------------|--------------------|---------------------|--------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C1-1-FHC2-RTA-1 | A             | C1              | 1             | 1            | 64.72          | 0.1408                       | 20                  | M(A,L)GF           | 0.007038            | 65.06                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C1-1-FHC2-RTA-2 | A             | C1              | 1             | 1            | 66.14          | 0.1411                       | 20                  | M(A,L)GF           | 0.007056            | 66.66                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C1-1-FHC2-RTA-3 | A             | C1              | 1             | 1            | 63.28          | 0.1406                       | 20                  | M(A,L)GF           | 0.007028            | 63.53                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C2-1-FHC2-RTA-1 | A             | C2              | 1             | 2            | 63.43          | 0.1403                       | 20                  | M(A,L)GF           | 0.007014            | 63.56                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C2-1-FHC2-RTA-2 | A             | C2              | 1             | 2            | 65.59          | 0.1404                       | 20                  | M(A,L)GF           | 0.007020            | 65.78                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C2-1-FHC2-RTA-3 | A             | C2              | 1             | 2            | 64.96          | 0.1398                       | 20                  | M(A,L)GF           | 0.006991            | 64.88                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C1-1-FHC2-RTA-1 | B             | C1              | 2             | 1            | 56.07          | 0.1410                       | 20                  | AGF                | 0.007052            | 56.49                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C1-1-FHC2-RTA-2 | B             | C1              | 2             | 1            | 60.92          | 0.1395                       | 20                  | AGF                | 0.006976            | 60.71                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C1-1-FHC2-RTA-3 | B             | C1              | 2             | 1            | 59.16          | 0.1400                       | 20                  | AGF                | 0.007002            | 59.18                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-FHC2-RTA-1 | B             | C2              | 2             | 2            | 64.27          | 0.1411                       | 20                  | M(A,L)GF           | 0.007053            | 64.76                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-FHC2-RTA-2 | B             | C2              | 2             | 2            | 62.32          | 0.1395                       | 20                  | M(A,L)GF, M(A,L)WB | 0.006973            | 62.08                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-FHC2-RTA-3 | B             | C2              | 2             | 2            | 64.34          | 0.1402                       | 20                  | M(A,L)GF           | 0.007012            | 64.44                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-FHC2-SP-1  | B             | C2              | 2             | 2            | 62.44          | 0.1396                       | 20                  | AGF                | 0.006978            | 62.25                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C1-1-FHC2-RTA-1 | C             | C1              | 3             | 1            | 63.67          | 0.1423                       | 20                  | M(A,L)GF           | 0.007113            | 64.70                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C1-1-FHC2-RTA-2 | C             | C1              | 3             | 1            | 63.10          | 0.1421                       | 20                  | M(A,L)GF           | 0.007103            | 64.02                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C1-1-FHC2-RTA-3 | C             | C1              | 3             | 1            | 63.29          | 0.1416                       | 20                  | M(A,L)GF           | 0.007080            | 64.02                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-FHC2-RTA-1 | C             | C2              | 3             | 2            | 64.61          | 0.1400                       | 20                  | M(A,L)GF           | 0.007001            | 64.62                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-FHC2-RTA-2 | C             | C2              | 3             | 2            | 66.47          | 0.1400                       | 20                  | M(A,L)GF           | 0.006999            | 66.46                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-FHC2-RTA-3 | C             | C2              | 3             | 2            | 64.78          | 0.1402                       | 20                  | M(A,L)GF           | 0.007010            | 64.87                          |

Average 63.35  
 Standard Dev. 2.482  
 Coeff. of Var. [%] 3.918  
 Min. 56.07  
 Max. 66.47  
 Number of Spec. 19

Average<sub>norm</sub> 0.007026 63.58  
 Standard Dev.<sub>norm</sub> 2.528  
 Coeff. of Var. [%]<sub>norm</sub> 3.975  
 Min. 0.006973 56.49  
 Max. 0.007113 66.66  
 Number of Spec. 19 19



**Laminate Filled-Hole Compression Properties (FHC2)--ETW2 (250°F)  
Strength**

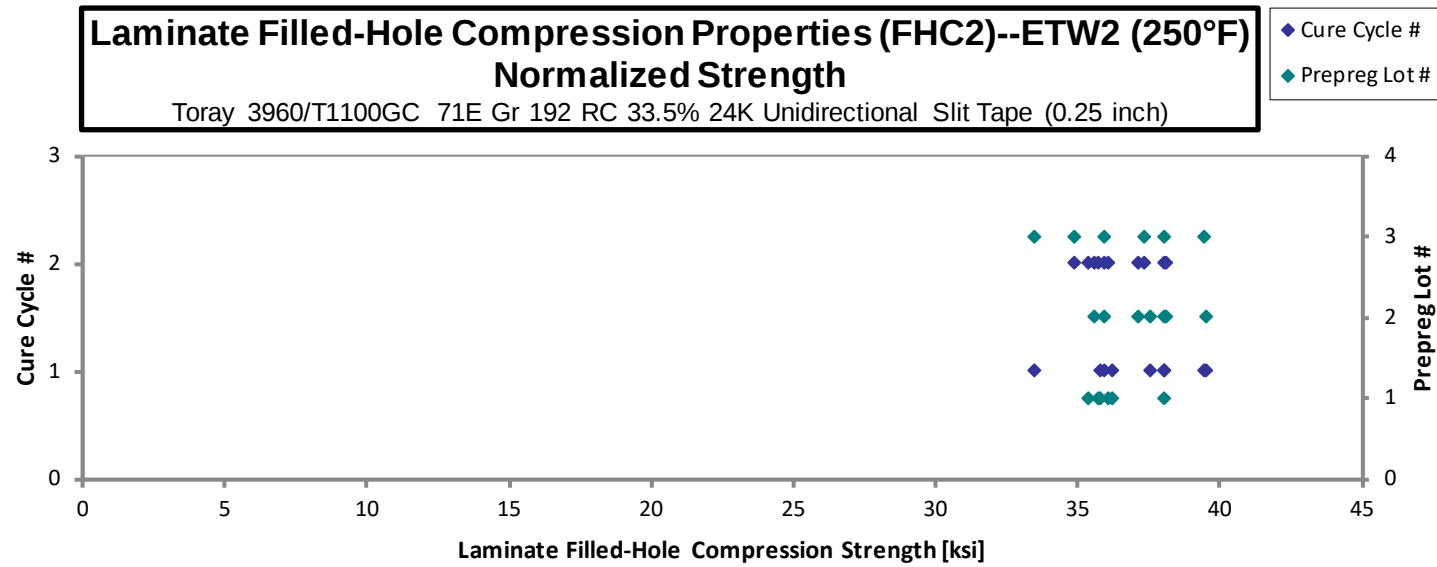
Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing  
 $t_{ply}$  [in]  
 0.007000

| Specimen Number                                   | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode  | Avg. $t_{ply}$ [in] | Strength <sub>norm</sub> [ksi] |
|---------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|------------------------------|---------------------|---------------|---------------------|--------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C1-1-FHC2-ETW2-1 | A             | C1              | 1             | 1            | 37.95          | 0.1404                       | 20                  | AGF           | 0.007022            | 38.07                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C1-1-FHC2-ETW2-2 | A             | C1              | 1             | 1            | 35.67          | 0.1405                       | 20                  | AGF           | 0.007026            | 35.80                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C1-1-FHC2-ETW2-3 | A             | C1              | 1             | 1            | 36.10          | 0.1405                       | 20                  | M(A,L)GF      | 0.007023            | 36.22                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C2-1-FHC2-ETW2-1 | A             | C2              | 1             | 2            | 36.07          | 0.1401                       | 20                  | M(A,L)GF      | 0.007007            | 36.10                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C2-1-FHC2-ETW2-2 | A             | C2              | 1             | 2            | 35.31          | 0.1401                       | 20                  | M(A,L)GF      | 0.007004            | 35.33                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C2-1-FHC2-ETW2-3 | A             | C2              | 1             | 2            | 35.74          | 0.1400                       | 20                  | AGT           | 0.007002            | 35.75                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C1-1-FHC2-ETW2-1 | B             | C1              | 2             | 1            | 39.55          | 0.1398                       | 20                  | M(A,L)GF      | 0.006988            | 39.49                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C1-1-FHC2-ETW2-2 | B             | C1              | 2             | 1            | 35.83          | 0.1405                       | 20                  | M(A,L)GF      | 0.007024            | 35.95                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C1-1-FHC2-ETW2-3 | B             | C1              | 2             | 1            | 37.50          | 0.1403                       | 20                  | M(A,L)GF      | 0.007013            | 37.57                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-FHC2-ETW2-1 | B             | C2              | 2             | 2            | 38.04          | 0.1400                       | 20                  | M(A,L)GF      | 0.006998            | 38.03                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-FHC2-ETW2-2 | B             | C2              | 2             | 2            | 37.19          | 0.1397                       | 20                  | M(A,L)GF      | 0.006986            | 37.11                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-FHC2-ETW2-3 | B             | C2              | 2             | 2            | 35.67          | 0.1396                       | 20                  | M(A,L)GF, AWT | 0.006980            | 35.56                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-FHC2-SP-3   | B             | C2              | 2             | 2            | 38.16          | 0.1398                       | 20                  | M(A,L)GF      | 0.006988            | 38.10                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C1-1-FHC2-ETW2-1 | C             | C1              | 3             | 1            | 37.60          | 0.1417                       | 20                  | M(A,L)GF      | 0.007086            | 38.06                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C1-1-FHC2-ETW2-2 | C             | C1              | 3             | 1            | 38.98          | 0.1416                       | 20                  | M(A,L)GF      | 0.007082            | 39.44                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C1-1-FHC2-ETW2-3 | C             | C1              | 3             | 1            | 33.07          | 0.1417                       | 20                  | M(A,L)GF      | 0.007087            | 33.48                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-FHC2-ETW2-1 | C             | C2              | 3             | 2            | 34.85          | 0.1401                       | 20                  | M(A,L)GF      | 0.007006            | 34.88                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-FHC2-ETW2-2 | C             | C2              | 3             | 2            | 37.27          | 0.1404                       | 20                  | M(A,L)GF      | 0.007018            | 37.36                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-FHC2-ETW2-3 | C             | C2              | 3             | 2            | 35.88          | 0.1401                       | 20                  | M(A,L)GF      | 0.007007            | 35.92                          |

Average 36.65  
 Standard Dev. 1.573  
 Coeff. of Var. [%] 4.292  
 Min. 33.07  
 Max. 39.55  
 Number of Spec. 19

Average<sub>norm</sub> 0.007018 36.75  
 Standard Dev.<sub>norm</sub> 1.569  
 Coeff. of Var. [%]<sub>norm</sub> 4.270  
 Min. 0.006980 33.48  
 Max. 0.007087 39.49  
 Number of Spec. 19 19



## 4.28 “50/40/10” Filled-Hole Compression 3 Properties (FHC3)

## Laminate Filled-Hole Compression Properties (FHC3)--RTA (70°F)

## Strength

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

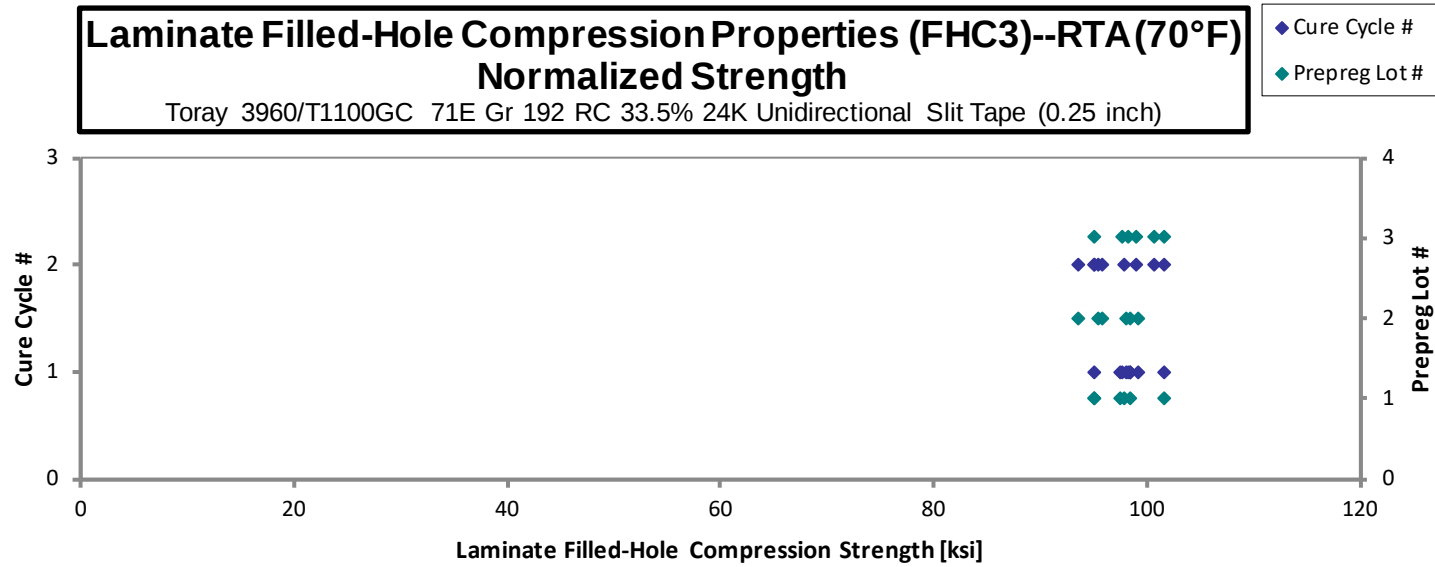
 $t_{ply}$  [in]

0.007000

| Specimen Number                                  | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | Strength <sub>norm</sub> [ksi] |
|--------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|------------------------------|---------------------|--------------|---------------------|--------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-FHC3-RTA-1 | A             | C1              | 1             | 1            | 96.54          | 0.1414                       | 20                  | LGF, AGF     | 0.007072            | 97.53                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-FHC3-RTA-2 | A             | C1              | 1             | 1            | 97.55          | 0.1413                       | 20                  | LGF, AGF     | 0.007066            | 98.47                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-FHC3-RTA-3 | A             | C1              | 1             | 1            | 94.48          | 0.1408                       | 20                  | LGF, AGF     | 0.007039            | 95.01                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-FHC3-RTA-1 | A             | C2              | 1             | 2            | 96.92          | 0.1415                       | 20                  | LGF, AGF     | 0.007073            | 97.93                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-FHC3-RTA-2 | A             | C2              | 1             | 2            | 94.18          | 0.1413                       | 20                  | LGF, AGF     | 0.007066            | 95.07                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-FHC3-RTA-3 | A             | C2              | 1             | 2            | 101.0          | 0.1408                       | 20                  | LGF, AGF     | 0.007040            | 101.6                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-FHC3-RTA-1 | B             | C1              | 2             | 1            | 99.93          | 0.1389                       | 20                  | M(A,L)GF     | 0.006947            | 99.16                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-FHC3-RTA-2 | B             | C1              | 2             | 1            | 98.87          | 0.1389                       | 20                  | M(A,L)GF     | 0.006945            | 98.10                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-FHC3-RTA-3 | B             | C1              | 2             | 1            | 98.88          | 0.1393                       | 20                  | M(A,L)GF     | 0.006967            | 98.41                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-FHC3-RTA-1 | B             | C2              | 2             | 2            | 96.26          | 0.1395                       | 20                  | LGO          | 0.006973            | 95.89                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-FHC3-RTA-2 | B             | C2              | 2             | 2            | 95.76          | 0.1394                       | 20                  | LGO          | 0.006970            | 95.35                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-FHC3-RTA-3 | B             | C2              | 2             | 2            | 94.05          | 0.1392                       | 20                  | LGO          | 0.006959            | 93.50                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-FHC3-RTA-1 | C             | C1              | 3             | 1            | 96.17          | 0.1423                       | 20                  | M(A,L)GF     | 0.007115            | 97.75                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-FHC3-RTA-2 | C             | C1              | 3             | 1            | 98.02          | 0.1402                       | 20                  | M(A,L)GF     | 0.007011            | 98.18                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-FHC3-RTA-3 | C             | C1              | 3             | 1            | 100.5          | 0.1417                       | 20                  | M(A,L)GF     | 0.007083            | 101.6                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-FHC3-RTA-1 | C             | C2              | 3             | 2            | 93.39          | 0.1425                       | 20                  | M(A,L)GF     | 0.007126            | 95.07                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-FHC3-RTA-2 | C             | C2              | 3             | 2            | 99.84          | 0.1413                       | 20                  | M(A,L)GF     | 0.007063            | 100.7                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-FHC3-RTA-3 | C             | C2              | 3             | 2            | 97.38          | 0.1424                       | 20                  | M(A,L)GF     | 0.007118            | 99.02                          |

Average 97.21  
 Standard Dev. 2.322  
 Coeff. of Var. [%] 2.389  
 Min. 93.39  
 Max. 101.0  
 Number of Spec. 18

Average<sub>norm</sub> 0.007035 97.69  
 Standard Dev.<sub>norm</sub> 2.340  
 Coeff. of Var. [%]<sub>norm</sub> 2.395  
 Min. 0.006945 93.50  
 Max. 0.007126 101.6  
 Number of Spec. 18 18



**Laminate Filled-Hole Compression Properties (FHC3)--ETW2 (250°F)  
Strength**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

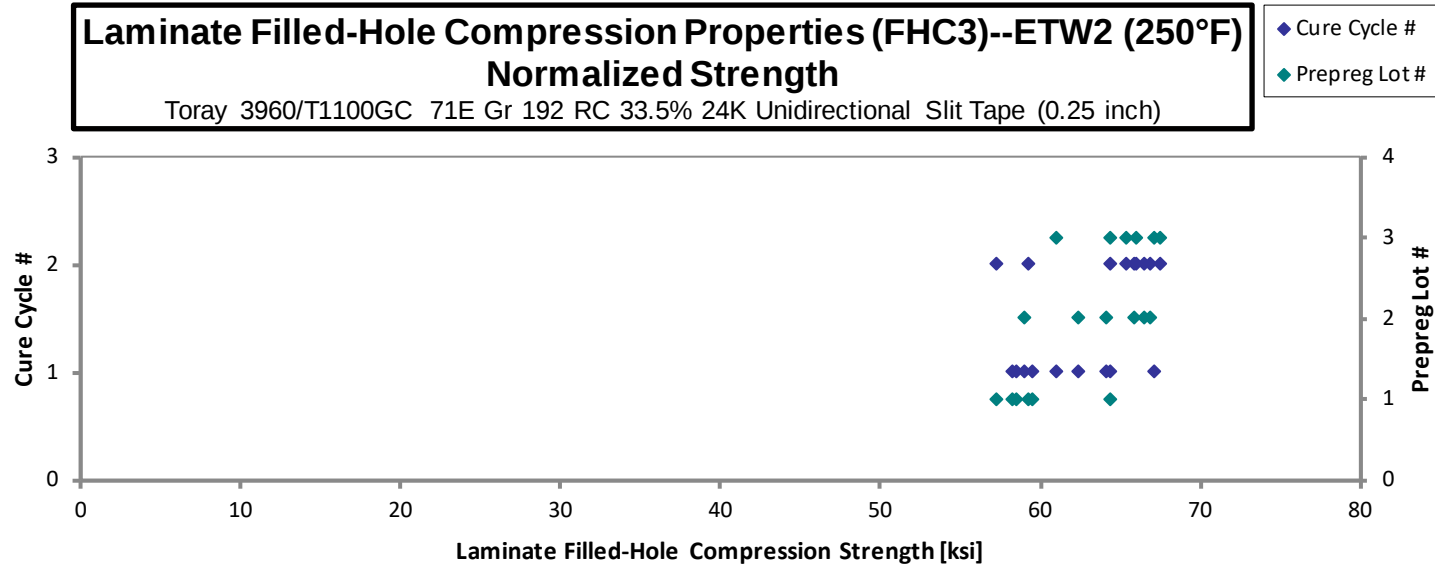
 $t_{ply}$  [in]

0.007000

| Specimen Number                                   | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | Strength <sub>norm</sub> [ksi] |
|---------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|------------------------------|---------------------|--------------|---------------------|--------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-FHC3-ETW2-1 | A             | C1              | 1             | 1            | 58.22          | 0.1407                       | 20                  | LGF          | 0.007037            | 58.52                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-FHC3-ETW2-2 | A             | C1              | 1             | 1            | 59.12          | 0.1408                       | 20                  | LGF          | 0.007038            | 59.45                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-FHC3-ETW2-3 | A             | C1              | 1             | 1            | 57.81          | 0.1411                       | 20                  | LGF          | 0.007056            | 58.27                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-FHC3-ETW2-1 | A             | C2              | 1             | 2            | 58.88          | 0.1409                       | 20                  | LGM          | 0.007047            | 59.28                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-FHC3-ETW2-2 | A             | C2              | 1             | 2            | 56.97          | 0.1407                       | 20                  | LGF          | 0.007035            | 57.25                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-FHC3-ETW2-3 | A             | C2              | 1             | 2            | 64.04          | 0.1408                       | 20                  | LGF          | 0.007041            | 64.41                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-FHC3-ETW2-1 | B             | C1              | 2             | 1            | 64.63          | 0.1388                       | 20                  | LGF          | 0.006940            | 64.08                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-FHC3-ETW2-2 | B             | C1              | 2             | 1            | 62.90          | 0.1388                       | 20                  | LGF          | 0.006939            | 62.35                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-FHC3-ETW2-3 | B             | C1              | 2             | 1            | 59.56          | 0.1388                       | 20                  | LGF          | 0.006940            | 59.05                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-FHC3-ETW2-1 | B             | C2              | 2             | 2            | 67.11          | 0.1395                       | 20                  | LGF          | 0.006973            | 66.86                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-FHC3-ETW2-2 | B             | C2              | 2             | 2            | 66.07          | 0.1396                       | 20                  | LGF          | 0.006978            | 65.86                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-FHC3-ETW2-3 | B             | C2              | 2             | 2            | 66.61          | 0.1397                       | 20                  | LGF          | 0.006986            | 66.48                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-FHC3-ETW2-1 | C             | C1              | 3             | 1            | 60.45          | 0.1412                       | 20                  | LGF          | 0.007062            | 60.98                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-FHC3-ETW2-2 | C             | C1              | 3             | 1            | 66.55          | 0.1413                       | 20                  | LGF          | 0.007064            | 67.16                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-FHC3-ETW2-3 | C             | C1              | 3             | 1            | 63.76          | 0.1412                       | 20                  | LGF          | 0.007061            | 64.32                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-FHC3-ETW2-1 | C             | C2              | 3             | 2            | 64.55          | 0.1432                       | 20                  | LGF          | 0.007160            | 66.03                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-FHC3-ETW2-2 | C             | C2              | 3             | 2            | 63.89          | 0.1432                       | 20                  | LGF          | 0.007161            | 65.36                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-FHC3-ETW2-3 | C             | C2              | 3             | 2            | 66.55          | 0.1421                       | 20                  | LGF          | 0.007106            | 67.55                          |

Average 62.65  
 Standard Dev. 3.484  
 Coeff. of Var. [%] 5.561  
 Min. 56.97  
 Max. 67.11  
 Number of Spec. 18

Average<sub>norm</sub> 0.007035 62.96  
 Standard Dev.<sub>norm</sub> 3.555  
 Coeff. of Var. [%]<sub>norm</sub> 5.646  
 Min. 0.006939 57.25  
 Max. 0.007161 67.55  
 Number of Spec. 18 18



## 4.29 “25/50/25” Single-Shear Bearing 1 Properties (SSB1, Proc. C)

## Laminate Single-Shear Bearing Properties (SSB1, Proc. C)--RTA (70°F)

## Strength &amp; Chord Modulus

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

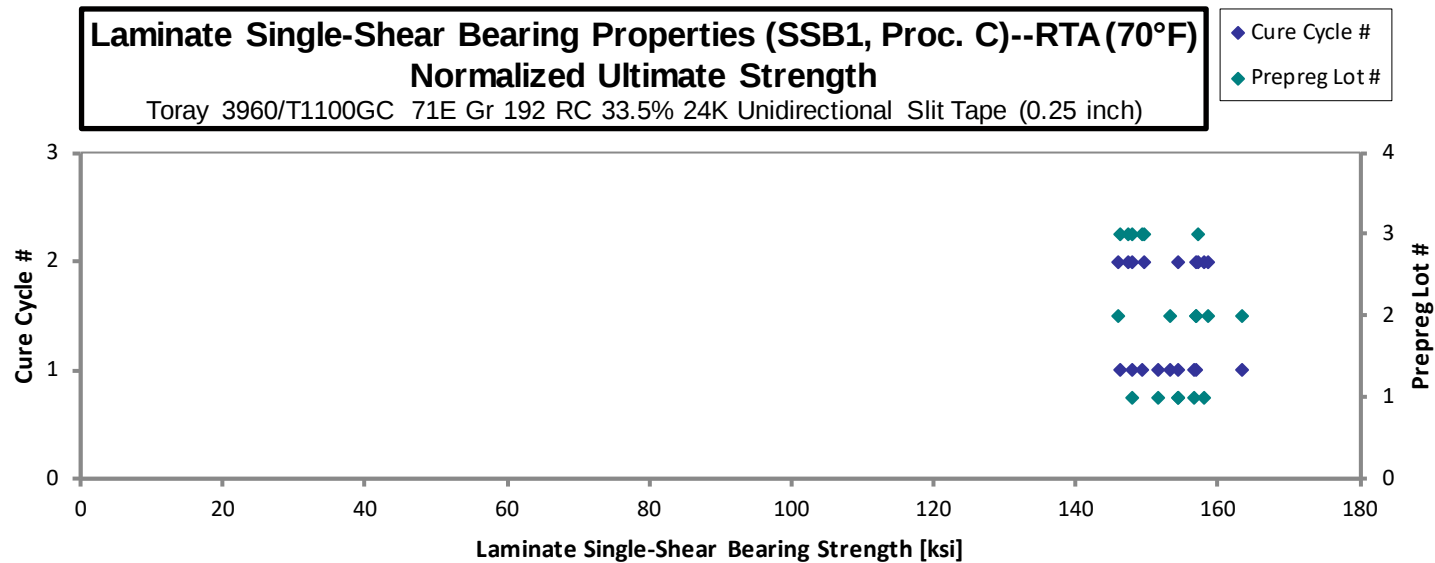
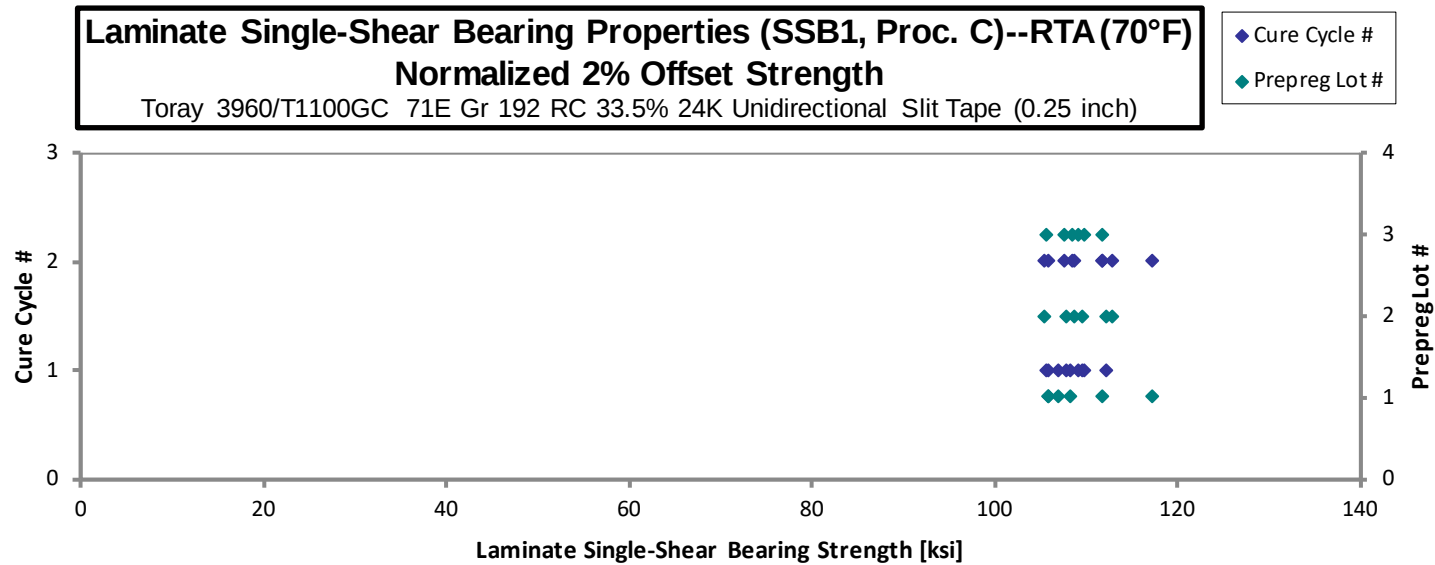
t<sub>ply</sub> [in]

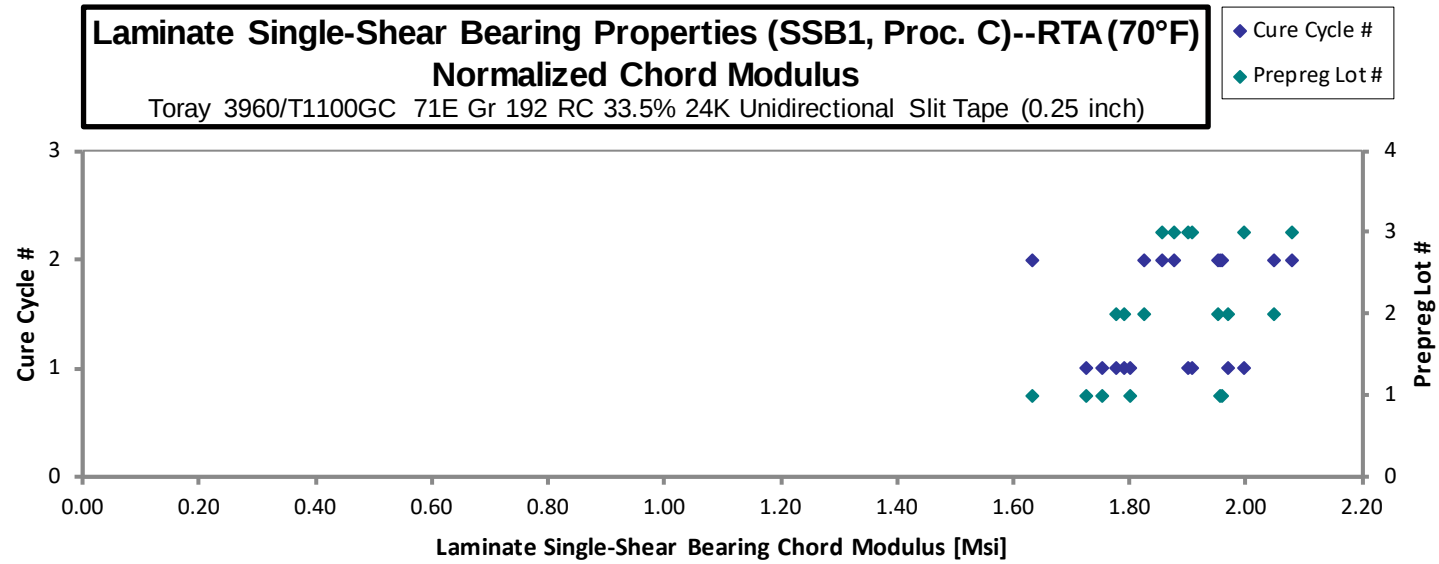
0.007000

| Specimen Number                                  | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | 2% Offset Strength [ksi] | Ultimate Strength [ksi] | Chord Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. t <sub>ply</sub> [in] | 2% Offset Strength <sub>norm</sub> [ksi] | Ultimate Strength <sub>norm</sub> [ksi] | Chord Modulus <sub>norm</sub> [Msi] |
|--------------------------------------------------|---------------|-----------------|---------------|--------------|--------------------------|-------------------------|---------------------|------------------------------|---------------------|--------------|----------------------------|------------------------------------------|-----------------------------------------|-------------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-SSB1-RTA-1 | A             | C1              | 1             | 1            | 108.5                    | 151.8                   | 1.758               | 0.1118                       | 16                  | B1I          | 0.006984                   | 108.3                                    | 151.5                                   | 1.754                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-SSB1-RTA-2 | A             | C1              | 1             | 1            | 107.3                    | 154.9                   | 1.807               | 0.1117                       | 16                  | B1I          | 0.006979                   | 107.0                                    | 154.4                                   | 1.802                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-SSB1-RTA-3 | A             | C1              | 1             | 1            | 106.2                    | 157.1                   | 1.731               | 0.1117                       | 16                  | B1I          | 0.006981                   | 105.9                                    | 156.7                                   | 1.727                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-SSB1-RTA-1 | A             | C2              | 1             | 2            | 105.2                    | 147.2                   | 1.623               | 0.1126                       | 16                  | B1I          | 0.007039                   | 105.8                                    | 148.0                                   | 1.632                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-SSB1-RTA-2 | A             | C2              | 1             | 2            | 117.4                    | 154.6                   | 1.961               | 0.1119                       | 16                  | B1I          | 0.006993                   | 117.3                                    | 154.4                                   | 1.959                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-SSB1-RTA-3 | A             | C2              | 1             | 2            | 111.2                    | 157.2                   | 1.947               | 0.1126                       | 16                  | B1I          | 0.007035                   | 111.8                                    | 158.0                                   | 1.957                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C1-1-SSB1-RTA-1 | B             | C1              | 2             | 1            | 112.1                    | 156.8                   | 1.789               | 0.1121                       | 16                  | B1I          | 0.007003                   | 112.1                                    | 156.9                                   | 1.789                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C1-1-SSB1-RTA-2 | B             | C1              | 2             | 1            | 107.6                    | 163.1                   | 1.773               | 0.1121                       | 16                  | B1I          | 0.007008                   | 107.7                                    | 163.3                                   | 1.775                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C1-1-SSB1-RTA-3 | B             | C1              | 2             | 1            | 109.2                    | 152.6                   | 1.961               | 0.1125                       | 16                  | B1I          | 0.007028                   | 109.7                                    | 153.2                                   | 1.969                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C2-1-SSB1-RTA-1 | B             | C2              | 2             | 2            | 112.8                    | 156.7                   | 1.948               | 0.1122                       | 16                  | B1I          | 0.007009                   | 113.0                                    | 156.9                                   | 1.951                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C2-1-SSB1-RTA-2 | B             | C2              | 2             | 2            | 105.0                    | 145.7                   | 1.818               | 0.1123                       | 16                  | B1I          | 0.007020                   | 105.3                                    | 146.1                                   | 1.823                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C2-1-SSB1-RTA-3 | B             | C2              | 2             | 2            | 108.6                    | 158.3                   | 2.045               | 0.1123                       | 16                  | B1I          | 0.007016                   | 108.8                                    | 158.7                                   | 2.050                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C1-1-SSB1-RTA-1 | C             | C1              | 3             | 1            | 108.6                    | 147.6                   | 1.879               | 0.1133                       | 16                  | B1I          | 0.007078                   | 109.8                                    | 149.2                                   | 1.900                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C1-1-SSB1-RTA-2 | C             | C1              | 3             | 1            | 108.3                    | 146.8                   | 1.982               | 0.1128                       | 16                  | B1I          | 0.007049                   | 109.1                                    | 147.8                                   | 1.996                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C1-1-SSB1-RTA-3 | C             | C1              | 3             | 1            | 104.3                    | 144.4                   | 1.883               | 0.1135                       | 16                  | B1I          | 0.007091                   | 105.7                                    | 146.3                                   | 1.908                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C2-1-SSB1-RTA-1 | C             | C2              | 3             | 2            | 106.3                    | 145.7                   | 1.852               | 0.1134                       | 16                  | B1I          | 0.007086                   | 107.6                                    | 147.5                                   | 1.875                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C2-1-SSB1-RTA-2 | C             | C2              | 3             | 2            | 111.7                    | 157.1                   | 2.078               | 0.1121                       | 16                  | B1I          | 0.007006                   | 111.8                                    | 157.2                                   | 2.080                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C2-1-SSB1-RTA-3 | C             | C2              | 3             | 2            | 108.2                    | 149.2                   | 1.851               | 0.1123                       | 16                  | B1I          | 0.007019                   | 108.5                                    | 149.6                                   | 1.856                               |

Average 108.8 152.6 1.872  
 Standard Dev. 3.249 5.493 0.1167  
 Coeff. of Var. [%] 2.986 3.600 6.236  
 Min. 104.3 144.4 1.623  
 Max. 117.4 163.1 2.078  
 Number of Spec. 18 18 18

Average<sub>norm</sub> 0.007024 109.2 153.1 1.878  
 Standard Dev.<sub>norm</sub> 3.094 5.050 0.1184  
 Coeff. of Var. [%]<sub>norm</sub> 2.834 3.299 6.307  
 Min. 0.006979 105.3 146.1 1.632  
 Max. 0.007091 117.3 163.3 2.080  
 Number of Spec. 18 18 18





January 2, 2026

CAM-RP-2023-002 Rev B

**Laminate Single-Shear Bearing Properties (SSB1, Proc. C)--ETW1 (180°F)**  
**Strength & Chord Modulus**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

$t_{ply}$  [in]

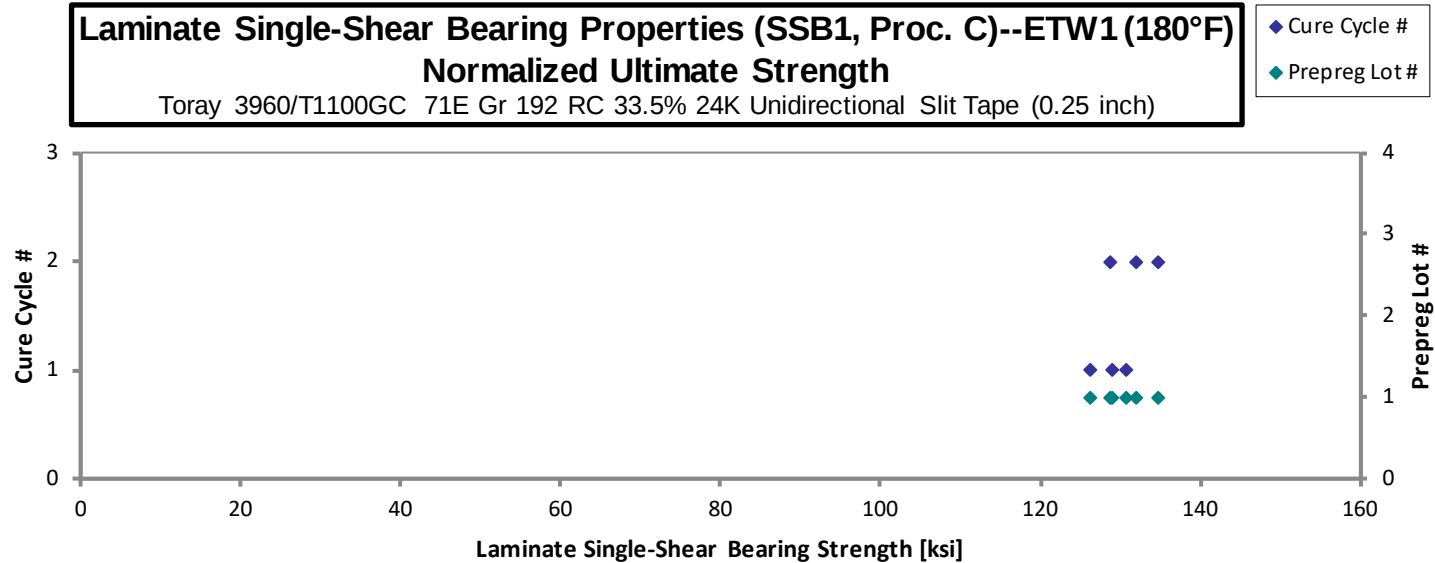
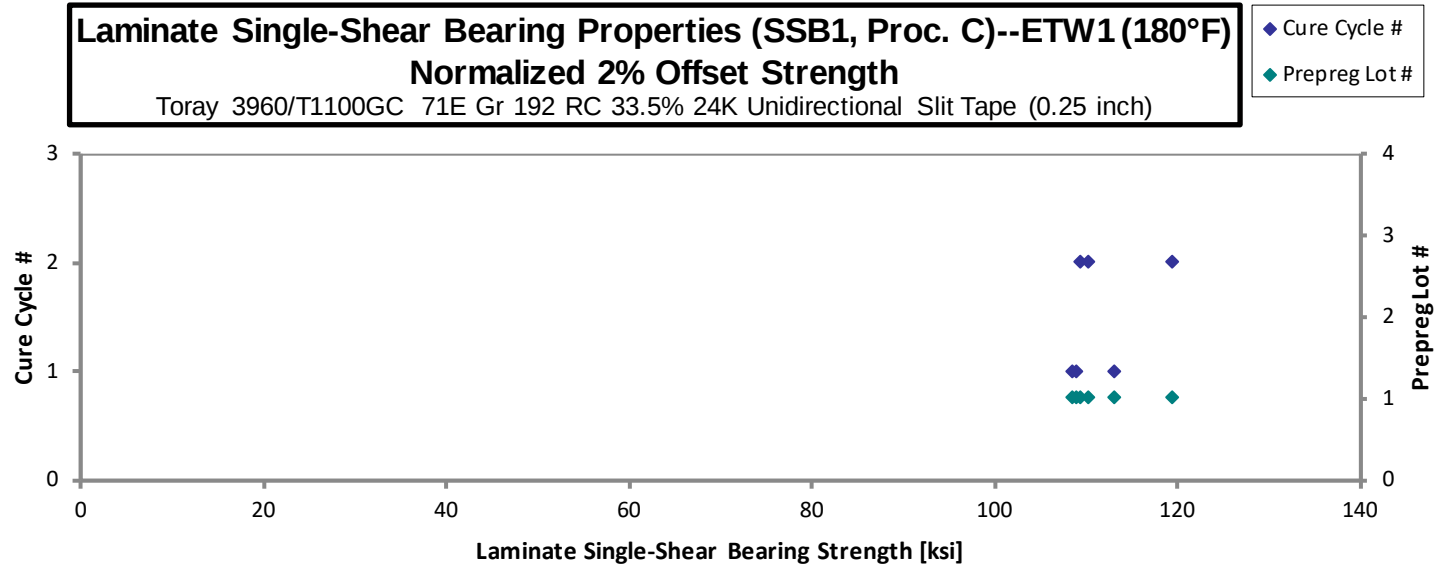
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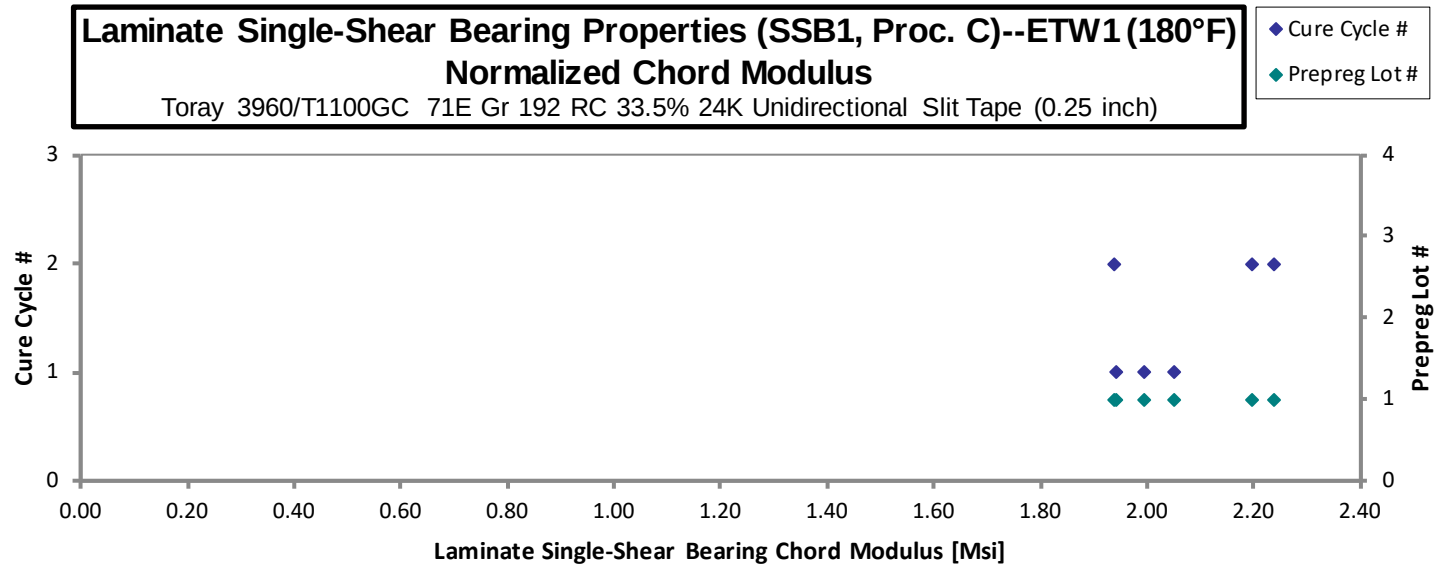
| Specimen Number                                   | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | 2% Offset Strength [ksi] | Ultimate Strength [ksi] | Chord Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode |
|---------------------------------------------------|---------------|-----------------|---------------|--------------|--------------------------|-------------------------|---------------------|------------------------------|---------------------|--------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-SSB1-ETW1-1 | A             | C1              | 1             | 1            | 109.3                    | 126.7                   | 2.002               | 0.1116                       | 16                  | B1I          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-SSB1-ETW1-2 | A             | C1              | 1             | 1            | 108.2                    | 130.4                   | 2.047               | 0.1122                       | 16                  | B1I          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-SSB1-ETW1-3 | A             | C1              | 1             | 1            | 113.2                    | 129.2                   | 1.945               | 0.1117                       | 16                  | B1I          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-SSB1-ETW1-1 | A             | C2              | 1             | 2            | 109.3                    | 128.8                   | 2.197               | 0.1120                       | 16                  | B1I          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-SSB1-ETW1-2 | A             | C2              | 1             | 2            | 110.0                    | 131.5                   | 2.232               | 0.1123                       | 16                  | B1I          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-SSB1-ETW1-3 | A             | C2              | 1             | 2            | 119.8                    | 135.0                   | 1.944               | 0.1118                       | 16                  | B1I          |

| Avg. $t_{ply}$ [in] | 2% Offset Strength <sub>norm</sub> [ksi] | Ultimate Strength <sub>norm</sub> [ksi] | Chord Modulus <sub>norm</sub> [Msi] |
|---------------------|------------------------------------------|-----------------------------------------|-------------------------------------|
| 0.006973            | 108.9                                    | 126.3                                   | 1.994                               |
| 0.007013            | 108.4                                    | 130.6                                   | 2.051                               |
| 0.006983            | 113.0                                    | 128.9                                   | 1.941                               |
| 0.007001            | 109.3                                    | 128.8                                   | 2.197                               |
| 0.007019            | 110.3                                    | 131.9                                   | 2.238                               |
| 0.006985            | 119.5                                    | 134.7                                   | 1.940                               |

Average 111.6 130.3 2.061  
Standard Dev. 4.325 2.806 0.1253  
Coeff. of Var. [%] 3.873 2.154 6.080  
Min. 108.2 126.7 1.944  
Max. 119.8 135.0 2.232  
Number of Spec. 6 6 6

Average<sub>norm</sub> 0.006996 111.6 130.2 2.060  
Standard Dev.<sub>norm</sub> 4.211 2.908 0.1293  
Coeff. of Var. [%]<sub>norm</sub> 3.774 2.234 6.278  
Min. 0.006973 108.4 126.3 1.940  
Max. 0.007019 119.5 134.7 2.238  
Number of Spec. 6 6 6 6





**Laminate Single-Shear Bearing Properties (SSB1, Proc. C)--ETW2 (250°F)**  
**Strength & Chord Modulus**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

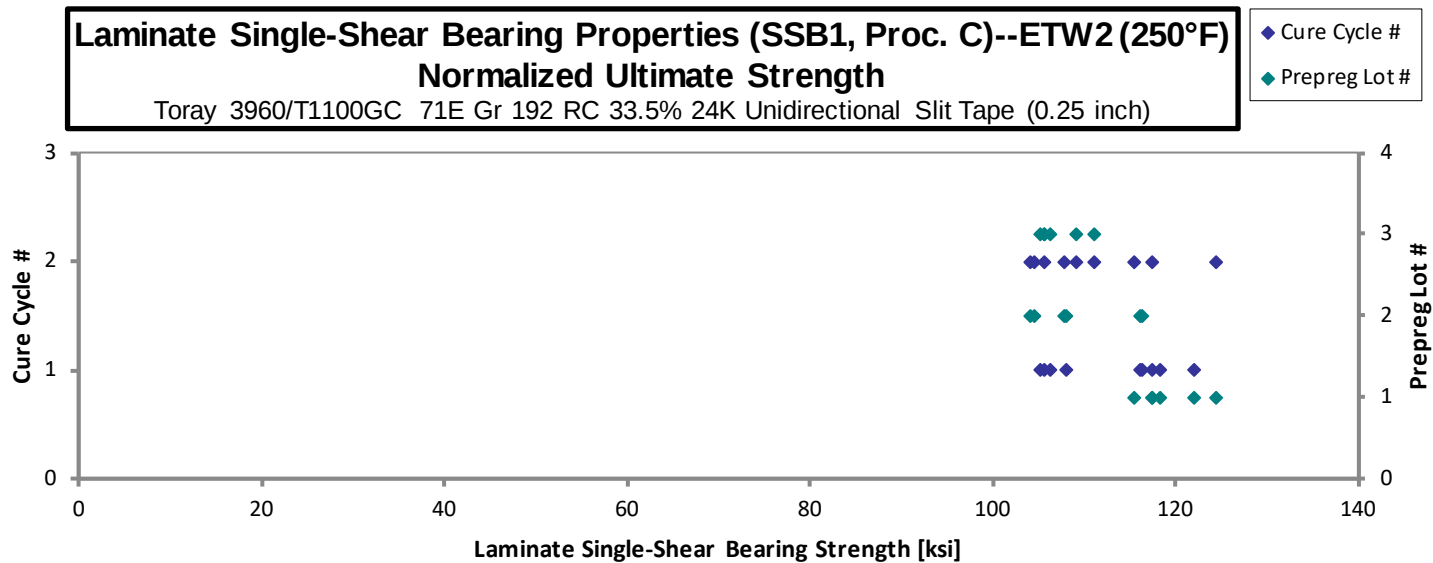
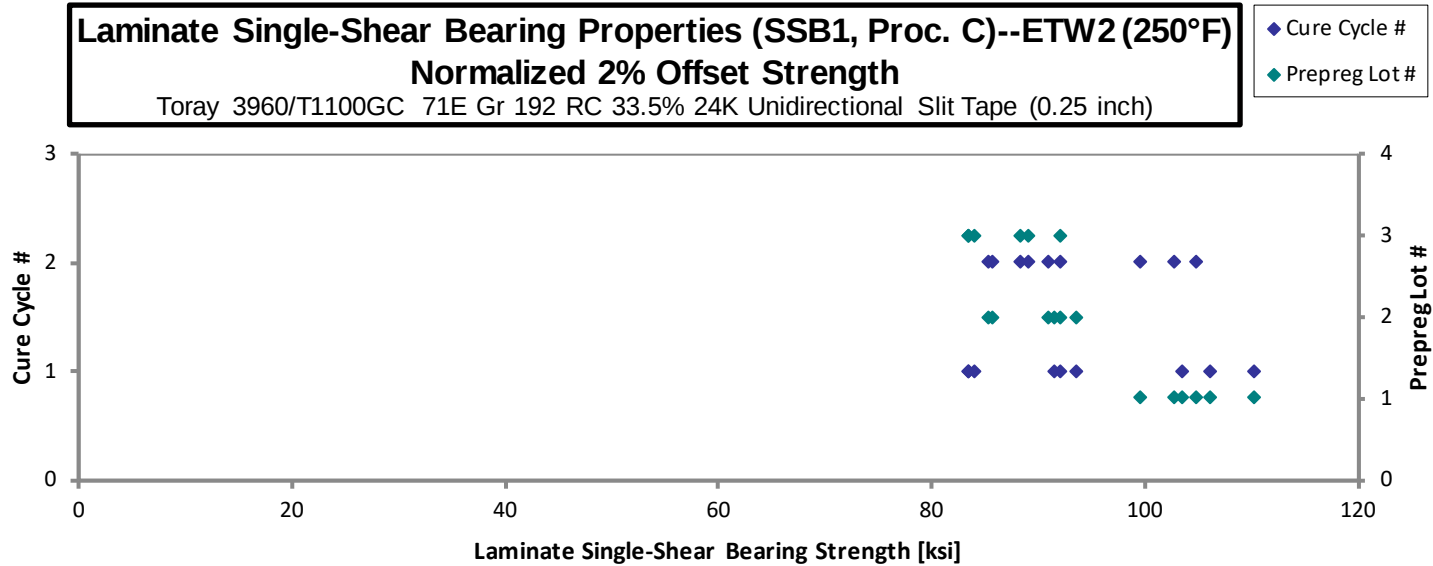
$t_{ply}$  [in]

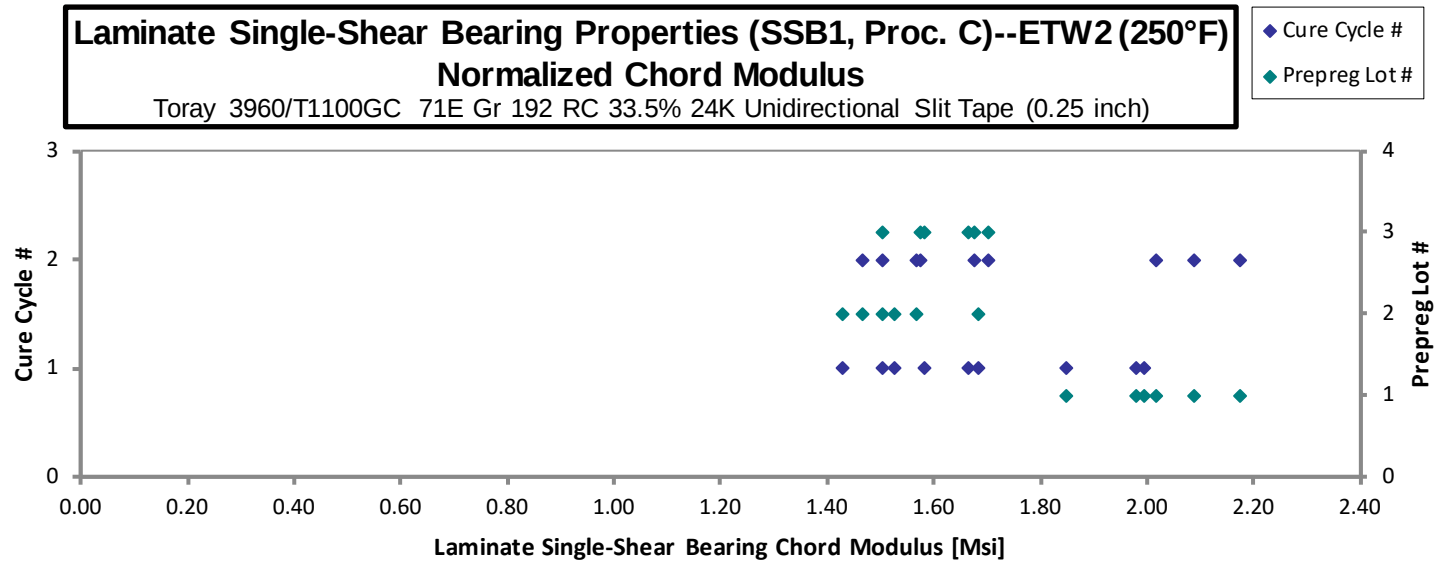
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| Specimen Number                                   | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | 2% Offset Strength [ksi] | Ultimate Strength [ksi] | Chord Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | 2% Offset Strength <sub>norm</sub> [ksi] | Ultimate Strength <sub>norm</sub> [ksi] | Chord Modulus <sub>norm</sub> [Msi] |
|---------------------------------------------------|---------------|-----------------|---------------|--------------|--------------------------|-------------------------|---------------------|------------------------------|---------------------|--------------|---------------------|------------------------------------------|-----------------------------------------|-------------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-SSB1-ETW2-1 | A             | C1              | 1             | 1            | 103.6                    | 118.6                   | 1.951               | 0.1118                       | 16                  | B1I          | 0.006990            | 103.4                                    | 118.4                                   | 1.848                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-SSB1-ETW2-2 | A             | C1              | 1             | 1            | 109.9                    | 117.1                   | 1.974               | 0.1123                       | 16                  | B1I          | 0.007017            | 110.2                                    | 117.4                                   | 1.979                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-SSB1-ETW2-3 | A             | C1              | 1             | 1            | 105.9                    | 121.8                   | 1.988               | 0.1123                       | 16                  | B1I          | 0.007019            | 106.2                                    | 122.1                                   | 1.993                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-SSB1-ETW2-1 | A             | C2              | 1             | 2            | 102.1                    | 114.9                   | 2.078               | 0.1126                       | 16                  | B1I          | 0.007035            | 102.7                                    | 115.5                                   | 2.088                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-SSB1-ETW2-2 | A             | C2              | 1             | 2            | 99.55                    | 117.6                   | 2.175               | 0.1119                       | 16                  | B1I          | 0.006995            | 99.48                                    | 117.5                                   | 2.173                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-SSB1-ETW2-3 | A             | C2              | 1             | 2            | 105.0                    | 124.7                   | 2.023               | 0.1117                       | 16                  | B1I          | 0.006982            | 104.7                                    | 124.4                                   | 2.017                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C1-1-SSB1-ETW2-1 | B             | C1              | 2             | 1            | 91.09                    | 107.0                   | 1.415               | 0.1132                       | 16                  | B1I          | 0.007072            | 92.02                                    | 108.1                                   | 1.429                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C1-1-SSB1-ETW2-2 | B             | C1              | 2             | 1            | 93.41                    | 116.2                   | 1.680               | 0.1122                       | 16                  | B1I          | 0.007014            | 93.59                                    | 116.5                                   | 1.683                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C1-1-SSB1-ETW2-3 | B             | C1              | 2             | 1            | 91.44                    | 116.1                   | 1.526               | 0.1120                       | 16                  | B1I          | 0.007001            | 91.45                                    | 116.1                                   | 1.526                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C2-1-SSB1-ETW2-1 | B             | C2              | 2             | 2            | 85.57                    | 103.9                   | 1.501               | 0.1122                       | 16                  | B1I          | 0.007011            | 85.71                                    | 104.1                                   | 1.504                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C2-1-SSB1-ETW2-2 | B             | C2              | 2             | 2            | 90.79                    | 104.4                   | 1.463               | 0.1122                       | 16                  | B1I          | 0.007011            | 90.93                                    | 104.6                                   | 1.466                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C2-1-SSB1-ETW2-3 | B             | C2              | 2             | 2            | 84.86                    | 107.3                   | 1.560               | 0.1126                       | 16                  | B1I          | 0.007036            | 85.31                                    | 107.9                                   | 1.569                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C1-1-SSB1-ETW2-1 | C             | C1              | 3             | 1            | 83.19                    | 105.1                   | 1.566               | 0.1131                       | 16                  | B1I          | 0.007071            | 84.04                                    | 106.2                                   | 1.582                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C1-1-SSB1-ETW2-2 | C             | C1              | 3             | 1            | 82.48                    | 104.0                   | 1.644               | 0.1134                       | 16                  | B1I          | 0.007088            | 83.51                                    | 105.3                                   | 1.664                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C1-1-SSB1-SP-3   | C             | C1              | 3             | 1            | 82.51                    | 104.6                   | 1.489               | 0.1132                       | 16                  | B1I          | 0.007073            | 83.37                                    | 105.7                                   | 1.504                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C2-1-SSB1-ETW2-1 | C             | C2              | 3             | 2            | 91.71                    | 110.6                   | 1.568               | 0.1124                       | 16                  | B1I          | 0.007024            | 92.02                                    | 111.0                                   | 1.573                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C2-1-SSB1-ETW2-2 | C             | C2              | 3             | 2            | 87.88                    | 108.6                   | 1.696               | 0.1125                       | 16                  | B1I          | 0.007033            | 88.30                                    | 109.1                                   | 1.704                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C2-1-SSB1-ETW2-3 | C             | C2              | 3             | 2            | 88.61                    | 105.0                   | 1.669               | 0.1126                       | 16                  | B1I          | 0.007038            | 89.08                                    | 105.6                                   | 1.677                               |

Average 93.31 111.5 1.715  
Standard Dev. 8.845 6.838 0.2378  
Coeff. of Var. [%] 9.479 6.131 13.87  
Min. 82.48 103.9 1.415  
Max. 109.9 124.7 2.175  
Number of Spec. 18 18 18

Average<sub>norm</sub> 0.007028 93.67 112.0 1.721  
Standard Dev.<sub>norm</sub> 8.625 6.524 0.2349  
Coeff. of Var. [%]<sub>norm</sub> 9.208 5.827 13.65  
Min. 0.006982 83.37 104.1 1.429  
Max. 0.007088 110.2 124.4 2.173  
Number of Spec. 18 18 18





## 4.30 “10/80/10” Single-Shear Bearing 2 Properties (SSB2, Proc. C)

**Laminate Single-Shear Bearing Properties (SSB2, Proc. C)--RTA (70°F)**  
**Strength & Chord Modulus**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

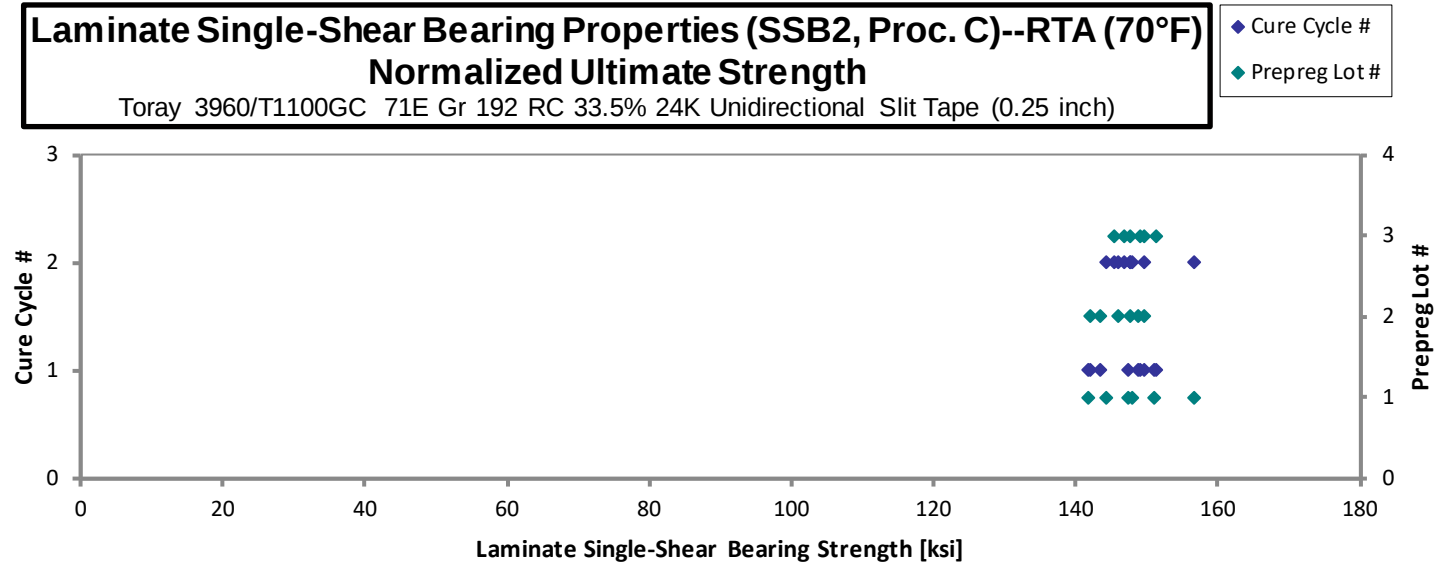
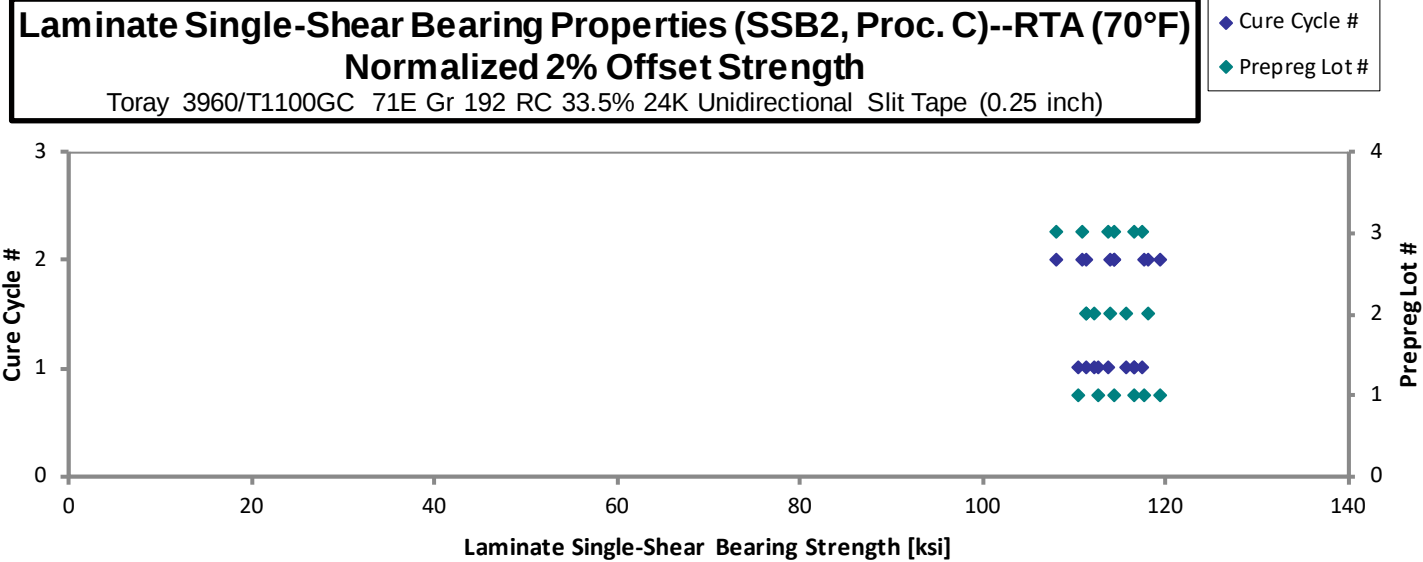
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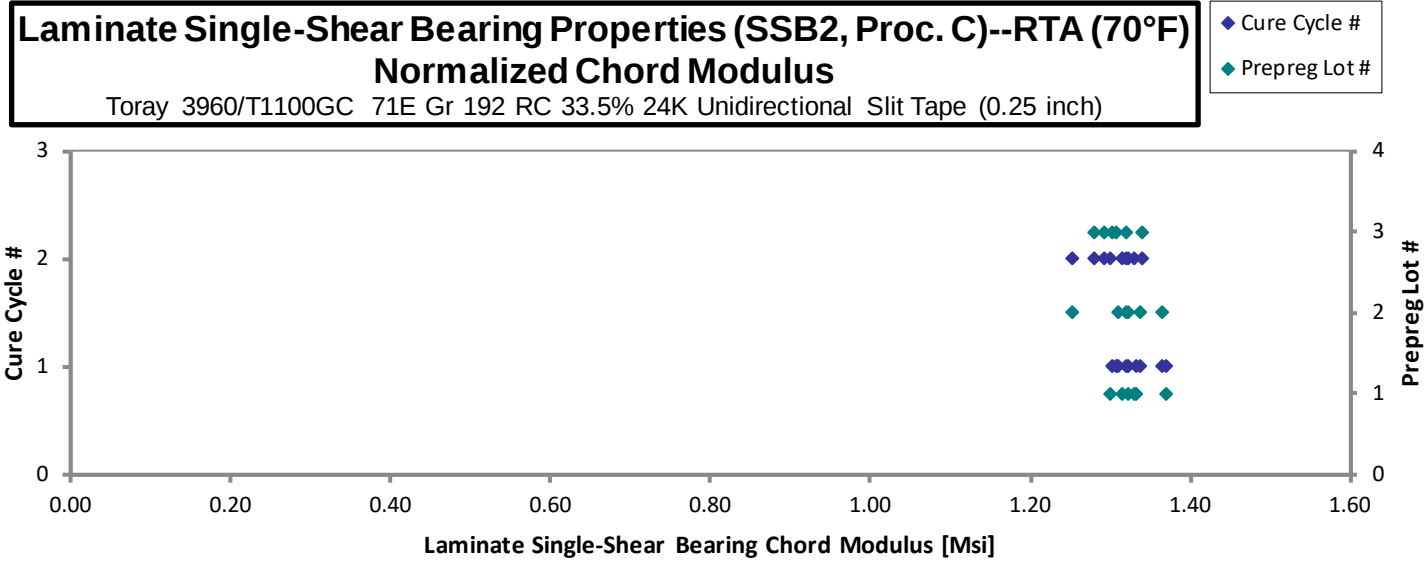
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| Specimen Number                                  | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | 2% Offset Strength [ksi] | Ultimate Strength [ksi] | Chord Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | 2% Offset Strength <sub>norm</sub> [ksi] | Ultimate Strength <sub>norm</sub> [ksi] | Chord Modulus <sub>norm</sub> [Msi] |
|--------------------------------------------------|---------------|-----------------|---------------|--------------|--------------------------|-------------------------|---------------------|------------------------------|---------------------|--------------|---------------------|------------------------------------------|-----------------------------------------|-------------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C1-1-SSB2-RTA-1 | A             | C1              | 1             | 1            | 116.2                    | 150.6                   | 1.318               | 0.1404                       | 20                  | B1I          | 0.007022            | 116.5                                    | 151.1                                   | 1.322                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C1-1-SSB2-RTA-2 | A             | C1              | 1             | 1            | 112.4                    | 147.0                   | 1.366               | 0.1404                       | 20                  | B1I          | 0.007021            | 112.7                                    | 147.5                                   | 1.370                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C1-1-SSB2-RTA-3 | A             | C1              | 1             | 1            | 110.2                    | 141.3                   | 1.329               | 0.1404                       | 20                  | B1I          | 0.007021            | 110.6                                    | 141.7                                   | 1.333                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C2-1-SSB2-RTA-1 | A             | C2              | 1             | 2            | 117.4                    | 156.1                   | 1.327               | 0.1404                       | 20                  | B1I          | 0.007018            | 117.7                                    | 156.5                                   | 1.330                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C2-1-SSB2-RTA-2 | A             | C2              | 1             | 2            | 114.3                    | 147.8                   | 1.312               | 0.1402                       | 20                  | B1I          | 0.007009            | 114.4                                    | 148.0                                   | 1.314                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C2-1-SSB2-RTA-3 | A             | C2              | 1             | 2            | 119.1                    | 143.7                   | 1.296               | 0.1405                       | 20                  | B1I          | 0.007024            | 119.5                                    | 144.2                                   | 1.301                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C1-1-SSB2-RTA-1 | B             | C1              | 2             | 1            | 111.0                    | 147.0                   | 1.321               | 0.1417                       | 20                  | B1I          | 0.007084            | 112.3                                    | 148.8                                   | 1.337                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C1-1-SSB2-RTA-2 | B             | C1              | 2             | 1            | 111.6                    | 142.5                   | 1.315               | 0.1395                       | 20                  | B1I          | 0.006977            | 111.3                                    | 142.0                                   | 1.311                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C1-1-SSB2-RTA-3 | B             | C1              | 2             | 1            | 115.3                    | 143.0                   | 1.360               | 0.1405                       | 20                  | B1I          | 0.007023            | 115.6                                    | 143.4                                   | 1.364                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-SSB2-RTA-1 | B             | C2              | 2             | 2            | 117.5                    | 148.8                   | 1.315               | 0.1408                       | 20                  | B1I          | 0.007040            | 118.2                                    | 149.7                                   | 1.323                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-SSB2-RTA-2 | B             | C2              | 2             | 2            | 111.5                    | 148.0                   | 1.322               | 0.1398                       | 20                  | B1I          | 0.006992            | 111.4                                    | 147.8                                   | 1.320                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-SSB2-RTA-3 | B             | C2              | 2             | 2            | 113.6                    | 145.5                   | 1.249               | 0.1404                       | 20                  | B1I          | 0.007018            | 113.9                                    | 145.9                                   | 1.252                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C1-1-SSB2-RTA-1 | C             | C1              | 3             | 1            | 115.8                    | 149.1                   | 1.300               | 0.1421                       | 20                  | B1I          | 0.007103            | 117.5                                    | 151.3                                   | 1.319                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C1-1-SSB2-RTA-2 | C             | C1              | 3             | 1            | 115.1                    | 147.2                   | 1.286               | 0.1418                       | 20                  | B1I          | 0.007091            | 116.6                                    | 149.2                                   | 1.302                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C1-1-SSB2-RTA-3 | C             | C1              | 3             | 1            | 112.5                    | 147.9                   | 1.293               | 0.1416                       | 20                  | B1I          | 0.007082            | 113.8                                    | 149.6                                   | 1.308                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-SSB2-RTA-1 | C             | C2              | 3             | 2            | 107.0                    | 146.0                   | 1.325               | 0.1415                       | 20                  | B1I          | 0.007073            | 108.2                                    | 147.5                                   | 1.339                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-SSB2-RTA-2 | C             | C2              | 3             | 2            | 113.5                    | 145.5                   | 1.281               | 0.1412                       | 20                  | B1I          | 0.007059            | 114.5                                    | 146.7                                   | 1.292                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-SSB2-RTA-3 | C             | C2              | 3             | 2            | 110.1                    | 144.5                   | 1.272               | 0.1409                       | 20                  | B1I          | 0.007047            | 110.8                                    | 145.5                                   | 1.280                               |

**Average** 113.6 146.8 1.310  
**Standard Dev.** 3.084 3.402 0.02871  
**Coeff. of Var. [%]** 2.715 2.318 2.191  
**Min.** 107.0 141.3 1.249  
**Max.** 119.1 156.1 1.366  
**Number of Spec.** 18 18 18

**Average<sub>norm</sub>** 0.007039 114.2 147.6 1.318  
**Standard Dev.<sub>norm</sub>** 3.112 3.602 0.02780  
**Coeff. of Var. [%]<sub>norm</sub>** 2.725 2.441 2.110  
**Min.** 0.006977 108.2 141.7 1.252  
**Max.** 0.007103 119.5 156.5 1.370  
**Number of Spec.** 18 18 18 18





**Laminate Single-Shear Bearing Properties (SSB2, Proc. C)--ETW2 (250°F)**  
**Strength & Chord Modulus**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

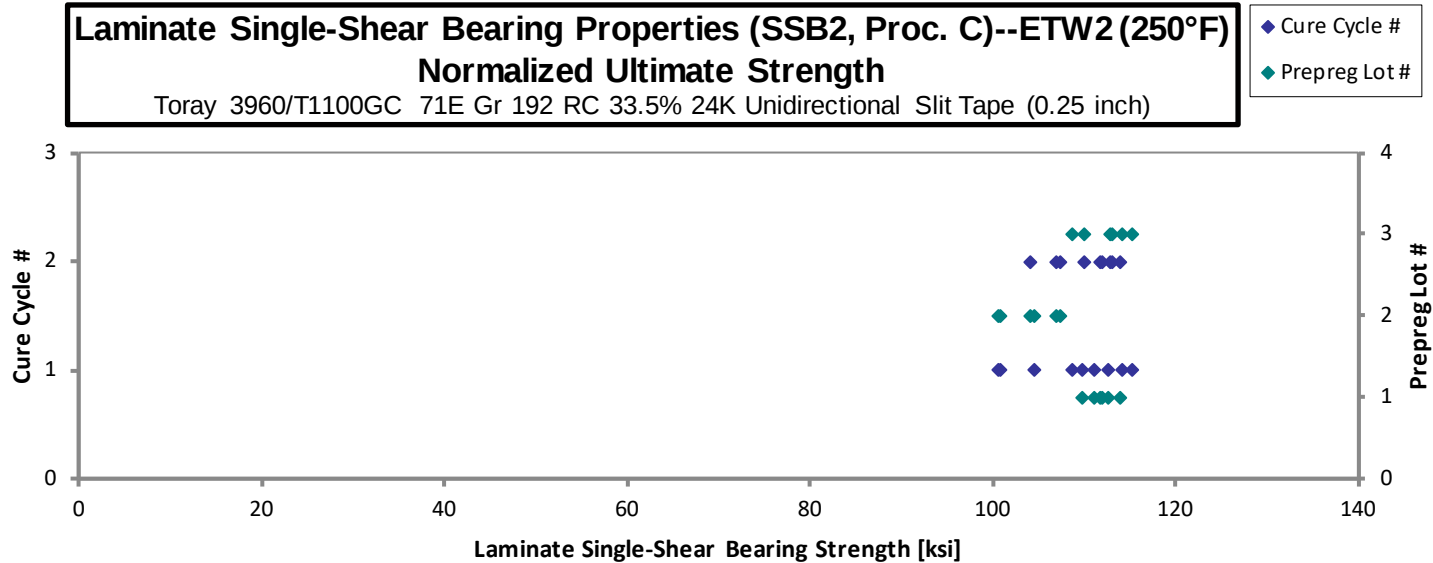
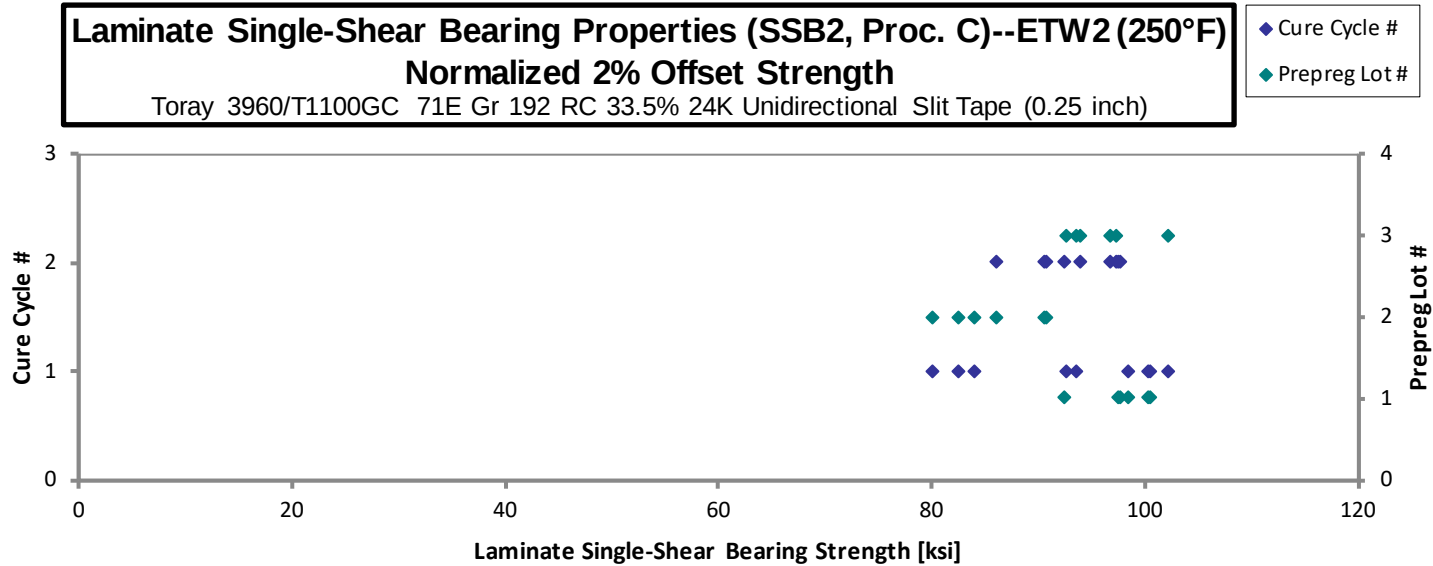
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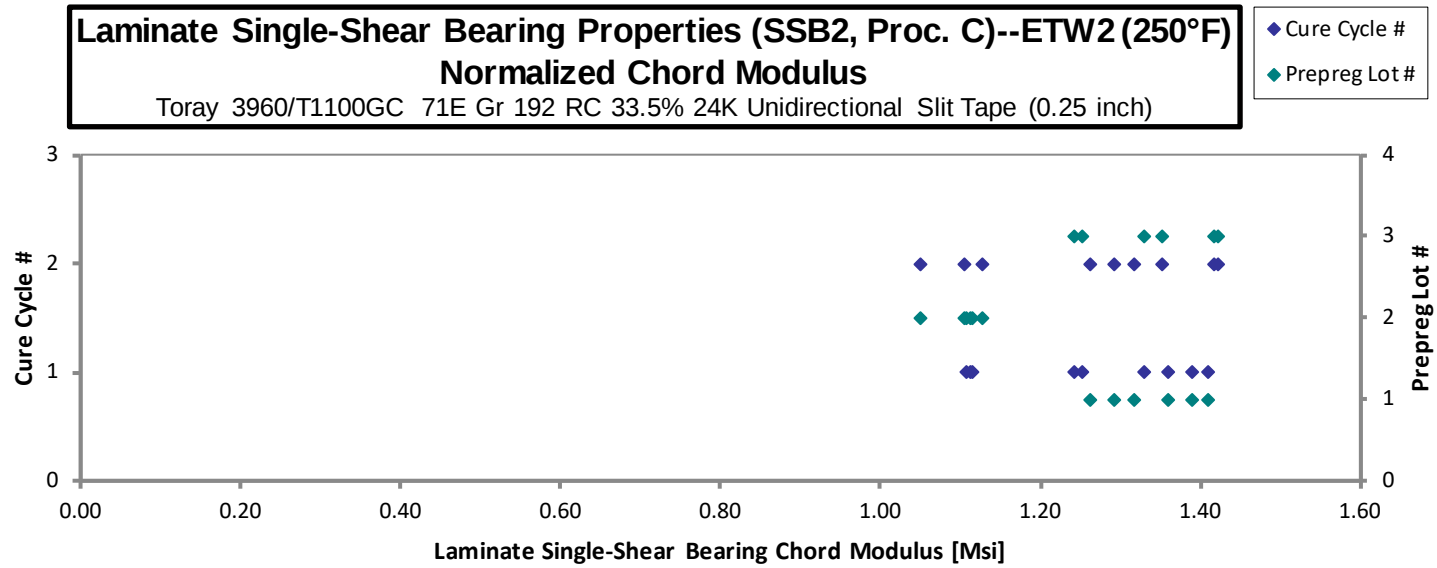
$t_{ply}$  [in]  
0.007000

| Specimen Number                                   | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | 2% Offset Strength [ksi] | Ultimate Strength [ksi] | Chord Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | 2% Offset Strength <sub>norm</sub> [ksi] | Ultimate Strength <sub>norm</sub> [ksi] | Chord Modulus <sub>norm</sub> [Msi] |
|---------------------------------------------------|---------------|-----------------|---------------|--------------|--------------------------|-------------------------|---------------------|------------------------------|---------------------|--------------|---------------------|------------------------------------------|-----------------------------------------|-------------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C1-1-SSB2-ETW2-1 | A             | C1              | 1             | 1            | 98.10                    | 112.3                   | 1.356               | 0.1404                       | 20                  | B1I          | 0.007018            | 98.36                                    | 112.6                                   | 1.359                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C1-1-SSB2-ETW2-2 | A             | C1              | 1             | 1            | 100.0                    | 110.9                   | 1.407               | 0.1403                       | 20                  | B1I          | 0.007017            | 100.3                                    | 111.1                                   | 1.410                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C1-1-SSB2-ETW2-3 | A             | C1              | 1             | 1            | 100.3                    | 109.5                   | 1.387               | 0.1404                       | 20                  | B1I          | 0.007018            | 100.5                                    | 109.8                                   | 1.391                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C2-1-SSB2-ETW2-1 | A             | C2              | 1             | 2            | 97.49                    | 113.7                   | 1.292               | 0.1402                       | 20                  | B1I          | 0.007010            | 97.63                                    | 113.9                                   | 1.293                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C2-1-SSB2-ETW2-2 | A             | C2              | 1             | 2            | 92.05                    | 111.6                   | 1.312               | 0.1405                       | 20                  | B1I          | 0.007025            | 92.38                                    | 112.0                                   | 1.317                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C2-1-SSB2-ETW2-3 | A             | C2              | 1             | 2            | 97.16                    | 111.4                   | 1.259               | 0.1404                       | 20                  | B1I          | 0.007018            | 97.41                                    | 111.7                                   | 1.262                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C1-1-SSB2-ETW2-1 | B             | C1              | 2             | 1            | 80.04                    | 100.8                   | 1.115               | 0.1400                       | 20                  | B1I          | 0.007000            | 80.04                                    | 100.8                                   | 1.115                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C1-1-SSB2-ETW2-2 | B             | C1              | 2             | 1            | 82.57                    | 104.6                   | 1.110               | 0.1398                       | 20                  | B1I          | 0.006991            | 82.46                                    | 104.5                                   | 1.108                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C1-1-SSB2-ETW2-3 | B             | C1              | 2             | 1            | 84.12                    | 100.7                   | 1.114               | 0.1400                       | 20                  | B1I          | 0.006998            | 84.09                                    | 100.7                                   | 1.114                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-SSB2-ETW2-1 | B             | C2              | 2             | 2            | 90.50                    | 107.2                   | 1.127               | 0.1402                       | 20                  | B1I          | 0.007008            | 90.60                                    | 107.3                                   | 1.129                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-SSB2-ETW2-2 | B             | C2              | 2             | 2            | 90.62                    | 106.8                   | 1.050               | 0.1402                       | 20                  | B1I          | 0.007009            | 90.74                                    | 107.0                                   | 1.051                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-SSB2-ETW2-3 | B             | C2              | 2             | 2            | 86.02                    | 104.1                   | 1.104               | 0.1402                       | 20                  | B1I          | 0.007008            | 86.11                                    | 104.2                                   | 1.105                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C1-1-SSB2-ETW2-1 | C             | C1              | 3             | 1            | 91.53                    | 112.7                   | 1.314               | 0.1417                       | 20                  | B1I          | 0.007085            | 92.64                                    | 114.1                                   | 1.330                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C1-1-SSB2-ETW2-2 | C             | C1              | 3             | 1            | 101.1                    | 114.0                   | 1.239               | 0.1415                       | 20                  | B1I          | 0.007077            | 102.2                                    | 115.3                                   | 1.252                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C1-1-SSB2-ETW2-3 | C             | C1              | 3             | 1            | 92.33                    | 107.3                   | 1.225               | 0.1419                       | 20                  | B1I          | 0.007094            | 93.57                                    | 108.7                                   | 1.241                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-SSB2-ETW2-1 | C             | C2              | 3             | 2            | 92.67                    | 111.6                   | 1.335               | 0.1419                       | 20                  | B1I          | 0.007096            | 93.94                                    | 113.2                                   | 1.353                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-SSB2-ETW2-2 | C             | C2              | 3             | 2            | 96.64                    | 112.1                   | 1.414               | 0.1410                       | 20                  | B1I          | 0.007048            | 97.30                                    | 112.9                                   | 1.423                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-SSB2-ETW2-3 | C             | C2              | 3             | 2            | 95.84                    | 109.1                   | 1.405               | 0.1413                       | 20                  | B1I          | 0.007064            | 96.72                                    | 110.1                                   | 1.418                               |

Average 92.73 108.9 1.254  
Standard Dev. 6.281 4.167 0.1227  
Coeff. of Var. [%] 6.773 3.826 9.790  
Min. 80.04 100.7 1.050  
Max. 101.1 114.0 1.414  
Number of Spec. 18 18 18

Average<sub>norm</sub> 0.007032 93.16 109.4 1.260  
Standard Dev.<sub>norm</sub> 6.477 4.477 0.1260  
Coeff. of Var. [%]<sub>norm</sub> 6.953 4.091 10.01  
Min. 0.006991 80.04 100.7 1.051  
Max. 0.007096 102.2 115.3 1.423  
Number of Spec. 18 18 18 18





## 4.31 “50/40/10” Single-Shear Bearing 3 Properties (SSB3, Proc. C)

## Laminate Single-Shear Bearing Properties (SSB3, Proc. C)--RTA (70°F)

## Strength &amp; Chord Modulus

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

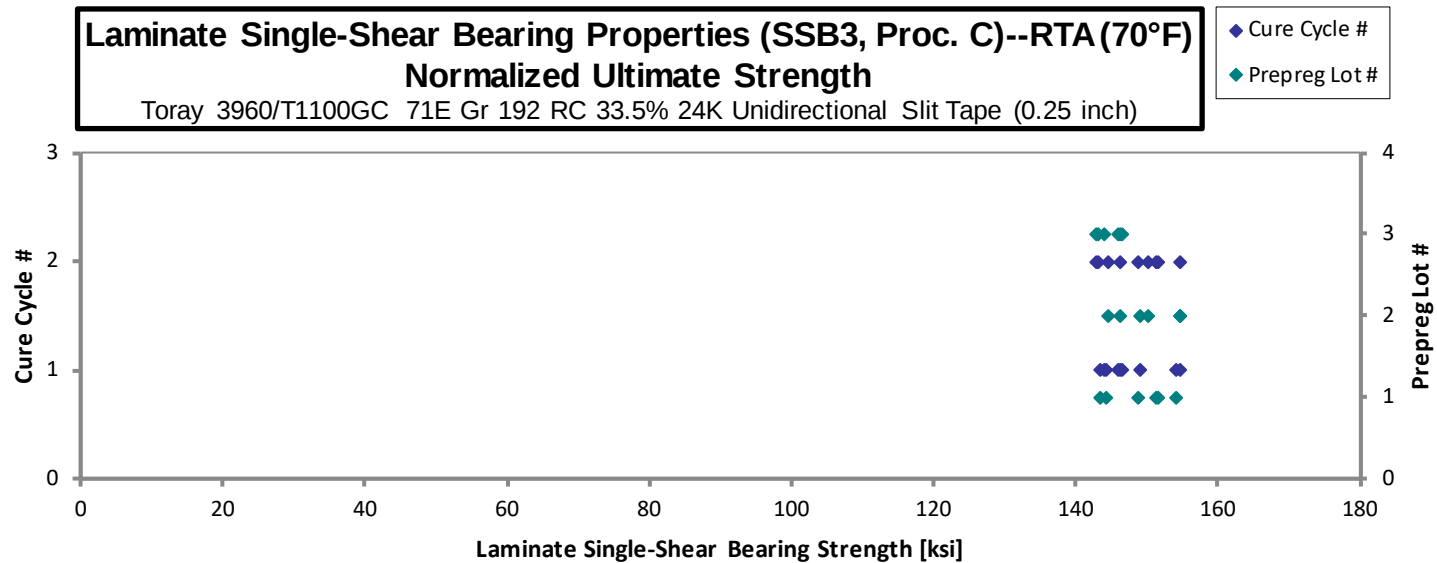
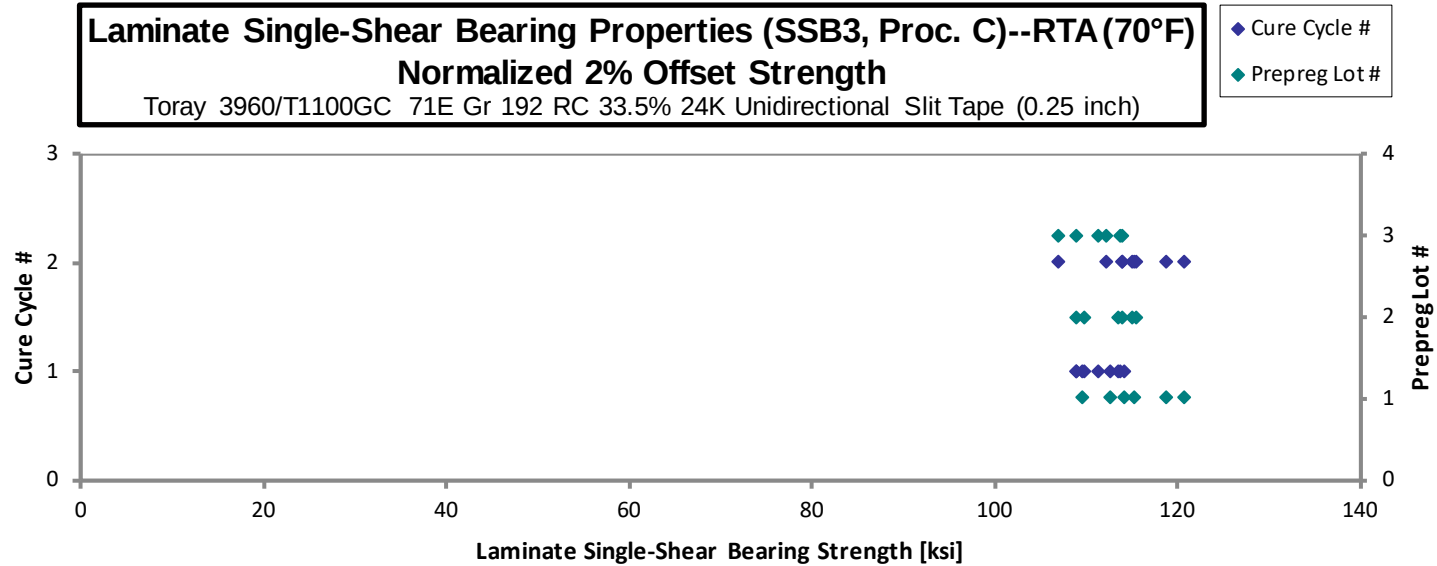
 $t_{ply}$  [in]

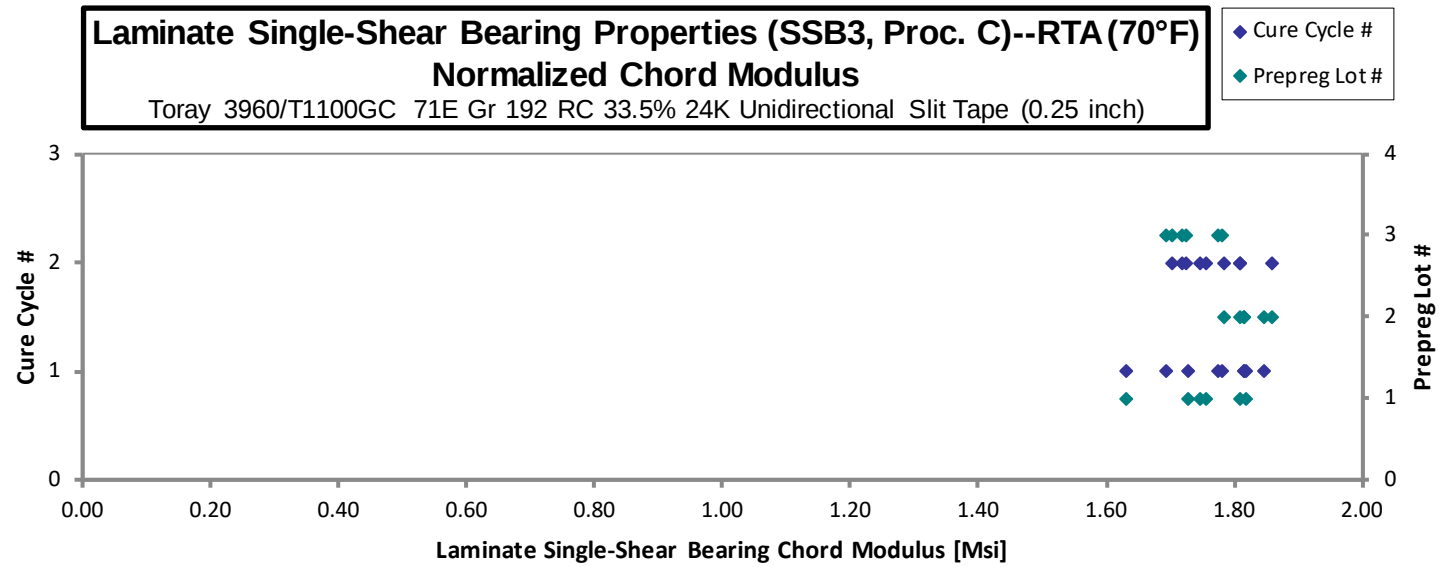
0.007000

| Specimen Number                                  | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | 2% Offset Strength [ksi] | Ultimate Strength [ksi] | Chord Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | 2% Offset Strength <sub>norm</sub> [ksi] | Ultimate Strength <sub>norm</sub> [ksi] | Chord Modulus <sub>norm</sub> [Msi] |
|--------------------------------------------------|---------------|-----------------|---------------|--------------|--------------------------|-------------------------|---------------------|------------------------------|---------------------|--------------|---------------------|------------------------------------------|-----------------------------------------|-------------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-SSB3-RTA-1 | A             | C1              | 1             | 1            | 113.0                    | 152.4                   | 1.800               | 0.1416                       | 20                  | B1I          | 0.007078            | 114.3                                    | 154.0                                   | 1.820                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-SSB3-RTA-2 | A             | C1              | 1             | 1            | 108.7                    | 142.9                   | 1.711               | 0.1413                       | 20                  | B1I          | 0.007065            | 109.7                                    | 144.2                                   | 1.727                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-SSB3-RTA-3 | A             | C1              | 1             | 1            | 111.7                    | 142.1                   | 1.617               | 0.1413                       | 20                  | B1I          | 0.007067            | 112.8                                    | 143.5                                   | 1.632                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-SSB3-RTA-1 | A             | C2              | 1             | 2            | 117.8                    | 147.6                   | 1.740               | 0.1412                       | 20                  | B1I          | 0.007059            | 118.7                                    | 148.8                                   | 1.755                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-SSB3-RTA-2 | A             | C2              | 1             | 2            | 114.1                    | 149.9                   | 1.729               | 0.1414                       | 20                  | B1I          | 0.007070            | 115.3                                    | 151.4                                   | 1.746                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-SSB3-RTA-3 | A             | C2              | 1             | 2            | 119.7                    | 149.9                   | 1.793               | 0.1412                       | 20                  | B1I          | 0.007058            | 120.7                                    | 151.2                                   | 1.808                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-SSB3-RTA-1 | B             | C1              | 2             | 1            | 112.1                    | 146.9                   | 1.793               | 0.1419                       | 20                  | B1I          | 0.007094            | 113.6                                    | 148.9                                   | 1.817                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-SSB3-RTA-2 | B             | C1              | 2             | 1            | 110.5                    | 147.3                   | 1.859               | 0.1391                       | 20                  | B1I          | 0.006954            | 109.7                                    | 146.4                                   | 1.847                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-SSB3-RTA-3 | B             | C1              | 2             | 1            | 108.5                    | 153.9                   | 1.808               | 0.1405                       | 20                  | B1I          | 0.007027            | 108.9                                    | 154.5                                   | 1.815                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-SSB3-RTA-1 | B             | C2              | 2             | 2            | 115.1                    | 150.3                   | 1.811               | 0.1399                       | 20                  | B1I          | 0.006995            | 115.0                                    | 150.2                                   | 1.810                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-SSB3-RTA-2 | B             | C2              | 2             | 2            | 114.0                    | 144.7                   | 1.785               | 0.1399                       | 20                  | B1I          | 0.006997            | 113.9                                    | 144.6                                   | 1.784                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-SSB3-RTA-3 | B             | C2              | 2             | 2            | 115.5                    | 154.6                   | 1.861               | 0.1400                       | 20                  | B1I          | 0.006998            | 115.4                                    | 154.5                                   | 1.860                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-SSB3-RTA-1 | C             | C1              | 3             | 1            | 108.3                    | 143.1                   | 1.764               | 0.1409                       | 20                  | B1I          | 0.007044            | 109.0                                    | 144.0                                   | 1.775                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-SSB3-RTA-2 | C             | C1              | 3             | 1            | 111.1                    | 145.6                   | 1.688               | 0.1404                       | 20                  | B1I          | 0.007019            | 111.4                                    | 146.0                                   | 1.693                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-SSB3-RTA-3 | C             | C1              | 3             | 1            | 112.6                    | 145.0                   | 1.764               | 0.1415                       | 20                  | B1I          | 0.007073            | 113.8                                    | 146.5                                   | 1.782                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-SSB3-RTA-1 | C             | C2              | 3             | 2            | 104.8                    | 143.2                   | 1.689               | 0.1430                       | 20                  | B1I          | 0.007148            | 107.0                                    | 146.2                                   | 1.725                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-SSB3-RTA-2 | C             | C2              | 3             | 2            | 111.5                    | 142.3                   | 1.708               | 0.1409                       | 20                  | B1I          | 0.007043            | 112.1                                    | 143.2                                   | 1.719                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-SSB3-RTA-3 | C             | C2              | 3             | 2            | 112.6                    | 140.9                   | 1.681               | 0.1419                       | 20                  | B1I          | 0.007093            | 114.1                                    | 142.8                                   | 1.704                               |

Average 112.3 146.8 1.756  
 Standard Dev. 3.551 4.223 0.06520  
 Coeff. of Var. [%] 3.162 2.876 3.714  
 Min. 104.8 140.9 1.617  
 Max. 119.7 154.6 1.861  
 Number of Spec. 18 18 18

Average<sub>norm</sub> 0.007049 113.1 147.8 1.768  
 Standard Dev.<sub>norm</sub> 3.472 4.019 0.05979  
 Coeff. of Var. [%]<sub>norm</sub> 3.070 2.719 3.382  
 Min. 0.006954 107.0 142.8 1.632  
 Max. 0.007148 120.7 154.5 1.860  
 Number of Spec. 18 18 18





**Laminate Single-Shear Bearing Properties (SSB3, Proc. C)--ETW2 (250°F)**  
**Strength & Chord Modulus**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

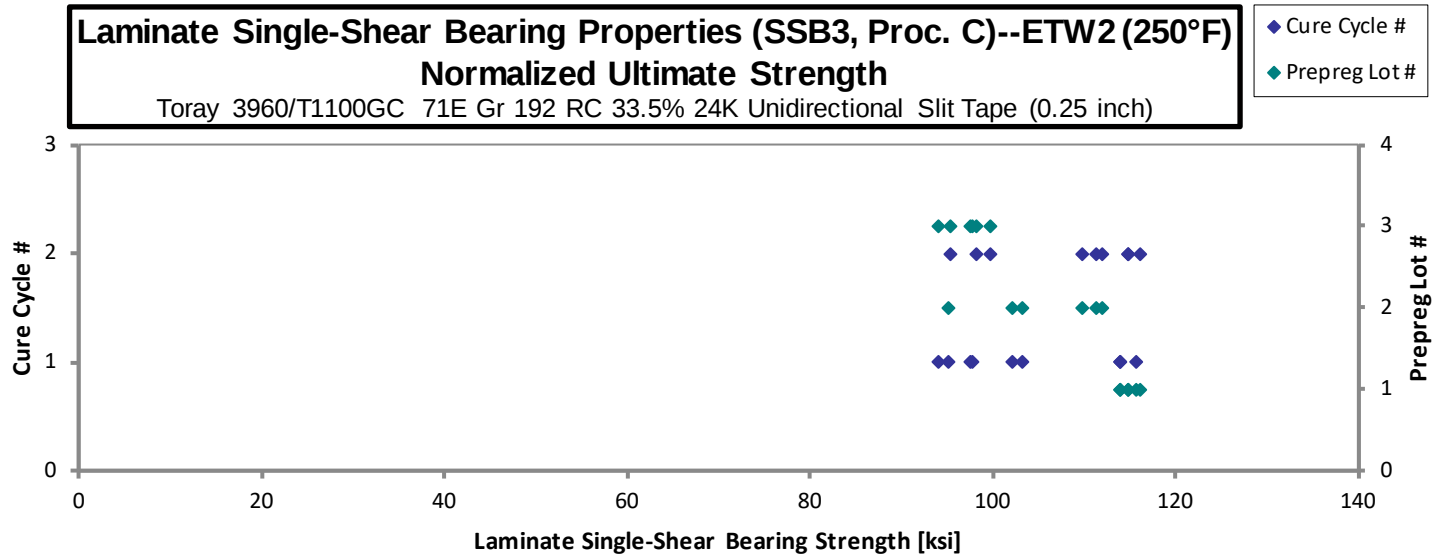
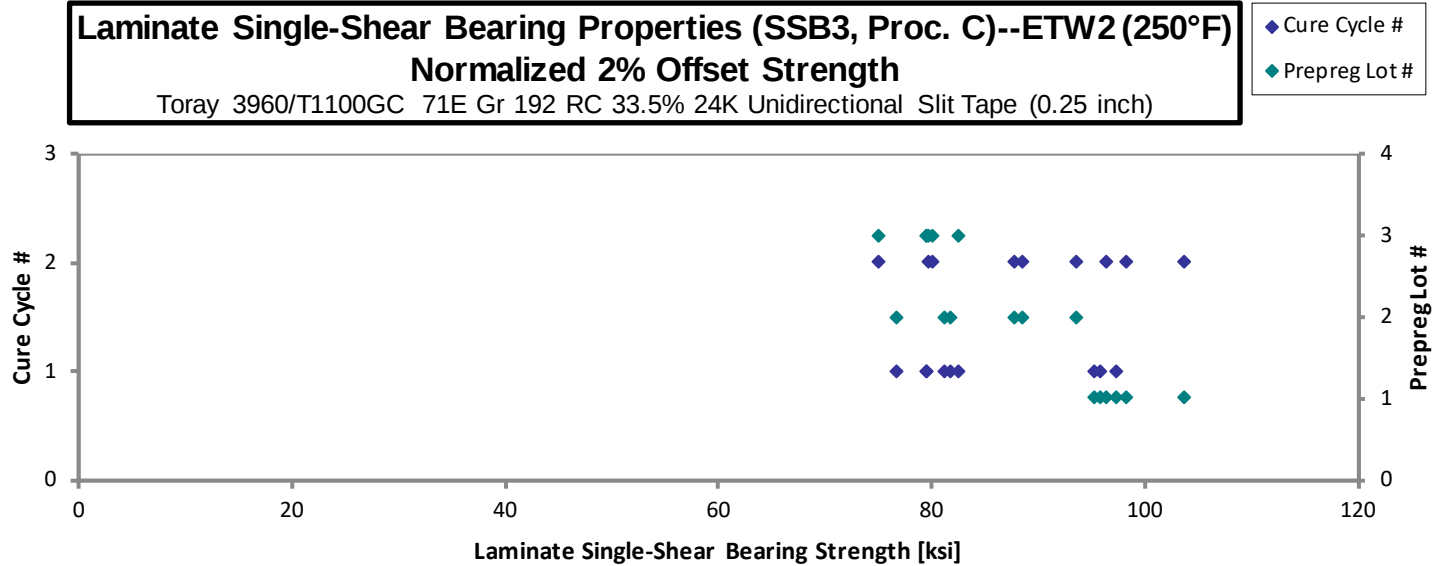
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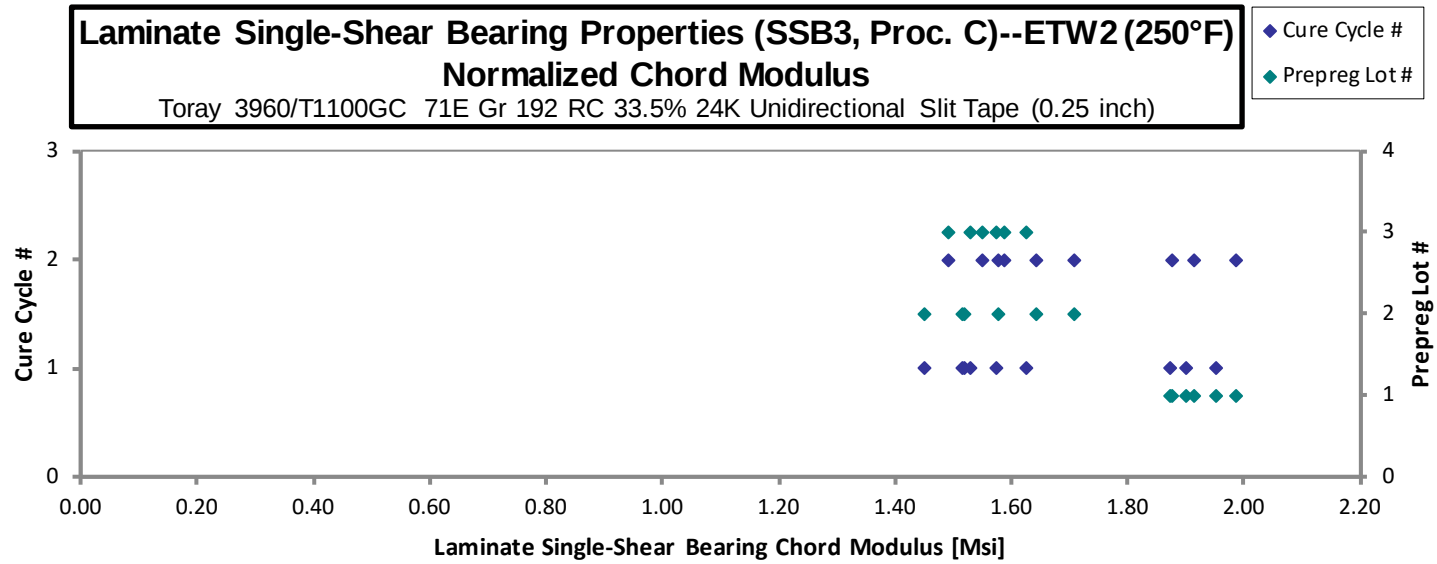
$t_{ply}$  [in]  
0.007000

| Specimen Number                                   | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | 2% Offset Strength [ksi] | Ultimate Strength [ksi] | Chord Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | 2% Offset Strength <sub>norm</sub> [ksi] | Ultimate Strength <sub>norm</sub> [ksi] | Chord Modulus <sub>norm</sub> [Msi] |
|---------------------------------------------------|---------------|-----------------|---------------|--------------|--------------------------|-------------------------|---------------------|------------------------------|---------------------|--------------|---------------------|------------------------------------------|-----------------------------------------|-------------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-SSB3-ETW2-1 | A             | C1              | 1             | 1            | 95.40                    | 113.4                   | 1.865               | 0.1407                       | 20                  | B1I          | 0.007035            | 95.88                                    | 114.0                                   | 1.874                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-SSB3-ETW2-2 | A             | C1              | 1             | 1            | 96.34                    | 114.5                   | 1.882               | 0.1414                       | 20                  | B1I          | 0.007071            | 97.31                                    | 115.7                                   | 1.901                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-SSB3-ETW2-3 | A             | C1              | 1             | 1            | 94.33                    | 112.8                   | 1.933               | 0.1414                       | 20                  | B1I          | 0.007068            | 95.25                                    | 113.9                                   | 1.952                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-SSB3-ETW2-1 | A             | C2              | 1             | 2            | 97.46                    | 115.3                   | 1.972               | 0.1411                       | 20                  | B1I          | 0.007056            | 98.23                                    | 116.2                                   | 1.988                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-SSB3-ETW2-2 | A             | C2              | 1             | 2            | 102.3                    | 113.5                   | 1.890               | 0.1417                       | 20                  | B1I          | 0.007086            | 103.6                                    | 114.9                                   | 1.913                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-SSB3-ETW2-3 | A             | C2              | 1             | 2            | 95.33                    | 113.6                   | 1.857               | 0.1416                       | 20                  | B1I          | 0.007078            | 96.39                                    | 114.9                                   | 1.878                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-SSB3-ETW2-1 | B             | C1              | 2             | 1            | 81.71                    | 103.1                   | 1.517               | 0.1402                       | 20                  | B1I          | 0.007010            | 81.83                                    | 103.3                                   | 1.519                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-SSB3-ETW2-2 | B             | C1              | 2             | 1            | 81.04                    | 102.0                   | 1.449               | 0.1401                       | 20                  | B1I          | 0.007007            | 81.12                                    | 102.1                                   | 1.451                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C1-1-SSB3-ETW2-3 | B             | C1              | 2             | 1            | 76.63                    | 95.09                   | 1.514               | 0.1400                       | 20                  | B1I          | 0.007001            | 76.64                                    | 95.10                                   | 1.515                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-SSB3-ETW2-1 | B             | C2              | 2             | 2            | 88.53                    | 109.8                   | 1.708               | 0.1400                       | 20                  | B1I          | 0.006998            | 88.51                                    | 109.8                                   | 1.707                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-SSB3-ETW2-2 | B             | C2              | 2             | 2            | 93.71                    | 112.2                   | 1.647               | 0.1397                       | 20                  | B1I          | 0.006985            | 93.51                                    | 111.9                                   | 1.643                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-SSB3-ETW2-3 | B             | C2              | 2             | 2            | 87.78                    | 111.4                   | 1.578               | 0.1400                       | 20                  | B1I          | 0.006998            | 87.76                                    | 111.3                                   | 1.578                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-SSB3-ETW2-1 | C             | C1              | 3             | 1            | 78.83                    | 96.71                   | 1.562               | 0.1412                       | 20                  | B1I          | 0.007059            | 79.49                                    | 97.52                                   | 1.575                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-SSB3-ETW2-2 | C             | C1              | 3             | 1            | 81.97                    | 97.15                   | 1.614               | 0.1409                       | 20                  | B1I          | 0.007046            | 82.50                                    | 97.79                                   | 1.625                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-SSB3-ETW2-3 | C             | C1              | 3             | 1            | 78.74                    | 93.30                   | 1.517               | 0.1413                       | 20                  | B1I          | 0.007064            | 79.46                                    | 94.16                                   | 1.531                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-SSB3-ETW2-1 | C             | C2              | 3             | 2            | 78.79                    | 96.99                   | 1.533               | 0.1416                       | 20                  | B1I          | 0.007082            | 79.71                                    | 98.12                                   | 1.551                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-SSB3-ETW2-2 | C             | C2              | 3             | 2            | 78.96                    | 98.46                   | 1.564               | 0.1420                       | 20                  | B1I          | 0.007099            | 80.08                                    | 99.85                                   | 1.586                               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-SSB3-ETW2-3 | C             | C2              | 3             | 2            | 73.92                    | 94.07                   | 1.473               | 0.1419                       | 20                  | B1I          | 0.007095            | 74.92                                    | 95.34                                   | 1.493                               |

Average 86.77 105.2 1.671  
Standard Dev. 8.768 8.376 0.1783  
Coeff. of Var. [%] 10.11 7.963 10.67  
Min. 73.92 93.30 1.449  
Max. 102.3 115.3 1.972  
Number of Spec. 18 18 18

Average<sub>norm</sub> 0.007047 87.34 105.9 1.682  
Standard Dev.<sub>norm</sub> 8.862 8.379 0.1821  
Coeff. of Var. [%]<sub>norm</sub> 10.15 7.913 10.83  
Min. 0.006985 74.92 94.16 1.451  
Max. 0.007099 103.6 116.2 1.988  
Number of Spec. 18 18 18 18





## 4.32 “25/50/25” Compression After Impact 1 Properties (CAI1)

## Laminate Compression After Impact 1 Properties (CAI1)--RTA(70°F)

## Strength

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

normalizing

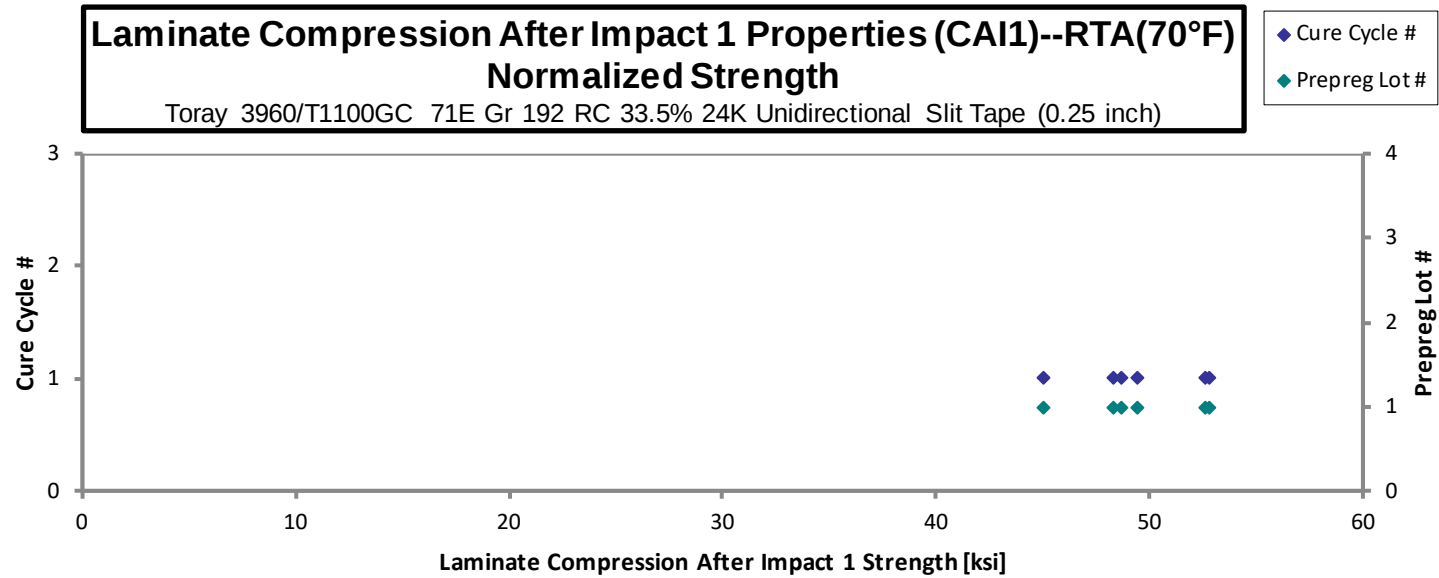
t<sub>ply</sub> [in]

0.0070

| Specimen Number                                  | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Measured Impact Energy [in-lbf] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. t <sub>ply</sub> [in] | Strength <sub>norm</sub> [ksi] |
|--------------------------------------------------|---------------|-----------------|---------------|--------------|----------------|---------------------------------|------------------------------|---------------------|--------------|----------------------------|--------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C1-1-CAI1-RTA-1 | A             | C1              | 1             | 1            | 53.55          | 247.8                           | 0.1658                       | 24                  | LDM          | 0.006906                   | 52.83                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C1-1-CAI1-RTA-2 | A             | C1              | 1             | 1            | 53.44          | 247.8                           | 0.1656                       | 24                  | LDM          | 0.006900                   | 52.68                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C1-1-CAI1-RTA-3 | A             | C1              | 1             | 1            | 49.09          | 247.6                           | 0.1655                       | 24                  | LDM          | 0.006894                   | 48.35                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C1-1-CAI1-RTA-4 | A             | C1              | 1             | 1            | 50.30          | 245.4                           | 0.1653                       | 24                  | LDM          | 0.006888                   | 49.49                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C1-1-CAI1-RTA-5 | A             | C1              | 1             | 1            | 49.42          | 248.1                           | 0.1657                       | 24                  | LDM          | 0.006903                   | 48.73                          |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C1-1-CAI1-RTA-6 | A             | C1              | 1             | 1            | 45.66          | 247.6                           | 0.1657                       | 24                  | LDM          | 0.006903                   | 45.03                          |

Average 50.24  
 Standard Dev. 2.973  
 Coeff. of Var. [%] 5.917  
 Min. 45.66  
 Max. 53.55  
 Number of Spec. 6

Average<sub>norm</sub> 0.006899 49.52  
 Standard Dev.<sub>norm</sub> 2.937  
 Coeff. of Var. [%]<sub>norm</sub> 5.931  
 Min. 0.006888 45.03  
 Max. 0.006906 52.83  
 Number of Spec. 6



### 4.33 “100/0/0” Interlaminar Tension Properties (ILT)

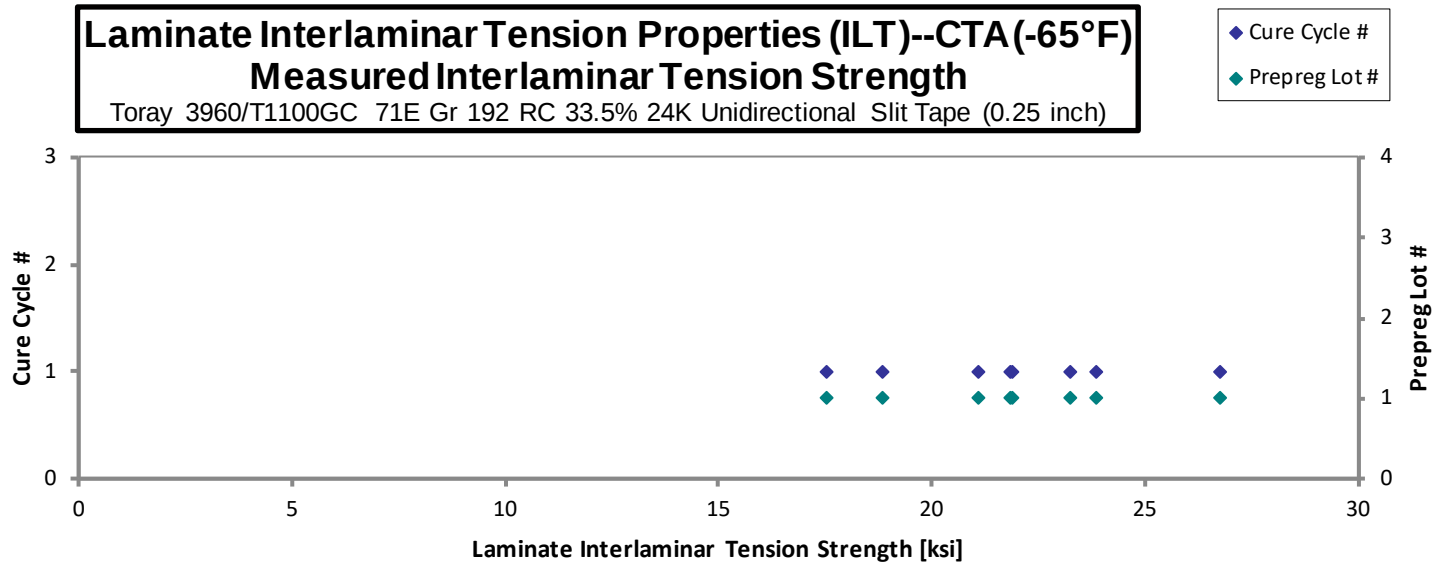
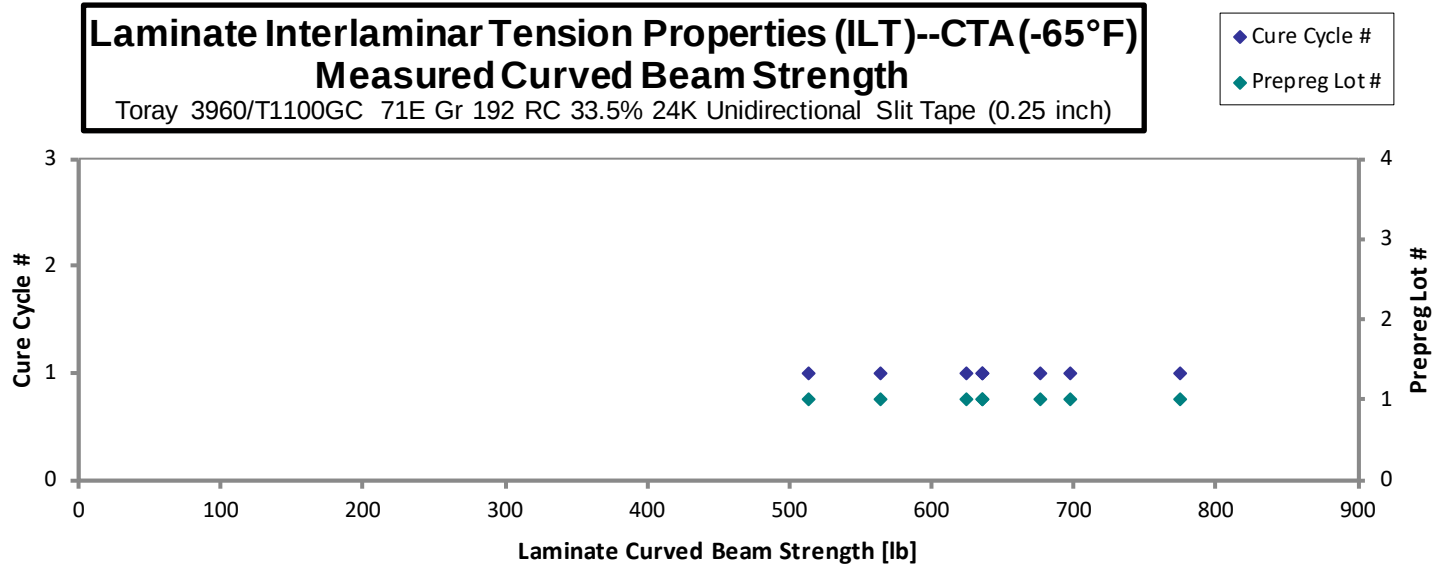
#### Laminate Interlaminar Tension Properties (ILT)--CTA (-65°F) Strength

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

| Specimen Number                                  | Toray Batch # | NIAR Cure Cycle | Prepreg Lot # | Cure Cycle # | Curved Beam Strength [lb] | Interlaminar Tension Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Avg. $t_{ply}$ [in] | Failure Mode                 |
|--------------------------------------------------|---------------|-----------------|---------------|--------------|---------------------------|-------------------------------------|------------------------------|---------------------|---------------------|------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST9-A-C1-1-ILT-CTA-1* | A             | C1              | 1             | 1            | 635.4                     | 21.82                               | 0.1399                       | 22                  | 0.006358            | INTERLAMINAR TENSILE FAILURE |
| NTP3963Q1-TC-WEB-NIAR-T01-MST9-A-C1-1-ILT-CTA-2* | A             | C1              | 1             | 1            | 775.1                     | 26.78                               | 0.1392                       | 22                  | 0.006326            | INTERLAMINAR TENSILE FAILURE |
| NTP3963Q1-TC-WEB-NIAR-T01-MST9-A-C1-1-ILT-CTA-3* | A             | C1              | 1             | 1            | 676.2                     | 23.23                               | 0.1399                       | 22                  | 0.006358            | INTERLAMINAR TENSILE FAILURE |
| NTP3963Q1-TC-WEB-NIAR-T01-MST9-A-C1-1-ILT-CTA-4* | A             | C1              | 1             | 1            | 513.6                     | 17.55                               | 0.1405                       | 22                  | 0.006386            | INTERLAMINAR TENSILE FAILURE |
| NTP3963Q1-TC-WEB-NIAR-T01-MST9-A-C1-1-ILT-CTA-5* | A             | C1              | 1             | 1            | 635.4                     | 21.89                               | 0.1395                       | 22                  | 0.006341            | INTERLAMINAR TENSILE FAILURE |
| NTP3963Q1-TC-WEB-NIAR-T01-MST9-A-C1-1-ILT-CTA-6* | A             | C1              | 1             | 1            | 697.6                     | 23.88                               | 0.1403                       | 22                  | 0.006377            | INTERLAMINAR TENSILE FAILURE |
| NTP3963Q1-TC-WEB-NIAR-T01-MST9-A-C1-1-ILT-SP-1*  | A             | C1              | 1             | 1            | 564.4                     | 18.87                               | 0.1431                       | 22                  | 0.006506            | INTERLAMINAR TENSILE FAILURE |
| NTP3963Q1-TC-WEB-NIAR-T01-MST9-A-C1-1-ILT-SP-2*  | A             | C1              | 1             | 1            | 624.8                     | 21.09                               | 0.1420                       | 22                  | 0.006453            | INTERLAMINAR TENSILE FAILURE |

\*Cross head displacement exceeds 0.2in.

|                    |       |       |          |
|--------------------|-------|-------|----------|
| Average            | 640.3 | 21.89 | 0.006388 |
| Standard Dev.      | 80.04 | 2.886 |          |
| Coeff. of Var. [%] | 12.50 | 13.18 |          |
| Min.               | 513.6 | 17.55 | 0.006326 |
| Max.               | 775.1 | 26.78 | 0.006506 |
| Number of Spec.    | 8     | 8     | 8        |



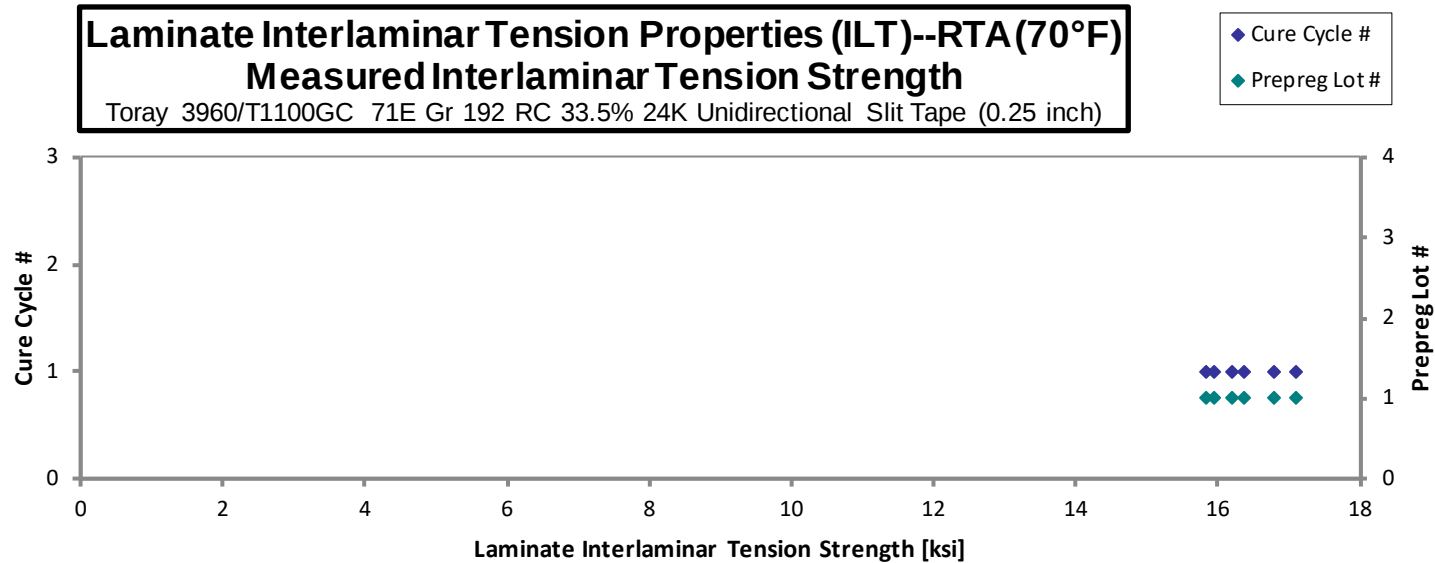
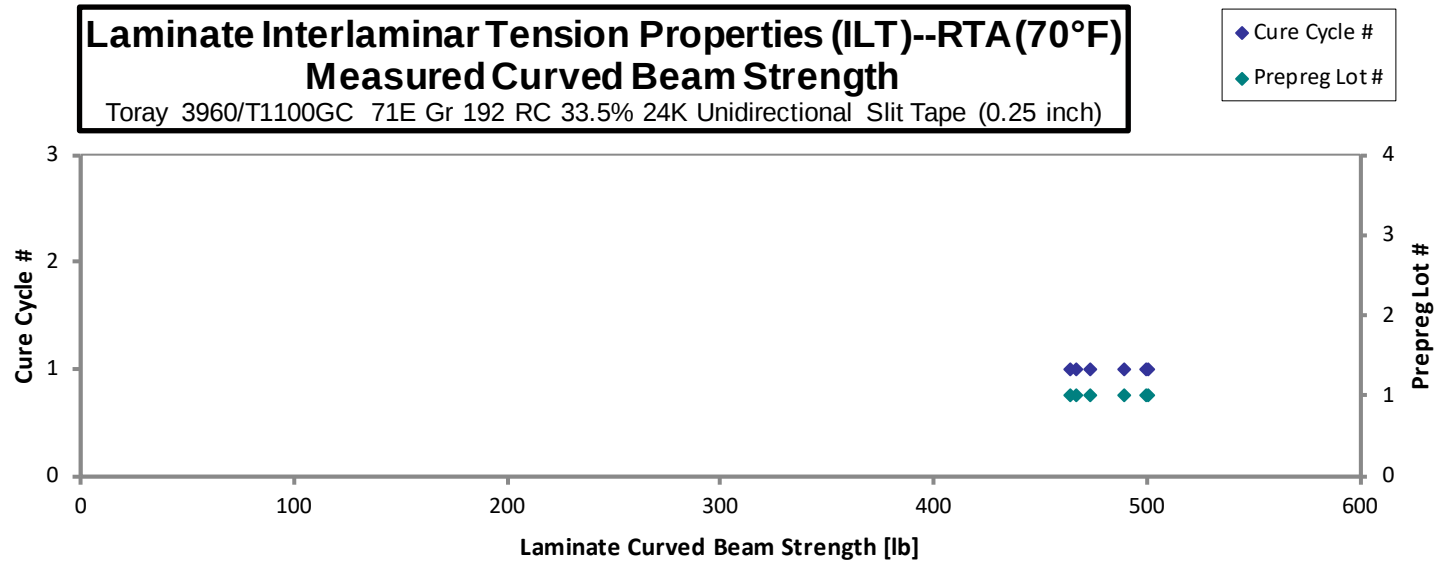
**Laminate Interlaminar Tension Properties (ILT)--RTA (70°F)  
Strength**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

| Specimen Number                                  | Toray<br>Batch # | NIAR<br>Cure Cycle | Prepreg<br>Lot # | Cure Cycle<br># | Curved<br>Beam<br>Strength [lb] | Interlaminar<br>Tension<br>Strength<br>[ksi] | Avg.<br>Specimen<br>Thickness<br>[in] | # Plies in<br>Laminate | Avg. $t_{ply}$ [in] | Failure Mode                 |
|--------------------------------------------------|------------------|--------------------|------------------|-----------------|---------------------------------|----------------------------------------------|---------------------------------------|------------------------|---------------------|------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST9-A-C1-1-ILT-RTA-1* | A                | C1                 | 1                | 1               | 463.6                           | 15.94                                        | 0.1398                                | 22                     | 0.006352            | INTERLAMINAR TENSILE FAILURE |
| NTP3963Q1-TC-WEB-NIAR-T01-MST9-A-C1-1-ILT-RTA-2* | A                | C1                 | 1                | 1               | 473.6                           | 16.21                                        | 0.1403                                | 22                     | 0.006377            | INTERLAMINAR TENSILE FAILURE |
| NTP3963Q1-TC-WEB-NIAR-T01-MST9-A-C1-1-ILT-RTA-3* | A                | C1                 | 1                | 1               | 466.6                           | 15.83                                        | 0.1414                                | 22                     | 0.006425            | INTERLAMINAR TENSILE FAILURE |
| NTP3963Q1-TC-WEB-NIAR-T01-MST9-A-C1-1-ILT-RTA-4* | A                | C1                 | 1                | 1               | 489.1                           | 16.37                                        | 0.1430                                | 22                     | 0.006500            | INTERLAMINAR TENSILE FAILURE |
| NTP3963Q1-TC-WEB-NIAR-T01-MST9-A-C1-1-ILT-RTA-5* | A                | C1                 | 1                | 1               | 499.8                           | 16.79                                        | 0.1426                                | 22                     | 0.006481            | INTERLAMINAR TENSILE FAILURE |
| NTP3963Q1-TC-WEB-NIAR-T01-MST9-A-C1-1-ILT-RTA-6* | A                | C1                 | 1                | 1               | 500.6                           | 17.10                                        | 0.1405                                | 22                     | 0.006388            | INTERLAMINAR TENSILE FAILURE |

\*Cross head displacement exceeds 0.2in.

|                    |       |        |          |
|--------------------|-------|--------|----------|
| Average            | 482.2 | 16.37  | 0.006420 |
| Standard Dev.      | 16.51 | 0.4923 |          |
| Coeff. of Var. [%] | 3.424 | 3.007  |          |
| Min.               | 463.6 | 15.83  | 0.006352 |
| Max.               | 500.6 | 17.10  | 0.006500 |
| Number of Spec.    | 6     | 6      | 6        |



**Laminate Interlaminar Tension Properties (ILT)--ETW2 (250°F)  
Strength**

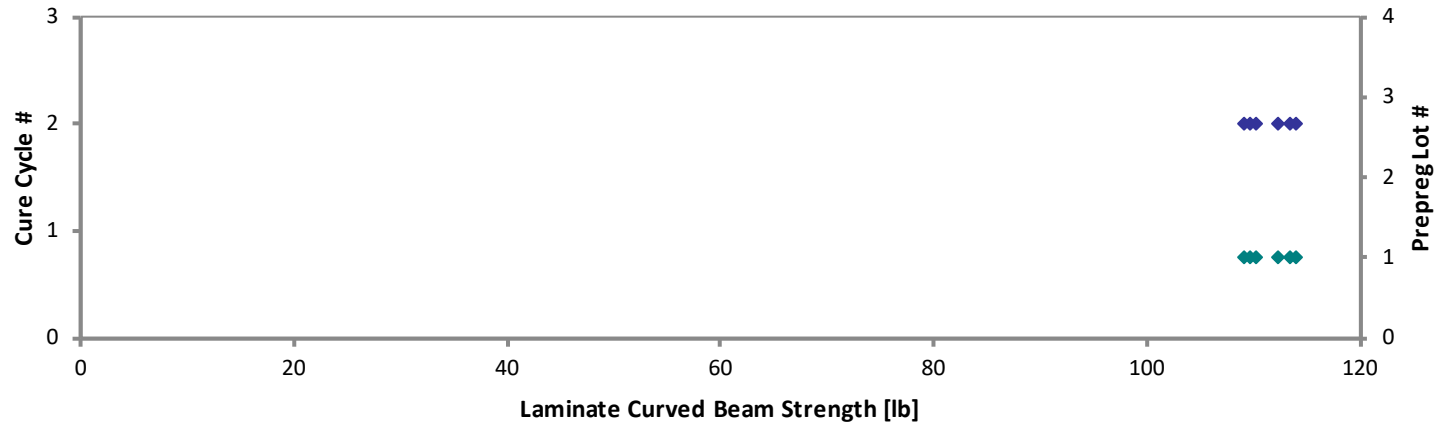
Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

| Specimen Number                                  | Toray<br>Batch # | NIAR<br>Cure Cycle | Prepreg<br>Lot # | Cure Cycle<br># | Curved<br>Beam<br>Strength [lb] | Interlaminar<br>Tension<br>Strength<br>[ksi] | Avg.<br>Specimen<br>Thickness<br>[in] | # Plies in<br>Laminate | Avg. $t_{ply}$ [in] | Failure Mode                 |
|--------------------------------------------------|------------------|--------------------|------------------|-----------------|---------------------------------|----------------------------------------------|---------------------------------------|------------------------|---------------------|------------------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST9-A-C2-1-ILT-ETW2-1 | A                | C2                 | 1                | 2               | 112.2                           | 3.385                                        | 0.1561                                | 22                     | 0.007095            | INTERLAMINAR TENSILE FAILURE |
| NTP3963Q1-TC-WEB-NIAR-T01-MST9-A-C2-1-ILT-ETW2-2 | A                | C2                 | 1                | 2               | 109.7                           | 3.403                                        | 0.1525                                | 22                     | 0.006930            | INTERLAMINAR TENSILE FAILURE |
| NTP3963Q1-TC-WEB-NIAR-T01-MST9-A-C2-1-ILT-ETW2-3 | A                | C2                 | 1                | 2               | 113.4                           | 3.469                                        | 0.1543                                | 22                     | 0.007013            | INTERLAMINAR TENSILE FAILURE |
| NTP3963Q1-TC-WEB-NIAR-T01-MST9-A-C2-1-ILT-ETW2-4 | A                | C2                 | 1                | 2               | 110.3                           | 3.393                                        | 0.1535                                | 22                     | 0.006978            | INTERLAMINAR TENSILE FAILURE |
| NTP3963Q1-TC-WEB-NIAR-T01-MST9-A-C2-1-ILT-ETW2-5 | A                | C2                 | 1                | 2               | 109.1                           | 3.361                                        | 0.1533                                | 22                     | 0.006968            | INTERLAMINAR TENSILE FAILURE |
| NTP3963Q1-TC-WEB-NIAR-T01-MST9-A-C2-1-ILT-ETW2-6 | A                | C2                 | 1                | 2               | 113.9                           | 3.525                                        | 0.1528                                | 22                     | 0.006943            | INTERLAMINAR TENSILE FAILURE |

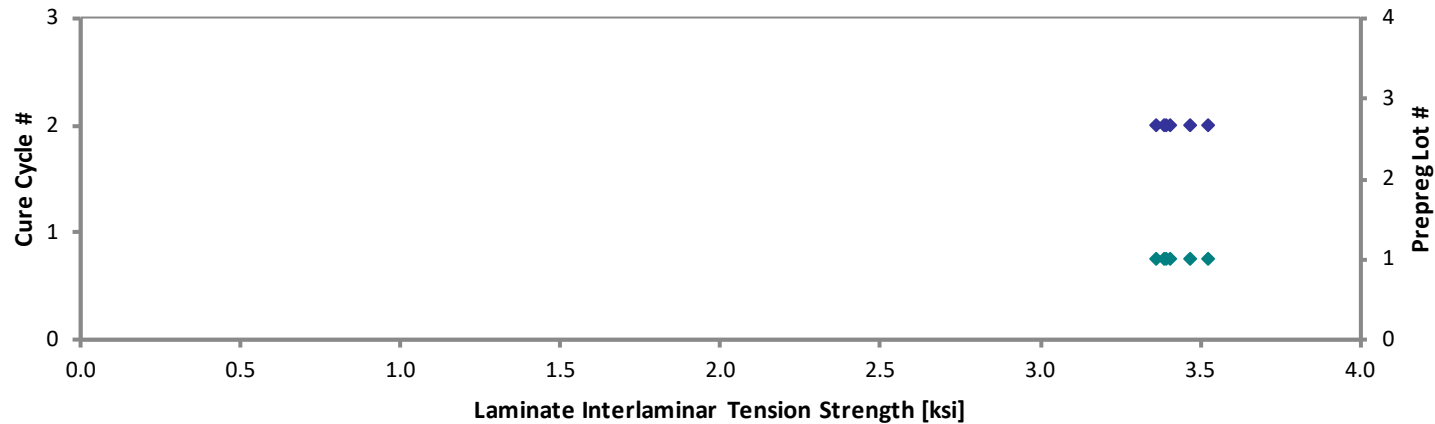
|                    |       |         |          |
|--------------------|-------|---------|----------|
| Average            | 111.4 | 3.423   | 0.006988 |
| Standard Dev.      | 2.027 | 0.06192 |          |
| Coeff. of Var. [%] | 1.819 | 1.809   |          |
| Min.               | 109.1 | 3.361   | 0.006930 |
| Max.               | 113.9 | 3.525   | 0.007095 |
| Number of Spec.    | 6     | 6       | 6        |

**Laminate Interlaminar Tension Properties (ILT)--ETW2 (250°F)  
Measured Curved Beam Strength**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

**Laminate Interlaminar Tension Properties (ILT)--ETW2 (250°F)  
Measured Interlaminar Tension Strength**

Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

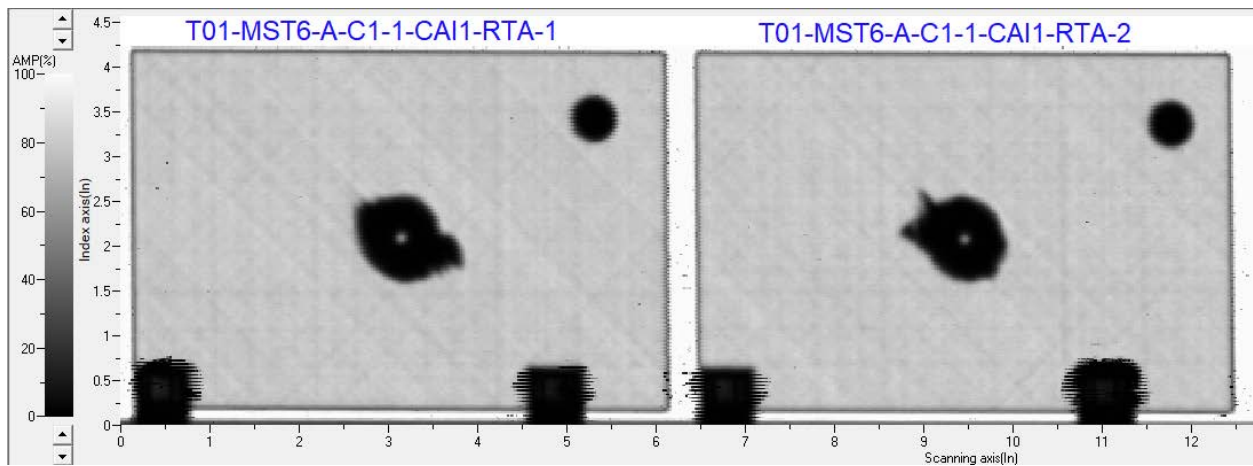


## 5. Additional Compression After Impact Data

Target Impact Energy Level: 1500 in-lb/in

Impactor Diameter: 0.625"

Representative of Damage Area:



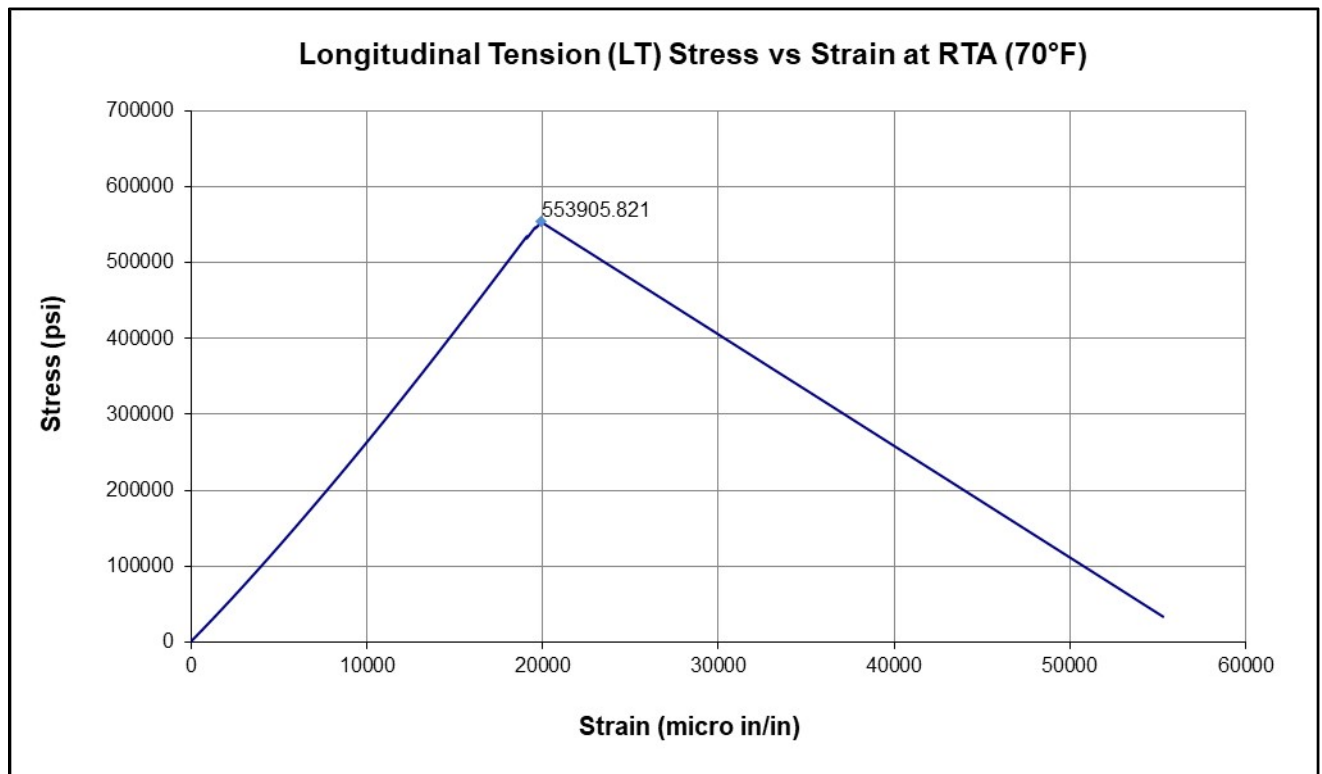
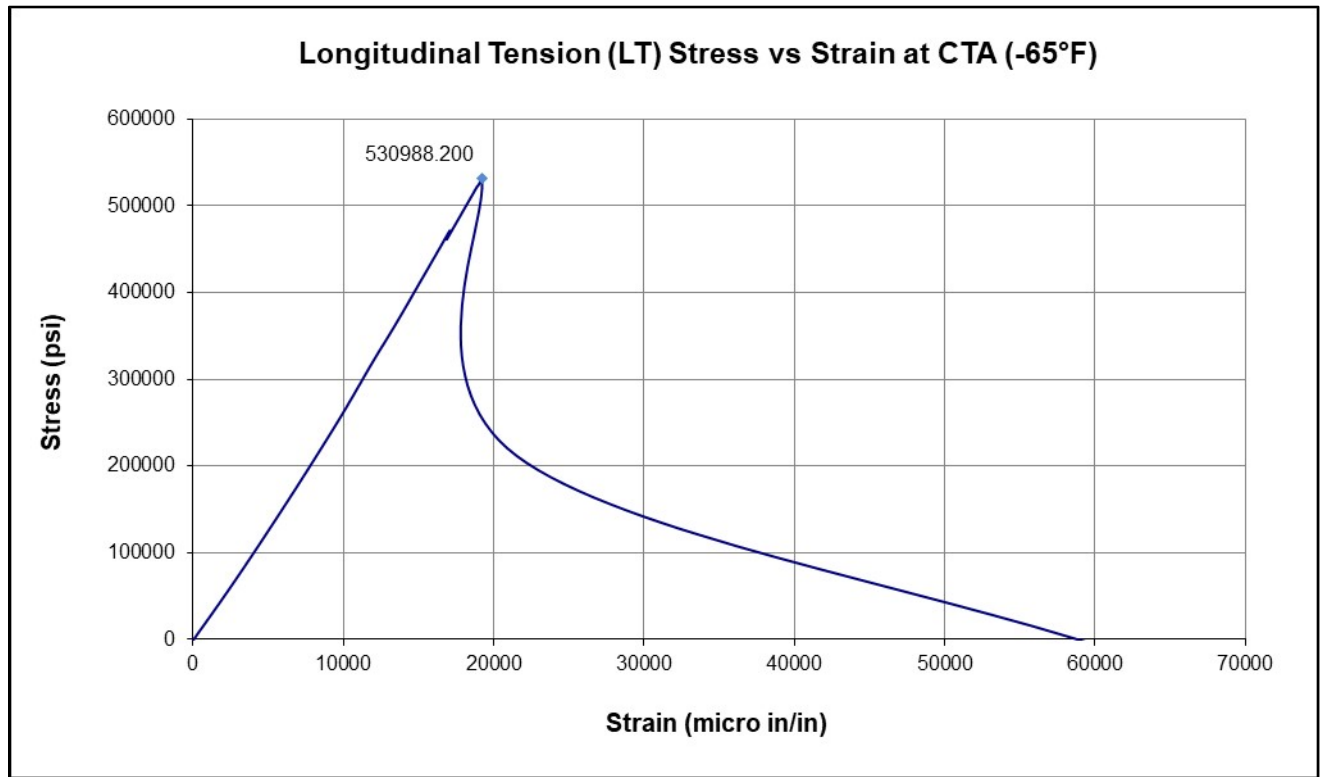
Damage Area and Dent Depth Summary:

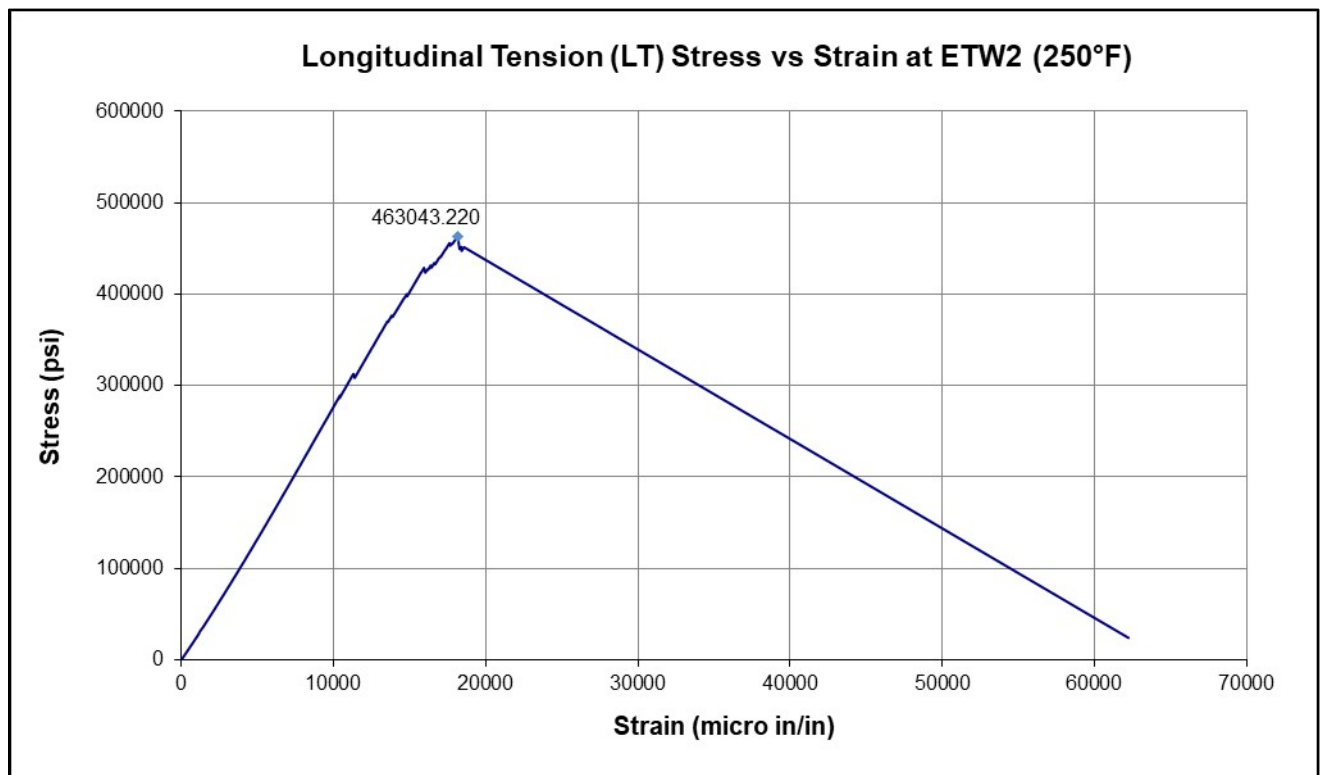
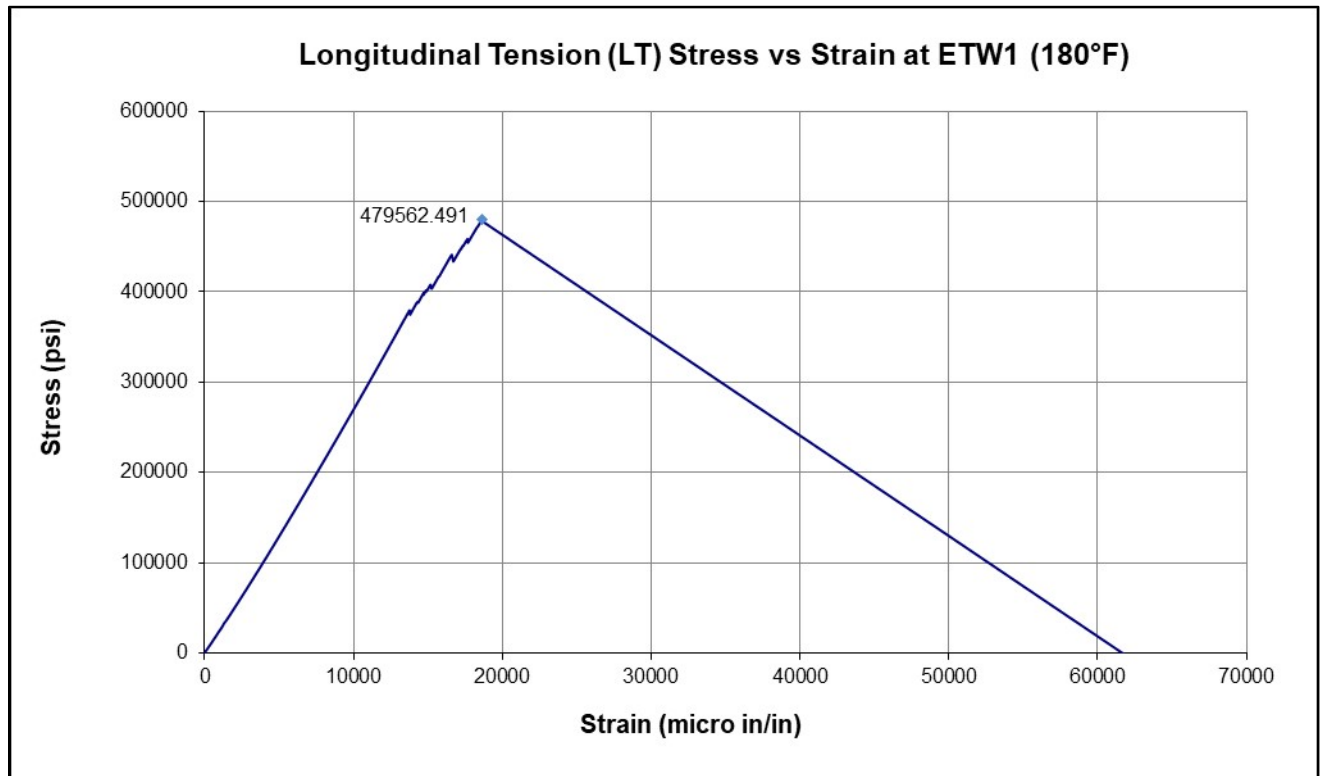
| Specimen ID                                      | Damage Area<br>(inch <sup>2</sup> ) | Dent Depth<br>(inch) |
|--------------------------------------------------|-------------------------------------|----------------------|
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C1-1-CAI1-RTA-1 | 0.8112                              | 0.0095               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C1-1-CAI1-RTA-2 | 0.7728                              | 0.0095               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C1-1-CAI1-RTA-3 | 0.8084                              | 0.0095               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C1-1-CAI1-RTA-4 | 0.7600                              | 0.0095               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C1-1-CAI1-RTA-5 | 0.7920                              | 0.0095               |
| NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C1-1-CAI1-RTA-6 | 0.7488                              | 0.0095               |

## **6. Full Stress vs. Strain Curve**

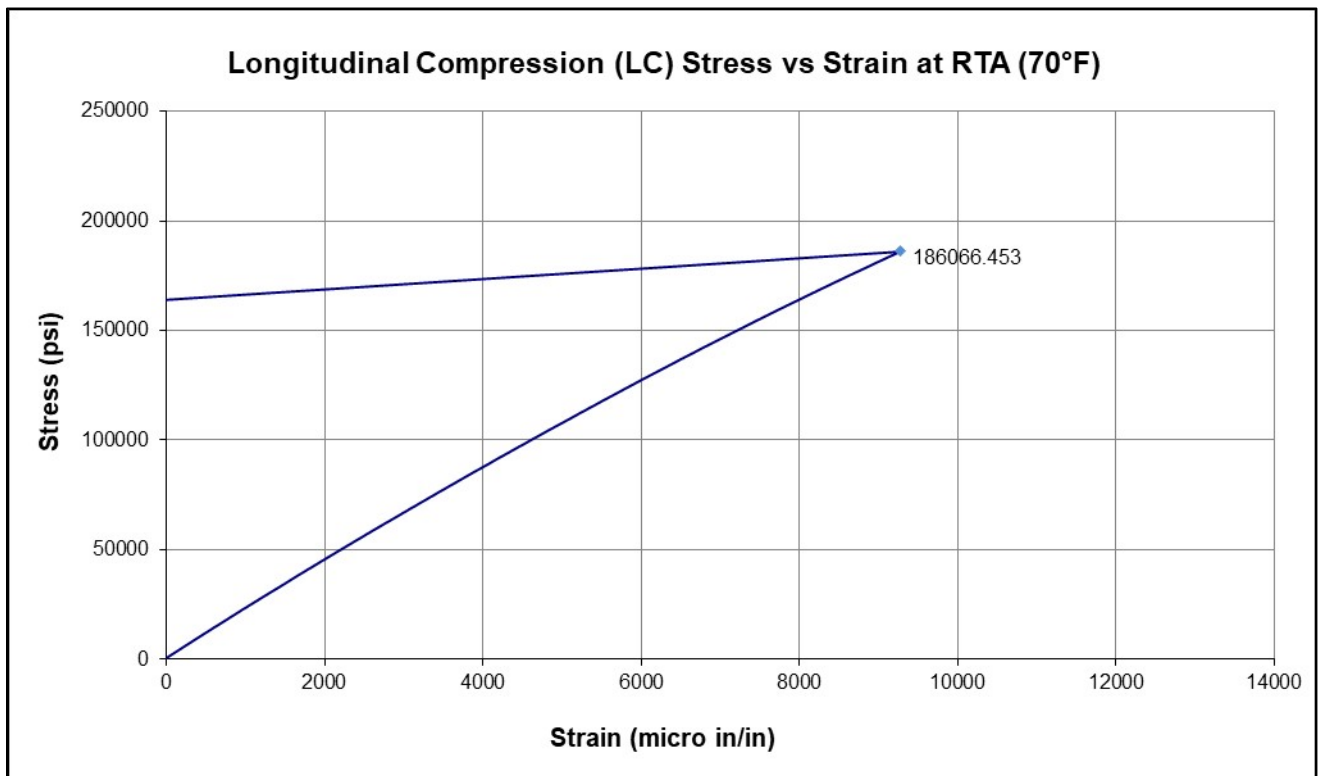
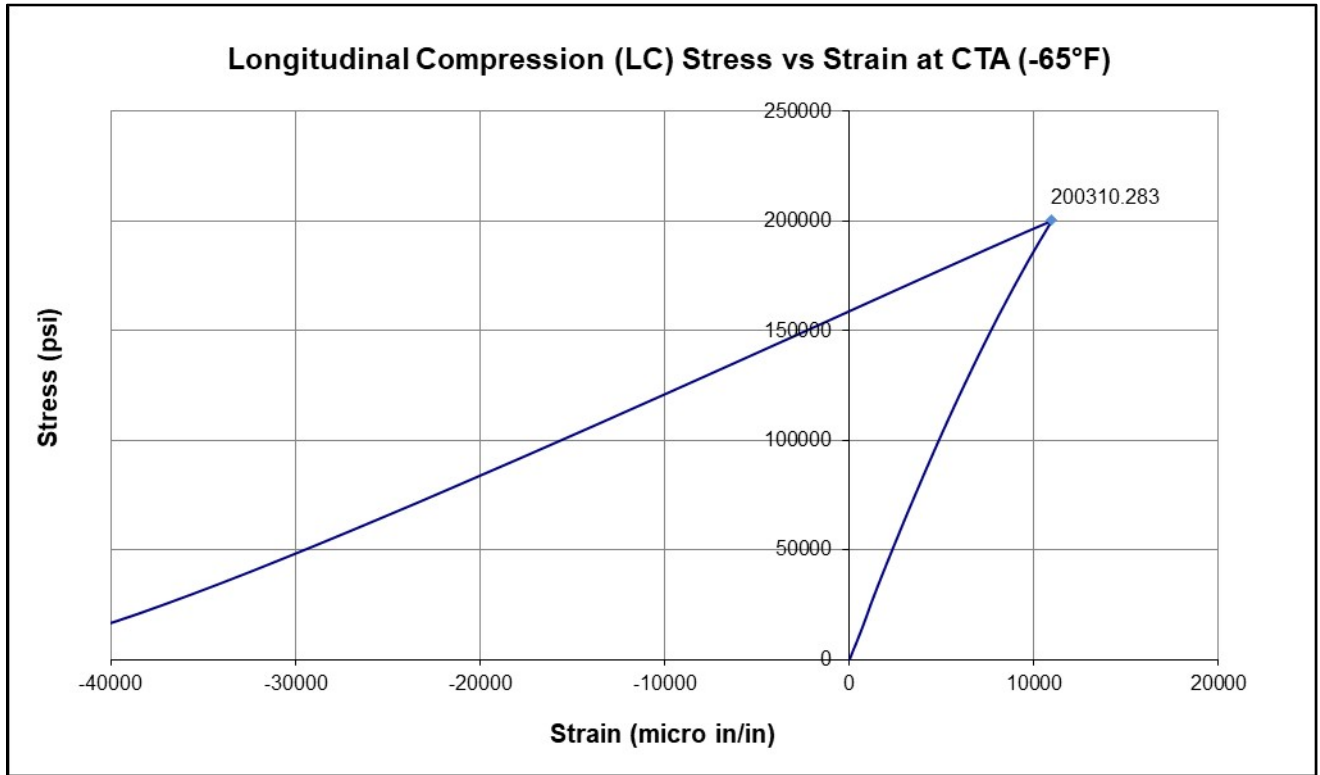
This section provides charts to display the stress-strain curves of the material for the environmental conditions tested. Representative curves for each configuration are provided in the sections below.

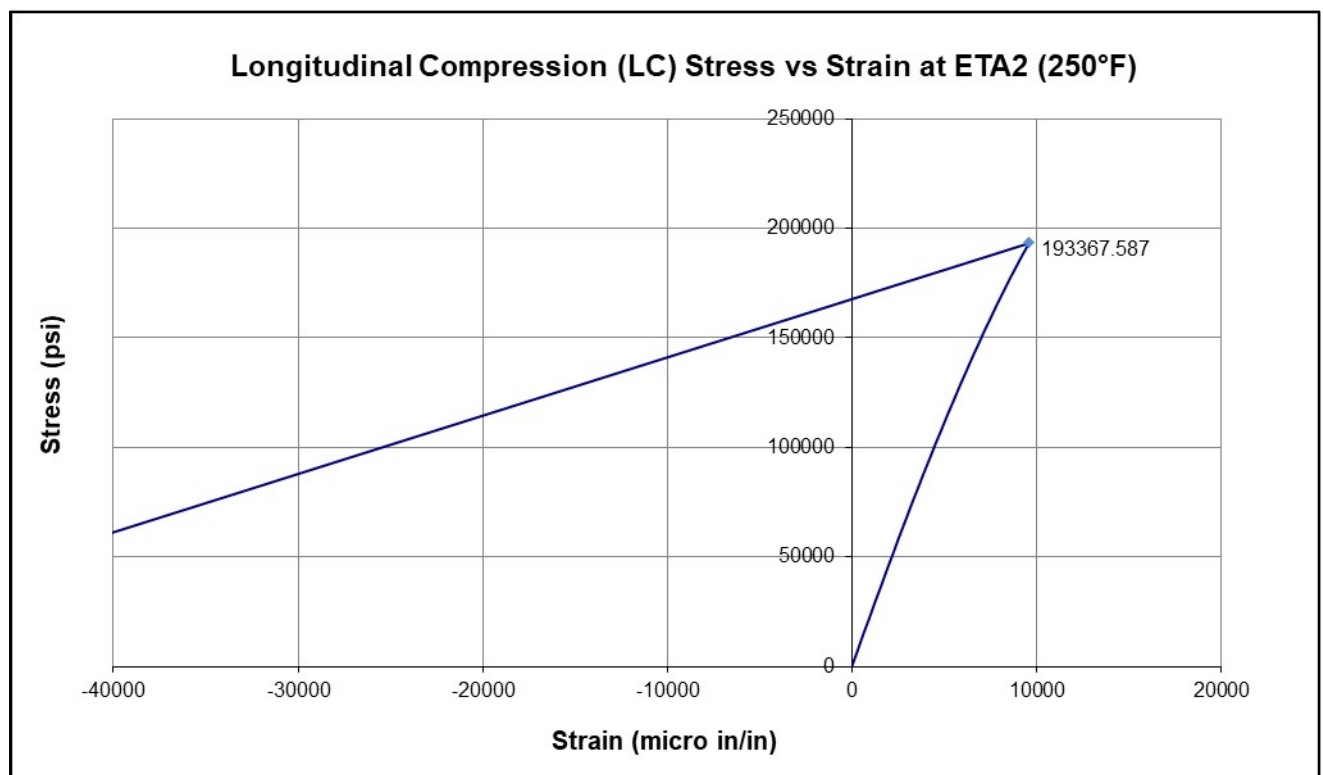
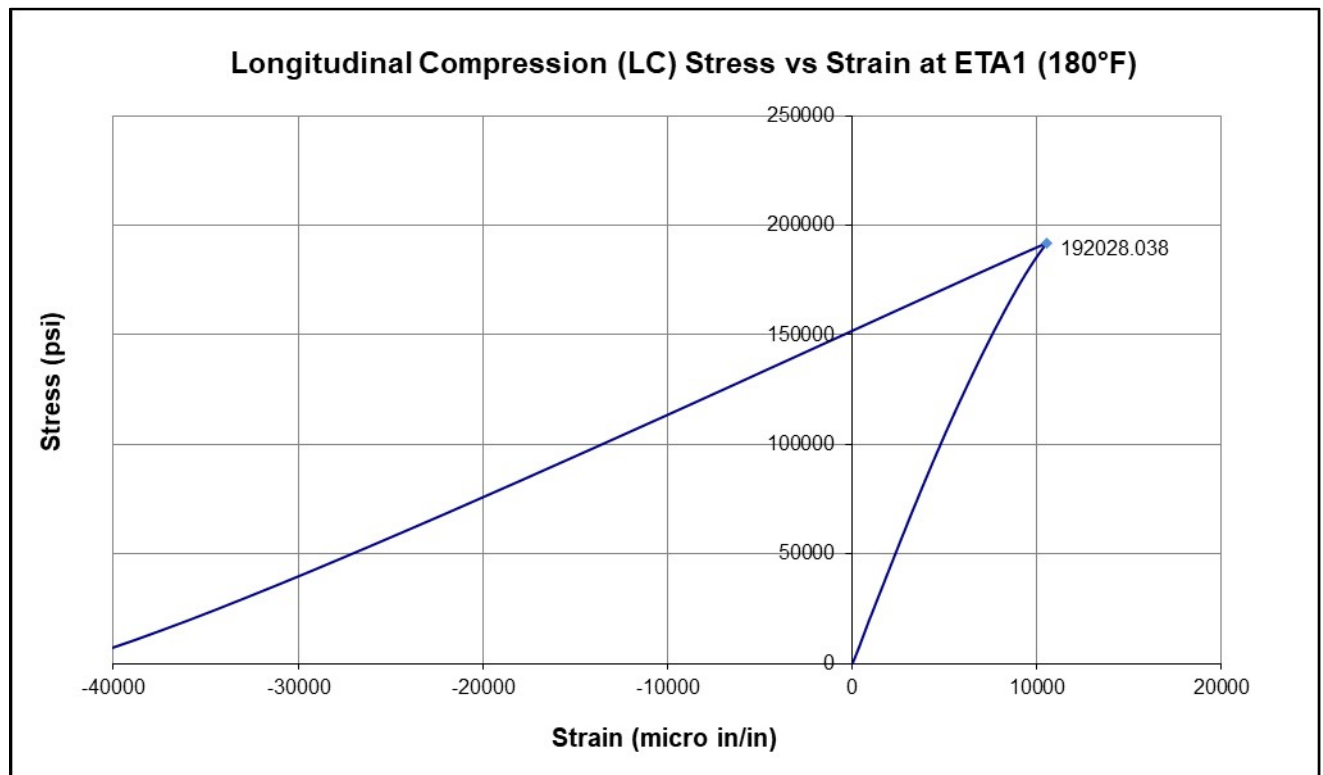
## 6.1 Longitudinal Tension (LT)

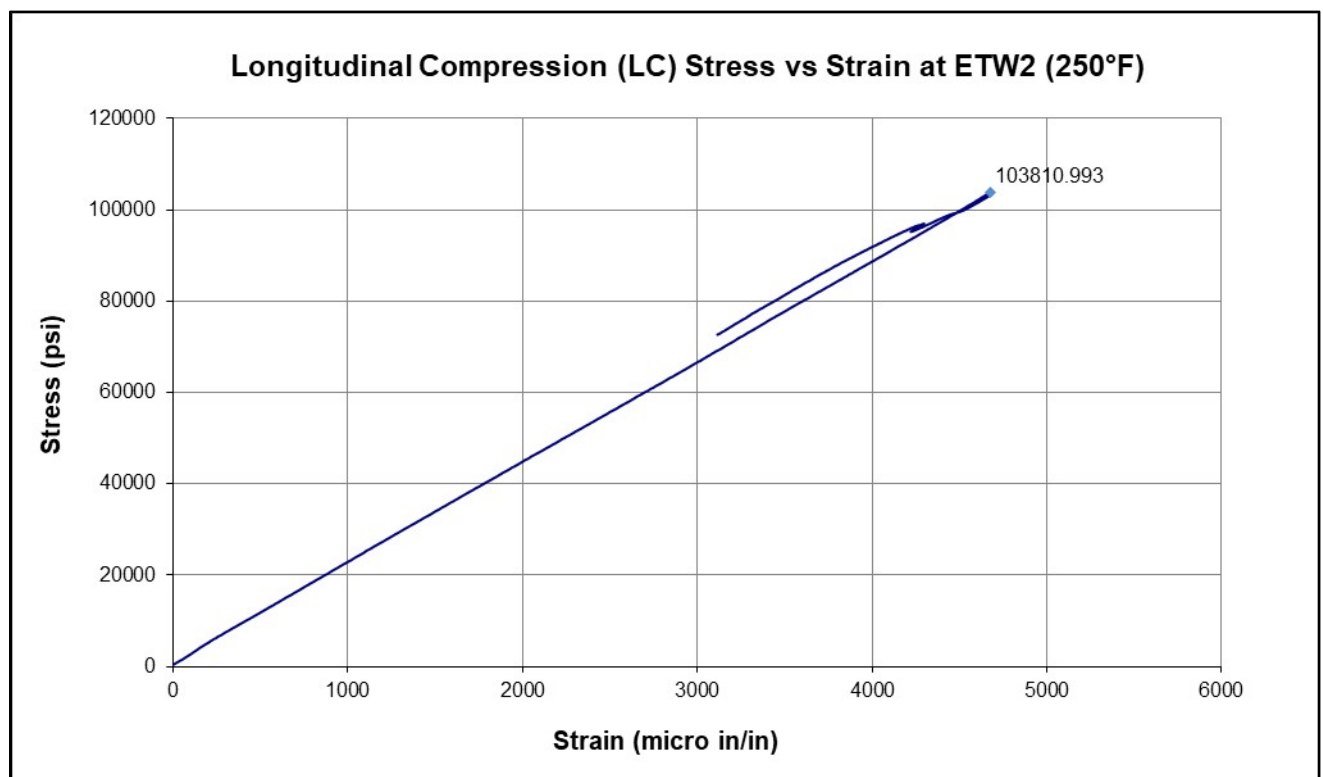
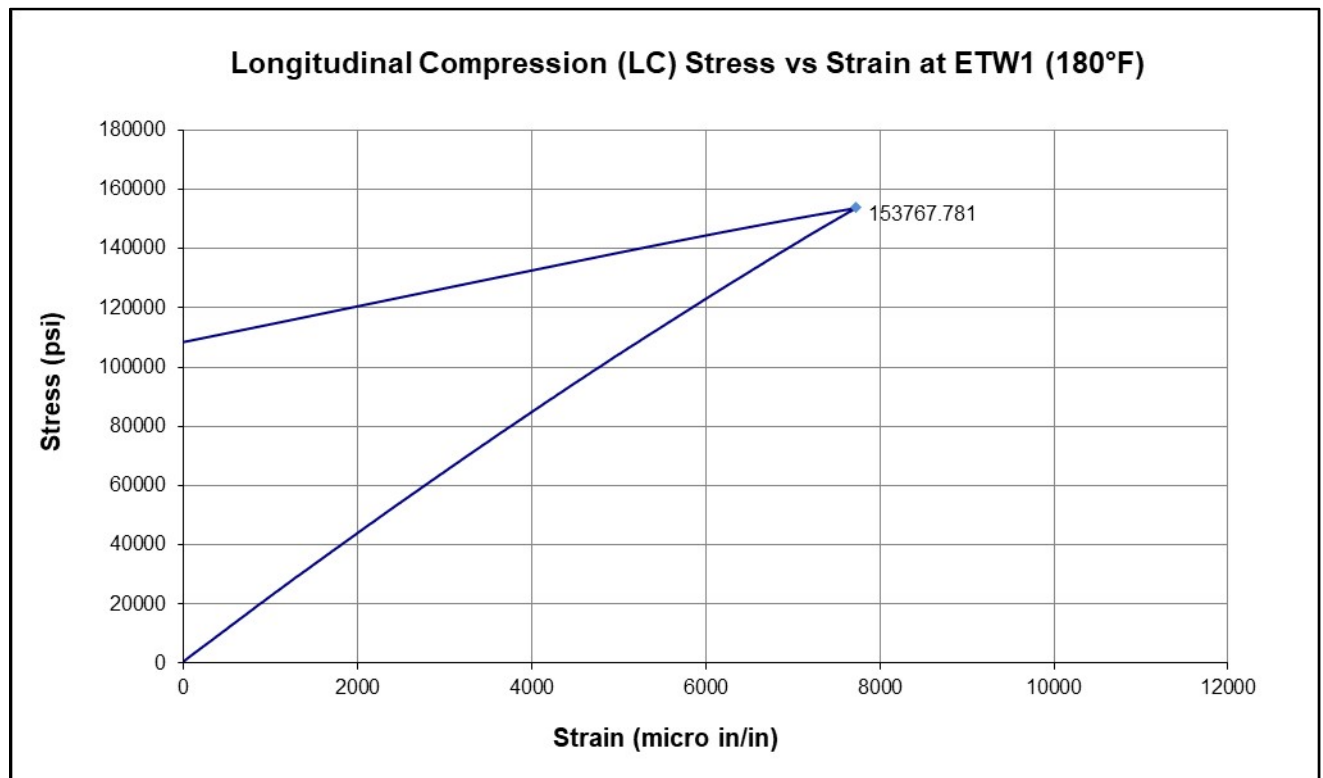




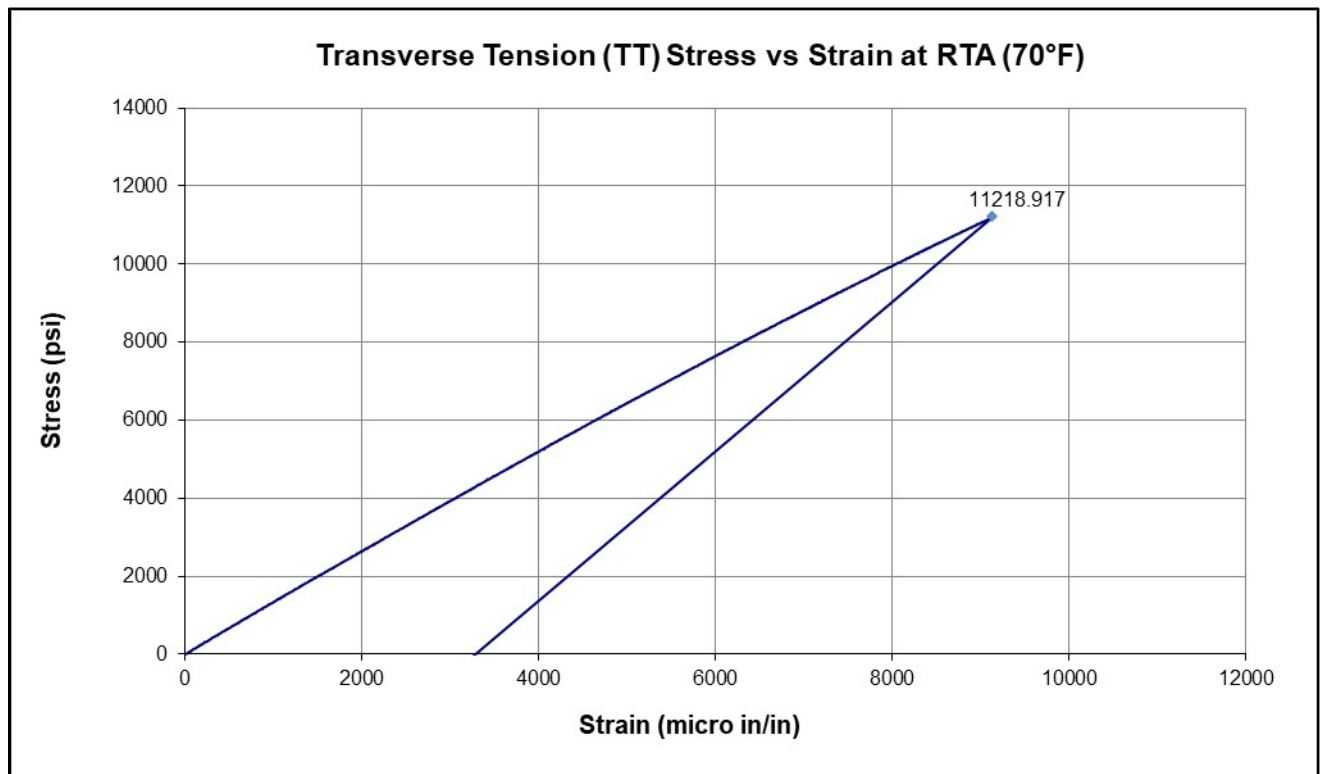
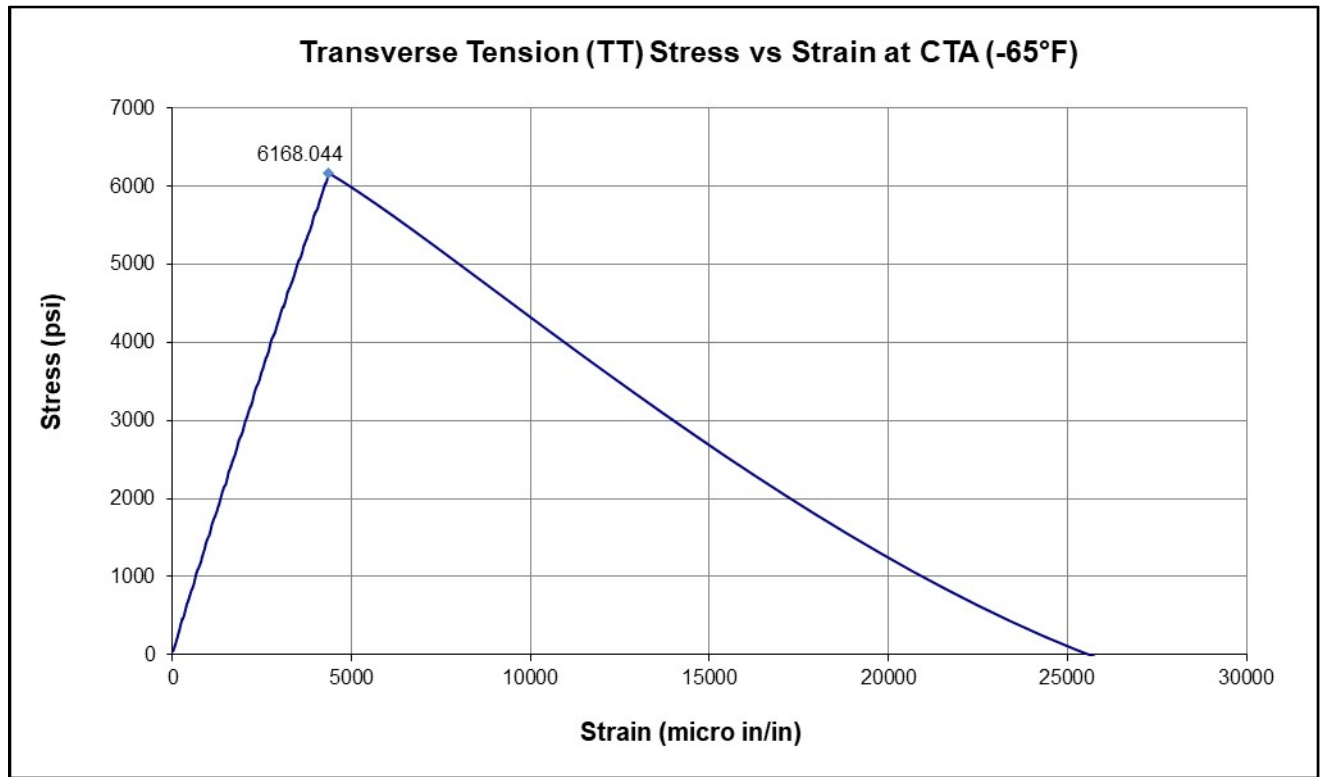
## 6.2 Longitudinal Compression (LC)

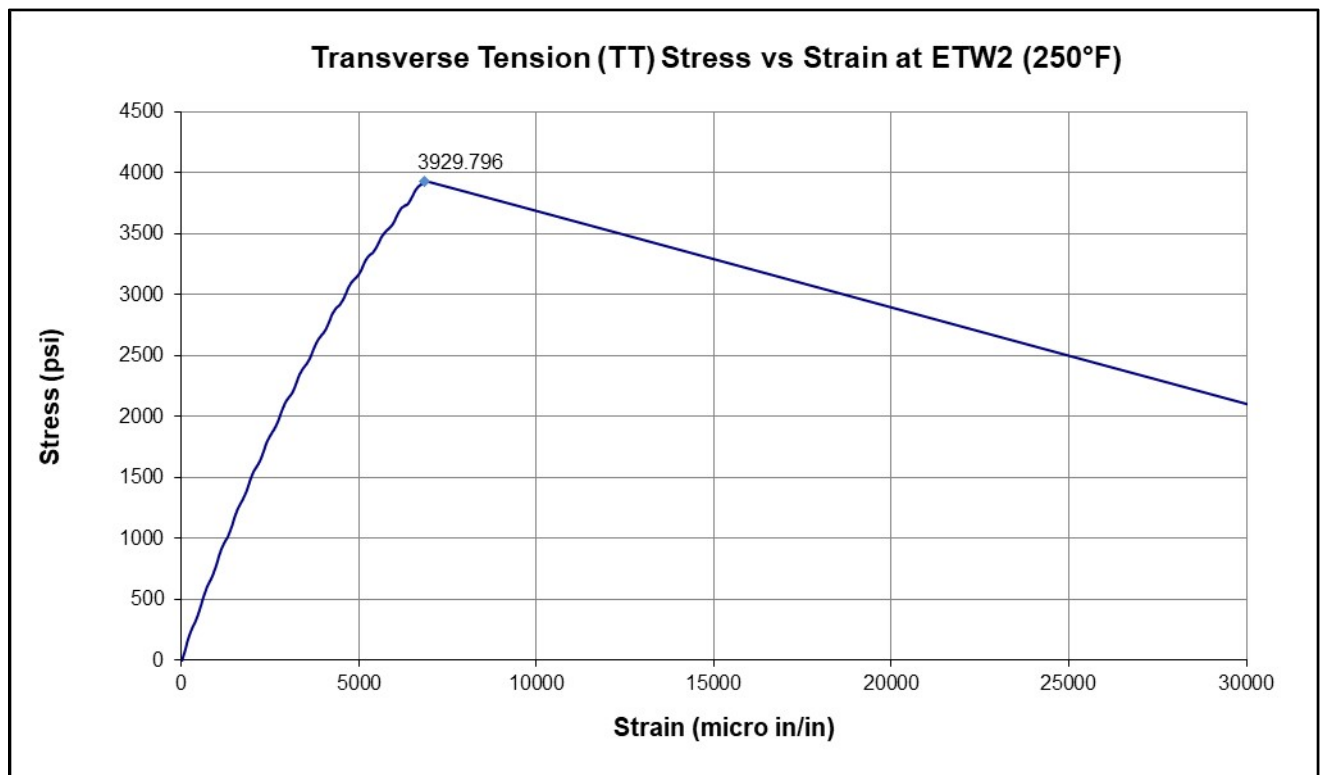
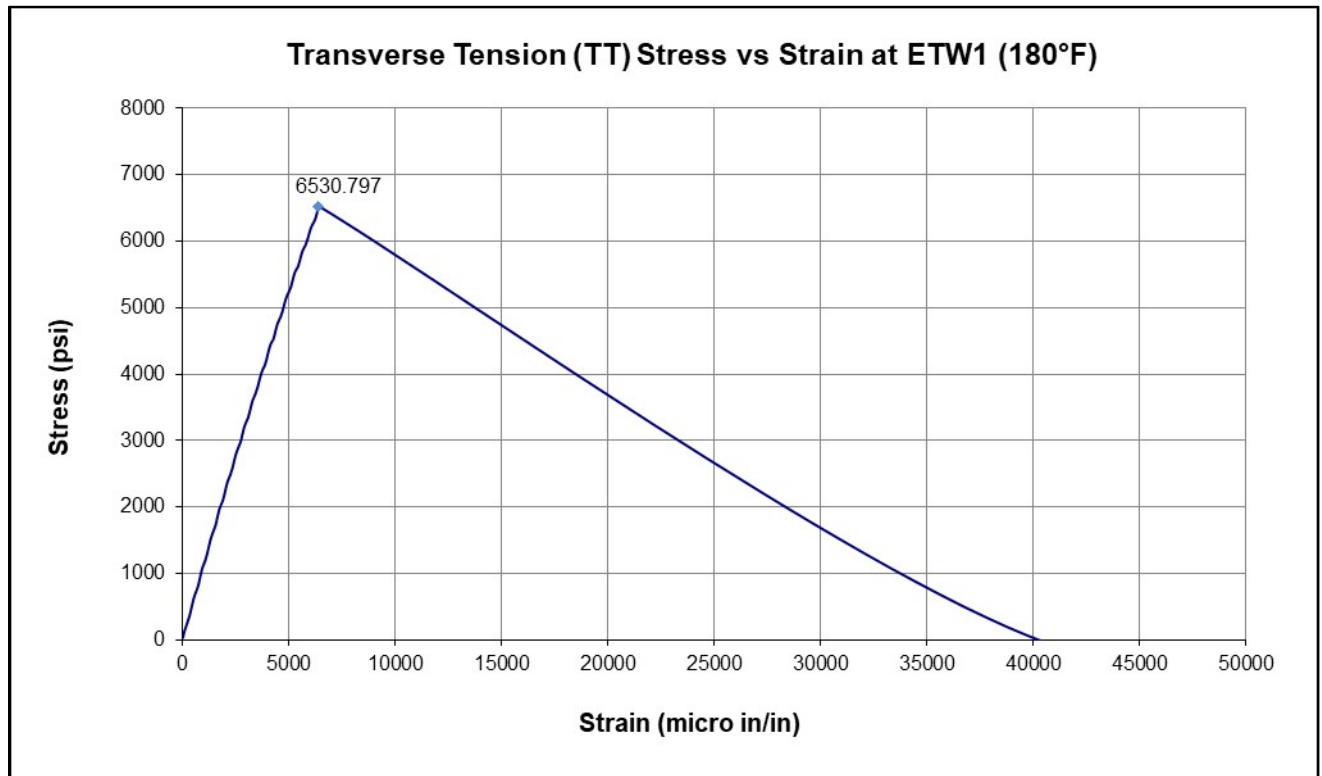




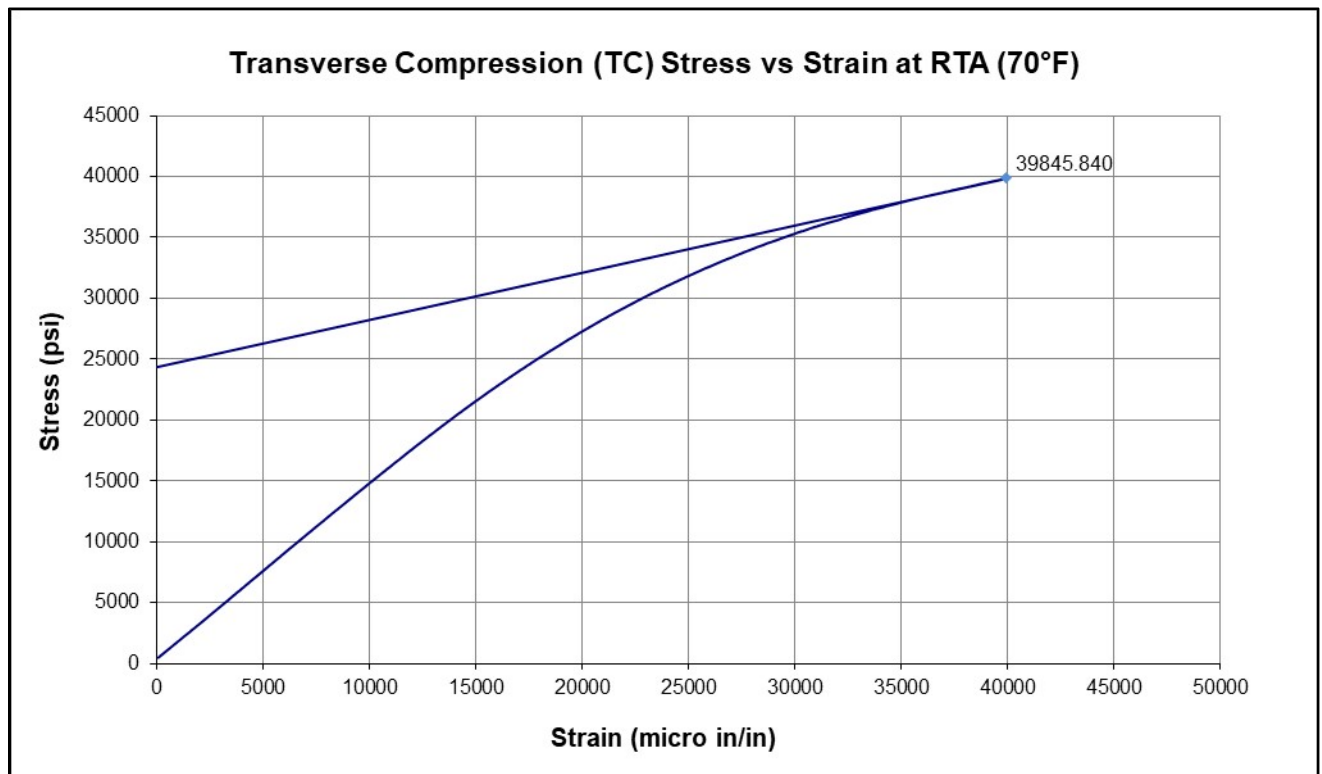
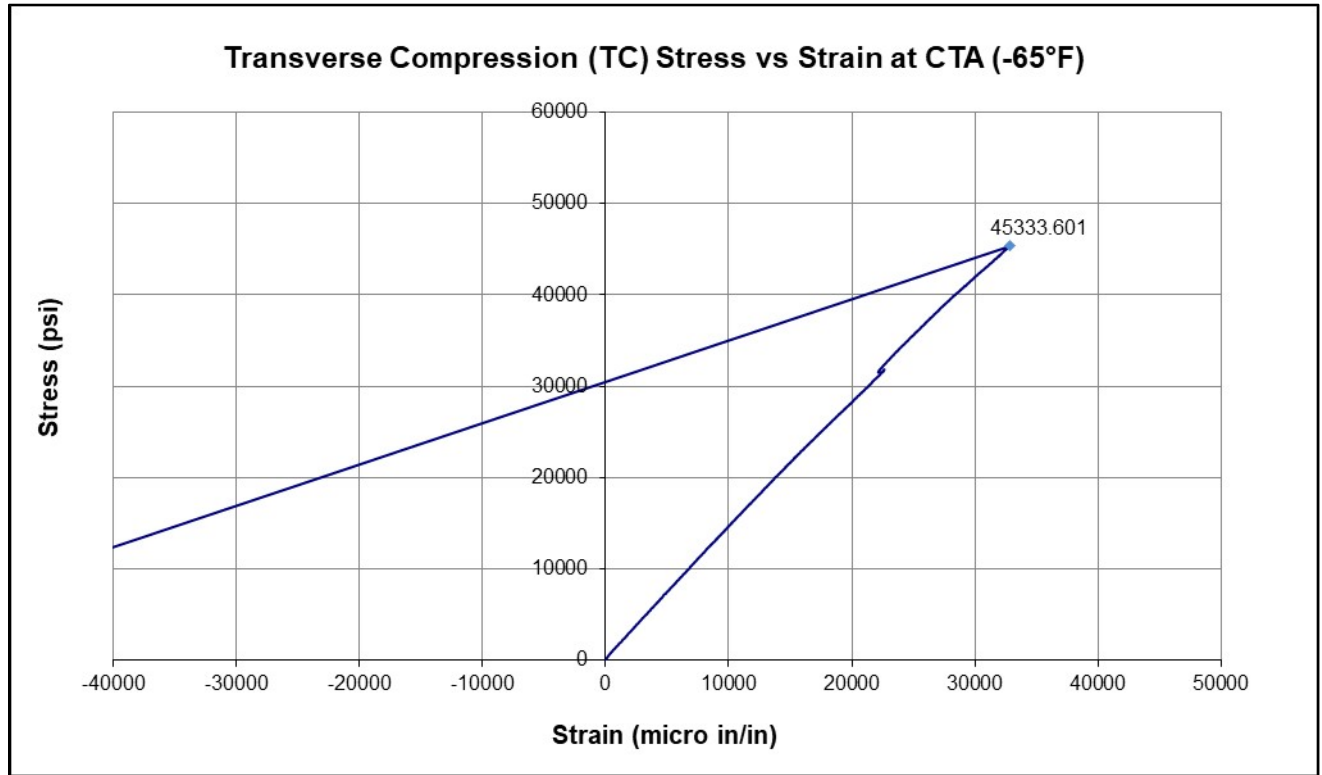


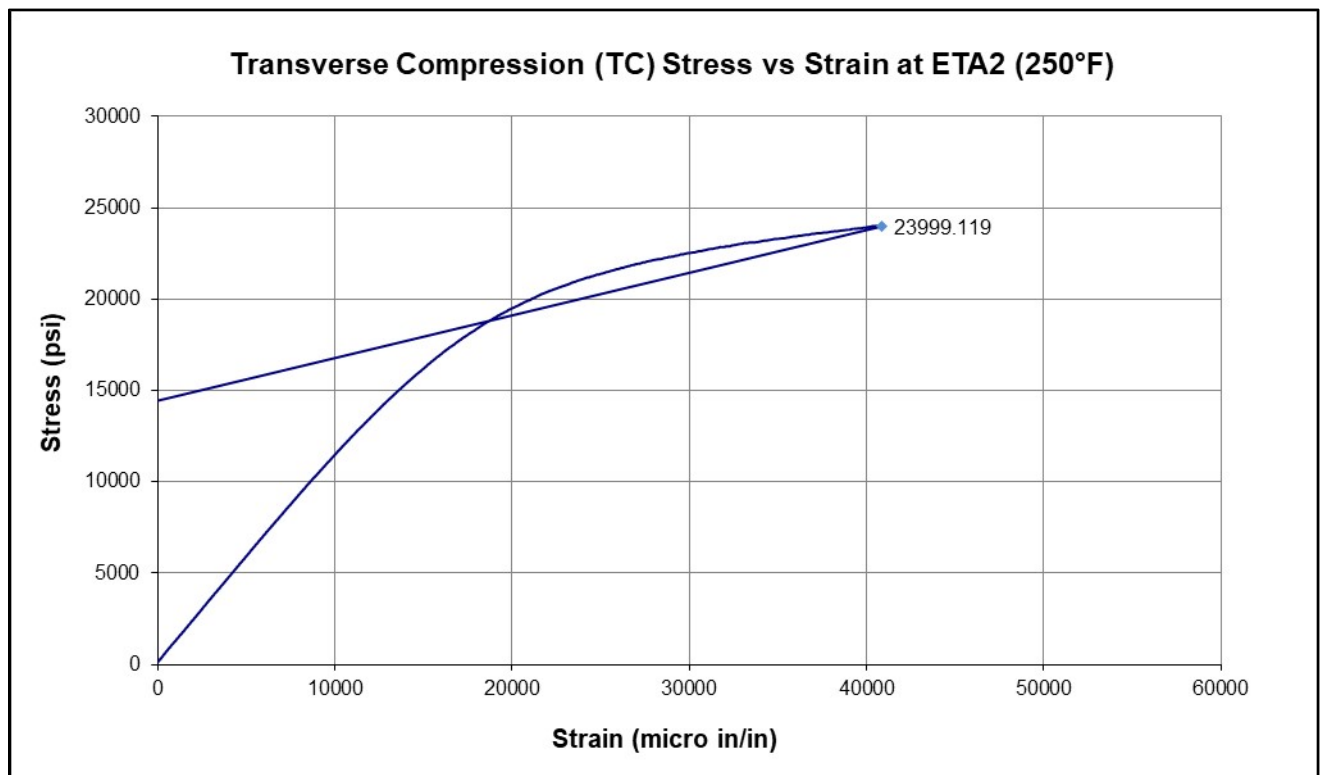
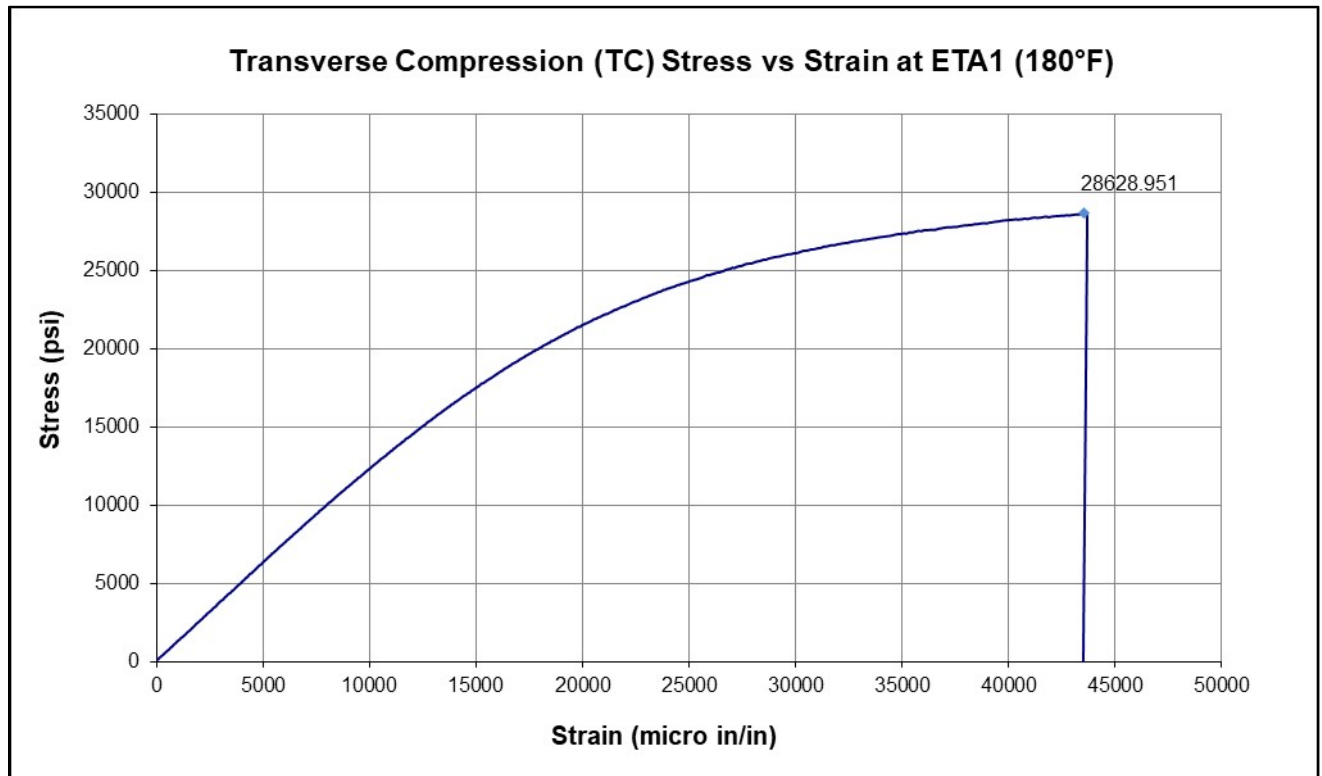
### 6.3 Transverse Tension (TT)

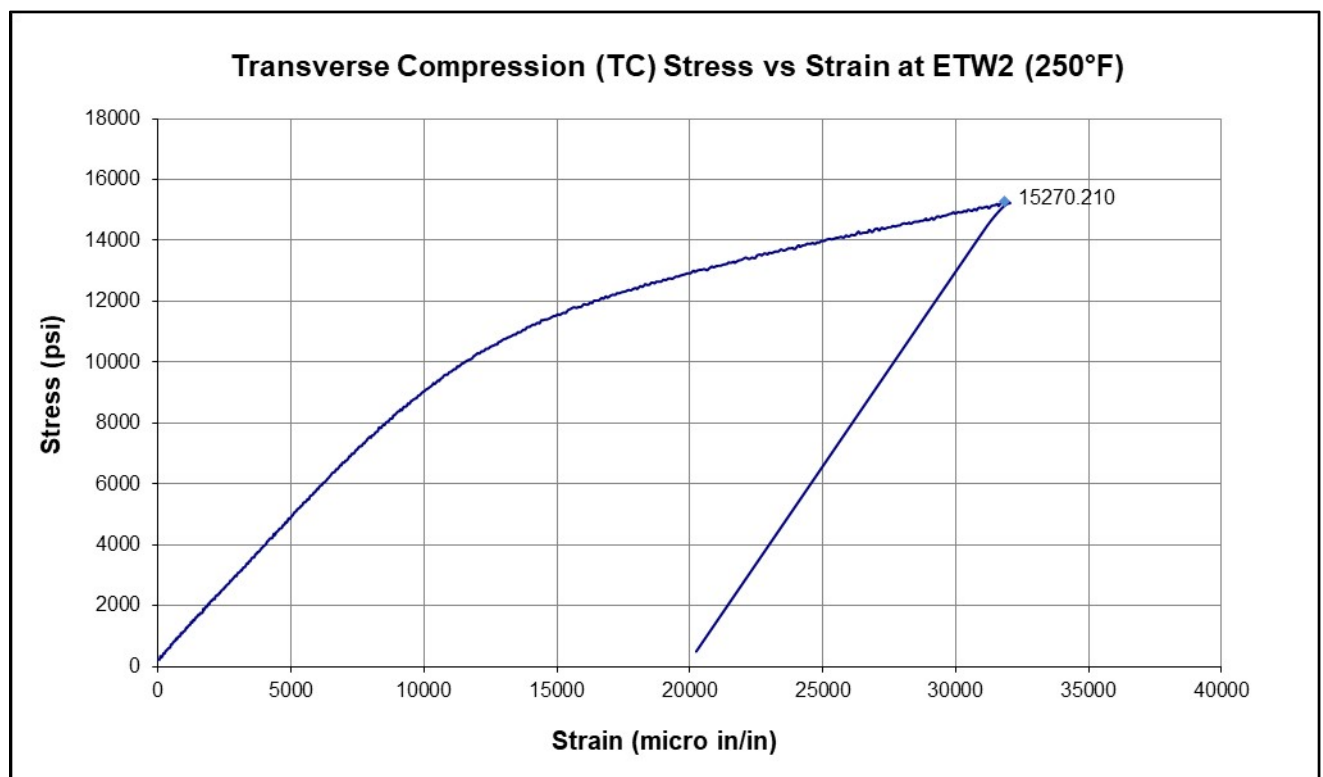
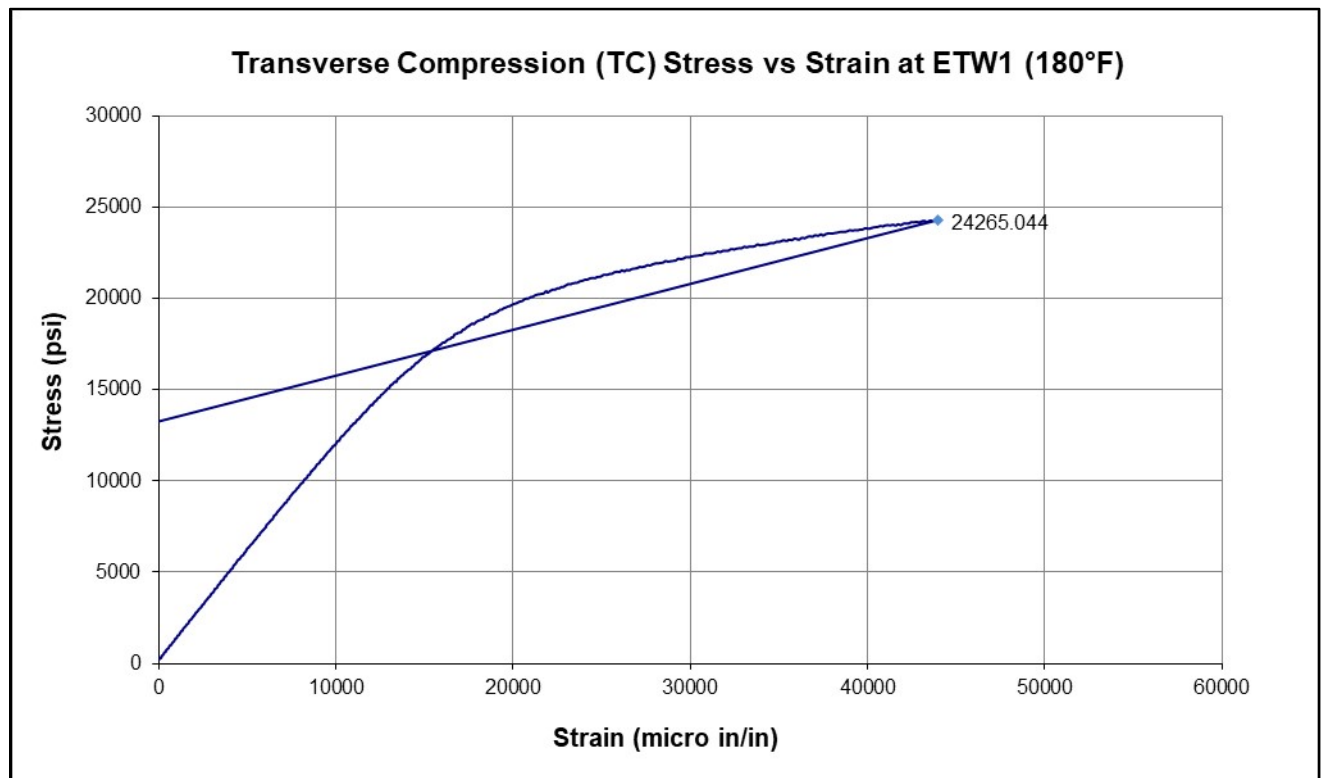




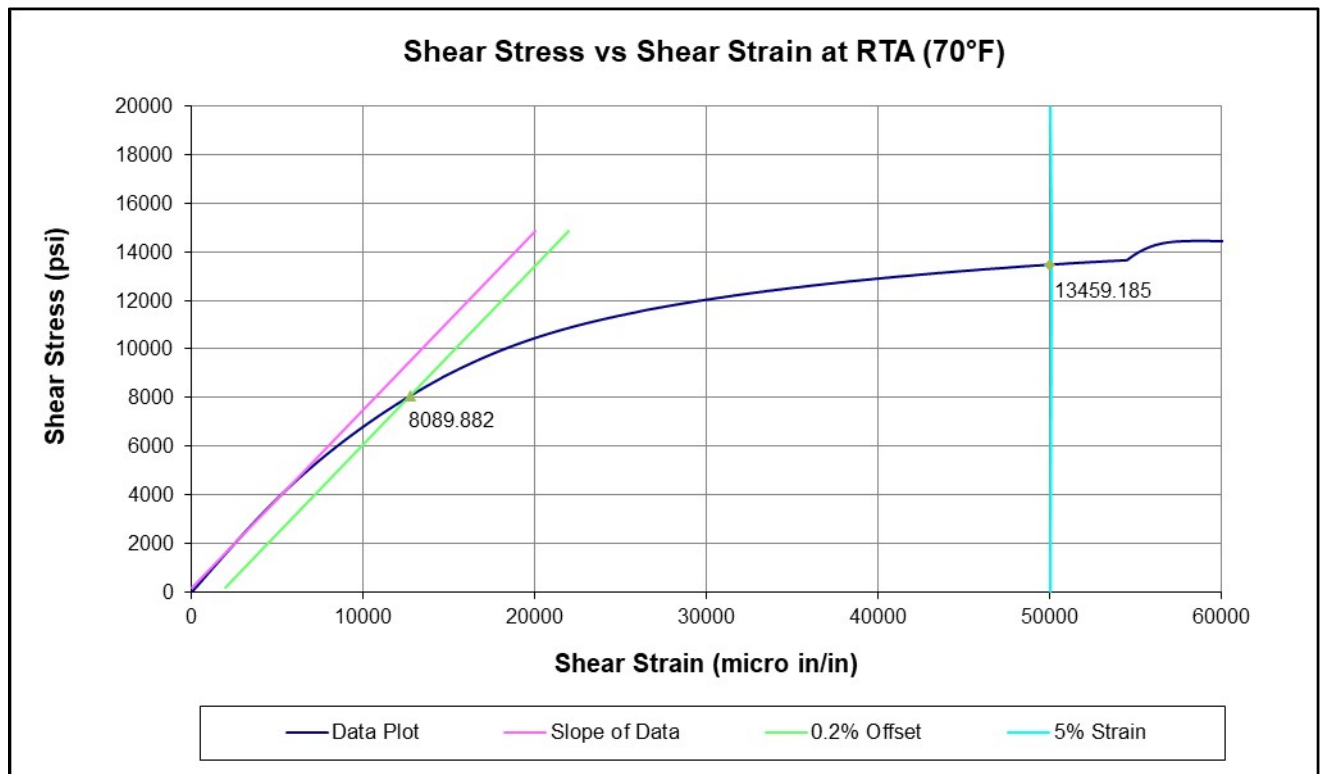
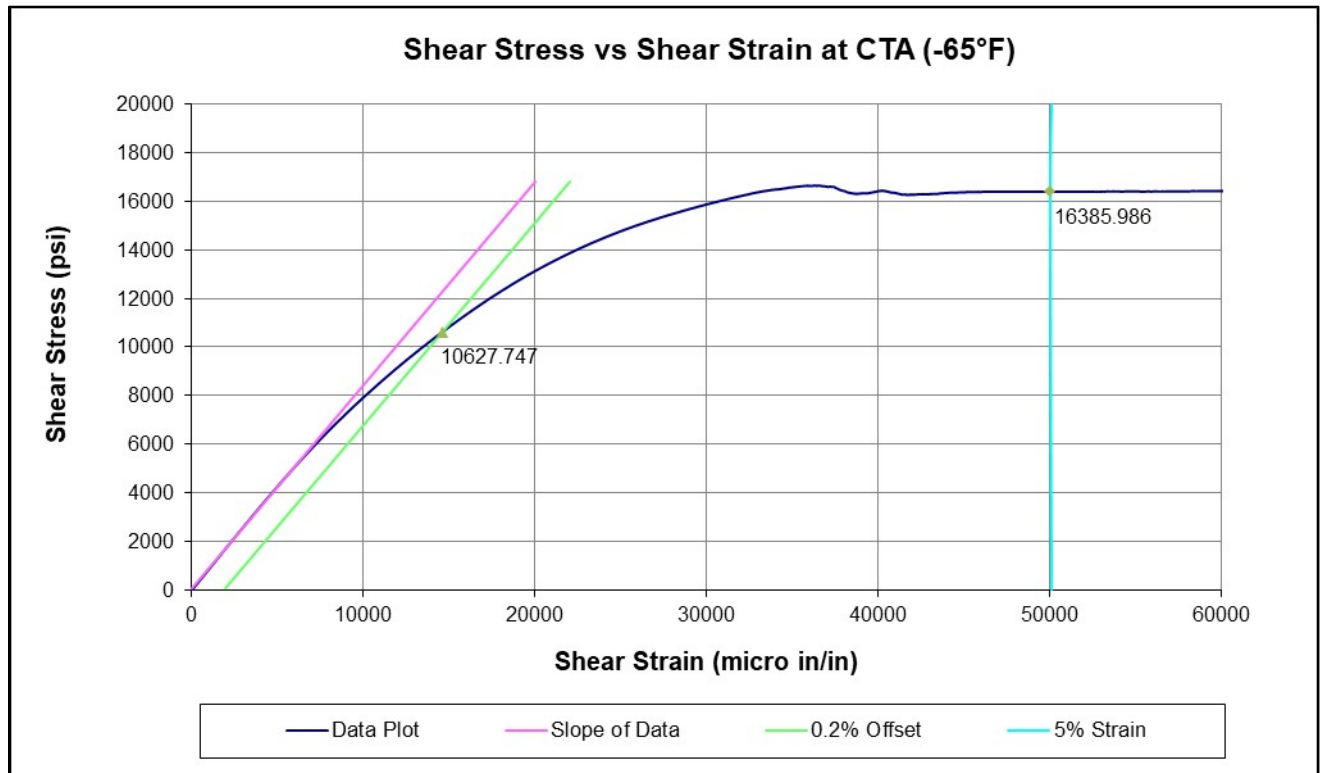
## 6.4 Transverse Compression (TC)

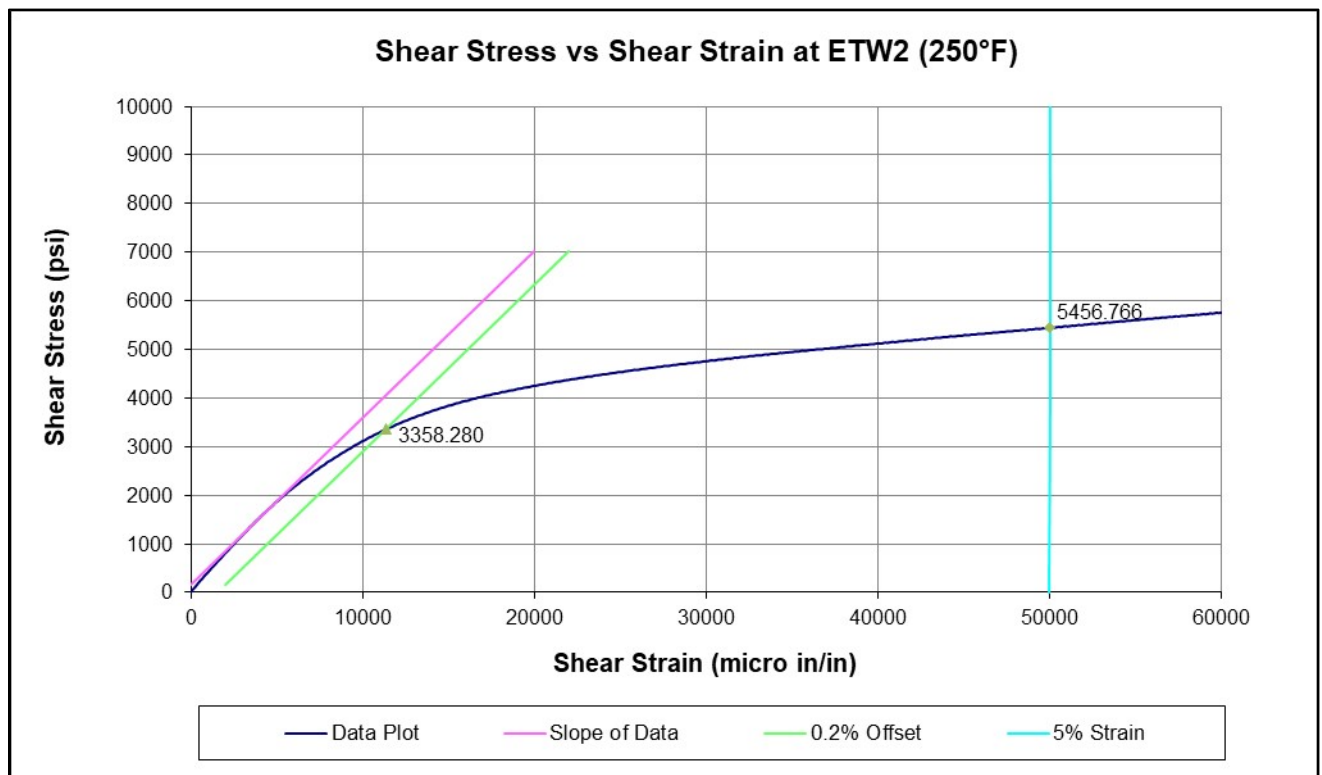
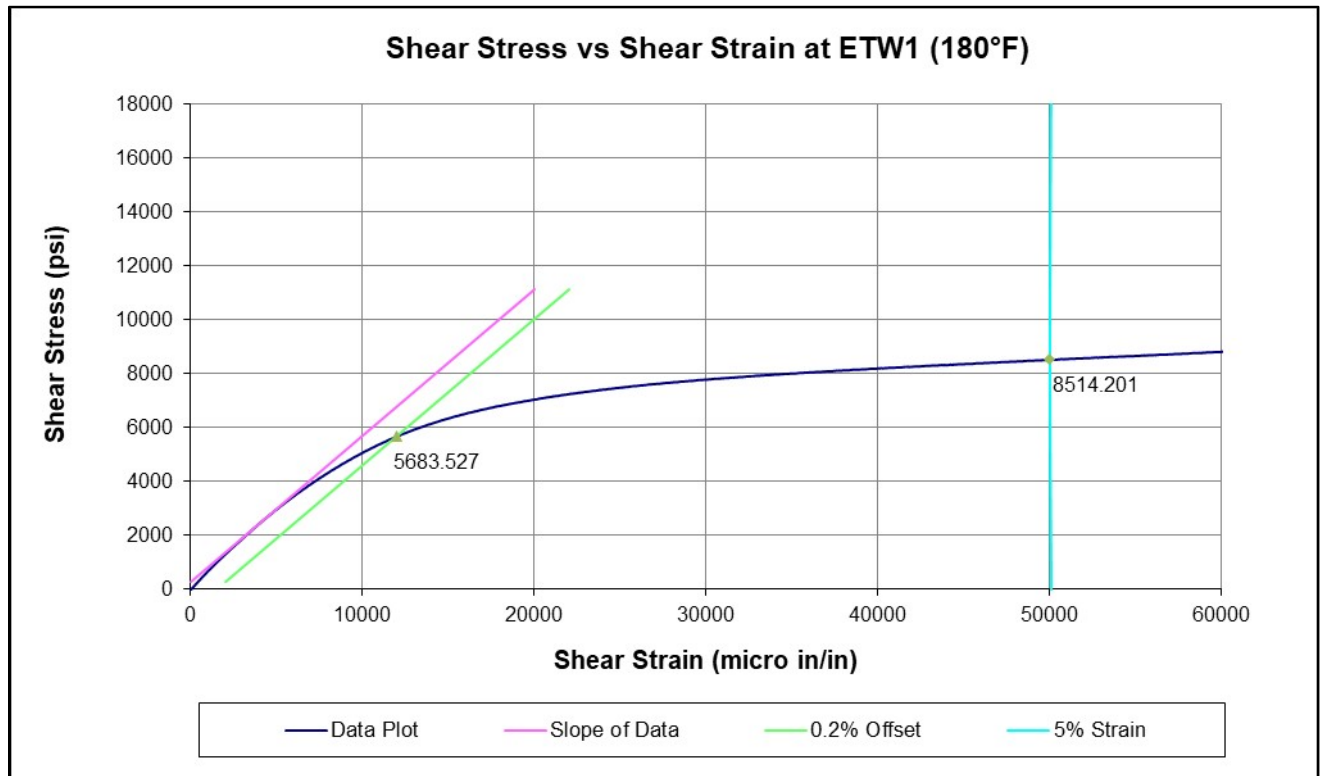




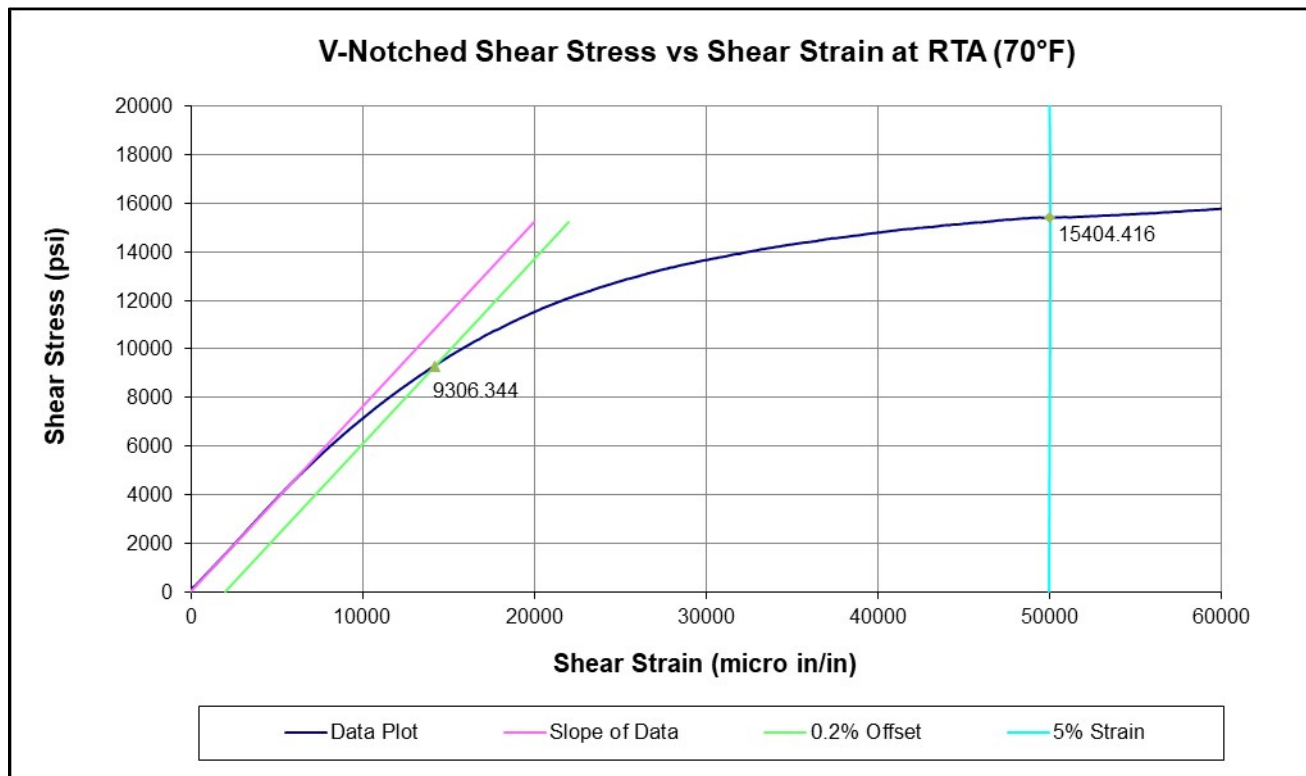
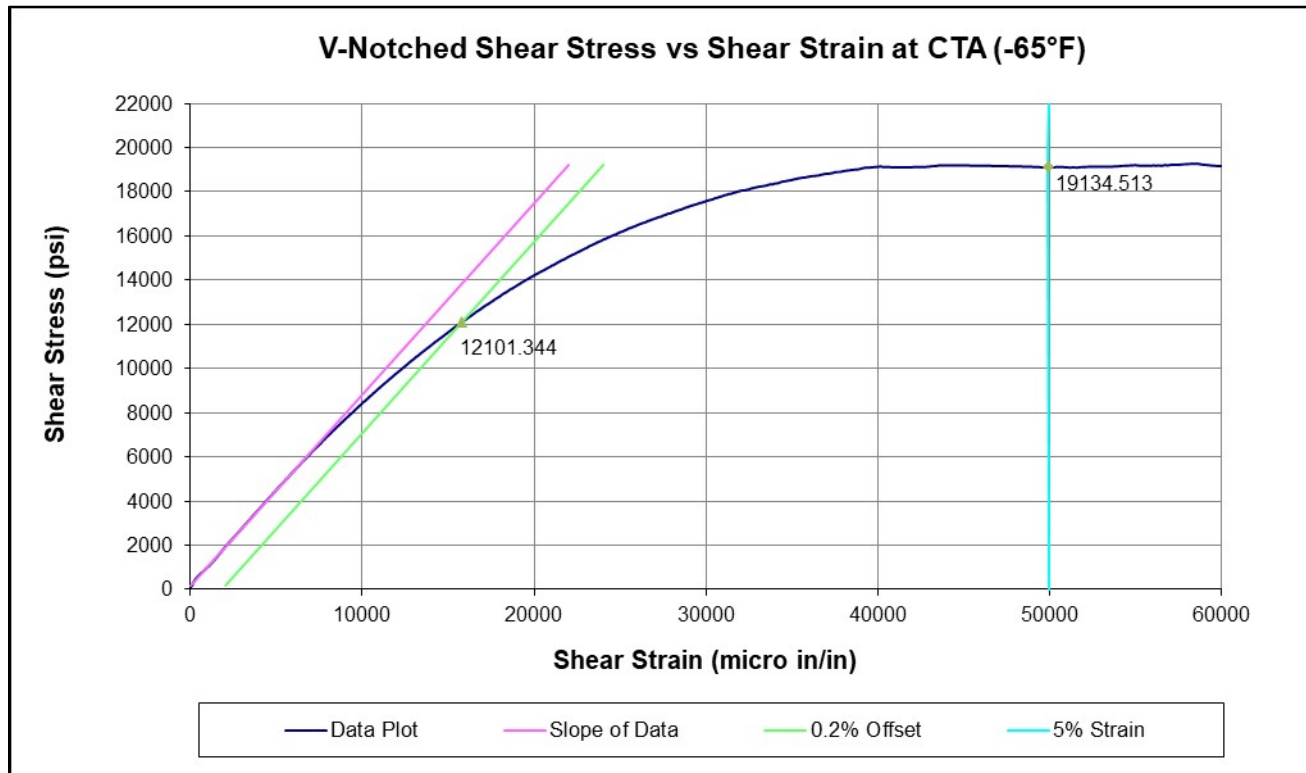


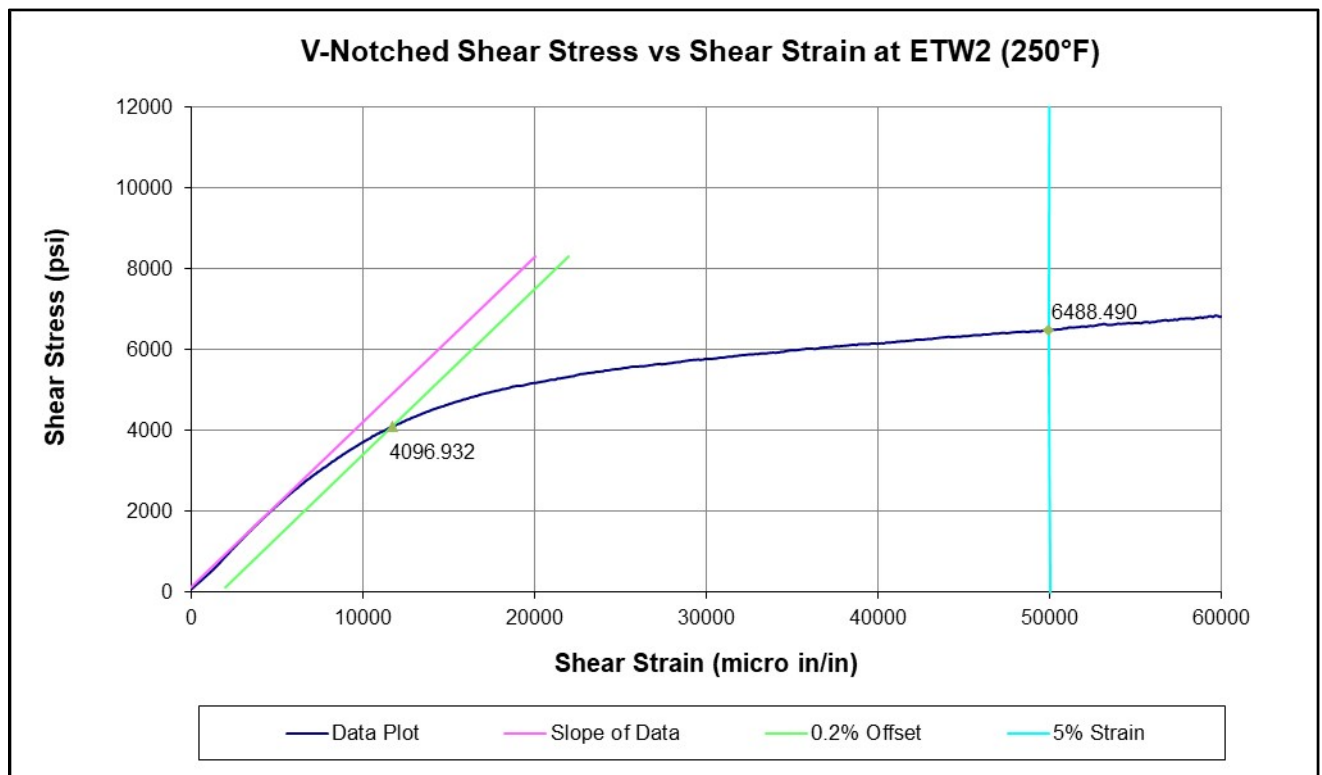
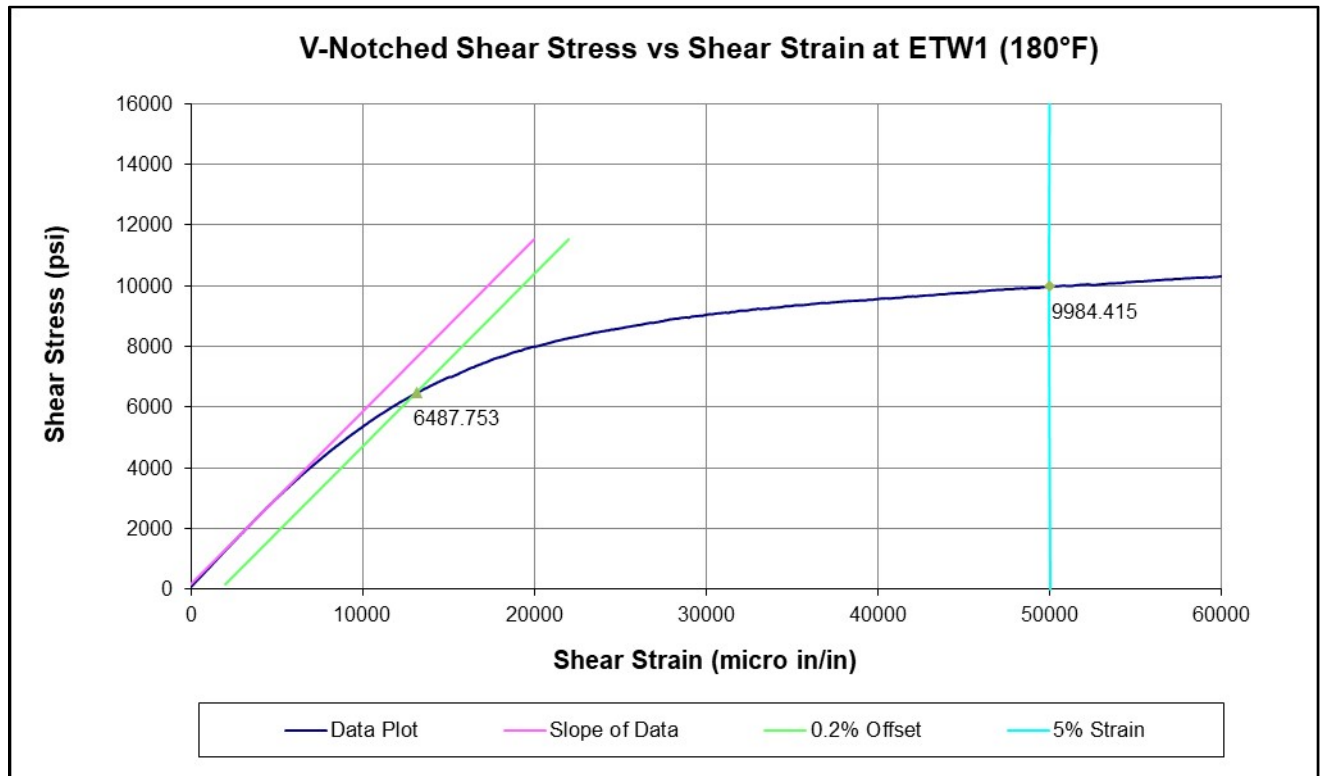
## 6.5 In-Plane Shear (IPS)



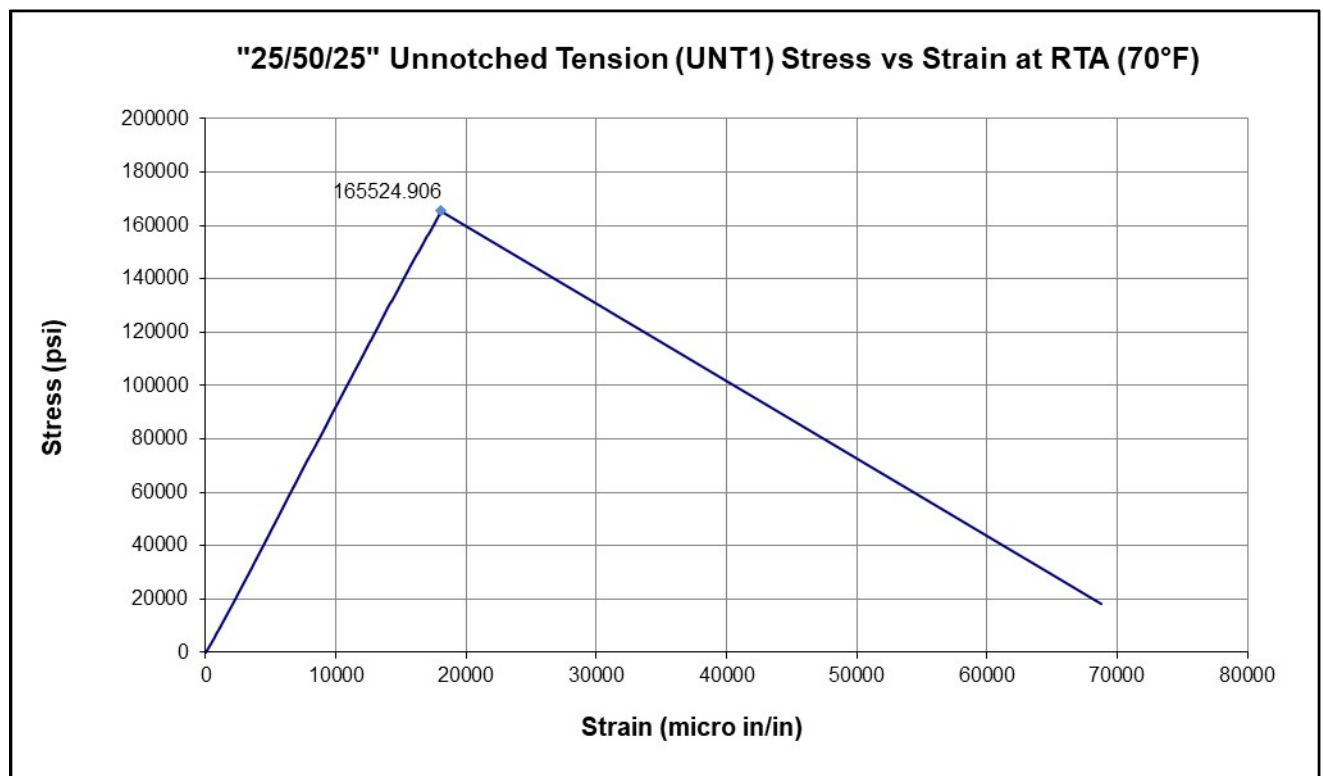
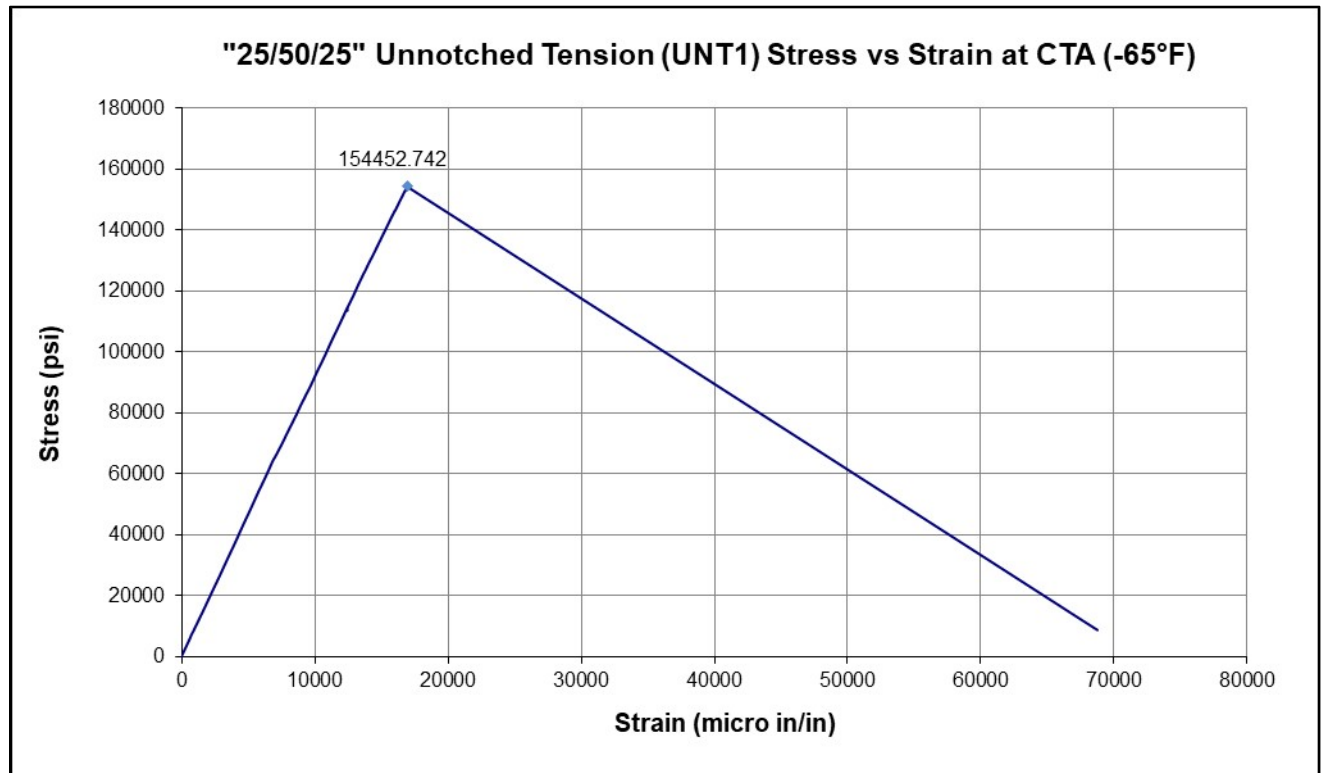


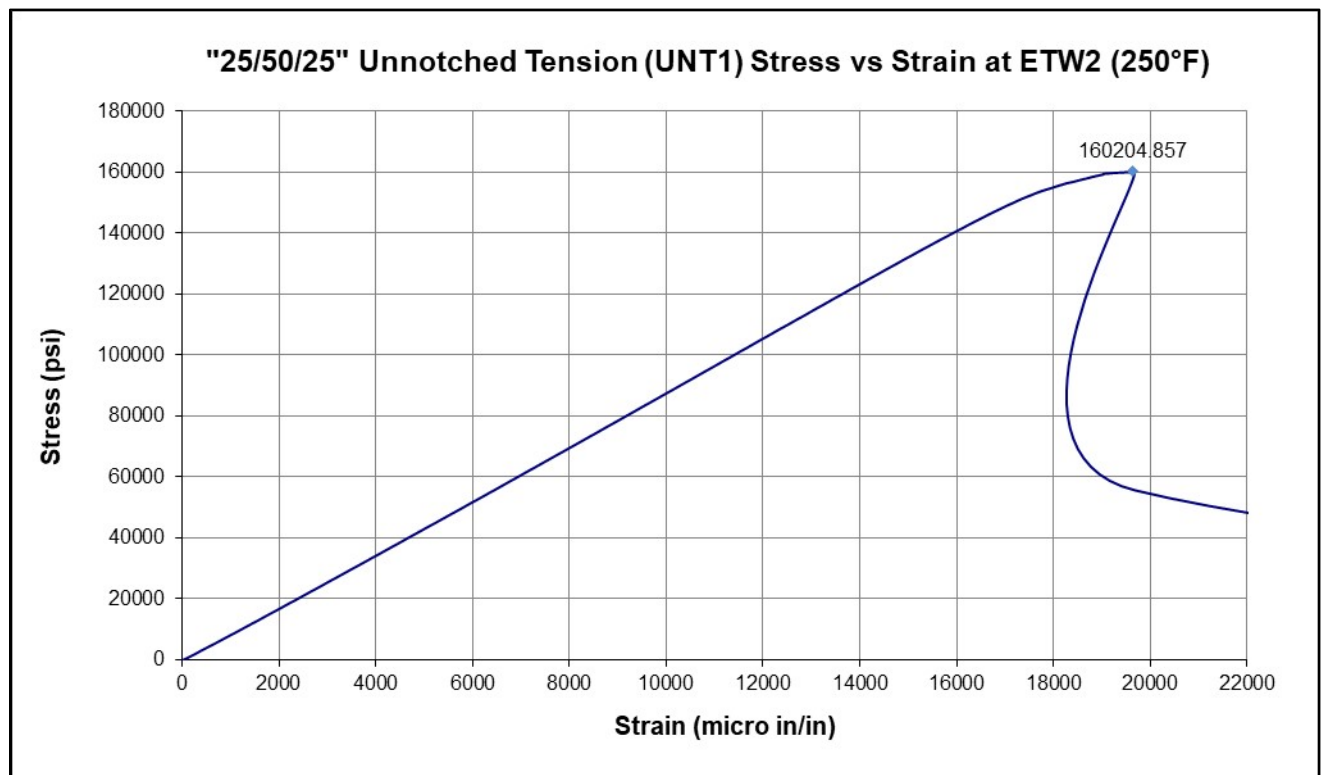
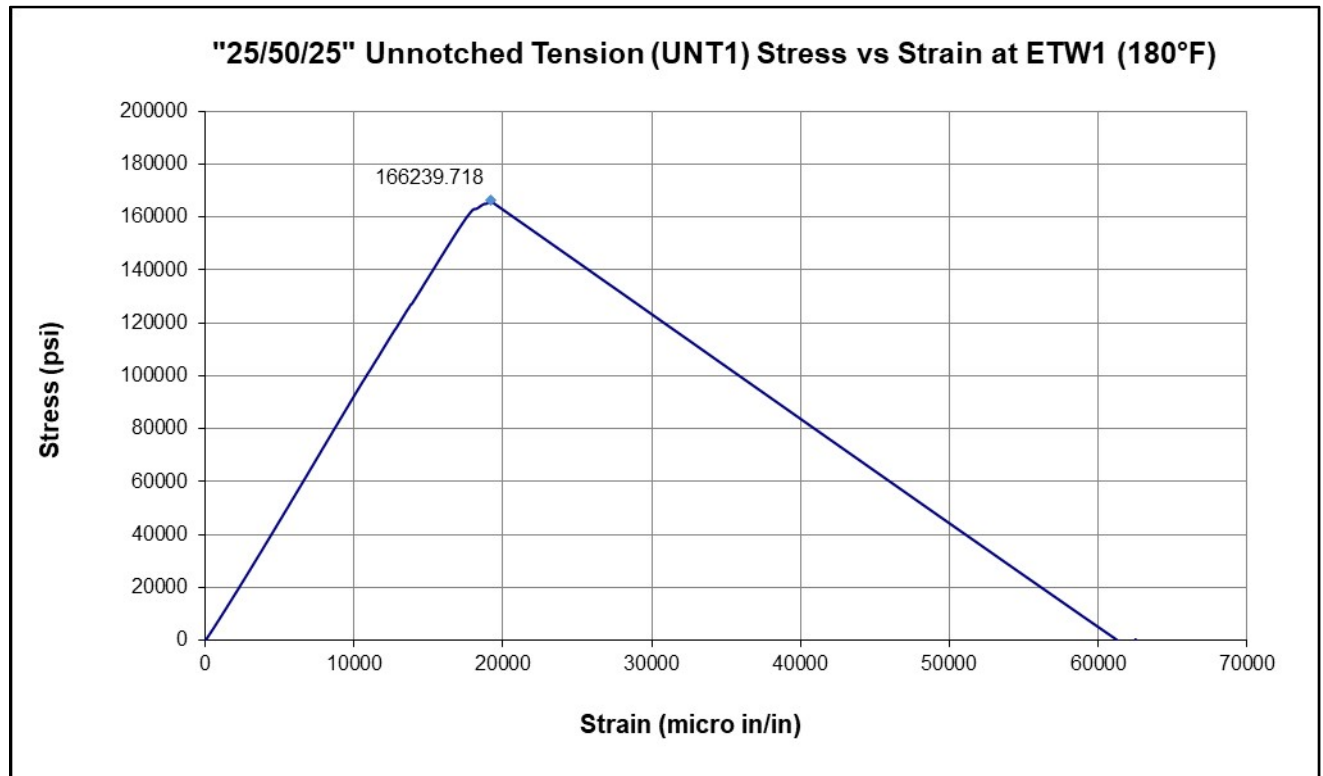
## 6.6 In-Plane Shear V-Notched Properties (VNS)



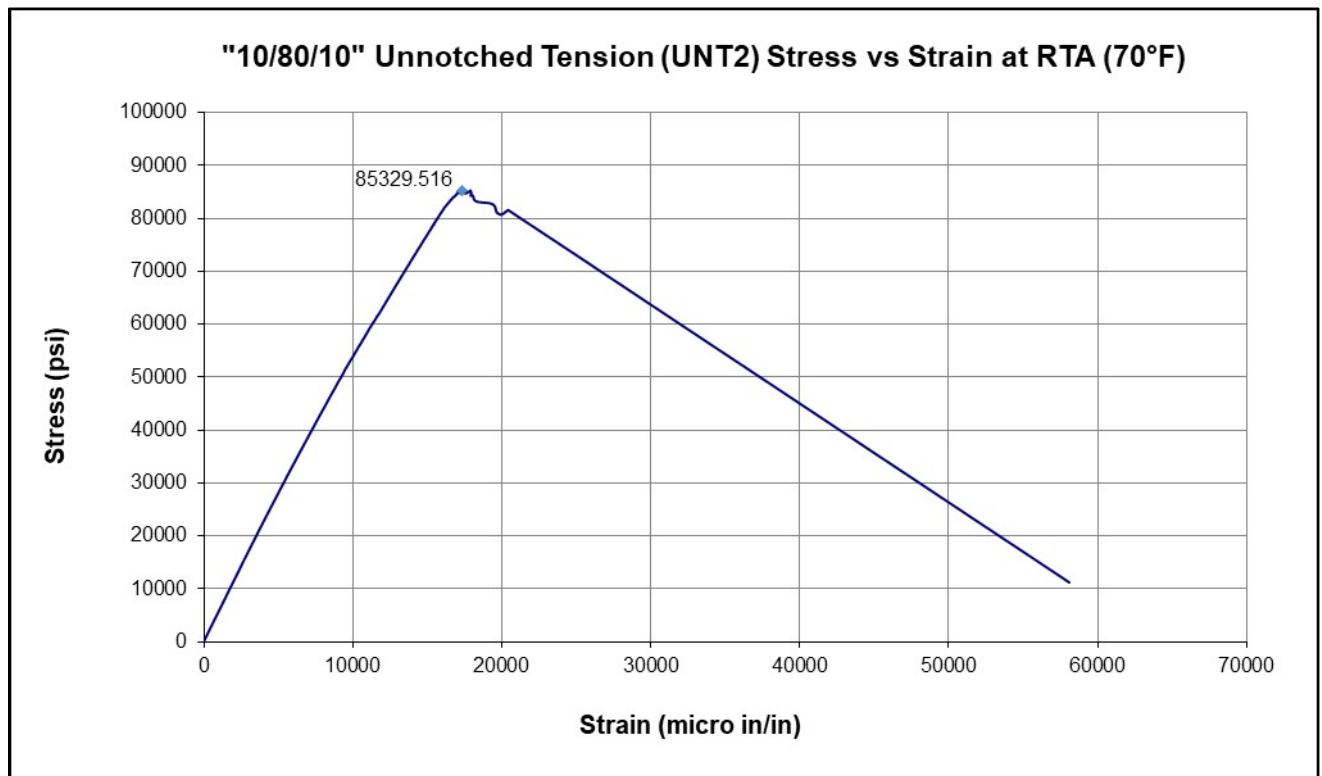
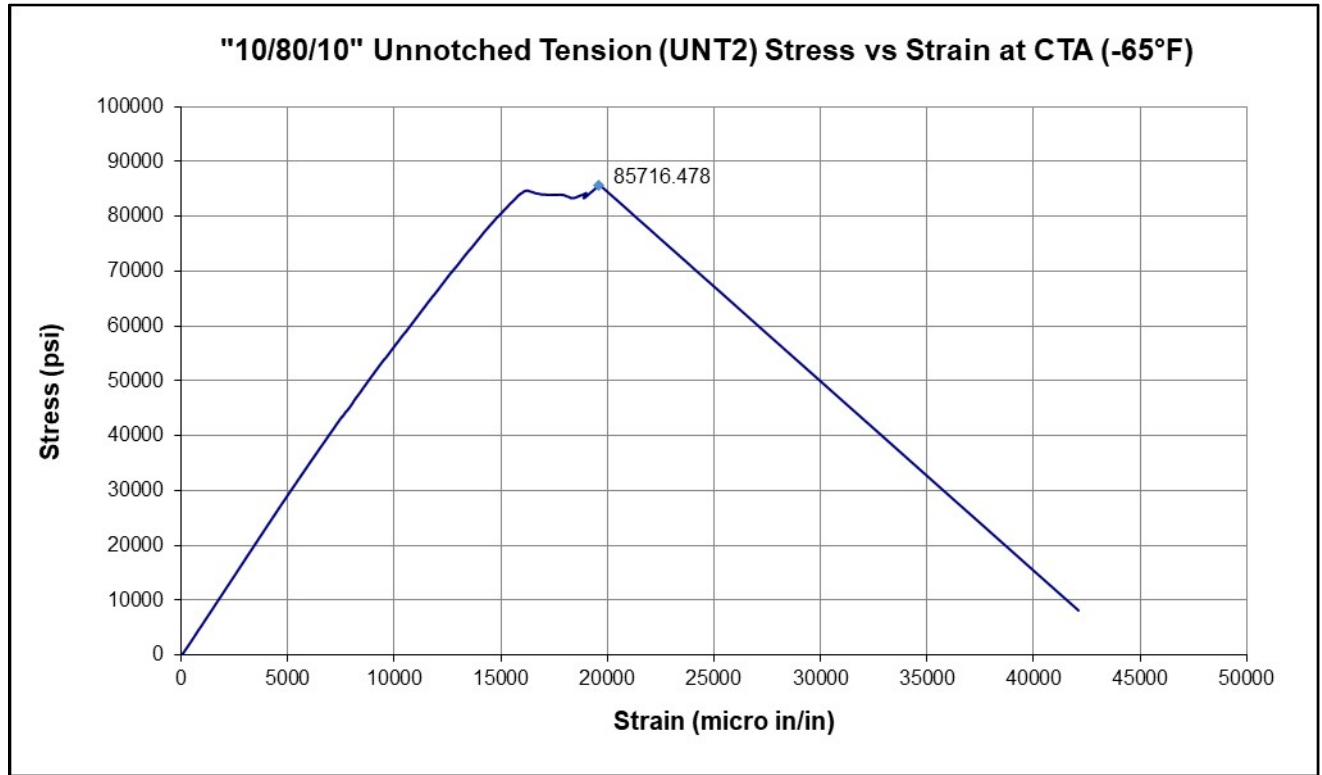


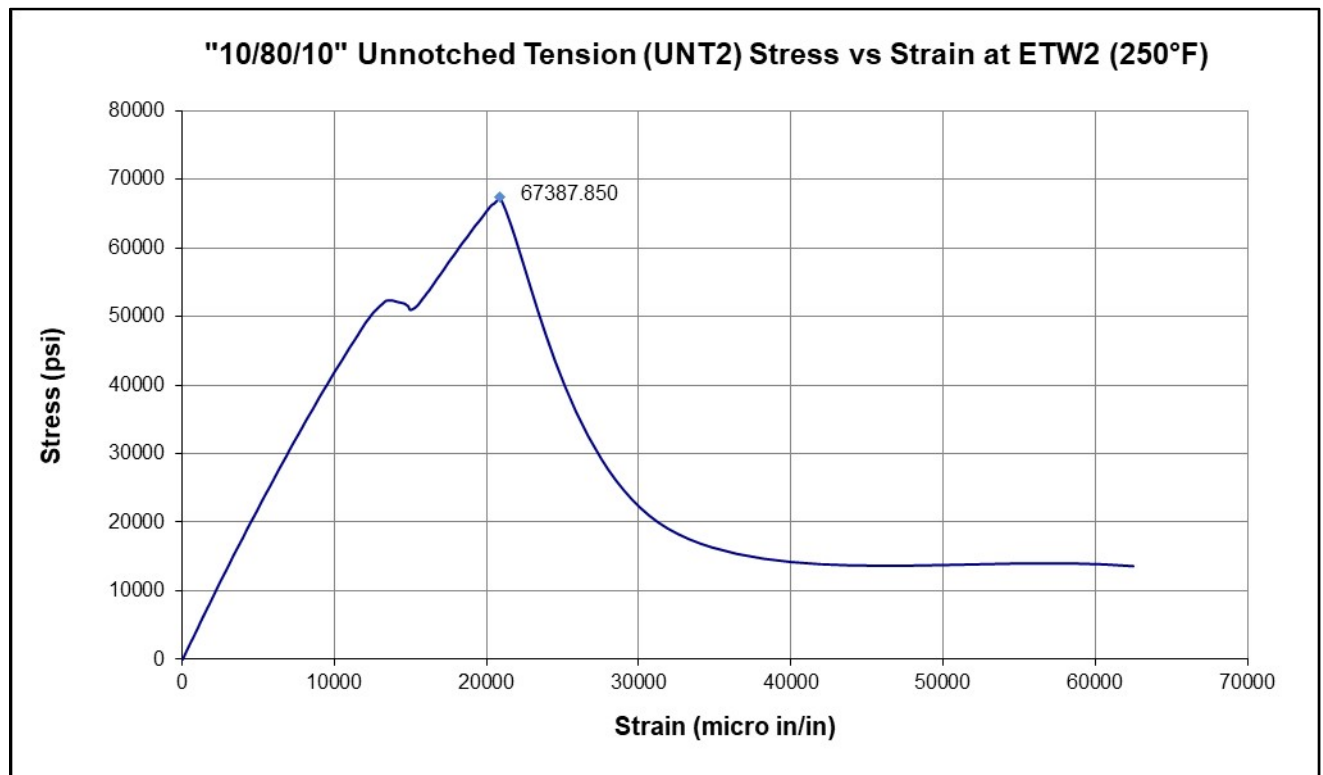
## 6.7 "25/50/25" Unnotched Tension 1 (UNT1)



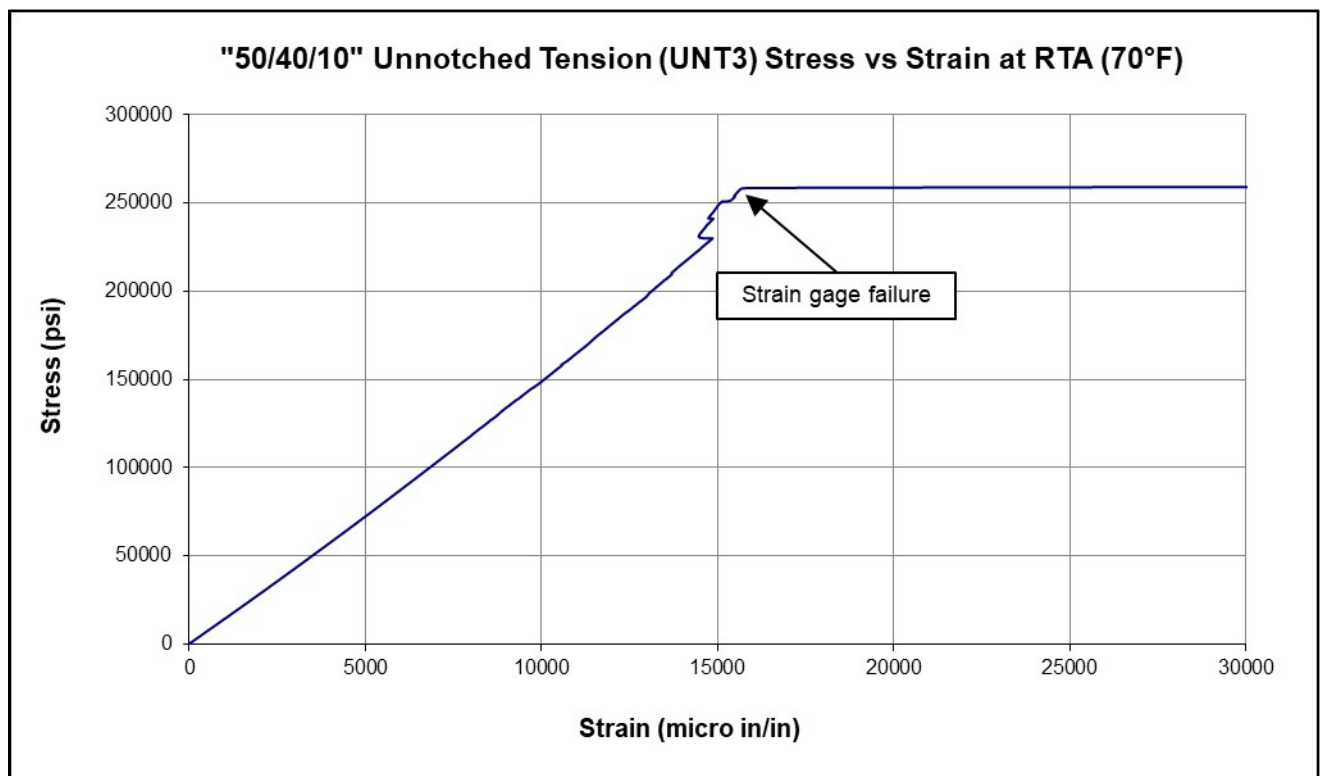
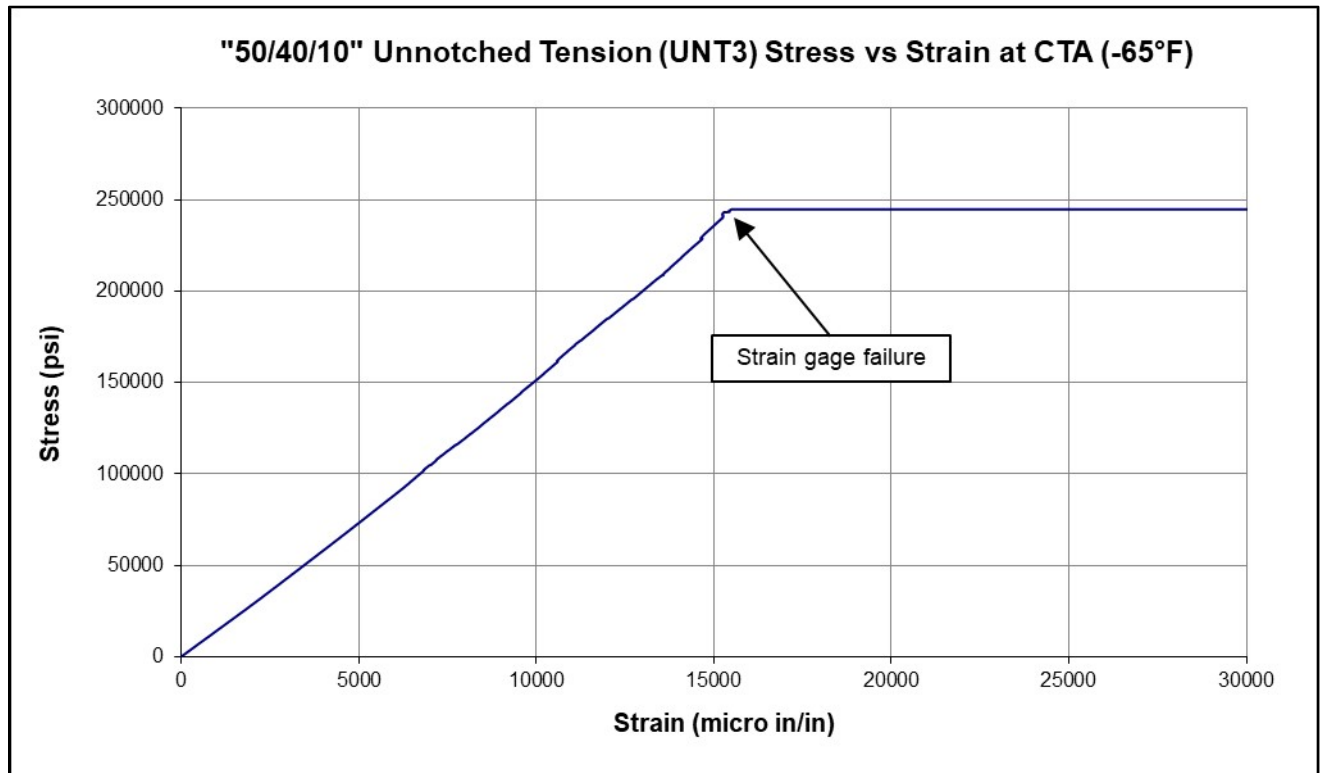


## 6.8 "10/80/10" Unnotched Tension 2 (UNT2)

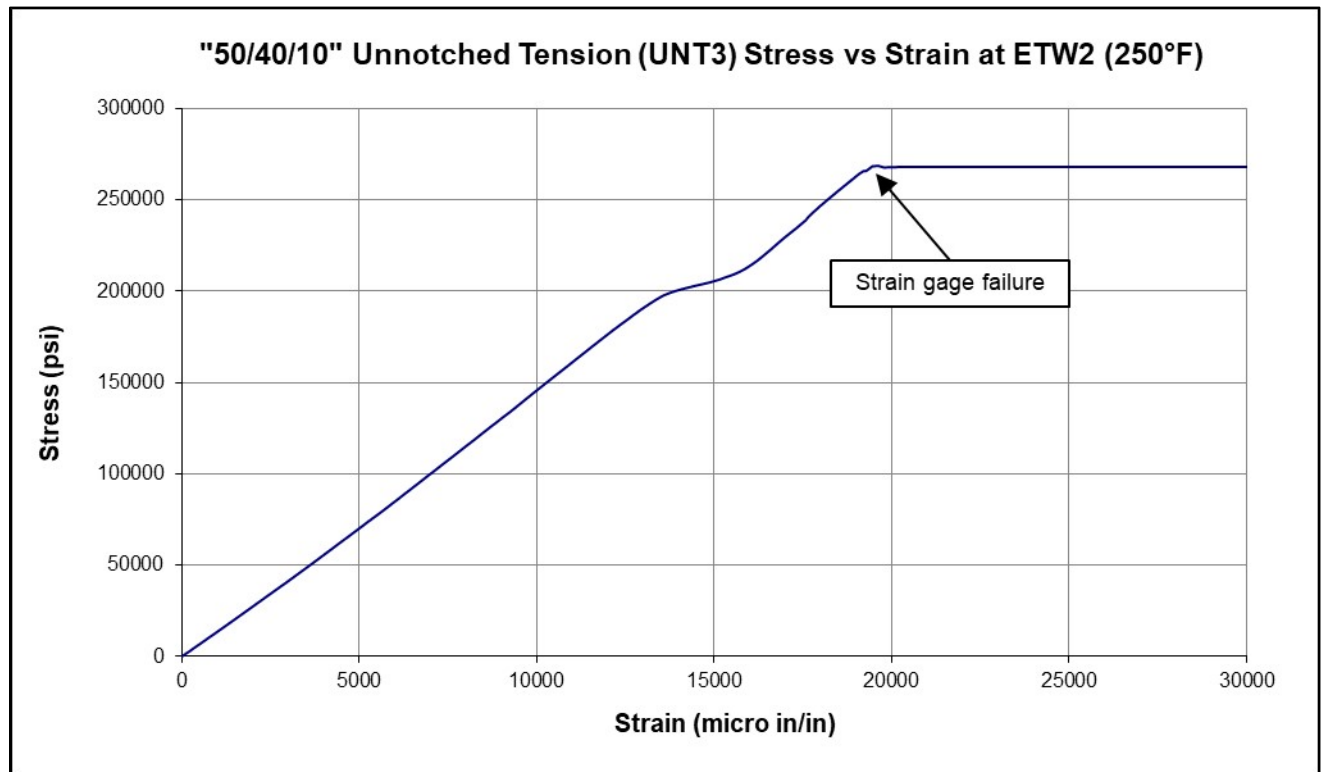


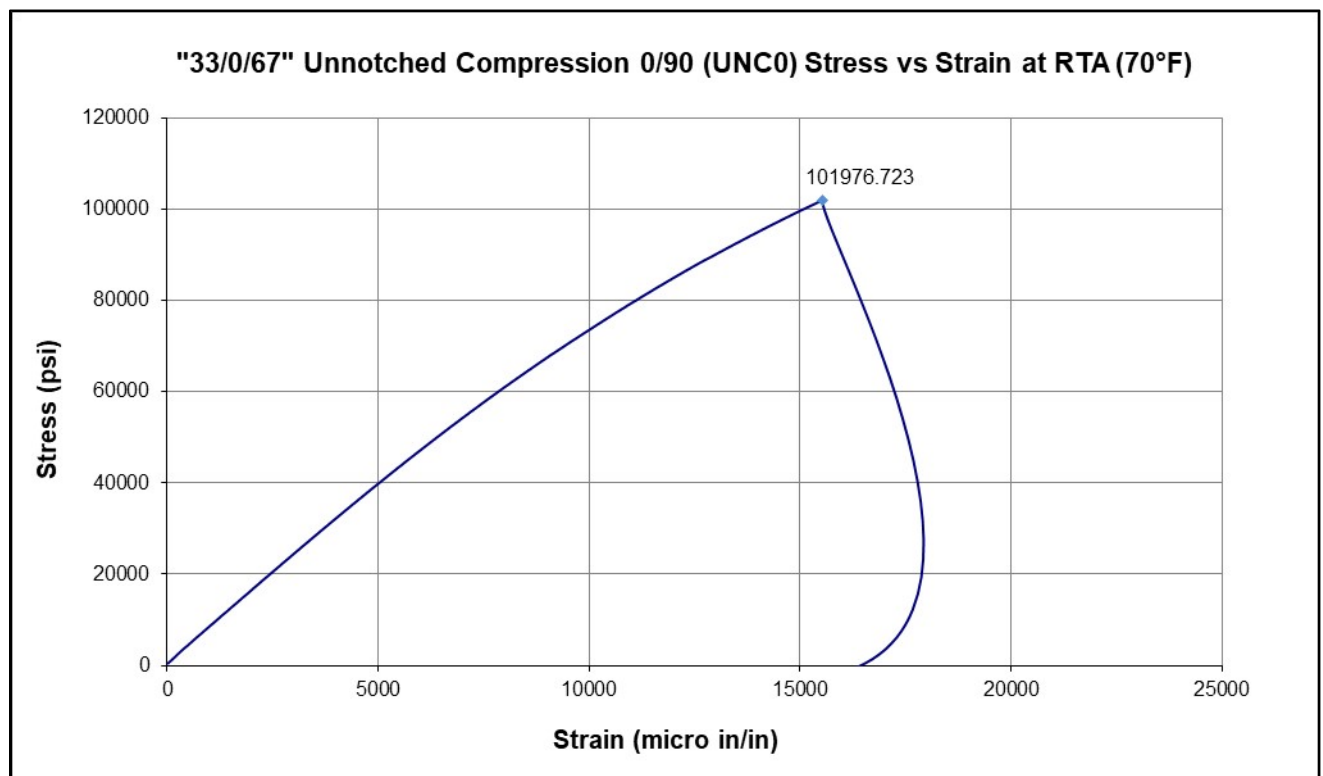
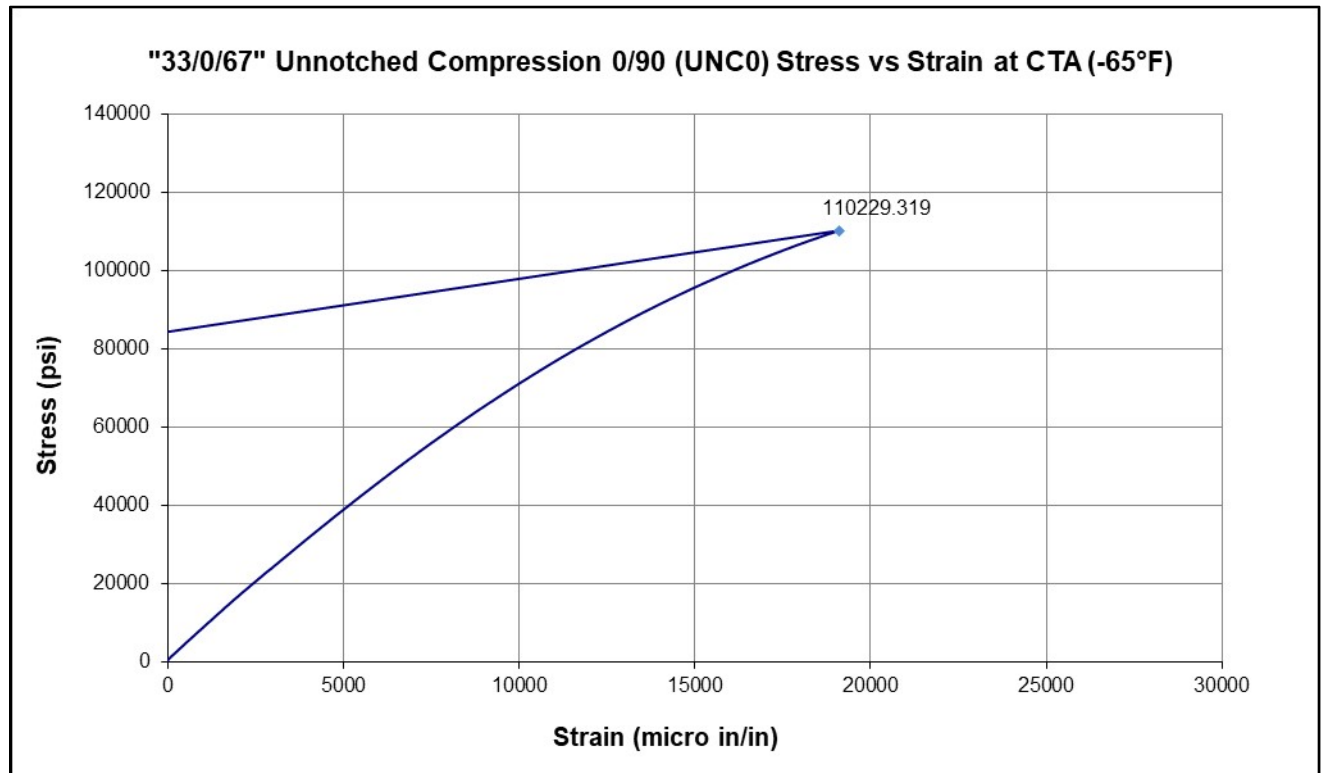


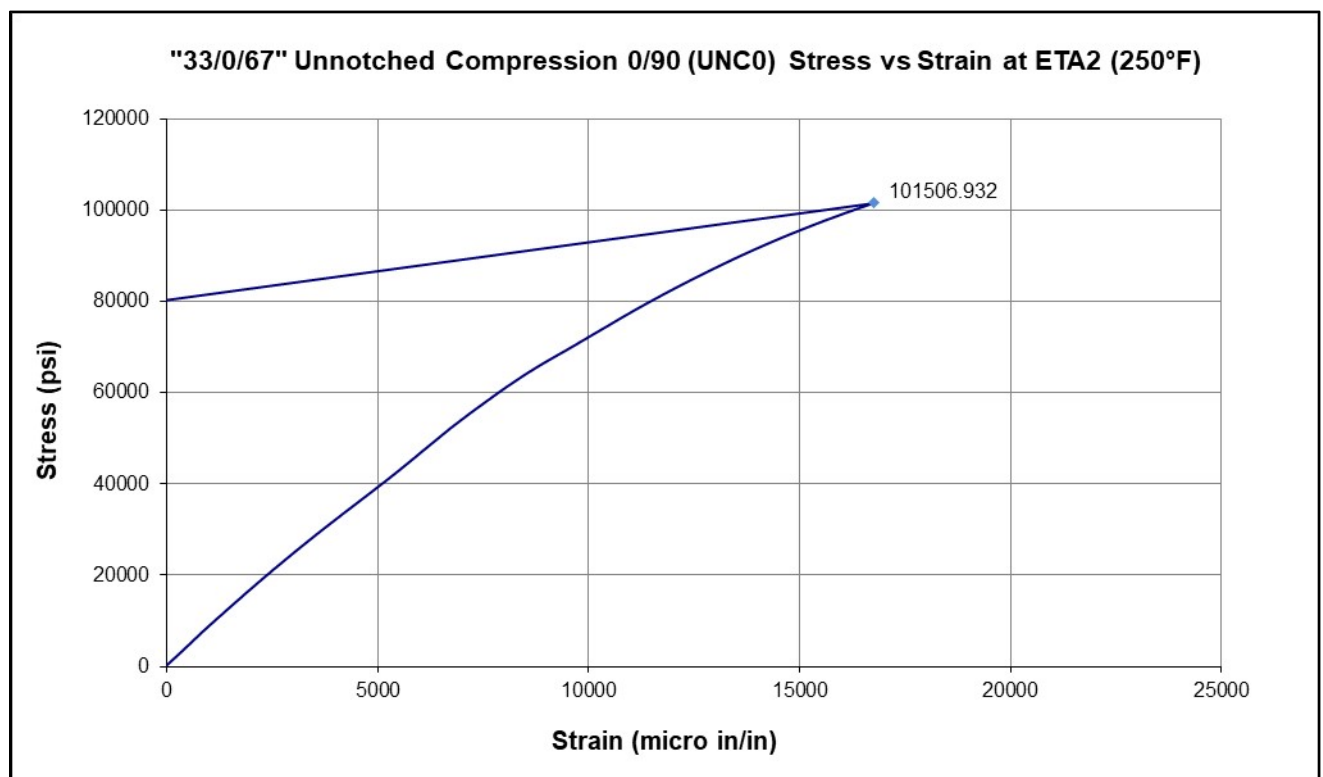
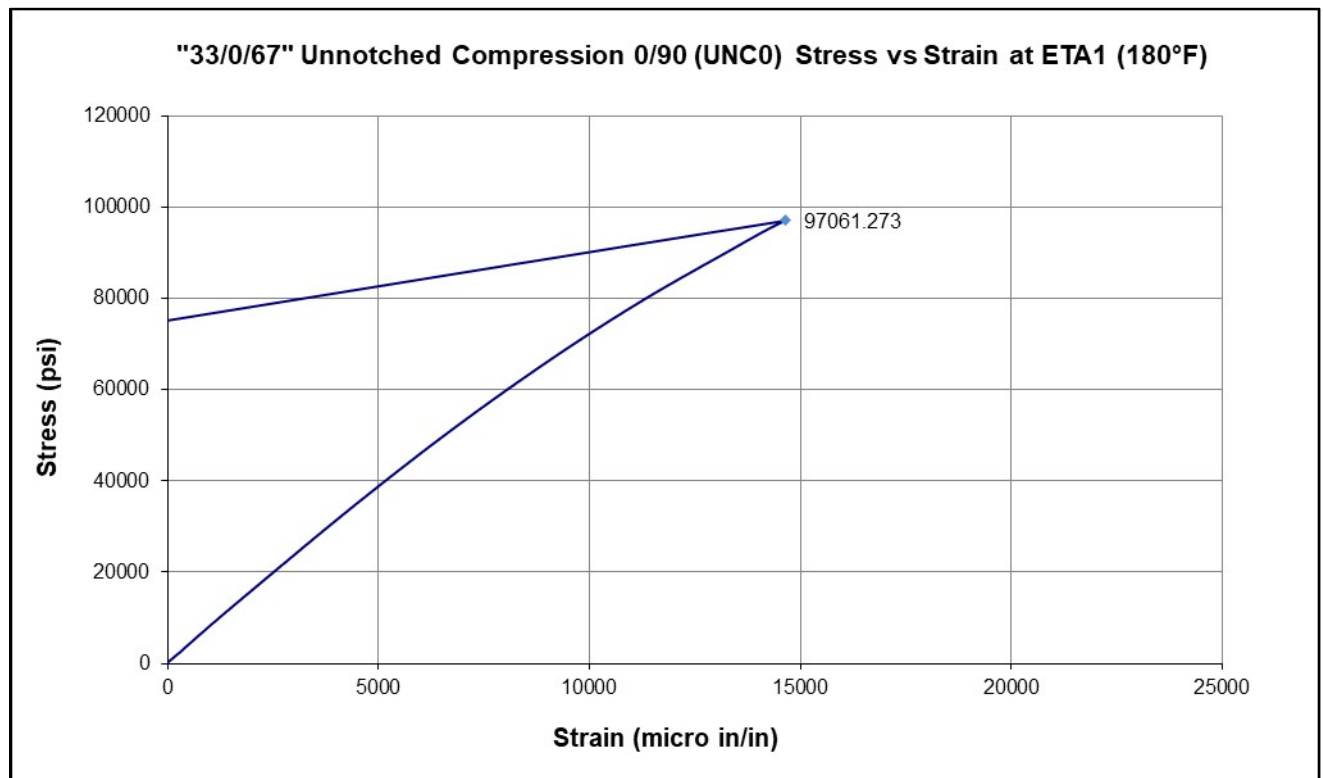
## 6.9 "50/40/10" Unnotched Tension 3 (UNT3)

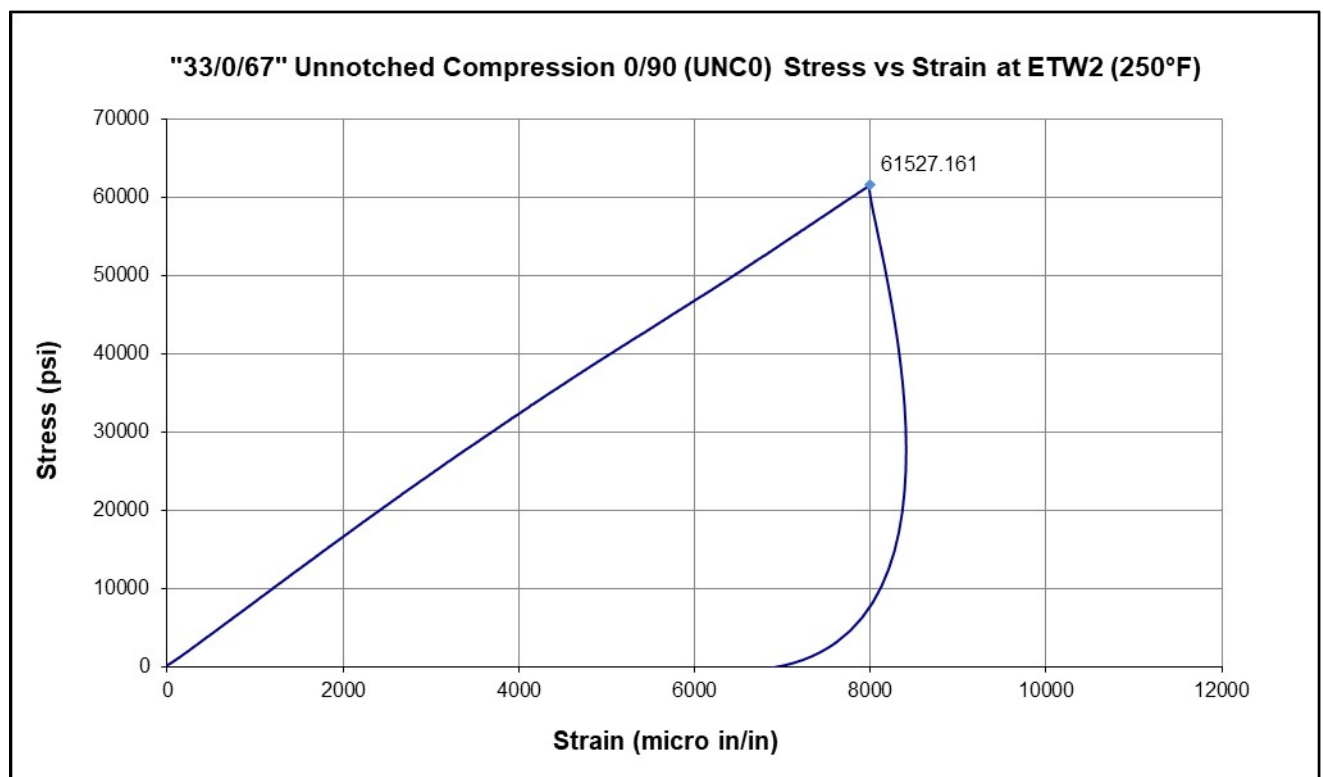
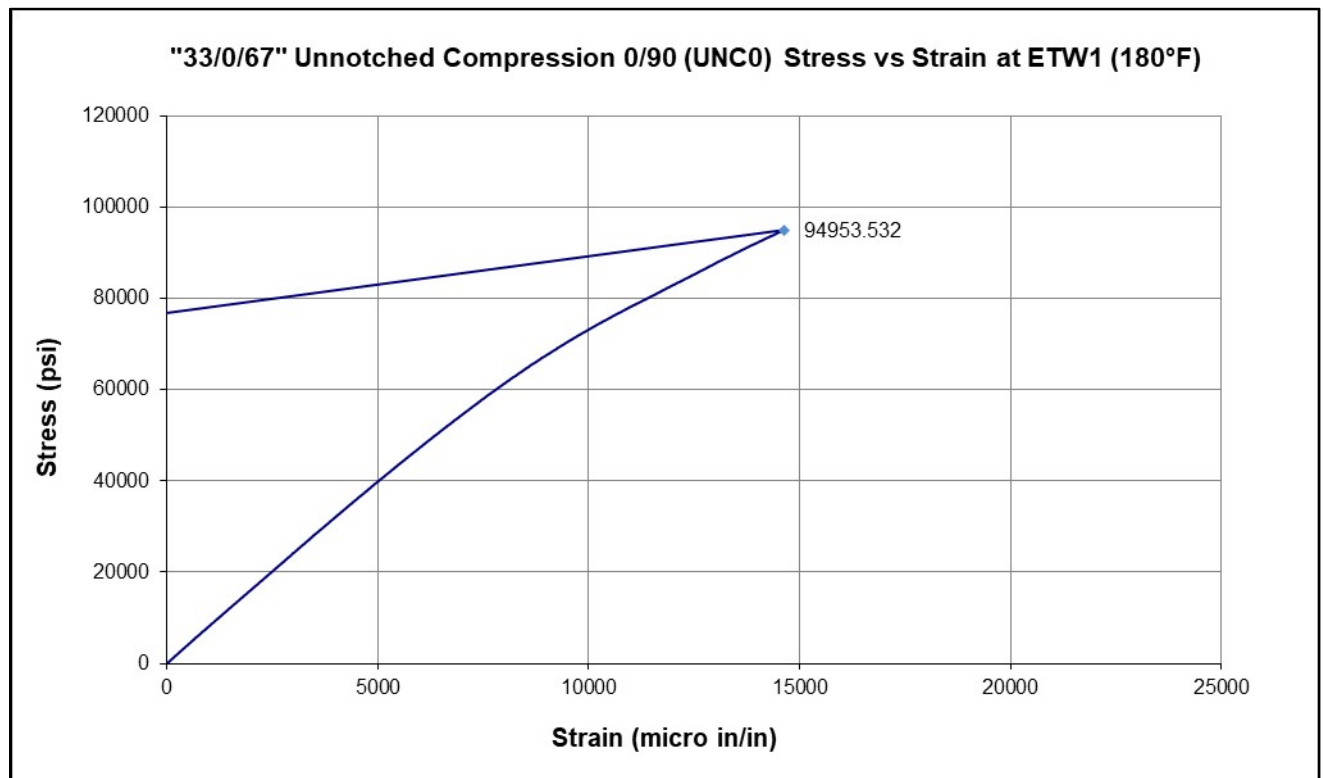


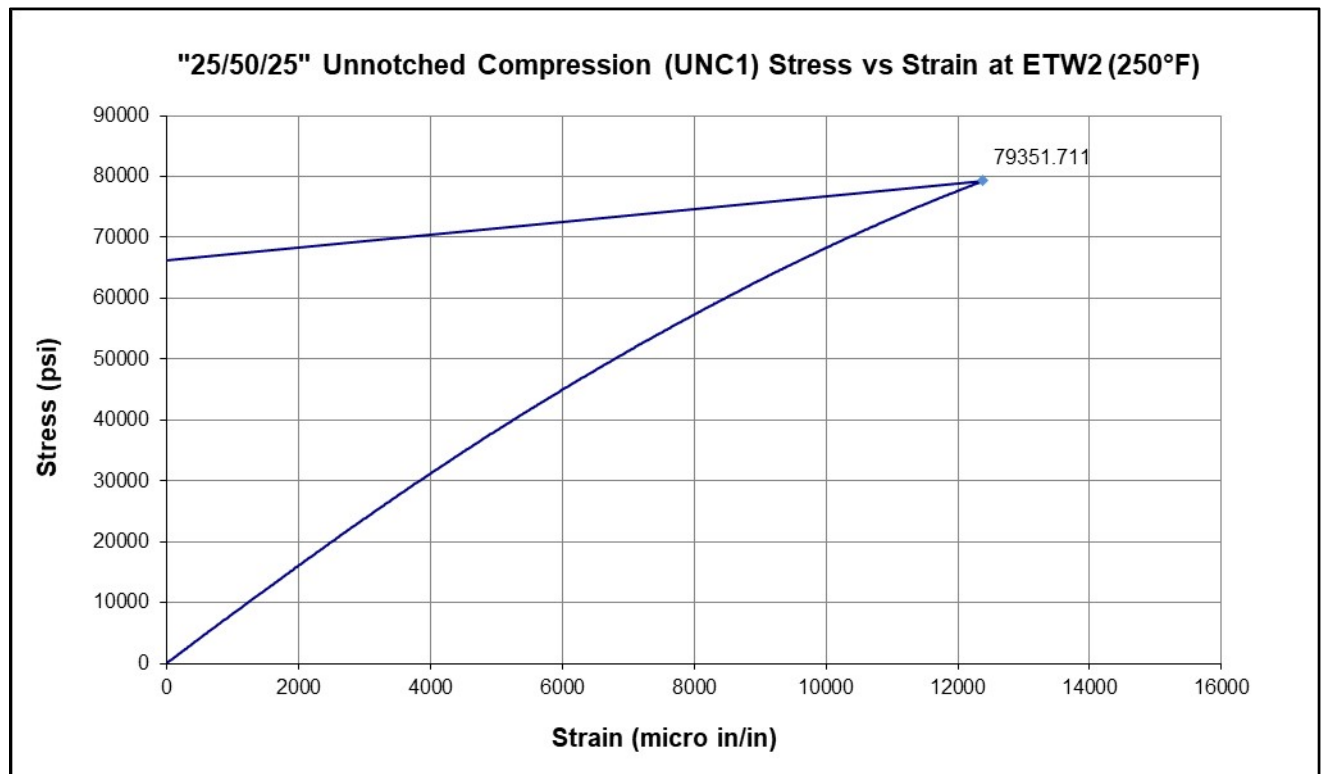
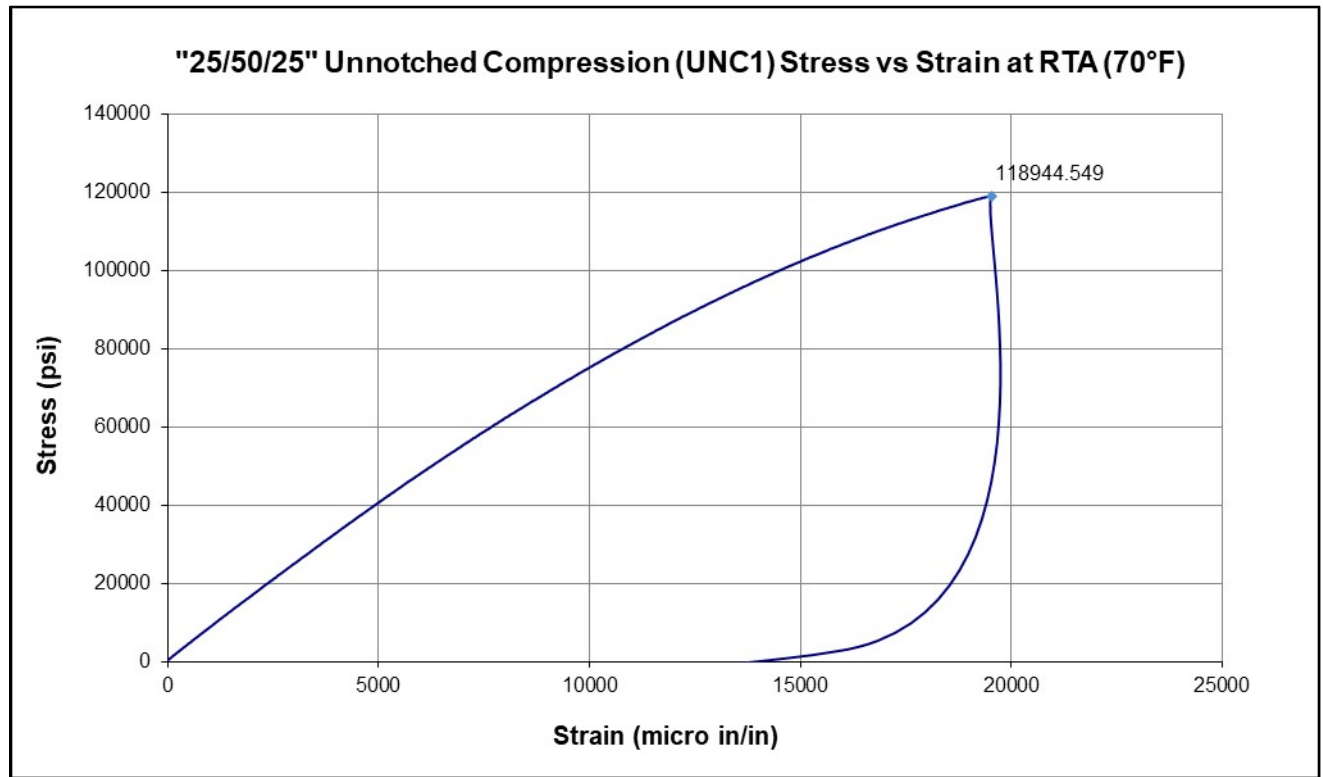
## UNT3 ETW2 (250°F) – Retest

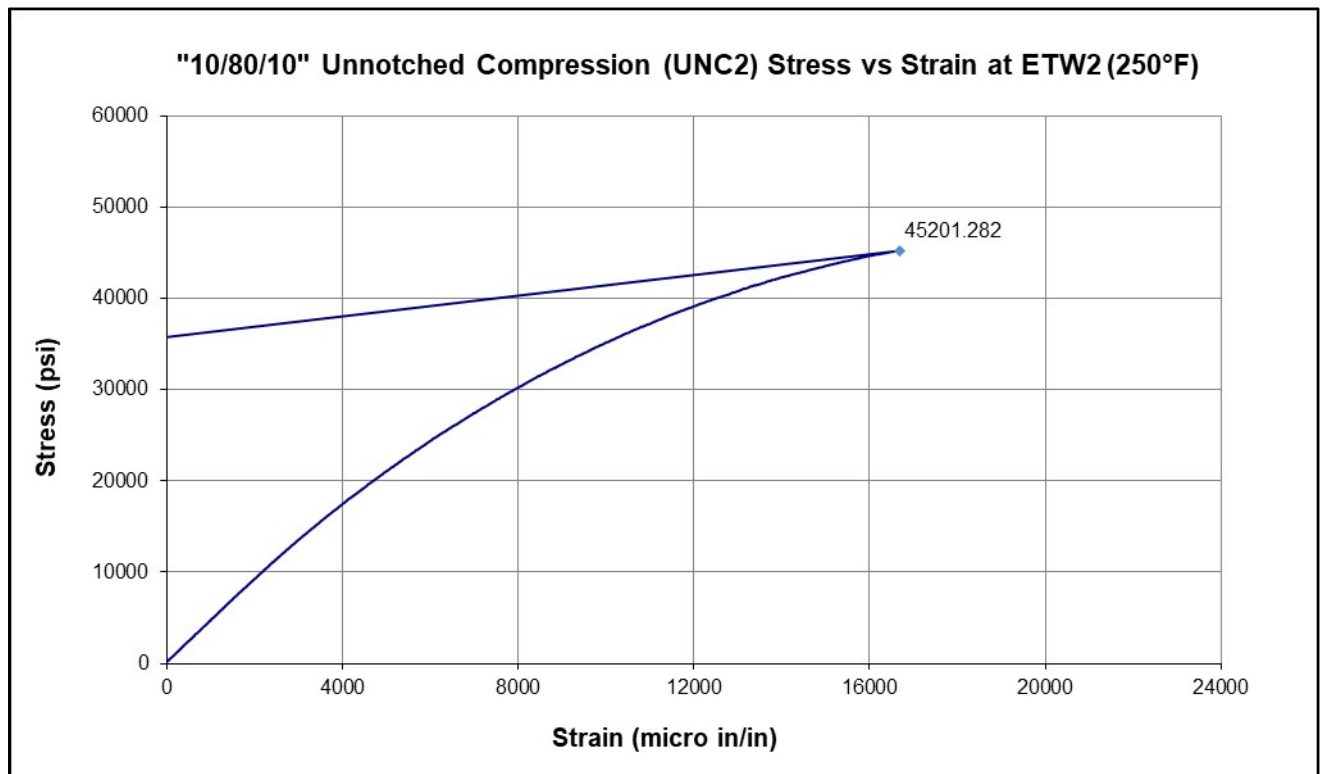
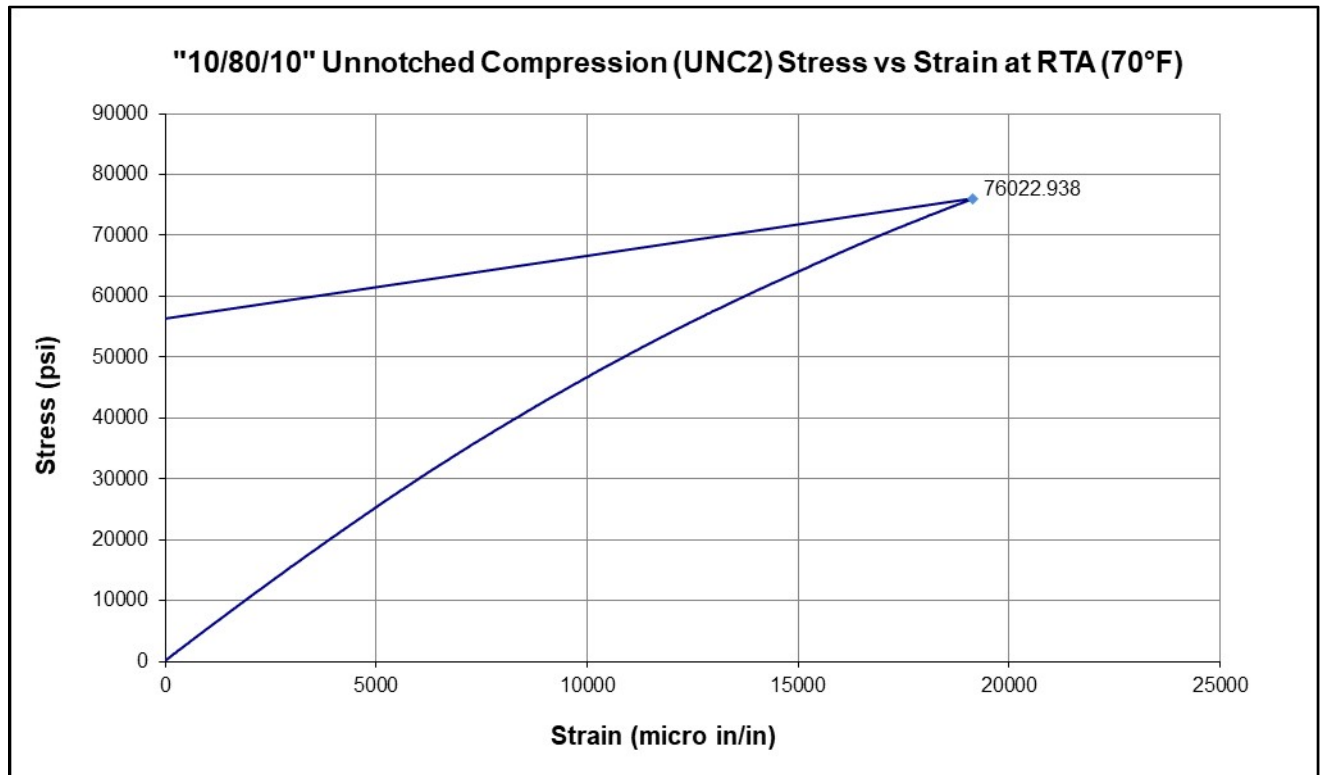


**6.10 "33/0/67" Unnotched Compression 0/90 (UNC0)**

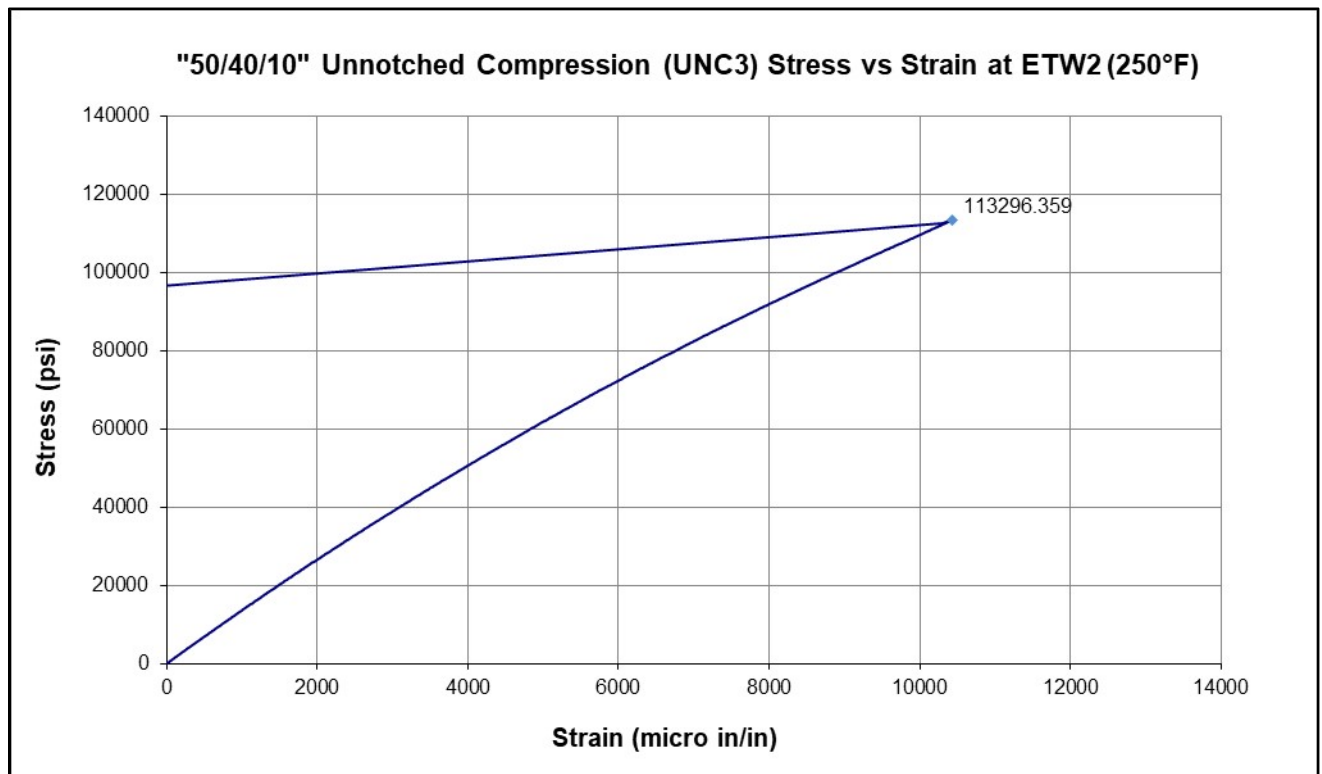
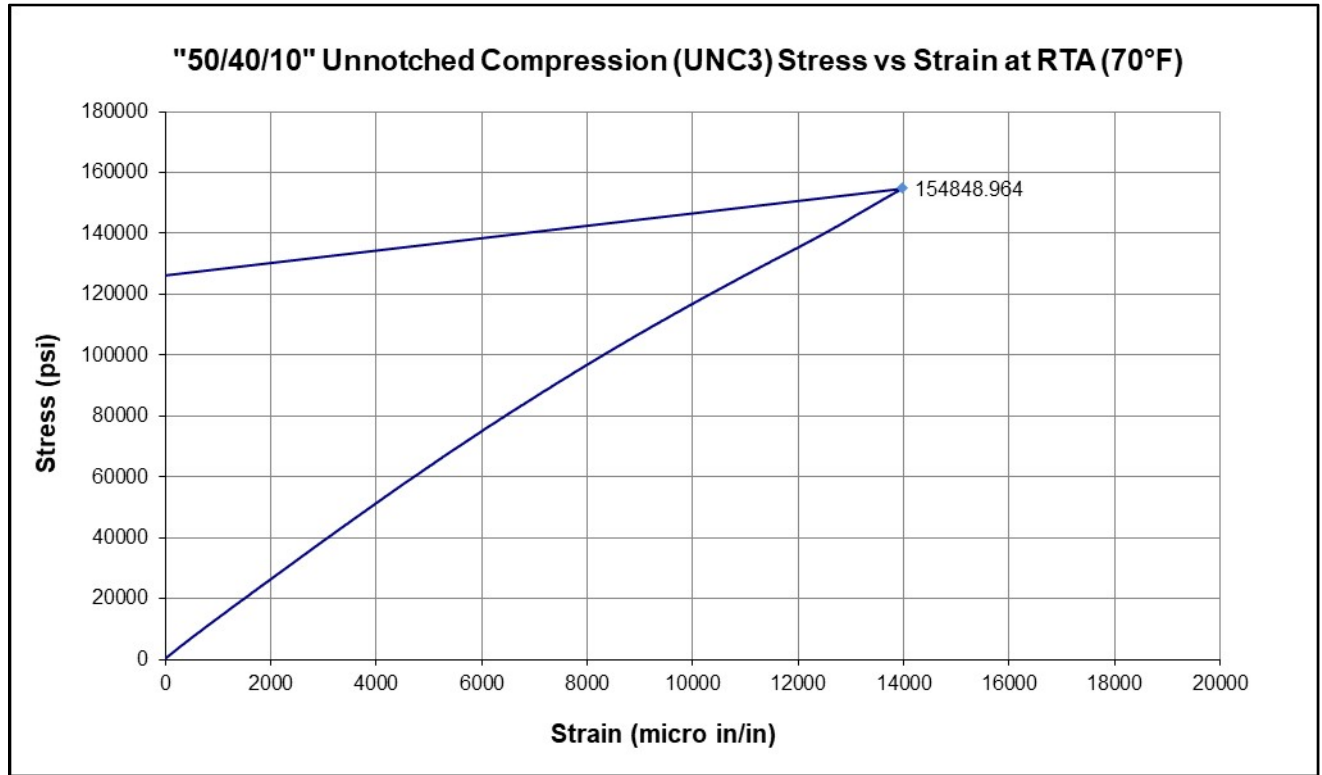




**6.11 "25/50/25" Unnotched Compression 1 (UNC1)**

**6.12 "10/80/10" Unnotched Compression 2 (UNC2)**

### 6.13 "50/40/10" Unnotched Compression 3 (UNC3)

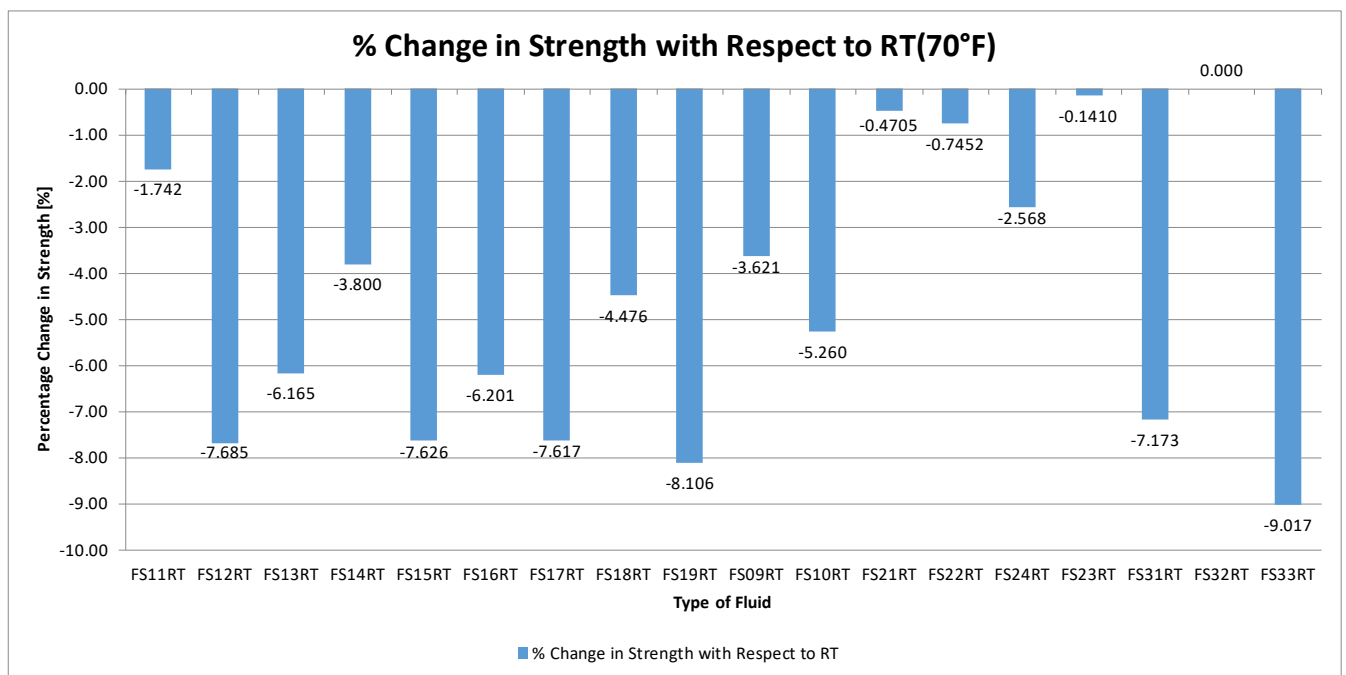
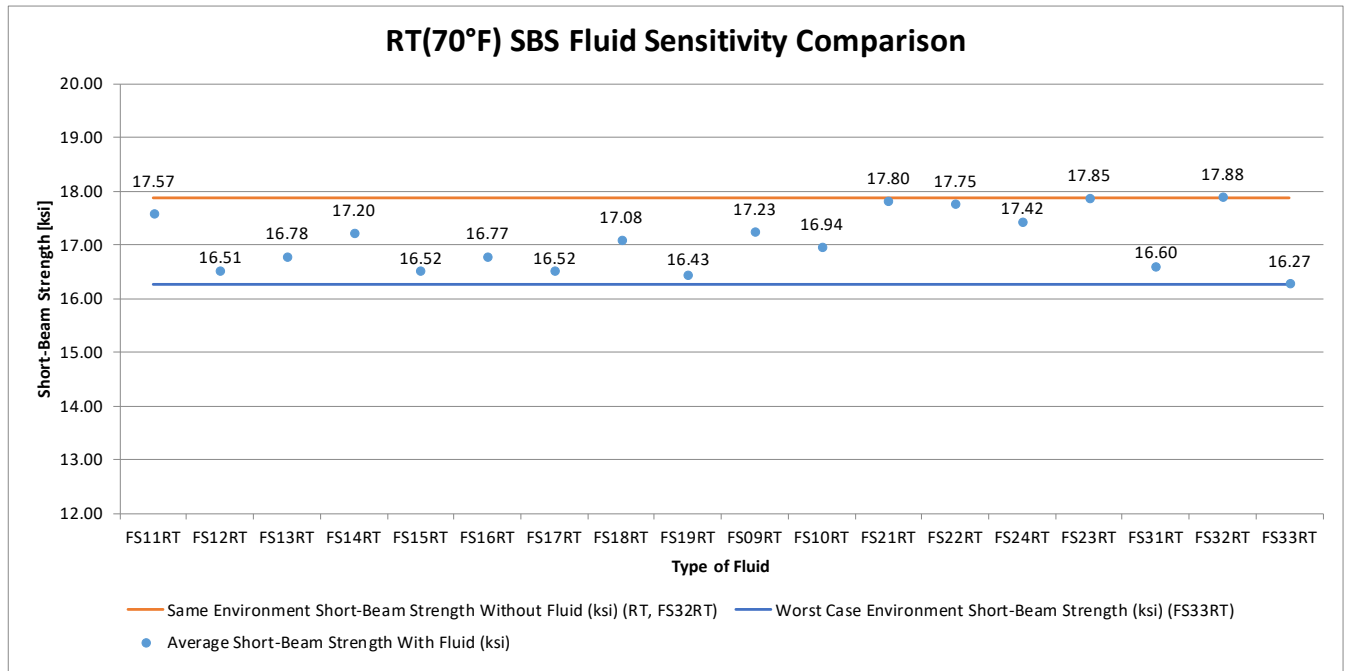


## 7. Fluid Sensitivity Comparison

### 7.1 Short Beam Strength Fluid Sensitivity (SBSFS)

#### 7.1.1 SBSFS Room Temperature Test Data

| Code   | Type of Fluid                                     | Exposure                                |
|--------|---------------------------------------------------|-----------------------------------------|
| FS11RT | 100 Low Lead Fuel (ASTM D910)                     | 90 days min @ 70°F ± 10F                |
| FS12RT | Jet A Fuel (ASTM D1655)                           |                                         |
| FS13RT | MIL-PRF-5606 Hydraulic Oil                        |                                         |
| FS14RT | MIL-PRF-83282 Hydraulic Oil                       |                                         |
| FS15RT | MIL-PRF-7808 Engine Oil                           |                                         |
| FS16RT | MIL-PRF-23699, Class STD Engine Oil               |                                         |
| FS17RT | Salt Water (ASTM D1141 or equiv.)                 |                                         |
| FS18RT | Skydrol LD-4 (SAE AS1241, Type IV, Class 1)       |                                         |
| FS19RT | 50% Water with 50% Skydrol                        |                                         |
| FS09RT | Degreasing Solvent per MIL-PRF-680, Type III      |                                         |
| FS10RT | Preservation Oil per MIL-PRF-6081                 |                                         |
| FS31RT | Distilled Water                                   |                                         |
| FS21RT | MEK Washing Fluid (ASTM D740)                     | 90 mins @ 70°F ± 10F                    |
| FS22RT | Polypropylene Glycol Deicer (Type I) SAE AMS 1424 |                                         |
| FS24RT | Detergent per MIL-D-16791, Type I                 |                                         |
| FS23RT | Isopropyl Alcohol Deicing Agent (TT-I-735)        | 48±4 hrs @ 70°F ± 10F                   |
| FS32RT | Dry                                               | Per section 6.2 Test Plan<br>NTP 3963Q1 |
| FS33RT | 85% Relative Humidity                             |                                         |

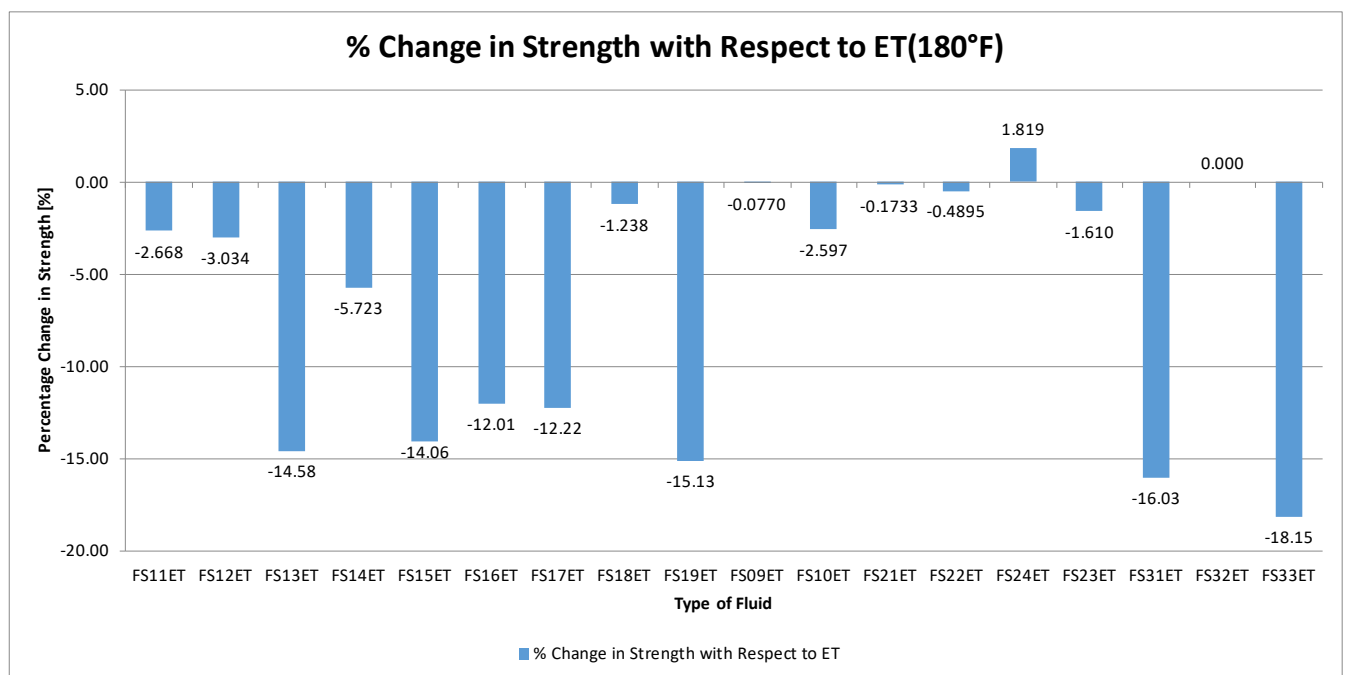
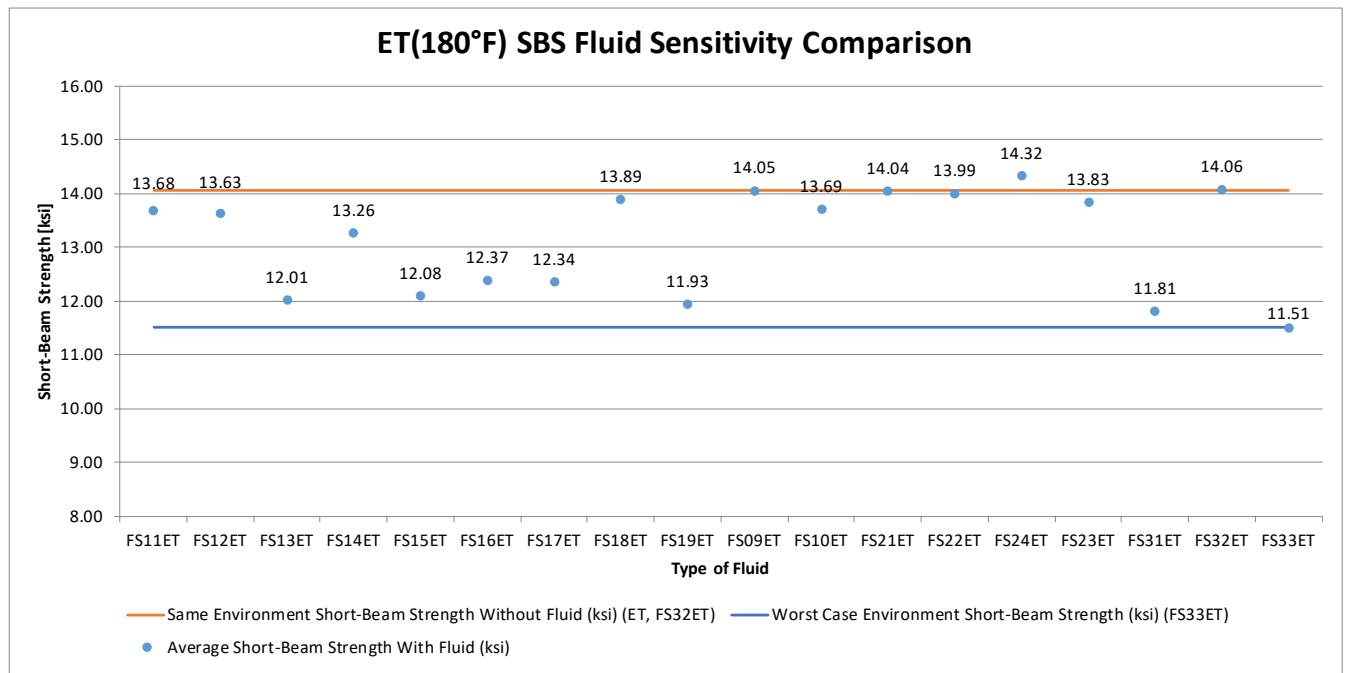


**Fluid Sensitivity Screening**  
**Short-Beam Strength Properties (FSSBS)–RT(70°F) Strength**  
 Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

| Fluid Code | Specimen Number                                     | Toray Batch # | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Avg. $t_{ply}$ [in] | Failure Mode     | Average |
|------------|-----------------------------------------------------|---------------|---------------|--------------|----------------|------------------------------|---------------------|---------------------|------------------|---------|
| FS11RT     | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS11-RT-1 | A             | 1             | 1            | 17.35          | 0.09975                      | 14                  | 0.007125            | ILS, COMPRESSION | 17.57   |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS11-RT-2 | A             | 1             | 1            | 17.55          | 0.09922                      | 14                  | 0.007087            | ILS, COMPRESSION |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS11-RT-3 | A             | 1             | 1            | 17.38          | 0.09950                      | 14                  | 0.007107            | ILS, COMPRESSION |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS11-RT-4 | A             | 1             | 1            | 17.80          | 0.09970                      | 14                  | 0.007121            | ILS, COMPRESSION |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS11-RT-5 | A             | 1             | 1            | 17.77          | 0.09958                      | 14                  | 0.007113            | ILS, COMPRESSION |         |
| FS12RT     | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS12-RT-1 | A             | 1             | 1            | 16.84          | 0.09958                      | 14                  | 0.007113            | ILS, COMPRESSION | 16.51   |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS12-RT-2 | A             | 1             | 1            | 16.55          | 0.09905                      | 14                  | 0.007075            | ILS, COMPRESSION |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS12-RT-3 | A             | 1             | 1            | 16.28          | 0.09840                      | 14                  | 0.007029            | ILS, COMPRESSION |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS12-RT-4 | A             | 1             | 1            | 16.38          | 0.09867                      | 14                  | 0.007048            | ILS, COMPRESSION |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS12-RT-5 | A             | 1             | 1            | 16.47          | 0.09952                      | 14                  | 0.007108            | ILS, COMPRESSION |         |
| FS13RT     | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS13-RT-1 | A             | 1             | 1            | 16.80          | 0.09828                      | 14                  | 0.007020            | ILS              | 16.78   |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS13-RT-2 | A             | 1             | 1            | 16.44          | 0.09917                      | 14                  | 0.007083            | ILS              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS13-RT-3 | A             | 1             | 1            | 16.76          | 0.09862                      | 14                  | 0.007044            | ILS              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS13-RT-4 | A             | 1             | 1            | 17.03          | 0.09828                      | 14                  | 0.007020            | ILS              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS13-RT-5 | A             | 1             | 1            | 16.86          | 0.09875                      | 14                  | 0.007054            | ILS, COMPRESSION |         |
| FS14RT     | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS14-RT-1 | A             | 1             | 1            | 17.34          | 0.09838                      | 14                  | 0.007027            | ILS              | 17.20   |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS14-RT-2 | A             | 1             | 1            | 16.94          | 0.09758                      | 14                  | 0.006970            | ILS              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS14-RT-3 | A             | 1             | 1            | 16.97          | 0.09768                      | 14                  | 0.006977            | ILS              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS14-RT-4 | A             | 1             | 1            | 17.39          | 0.09745                      | 14                  | 0.006961            | ILS              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS14-RT-5 | A             | 1             | 1            | 17.36          | 0.09838                      | 14                  | 0.007027            | ILS              |         |
| FS15RT     | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS15-RT-1 | A             | 1             | 1            | 16.72          | 0.09725                      | 14                  | 0.006946            | ILS              | 16.52   |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS15-RT-2 | A             | 1             | 1            | 16.28          | 0.09705                      | 14                  | 0.006932            | ILS              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS15-RT-3 | A             | 1             | 1            | 16.41          | 0.09657                      | 14                  | 0.006898            | ILS              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS15-RT-4 | A             | 1             | 1            | 16.54          | 0.09650                      | 14                  | 0.006893            | ILS              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS15-RT-5 | A             | 1             | 1            | 16.62          | 0.09675                      | 14                  | 0.006911            | ILS              |         |
| FS16RT     | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS16-RT-1 | A             | 1             | 2            | 16.66          | 0.09772                      | 14                  | 0.006980            | ILS              | 16.77   |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS16-RT-2 | A             | 1             | 2            | 16.81          | 0.09808                      | 14                  | 0.007006            | ILS              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS16-RT-3 | A             | 1             | 2            | 16.52          | 0.09840                      | 14                  | 0.007029            | ILS              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS16-RT-4 | A             | 1             | 2            | 16.83          | 0.09770                      | 14                  | 0.006979            | ILS              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS16-RT-5 | A             | 1             | 2            | 17.04          | 0.09802                      | 14                  | 0.007001            | ILS              |         |
| FS17RT     | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS17-RT-1 | A             | 1             | 2            | 16.52          | 0.09835                      | 14                  | 0.007025            | ILS              | 16.52   |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS17-RT-2 | A             | 1             | 2            | 16.42          | 0.09795                      | 14                  | 0.006996            | ILS              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS17-RT-3 | A             | 1             | 2            | 16.39          | 0.09780                      | 14                  | 0.006986            | ILS              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS17-RT-4 | A             | 1             | 2            | 16.71          | 0.09795                      | 14                  | 0.006996            | ILS              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS17-RT-5 | A             | 1             | 2            | 16.54          | 0.09853                      | 14                  | 0.007038            | ILS              |         |
| FS18RT     | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS18-RT-1 | A             | 1             | 2            | 17.09          | 0.09800                      | 14                  | 0.007000            | ILS, COMPRESSION | 17.08   |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS18-RT-2 | A             | 1             | 2            | 16.96          | 0.09772                      | 14                  | 0.006980            | ILS, COMPRESSION |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS18-RT-3 | A             | 1             | 2            | 16.87          | 0.09772                      | 14                  | 0.006980            | ILS, COMPRESSION |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS18-RT-4 | A             | 1             | 2            | 17.07          | 0.09760                      | 14                  | 0.006971            | ILS              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS18-RT-5 | A             | 1             | 2            | 17.41          | 0.09790                      | 14                  | 0.006993            | ILS, COMPRESSION |         |
| FS19RT     | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS19-RT-1 | A             | 1             | 2            | 16.52          | 0.09788                      | 14                  | 0.006992            | ILS              | 16.43   |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS19-RT-2 | A             | 1             | 2            | 16.43          | 0.09815                      | 14                  | 0.007011            | ILS              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS19-RT-3 | A             | 1             | 2            | 16.51          | 0.09828                      | 14                  | 0.007020            | ILS              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS19-RT-4 | A             | 1             | 2            | 16.40          | 0.09847                      | 14                  | 0.007033            | ILS, COMPRESSION |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS19-RT-5 | A             | 1             | 2            | 16.30          | 0.09852                      | 14                  | 0.007037            | ILS, COMPRESSION |         |
| FS09RT     | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS09-RT-1 | A             | 1             | 2            | 18.01          | 0.10260                      | 14                  | 0.007329            | ILS              | 17.23   |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS09-RT-2 | A             | 1             | 2            | 16.92          | 0.10188                      | 14                  | 0.007277            | ILS              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS09-RT-3 | A             | 1             | 2            | 16.93          | 0.10080                      | 14                  | 0.007200            | ILS              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS09-RT-4 | A             | 1             | 2            | 17.25          | 0.09980                      | 14                  | 0.007129            | ILS              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS09-RT-5 | A             | 1             | 2            | 17.05          | 0.09948                      | 14                  | 0.007106            | ILS              |         |
| FS10RT     | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS10-RT-1 | A             | 1             | 2            | 16.64          | 0.09832                      | 14                  | 0.007023            | ILS              | 16.94   |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS10-RT-2 | A             | 1             | 2            | 16.93          | 0.09793                      | 14                  | 0.006995            | ILS              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS10-RT-3 | A             | 1             | 2            | 17.24          | 0.09778                      | 14                  | 0.006985            | ILS              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS10-RT-4 | A             | 1             | 2            | 16.94          | 0.09818                      | 14                  | 0.007013            | ILS              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS10-RT-5 | A             | 1             | 2            | 16.95          | 0.09813                      | 14                  | 0.007010            | ILS              |         |
| FS21RT     | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS21-RT-1 | A             | 1             | 2            | 17.79          | 0.09867                      | 14                  | 0.007048            | ILS              | 17.80   |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS21-RT-2 | A             | 1             | 2            | 17.60          | 0.09842                      | 14                  | 0.007030            | ILS              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS21-RT-3 | A             | 1             | 2            | 17.77          | 0.09823                      | 14                  | 0.007017            | ILS              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS21-RT-4 | A             | 1             | 2            | 17.97          | 0.09825                      | 14                  | 0.007018            | ILS              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS21-RT-5 | A             | 1             | 2            | 17.84          | 0.09807                      | 14                  | 0.007005            | ILS              |         |
| FS22RT     | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS22-RT-1 | A             | 1             | 1            | 17.72          | 0.09813                      | 14                  | 0.007010            | ILS              | 17.75   |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS22-RT-2 | A             | 1             | 1            | 17.78          | 0.09758                      | 14                  | 0.006970            | ILS              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS22-RT-3 | A             | 1             | 1            | 17.61          | 0.09733                      | 14                  | 0.006952            | ILS              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS22-RT-4 | A             | 1             | 1            | 17.62          | 0.09768                      | 14                  | 0.006977            | ILS              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS22-RT-5 | A             | 1             | 1            | 18.00          | 0.09782                      | 14                  | 0.006987            | ILS              |         |
| FS24RT     | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS24-RT-1 | A             | 1             | 1            | 17.47          | 0.09748                      | 14                  | 0.006963            | ILS, COMPRESSION | 17.42   |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS24-RT-2 | A             | 1             | 1            | 17.48          | 0.09750                      | 14                  | 0.006964            | ILS              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS24-RT-3 | A             | 1             | 1            | 17.14          | 0.09772                      | 14                  | 0.006980            | ILS, COMPRESSION |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS24-RT-4 | A             | 1             | 1            | 17.39          | 0.09763                      | 14                  | 0.006974            | ILS, COMPRESSION |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS24-RT-5 | A             | 1             | 1            | 17.62          | 0.09940                      | 14                  | 0.007100            | ILS              |         |
| FS23RT     | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS23-RT-1 | A             | 1             | 1            | 18.00          | 0.09778                      | 14                  | 0.006985            | ILS, COMPRESSION | 17.85   |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS23-RT-2 | A             | 1             | 1            | 17.94          | 0.09738                      | 14                  | 0.006956            | ILS, COMPRESSION |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS23-RT-3 | A             | 1             | 1            | 17.60          | 0.09767                      | 14                  | 0.006976            | ILS, COMPRESSION |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS23-RT-4 | A             | 1             | 1            | 17.88          | 0.09772                      | 14                  | 0.006980            | ILS, COMPRESSION |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS23-RT-5 | A             | 1             | 1            | 17.85          | 0.09798                      | 14                  | 0.006999            | ILS, COMPRESSION |         |
| FS31RT     | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS31-RT-1 | A             | 1             | 1            | 16.71          | 0.09768                      | 14                  | 0.006977            | ILS              | 16.60   |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS31-RT-2 | A             | 1             | 1            | 16.54          | 0.09732                      | 14                  | 0.006951            | ILS              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS31-RT-3 | A             | 1             | 1            | 16.38          | 0.09737                      | 14                  | 0.006955            | ILS              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS31-RT-4 | A             | 1             | 1            | 16.69          | 0.09765                      | 14                  | 0.006975            | ILS              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS31-RT-5 | A             | 1             | 1            | 16.66          | 0.09712                      | 14                  | 0.006937            | ILS              |         |
| FS32RT     | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS32-RT-1 | A             | 1             | 1            | 18.10          | 0.09753                      | 14                  | 0.006967            | ILS              | 17.88   |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS32-RT-2 | A             | 1             | 1            | 17.75          | 0.09717                      | 14                  | 0.006940            | ILS              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS32-RT-3 | A             | 1             | 1            | 17.85          | 0.09683                      | 14                  | 0.006917            | ILS, COMPRESSION |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS32-RT-4 | A             | 1             | 1            | 17.76          | 0.09673                      | 14                  | 0.006910            | ILS              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS32-RT-5 | A             | 1             | 1            | 17.93          | 0.09745                      | 14                  | 0.006961            | ILS, COMPRESSION |         |
| FS33RT     | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS33-RT-1 | A             | 1             | 1            | 16.54          | 0.09665                      | 14                  | 0.006904            | ILS, COMPRESSION | 16.27   |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS33-RT-2 | A             | 1             | 1            | 16.26          | 0.09760                      | 14                  | 0.006971            | ILS, COMPRESSION |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS33-RT-3 | A             | 1             | 1            | 15.90          | 0.09748                      | 14                  | 0.006963            | ILS              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS33-RT-4 | A             | 1             | 1            | 16.30          | 0.09748                      | 14                  | 0.006963            | ILS              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS33-RT-5 | A             | 1             | 1            | 16.33          | 0.09723                      | 14                  | 0.006945            | ILS, COMPRESSION |         |

**7.1.2 SBSFS Elevated Temperature Test Data**

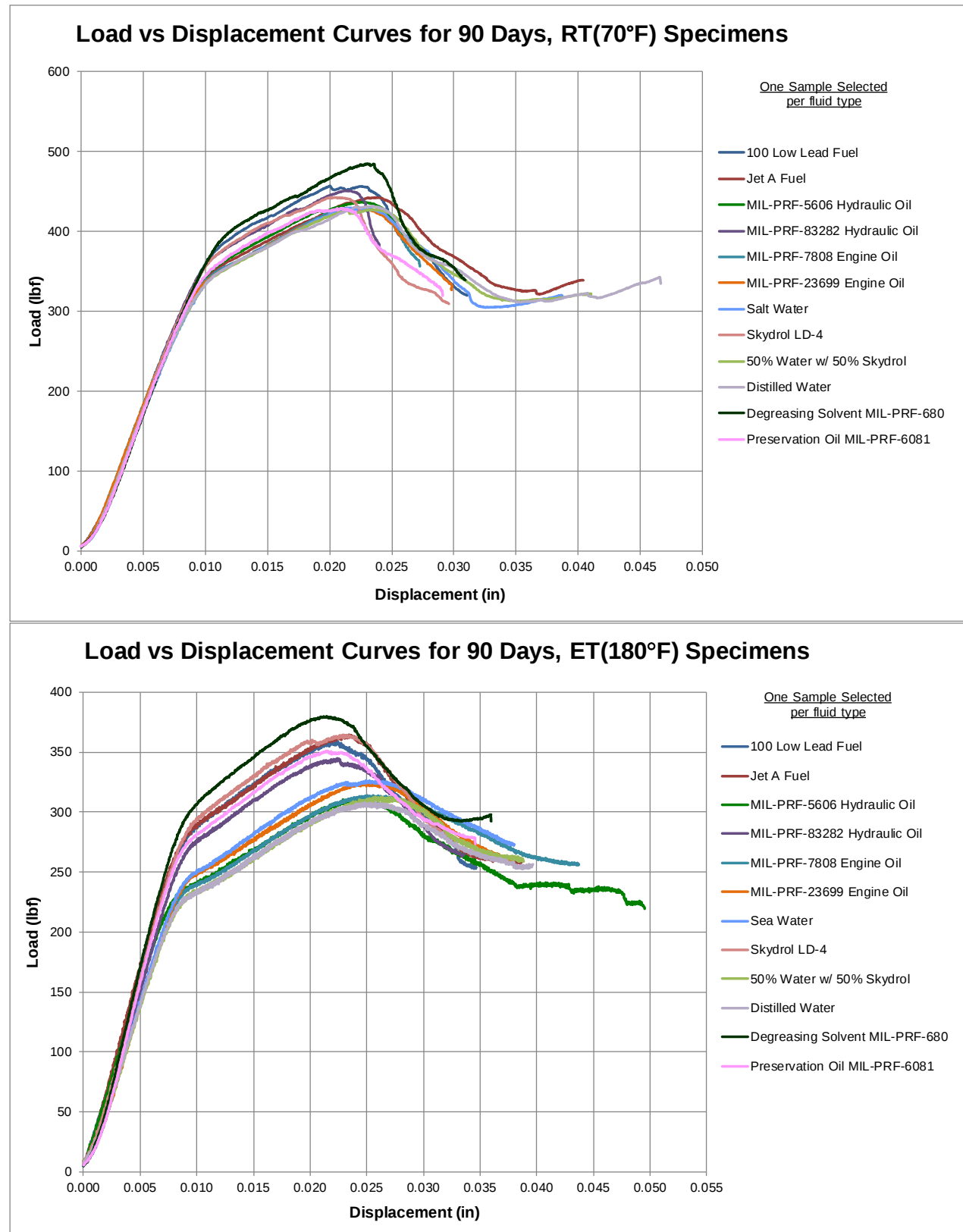
| Code   | Type of Fluid                                     | Exposure                                |
|--------|---------------------------------------------------|-----------------------------------------|
| FS11ET | 100 Low Lead Fuel (ASTM D910)                     | 90 days min @ 70°F ± 10F                |
| FS12ET | Jet A Fuel (ASTM D1655)                           |                                         |
| FS13ET | MIL-PRF-5606 Hydraulic Oil                        |                                         |
| FS14ET | MIL-PRF-83282 Hydraulic Oil                       |                                         |
| FS15ET | MIL-PRF-7808 Engine Oil                           |                                         |
| FS16ET | MIL-PRF-23699, Class STD Engine Oil               |                                         |
| FS17ET | Salt Water (ASTM D1141 or equiv.)                 |                                         |
| FS18ET | Skydrol LD-4 (SAE AS1241, Type IV, Class 1)       |                                         |
| FS19ET | 50% Water with 50% Skydrol                        |                                         |
| FS09ET | Degreasing Solvent per MIL-PRF-680, Type III      |                                         |
| FS10ET | Preservation Oil per MIL-PRF-6081                 |                                         |
| FS31ET | Distilled Water                                   |                                         |
| FS21ET | MEK Washing Fluid (ASTM D740)                     | 90 mins @ 70°F ± 10F                    |
| FS22ET | Polypropylene Glycol Deicer (Type I) SAE AMS 1424 |                                         |
| FS24ET | Detergent per MIL-D-16791, Type I                 |                                         |
| FS23ET | Isopropyl Alcohol Deicing Agent (TT-I-735)        | 48±4 hrs @ 70°F ± 10F                   |
| FS32ET | Dry                                               | Per section 6.2 Test Plan<br>NTP 3963Q1 |
| FS33ET | 85% Relative Humidity                             |                                         |

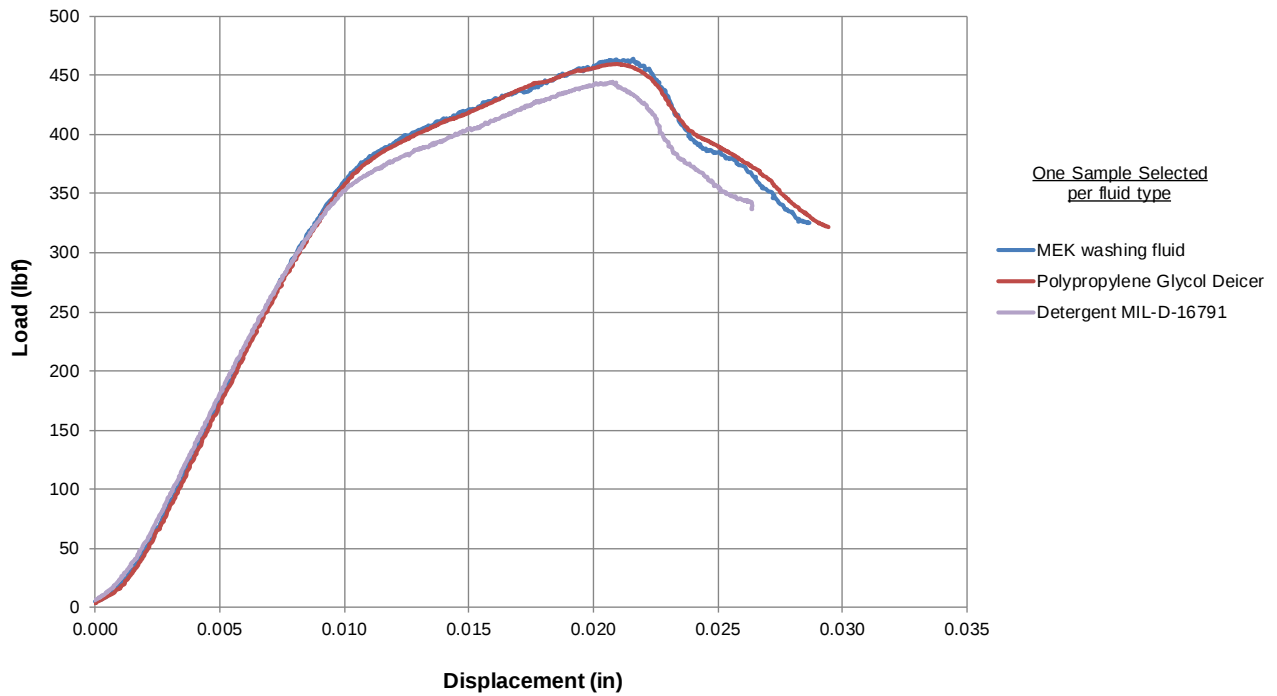
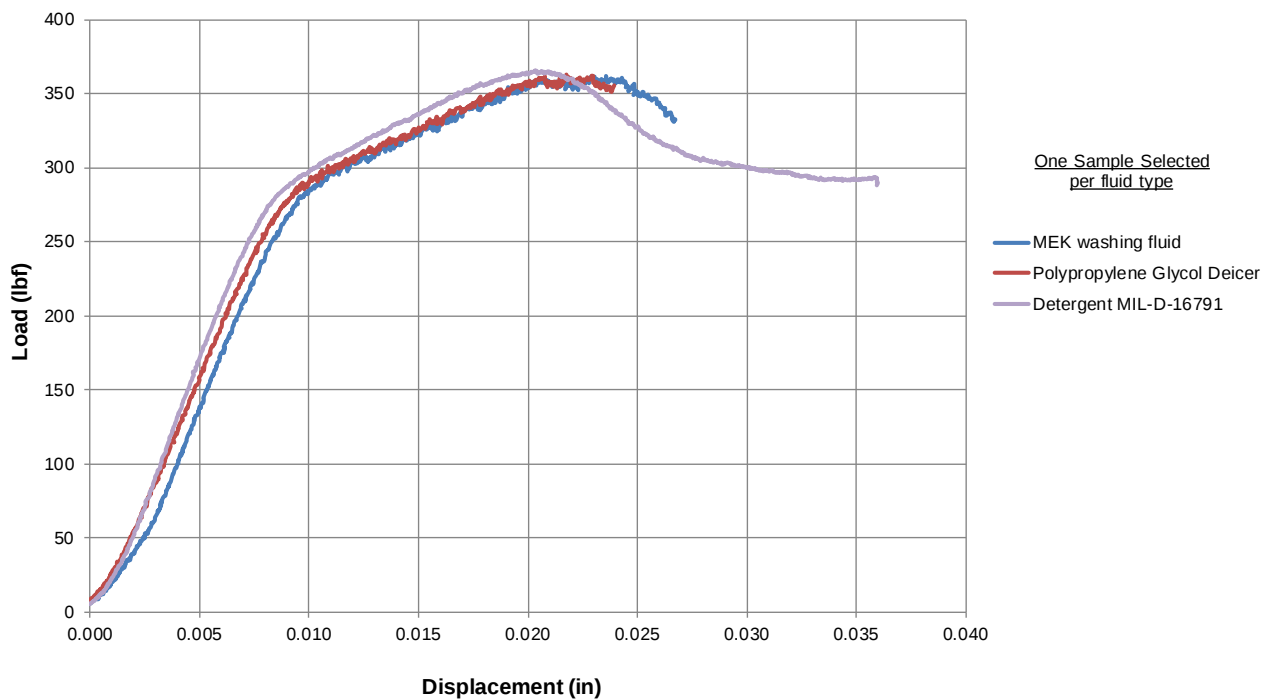


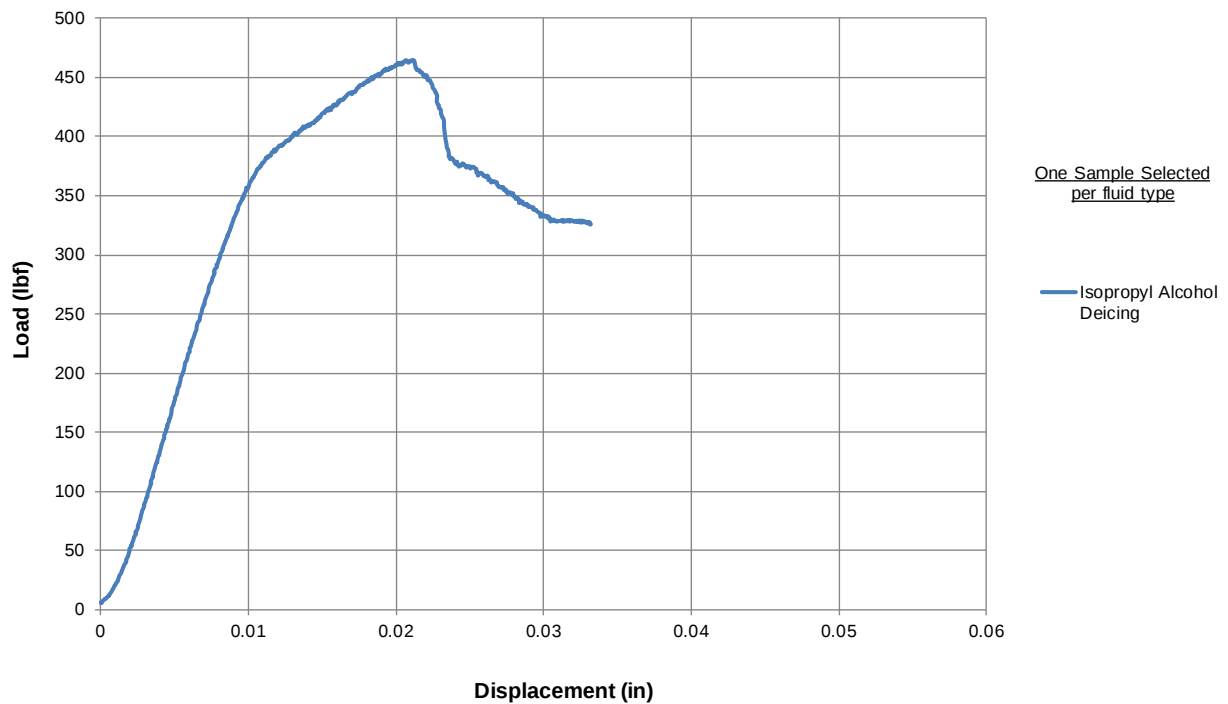
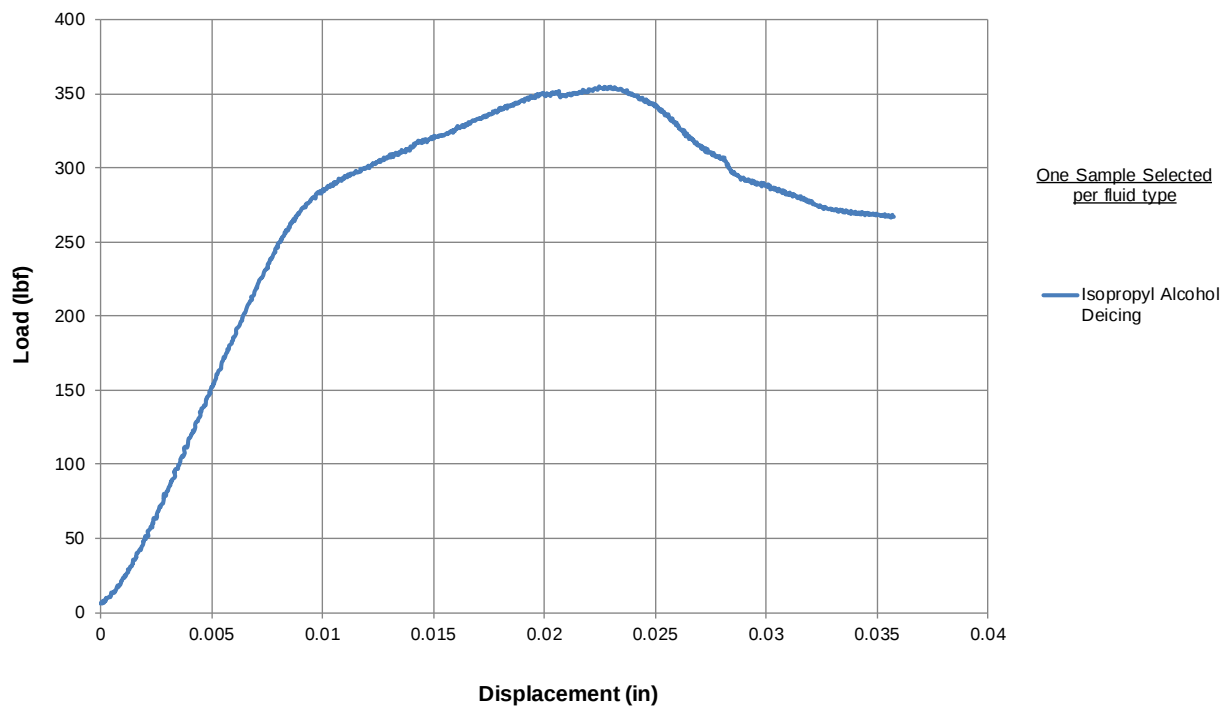
**Fluid Sensitivity Screening**  
**Short-Beam Strength Properties (FSSBS)--ET(180°F) Strength**  
Toray 3960/T1100GC 71E Gr 192 RC 33.5% 24K Unidirectional Slit Tape (0.25 inch)

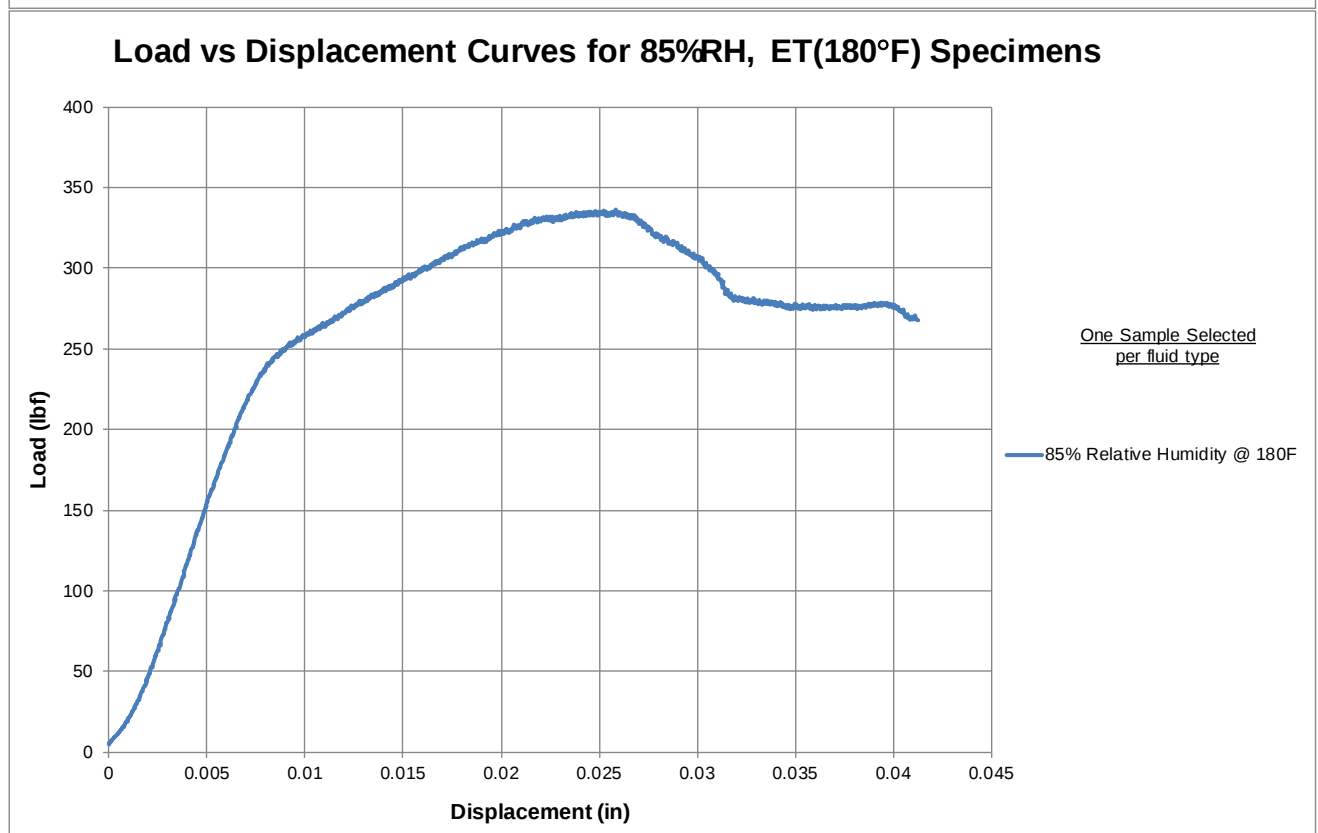
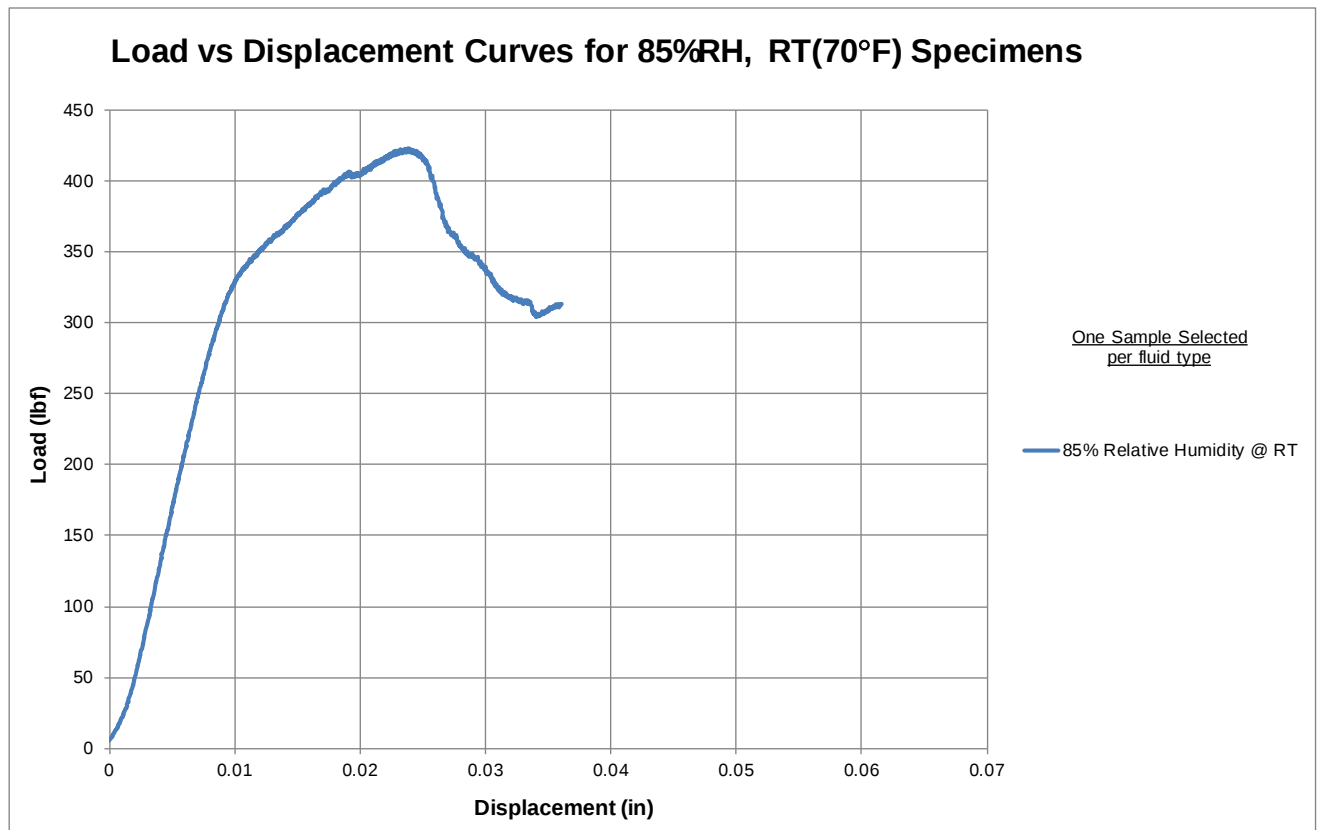
| Fluid Code | Specimen Number                                     | Toray Batch # | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Avg. $t_{ply}$ [in] | Failure Mode                            | Average |
|------------|-----------------------------------------------------|---------------|---------------|--------------|----------------|------------------------------|---------------------|---------------------|-----------------------------------------|---------|
| FS11ET     | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS11-ET-1 | A             | 1             | 1            | 13.62          | 0.09988                      | 14                  | 0.007135            | ILS, INELASTIC DEFORMATION              | 13.68   |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS11-ET-2 | A             | 1             | 1            | 13.68          | 0.09967                      | 14                  | 0.007119            | ILS, INELASTIC DEFORMATION              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS11-ET-3 | A             | 1             | 1            | 13.58          | 0.09993                      | 14                  | 0.007138            | ILS, INELASTIC DEFORMATION, COMPRESSION |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS11-ET-4 | A             | 1             | 1            | 13.90          | 0.09950                      | 14                  | 0.007107            | ILS, INELASTIC DEFORMATION              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS11-ET-5 | A             | 1             | 1            | 13.65          | 0.09990                      | 14                  | 0.007136            | ILS, INELASTIC DEFORMATION              |         |
| FS12ET     | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS12-ET-1 | A             | 1             | 1            | 13.73          | 0.10050                      | 14                  | 0.007179            | ILS, INELASTIC DEFORMATION              | 13.63   |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS12-ET-4 | A             | 1             | 1            | 13.69          | 0.09838                      | 14                  | 0.007027            | ILS, INELASTIC DEFORMATION              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS12-ET-5 | A             | 1             | 1            | 13.51          | 0.09867                      | 14                  | 0.007048            | ILS, INELASTIC DEFORMATION              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS12-SP-4 | A             | 1             | 1            | 13.69          | 0.09858                      | 14                  | 0.007042            | ILS, INELASTIC DEFORMATION              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS12-SP-5 | A             | 1             | 1            | 13.55          | 0.09828                      | 14                  | 0.007020            | ILS, INELASTIC DEFORMATION              |         |
| FS13ET     | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS13-ET-1 | A             | 1             | 1            | 11.97          | 0.09870                      | 14                  | 0.007050            | ILS, INELASTIC DEFORMATION              | 12.01   |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS13-ET-2 | A             | 1             | 1            | 12.10          | 0.09878                      | 14                  | 0.007056            | ILS, INELASTIC DEFORMATION              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS13-ET-3 | A             | 1             | 1            | 11.75          | 0.09848                      | 14                  | 0.007035            | ILS, INELASTIC DEFORMATION, COMPRESSION |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS13-ET-4 | A             | 1             | 1            | 12.35          | 0.09792                      | 14                  | 0.006994            | ILS, INELASTIC DEFORMATION              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS13-ET-5 | A             | 1             | 1            | 11.88          | 0.09757                      | 14                  | 0.006969            | ILS, INELASTIC DEFORMATION, COMPRESSION |         |
| FS14ET     | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS14-ET-1 | A             | 1             | 1            | 13.27          | 0.09837                      | 14                  | 0.007026            | ILS, INELASTIC DEFORMATION              | 13.26   |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS14-ET-2 | A             | 1             | 1            | 13.18          | 0.09743                      | 14                  | 0.006960            | ILS, INELASTIC DEFORMATION              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS14-ET-3 | A             | 1             | 1            | 13.22          | 0.09755                      | 14                  | 0.006968            | ILS, INELASTIC DEFORMATION              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS14-ET-4 | A             | 1             | 1            | 13.28          | 0.09777                      | 14                  | 0.006983            | ILS, INELASTIC DEFORMATION              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS14-ET-5 | A             | 1             | 1            | 13.32          | 0.09803                      | 14                  | 0.007002            | ILS, INELASTIC DEFORMATION              |         |
| FS15ET     | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS15-ET-1 | A             | 1             | 1            | 12.07          | 0.09842                      | 14                  | 0.007030            | ILS, INELASTIC DEFORMATION              | 12.08   |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS15-ET-2 | A             | 1             | 1            | 12.30          | 0.09927                      | 14                  | 0.007090            | ILS, INELASTIC DEFORMATION              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS15-ET-4 | A             | 1             | 1            | 12.04          | 0.09788                      | 14                  | 0.006992            | ILS, INELASTIC DEFORMATION              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS15-ET-5 | A             | 1             | 1            | 11.90          | 0.09758                      | 14                  | 0.006970            | ILS, INELASTIC DEFORMATION              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS15-SP-4 | A             | 1             | 1            | 12.10          | 0.09800                      | 14                  | 0.007000            | ILS, INELASTIC DEFORMATION              |         |
| FS16ET     | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS16-ET-1 | A             | 1             | 2            | 12.53          | 0.09793                      | 14                  | 0.006995            | ILS, INELASTIC DEFORMATION              | 12.37   |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS16-ET-2 | A             | 1             | 2            | 12.41          | 0.09772                      | 14                  | 0.006980            | ILS, INELASTIC DEFORMATION              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS16-ET-3 | A             | 1             | 2            | 12.30          | 0.09778                      | 14                  | 0.006985            | ILS, INELASTIC DEFORMATION              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS16-ET-4 | A             | 1             | 2            | 12.37          | 0.09730                      | 14                  | 0.006950            | ILS, INELASTIC DEFORMATION              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS16-ET-5 | A             | 1             | 2            | 12.24          | 0.09678                      | 14                  | 0.006913            | ILS, INELASTIC DEFORMATION              |         |
| FS17ET     | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS17-ET-1 | A             | 1             | 2            | 12.61          | 0.09800                      | 14                  | 0.007000            | ILS, INELASTIC DEFORMATION              | 12.34   |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS17-ET-2 | A             | 1             | 2            | 12.39          | 0.09782                      | 14                  | 0.006987            | ILS, INELASTIC DEFORMATION              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS17-ET-3 | A             | 1             | 2            | 12.39          | 0.09815                      | 14                  | 0.007011            | ILS, INELASTIC DEFORMATION              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS17-ET-4 | A             | 1             | 2            | 12.26          | 0.09767                      | 14                  | 0.006976            | ILS, INELASTIC DEFORMATION              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS17-ET-5 | A             | 1             | 2            | 12.05          | 0.09823                      | 14                  | 0.007017            | ILS, INELASTIC DEFORMATION              |         |
| FS18ET     | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS18-ET-1 | A             | 1             | 2            | 13.99          | 0.09858                      | 14                  | 0.007042            | ILS, INELASTIC DEFORMATION              | 13.89   |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS18-ET-2 | A             | 1             | 2            | 13.91          | 0.10023                      | 14                  | 0.007160            | ILS, INELASTIC DEFORMATION              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS18-ET-4 | A             | 1             | 2            | 13.83          | 0.09852                      | 14                  | 0.007037            | ILS, INELASTIC DEFORMATION              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS18-ET-5 | A             | 1             | 2            | 13.81          | 0.09810                      | 14                  | 0.007007            | ILS, INELASTIC DEFORMATION              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS18-SP-4 | A             | 1             | 2            | 13.88          | 0.09860                      | 14                  | 0.007043            | ILS, INELASTIC DEFORMATION              |         |
| FS19ET     | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS19-ET-1 | A             | 1             | 2            | 12.03          | 0.09840                      | 14                  | 0.007029            | ILS, INELASTIC DEFORMATION              | 11.93   |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS19-ET-2 | A             | 1             | 2            | 12.07          | 0.09810                      | 14                  | 0.007007            | ILS, INELASTIC DEFORMATION              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS19-ET-3 | A             | 1             | 2            | 11.86          | 0.09830                      | 14                  | 0.007021            | ILS, INELASTIC DEFORMATION              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS19-ET-4 | A             | 1             | 2            | 11.89          | 0.09813                      | 14                  | 0.007010            | ILS, INELASTIC DEFORMATION              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS19-ET-5 | A             | 1             | 2            | 11.81          | 0.09802                      | 14                  | 0.007001            | ILS, INELASTIC DEFORMATION              |         |
| FS09ET     | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS09-ET-1 | A             | 1             | 2            | 14.58          | 0.09932                      | 14                  | 0.007094            | ILS                                     | 14.05   |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS09-ET-2 | A             | 1             | 2            | 13.86          | 0.09917                      | 14                  | 0.007083            | ILS                                     |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS09-ET-3 | A             | 1             | 2            | 13.88          | 0.09917                      | 14                  | 0.007083            | ILS                                     |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS09-ET-4 | A             | 1             | 2            | 13.87          | 0.09957                      | 14                  | 0.007112            | ILS                                     |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS09-ET-5 | A             | 1             | 2            | 14.07          | 0.09970                      | 14                  | 0.007121            | ILS                                     |         |
| FS10ET     | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS10-ET-1 | A             | 1             | 2            | 13.67          | 0.09830                      | 14                  | 0.007021            | ILS                                     | 13.69   |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS10-ET-2 | A             | 1             | 2            | 13.80          | 0.09863                      | 14                  | 0.007045            | ILS                                     |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS10-ET-3 | A             | 1             | 2            | 13.70          | 0.09863                      | 14                  | 0.007045            | ILS                                     |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS10-ET-4 | A             | 1             | 2            | 13.78          | 0.10000                      | 14                  | 0.007143            | ILS                                     |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS10-ET-5 | A             | 1             | 2            | 13.51          | 0.09978                      | 14                  | 0.007127            | ILS                                     |         |
| FS21ET     | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS21-ET-1 | A             | 1             | 2            | 13.96          | 0.09800                      | 14                  | 0.007000            | ILS, INELASTIC DEFORMATION, COMPRESSION | 14.04   |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS21-ET-2 | A             | 1             | 2            | 14.00          | 0.09815                      | 14                  | 0.007011            | ILS, INELASTIC DEFORMATION              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS21-ET-3 | A             | 1             | 2            | 14.06          | 0.09788                      | 14                  | 0.006992            | ILS, INELASTIC DEFORMATION, COMPRESSION |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS21-ET-4 | A             | 1             | 2            | 14.04          | 0.09793                      | 14                  | 0.006995            | ILS, INELASTIC DEFORMATION              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS21-ET-5 | A             | 1             | 2            | 14.11          | 0.09753                      | 14                  | 0.006967            | ILS, INELASTIC DEFORMATION, COMPRESSION |         |
| FS22ET     | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS22-ET-1 | A             | 1             | 1            | 13.93          | 0.09868                      | 14                  | 0.007049            | ILS, INELASTIC DEFORMATION              | 13.99   |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS22-ET-2 | A             | 1             | 1            | 14.18          | 0.09972                      | 14                  | 0.007123            | ILS, INELASTIC DEFORMATION              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS22-ET-3 | A             | 1             | 1            | 14.07          | 0.10127                      | 14                  | 0.007233            | ILS, INELASTIC DEFORMATION              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS22-ET-4 | A             | 1             | 1            | 13.95          | 0.09773                      | 14                  | 0.006981            | ILS, INELASTIC DEFORMATION              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS22-ET-5 | A             | 1             | 1            | 13.83          | 0.09783                      | 14                  | 0.006988            | ILS, INELASTIC DEFORMATION              |         |
| FS24ET     | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS24-ET-1 | A             | 1             | 1            | 14.03          | 0.09933                      | 14                  | 0.007095            | ILS                                     | 14.32   |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS24-ET-2 | A             | 1             | 1            | 14.45          | 0.09867                      | 14                  | 0.007048            | ILS                                     |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS24-ET-3 | A             | 1             | 1            | 14.58          | 0.09780                      | 14                  | 0.006986            | ILS                                     |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS24-ET-4 | A             | 1             | 1            | 14.29          | 0.09785                      | 14                  | 0.006989            | ILS                                     |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS24-ET-5 | A             | 1             | 1            | 14.23          | 0.09765                      | 14                  | 0.006975            | ILS                                     |         |
| FS23ET     | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS23-ET-1 | A             | 1             | 1            | 13.77          | 0.09767                      | 14                  | 0.006976            | ILS, INELASTIC DEFORMATION              | 13.83   |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS23-ET-2 | A             | 1             | 1            | 13.83          | 0.09797                      | 14                  | 0.006998            | ILS, INELASTIC DEFORMATION              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS23-ET-3 | A             | 1             | 1            | 13.90          | 0.09748                      | 14                  | 0.006963            | ILS, INELASTIC DEFORMATION              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS23-ET-4 | A             | 1             | 1            | 13.88          | 0.09735                      | 14                  | 0.006954            | ILS, INELASTIC DEFORMATION              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS23-ET-5 | A             | 1             | 1            | 13.77          | 0.09713                      | 14                  | 0.006938            | ILS, INELASTIC DEFORMATION              |         |
| FS31ET     | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS31-ET-1 | A             | 1             | 1            | 11.97          | 0.09748                      | 14                  | 0.006963            | ILS, INELASTIC DEFORMATION              | 11.81   |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS31-ET-2 | A             | 1             | 1            | 11.69          | 0.09757                      | 14                  | 0.006969            | ILS, INELASTIC DEFORMATION              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS31-ET-3 | A             | 1             | 1            | 11.81          | 0.09742                      | 14                  | 0.006958            | ILS, INELASTIC DEFORMATION              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS31-ET-4 | A             | 1             | 1            | 11.85          | 0.09760                      | 14                  | 0.006971            | ILS, INELASTIC DEFORMATION              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS31-ET-5 | A             | 1             | 1            | 11.71          | 0.09733                      | 14                  | 0.006952            | ILS, INELASTIC DEFORMATION              |         |
| FS32ET     | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS32-ET-1 | A             | 1             | 1            | 14.07          | 0.09795                      | 14                  | 0.006996            | ILS, INELASTIC DEFORMATION              | 14.06   |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS32-ET-2 | A             | 1             | 1            | 14.08          | 0.09913                      | 14                  | 0.007081            | ILS, INELASTIC DEFORMATION              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS32-ET-3 | A             | 1             | 1            | 14.00          | 0.10015                      | 14                  | 0.007154            | ILS, INELASTIC DEFORMATION              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS32-ET-4 | A             | 1             | 1            | 14.12          | 0.09750                      | 14                  | 0.006964            | ILS, INELASTIC DEFORMATION              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS32-ET-5 | A             | 1             | 1            | 14.03          | 0.09750                      | 14                  | 0.006964            | ILS, INELASTIC DEFORMATION              |         |
| FS33ET     | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS33-ET-1 | A             | 1             | 1            | 13.07          | 0.09767                      | 14                  | 0.006976            | ILS, INELASTIC DEFORMATION              | 11.51   |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS33-ET-2 | A             | 1             | 1            | 10.68          | 0.09733                      | 14                  | 0.006952            | ILS, INELASTIC DEFORMATION              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS33-ET-3 | A             | 1             | 1            | 11.01          | 0.09762                      | 14                  | 0.006973            | ILS, INELASTIC DEFORMATION              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS33-ET-4 | A             | 1             | 1            | 11.15          | 0.09772                      | 14                  | 0.006980            | ILS, INELASTIC DEFORMATION              |         |
|            | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-SBSFS33-ET-5 | A             | 1             | 1            | 11.63          | 0.09700                      | 14                  | 0.006929            | ILS, INELASTIC DEFORMATION              |         |

## 7.2 Load Displacement Curves



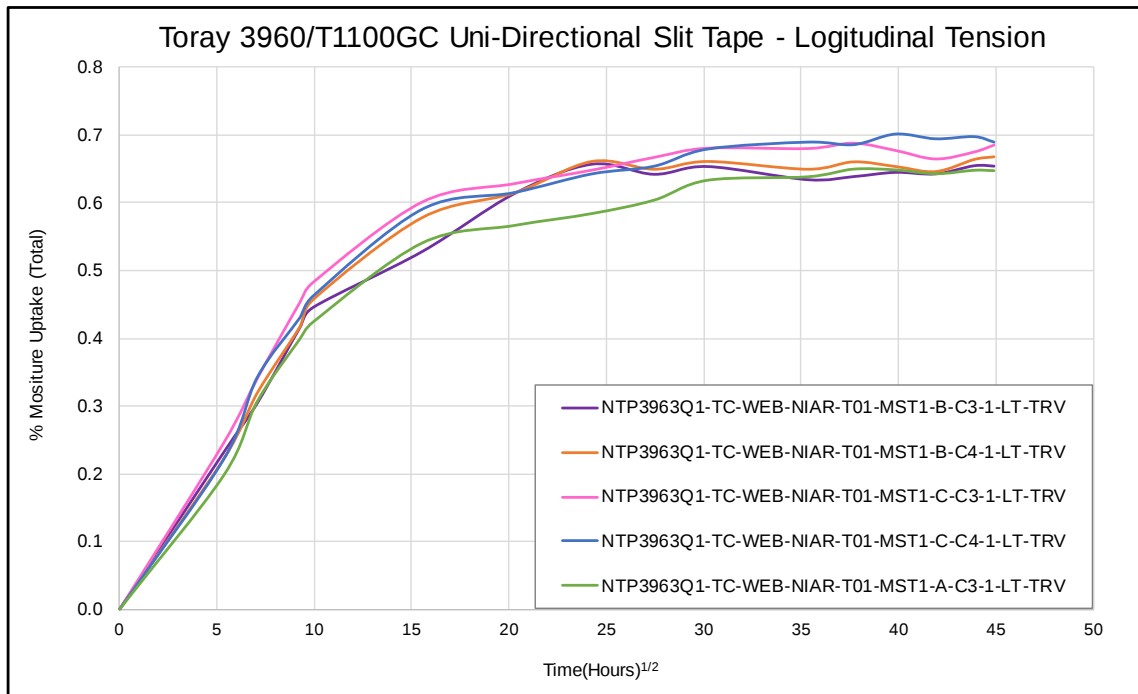
**Load vs Displacement Curves for 90 minutes, RT(70°F) Specimens****Load vs Displacement Curves for 90 minutes, ET(180°F) Specimens**

**Load vs Displacement Curves for 48hrs  $\pm$  4hrs, RT(70F°) Specimens****Load vs Displacement Curves for 48hrs  $\pm$  4hrs, ET(180°F) Specimens**

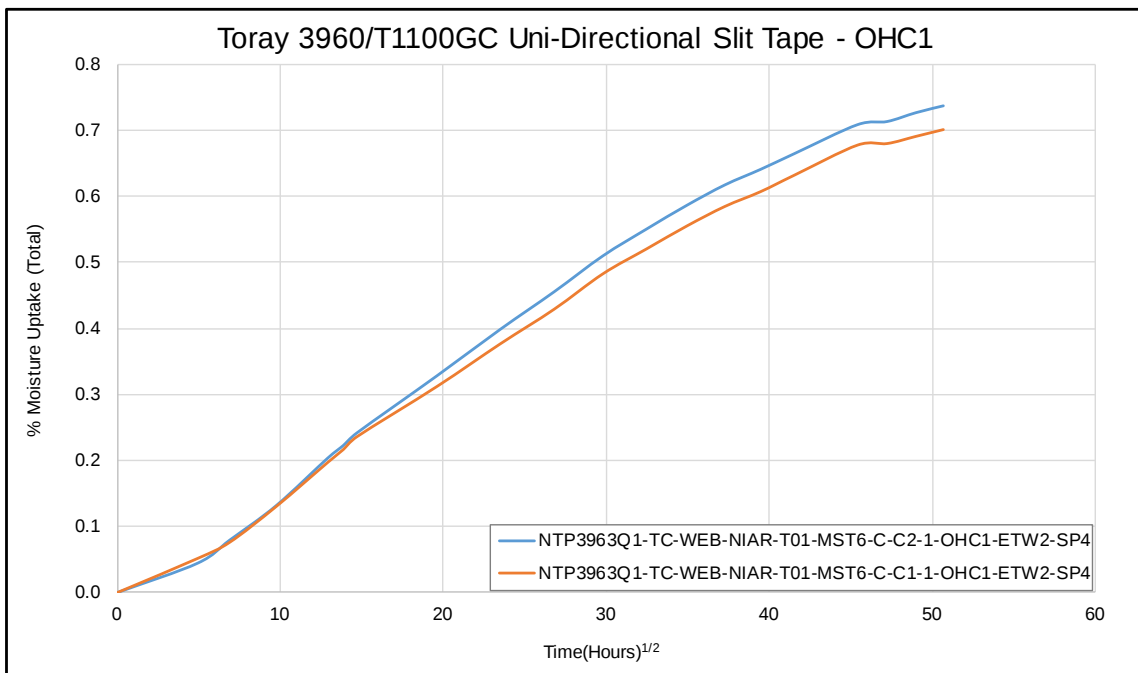


## 8. Moisture Conditioning Charts

### 8.1 Longitudinal Tension (LT) – Thinnest Panel



### 8.2 “25/50/25” Open Hole Compression 1 (OHC1) – Thickest Panel



## 9. DMA Results

### 9.1 DMA Dry Data

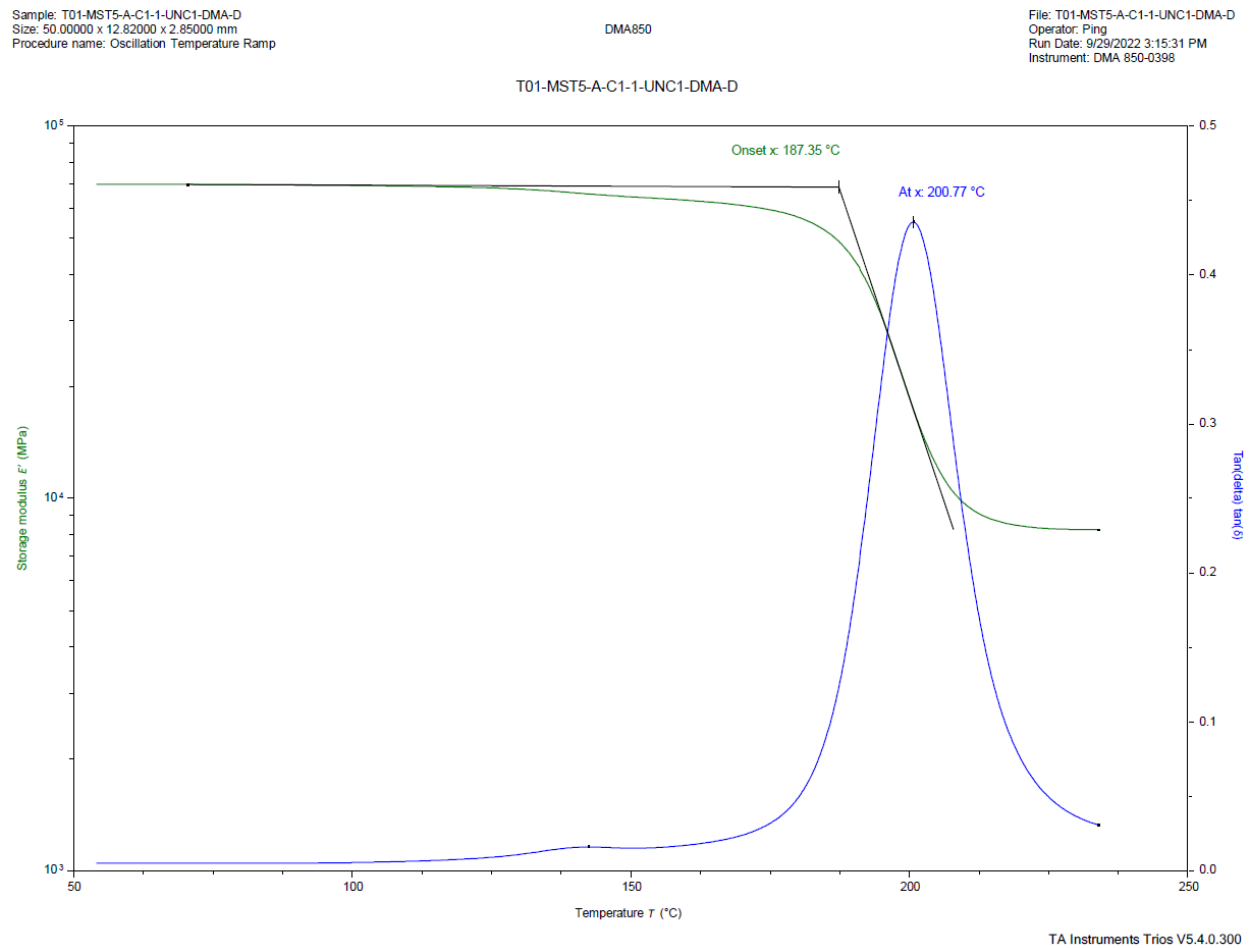
| DMA Results Summary                                  |                       |                     |                       |                     |
|------------------------------------------------------|-----------------------|---------------------|-----------------------|---------------------|
| Toray T1100G/3960 Unidirectional Slit Tape - DMA Dry |                       |                     |                       |                     |
| Sample #                                             | Onset Storage Modulus |                     | Peak of Tangent Delta |                     |
|                                                      | T <sub>g</sub> [°C]   | T <sub>g</sub> [°F] | T <sub>g</sub> [°C]   | T <sub>g</sub> [°F] |
| T01-MST5-A-C1-1-UNC1-DMA-D                           | 187.35                | 369.23              | 200.77                | 393.39              |
| T01-MST5-A-C2-1-UNC1-DMA-D                           | 189.86                | 373.75              | 202.61                | 396.70              |
| T01-MST5-B-C1-1-UNC1-DMA-D                           | 189.47                | 373.05              | 201.64                | 394.95              |
| T01-MST5-B-C2-1-UNC1-DMA-D                           | 189.08                | 372.34              | 201.65                | 394.97              |
| T01-MST5-C-C1-1-UNC1-DMA-D                           | 189.77                | 373.59              | 202.15                | 395.87              |
| T01-MST5-C-C2-1-UNC1-DMA-D                           | 187.72                | 369.90              | 200.85                | 393.53              |
| T01-MST6-A-C1-1-SBS1-DMA-D                           | 191.43                | 376.57              | 204.05                | 399.29              |
| T01-MST6-A-C2-1-SBS1-DMA-D                           | 191.29                | 376.32              | 203.62                | 398.52              |
| T01-MST6-B-C1-1-SBS1-DMA-D                           | 190.74                | 375.33              | 202.95                | 397.31              |
| T01-MST6-B-C2-1-SBS1-DMA-D                           | 190.33                | 374.59              | 202.85                | 397.13              |
| T01-MST6-C-C1-1-SBS1-DMA-D                           | 190.26                | 374.47              | 202.70                | 396.86              |
| T01-MST6-C-C2-1-SBS1-DMA-D                           | 192.13                | 377.83              | 204.28                | 399.70              |
| T01-MST7-A-C1-1-OHC2-DMA-D                           | 187.53                | 369.55              | 204.36                | 399.85              |
| T01-MST7-A-C2-1-OHC2-DMA-D                           | 188.57                | 371.43              | 204.89                | 400.80              |
| T01-MST7-B-C1-1-OHC2-DMA-D                           | 189.12                | 372.42              | 204.57                | 400.23              |
| T01-MST7-B-C2-1-OHC2-DMA-D                           | 189.13                | 372.43              | 204.15                | 399.47              |
| T01-MST7-C-C1-1-OHC2-DMA-D                           | 185.30                | 365.54              | 202.60                | 396.68              |
| T01-MST7-C-C2-1-OHC2-DMA-D                           | 189.56                | 373.21              | 205.04                | 401.07              |
| T01-MST8-A-C1-1-OHC3-DMA-D                           | 192.25                | 378.05              | 203.64                | 398.55              |
| T01-MST8-A-C2-1-OHC3-DMA-D                           | 192.30                | 378.14              | 203.52                | 398.34              |
| T01-MST8-B-C1-1-OHC3-DMA-D                           | 190.70                | 375.26              | 203.11                | 397.60              |
| T01-MST8-B-C2-1-OHC3-DMA-D                           | 191.25                | 376.25              | 202.73                | 396.91              |
| T01-MST8-C-C1-1-OHC3-DMA-D                           | 188.02                | 370.44              | 200.88                | 393.58              |
| T01-MST8-C-C2-1-OHC3-DMA-D                           | 188.47                | 371.25              | 201.25                | 394.25              |
| Average                                              | 189.65                | 373.37              | 202.95                | 397.31              |
| Standard Deviation                                   | 1.75                  | 3.14                | 1.31                  | 2.35                |

## 9.2 DMA Wet Data

| DMA Results Summary                                  |                       |                     |                       |                     |
|------------------------------------------------------|-----------------------|---------------------|-----------------------|---------------------|
| Toray T1100G/3960 Unidirectional Slit Tape - DMA Wet |                       |                     |                       |                     |
| Sample #                                             | Onset Storage Modulus |                     | Peak of Tangent Delta |                     |
|                                                      | T <sub>g</sub> [°C]   | T <sub>g</sub> [°F] | T <sub>g</sub> [°C]   | T <sub>g</sub> [°F] |
| T01-MST5-A-C1-1-UNC1-DMA-W                           | 154.22                | 309.60              | 166.86                | 332.35              |
| T01-MST5-A-C2-1-UNC1-DMA-W                           | 155.30                | 311.54              | 167.80                | 334.04              |
| T01-MST5-B-C1-1-UNC1-DMA-W                           | 153.61                | 308.50              | 165.31                | 329.56              |
| T01-MST5-B-C2-1-UNC1-DMA-W                           | 153.06                | 307.51              | 164.57                | 328.23              |
| T01-MST5-C-C1-1-UNC1-DMA-W                           | 153.97                | 309.15              | 166.54                | 331.77              |
| T01-MST5-C-C2-1-UNC1-DMA-W                           | 153.13                | 307.63              | 165.85                | 330.53              |
| T01-MST6-A-C1-1-SBS1-DMA-W                           | 155.32                | 311.58              | 167.98                | 334.36              |
| T01-MST6-A-C2-1-SBS1-DMA-W                           | 155.49                | 311.88              | 168.14                | 334.65              |
| T01-MST6-B-C1-1-SBS1-DMA-W                           | 154.78                | 310.60              | 165.88                | 330.58              |
| T01-MST6-B-C2-1-SBS1-DMA-W                           | 153.52                | 308.34              | 165.09                | 329.16              |
| T01-MST6-C-C1-1-SBS1-DMA-W                           | 153.49                | 308.28              | 166.57                | 331.83              |
| T01-MST6-C-C2-1-SBS1-DMA-W                           | 154.83                | 310.69              | 167.43                | 333.37              |
| T01-MST7-A-C1-1-OHC2-DMA-W                           | 147.84                | 298.11              | 167.45                | 333.41              |
| T01-MST7-A-C2-1-OHC2-DMA-W                           | 148.85                | 299.93              | 167.45                | 333.41              |
| T01-MST7-B-C1-1-OHC2-DMA-W                           | 149.49                | 301.08              | 166.59                | 331.86              |
| T01-MST7-B-C2-1-OHC2-DMA-W                           | 149.75                | 301.55              | 166.25                | 331.25              |
| T01-MST7-C-C1-1-OHC2-DMA-W                           | 146.97                | 296.55              | 165.52                | 329.94              |
| T01-MST7-C-C2-1-OHC2-DMA-W                           | 149.23                | 300.61              | 166.41                | 331.54              |
| T01-MST8-A-C1-1-OHC3-DMA-W                           | 154.93                | 310.87              | 166.00                | 330.80              |
| T01-MST8-A-C2-1-OHC3-DMA-W                           | 155.37                | 311.67              | 166.49                | 331.68              |
| T01-MST8-B-C1-1-OHC3-DMA-W                           | 154.48                | 310.06              | 166.35                | 331.43              |
| T01-MST8-B-C2-1-OHC3-DMA-W                           | 153.78                | 308.80              | 164.60                | 328.28              |
| T01-MST8-C-C1-1-OHC3-DMA-W                           | 152.30                | 306.14              | 164.14                | 327.45              |
| T01-MST8-C-C2-1-OHC3-DMA-W                           | 152.34                | 306.21              | 164.57                | 328.23              |
| Average                                              | 152.75                | 306.95              | 166.24                | 331.24              |
| Standard Deviation                                   | 2.60                  | 4.68                | 1.14                  | 2.05                |

### 9.3 DMA Dry Batch A

A representative of DMA Dry profile from Batch A is provided below.



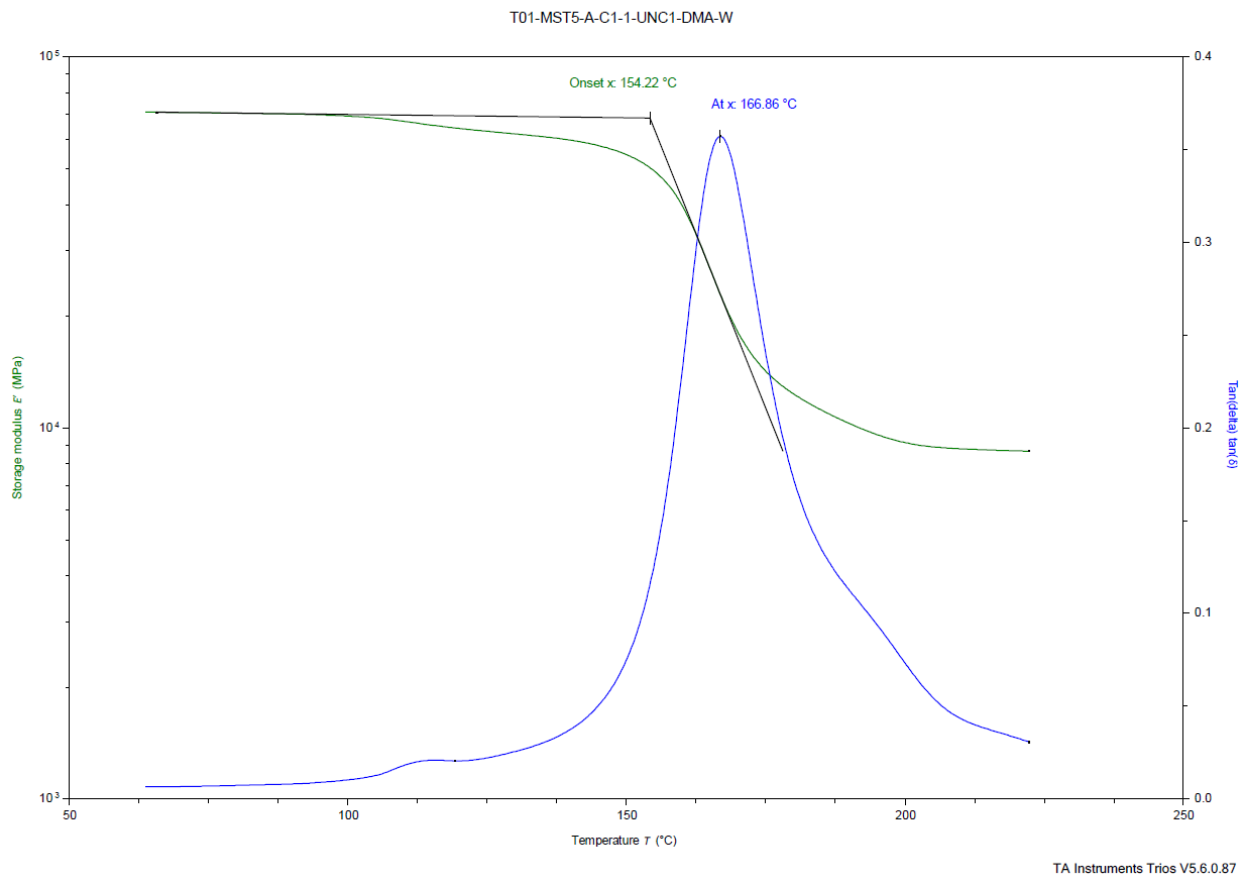
## 9.4 DMA Wet Batch A

A representative of DMA Wet profile from Batch A is provided below.

Sample: T01-MST5-A-C1-1-UNC1-DMA-W  
Size: 50.00000 x 12.82000 x 2.86000 mm  
Procedure name: Oscillation Temperature Ramp

DMA850

File: T01-MST5-A-C1-1-UNC1-DMA-W  
Operator: Ping  
Run Date: 3/28/2023 9:45:03 AM  
Instrument: DMA 850-0398



## 10. Moisture Loss

A representative specimen was used to measure the moisture loss.

| Layup                               | Test Type | Test Temperature | Specimen ID                                         | Weight Pre-Test (g) | Weight Post-Test (g) | Moisture Loss (g) |
|-------------------------------------|-----------|------------------|-----------------------------------------------------|---------------------|----------------------|-------------------|
| [0]6                                | LT        | ETW1(180°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C3-1-LT-TRV        | 17.80               | 17.77                | 0.02560           |
|                                     |           | ETW2(250°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-LT-TRV        | 17.34               | 17.32                | 0.02140           |
| [0]14                               | LC        | ETW1(180°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-LC/TC/SBS-TRV | 22.63               | 22.61                | 0.01930           |
|                                     |           | ETW2(250°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST1-B-C1-1-LC/TC-TRV     | 23.40               | 23.37                | 0.02610           |
| [90]12                              | TT        | ETW2(250°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST1-C-C1-1-LC/TC-TRV     | 23.33               | 23.29                | 0.03360           |
|                                     |           | ETW1(180°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-TT-TRV        | 19.42               | 19.41                | 0.01480           |
| [90]14                              | TC        | ETW1(180°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-TT-TRV        | 19.61               | 19.60                | 0.01000           |
|                                     |           | ETW2(250°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C2-1-LC/TC-TRV     | 22.88               | 22.86                | 0.02190           |
| [45/-45]4S                          | IPS       | ETW1(180°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST3-A-C1-1-IPS-SP-6      | 29.27               | 29.24                | 0.02780           |
|                                     |           | ETW2(250°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST3-A-C2-1-IPS-SP-8      | 29.10               | 29.08                | 0.01810           |
| [0/90]5S                            | VNS       | ETW2(250°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST3-B-C1-1-TRV MACH      | 19.95               | 19.93                | 0.02110           |
|                                     |           | ETW1(180°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST4-A-C1-1-VNS-SP-5      | 7.936               | 7.933                | 0.00340           |
| [0]14                               | SBS       | ETW2(250°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST4-A-C1-1-VNS-SP-5      | 8.117               | 8.109                | 0.00760           |
|                                     |           | ETW1(180°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST1-A-C1-1-LC/TC/SBS-TRV | 23.18               | 23.17                | 0.01190           |
| [45/0/-45/90]3S                     | SBS1      | ETW1(180°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C1-1-SBS1-TRV      | 27.18               | 27.17                | 0.00960           |
| [45/0/-45/90]2S                     | UNT1      | ETW1(180°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-UNT1-TRV      | 26.50               | 26.48                | 0.01300           |
|                                     |           | ETW2(250°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C1-1-UNT1-TRV      | 26.33               | 26.31                | 0.01570           |
| [45/-45/90/45/-45/45/-45/0/45/-45]S | UNT2      | ETW2(250°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST7-A-C2-1-UNT2-TRV      | 23.11               | 23.10                | 0.01130           |
| [45/90/-45/0/0/45/0/0/-45/0]S       | UNT3      | ETW2(250°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-UNT3-SP-8     | 36.91               | 36.89                | 0.01310           |
|                                     |           | ETW2(250°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-UNT3-TRV      | 23.26               | 23.24                | 0.01710           |
| [90/0/90]5                          | UNC0      | ETW1(180°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C2-1-UNC0-TRV      | 24.42               | 24.40                | 0.01810           |
|                                     |           | ETW2(250°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST2-A-C1-1-UNC0-TRV      | 25.02               | 24.99                | 0.02840           |
| [45/0/-45/90]2S                     | UNC1      | ETW1(180°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-UNC1-TRV      | 26.53               | 26.52                | 0.01190           |
|                                     |           | ETW2(250°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C1-1-UNC1-TRV      | 26.48               | 26.46                | 0.02200           |
| [45/-45/90/45/-45/45/-45/0/45/-45]S | UNC2      | ETW2(250°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C2-1-UNC1-TRV      | 19.87               | 19.85                | 0.01530           |
|                                     |           | ETW2(250°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-UNC2-TRV      | 23.02               | 23.00                | 0.01900           |
| [45/90/-45/0/0/45/0/0/-45/0]S       | UNC3      | ETW2(250°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C1-1-UNC2-TRV      | 23.41               | 23.39                | 0.01620           |
|                                     |           | ETW2(250°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-UNC3-TRV      | 23.20               | 23.19                | 0.01360           |
| [45/0/-45/90]2S                     | OHT1      | ETW1(180°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-OHT1-SP-6     | 52.73               | 52.71                | 0.02310           |
|                                     |           | ETW2(250°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C2-1-OHT1-ETW2-1   | 52.78               | 51.95                | 0.82850           |
|                                     |           | ETW2(250°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C1-1-OHT1-ETW2-1   | 52.93               | 51.98                | 0.94970           |
|                                     |           | ETW2(250°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C2-1-OHT1-SP-5     | 52.72               | 52.68                | 0.04000           |
| [45/-45/90/45/-45/45/-45/0/45/-45]S | OHT2      | ETW2(250°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-OHT2-ETW2-1   | 65.69               | 65.63                | 0.05840           |
| [45/90/-45/0/0/45/0/0/-45/0]S       | OHT3      | ETW2(250°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-OHT3-SP-5     | 66.21               | 66.15                | 0.05670           |
| [45/0/-45/90]3S                     | FHC1      | ETW1(180°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C2-1-FHC1-SP-3     | 78.38               | 78.36                | 0.02310           |
|                                     |           | ETW2(250°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C1-1-FHC1-SP-5     | 77.33               | 77.28                | 0.04600           |
| [45/-45/90/45/-45/45/-45/0/45/-45]S | FHC2      | ETW2(250°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST6-C-C1-1-FHC1-SP-3     | 78.71               | 78.67                | 0.04170           |
|                                     |           | ETW2(250°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C1-1-FHC2-SP-4     | 66.07               | 66.01                | 0.05560           |
| [45/90/-45/0/0/45/0/0/-45/0]S       | FHC3      | ETW2(250°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-FHC2-SP-4     | 66.31               | 66.26                | 0.05390           |
|                                     |           | ETW2(250°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C2-1-FHC3-SP-4     | 66.11               | 66.05                | 0.05690           |
| [45/0/-45/90]3S                     | OHC1      | ETW2(250°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C2-1-FHC3-SP-4     | 66.11               | 66.07                | 0.04020           |
|                                     |           | ETW1(180°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C2-1-OHC1-SP-4     | 78.34               | 78.31                | 0.02820           |
| [45/-45/90/45/-45/45/-45/0/45/-45]S | OHC2      | ETW2(250°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST6-A-C1-1-OHC1-SP-6     | 77.29               | 77.26                | 0.02880           |
|                                     |           | ETW2(250°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C1-1-OHC2-SP-4     | 65.96               | 65.92                | 0.03780           |
| [45/90/-45/0/0/45/0/0/-45/0]S       | OHC3      | ETW2(250°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST7-C-C2-1-OHC2-SP-4     | 66.27               | 66.22                | 0.05550           |
|                                     |           | ETW2(250°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST8-A-C1-1-OHC3-SP-4     | 66.33               | 66.27                | 0.05600           |
| [45/0/-45/90]2S                     | SSB1      | ETW2(250°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST8-B-C2-1-OHC3-ETW2-1   | 65.59               | 65.55                | 0.04480           |
|                                     |           | ETW1(180°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST5-A-C2-1-SSB1-SP-4     | 24.06               | 24.05                | 0.01140           |
| [45/-45/90/45/-45/45/-45/0/45/-45]S | SSB2      | ETW2(250°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST5-B-C1-1-SSB1-ETW2-1   | 23.92               | 23.90                | 0.02810           |
|                                     |           | ETW2(250°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST5-C-C1-1-SSB1-SP-4     | 24.21               | 24.18                | 0.02380           |
| [45/90/-45/0/0/45/0/0/-45/0]S       | SSB3      | ETW2(250°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST7-B-C2-1-SSB2-SP-4     | 30.08               | 30.06                | 0.02010           |
| [0]22                               | ILT       | ETW2(250°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST8-C-C1-1-SSB3-SP-4     | 30.27               | 30.24                | 0.02370           |
| [0]14                               | FSSBS     | ETW2(250°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST9-A-C2-1-ILT-SP-6      | 32.98               | 32.95                | 0.02660           |
|                                     |           | ETW2(250°F)      | NTP3963Q1-TC-WEB-NIAR-T01-MST10-A-C1-1-TRV          | 23.20               | 23.19                | 0.01090           |

## 11. Deviations

N/A