# Cytec Cycom 5320-1 T650 3k-PW Fabric Qualification Material Property Data Report

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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—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 does 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 a 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, Cytec Cycom 5320-1 T650 3k-PW Fabric Qualification Statistical Analysis Report NCP-RP-2012-023 N/C. The qualification material was procured to NCAMP Material Specification NMS 532/6 Rev Initial Release dated July 06, 2010. The qualification test panels were cured in accordance with NCAMP Process Specification NPS 85321 Revision A dated September 23, 2010 Baseline “C” Cure Cycle. The NCAMP Test Plan NTP 5326Q1 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. 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 are adequate for the given program.

Aircraft companies should not use the data published in this report without specifying NCAMP Material Specification NMS 532/6. NMS 532/6 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 532/6.* NMS 532/6 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 Used

| | |
|---|---|
| $\nu_{12}^{t}$ | major Poisson's ratio, tension |
| $\mu\varepsilon$ | 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 |
| $\nu_{12}^{c}$ | major Poisson's Ratio, compression |
| $\nu_{21}^{c}$ | minor Poisson's Ratio, compression |
| $F_{12}^{s5\% \text{ strain}}$ | in-plane shear strength at 5% strain |
| $F_{12}^{smax}$ | in-plane shear peak strength before 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 |
| CTD | cold temperature dry |
| CPT | cured ply thickness |
| ETD | elevated temperature dry |
| ETW | elevated temperature wet |
| Gr/Ep | graphite/epoxy |
| norm | normalized |
| RTD | room temperature dry |
| 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

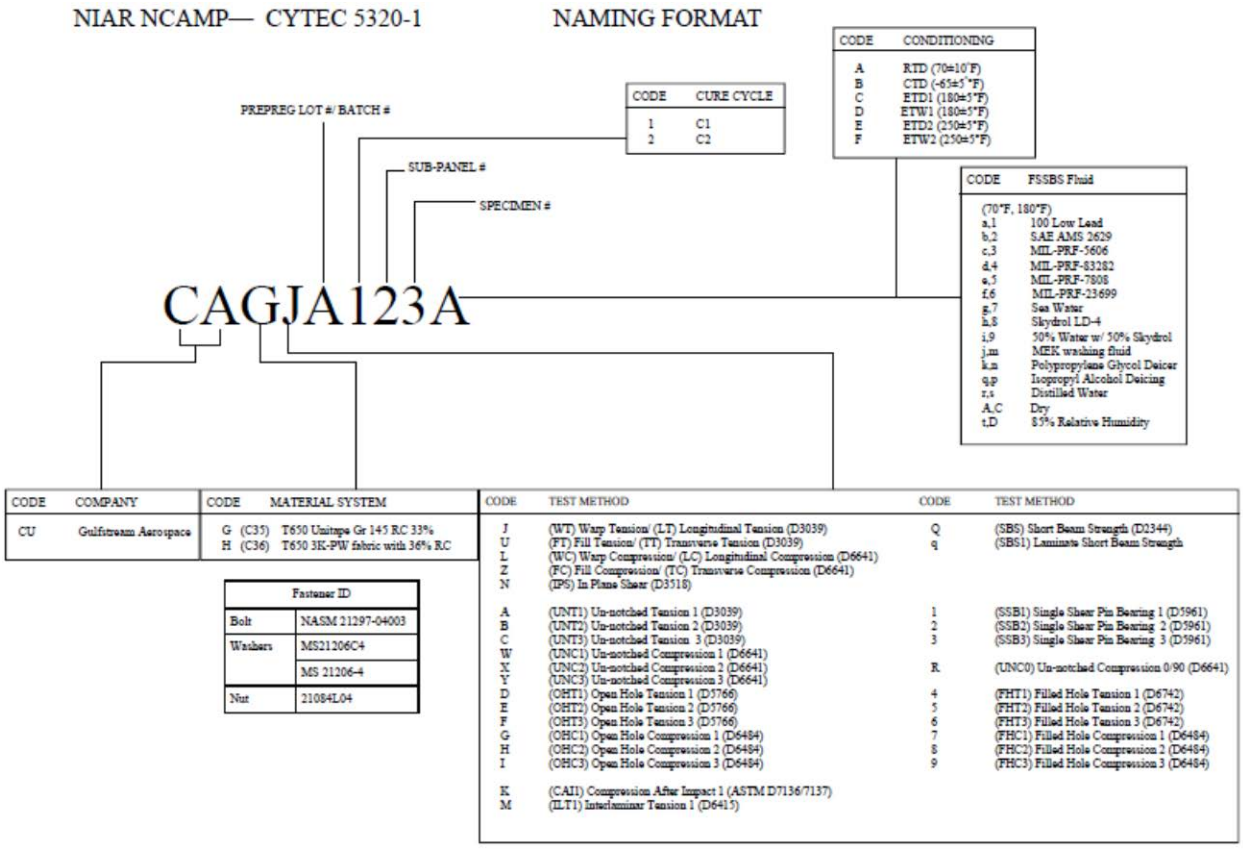



**Figure 1-1: Naming Format**

## 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-00(2006) – Standard Test Method for Short-Beam Strength of Polymer Matrix Composite Materials and Their Laminates
- ASTM D3039/D3039M-08 – Standard Test Method for Tensile Properties of Polymer Matrix Composite Materials
- ASTM D3518/D3518M-94(2007) – Standard Test Method for In-Plane Shear Response of Polymer Matrix Composite Materials by Tensile Test of a ± 45º Laminate In-Plane Shear Strength and Modulus
- ASTM D5766/D5766M-07 – Standard Test Method for Open Hole Tensile Strength of Polymer Matrix Composite Laminates
- ASTM D5961/D5961M-08 – Standard Test Method for Bearing Response of Polymer Matrix Composite Laminates
- ASTM D6415-06ae1 – Standard Test Method for Measuring the Curved Beam Strength of a Fiber-Reinforced Polymer-Matrix Composite
- ASTM D6484/D6484M-04 – Standard Test Method for Open-Hole Compressive Strength of Polymer Matrix Composite Laminates
- ASTM D6641/D6641M-01e1 – Standard Test Method for Determining the Compressive Properties of Polymer Matrix Composite Laminates Using a Combined Loading Compression (CLC) Test Fixture
- ASTM D6742/D6742M-07 – Standard Practice for Filled-Hole Tension and Compression Testing of Polymer Matrix Composite Laminates
- ASTM D7028-07e1 – Standard Test Method for Glass Transition Temperature (DMA Tg) of Polymer Matrix Composites by Dynamic Mechanical Analysis (DMA)
- ASTM D7136/D7136M-07 – Standard Test Method for Measuring the Damage Resistance of a Fiber-Reinforced Polymer Matrix Composite to a Drop-Weight Impact Event
- ASTM D7137/D7137M-07 – Standard Test Method for Compressive Residual Strength Properties of Damaged Polymer Matrix Composite Plates

## 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.

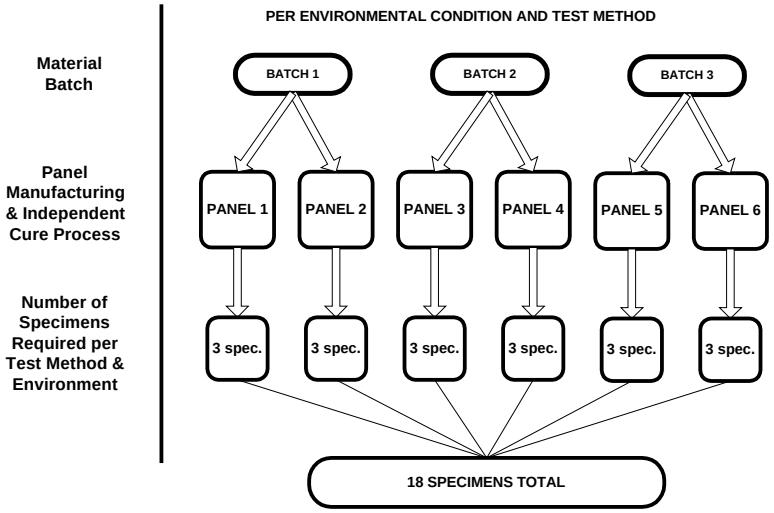



**Figure 1-2: Specimen Selection Methodology**

All panels were fabricated in accordance with NCAMP Process Specification 85321 “C” Cure Cycle.

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.

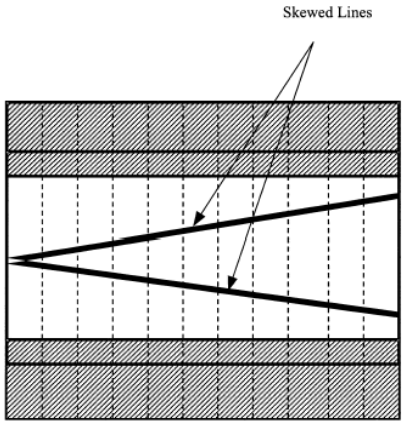



**Figure 1-3: Specimen Traceability Line**

## 1.5.2 Specimen & Testing Details

### 1.5.2.1 Tabbing

No tabs were used for this program.

### 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.

Caul plate was used in the fabrication of the panels.

For filled-hole and bearing tests, the hole diameter was 0.25 in -0.000 +0.003 in. For filled-hole tension tests, the fasteners were installed to 85±5 in-lb above prevailing torque. For filled-hole compression and bearing tests, the fasteners were installed to 30±5 in-lb above the prevailing torque. 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 tests, the hole diameter was 0.25 in -0.000 +0.003 in. The following fasteners were used:

1) NASM 21297-04003 bolts with MS21206 washers and NASM 21084 nuts for FHT and FHC
2) NASM 21297-04016 bolts with MS21206 washers and MS 21084 nuts AND NASM 14181-04016 bolts with MS 14183 washes and MS 14182 nuts for SSB

### 1.5.3 Test Matrix

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

| Layup (warp direction) | Test Type and Direction | Property | Number of Batches x Number of Panels x Number of Test Specimens | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Test Temperature/Moisture Condition | | | | | |
| | | | CTD | RTD (4) | ETD1 | ETW1 | ETD2 | ETW2 |
| $[0]_{15}$ | ASTM D3039 Warp Tension | Strength, Modulus, and Poisson's Ratio | 3x2x3 | 3x2x3 | | 1x2x3 | | 3x2x3 |
| $[0]_{15}$ | ASTM D6641 Warp Compression | Strength and Modulus | 3x2x3 | 3x2x3 (1) | 1x2x3 | 1x2x3 (3) | 1x2x3 | 3x2x3 (3) |
| $[90]_{15}$ | ASTM D3039 Fill Tension | Strength and Modulus | 3x2x3 | 3x2x3 | | 1x2x3 | | 3x2x3 |
| $[90]_{15}$ | ASTM D6641 Fill Compression | Strength and Modulus | 3x2x3 | 3x2x3 (1) | 1x2x3 | 1x2x3 (3) | 1x2x3 | 3x2x3 (3) |
| $[45/-45]_{3S}$ | ASTM D3518 In-Plane Shear (2) | Strength and Modulus | 3x2x3 | 3x2x3 | | 1x2x3 | | 3x2x3 |
| $[0]_{32}$ | ASTM D2344 Short Beam | Strength | 3x2x3 | 3x2x3 | 1x2x3 | 1x2x3 | 1x2x3 | 3x2x3 |

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

**Note 1:** Back-to-back strain gages are needed on the first two specimens of each environment. 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 1.5±0.5" on each end of the 10" 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:** If strain gage is used for modulus measurement, a separate un-gaged specimen must be used for strength measurement; because the strain gage and its protective coating may prevent moisture absorption in the gage area.

**Note 4:** 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.

Table 1-2 below summarizes the laminate level tests carried out. The layup angles 0º, 45º, -45º, and 90º 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 1-2 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.

| (%0°/%±45°/%90°) Actual Test Type | Test Type and Layup (5) | Property | Number of Batches x Number of Panels x Number of Test Specimens | | | |
|---|---|---|---|---|---|---|
| | | | Test Temperature/Moisture Condition | | | |
| | | | CTD | RTD | ETW1 | ETW2 |
| (25/50/25 - QI) UNT1 | ASTM D3039 Un-notched Tension [45/0/-45/90]2S | Strength & modulus | 3x2x3 | 3x2x3 (7) | 1x2x3 | 3x2x3 |
| (10/80/10) UNT2 | ASTM D3039 Un-notched Tension [45/-45/0/45/-45/45/-45/90/45/-45]S | Strength & modulus | 3x2x3 | 3x2x3 (7) | | 3x2x3 |
| (40/20/40) UNT3 | ASTM D3039 Un-notched Tension [0/90/0/45/90/0/90/-45/90/0/90/45/0/90/0] | Strength & modulus | 3x2x3 | 3x2x3 (7) | | 3x2x3 |
| (25/50/25 - QI) UNC1 | ASTM D6641 Un-notched Compression [45/0/-45/90]2S | Strength & modulus | | 3x2x3 (4&7) | 1x2x3 (6) | 3x2x3 (6) |
| (10/80/10) UNC2 | ASTM D6641 Un-notched Compression [45/-45/0/45/-45/45/-45/90/45/-45]S | Strength & modulus | | 3x2x3 (4&7) | | 3x2x3 (6) |
| (40/20/40) UNC3 | ASTM D6641 Un-notched Compression [0/90/45/0/90/0/90/-45/0/90]S | Strength & modulus | | 3x2x3 (4&7) | | 3x2x3 (6) |
| (25/50/25 - QI) SBS1 | ASTM D2344 Short Beam [45/0/-45/90/45/0/-45/90/-45/90]S (specimens may be taken from panels of similar layup) | Strength | | 3x2x3 | | 3x2x3 |
| (25/50/25 - QI) OHT1 | ASTM D5766 Open Hole Tension (1) [45/0/-45/90]2S | Strength | 3x2x3 | 3x2x3 | 1x2x3 | 3x2x3 |
| (10/80/10) OHT2 | ASTM D5766 Open Hole Tension (1) [45/-45/0/45/-45/45/-45/90/45/-45]S | Strength | 3x2x3 | 3x2x3 | | 3x2x3 |
| (40/20/40) OHT3 | ASTM D5766 Open Hole Tension (1) [0/90/0/45/90/0/90/-45/90/0/90/45/0/90/0] | Strength | 3x2x3 | 3x2x3 | | 3x2x3 |
| (25/50/25 - QI) FHT1 | ASTM D6742 Filled Hole Tension (2) [45/0/-45/90]2S | Strength | 3x2x3 | 3x2x3 | 1x2x3 | 3x2x3 |
| (10/80/10) FHT2 | ASTM D6742 Filled Hole Tension (2) [45/-45/0/45/-45/45/-45/90/45/-45]S | Strength | 3x2x3 | 3x2x3 | | 3x2x3 |
| (40/20/40) FHT3 | ASTM D6742 Filled Hole Tension (2) [0/90/0/45/90/0/90/-45/90/0/90/45/0/90/0] | Strength | 3x2x3 | 3x2x3 | | 3x2x3 |
| (25/50/25 - QI) OHC1 | ASTM D6484 Open Hole Compression (1) [45/0/-45/90/45/0/-45/90/-45/90]S | Strength | | 3x2x3 (4) | 1x2x3 | 3x2x3 |
| (10/80/10) OHC2 | ASTM D6484 Open Hole Compression (1) [45/-45/0/45/-45/45/-45/90/45/-45]S | Strength | | 3x2x3 (4) | | 3x2x3 |
| (40/20/40) OHC3 | ASTM D6484 Open Hole Compression (1) [0/90/45/90/0/0/90/-45/90/0]S | Strength | | 3x2x3 (4) | | 3x2x3 |
| (25/50/25 - QI) FHC1 | ASTM D6484 Filled Hole Compression (2) [45/0/-45/90/45/0/-45/90/-45/90]S | Strength | | 3x2x3 | 1x2x3 | 3x2x3 |
| (10/80/10) FHC2 | ASTM D6484 Filled Hole Compression (2) [45/-45/0/45/-45/45/-45/90/45/-45]S | Strength | | 3x2x3 | | 3x2x3 |
| (40/20/40) FHC3 | ASTM D6484 Filled Hole Compression (2) [0/90/45/90/0/0/90/-45/90/0]S | Strength | | 3x2x3 | | 3x2x3 |
| (25/50/25 - QI) SSB1 | ASTM D5961 Single Shear Bearing (3) [45/0/-45/90]2S | Strength & Deformation | | 3x2x3 | 1x2x3 | 3x2x3 |
| (10/80/10) SSB2 | ASTM D5961 Single Shear Bearing (3) [45/-45/90/45/-45]2S | Strength & Deformation | | 3x2x3 | | 3x2x3 |
| (40/20/40) SSB3 | ASTM D5961 Single Shear Bearing (3) [0/90/45/0/90]2S | Strength & Deformation | | 3x2x3 | | 3x2x3 |
| (50/0/50) ILT | ASTM D6415 Interlaminar Tension [0]21 | Strength | 1x1x6 | 1x1x6 | | 1x1x6 |
| (25/50/25 - QI) CAI1 | ASTM D7136 & D7137 Compression After Impact (1500 in.lb/in) (4) [45/0/-45/90]3S | Strength | | 1x1x6 | | |

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

**Note 1:** Open-hole configuration: 0.25” hole diameter, 1.5 inch width.
**Note 2:** Filled-hole test configuration: 0.25” diameter, see section 1.5.2.2 for fastener callout, 1.5” width.
**Note 3:** Single shear bearing test configuration: 0.25: hole diameter, 1.5” width, see section 1.5.2.2 for

fastener callout, e/D=3, ASTM D5961-08

**Note 4:** Back-to-back strain gages needed on the first two specimens of each environment. 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:** If strain gage is used for modulus measurement, a separate un-gaged specimen must be used for strength measurement, because the strain gage and its protective coating may prevent moisture absorption in the gage area.

**Note 7:** 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.

## 1.5.4 Cured Laminate Physical Testing

The properties in Table 1-3 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 (Note 1) | Min Replicates per panel |
|---|---|---|
| Cured Ply Thickness | ASTM D3171-06 | All data from mechanical test specimens |
| Laminate Density | ASTM D792-08 | 3 |
| Fiber Volume, % by Volume | ASTM D3171-06(Note 2) | 3 |
| Resin Content, % by Weight | ASTM D3171-06(Note 2) | 3 |
| Ultrasonic Through Transmission, C-Scan | MIL-HDBK-787A (Note 3) | 1 |
| Glass Transition Temperature, Tg by DMA flexural loading | Dry and Wet – ASTM D7028 | 1 Dry, 1 Wet (Note 4) |
| Glass Transition Temperature, Tg by DMA torsional loading | Dry and Wet – ASTM D5279 (Note 5) | 1 Dry, 1 Wet (Note 4) |

**Table 1-3: 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, except for laminates of materials where actual fiber weight is not accurately known prior to impregnation, as in the case for unidirectional materials. For these materials, in order to verify Method II is accurate, a minimum of 12 samples per batch shall be tested by Method I, Procedure B.

**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:** To be performed by Cytec Engineered Materials, Greenville, TX

## 1.5.5 Environmental Conditioning

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

CTD = -65±5°F, dry
RTD = 70±10°F, dry
ETD1 = 180±5°F, dry
ETW1 = 180±5°F, wet
ETD2 = 250±5°F, dry
ETW2 = 250±5°F**, wet

** If the wet glass transition temperature as determined in Table 1-3 is not 300°F or higher, the ETW2 test temperature will be reduced to 50°F below the measured wet glass transition temperature.

Within each test method and test environment, the failure mode was evaluated immediately after each test by an NCAMP staff engineer or NCAMP AER. All tested specimens were digitally photographed after each test in order to pictorially document failure modes. Representative photos are included in the CD accompanying this report.

For dry testing, specimens were dried at 250°F±5°F for at least 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 (no drying was required if specimens were tested within 14 days from the date they were cured). 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 dried at 250°F±5°F for a minimum of 24 hours before being conditioned to equilibrium at 160°F±5°F and 85% ± 5%. Effective moisture equilibrium was achieved when the average moisture content of the traveler specimen changed by less than 0.02% for two consecutive readings 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 ±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 $5^{+1}_{-0}$ minutes after the specimen reached the test temperature. During the test, the temperature, as measured on the specimen, was within ±5°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 ±5°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 1-4 lists the requirements for fluid sensitivity screening, which requires ASTM D2344 Short Beam Strength testing on $[0°]_{15}$ lamina level specimens dried at 250°F±5°F for 24 hours minimum before being subjected to the conditions indicated, five replicates per fluid and one cure cycle. 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, through a single setup.

Experience suggests 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. For example, the exposure condition for jet fuel may not fully represent the condition of integral fuel tanks.

| Extended Contact: | Exposure | Test Condition | Code |
|---|---|---|---|
| 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 |
| SAE AMS 2629 Jet Reference Fluid (other jet fuel may be used but its type must be reported) | 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 |
| Sea 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 |
| Short Duration Contact: | | | |
| 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 |
| 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 |
| Control Tests: | | | |
| 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 6.1 | 70°F | FS32RT |
| | Dry per section 6.1 | 180°F | FS32ET |
| 85% Relative Humidity | Per section 6.1 | 70°F | FS33RT |
| | Per section 6.1 | 180°F | FS33ET |

**Table 1-4: 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 level properties that were not normalized include 90º tensile strength and modulus (unidirectional only), 90º compressive strength and modulus (unidirectional only), in-plane shear strength and modulus, Poisson's ratio, SBS, and 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 average cured ply thickness of 0.0077 inches has been used as the nominal cured ply thickness (CPT) for normalization purpose. The following normalization formula was used:

Normalized Value = Measured Value x Measured CPT / Nominal CPT.

For Cytec 5320-1 the anticipated CPT was 0.0075 inches. The as measured CPT of the qualification panels was 0.00769 inches while the overall averages with equivalency samples included was 0.00772 inches. The lowest and highest CPT measured were 0.00758 inches and 0.00783 inches respectively. A proposed CPT of 0.0077 inches was suggested and agreed upon by participants of this qualification and equivalency project for use in the normalization procedures.

## 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. Witnessing was delegated to an AER. Mechanical testing was carried out at the National Institute for Aviation Research, Wichita State University. The conformity documentation, with required approval signatures, is included in the CD provided with this report.

## 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 is included on the CD provided with this report.

# 2. Test Results

## 2.1 Lamina Level Test Summary

| | | | | | |
|---|---|---|---|---|---|
| **Prepreg Material:** | Cytec 5320-1 T650 3k-PW fabric | | | | **Cytec 5320-1 T650 3k-PW fabric Lamina Properties Summary** |
| **Material Specification:** | NMS 532/6 | | | | |
| **Process Specification:** | NPS 85321 Baseline Cure Cycle C | | | | |
| **Fabric:** | T650 3k PW | **Resin:** | Cycom 5320-1 | | |
| **Tg(dry):** | 374.80 °F | **Tg(wet):** | 318.62 °F | **Tg METHOD:** | ASTM D7028 |

| | | | |
|---|---|---|---|
| **Date of fiber manufacture** | Dec-08 | **Date of testing** | June 2011 to May 2012 |
| **Date of resin manufacture** | Aug-10 | **Date of data submittal** | Nov-12 |
| **Date of prepreg manufacture** | Aug to Sept 2010 | | |
| **Date of composite manufacture** | Oct to Nov 2010 | | |

**LAMINA MECHANICAL PROPERTY SUMMARY**
**Data reported as: Normalized & Measured**
**(Normalized by CPT=0.0077 inch)**

| | CTD Mean | | RTD Mean | | ETD1 Mean | | ETW1 Mean | | ETD2 Mean | | ETW2 Mean | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Normalized | Measured | Normalized | Measured | Normalized | Measured | Normalized | Measured | Normalized | Measured | Normalized | Measured |
| $F_1^{tu}$ (ksi) | 107.279 | 109.757 | 121.838 | 124.900 | --- | --- | 128.089 | 128.550 | --- | --- | 129.354 | 132.201 |
| $E_1^t$ (Msi) | 9.865 | 10.095 | 9.738 | 9.990 | --- | --- | 9.995 | 10.051 | --- | --- | 9.741 | 9.955 |
| $\nu_{12}$ | | 0.060 | | 0.053 | | --- | | 0.047 | | --- | | 0.049 |
| $F_2^{tu}$ (ksi) | 101.592 | 103.151 | 118.678 | 121.810 | --- | --- | 122.292 | 123.845 | --- | --- | 119.526 | 122.061 |
| $E_2^t$ (Msi) | 9.770 | 9.919 | 9.678 | 9.931 | --- | --- | 10.085 | 10.212 | --- | --- | 9.519 | 9.719 |
| $F_1^{cu}$ (ksi) | 107.485 | 109.965 | 102.675 | 106.167 | 104.394 | 106.896 | 91.087 | 90.894 | 85.318 | 88.027 | 71.411 | 72.629 |
| $E_1^c$ (Msi) | 8.815 | 9.033 | 9.030 | 9.370 | 8.974 | 9.170 | 8.955 | 9.079 | 8.972 | 9.275 | 8.840 | 8.986 |
| $F_2^{cu}$ (ksi) | 100.115 | 101.710 | 98.149 | 100.365 | 97.320 | 99.075 | 79.819 | 81.669 | 84.215 | 87.433 | 62.660 | 63.541 |
| $E_2^c$ (Msi) | 8.868 | 8.989 | 8.680 | 8.876 | 8.724 | 8.896 | 8.715 | 8.923 | 8.712 | 8.987 | 8.732 | 8.818 |
| $F_{12}^{s0.2\%}$ (ksi) | | 11.504 | | 8.299 | | --- | | 5.455 | | --- | | 3.760 |
| $F_{12}^{s5\%strain}$ (ksi) | | 18.882 | | 14.650 | | --- | | 9.506 | | --- | | 6.915 |
| $G_{12}^s$ (Msi) | | 0.852 | | 0.735 | | --- | | 0.560 | | --- | | 0.386 |
| SBS (ksi) | | 12.538 | | 11.035 | | 9.898 | | 9.107 | | 8.805 | | 6.580 |

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

## 2.2 Laminate Level Test Summary

| | | | | | | |
|---|---|---|---|---|---|---|
| **Prepreg Material:** | Cytec 5320-1 T650 3k-PW fabric | | | | | **Cytec 5320-1 T650 3k-PW fabric Laminate Properties Summary** |
| **Material Specification:** | NMS 532/6 | | | | | |
| **Process Specification:** | NPS 85321 Baseline Cure Cycle C | | | | | |
| **Fabric:** | T650 3k PW | | **Resin:** | Cycom 5320-1 | | |
| **Tg(dry):** | 374.80 °F | **Tg(wet):** | 318.62 °F | **Tg METHOD:** | ASTM D7028 | |

| | | | |
|---|---|---|---|
| **Date of fiber manufacture** | Dec-08 | **Date of testing** | June 2011 to May 2012 |
| **Date of resin manufacture** | Aug-10 | **Date of data submittal** | Nov-12 |
| **Date of prepreg manufacture** | Aug to Sept 2010 | | |
| **Date of composite manufacture** | Oct to Nov 2010 | | |

**LAMINATE MECHANICAL PROPERTY SUMMARY**
**Data reported as: Normalized & Measured**
**(Normalized by CPT=0.0077 inch)**

| | Layup: | 25/50/25 | | 10/80/10 | | 40/20/40 | |
|---|---|---|---|---|---|---|---|
| | **Test Condition** | **Normalized** | **Measured** | **Normalized** | **Measured** | **Normalized** | **Measured** |
| **OHT Strength (ksi)** | **CTD** | 41.167 | 41.255 | 43.644 | 43.892 | 46.769 | 46.882 |
| | **RTD** | 43.645 | 43.798 | 45.890 | 46.210 | 49.920 | 50.115 |
| | **ETW1** | 47.319 | 48.067 | --- | --- | --- | --- |
| | **ETW2** | 48.634 | 48.558 | 34.069 | 34.152 | 59.524 | 59.588 |
| **OHC Strength (ksi)** | **RTD** | 48.077 | 48.267 | 42.467 | 42.707 | 50.104 | 50.236 |
| | **ETW1** | 40.963 | 41.400 | --- | --- | --- | --- |
| | **ETW2** | 34.342 | 34.440 | 30.886 | 31.007 | 37.556 | 37.660 |
| **UNT Strength (ksi)** | **CTD** | 82.950 | 83.241 | 59.011 | 59.450 | 95.768 | 96.475 |
| | **RTD** | 88.466 | 89.062 | 58.013 | 58.502 | 104.345 | 105.126 |
| | **ETW1** | 91.366 | 91.488 | --- | --- | --- | --- |
| | **ETW2** | 91.096 | 91.132 | 50.064 | 50.293 | 111.535 | 111.578 |
| **UNT Modulus (ksi)** | **CTD** | 7.113 | 7.139 | 4.868 | 4.905 | 8.832 | 8.896 |
| | **RTD** | 6.936 | 6.982 | 4.602 | 4.642 | 8.622 | 8.678 |
| | **ETW1** | 7.005 | 7.014 | --- | --- | --- | --- |
| | **ETW2** | 6.640 | 6.641 | 3.888 | 3.905 | 8.603 | 8.604 |
| **UNC Strength (ksi)** | **RTD** | 82.242 | 82.818 | 60.961 | 62.373 | 87.385 | 90.100 |
| | **ETW1** | 70.843 | 70.952 | --- | --- | --- | --- |
| | **ETW2** | 58.385 | 58.500 | 37.875 | 38.573 | 65.912 | 67.662 |
| **UNC Modulus (Msi)** | **RTD** | 6.413 | 6.455 | 4.390 | 4.494 | 7.919 | 8.174 |
| | **ETW1** | 6.468 | 6.481 | --- | --- | --- | --- |
| | **ETW2** | 6.246 | 6.264 | 3.767 | 3.844 | 7.873 | 8.068 |
| **FHT Strength (ksi)** | **CTD** | 47.455 | 47.564 | 47.804 | 48.108 | 53.638 | 54.032 |
| | **RTD** | 49.512 | 49.768 | 49.406 | 49.611 | 55.324 | 55.808 |
| | **ETW1** | 53.547 | 53.203 | --- | --- | --- | --- |
| | **ETW2** | 50.387 | 50.483 | 37.636 | 37.699 | 58.910 | 59.244 |
| **FHC Strength (ksi)** | **RTD** | 79.638 | 79.882 | 60.566 | 60.729 | 80.727 | 81.322 |
| | **ETW1** | 68.059 | 68.273 | --- | --- | --- | --- |
| | **ETW2** | 56.888 | 56.950 | 39.191 | 39.312 | 58.213 | 58.669 |
| **SBS1 Strength (ksi)** | **RTD** | | 11.955 | | | | |
| | **ETW2** | | 6.497 | | | | |
| **SSB Initial Peak Strength (ksi)** | **RTD** | 98.781 | 99.056 | --- | --- | 97.371 | 98.599 |
| | **ETW1** | --- | --- | --- | --- | --- | --- |
| | **ETW2** | --- | --- | --- | --- | 61.896 | 62.297 |
| **SSB 2% Offset Strength (ksi)** | **RTD** | 108.922 | 109.613 | 108.455 | 109.791 | 103.771 | 104.982 |
| | **ETW1** | 107.898 | 106.749 | --- | --- | --- | --- |
| | **ETW2** | 88.256 | 88.279 | 82.161 | 82.609 | 76.045 | 76.642 |
| **SSB Ultimate Strength (ksi)** | **RTD** | 131.495 | 132.316 | 135.163 | 136.829 | 125.470 | 126.946 |
| | **ETW1** | 129.057 | 127.693 | --- | --- | --- | --- |
| | **ETW2** | 108.348 | 108.370 | 106.960 | 107.503 | 98.555 | 99.326 |
| **CBS (lb)** | **CTD** | --- | 286.249 | | | | |
| | **RTD** | --- | 196.160 | | | | |
| | **ETW2** | --- | 154.594 | | | | |
| **ILT (ksi)** | **CTD** | --- | 7.440 | | | | |
| | **RTD** | --- | 5.070 | | | | |
| | **ETW2** | --- | 4.018 | | | | |
| **CAI Strength (ksi)** | **RTD** | 33.442 | 33.301 | | | | |

**Table 2-2: Laminate Summary Data**

## 2.3 Individual Test Summaries

## 2.3.1 Warp Tension Properties (WT)

**Material:** Cytec 5320-1 T650 3k-PW fabric with 36% RC

**Resin content:** 34.10 % wt **Comp. density:** 1.544 g/cc
**Fiber volume:** 57.73 % vol
**Ply count:** 15

**Test method:** ASTM D 3039-08 **Modulus calculation: 1000 to 3000 microstrain**

**Normalized by:** 0.0077 in. CPT

**Tension, 1-axis**
Cytec 5320-1 T650 3k-PW fabric with 36% RC
[0]15

| | | CTD | | RTD | | ETW1 | | ETW2 | |
|---|---|---|---|---|---|---|---|---|---|
| **Test Temperature [F]** | | -65 | | 70 | | 180 | | 250 | |
| **Moisture Conditioning** | | Dry | | Dry | | Equilbrium | | Equilbrium | |
| **Equilbrium at T, RH** | | | | | | 160 F,85% | | 160 F,85% | |
| **Source code** | | CUHJX XXXB | | CUHJX XXXA | | CUHJX XXXD | | CUHJX XXXF | |
| | | **Normalized** | **Measured** | **Normalized** | **Measured** | **Normalized** | **Measured** | **Normalized** | **Measured** |
| $F_1^{tu}$(ksi) | **Mean** | 107.279 | 109.757 | 121.838 | 124.900 | 128.089 | 128.550 | 129.354 | 132.201 |
| | **Minimum** | 95.993 | 99.615 | 113.921 | 114.962 | 122.294 | 121.907 | 112.814 | 114.768 |
| | **Maximum** | 121.054 | 124.355 | 131.605 | 134.039 | 132.671 | 133.557 | 137.556 | 141.756 |
| | **C.V.(%)** | 5.494 | 5.123 | 4.371 | 4.811 | 2.821 | 3.007 | 5.469 | 6.395 |
| | **No. Specimens** | 21 | | 22 | | 7 | | 22 | |
| | **No. Prepreg Lots** | 3 | | 3 | | 1 | | 3 | |
| $E_1^t$(Msi) | **Mean** | 9.865 | 10.095 | 9.738 | 9.990 | 9.995 | 10.051 | 9.741 | 9.955 |
| | **Minimum** | 9.551 | 9.876 | 9.547 | 9.771 | 9.864 | 10.001 | 9.499 | 9.753 |
| | **Maximum** | 10.063 | 10.369 | 9.966 | 10.172 | 10.095 | 10.117 | 9.987 | 10.162 |
| | **C.V.(%)** | 1.606 | 1.297 | 1.065 | 1.104 | 0.731 | 0.474 | 1.432 | 1.015 |
| | **No. Specimens** | 21 | | 22 | | 9 | | 24 | |
| | **No. Prepreg Lots** | 3 | | 3 | | 1 | | 3 | |
| $\nu_{12}$ | **Mean** | 0.060 | | 0.053 | | 0.047 | | 0.049 | |
| | **No. Specimens** | 21 | | 22 | | 7 | | 22 | |
| | **No. Prepreg Lots** | 3 | | 3 | | 1 | | 3 | |

## 2.3.2 Fill Tension Properties (FT)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Material:** | Cytec 5320-1 T650 3k-PW fabric with 36% RC | | | | | **Tension, 2-axis** Cytec 5320-1 T650 3k-PW fabric with 36% RC [90]15 | | | |
| **Resin content:** | 34.46 % wt | **Comp. density:** | 1.544 g/cc | | | | | | |
| **Fiber volume:** | 57.40 % vol | | | | | | | | |
| **Ply count:** | 15 | | | | | | | | |
| **Test method:** | ASTM D 3039-08 | **Modulus calculation: 1000 to 3000 microstrain** | | | | | | | |
| **Normalized by:** | 0.0077 | in. CPT | | | | | | | |
| | | **CTD** | | **RTD** | | **ETW1** | | **ETW2** | |
| **Test Temperature [F]** | | -65 | | 70 | | 180 | | 250 | |
| **Moisture Conditioning** | | Dry | | Dry | | Equilbrium | | Equilbrium | |
| **Equilbrium at T, RH** | | | | | | 160 F,85% | | 160 F,85% | |
| **Source code** | | CUHUX XXXB | | CUHUX XXXA | | CUHUX XXXD | | CUHUX XXXF | |
| | | **Normalized** | **Measured** | **Normalized** | **Measured** | **Normalized** | **Measured** | **Normalized** | **Measured** |
| $F_2^{tu}$ (ksi) | **Mean** | 101.592 | 103.151 | 118.678 | 121.810 | 122.292 | 123.845 | 119.526 | 122.061 |
| | **Minimum** | 83.956 | 85.991 | 110.990 | 114.441 | 115.180 | 115.798 | 108.939 | 112.915 |
| | **Maximum** | 115.184 | 116.751 | 127.331 | 130.979 | 126.238 | 128.762 | 126.636 | 130.017 |
| | **C.V.(%)** | 7.527 | 7.367 | 4.196 | 4.241 | 3.340 | 3.697 | 4.320 | 4.412 |
| | **No. Specimens** | 21 | | 21 | | 7 | | 21 | |
| | **No. Prepreg Lots** | 3 | | 3 | | 1 | | 3 | |
| $E_2^t$ (Msi) | **Mean** | 9.770 | 9.919 | 9.678 | 9.931 | 10.085 | 10.212 | 9.519 | 9.719 |
| | **Minimum** | 9.288 | 9.553 | 9.187 | 9.463 | 9.969 | 10.001 | 9.070 | 9.318 |
| | **Maximum** | 10.330 | 10.494 | 10.180 | 10.457 | 10.250 | 10.379 | 10.153 | 10.350 |
| | **C.V.(%)** | 3.180 | 2.582 | 3.144 | 2.563 | 0.969 | 1.344 | 3.314 | 2.888 |
| | **No. Specimens** | 21 | | 22 | | 7 | | 21 | |
| | **No. Prepreg Lots** | 3 | | 3 | | 1 | | 3 | |

# 2.3.3 Warp Compression Properties (WC)

**Material:** Cytec 5320-1 T650 3k-PW fabric with 36% RC

**Resin content:** 34.68 % wt **Comp. density:** 1.549 g/cc
**Fiber volume:** 57.40 % vol
**Ply count:** 15

**Test method:** ASTM D 6641-05 **Modulus calculation: 1000 to 3000 microstrain**

**Normalized by:** 0.0077 in. CPT

**Compression, 1-axis**
Cytec 5320-1 T650 3k-PW fabric with 36% RC
[0]15

| | | CTD | | RTD | | ETD1 | | ETW1 | | ETD2 | | ETW2 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Test Temperature [F]** | | -65 | | 70 | | 180 | | 180 | | 250 | | 250 | |
| **Moisture Conditioning** | | Dry | | Dry | | Dry | | Equilbrium | | Dry | | Equilbrium | |
| **Equilbrium at T, RH** | | | | | | | | 160 F,85% | | | | 160 F,85% | |
| **Source code** | | CUHLX XXXB | | CUHLX XXXA | | CUHLX XXXC | | CUHLX XXXD | | CUHLX XXXE | | CUHLX XXXF | |
| | | **Normalized** | **Measured** | **Normalized** | **Measured** | **Normalized** | **Measured** | **Normalized** | **Measured** | **Normalized** | **Measured** | **Normalized** | **Measured** |
| $F_1^{cu}$(ksi) | **Mean** | 107.485 | 109.965 | 102.675 | 106.167 | 104.394 | 106.896 | 91.087 | 90.894 | 85.318 | 88.027 | 71.411 | 72.629 |
| | **Minimum** | 93.342 | 95.439 | 91.296 | 92.133 | 96.324 | 98.783 | 81.040 | 80.535 | 71.048 | 73.211 | 62.710 | 63.752 |
| | **Maximum** | 125.370 | 129.824 | 118.856 | 124.206 | 111.065 | 114.638 | 100.336 | 101.135 | 94.330 | 97.180 | 81.372 | 82.788 |
| | **C.V.(%)** | 7.472 | 7.919 | 6.099 | 6.967 | 4.569 | 4.761 | 6.062 | 6.429 | 9.335 | 9.203 | 6.936 | 7.196 |
| | **No. Specimens** | 28 | | 25 | | 9 | | 9 | | 8 | | 32 | |
| | **No. Prepreg Lots** | 3 | | 3 | | 1 | | 1 | | 1 | | 3 | |
| $E_1^c$(Msi) | **Mean** | 8.815 | 9.033 | 9.030 | 9.370 | 8.974 | 9.170 | 8.955 | 9.079 | 8.972 | 9.275 | 8.840 | 8.986 |
| | **Minimum** | 8.437 | 8.454 | 8.759 | 8.993 | 8.845 | 9.053 | 8.726 | 8.874 | 8.723 | 8.960 | 8.371 | 8.463 |
| | **Maximum** | 9.315 | 9.646 | 9.205 | 9.619 | 9.110 | 9.295 | 9.134 | 9.280 | 9.114 | 9.558 | 9.193 | 9.309 |
| | **C.V.(%)** | 2.687 | 2.782 | 1.328 | 1.907 | 1.019 | 0.893 | 1.586 | 1.529 | 1.449 | 1.956 | 2.135 | 2.003 |
| | **No. Specimens** | 21 | | 21 | | 7 | | 7 | | 7 | | 21 | |
| | **No. Prepreg Lots** | 3 | | 3 | | 1 | | 1 | | 1 | | 3 | |

# 2.3.4 Fill Compression Properties (FC)

**Material:** Cytec 5320-1 T650 3k-PW fabric with 36% RC

**Resin content:** 34.54 % wt **Comp. density:** 1.545 g/cc
**Fiber volume:** 57.37 % vol
**Ply count:** 15

**Test method:** ASTM D 6641-05 **Modulus calculation: 1000 to 3000 microstrain**

**Normalized by:** 0.0077 in. CPT

**Compression, 2-axis**
Cytec 5320-1 T650 3k-PW fabric with 36% RC
[90]15

| | | CTD | | RTD | | ETD1 | | ETW1 | | ETD2 | | ETW2 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Test Temperature [F]** | | -65 | | 70 | | 180 | | 180 | | 250 | | 250 | |
| **Moisture Conditioning** | | Dry | | Dry | | Dry | | Equilbrium | | Dry | | Equilbrium | |
| **Equilbrium at T, RH** | | | | | | | | 160 F,85% | | | | 160 F,85% | |
| **Source code** | | CUHZX XXXB | | CUHZX XXXA | | CUHZX XXXC | | CUHZX XXXD | | CUHZX XXXE | | CUHZX XXXF | |
| | | **Normalized** | **Measured** | **Normalized** | **Measured** | **Normalized** | **Measured** | **Normalized** | **Measured** | **Normalized** | **Measured** | **Normalized** | **Measured** |
| $F_2^{cu}$ (ksi) | **Mean** | 100.115 | 101.710 | 98.149 | 100.365 | 97.320 | 99.075 | 79.819 | 81.669 | 84.215 | 87.433 | 62.660 | 63.541 |
| | **Minimum** | 83.271 | 84.570 | 81.915 | 86.139 | 89.399 | 91.580 | 73.843 | 75.820 | 77.343 | 78.958 | 51.634 | 52.660 |
| | **Maximum** | 117.161 | 116.480 | 116.024 | 117.939 | 108.617 | 110.701 | 86.708 | 89.298 | 97.856 | 101.766 | 77.482 | 79.311 |
| | **C.V.(%)** | 8.852 | 8.417 | 8.954 | 7.587 | 6.927 | 7.784 | 6.042 | 6.328 | 8.285 | 8.573 | 12.064 | 11.602 |
| | **No. Specimens** | 24 | | 23 | | 8 | | 5 | | 8 | | 22 | |
| | **No. Prepreg Lots** | 3 | | 3 | | 1 | | 1 | | 1 | | 3 | |
| $E_2^c$ (Msi) | **Mean** | 8.868 | 8.989 | 8.680 | 8.876 | 8.724 | 8.896 | 8.715 | 8.923 | 8.712 | 8.987 | 8.732 | 8.818 |
| | **Minimum** | 8.083 | 8.365 | 8.203 | 8.521 | 8.497 | 8.726 | 8.239 | 8.359 | 8.644 | 8.830 | 7.938 | 7.977 |
| | **Maximum** | 9.734 | 9.620 | 9.162 | 9.408 | 8.796 | 9.079 | 9.160 | 9.575 | 8.808 | 9.182 | 9.244 | 9.276 |
| | **C.V.(%)** | 5.369 | 4.562 | 3.521 | 2.965 | 1.179 | 1.629 | 2.945 | 3.747 | 0.579 | 1.335 | 4.381 | 4.058 |
| | **No. Specimens** | 21 | | 21 | | 7 | | 8 | | 7 | | 21 | |
| | **No. Prepreg Lots** | 3 | | 3 | | 1 | | 1 | | 1 | | 3 | |

## 2.3.5 In-Plane Shear Properties (IPS)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Material:** | Cytec 5320-1 T650 3k-PW fabric with 36% RC | | | | | **In-Plane Shear** Cytec 5320-1 T650 3k-PW fabric with 36% RC [45/-45]3S | | | |
| **Resin content** | 34.38 % wt | | **Comp. density:** | 1.538 g/cc | | | | | |
| **Fiber volume:** | 57.26 % vol | | | | | | | | |
| **Ply count** | 12 | | | | | | | | |
| **Test method:** | ASTM D 3518-07 | | **Modulus calculation: 2000 to 6000 microstrain** | | | | | | |
| **Normalized by:** | NA | in. CPT | | | | | | | |
| | | **CTD** | | **RTD** | | **ETW1** | | **ETW2** | |
| **Test Temperature [F]** | | -65 | | 70 | | 180 | | 250 | |
| **Moisture Conditioning** | | Dry | | Dry | | Equilbrium | | Equilbrium | |
| **Equilbrium at T, RH** | | | | | | 160 F,85% | | 160 F,85% | |
| **Source code** | | CUHNX XXXB | | CUHNX XXXA | | CUHNX XXXD | | CUHNX XXXF | |
| | | **Normalized** | **Measured** | **Normalized** | **Measured** | **Normalized** | **Measured** | **Normalized** | **Measured** |
| $F_{12}^{s0.2\%}$ **(ksi)** | **Mean** | | 11.504 | | 8.299 | | 5.455 | | 3.760 |
| | **Minimum** | | 11.011 | | 8.095 | | 5.211 | | 3.545 |
| | **Maximum** | | 11.856 | | 8.614 | | 5.563 | | 4.108 |
| | **C.V.(%)** | | 1.559 | | 1.612 | | 2.302 | | 4.238 |
| | **No. Specimens** | 21 | | 21 | | 7 | | 21 | |
| | **No. Prepreg Lots** | 3 | | 3 | | 1 | | 3 | |
| $F_{12}^{s5\% \text{ strain}}$ **(ksi)** | **Mean** | | 18.882 | | 14.650 | | 9.506 | | 6.915 |
| | **Minimum** | | 17.916 | | 14.071 | | 9.335 | | 6.427 |
| | **Maximum** | | 19.882 | | 15.577 | | 9.733 | | 7.487 |
| | **C.V.(%)** | | 3.382 | | 3.081 | | 1.809 | | 4.737 |
| | **No. Specimens** | 17 | | 21 | | 7 | | 19 | |
| | **No. Prepreg Lots** | 3 | | 3 | | 1 | | 3 | |
| $G_{12}^{s}$ **(Msi)** | **Mean** | | 0.852 | | 0.735 | | 0.560 | | 0.386 |
| | **Minimum** | | 0.820 | | 0.711 | | 0.545 | | 0.358 |
| | **Maximum** | | 0.881 | | 0.759 | | 0.569 | | 0.422 |
| | **C.V.(%)** | | 2.387 | | 1.664 | | 1.336 | | 4.359 |
| | **No. Specimens** | 21 | | 21 | | 7 | | 21 | |
| | **No. Prepreg Lots** | 3 | | 3 | | 1 | | 3 | |

## 2.3.6 “25/50/25” Unnotched Tension 1 Properties (UNT1)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Material:** | Cytec 5320-1 T650 3k-PW fabric with 36% RC | | | | | **Unnotched Tension 1** Cytec 5320-1 T650 3k-PW fabric with 36% RC [45/0/-45/90]2S | | | |
| **Resin content:** | 35.73 % wt | | **Comp. density:** | 1.545 g/cc | | | | | |
| **Fiber volume:** | 56.33 % vol | | | | | | | | |
| **Ply count:** | 16 | | | | | | | | |
| **Test method:** | ASTM D 3039-08 | | **Modulus calculation: 1000 to 3000 microstrain** | | | | | | |
| **Normalized by:** | 0.0077 | in. CPT | | | | | | | |
| | | **CTD** | | **RTD** | | **ETW1** | | **ETW2** | |
| **Test Temperature [F]** | | -65 | | 70 | | 180 | | 250 | |
| **Moisture Conditioning** | | Dry | | Dry | | Equilbrium | | Equilbrium | |
| **Equilbrium at T, RH** | | | | | | 160 F,85% | | 160 F,85% | |
| **Source code** | | CUHAX XXXB | | CUHAX XXXA | | CUHAX XXXD | | CUHAX XXXF | |
| | | **Normalized** | **Measured** | **Normalized** | **Measured** | **Normalized** | **Measured** | **Normalized** | **Measured** |
| **UNT1 Strength (ksi)** | **Mean** | 82.950 | 83.241 | 88.466 | 89.062 | 91.366 | 91.488 | 91.096 | 91.132 |
| | **Minimum** | 76.964 | 77.669 | 81.421 | 82.143 | 87.943 | 88.313 | 86.621 | 85.488 |
| | **Maximum** | 90.966 | 90.904 | 95.192 | 95.892 | 94.902 | 95.108 | 99.178 | 98.804 |
| | **C.V.(%)** | 4.356 | 3.791 | 4.907 | 5.002 | 2.701 | 2.856 | 3.136 | 3.723 |
| | **No. Specimens** | 21 | | 21 | | 7 | | 21 | |
| | **No. Prepreg Lots** | 3 | | 3 | | 1 | | 3 | |
| **UNT1 Modulus (Msi)** | **Mean** | 7.113 | 7.139 | 6.936 | 6.982 | 7.005 | 7.014 | 6.640 | 6.641 |
| | **Minimum** | 6.941 | 6.932 | 6.624 | 6.716 | 6.802 | 6.829 | 6.458 | 6.438 |
| | **Maximum** | 7.413 | 7.291 | 7.282 | 7.324 | 7.117 | 7.160 | 6.847 | 6.866 |
| | **C.V.(%)** | 2.007 | 1.470 | 2.680 | 2.482 | 1.549 | 1.550 | 1.786 | 1.390 |
| | **No. Specimens** | 21 | | 21 | | 7 | | 21 | |
| | **No. Prepreg Lots** | 3 | | 3 | | 1 | | 3 | |

## 2.3.7 "10/80/10" Unnotched Tension 2 Properties (UNT2)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Material:** | Cytec 5320-1 T650 3k-PW fabric with 36% RC | | | | | **Unnotched Tension 2** Cytec 5320-1 T650 3k-PW fabric with 36% RC [45/-45/0/45/-45/45/-45/90/45/-45]S | | | |
| **Resin content:** | 35.60 % wt | | **Comp. density:** | 1.550 g/cc | | | | | |
| **Fiber volume:** | 56.63 % vol | | | | | | | | |
| **Ply count:** | 20 | | | | | | | | |
| **Test method:** | ASTM D 3039-08 | | **Modulus calculation: 1000 to 3000 microstrain** | | | | | | |
| **Normalized by:** | 0.0077 | in. CPT | | | | | | | |
| | | **CTD** | | **RTD** | | **ETW2** | | | |
| **Test Temperature [F]** | | -65 | | 70 | | 250 | | | |
| **Moisture Conditioning** | | Dry | | Dry | | Equilbrium | | | |
| **Equilbrium at T, RH** | | | | | | 160 F,85% | | | |
| **Source code** | | CUHBX XXXB | | CUHBX XXXA | | CUHBX XXXF | | | |
| | | **Normalized** | **Measured** | **Normalized** | **Measured** | **Normalized** | **Measured** | | |
| **UNT2 Strength (ksi)** | **Mean** | 59.011 | 59.450 | 58.013 | 58.502 | 50.064 | 50.293 | | |
| | **Minimum** | 55.905 | 57.453 | 55.320 | 56.846 | 47.188 | 46.242 | | |
| | **Maximum** | 62.102 | 61.811 | 61.058 | 61.084 | 52.070 | 53.240 | | |
| | **C.V.(%)** | 3.197 | 2.226 | 2.637 | 2.009 | 2.394 | 3.050 | | |
| | **No. Specimens** | 21 | | 21 | | 21 | | | |
| | **No. Prepreg Lots** | 3 | | 3 | | 3 | | | |
| **UNT2 Modulus (Msi)** | **Mean** | 4.868 | 4.905 | 4.602 | 4.642 | 3.888 | 3.905 | | |
| | **Minimum** | 4.696 | 4.810 | 4.259 | 4.362 | 3.734 | 3.785 | | |
| | **Maximum** | 5.025 | 5.093 | 4.724 | 4.806 | 4.089 | 4.143 | | |
| | **C.V.(%)** | 1.824 | 1.329 | 2.558 | 2.426 | 2.725 | 2.588 | | |
| | **No. Specimens** | 21 | | 21 | | 21 | | | |
| | **No. Prepreg Lots** | 3 | | 3 | | 3 | | | |

## 2.3.8 "40/20/40" Unnotched Tension 3 Properties (UNT3)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Material:** | Cytec 5320-1 T650 3k-PW fabric with 36% RC | | | | | **Unnotched Tension 3** Cytec 5320-1 T650 3k-PW fabric with 36% RC [0/90/0/45/90/0/90/-45/90/0/90/45/0/90/0] | | | |
| **Resin content:** | 35.61 % wt | | **Comp. density:** | 1.544 g/cc | | | | | |
| **Fiber volume:** | 56.38 % vol | | | | | | | | |
| **Ply count:** | 15 | | | | | | | | |
| **Test method:** | ASTM D 3039-08 | | **Modulus calculation: 1000 to 3000 microstrain** | | | | | | |
| **Normalized by:** | 0.0077 | in. CPT | | | | | | | |
| | | **CTD** | | **RTD** | | **ETW2** | | | |
| **Test Temperature [F]** | | -65 | | 70 | | 250 | | | |
| **Moisture Conditioning** | | Dry | | Dry | | Equilbrium | | | |
| **Equilbrium at T, RH** | | | | | | 160 F,85% | | | |
| **Source code** | | CUHCX XXXB | | CUHCX XXXA | | CUHCX XXXF | | | |
| | | **Normalized** | **Measured** | **Normalized** | **Measured** | **Normalized** | **Measured** | | |
| **UNT3 Strength (ksi)** | **Mean** | 95.768 | 96.475 | 104.345 | 105.126 | 111.535 | 111.578 | | |
| | **Minimum** | 87.836 | 87.495 | 97.699 | 98.495 | 105.341 | 104.556 | | |
| | **Maximum** | 103.589 | 103.440 | 109.152 | 110.234 | 120.019 | 122.331 | | |
| | **C.V.(%)** | 3.654 | 3.729 | 2.664 | 2.638 | 3.444 | 4.077 | | |
| | **No. Specimens** | 21 | | 22 | | 22 | | | |
| | **No. Prepreg Lots** | 3 | | 3 | | 3 | | | |
| **UNT3 Modulus (Msi)** | **Mean** | 8.832 | 8.896 | 8.622 | 8.678 | 8.603 | 8.604 | | |
| | **Minimum** | 8.582 | 8.700 | 8.250 | 8.384 | 8.302 | 8.341 | | |
| | **Maximum** | 9.183 | 9.225 | 8.892 | 9.071 | 9.024 | 9.015 | | |
| | **C.V.(%)** | 2.101 | 1.546 | 2.203 | 1.817 | 2.223 | 2.104 | | |
| | **No. Specimens** | 21 | | 23 | | 22 | | | |
| | **No. Prepreg Lots** | 3 | | 3 | | 3 | | | |

## 2.3.9 "25/50/25" Unnotched Compression 1 Properties (UNC1)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Material:** | Cytec 5320-1 T650 3k-PW fabric with 36% RC | | | | | **Unnotched Compression 1** Cytec 5320-1 T650 3k-PW fabric with 36% RC [45/0/-45/90]2S | | | |
| **Resin content:** | 35.87 % wt | | **Comp. density:** | 1.551 g/cc | | | | | |
| **Fiber volume:** | 56.43 % vol | | | | | | | | |
| **Ply count:** | 16 | | | | | | | | |
| **Test method:** | ASTM D 6641-05 | | **Modulus calculation: 1000 to 3000 microstrain** | | | | | | |
| **Normalized by:** | 0.0077 | in. CPT | | | | | | | |
| | | **RTD** | | **ETW1** | | **ETW2** | | | |
| **Test Temperature [F]** | | 70 | | 180 | | 250 | | | |
| **Moisture Conditioning** | | Dry | | Equilbrium | | Equilbrium | | | |
| **Equilbrium at T, RH** | | | | 160 F,85% | | 160 F,85% | | | |
| **Source code** | | CUHWX XXXA | | CUHWX XXXD | | CUHWX XXXF | | | |
| | | **Normalized** | **Measured** | **Normalized** | **Measured** | **Normalized** | **Measured** | | |
| **UNC1 Strength (ksi)** | **Mean** | 82.242 | 82.818 | 70.843 | 70.952 | 58.385 | 58.500 | | |
| | **Minimum** | 75.686 | 75.410 | 62.481 | 62.838 | 54.039 | 55.307 | | |
| | **Maximum** | 88.649 | 90.165 | 76.061 | 75.523 | 65.806 | 65.250 | | |
| | **C.V.(%)** | 4.793 | 5.089 | 6.649 | 6.388 | 4.720 | 4.317 | | |
| | **No. Specimens** | 21 | | 7 | | 21 | | | |
| | **No. Prepreg Lots** | 3 | | 1 | | 3 | | | |
| **UNC1 Modulus (Msi)** | **Mean** | 6.413 | 6.455 | 6.468 | 6.481 | 6.246 | 6.264 | | |
| | **Minimum** | 6.103 | 6.160 | 6.336 | 6.407 | 5.861 | 6.014 | | |
| | **Maximum** | 6.610 | 6.661 | 6.582 | 6.596 | 6.581 | 6.562 | | |
| | **C.V.(%)** | 2.719 | 1.931 | 1.469 | 1.174 | 3.352 | 2.595 | | |
| | **No. Specimens** | 21 | | 7 | | 21 | | | |
| | **No. Prepreg Lots** | 3 | | 1 | | 3 | | | |

## 2.3.10 "10/80/10" Unnotched Compression 2 Properties (UNC2)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Material:** | Cytec 5320-1 T650 3k-PW fabric with 36% RC | | | | | **Unnotched Compression 2** Cytec 5320-1 T650 3k-PW fabric with 36% RC [45/-45/0/45/-45/45/-45/90/45/-45]S | | | |
| **Resin content:** | 35.63 % wt | | | **Comp. density:** | 1.556 g/cc | | | | |
| **Fiber volume:** | 56.84 % vol | | | | | | | | |
| **Ply count:** | 20 | | | | | | | | |
| **Test method:** | ASTM D 6641-05 | | | **Modulus calculation: 1000 to 3000 microstrain** | | | | | |
| **Normalized by:** | 0.0077 | in. CPT | | | | | | | |
| | | **RTD** | | **ETW2** | | | | | |
| **Test Temperature [F]** | | 70 | | 250 | | | | | |
| **Moisture Conditioning** | | Dry | | Equilbrium | | | | | |
| **Equilbrium at T, RH** | | | | 160 F,85% | | | | | |
| **Source code** | | CUHXX XXXA | | CUHXX XXXF | | | | | |
| | | **Normalized** | **Measured** | **Normalized** | **Measured** | | | | |
| | **Mean** | 60.961 | 62.373 | 37.875 | 38.573 | | | | |
| | **Minimum** | 55.161 | 57.475 | 33.441 | 34.762 | | | | |
| | **Maximum** | 67.294 | 69.048 | 40.729 | 40.683 | | | | |
| **UNC2 Strength (ksi)** | **C.V.(%)** | 6.026 | 5.267 | 4.861 | 4.274 | | | | |
| | **No. Specimens** | 21 | | 21 | | | | | |
| | **No. Prepreg Lots** | 3 | | 3 | | | | | |
| | **Mean** | 4.390 | 4.494 | 3.767 | 3.844 | | | | |
| | **Minimum** | 4.275 | 4.382 | 3.056 | 3.157 | | | | |
| | **Maximum** | 4.538 | 4.653 | 4.065 | 4.079 | | | | |
| **UNC2 Modulus (Msi)** | **C.V.(%)** | 1.797 | 1.580 | 5.383 | 4.812 | | | | |
| | **No. Specimens** | 21 | | 20 | | | | | |
| | **No. Prepreg Lots** | 3 | | 3 | | | | | |

## 2.3.11 "40/20/40" Unnotched Compression 3 Properties (UNC3)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Material:** | Cytec 5320-1 T650 3k-PW fabric with 36% RC | | | | | **Unnotched Compression 3** Cytec 5320-1 T650 3k-PW fabric with 36% RC [0/90/45/0/90/0/90/-45/0/90]S | | | |
| **Resin content:** | 35.60 % wt | | | **Comp. density:** | 1.559 g/cc | | | | |
| **Fiber volume:** | 56.95 % vol | | | | | | | | |
| **Ply count:** | 20 | | | | | | | | |
| **Test method:** | ASTM D 6641-05 | | | **Modulus calculation: 1000 to 3000 microstrain** | | | | | |
| **Normalized by:** | 0.0077 | in. CPT | | | | | | | |
| | | **RTD** | | **ETW2** | | | | | |
| **Test Temperature [F]** | | 70 | | 250 | | | | | |
| **Moisture Conditioning** | | Dry | | Equilbrium | | | | | |
| **Equilbrium at T, RH** | | | | 160 F,85% | | | | | |
| **Source code** | | CUHYX XXXA | | CUHYX XXXF | | | | | |
| | | **Normalized** | **Measured** | **Normalized** | **Measured** | | | | |
| | **Mean** | 87.385 | 90.100 | 65.912 | 67.662 | | | | |
| | **Minimum** | 76.559 | 79.663 | 58.980 | 60.568 | | | | |
| | **Maximum** | 107.515 | 108.235 | 74.176 | 77.027 | | | | |
| **UNC3 Strength (ksi)** | **C.V.(%)** | 6.487 | 5.778 | 5.756 | 5.857 | | | | |
| | **No. Specimens** | 22 | | 23 | | | | | |
| | **No. Prepreg Lots** | 3 | | 3 | | | | | |
| | **Mean** | 7.919 | 8.174 | 7.873 | 8.068 | | | | |
| | **Minimum** | 7.563 | 7.921 | 7.521 | 7.652 | | | | |
| | **Maximum** | 8.134 | 8.362 | 8.660 | 8.857 | | | | |
| **UNC3 Modulus (Msi)** | **C.V.(%)** | 1.921 | 1.528 | 3.669 | 3.399 | | | | |
| | **No. Specimens** | 21 | | 21 | | | | | |
| | **No. Prepreg Lots** | 3 | | 3 | | | | | |

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

**Material:** Cytec 5320-1 T650 3k-PW fabric with 36% RC

**Resin content:** 33.84 % wt **Comp. density:** 1.535 g/cc
**Fiber volume:** 57.60 % vol
**Ply count:** 32

**Test method:** ASTM D 2344-06

**Normalized by:** N/A

**Short-Beam Strength**
Cytec 5320-1 T650 3k-PW fabric with 36% RC
[0]32

| | | CTD | | RTD | | ETD1 | | ETW1 | | ETD2 | | ETW2 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Test Temperature [F]** | | -65 | | 70 | | 180 | | 180 | | 250 | | 250 | |
| **Moisture Conditioning** | | Dry | | Dry | | Dry | | Equilbrium | | Dry | | Equilbrium | |
| **Equilbrium at T, RH** | | | | | | | | 160 F,85% | | | | 160 F,85% | |
| **Source code** | | CUHQX XXXB | | CUHQX XXXA | | CUHQX XXXC | | CUHQX XXXD | | CUHQX XXXE | | CUHQX XXXF | |
| | | **Normalized** | **Measured** | **Normalized** | **Measured** | **Normalized** | **Measured** | **Normalized** | **Measured** | **Normalized** | **Measured** | **Normalized** | **Measured** |
| **SBS Strength (ksi)** | **Mean** | | 12.538 | | 11.035 | | 9.898 | | 9.107 | | 8.805 | | 6.580 |
| | **Minimum** | | 11.703 | | 9.931 | | 9.017 | | 8.436 | | 8.494 | | 5.804 |
| | **Maximum** | | 13.712 | | 11.871 | | 10.476 | | 9.613 | | 9.233 | | 7.452 |
| | **C.V.(%)** | | 4.640 | | 3.691 | | 4.714 | | 5.055 | | 3.304 | | 8.103 |
| | **No. Specimens** | | 21 | | 21 | | 7 | | 7 | | 7 | | 21 |
| | **No. Prepreg Lots** | | 3 | | 3 | | 1 | | 1 | | 1 | | 3 |

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

**Material:** Cytec 5320-1 T650 3k-PW fabric with 36% RC

**Resin content:** see FHC1 **Comp. density:** see FHC1
**Fiber volume:** see FHC1
**Ply count:** 20

**Test method:** ASTM D 2344-06

**Normalized by:** N/A

**Laminate Short-Beam Strength**
Cytec 5320-1 T650 3k-PW fabric with 36% RC
[45/0/-45/90/45/0/-45/90/-45/90]S

| | | RTD | | ETW2 | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Test Temperature [F]** | | 70 | | 250 | | | | | |
| **Moisture Conditioning** | | Dry | | Equilbrium | | | | | |
| **Equilbrium at T, RH** | | | | 160 F,85% | | | | | |
| **Source code** | | CUHqX XXXA | | CUHqX XXXF | | | | | |
| | | **Normalized** | **Measured** | **Normalized** | **Measured** | | | | |
| **SBS1 Strength (ksi)** | **Mean** | | 11.955 | | 6.497 | | | | |
| | **Minimum** | | 8.439 | | 6.092 | | | | |
| | **Maximum** | | 13.019 | | 7.427 | | | | |
| | **C.V.(%)** | | 8.967 | | 6.149 | | | | |
| | **No. Specimens** | | 27 | | 21 | | | | |
| | **No. Prepreg Lots** | | 3 | | 3 | | | | |

## 2.3.14 "25/50/25" Open-Hole Tension 1 Properties (OHT1)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Material:** | Cytec 5320-1 T650 3k-PW fabric with 36% RC | | | | | **Open-Hole Tension 1** Cytec 5320-1 T650 3k-PW fabric with 36% RC [45/0/-45/90]2S | | | |
| **Resin content:** | 34.32 % wt | | **Comp. density:** | 1.537 g/cc | | | | | |
| **Fiber volume:** | 57.27 % vol | | | | | | | | |
| **Ply count:** | 16 | | | | | | | | |
| **Test method:** | ASTM D 5766-11 | | | | | | | | |
| **Normalized by:** | 0.0077 | in. CPT | | | | | | | |
| | | **CTD** | | **RTD** | | **ETW1** | | **ETW2** | |
| **Test Temperature [F]** | | -65 | | 70 | | 180 | | 250 | |
| **Moisture Conditioning** | | Dry | | Dry | | Equilbrium | | Equilbrium | |
| **Equilbrium at T, RH** | | | | | | 160 F,85% | | 160 F,85% | |
| **Source code** | | CUHDX XXXB | | CUHDX XXXA | | CUHDX XXXD | | CUHDX XXXF | |
| | | **Normalized** | **Measured** | **Normalized** | **Measured** | **Normalized** | **Measured** | **Normalized** | **Measured** |
| **OHT1 Strength (ksi)** | **Mean** | 41.167 | 41.255 | 43.645 | 43.798 | 47.319 | 48.067 | 48.634 | 48.558 |
| | **Minimum** | 36.801 | 37.143 | 37.877 | 38.550 | 45.226 | 45.790 | 46.035 | 45.719 |
| | **Maximum** | 44.305 | 44.781 | 49.687 | 49.162 | 48.721 | 49.958 | 53.216 | 53.001 |
| | **C.V.(%)** | 5.136 | 4.650 | 7.657 | 6.759 | 3.222 | 3.755 | 3.432 | 3.318 |
| | **No. Specimens** | 19 | | 19 | | 6 | | 19 | |
| | **No. Prepreg Lots** | 3 | | 3 | | 1 | | 3 | |

## 2.3.15 "10/80/10" Open-Hole Tension 2 Properties (OHT2)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Material:** | Cytec 5320-1 T650 3k-PW fabric with 36% RC | | | | | **Open-Hole Tension 2** Cytec 5320-1 T650 3k-PW fabric with 36% RC [45/-45/0/45/-45/45/-45/90/45/-45]S | | | |
| **Resin content:** | 34.44 % wt | | **Comp. density:** | 1.546 g/cc | | | | | |
| **Fiber volume:** | 57.50 % vol | | | | | | | | |
| **Ply count:** | 20 | | | | | | | | |
| **Test method:** | ASTM D 5766-11 | | | | | | | | |
| **Normalized by:** | 0.0077 | in. CPT | | | | | | | |
| | | **CTD** | | **RTD** | | **ETW2** | | | |
| **Test Temperature [F]** | | -65 | | 70 | | 250 | | | |
| **Moisture Conditioning** | | Dry | | Dry | | Equilbrium | | | |
| **Equilbrium at T, RH** | | | | | | 160 F,85% | | | |
| **Source code** | | CUHEX XXXB | | CUHEX XXXA | | CUHEX XXXF | | | |
| | | **Normalized** | **Measured** | **Normalized** | **Measured** | **Normalized** | **Measured** | | |
| **OHT2 Strength (ksi)** | **Mean** | 43.644 | 43.892 | 45.890 | 46.210 | 34.069 | 34.152 | | |
| | **Minimum** | 39.450 | 40.159 | 43.739 | 44.199 | 32.865 | 32.812 | | |
| | **Maximum** | 48.605 | 48.432 | 48.378 | 47.728 | 36.688 | 36.029 | | |
| | **C.V.(%)** | 6.115 | 5.668 | 3.118 | 2.258 | 2.969 | 2.423 | | |
| | **No. Specimens** | 18 | | 18 | | 21 | | | |
| | **No. Prepreg Lots** | 3 | | 3 | | 3 | | | |

## 2.3.16 "40/20/40" Open-Hole Tension 3 Properties (OHT3)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Material:** | Cytec 5320-1 T650 3k-PW fabric with 36% RC | | | | | **Open-Hole Tension 3** Cytec 5320-1 T650 3k-PW fabric with 36% RC [0/90/0/45/90/0/90/-45/90/0/90/45/0/90/0] | | | |
| **Resin content:** | 34.42 % wt | | **Comp. density:** | 1.536 g/cc | | | | | |
| **Fiber volume:** | 57.15 % vol | | | | | | | | |
| **Ply count:** | 15 | | | | | | | | |
| **Test method:** | ASTM D 5766-11 | | | | | | | | |
| **Normalized by:** | 0.0077 | in. CPT | | | | | | | |
| | | **CTD** | | **RTD** | | **ETW2** | | | |
| **Test Temperature [F]** | | -65 | | 70 | | 250 | | | |
| **Moisture Conditioning** | | Dry | | Dry | | Equilbrium | | | |
| **Equilbrium at T, RH** | | | | | | 160 F,85% | | | |
| **Source code** | | CUHFX XXXB | | CUHFX XXXA | | CUHFX XXXF | | | |
| | | **Normalized** | **Measured** | **Normalized** | **Measured** | **Normalized** | **Measured** | | |
| **OHT3 Strength (ksi)** | **Mean** | 46.769 | 46.882 | 49.920 | 50.115 | 59.524 | 59.588 | | |
| | **Minimum** | 41.332 | 41.050 | 43.519 | 42.979 | 54.356 | 55.338 | | |
| | **Maximum** | 53.498 | 53.367 | 55.745 | 56.305 | 63.919 | 63.607 | | |
| | **C.V.(%)** | 7.329 | 7.113 | 6.667 | 6.448 | 3.755 | 3.515 | | |
| | **No. Specimens** | 18 | | 18 | | 20 | | | |
| | **No. Prepreg Lots** | 3 | | 3 | | 3 | | | |

## 2.3.17 "25/50/25" Filled-Hole Tension 1 Properties (FHT1)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Material:** | Cytec 5320-1 T650 3k-PW fabric with 36% RC | | | | | **Filled-Hole Tension 1** Cytec 5320-1 T650 3k-PW fabric with 36% RC [45/0/-45/90]2S | | | |
| **Resin content:** | 34.90 % wt | | **Comp. density:** | 1.543 g/cc | | | | | |
| **Fiber volume:** | 56.97 % vol | | | | | | | | |
| **Ply count:** | 16 | | | | | | | | |
| **Test method:** | ASTM D 6742-07 | | | | | | | | |
| **Normalized by:** | 0.0077 | in. CPT | | | | | | | |
| | | **CTD** | | **RTD** | | **ETW1** | | **ETW2** | |
| **Test Temperature [F]** | | -65 | | 70 | | 180 | | 250 | |
| **Moisture Conditioning** | | Dry | | Dry | | Equilbrium | | Equilbrium | |
| **Equilbrium at T, RH** | | | | | | 160 F,85% | | 160 F,85% | |
| **Source code** | | CUH4X XXXB | | CUH4X XXXA | | CUH4X XXXD | | CUH4X XXXF | |
| | | **Normalized** | **Measured** | **Normalized** | **Measured** | **Normalized** | **Measured** | **Normalized** | **Measured** |
| **FHT1 Strength (ksi)** | **Mean** | 47.455 | 47.564 | 49.512 | 49.768 | 53.547 | 53.203 | 50.387 | 50.483 |
| | **Minimum** | 42.581 | 42.807 | 46.034 | 46.071 | 52.557 | 52.535 | 47.804 | 47.798 |
| | **Maximum** | 53.671 | 53.254 | 54.448 | 53.650 | 54.384 | 54.418 | 53.819 | 54.046 |
| | **C.V.(%)** | 6.197 | 5.592 | 5.157 | 4.455 | 1.471 | 1.457 | 3.959 | 3.606 |
| | **No. Specimens** | 18 | | 15 | | 6 | | 18 | |
| | **No. Prepreg Lots** | 3 | | 3 | | 1 | | 3 | |

## 2.3.18 "10/80/10" Filled-Hole Tension 2 Properties (FHT2)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Material:** | Cytec 5320-1 T650 3k-PW fabric with 36% RC | | | | | **Filled-Hole Tension 2** Cytec 5320-1 T650 3k-PW fabric with 36% RC [45/-45/0/45/-45/45/-45/90/45/-45]S | | | |
| **Resin content:** | 34.47 % wt | | | **Comp. density:** | 1.551 g/cc | | | | |
| **Fiber volume:** | 57.66 % vol | | | | | | | | |
| **Ply count:** | 20 | | | | | | | | |
| **Test method:** | ASTM D 6742-07 | | | | | | | | |
| **Normalized by:** | 0.0077 | in. CPT | | | | | | | |
| | | **CTD** | | **RTD** | | **ETW2** | | | |
| **Test Temperature [F]** | | -65 | | 70 | | 250 | | | |
| **Moisture Conditioning** | | Dry | | Dry | | Equilbrium | | | |
| **Equilbrium at T, RH** | | | | | | 160 F,85% | | | |
| **Source code** | | CUH5X XXXB | | CUH5X XXXA | | CUH5X XXXF | | | |
| | | **Normalized** | **Measured** | **Normalized** | **Measured** | **Normalized** | **Measured** | | |
| | **Mean** | 47.804 | 48.108 | 49.406 | 49.611 | 37.636 | 37.699 | | |
| | **Minimum** | 43.187 | 44.153 | 45.976 | 46.367 | 35.208 | 35.683 | | |
| | **Maximum** | 51.735 | 51.871 | 52.883 | 52.877 | 40.819 | 41.566 | | |
| **FHT2 Strength (ksi)** | **C.V.(%)** | 5.205 | 4.922 | 4.015 | 3.211 | 4.092 | 4.433 | | |
| | **No. Specimens** | 18 | | 18 | | 18 | | | |
| | **No. Prepreg Lots** | 3 | | 3 | | 3 | | | |

## 2.3.19 "40/20/40" Filled-Hole Tension 3 Properties (FHT3)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Material:** | Cytec 5320-1 T650 3k-PW fabric with 36% RC | | | | | **Filled-Hole Tension 3** Cytec 5320-1 T650 3k-PW fabric with 36% RC [0/90/0/45/90/0/90/-45/90/0/90/45/0/90/0] | | | |
| **Resin content:** | 35.16 % wt | | **Comp. density:** | 1.540 g/cc | | | | | |
| **Fiber volume:** | 56.63 % vol | | | | | | | | |
| **Ply count:** | 15 | | | | | | | | |
| **Test method:** | ASTM D 6742-07 | | | | | | | | |
| **Normalized by:** | 0.0077 | in. CPT | | | | | | | |
| | | **CTD** | | **RTD** | | **ETW2** | | | |
| **Test Temperature [F]** | | -65 | | 70 | | 250 | | | |
| **Moisture Conditioning** | | Dry | | Dry | | Equilbrium | | | |
| **Equilbrium at T, RH** | | | | | | 160 F,85% | | | |
| **Source code** | | CUH6X XXXB | | CUH6X XXXA | | CUH6X XXXF | | | |
| | | **Normalized** | **Measured** | **Normalized** | **Measured** | **Normalized** | **Measured** | | |
| | **Mean** | 53.638 | 54.032 | 55.324 | 55.808 | 58.910 | 59.244 | | |
| | **Minimum** | 48.313 | 49.013 | 49.307 | 50.154 | 54.951 | 55.568 | | |
| | **Maximum** | 60.759 | 59.861 | 61.138 | 60.354 | 63.675 | 64.231 | | |
| **FHT3 Strength (ksi)** | **C.V.(%)** | 6.222 | 5.819 | 6.154 | 5.590 | 3.926 | 3.730 | | |
| | **No. Specimens** | 18 | | 18 | | 18 | | | |
| | **No. Prepreg Lots** | 3 | | 3 | | 3 | | | |

## 2.3.20 "25/50/25" Open-Hole Compression 1 Properties (OHC1)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Material:** | Cytec 5320-1 T650 3k-PW fabric with 36% RC | | | | | **Open-Hole Compression 1** Cytec 5320-1 T650 3k-PW fabric with 36% RC [45/0/-45/90/45/0/-45/90/-45/90]S | | | |
| **Resin content:** | 34.28 % wt | | | **Comp. density:** | 1.534 g/cc | | | | |
| **Fiber volume:** | 57.18 % vol | | | | | | | | |
| **Ply count:** | 20 | | | | | | | | |
| **Test method:** | ASTM D 6484-09 | | | | | | | | |
| **Normalized by:** | 0.0077 | in. CPT | | | | | | | |
| | | **RTD** | | **ETW1** | | **ETW2** | | | |
| **Test Temperature [F]** | | 70 | | 180 | | 250 | | | |
| **Moisture Conditioning** | | Dry | | Equilbrium | | Equilbrium | | | |
| **Equilbrium at T, RH** | | | | 160 F,85% | | 160 F,85% | | | |
| **Source code** | | CUHGX XXXA | | CUHGX XXXD | | CUHGX XXXF | | | |
| | | **Normalized** | **Measured** | **Normalized** | **Measured** | **Normalized** | **Measured** | | |
| **OHC1 Strength (ksi)** | **Mean** | 48.077 | 48.267 | 40.963 | 41.400 | 34.342 | 34.440 | | |
| | **Minimum** | 46.044 | 46.524 | 40.506 | 40.558 | 31.311 | 31.741 | | |
| | **Maximum** | 49.978 | 49.913 | 41.479 | 42.510 | 36.496 | 36.606 | | |
| | **C.V.(%)** | 2.504 | 1.923 | 0.870 | 1.574 | 3.696 | 3.491 | | |
| | **No. Specimens** | 21 | | 8 | | 22 | | | |
| | **No. Prepreg Lots** | 3 | | 1 | | 3 | | | |

## 2.3.21 "10/80/10" Open-Hole Compression 2 Properties (OHC2)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Material:** | Cytec 5320-1 T650 3k-PW fabric with 36% RC | | | | | **Open-Hole Compression 2** Cytec 5320-1 T650 3k-PW fabric with 36% RC [45/-45/0/45/-45/45/-45/90/45/-45]S | | | |
| **Resin content:** | 34.26 % wt | | | **Comp. density:** | 1.541 g/cc | | | | |
| **Fiber volume:** | 57.47 % vol | | | | | | | | |
| **Ply count:** | 20 | | | | | | | | |
| **Test method:** | ASTM D 6484-09 | | | | | | | | |
| **Normalized by:** | 0.0077 | in. CPT | | | | | | | |
| | | **RTD** | | **ETW2** | | | | | |
| **Test Temperature [F]** | | 70 | | 250 | | | | | |
| **Moisture Conditioning** | | Dry | | Equilbrium | | | | | |
| **Equilbrium at T, RH** | | | | 160 F,85% | | | | | |
| **Source code** | | CUHHX XXXA | | CUHHX XXXF | | | | | |
| | | **Normalized** | **Measured** | **Normalized** | **Measured** | | | | |
| | **Mean** | 42.467 | 42.707 | 30.886 | 31.007 | | | | |
| | **Minimum** | 40.466 | 40.376 | 29.271 | 29.221 | | | | |
| | **Maximum** | 44.195 | 44.114 | 33.814 | 34.128 | | | | |
| **OHC2 Strength (ksi)** | **C.V.(%)** | 2.548 | 2.444 | 4.005 | 3.778 | | | | |
| | **No. Specimens** | 21 | | 21 | | | | | |
| | **No. Prepreg Lots** | 3 | | 3 | | | | | |

## 2.3.22 "40/20/40" Open-Hole Compression 3 Properties (OHC3)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Material:** | Cytec 5320-1 T650 3k-PW fabric with 36% RC | | | | | **Open-Hole Compression 3** Cytec 5320-1 T650 3k-PW fabric with 36% RC [0/90/45/90/0/0/90/-45/90/0]S | | | |
| **Resin content:** | 34.51 % wt | | | **Comp. density:** | 1.537 g/cc | | | | |
| **Fiber volume:** | 57.10 % vol | | | | | | | | |
| **Ply count:** | 20 | | | | | | | | |
| **Test method:** | ASTM D 6484-09 | | | | | | | | |
| **Normalized by:** | 0.0077 | in. CPT | | | | | | | |
| | | **RTD** | | **ETW2** | | | | | |
| **Test Temperature [F]** | | 70 | | 250 | | | | | |
| **Moisture Conditioning** | | Dry | | Equilbrium | | | | | |
| **Equilbrium at T, RH** | | | | 160 F,85% | | | | | |
| **Source code** | | CUHIX XXXA | | CUHIX XXXF | | | | | |
| | | **Normalized** | **Measured** | **Normalized** | **Measured** | | | | |
| | **Mean** | 50.104 | 50.236 | 37.556 | 37.660 | | | | |
| | **Minimum** | 46.555 | 47.339 | 35.239 | 35.004 | | | | |
| | **Maximum** | 53.172 | 52.874 | 40.096 | 39.863 | | | | |
| **OHC3 Strength (ksi)** | **C.V.(%)** | 3.244 | 3.016 | 3.935 | 4.078 | | | | |
| | **No. Specimens** | 21 | | 21 | | | | | |
| | **No. Prepreg Lots** | 3 | | 3 | | | | | |

## 2.3.23 "25/50/25" Filled-Hole Compression 1 Properties (FHC1)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Material:** | Cytec 5320-1 T650 3k-PW fabric with 36% RC | | | | | **Filled-Hole Compression 1** Cytec 5320-1 T650 3k-PW fabric with 36% RC [45/0/-45/90/45/0/-45/90/-45/90]S | | | |
| **Resin content:** | 35.24 % wt | | | **Comp. density:** | 1.541 g/cc | | | | |
| **Fiber volume:** | 56.60 % vol | | | | | | | | |
| **Ply count:** | 20 | | | | | | | | |
| **Test method:** | ASTM D 6742-07 | | | | | | | | |
| **Normalized by:** | 0.0077 | in. CPT | | | | | | | |
| | | **RTD** | | **ETW1** | | **ETW2** | | | |
| **Test Temperature [F]** | | 70 | | 180 | | 250 | | | |
| **Moisture Conditioning** | | Dry | | Equilbrium | | Equilbrium | | | |
| **Equilbrium at T, RH** | | | | 160 F,85% | | 160 F,85% | | | |
| **Source code** | | CUH7X XXXA | | CUH7X XXXD | | CUH7X XXXF | | | |
| | | **Normalized** | **Measured** | **Normalized** | **Measured** | **Normalized** | **Measured** | | |
| **FHC1 Strength (ksi)** | **Mean** | 79.638 | 79.882 | 68.059 | 68.273 | 56.888 | 56.950 | | |
| | **Minimum** | 71.731 | 72.939 | 65.800 | 65.545 | 53.139 | 53.150 | | |
| | **Maximum** | 89.402 | 89.016 | 71.764 | 71.110 | 62.082 | 62.109 | | |
| | **C.V.(%)** | 5.697 | 5.084 | 3.403 | 3.014 | 3.939 | 3.880 | | |
| | **No. Specimens** | 19 | | 7 | | 16 | | | |
| | **No. Prepreg Lots** | 3 | | 1 | | 3 | | | |

## 2.3.24 "10/80/10" Filled-Hole Compression 2 Properties (FHC2)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Material:** | Cytec 5320-1 T650 3k-PW fabric with 36% RC | | | | | **Filled-Hole Compression 2** Cytec 5320-1 T650 3k-PW fabric with 36% RC [45/-45/0/45/-45/45/-45/90/45/-45]S | | | |
| **Resin content:** | 36.03 % wt | **Comp. density:** | 1.556 g/cc | | | | | | |
| **Fiber volume:** | 56.46 % vol | | | | | | | | |
| **Ply count:** | 20 | | | | | | | | |
| **Test method:** | ASTM D 6742-07 | | | | | | | | |
| **Normalized by:** | 0.0077 | in. CPT | | | | | | | |
| | | **RTD** | | **ETW2** | | | | | |
| **Test Temperature [F]** | | 70 | | 250 | | | | | |
| **Moisture Conditioning** | | Dry | | Equilbrium | | | | | |
| **Equilbrium at T, RH** | | | | 160 F,85% | | | | | |
| **Source code** | | CUH8X XXXA | | CUH8X XXXF | | | | | |
| | | **Normalized** | **Measured** | **Normalized** | **Measured** | | | | |
| | **Mean** | 60.566 | 60.729 | 39.191 | 39.312 | | | | |
| | **Minimum** | 56.986 | 58.035 | 35.850 | 36.013 | | | | |
| | **Maximum** | 65.838 | 65.175 | 40.562 | 40.587 | | | | |
| **FHC2 Strength (ksi)** | **C.V.(%)** | 3.891 | 3.599 | 3.102 | 3.227 | | | | |
| | **No. Specimens** | 20 | | 17 | | | | | |
| | **No. Prepreg Lots** | 3 | | 3 | | | | | |

## 2.3.25 "40/20/40" Filled-Hole Compression 3 Properties (FHC3)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Material:** | Cytec 5320-1 T650 3k-PW fabric with 36% RC | | | | | **Filled-Hole Compression 3** Cytec 5320-1 T650 3k-PW fabric with 36% RC [0/90/45/90/0/0/90/-45/90/0]S | | | |
| **Resin content:** | 35.93 % wt | | | **Comp. density:** | 1.553 g/cc | | | | |
| **Fiber volume:** | 56.46 % vol | | | | | | | | |
| **Ply count:** | 20 | | | | | | | | |
| **Test method:** | ASTM D 6742-07 | | | | | | | | |
| **Normalized by:** | 0.0077 | in. CPT | | | | | | | |
| | | **RTD** | | **ETW2** | | | | | |
| **Test Temperature [F]** | | 70 | | 250 | | | | | |
| **Moisture Conditioning** | | Dry | | Equilbrium | | | | | |
| **Equilbrium at T, RH** | | | | 160 F,85% | | | | | |
| **Source code** | | CUH9X XXXA | | CUH9X XXXF | | | | | |
| | | **Normalized** | **Measured** | **Normalized** | **Measured** | | | | |
| | **Mean** | 80.727 | 81.322 | 58.213 | 58.669 | | | | |
| | **Minimum** | 71.245 | 71.680 | 52.765 | 53.081 | | | | |
| | **Maximum** | 86.497 | 87.325 | 64.625 | 65.397 | | | | |
| **FHC3 Strength (ksi)** | **C.V.(%)** | 5.825 | 5.684 | 5.809 | 5.783 | | | | |
| | **No. Specimens** | 19 | | 12 | | | | | |
| | **No. Prepreg Lots** | 3 | | 3 | | | | | |

## 2.3.26 "25/50/25" Single-Shear Bearing 1 Properties (SSB1)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Material:** | Cytec 5320-1 T650 3k-PW fabric with 36% RC | | | | | | | **Single-Shear Bearing 1** Cytec 5320-1 T650 3k-PW fabric with 36% RC [45/0/-45/90]2S | |
| **Resin content:** | 34.48 % wt | | | **Comp. density:** | 1.529 g/cc | | | | |
| **Fiber volume:** | 56.83 % vol | | | | | | | | |
| **Ply count:** | 16 | | | | | | | | |
| **Test method:** | ASTM D 5961-08 | | | | | | | | |
| **Normalized by:** | 0.0077 | in. CPT | | | | | | | |
| | | **RTD** | | **ETW1** | | **ETW2** | | | |
| **Test Temperature [F]** | | 70 | | 180 | | 250 | | | |
| **Moisture Conditioning** | | Dry | | Equilbrium | | Equilbrium | | | |
| **Equilbrium at T, RH** | | | | 160 F,85% | | 160 F,85% | | | |
| **Source code** | | CUH1X XXXA | | CUH1X XXXD | | CUH1X XXXF | | | |
| | | **Normalized** | **Measured** | **Normalized** | **Measured** | **Normalized** | **Measured** | | |
| **SSB1 Initial Peak Bearing Strength (ksi)** | **Mean** | 98.781 | 99.056 | | | | | | |
| | **Minimum** | 90.233 | 88.839 | | | | | | |
| | **Maximum** | 105.402 | 106.555 | | | | | | |
| | **C.V.(%)** | 3.337 | 4.203 | | | | | | |
| | **No. Specimens** | 16 | | | | | | | |
| | **No. Prepreg Lots** | 3 | | | | | | | |
| **SSB1 2% Offset Strength (ksi)** | **Mean** | 108.922 | 109.613 | 107.898 | 106.749 | 88.256 | 88.279 | | |
| | **Minimum** | 99.295 | 97.761 | 101.322 | 100.994 | 72.309 | 71.592 | | |
| | **Maximum** | 121.128 | 122.453 | 113.588 | 111.714 | 99.584 | 99.584 | | |
| | **C.V.(%)** | 4.948 | 5.776 | 4.241 | 3.893 | 7.794 | 7.931 | | |
| | **No. Specimens** | 21 | | 8 | | 28 | | | |
| | **No. Prepreg Lots** | 3 | | 1 | | 3 | | | |
| **SSB1 Ultimate Strength (ksi)** | **Mean** | 131.495 | 132.316 | 129.057 | 127.693 | 108.348 | 108.370 | | |
| | **Minimum** | 120.566 | 118.027 | 124.996 | 124.223 | 97.664 | 98.645 | | |
| | **Maximum** | 143.939 | 144.899 | 135.950 | 134.657 | 124.590 | 127.948 | | |
| | **C.V.(%)** | 4.263 | 4.991 | 3.171 | 3.024 | 5.250 | 5.410 | | |
| | **No. Specimens** | 21 | | 8 | | 28 | | | |
| | **No. Prepreg Lots** | 3 | | 1 | | 3 | | | |

## 2.3.27 "10/80/10" Single-Shear Bearing 2 Properties (SSB2)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Material:** | Cytec 5320-1 T650 3K-PW fabric with 36% RC | | | | | **Single-Shear Bearing 2** CCytec 5320-1 T650 3K-PW fabric with 36% RC [45/-45/90/45/-45]2S | | | |
| **Resin content** | 34.45 % wt | | | **Comp. density:** | 1.541 g/cc | | | | |
| **Fiber volume:** | 57.32 % vol | | | | | | | | |
| **Ply count** | 20 | | | | | | | | |
| **Test method:** | ASTM D 5961-08 | | | | | | | | |
| **Normalized by:** | 0.0077 | in. CPT | | | | | | | |
| | | **RTD** | | **ETW2** | | | | | |
| **Test Temperature [F]** | | 70 | | 250 | | | | | |
| **Moisture Conditioning** | | Dry | | Equilbrium | | | | | |
| **Equilbrium at T, RH** | | | | 160 F,85% | | | | | |
| **Source code** | | CUH2X XXXA | | CUH2X XXXF | | | | | |
| | | **Normalized** | **Measured** | **Normalized** | **Measured** | | | | |
| **SSB2 2% Offset Strength (ksi)** | **Mean** | 108.455 | 109.791 | 82.161 | 82.609 | | | | |
| | **Minimum** | 98.223 | 98.244 | 75.961 | 75.585 | | | | |
| | **Maximum** | 116.429 | 119.690 | 91.069 | 93.342 | | | | |
| | **C.V.(%)** | 4.304 | 4.936 | 4.488 | 5.008 | | | | |
| | **No. Specimens** | 21 | | 21 | | | | | |
| | **No. Prepreg Lots** | 3 | | 3 | | | | | |
| **SSB2 Ultimate Strength (ksi)** | **Mean** | 135.163 | 136.829 | 106.960 | 107.503 | | | | |
| | **Minimum** | 127.122 | 126.342 | 98.042 | 97.989 | | | | |
| | **Maximum** | 147.978 | 150.221 | 113.397 | 112.650 | | | | |
| | **C.V.(%)** | 4.537 | 5.142 | 3.867 | 3.457 | | | | |
| | **No. Specimens** | 21 | | 21 | | | | | |
| | **No. Prepreg Lots** | 3 | | 3 | | | | | |

## 2.3.28 "40/20/40" Single-Shear Bearing 3 Properties (SSB3)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Material:** | Cytec 5320-1 T650 3k-PW fabric with 36% RC | | | | | | **Single-Shear Bearing 3** Cytec 5320-1 T650 3k-PW fabric with 36% RC [0/90/45/0/90]2S | | |
| **Resin content** | 34.44 % wt | | | **Comp. density:** | 1.537 g/cc | | | | |
| **Fiber volume:** | 57.16 % vol | | | | | | | | |
| **Ply count** | 20 | | | | | | | | |
| **Test method:** | ASTM D 5961-08 | | | | | | | | |
| **Normalized by:** | 0.0077 | in. CPT | | | | | | | |
| | | **RTD** | | **ETW2** | | | | | |
| **Test Temperature [F]** | | 70 | | 250 | | | | | |
| **Moisture Conditioning** | | Dry | | Equilbrium | | | | | |
| **Equilbrium at T, RH** | | | | 160 F,85% | | | | | |
| **Source code** | | CUH3X XXXA | | CUH3X XXXF | | | | | |
| | | **Normalized** | **Measured** | **Normalized** | **Measured** | | | | |
| **SSB3 Initial Peak Bearing Strength (ksi)** | **Mean** | 97.371 | 98.599 | 61.896 | 62.297 | | | | |
| | **Minimum** | 86.469 | 88.735 | 56.264 | 56.942 | | | | |
| | **Maximum** | 106.196 | 108.293 | 68.010 | 67.282 | | | | |
| | **C.V.(%)** | 5.399 | 5.240 | 5.891 | 5.566 | | | | |
| | **No. Specimens** | 15 | | 14 | | | | | |
| | **No. Prepreg Lots** | 3 | | 3 | | | | | |
| **SSB3 2% Offset Strength (ksi)** | **Mean** | 103.771 | 104.982 | 76.045 | 76.642 | | | | |
| | **Minimum** | 93.892 | 93.337 | 69.330 | 69.210 | | | | |
| | **Maximum** | 110.616 | 113.421 | 83.462 | 84.514 | | | | |
| | **C.V.(%)** | 4.308 | 4.949 | 4.695 | 5.018 | | | | |
| | **No. Specimens** | 22 | | 21 | | | | | |
| | **No. Prepreg Lots** | 3 | | 3 | | | | | |
| **SSB1 Ultimate Strength (ksi)** | **Mean** | 125.470 | 126.946 | 98.555 | 99.326 | | | | |
| | **Minimum** | 112.129 | 113.393 | 89.961 | 89.506 | | | | |
| | **Maximum** | 140.211 | 144.464 | 104.779 | 106.091 | | | | |
| | **C.V.(%)** | 5.401 | 6.136 | 3.456 | 3.796 | | | | |
| | **No. Specimens** | 22 | | 21 | | | | | |
| | **No. Prepreg Lots** | 3 | | 3 | | | | | |

## 2.3.29 "25/50/25" Compression After Impact 1 Properties (CAI1)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Material:** | Cytec 5320-1 T650 3k-PW fabric with 36% RC | | | | | | **Compression After Impact Layup 1** Cytec 5320-1 T650 3k-PW fabric with 36% RC [45/0/-45/90]3S | |
| **Resin content:** | 35.67 % wt | | **Comp. density:** | 1.551 g/cc | | | | |
| **Fiber volume:** | 56.72 % vol | | | | | | | |
| **Ply count:** | 24 | | | | | | | |
| **Test method:** | ASTM D7136/7137-07 | | | | | | | |
| **Normalized by:** | 0.0077 | in. CPT | | | | | | |
| | | **RTD** | | | | | | |
| **Test Temperature [F]** | | 70 | | | | | | |
| **Moisture Conditioning** | | Dry | | | | | | |
| **Equilbrium at T, RH** | | | | | | | | |
| **Source code** | | CUHKX XXXA | | | | | | |
| | | **Normalized** | **Measured** | | | | | |
| **CAI Strength (ksi)** | **Mean** | 33.442 | 33.301 | | | | | |
| | **Minimum** | 32.800 | 32.605 | | | | | |
| | **Maximum** | 35.405 | 35.252 | | | | | |
| | **C.V.(%)** | 2.684 | 2.669 | | | | | |
| | **No. Specimens** | 7 | | | | | | |
| | **No. Prepreg Lots** | 1 | | | | | | |

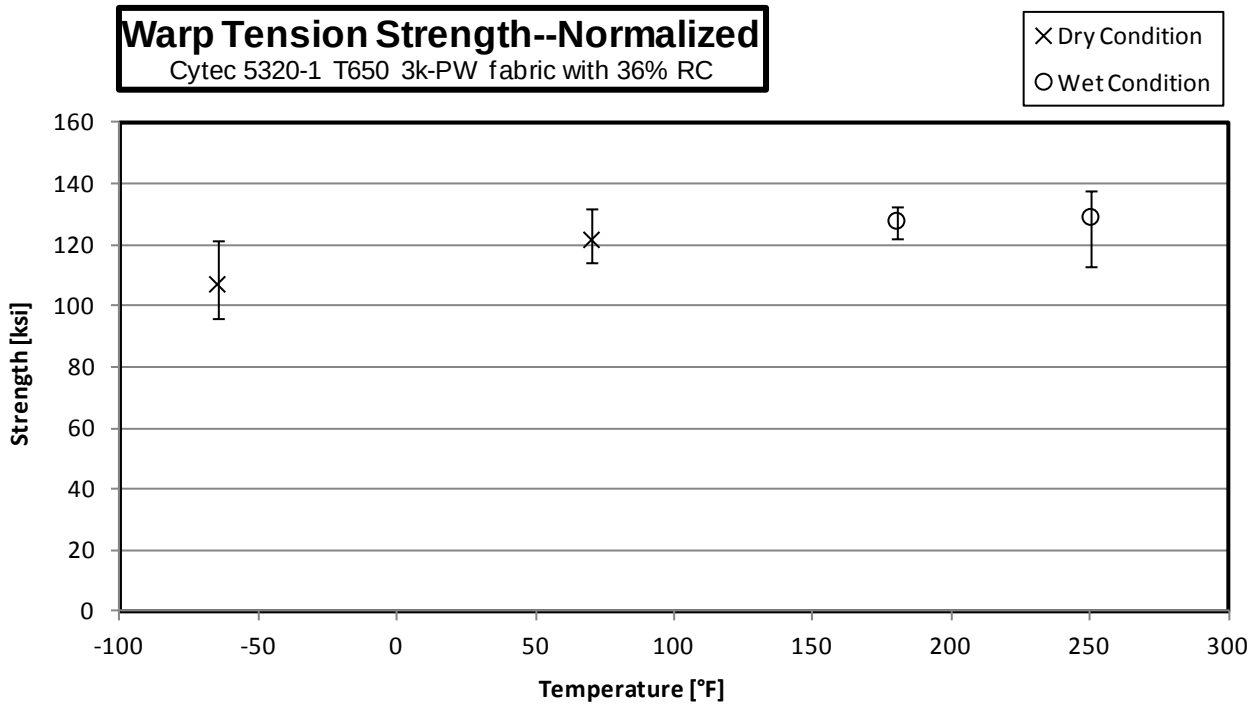
## 2.3.30 Interlaminar Tension Properties (ILT)

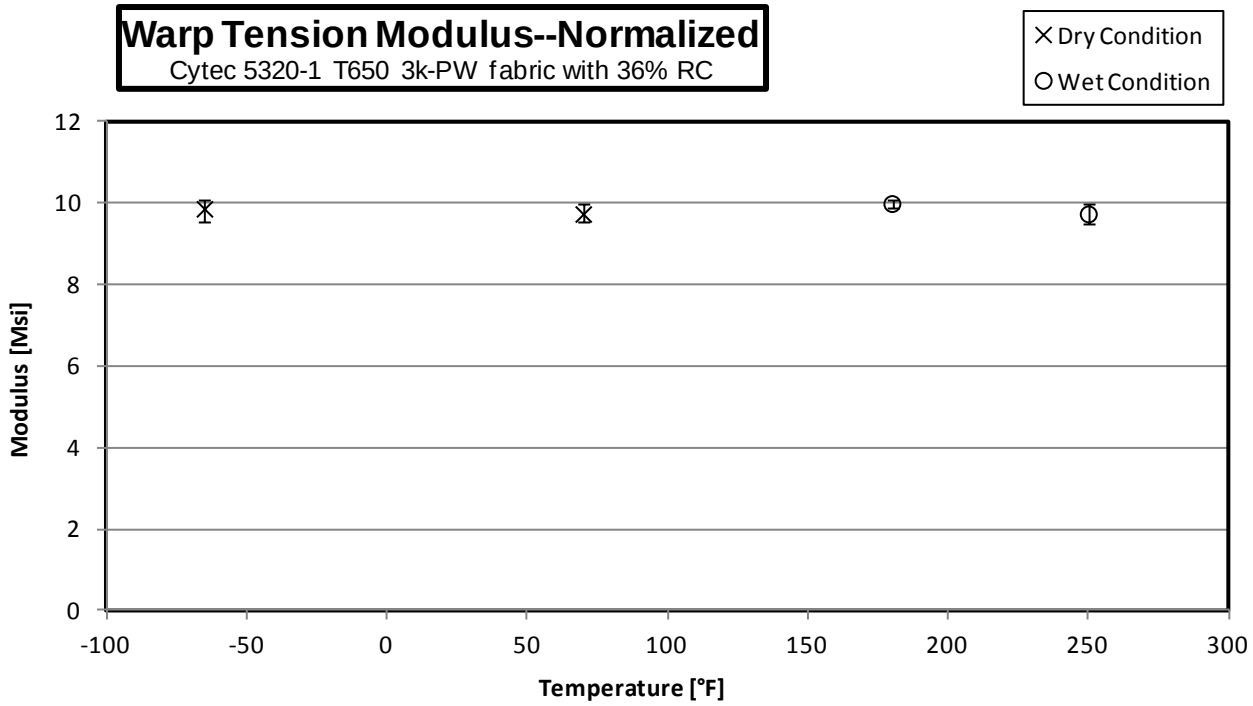
| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Material:** | Cytec 5320-1 T650 3k-PW fabric with 36% RC | | | | | **Interlaminar Tension** Cytec 5320-1 T650 3k-PW fabric with 36% RC [0]21 | | | |
| **Resin content:** | 35.09 % wt | | **Comp. density:** | 1.557 g/cc | | | | | |
| **Fiber volume:** | 57.48 % vol | | | | | | | | |
| **Ply count:** | 21 | | | | | | | | |
| **Test method:** | ASTM D 6415-06 | | | | | | | | |
| **Normalized by:** | NA | in. CPT | | | | | | | |
| | | **CTD** | | **RTD** | | **ETW2** | | | |
| **Test Temperature [F]** | | -65 | | 70 | | 250 | | | |
| **Moisture Conditioning** | | Dry | | Dry | | Equilbrium | | | |
| **Equilbrium at T, RH** | | | | | | 160 F,85% | | | |
| **Source code** | | CUHMX XXXB | | CUHMX XXXA | | CUHMX XXXF | | | |
| | | **Normalized** | **Measured** | **Normalized** | **Measured** | **Normalized** | **Measured** | | |
| **CBS (lb)** | **Mean** | | 286.249 | | 196.160 | | 154.594 | | |
| | **Minimum** | | 232.859 | | 177.240 | | 143.817 | | |
| | **Maximum** | | 315.503 | | 214.607 | | 159.361 | | |
| | **C.V.(%)** | | 9.788 | | 5.655 | | 3.788 | | |
| | **No. Specimens** | 7 | | 7 | | 6 | | | |
| | **No. Prepreg Lots** | 1 | | 1 | | 1 | | | |
| **ILT (ksi)** | **Mean** | | 7.440 | | 5.070 | | 4.018 | | |
| | **Minimum** | | 6.208 | | 4.531 | | 3.756 | | |
| | **Maximum** | | 8.132 | | 5.631 | | 4.173 | | |
| | **C.V.(%)** | | 9.008 | | 6.569 | | 3.878 | | |
| | **No. Specimens** | 7 | | 7 | | 6 | | | |
| | **No. Prepreg Lots** | 1 | | 1 | | 1 | | | |

## 3. Individual Test Charts

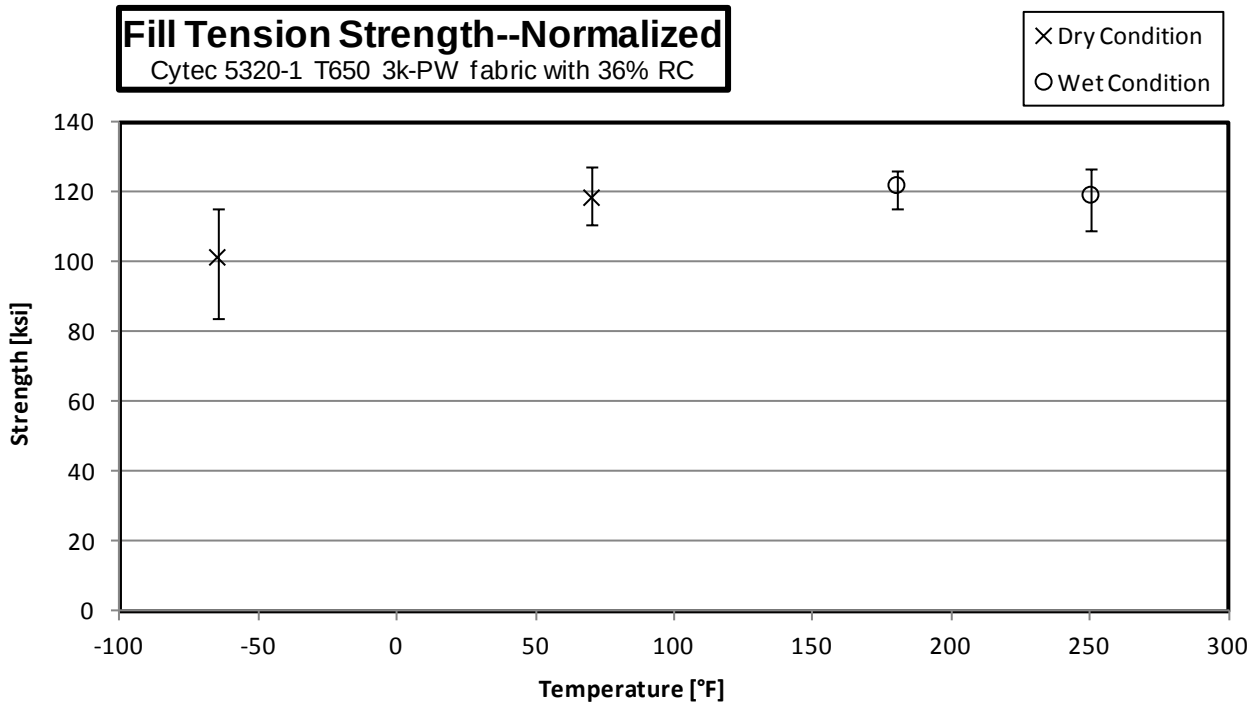
These charts combine all three batches of data and plot the minimum and maximum modulus and strength range based on the test temperature.

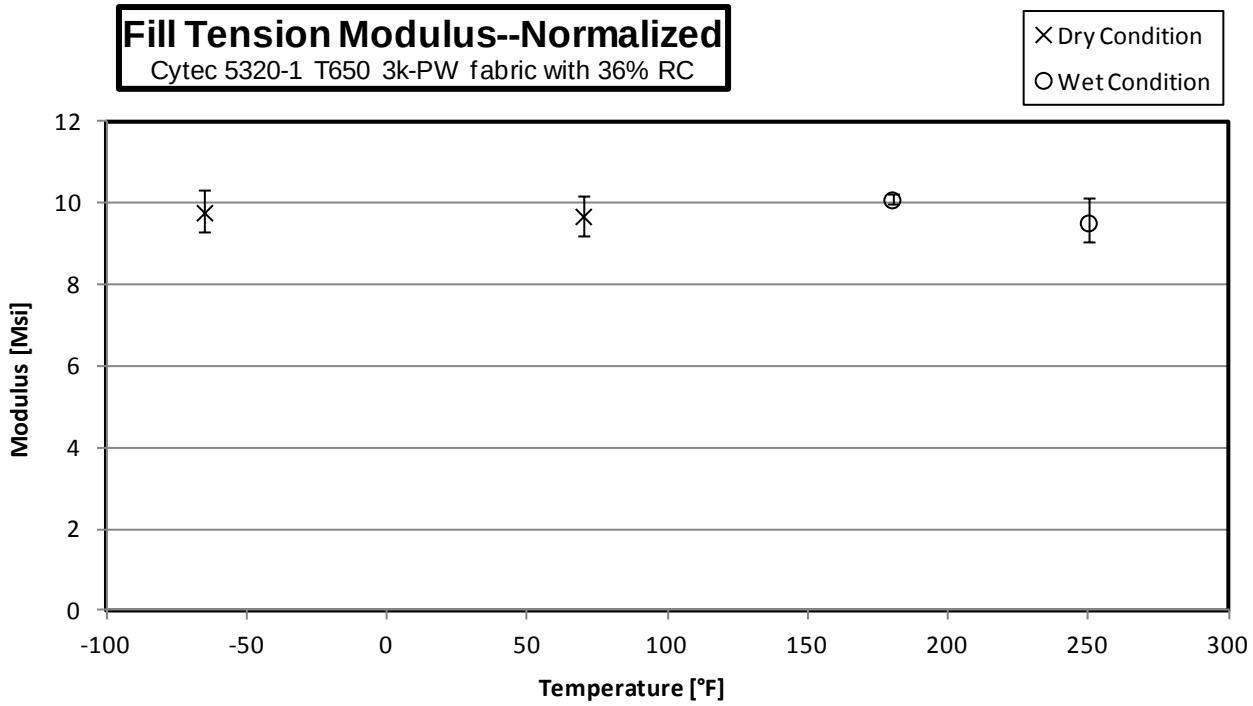
## 3.1 Warp Tension Properties (WT)



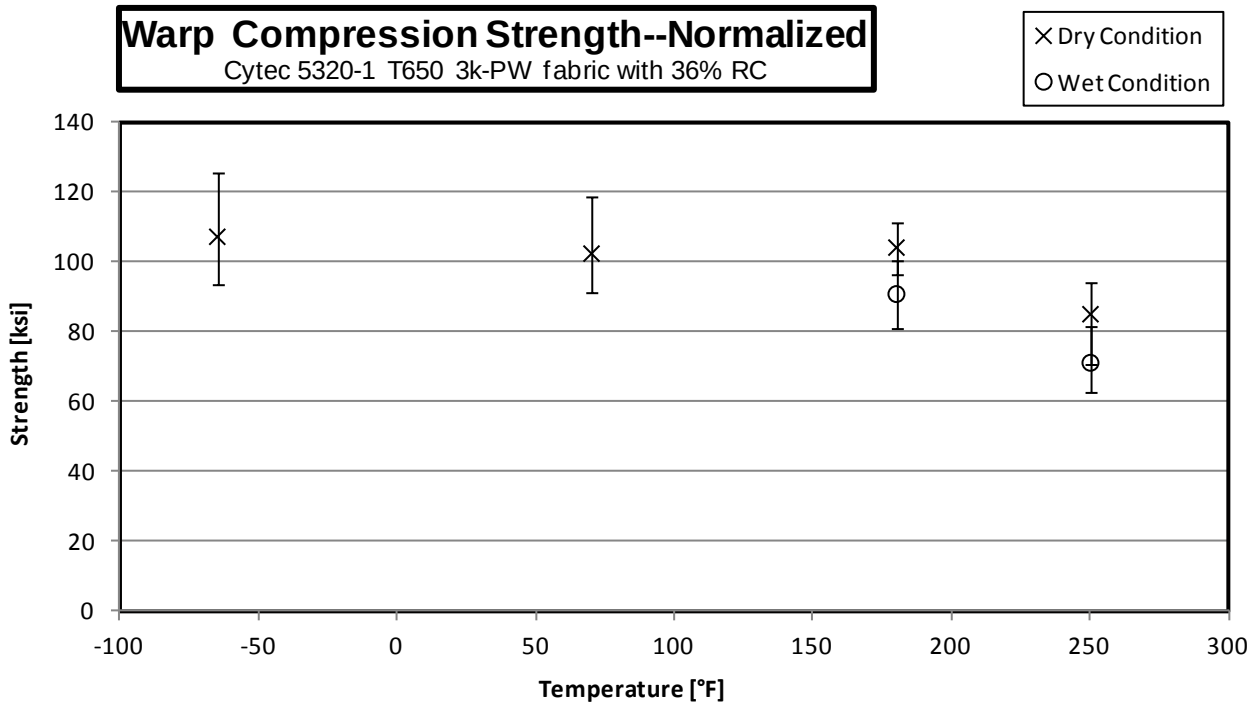



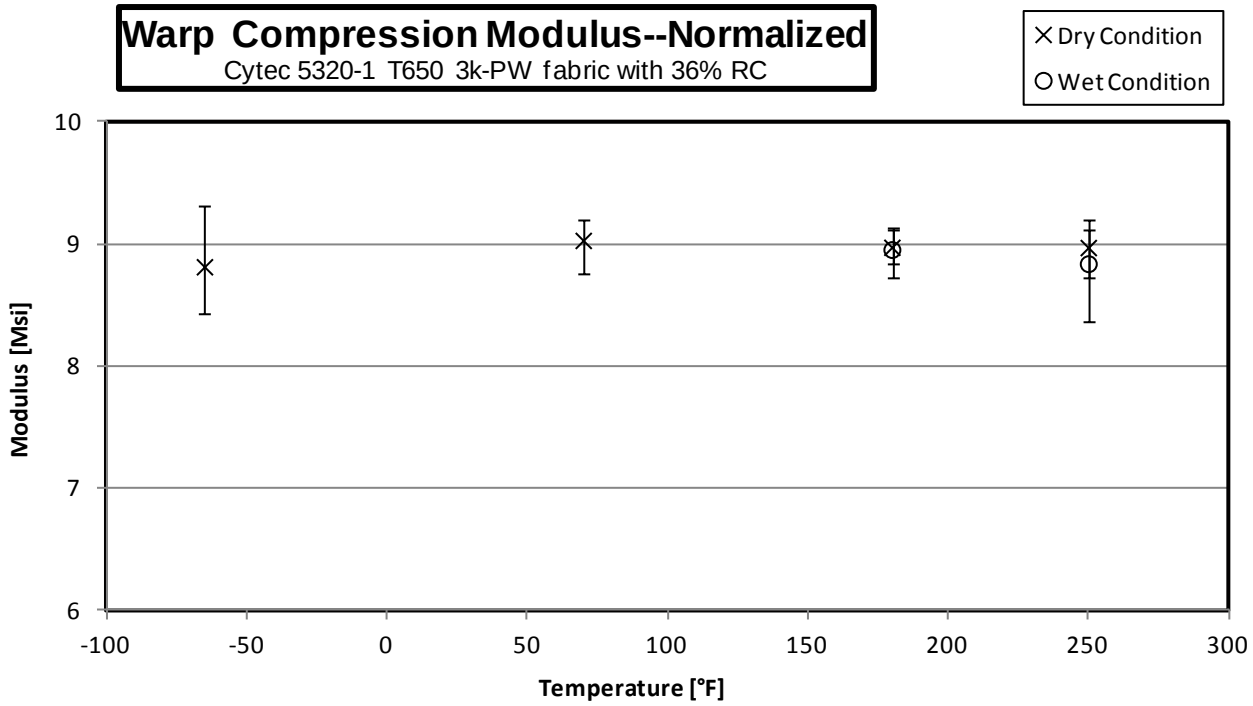
## 3.2 Fill Tension Properties (FT)



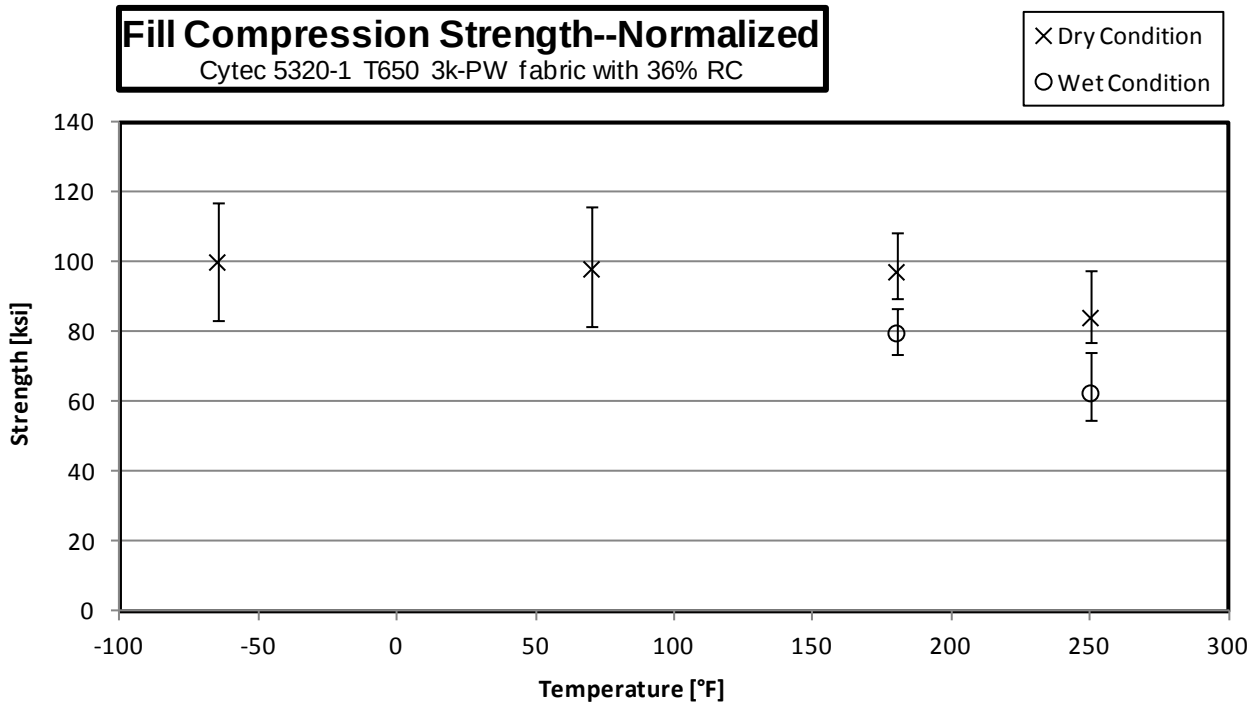



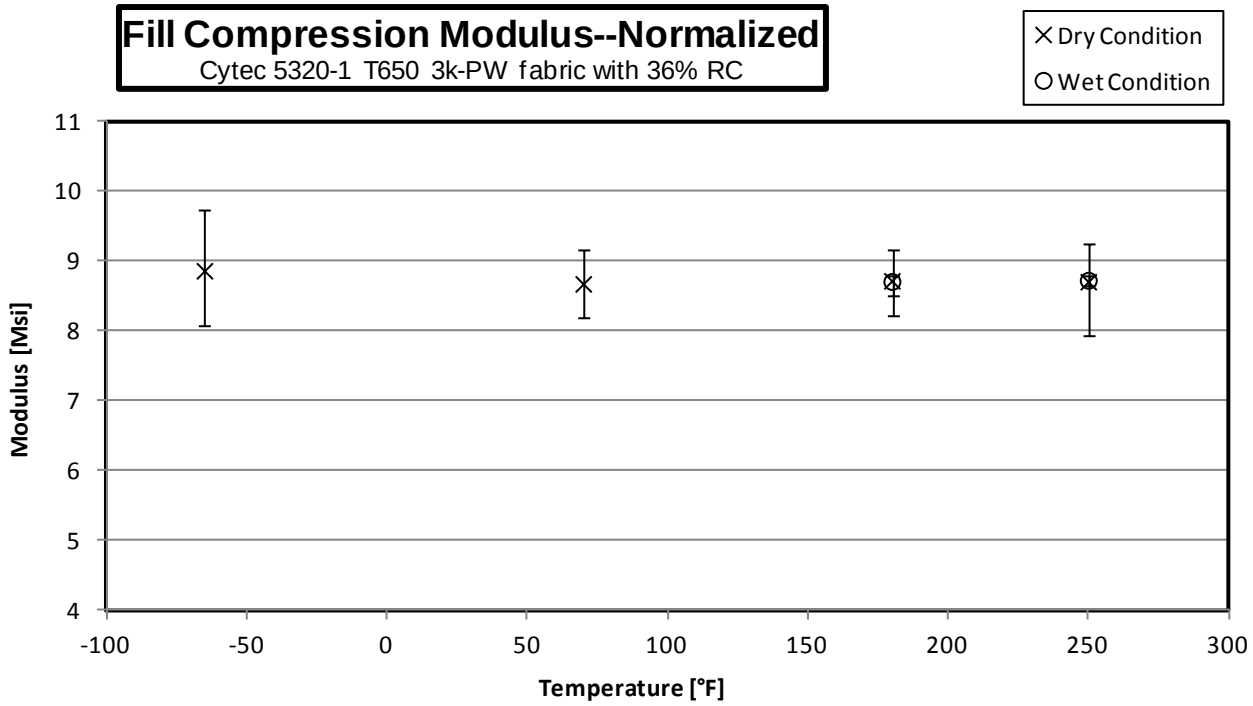
## 3.3 Warp Compression Properties (WC)



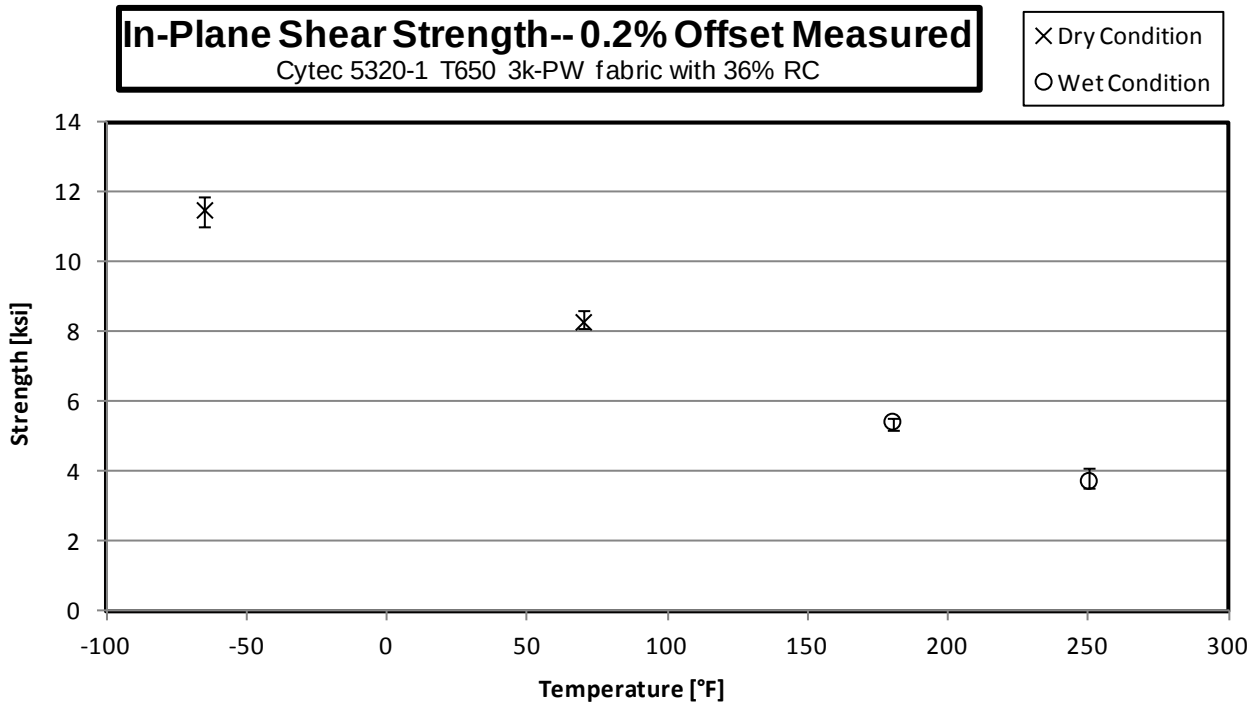



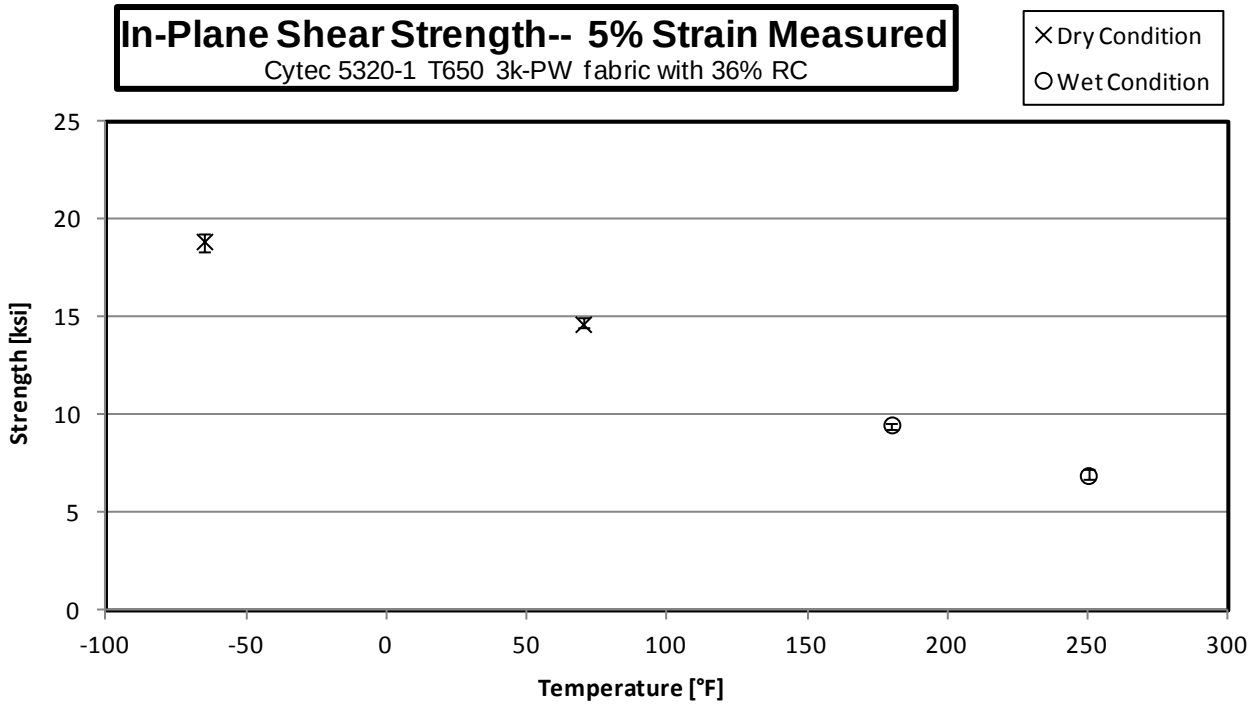
## 3.4 Fill Compression Properties (FC)

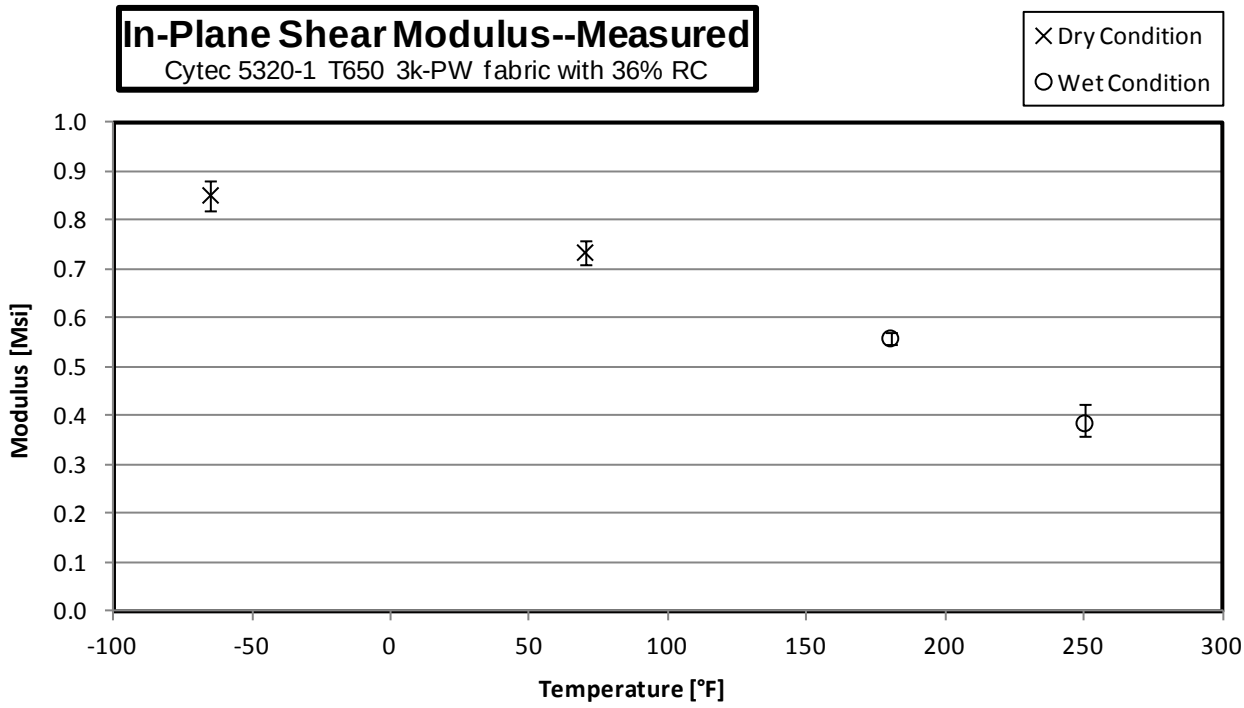


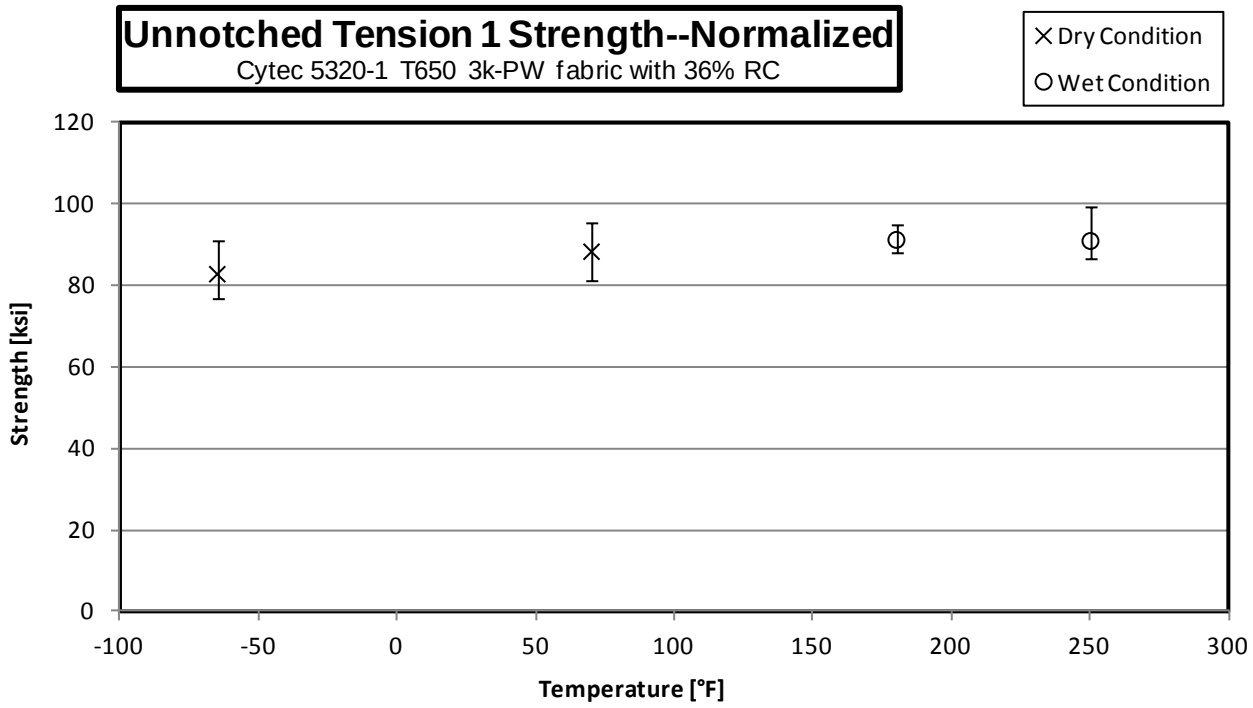
## 3.5 In-Plane Shear Properties (IPS)

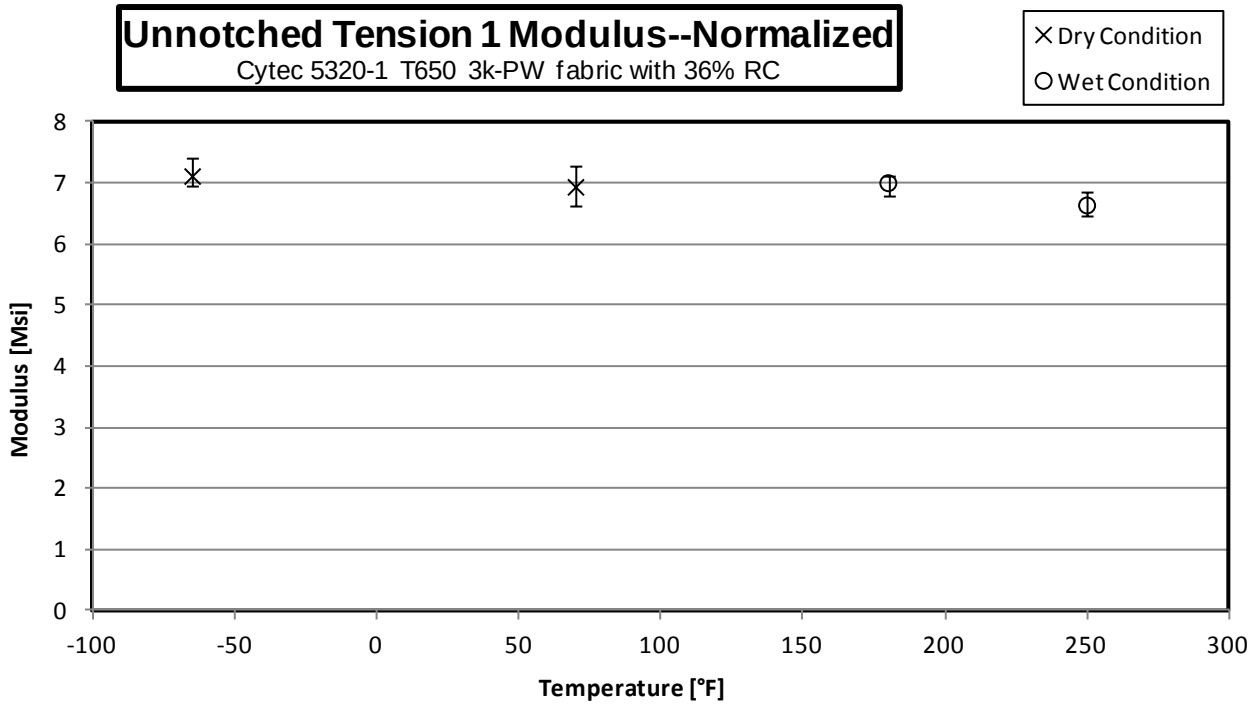


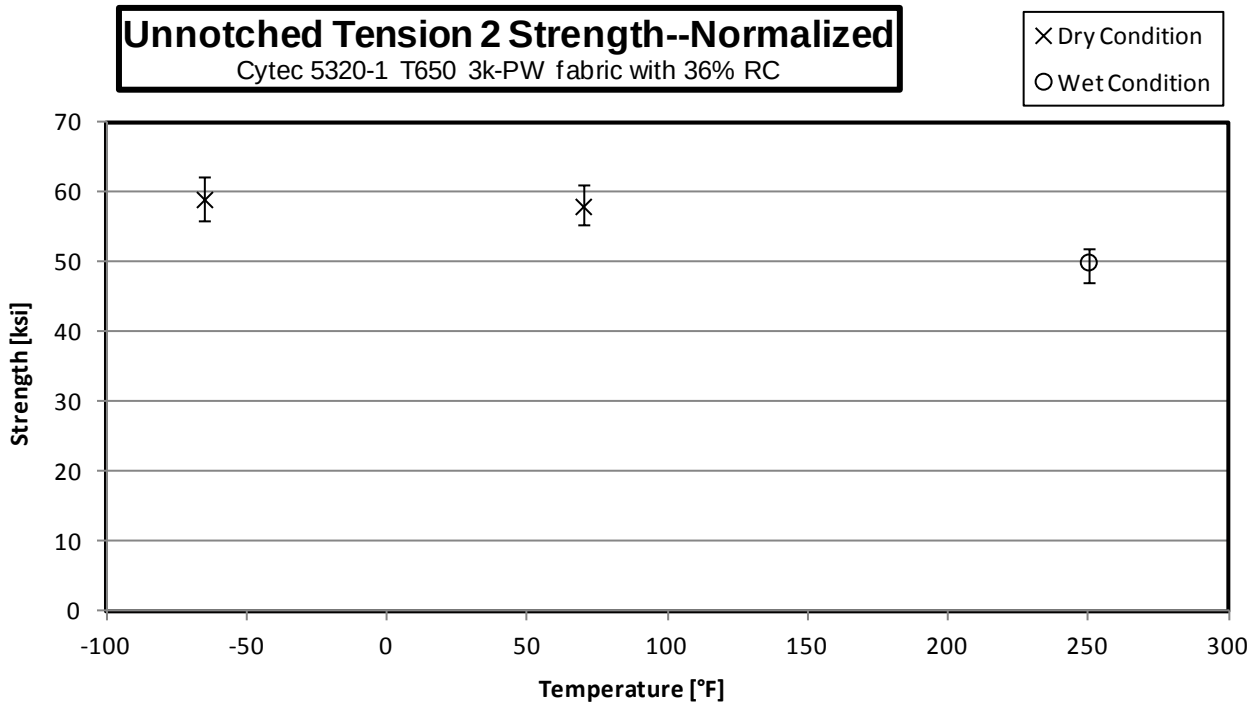

In-Plane Shear Modulus--Measured
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Dry Condition
Wet Condition
Modulus [Msi]
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
-100
-50
0
50
100
150
200
250
300
Temperature [°F]

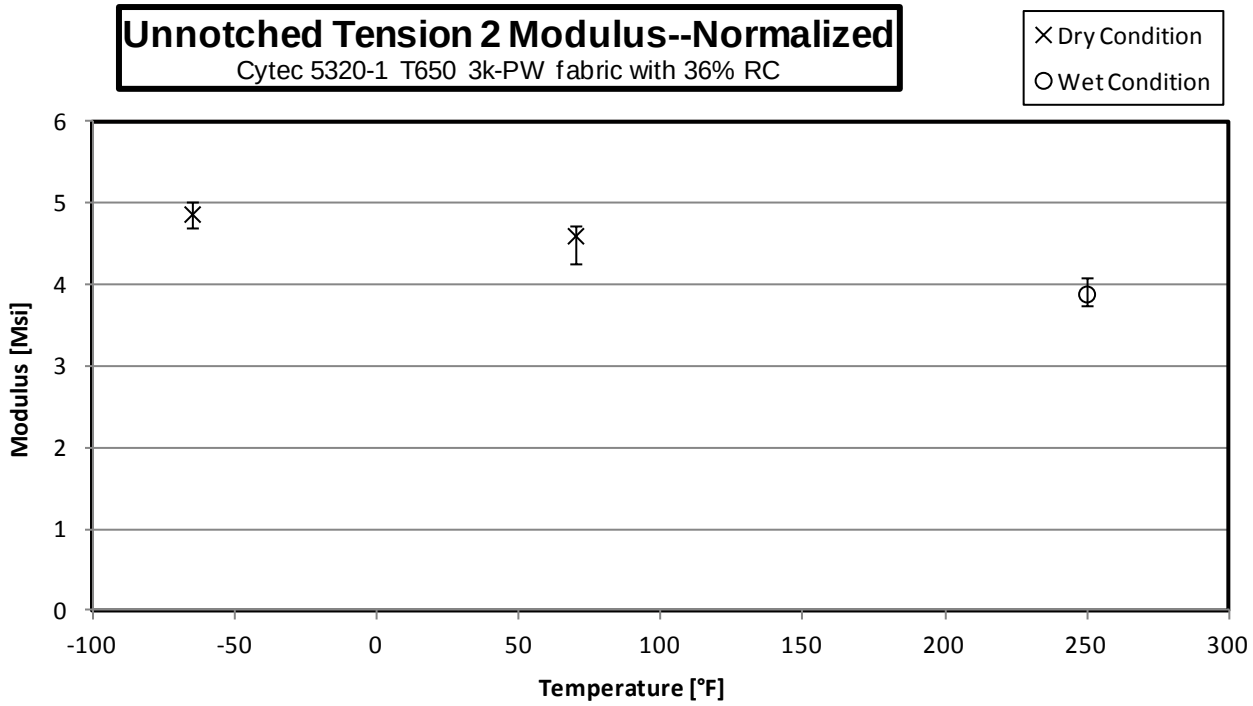
## 3.6 "25/50/25" Unnotched Tension 1 Properties (UNT1)



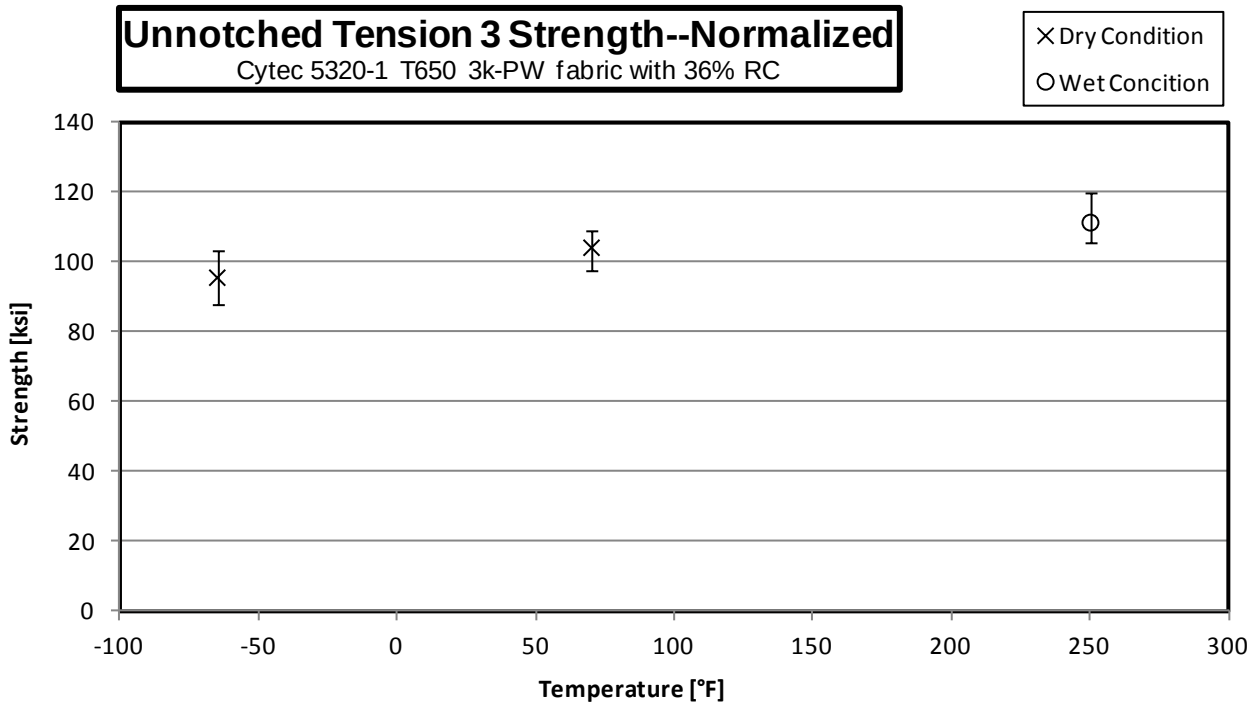



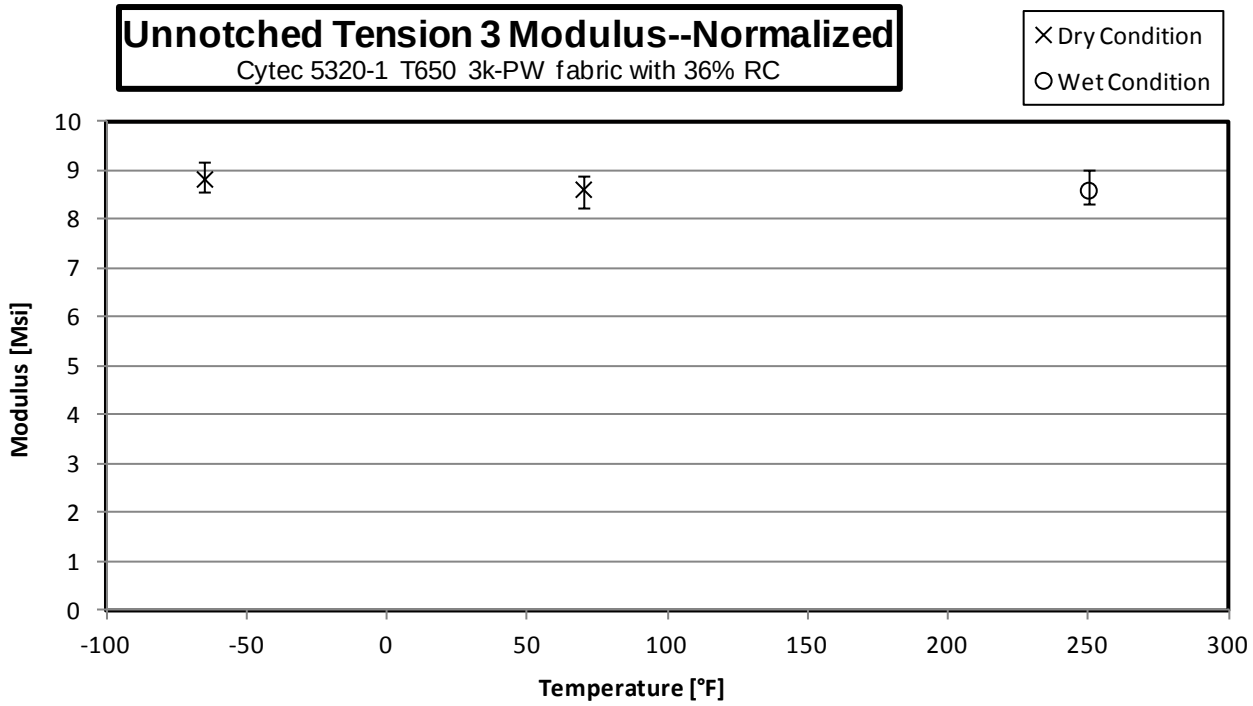
## 3.7 "10/80/10" Unnotched Tension 2 Properties (UNT2)



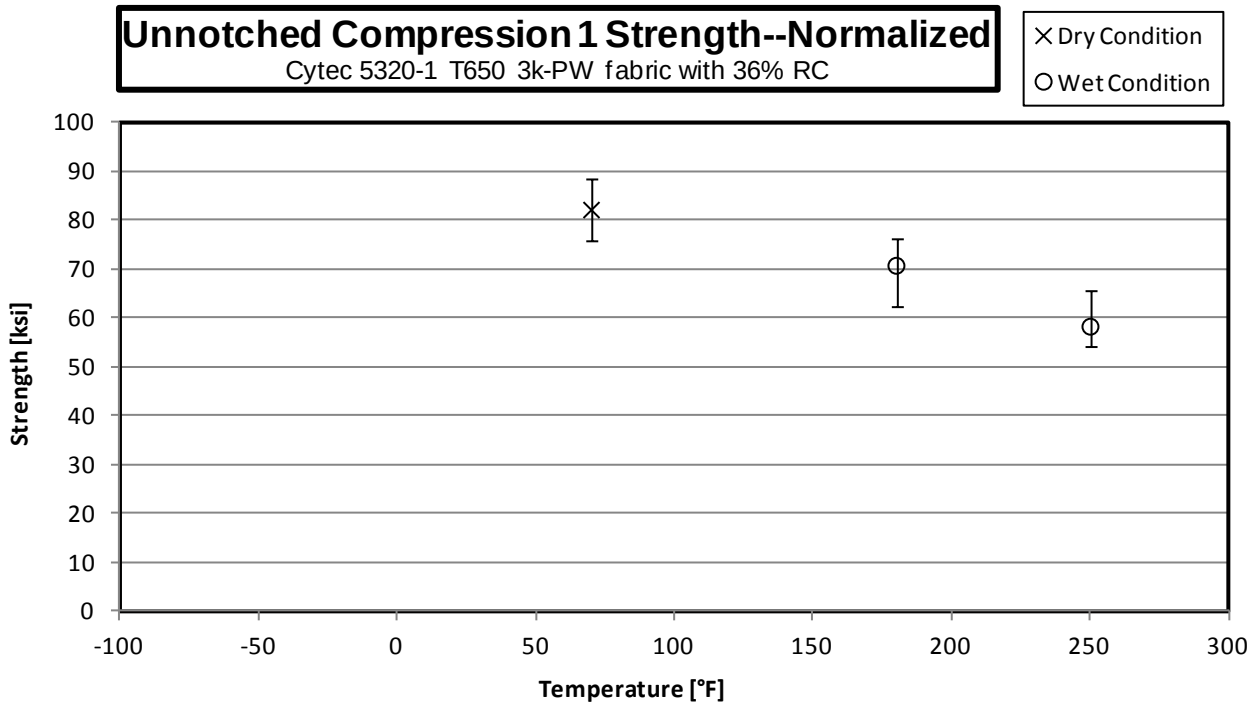



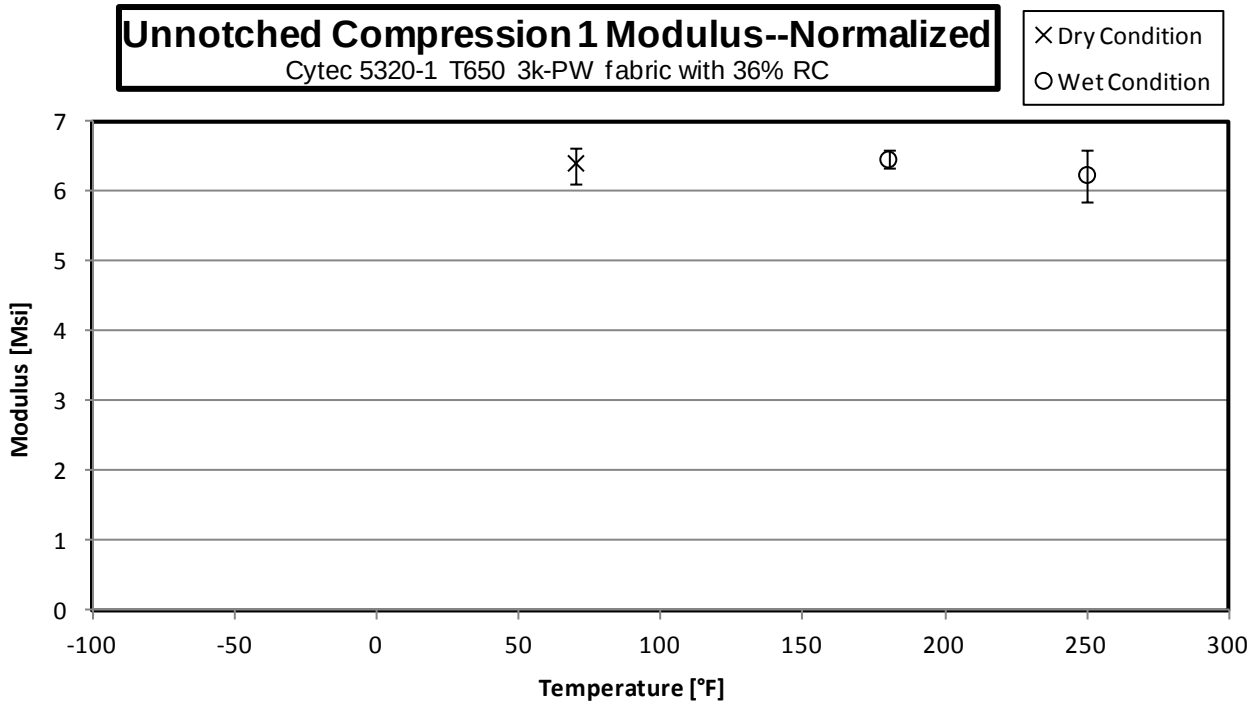
## 3.8 "40/20/40" Unnotched Tension 3 Properties (UNT3)



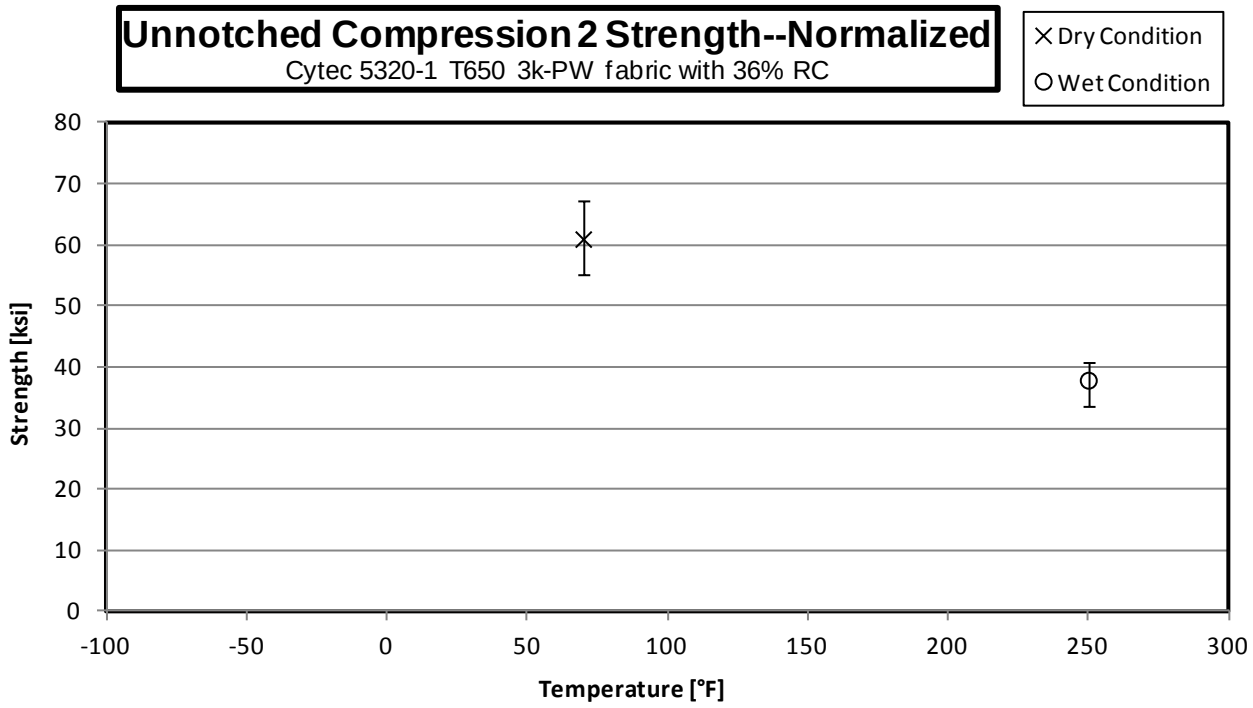



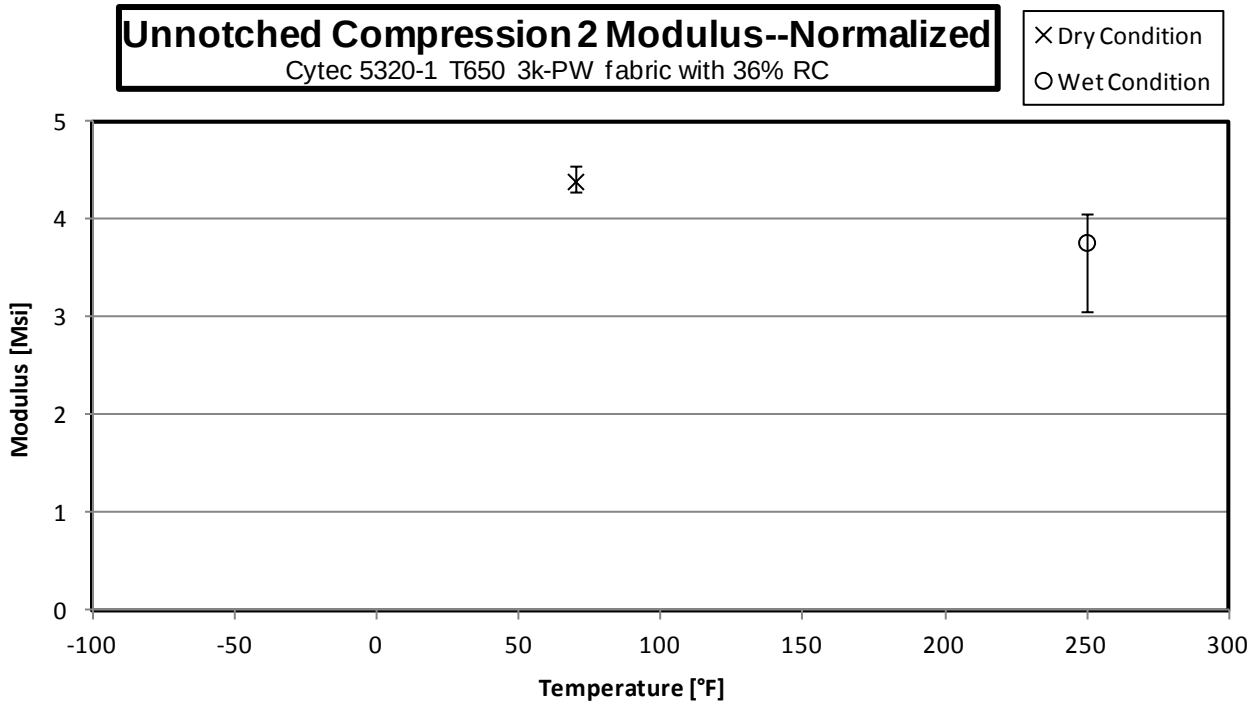
## 3.9 "25/50/25" Unnotched Compression 1 Properties (UNC1)



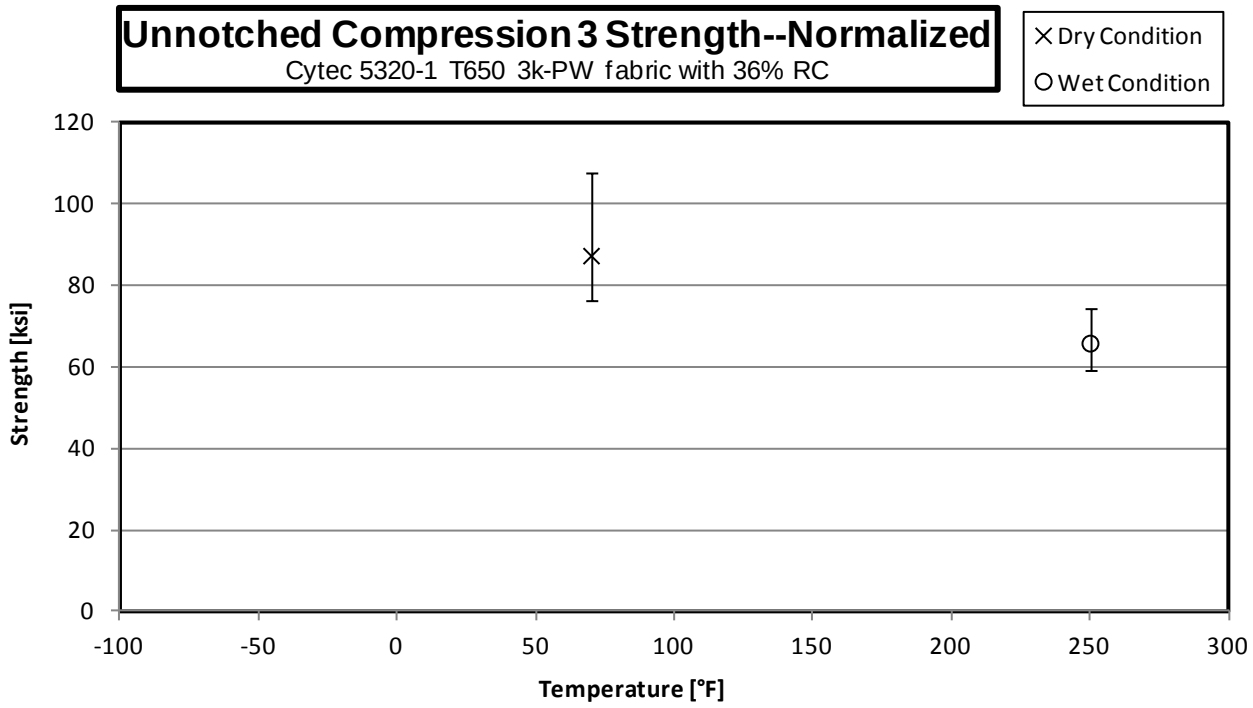



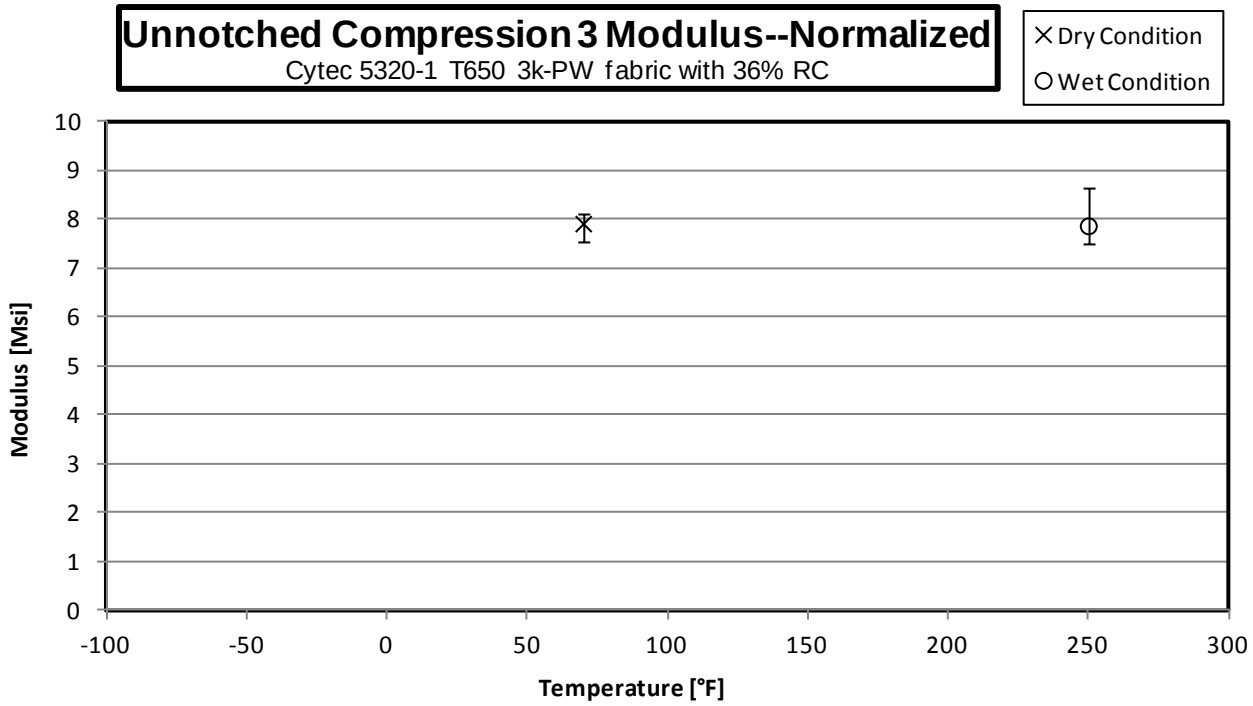
## 3.10 "10/80/10" Unnotched Compression 2 Properties (UNC2)



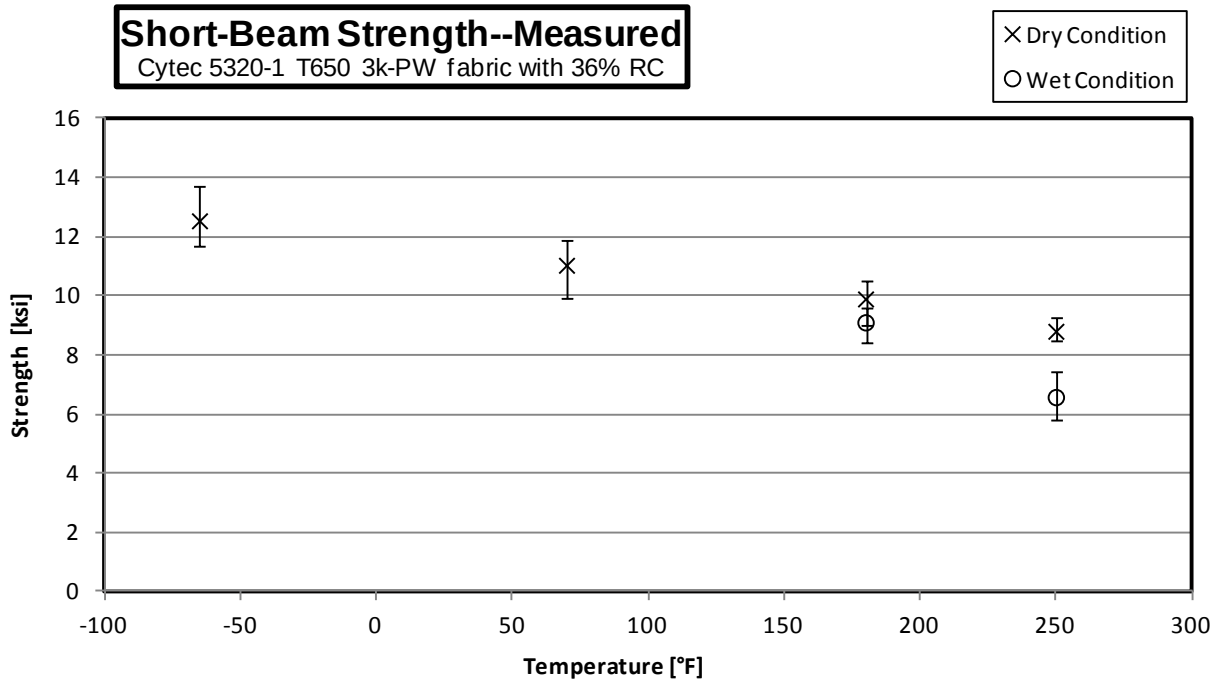



## 3.11 "40/20/40" Unnotched Compression 3 Properties (UNC3)

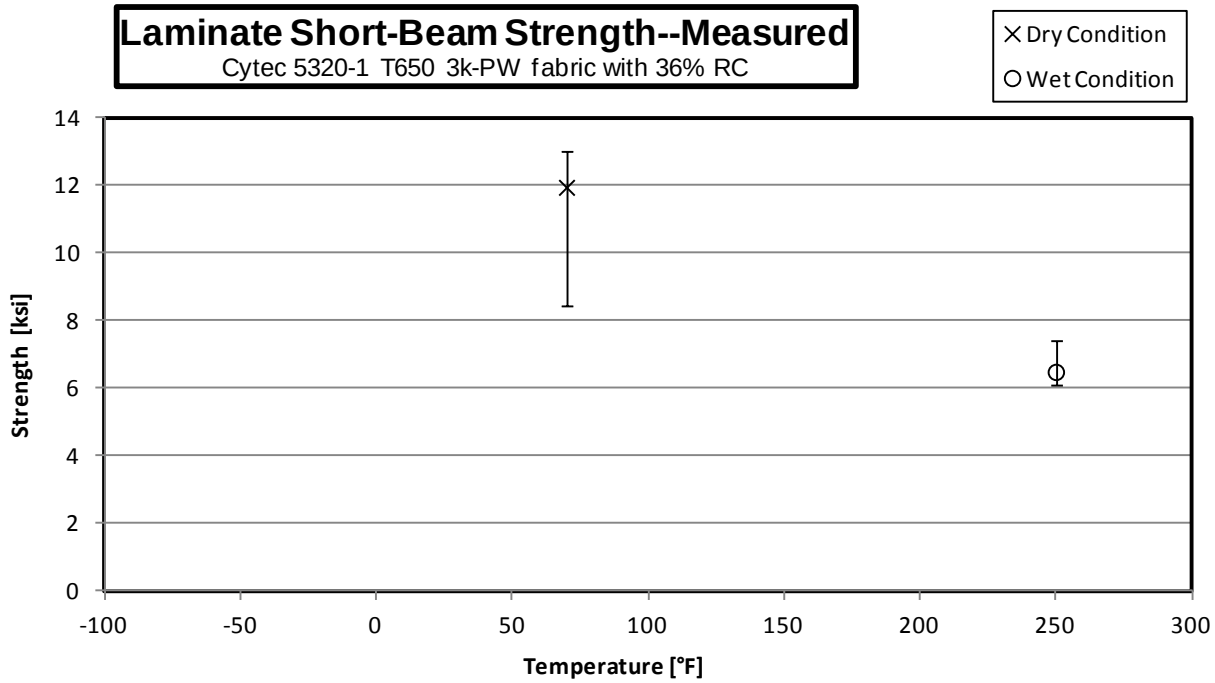


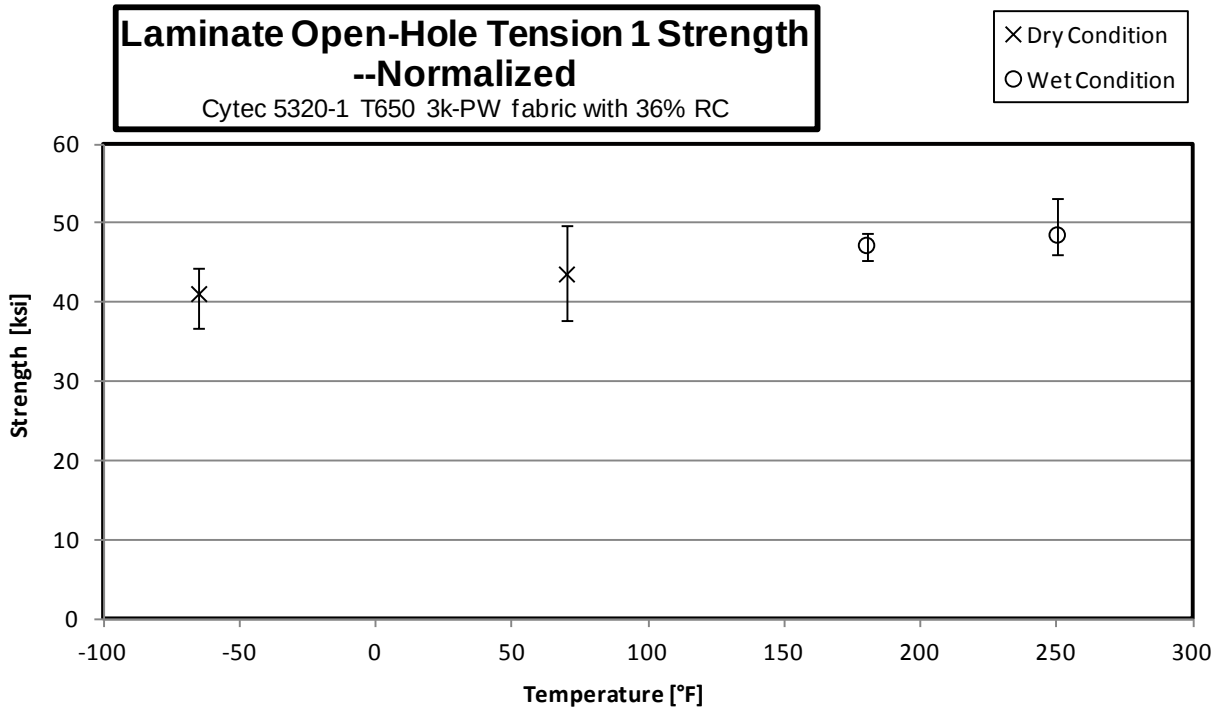
## 3.12 Lamina Short-Beam Strength Properties (SBS)



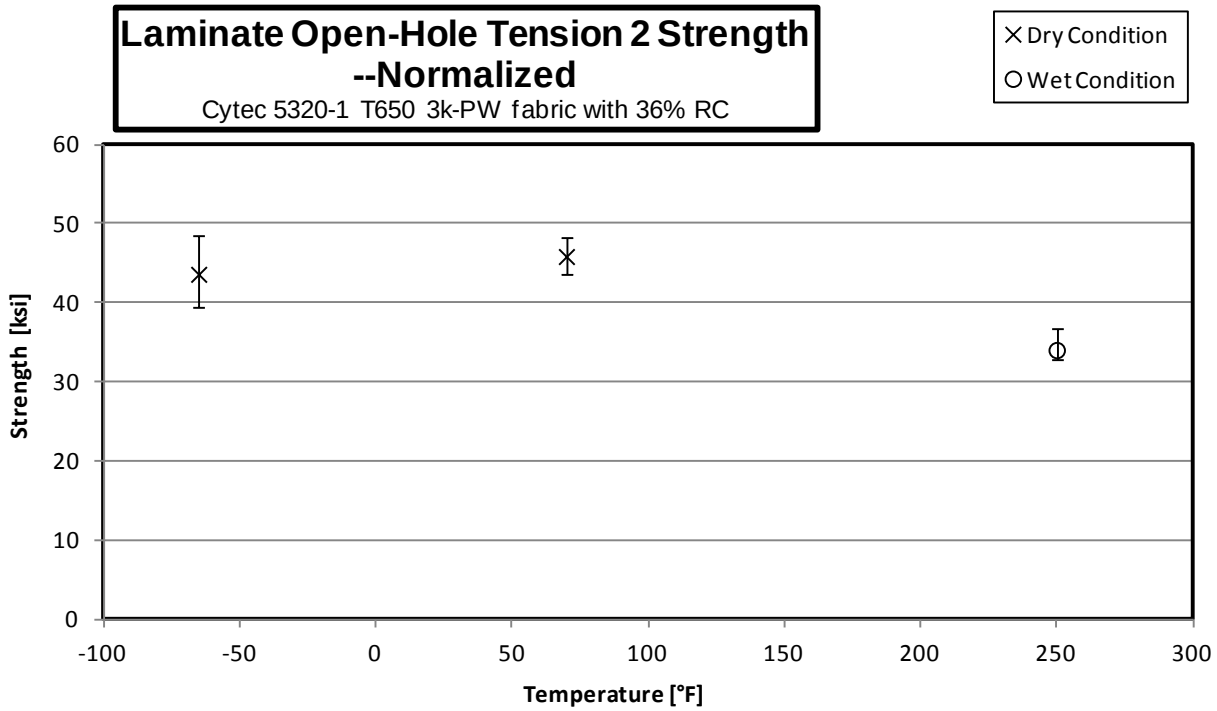

## 3.13 Laminate Short-Beam Strength Properties (SBS1)



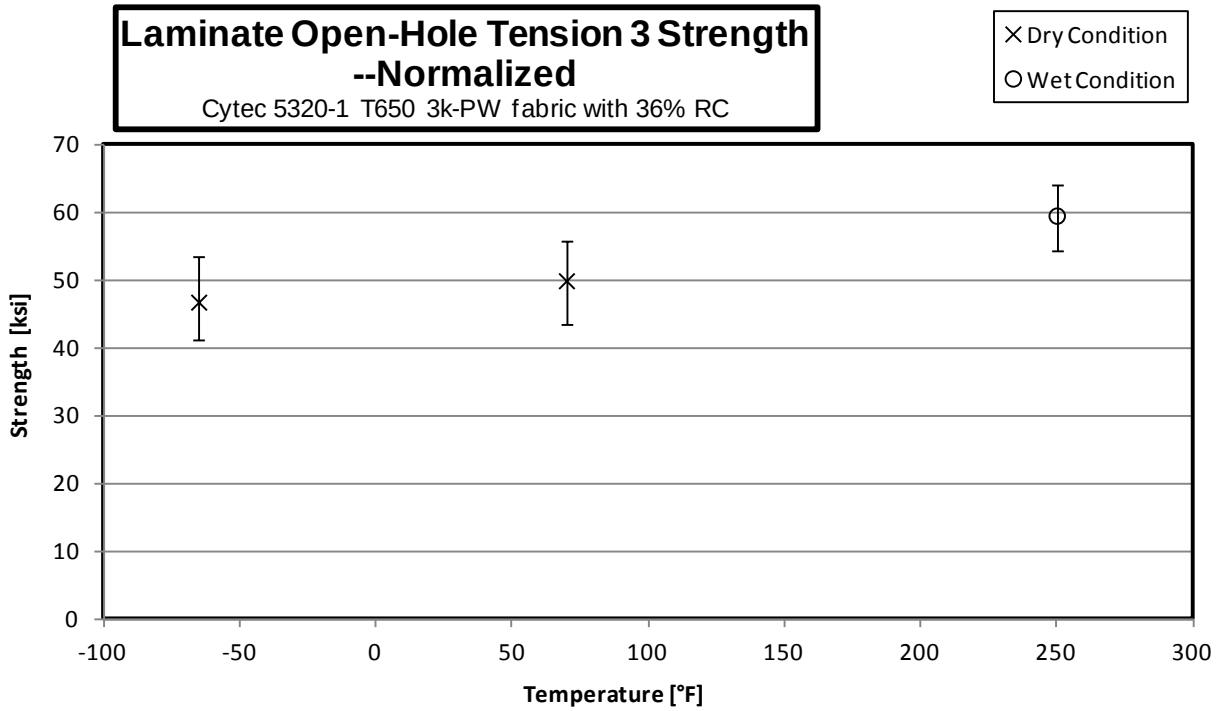
## 3.14 "25/50/25" Open-Hole Tension 1 Properties (OHT1)



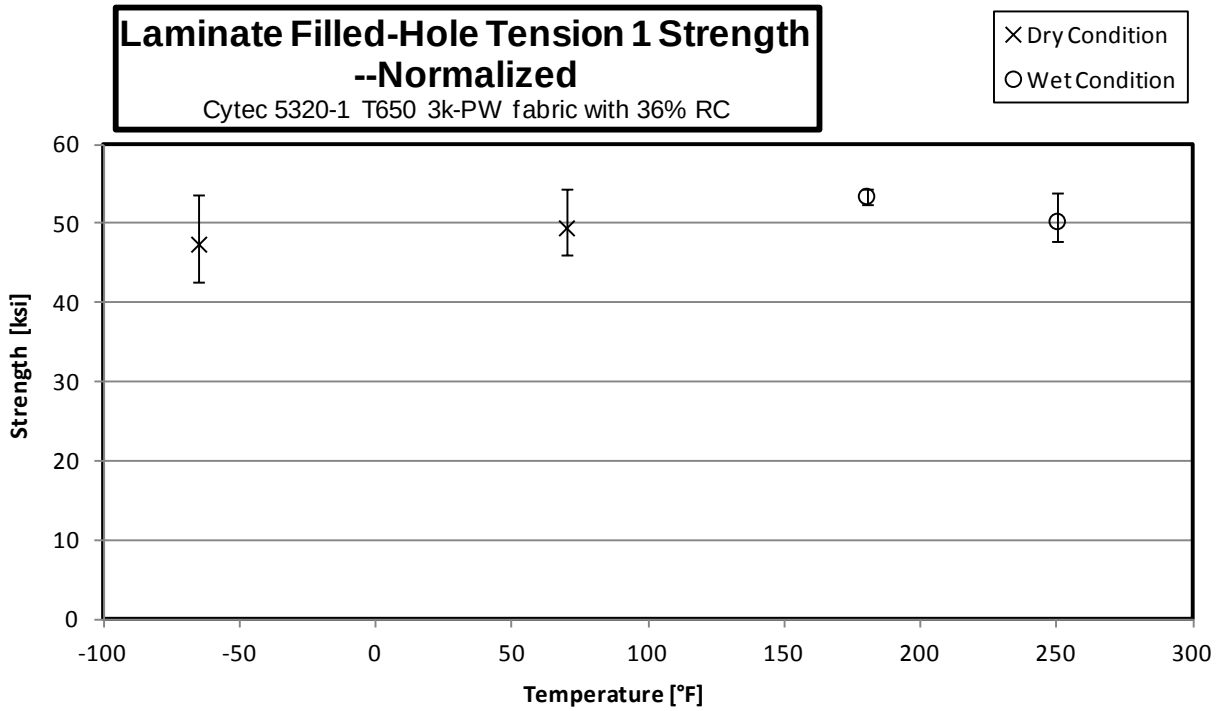

## 3.15 "10/80/10" Open-Hole Tension 2 Properties (OHT2)



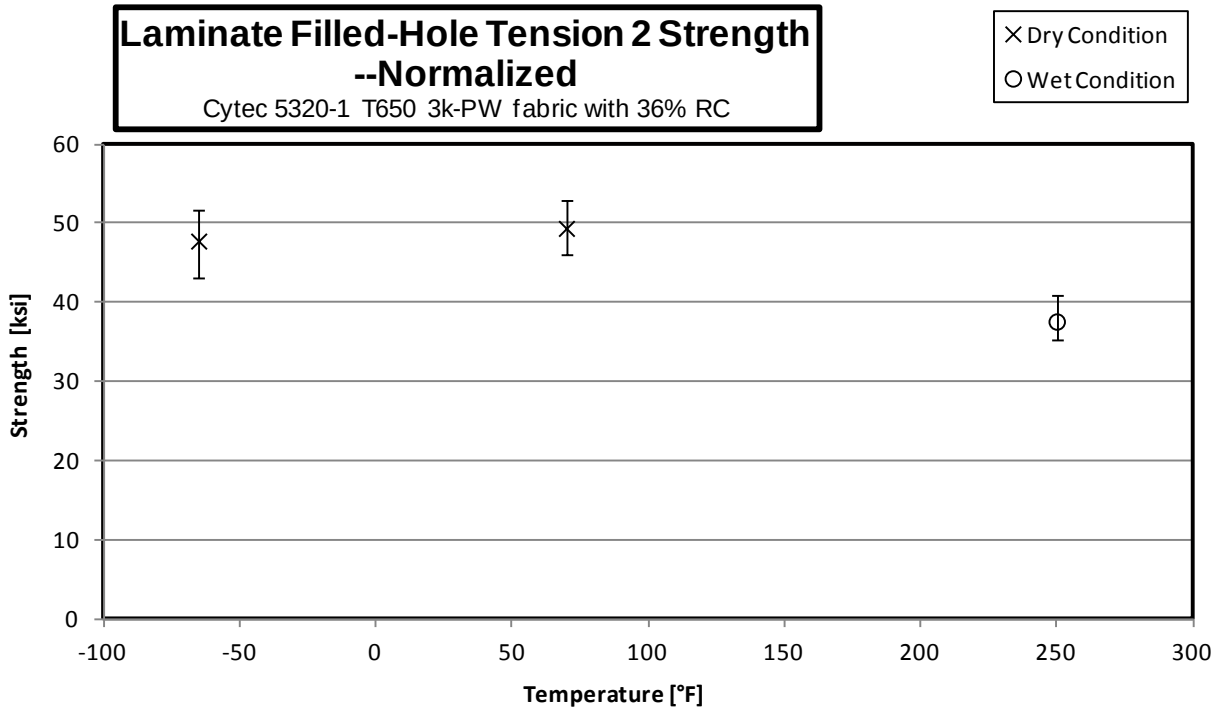
## 3.16 "40/20/40" Open-Hole Tension 3 Properties (OHT3)



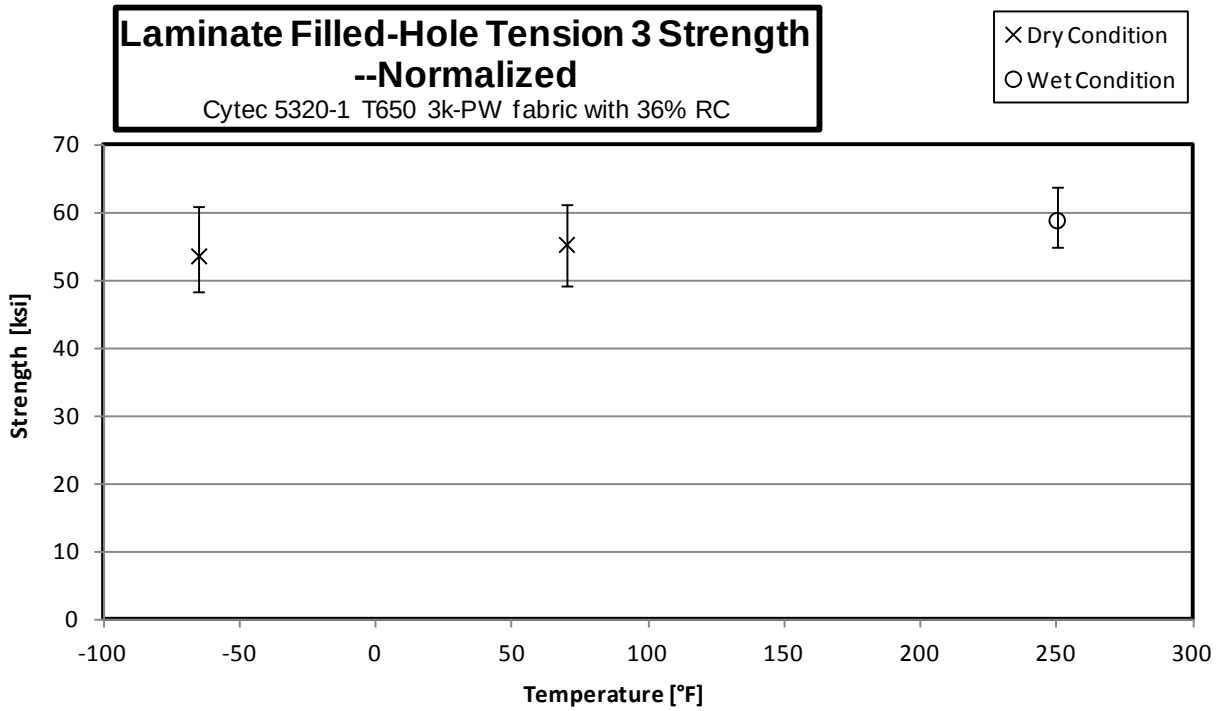

## 3.17 "25/50/25" Filled-Hole Tension 1 Properties (FHT1)



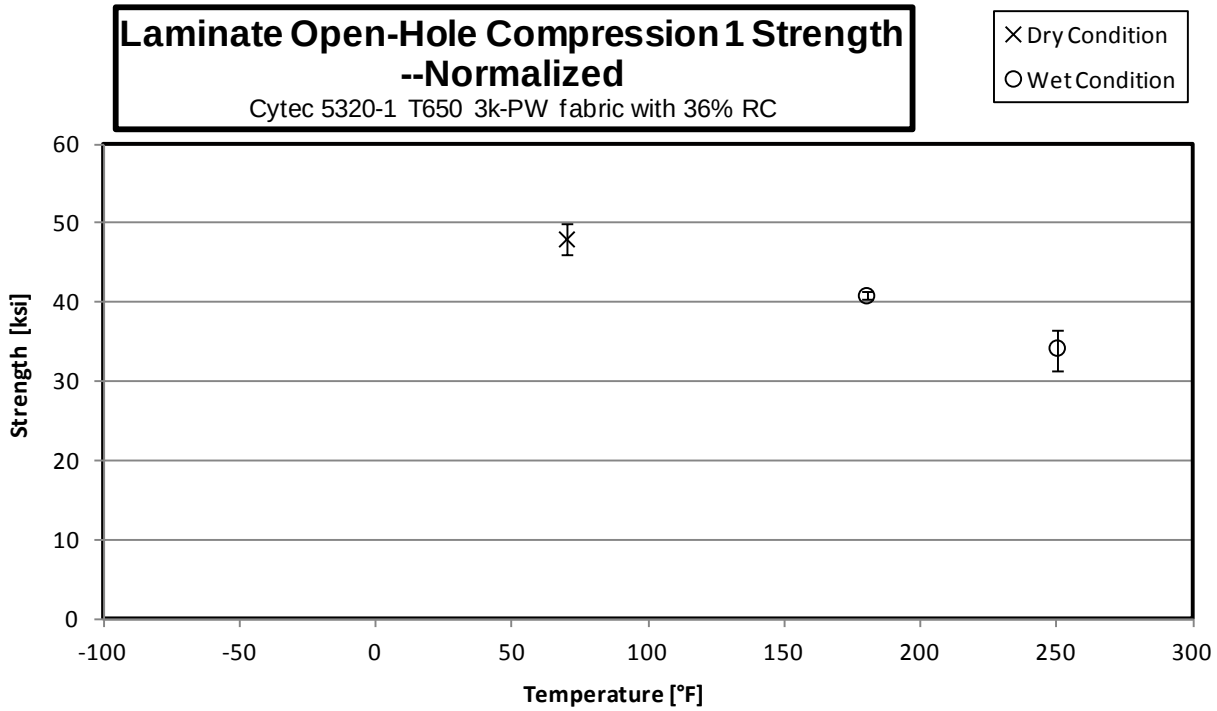
## 3.18 "10/80/10" Filled-Hole Tension 2 Properties (FHT2)



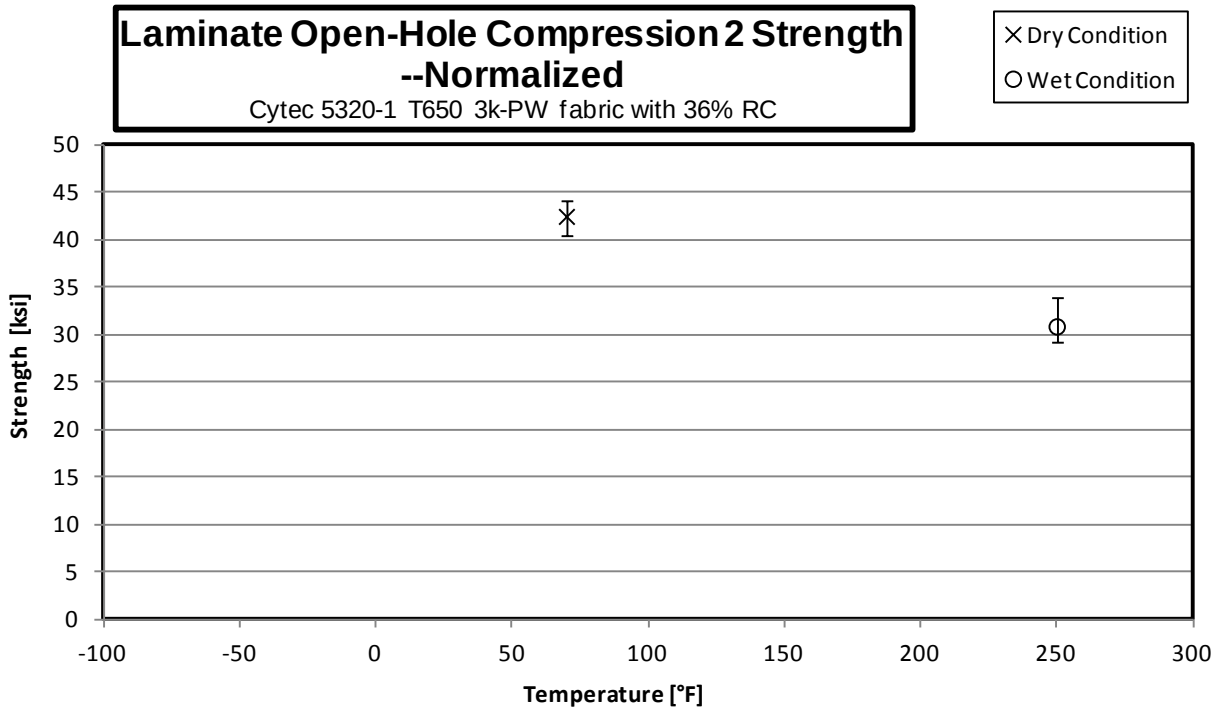

## 3.19 "40/20/40" Filled-Hole Tension 3 Properties (FHT3)



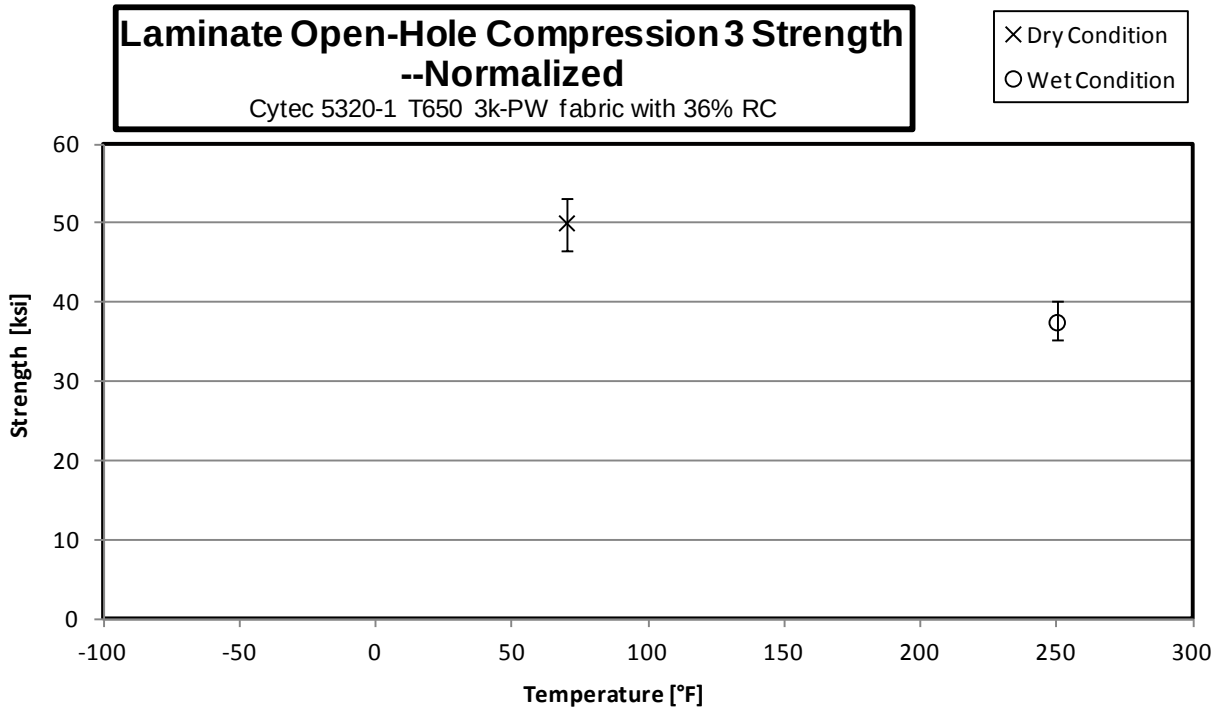
## 3.20 "25/50/25" Open-Hole Compression 1 Properties (OHC1)



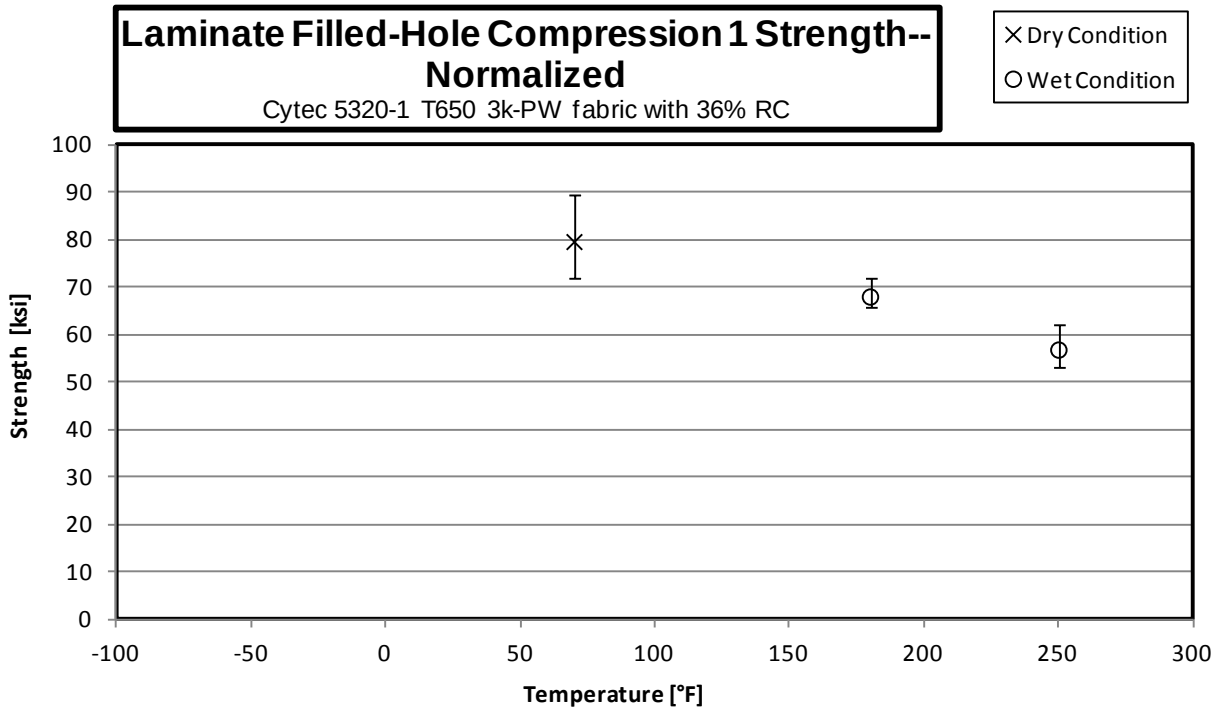

## 3.21 "10/80/10" Open-Hole Compression 2 Properties (OHC2)



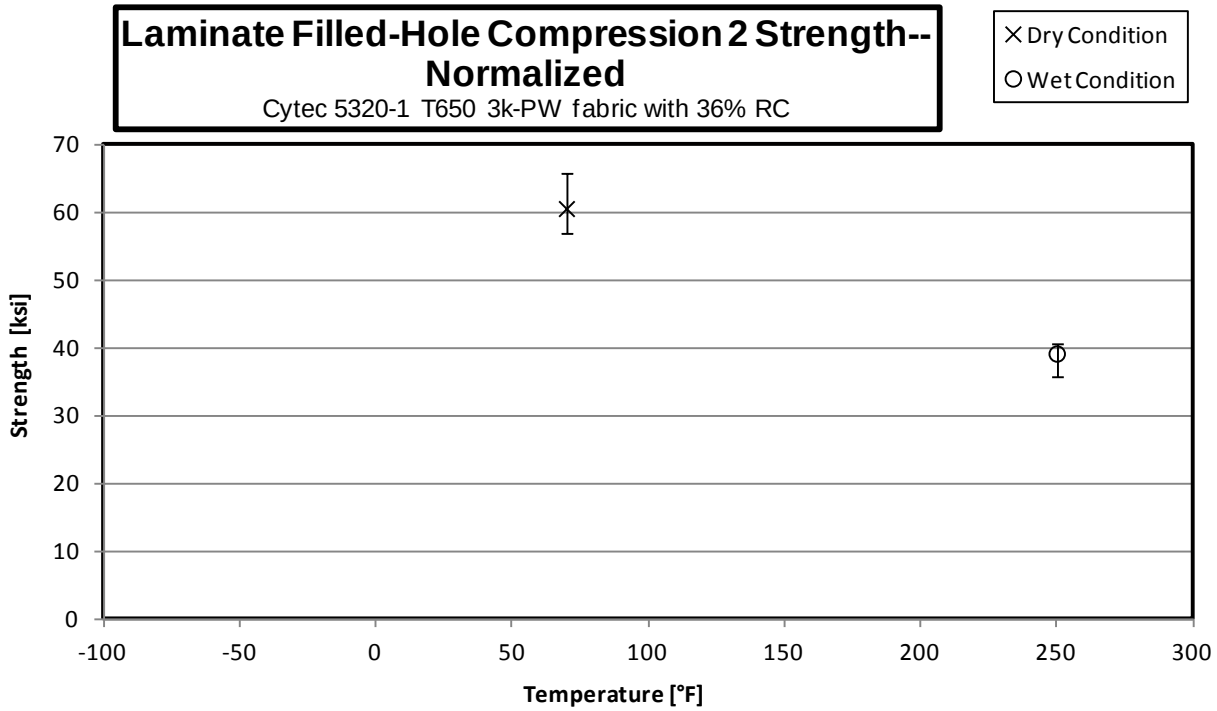
## 3.22 "40/20/40" Open-Hole Compression 3 Properties (OHC3)



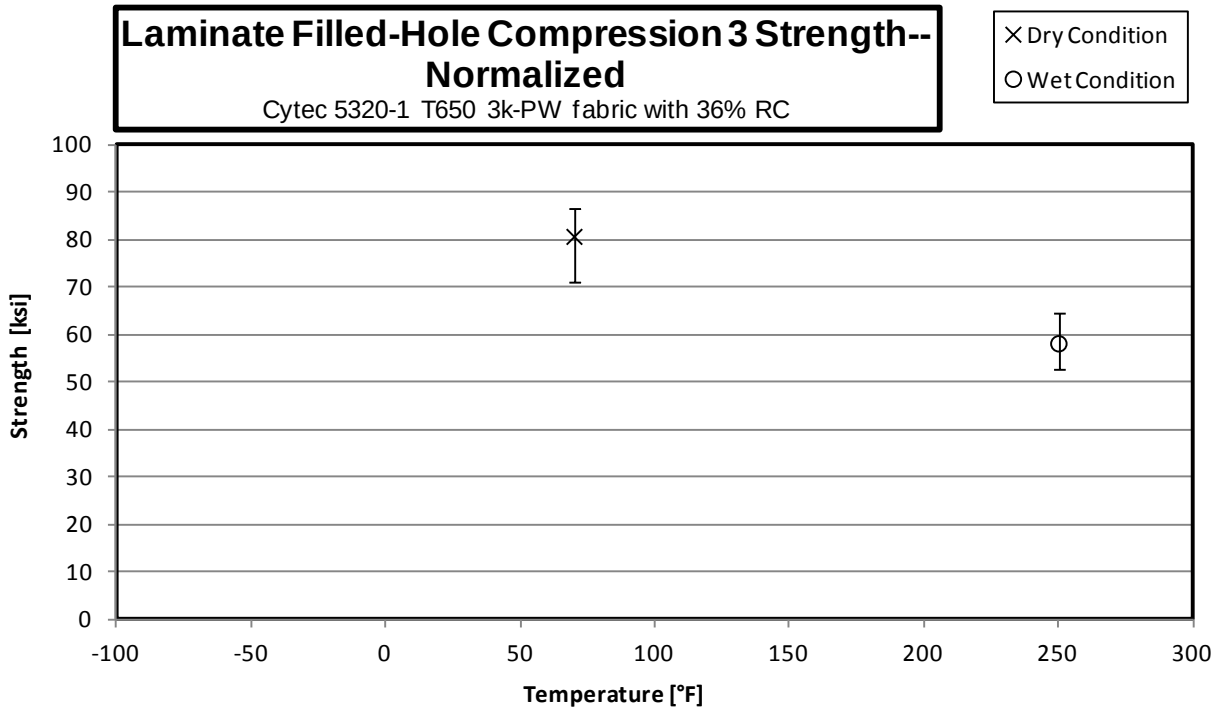

## 3.23 "25/50/25" Filled-Hole Compression 1 Properties (FHC1)



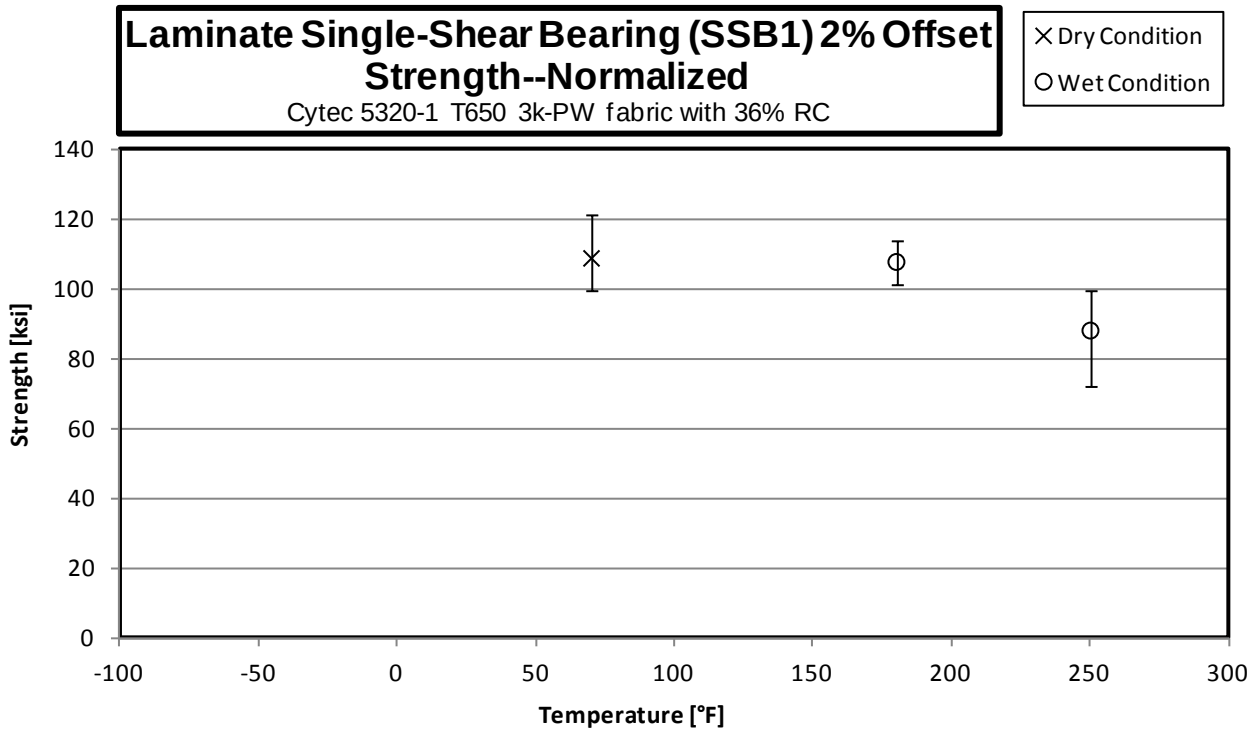
## 3.24 "10/80/10" Filled-Hole Compression 2 Properties (FHC2)

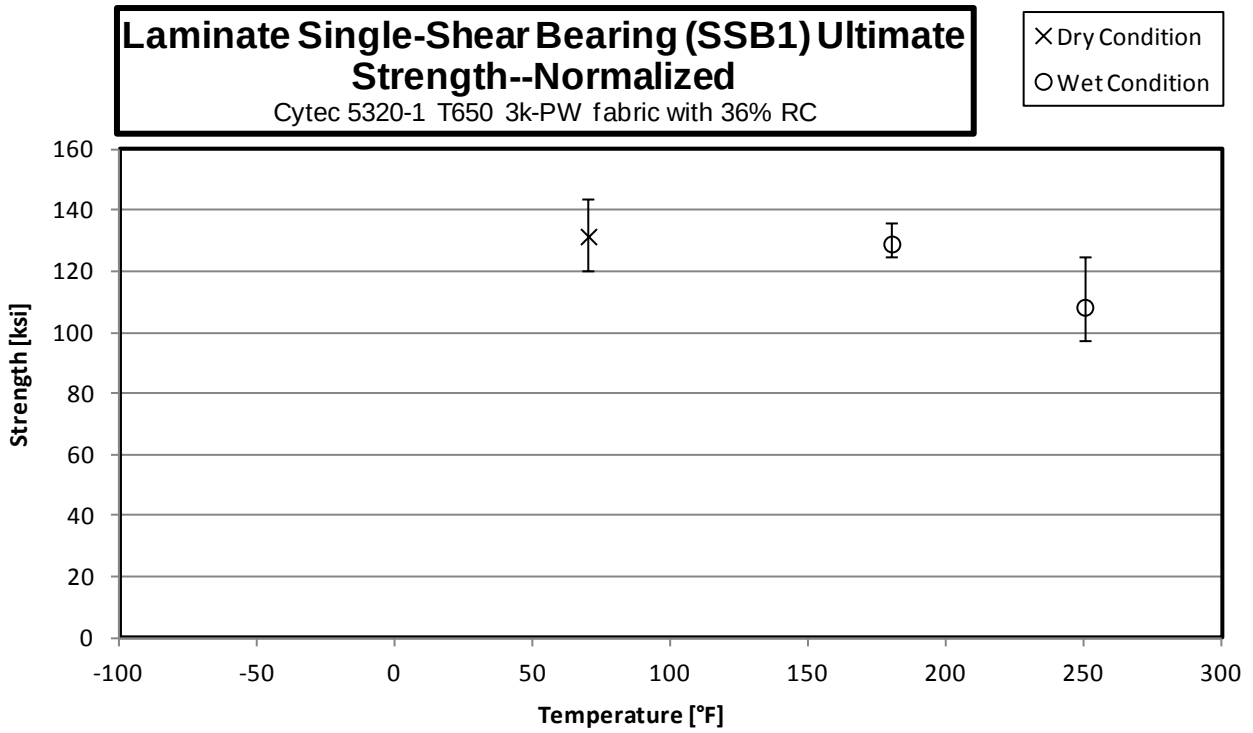



## 3.25 "40/20/40" Filled-Hole Compression 3 Properties (FHC3)

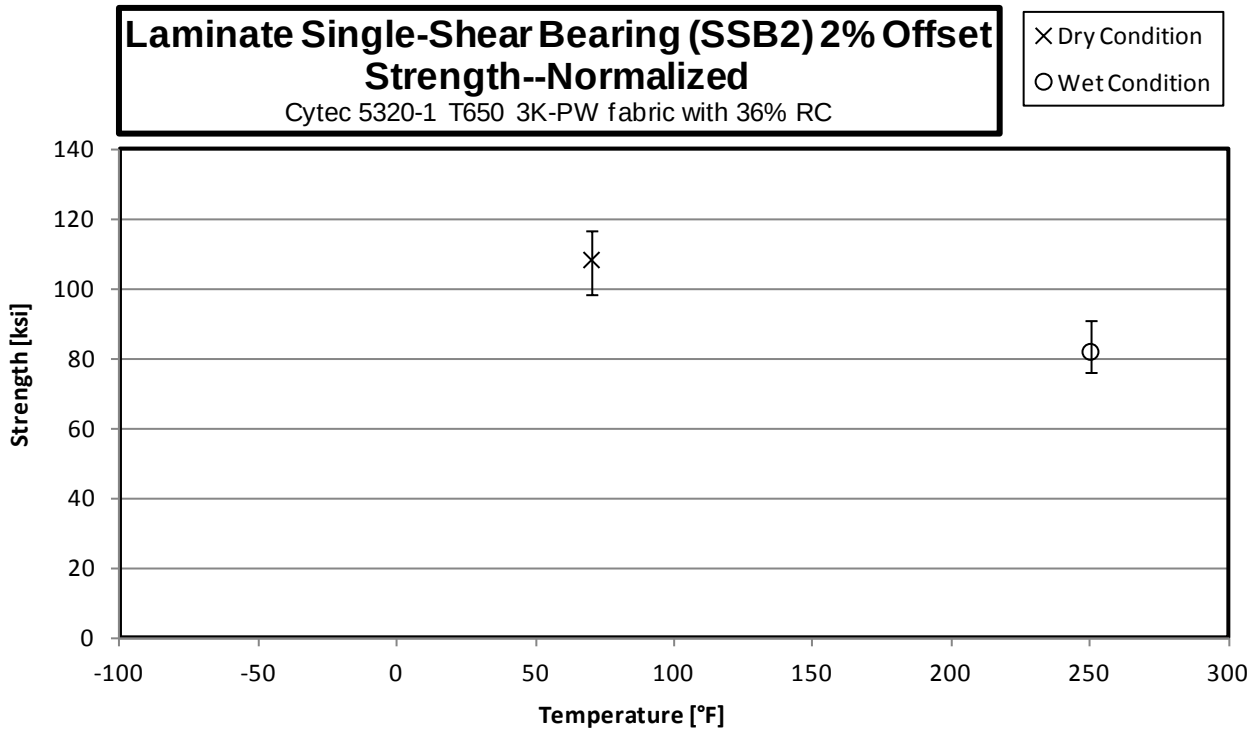


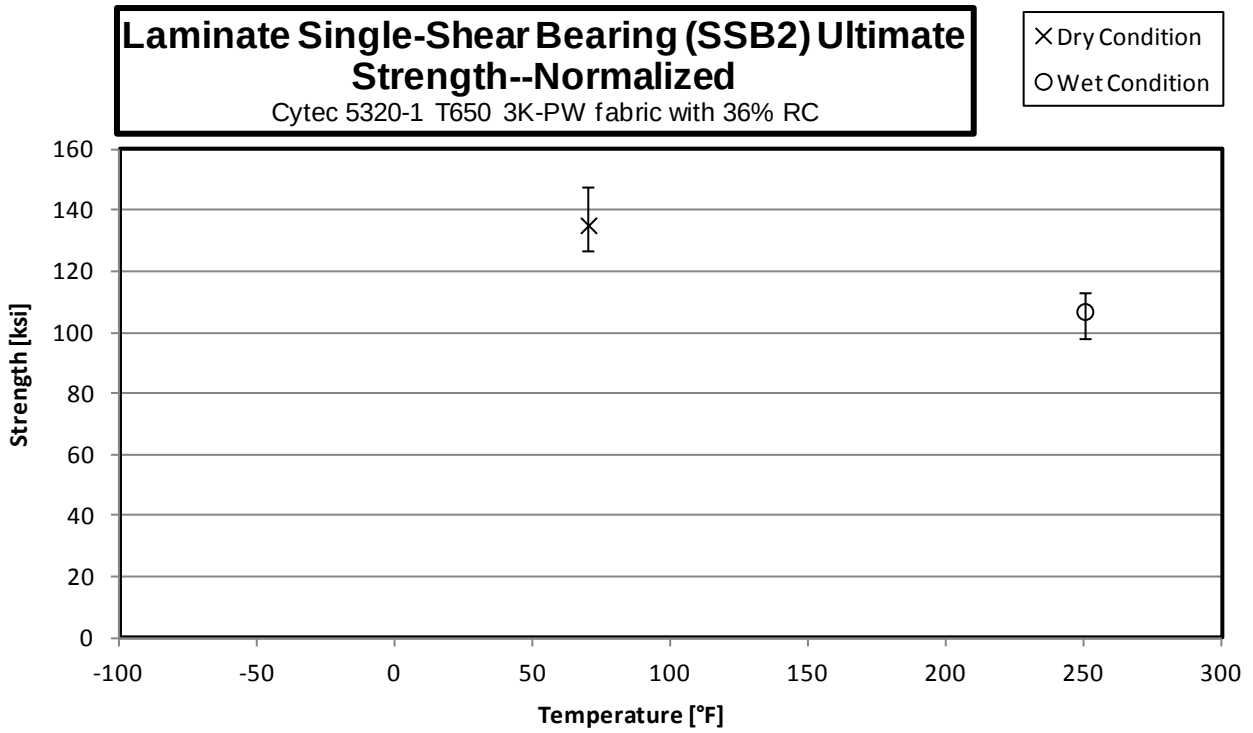
## 3.26 "25/50/25" Single-Shear Bearing 1 Properties (SSB1)



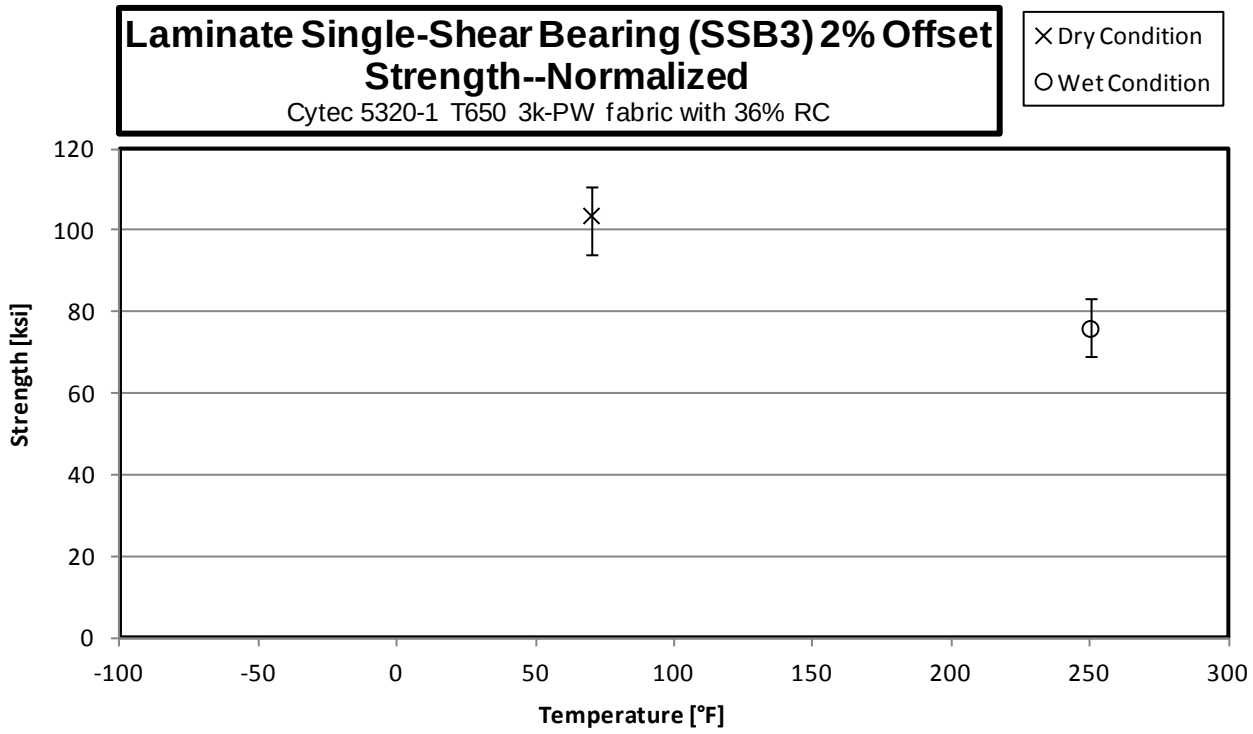



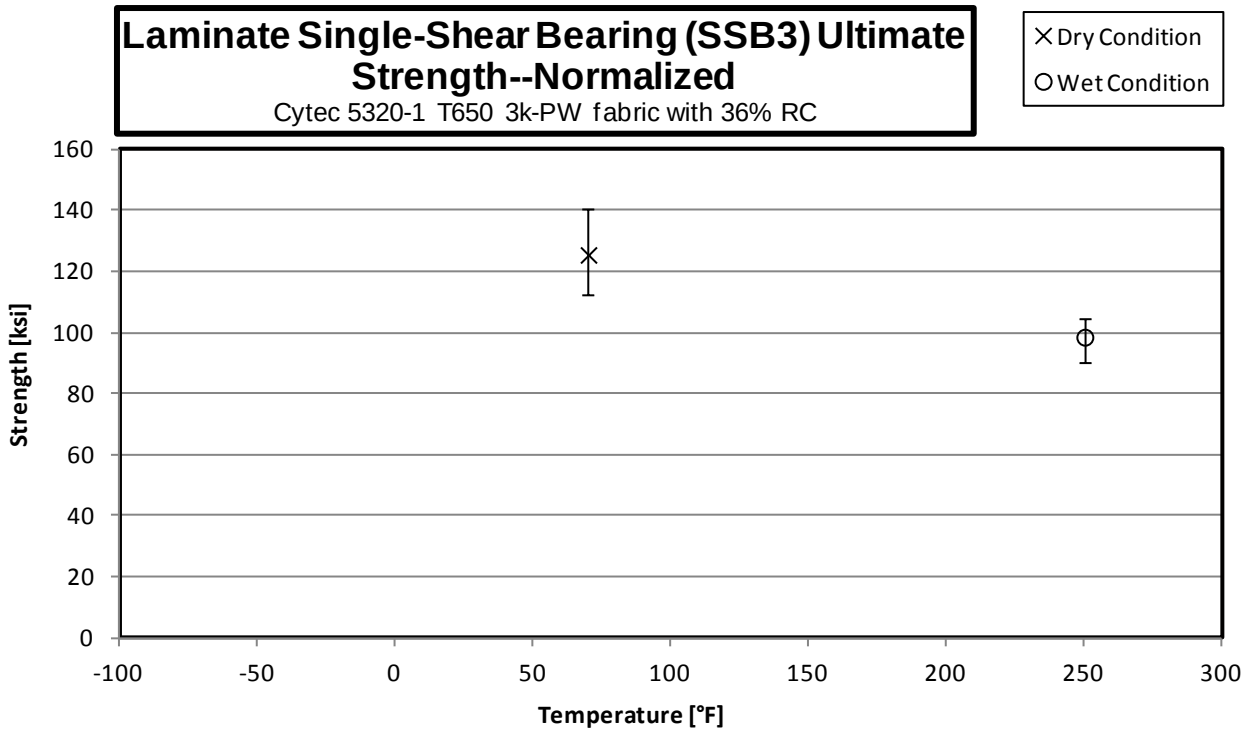
## 3.27 "10/80/10" Single-Shear Bearing 2 Properties (SSB2)



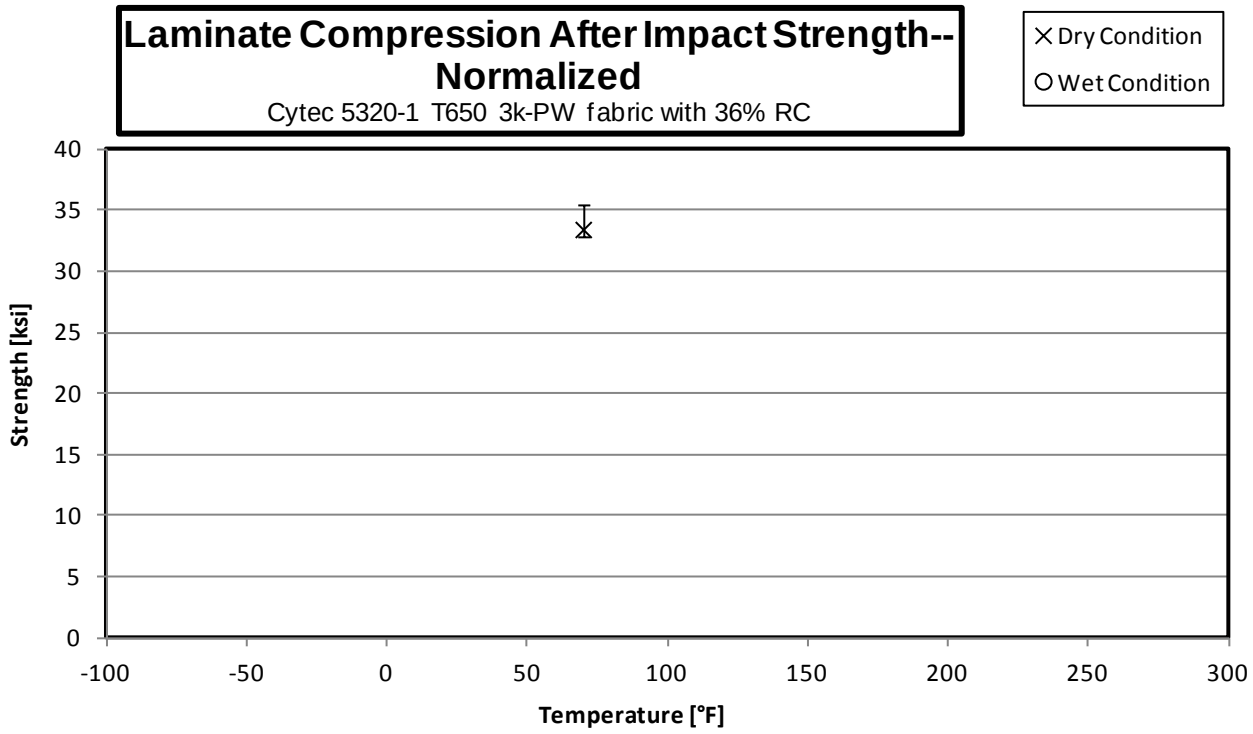



## 3.28 "40/20/40" Single-Shear Bearing 3 Properties (SSB3)

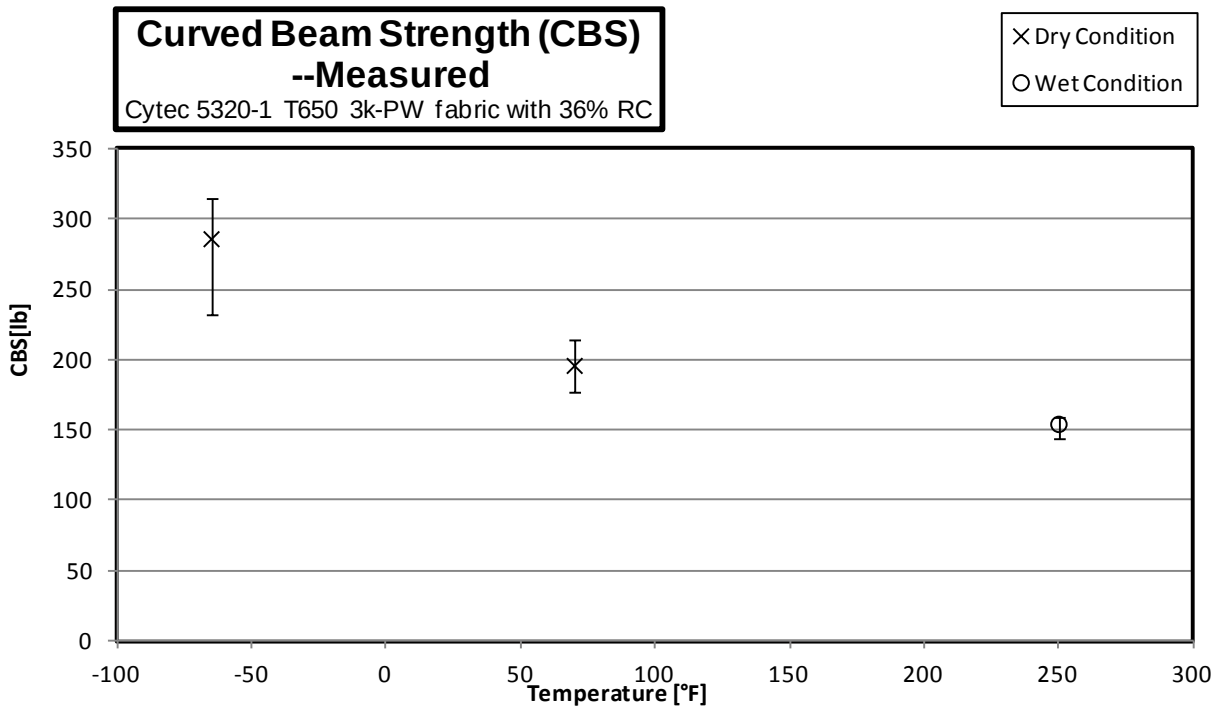


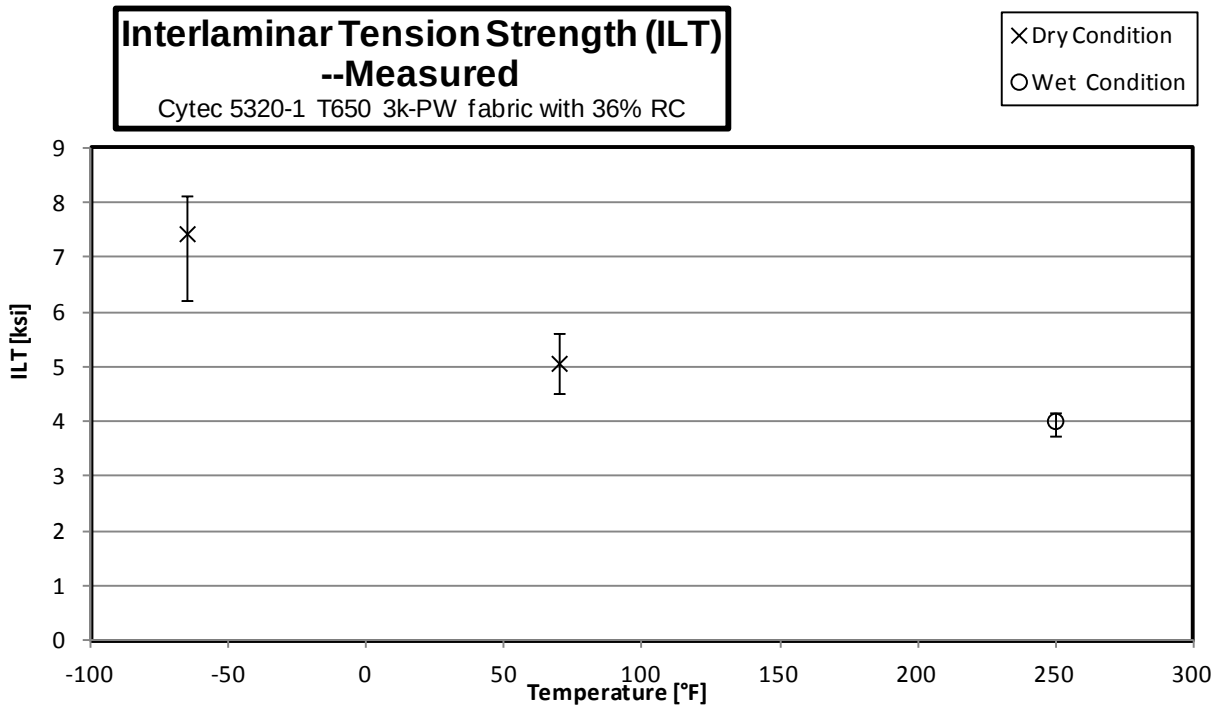



## 3.29 "25/50/25" Compression After Impact 1 Properties (CAI1)



## 3.30 Interlaminar Tension Properties (ILT)



# 4. Raw Data

## 4.1 Warp Tension Properties (WT)

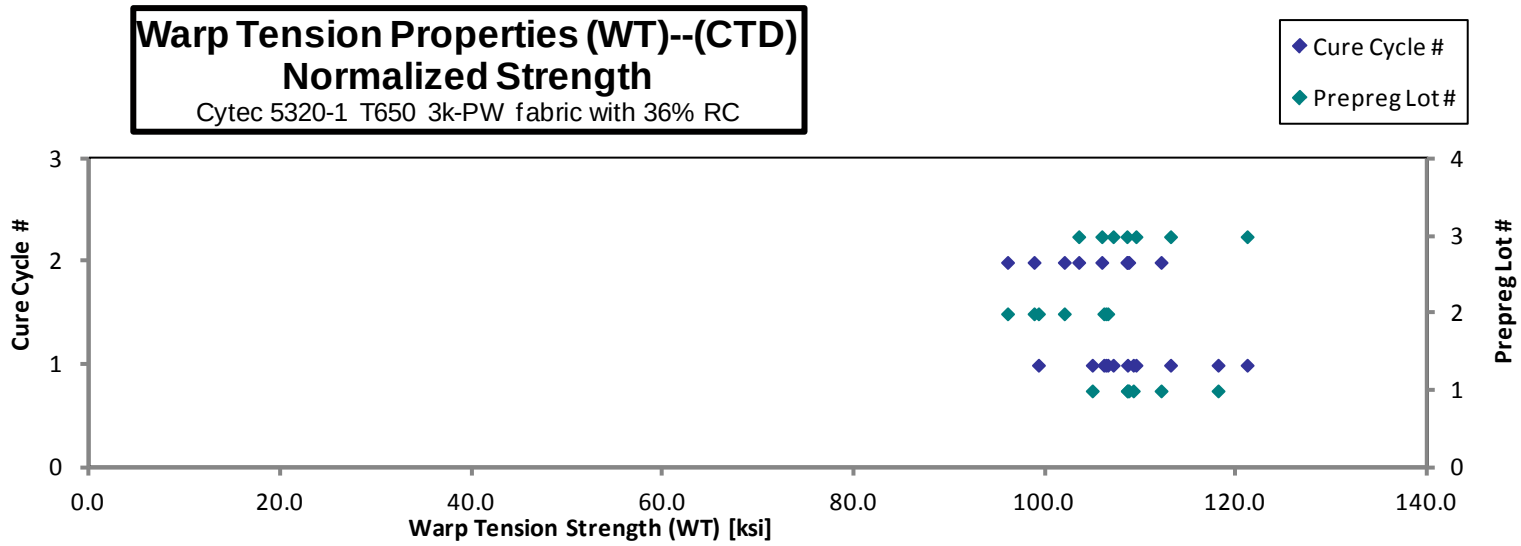
**Warp Tension Properties (WT)--CTD**
**Strength & Modulus**
Cytec 5320-1 T650 3k-PW fabric with 36% RC

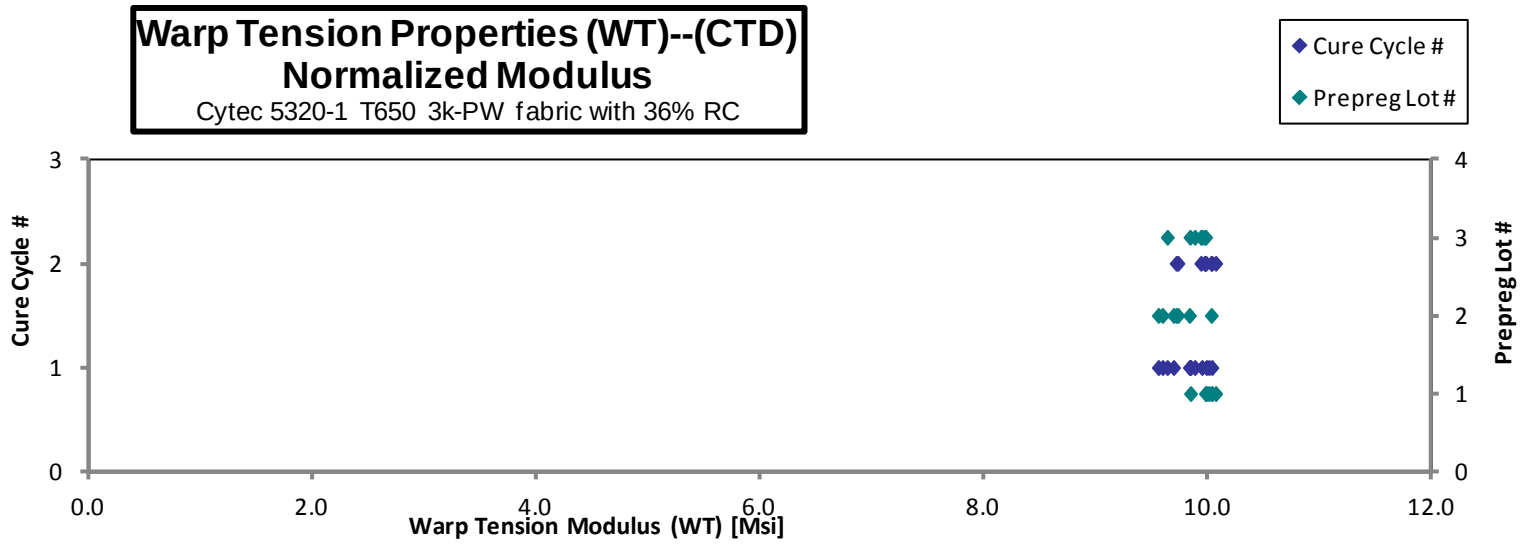
| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec 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] | $Strength_{norm}$ [ksi] | $Modulus_{norm}$ [Msi] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CUHJA115B | A | C1 | 1 | 1 | 106.017 | 10.090 | 0.059 | 0.114 | 15 | LGM | 0.0076 | 104.854 | 9.980 |
| CUHJA116B | A | C1 | 1 | 1 | 110.762 | 10.234 | 0.061 | 0.113 | 15 | LGM | 0.0075 | 108.540 | 10.029 |
| CUHJA117B | A | C1 | 1 | 1 | 119.321 | 10.113 | 0.064 | 0.114 | 15 | LGM | 0.0076 | 118.013 | 10.002 |
| CUHJA118B | A | C1 | 1 | 1 | 110.841 | 9.991 | 0.059 | 0.114 | 15 | LGM | 0.0076 | 109.145 | 9.838 |
| CUHJA215B | A | C2 | 1 | 2 | 108.545 | 10.016 | 0.066 | 0.116 | 15 | LGM | 0.0077 | 108.671 | 10.027 |
| CUHJA216B | A | C2 | 1 | 2 | 112.719 | 10.123 | 0.066 | 0.115 | 15 | LGM | 0.0077 | 112.052 | 10.063 |
| CUHJA217B | A | C2 | 1 | 2 | 107.892 | 9.914 | 0.053 | 0.116 | 15 | LWT | 0.0077 | 108.515 | 9.972 |
| CUHJB117B | B | C1 | 2 | 1 | 109.376 | 9.887 | 0.056 | 0.112 | 15 | LAB | 0.0075 | 106.062 | 9.587 |
| CUHJB118B | B | C1 | 2 | 1 | 111.008 | 10.099 | 0.058 | 0.111 | 15 | LGM | 0.0074 | 106.475 | 9.686 |
| CUHJB119B | B | C1 | 2 | 1 | 103.310 | 9.944 | 0.064 | 0.111 | 15 | LWB | 0.0074 | 99.225 | 9.551 |
| CUHJB11AB | B | C1 | 2 | 1 | 110.269 | 10.198 | 0.070 | 0.111 | 15 | LGM | 0.0074 | 106.275 | 9.828 |
| CUHJB217B | B | C2 | 2 | 2 | 101.929 | 10.021 | 0.056 | 0.112 | 15 | LWT | 0.0075 | 98.767 | 9.710 |
| CUHJB218B | B | C2 | 2 | 2 | 105.445 | 10.369 | 0.066 | 0.112 | 15 | LWT | 0.0074 | 101.930 | 10.024 |
| CUHJB219B | B | C2 | 2 | 2 | 99.615 | 10.092 | 0.048 | 0.111 | 15 | LWT | 0.0074 | 95.993 | 9.725 |
| CUHJC117B | C | C1 | 3 | 1 | 124.355 | 10.145 | 0.060 | 0.112 | 15 | LGM | 0.0075 | 121.054 | 9.876 |
| CUHJC118B | C | C1 | 3 | 1 | 112.947 | 10.260 | 0.065 | 0.112 | 15 | LGM | 0.0075 | 109.427 | 9.940 |
| CUHJC119B | C | C1 | 3 | 1 | 116.126 | 10.102 | 0.058 | 0.112 | 15 | LWT | 0.0075 | 113.043 | 9.833 |
| CUHJC11AB | C | C1 | 3 | 1 | 109.764 | 9.876 | 0.058 | 0.113 | 15 | LGM | 0.0075 | 107.040 | 9.630 |
| CUHJC217B | C | C2 | 3 | 2 | 107.197 | 10.057 | 0.056 | 0.114 | 15 | LGM | 0.0076 | 105.851 | 9.931 |
| CUHJC218B | C | C2 | 3 | 2 | 111.192 | 10.222 | 0.063 | 0.113 | 15 | LGM | 0.0075 | 108.481 | 9.973 |
| CUHJC219B | C | C2 | 3 | 2 | 106.260 | 10.235 | 0.057 | 0.112 | 15 | LGM | 0.0075 | 103.438 | 9.964 |

| | | | |
|---|---|---|---|
| **Average** | **109.757** | **10.095** | **0.060** |
| **Standard Dev.** | **5.623** | **0.131** | **0.005** |
| **Coeff. of Var. [%]** | **5.123** | **1.297** | **8.572** |
| **Min.** | **99.615** | **9.876** | **0.048** |
| **Max.** | **124.355** | **10.369** | **0.070** |
| **Number of Spec.** | **21** | **21** | **21** |

| | | | |
|---|---|---|---|
| **$Average_{norm}$** | **0.0075** | **107.279** | **9.865** |
| **Standard $Dev._{norm}$** | | **5.894** | **0.158** |
| **Coeff. of Var. [%]$_{norm}$** | | **5.494** | **1.606** |
| **Min.** | **0.0074** | **95.993** | **9.551** |
| **Max.** | **0.0077** | **121.054** | **10.063** |
| **Number of Spec.** | **21** | **21** | **21** |


Warp Tension Properties (WT)--(CTD)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
20.0
40.0
60.0
80.0
100.0
120.0
140.0
Warp Tension Strength (WT) [ksi]


Warp Tension Properties (WT)--(CTD)
Normalized Modulus
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
2.0
4.0
6.0
8.0
10.0
12.0
Warp Tension Modulus (WT) [Msi]

## Warp Tension Properties (WT)--RTD
## Strength & Modulus

Cytec 5320-1 T650 3k-PW fabric with 36% RC

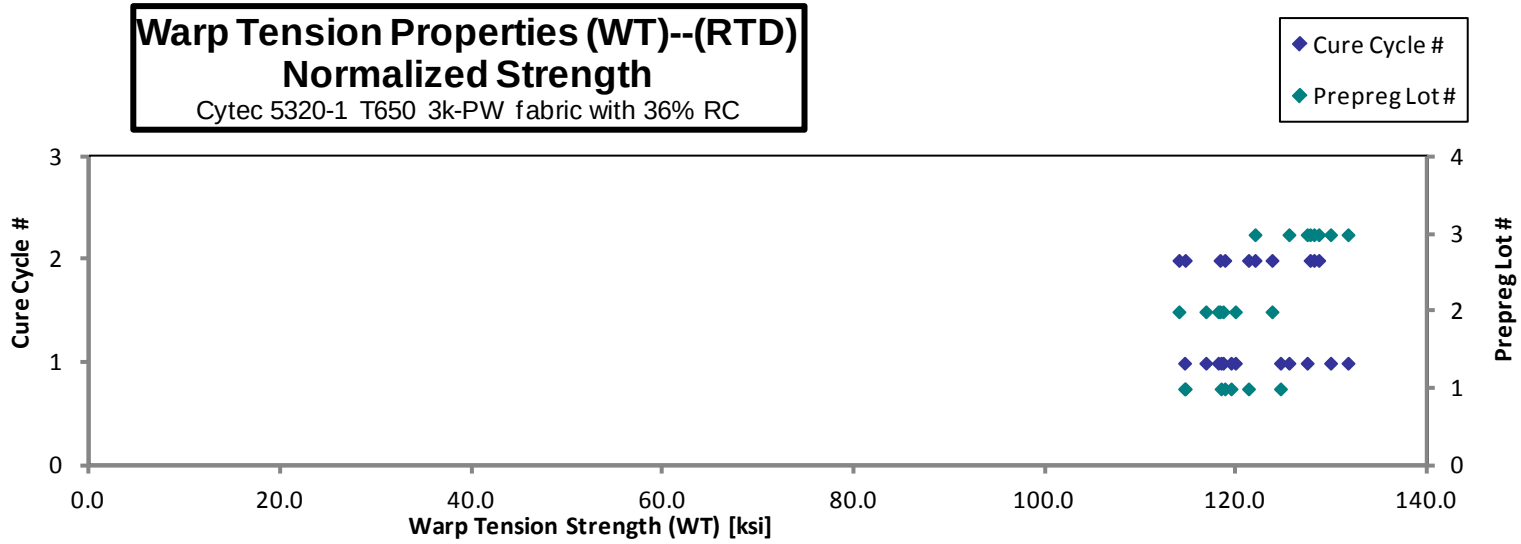
| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

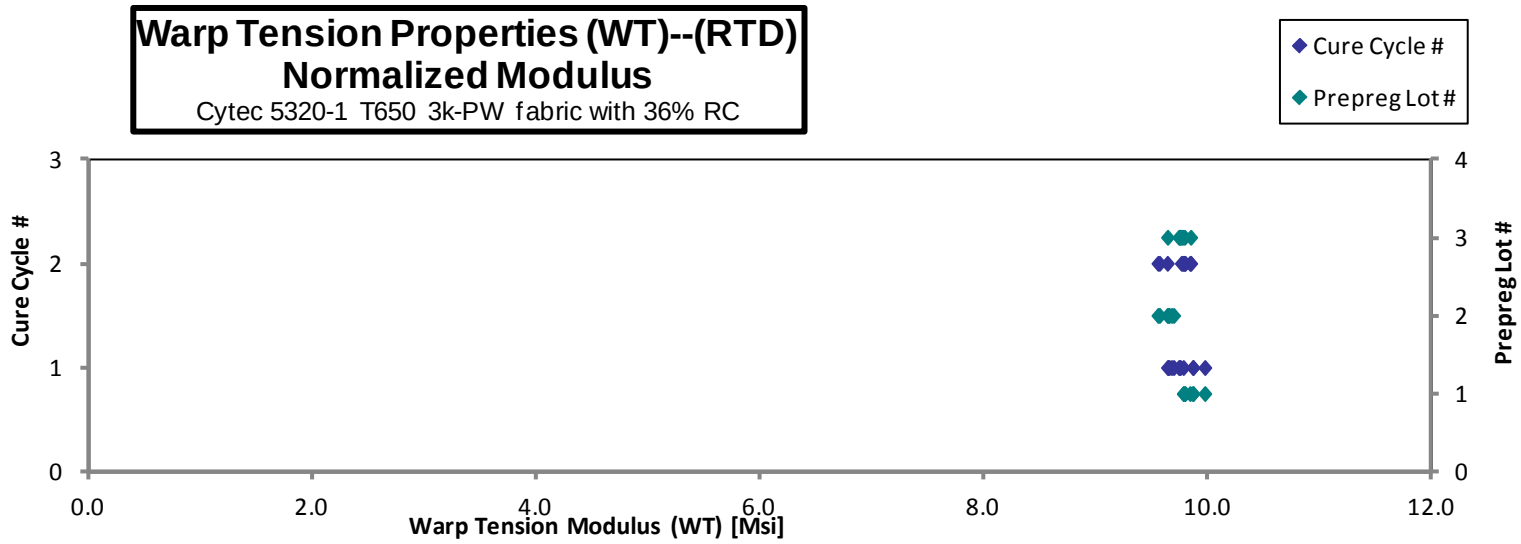
| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Poisson's Ratio | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] | $Modulus_{norm}$ [Msi] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CUHJA111A* | A | C1 | 1 | 1 | 120.787 | 10.049 | 0.047 | 0.113 | 15 | LGM | 0.0075 | 118.329 | 9.859 |
| CUHJA112A* | A | C1 | 1 | 1 | 126.923 | 10.172 | 0.047 | 0.113 | 15 | LWT | 0.0076 | 124.542 | 9.773 |
| CUHJA113A | A | C1 | 1 | 1 | 116.547 | 10.035 | 0.051 | 0.113 | 15 | LAT | 0.0076 | 114.512 | 9.860 |
| CUHJA114A | A | C1 | 1 | 1 | 120.206 | 10.035 | 0.051 | 0.115 | 15 | LAT | 0.0076 | 119.373 | 9.966 |
| CUHJA211A | A | C2 | 1 | 2 | 114.962 | 9.821 | 0.051 | 0.115 | 15 | LGM | 0.0077 | 114.580 | 9.788 |
| CUHJA212A | A | C2 | 1 | 2 | 121.144 | 9.771 | 0.051 | 0.116 | 15 | LGM | 0.0077 | 121.197 | 9.776 |
| CUHJA213A | A | C2 | 1 | 2 | 117.987 | 9.772 | 0.048 | 0.116 | 15 | LAB | 0.0077 | 118.719 | 9.833 |
| CUHJB111A | B | C1 | 2 | 1 | 121.396 | 10.022 | 0.058 | 0.111 | 15 | LAB | 0.0074 | 116.737 | 9.637 |
| CUHJB112A | B | C1 | 2 | 1 | 122.159 | 10.026 | 0.058 | 0.112 | 15 | LWB | 0.0074 | 118.034 | 9.687 |
| CUHJB113A | B | C1 | 2 | 1 | 123.736 | 9.962 | 0.056 | 0.112 | 15 | LWB | 0.0075 | 119.826 | 9.647 |
| CUHJB114A | B | C1 | 2 | 1 | 122.261 | 9.972 | 0.056 | 0.112 | 15 | LWB | 0.0075 | 118.538 | 9.669 |
| CUHJB211A | B | C2 | 2 | 2 | 118.736 | 9.964 | 0.054 | 0.111 | 15 | LWT | 0.0074 | 113.921 | 9.560 |
| CUHJB212A | B | C2 | 2 | 2 | 128.921 | 10.041 | 0.058 | 0.111 | 15 | LWT | 0.0074 | 123.656 | 9.631 |
| CUHJB213A | B | C2 | 2 | 2 | 122.476 | 9.891 | 0.063 | 0.111 | 15 | LAB | 0.0074 | 118.217 | 9.547 |
| CUHJC111A | C | C1 | 3 | 1 | 130.162 | 10.100 | 0.052 | 0.111 | 15 | LWT | 0.0074 | 125.429 | 9.733 |
| CUHJC112A | C | C1 | 3 | 1 | 134.039 | 9.949 | 0.049 | 0.112 | 15 | LGM | 0.0075 | 129.784 | 9.633 |
| CUHJC113A | C | C1 | 3 | 1 | 131.176 | 10.037 | 0.053 | 0.112 | 15 | LWT | 0.0075 | 127.333 | 9.743 |
| CUHJC114A | C | C1 | 3 | 1 | 133.845 | 9.911 | 0.056 | 0.114 | 15 | LGM | 0.0076 | 131.605 | 9.745 |
| CUHJC211A | C | C2 | 3 | 2 | 133.415 | 10.138 | 0.052 | 0.111 | 15 | LWB | 0.0074 | 128.545 | 9.768 |
| CUHJC212A | C | C2 | 3 | 2 | 133.275 | 10.155 | 0.055 | 0.111 | 15 | LWT | 0.0074 | 128.044 | 9.756 |
| CUHJC213A | C | C2 | 3 | 2 | 124.012 | 10.012 | 0.052 | 0.114 | 15 | LAB | 0.0076 | 121.882 | 9.840 |
| CUHJC214A | C | C2 | 3 | 2 | 129.641 | 9.938 | 0.054 | 0.114 | 15 | LAB | 0.0076 | 127.639 | 9.785 |

*Strain measurement was measured with SG. Extensometer used on other coupons.

| | | | |
|---|---|---|---|
| **Average** | **124.900** | **9.990** | **0.053** |
| **Standard Dev.** | **6.009** | **0.110** | **0.004** |
| **Coeff. of Var. [%]** | **4.811** | **1.104** | **7.533** |
| **Min.** | **114.962** | **9.771** | **0.047** |
| **Max.** | **134.039** | **10.172** | **0.063** |
| **Number of Spec.** | **22** | **22** | **22** |

| | | | |
|---|---|---|---|
| **$Average_{norm}$** | **0.0075** | **121.838** | **9.738** |
| **Standard $Dev._{norm}$** | | **5.325** | **0.104** |
| **Coeff. of Var. $[\%]_{norm}$** | | **4.371** | **1.065** |
| **Min.** | **0.0074** | **113.921** | **9.547** |
| **Max.** | **0.0077** | **131.605** | **9.966** |
| **Number of Spec.** | **22** | **22** | **22** |


Warp Tension Properties (WT)--(RTD)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Warp Tension Strength (WT) [ksi]
0.0
20.0
40.0
60.0
80.0
100.0
120.0
140.0
0
1
2
3
4


Warp Tension Properties (WT)--(RTD)
Normalized Modulus
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Warp Tension Modulus (WT) [Msi]
0.0
2.0
4.0
6.0
8.0
10.0
12.0
0
1
2
3
4

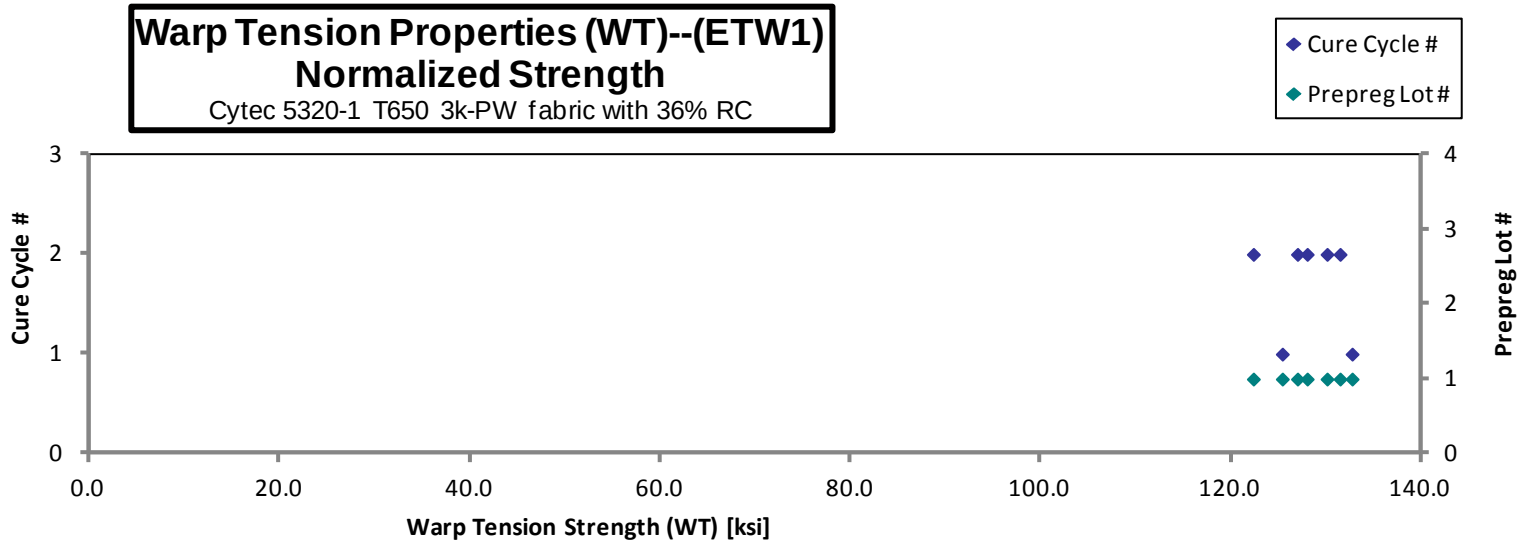
## Warp Tension Properties (WT)--ETW1
## Strength & Modulus
Cytec 5320-1 T650 3k-PW fabric with 36% RC

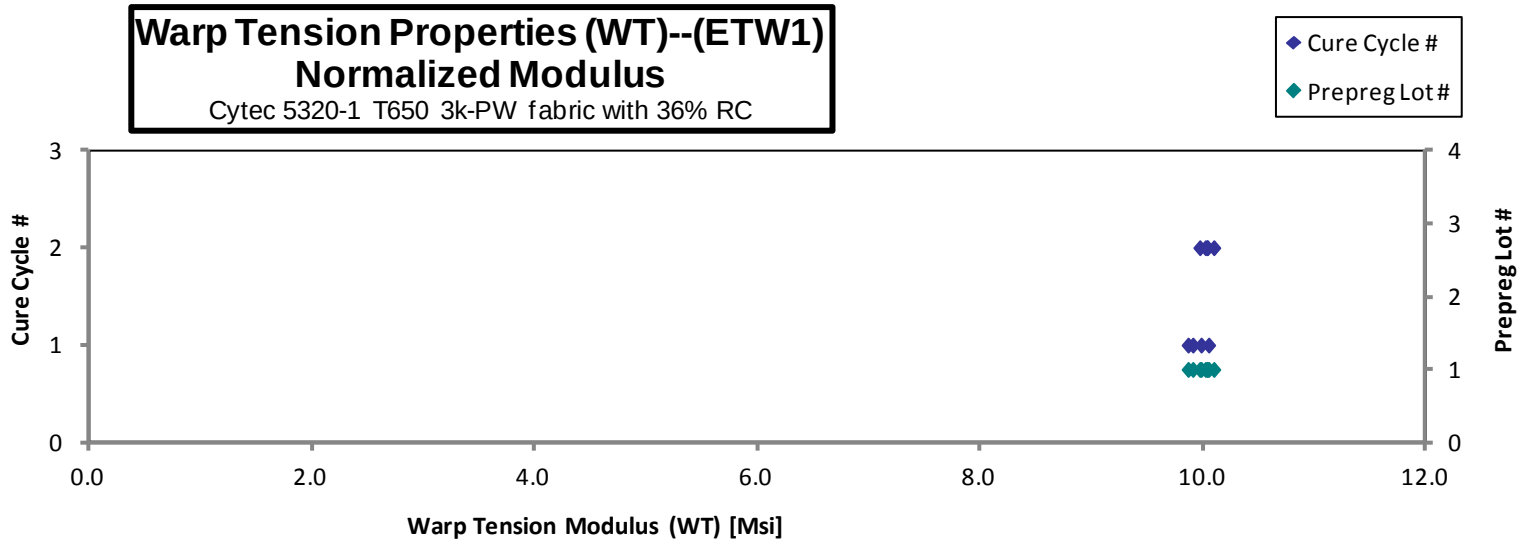
normalizing $t_{ply}$ [in]: 0.0077

| Specimen Number | Cytec Batch # | Cytec 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] | $Strength_{norm}$ [ksi] | $Modulus_{norm}$ [Msi] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CUHJA11AD | A | C1 | 1 | 1 | * | 10.021 | ** | 0.114 | 15 | LWB / LIT | 0.0076 | | 9.864 |
| CUHJA11BD | A | C1 | 1 | 1 | * | 10.001 | ** | 0.114 | 15 | LIB | 0.0076 | | 9.906 |
| CUHJA11CD | A | C1 | 1 | 1 | 133.557 | 10.116 | 0.045 | 0.115 | 15 | LWT | 0.0076 | 132.671 | 10.049 |
| CUHJA11DD | A | C1 | 1 | 1 | 126.137 | 10.045 | 0.041 | 0.115 | 15 | LAT | 0.0077 | 125.337 | 9.981 |
| CUHJA219D | A | C2 | 1 | 2 | 131.308 | 10.117 | 0.054 | 0.114 | 15 | LGM | 0.0076 | 130.038 | 10.019 |
| CUHJA21AD | A | C2 | 1 | 2 | 121.907 | 10.063 | 0.043 | 0.116 | 15 | LGM | 0.0077 | 122.294 | 10.095 |
| CUHJA21BD | A | C2 | 1 | 2 | 128.358 | 10.001 | 0.048 | 0.115 | 15 | LAT | 0.0077 | 127.951 | 9.969 |
| CUHJA21CD | A | C2 | 1 | 2 | 127.573 | 10.087 | 0.048 | 0.115 | 15 | LAB | 0.0077 | 126.928 | 10.036 |
| CUHJA21DD | A | C2 | 1 | 2 | 131.008 | 10.004 | 0.050 | 0.116 | 15 | LGM | 0.0077 | 131.405 | 10.034 |

*Strength not reported due to unacceptable failure mode.
** Poissons Ratio value is not available because a uniaxial extensometer was used.

| | Strength [ksi] | Modulus [Msi] | Poisson's Ratio | | $Strength_{norm}$ [ksi] | $Modulus_{norm}$ [Msi] |
|---|---|---|---|---|---|---|
| **Average** | **128.550** | **10.051** | **0.047** | **Average** | **128.089** | **9.995** |
| **Standard Dev.** | **3.866** | **0.048** | **0.004** | **Standard Dev.** | **3.613** | **0.073** |
| **Coeff. of Var. [%]** | **3.007** | **0.474** | **9.265** | **Coeff. of Var. [%]** | **2.821** | **0.731** |
| **Min.** | **121.907** | **10.001** | **0.041** | **Min.** | **122.294** | **9.864** |
| **Max.** | **133.557** | **10.117** | **0.054** | **Max.** | **132.671** | **10.095** |
| **Number of Spec.** | **7** | **9** | **7** | **Number of Spec.** | **9** | **7** | **9** |




Warp Tension Properties (WT)--(ETW1)
Normalized Modulus
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
2.0
4.0
6.0
8.0
10.0
12.0
Warp Tension Modulus (WT) [Msi]

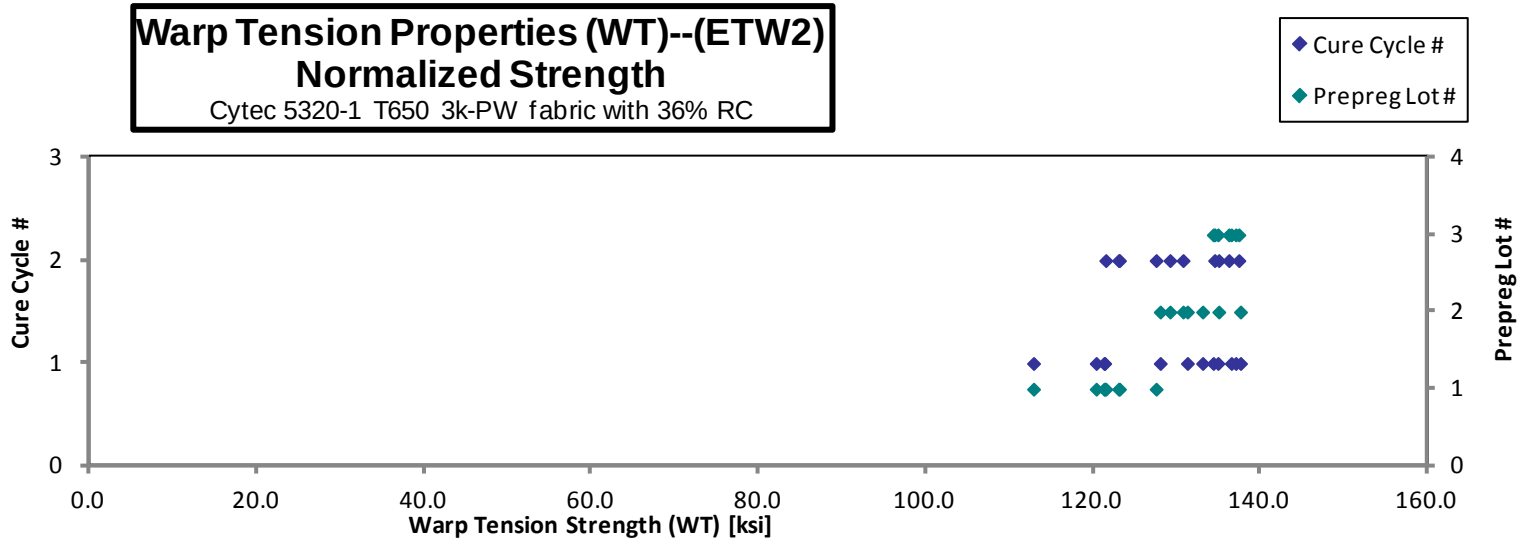
## Warp Tension Properties (WT)--ETW2
## Strength & Modulus
Cytec 5320-1 T650 3k-PW fabric with 36% RC

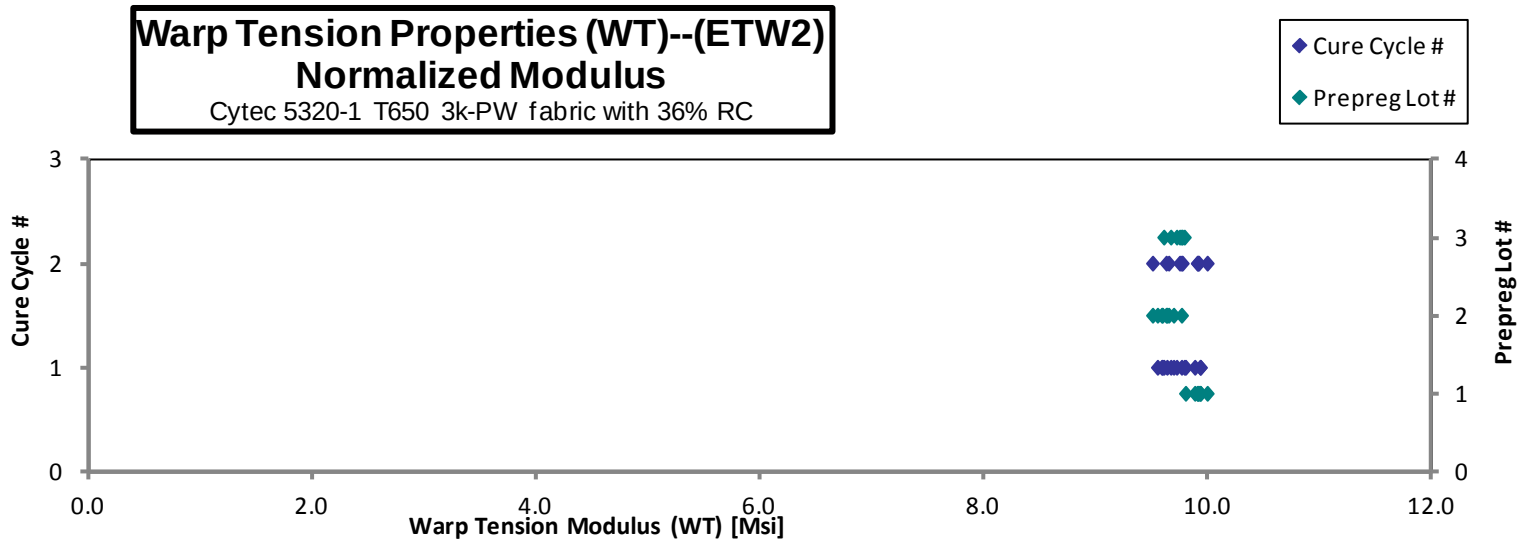
normalizing $t_{ply}$ [in]: 0.0077

| Specimen Number | Cytec Batch # | Cytec 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] | $Strength_{norm}$ [ksi] | $Modulus_{norm}$ [Msi] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CUHJA11EF | A | C1 | 1 | 1 | 120.757 | 9.830 | ** | 0.115 | 15 | LGM | 0.0077 | 120.304 | 9.793 |
| CUHJA11FF | A | C1 | 1 | 1 | 122.860 | 10.052 | 0.037 | 0.114 | 15 | LGM | 0.0076 | 121.317 | 9.926 |
| CUHJA11GF | A | C1 | 1 | 1 | 114.768 | 10.096 | 0.037 | 0.114 | 15 | LAT | 0.0076 | 112.814 | 9.924 |
| CUHJA11HF | A | C1 | 1 | 1 | 123.255 | 10.039 | *** | 0.114 | 15 | LGM | 0.0076 | 121.245 | 9.876 |
| CUHJA21EF | A | C2 | 1 | 2 | 121.837 | 9.930 | 0.040 | 0.115 | 15 | LGM | 0.0077 | 121.450 | 9.898 |
| CUHJA21FF | A | C2 | 1 | 2 | 122.439 | 9.866 | 0.040 | 0.116 | 15 | LGM | 0.0077 | 122.987 | 9.910 |
| CUHJA21GF | A | C2 | 1 | 2 | 122.608 | 9.948 | 0.042 | 0.116 | 15 | LAT | 0.0077 | 123.086 | 9.987 |
| CUHJA21HF | A | C2 | 1 | 2 | 126.737 | 9.846 | 0.043 | 0.116 | 15 | LWB | 0.0077 | 127.469 | 9.903 |
| CUHJB11DF | B | C1 | 2 | 1 | * | 9.964 | 0.052 | 0.112 | 15 | LWT / LIB | 0.0075 | | 9.687 |
| CUHJB11EF | B | C1 | 2 | 1 | 141.350 | 9.893 | 0.054 | 0.112 | 15 | LAT | 0.0075 | 137.556 | 9.627 |
| CUHJB11FF | B | C1 | 2 | 1 | * | 10.048 | 0.055 | 0.112 | 15 | LWT / LIB | 0.0075 | | 9.758 |
| CUHJB11GF | B | C1 | 2 | 1 | 137.328 | 9.851 | 0.058 | 0.112 | 15 | LAT | 0.0075 | 133.027 | 9.542 |
| CUHJB11HF | B | C1 | 2 | 1 | 133.151 | 9.968 | 0.054 | 0.111 | 15 | LWB | 0.0074 | 127.963 | 9.580 |
| CUHJB11lF | B | C1 | 2 | 1 | 137.000 | 10.010 | 0.045 | 0.111 | 15 | LWB / LAT | 0.0074 | 131.208 | 9.587 |
| CUHJB21DF | B | C2 | 2 | 2 | 135.704 | 10.111 | 0.039 | 0.110 | 15 | LAB | 0.0073 | 129.125 | 9.620 |
| CUHJB21EF | B | C2 | 2 | 2 | 134.194 | 9.753 | 0.062 | 0.112 | 15 | LGM | 0.0075 | 130.689 | 9.499 |
| CUHJB21FF | B | C2 | 2 | 2 | 140.219 | 10.018 | 0.055 | 0.111 | 15 | LGM | 0.0074 | 134.958 | 9.643 |
| CUHJC11DF | C | C1 | 3 | 1 | 141.756 | 10.162 | 0.053 | 0.111 | 15 | LAB | 0.0074 | 136.458 | 9.783 |
| CUHJC11EF | C | C1 | 3 | 1 | 141.457 | 10.031 | 0.052 | 0.112 | 15 | LGM/LAT | 0.0075 | 136.987 | 9.714 |
| CUHJC11FF | C | C1 | 3 | 1 | 138.313 | 9.908 | 0.053 | 0.113 | 15 | LGM | 0.0075 | 134.861 | 9.661 |
| CUHJC11GF | C | C1 | 3 | 1 | 137.801 | 9.849 | 0.049 | 0.113 | 15 | LGM | 0.0075 | 134.301 | 9.599 |
| CUHJC21DF | C | C2 | 3 | 2 | 139.308 | 9.903 | 0.048 | 0.114 | 15 | LWB | 0.0076 | 137.358 | 9.764 |
| CUHJC21EF | C | C2 | 3 | 2 | 137.011 | 9.941 | 0.051 | 0.113 | 15 | LWB/LAT | 0.0076 | 134.461 | 9.756 |
| CUHJC21FF | C | C2 | 3 | 2 | 138.563 | 9.912 | 0.050 | 0.114 | 15 | LGM | 0.0076 | 136.163 | 9.741 |

*Strength not reported due to unacceptable failure mode.
** Poissons Ratio value is not available because a uniaxial extensometer was used.
*** Poissons Ratio not reported due to non linear data.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Average** | **132.201** | **9.955** | **0.049** | **$Average_{norm}$** | **0.0075** | **129.354** | **9.741** |
| **Standard Dev.** | **8.454** | **0.101** | **0.007** | **$Standard\ Dev._{norm}$** | | **7.075** | **0.139** |
| **Coeff. of Var. [%]** | **6.395** | **1.015** | **14.510** | **Coeff. of Var. $[\%]_{norm}$** | | **5.469** | **1.432** |
| **Min.** | **114.768** | **9.753** | **0.037** | **Min.** | **0.0073** | **112.814** | **9.499** |
| **Max.** | **141.756** | **10.162** | **0.062** | **Max.** | **0.0077** | **137.556** | **9.987** |
| **Number of Spec.** | **22** | **24** | **22** | **Number of Spec.** | **24** | **22** | **24** |


Warp Tension Properties (WT)--(ETW2)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
20.0
40.0
60.0
80.0
100.0
120.0
140.0
160.0
Warp Tension Strength (WT) [ksi]


Warp Tension Properties (WT)--(ETW2)
Normalized Modulus
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
2.0
4.0
6.0
8.0
10.0
12.0
Warp Tension Modulus (WT) [Msi]

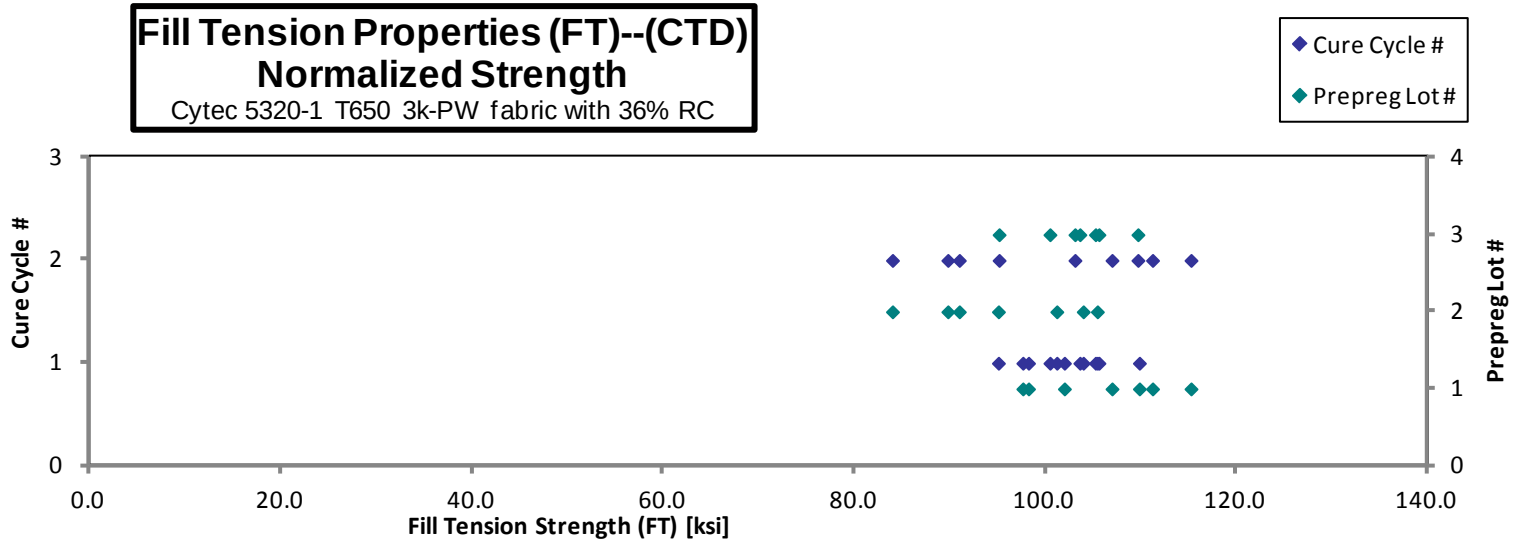
## 4.2 Fill Tension Properties (FT)

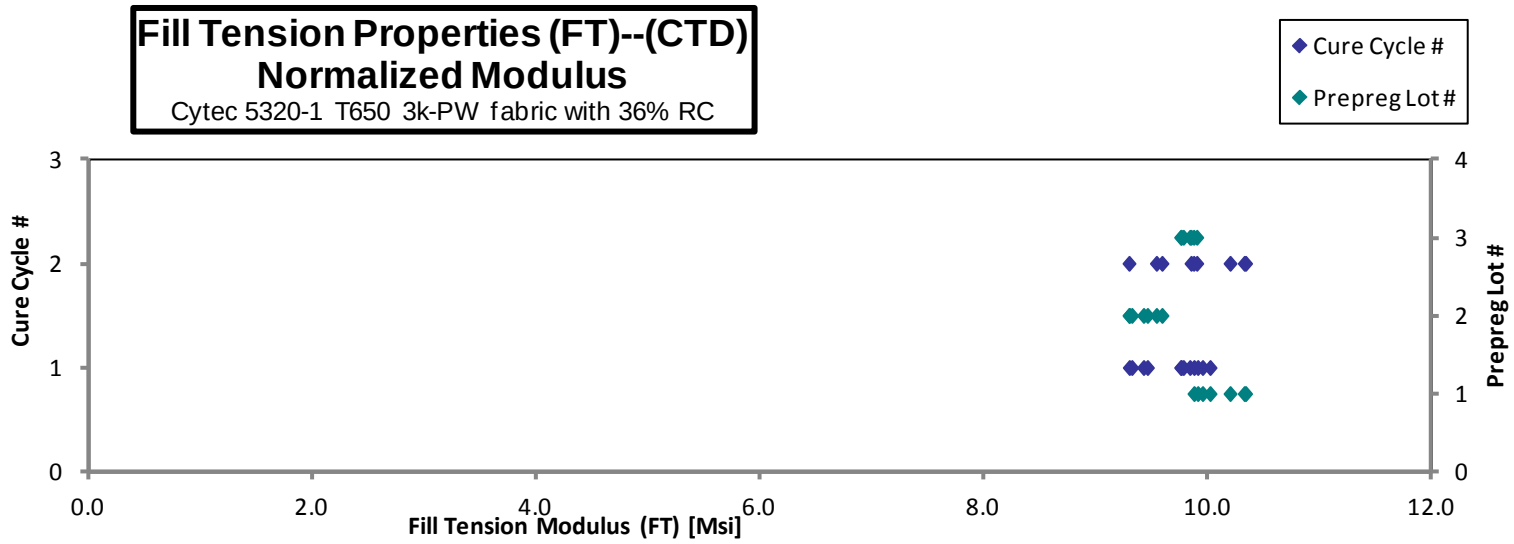
**Fill Tension Properties (FT)--CTD**
**Strength & Modulus**
Cytec 5320-1 T650 3k-PW fabric with 36% RC

normalizing $t_{ply}$ [in]: 0.0077

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] | $Modulus_{norm}$ [Msi] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CUHUA116B | A | C1 | 1 | 1 | 102.355 | 10.053 | 0.115 | 15 | LGM | 0.0077 | 101.941 | 10.013 |
| CUHUA117B | A | C1 | 1 | 1 | 97.257 | 9.911 | 0.116 | 15 | LGM | 0.0077 | 97.594 | 9.945 |
| CUHUA118B | A | C1 | 1 | 1 | 98.943 | 9.979 | 0.115 | 15 | LAT | 0.0076 | 98.186 | 9.903 |
| CUHUA119B | A | C1 | 1 | 1 | 110.391 | 9.924 | 0.115 | 15 | LGM | 0.0077 | 109.786 | 9.869 |
| CUHUA215B | A | C2 | 1 | 2 | 108.614 | 10.494 | 0.114 | 15 | LWT | 0.0076 | 106.921 | 10.330 |
| CUHUA216B | A | C2 | 1 | 2 | 116.751 | 10.459 | 0.114 | 15 | LGM | 0.0076 | 115.184 | 10.319 |
| CUHUA217B | A | C2 | 1 | 2 | 113.118 | 10.371 | 0.114 | 15 | LWT | 0.0076 | 111.160 | 10.192 |
| CUHUB117B | B | C1 | 2 | 1 | 98.082 | 9.755 | 0.112 | 15 | LGM | 0.0075 | 95.039 | 9.453 |
| CUHUB118B | B | C1 | 2 | 1 | 109.694 | 9.803 | 0.111 | 15 | LGM | 0.0074 | 105.388 | 9.418 |
| CUHUB119B | B | C1 | 2 | 1 | 107.016 | 9.592 | 0.112 | 15 | LGM | 0.0075 | 103.912 | 9.313 |
| CUHUB11AB | B | C1 | 2 | 1 | 105.057 | 9.650 | 0.111 | 15 | LGM | 0.0074 | 101.146 | 9.291 |
| CUHUB217B | B | C2 | 2 | 2 | 92.308 | 9.553 | 0.112 | 15 | LGM | 0.0075 | 89.750 | 9.288 |
| CUHUB218B | B | C2 | 2 | 2 | 85.991 | 9.815 | 0.113 | 15 | LWT | 0.0075 | 83.956 | 9.583 |
| CUHUB219B | B | C2 | 2 | 2 | 92.469 | 9.693 | 0.114 | 15 | LAT | 0.0076 | 90.948 | 9.533 |
| CUHUC117B | C | C1 | 3 | 1 | 105.798 | 9.855 | 0.115 | 15 | LGM | 0.0077 | 105.553 | 9.832 |
| CUHUC118B | C | C1 | 3 | 1 | 104.084 | 9.823 | 0.115 | 15 | LGM | 0.0077 | 103.558 | 9.774 |
| CUHUC119B | C | C1 | 3 | 1 | 105.554 | 9.789 | 0.115 | 15 | LGM | 0.0077 | 105.189 | 9.755 |
| CUHUC11AB | C | C1 | 3 | 1 | 101.720 | 9.876 | 0.114 | 15 | LAT | 0.0076 | 100.428 | 9.750 |
| CUHUC217B | C | C2 | 3 | 2 | 103.627 | 9.898 | 0.115 | 15 | LWB | 0.0077 | 103.044 | 9.843 |
| CUHUC218B | C | C2 | 3 | 2 | 96.404 | 10.000 | 0.114 | 15 | LAT | 0.0076 | 95.111 | 9.866 |
| CUHUC219B | C | C2 | 3 | 2 | 110.928 | 10.011 | 0.114 | 15 | LAB | 0.0076 | 109.632 | 9.894 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Average** | **103.151** | **9.919** | **$Average_{norm}$** | **0.0076** | **101.592** | **9.770** |
| **Standard Dev.** | **7.599** | **0.256** | **$Standard\ Dev._{norm}$** | | **7.647** | **0.311** |
| **Coeff. of Var. [%]** | **7.367** | **2.582** | **$Coeff.\ of\ Var.\ [\%]_{norm}$** | | **7.527** | **3.180** |
| **Min.** | **85.991** | **9.553** | **Min.** | **0.0074** | **83.956** | **9.288** |
| **Max.** | **116.751** | **10.494** | **Max.** | **0.0077** | **115.184** | **10.330** |
| **Number of Spec.** | **21** | **21** | **Number of Spec.** | **21** | **21** | **21** |


Fill Tension Properties (FT)--(CTD)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Fill Tension Strength (FT) [ksi]
0.0
20.0
40.0
60.0
80.0
100.0
120.0
140.0


Fill Tension Properties (FT)--(CTD)
Normalized Modulus
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Fill Tension Modulus (FT) [Msi]
0.0
2.0
4.0
6.0
8.0
10.0
12.0

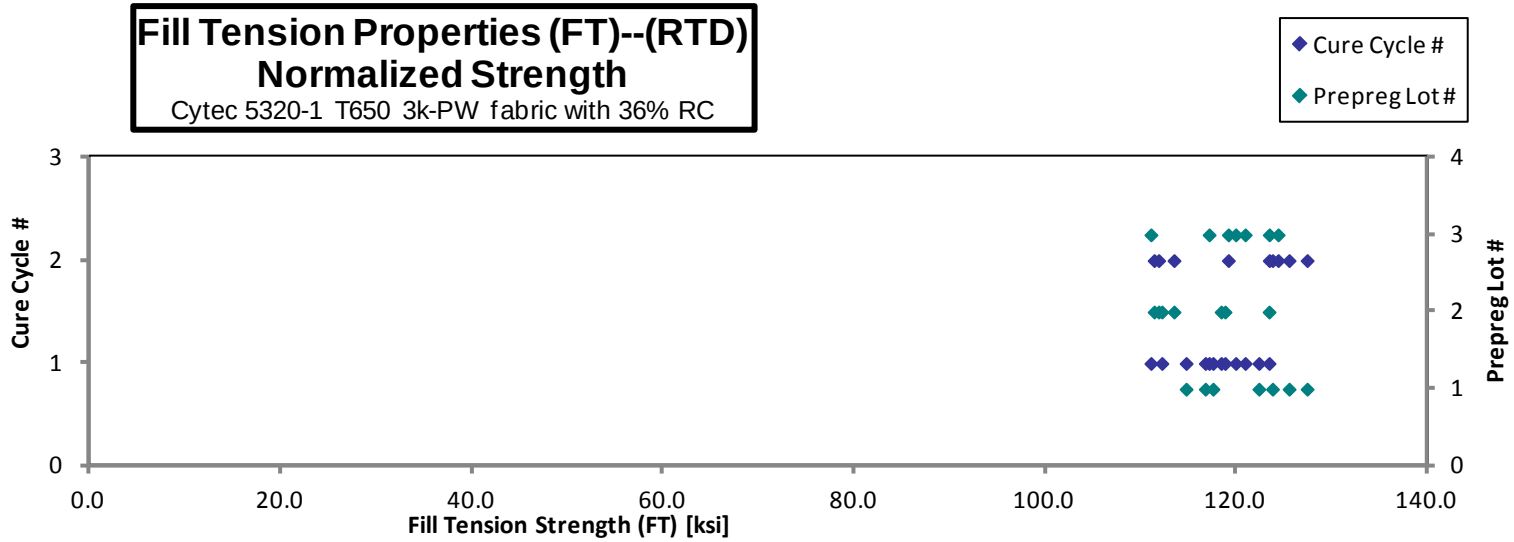
## Fill Tension Properties (FT)--RTD
## Strength & Modulus
Cytec 5320-1 T650 3k-PW fabric with 36% RC

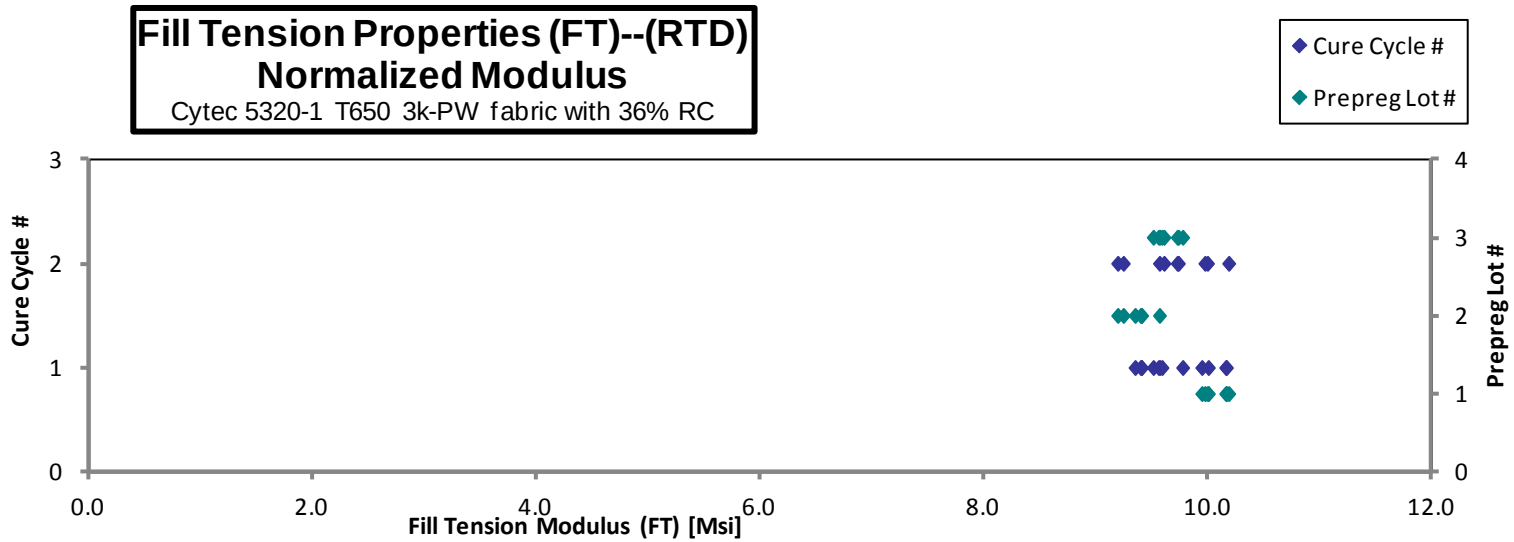
normalizing $t_{ply}$ [in]: 0.0077

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] | $Modulus_{norm}$ [Msi] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CUHUA111A* | A | C1 | 1 | 1 | 116.539 | 10.101 | 0.114 | 15 | LGM | 0.0076 | 114.672 | 9.939 |
| CUHUA112A* | A | C1 | 1 | 1 | 118.353 | 10.072 | 0.115 | 15 | LGM | 0.0076 | 117.482 | 9.998 |
| CUHUA113A | A | C1 | 1 | 1 | 117.323 | 10.215 | 0.115 | 15 | LGM | 0.0077 | 116.679 | 10.159 |
| CUHUA114A | A | C1 | 1 | 1 | 123.032 | 10.215 | 0.115 | 15 | LWB | 0.0077 | 122.286 | 10.153 |
| CUHUA211A | A | C2 | 1 | 2 | 130.979 | 10.252 | 0.112 | 15 | LAB | 0.0075 | 127.331 | 9.967 |
| CUHUA212A | A | C2 | 1 | 2 | 127.081 | 10.457 | 0.112 | 15 | LWB | 0.0075 | 123.707 | 10.180 |
| CUHUA213A | A | C2 | 1 | 2 | 128.409 | 10.226 | 0.113 | 15 | LAT | 0.0075 | 125.444 | 9.990 |
| CUHUB111A | B | C1 | 2 | 1 | 124.663 | 9.867 | 0.110 | 15 | LGM | 0.0073 | 118.744 | 9.399 |
| CUHUB112A | B | C1 | 2 | 1 | 118.336 | 9.859 | 0.109 | 15 | LGM | 0.0073 | 112.138 | 9.342 |
| CUHUB113A | B | C1 | 2 | 1 | 123.820 | 9.827 | 0.110 | 15 | LWB | 0.0074 | 118.335 | 9.392 |
| CUHUB114A | B | C1 | 2 | 1 | 128.487 | 9.791 | 0.111 | 15 | LGM | 0.0074 | 123.352 | 9.400 |
| CUHUB211A | B | C2 | 2 | 2 | 114.893 | 9.481 | 0.112 | 15 | LGM / LAT | 0.0075 | 111.328 | 9.187 |
| CUHUB212A | B | C2 | 2 | 2 | 116.172 | 9.463 | 0.113 | 15 | LGM | 0.0075 | 113.406 | 9.237 |
| CUHUB213A | B | C2 | 2 | 2 | 114.441 | 9.786 | 0.113 | 15 | LAT / LWB | 0.0075 | 111.799 | 9.561 |
| CUHUC111A | C | C1 | 3 | 1 | 123.910 | 9.806 | 0.113 | 15 | LGM | 0.0075 | 120.852 | 9.564 |
| CUHUC112A | C | C1 | 3 | 1 | 123.640 | 10.076 | 0.112 | 15 | LGM | 0.0075 | 119.858 | 9.768 |
| CUHUC113A | C | C1 | 3 | 1 | 114.647 | 9.899 | 0.112 | 15 | LGM | 0.0075 | 110.990 | 9.583 |
| CUHUC114A | C | C1 | 3 | 1 | ** | 9.731 | 0.113 | 15 | LIB | 0.0075 | | 9.505 |
| CUHUC115A | C | C1 | 3 | 1 | 118.603 | 9.677 | 0.114 | 15 | LGM | 0.0076 | 117.080 | 9.552 |
| CUHUC211A | C | C2 | 3 | 2 | 127.282 | 10.028 | 0.112 | 15 | LGM | 0.0075 | 123.370 | 9.720 |
| CUHUC212A | C | C2 | 3 | 2 | 121.724 | 9.945 | 0.113 | 15 | LAB | 0.0075 | 119.089 | 9.730 |
| CUHUC213A | C | C2 | 3 | 2 | 125.675 | 9.707 | 0.114 | 15 | LGM | 0.0076 | 124.297 | 9.601 |

*Strain measurement was measured with SG. Extensometer used on other coupons.
**Tensile strength was not reported due to unacceptable failure mode.

| | | | | | | |
|---|---|---|---|---|---|---|
| **Average** | **121.810** | **9.931** | **$Average_{norm}$** | **0.0075** | **118.678** | **9.678** |
| **Standard Dev.** | **5.166** | **0.255** | **$Standard\ Dev._{norm}$** | | **4.979** | **0.304** |
| **Coeff. of Var. [%]** | **4.241** | **2.563** | **$Coeff.\ of\ Var.\ [\%]_{norm}$** | | **4.196** | **3.144** |
| **Min.** | **114.441** | **9.463** | **Min.** | **0.0073** | **110.990** | **9.187** |
| **Max.** | **130.979** | **10.457** | **Max.** | **0.0077** | **127.331** | **10.180** |
| **Number of Spec.** | **21** | **22** | **Number of Spec.** | **22** | **21** | **22** |


Fill Tension Properties (FT)--(RTD)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
20.0
40.0
60.0
80.0
100.0
120.0
140.0
Fill Tension Strength (FT) [ksi]


Fill Tension Properties (FT)--(RTD)
Normalized Modulus
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
2.0
4.0
6.0
8.0
10.0
12.0
Fill Tension Modulus (FT) [Msi]

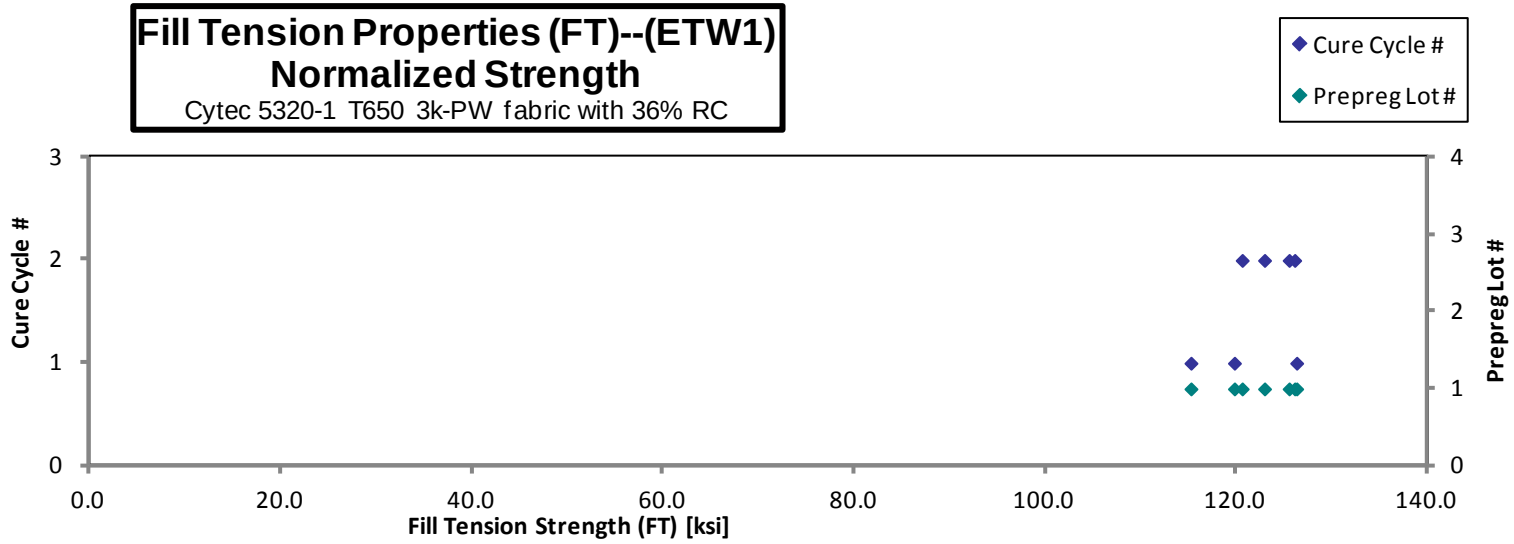
## Fill Tension Properties (FT)--ETW1
## Strength & Modulus

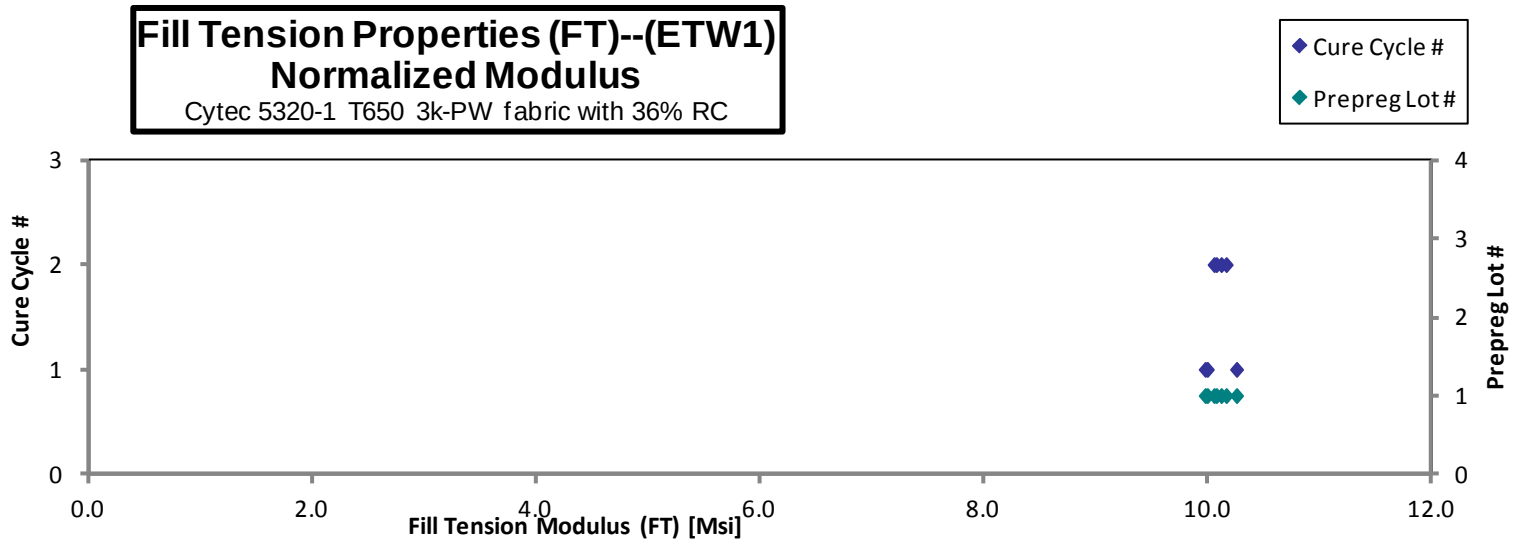
Cytec 5320-1 T650 3k-PW fabric with 36% RC

| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] | $Modulus_{norm}$ [Msi] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CUHUA11BD | A | C1 | 1 | 1 | 115.798 | 10.305 | 0.115 | 15 | LWT | 0.0077 | 115.180 | 10.250 |
| CUHUA11CD | A | C1 | 1 | 1 | 120.458 | 10.049 | 0.115 | 15 | LGM | 0.0077 | 119.728 | 9.989 |
| CUHUA11DD | A | C1 | 1 | 1 | 126.640 | 10.001 | 0.115 | 15 | LWT | 0.0077 | 126.238 | 9.969 |
| CUHUA219D | A | C2 | 1 | 2 | 125.558 | 10.379 | 0.113 | 15 | LGM | 0.0075 | 122.877 | 10.157 |
| CUHUA21AD | A | C2 | 1 | 2 | 127.360 | 10.223 | 0.114 | 15 | LWT/LWB | 0.0076 | 125.449 | 10.069 |
| CUHUA21BD | A | C2 | 1 | 2 | 122.340 | 10.264 | 0.114 | 15 | LWT | 0.0076 | 120.539 | 10.112 |
| CUHUA21CD | A | C2 | 1 | 2 | 128.762 | 10.267 | 0.113 | 15 | LGM | 0.0075 | 126.031 | 10.049 |

| | | | | | |
|---|---|---|---|---|---|
| **Average** | **123.845** | **10.212** | **$Average_{norm}$** | **0.0076** | **122.292** | **10.085** |
| **Standard Dev.** | **4.578** | **0.137** | **$Standard\ Dev._{norm}$** | | **4.084** | **0.098** |
| **Coeff. of Var. [%]** | **3.697** | **1.344** | **Coeff. of Var. $[\%]_{norm}$** | | **3.340** | **0.969** |
| **Min.** | **115.798** | **10.001** | **Min.** | **0.0075** | **115.180** | **9.969** |
| **Max.** | **128.762** | **10.379** | **Max.** | **0.0077** | **126.238** | **10.250** |
| **Number of Spec.** | **7** | **7** | **Number of Spec.** | **7** | **7** | **7** |


Fill Tension Properties (FT)--(ETW1)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
20.0
40.0
60.0
80.0
100.0
120.0
140.0
Fill Tension Strength (FT) [ksi]

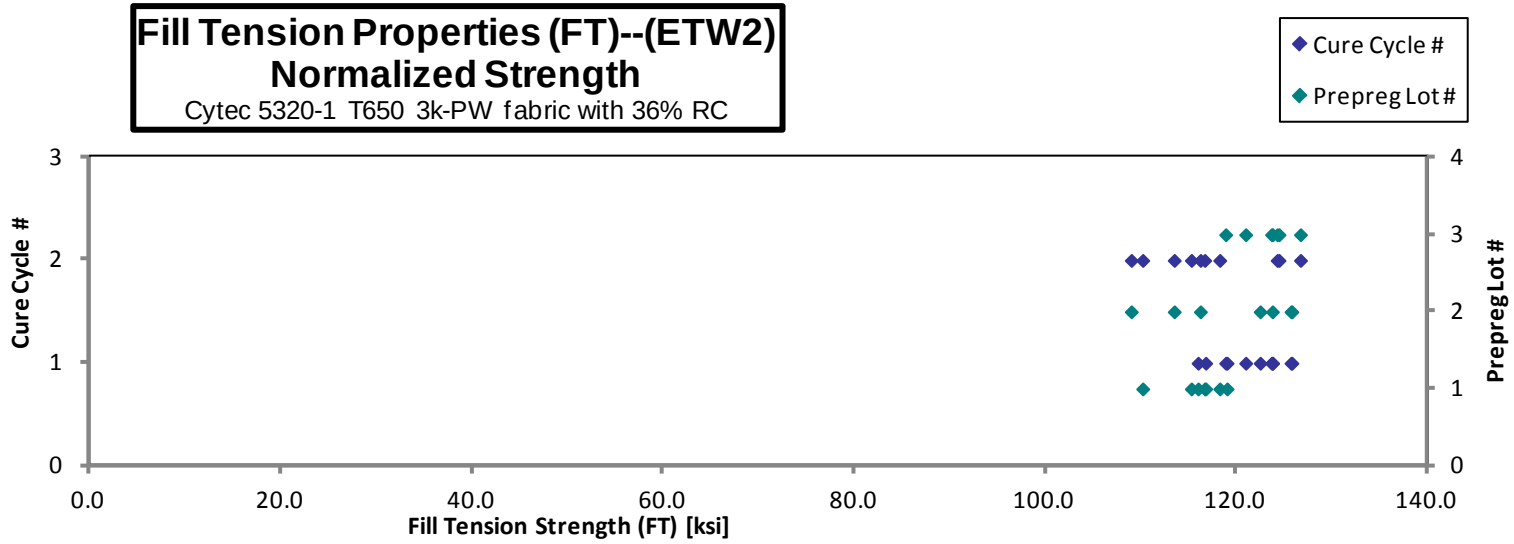

Fill Tension Properties (FT)--(ETW1)
Normalized Modulus
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
2.0
4.0
6.0
8.0
10.0
12.0
Fill Tension Modulus (FT) [Msi]

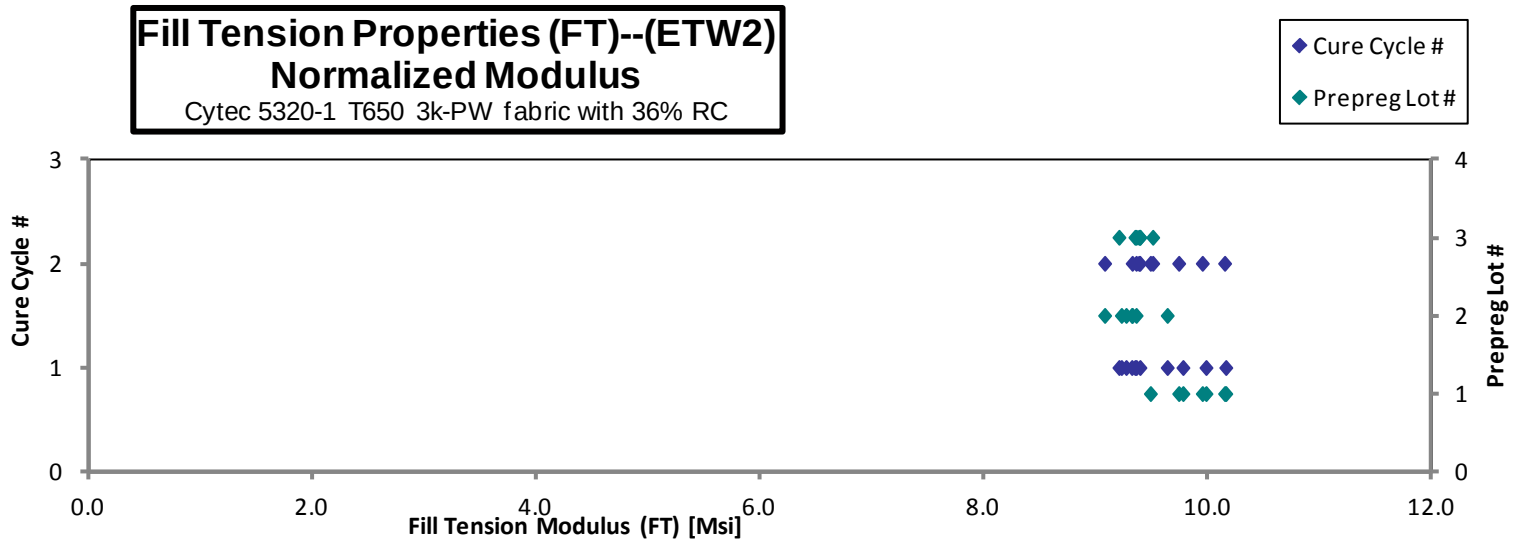
## Fill Tension Properties (FT)--ETW2
## Strength & Modulus
Cytec 5320-1 T650 3k-PW fabric with 36% RC

normalizing $t_{ply}$ [in]: 0.0077

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] | $Modulus_{norm}$ [Msi] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CUHUA11FF | A | C1 | 1 | 1 | 119.734 | 10.220 | 0.115 | 15 | LGM/LAB | 0.0077 | 118.957 | 10.153 |
| CUHUA11GF | A | C1 | 1 | 1 | 116.513 | 9.820 | 0.115 | 15 | LGM | 0.0077 | 115.925 | 9.770 |
| CUHUA11HF | A | C1 | 1 | 1 | 118.324 | 10.114 | 0.114 | 15 | LGM | 0.0076 | 116.719 | 9.976 |
| CUHUA21EF | A | C2 | 1 | 2 | 117.804 | 10.045 | 0.114 | 15 | LWB | 0.0076 | 116.614 | 9.943 |
| CUHUA21FF | A | C2 | 1 | 2 | 117.179 | 9.898 | 0.114 | 15 | LGM | 0.0076 | 115.218 | 9.733 |
| CUHUA21GF | A | C2 | 1 | 2 | 120.609 | 10.350 | 0.113 | 15 | LGM | 0.0075 | 118.189 | 10.143 |
| CUHUA21HF | A | C2 | 1 | 2 | 113.020 | 9.728 | 0.113 | 15 | LGM | 0.0075 | 110.133 | 9.479 |
| CUHUB11DF | B | C1 | 2 | 1 | 129.798 | 9.941 | 0.112 | 15 | LGM | 0.0075 | 125.733 | 9.630 |
| CUHUB11EF | B | C1 | 2 | 1 | 125.442 | 9.490 | 0.113 | 15 | LGM | 0.0075 | 122.419 | 9.262 |
| CUHUB11FF | B | C1 | 2 | 1 | 128.138 | 9.551 | 0.112 | 15 | LGM | 0.0074 | 123.701 | 9.220 |
| CUHUB11GF | B | C1 | 2 | 1 | 130.017 | 9.637 | 0.112 | 15 | LGM/LWB | 0.0074 | 125.646 | 9.313 |
| CUHUB21DF | B | C2 | 2 | 2 | 119.565 | 9.625 | 0.112 | 15 | LGM/LWT | 0.0075 | 116.166 | 9.352 |
| CUHUB21EF | B | C2 | 2 | 2 | 112.915 | 9.657 | 0.111 | 15 | LWT | 0.0074 | 108.939 | 9.317 |
| CUHUB21FF | B | C2 | 2 | 2 | 116.525 | 9.318 | 0.112 | 15 | LWT/LWB | 0.0075 | 113.431 | 9.070 |
| CUHUC11DF | C | C1 | 3 | 1 | 126.694 | 9.566 | 0.113 | 15 | LGM | 0.0075 | 123.714 | 9.341 |
| CUHUC11EF | C | C1 | 3 | 1 | 121.208 | 9.541 | 0.113 | 15 | LGM/LAB | 0.0075 | 118.812 | 9.353 |
| CUHUC11FF | C | C1 | 3 | 1 | 125.767 | 9.550 | 0.114 | 15 | LAB | 0.0076 | 123.607 | 9.386 |
| CUHUC11GF | C | C1 | 3 | 1 | 123.688 | 9.410 | 0.113 | 15 | LGM | 0.0075 | 120.904 | 9.198 |
| CUHUC21DF | C | C2 | 3 | 2 | 127.020 | 9.716 | 0.113 | 15 | LGM | 0.0075 | 124.197 | 9.500 |
| CUHUC21EF | C | C2 | 3 | 2 | 128.471 | 9.512 | 0.114 | 15 | LAT/LWB | 0.0076 | 126.636 | 9.376 |
| CUHUC21FF | C | C2 | 3 | 2 | 124.840 | 9.418 | 0.115 | 15 | LGM | 0.0077 | 124.390 | 9.384 |

| | | | | | |
|---|---|---|---|---|---|
| **Average** | **122.061** | **9.719** | **$Average_{norm}$** | **0.0075** | **119.526** | **9.519** |
| **Standard Dev.** | **5.385** | **0.281** | **$Standard\ Dev._{norm}$** | | **5.163** | **0.315** |
| **Coeff. of Var. [%]** | **4.412** | **2.888** | **$Coeff.\ of\ Var.\ [\%]_{norm}$** | | **4.320** | **3.314** |
| **Min.** | **112.915** | **9.318** | **Min.** | **0.0074** | **108.939** | **9.070** |
| **Max.** | **130.017** | **10.350** | **Max.** | **0.0077** | **126.636** | **10.153** |
| **Number of Spec.** | **21** | **21** | **Number of Spec.** | **21** | **21** | **21** |


Fill Tension Properties (FT)--(ETW2)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Fill Tension Strength (FT) [ksi]
0.0
20.0
40.0
60.0
80.0
100.0
120.0
140.0


Fill Tension Properties (FT)--(ETW2)
Normalized Modulus
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Fill Tension Modulus (FT) [Msi]
0.0
2.0
4.0
6.0
8.0
10.0
12.0

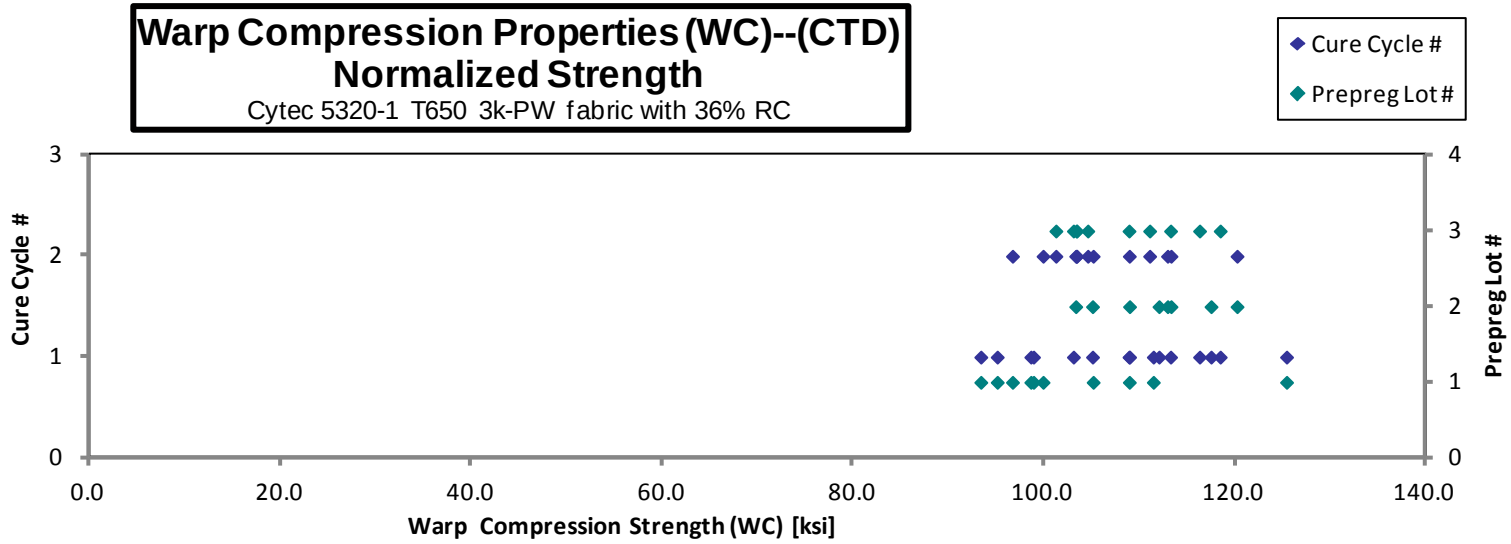
# 4.3 Warp Compression Properties (WC)

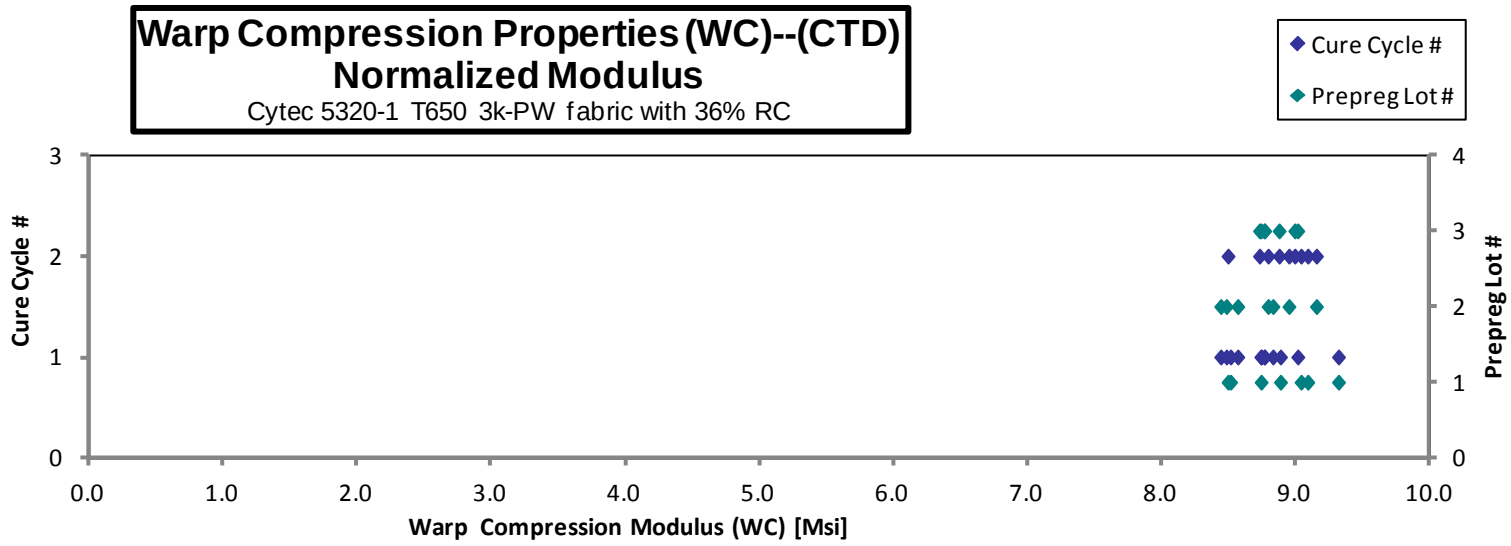
**Warp Compression Properties (WC)--CTD**
**Strength & Modulus**
Cytec 5320-1 T650 3k-PW fabric with 36% RC

normalizing $t_{ply}$ [in]: 0.0077

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] | $Modulus_{norm}$ [Msi] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CUHLA117B | A | C1 | 1 | 1 | 114.743 | 8.999 | 0.112 | 15 | HIT[1]/ BGM[2] | 0.0075 | 111.414 | 8.738 |
| CUHLA118B | A | C1 | 1 | 1 | 129.824 | 9.646 | 0.112 | 15 | BGM | 0.0074 | 125.370 | 9.315 |
| CUHLA119B | A | C1 | 1 | 1 | 95.439 | 8.701 | 0.113 | 15 | BGM | 0.0075 | 93.342 | 8.510 |
| CUHLA11AB | A | C1 | 1 | 1 | 100.964 | 9.097 | 0.113 | 15 | HAT[1]/ BGM[2] | 0.0075 | 98.582 | 8.882 |
| CUHLA11BB | A | C1 | 1 | 1 | 100.648 | | 0.113 | 15 | BGM | 0.0076 | 98.861 | |
| CUHLA11CB | A | C1 | 1 | 1 | 96.909 | | 0.113 | 15 | BAT | 0.0076 | 95.063 | |
| CUHLA216B | A | C2 | 1 | 2 | 96.640 | 9.084 | 0.116 | 15 | BGM[1] / HIT[2] | 0.0077 | 96.661 | 9.086 |
| CUHLA217B | A | C2 | 1 | 2 | 104.659 | 8.454 | 0.116 | 15 | BGM[1] / HIT[2] | 0.0077 | 105.112 | 8.491 |
| CUHLA218B | A | C2 | 1 | 2 | 109.256 | 9.065 | 0.115 | 15 | BGM[1] / HIT[2] | 0.0077 | 108.901 | 9.036 |
| CUHLA21AB | A | C2 | 1 | 2 | 100.026 | | 0.115 | 15 | BGM[1] / HIT[2] | 0.0077 | 99.863 | |
| CUHLB116B | B | C1 | 2 | 1 | 113.595 | 8.799 | 0.111 | 15 | BAT | 0.0074 | 108.923 | 8.437 |
| CUHLB117B | B | C1 | 2 | 1 | 116.416 | 8.901 | 0.111 | 15 | BGM | 0.0074 | 112.007 | 8.564 |
| CUHLB118B | B | C1 | 2 | 1 | 121.104 | 8.742 | 0.112 | 15 | BGM[1] / HIT[2] | 0.0075 | 117.460 | 8.479 |
| CUHLB119B | B | C1 | 2 | 1 | 108.242 | 9.094 | 0.112 | 15 | BGM | 0.0075 | 105.044 | 8.826 |
| CUHLB216B | B | C2 | 2 | 2 | 115.069 | 8.959 | 0.113 | 15 | HIT[1] / BAB[2] | 0.0076 | 112.902 | 8.790 |
| CUHLB217B | B | C2 | 2 | 2 | 115.122 | 9.300 | 0.114 | 15 | BAT | 0.0076 | 113.265 | 9.150 |
| CUHLB218B | B | C2 | 2 | 2 | 121.393 | 9.035 | 0.114 | 15 | BGM[1] / HIT[2] | 0.0076 | 120.185 | 8.945 |
| CUHLB21AB | B | C2 | 2 | 2 | 104.715 | | 0.114 | 15 | BGM | 0.0076 | 103.287 | |
| CUHLC136B | C | C1 | 3 | 1 | 117.112 | 9.321 | 0.112 | 15 | BGM | 0.0074 | 113.221 | 9.011 |
| CUHLC137B | C | C1 | 3 | 1 | 121.784 | 8.984 | 0.112 | 15 | HIT[1] / BAT[2] | 0.0075 | 118.423 | 8.736 |
| CUHLC138B | C | C1 | 3 | 1 | 112.158 | 9.026 | 0.112 | 15 | BGM | 0.0075 | 108.869 | 8.761 |
| CUHLC139B | C | C1 | 3 | 1 | 105.814 | 9.000 | 0.112 | 15 | BGM | 0.0075 | 103.043 | 8.764 |
| CUHLC13AB | C | C1 | 3 | 1 | 119.095 | | 0.113 | 15 | HIT[1] / BAT[2] | 0.0075 | 116.259 | |
| CUHLC236B | C | C2 | 3 | 2 | 107.472 | 9.347 | 0.111 | 15 | BGM | 0.0074 | 103.354 | 8.989 |
| CUHLC237B | C | C2 | 3 | 2 | 104.440 | 9.005 | 0.112 | 15 | BGM | 0.0075 | 101.208 | 8.726 |
| CUHLC238B | C | C2 | 3 | 2 | 114.244 | 9.129 | 0.112 | 15 | HIT/ BGM | 0.0075 | 111.030 | 8.872 |
| CUHLC239B | C | C2 | 3 | 2 | 105.102 | | 0.114 | 15 | BAT | 0.0076 | 103.385 | |
| CUHLC23AB | C | C2 | 3 | 2 | 107.049 | | 0.113 | 15 | BAT | 0.0075 | 104.547 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Average** | **109.965** | **9.033** | **$Average_{norm}$** | **0.0075** | **107.485** | **8.815** |
| **Standard Dev.** | **8.708** | **0.251** | **$Standard\ Dev._{norm}$** | | **8.031** | **0.237** |
| **Coeff. of Var. [%]** | **7.919** | **2.782** | **$Coeff.\ of\ Var.\ [\%]_{norm}$** | | **7.472** | **2.687** |
| **Min.** | **95.439** | **8.454** | **Min.** | **0.0074** | **93.342** | **8.437** |
| **Max.** | **129.824** | **9.646** | **Max.** | **0.0077** | **125.370** | **9.315** |
| **Number of Spec.** | **28** | **21** | **Number of Spec.** | **28** | **28** | **21** |


Warp Compression Properties (WC)--(CTD)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
20.0
40.0
60.0
80.0
100.0
120.0
140.0
Warp Compression Strength (WC) [ksi]


Warp Compression Properties (WC)--(CTD)
Normalized Modulus
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
Warp Compression Modulus (WC) [Msi]

## Warp Compression Properties (WC)--RTD
## Strength & Modulus

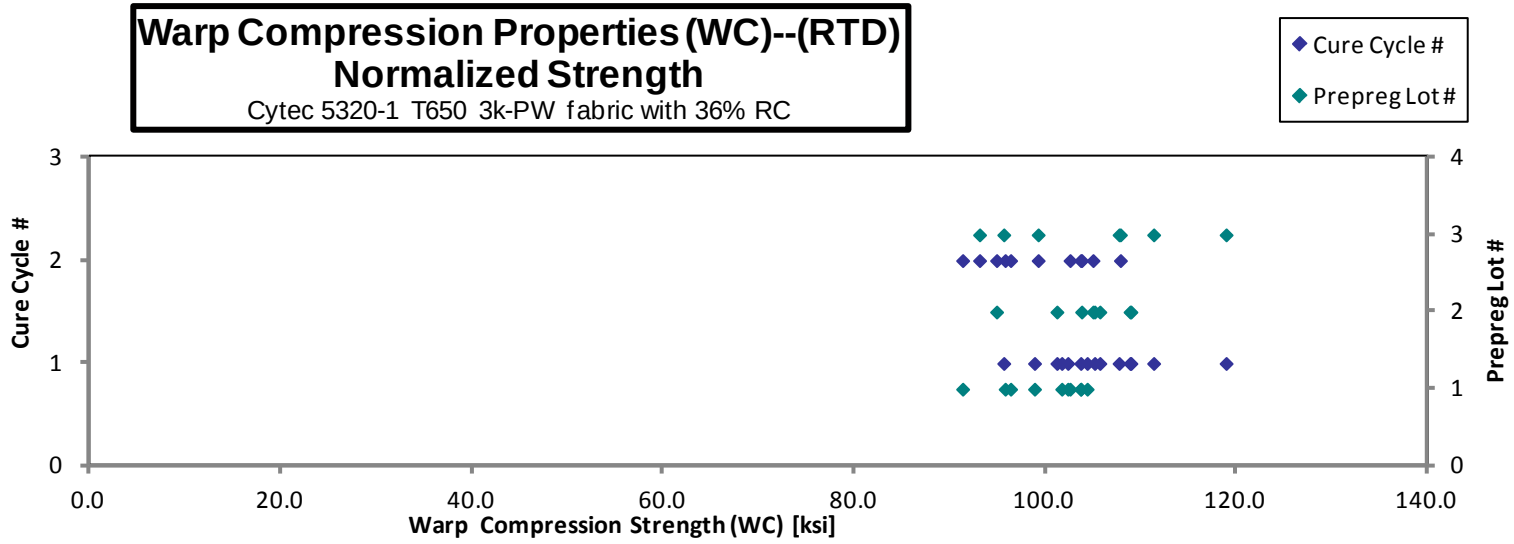
Cytec 5320-1 T650 3k-PW fabric with 36% RC

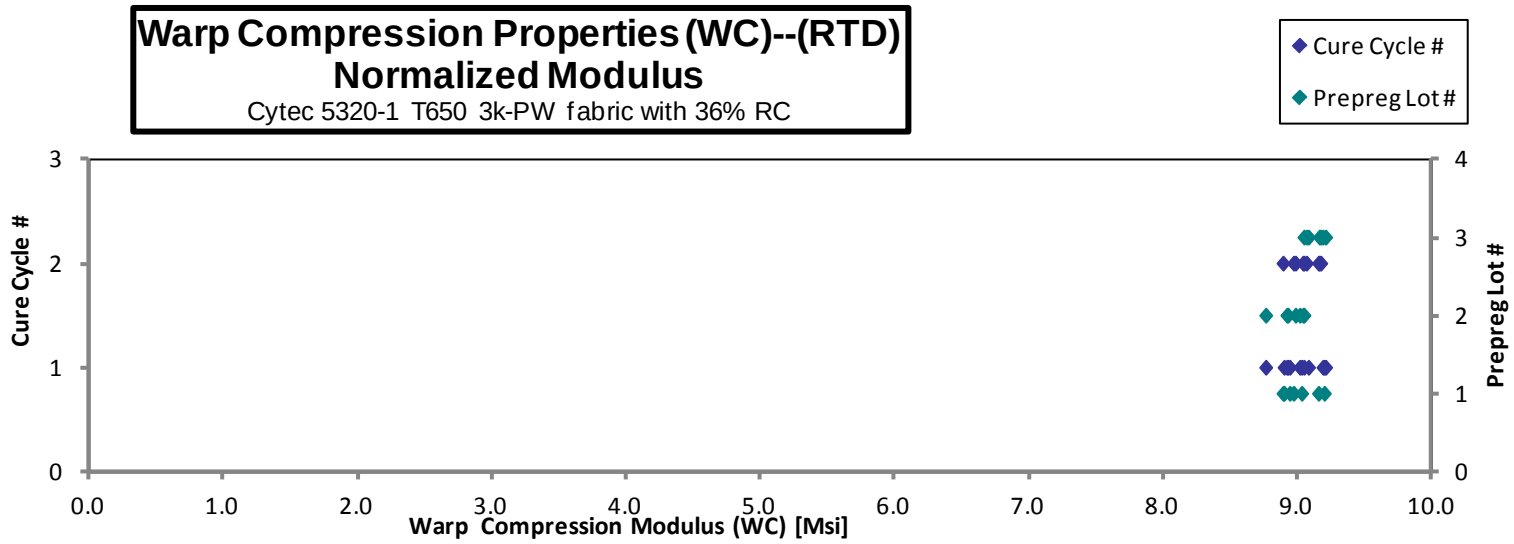
| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] | $Modulus_{norm}$ [Msi] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CUHLA111A | A | C1 | 1 | 1 | * | 9.348 | 0.110 | 15 | HIT | 0.0074 | | 8.938 |
| CUHLA112A | A | C1 | 1 | 1 | 106.744 | 9.296 | 0.112 | 15 | HIB/BGM | 0.0075 | 103.648 | 9.026 |
| CUHLA113A | A | C1 | 1 | 1 | 105.685 | 9.189 | 0.112 | 15 | BAB | 0.0075 | 102.299 | 8.895 |
| CUHLA114A | A | C1 | 1 | 1 | 107.582 | 9.483 | 0.112 | 15 | HIB/BGM | 0.0075 | 104.322 | 9.195 |
| CUHLA115A | A | C1 | 1 | 1 | 100.813 | | 0.113 | 15 | HIB/BAB | 0.0075 | 98.816 | |
| CUHLA116A | A | C1 | 1 | 1 | 104.524 | | 0.112 | 15 | BGM | 0.0075 | 101.662 | |
| CUHLA211A | A | C2 | 1 | 2 | 96.886 | 8.993 | 0.114 | 15 | BAB | 0.0076 | 95.743 | 8.887 |
| CUHLA212A | A | C2 | 1 | 2 | 96.669 | 9.185 | 0.115 | 15 | BGM | 0.0077 | 96.314 | 9.152 |
| CUHLA213A | A | C2 | 1 | 2 | 92.133 | 9.048 | 0.114 | 15 | BAB | 0.0076 | 91.296 | 8.966 |
| CUHLA214A | A | C2 | 1 | 2 | 102.852 | | 0.115 | 15 | BAB | 0.0077 | 102.529 | |
| CUHLA215A | A | C2 | 1 | 2 | 103.699 | | 0.115 | 15 | BAB | 0.0077 | 103.643 | |
| CUHLB111A | B | C1 | 2 | 1 | 107.460 | 9.472 | 0.109 | 15 | BGM | 0.0072 | 101.156 | 8.916 |
| CUHLB112A | B | C1 | 2 | 1 | 111.911 | 9.278 | 0.109 | 15 | BGM | 0.0073 | 105.649 | 8.759 |
| CUHLB113A | B | C1 | 2 | 1 | 111.600 | 9.569 | 0.109 | 15 | BGM | 0.0073 | 105.102 | 9.012 |
| CUHLB114A | B | C1 | 2 | 1 | 114.006 | 9.343 | 0.110 | 15 | BGM/HIT | 0.0074 | 108.897 | 8.924 |
| CUHLB115A | B | C1 | 2 | 1 | 113.461 | | 0.111 | 15 | BGM | 0.0074 | 108.807 | |
| CUHLB211A | B | C2 | 2 | 2 | 97.150 | 9.198 | 0.113 | 15 | BGM | 0.0075 | 94.848 | 8.980 |
| CUHLB212A | B | C2 | 2 | 2 | 107.947 | 9.303 | 0.112 | 15 | BGM | 0.0075 | 104.933 | 9.043 |
| CUHLB213A | B | C2 | 2 | 2 | 107.105 | 9.329 | 0.112 | 15 | BGM | 0.0075 | 103.744 | 9.036 |
| CUHLC131A | C | C1 | 3 | 1 | 100.286 | 9.522 | 0.110 | 15 | BAB | 0.0073 | 95.598 | 9.077 |
| CUHLC132A | C | C1 | 3 | 1 | 116.193 | 9.443 | 0.111 | 15 | BGM | 0.0074 | 111.276 | 9.043 |
| CUHLC133A | C | C1 | 3 | 1 | 124.206 | 9.619 | 0.111 | 15 | BGM | 0.0074 | 118.856 | 9.205 |
| CUHLC134A | C | C1 | 3 | 1 | 112.493 | 9.597 | 0.111 | 15 | BGM | 0.0074 | 107.659 | 9.185 |
| CUHLC231A | C | C2 | 3 | 2 | 97.113 | 9.567 | 0.111 | 15 | BAB | 0.0074 | 93.066 | 9.168 |
| CUHLC232A | C | C2 | 3 | 2 | 103.568 | 9.462 | 0.111 | 15 | BGM | 0.0074 | 99.197 | 9.062 |
| CUHLC233A | C | C2 | 3 | 2 | 112.095 | 9.523 | 0.111 | 15 | BGM | 0.0074 | 107.801 | 9.158 |

*Strength not reported due to unacceptable failure mode.

| | | | | | | |
|---|---|---|---|---|---|---|
| **Average** | **106.167** | **9.370** | **$Average_{norm}$** | **0.0074** | **102.675** | **9.030** |
| **Standard Dev.** | **7.396** | **0.179** | **$Standard\ Dev._{norm}$** | | **6.262** | **0.120** |
| **Coeff. of Var. [%]** | **6.967** | **1.907** | **$Coeff.\ of\ Var.\ [\%]_{norm}$** | | **6.099** | **1.328** |
| **Min.** | **92.133** | **8.993** | **Min.** | **0.0072** | **91.296** | **8.759** |
| **Max.** | **124.206** | **9.619** | **Max.** | **0.0077** | **118.856** | **9.205** |
| **Number of Spec.** | **25** | **21** | **Number of Spec.** | **26** | **25** | **21** |


Warp Compression Properties (WC)--(RTD)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
20.0
40.0
60.0
80.0
100.0
120.0
140.0
Warp Compression Strength (WC) [ksi]


Warp Compression Properties (WC)--(RTD)
Normalized Modulus
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
Warp Compression Modulus (WC) [Msi]

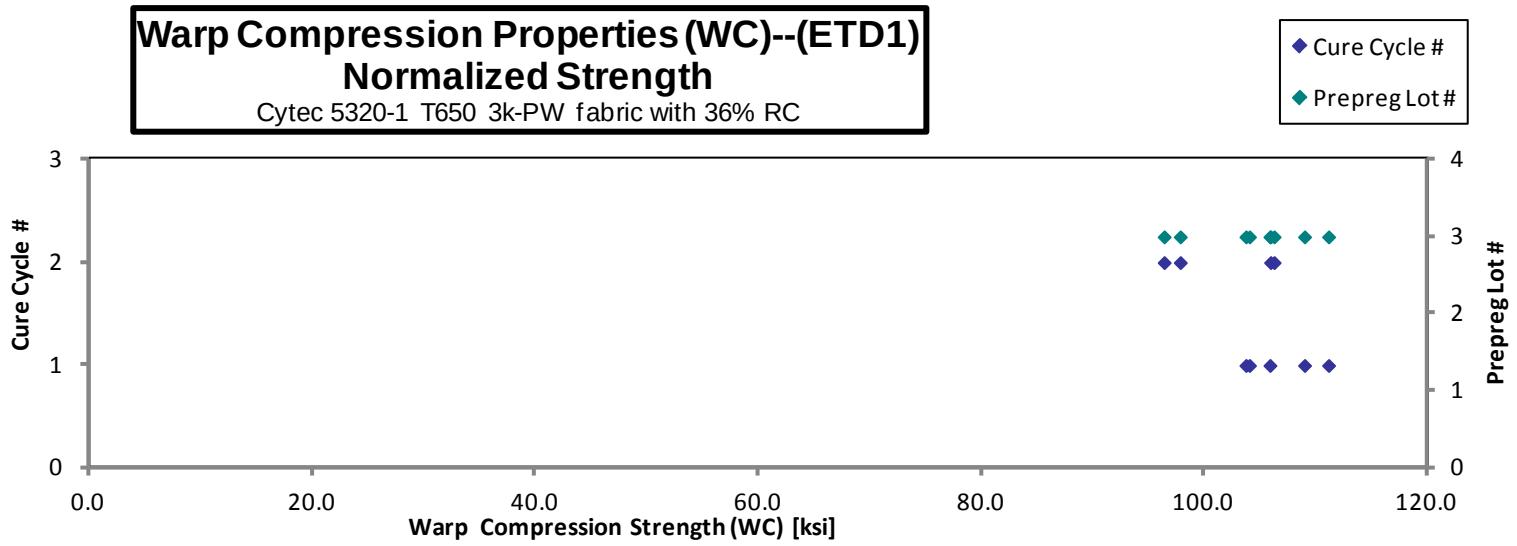
## Warp Compression Properties (WC)--ETD1
## Strength & Modulus

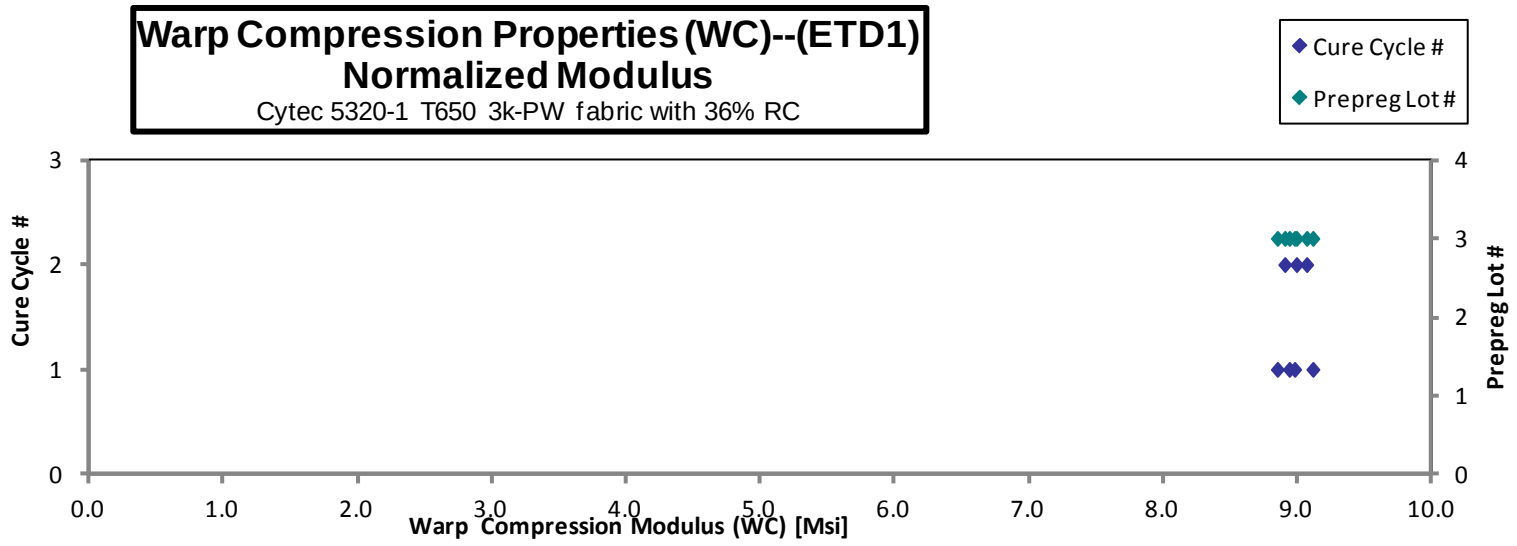
Cytec 5320-1 T650 3k-PW fabric with 36% RC

| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] | $Modulus_{norm}$ [Msi] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CUHLC13BC | C | C1 | 3 | 1 | 111.467 | 9.053 | 0.113 | 15 | BGM | 0.0075 | 108.910 | 8.845 |
| CUHLC13CC | C | C1 | 3 | 1 | 107.779 | 9.141 | 0.113 | 15 | BGM/HIT | 0.0076 | 105.807 | 8.974 |
| CUHLC13DC | C | C1 | 3 | 1 | 105.758 | 9.295 | 0.113 | 15 | BGM | 0.0075 | 103.652 | 9.110 |
| CUHLC13EC | C | C1 | 3 | 1 | 106.389 | 9.142 | 0.113 | 15 | BGM | 0.0075 | 103.971 | 8.934 |
| CUHLC13FC | C | C1 | 3 | 1 | 114.638 | | 0.112 | 15 | BGM | 0.0075 | 111.065 | |
| CUHLC23BC | C | C2 | 3 | 2 | 98.783 | 9.128 | 0.113 | 15 | BGM | 0.0075 | 96.324 | 8.901 |
| CUHLC23CC | C | C2 | 3 | 2 | 99.777 | 9.173 | 0.113 | 15 | BGM/HIT | 0.0075 | 97.768 | 8.988 |
| CUHLC23DC | C | C2 | 3 | 2 | 108.124 | 9.257 | 0.113 | 15 | BGM | 0.0075 | 105.865 | 9.064 |
| CUHLC23EC | C | C2 | 3 | 2 | 109.354 | | 0.112 | 15 | BGM | 0.0075 | 106.182 | |

| | Strength [ksi] | Modulus [Msi] | | | $Strength_{norm}$ [ksi] | $Modulus_{norm}$ [Msi] |
|---|---|---|---|---|---|---|
| **Average** | **106.896** | **9.170** | | **$Average_{norm}$** | **0.0075** | **104.394** | **8.974** |
| **Standard Dev.** | **5.089** | **0.082** | | **Standard $Dev._{norm}$** | | **4.770** | **0.091** |
| **Coeff. of Var. [%]** | **4.761** | **0.893** | | **Coeff. of Var. $[\%]_{norm}$** | | **4.569** | **1.019** |
| **Min.** | **98.783** | **9.053** | | **Min.** | **0.0075** | **96.324** | **8.845** |
| **Max.** | **114.638** | **9.295** | | **Max.** | **0.0076** | **111.065** | **9.110** |
| **Number of Spec.** | **9** | **7** | | **Number of Spec.** | **9** | **9** | **7** |


Warp Compression Properties (WC)--(ETD1)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
20.0
40.0
60.0
80.0
100.0
120.0
Warp Compression Strength (WC) [ksi]


Warp Compression Properties (WC)--(ETD1)
Normalized Modulus
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
Warp Compression Modulus (WC) [Msi]

## Warp Compression Properties (WC)--ETW1
## Strength & Modulus

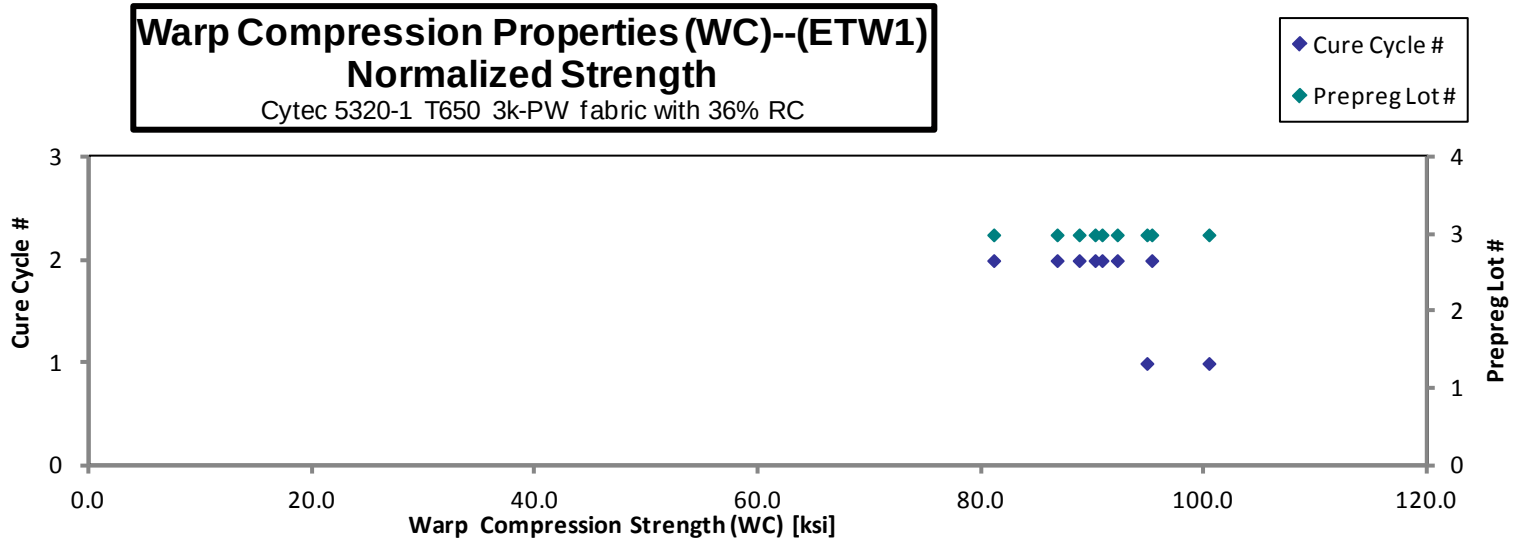
Cytec 5320-1 T650 3k-PW fabric with 36% RC

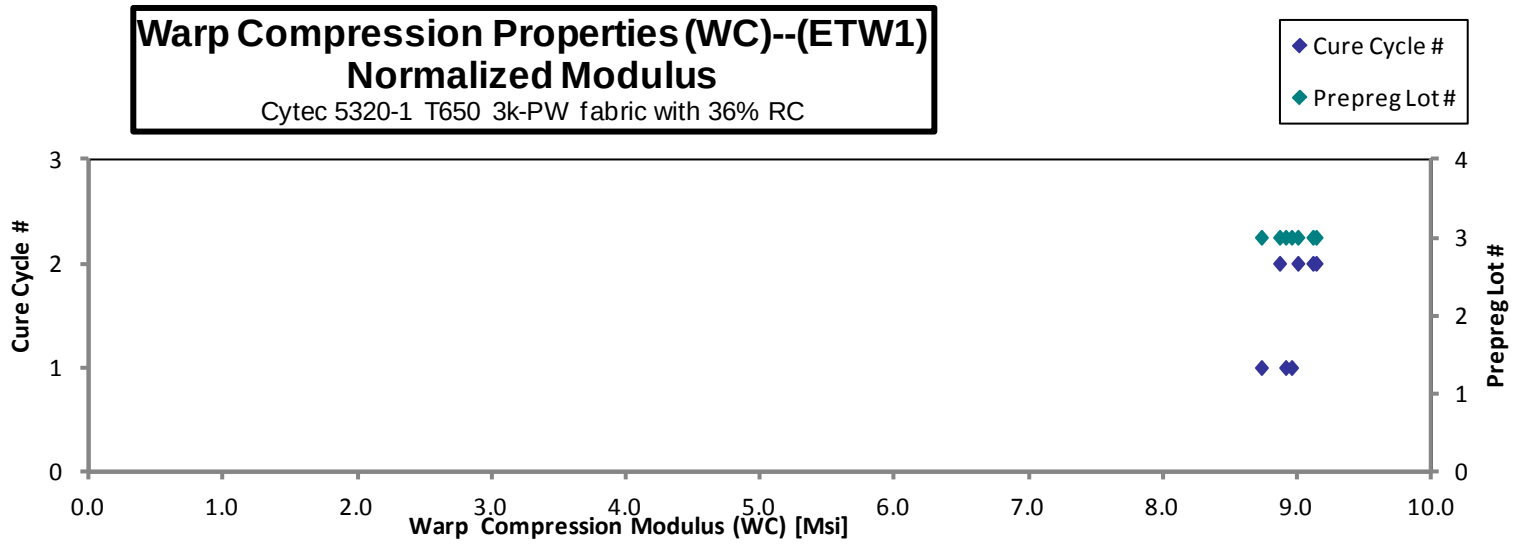
| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] | $Modulus_{norm}$ [Msi] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CUHLC111D | C | C1 | 3 | 1 | | 8.874 | 0.114 | 15 | BGM | 0.0076 | | 8.726 |
| CUHLC112D | C | C1 | 3 | 1 | | 9.133 | 0.113 | 15 | BGM | 0.0075 | | 8.951 |
| CUHLC113D | C | C1 | 3 | 1 | | 9.017 | 0.114 | 15 | BGM | 0.0076 | | 8.907 |
| CUHLC115D | C | C1 | 3 | 1 | 101.135 | | 0.115 | 15 | BGM / HAB | 0.0076 | 100.336 | |
| CUHLC118D | C | C1 | 3 | 1 | 95.312 | | 0.115 | 15 | HGM | 0.0077 | 94.775 | |
| CUHLC211D | C | C2 | 3 | 2 | | 8.978 | 0.114 | 15 | BGM / HIT | 0.0076 | | 8.862 |
| CUHLC212D | C | C2 | 3 | 2 | | 9.206 | 0.114 | 15 | HGM | 0.0076 | | 9.110 |
| CUHLC213D | C | C2 | 3 | 2 | | 9.067 | 0.115 | 15 | BGM | 0.0076 | | 8.998 |
| CUHLC214D | C | C2 | 3 | 2 | | 9.280 | 0.114 | 15 | BGM | 0.0076 | | 9.134 |
| CUHLC215D | C | C2 | 3 | 2 | 87.366 | | 0.115 | 15 | BGM | 0.0076 | 86.723 | |
| CUHLC216D | C | C2 | 3 | 2 | 89.536 | | 0.116 | 15 | BGM / HIT | 0.0078 | 90.127 | |
| CUHLC217D | C | C2 | 3 | 2 | 90.395 | | 0.118 | 15 | HGM | 0.0078 | 92.117 | |
| CUHLC218D | C | C2 | 3 | 2 | 87.836 | | 0.117 | 15 | BGM | 0.0078 | 88.701 | |
| CUHLC219D | C | C2 | 3 | 2 | 80.535 | | 0.116 | 15 | HIT/ BAB | 0.0077 | 81.040 | |
| CUHLC21BD | C | C2 | 3 | 2 | 90.840 | | 0.115 | 15 | BGM / HIB | 0.0077 | 90.751 | |
| CUHLC21CD | C | C2 | 3 | 2 | 95.088 | | 0.116 | 15 | BGM | 0.0077 | 95.212 | |

| | Strength [ksi] | Modulus [Msi] |
|---|---|---|
| **Average** | **90.894** | **9.079** |
| **Standard Dev.** | **5.844** | **0.139** |
| **Coeff. of Var. [%]** | **6.429** | **1.529** |
| **Min.** | **80.535** | **8.874** |
| **Max.** | **101.135** | **9.280** |
| **Number of Spec.** | **9** | **7** |

| | $t_{ply}$ [in] | $Strength_{norm}$ [ksi] | $Modulus_{norm}$ [Msi] |
|---|---|---|---|
| **$Average_{norm}$** | **0.0077** | **91.087** | **8.955** |
| **Standard $Dev._{norm}$** | | **5.522** | **0.142** |
| **Coeff. of Var. $[\%]_{norm}$** | | **6.062** | **1.586** |
| **Min.** | **0.0075** | **81.040** | **8.726** |
| **Max.** | **0.0078** | **100.336** | **9.134** |
| **Number of Spec.** | **16** | **9** | **7** |


Warp Compression Properties (WC)--(ETW1)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Warp Compression Strength (WC) [ksi]
0.0
20.0
40.0
60.0
80.0
100.0
120.0
0
1
2
3
4


Warp Compression Properties (WC)--(ETW1)
Normalized Modulus
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Warp Compression Modulus (WC) [Msi]
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
0
1
2
3
4

## Warp Compression Properties (WC)--ETD2
## Strength & Modulus

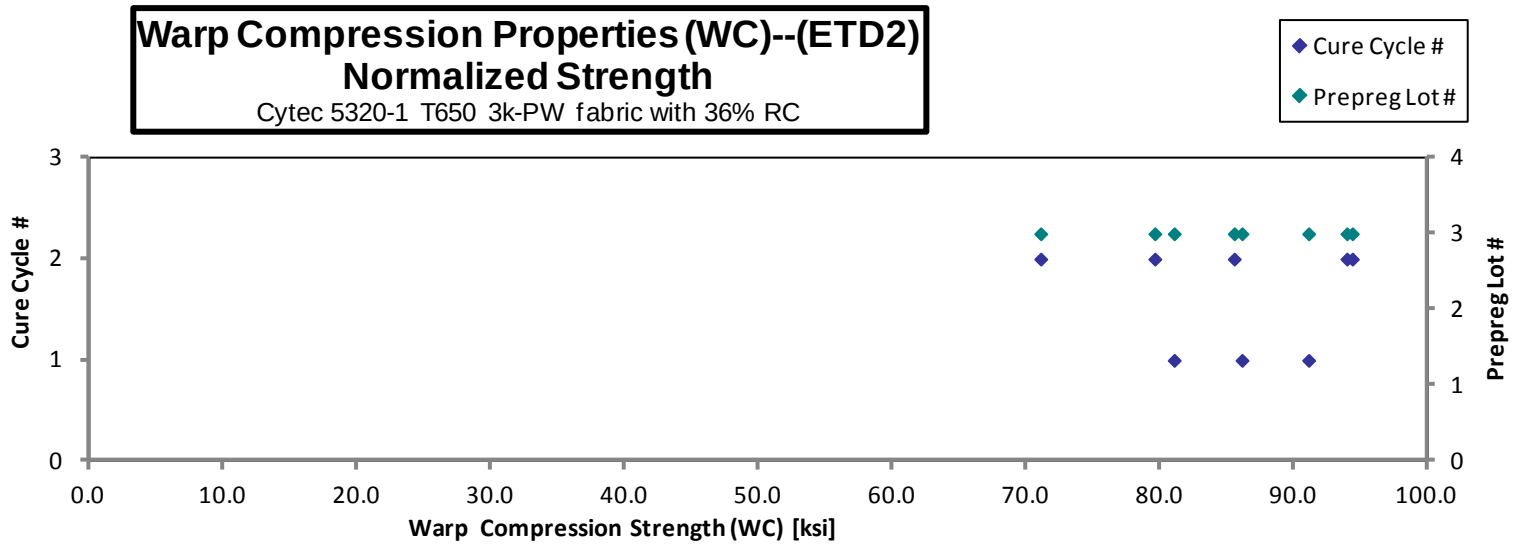
Cytec 5320-1 T650 3k-PW fabric with 36% RC

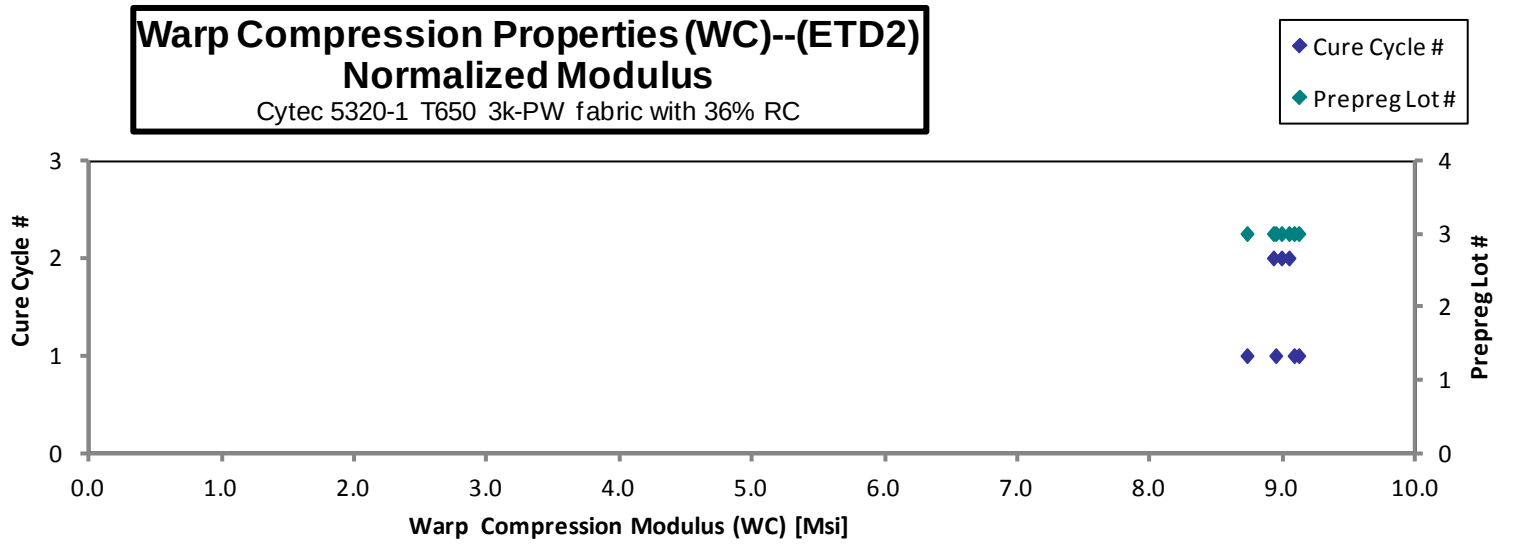
| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] | $Modulus_{norm}$ [Msi] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CUHLC13GE | C | C1 | 3 | 1 | 93.534 | 8.960 | 0.112 | 15 | BGM | 0.0075 | 91.064 | 8.723 |
| CUHLC13HE | C | C1 | 3 | 1 | * | 9.334 | 0.112 | 15 | HIT | 0.0075 | | 9.078 |
| CUHLC13IE | C | C1 | 3 | 1 | 84.965 | 9.558 | 0.110 | 15 | BGM | 0.0073 | 81.020 | 9.114 |
| CUHLC13JE | C | C1 | 3 | 1 | * | 9.227 | 0.112 | 15 | HIT | 0.0075 | | 8.940 |
| CUHLC13KE | C | C1 | 3 | 1 | 87.641 | | 0.113 | 15 | BAT[1] / HIT[2] | 0.0076 | 86.085 | |
| CUHLC23GE | C | C2 | 3 | 2 | 96.911 | 9.328 | 0.112 | 15 | BGM | 0.0075 | 93.922 | 9.040 |
| CUHLC23HE | C | C2 | 3 | 2 | 97.180 | 9.192 | 0.112 | 15 | BGM | 0.0075 | 94.330 | 8.922 |
| CUHLC23IE | C | C2 | 3 | 2 | 88.803 | 9.330 | 0.111 | 15 | HIT[1] / HGM[2] | 0.0074 | 85.506 | 8.984 |
| CUHLC23JE | C | C2 | 3 | 2 | 73.211 | | 0.112 | 15 | HIT[1] / BGM[2] | 0.0075 | 71.048 | |
| CUHLC23KE | C | C2 | 3 | 2 | 81.968 | | 0.112 | 15 | HGM | 0.0075 | 79.573 | |

*Strength not reported due to unacceptable failure mode.

| | | | | | | |
|---|---|---|---|---|---|---|
| **Average** | **88.027** | **9.275** | | **$Average_{norm}$** | **0.0075** | **85.318** | **8.972** |
| **Standard Dev.** | **8.101** | **0.181** | | **$Standard\ Dev._{norm}$** | | **7.964** | **0.130** |
| **Coeff. of Var. [%]** | **9.203** | **1.956** | | **Coeff. of Var. [%]$_{norm}$** | | **9.335** | **1.449** |
| **Min.** | **73.211** | **8.960** | | **Min.** | **0.0073** | **71.048** | **8.723** |
| **Max.** | **97.180** | **9.558** | | **Max.** | **0.0076** | **94.330** | **9.114** |
| **Number of Spec.** | **8** | **7** | | **Number of Spec.** | **10** | **8** | **7** |


Warp Compression Properties (WC)--(ETD2)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Warp Compression Strength (WC) [ksi]
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0


Warp Compression Properties (WC)--(ETD2)
Normalized Modulus
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Warp Compression Modulus (WC) [Msi]
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0

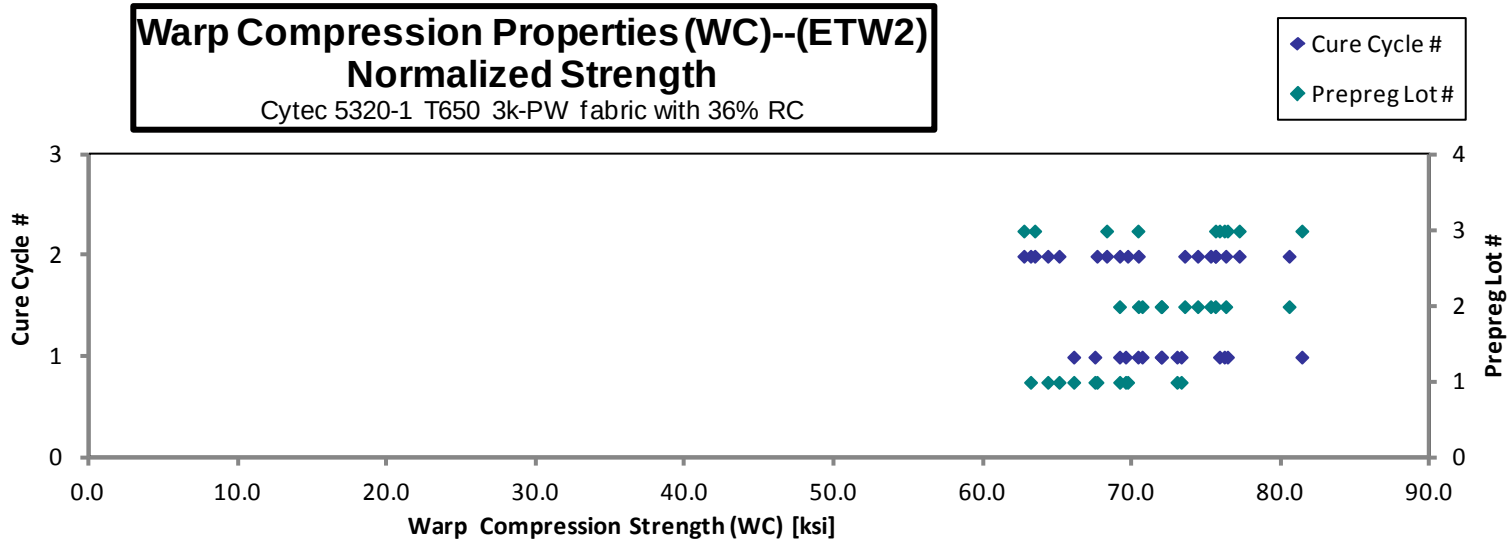
**Warp Compression Properties (WC)--ETW2**
**Strength & Modulus**
Cytec 5320-1 T650 3k-PW fabric with 36% RC

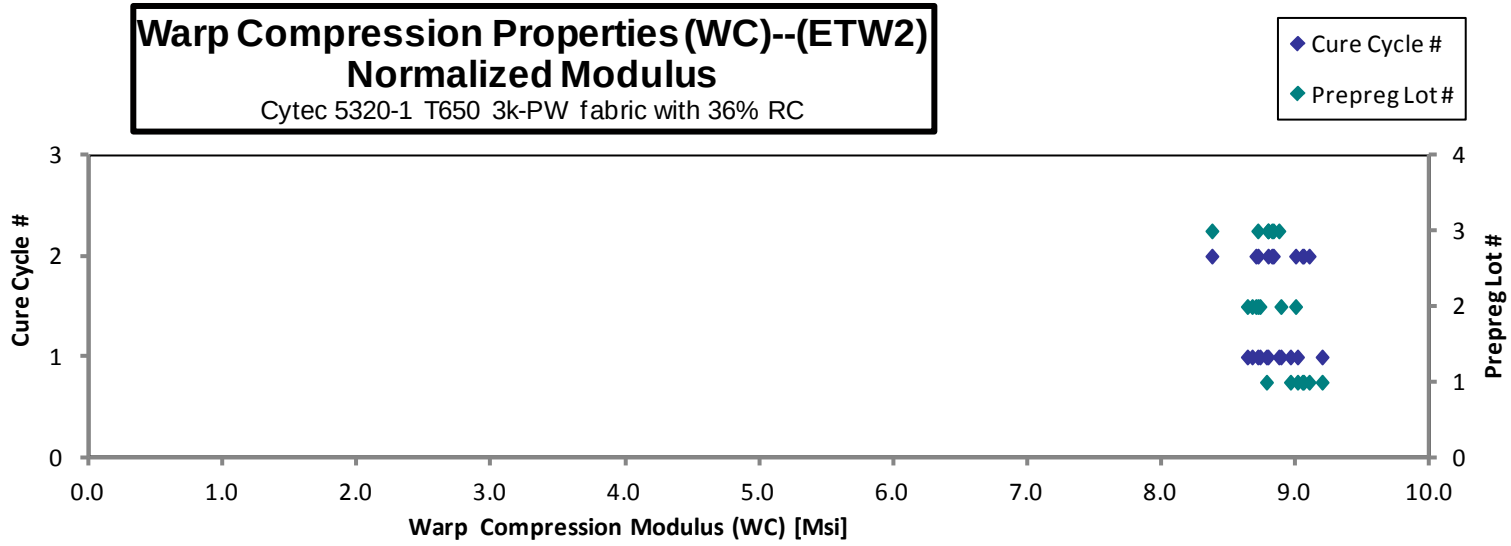
normalizing $t_{ply}$ [in]: 0.0077

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] | $Modulus_{norm}$ [Msi] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CUHLA11DF | A | C1 | 1 | 1 | | 9.119 | 0.113 | 15 | BGM | 0.0076 | | 8.956 |
| CUHLA11EF | A | C1 | 1 | 1 | | 9.309 | 0.114 | 15 | CIT / CIB | 0.0076 | | 9.193 |
| CUHLA11FF | A | C1 | 1 | 1 | | 8.874 | 0.114 | 15 | BGM | 0.0076 | | 8.778 |
| CUHLA11GF | A | C1 | 1 | 1 | | 9.105 | 0.114 | 15 | BGM | 0.0076 | | 9.009 |
| CUHLA11HF | A | C1 | 1 | 1 | 66.461 | | 0.115 | 15 | BGM / HGM | 0.0077 | 66.059 | |
| CUHLA11JF | A | C1 | 1 | 1 | 68.119 | | 0.114 | 15 | BGM | 0.0076 | 67.478 | |
| CUHLA11MF | A | C1 | 1 | 1 | 73.224 | | 0.116 | 15 | BGM | 0.0077 | 73.272 | |
| CUHLA11NF | A | C1 | 1 | 1 | 69.659 | | 0.115 | 15 | BGM / HGM | 0.0077 | 69.538 | |
| CUHLA11OF | A | C1 | 1 | 1 | 73.386 | | 0.115 | 15 | BAB | 0.0077 | 72.989 | |
| CUHLA21BF | A | C2 | 1 | 2 | 64.479 | | 0.113 | 15 | BGM | 0.0075 | 63.160 | |
| CUHLA21CF | A | C2 | 1 | 2 | | 9.121 | 0.115 | 15 | HIT/ BGM | 0.0077 | | 9.096 |
| CUHLA21DF | A | C2 | 1 | 2 | | 9.103 | 0.115 | 15 | HIT/ BGM | 0.0077 | | 9.046 |
| CUHLA21EF | A | C2 | 1 | 2 | | 9.106 | 0.115 | 15 | BGM | 0.0077 | | 9.054 |
| CUHLA21FF | A | C2 | 1 | 2 | 65.457 | | 0.115 | 15 | BGM | 0.0077 | 65.074 | |
| CUHLA21GF | A | C2 | 1 | 2 | 67.818 | | 0.115 | 15 | BGM/ HIT | 0.0077 | 67.619 | |
| CUHLA21IF | A | C2 | 1 | 2 | 64.771 | | 0.115 | 15 | BGM | 0.0076 | 64.316 | |
| CUHLA21JF | A | C2 | 1 | 2 | 69.487 | | 0.115 | 15 | BGM | 0.0077 | 69.141 | |
| CUHLA21KF | A | C2 | 1 | 2 | 70.110 | | 0.115 | 15 | BGM | 0.0077 | 69.678 | |
| CUHLB11BF | B | C1 | 2 | 1 | | 8.971 | 0.111 | 15 | BGM | 0.0074 | | 8.635 |
| CUHLB11CF | B | C1 | 2 | 1 | | 9.103 | 0.111 | 15 | BGM | 0.0074 | | 8.729 |
| CUHLB11DF | B | C1 | 2 | 1 | | 9.195 | 0.112 | 15 | BGM | 0.0074 | | 8.885 |
| CUHLB11EF | B | C1 | 2 | 1 | | 9.026 | 0.111 | 15 | BGM | 0.0074 | | 8.670 |
| CUHLB11FF | B | C1 | 2 | 1 | 75.252 | | 0.110 | 15 | BGM | 0.0074 | 71.953 | |
| CUHLB11GF | B | C1 | 2 | 1 | 72.268 | | 0.110 | 15 | BGM | 0.0074 | 69.131 | |
| CUHLB11HF | B | C1 | 2 | 1 | 74.322 | | 0.112 | 15 | HGM | 0.0075 | 71.925 | |
| CUHLB11IF | B | C1 | 2 | 1 | 72.987 | | 0.112 | 15 | HGM | 0.0075 | 70.649 | |
| CUHLB21BF | B | C2 | 2 | 2 | | 9.129 | 0.114 | 15 | HIT / BGM | 0.0076 | | 8.995 |
| CUHLB21CF | B | C2 | 2 | 2 | | 8.891 | 0.113 | 15 | BGM | 0.0075 | | 8.714 |
| CUHLB21DF | B | C2 | 2 | 2 | | 8.860 | 0.113 | 15 | BGM | 0.0076 | | 8.699 |
| CUHLB21EF | B | C2 | 2 | 2 | 70.865 | | 0.115 | 15 | BGM | 0.0076 | 70.397 | |
| CUHLB21FF | B | C2 | 2 | 2 | 74.140 | | 0.115 | 15 | HIT / BGM | 0.0076 | 73.506 | |
| CUHLB21GF | B | C2 | 2 | 2 | 77.532 | | 0.114 | 15 | HIT / BGM | 0.0076 | 76.265 | |
| CUHLB21HF | B | C2 | 2 | 2 | 76.422 | | 0.114 | 15 | BGM | 0.0076 | 75.562 | |
| CUHLB21IF | B | C2 | 2 | 2 | 81.631 | | 0.114 | 15 | HIB / BGM | 0.0076 | 80.518 | |
| CUHLB21JF | B | C2 | 2 | 2 | 75.532 | | 0.114 | 15 | HGM | 0.0076 | 74.379 | |
| CUHLB21KF | B | C2 | 2 | 2 | 76.574 | | 0.114 | 15 | HGM | 0.0076 | 75.248 | |
| CUHLC11DF | C | C1 | 3 | 1 | | 8.965 | 0.114 | 15 | BGM | 0.0076 | | 8.870 |
| CUHLC11EF | C | C1 | 3 | 1 | | 8.905 | 0.114 | 15 | HGM | 0.0076 | | 8.788 |
| CUHLC11FF | C | C1 | 3 | 1 | | 8.824 | 0.114 | 15 | HIB / BGM | 0.0076 | | 8.713 |
| CUHLC11GF | C | C1 | 3 | 1 | 78.555 | | 0.112 | 15 | BAB | 0.0074 | 75.843 | |
| CUHLC11HF | C | C1 | 3 | 1 | 78.512 | | 0.112 | 15 | HIB / BGM | 0.0075 | 76.167 | |
| CUHLC11IF | C | C1 | 3 | 1 | 77.974 | | 0.113 | 15 | BGM / HGM | 0.0075 | 76.379 | |
| CUHLC11JF | C | C1 | 3 | 1 | 72.207 | | 0.113 | 15 | BGM | 0.0075 | 70.370 | |
| CUHLC11LF | C | C1 | 3 | 1 | 82.788 | | 0.114 | 15 | BGM | 0.0076 | 81.372 | |
| CUHLC21DF | C | C2 | 3 | 2 | | 8.463 | 0.114 | 15 | BAT | 0.0076 | | 8.371 |
| CUHLC21EF | C | C2 | 3 | 2 | | 8.848 | 0.115 | 15 | BGM | 0.0077 | | 8.818 |
| CUHLC21FF | C | C2 | 3 | 2 | | 8.842 | 0.115 | 15 | HIT | 0.0077 | | 8.790 |
| CUHLC21GF | C | C2 | 3 | 2 | | 8.940 | 0.114 | 15 | HIT / BAT | 0.0076 | | 8.829 |
| CUHLC21IF | C | C2 | 3 | 2 | 69.949 | | 0.113 | 15 | HIT / BGM | 0.0075 | 68.268 | |
| CUHLC21JF | C | C2 | 3 | 2 | 78.262 | | 0.114 | 15 | BAT | 0.0076 | 77.170 | |
| CUHLC21KF | C | C2 | 3 | 2 | 64.700 | | 0.113 | 15 | BGM | 0.0076 | 63.439 | |
| CUHLC21LF | C | C2 | 3 | 2 | 63.752 | | 0.114 | 15 | HGM | 0.0076 | 62.710 | |
| CUHLC21MF | C | C2 | 3 | 2 | 76.940 | | 0.113 | 15 | BAB | 0.0076 | 75.574 | |

| | | | |
|---|---|---|---|
| **Average** | **72.629** | **8.986** | |
| **Standard Dev.** | **5.227** | **0.180** | |
| **Coeff. of Var. [%]** | **7.196** | **2.003** | |
| **Min.** | **63.752** | **8.463** | |
| **Max.** | **82.788** | **9.309** | |
| **Number of Spec.** | **32** | **21** | |

| | | | |
|---|---|---|---|
| **$Average_{norm}$** | **0.0076** | **71.411** | **8.840** |
| **$Standard\ Dev._{norm}$** | | **4.953** | **0.189** |
| **Coeff. of Var. $[\%]_{norm}$** | | **6.936** | **2.135** |
| **Min.** | **0.0074** | **62.710** | **8.371** |
| **Max.** | **0.0077** | **81.372** | **9.193** |
| **Number of Spec.** | **53** | **32** | **21** |


Warp Compression Properties (WC)--(ETW2)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
Warp Compression Strength (WC) [ksi]


Warp Compression Properties (WC)--(ETW2)
Normalized Modulus
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
Warp Compression Modulus (WC) [Msi]

# 4.4 Fill Compression Properties (FC)

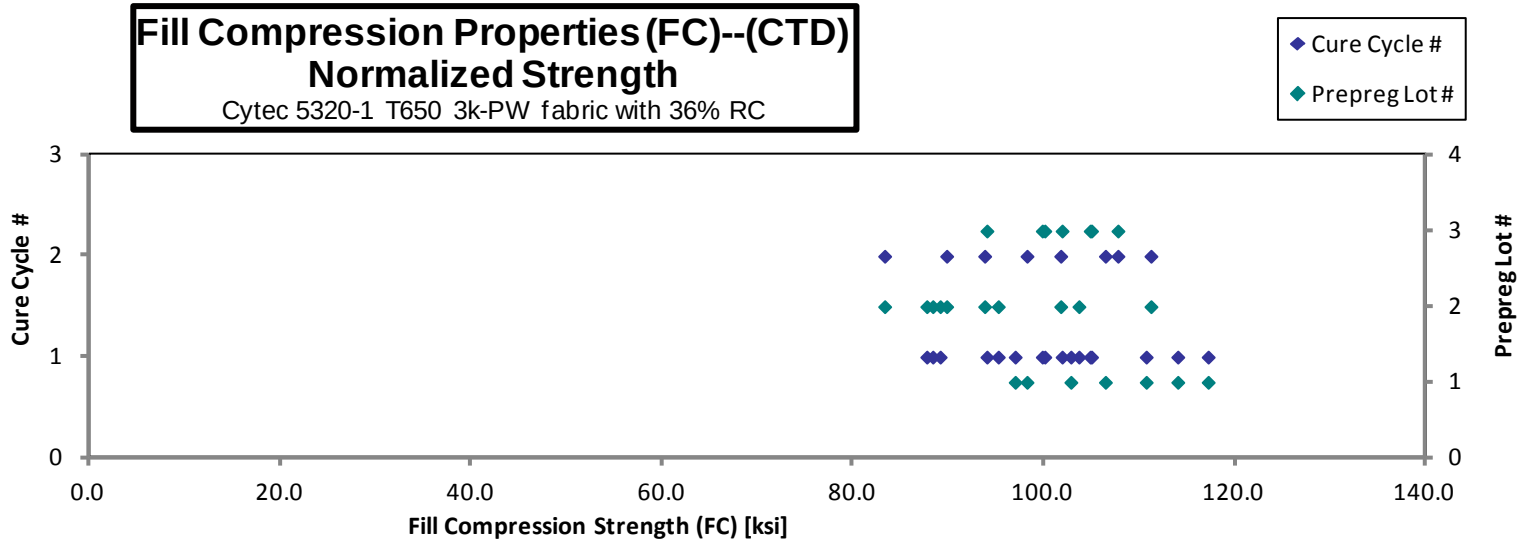
**Fill Compression Properties (FC)--CTD**
**Strength & Modulus**
Cytec 5320-1 T650 3k-PW fabric with 36% RC

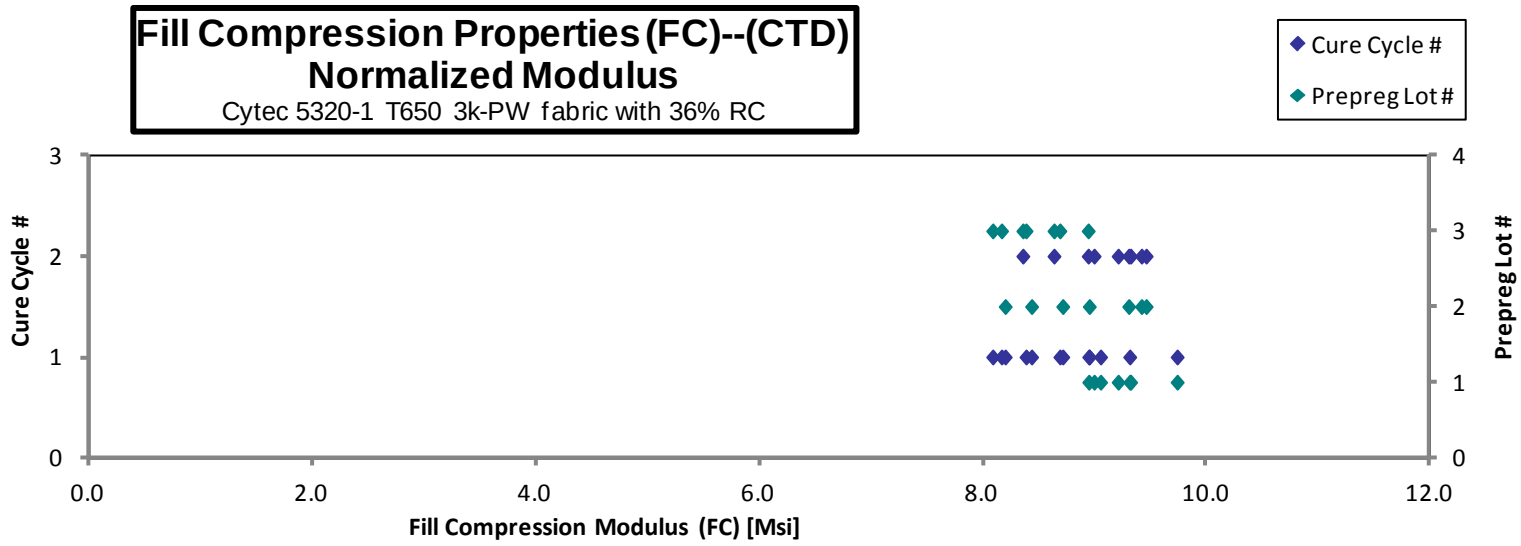
normalizing $t_{ply}$ [in]: 0.0077

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] | $Modulus_{norm}$ [Msi] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CUHZA117B | A | C1 | 1 | 1 | 111.739 | 9.543 | 0.118 | 15 | BGM[1] / HIT[2] | 0.0079 | 113.976 | 9.734 |
| CUHZA118B | A | C1 | 1 | 1 | 116.480 | 8.996 | 0.116 | 15 | BAT | 0.0077 | 117.161 | 9.048 |
| CUHZA119B | A | C1 | 1 | 1 | * | 9.133 | 0.118 | 15 | BGM | 0.0078 | | 9.309 |
| CUHZA11AB | A | C1 | 1 | 1 | 102.235 | 8.896 | 0.116 | 15 | BAT | 0.0077 | 102.777 | 8.943 |
| CUHZA11BB | A | C1 | 1 | 1 | 95.405 | | 0.117 | 15 | BGM | 0.0078 | 96.944 | |
| CUHZA11CB | A | C1 | 1 | 1 | 108.717 | | 0.118 | 15 | BGM | 0.0078 | 110.670 | |
| CUHZA216B | A | C2 | 1 | 2 | ** | 9.132 | 0.114 | 15 | HIT[1] / BGM[2] | 0.0076 | | 8.990 |
| CUHZA217B | A | C2 | 1 | 2 | 99.604 | 9.452 | 0.114 | 15 | BGM | 0.0076 | 98.181 | 9.317 |
| CUHZA218B | A | C2 | 1 | 2 | 107.747 | 9.322 | 0.114 | 15 | BGM | 0.0076 | 106.394 | 9.205 |
| CUHZB117B | B | C1 | 2 | 1 | ** | 8.623 | 0.113 | 15 | HIT[1] / BAT[2] | 0.0075 | | 8.431 |
| CUHZB118B | B | C1 | 2 | 1 | 90.938 | 8.365 | 0.113 | 15 | HIT[1] / BGM[2] | 0.0075 | 89.087 | 8.195 |
| CUHZB119B | B | C1 | 2 | 1 | 97.021 | 8.879 | 0.113 | 15 | BGM | 0.0076 | 95.173 | 8.710 |
| CUHZB11AB | B | C1 | 2 | 1 | 89.669 | 9.085 | 0.114 | 15 | BAT | 0.0076 | 88.310 | 8.947 |
| CUHZB11BB | B | C1 | 2 | 1 | 105.807 | | 0.113 | 15 | BGM | 0.0075 | 103.619 | |
| CUHZB11CB | B | C1 | 2 | 1 | 89.643 | | 0.113 | 15 | BGM | 0.0075 | 87.683 | |
| CUHZB216B | B | C2 | 2 | 2 | 95.254 | 9.450 | 0.114 | 15 | BAB[1] / HIT[2] | 0.0076 | 93.748 | 9.300 |
| CUHZB217B | B | C2 | 2 | 2 | 103.473 | 9.620 | 0.114 | 15 | HIT[1] / BGM[2] | 0.0076 | 101.715 | 9.456 |
| CUHZB218B | B | C2 | 2 | 2 | 90.669 | 9.509 | 0.114 | 15 | HIT[1] / BGM[2] | 0.0076 | 89.766 | 9.414 |
| CUHZB219B | B | C2 | 2 | 2 | 84.570 | | 0.114 | 15 | BAT | 0.0076 | 83.271 | |
| CUHZB21AB | B | C2 | 2 | 2 | 113.186 | | 0.113 | 15 | HIT[1] / BGM[2] | 0.0076 | 111.165 | |
| CUHZC137B | C | C1 | 3 | 1 | 103.670 | 8.376 | 0.111 | 15 | BGM[1] / HIT[2] | 0.0074 | 100.046 | 8.083 |
| CUHZC138B | C | C1 | 3 | 1 | 102.025 | 8.569 | 0.113 | 15 | BGM | 0.0075 | 99.784 | 8.381 |
| CUHZC139B | C | C1 | 3 | 1 | 107.550 | 8.376 | 0.113 | 15 | BGM[1] / HIT[2] | 0.0075 | 104.803 | 8.162 |
| CUHZC13AB | C | C1 | 3 | 1 | 108.756 | 8.999 | 0.111 | 15 | HIT[1] / BGM[2] | 0.0074 | 104.943 | 8.684 |
| CUHZC13BB | C | C1 | 3 | 1 | 99.019 | | 0.110 | 15 | BAB | 0.0073 | 93.982 | |
| CUHZC13CB | C | C1 | 3 | 1 | 108.656 | | 0.108 | 15 | HIT[1] / BGM[2] | 0.0072 | 101.859 | |
| CUHZC235B | C | C2 | 3 | 2 | * | 9.141 | 0.113 | 15 | BAT | 0.0075 | | 8.937 |
| CUHZC236B | C | C2 | 3 | 2 | * | 8.850 | 0.113 | 15 | BGM | 0.0075 | | 8.631 |
| CUHZC237B | C | C2 | 3 | 2 | * | 8.456 | 0.114 | 15 | BGM | 0.0076 | | 8.352 |
| CUHZC238B | C | C2 | 3 | 2 | 109.197 | | 0.114 | 15 | BAT | 0.0076 | 107.707 | |

* Strength not reported due to uneven grip marks
** Strength not reported because unacceptable failure mode was more apparent.

| | | | | | | |
|---|---|---|---|---|---|---|
| **Average** | **101.710** | **8.989** | | **$Average_{norm}$** | **0.0076** | **100.115** | **8.868** |
| **Standard Dev.** | **8.561** | **0.410** | | **$Standard\ Dev._{norm}$** | | **8.862** | **0.476** |
| **Coeff. of Var. [%]** | **8.417** | **4.562** | | **Coeff. of Var. [%]$_{norm}$** | | **8.852** | **5.369** |
| **Min.** | **84.570** | **8.365** | | **Min.** | **0.0072** | **83.271** | **8.083** |
| **Max.** | **116.480** | **9.620** | | **Max.** | **0.0079** | **117.161** | **9.734** |
| **Number of Spec.** | **24** | **21** | | **Number of Spec.** | **30** | **24** | **21** |


Fill Compression Properties (FC)--(CTD)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
20.0
40.0
60.0
80.0
100.0
120.0
140.0
Fill Compression Strength (FC) [ksi]


Fill Compression Properties (FC)--(CTD)
Normalized Modulus
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
2.0
4.0
6.0
8.0
10.0
12.0
Fill Compression Modulus (FC) [Msi]

## Fill Compression Properties (FC)--RTD
## Strength & Modulus

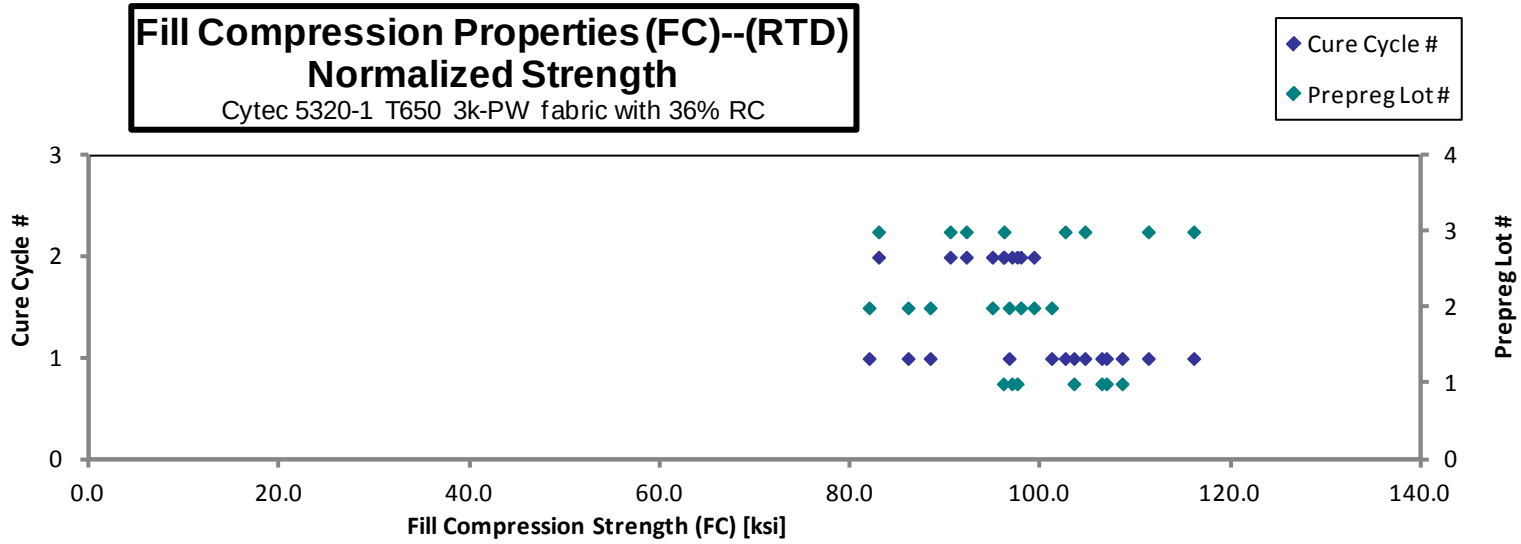
Cytec 5320-1 T650 3k-PW fabric with 36% RC

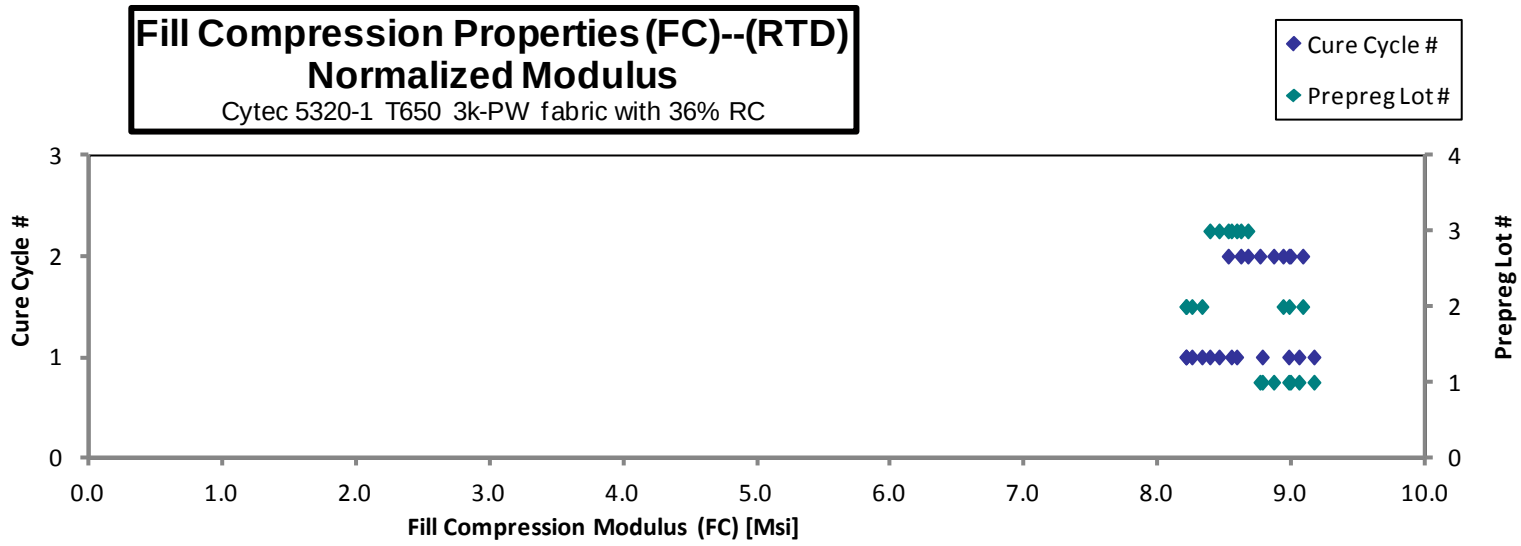
normalizing $t_{ply}$ [in]: 0.0077

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] | $Modulus_{norm}$ [Msi] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CUHZA111A | A | C1 | 1 | 1 | 100.686 | 8.918 | 0.119 | 15 | BGM | 0.0079 | 103.432 | 9.162 |
| CUHZA112A | A | C1 | 1 | 1 | 104.134 | 8.819 | 0.119 | 15 | BGM | 0.0079 | 106.850 | 9.049 |
| CUHZA113A | A | C1 | 1 | 1 | 104.566 | 8.627 | 0.117 | 15 | BGM | 0.0078 | 106.354 | 8.775 |
| CUHZA114A | A | C1 | 1 | 1 | 105.756 | 8.745 | 0.119 | 15 | HGM | 0.0079 | 108.503 | 8.973 |
| CUHZA211A | A | C2 | 1 | 2 | 100.362 | 9.017 | 0.112 | 15 | BGM | 0.0075 | 97.472 | 8.758 |
| CUHZA212A | A | C2 | 1 | 2 | 98.086 | 9.051 | 0.113 | 15 | BGM | 0.0075 | 96.016 | 8.860 |
| CUHZA213A | A | C2 | 1 | 2 | 98.508 | 9.133 | 0.114 | 15 | BGM | 0.0076 | 96.919 | 8.985 |
| CUHZB111A | B | C1 | 2 | 1 | 92.937 | 8.757 | 0.110 | 15 | BAT | 0.0073 | 88.330 | 8.323 |
| CUHZB112A | B | C1 | 2 | 1 | 86.139 | 8.673 | 0.110 | 15 | BAB | 0.0073 | 81.915 | 8.248 |
| CUHZB113A | B | C1 | 2 | 1 | 90.106 | 8.596 | 0.110 | 15 | BAT | 0.0074 | 86.010 | 8.205 |
| CUHZB114A | B | C1 | 2 | 1 | 100.429 | 8.526 | 0.111 | 15 | HIB[1]/BGM[2] | 0.0074 | 96.625 | 8.203 |
| CUHZB115A | B | C1 | 2 | 1 | 104.844 | | 0.111 | 15 | BGM | 0.0074 | 101.088 | |
| CUHZB211A | B | C2 | 2 | 2 | 101.406 | 9.408 | 0.111 | 15 | BGM | 0.0074 | 97.850 | 9.078 |
| CUHZB212A | B | C2 | 2 | 2 | 103.661 | 9.376 | 0.111 | 15 | BGM | 0.0074 | 99.229 | 8.975 |
| CUHZB213A | B | C2 | 2 | 2 | 98.617 | 9.283 | 0.111 | 15 | BAB | 0.0074 | 94.871 | 8.930 |
| CUHZC131A | C | C1 | 3 | 1 | 113.278 | 8.739 | 0.113 | 15 | BGM | 0.0076 | 111.256 | 8.583 |
| CUHZC132A | C | C1 | 3 | 1 | 117.939 | 8.521 | 0.114 | 15 | BGM | 0.0076 | 116.024 | 8.382 |
| CUHZC133A | C | C1 | 3 | 1 | 104.845 | 8.737 | 0.113 | 15 | BGM | 0.0075 | 102.518 | 8.543 |
| CUHZC134A | C | C1 | 3 | 1 | 107.357 | 8.675 | 0.113 | 15 | BGM | 0.0075 | 104.592 | 8.451 |
| CUHZC231A | C | C2 | 3 | 2 | 86.877 | 9.027 | 0.110 | 15 | HIT[1] / BAT[2] | 0.0073 | 82.910 | 8.614 |
| CUHZC232A | C | C2 | 3 | 2 | 93.125 | 8.925 | 0.112 | 15 | HIT[1] / BAT[2] | 0.0075 | 90.434 | 8.667 |
| CUHZC233A | C | C2 | 3 | 2 | 99.767 | 8.845 | 0.111 | 15 | HIT[1] / BAT[2] | 0.0074 | 96.096 | 8.520 |
| CUHZC234A | C | C2 | 3 | 2 | 94.979 | | 0.112 | 15 | BAB | 0.0075 | 92.132 | |

| | | | |
|---|---|---|---|
| **Average** | **100.365** | **8.876** | |
| **Standard Dev.** | **7.615** | **0.263** | |
| **Coeff. of Var. [%]** | **7.587** | **2.965** | |
| **Min.** | **86.139** | **8.521** | |
| **Max.** | **117.939** | **9.408** | |
| **Number of Spec.** | **23** | **21** | |

| | | | |
|---|---|---|---|
| **$Average_{norm}$** | **0.0075** | **98.149** | **8.680** |
| **$Standard\ Dev._{norm}$** | | **8.788** | **0.306** |
| **$Coeff.\ of\ Var.\ [\%]_{norm}$** | | **8.954** | **3.521** |
| **Min.** | **0.0073** | **81.915** | **8.203** |
| **Max.** | **0.0079** | **116.024** | **9.162** |
| **Number of Spec.** | **23** | **23** | **21** |


Fill Compression Properties (FC)--(RTD)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
20.0
40.0
60.0
80.0
100.0
120.0
140.0
Fill Compression Strength (FC) [ksi]

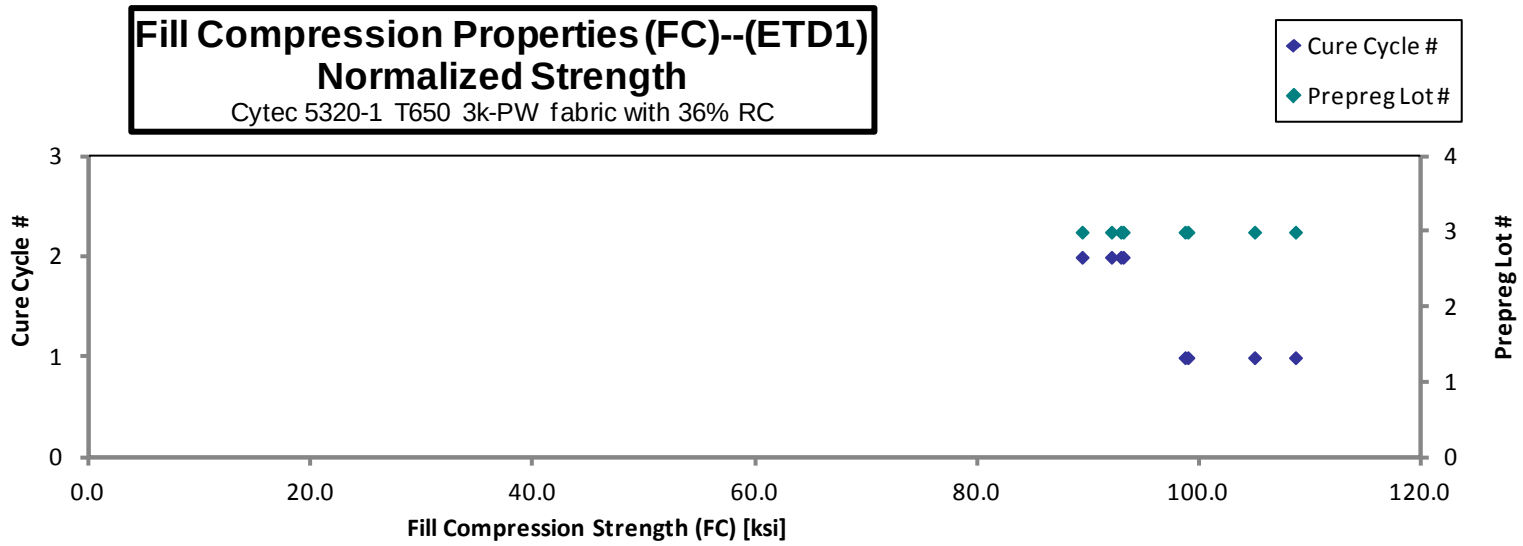

Fill Compression Properties (FC)--(RTD)
Normalized Modulus
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
Fill Compression Modulus (FC) [Msi]

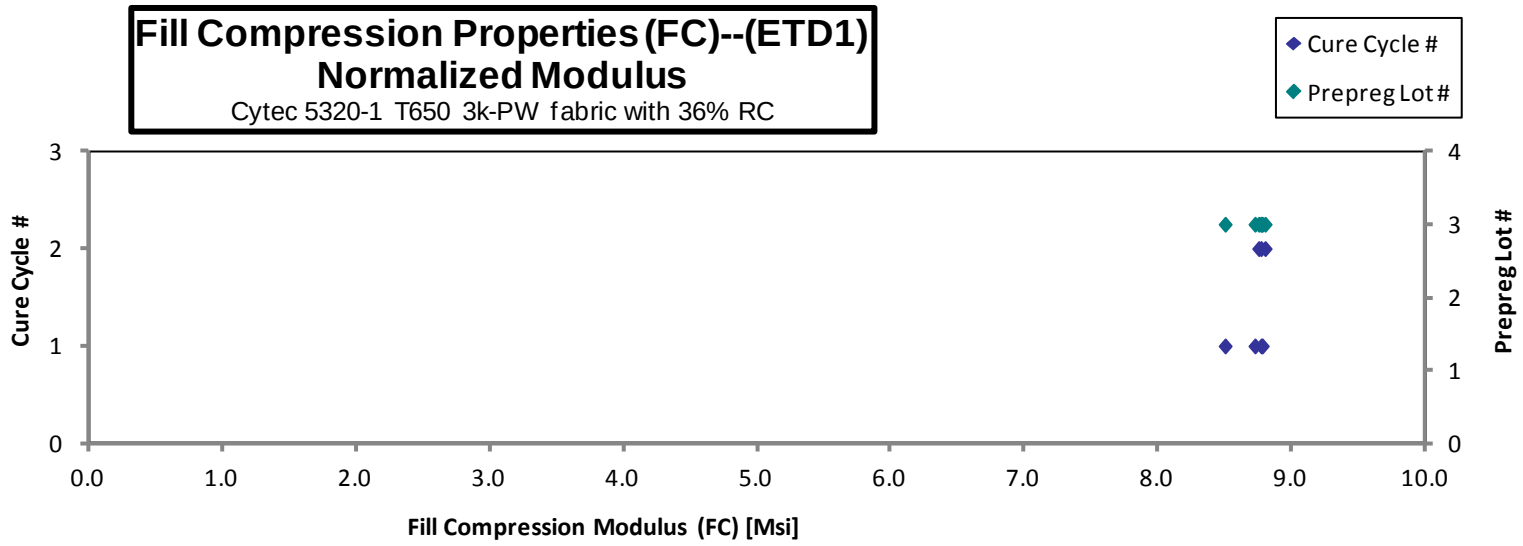
## Fill Compression Properties (FC)--ETD1
## Strength & Modulus
Cytec 5320-1 T650 3k-PW fabric with 36% RC

| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] | $Modulus_{norm}$ [Msi] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CUHZC13DC | C | C1 | 3 | 1 | 101.322 | 8.726 | 0.112 | 15 | BGM | 0.0075 | 98.668 | 8.497 |
| CUHZC13EC | C | C1 | 3 | 1 | 110.701 | 8.888 | 0.113 | 15 | BGM | 0.0076 | 108.617 | 8.720 |
| CUHZC13FC | C | C1 | 3 | 1 | 108.563 | 9.079 | 0.112 | 15 | BGM[1] / HIT[2] | 0.0074 | 104.933 | 8.775 |
| CUHZC13GC | C | C1 | 3 | 1 | 102.178 | 9.055 | 0.112 | 15 | BGM | 0.0075 | 98.926 | 8.767 |
| CUHZC239C | C | C2 | 3 | 2 | 91.580 | 8.980 | 0.113 | 15 | BGM[1] / HAT[2] | 0.0075 | 89.399 | 8.766 |
| CUHZC23AC | C | C2 | 3 | 2 | 92.901 | 8.750 | 0.115 | 15 | HIT[1] / HGM[2] | 0.0077 | 92.881 | 8.748 |
| CUHZC23BC | C | C2 | 3 | 2 | 93.088 | 8.795 | 0.116 | 15 | BGM | 0.0077 | 93.099 | 8.796 |
| CUHZC23CC | C | C2 | 3 | 2 | 92.271 | | 0.115 | 15 | BAB | 0.0077 | 92.041 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Average** | **99.075** | **8.896** | | **$Average_{norm}$** | **0.0076** | **97.320** | **8.724** |
| **Standard Dev.** | **7.712** | **0.145** | | **$Standard\ Dev._{norm}$** | | **6.741** | **0.103** |
| **Coeff. of Var. [%]** | **7.784** | **1.629** | | **$Coeff.\ of\ Var.\ [\%]_{norm}$** | | **6.927** | **1.179** |
| **Min.** | **91.580** | **8.726** | | **Min.** | **0.0074** | **89.399** | **8.497** |
| **Max.** | **110.701** | **9.079** | | **Max.** | **0.0077** | **108.617** | **8.796** |
| **Number of Spec.** | **8** | **7** | | **Number of Spec.** | **8** | **8** | **7** |


Fill Compression Properties (FC)--(ETD1)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
20.0
40.0
60.0
80.0
100.0
120.0
Fill Compression Strength (FC) [ksi]


Fill Compression Properties (FC)--(ETD1)
Normalized Modulus
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
Fill Compression Modulus (FC) [Msi]

## Fill Compression Properties (FC)--ETW1
## Strength & Modulus

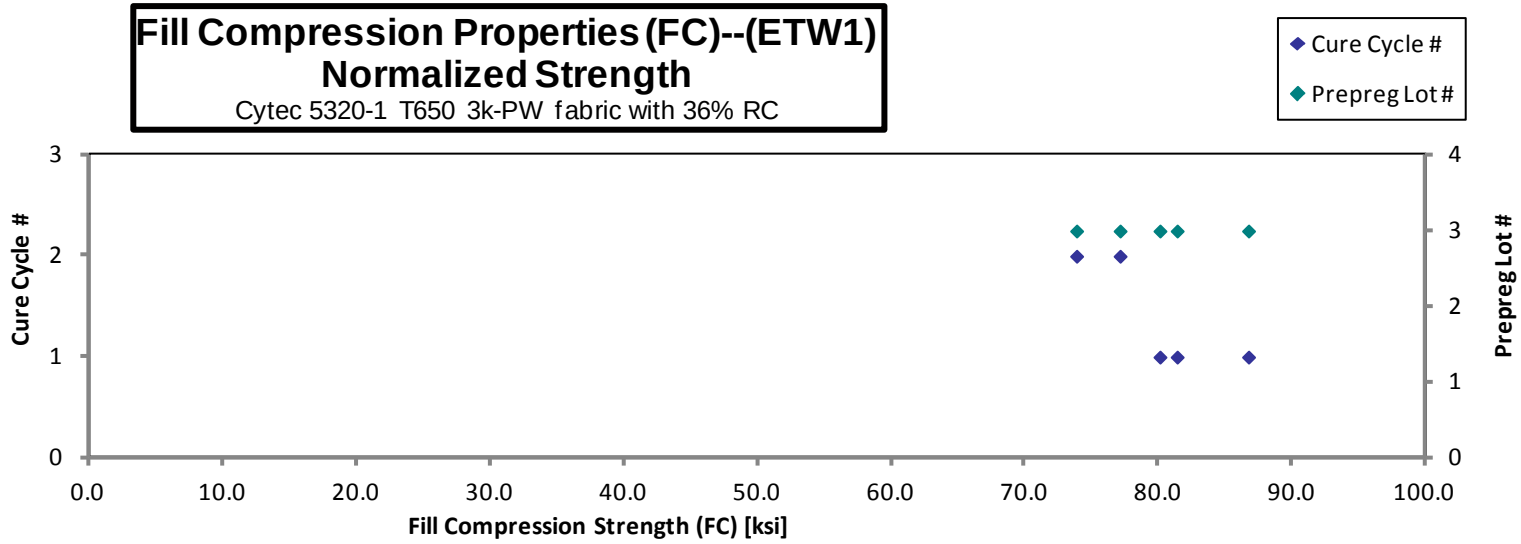
Cytec 5320-1 T650 3k-PW fabric with 36% RC

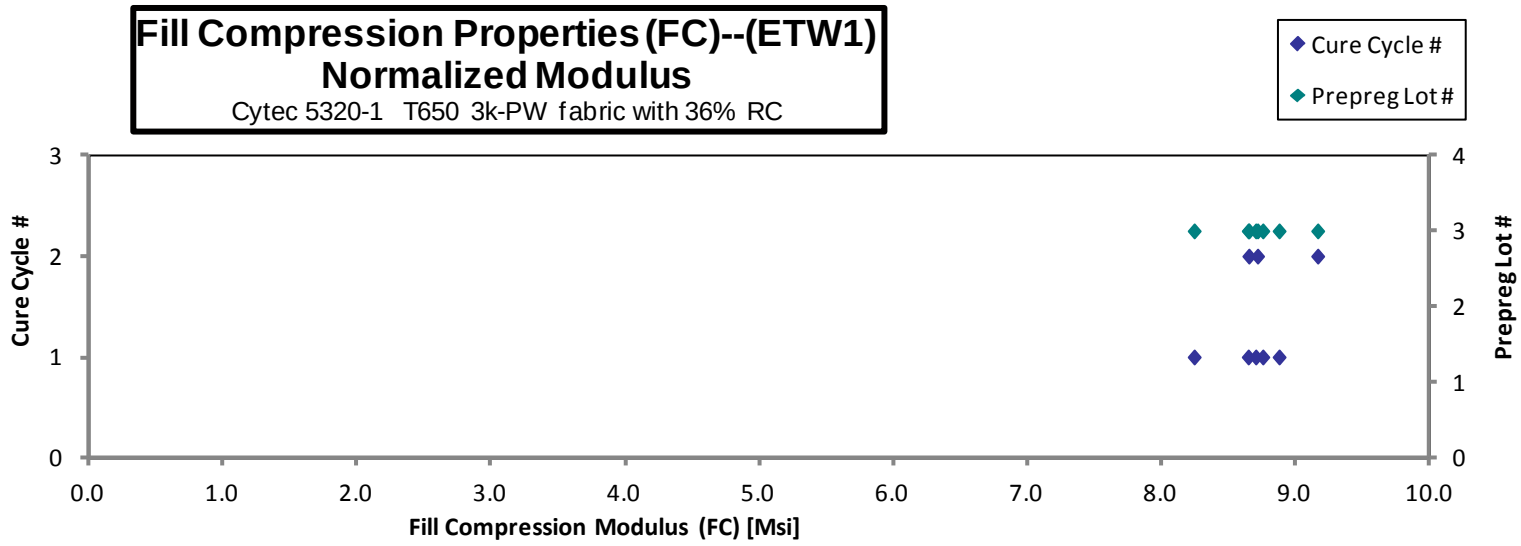
| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] | $Modulus_{norm}$ [Msi] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CUHZC111D | C | C1 | 3 | 1 | | 8.359 | 0.114 | 15 | HIB | 0.0076 | | 8.239 |
| CUHZC112D | C | C1 | 3 | 1 | | 8.867 | 0.114 | 15 | BGM | 0.0076 | | 8.750 |
| CUHZC113D | C | C1 | 3 | 1 | | 8.773 | 0.115 | 15 | BGM | 0.0076 | | 8.698 |
| CUHZC116D | C | C1 | 3 | 1 | | 8.981 | 0.114 | 15 | CIT | 0.0076 | | 8.872 |
| CUHZC117D | C | C1 | 3 | 1 | | 8.875 | 0.112 | 15 | BGM | 0.0075 | | 8.642 |
| CUHZC119D | C | C1 | 3 | 1 | 89.298 | | 0.112 | 15 | BGM | 0.0075 | 86.708 | |
| CUHZC11AD | C | C1 | 3 | 1 | 83.947 | | 0.112 | 15 | BGM | 0.0075 | 81.367 | |
| CUHZC11ED | C | C1 | 3 | 1 | 80.349 | | 0.115 | 15 | HIB / HGM | 0.0077 | 80.079 | |
| CUHZC212D | C | C2 | 3 | 2 | | 9.575 | 0.110 | 15 | HIT / HIB | 0.0074 | | 9.160 |
| CUHZC213D | C | C2 | 3 | 2 | | 8.948 | 0.112 | 15 | HIT | 0.0074 | | 8.646 |
| CUHZC214D | C | C2 | 3 | 2 | | 9.008 | 0.112 | 15 | HAT / BGM | 0.0074 | | 8.711 |
| CUHZC215D | C | C2 | 3 | 2 | 75.820 | | 0.112 | 15 | HGM | 0.0075 | 73.843 | |
| CUHZC216D | C | C2 | 3 | 2 | 78.933 | | 0.113 | 15 | BGM | 0.0075 | 77.096 | |

| | | | |
|---|---|---|---|
| **Average** | **81.669** | **8.923** | |
| **Standard Dev.** | **5.168** | **0.334** | |
| **Coeff. of Var. [%]** | **6.328** | **3.747** | |
| **Min.** | **75.820** | **8.359** | |
| **Max.** | **89.298** | **9.575** | |
| **Number of Spec.** | **5** | **8** | |

| | | | |
|---|---|---|---|
| **$Average_{norm}$** | **0.0075** | **79.819** | **8.715** |
| **Standard $Dev._{norm}$** | | **4.823** | **0.257** |
| **Coeff. of Var. [%]$_{norm}$** | | **6.042** | **2.945** |
| **Min.** | **0.0074** | **73.843** | **8.239** |
| **Max.** | **0.0077** | **86.708** | **9.160** |
| **Number of Spec.** | **13** | **5** | **8** |


Fill Compression Properties (FC)--(ETW1)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
Fill Compression Strength (FC) [ksi]


Fill Compression Properties (FC)--(ETW1)
Normalized Modulus
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
Fill Compression Modulus (FC) [Msi]

## Fill Compression Properties (FC)--ETD2
## Strength & Modulus

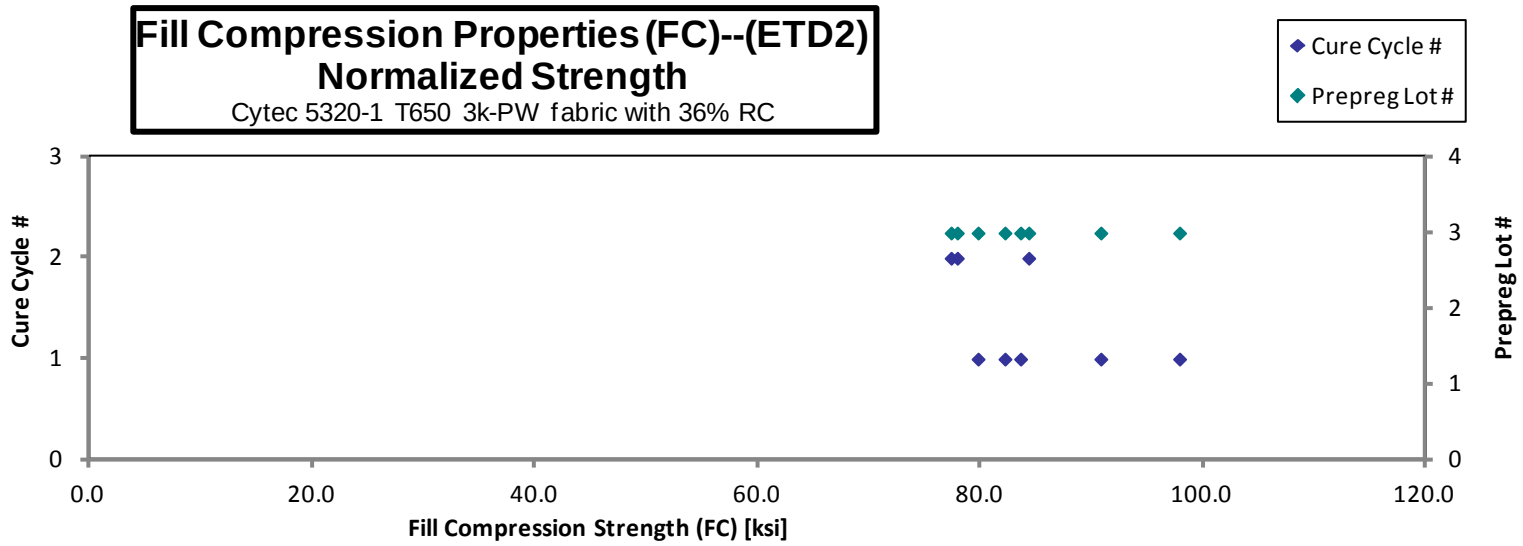
Cytec 5320-1 T650 3k-PW fabric with 36% RC

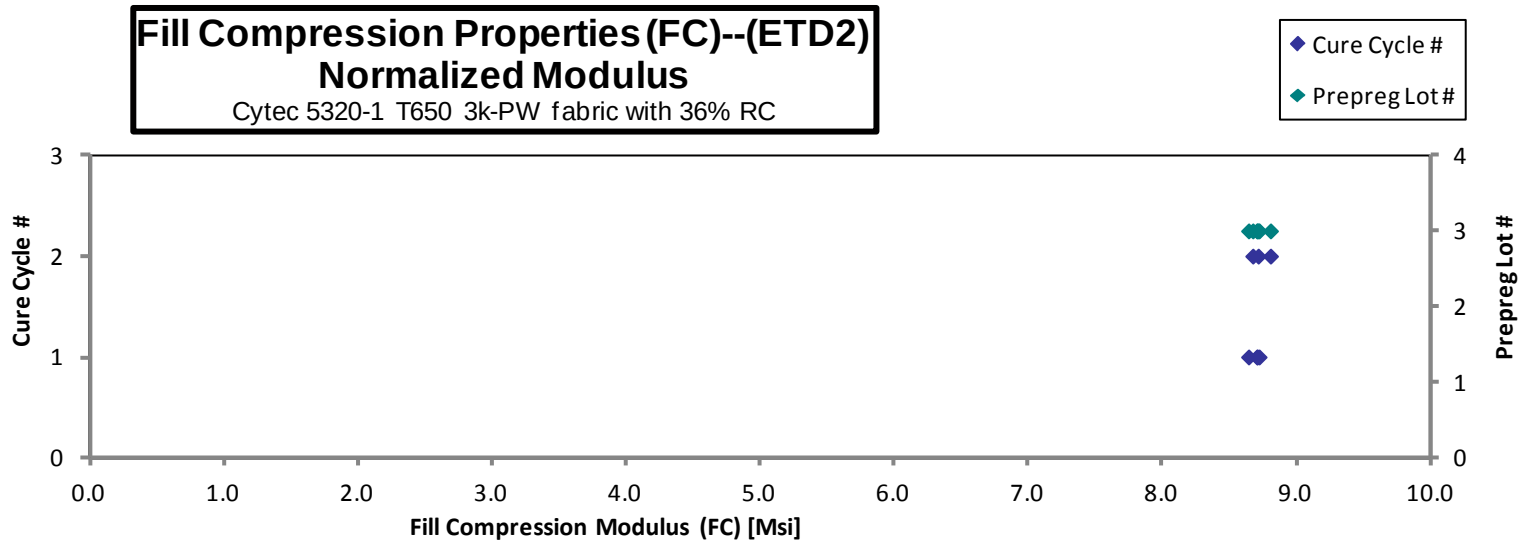
| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] | $Modulus_{norm}$ [Msi] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CUHZC13JE | C | C1 | 3 | 1 | 85.212 | 9.031 | 0.111 | 15 | HIB[1] / BGM[2] | 0.0074 | 82.178 | 8.709 |
| CUHZC13KE | C | C1 | 3 | 1 | 94.116 | 8.961 | 0.111 | 15 | BGM | 0.0074 | 90.785 | 8.644 |
| CUHZC13LE | C | C1 | 3 | 1 | 101.766 | 9.053 | 0.111 | 15 | HGM | 0.0074 | 97.856 | 8.705 |
| CUHZC13ME | C | C1 | 3 | 1 | * | 9.182 | 0.110 | 15 | HIT | 0.0073 | | 8.723 |
| CUHZC13NE | C | C1 | 3 | 1 | 88.182 | | 0.109 | 15 | HGM | 0.0073 | 83.582 | |
| CUHZC13OE | C | C1 | 3 | 1 | 85.490 | | 0.108 | 15 | HIT[1] / BAT[2] | 0.0072 | 79.763 | |
| CUHZC23EE | C | C2 | 3 | 2 | * | 8.830 | 0.113 | 15 | HIT | 0.0076 | | 8.675 |
| CUHZC23FE | C | C2 | 3 | 2 | 86.075 | 8.992 | 0.113 | 15 | BGM | 0.0075 | 84.315 | 8.808 |
| CUHZC23GE | C | C2 | 3 | 2 | * | 8.857 | 0.114 | 15 | HIT | 0.0076 | | 8.716 |
| CUHZC23HE | C | C2 | 3 | 2 | 78.958 | | 0.113 | 15 | HIT[1] / BAT[2] | 0.0075 | 77.343 | |
| CUHZC23IE | C | C2 | 3 | 2 | 79.668 | | 0.113 | 15 | HIT[1] / BAT[2] | 0.0075 | 77.900 | |

* Strength not reported due to unacceptable failure mode

| | Strength [ksi] | Modulus [Msi] | | $t_{ply}$ [in] | $Strength_{norm}$ [ksi] | $Modulus_{norm}$ [Msi] |
|---|---|---|---|---|---|---|
| **Average** | **87.433** | **8.987** | **$Average_{norm}$** | **0.0074** | **84.215** | **8.712** |
| **Standard Dev.** | **7.496** | **0.120** | **$Standard\ Dev._{norm}$** | | **6.977** | **0.050** |
| **Coeff. of Var. [%]** | **8.573** | **1.335** | **$Coeff.\ of\ Var.\ [\%]_{norm}$** | | **8.285** | **0.579** |
| **Min.** | **78.958** | **8.830** | **Min.** | **0.0072** | **77.343** | **8.644** |
| **Max.** | **101.766** | **9.182** | **Max.** | **0.0076** | **97.856** | **8.808** |
| **Number of Spec.** | **8** | **7** | **Number of Spec.** | **11** | **8** | **7** |


Fill Compression Properties (FC)--(ETD2)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
20.0
40.0
60.0
80.0
100.0
120.0
Fill Compression Strength (FC) [ksi]


Fill Compression Properties (FC)--(ETD2)
Normalized Modulus
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
Fill Compression Modulus (FC) [Msi]

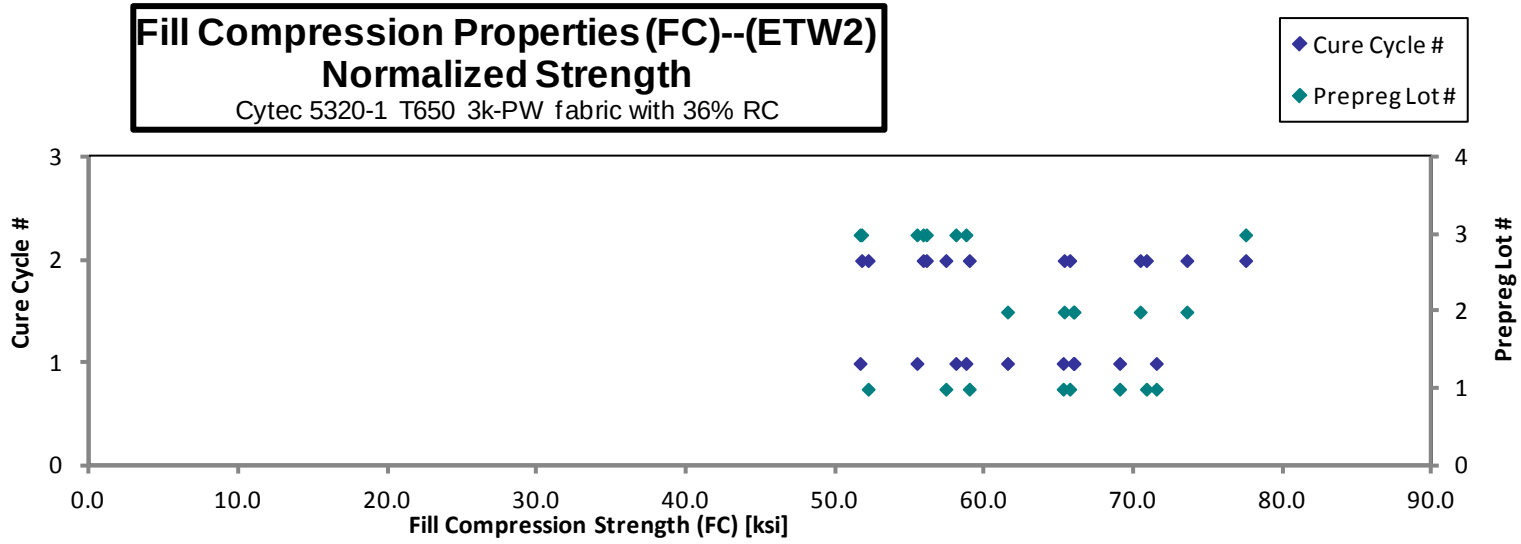
**Fill Compression Properties (FC)--ETW2**
**Strength & Modulus**
Cytec 5320-1 T650 3k-PW fabric with 36% RC

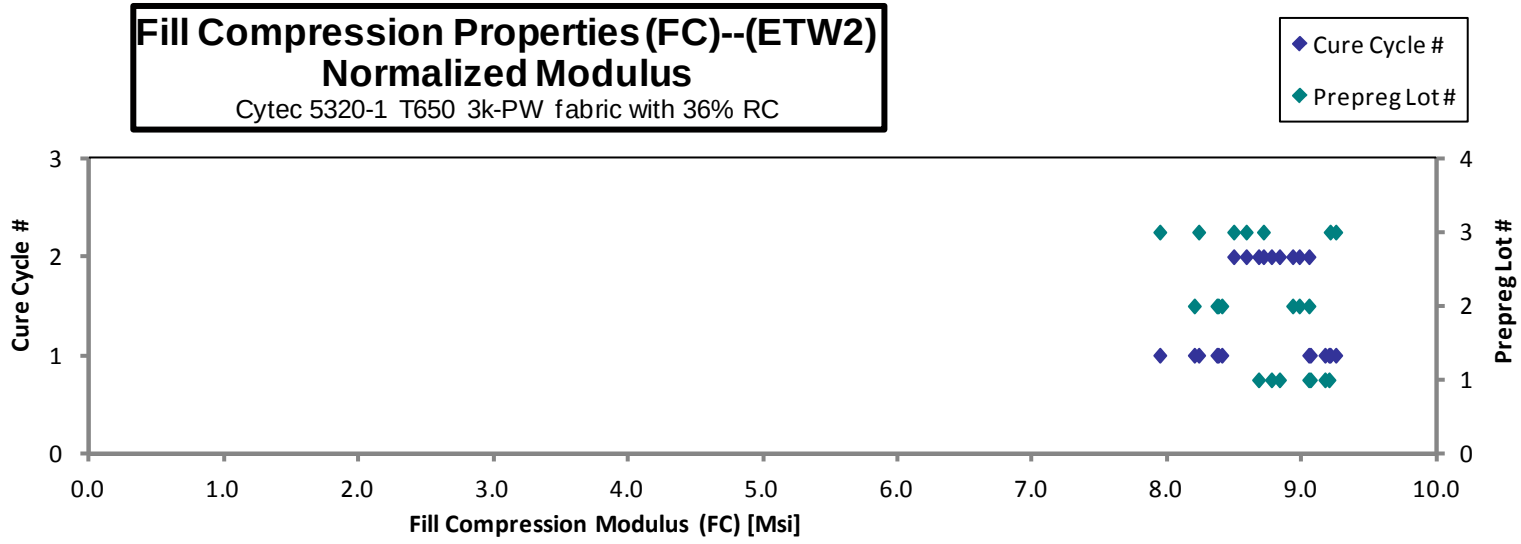
normalizing $t_{ply}$ [in]: 0.0077

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] | $Modulus_{norm}$ [Msi] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CUHZA11DF | A | C1 | 1 | 1 | | 9.104 | 0.116 | 15 | HIB | 0.0078 | | 9.163 |
| CUHZA11EF | A | C1 | 1 | 1 | | 9.037 | 0.118 | 15 | BGM | 0.0078 | | 9.194 |
| CUHZA11FF | A | C1 | 1 | 1 | | 8.971 | 0.116 | 15 | BGM | 0.0078 | | 9.043 |
| CUHZA11GF | A | C1 | 1 | 1 | | 8.929 | 0.117 | 15 | BGM | 0.0078 | | 9.056 |
| CUHZA11IF | A | C1 | 1 | 1 | 70.477 | | 0.117 | 15 | BGM | 0.0078 | 71.491 | |
| CUHZA11JF | A | C1 | 1 | 1 | 68.640 | | 0.116 | 15 | BGM | 0.0077 | 69.033 | |
| CUHZA11LF | A | C1 | 1 | 1 | 66.091 | | 0.114 | 15 | BGM | 0.0076 | 65.247 | |
| CUHZA21BF | A | C2 | 1 | 2 | | 8.972 | 0.114 | 15 | CIT | 0.0076 | | 8.826 |
| CUHZA21CF | A | C2 | 1 | 2 | | 8.898 | 0.114 | 15 | HIT / HAT | 0.0076 | | 8.766 |
| CUHZA21EF | A | C2 | 1 | 2 | | 8.758 | 0.114 | 15 | BGM | 0.0076 | | 8.671 |
| CUHZA21FF | A | C2 | 1 | 2 | 57.810 | | 0.115 | 15 | BAT | 0.0076 | 57.385 | |
| CUHZA21GF | A | C2 | 1 | 2 | 59.256 | | 0.115 | 15 | BGM / HIB | 0.0077 | 58.955 | |
| CUHZA21HF | A | C2 | 1 | 2 | 52.660 | | 0.114 | 15 | BAB | 0.0076 | 52.176 | |
| CUHZA21IF | A | C2 | 1 | 2 | 66.379 | | 0.114 | 15 | BGM | 0.0076 | 65.689 | |
| CUHZA21JF | A | C2 | 1 | 2 | 71.043 | | 0.115 | 15 | BGM | 0.0077 | 70.828 | |
| CUHZB11DF | B | C1 | 2 | 1 | | 8.391 | 0.113 | 15 | HIB | 0.0075 | | 8.194 |
| CUHZB11EF | B | C1 | 2 | 1 | | 8.511 | 0.114 | 15 | BGM | 0.0076 | | 8.372 |
| CUHZB11FF | B | C1 | 2 | 1 | | 8.537 | 0.114 | 15 | BGM | 0.0076 | | 8.398 |
| CUHZB11GF | B | C1 | 2 | 1 | | 8.503 | 0.114 | 15 | BGM | 0.0076 | | 8.362 |
| CUHZB11JF | B | C1 | 2 | 1 | 67.683 | | 0.113 | 15 | BGM | 0.0075 | 65.933 | |
| CUHZB11KF | B | C1 | 2 | 1 | 67.467 | | 0.113 | 15 | BAB | 0.0075 | 65.977 | |
| CUHZB11LF | B | C1 | 2 | 1 | 63.285 | | 0.112 | 15 | BGM | 0.0075 | 61.518 | |
| CUHZB21BF | B | C2 | 2 | 2 | | 9.240 | 0.112 | 15 | BGM | 0.0075 | | 8.973 |
| CUHZB21CF | B | C2 | 2 | 2 | | 9.240 | 0.112 | 15 | BGM | 0.0074 | | 8.924 |
| CUHZB21DF | B | C2 | 2 | 2 | | 9.276 | 0.113 | 15 | CIT / CIB / BGM | 0.0075 | | 9.045 |
| CUHZB21FF | B | C2 | 2 | 2 | 74.197 | | 0.114 | 15 | BGM | 0.0076 | 73.539 | |
| CUHZB21GF | B | C2 | 2 | 2 | 70.942 | | 0.115 | 15 | BGM | 0.0076 | 70.412 | |
| CUHZB21HF | B | C2 | 2 | 2 | 66.010 | | 0.114 | 15 | HGM | 0.0076 | 65.317 | |
| CUHZC11FF | C | C1 | 3 | 1 | | 8.310 | 0.114 | 15 | HIT / CIT / BGM | 0.0076 | | 8.227 |
| CUHZC11GF | C | C1 | 3 | 1 | | 9.209 | 0.115 | 15 | HGM | 0.0077 | | 9.202 |
| CUHZC11HF | C | C1 | 3 | 1 | | 9.214 | 0.116 | 15 | BGM | 0.0077 | | 9.244 |
| CUHZC11IF | C | C1 | 3 | 1 | | 7.977 | 0.115 | 15 | BGM / HIB | 0.0077 | | 7.938 |
| CUHZC11KF | C | C1 | 3 | 1 | 59.194 | | 0.115 | 15 | BGM / HIB | 0.0076 | 58.733 | |
| CUHZC11LF | C | C1 | 3 | 1 | 56.460 | | 0.113 | 15 | HGM | 0.0076 | 55.446 | |
| CUHZC11MF | C | C1 | 3 | 1 | 59.410 | | 0.113 | 15 | HGM | 0.0075 | 58.053 | |
| CUHZC11NF | C | C1 | 3 | 1 | 53.259 | | 0.112 | 15 | BGM | 0.0075 | 51.634 | |
| CUHZC21BF | C | C2 | 3 | 2 | | 8.582 | 0.114 | 15 | BAT | 0.0076 | | 8.487 |
| CUHZC21CF | C | C2 | 3 | 2 | | 8.807 | 0.114 | 15 | HIT | 0.0076 | | 8.707 |
| CUHZC21DF | C | C2 | 3 | 2 | | 8.715 | 0.114 | 15 | HIT | 0.0076 | | 8.579 |
| CUHZC21EF | C | C2 | 3 | 2 | 57.645 | | 0.112 | 15 | BAT | 0.0075 | 56.079 | |
| CUHZC21FF | C | C2 | 3 | 2 | 53.110 | | 0.113 | 15 | BAT | 0.0075 | 51.737 | |
| CUHZC21GF | C | C2 | 3 | 2 | 57.580 | | 0.112 | 15 | HAT | 0.0075 | 55.860 | |
| CUHZC21HF | C | C2 | 3 | 2 | 79.311 | | 0.113 | 15 | BAT | 0.0075 | 77.482 | |

| | Strength [ksi] | Modulus [Msi] |
|---|---|---|
| Average | 63.541 | 8.818 |
| Standard Dev. | 7.372 | 0.358 |
| Coeff. of Var. [%] | 11.602 | 4.058 |
| Min. | 52.660 | 7.977 |
| Max. | 79.311 | 9.276 |
| Number of Spec. | 22 | 21 |

| | $t_{ply}$ [in] | $Strength_{norm}$ [ksi] | $Modulus_{norm}$ [Msi] |
|---|---|---|---|
| $Average_{norm}$ | 0.0076 | 62.660 | 8.732 |
| $Standard\ Dev._{norm}$ | | 7.559 | 0.383 |
| $Coeff.\ of\ Var.\ [\%]_{norm}$ | | 12.064 | 4.381 |
| Min. | 0.0074 | 51.634 | 7.938 |
| Max. | 0.0078 | 77.482 | 9.244 |
| Number of Spec. | 43 | 22 | 21 |


Fill Compression Properties (FC)--(ETW2)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
Fill Compression Strength (FC) [ksi]


Fill Compression Properties (FC)--(ETW2)
Normalized Modulus
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
Fill Compression Modulus (FC) [Msi]

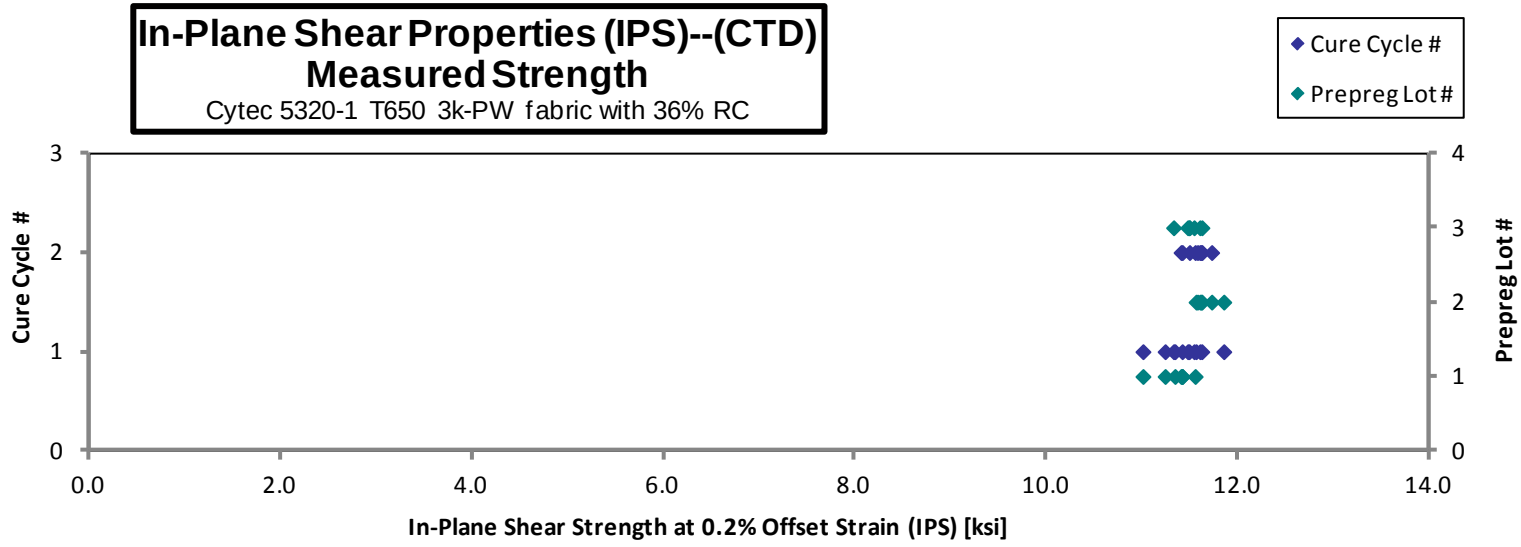
## 4.5 In-Plane Shear Properties (IPS)

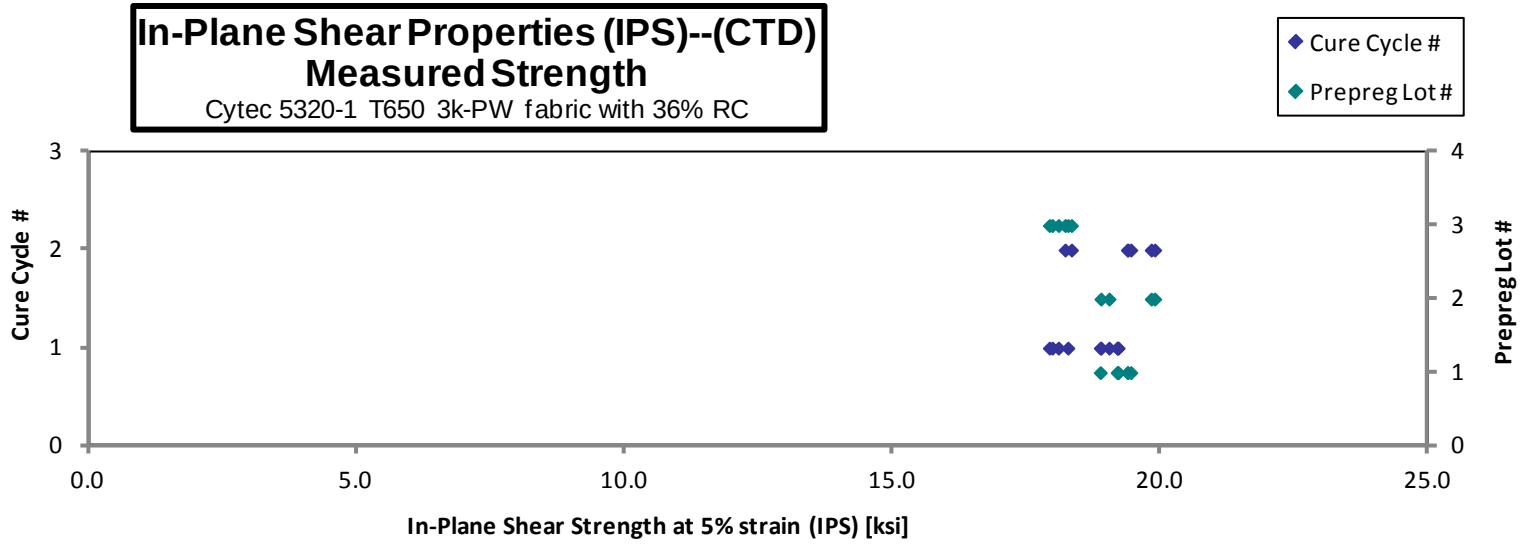
**In-Plane Shear Properties (IPS)--CTD**
**Strength & Modulus**
Cytec 5320-1 T650 3k-PW fabric with 36% RC

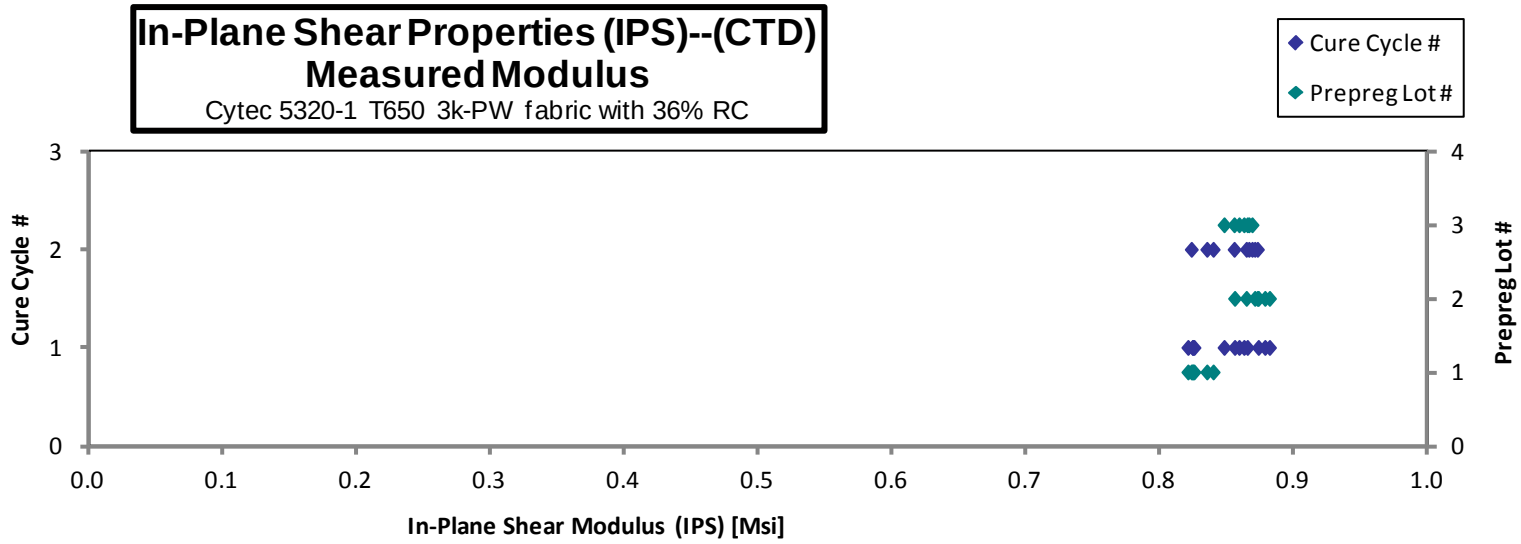
| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | 0.2% Offset Strength [ksi] | Strength at 5% Strain [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Avg. $t_{ply}$ [in] |
|---|---|---|---|---|---|---|---|---|---|---|
| CUHNA115B | A | C1 | 1 | 1 | 11.011 | 18.867 | 0.820 | 0.096 | 12 | 0.0080 |
| CUHNA116B | A | C1 | 1 | 1 | 11.243 | 19.200 | 0.825 | 0.095 | 12 | 0.0079 |
| CUHNA117B | A | C1 | 1 | 1 | 11.421 | 19.181 | 0.824 | 0.095 | 12 | 0.0079 |
| CUHNA118B | A | C1 | 1 | 1 | 11.346 | 19.189 | 0.823 | 0.094 | 12 | 0.0079 |
| CUHNA215B | A | C2 | 1 | 2 | 11.557 | 19.376 | 0.834 | 0.093 | 12 | 0.0077 |
| CUHNA216B | A | C2 | 1 | 2 | 11.423 | 19.375 | 0.839 | 0.092 | 12 | 0.0077 |
| CUHNA217B | A | C2 | 1 | 2 | 11.410 | 19.436 | 0.823 | 0.092 | 12 | 0.0077 |
| CUHNB118B | B | C1 | 2 | 1 | 11.626 | 18.878 | 0.873 | 0.089 | 12 | 0.0074 |
| CUHNB119B* | B | C1 | 2 | 1 | 11.567 | | 0.855 | 0.090 | 12 | 0.0075 |
| CUHNB11AB* | B | C1 | 2 | 1 | 11.856 | | 0.878 | 0.088 | 12 | 0.0073 |
| CUHNB11BB | B | C1 | 2 | 1 | 11.607 | 19.030 | 0.881 | 0.089 | 12 | 0.0074 |
| CUHNB217B | B | C2 | 2 | 2 | 11.730 | 19.882 | 0.870 | 0.090 | 12 | 0.0075 |
| CUHNB218B | B | C2 | 2 | 2 | 11.619 | 19.817 | 0.864 | 0.090 | 12 | 0.0075 |
| CUHNB219B* | B | C2 | 2 | 2 | 11.582 | | 0.872 | 0.090 | 12 | 0.0075 |
| CUHNC117B | C | C1 | 3 | 1 | 11.494 | 18.261 | 0.864 | 0.091 | 12 | 0.0076 |
| CUHNC118B | C | C1 | 3 | 1 | 11.332 | 18.084 | 0.847 | 0.092 | 12 | 0.0077 |
| CUHNC119B | C | C1 | 3 | 1 | 11.545 | 17.969 | 0.862 | 0.091 | 12 | 0.0076 |
| CUHNC11AB | C | C1 | 3 | 1 | 11.479 | 17.916 | 0.858 | 0.090 | 12 | 0.0075 |
| CUHNC217B | C | C2 | 3 | 2 | 11.498 | 18.210 | 0.855 | 0.091 | 12 | 0.0076 |
| CUHNC218B | C | C2 | 3 | 2 | 11.606 | 18.328 | 0.868 | 0.089 | 12 | 0.0075 |
| CUHNC219B* | C | C2 | 3 | 2 | 11.628 | | 0.866 | 0.089 | 12 | 0.0074 |

*Strength at 5% strain is not available because strain gage failed prior to reaching 5% strain.

| | | | | | |
|---|---|---|---|---|---|
| **Average** | **11.504** | **18.882** | **0.852** | **Average** | **0.0076** |
| **Standard Dev.** | **0.179** | **0.639** | **0.020** | **Standard Dev.** | |
| **Coeff. of Var. [%]** | **1.559** | **3.382** | **2.387** | **Coeff. of Var. [%]** | |
| **Min.** | **11.011** | **17.916** | **0.820** | **Min.** | **0.0073** |
| **Max.** | **11.856** | **19.882** | **0.881** | **Max.** | **0.0080** |
| **Number of Spec.** | **21** | **17** | **21** | **Number of Spec.** | **21** |


In-Plane Shear Properties (IPS)--(CTD)
Measured Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
In-Plane Shear Strength at 0.2% Offset Strain (IPS) [ksi]


In-Plane Shear Properties (IPS)--(CTD)
Measured Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
5.0
10.0
15.0
20.0
25.0
In-Plane Shear Strength at 5% strain (IPS) [ksi]

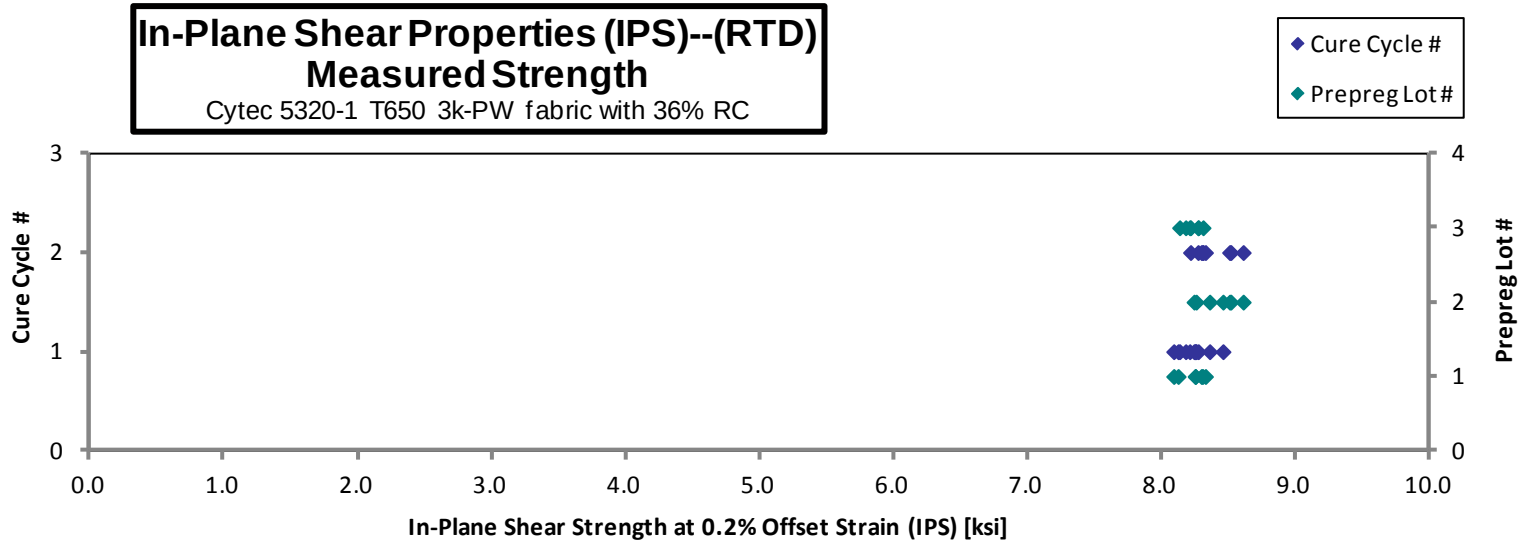

In-Plane Shear Properties (IPS)--(CTD)
Measured Modulus
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
In-Plane Shear Modulus (IPS) [Msi]
0
1
2
3
4
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0

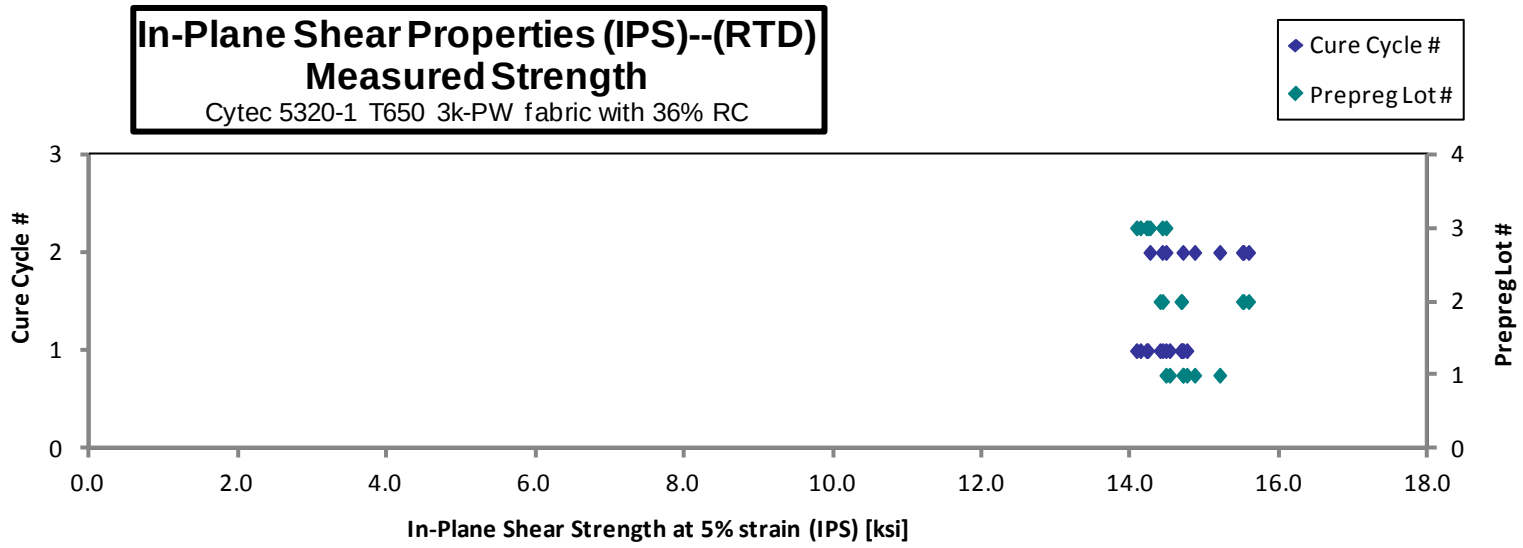
## In-Plane Shear Properties (IPS)--RTD
## Strength & Modulus

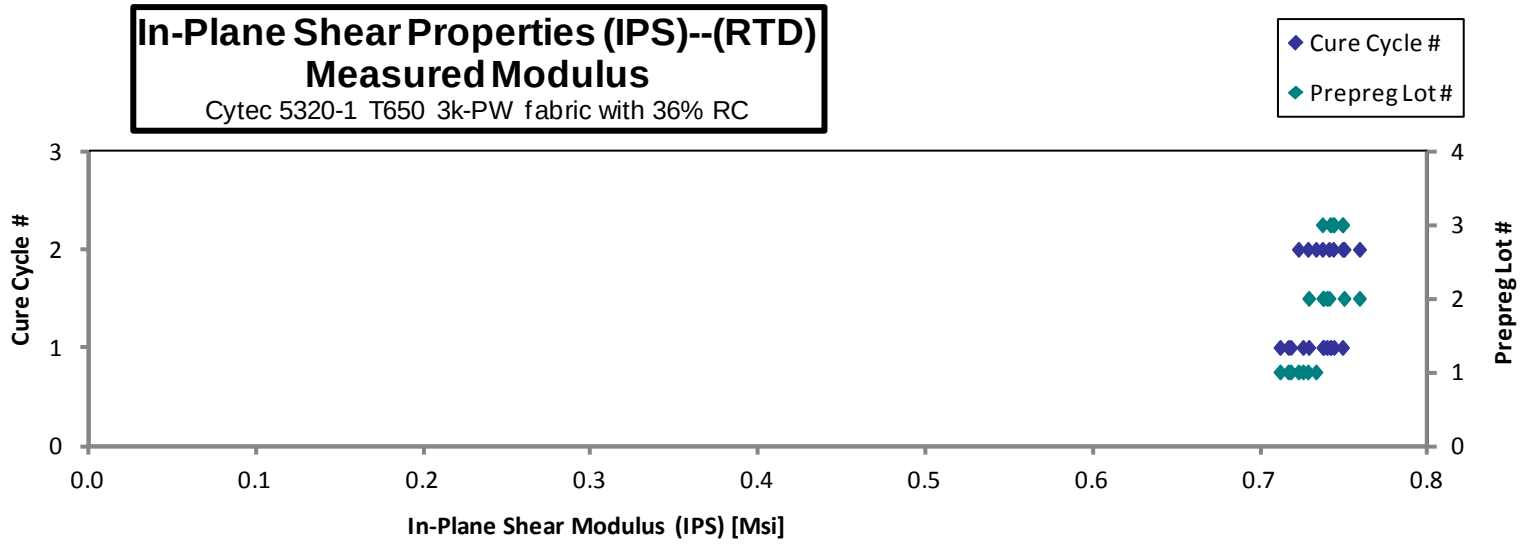
Cytec 5320-1 T650 3k-PW fabric with 36% RC

| Specimen Number | Cytec Batch # | Cytec 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] |
|---|---|---|---|---|---|---|---|---|---|---|
| CUHNA111A | A | C1 | 1 | 1 | 8.256 | 14.697 | 0.725 | 0.092 | 12 | 0.0077 |
| CUHNA112A | A | C1 | 1 | 1 | 8.128 | 14.466 | 0.711 | 0.095 | 12 | 0.0079 |
| CUHNA113A | A | C1 | 1 | 1 | 8.095 | 14.515 | 0.717 | 0.094 | 12 | 0.0078 |
| CUHNA114A | A | C1 | 1 | 1 | 8.255 | 14.747 | 0.716 | 0.095 | 12 | 0.0079 |
| CUHNA211A | A | C2 | 1 | 2 | 8.310 | 14.694 | 0.722 | 0.091 | 12 | 0.0076 |
| CUHNA212A | A | C2 | 1 | 2 | 8.332 | 14.853 | 0.728 | 0.091 | 12 | 0.0076 |
| CUHNA213A | A | C2 | 1 | 2 | 8.301 | 15.189 | 0.733 | 0.092 | 12 | 0.0076 |
| CUHNB111A | B | C1 | 2 | 1 | 8.363 | 14.669 | 0.739 | 0.089 | 12 | 0.0074 |
| CUHNB112A | B | C1 | 2 | 1 | 8.247 | 14.387 | 0.737 | 0.090 | 12 | 0.0075 |
| CUHNB113A | B | C1 | 2 | 1 | 8.263 | 14.421 | 0.737 | 0.090 | 12 | 0.0075 |
| CUHNB114A | B | C1 | 2 | 1 | 8.463 | 14.677 | 0.728 | 0.090 | 12 | 0.0075 |
| CUHNB211A | B | C2 | 2 | 2 | 8.614 | 15.577 | 0.759 | 0.089 | 12 | 0.0074 |
| CUHNB212A | B | C2 | 2 | 2 | 8.512 | 15.494 | 0.749 | 0.089 | 12 | 0.0074 |
| CUHNB213A | B | C2 | 2 | 2 | 8.521 | 15.509 | 0.740 | 0.091 | 12 | 0.0076 |
| CUHNC111A | C | C1 | 3 | 1 | 8.214 | 14.204 | 0.748 | 0.090 | 12 | 0.0075 |
| CUHNC112A | C | C1 | 3 | 1 | 8.278 | 14.221 | 0.741 | 0.092 | 12 | 0.0076 |
| CUHNC113A | C | C1 | 3 | 1 | 8.139 | 14.071 | 0.743 | 0.092 | 12 | 0.0077 |
| CUHNC114A | C | C1 | 3 | 1 | 8.184 | 14.123 | 0.741 | 0.092 | 12 | 0.0077 |
| CUHNC211A | C | C2 | 3 | 2 | 8.220 | 14.251 | 0.748 | 0.089 | 12 | 0.0075 |
| CUHNC212A | C | C2 | 3 | 2 | 8.314 | 14.417 | 0.743 | 0.090 | 12 | 0.0075 |
| CUHNC213A | C | C2 | 3 | 2 | 8.277 | 14.467 | 0.736 | 0.090 | 12 | 0.0075 |

| | | | | | |
|---|---|---|---|---|---|
| **Average** | **8.299** | **14.650** | **0.735** | **Average** | **0.0076** |
| **Standard Dev.** | **0.134** | **0.451** | **0.012** | **Standard Dev.** | |
| **Coeff. of Var. [%]** | **1.612** | **3.081** | **1.664** | **Coeff. of Var. [%]** | |
| **Min.** | **8.095** | **14.071** | **0.711** | **Min.** | **0.0074** |
| **Max.** | **8.614** | **15.577** | **0.759** | **Max.** | **0.0079** |
| **Number of Spec.** | **21** | **21** | **21** | **Number of Spec.** | **21** |


In-Plane Shear Properties (IPS)--(RTD)
Measured Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
In-Plane Shear Strength at 0.2% Offset Strain (IPS) [ksi]


In-Plane Shear Properties (IPS)--(RTD)
Measured Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0
In-Plane Shear Strength at 5% strain (IPS) [ksi]

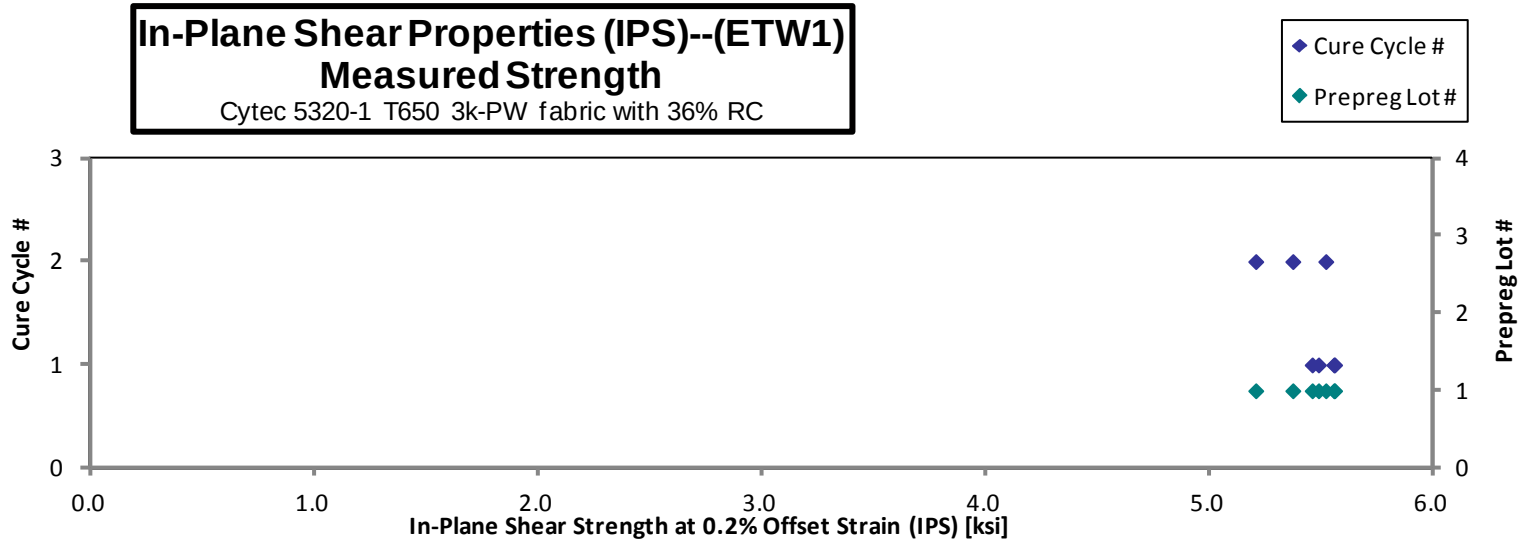

In-Plane Shear Properties (IPS)--(RTD)
Measured Modulus
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
In-Plane Shear Modulus (IPS) [Msi]
0
1
2
3
4
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8

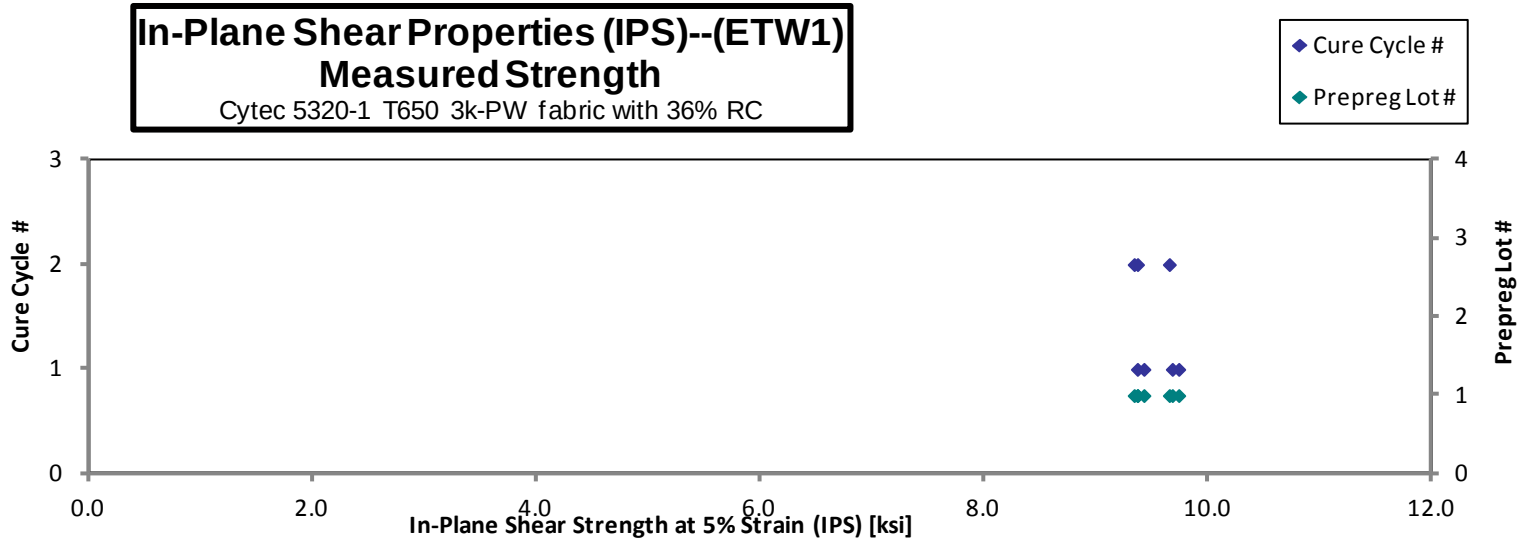
## In-Plane Shear Properties (IPS)--ETW1
## Strength & Modulus

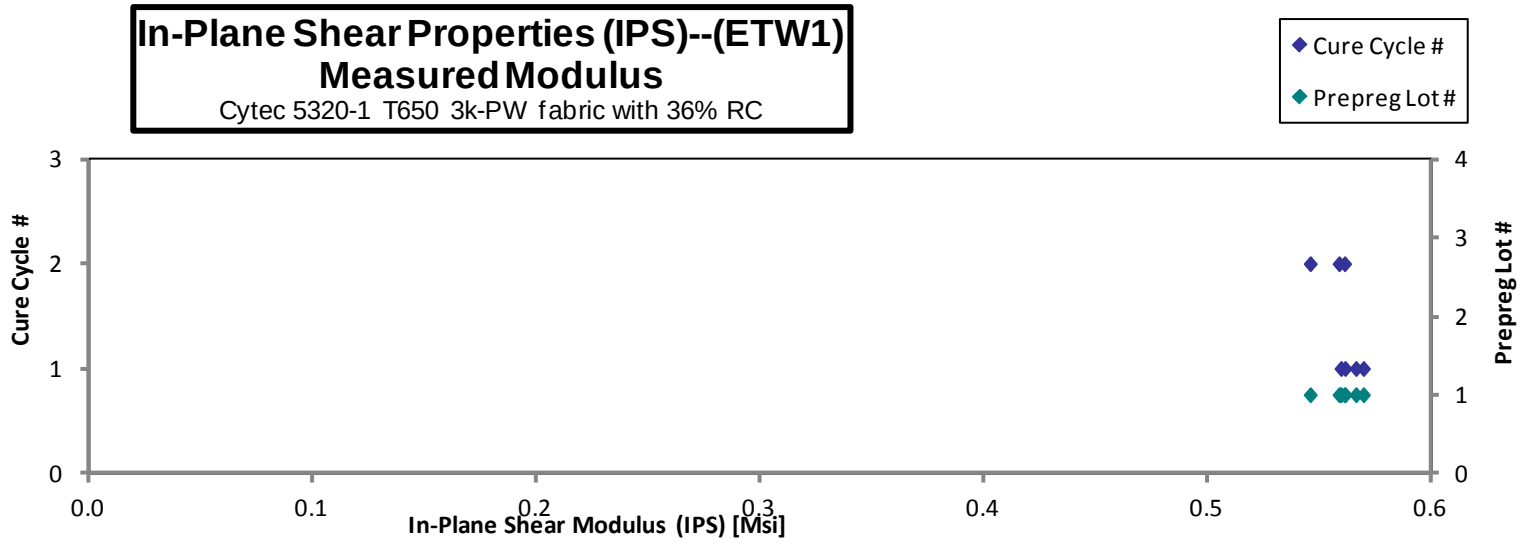
Cytec 5320-1 T650 3k-PW fabric with 36% RC

| Specimen Number | Cytec Batch # | Cytec 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] |
|---|---|---|---|---|---|---|---|---|---|---|
| CUHNA11AD | A | C1 | 1 | 1 | 5.563 | 9.422 | 0.566 | 0.092 | 12 | 0.0076 |
| CUHNA11BD | A | C1 | 1 | 1 | 5.491 | 9.363 | 0.561 | 0.094 | 12 | 0.0078 |
| CUHNA11CD | A | C1 | 1 | 1 | 5.463 | 9.675 | 0.559 | 0.094 | 12 | 0.0078 |
| CUHNA11DD | A | C1 | 1 | 1 | 5.560 | 9.733 | 0.569 | 0.093 | 12 | 0.0078 |
| CUHNA219D | A | C2 | 1 | 2 | 5.211 | 9.364 | 0.545 | 0.092 | 12 | 0.0076 |
| CUHNA21AD | A | C2 | 1 | 2 | 5.376 | 9.335 | 0.561 | 0.092 | 12 | 0.0077 |
| CUHNA21BD | A | C2 | 1 | 2 | 5.524 | 9.649 | 0.558 | 0.092 | 12 | 0.0077 |

| | | | | | |
|---|---|---|---|---|---|
| **Average** | **5.455** | **9.506** | **0.560** | **Average** | **0.0077** |
| **Standard Dev.** | **0.126** | **0.172** | **0.007** | **Standard Dev.** | |
| **Coeff. of Var. [%]** | **2.302** | **1.809** | **1.336** | **Coeff. of Var. [%]** | |
| **Min.** | **5.211** | **9.335** | **0.545** | **Min.** | **0.0076** |
| **Max.** | **5.563** | **9.733** | **0.569** | **Max.** | **0.0078** |
| **Number of Spec.** | **7** | **7** | **7** | **Number of Spec.** | **7** |


In-Plane Shear Properties (IPS)--(ETW1)
Measured Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
1.0
2.0
3.0
4.0
5.0
6.0
In-Plane Shear Strength at 0.2% Offset Strain (IPS) [ksi]


In-Plane Shear Properties (IPS)--(ETW1)
Measured Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
2.0
4.0
6.0
8.0
10.0
12.0
In-Plane Shear Strength at 5% Strain (IPS) [ksi]

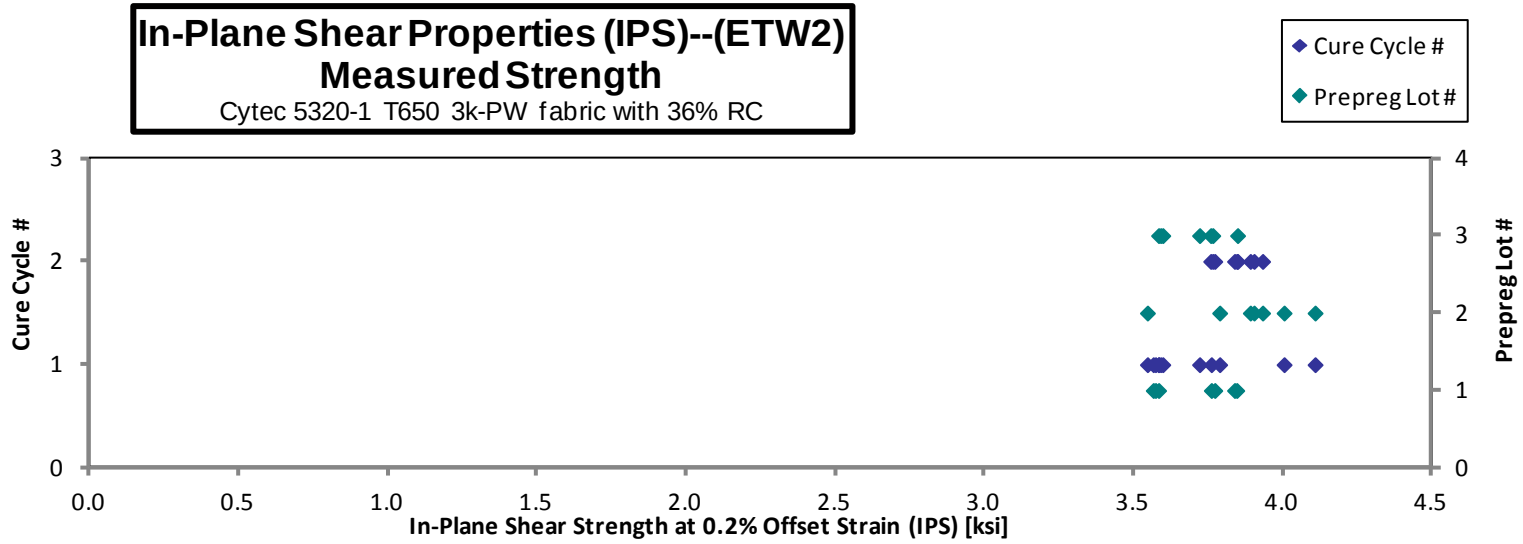

In-Plane Shear Properties (IPS)--(ETW1)
Measured Modulus
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
0.1
0.2
0.3
0.4
0.5
0.6
In-Plane Shear Modulus (IPS) [Msi]

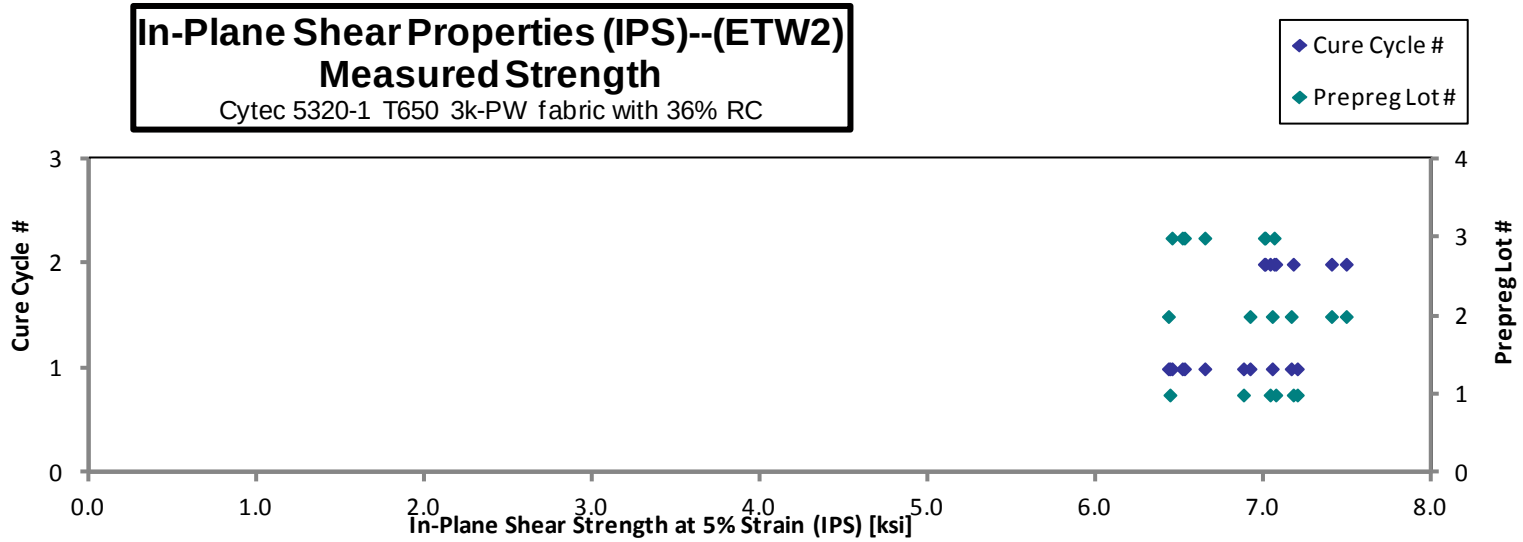
## In-Plane Shear Properties (IPS)--ETW2
## Strength & Modulus
Cytec 5320-1 T650 3k-PW fabric with 36% RC

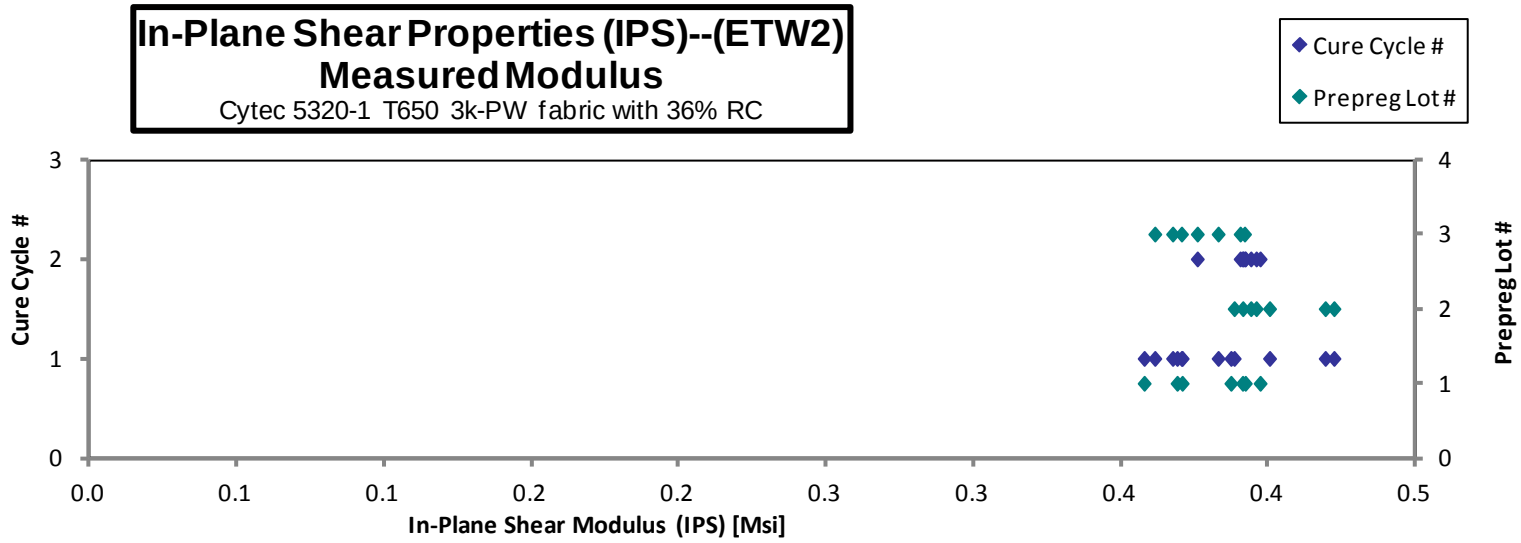
| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | 0.2% Offset Strength [ksi] | Strength at 5% Strain [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Avg. $t_{ply}$ [in] |
|---|---|---|---|---|---|---|---|---|---|---|
| CUHNA11FF | A | C1 | 1 | 1 | 3.583 | 6.436 | 0.371 | 0.094 | 12 | 0.0079 |
| CUHNA11GF | A | C1 | 1 | 1 | 3.760 | 6.874 | 0.387 | 0.094 | 12 | 0.0078 |
| CUHNA11HF* | A | C1 | 1 | 1 | 3.573 | | 0.369 | 0.094 | 12 | 0.0078 |
| CUHNA11IF | A | C1 | 1 | 1 | 3.565 | 7.195 | 0.358 | 0.094 | 12 | 0.0078 |
| CUHNA21EF | A | C2 | 1 | 2 | 3.837 | 7.171 | 0.392 | 0.094 | 12 | 0.0078 |
| CUHNA21FF | A | C2 | 1 | 2 | 3.771 | 7.033 | 0.391 | 0.094 | 12 | 0.0079 |
| CUHNA21GF | A | C2 | 1 | 2 | 3.845 | 7.067 | 0.397 | 0.094 | 12 | 0.0078 |
| CUHNB11DF | B | C1 | 2 | 1 | 4.108 | 6.913 | 0.422 | 0.090 | 12 | 0.0075 |
| CUHNB11EF | B | C1 | 2 | 1 | 3.788 | 7.046 | 0.388 | 0.091 | 12 | 0.0075 |
| CUHNB11FF | B | C1 | 2 | 1 | 3.545 | 6.427 | 0.400 | 0.090 | 12 | 0.0075 |
| CUHNB11GF | B | C1 | 2 | 1 | 4.004 | 7.159 | 0.419 | 0.090 | 12 | 0.0075 |
| CUHNB21DF | B | C2 | 2 | 2 | 3.903 | 7.399 | 0.396 | 0.091 | 12 | 0.0076 |
| CUHNB21EF* | B | C2 | 2 | 2 | 3.890 | | 0.391 | 0.091 | 12 | 0.0076 |
| CUHNB21FF | B | C2 | 2 | 2 | 3.932 | 7.487 | 0.394 | 0.091 | 12 | 0.0076 |
| CUHNC11DF | C | C1 | 3 | 1 | 3.583 | 6.510 | 0.361 | 0.093 | 12 | 0.0078 |
| CUHNC11EF | C | C1 | 3 | 1 | 3.597 | 6.448 | 0.367 | 0.093 | 12 | 0.0077 |
| CUHNC11FF | C | C1 | 3 | 1 | 3.590 | 6.523 | 0.370 | 0.092 | 12 | 0.0077 |
| CUHNC11GF | C | C1 | 3 | 1 | 3.720 | 6.644 | 0.383 | 0.092 | 12 | 0.0077 |
| CUHNC21DF | C | C2 | 3 | 2 | 3.848 | 7.057 | 0.390 | 0.091 | 12 | 0.0075 |
| CUHNC21EF | C | C2 | 3 | 2 | 3.764 | 7.004 | 0.392 | 0.091 | 12 | 0.0076 |
| CUHNC21FF | C | C2 | 3 | 2 | 3.758 | 6.999 | 0.376 | 0.091 | 12 | 0.0076 |

*Strength at 5% strain is not available because strain gage failed prior to reaching 5% strain.

| | | | | | |
|---|---|---|---|---|---|
| **Average** | **3.760** | **6.915** | **0.386** | **Average** | **0.0077** |
| **Standard Dev.** | **0.159** | **0.328** | **0.017** | **Standard Dev.** | |
| **Coeff. of Var. [%]** | **4.238** | **4.737** | **4.359** | **Coeff. of Var. [%]** | |
| **Min.** | **3.545** | **6.427** | **0.358** | **Min.** | **0.0075** |
| **Max.** | **4.108** | **7.487** | **0.422** | **Max.** | **0.0079** |
| **Number of Spec.** | **21** | **19** | **21** | **Number of Spec.** | **21** |


In-Plane Shear Properties (IPS)--(ETW2)
Measured Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
In-Plane Shear Strength at 0.2% Offset Strain (IPS) [ksi]


In-Plane Shear Properties (IPS)--(ETW2)
Measured Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
In-Plane Shear Strength at 5% Strain (IPS) [ksi]


In-Plane Shear Properties (IPS)--(ETW2)
Measured Modulus
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
In-Plane Shear Modulus (IPS) [Msi]
0
1
2
3
4
0.0
0.1
0.1
0.2
0.2
0.3
0.3
0.4
0.4
0.5

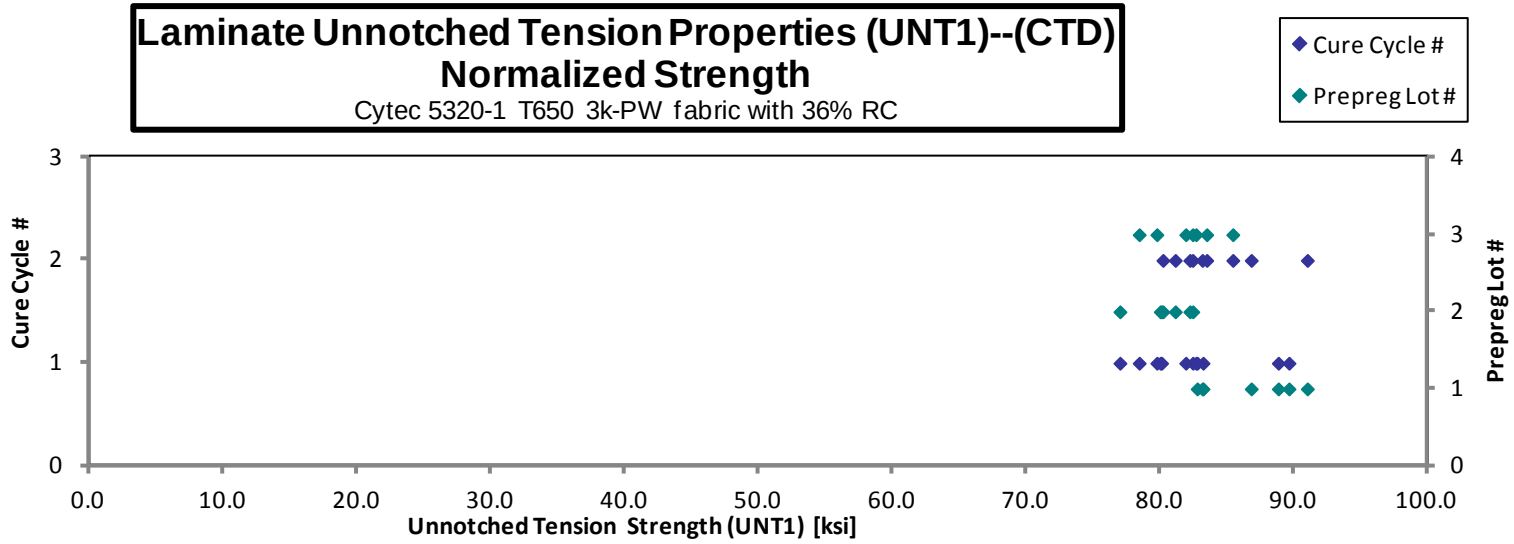
# 4.6 "25/50/25" Unnotched Tension 1 Properties (UNT1)

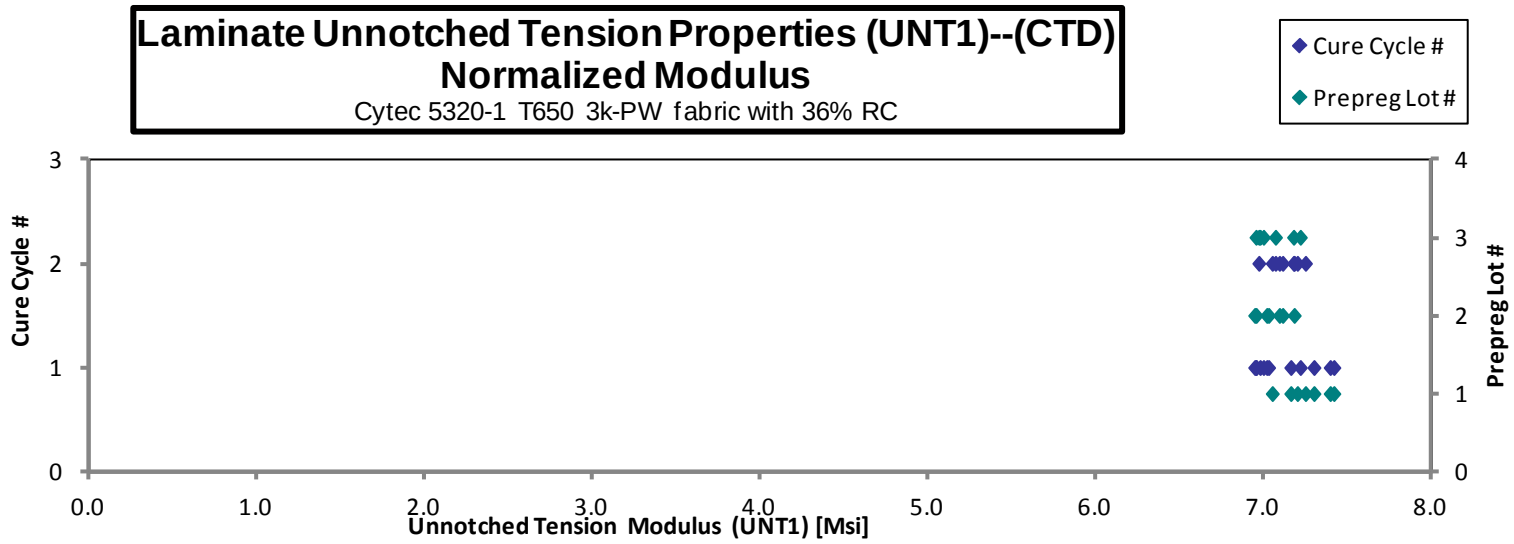
**Laminate Unnotched Tension Properties (UNT1)--CTD**
**Strength & Modulus**
Cytec 5320-1 T650 3k-PW fabric with 36% RC

normalizing $t_{ply}$ [in]: 0.0077

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] | $Modulus_{norm}$ [Msi] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CUHAA115B | A | C1 | 1 | 1 | 82.539 | 7.239 | 0.124 | 16 | LWB | 0.0078 | 83.175 | 7.294 |
| CUHAA116B | A | C1 | 1 | 1 | 87.602 | 7.291 | 0.125 | 16 | LWB | 0.0078 | 88.799 | 7.391 |
| CUHAA117B | A | C1 | 1 | 1 | 87.777 | 7.263 | 0.126 | 16 | LWT | 0.0079 | 89.594 | 7.413 |
| CUHAA118B | A | C1 | 1 | 1 | 81.904 | 7.084 | 0.124 | 16 | LGM | 0.0078 | 82.735 | 7.156 |
| CUHAA215B | A | C2 | 1 | 2 | 90.904 | 7.239 | 0.123 | 16 | LGM | 0.0077 | 90.966 | 7.244 |
| CUHAA216B | A | C2 | 1 | 2 | 86.623 | 7.183 | 0.123 | 16 | LWB | 0.0077 | 86.776 | 7.195 |
| CUHAA217B | A | C2 | 1 | 2 | 83.085 | 7.043 | 0.123 | 16 | LGM | 0.0077 | 83.119 | 7.046 |
| CUHAB117B | B | C1 | 2 | 1 | 78.559 | 7.170 | 0.121 | 16 | LWB | 0.0075 | 76.964 | 7.024 |
| CUHAB118B | B | C1 | 2 | 1 | 81.564 | 7.144 | 0.121 | 16 | LWT | 0.0076 | 80.075 | 7.013 |
| CUHAB119B | B | C1 | 2 | 1 | 81.750 | 7.095 | 0.121 | 16 | LGM | 0.0075 | 79.981 | 6.941 |
| CUHAB11AB | B | C1 | 2 | 1 | 85.054 | 7.173 | 0.119 | 16 | LGM | 0.0075 | 82.408 | 6.950 |
| CUHAB216B | B | C2 | 2 | 2 | 82.132 | 7.198 | 0.122 | 16 | LGM | 0.0076 | 81.099 | 7.108 |
| CUHAB217B | B | C2 | 2 | 2 | 83.280 | 7.272 | 0.122 | 16 | LGM | 0.0076 | 82.187 | 7.177 |
| CUHAB218B | B | C2 | 2 | 2 | 81.108 | 7.171 | 0.122 | 16 | LGM | 0.0076 | 80.175 | 7.088 |
| CUHCC117B | C | C1 | 3 | 1 | 82.158 | 6.932 | 0.124 | 16 | LGM | 0.0077 | 82.647 | 6.973 |
| CUHCC118B | C | C1 | 3 | 1 | 77.669 | 7.145 | 0.124 | 16 | LGM | 0.0078 | 78.404 | 7.213 |
| CUHCC119B | C | C1 | 3 | 1 | 81.749 | 6.938 | 0.123 | 16 | LGM | 0.0077 | 81.882 | 6.949 |
| CUHCC11AB | C | C1 | 3 | 1 | 80.047 | 7.022 | 0.123 | 16 | LGM | 0.0077 | 79.722 | 6.993 |
| CUHAC216B | C | C2 | 3 | 2 | 83.937 | 7.215 | 0.122 | 16 | LGM | 0.0077 | 83.449 | 7.173 |
| CUHAC217B | C | C2 | 3 | 2 | 85.665 | 7.087 | 0.123 | 16 | LGM | 0.0077 | 85.398 | 7.065 |
| CUHAC218B | C | C2 | 3 | 2 | 82.958 | 7.013 | 0.122 | 16 | LGM | 0.0076 | 82.396 | 6.966 |

| | Strength [ksi] | Modulus [Msi] | | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] | $Modulus_{norm}$ [Msi] |
|---|---|---|---|---|---|---|
| Average | 83.241 | 7.139 | $Average_{norm}$ | 0.0077 | 82.950 | 7.113 |
| Standard Dev. | 3.156 | 0.105 | $Standard\ Dev._{norm}$ | | 3.613 | 0.143 |
| Coeff. of Var. [%] | 3.791 | 1.470 | $Coeff.\ of\ Var.\ [\%]_{norm}$ | | 4.356 | 2.007 |
| Min. | 77.669 | 6.932 | Min. | 0.0075 | 76.964 | 6.941 |
| Max. | 90.904 | 7.291 | Max. | 0.0079 | 90.966 | 7.413 |
| Number of Spec. | 21 | 21 | Number of Spec. | 21 | 21 | 21 |


Laminate Unnotched Tension Properties (UNT1)--(CTD)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
Unnotched Tension Strength (UNT1) [ksi]


Laminate Unnotched Tension Properties (UNT1)--(CTD)
Normalized Modulus
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
Unnotched Tension Modulus (UNT1) [Msi]

## Laminate Unnotched Tension Properties (UNT1)--RTD
## Strength & Modulus

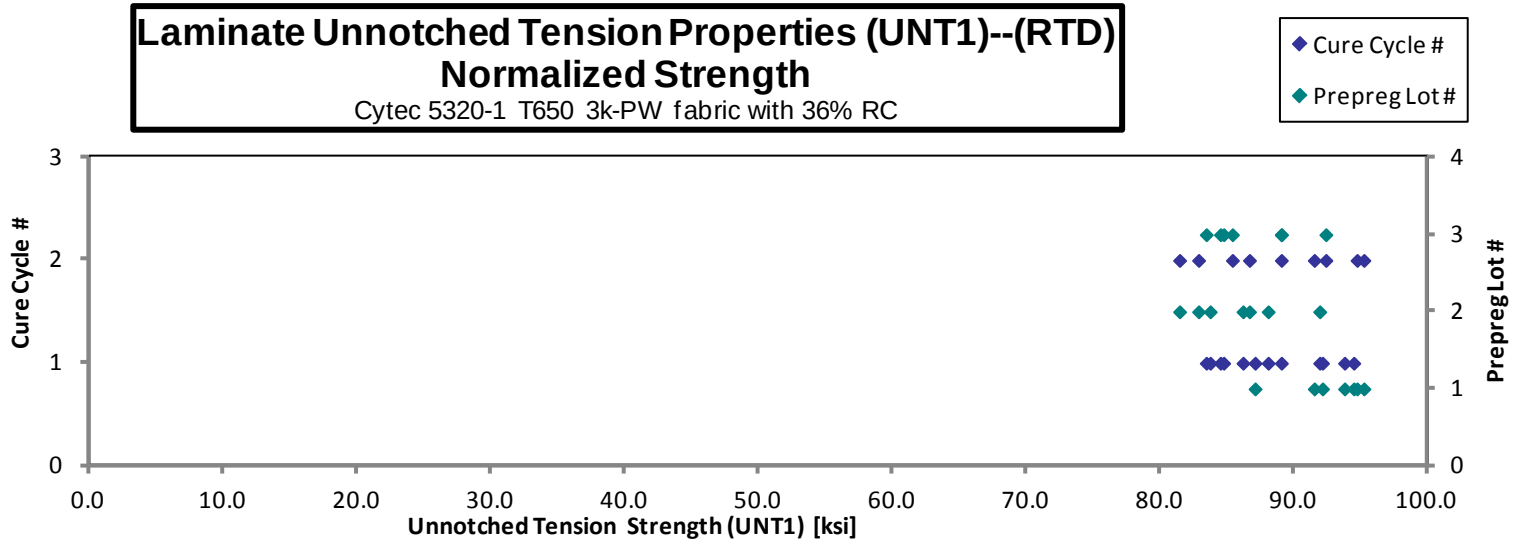
Cytec 5320-1 T650 3k-PW fabric with 36% RC

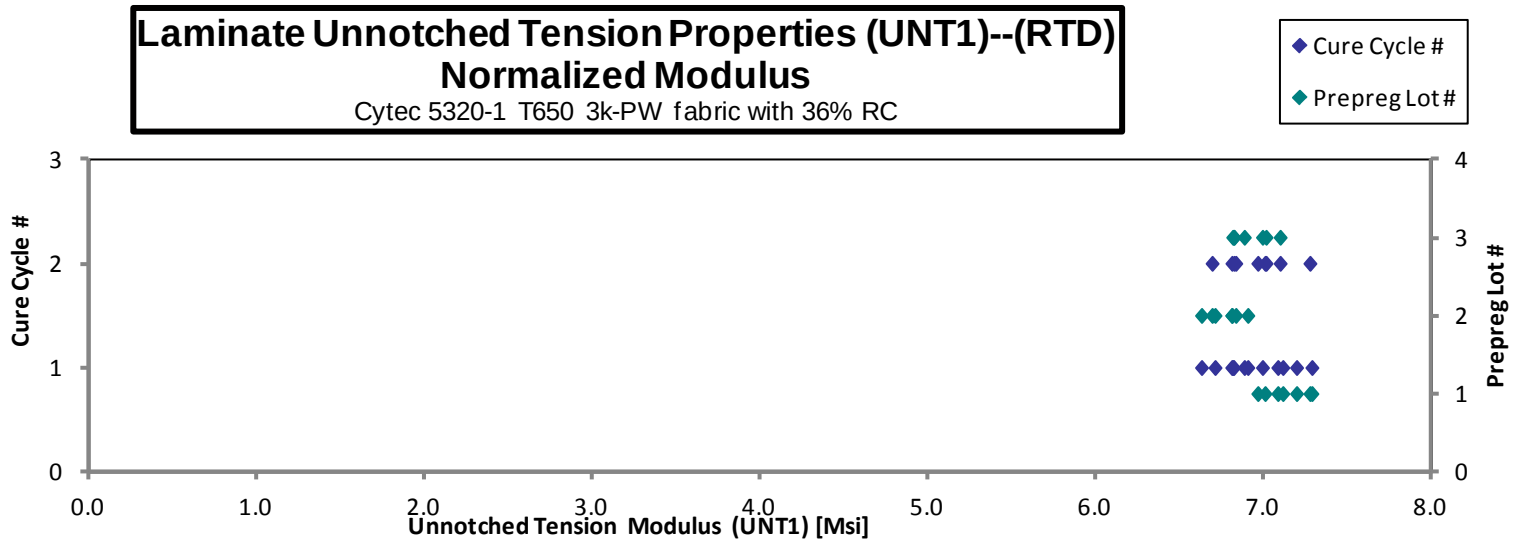
normalizing $t_{ply}$ [in]: 0.0077

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] | $Modulus_{norm}$ [Msi] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CUHAA111A* | A | C1 | 1 | 1 | 92.086 | 7.281 | 0.123 | 16 | LGM | 0.0077 | 92.099 | 7.282 |
| CUHAA112A* | A | C1 | 1 | 1 | 93.344 | 7.160 | 0.124 | 16 | LWT | 0.0077 | 93.748 | 7.191 |
| CUHAA113A | A | C1 | 1 | 1 | 93.448 | 7.035 | 0.125 | 16 | LWT | 0.0078 | 94.435 | 7.109 |
| CUHAA114A | A | C1 | 1 | 1 | 85.911 | 6.985 | 0.125 | 16 | LGM | 0.0078 | 87.062 | 7.079 |
| CUHAA211A | A | C2 | 1 | 2 | 92.487 | 7.079 | 0.122 | 16 | LWT | 0.0076 | 91.486 | 7.003 |
| CUHAA212A | A | C2 | 1 | 2 | 95.892 | 7.324 | 0.122 | 16 | LGM | 0.0076 | 95.192 | 7.270 |
| CUHAA213A | A | C2 | 1 | 2 | 95.626 | 7.029 | 0.122 | 16 | LGM | 0.0076 | 94.681 | 6.960 |
| CUHAB111A | B | C1 | 2 | 1 | 90.202 | 6.787 | 0.120 | 16 | LGM | 0.0075 | 88.042 | 6.624 |
| CUHAB112A | B | C1 | 2 | 1 | 94.224 | 7.075 | 0.120 | 16 | LGM | 0.0075 | 91.892 | 6.900 |
| CUHAB113A | B | C1 | 2 | 1 | 87.799 | 6.934 | 0.121 | 16 | LWT | 0.0076 | 86.160 | 6.805 |
| CUHAB114A | B | C1 | 2 | 1 | 84.788 | 6.791 | 0.122 | 16 | LGM | 0.0076 | 83.709 | 6.705 |
| CUHAB211A | B | C2 | 2 | 2 | 84.709 | 6.982 | 0.120 | 16 | LWB | 0.0075 | 82.841 | 6.828 |
| CUHAB212A | B | C2 | 2 | 2 | 88.108 | 6.921 | 0.121 | 16 | LAT/LAB | 0.0076 | 86.642 | 6.806 |
| CUHAB213A | B | C2 | 2 | 2 | 82.143 | 6.747 | 0.122 | 16 | LWB | 0.0076 | 81.421 | 6.687 |
| CUHAC111A | C | C1 | 3 | 1 | 85.129 | 6.913 | 0.123 | 16 | LGM | 0.0077 | 84.714 | 6.879 |
| CUHAC112A | C | C1 | 3 | 1 | 88.524 | 6.948 | 0.124 | 16 | LGM | 0.0077 | 89.027 | 6.988 |
| CUHAC113A | C | C1 | 3 | 1 | 83.717 | 6.754 | 0.124 | 16 | LWT | 0.0078 | 84.476 | 6.816 |
| CUHAC114A | C | C1 | 3 | 1 | 82.258 | 6.716 | 0.125 | 16 | LGM | 0.0078 | 83.416 | 6.810 |
| CUHAC211A | C | C2 | 3 | 2 | 90.295 | 7.194 | 0.121 | 16 | LGM | 0.0076 | 89.025 | 7.093 |
| CUHAC212A | C | C2 | 3 | 2 | 85.938 | 6.864 | 0.122 | 16 | LAT | 0.0076 | 85.368 | 6.818 |
| CUHAC213A | C | C2 | 3 | 2 | 93.682 | 7.110 | 0.121 | 16 | LWT | 0.0076 | 92.351 | 7.009 |

*Strain measurement was measured with SG. Extensometer used on other coupons.

| | | | | | |
|---|---|---|---|---|---|
| **Average** | **89.062** | **6.982** | **$Average_{norm}$** | **0.0076** | **88.466** | **6.936** |
| **Standard Dev.** | **4.455** | **0.173** | **$Standard\ Dev._{norm}$** | | **4.341** | **0.186** |
| **Coeff. of Var. [%]** | **5.002** | **2.482** | **$Coeff.\ of\ Var.\ [\%]_{norm}$** | | **4.907** | **2.680** |
| **Min.** | **82.143** | **6.716** | **Min.** | **0.0075** | **81.421** | **6.624** |
| **Max.** | **95.892** | **7.324** | **Max.** | **0.0078** | **95.192** | **7.282** |
| **Number of Spec.** | **21** | **21** | **Number of Spec.** | **21** | **21** | **21** |


Laminate Unnotched Tension Properties (UNT1)--(RTD)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
Unnotched Tension Strength (UNT1) [ksi]


Laminate Unnotched Tension Properties (UNT1)--(RTD)
Normalized Modulus
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
Unnotched Tension Modulus (UNT1) [Msi]

## Laminate Unnotched Tension Properties (UNT1)--ETW1
## Strength & Modulus

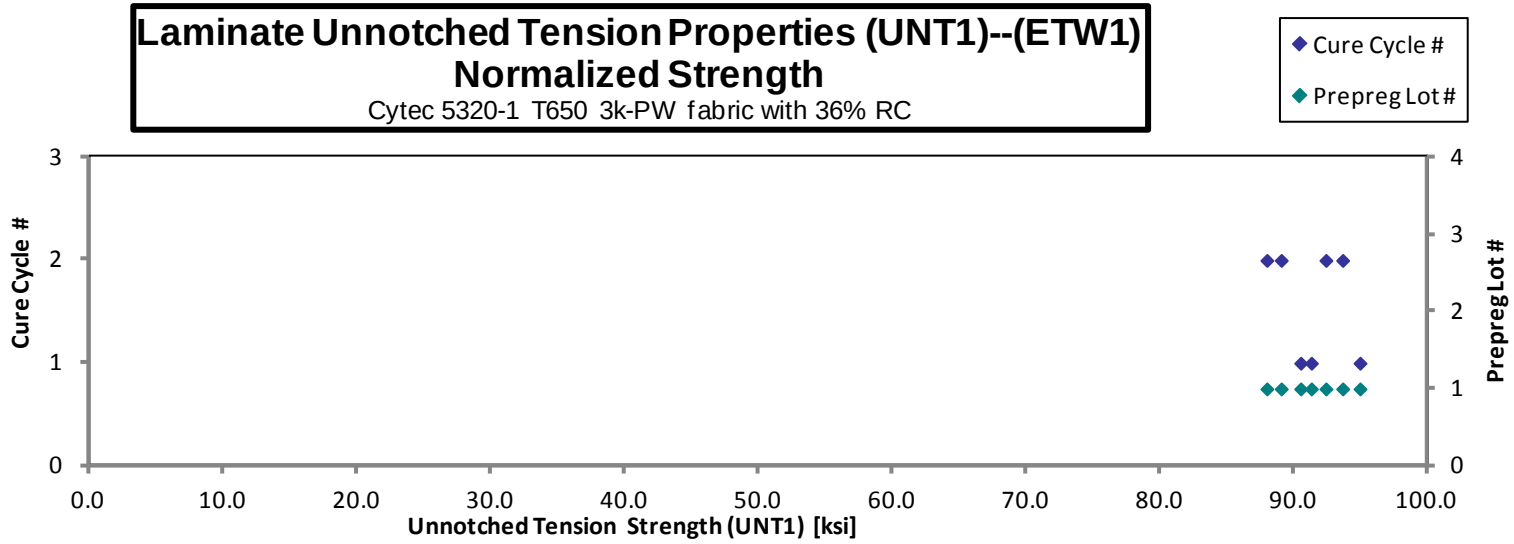
Cytec 5320-1 T650 3k-PW fabric with 36% RC

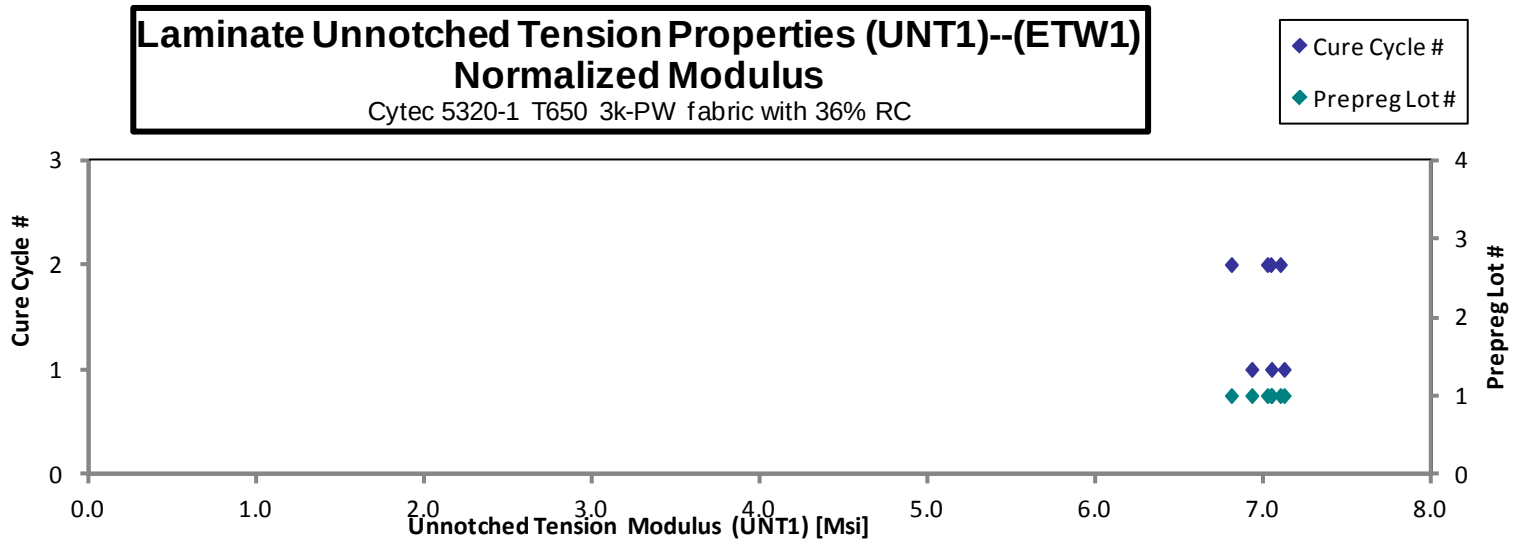
| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] | $Modulus_{norm}$ [Msi] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CUHAA119D | A | C1 | 1 | 1 | 89.610 | 6.975 | 0.124 | 16 | LGM | 0.0078 | 90.471 | 7.042 |
| CUHAA11AD | A | C1 | 1 | 1 | 95.108 | 6.939 | 0.123 | 16 | LGM | 0.0077 | 94.902 | 6.924 |
| CUHAA11BD | A | C1 | 1 | 1 | 90.800 | 7.080 | 0.124 | 16 | LGM | 0.0077 | 91.267 | 7.117 |
| CUHAA219D | A | C2 | 1 | 2 | 88.313 | 7.046 | 0.123 | 16 | LGM | 0.0077 | 87.943 | 7.017 |
| CUHAA21AD | A | C2 | 1 | 2 | 93.213 | 7.160 | 0.122 | 16 | LWT/ LWB | 0.0076 | 92.355 | 7.094 |
| CUHAA21BD | A | C2 | 1 | 2 | 94.001 | 7.067 | 0.123 | 16 | LWT | 0.0077 | 93.606 | 7.037 |
| CUHAA21CD | A | C2 | 1 | 2 | 89.368 | 6.829 | 0.123 | 16 | LGM | 0.0077 | 89.017 | 6.802 |

| | | | |
|---|---|---|---|
| **Average** | **91.488** | **7.014** | |
| **Standard Dev.** | **2.613** | **0.109** | |
| **Coeff. of Var. [%]** | **2.856** | **1.550** | |
| **Min.** | **88.313** | **6.829** | |
| **Max.** | **95.108** | **7.160** | |
| **Number of Spec.** | **7** | **7** | |

| | | | |
|---|---|---|---|
| **$Average_{norm}$** | **0.0077** | **91.366** | **7.005** |
| **Standard $Dev._{norm}$** | | **2.468** | **0.108** |
| **Coeff. of Var. $[\%]_{norm}$** | | **2.701** | **1.549** |
| **Min.** | **0.0076** | **87.943** | **6.802** |
| **Max.** | **0.0078** | **94.902** | **7.117** |
| **Number of Spec.** | **7** | **7** | **7** |


Laminate Unnotched Tension Properties (UNT1)--(ETW1)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
Unnotched Tension Strength (UNT1) [ksi]


Laminate Unnotched Tension Properties (UNT1)--(ETW1)
Normalized Modulus
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
Unnotched Tension Modulus (UNT1) [Msi]

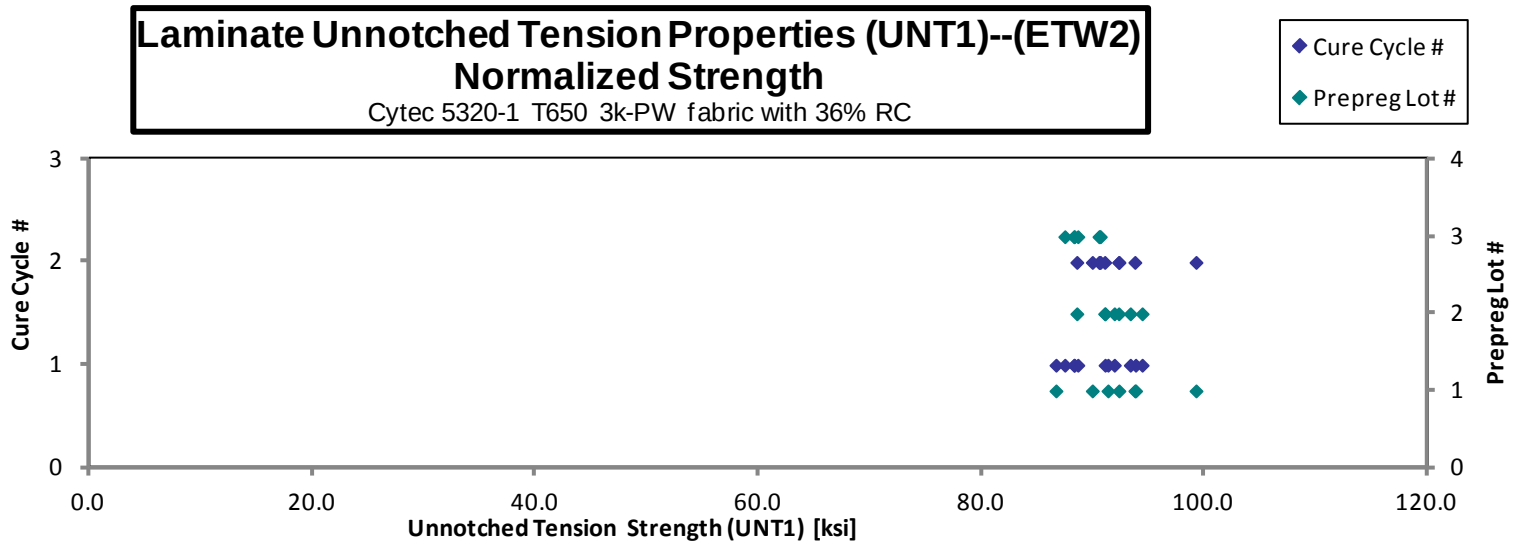
## Laminate Unnotched Tension Properties (UNT1)--ETW2
## Strength & Modulus

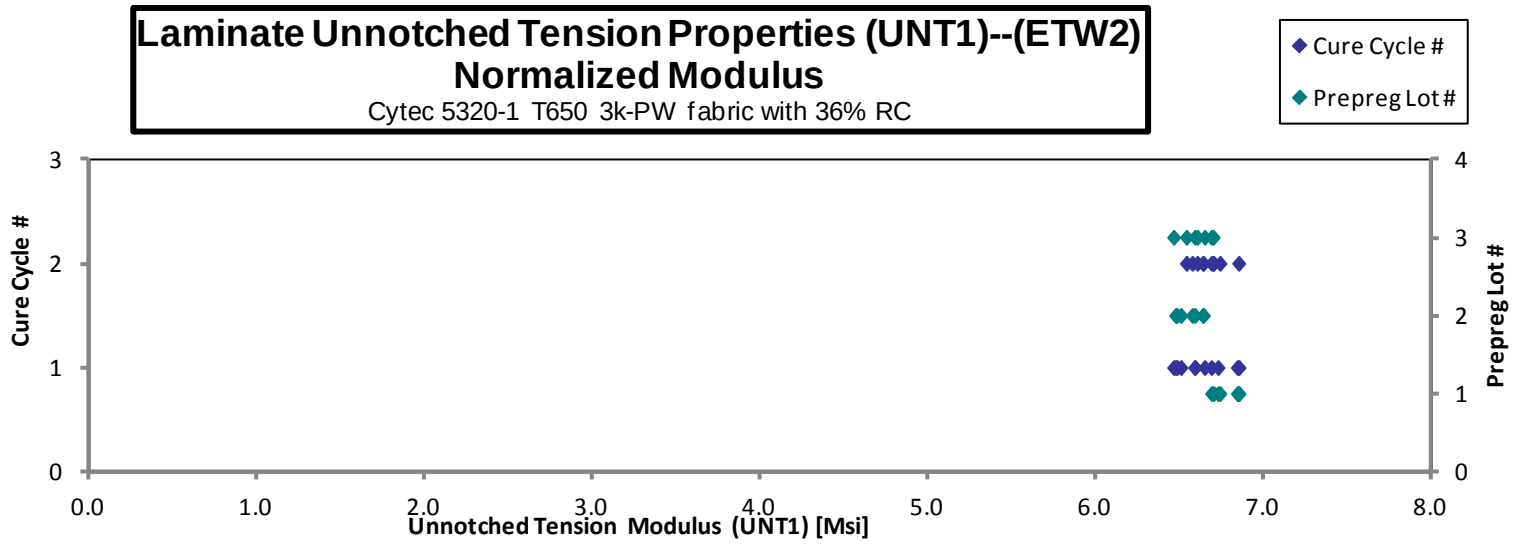
Cytec 5320-1 T650 3k-PW fabric with 36% RC

normalizing $t_{ply}$ [in]: 0.0077

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] | $Modulus_{norm}$ [Msi] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CUHAA11EF | A | C1 | 1 | 1 | 92.556 | 6.637 | 0.125 | 16 | LGM | 0.0078 | 93.758 | 6.723 |
| CUHAA11FF | A | C1 | 1 | 1 | 89.373 | 6.704 | 0.126 | 16 | LGM | 0.0079 | 91.283 | 6.847 |
| CUHAA11GF | A | C1 | 1 | 1 | 85.488 | 6.748 | 0.125 | 16 | LGM | 0.0078 | 86.621 | 6.838 |
| CUHAA21EF | A | C2 | 1 | 2 | 93.720 | 6.686 | 0.123 | 16 | LWT | 0.0077 | 93.695 | 6.684 |
| CUHAA21FF | A | C2 | 1 | 2 | 92.542 | 6.866 | 0.123 | 16 | LGM | 0.0077 | 92.267 | 6.846 |
| CUHAA21GF | A | C2 | 1 | 2 | 98.804 | 6.709 | 0.124 | 16 | LGM | 0.0077 | 99.178 | 6.734 |
| CUHAA21HF | A | C2 | 1 | 2 | 89.240 | 6.649 | 0.124 | 16 | LWB/LGM | 0.0078 | 89.880 | 6.696 |
| CUHAB11DF | B | C1 | 2 | 1 | 94.787 | 6.690 | 0.121 | 16 | LWT/LGM | 0.0076 | 93.286 | 6.584 |
| CUHAB11EF | B | C1 | 2 | 1 | 96.183 | 6.628 | 0.121 | 16 | LWT/LWB | 0.0076 | 94.348 | 6.502 |
| CUHAB11FF | B | C1 | 2 | 1 | 92.920 | 6.605 | 0.121 | 16 | LGM | 0.0075 | 91.022 | 6.470 |
| CUHAB11GF | B | C1 | 2 | 1 | 93.590 | 6.601 | 0.121 | 16 | LWB/LWT | 0.0076 | 91.855 | 6.478 |
| CUHAB21BF | B | C2 | 2 | 2 | 93.231 | 6.639 | 0.122 | 16 | LWB/LWT | 0.0076 | 92.247 | 6.569 |
| CUHAB21CF | B | C2 | 2 | 2 | 89.435 | 6.706 | 0.122 | 16 | LGM | 0.0076 | 88.492 | 6.635 |
| CUHAB21DF | B | C2 | 2 | 2 | 91.812 | 6.692 | 0.122 | 16 | LGM | 0.0076 | 90.992 | 6.632 |
| CUHAC11EF | C | C1 | 3 | 1 | 86.583 | 6.522 | 0.124 | 16 | LGM | 0.0078 | 87.414 | 6.585 |
| CUHAC11FF | C | C1 | 3 | 1 | 86.857 | 6.539 | 0.125 | 16 | LGM | 0.0078 | 88.232 | 6.643 |
| CUHAC11GF | C | C1 | 3 | 1 | 86.901 | 6.580 | 0.125 | 16 | LGM | 0.0078 | 88.264 | 6.683 |
| CUHAC11HF | C | C1 | 3 | 1 | 88.307 | 6.438 | 0.124 | 16 | LGM | 0.0077 | 88.582 | 6.458 |
| CUHAC21BF | C | C2 | 3 | 2 | 90.650 | 6.543 | 0.123 | 16 | LGM | 0.0077 | 90.527 | 6.534 |
| CUHAC21CF | C | C2 | 3 | 2 | 90.572 | 6.692 | 0.123 | 16 | LWB/LWT | 0.0077 | 90.596 | 6.694 |
| CUHAC21DF | C | C2 | 3 | 2 | 90.220 | 6.581 | 0.124 | 16 | LGM | 0.0077 | 90.477 | 6.599 |

| | | | | | |
|---|---|---|---|---|---|
| **Average** | **91.132** | **6.641** | **$Average_{norm}$** | **0.0077** | **91.096** | **6.640** |
| **Standard Dev.** | **3.393** | **0.092** | **$Standard\ Dev._{norm}$** | | **2.857** | **0.119** |
| **Coeff. of Var. [%]** | **3.723** | **1.390** | **Coeff. of Var. [%]$_{norm}$** | | **3.136** | **1.786** |
| **Min.** | **85.488** | **6.438** | **Min.** | **0.0075** | **86.621** | **6.458** |
| **Max.** | **98.804** | **6.866** | **Max.** | **0.0079** | **99.178** | **6.847** |
| **Number of Spec.** | **21** | **21** | **Number of Spec.** | **21** | **21** | **21** |


Laminate Unnotched Tension Properties (UNT1)--(ETW2)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
20.0
40.0
60.0
80.0
100.0
120.0
Unnotched Tension Strength (UNT1) [ksi]


Laminate Unnotched Tension Properties (UNT1)--(ETW2)
Normalized Modulus
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
Unnotched Tension Modulus (UNT1) [Msi]

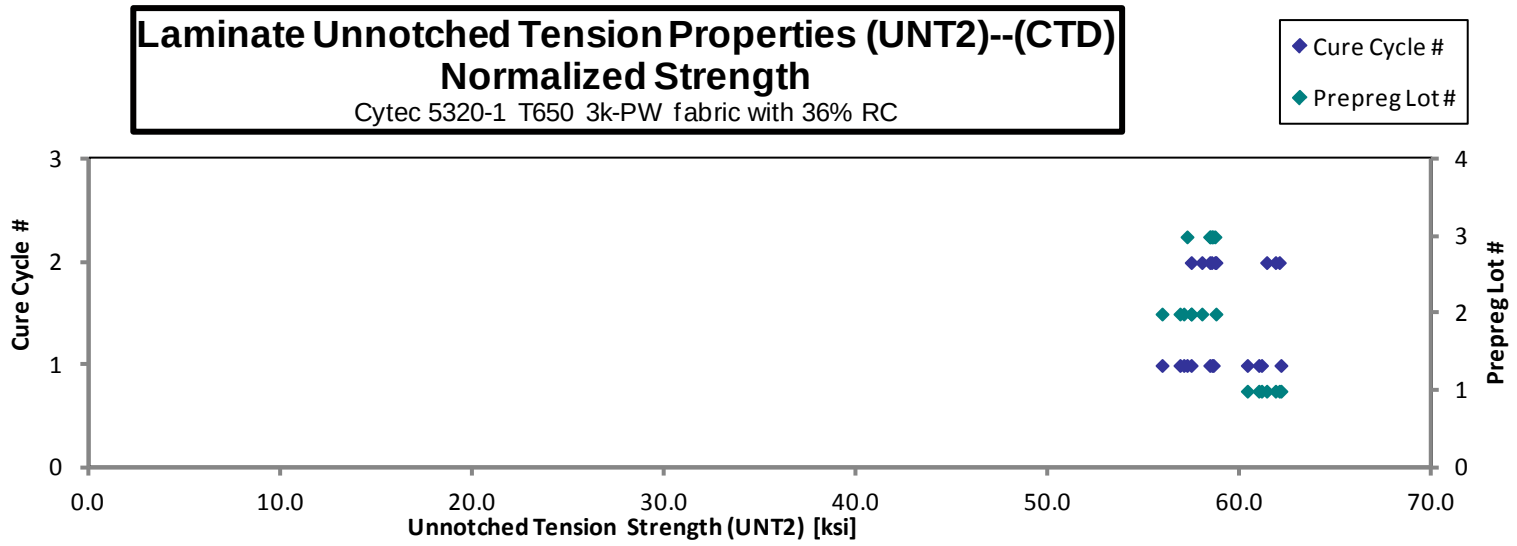
# 4.7 "10/80/10" Unnotched Tension 2 Properties (UNT2)

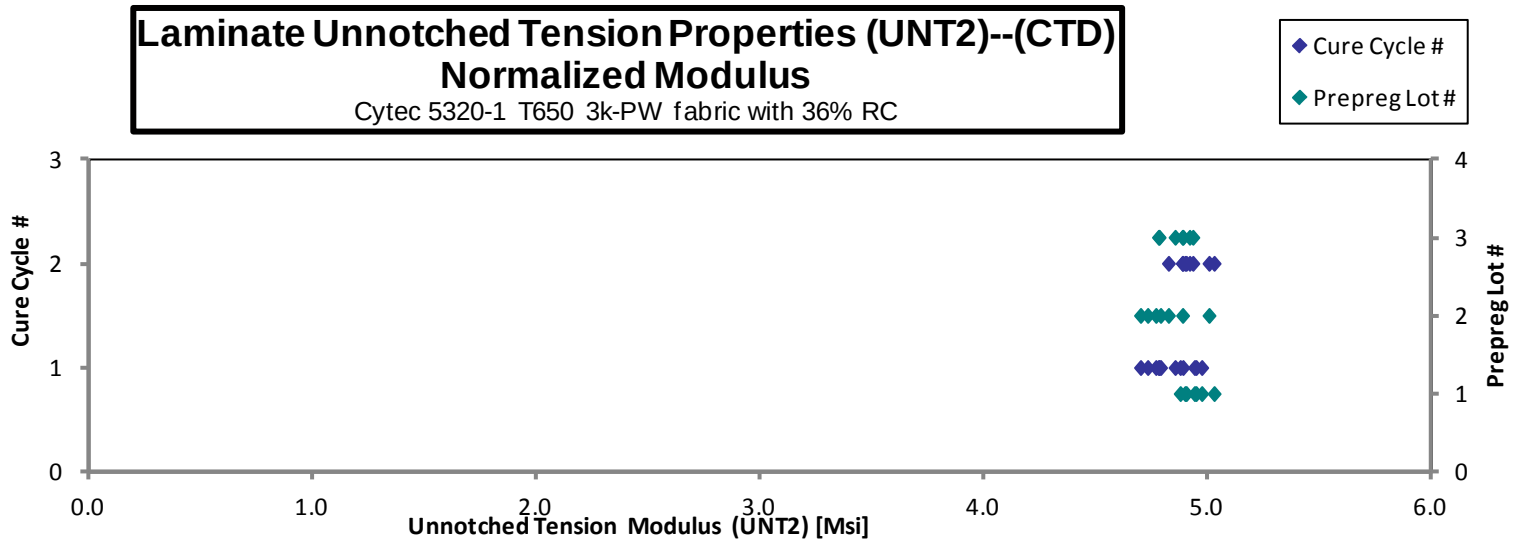
**Laminate Unnotched Tension Properties (UNT2) --CTD**
**Strength & Modulus**
Cytec 5320-1 T650 3k-PW fabric with 36% RC

normalizing $t_{ply}$ [in]: 0.0077

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] | $Modulus_{norm}$ [Msi] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CUHBA117B | A | C1 | 1 | 1 | 61.782 | 4.911 | 0.155 | 20 | AWT | 0.0077 | 62.102 | 4.937 |
| CUHBA118B | A | C1 | 1 | 1 | 60.314 | 4.918 | 0.156 | 20 | LGM | 0.0078 | 60.947 | 4.969 |
| CUHBA119B | A | C1 | 1 | 1 | 60.340 | 4.883 | 0.156 | 20 | LGM | 0.0078 | 61.091 | 4.944 |
| CUHBA11AB | A | C1 | 1 | 1 | 60.350 | 4.873 | 0.154 | 20 | AGM | 0.0077 | 60.350 | 4.873 |
| CUHBA216B | A | C2 | 1 | 2 | 61.625 | 4.869 | 0.155 | 20 | AGM | 0.0077 | 62.018 | 4.900 |
| CUHBA217B | A | C2 | 1 | 2 | 61.258 | 4.886 | 0.154 | 20 | LGM | 0.0077 | 61.358 | 4.894 |
| CUHBA218B | A | C2 | 1 | 2 | 61.811 | 5.024 | 0.154 | 20 | LGM | 0.0077 | 61.818 | 5.025 |
| CUHBB117B | B | C1 | 2 | 1 | 57.833 | 4.810 | 0.151 | 20 | LGM | 0.0076 | 56.838 | 4.728 |
| CUHBB118B | B | C1 | 2 | 1 | 59.018 | 4.918 | 0.150 | 20 | LWT | 0.0075 | 57.421 | 4.785 |
| CUHBB119B | B | C1 | 2 | 1 | 57.453 | 4.826 | 0.150 | 20 | LGM | 0.0075 | 55.905 | 4.696 |
| CUHBB11AB | B | C1 | 2 | 1 | 59.240 | 4.948 | 0.148 | 20 | LGM | 0.0074 | 57.035 | 4.764 |
| CUHBB216B | B | C2 | 2 | 2 | 59.139 | 4.917 | 0.151 | 20 | LGM | 0.0075 | 57.980 | 4.820 |
| CUHBB217B | B | C2 | 2 | 2 | 58.469 | 5.093 | 0.151 | 20 | LWB | 0.0076 | 57.425 | 5.002 |
| CUHBB218B | B | C2 | 2 | 2 | 59.625 | 4.959 | 0.152 | 20 | LGM | 0.0076 | 58.715 | 4.884 |
| CUHBC117B | C | C1 | 3 | 1 | 58.527 | 4.896 | 0.154 | 20 | LGM | 0.0077 | 58.393 | 4.885 |
| CUHBC118B | C | C1 | 3 | 1 | 59.064 | 4.896 | 0.153 | 20 | LWT | 0.0076 | 58.508 | 4.850 |
| CUHBC119B | C | C1 | 3 | 1 | 59.094 | 4.821 | 0.153 | 20 | AWT | 0.0076 | 58.576 | 4.779 |
| CUHBC11AB | C | C1 | 3 | 1 | 58.401 | 4.876 | 0.151 | 20 | LWT | 0.0075 | 57.207 | 4.776 |
| CUHBC216B | C | C2 | 3 | 2 | 58.291 | 4.852 | 0.155 | 20 | LGM | 0.0077 | 58.663 | 4.883 |
| CUHBC217B | C | C2 | 3 | 2 | 58.344 | 4.903 | 0.154 | 20 | LWB | 0.0077 | 58.489 | 4.915 |
| CUHBC218B | C | C2 | 3 | 2 | 58.478 | 4.936 | 0.154 | 20 | LGM | 0.0077 | 58.396 | 4.929 |

| | | | | | |
|---|---|---|---|---|---|
| **Average** | **59.450** | **4.905** | **$Average_{norm}$** | **0.0076** | **59.011** | **4.868** |
| **Standard Dev.** | **1.323** | **0.065** | **$Standard\ Dev._{norm}$** | | **1.886** | **0.089** |
| **Coeff. of Var. [%]** | **2.226** | **1.329** | **$Coeff.\ of\ Var.\ [\%]_{norm}$** | | **3.197** | **1.824** |
| **Min.** | **57.453** | **4.810** | **Min.** | **0.0074** | **55.905** | **4.696** |
| **Max.** | **61.811** | **5.093** | **Max.** | **0.0078** | **62.102** | **5.025** |
| **Number of Spec.** | **21** | **21** | **Number of Spec.** | **21** | **21** | **21** |


Laminate Unnotched Tension Properties (UNT2)--(CTD)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
Unnotched Tension Strength (UNT2) [ksi]


Laminate Unnotched Tension Properties (UNT2)--(CTD)
Normalized Modulus
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0.0
1.0
2.0
3.0
4.0
5.0
6.0
Unnotched Tension Modulus (UNT2) [Msi]

## Laminate Unnotched Tension Properties (UNT2) --RTD
## Strength & Modulus

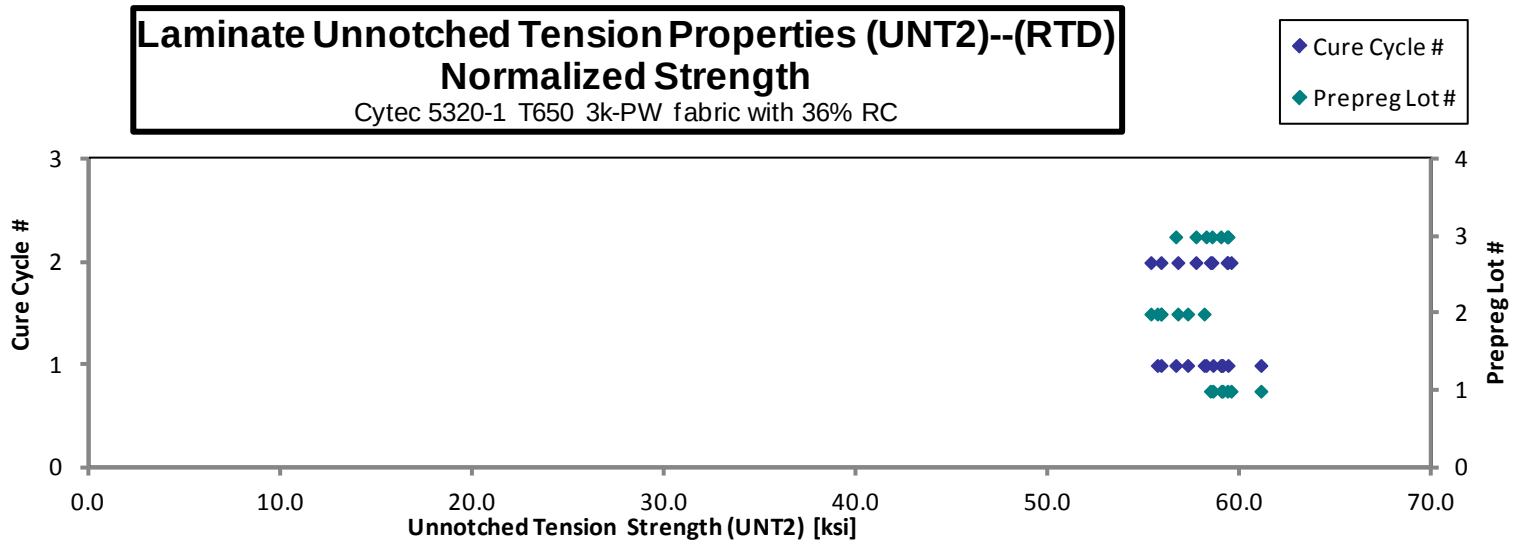
Cytec 5320-1 T650 3k-PW fabric with 36% RC

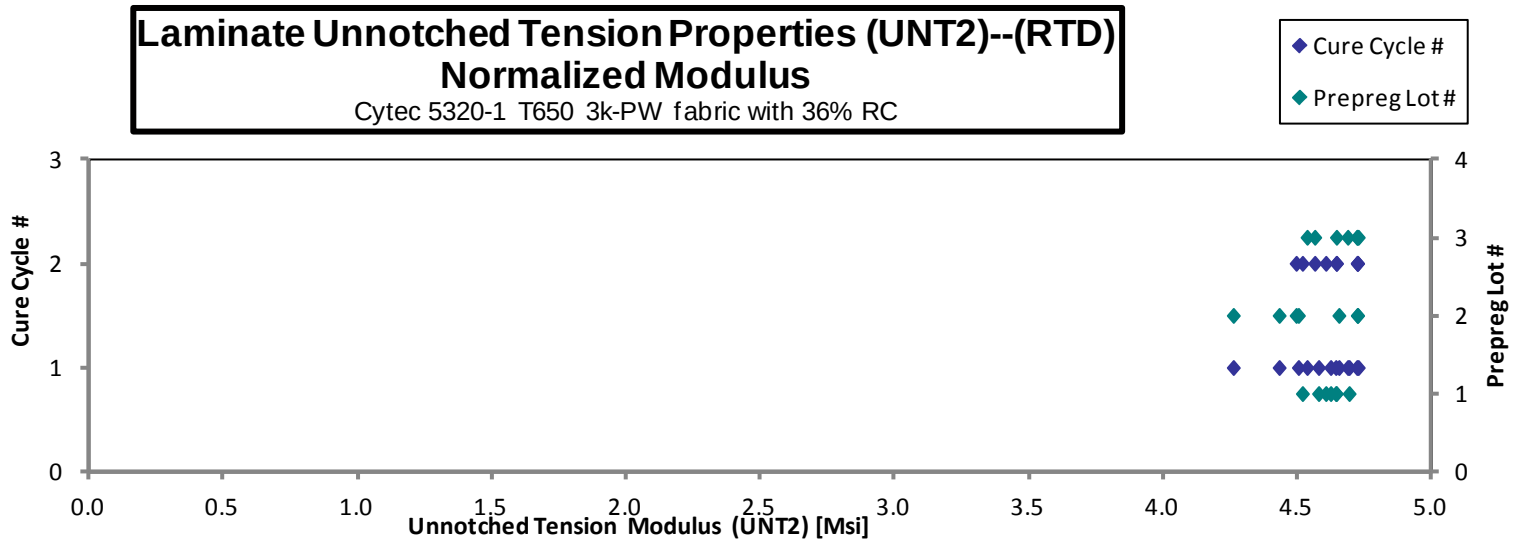
| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] | $Modulus_{norm}$ [Msi] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CUHBA111A* | A | C1 | 1 | 1 | 57.685 | 4.508 | 0.156 | 20 | AWT | 0.0078 | 58.559 | 4.576 |
| CUHBA112A* | A | C1 | 1 | 1 | 61.084 | 4.642 | 0.154 | 20 | AGM | 0.0077 | 61.058 | 4.640 |
| CUHBA113A | A | C1 | 1 | 1 | 58.098 | 4.551 | 0.156 | 20 | AWB | 0.0078 | 58.997 | 4.621 |
| CUHBA114A | A | C1 | 1 | 1 | 58.231 | 4.624 | 0.156 | 20 | AGM | 0.0078 | 59.063 | 4.690 |
| CUHBA211A | A | C2 | 1 | 2 | 58.602 | 4.617 | 0.154 | 20 | AGM | 0.0077 | 58.425 | 4.603 |
| CUHBA212A | A | C2 | 1 | 2 | 59.501 | 4.657 | 0.154 | 20 | AWT | 0.0077 | 59.314 | 4.642 |
| CUHBA213A | A | C2 | 1 | 2 | 59.325 | 4.502 | 0.154 | 20 | AGM | 0.0077 | 59.504 | 4.516 |
| CUHBB111A | B | C1 | 2 | 1 | 57.015 | 4.362 | 0.150 | 20 | AGM | 0.0075 | 55.657 | 4.259 |
| CUHBB112A | B | C1 | 2 | 1 | 57.157 | 4.533 | 0.150 | 20 | LGM | 0.0075 | 55.852 | 4.429 |
| CUHBB113A | B | C1 | 2 | 1 | 58.714 | 4.617 | 0.150 | 20 | LGM | 0.0075 | 57.240 | 4.501 |
| CUHBB114A | B | C1 | 2 | 1 | 59.273 | 4.746 | 0.151 | 20 | LGM | 0.0075 | 58.099 | 4.652 |
| CUHBB211A | B | C2 | 2 | 2 | 56.852 | 4.617 | 0.150 | 20 | AWB | 0.0075 | 55.320 | 4.493 |
| CUHBB212A | B | C2 | 2 | 2 | 57.505 | 4.785 | 0.152 | 20 | AWT | 0.0076 | 56.727 | 4.720 |
| CUHBB213A | B | C2 | 2 | 2 | 56.846 | 4.806 | 0.151 | 20 | LWB | 0.0076 | 55.849 | 4.721 |
| CUHBC111A | C | C1 | 3 | 1 | 57.164 | 4.769 | 0.153 | 20 | AWT | 0.0076 | 56.619 | 4.724 |
| CUHBC112A | C | C1 | 3 | 1 | 59.009 | 4.596 | 0.152 | 20 | AWB | 0.0076 | 58.204 | 4.533 |
| CUHBC113A | C | C1 | 3 | 1 | 60.114 | 4.745 | 0.152 | 20 | AWT | 0.0076 | 59.346 | 4.685 |
| CUHBC114A | C | C1 | 3 | 1 | 59.644 | 4.773 | 0.152 | 20 | AGM | 0.0076 | 58.966 | 4.719 |
| CUHBC211A | C | C2 | 3 | 2 | 59.291 | 4.705 | 0.152 | 20 | LGM | 0.0076 | 58.508 | 4.643 |
| CUHBC212A | C | C2 | 3 | 2 | 58.180 | 4.602 | 0.153 | 20 | LGM | 0.0076 | 57.670 | 4.562 |
| CUHBC213A | C | C2 | 3 | 2 | 59.252 | 4.717 | 0.154 | 20 | LGM | 0.0077 | 59.297 | 4.720 |

*Strain measurement was measured with SG. Extensometer used on other coupons.

| | | | | | |
|---|---|---|---|---|---|
| **Average** | **58.502** | **4.642** | **$Average_{norm}$** | **0.0076** | **58.013** | **4.602** |
| **Standard Dev.** | **1.175** | **0.113** | **$Standard\ Dev._{norm}$** | | **1.530** | **0.118** |
| **Coeff. of Var. [%]** | **2.009** | **2.426** | **$Coeff.\ of\ Var.\ [\%]_{norm}$** | | **2.637** | **2.558** |
| **Min.** | **56.846** | **4.362** | **Min.** | **0.0075** | **55.320** | **4.259** |
| **Max.** | **61.084** | **4.806** | **Max.** | **0.0078** | **61.058** | **4.724** |
| **Number of Spec.** | **21** | **21** | **Number of Spec.** | **21** | **21** | **21** |


Laminate Unnotched Tension Properties (UNT2)--(RTD)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Unnotched Tension Strength (UNT2) [ksi]
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0


Laminate Unnotched Tension Properties (UNT2)--(RTD)
Normalized Modulus
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Unnotched Tension Modulus (UNT2) [Msi]
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0

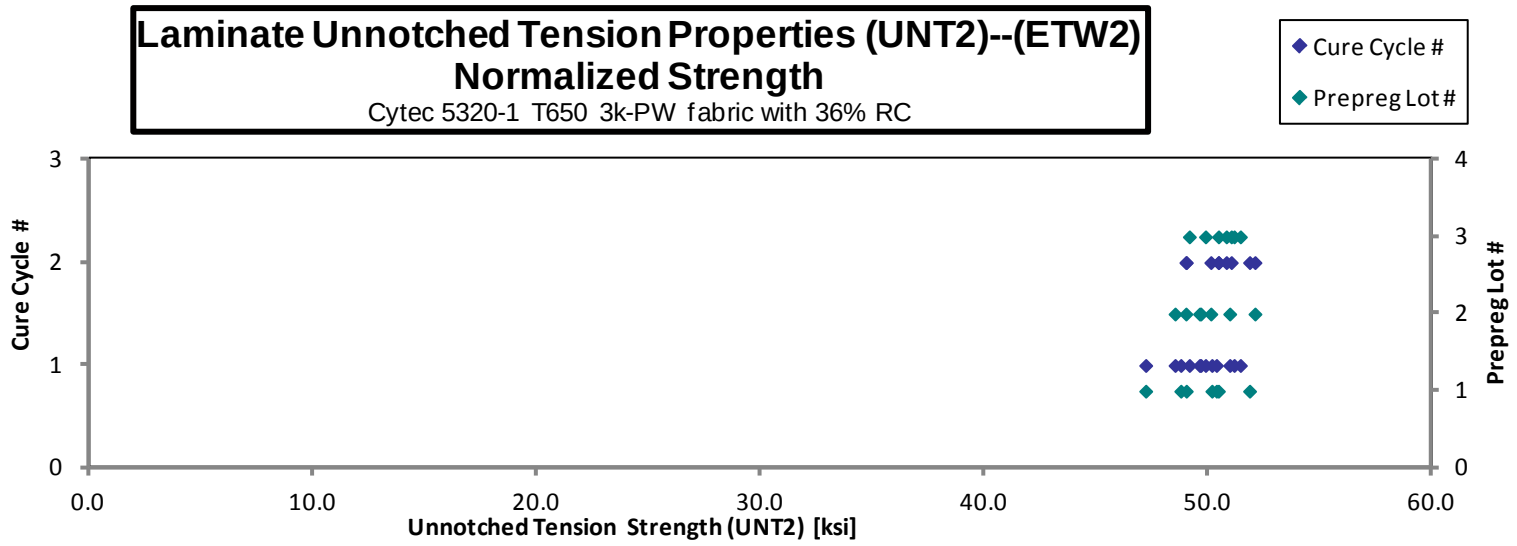
## Laminate Unnotched Tension Properties (UNT2) --ETW2
## Strength & Modulus

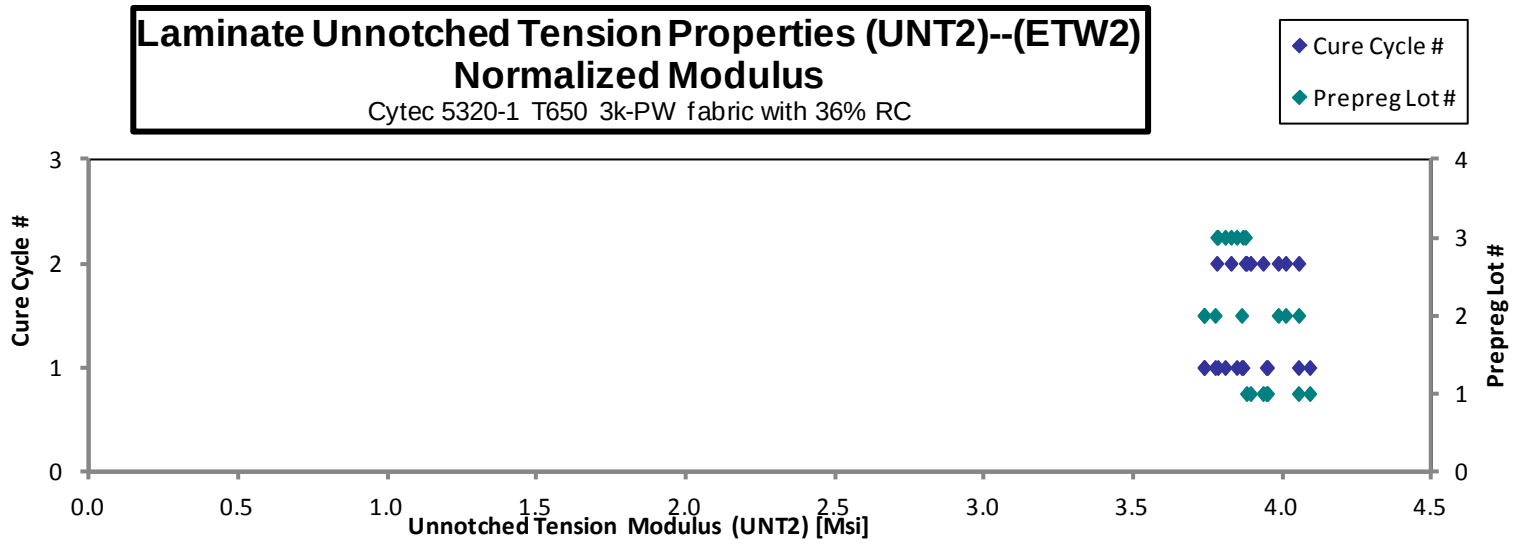
Cytec 5320-1 T650 3k-PW fabric with 36% RC

| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] | $Modulus_{norm}$ [Msi] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CUHBA11DF | A | C1 | 1 | 1 | 46.242 | 4.007 | 0.157 | 20 | AGM | 0.0079 | 47.188 | 4.089 |
| CUHBA11EF | A | C1 | 1 | 1 | 48.054 | 3.993 | 0.156 | 20 | AWB | 0.0078 | 48.756 | 4.051 |
| CUHBA11FF | A | C1 | 1 | 1 | 49.402 | 3.889 | 0.156 | 20 | AGM | 0.0078 | 50.145 | 3.947 |
| CUHBA11GF | A | C1 | 1 | 1 | 49.214 | 3.855 | 0.158 | 20 | AGM | 0.0079 | 50.348 | 3.943 |
| CUHBA21BF | A | C2 | 1 | 2 | 52.049 | 3.907 | 0.153 | 20 | AWB | 0.0077 | 51.830 | 3.890 |
| CUHBA21CF | A | C2 | 1 | 2 | 49.112 | 3.941 | 0.154 | 20 | AWB | 0.0077 | 49.000 | 3.932 |
| CUHBA21DF | A | C2 | 1 | 2 | 50.047 | 3.847 | 0.155 | 20 | AGM | 0.0078 | 50.436 | 3.877 |
| CUHBB11DF | B | C1 | 2 | 1 | 50.594 | 3.806 | 0.151 | 20 | AWT | 0.0076 | 49.647 | 3.735 |
| CUHBB11EF | B | C1 | 2 | 1 | 49.506 | 3.850 | 0.151 | 20 | AGM | 0.0075 | 48.499 | 3.772 |
| CUHBB11FF | B | C1 | 2 | 1 | 50.624 | 3.941 | 0.151 | 20 | AGM | 0.0075 | 49.594 | 3.861 |
| CUHBB11GF | B | C1 | 2 | 1 | 51.698 | 3.790 | 0.152 | 20 | AGM | 0.0076 | 50.943 | 3.734 |
| CUHBB21BF | B | C2 | 2 | 2 | 51.246 | 4.100 | 0.151 | 20 | AGM | 0.0075 | 50.098 | 4.008 |
| CUHBB21CF | B | C2 | 2 | 2 | 49.685 | 4.040 | 0.152 | 20 | AGM | 0.0076 | 48.986 | 3.983 |
| CUHBB21DF | B | C2 | 2 | 2 | 53.240 | 4.143 | 0.151 | 20 | AGM | 0.0075 | 52.070 | 4.052 |
| CUHBC11DF | C | C1 | 3 | 1 | 49.913 | 3.785 | 0.154 | 20 | AGM | 0.0077 | 49.859 | 3.781 |
| CUHBC11EF | C | C1 | 3 | 1 | 49.283 | 3.876 | 0.154 | 20 | AGM | 0.0077 | 49.139 | 3.865 |
| CUHBC11FF | C | C1 | 3 | 1 | 51.439 | 3.828 | 0.153 | 20 | AGM | 0.0077 | 51.139 | 3.805 |
| CUHBC11GF | C | C1 | 3 | 1 | 51.761 | 3.869 | 0.153 | 20 | AGM | 0.0076 | 51.419 | 3.844 |
| CUHBC21BF | C | C2 | 3 | 2 | 51.195 | 3.855 | 0.153 | 20 | AGM | 0.0076 | 50.790 | 3.825 |
| CUHBC21CF | C | C2 | 3 | 2 | 51.183 | 3.790 | 0.153 | 20 | AGM | 0.0077 | 51.012 | 3.777 |
| CUHBC21DF | C | C2 | 3 | 2 | 50.671 | 3.891 | 0.153 | 20 | AGM | 0.0077 | 50.440 | 3.873 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Average** | **50.293** | **3.905** | | **$Average_{norm}$** | **0.0077** | **50.064** | **3.888** |
| **Standard Dev.** | **1.534** | **0.101** | | **$Standard\ Dev._{norm}$** | | **1.198** | **0.106** |
| **Coeff. of Var. [%]** | **3.050** | **2.588** | | **Coeff. of Var. [%]$_{norm}$** | | **2.394** | **2.725** |
| **Min.** | **46.242** | **3.785** | | **Min.** | **0.0075** | **47.188** | **3.734** |
| **Max.** | **53.240** | **4.143** | | **Max.** | **0.0079** | **52.070** | **4.089** |
| **Number of Spec.** | **21** | **21** | | **Number of Spec.** | **21** | **21** | **21** |


Laminate Unnotched Tension Properties (UNT2)--(ETW2)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
10.0
20.0
30.0
40.0
50.0
60.0
Unnotched Tension Strength (UNT2) [ksi]


Laminate Unnotched Tension Properties (UNT2)--(ETW2)
Normalized Modulus
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
Unnotched Tension Modulus (UNT2) [Msi]

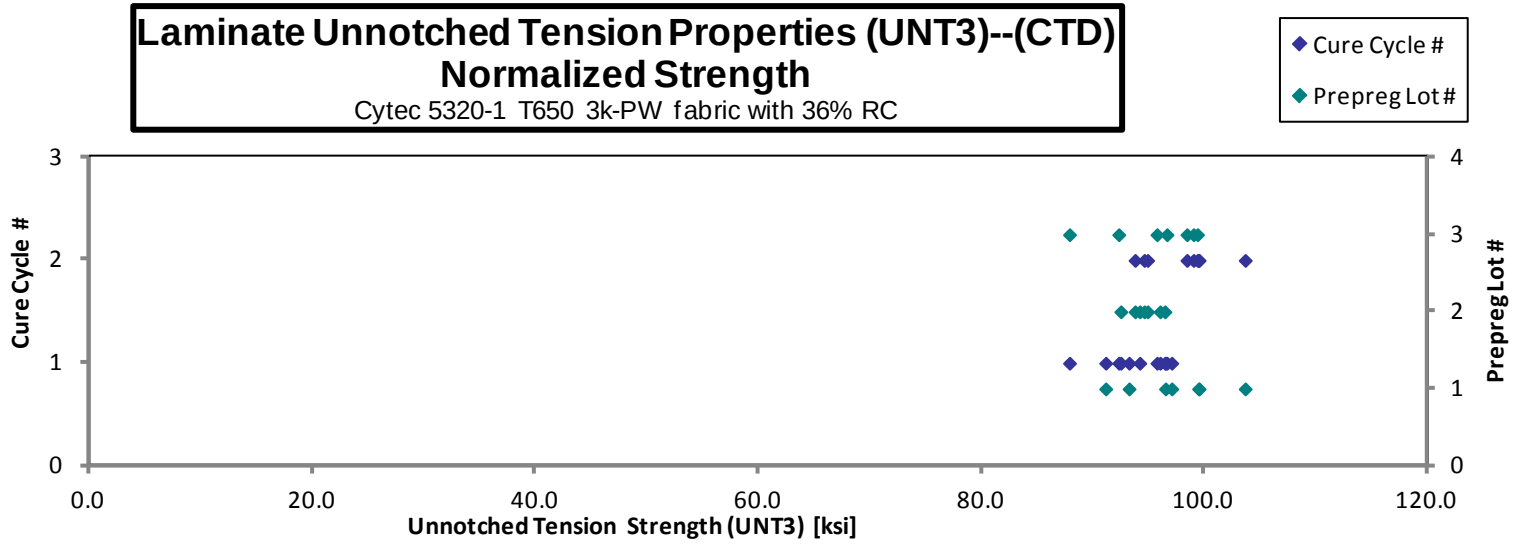
# 4.8 "40/20/40" Unnotched Tension 3 Properties (UNT3)

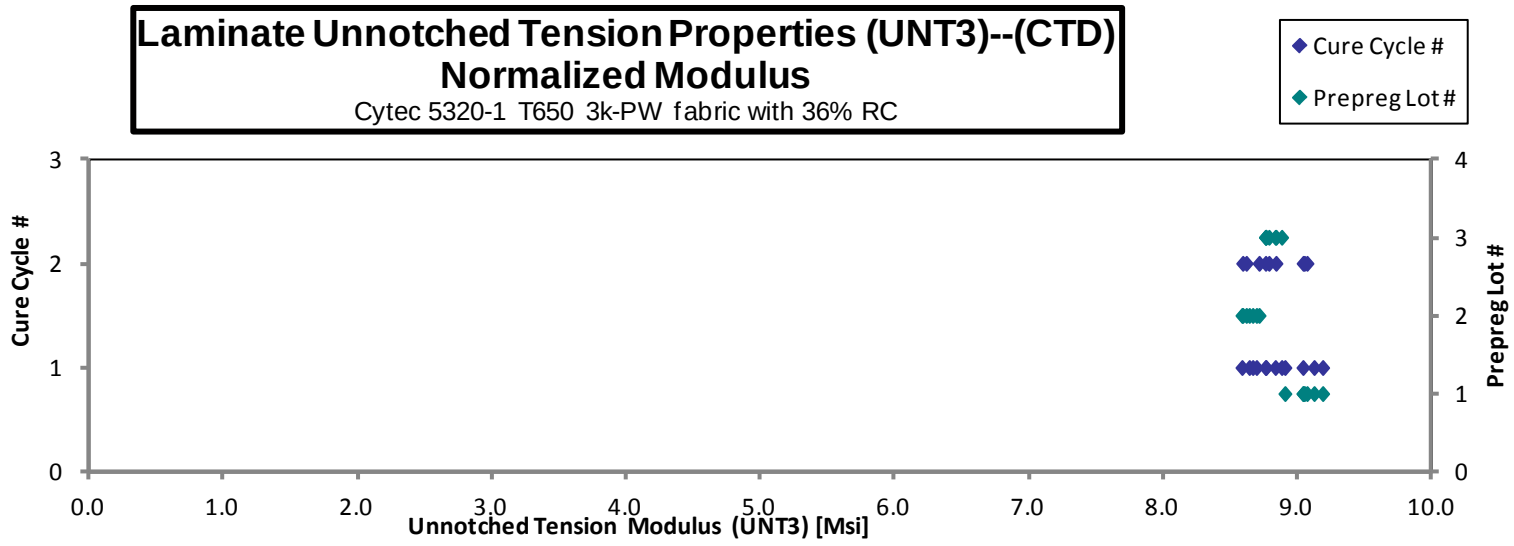
**Laminate Unnotched Tension Properties (UNT3)--CTD**
**Strength & Modulus**
Cytec 5320-1 T650 3k-PW fabric with 36% RC

normalizing $t_{ply}$ [in]: 0.0077

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] | $Modulus_{norm}$ [Msi] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CUHCA117B | A | C1 | 1 | 1 | 95.614 | 9.104 | 0.117 | 15 | LGM | 0.0078 | 96.442 | 9.183 |
| CUHCA118B | A | C1 | 1 | 1 | 89.253 | 8.854 | 0.118 | 15 | LAB | 0.0079 | 91.082 | 9.036 |
| CUHCA119B | A | C1 | 1 | 1 | 96.443 | 8.850 | 0.116 | 15 | LWB | 0.0077 | 97.000 | 8.902 |
| CUHCA11AB | A | C1 | 1 | 1 | 94.265 | 9.225 | 0.114 | 15 | LWT | 0.0076 | 93.176 | 9.119 |
| CUHCA216B | A | C2 | 1 | 2 | 103.440 | 9.053 | 0.116 | 15 | LWT / LWB | 0.0077 | 103.589 | 9.066 |
| CUHCA217B | A | C2 | 1 | 2 | 99.874 | 9.089 | 0.115 | 15 | LWB | 0.0077 | 99.413 | 9.047 |
| CUHCA218B | A | C2 | 1 | 2 | 99.439 | 9.036 | 0.116 | 15 | LGM | 0.0077 | 99.453 | 9.037 |
| CUHCB117B | B | C1 | 2 | 1 | 97.635 | 8.787 | 0.114 | 15 | LGM | 0.0076 | 95.958 | 8.636 |
| CUHCB118B | B | C1 | 2 | 1 | 98.434 | 8.845 | 0.113 | 15 | LGM | 0.0075 | 96.389 | 8.661 |
| CUHCB119B | B | C1 | 2 | 1 | 95.184 | 8.837 | 0.112 | 15 | LWT/LWB | 0.0075 | 92.437 | 8.582 |
| CUHCB11AB | B | C1 | 2 | 1 | 97.148 | 8.968 | 0.112 | 15 | LGM | 0.0075 | 94.134 | 8.689 |
| CUHCB216B | B | C2 | 2 | 2 | 96.486 | 8.764 | 0.113 | 15 | LWB | 0.0075 | 94.537 | 8.587 |
| CUHCB217B | B | C2 | 2 | 2 | 96.822 | 8.794 | 0.113 | 15 | LGM | 0.0075 | 94.838 | 8.614 |
| CUHCB218B | B | C2 | 2 | 2 | 95.716 | 8.895 | 0.113 | 15 | LWB/LWT | 0.0075 | 93.713 | 8.709 |
| CUHCC117B | C | C1 | 3 | 1 | 91.787 | 8.833 | 0.116 | 15 | LGM | 0.0077 | 92.251 | 8.877 |
| CUHCC118B | C | C1 | 3 | 1 | 87.495 | 8.723 | 0.116 | 15 | LGM | 0.0077 | 87.836 | 8.757 |
| CUHCC119B | C | C1 | 3 | 1 | 96.993 | 8.798 | 0.115 | 15 | LGM | 0.0077 | 96.573 | 8.760 |
| CUHCC11AB | C | C1 | 3 | 1 | 96.693 | 8.924 | 0.114 | 15 | LGM | 0.0076 | 95.675 | 8.830 |
| CUHCC216B | C | C2 | 3 | 2 | 99.309 | 8.920 | 0.114 | 15 | LGM | 0.0076 | 98.363 | 8.835 |
| CUHCC217B | C | C2 | 3 | 2 | 99.572 | 8.812 | 0.115 | 15 | LGM | 0.0077 | 98.954 | 8.757 |
| CUHCC218B | C | C2 | 3 | 2 | 98.373 | 8.700 | 0.117 | 15 | LWB | 0.0078 | 99.310 | 8.782 |

| | | | | | |
|---|---|---|---|---|---|
| **Average** | **96.475** | **8.896** | **$Average_{norm}$** | **0.0076** | **95.768** | **8.832** |
| **Standard Dev.** | **3.597** | **0.138** | **$Standard\ Dev._{norm}$** | | **3.499** | **0.186** |
| **Coeff. of Var. [%]** | **3.729** | **1.546** | **$Coeff.\ of\ Var.\ [\%]_{norm}$** | | **3.654** | **2.101** |
| **Min.** | **87.495** | **8.700** | **Min.** | **0.0075** | **87.836** | **8.582** |
| **Max.** | **103.440** | **9.225** | **Max.** | **0.0079** | **103.589** | **9.183** |
| **Number of Spec.** | **21** | **21** | **Number of Spec.** | **21** | **21** | **21** |


Laminate Unnotched Tension Properties (UNT3)--(CTD)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
20.0
40.0
60.0
80.0
100.0
120.0
Unnotched Tension Strength (UNT3) [ksi]


Laminate Unnotched Tension Properties (UNT3)--(CTD)
Normalized Modulus
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
Unnotched Tension Modulus (UNT3) [Msi]

## Laminate Unnotched Tension Properties (UNT3)--RTD
## Strength & Modulus

Cytec 5320-1 T650 3k-PW fabric with 36% RC

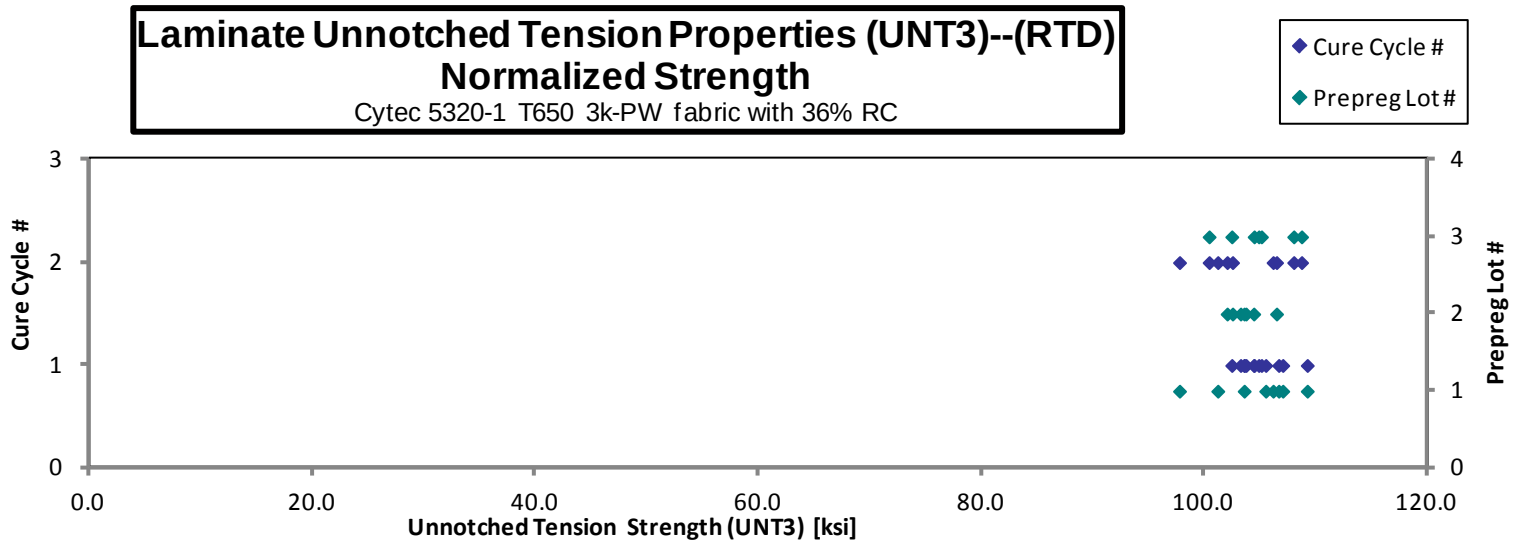
| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

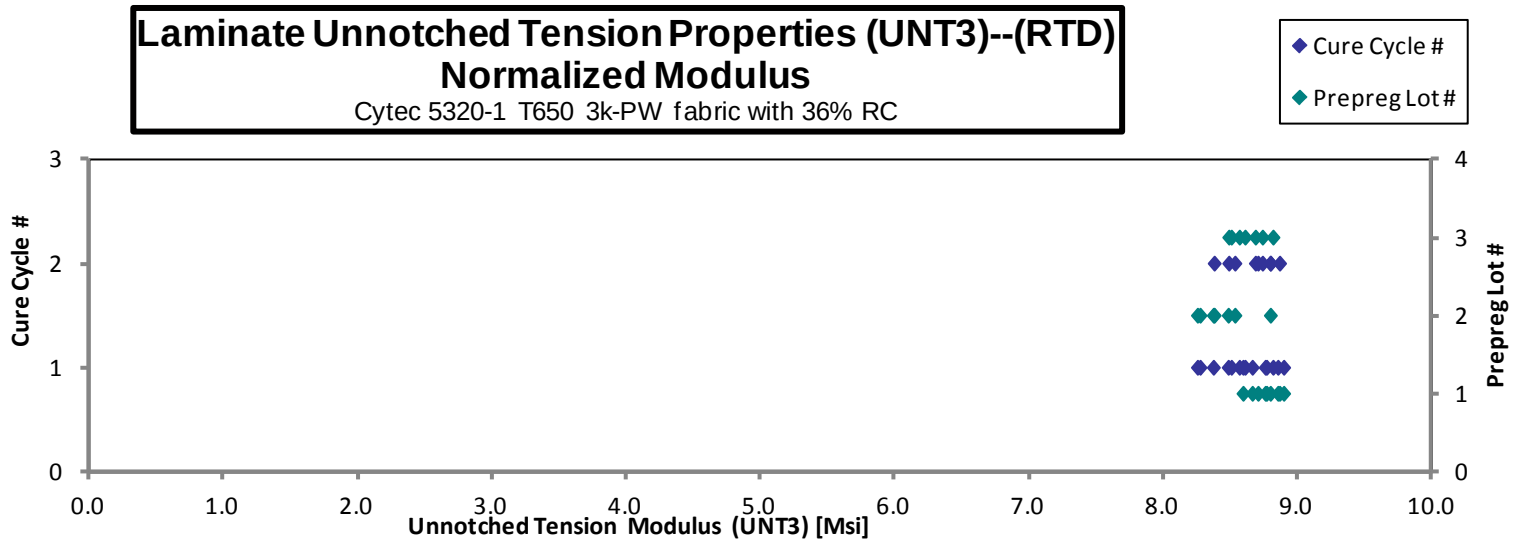
| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] | $Modulus_{norm}$ [Msi] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CUHCA111A* | A | C1 | 1 | 1 | 110.234 | 8.674 | 0.114 | 15 | LGM | 0.0076 | 109.152 | 8.589 |
| CUHCA112A* | A | C1 | 1 | 1 | 107.373 | 8.789 | 0.115 | 15 | LGM | 0.0077 | 106.955 | 8.755 |
| CUHCA113A | A | C1 | 1 | 1 | 102.447 | 8.570 | 0.117 | 15 | LWB/LAT | 0.0078 | 103.497 | 8.658 |
| CUHCA114A | A | C1 | 1 | 1 | 103.150 | 8.575 | 0.118 | 15 | LWB | 0.0079 | 105.428 | 8.765 |
| CUHCA115A* | A | C1 | 1 | 1 | ** | 8.733 | 0.117 | 15 | LAB | 0.0078 | | 8.849 |
| CUHCA116A* | A | C1 | 1 | 1 | 106.375 | 8.874 | 0.116 | 15 | LGM | 0.0077 | 106.590 | 8.892 |
| CUHCA211A | A | C2 | 1 | 2 | 101.687 | 8.841 | 0.115 | 15 | LWT/LWB | 0.0077 | 101.129 | 8.793 |
| CUHCA212A | A | C2 | 1 | 2 | 98.495 | 8.772 | 0.115 | 15 | LWT/LWB | 0.0076 | 97.699 | 8.701 |
| CUHCA213A | A | C2 | 1 | 2 | 105.057 | 8.776 | 0.117 | 15 | LWB | 0.0078 | 106.088 | 8.862 |
| CUHCB111A | B | C1 | 2 | 1 | 106.318 | 8.501 | 0.112 | 15 | LWT/LWB | 0.0075 | 103.173 | 8.250 |
| CUHCB112A | B | C1 | 2 | 1 | 104.488 | 8.449 | 0.114 | 15 | LWT/LWB | 0.0076 | 103.493 | 8.369 |
| CUHCB113A | B | C1 | 2 | 1 | 106.393 | 8.487 | 0.113 | 15 | LGM | 0.0075 | 103.660 | 8.269 |
| CUHCB114A | B | C1 | 2 | 1 | 105.818 | 8.598 | 0.114 | 15 | LWT | 0.0076 | 104.352 | 8.479 |
| CUHCB211A | B | C2 | 2 | 2 | 105.187 | 9.071 | 0.112 | 15 | LWT/LWB | 0.0075 | 101.969 | 8.793 |
| CUHCB212A | B | C2 | 2 | 2 | 104.750 | 8.563 | 0.113 | 15 | LWT/LWB | 0.0075 | 102.452 | 8.375 |
| CUHCB213A | B | C2 | 2 | 2 | 107.562 | 8.622 | 0.114 | 15 | LWT/LWB | 0.0076 | 106.398 | 8.529 |
| CUHCC111A | C | C1 | 3 | 1 | 106.308 | 8.762 | 0.113 | 15 | LGM | 0.0076 | 104.390 | 8.604 |
| CUHCC113A | C | C1 | 3 | 1 | 105.607 | 8.628 | 0.115 | 15 | LWT | 0.0076 | 104.799 | 8.562 |
| CUHCC114A | C | C1 | 3 | 1 | 103.579 | 8.384 | 0.117 | 15 | LGM | 0.0078 | 105.044 | 8.502 |
| CUHCC115A | C | C1 | 3 | 1 | 102.164 | 8.793 | 0.116 | 15 | LGM | 0.0077 | 102.385 | 8.812 |
| CUHCC211A | C | C2 | 3 | 2 | 101.972 | 8.620 | 0.114 | 15 | LWT/LWB | 0.0076 | 100.353 | 8.483 |
| CUHCC212A | C | C2 | 3 | 2 | 108.330 | 8.713 | 0.115 | 15 | LWT/LWB | 0.0077 | 107.939 | 8.681 |
| CUHCC213A | C | C2 | 3 | 2 | 109.480 | 8.801 | 0.115 | 15 | LWT/LWB | 0.0076 | 108.642 | 8.734 |

**Strength not reported due to anomalous data

*Strain measurement was measured with SG. Extensometer used on other coupons.

| | | | | | | |
|---|---|---|---|---|---|---|
| **Average** | **105.126** | **8.678** | **Average$_{norm}$** | **0.0077** | **104.345** | **8.622** |
| **Standard Dev.** | **2.774** | **0.158** | **Standard Dev.$_{norm}$** | | **2.780** | **0.190** |
| **Coeff. of Var. [%]** | **2.638** | **1.817** | **Coeff. of Var. [%]$_{norm}$** | | **2.664** | **2.203** |
| **Min.** | **98.495** | **8.384** | **Min.** | **0.0075** | **97.699** | **8.250** |
| **Max.** | **110.234** | **9.071** | **Max.** | **0.0079** | **109.152** | **8.892** |
| **Number of Spec.** | **22** | **23** | **Number of Spec.** | **23** | **22** | **23** |


Laminate Unnotched Tension Properties (UNT3)--(RTD)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
20.0
40.0
60.0
80.0
100.0
120.0
Unnotched Tension Strength (UNT3) [ksi]

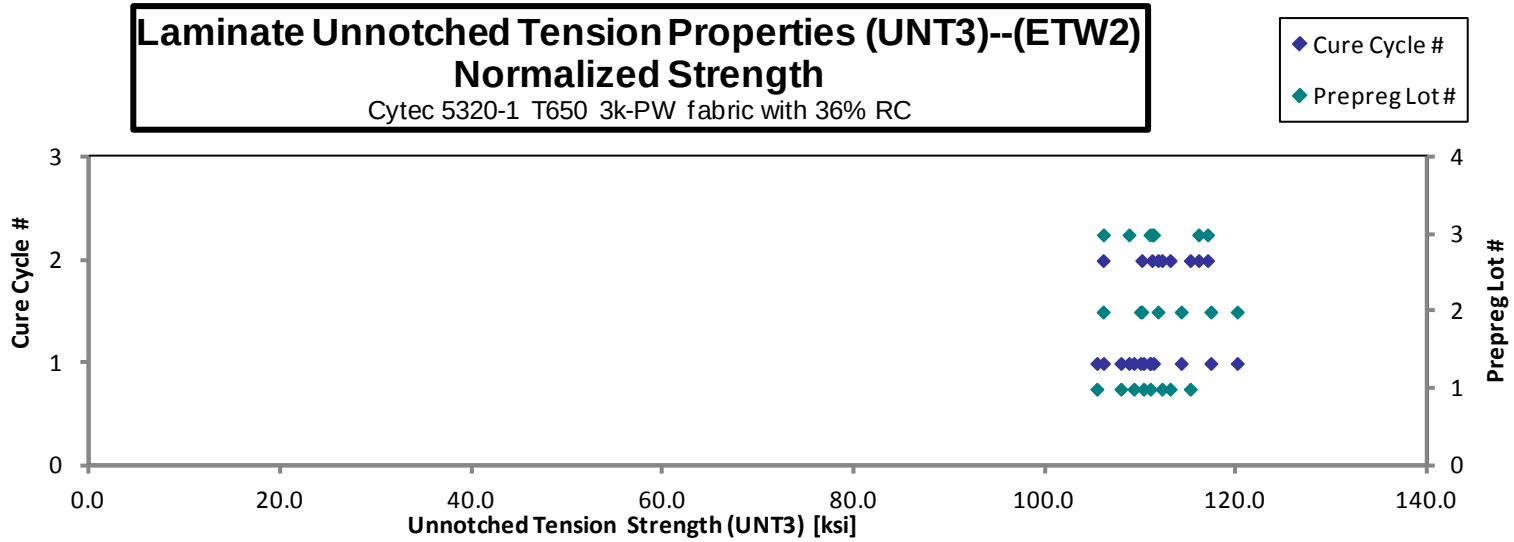

Laminate Unnotched Tension Properties (UNT3)--(RTD)
Normalized Modulus
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
Unnotched Tension Modulus (UNT3) [Msi]

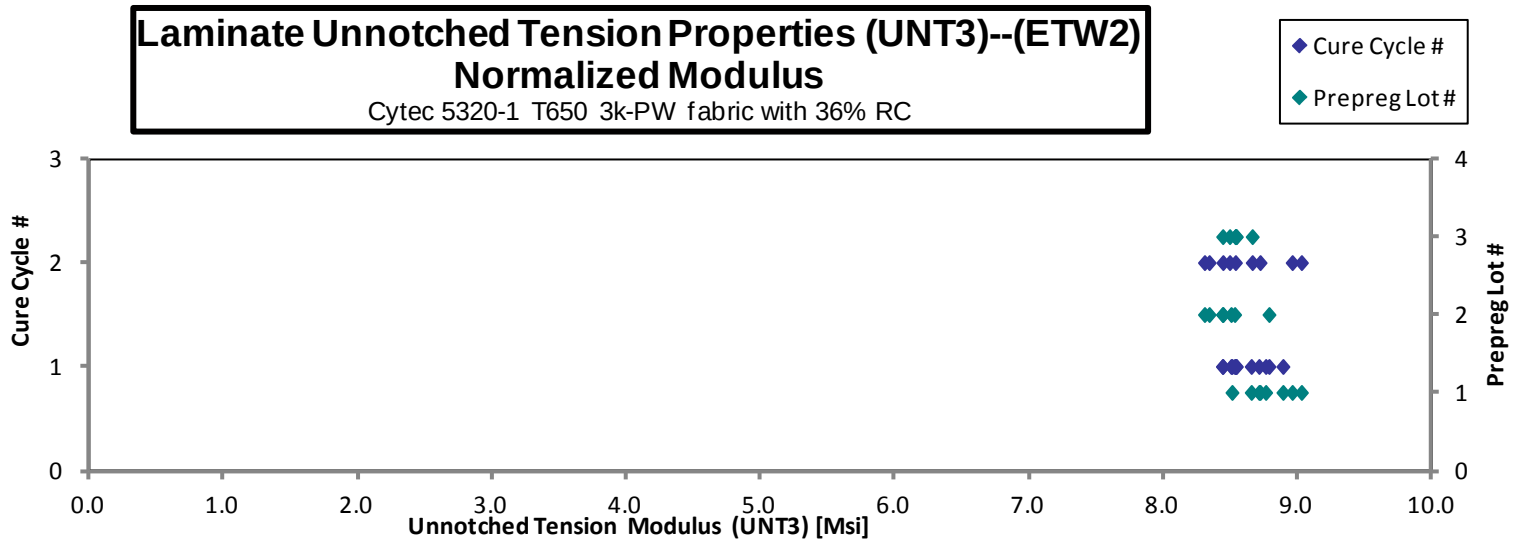
## Laminate Unnotched Tension Properties (UNT3)--ETW2
## Strength & Modulus
Cytec 5320-1 T650 3k-PW fabric with 36% RC

| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] | $Modulus_{norm}$ [Msi] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CUHCA11DF | A | C1 | 1 | 1 | 108.993 | 8.413 | 0.117 | 15 | LAT/ LGM | 0.0078 | 110.220 | 8.507 |
| CUHCA11EF | A | C1 | 1 | 1 | 104.556 | 8.586 | 0.116 | 15 | LWT/ LAB | 0.0078 | 105.341 | 8.651 |
| CUHCA11FF | A | C1 | 1 | 1 | 106.409 | 8.768 | 0.117 | 15 | LWB/ LWT | 0.0078 | 107.852 | 8.887 |
| CUHCA11GF | A | C1 | 1 | 1 | 108.287 | 8.684 | 0.116 | 15 | LAB/ LGM | 0.0078 | 109.209 | 8.758 |
| CUHCA11HF | A | C1 | 1 | 1 | 108.367 | 8.507 | 0.118 | 15 | LAB/LWT | 0.0079 | 110.931 | 8.708 |
| CUHCA21BF | A | C2 | 1 | 2 | 115.558 | 8.991 | 0.115 | 15 | LGM/ LWB | 0.0077 | 115.108 | 8.956 |
| CUHCA21CF | A | C2 | 1 | 2 | 112.852 | 8.705 | 0.116 | 15 | LAT/ LWB | 0.0077 | 112.999 | 8.717 |
| CUHCA21DF | A | C2 | 1 | 2 | 112.037 | 9.015 | 0.116 | 15 | LWB/ LWT | 0.0077 | 112.150 | 9.024 |
| CUHCB11DF | B | C1 | 2 | 1 | 120.026 | 8.701 | 0.113 | 15 | LWB/ LGM | 0.0075 | 117.255 | 8.500 |
| CUHCB11EF | B | C1 | 2 | 1 | 122.331 | 8.599 | 0.113 | 15 | LWT/ LGM | 0.0076 | 120.019 | 8.437 |
| CUHCB11FF | B | C1 | 2 | 1 | 115.289 | 8.611 | 0.114 | 15 | LWT/ LWB | 0.0076 | 114.158 | 8.527 |
| CUHCB11GF | B | C1 | 2 | 1 | 111.195 | 8.887 | 0.114 | 15 | LWT/ LGM | 0.0076 | 109.896 | 8.783 |
| CUHCB21BF | B | C2 | 2 | 2 | 112.250 | 8.341 | 0.115 | 15 | LAT/ AGM/ LWB | 0.0077 | 111.731 | 8.302 |
| CUHCB21CF | B | C2 | 2 | 2 | 106.889 | 8.511 | 0.115 | 15 | LGM/ LAT/ LWB | 0.0076 | 105.995 | 8.440 |
| CUHCB21DF | B | C2 | 2 | 2 | 111.450 | 8.445 | 0.114 | 15 | LGM/ LWB | 0.0076 | 110.035 | 8.337 |
| CUHCC11EF | C | C1 | 3 | 1 | 105.355 | 8.478 | 0.116 | 15 | LGM | 0.0077 | 106.024 | 8.532 |
| CUHCC11FF | C | C1 | 3 | 1 | 108.760 | 8.545 | 0.115 | 15 | LWB/ LWT | 0.0077 | 108.697 | 8.540 |
| CUHCC11GF | C | C1 | 3 | 1 | 110.886 | 8.438 | 0.116 | 15 | LGM/ LWT | 0.0077 | 110.886 | 8.438 |
| CUHCC11HF | C | C1 | 3 | 1 | 111.890 | 8.583 | 0.115 | 15 | LWB/ AWT | 0.0077 | 111.260 | 8.535 |
| CUHCC21BF | C | C2 | 3 | 2 | 116.064 | 8.470 | 0.116 | 15 | LWT/ LGM | 0.0078 | 116.918 | 8.533 |
| CUHCC21CF | C | C2 | 3 | 2 | 115.814 | 8.477 | 0.116 | 15 | LGM | 0.0077 | 115.981 | 8.489 |
| CUHCC21DF | C | C2 | 3 | 2 | 109.466 | 8.530 | 0.117 | 15 | LWT/ LGM | 0.0078 | 111.109 | 8.658 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Average** | **111.578** | **8.604** | | **$Average_{norm}$** | **0.0077** | **111.535** | **8.603** |
| **Standard Dev.** | **4.550** | **0.181** | | **$Standard\ Dev._{norm}$** | | **3.841** | **0.191** |
| **Coeff. of Var. [%]** | **4.077** | **2.104** | | **$Coeff.\ of\ Var.\ [\%]_{norm}$** | | **3.444** | **2.223** |
| **Min.** | **104.556** | **8.341** | | **Min.** | **0.0075** | **105.341** | **8.302** |
| **Max.** | **122.331** | **9.015** | | **Max.** | **0.0079** | **120.019** | **9.024** |
| **Number of Spec.** | **22** | **22** | | **Number of Spec.** | **22** | **22** | **22** |


Laminate Unnotched Tension Properties (UNT3)--(ETW2)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
20.0
40.0
60.0
80.0
100.0
120.0
140.0
Unnotched Tension Strength (UNT3) [ksi]


Laminate Unnotched Tension Properties (UNT3)--(ETW2)
Normalized Modulus
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
Unnotched Tension Modulus (UNT3) [Msi]

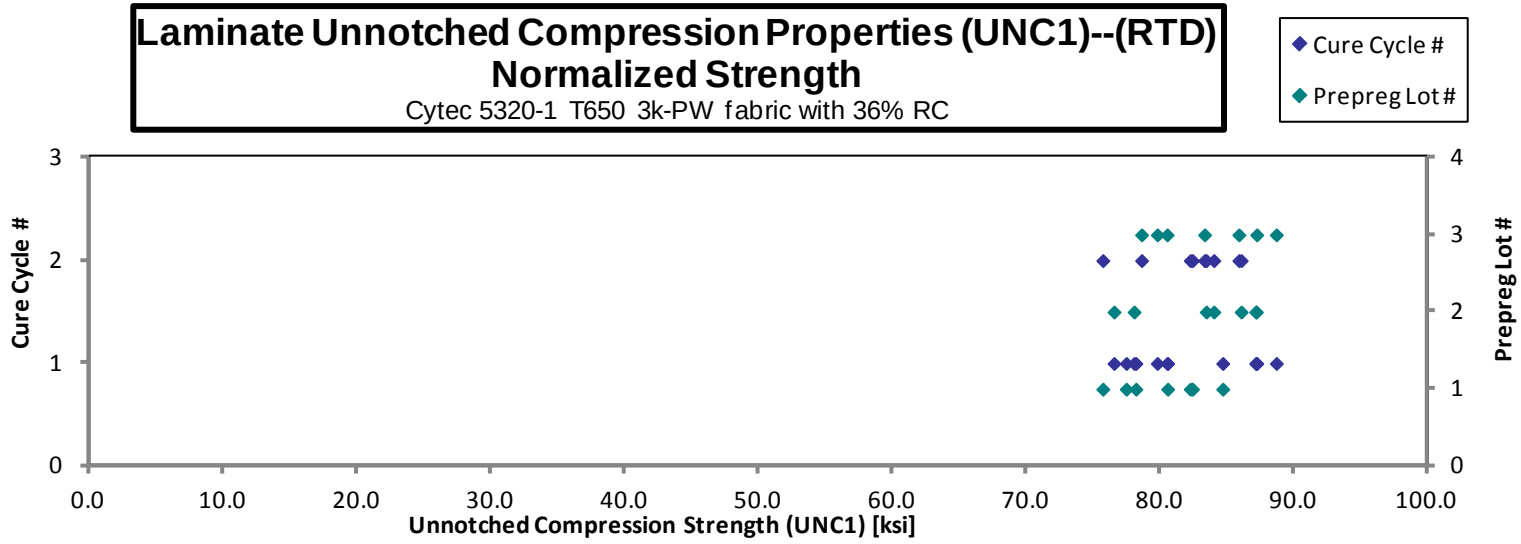
# 4.9 "25/50/25" Unnotched Compression 1 Properties (UNC1)

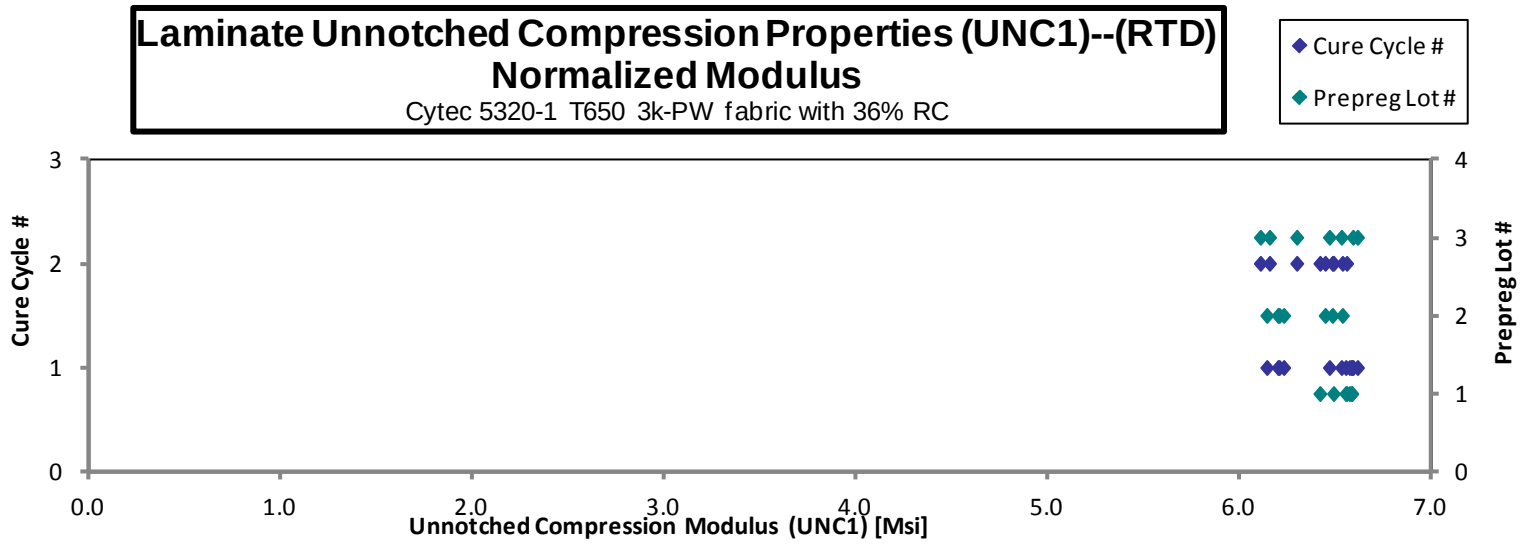
**Laminate Unnotched Compression Properties (UNC1)--RTD**
**Strength & Modulus**
Cytec 5320-1 T650 3k-PW fabric with 36% RC

| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] | $Modulus_{norm}$ [Msi] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CUHWA111A | A | C1 | 1 | 1 | 76.605 | 6.508 | 0.125 | 16 | BGM | 0.0078 | 77.437 | 6.579 |
| CUHWA112A | A | C1 | 1 | 1 | 84.040 | 6.521 | 0.124 | 16 | BGM | 0.0078 | 84.645 | 6.568 |
| CUHWA113A | A | C1 | 1 | 1 | 79.946 | 6.532 | 0.124 | 16 | BGM | 0.0078 | 80.530 | 6.579 |
| CUHWA114A | A | C1 | 1 | 1 | 77.902 | 6.527 | 0.124 | 16 | BGM | 0.0077 | 78.155 | 6.548 |
| CUHWA211A | A | C2 | 1 | 2 | 75.410 | 6.390 | 0.124 | 16 | BGM | 0.0077 | 75.686 | 6.414 |
| CUHWA212A | A | C2 | 1 | 2 | 82.101 | 6.462 | 0.124 | 16 | BGM | 0.0077 | 82.384 | 6.484 |
| CUHWA213A | A | C2 | 1 | 2 | 81.937 | 6.531 | 0.124 | 16 | BGM | 0.0077 | 82.220 | 6.553 |
| CUHWB111A | B | C1 | 2 | 1 | 81.660 | 6.484 | 0.118 | 16 | BGM | 0.0074 | 78.023 | 6.195 |
| CUHWB112A | B | C1 | 2 | 1 | 79.381 | 6.433 | 0.119 | 16 | BGM | 0.0074 | 76.522 | 6.201 |
| CUHWB113A | B | C1 | 2 | 1 | 90.082 | 6.437 | 0.119 | 16 | BGM | 0.0074 | 87.111 | 6.225 |
| CUHWB114A | B | C1 | 2 | 1 | 90.165 | 6.349 | 0.119 | 16 | BGM | 0.0074 | 87.155 | 6.137 |
| CUHWB211A | B | C2 | 2 | 2 | 82.908 | 6.491 | 0.124 | 16 | BGM | 0.0077 | 83.413 | 6.531 |
| CUHWB212A | B | C2 | 2 | 2 | 85.333 | 6.426 | 0.124 | 16 | BGM | 0.0078 | 86.025 | 6.479 |
| CUHWB213A | B | C2 | 2 | 2 | 83.832 | 6.430 | 0.123 | 16 | BGM | 0.0077 | 83.977 | 6.441 |
| CUHWC111A | C | C1 | 3 | 1 | 80.900 | 6.559 | 0.123 | 16 | BGM | 0.0077 | 80.489 | 6.526 |
| CUHWC112A | C | C1 | 3 | 1 | 80.747 | 6.543 | 0.122 | 16 | BGM | 0.0076 | 79.756 | 6.463 |
| CUHWC113A | C | C1 | 3 | 1 | 88.179 | 6.661 | 0.122 | 16 | BGM | 0.0076 | 87.186 | 6.586 |
| CUHWC114A | C | C1 | 3 | 1 | 88.667 | 6.611 | 0.123 | 16 | BGM | 0.0077 | 88.649 | 6.610 |
| CUHWC211A | C | C2 | 3 | 2 | 79.194 | 6.342 | 0.122 | 16 | BGM | 0.0076 | 78.583 | 6.293 |
| CUHWC212A | C | C2 | 3 | 2 | 86.659 | 6.160 | 0.122 | 16 | BGM | 0.0076 | 85.850 | 6.103 |
| CUHWC213A | C | C2 | 3 | 2 | 83.525 | 6.168 | 0.123 | 16 | BGM | 0.0077 | 83.287 | 6.151 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Average** | **82.818** | **6.455** | | **$Average_{norm}$** | **0.0076** | **82.242** | **6.413** |
| **Standard Dev.** | **4.214** | **0.125** | | **$Standard\ Dev._{norm}$** | | **3.942** | **0.174** |
| **Coeff. of Var. [%]** | **5.089** | **1.931** | | **$Coeff.\ of\ Var.\ [\%]_{norm}$** | | **4.793** | **2.719** |
| **Min.** | **75.410** | **6.160** | | **Min.** | **0.0074** | **75.686** | **6.103** |
| **Max.** | **90.165** | **6.661** | | **Max.** | **0.0078** | **88.649** | **6.610** |
| **Number of Spec.** | **21** | **21** | | **Number of Spec.** | **21** | **21** | **21** |


Laminate Unnotched Compression Properties (UNC1)--(RTD)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
Unnotched Compression Strength (UNC1) [ksi]


Laminate Unnotched Compression Properties (UNC1)--(RTD)
Normalized Modulus
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
Unnotched Compression Modulus (UNC1) [Msi]

## Laminate Unnotched Compression Properties (UNC1)--ETW1
## Strength & Modulus

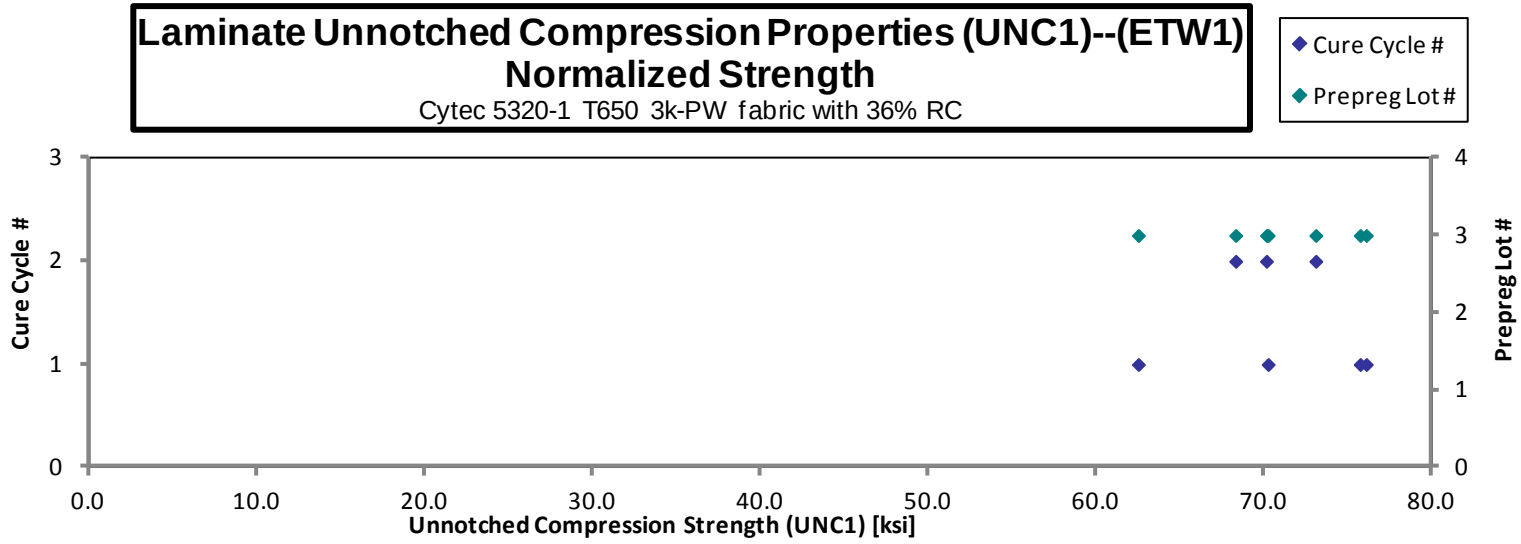
Cytec 5320-1 T650 3k-PW fabric with 36% RC

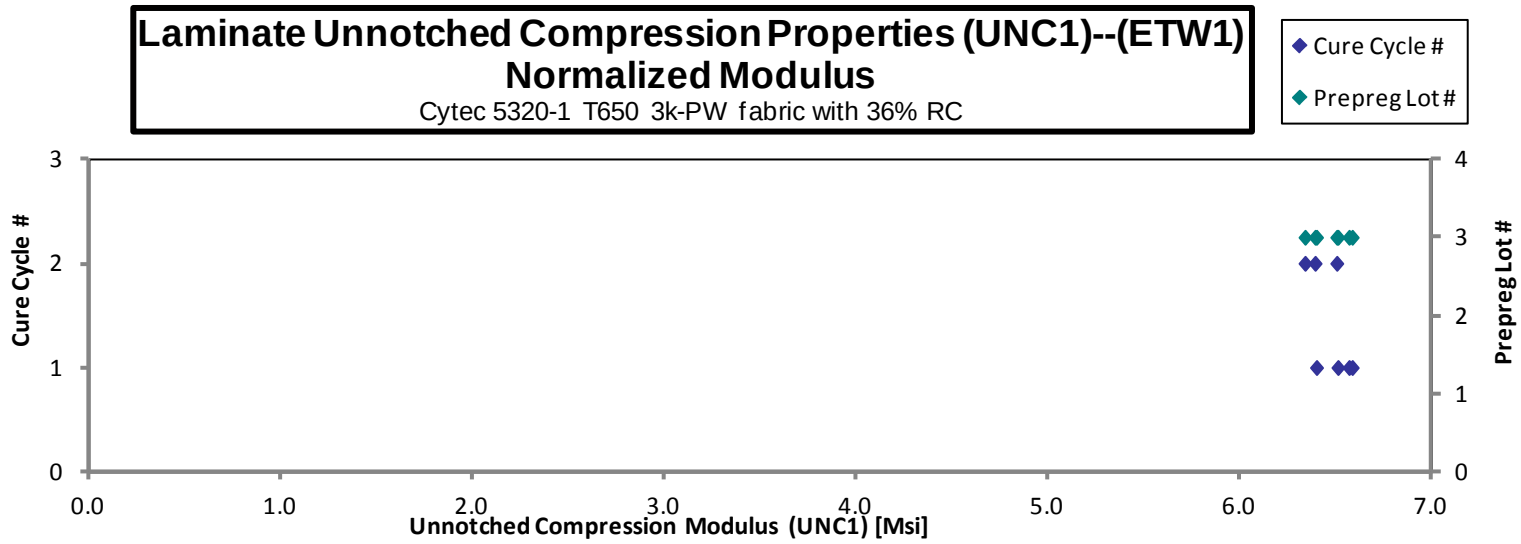
| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] | $Modulus_{norm}$ [Msi] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CUHWC116D | C | C1 | 3 | 1 | | 6.407 | 0.123 | 16 | END CRUSH | 0.0077 | | 6.396 |
| CUHWC117D | C | C1 | 3 | 1 | | 6.596 | 0.123 | 16 | END CRUSH | 0.0077 | | 6.582 |
| CUHWC118D | C | C1 | 3 | 1 | | 6.523 | 0.124 | 16 | BGM | 0.0078 | | 6.566 |
| CUHWC119D | C | C1 | 3 | 1 | | 6.422 | 0.125 | 16 | END CRUSH | 0.0078 | | 6.508 |
| CUHWC11AD | C | C1 | 3 | 1 | 75.282 | | 0.124 | 16 | BGM | 0.0078 | 76.061 | |
| CUHWC11BD | C | C1 | 3 | 1 | 75.523 | | 0.123 | 16 | BGM | 0.0077 | 75.699 | |
| CUHWC11CD | C | C1 | 3 | 1 | 69.740 | | 0.124 | 16 | BGM | 0.0078 | 70.214 | |
| CUHWC11DD | C | C1 | 3 | 1 | 62.838 | | 0.123 | 16 | BGM | 0.0077 | 62.481 | |
| CUHWC215D | C | C2 | 3 | 2 | | 6.420 | 0.122 | 16 | BGM/END CRUSH | 0.0076 | | 6.336 |
| CUHWC216D | C | C2 | 3 | 2 | | 6.555 | 0.122 | 16 | BGM | 0.0076 | | 6.502 |
| CUHWC217D | C | C2 | 3 | 2 | | 6.442 | 0.122 | 16 | BGM | 0.0076 | | 6.388 |
| CUHWC218D | C | C2 | 3 | 2 | 74.085 | | 0.121 | 16 | BGM | 0.0076 | 73.055 | |
| CUHWC219D | C | C2 | 3 | 2 | 70.787 | | 0.122 | 16 | BGM | 0.0076 | 70.112 | |
| CUHWC21AD | C | C2 | 3 | 2 | 68.413 | | 0.123 | 16 | BGM | 0.0077 | 68.281 | |

| | Strength [ksi] | Modulus [Msi] |
|---|---|---|
| **Average** | **70.952** | **6.481** |
| **Standard Dev.** | **4.532** | **0.076** |
| **Coeff. of Var. [%]** | **6.388** | **1.174** |
| **Min.** | **62.838** | **6.407** |
| **Max.** | **75.523** | **6.596** |
| **Number of Spec.** | **7** | **7** |

| | $t_{ply}$ [in] | $Strength_{norm}$ [ksi] | $Modulus_{norm}$ [Msi] |
|---|---|---|---|
| **$Average_{norm}$** | **0.0077** | **70.843** | **6.468** |
| **Standard $Dev._{norm}$** | | **4.710** | **0.095** |
| **Coeff. of Var. $[\%]_{norm}$** | | **6.649** | **1.469** |
| **Min.** | **0.0076** | **62.481** | **6.336** |
| **Max.** | **0.0078** | **76.061** | **6.582** |
| **Number of Spec.** | **14** | **7** | **7** |


Laminate Unnotched Compression Properties (UNC1)--(ETW1)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
Unnotched Compression Strength (UNC1) [ksi]


Laminate Unnotched Compression Properties (UNC1)--(ETW1)
Normalized Modulus
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
Unnotched Compression Modulus (UNC1) [Msi]

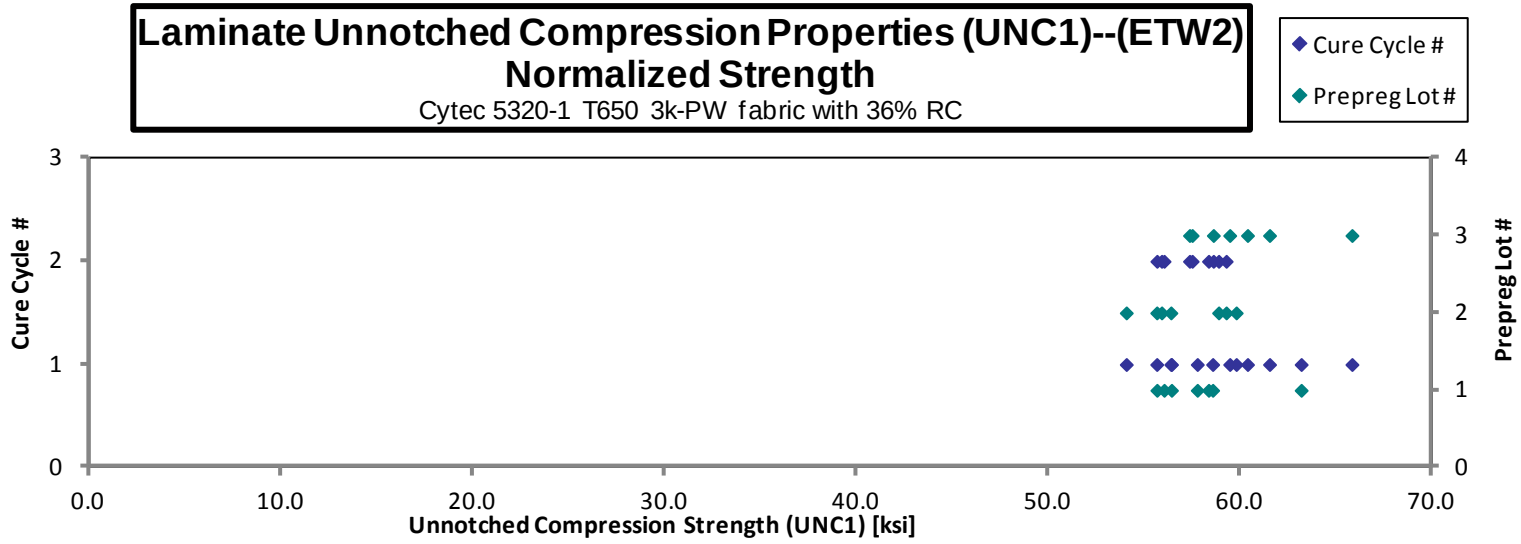
**Laminate Unnotched Compression Properties (UNC1)--ETW2**
**Strength & Modulus**
Cytec 5320-1 T650 3k-PW fabric with 36% RC

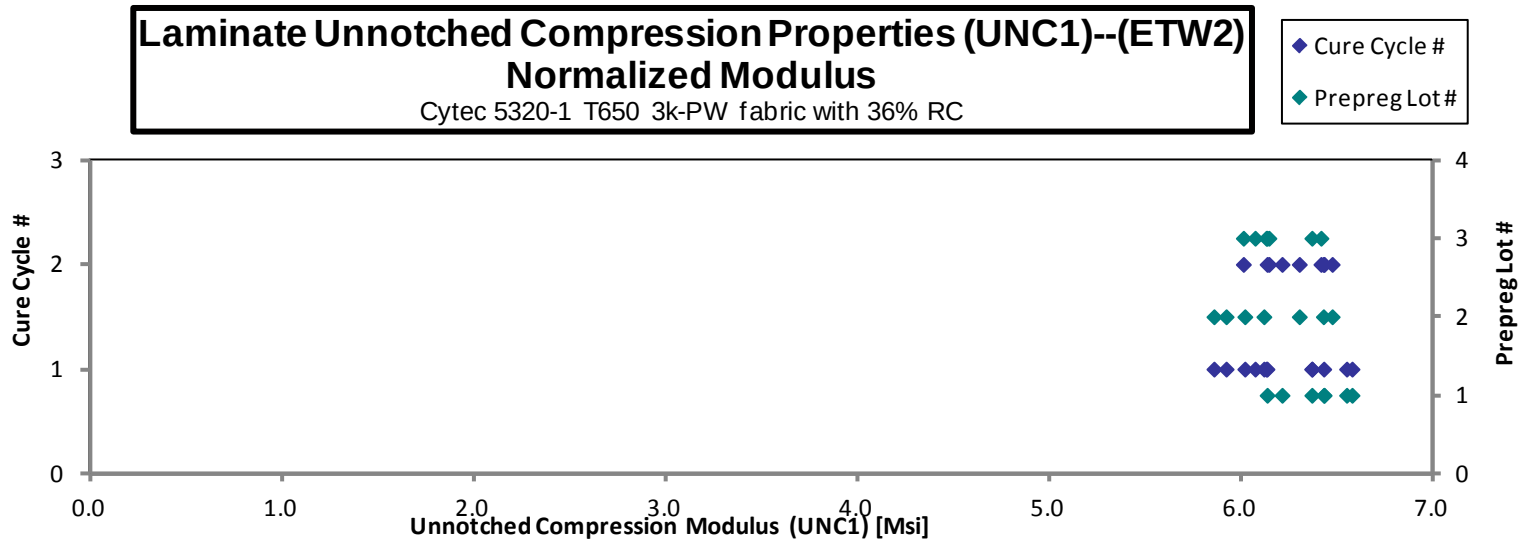
| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] | $Modulus_{norm}$ [Msi] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CUHWA117F | A | C1 | 1 | 1 | | 6.562 | 0.124 | 16 | END CRUSH | 0.0077 | | 6.581 |
| CUHWA119F | A | C1 | 1 | 1 | | 6.391 | 0.124 | 16 | BGM | 0.0078 | | 6.433 |
| CUHWA11AF | A | C1 | 1 | 1 | | 6.517 | 0.124 | 16 | BGM | 0.0077 | | 6.553 |
| CUHWA11BF | A | C1 | 1 | 1 | | 6.348 | 0.124 | 16 | BGM | 0.0077 | | 6.372 |
| CUHWA11CF | A | C1 | 1 | 1 | 62.814 | | 0.124 | 16 | BGM | 0.0077 | 63.158 | |
| CUHWA11DF | A | C1 | 1 | 1 | 57.467 | | 0.124 | 16 | BGM | 0.0077 | 57.741 | |
| CUHWA11EF | A | C1 | 1 | 1 | 58.377 | | 0.124 | 16 | BGM | 0.0077 | 58.543 | |
| CUHWA11FF | A | C1 | 1 | 1 | 55.947 | | 0.124 | 16 | BGM | 0.0078 | 56.395 | |
| CUHWA216F | A | C2 | 1 | 2 | | 6.411 | 0.124 | 16 | BGM | 0.0077 | | 6.435 |
| CUHWA217F | A | C2 | 1 | 2 | | 6.165 | 0.124 | 16 | BGM | 0.0078 | | 6.216 |
| CUHWA218F | A | C2 | 1 | 2 | | 6.103 | 0.124 | 16 | BGM | 0.0077 | | 6.138 |
| CUHWA219F | A | C2 | 1 | 2 | 55.484 | | 0.124 | 16 | BGM | 0.0077 | 55.636 | |
| CUHWA21AF | A | C2 | 1 | 2 | 55.665 | | 0.124 | 16 | BGM | 0.0077 | 56.009 | |
| CUHWA21BF | A | C2 | 1 | 2 | 57.911 | | 0.124 | 16 | HGM | 0.0078 | 58.328 | |
| CUHWB117F | B | C1 | 2 | 1 | | 6.237 | 0.121 | 16 | BGM | 0.0076 | | 6.121 |
| CUHWB118F | B | C1 | 2 | 1 | | 6.014 | 0.120 | 16 | BGM | 0.0075 | | 5.861 |
| CUHWB119F | B | C1 | 2 | 1 | | 6.047 | 0.121 | 16 | BGM | 0.0075 | | 5.925 |
| CUHWB11AF | B | C1 | 2 | 1 | | 6.240 | 0.119 | 16 | BGM | 0.0074 | | 6.022 |
| CUHWB11BF | B | C1 | 2 | 1 | 55.958 | | 0.119 | 16 | BGM | 0.0074 | 54.039 | |
| CUHWB11CF | B | C1 | 2 | 1 | 58.275 | | 0.119 | 16 | BGM | 0.0074 | 56.365 | |
| CUHWB11DF | B | C1 | 2 | 1 | 61.628 | | 0.119 | 16 | BGM | 0.0075 | 59.771 | |
| CUHWB11EF | B | C1 | 2 | 1 | 57.261 | | 0.120 | 16 | BGM | 0.0075 | 55.628 | |
| CUHWB216F | B | C2 | 2 | 2 | | 6.268 | 0.124 | 16 | HIB / BGM | 0.0077 | | 6.306 |
| CUHWB217F | B | C2 | 2 | 2 | | 6.442 | 0.124 | 16 | BGM | 0.0077 | | 6.477 |
| CUHWB218F | B | C2 | 2 | 2 | | 6.378 | 0.124 | 16 | BGM | 0.0078 | | 6.432 |
| CUHWB219F | B | C2 | 2 | 2 | 55.307 | | 0.124 | 16 | BGM | 0.0078 | 55.880 | |
| CUHWB21AF | B | C2 | 2 | 2 | 58.895 | | 0.124 | 16 | BGM | 0.0077 | 59.247 | |
| CUHWB21BF | B | C2 | 2 | 2 | 58.728 | | 0.123 | 16 | BGM | 0.0077 | 58.853 | |
| CUHWC11EF | C | C1 | 3 | 1 | | 6.201 | 0.122 | 16 | HGM | 0.0076 | | 6.134 |
| CUHWC11FF | C | C1 | 3 | 1 | | 6.111 | 0.124 | 16 | BGM | 0.0077 | | 6.137 |
| CUHWC11GF | C | C1 | 3 | 1 | | 6.115 | 0.122 | 16 | BGM | 0.0077 | | 6.075 |
| CUHWC11HF | C | C1 | 3 | 1 | | 6.337 | 0.124 | 16 | BGM | 0.0077 | | 6.372 |
| CUHWC11IF | C | C1 | 3 | 1 | 59.067 | | 0.124 | 16 | BGM | 0.0077 | 59.433 | |
| CUHWC11JF | C | C1 | 3 | 1 | 59.946 | | 0.124 | 16 | BGM | 0.0078 | 60.360 | |
| CUHWC11KF | C | C1 | 3 | 1 | 60.958 | | 0.124 | 16 | BGM | 0.0078 | 61.509 | |
| CUHWC11LF | C | C1 | 3 | 1 | 65.250 | | 0.124 | 16 | BGM | 0.0078 | 65.806 | |
| CUHWC21HF | C | C2 | 3 | 2 | | 6.038 | 0.123 | 16 | BGM | 0.0077 | | 6.014 |
| CUHWC21IF | C | C2 | 3 | 2 | | 6.432 | 0.123 | 16 | BGM | 0.0077 | | 6.419 |
| CUHWC21JF | C | C2 | 3 | 2 | | 6.192 | 0.122 | 16 | BGM | 0.0076 | | 6.147 |
| CUHWC21KF | C | C2 | 3 | 2 | 57.523 | | 0.123 | 16 | BGM | 0.0077 | 57.336 | |
| CUHWC21LF | C | C2 | 3 | 2 | 58.330 | | 0.124 | 16 | BGM | 0.0077 | 58.578 | |
| CUHWC21MF | C | C2 | 3 | 2 | 57.708 | | 0.123 | 16 | BGM | 0.0077 | 57.474 | |

| | Strength [ksi] | Modulus [Msi] |
|---|---|---|
| Average | 58.500 | 6.264 |
| Standard Dev. | 2.525 | 0.163 |
| Coeff. of Var. [%] | 4.317 | 2.595 |
| Min. | 55.307 | 6.014 |
| Max. | 65.250 | 6.562 |
| Number of Spec. | 21 | 21 |

| | $t_{ply}$ [in] | $Strength_{norm}$ [ksi] | $Modulus_{norm}$ [Msi] |
|---|---|---|---|
| $Average_{norm}$ | 0.0077 | 58.385 | 6.246 |
| $Standard\ Dev._{norm}$ | | 2.756 | 0.209 |
| $Coeff.\ of\ Var.\ [\%]_{norm}$ | | 4.720 | 3.352 |
| Min. | 0.0074 | 54.039 | 5.861 |
| Max. | 0.0078 | 65.806 | 6.581 |
| Number of Spec. | 42 | 21 | 21 |


Laminate Unnotched Compression Properties (UNC1)--(ETW2)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
Unnotched Compression Strength (UNC1) [ksi]


Laminate Unnotched Compression Properties (UNC1)--(ETW2)
Normalized Modulus
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
Unnotched Compression Modulus (UNC1) [Msi]

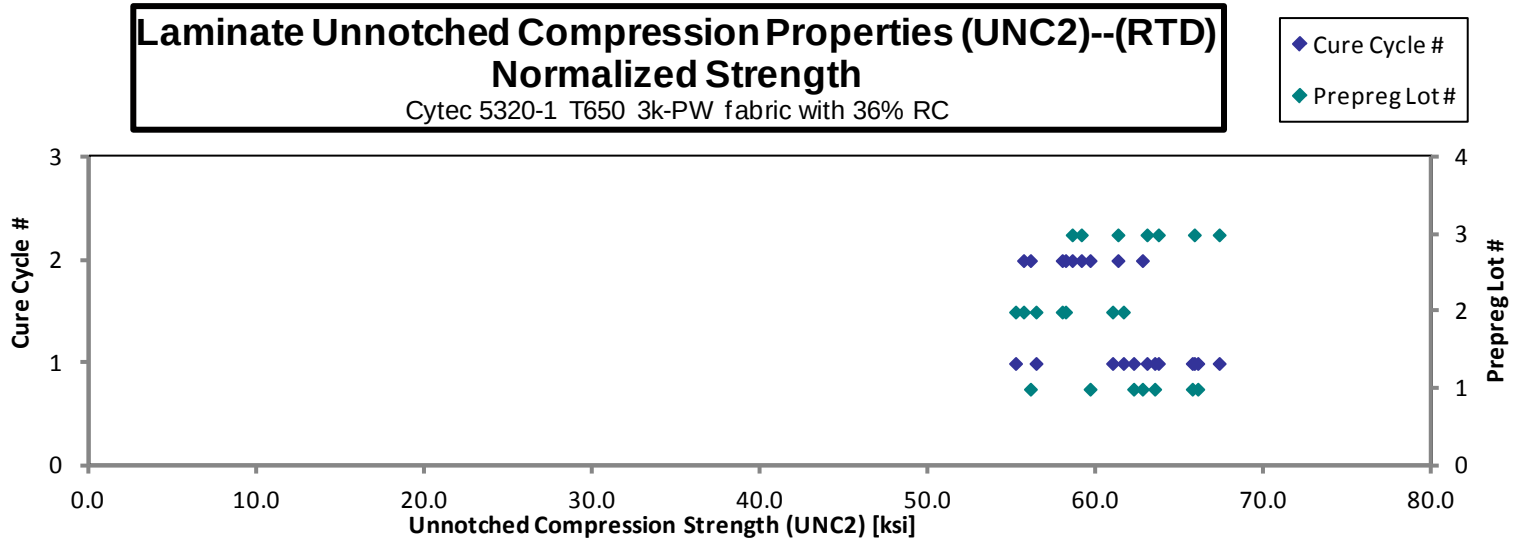
# 4.10 "10/80/10" Unnotched Compression 2 Properties (UNC2)

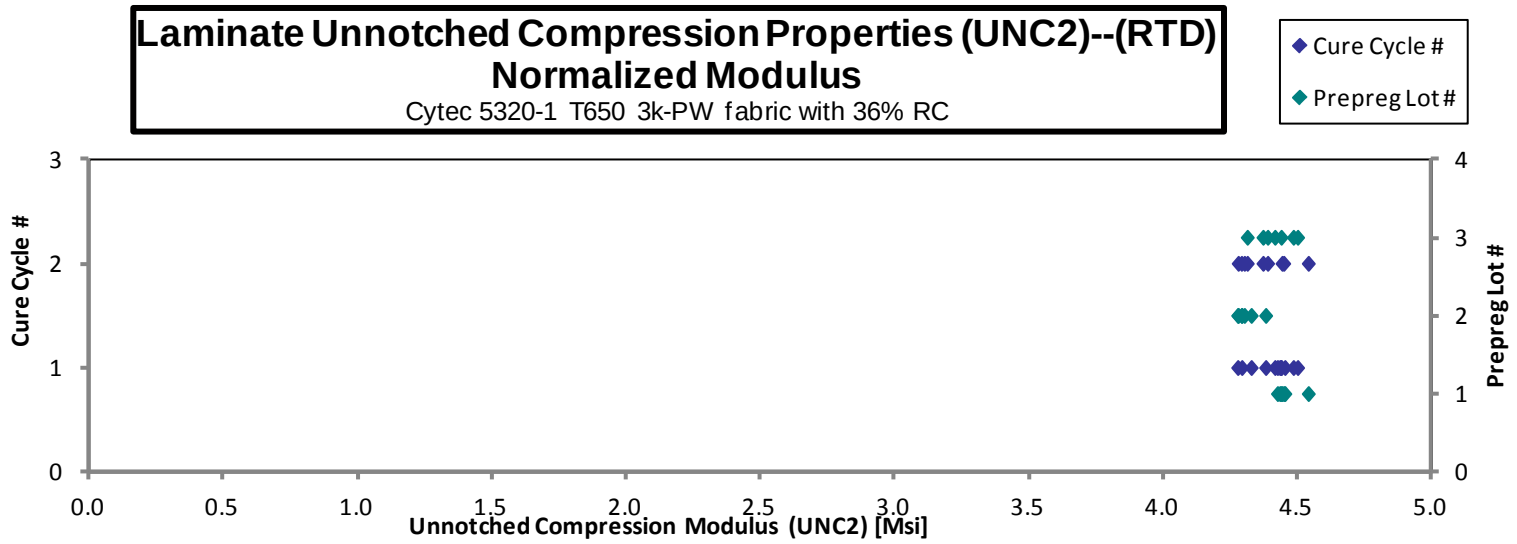
**Laminate Unnotched Compression Properties (UNC2)--RTD**
**Strength & Modulus**
Cytec 5320-1 T650 3k-PW fabric with 36% RC

| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] | $Modulus_{norm}$ [Msi] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CUHXA111A | A | C1 | 1 | 1 | 63.695 | 4.440 | 0.153 | 20 | BGM | 0.0077 | 63.452 | 4.423 |
| CUHXA112A | A | C1 | 1 | 1 | 62.307 | 4.440 | 0.154 | 20 | BGM | 0.0077 | 62.196 | 4.432 |
| CUHXA113A | A | C1 | 1 | 1 | 66.435 | 4.464 | 0.153 | 20 | BGM | 0.0077 | 66.020 | 4.436 |
| CUHXA114A | A | C1 | 1 | 1 | 65.868 | 4.462 | 0.154 | 20 | BGM | 0.0077 | 65.692 | 4.451 |
| CUHXA211A | A | C2 | 1 | 2 | 57.475 | 4.653 | 0.150 | 20 | BGM | 0.0075 | 56.047 | 4.538 |
| CUHXA212A | A | C2 | 1 | 2 | 64.179 | 4.543 | 0.151 | 20 | BGM | 0.0075 | 62.721 | 4.440 |
| CUHXA213A | A | C2 | 1 | 2 | 60.963 | 4.548 | 0.151 | 20 | BGM | 0.0075 | 59.603 | 4.446 |
| CUHXB111A | B | C1 | 2 | 1 | 58.079 | 4.611 | 0.146 | 20 | BGM | 0.0073 | 55.161 | 4.379 |
| CUHXB112A | B | C1 | 2 | 1 | 59.080 | 4.480 | 0.147 | 20 | BGM | 0.0073 | 56.380 | 4.275 |
| CUHXB113A | B | C1 | 2 | 1 | 64.057 | 4.462 | 0.148 | 20 | BGM | 0.0074 | 61.587 | 4.290 |
| CUHXB114A | B | C1 | 2 | 1 | 63.264 | 4.490 | 0.148 | 20 | BGM | 0.0074 | 60.943 | 4.325 |
| CUHXB211A | B | C2 | 2 | 2 | 57.814 | 4.444 | 0.148 | 20 | BGM | 0.0074 | 55.637 | 4.277 |
| CUHXB212A | B | C2 | 2 | 2 | 59.565 | 4.420 | 0.150 | 20 | BGM | 0.0075 | 57.941 | 4.300 |
| CUHXB213A | B | C2 | 2 | 2 | 59.398 | 4.382 | 0.151 | 20 | BGM | 0.0075 | 58.140 | 4.289 |
| CUHXC112A | C | C1 | 3 | 1 | 64.116 | 4.562 | 0.151 | 20 | BGM | 0.0076 | 62.992 | 4.482 |
| CUHXC113A | C | C1 | 3 | 1 | 66.884 | 4.571 | 0.152 | 20 | BGM | 0.0076 | 65.814 | 4.498 |
| CUHXC114A | C | C1 | 3 | 1 | 69.048 | 4.528 | 0.150 | 20 | BGM | 0.0075 | 67.294 | 4.413 |
| CUHXC115A | C | C1 | 3 | 1 | 65.213 | 4.544 | 0.150 | 20 | BGM | 0.0075 | 63.672 | 4.437 |
| CUHXC211A | C | C2 | 3 | 2 | 59.982 | 4.495 | 0.150 | 20 | BGM | 0.0075 | 58.536 | 4.386 |
| CUHXC212A | C | C2 | 3 | 2 | 62.018 | 4.423 | 0.152 | 20 | BGM | 0.0076 | 61.263 | 4.369 |
| CUHXC213A | C | C2 | 3 | 2 | 60.399 | 4.407 | 0.151 | 20 | BGM | 0.0075 | 59.080 | 4.311 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Average** | **62.373** | **4.494** | **Average$_{norm}$** | **0.0075** | **60.961** | **4.390** |
| **Standard Dev.** | **3.285** | **0.071** | **Standard Dev.$_{norm}$** | | **3.673** | **0.079** |
| **Coeff. of Var. [%]** | **5.267** | **1.580** | **Coeff. of Var. [%]$_{norm}$** | | **6.026** | **1.797** |
| **Min.** | **57.475** | **4.382** | **Min.** | **0.0073** | **55.161** | **4.275** |
| **Max.** | **69.048** | **4.653** | **Max.** | **0.0077** | **67.294** | **4.538** |
| **Number of Spec.** | **21** | **21** | **Number of Spec.** | **21** | **21** | **21** |


Laminate Unnotched Compression Properties (UNC2)--(RTD)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
Unnotched Compression Strength (UNC2) [ksi]


Laminate Unnotched Compression Properties (UNC2)--(RTD)
Normalized Modulus
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
Unnotched Compression Modulus (UNC2) [Msi]

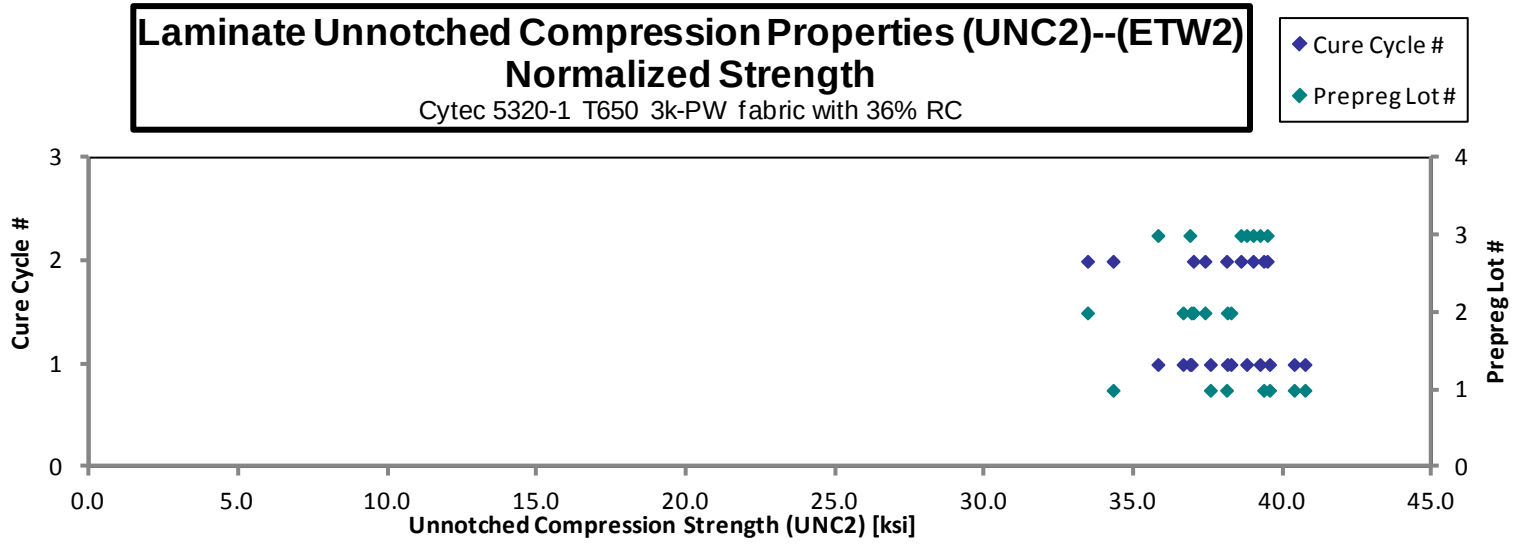
**Laminate Unnotched Compression Properties (UNC2)--ETW2**
**Strength & Modulus**
Cytec 5320-1 T650 3k-PW fabric with 36% RC

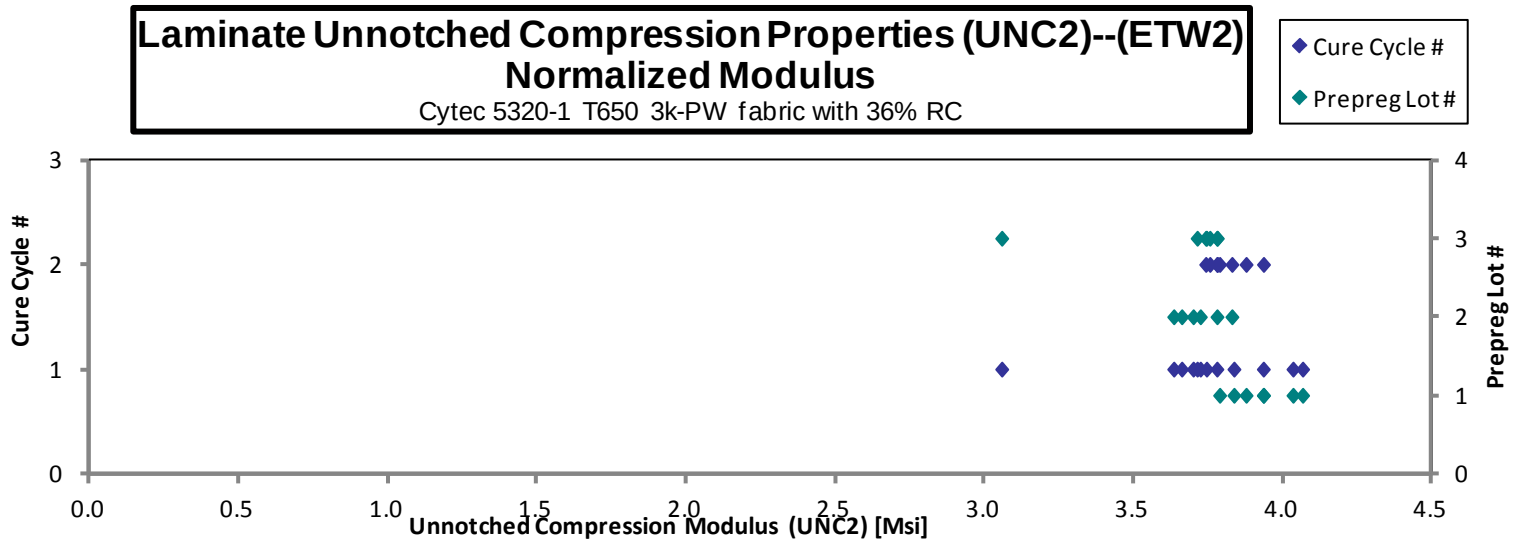
| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] | $Modulus_{norm}$ [Msi] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CUHXA117F | A | C1 | 1 | 1 | | 4.079 | 0.153 | 20 | BGM | 0.0077 | | 4.065 |
| CUHXA118F | A | C1 | 1 | 1 | | 4.066 | 0.153 | 20 | BGM | 0.0076 | | 4.033 |
| CUHXA119F | A | C1 | 1 | 1 | | 3.966 | 0.153 | 20 | BGM | 0.0076 | | 3.933 |
| CUHXA11AF | A | C1 | 1 | 1 | | 3.849 | 0.153 | 20 | HGM | 0.0077 | | 3.835 |
| CUHXA11BF | A | C1 | 1 | 1 | 40.279 | | 0.154 | 20 | BGM | 0.0077 | 40.367 | |
| CUHXA11CF | A | C1 | 1 | 1 | 37.313 | | 0.155 | 20 | BGM | 0.0078 | 37.558 | |
| CUHXA11DF | A | C1 | 1 | 1 | 39.707 | | 0.153 | 20 | BGM | 0.0077 | 39.543 | |
| CUHXA11EF | A | C1 | 1 | 1 | 40.683 | | 0.154 | 20 | BGM | 0.0077 | 40.729 | |
| CUHXA216F | A | C2 | 1 | 2 | | 3.946 | 0.151 | 20 | BGM | 0.0076 | | 3.876 |
| CUHXA217F | A | C2 | 1 | 2 | | 3.850 | 0.151 | 20 | BGM | 0.0076 | | 3.787 |
| CUHXA218F | A | C2 | 1 | 2 | | 4.005 | 0.151 | 20 | BGM | 0.0076 | | 3.934 |
| CUHXA219F | A | C2 | 1 | 2 | 35.188 | | 0.150 | 20 | BGM | 0.0075 | 34.297 | |
| CUHXA21AF | A | C2 | 1 | 2 | 38.768 | | 0.151 | 20 | BGM | 0.0076 | 38.101 | |
| CUHXA21BF | A | C2 | 1 | 2 | 40.136 | | 0.151 | 20 | BGM | 0.0075 | 39.345 | |
| CUHXB117F | B | C1 | 2 | 1 | | 3.780 | 0.149 | 20 | BGM | 0.0075 | | 3.660 |
| CUHXB118F | B | C1 | 2 | 1 | | 3.812 | 0.149 | 20 | BGM | 0.0075 | | 3.698 |
| CUHXB119F | B | C1 | 2 | 1 | | 3.847 | 0.149 | 20 | HGM | 0.0075 | | 3.722 |
| CUHXB11AF | B | C1 | 2 | 1 | | 3.826 | 0.146 | 20 | BGM | 0.0073 | | 3.633 |
| CUHXB11BF | B | C1 | 2 | 1 | 39.712 | | 0.148 | 20 | BGM | 0.0074 | 38.126 | |
| CUHXB11CF | B | C1 | 2 | 1 | 37.901 | | 0.149 | 20 | HGM | 0.0074 | 36.643 | |
| CUHXB11DF | B | C1 | 2 | 1 | 38.029 | | 0.150 | 20 | BGM | 0.0075 | 36.918 | |
| CUHXB11EF | B | C1 | 2 | 1 | 39.504 | | 0.149 | 20 | BGM | 0.0075 | 38.247 | |
| CUHXB216F | B | C2 | 2 | 2 | | 3.941 | 0.150 | 20 | BGM | 0.0075 | | 3.828 |
| CUHXB217F | B | C2 | 2 | 2 | | 3.841 | 0.151 | 20 | BGM | 0.0076 | | 3.778 |
| CUHXB219F | B | C2 | 2 | 2 | 34.762 | | 0.148 | 20 | BGM | 0.0074 | 33.441 | |
| CUHXB21AF | B | C2 | 2 | 2 | 38.018 | | 0.150 | 20 | BGM / HGM | 0.0075 | 36.988 | |
| CUHXB21BF | B | C2 | 2 | 2 | 38.132 | | 0.151 | 20 | BGM / HGM | 0.0075 | 37.377 | |
| CUHXC117F | C | C1 | 3 | 1 | | 3.157 | 0.149 | 20 | BGM | 0.0075 | | 3.056 |
| CUHXC118F | C | C1 | 3 | 1 | | 3.842 | 0.150 | 20 | BGM | 0.0075 | | 3.743 |
| CUHXC119F | C | C1 | 3 | 1 | | 3.822 | 0.150 | 20 | BGM | 0.0075 | | 3.712 |
| CUHXC11AF | C | C1 | 3 | 1 | | 3.841 | 0.151 | 20 | BGM | 0.0076 | | 3.778 |
| CUHXC11BF | C | C1 | 3 | 1 | 39.617 | | 0.152 | 20 | BGM | 0.0076 | 39.221 | |
| CUHXC11CF | C | C1 | 3 | 1 | 39.103 | | 0.153 | 20 | BGM | 0.0076 | 38.773 | |
| CUHXC11DF | C | C1 | 3 | 1 | 37.337 | | 0.152 | 20 | HGM | 0.0076 | 36.870 | |
| CUHXC11EF | C | C1 | 3 | 1 | 36.442 | | 0.151 | 20 | HGM | 0.0076 | 35.800 | |
| CUHXC216F | C | C2 | 3 | 2 | | 3.842 | 0.150 | 20 | BGM / HGM | 0.0075 | | 3.754 |
| CUHXC217F | C | C2 | 3 | 2 | | 3.779 | 0.152 | 20 | BGM | 0.0076 | | 3.740 |
| CUHXC218F | C | C2 | 3 | 2 | | 3.789 | 0.154 | 20 | BGM / HGM | 0.0077 | | 3.779 |
| CUHXC219F | C | C2 | 3 | 2 | 39.601 | | 0.150 | 20 | BGM | 0.0075 | 38.582 | |
| CUHXC21AF | C | C2 | 3 | 2 | 40.228 | | 0.151 | 20 | BGM / HGM | 0.0076 | 39.464 | |
| CUHXC21BF | C | C2 | 3 | 2 | 39.578 | | 0.152 | 20 | BGM / HGM | 0.0076 | 38.990 | |

| | Strength [ksi] | Modulus [Msi] |
|---|---|---|
| Average | 38.573 | 3.844 |
| Standard Dev. | 1.649 | 0.185 |
| Coeff. of Var. [%] | 4.274 | 4.812 |
| Min. | 34.762 | 3.157 |
| Max. | 40.683 | 4.079 |
| Number of Spec. | 21 | 20 |

| | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] | $Modulus_{norm}$ [Msi] |
|---|---|---|---|
| $Average_{norm}$ | 0.0076 | 37.875 | 3.767 |
| $Standard\ Dev._{norm}$ | | 1.841 | 0.203 |
| $Coeff.\ of\ Var.\ [\%]_{norm}$ | | 4.861 | 5.383 |
| Min. | 0.0073 | 33.441 | 3.056 |
| Max. | 0.0078 | 40.729 | 4.065 |
| Number of Spec. | 41 | 21 | 20 |


Laminate Unnotched Compression Properties (UNC2)--(ETW2)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Unnotched Compression Strength (UNC2) [ksi]
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0


Laminate Unnotched Compression Properties (UNC2)--(ETW2)
Normalized Modulus
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Unnotched Compression Modulus (UNC2) [Msi]
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5

# 4.11 "40/20/40" Unnotched Compression 3 Properties (UNC3)

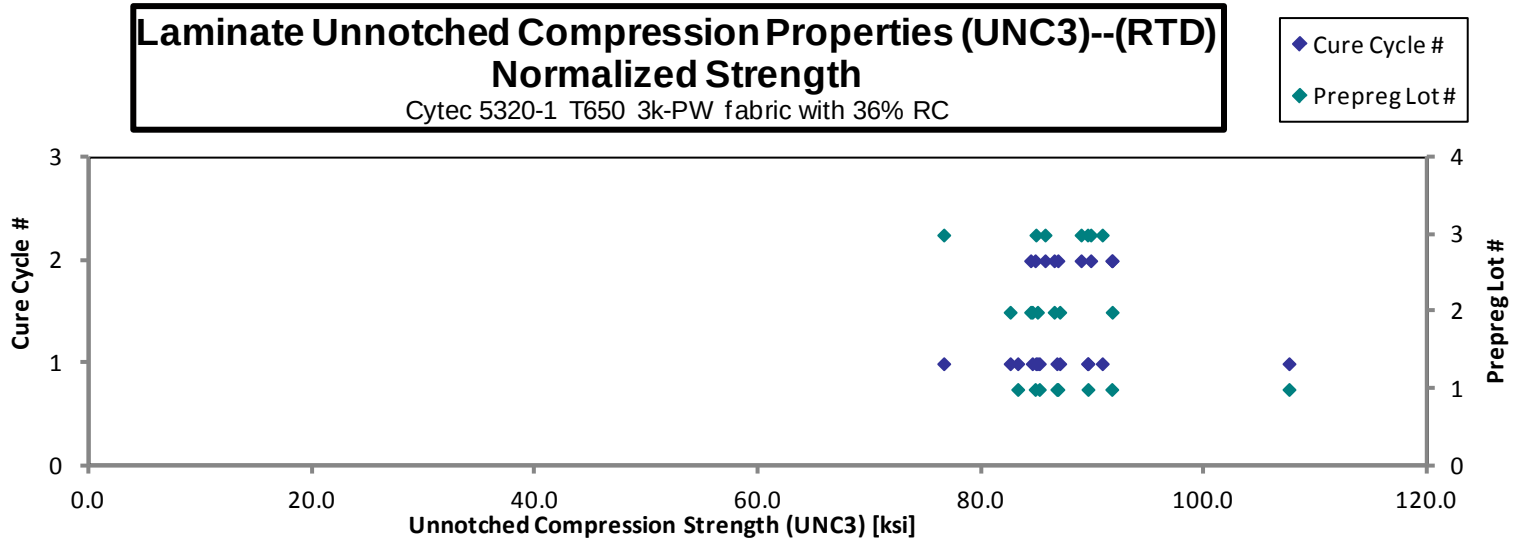
**Laminate Unnotched Compression Properties (UNC3)--RTD**
**Strength & Modulus**
Cytec 5320-1 T650 3k-PW fabric with 36% RC

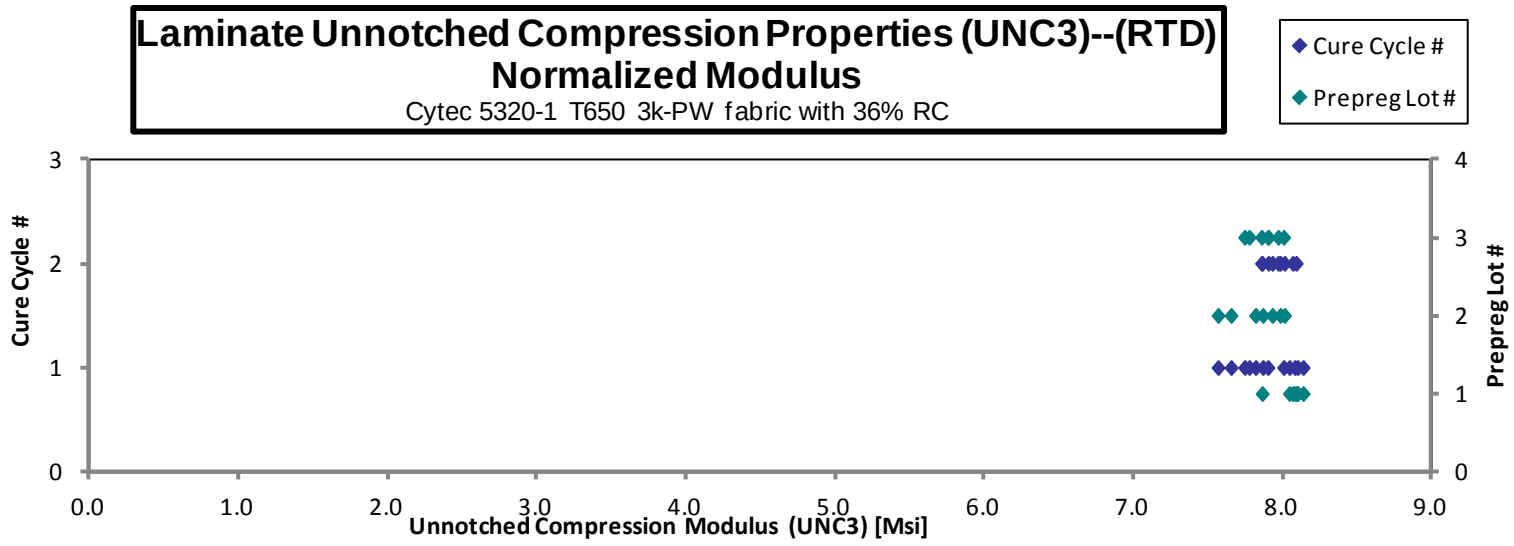
normalizing $t_{ply}$ [in]: 0.0077

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] | $Modulus_{norm}$ [Msi] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CUHYA111A | A | C1 | 1 | 1 | 85.505 | 8.265 | 0.150 | 20 | BGM | 0.0075 | 83.194 | 8.041 |
| CUHYA112A | A | C1 | 1 | 1 | 88.328 | 8.286 | 0.151 | 20 | BGM | 0.0076 | 86.700 | 8.134 |
| CUHYA113A | A | C1 | 1 | 1 | 86.206 | 8.180 | 0.152 | 20 | BGM | 0.0076 | 85.128 | 8.078 |
| CUHYA114A | A | C1 | 1 | 1 | 108.235 | 8.151 | 0.153 | 20 | BGM | 0.0076 | 107.515 | 8.097 |
| CUHYA116A | A | C1 | 1 | 1 | 90.870 | * | 0.152 | 20 | BGM | 0.0076 | 89.490 | |
| CUHYA211A | A | C2 | 1 | 2 | 88.535 | 8.210 | 0.147 | 20 | BGM | 0.0074 | 84.755 | 7.859 |
| CUHYA212A | A | C2 | 1 | 2 | 94.384 | 8.331 | 0.150 | 20 | BGM | 0.0075 | 91.626 | 8.087 |
| CUHYA213A | A | C2 | 1 | 2 | 89.287 | 8.296 | 0.150 | 20 | BGM | 0.0075 | 86.794 | 8.064 |
| CUHYB111A | B | C1 | 2 | 1 | 89.364 | 7.999 | 0.146 | 20 | BGM | 0.0073 | 84.497 | 7.563 |
| CUHYB112A | B | C1 | 2 | 1 | 90.962 | 8.174 | 0.147 | 20 | BGM | 0.0074 | 86.960 | 7.815 |
| CUHYB113A | B | C1 | 2 | 1 | 86.356 | 8.230 | 0.147 | 20 | BGM | 0.0074 | 82.514 | 7.864 |
| CUHYB114A | B | C1 | 2 | 1 | 87.960 | 7.921 | 0.149 | 20 | BGM | 0.0074 | 84.961 | 7.651 |
| CUHYB211A | B | C2 | 2 | 2 | 88.066 | 8.362 | 0.148 | 20 | BGM | 0.0074 | 84.349 | 8.009 |
| CUHYB212A | B | C2 | 2 | 2 | 89.436 | 8.255 | 0.149 | 20 | BGM | 0.0074 | 86.460 | 7.980 |
| CUHYB213A | B | C2 | 2 | 2 | 94.912 | 8.208 | 0.149 | 20 | BGM | 0.0074 | 91.661 | 7.927 |
| CUHYC111A** | C | C1 | 3 | 1 | 79.663 | 8.218 | 0.148 | 20 | BGM | 0.0074 | 76.559 | 7.897 |
| CUHYC112A | C | C1 | 3 | 1 | 87.669 | 8.271 | 0.149 | 20 | BGM | 0.0075 | 84.823 | 8.003 |
| CUHYC113A | C | C1 | 3 | 1 | 93.239 | 7.983 | 0.150 | 20 | BGM | 0.0075 | 90.771 | 7.772 |
| CUHYC114A | C | C1 | 3 | 1 | 91.908 | 7.954 | 0.150 | 20 | BGM | 0.0075 | 89.454 | 7.741 |
| CUHYC211A | C | C2 | 3 | 2 | 89.077 | 8.170 | 0.148 | 20 | BGM | 0.0074 | 85.642 | 7.855 |
| CUHYC212A | C | C2 | 3 | 2 | 90.871 | 8.078 | 0.151 | 20 | BGM | 0.0075 | 88.872 | 7.901 |
| CUHYC213A | C | C2 | 3 | 2 | 91.376 | 8.112 | 0.151 | 20 | BGM | 0.0076 | 89.737 | 7.966 |

*Specimen was not gaged.
** Specimen shows higher porosity compared to other samples.

| | | | | | | |
|---|---|---|---|---|---|---|
| **Average** | **90.100** | **8.174** | **$Average_{norm}$** | **0.0075** | **87.385** | **7.919** |
| **Standard Dev.** | **5.206** | **0.125** | **$Standard\ Dev._{norm}$** | | **5.669** | **0.152** |
| **Coeff. of Var. [%]** | **5.778** | **1.528** | **$Coeff.\ of\ Var.\ [\%]_{norm}$** | | **6.487** | **1.921** |
| **Min.** | **79.663** | **7.921** | **Min.** | **0.0073** | **76.559** | **7.563** |
| **Max.** | **108.235** | **8.362** | **Max.** | **0.0076** | **107.515** | **8.134** |
| **Number of Spec.** | **22** | **21** | **Number of Spec.** | **22** | **22** | **21** |


Laminate Unnotched Compression Properties (UNC3)--(RTD)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
20.0
40.0
60.0
80.0
100.0
120.0
Unnotched Compression Strength (UNC3) [ksi]


Laminate Unnotched Compression Properties (UNC3)--(RTD)
Normalized Modulus
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
Unnotched Compression Modulus (UNC3) [Msi]

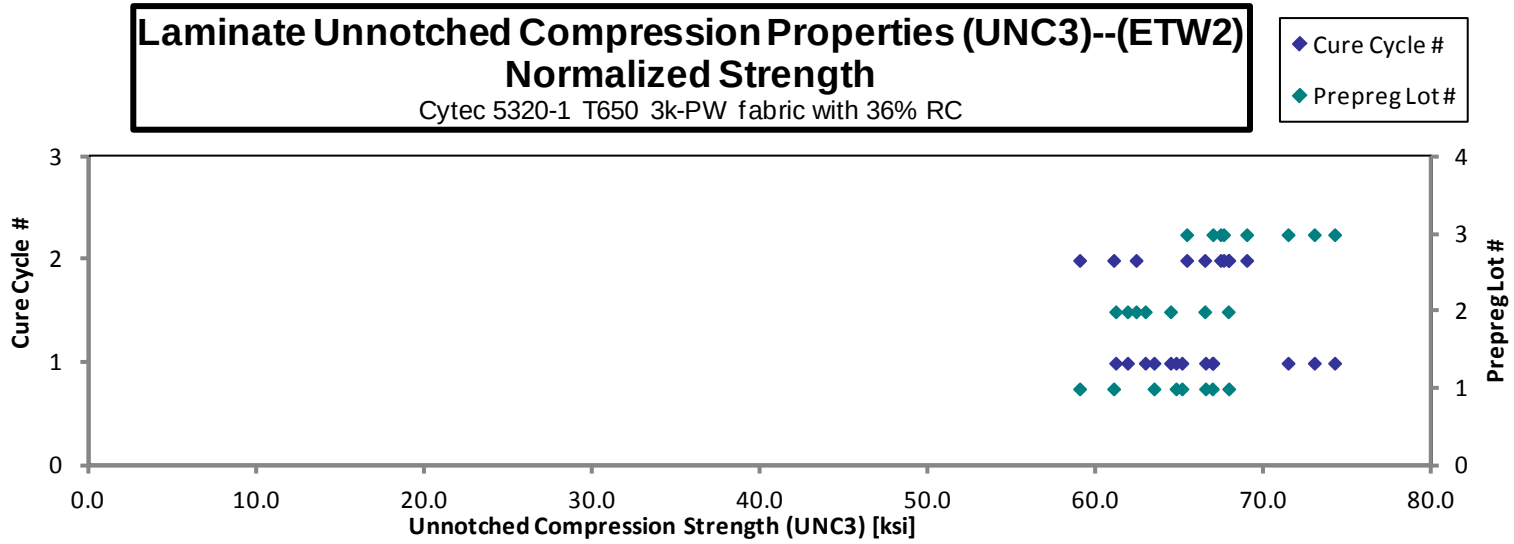
**Laminate Unnotched Compression Properties (UNC3)--ETW2**
**Strength & Modulus**
Cytec 5320-1 T650 3k-PW fabric with 36% RC

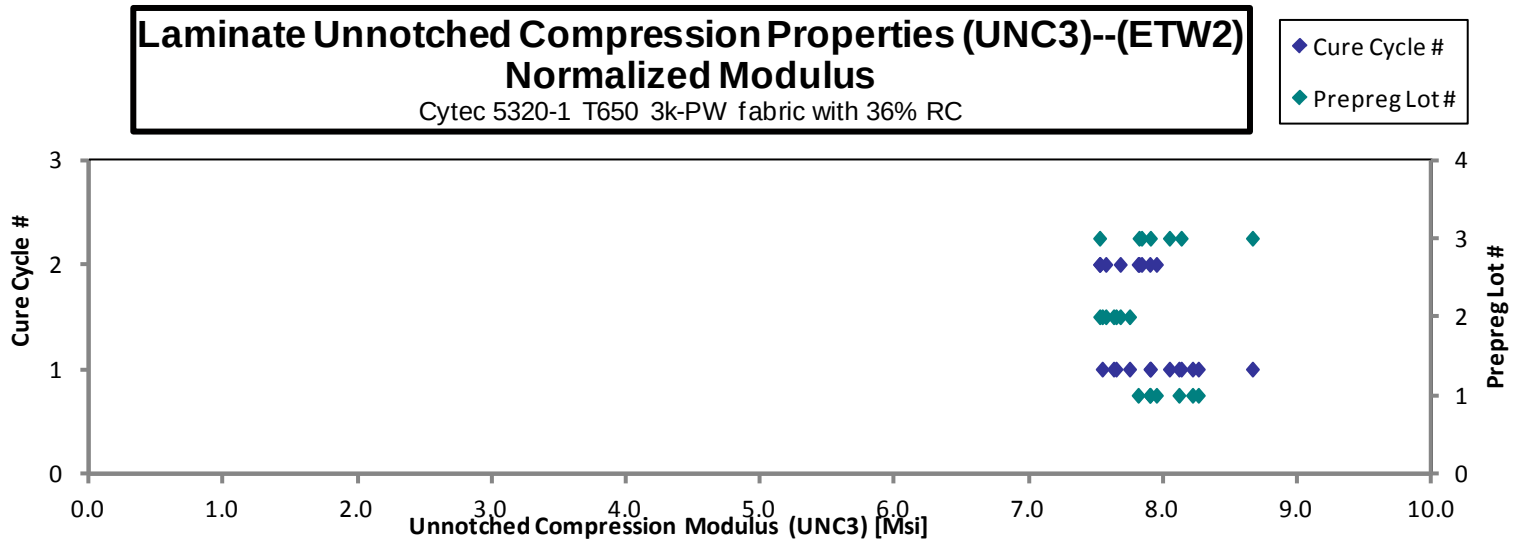
normalizing $t_{ply}$ [in]: 0.0077

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Modulus [Msi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] | $Modulus_{norm}$ [Msi] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CUHYA117F | A | C1 | 1 | 1 | | 8.170 | 0.153 | 20 | BGM | 0.0076 | | 8.112 |
| CUHYA118F | A | C1 | 1 | 1 | | 7.941 | 0.153 | 20 | BGM | 0.0077 | | 7.896 |
| CUHYA119F | A | C1 | 1 | 1 | | 8.298 | 0.153 | 20 | BGM | 0.0077 | | 8.257 |
| CUHYA11AF | A | C1 | 1 | 1 | | 8.441 | 0.150 | 20 | BGM | 0.0075 | | 8.213 |
| CUHYA11BF | A | C1 | 1 | 1 | 66.212 | | 0.151 | 20 | BAB | 0.0076 | 65.073 | |
| CUHYA11CF | A | C1 | 1 | 1 | 67.785 | | 0.151 | 20 | BGM | 0.0076 | 66.481 | |
| CUHYA11DF | A | C1 | 1 | 1 | 64.234 | | 0.152 | 20 | BAT[1] / HIT[2] | 0.0076 | 63.410 | |
| CUHYA11EF | A | C1 | 1 | 1 | 65.274 | | 0.153 | 20 | BGM | 0.0076 | 64.723 | |
| CUHYA11FF | A | C1 | 1 | 1 | 67.369 | | 0.153 | 20 | BGM | 0.0076 | 66.888 | |
| CUHYA216F | A | C2 | 1 | 2 | | 8.037 | 0.150 | 20 | HGM | 0.0075 | | 7.808 |
| CUHYA217F | A | C2 | 1 | 2 | | 8.167 | 0.150 | 20 | BGM | 0.0075 | | 7.944 |
| CUHYA218F | A | C2 | 1 | 2 | | 8.057 | 0.151 | 20 | BGM | 0.0075 | | 7.895 |
| CUHYA219F | A | C2 | 1 | 2 | 63.298 | | 0.148 | 20 | HGM | 0.0074 | 61.007 | |
| CUHYA21AF | A | C2 | 1 | 2 | 60.568 | | 0.150 | 20 | BGM | 0.0075 | 58.980 | |
| CUHYA21BF | A | C2 | 1 | 2 | 69.698 | | 0.150 | 20 | BGM | 0.0075 | 67.865 | |
| CUHYB117F | B | C1 | 2 | 1 | | 7.940 | 0.148 | 20 | HGM | 0.0074 | | 7.643 |
| CUHYB118F | B | C1 | 2 | 1 | | 7.971 | 0.150 | 20 | BGM | 0.0075 | | 7.744 |
| CUHYB119F | B | C1 | 2 | 1 | | 7.807 | 0.150 | 20 | HIT | 0.0075 | | 7.625 |
| CUHYB11AF | B | C1 | 2 | 1 | | 7.918 | 0.147 | 20 | BGM | 0.0073 | | 7.541 |
| CUHYB11BF | B | C1 | 2 | 1 | 63.435 | | 0.148 | 20 | HGM | 0.0074 | 61.128 | |
| CUHYB11CF | B | C1 | 2 | 1 | 64.041 | | 0.149 | 20 | BAT | 0.0074 | 61.832 | |
| CUHYB11DF | B | C1 | 2 | 1 | 66.445 | | 0.149 | 20 | HGM | 0.0075 | 64.396 | |
| CUHYB11FF | B | C1 | 2 | 1 | 64.663 | | 0.150 | 20 | BGM | 0.0075 | 62.889 | |
| CUHYB216F | B | C2 | 2 | 2 | | 7.757 | 0.149 | 20 | BGM | 0.0075 | | 7.522 |
| CUHYB217F | B | C2 | 2 | 2 | | 7.811 | 0.149 | 20 | BGM | 0.0075 | | 7.567 |
| CUHYB218F | B | C2 | 2 | 2 | | 7.883 | 0.150 | 20 | BGM | 0.0075 | | 7.675 |
| CUHYB219F | B | C2 | 2 | 2 | 70.668 | | 0.148 | 20 | BGM | 0.0074 | 67.834 | |
| CUHYB21AF | B | C2 | 2 | 2 | 64.987 | | 0.148 | 20 | BGM | 0.0074 | 62.344 | |
| CUHYB21BF | B | C2 | 2 | 2 | 68.584 | | 0.149 | 20 | BGM | 0.0075 | 66.435 | |
| CUHYC117F | C | C1 | 3 | 1 | | 8.353 | 0.150 | 20 | HGM | 0.0075 | | 8.129 |
| CUHYC118F | C | C1 | 3 | 1 | | 8.247 | 0.150 | 20 | HGM | 0.0075 | | 8.041 |
| CUHYC119F | C | C1 | 3 | 1 | | 8.857 | 0.151 | 20 | HGM | 0.0075 | | 8.660 |
| CUHYC11AF | C | C1 | 3 | 1 | | 8.221 | 0.148 | 20 | BGM | 0.0074 | | 7.900 |
| CUHYC11BF | C | C1 | 3 | 1 | 77.027 | | 0.148 | 20 | HGM | 0.0074 | 74.176 | |
| CUHYC11CF | C | C1 | 3 | 1 | 75.274 | | 0.149 | 20 | BGM | 0.0075 | 72.964 | |
| CUHYC11DF | C | C1 | 3 | 1 | 68.713 | | 0.150 | 20 | BGM | 0.0075 | 66.918 | |
| CUHYC11EF | C | C1 | 3 | 1 | 73.371 | | 0.150 | 20 | BGM | 0.0075 | 71.400 | |
| CUHYC216F | C | C2 | 3 | 2 | | 7.652 | 0.151 | 20 | BGM | 0.0076 | | 7.521 |
| CUHYC217F | C | C2 | 3 | 2 | | 7.931 | 0.152 | 20 | END CRUSH | 0.0076 | | 7.834 |
| CUHYC218F | C | C2 | 3 | 2 | | 7.968 | 0.151 | 20 | HGM | 0.0076 | | 7.815 |
| CUHYC219F | C | C2 | 3 | 2 | 69.669 | | 0.149 | 20 | BGM / HIT | 0.0074 | 67.379 | |
| CUHYC21AF | C | C2 | 3 | 2 | 68.678 | | 0.151 | 20 | BGM | 0.0076 | 67.557 | |
| CUHYC21CF | C | C2 | 3 | 2 | 70.246 | | 0.151 | 20 | BGM | 0.0076 | 68.935 | |
| CUHYC21DF | C | C2 | 3 | 2 | 65.981 | | 0.153 | 20 | BGM | 0.0076 | 65.360 | |

| | Strength [ksi] | Modulus [Msi] |
|---|---|---|
| **Average** | **67.662** | **8.068** |
| **Standard Dev.** | **3.963** | **0.274** |
| **Coeff. of Var. [%]** | **5.857** | **3.399** |
| **Min.** | **60.568** | **7.652** |
| **Max.** | **77.027** | **8.857** |
| **Number of Spec.** | **23** | **21** |

| | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] | $Modulus_{norm}$ [Msi] |
|---|---|---|---|
| **$Average_{norm}$** | **0.0075** | **65.912** | **7.873** |
| **Standard $Dev._{norm}$** | | **3.794** | **0.289** |
| **Coeff. of Var. $[\%]_{norm}$** | | **5.756** | **3.669** |
| **Min.** | **0.0073** | **58.980** | **7.521** |
| **Max.** | **0.0077** | **74.176** | **8.660** |
| **Number of Spec.** | **44** | **23** | **21** |


Laminate Unnotched Compression Properties (UNC3)--(ETW2)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Unnotched Compression Strength (UNC3) [ksi]
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0


Laminate Unnotched Compression Properties (UNC3)--(ETW2)
Normalized Modulus
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Unnotched Compression Modulus (UNC3) [Msi]
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0

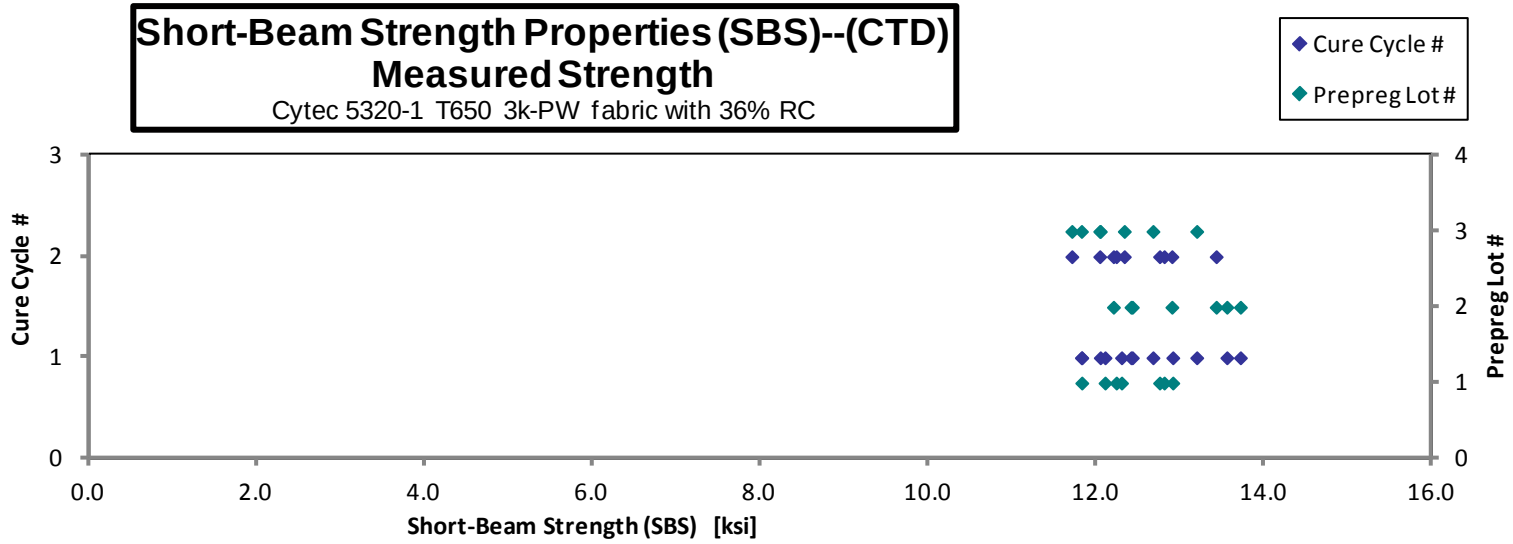
## 4.12 Lamina Short-Beam Strength Properties (SBS)

**Short-Beam Strength Properties (SBS)--CTD Strength**

Cytec 5320-1 T650 3k-PW fabric with 36% RC

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Avg. $t_{ply}$ [in] | Failure Mode |
|---|---|---|---|---|---|---|---|---|---|
| CUHQA117B | A | C1 | 1 | 1 | 11.822 | 0.244 | 32 | 0.0076 | ILS |
| CUHQA118B | A | C1 | 1 | 1 | 12.099 | 0.244 | 32 | 0.0076 | ILS |
| CUHQA119B | A | C1 | 1 | 1 | 12.295 | 0.244 | 32 | 0.0076 | ILS |
| CUHQA11AB | A | C1 | 1 | 1 | 12.906 | 0.245 | 32 | 0.0077 | ILS |
| CUHQA217B | A | C2 | 1 | 2 | 12.749 | 0.236 | 32 | 0.0074 | ILS |
| CUHQA218B | A | C2 | 1 | 2 | 12.803 | 0.237 | 32 | 0.0074 | ILS |
| CUHQA219B | A | C2 | 1 | 2 | 12.233 | 0.237 | 32 | 0.0074 | ILS |
| CUHQB117B | B | C1 | 2 | 1 | 12.408 | 0.234 | 32 | 0.0073 | ILS |
| CUHQB118B | B | C1 | 2 | 1 | 12.424 | 0.234 | 32 | 0.0073 | ILS |
| CUHQB119B | B | C1 | 2 | 1 | 13.712 | 0.236 | 32 | 0.0074 | ILS |
| CUHQB11AB | B | C1 | 2 | 1 | 13.551 | 0.236 | 32 | 0.0074 | ILS[1]/TENSION[2] |
| CUHQB217B | B | C2 | 2 | 2 | 12.199 | 0.241 | 32 | 0.0075 | ILS[1]/TENSION[2] |
| CUHQB218B | B | C2 | 2 | 2 | 12.895 | 0.240 | 32 | 0.0075 | ILS[1]/TENSION[2] |
| CUHQB219B | B | C2 | 2 | 2 | 13.423 | 0.239 | 32 | 0.0075 | ILS |
| CUHQC117B | C | C1 | 3 | 1 | 12.042 | 0.242 | 32 | 0.0076 | ILS |
| CUHQC118B | C | C1 | 3 | 1 | 11.818 | 0.242 | 32 | 0.0076 | ILS[1]/TENSION[2] |
| CUHQC119B | C | C1 | 3 | 1 | 12.670 | 0.243 | 32 | 0.0076 | ILS[1]/TENSION[2] |
| CUHQC11BB | C | C1 | 3 | 1 | 13.191 | 0.243 | 32 | 0.0076 | ILS[1]/TENSION[2] |
| CUHQC217B | C | C2 | 3 | 2 | 11.703 | 0.238 | 32 | 0.0074 | ILS[1]/TENSION[2] |
| CUHQC218B | C | C2 | 3 | 2 | 12.036 | 0.239 | 32 | 0.0075 | ILS[1]/TENSION[2] |
| CUHQC219B | C | C2 | 3 | 2 | 12.328 | 0.239 | 32 | 0.0075 | ILS |

| | | | |
|---|---|---|---|
| **Average** | **12.538** | **Average** | **0.0075** |
| **Standard Dev.** | **0.582** | **Standard Dev.** | |
| **Coeff. of Var. [%]** | **4.640** | **Coeff. of Var. [%]** | |
| **Min.** | **11.703** | **Min.** | **0.0073** |
| **Max.** | **13.712** | **Max.** | **0.0077** |
| **Number of Spec.** | **21** | **Number of Spec.** | **21** |

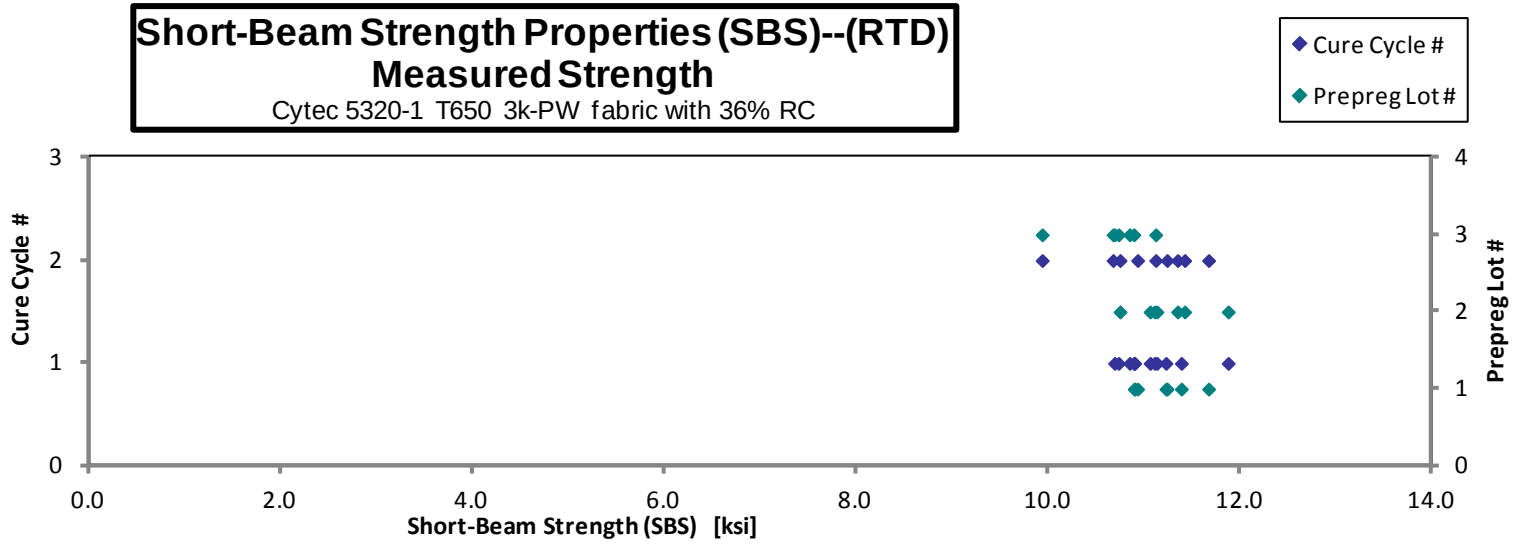

Short-Beam Strength Properties (SBS)--(CTD)
Measured Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Short-Beam Strength (SBS) [ksi]
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
0
1
2
3
4

## Short-Beam Strength Properties (SBS)--RTD Strength

Cytec 5320-1 T650 3k-PW fabric with 36% RC

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Avg. $t_{ply}$ [in] | Failure Mode |
|---|---|---|---|---|---|---|---|---|---|
| CUHQA111A | A | C1 | 1 | 1 | 10.895 | 0.242 | 32 | 0.0076 | ILS |
| CUHQA112A | A | C1 | 1 | 1 | 11.222 | 0.242 | 32 | 0.0076 | ILS |
| CUHQA113A | A | C1 | 1 | 1 | 11.382 | 0.243 | 32 | 0.0076 | ILS |
| CUHQA114A | A | C1 | 1 | 1 | 10.891 | 0.244 | 32 | 0.0076 | ILS |
| CUHQA211A | A | C2 | 1 | 2 | 11.233 | 0.233 | 32 | 0.0073 | ILS |
| CUHQA212A | A | C2 | 1 | 2 | 10.926 | 0.235 | 32 | 0.0073 | ILS |
| CUHQA213A | A | C2 | 1 | 2 | 11.666 | 0.235 | 32 | 0.0074 | ILS |
| CUHQB112A | B | C1 | 2 | 1 | 11.871 | 0.233 | 32 | 0.0073 | ILS |
| CUHQB113A | B | C1 | 2 | 1 | 11.128 | 0.236 | 32 | 0.0074 | ILS[1]/TENSION[2] |
| CUHQB114A | B | C1 | 2 | 1 | 11.103 | 0.235 | 32 | 0.0074 | ILS |
| CUHQB115A | B | C1 | 2 | 1 | 11.056 | 0.235 | 32 | 0.0074 | ILS |
| CUHQB211A | B | C2 | 2 | 2 | 11.417 | 0.240 | 32 | 0.0075 | ILS[1]/TENSION[2] |
| CUHQB212A | B | C2 | 2 | 2 | 11.343 | 0.239 | 32 | 0.0075 | ILS |
| CUHQB213A | B | C2 | 2 | 2 | 10.743 | 0.238 | 32 | 0.0074 | ILS[1]/TENSION[2] |
| CUHQC111A | C | C1 | 3 | 1 | 10.887 | 0.239 | 32 | 0.0075 | ILS |
| CUHQC112A | C | C1 | 3 | 1 | 10.728 | 0.239 | 32 | 0.0075 | ILS[1]/TENSION[2] |
| CUHQC113A | C | C1 | 3 | 1 | 10.686 | 0.240 | 32 | 0.0075 | ILS[1]/TENSION[2] |
| CUHQC114A | C | C1 | 3 | 1 | 10.843 | 0.240 | 32 | 0.0075 | ILS[1]/TENSION[2] |
| CUHQC211A | C | C2 | 3 | 2 | 10.670 | 0.236 | 32 | 0.0074 | ILS[1]/COMPRESSION[2] |
| CUHQC212A | C | C2 | 3 | 2 | 9.931 | 0.236 | 32 | 0.0074 | ILS[1]/COMPRESSION[2] |
| CUHQC213A | C | C2 | 3 | 2 | 11.115 | 0.238 | 32 | 0.0074 | ILS |

| | | | |
|---|---|---|---|
| **Average** | **11.035** | **Average** | **0.0074** |
| **Standard Dev.** | **0.407** | **Standard Dev.** | |
| **Coeff. of Var. [%]** | **3.691** | **Coeff. of Var. [%]** | |
| **Min.** | **9.931** | **Min.** | **0.0073** |
| **Max.** | **11.871** | **Max.** | **0.0076** |
| **Number of Spec.** | **21** | **Number of Spec.** | **21** |

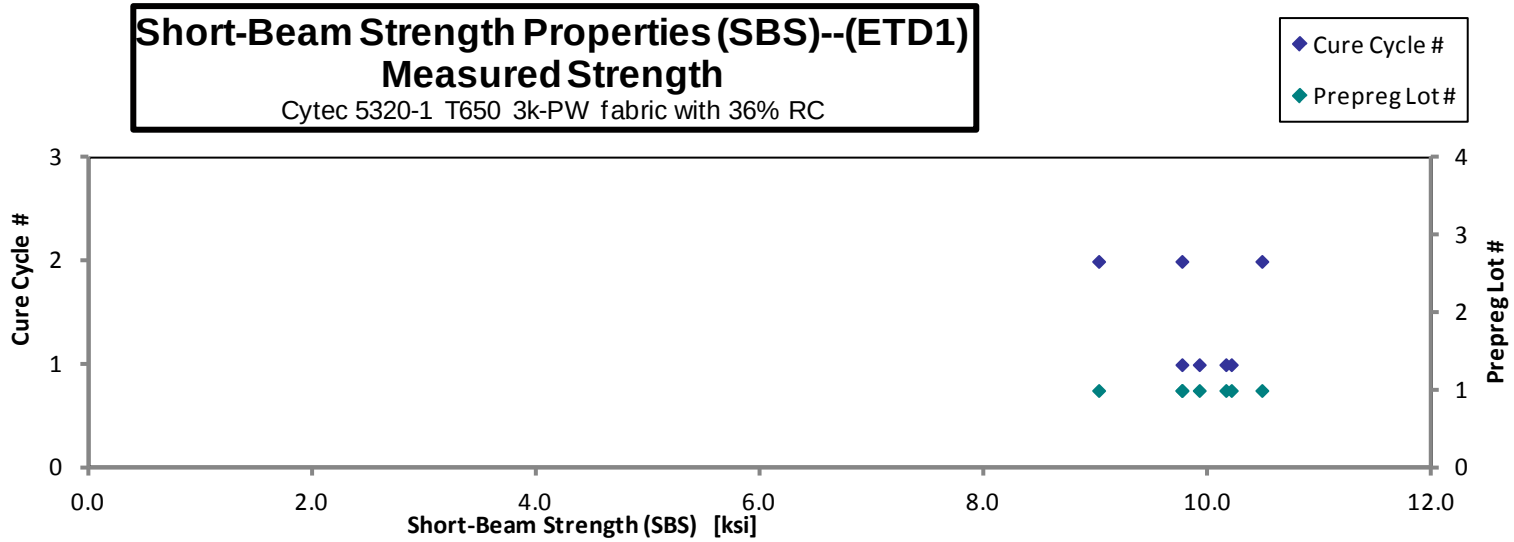

Short-Beam Strength Properties (SBS)--(RTD)
Measured Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Short-Beam Strength (SBS) [ksi]
0
1
2
3
4
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0

# Short-Beam Strength Properties (SBS)--ETD1 Strength

Cytec 5320-1 T650 3k-PW fabric with 36% RC

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Avg. $t_{ply}$ [in] | Failure Mode |
|---|---|---|---|---|---|---|---|---|---|
| CUHQA11DC | A | C1 | 1 | 1 | 9.916 | 0.244 | 32 | 0.0076 | ILS |
| CUHQA11EC | A | C1 | 1 | 1 | 9.761 | 0.245 | 32 | 0.0077 | ILS |
| CUHQA11FC | A | C1 | 1 | 1 | 10.203 | 0.246 | 32 | 0.0077 | ILS |
| CUHQA11GC | A | C1 | 1 | 1 | 10.154 | 0.245 | 32 | 0.0077 | ILS |
| CUHQA21DC | A | C2 | 1 | 2 | 9.017 | 0.236 | 32 | 0.0074 | ILS |
| CUHQA21EC | A | C2 | 1 | 2 | 9.761 | 0.239 | 32 | 0.0075 | ILS |
| CUHQA21FC | A | C2 | 1 | 2 | 10.476 | 0.239 | 32 | 0.0075 | ILS |

| | | | |
|---|---|---|---|
| **Average** | **9.898** | **Average** | **0.0076** |
| **Standard Dev.** | **0.467** | **Standard Dev.** | |
| **Coeff. of Var. [%]** | **4.714** | **Coeff. of Var. [%]** | |
| **Min.** | **9.017** | **Min.** | **0.0074** |
| **Max.** | **10.476** | **Max.** | **0.0077** |
| **Number of Spec.** | **7** | **Number of Spec.** | **7** |

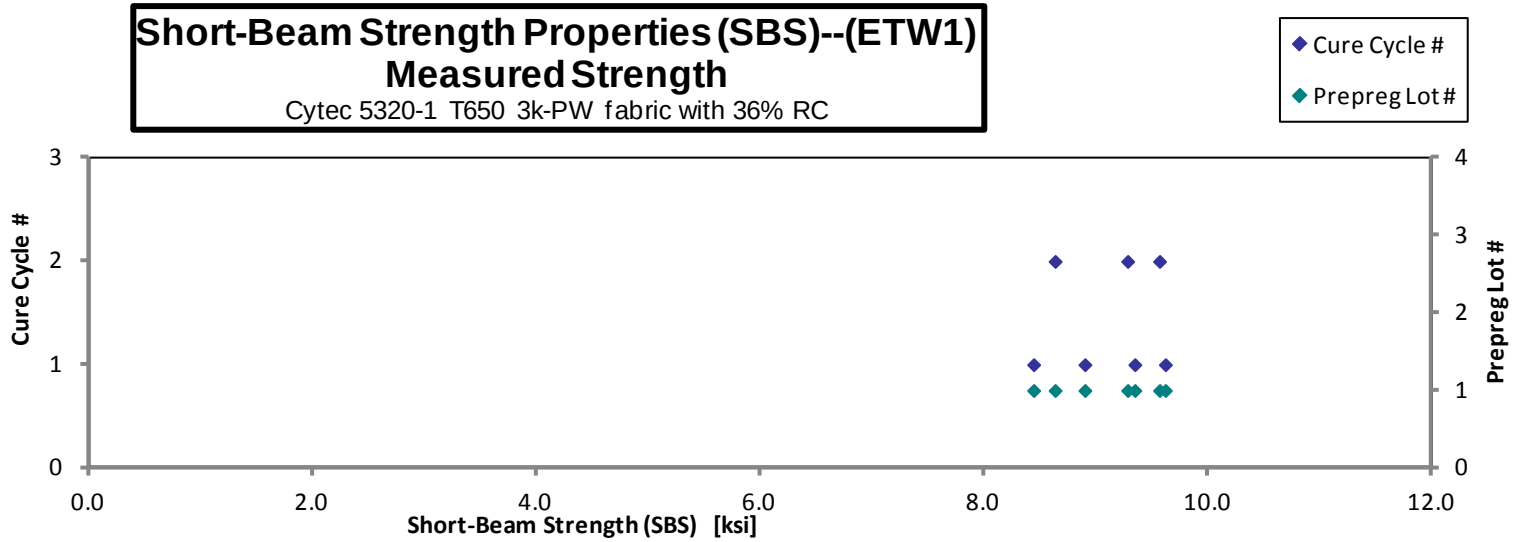

Short-Beam Strength Properties (SBS)--(ETD1)
Measured Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Short-Beam Strength (SBS) [ksi]
0.0
2.0
4.0
6.0
8.0
10.0
12.0
0
1
2
3
4

# Short-Beam Strength Properties (SBS)--ETW1 Strength

Cytec 5320-1 T650 3k-PW fabric with 36% RC

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Avg. $t_{ply}$ [in] | Failure Mode |
|---|---|---|---|---|---|---|---|---|---|
| CUHQA11JD | A | C1 | 1 | 1 | 8.436 | 0.243 | 32 | 0.0076 | ILS |
| CUHQA11KD | A | C1 | 1 | 1 | 8.894 | 0.244 | 32 | 0.0076 | ILS |
| CUHQA11LD | A | C1 | 1 | 1 | 9.340 | 0.245 | 32 | 0.0077 | ILS |
| CUHQA11MD | A | C1 | 1 | 1 | 9.613 | 0.245 | 32 | 0.0077 | ILS |
| CUHQA21JD | A | C2 | 1 | 2 | 8.628 | 0.237 | 32 | 0.0074 | ILS |
| CUHQA21KD | A | C2 | 1 | 2 | 9.276 | 0.239 | 32 | 0.0075 | ILS |
| CUHQA21LD | A | C2 | 1 | 2 | 9.562 | 0.240 | 32 | 0.0075 | ILS |

| | | | |
|---|---|---|---|
| **Average** | **9.107** | **Average** | **0.0076** |
| **Standard Dev.** | **0.460** | **Standard Dev.** | |
| **Coeff. of Var. [%]** | **5.055** | **Coeff. of Var. [%]** | |
| **Min.** | **8.436** | **Min.** | **0.0074** |
| **Max.** | **9.613** | **Max.** | **0.0077** |
| **Number of Spec.** | **7** | **Number of Spec.** | **7** |

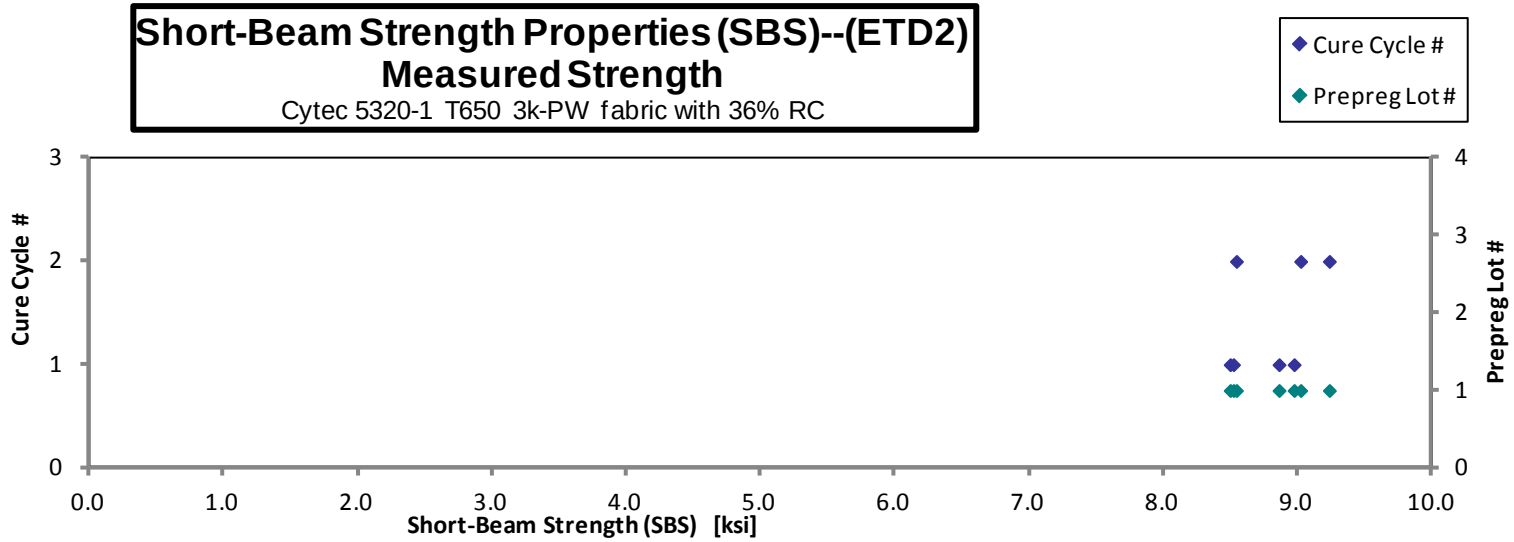

Short-Beam Strength Properties (SBS)--(ETW1)
Measured Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Short-Beam Strength (SBS) [ksi]
0.0
2.0
4.0
6.0
8.0
10.0
12.0
0
1
2
3
4

# Short-Beam Strength Properties (SBS)--ETD2 Strength

Cytec 5320-1 T650 3k-PW fabric with 36% RC

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Avg. $t_{ply}$ [in] | Failure Mode |
|---|---|---|---|---|---|---|---|---|---|
| CUHQA11PE | A | C1 | 1 | 1 | 8.518 | 0.243 | 32 | 0.0076 | ILS |
| CUHQA11QE | A | C1 | 1 | 1 | 8.858 | 0.244 | 32 | 0.0076 | ILS |
| CUHQA11RE | A | C1 | 1 | 1 | 8.494 | 0.245 | 32 | 0.0077 | ILS |
| CUHQA11SE | A | C1 | 1 | 1 | 8.970 | 0.246 | 32 | 0.0077 | ILS |
| CUHQA21PE | A | C2 | 1 | 2 | 8.540 | 0.237 | 32 | 0.0074 | ILS |
| CUHQA21QE | A | C2 | 1 | 2 | 9.019 | 0.240 | 32 | 0.0075 | ILS |
| CUHQA21RE | A | C2 | 1 | 2 | 9.233 | 0.240 | 32 | 0.0075 | ILS |

| | | | |
|---|---|---|---|
| **Average** | **8.805** | **Average** | **0.0076** |
| **Standard Dev.** | **0.291** | **Standard Dev.** | |
| **Coeff. of Var. [%]** | **3.304** | **Coeff. of Var. [%]** | |
| **Min.** | **8.494** | **Min.** | **0.0074** |
| **Max.** | **9.233** | **Max.** | **0.0077** |
| **Number of Spec.** | **7** | **Number of Spec.** | **7** |

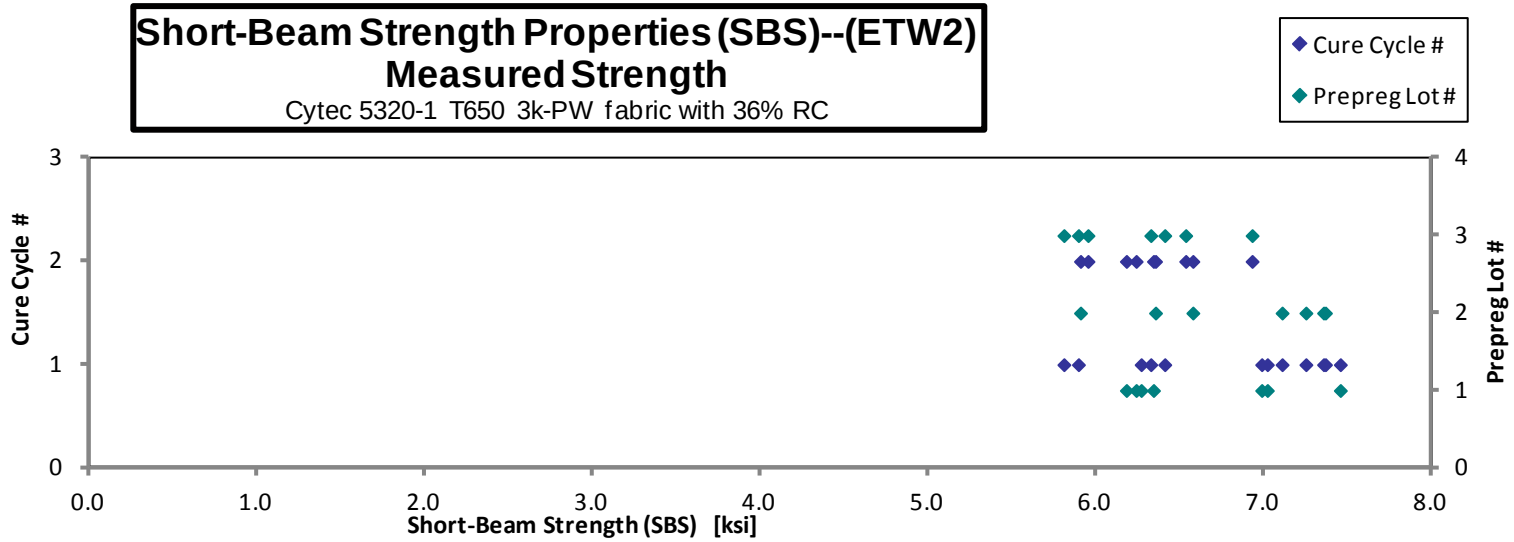

Short-Beam Strength Properties (SBS)--(ETD2)
Measured Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
Short-Beam Strength (SBS) [ksi]

## Short-Beam Strength Properties (SBS)--ETW2 Strength

Cytec 5320-1 T650 3k-PW fabric with 36% RC

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Avg. $t_{ply}$ [in] | Failure Mode |
|---|---|---|---|---|---|---|---|---|---|
| CUHQA11VF | A | C1 | 1 | 1 | 6.265 | 0.241 | 32 | 0.0075 | ILS |
| CUHQA11WF | A | C1 | 1 | 1 | 7.017 | 0.241 | 32 | 0.0075 | ILS |
| CUHQA11XF | A | C1 | 1 | 1 | 7.452 | 0.243 | 32 | 0.0076 | ILS |
| CUHQA11YF | A | C1 | 1 | 1 | 6.983 | 0.245 | 32 | 0.0077 | ILS |
| CUHQA21VF | A | C2 | 1 | 2 | 6.235 | 0.237 | 32 | 0.0074 | ILS |
| CUHQA21WF | A | C2 | 1 | 2 | 6.177 | 0.239 | 32 | 0.0075 | ILS |
| CUHQA21XF | A | C2 | 1 | 2 | 6.338 | 0.239 | 32 | 0.0075 | ILS |
| CUHQB11DF | B | C1 | 2 | 1 | 7.363 | 0.233 | 32 | 0.0073 | ILS |
| CUHQB11EF | B | C1 | 2 | 1 | 7.352 | 0.233 | 32 | 0.0073 | ILS |
| CUHQB11FF | B | C1 | 2 | 1 | 7.246 | 0.235 | 32 | 0.0073 | ILS |
| CUHQB11GF | B | C1 | 2 | 1 | 7.104 | 0.236 | 32 | 0.0074 | ILS |
| CUHQB21DF | B | C2 | 2 | 2 | 5.903 | 0.238 | 32 | 0.0074 | ILS |
| CUHQB21EF | B | C2 | 2 | 2 | 6.350 | 0.239 | 32 | 0.0075 | ILS |
| CUHQB21FF | B | C2 | 2 | 2 | 6.573 | 0.239 | 32 | 0.0075 | ILS |
| CUHQC11DF | C | C1 | 3 | 1 | 5.804 | 0.237 | 32 | 0.0074 | ILS |
| CUHQC11EF | C | C1 | 3 | 1 | 5.891 | 0.238 | 32 | 0.0074 | ILS |
| CUHQC11FF | C | C1 | 3 | 1 | 6.405 | 0.239 | 32 | 0.0075 | ILS |
| CUHQC11GF | C | C1 | 3 | 1 | 6.322 | 0.240 | 32 | 0.0075 | ILS |
| CUHQC21DF | C | C2 | 3 | 2 | 5.948 | 0.240 | 32 | 0.0075 | ILS |
| CUHQC21EF | C | C2 | 3 | 2 | 6.530 | 0.240 | 32 | 0.0075 | ILS |
| CUHQC21FF | C | C2 | 3 | 2 | 6.926 | 0.241 | 32 | 0.0075 | ILS |

| | | | |
|---|---|---|---|
| **Average** | **6.580** | **Average** | **0.0075** |
| **Standard Dev.** | **0.533** | **Standard Dev.** | |
| **Coeff. of Var. [%]** | **8.103** | **Coeff. of Var. [%]** | |
| **Min.** | **5.804** | **Min.** | **0.0073** |
| **Max.** | **7.452** | **Max.** | **0.0077** |
| **Number of Spec.** | **21** | **Number of Spec.** | **21** |


Short-Beam Strength Properties (SBS)--(ETW2)
Measured Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Short-Beam Strength (SBS) [ksi]
0
1
2
3
4
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0

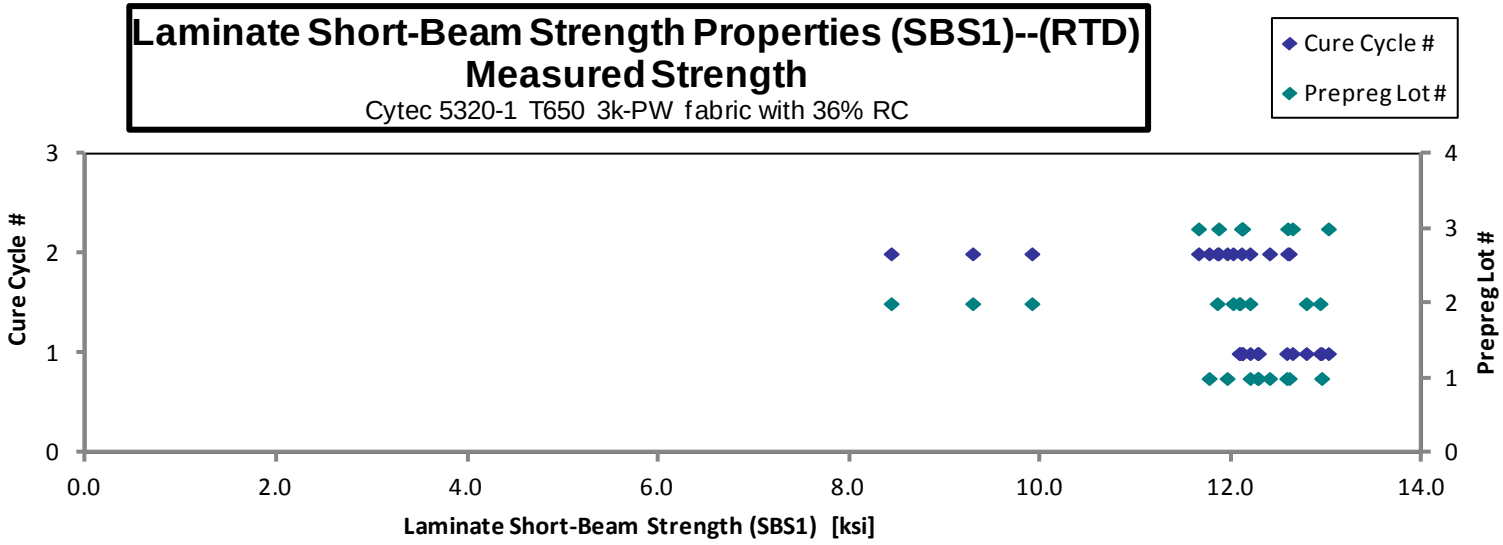
## 4.13 Laminate Short-Beam Strength Properties (SBS1)

**Laminate Short-Beam Strength Properties (SBS1)--RTD Strength**

Cytec 5320-1 T650 3k-PW fabric with 36% RC

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Avg. $t_{ply}$ [in] | Failure Mode |
|---|---|---|---|---|---|---|---|---|---|
| CUHqA171A | A | C1 | 1 | 1 | 12.286 | 0.155 | 20 | 0.0077 | INTERLAMINAR SHEAR |
| CUHqA172A | A | C1 | 1 | 1 | 12.199 | 0.154 | 20 | 0.0077 | INTERLAMINAR SHEAR |
| CUHqA173A | A | C1 | 1 | 1 | 12.949 | 0.154 | 20 | 0.0077 | INTERLAMINAR SHEAR |
| CUHqA174A | A | C1 | 1 | 1 | 12.583 | 0.154 | 20 | 0.0077 | INTERLAMINAR SHEAR |
| CUHqA175A | A | C1 | 1 | 1 | 12.275 | 0.153 | 20 | 0.0077 | INTERLAMINAR SHEAR |
| CUHqA271A | A | C2 | 1 | 2 | 12.609 | 0.154 | 20 | 0.0077 | INTERLAMINAR SHEAR |
| CUHqA272A | A | C2 | 1 | 2 | 12.403 | 0.155 | 20 | 0.0077 | INTERLAMINAR SHEAR |
| CUHqA273A | A | C2 | 1 | 2 | 11.959 | 0.155 | 20 | 0.0078 | INTERLAMINAR SHEAR |
| CUHqA274A | A | C2 | 1 | 2 | 11.770 | 0.155 | 20 | 0.0077 | INTERLAMINAR SHEAR |
| CUHqB172A | B | C1 | 2 | 1 | 12.093 | 0.152 | 20 | 0.0076 | INTERLAMINAR SHEAR |
| CUHqB173A | B | C1 | 2 | 1 | 12.932 | 0.152 | 20 | 0.0076 | INTERLAMINAR SHEAR |
| CUHqB174A | B | C1 | 2 | 1 | 12.788 | 0.152 | 20 | 0.0076 | INTERLAMINAR SHEAR |
| CUHqB175A | B | C1 | 2 | 1 | 12.085 | 0.152 | 20 | 0.0076 | INTERLAMINAR SHEAR |
| CUHqB271A | B | C2 | 2 | 2 | 9.914 | 0.152 | 20 | 0.0076 | INTERLAMINAR SHEAR |
| CUHqB272A | B | C2 | 2 | 2 | 11.855 | 0.153 | 20 | 0.0076 | INTERLAMINAR SHEAR |
| CUHqB273A | B | C2 | 2 | 2 | 9.293 | 0.153 | 20 | 0.0077 | INTERLAMINAR SHEAR |
| CUHqB274A | B | C2 | 2 | 2 | 8.439 | 0.153 | 20 | 0.0077 | INTERLAMINAR SHEAR |
| CUHqB275A | B | C2 | 2 | 2 | 12.020 | 0.154 | 20 | 0.0077 | INTERLAMINAR SHEAR |
| CUHqB276A | B | C2 | 2 | 2 | 12.197 | 0.153 | 20 | 0.0077 | INTERLAMINAR SHEAR |
| CUHqC171A | C | C1 | 3 | 1 | 12.643 | 0.152 | 20 | 0.0076 | INTERLAMINAR SHEAR |
| CUHqC172A | C | C1 | 3 | 1 | 12.117 | 0.152 | 20 | 0.0076 | INTERLAMINAR SHEAR |
| CUHqC173A | C | C1 | 3 | 1 | 12.120 | 0.152 | 20 | 0.0076 | INTERLAMINAR SHEAR |
| CUHqC174A | C | C1 | 3 | 1 | 13.019 | 0.152 | 20 | 0.0076 | INTERLAMINAR SHEAR |
| CUHqC271A | C | C2 | 3 | 2 | 11.659 | 0.154 | 20 | 0.0077 | TENSION / INTERLAMINAR SHEAR |
| CUHqC272A | C | C2 | 3 | 2 | 12.593 | 0.154 | 20 | 0.0077 | INTERLAMINAR SHEAR |
| CUHqC273A | C | C2 | 3 | 2 | 12.109 | 0.153 | 20 | 0.0077 | INTERLAMINAR SHEAR |
| CUHqC274A | C | C2 | 3 | 2 | 11.869 | 0.154 | 20 | 0.0077 | INTERLAMINAR SHEAR |

| | | | |
|---|---|---|---|
| **Average** | **11.955** | **Average** | **0.0077** |
| **Standard Dev.** | **1.072** | **Standard Dev.** | |
| **Coeff. of Var. [%]** | **8.967** | **Coeff. of Var. [%]** | |
| **Min.** | **8.439** | **Min.** | **0.0076** |
| **Max.** | **13.019** | **Max.** | **0.0078** |
| **Number of Spec.** | **27** | **Number of Spec.** | **27** |

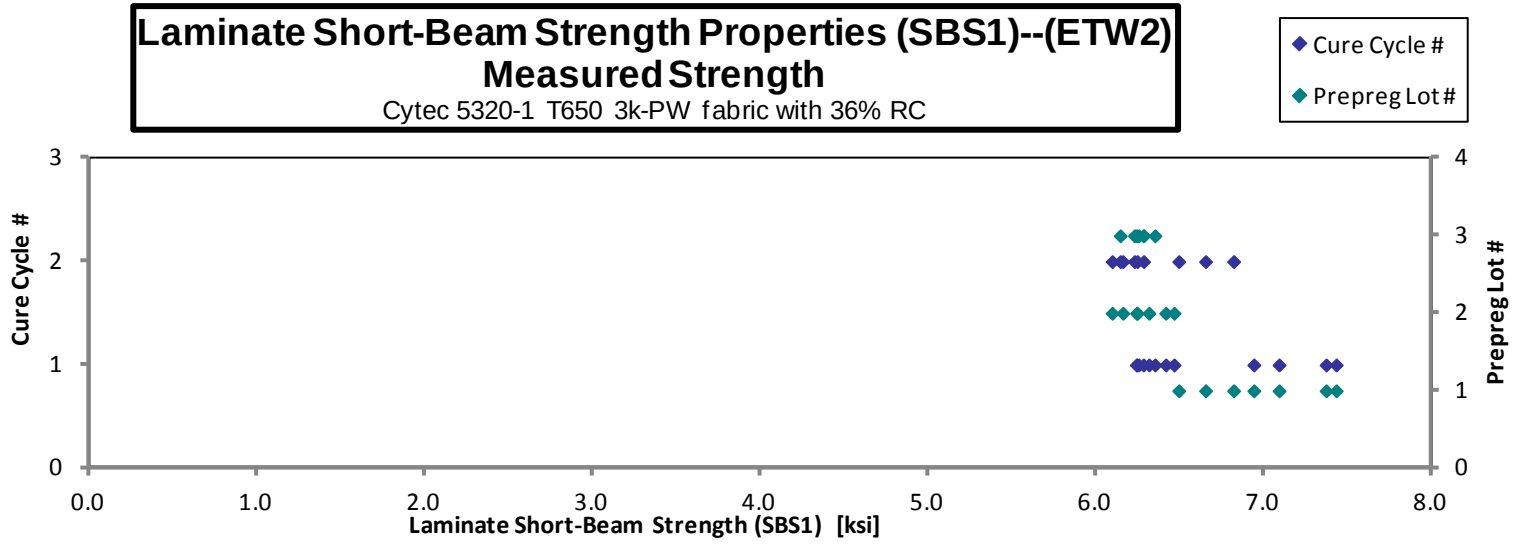

Laminate Short-Beam Strength Properties (SBS1)--(RTD)
Measured Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Short-Beam Strength (SBS1) [ksi]
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
0
1
2
3
4

## Laminate Short-Beam Strength Properties (SBS1)--ETW2 Strength

Cytec 5320-1 T650 3k-PW fabric with 36% RC

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Avg. $t_{ply}$ [in] | Failure Mode |
|---|---|---|---|---|---|---|---|---|---|
| CUHqA177F | A | C1 | 1 | 1 | 7.367 | 0.154 | 20 | 0.0077 | ILS |
| CUHqA178F | A | C1 | 1 | 1 | 7.427 | 0.154 | 20 | 0.0077 | ILS |
| CUHqA179F | A | C1 | 1 | 1 | 7.086 | 0.154 | 20 | 0.0077 | ILS |
| CUHqA17AF | A | C1 | 1 | 1 | 6.936 | 0.154 | 20 | 0.0077 | ILS |
| CUHqA277F | A | C2 | 1 | 2 | 6.816 | 0.155 | 20 | 0.0077 | ILS |
| CUHqA278F | A | C2 | 1 | 2 | 6.648 | 0.154 | 20 | 0.0077 | ILS |
| CUHqA279F | A | C2 | 1 | 2 | 6.489 | 0.154 | 20 | 0.0077 | ILS |
| CUHqB177F | B | C1 | 2 | 1 | 6.461 | 0.151 | 20 | 0.0075 | ILS |
| CUHqB178F | B | C1 | 2 | 1 | 6.411 | 0.152 | 20 | 0.0076 | ILS |
| CUHqB179F | B | C1 | 2 | 1 | 6.237 | 0.152 | 20 | 0.0076 | ILS |
| CUHqB17AF | B | C1 | 2 | 1 | 6.311 | 0.152 | 20 | 0.0076 | ILS |
| CUHqB277F | B | C2 | 2 | 2 | 6.241 | 0.152 | 20 | 0.0076 | ILS |
| CUHqB278F | B | C2 | 2 | 2 | 6.155 | 0.152 | 20 | 0.0076 | ILS |
| CUHqB279F | B | C2 | 2 | 2 | 6.092 | 0.153 | 20 | 0.0077 | ILS |
| CUHqC177F | C | C1 | 3 | 1 | 6.249 | 0.154 | 20 | 0.0077 | ILS |
| CUHqC178F | C | C1 | 3 | 1 | 6.237 | 0.153 | 20 | 0.0076 | ILS |
| CUHqC179F | C | C1 | 3 | 1 | 6.278 | 0.153 | 20 | 0.0077 | ILS |
| CUHqC17AF | C | C1 | 3 | 1 | 6.347 | 0.152 | 20 | 0.0076 | ILS |
| CUHqC277F | C | C2 | 3 | 2 | 6.225 | 0.153 | 20 | 0.0077 | ILS |
| CUHqC278F | C | C2 | 3 | 2 | 6.279 | 0.153 | 20 | 0.0076 | ILS |
| CUHqC279F | C | C2 | 3 | 2 | 6.140 | 0.154 | 20 | 0.0077 | ILS |

| | | | |
|---|---|---|---|
| **Average** | **6.497** | **Average** | **0.0077** |
| **Standard Dev.** | **0.399** | **Standard Dev.** | |
| **Coeff. of Var. [%]** | **6.149** | **Coeff. of Var. [%]** | |
| **Min.** | **6.092** | **Min.** | **0.0075** |
| **Max.** | **7.427** | **Max.** | **0.0077** |
| **Number of Spec.** | **21** | **Number of Spec.** | **21** |


Laminate Short-Beam Strength Properties (SBS1)--(ETW2)
Measured Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
Laminate Short-Beam Strength (SBS1) [ksi]

## 4.14 "25/50/25" Open-Hole Tension 1 Properties (OHT1)

**Laminate Open-Hole Tension Properties (OHT1)--CTD Strength**

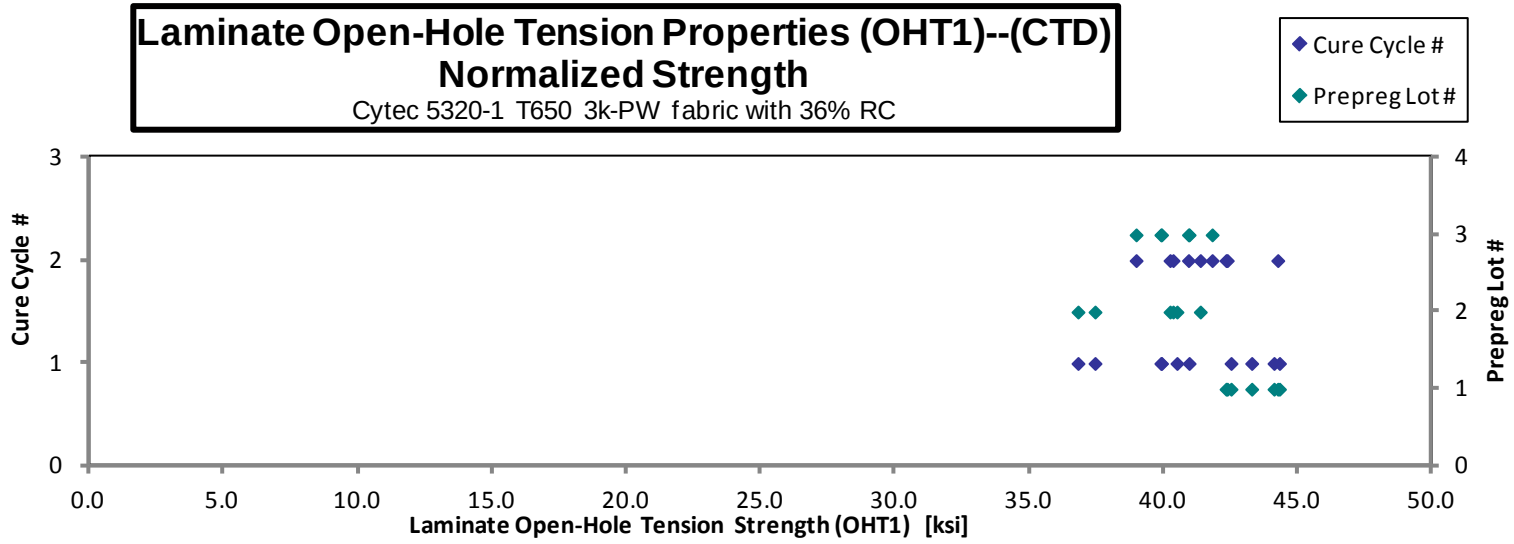
Cytec 5320-1 T650 3k-PW fabric with 36% RC

| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] |
|---|---|---|---|---|---|---|---|---|---|---|
| CUHDA115B | A | C1 | 1 | 1 | 43.557 | 0.125 | 16 | LGM | 0.0078 | 44.305 |
| CUHDA116B | A | C1 | 1 | 1 | 42.545 | 0.125 | 16 | LGM | 0.0078 | 43.271 |
| CUHDA117B | A | C1 | 1 | 1 | 43.675 | 0.124 | 16 | LGM | 0.0078 | 44.101 |
| CUHDA119B | A | C1 | 1 | 1 | 41.873 | 0.125 | 16 | LGM | 0.0078 | 42.501 |
| CUHDA215B | A | C2 | 1 | 2 | 41.896 | 0.124 | 16 | LGM | 0.0078 | 42.316 |
| CUHDA217B | A | C2 | 1 | 2 | 42.545 | 0.123 | 16 | LGM | 0.0077 | 42.361 |
| CUHDA218B | A | C2 | 1 | 2 | 44.781 | 0.122 | 16 | LGM | 0.0076 | 44.242 |
| CUHDB115B | B | C1 | 2 | 1 | 40.986 | 0.122 | 16 | LGM | 0.0076 | 40.487 |
| CUHDB116B | B | C1 | 2 | 1 | 37.143 | 0.122 | 16 | LGM | 0.0076 | 36.801 |
| CUHDB117B | B | C1 | 2 | 1 | 38.142 | 0.121 | 16 | LGM | 0.0076 | 37.435 |
| CUHDB214B | B | C2 | 2 | 2 | 40.766 | 0.122 | 16 | LGM | 0.0076 | 40.341 |
| CUHDB215B | B | C2 | 2 | 2 | 41.758 | 0.122 | 16 | LGM | 0.0076 | 41.357 |
| CUHDB216B | B | C2 | 2 | 2 | 40.508 | 0.122 | 16 | LGM | 0.0076 | 40.228 |
| CUHDC117B | C | C1 | 3 | 1 | 41.146 | 0.123 | 16 | LGM | 0.0077 | 40.940 |
| CUHDC118B | C | C1 | 3 | 1 | 40.321 | 0.122 | 16 | LGM | 0.0076 | 39.912 |
| CUHDC119B | C | C1 | 3 | 1 | 40.012 | 0.123 | 16 | LGM | 0.0077 | 39.888 |
| CUHDC215B | C | C2 | 3 | 2 | 38.512 | 0.125 | 16 | LGM | 0.0078 | 38.966 |
| CUHDC216B | C | C2 | 3 | 2 | 42.139 | 0.122 | 16 | LGM | 0.0076 | 41.797 |
| CUHDC217B | C | C2 | 3 | 2 | 41.545 | 0.121 | 16 | LGM | 0.0076 | 40.916 |

| | | |
|---|---|---|
| **Average** | **41.255** | |
| **Standard Dev.** | **1.918** | |
| **Coeff. of Var. [%]** | **4.650** | |
| **Min.** | **37.143** | |
| **Max.** | **44.781** | |
| **Number of Spec.** | **19** | |

| | | |
|---|---|---|
| **$Average_{norm}$** | **0.0077** | **41.167** |
| **$Standard\ Dev._{norm}$** | | **2.114** |
| **$Coeff.\ of\ Var.\ [\%]_{norm}$** | | **5.136** |
| **Min.** | **0.0076** | **36.801** |
| **Max.** | **0.0078** | **44.305** |
| **Number of Spec.** | **19** | **19** |


Laminate Open-Hole Tension Properties (OHT1)--(CTD)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
50.0
Laminate Open-Hole Tension Strength (OHT1) [ksi]

## Laminate Open-Hole Tension Properties (OHT1)--RTD Strength

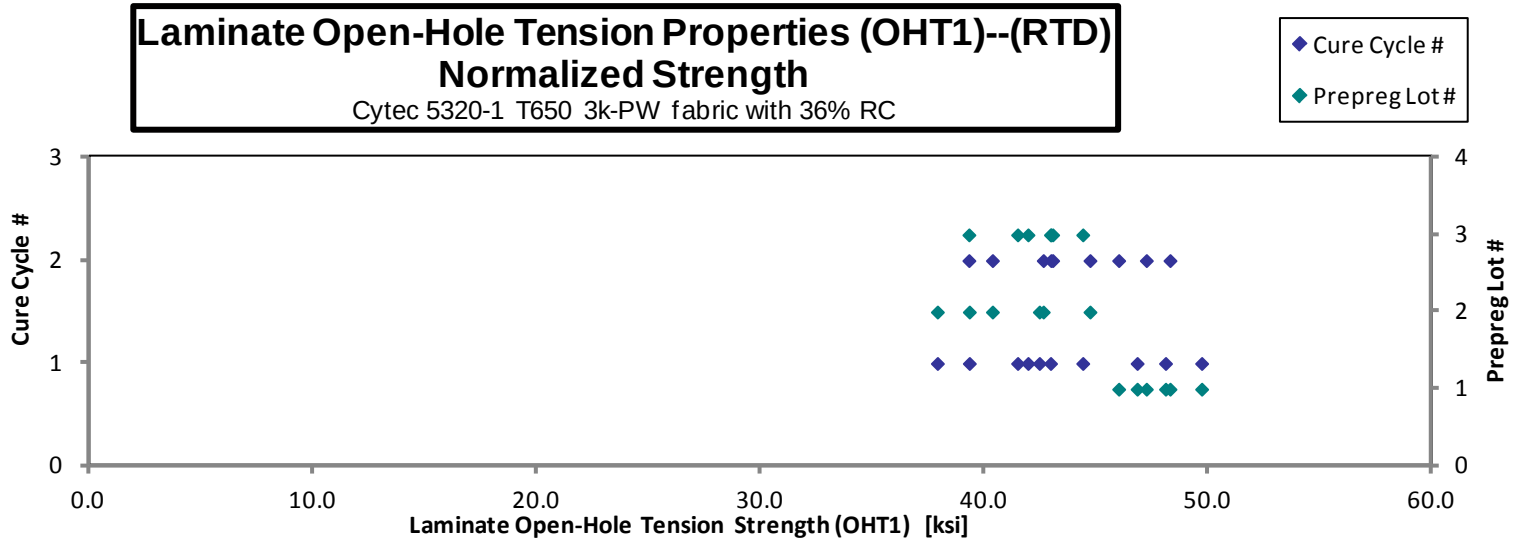
Cytec 5320-1 T650 3k-PW fabric with 36% RC

| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] |
|---|---|---|---|---|---|---|---|---|---|---|
| CUHDA111A | A | C1 | 1 | 1 | 49.162 | 0.125 | 16 | LGM | 0.0078 | 49.687 |
| CUHDA112A | A | C1 | 1 | 1 | 45.983 | 0.125 | 16 | LGM | 0.0078 | 46.804 |
| CUHDA113A | A | C1 | 1 | 1 | 46.980 | 0.126 | 16 | LGM | 0.0079 | 48.073 |
| CUHDA211A | A | C2 | 1 | 2 | 47.434 | 0.123 | 16 | LGM | 0.0077 | 47.216 |
| CUHDA212A | A | C2 | 1 | 2 | 46.199 | 0.123 | 16 | LGM | 0.0077 | 45.980 |
| CUHDA213A | A | C2 | 1 | 2 | 47.795 | 0.124 | 16 | LGM | 0.0078 | 48.273 |
| CUHDB111A | B | C1 | 2 | 1 | 40.264 | 0.120 | 16 | LGM | 0.0075 | 39.305 |
| CUHDB112A | B | C1 | 2 | 1 | 38.550 | 0.121 | 16 | LGM | 0.0076 | 37.877 |
| CUHDB113A | B | C1 | 2 | 1 | 42.933 | 0.122 | 16 | LGM | 0.0076 | 42.434 |
| CUHDB211A | B | C2 | 2 | 2 | 41.505 | 0.120 | 16 | LGM | 0.0075 | 40.337 |
| CUHDB212A | B | C2 | 2 | 2 | 43.348 | 0.121 | 16 | LGM | 0.0076 | 42.609 |
| CUHDB213A | B | C2 | 2 | 2 | 45.472 | 0.121 | 16 | LGM | 0.0076 | 44.697 |
| CUHDC111A | C | C1 | 3 | 1 | 41.485 | 0.123 | 16 | LGM | 0.0077 | 41.462 |
| CUHDC112A | C | C1 | 3 | 1 | 42.160 | 0.123 | 16 | LGM | 0.0077 | 41.926 |
| CUHDC113A | C | C1 | 3 | 1 | 43.197 | 0.122 | 16 | LGM | 0.0077 | 42.934 |
| CUHDC115A | C | C1 | 3 | 1 | 44.195 | 0.124 | 16 | LGM | 0.0077 | 44.374 |
| CUHDC211A | C | C2 | 3 | 2 | 43.272 | 0.122 | 16 | LGM | 0.0076 | 42.950 |
| CUHDC212A | C | C2 | 3 | 2 | 42.971 | 0.123 | 16 | LGM | 0.0077 | 43.029 |
| CUHDC213A | C | C2 | 3 | 2 | 39.264 | 0.123 | 16 | LGM | 0.0077 | 39.286 |

| | | |
|---|---|---|
| **Average** | **43.798** | |
| **Standard Dev.** | **2.960** | |
| **Coeff. of Var. [%]** | **6.759** | |
| **Min.** | **38.550** | |
| **Max.** | **49.162** | |
| **Number of Spec.** | **19** | |

| | | |
|---|---|---|
| **$Average_{norm}$** | **0.0077** | **43.645** |
| **$Standard\ Dev._{norm}$** | | **3.342** |
| **$Coeff.\ of\ Var.\ [\%]_{norm}$** | | **7.657** |
| **Min.** | **0.0075** | **37.877** |
| **Max.** | **0.0079** | **49.687** |
| **Number of Spec.** | **19** | **19** |


Laminate Open-Hole Tension Properties (OHT1)--(RTD)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
10.0
20.0
30.0
40.0
50.0
60.0
Laminate Open-Hole Tension Strength (OHT1) [ksi]

## Laminate Open-Hole Tension Properties (OHT1)--ETW1
## Strength

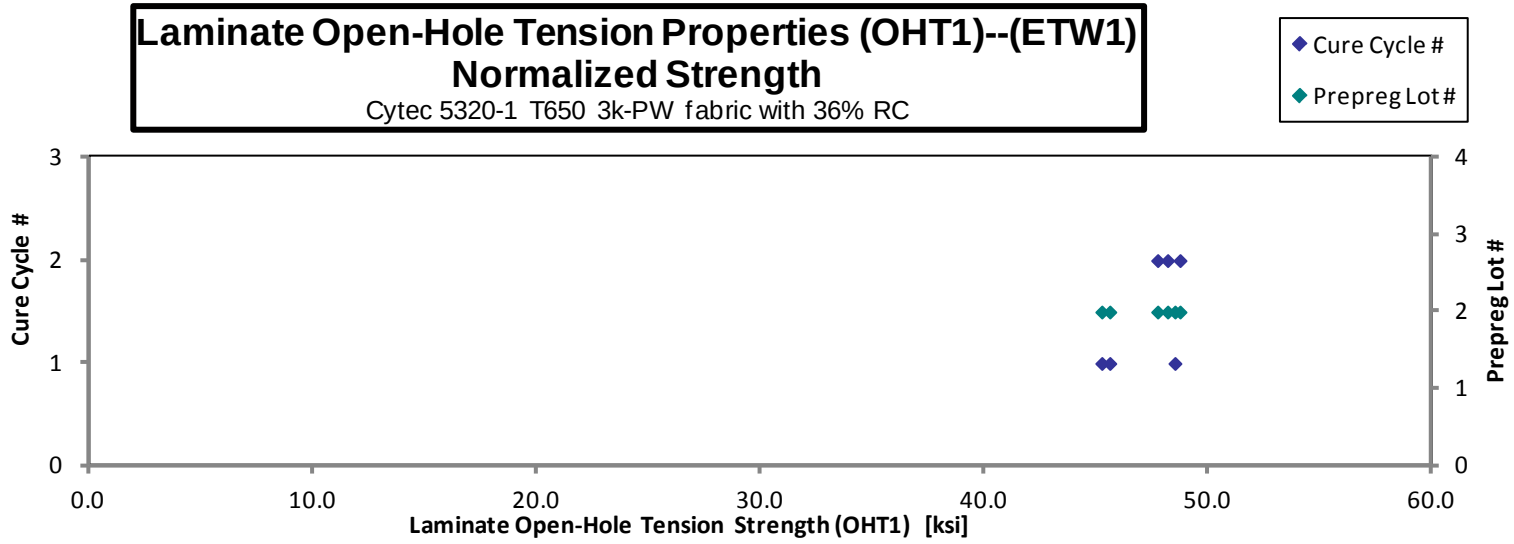
Cytec 5320-1 T650 3k-PW fabric with 36% RC

| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] |
|---|---|---|---|---|---|---|---|---|---|---|
| CUHDB119D | B | C1 | 2 | 1 | 45.790 | 0.122 | 16 | LGM | 0.0076 | 45.226 |
| CUHDB11AD | B | C1 | 2 | 1 | 45.825 | 0.123 | 16 | LGM | 0.0077 | 45.583 |
| CUHDB11BD | B | C1 | 2 | 1 | 48.785 | 0.122 | 16 | LGM | 0.0077 | 48.495 |
| CUHDB217D | B | C2 | 2 | 2 | 49.308 | 0.120 | 16 | LGM | 0.0075 | 48.168 |
| CUHDB218D | B | C2 | 2 | 2 | 49.958 | 0.120 | 16 | LGM | 0.0075 | 48.721 |
| CUHDB219D | B | C2 | 2 | 2 | 48.737 | 0.121 | 16 | LGM | 0.0075 | 47.722 |

| | | |
|---|---|---|
| **Average** | **48.067** | |
| **Standard Dev.** | **1.805** | |
| **Coeff. of Var. [%]** | **3.755** | |
| **Min.** | **45.790** | |
| **Max.** | **49.958** | |
| **Number of Spec.** | **6** | |

| | | |
|---|---|---|
| **$Average_{norm}$** | **0.0076** | **47.319** |
| **$Standard\ Dev._{norm}$** | | **1.525** |
| **$Coeff.\ of\ Var.\ [\%]_{norm}$** | | **3.222** |
| **Min.** | **0.0075** | **45.226** |
| **Max.** | **0.0077** | **48.721** |
| **Number of Spec.** | **6** | **6** |


Laminate Open-Hole Tension Properties (OHT1)--(ETW1)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
10.0
20.0
30.0
40.0
50.0
60.0
Laminate Open-Hole Tension Strength (OHT1) [ksi]

## Laminate Open-Hole Tension Properties (OHT1)--ETW2
## Strength

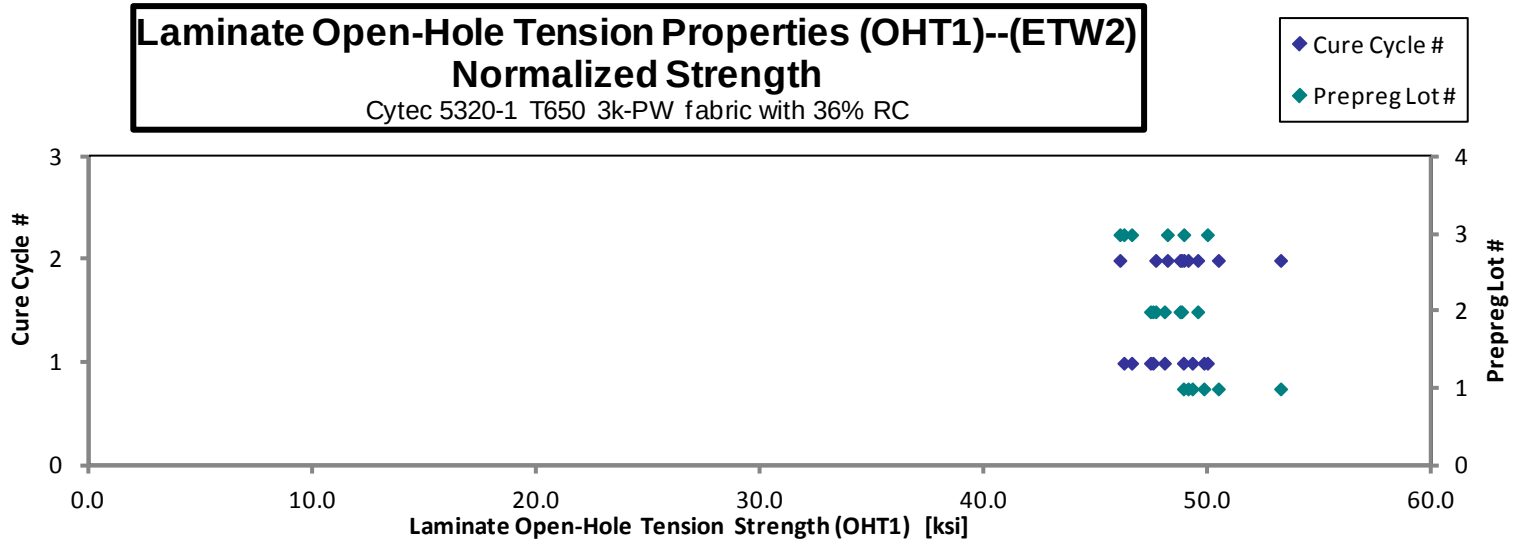
Cytec 5320-1 T650 3k-PW fabric with 36% RC

| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] |
|---|---|---|---|---|---|---|---|---|---|---|
| CUHDA11AF | A | C1 | 1 | 1 | 48.027 | 0.125 | 16 | LGM | 0.0078 | 48.871 |
| CUHDA11BF | A | C1 | 1 | 1 | 48.234 | 0.127 | 16 | LGM | 0.0079 | 49.787 |
| CUHDA11CF | A | C1 | 1 | 1 | 47.946 | 0.127 | 16 | LGM | 0.0079 | 49.269 |
| CUHDA21BF | A | C2 | 1 | 2 | 53.001 | 0.124 | 16 | LGM | 0.0077 | 53.216 |
| CUHDA21CF | A | C2 | 1 | 2 | 50.414 | 0.123 | 16 | LGM | 0.0077 | 50.434 |
| CUHDA21DF | A | C2 | 1 | 2 | 48.764 | 0.124 | 16 | LGM | 0.0078 | 49.081 |
| CUHDB11CF | B | C1 | 2 | 1 | 47.658 | 0.123 | 16 | LGM | 0.0077 | 47.400 |
| CUHDB11DF | B | C1 | 2 | 1 | 48.067 | 0.122 | 16 | LGM | 0.0076 | 47.508 |
| CUHDB11EF | B | C1 | 2 | 1 | 48.637 | 0.122 | 16 | LGM | 0.0076 | 48.025 |
| CUHDB21BF | B | C2 | 2 | 2 | 48.686 | 0.123 | 16 | LGM | 0.0077 | 48.791 |
| CUHDB21CF | B | C2 | 2 | 2 | 48.934 | 0.123 | 16 | LGM | 0.0077 | 48.722 |
| CUHDB21DF | B | C2 | 2 | 2 | 50.129 | 0.122 | 16 | LGM | 0.0076 | 49.512 |
| CUHDB21EF | B | C2 | 2 | 2 | 48.459 | 0.121 | 16 | LGM | 0.0076 | 47.633 |
| CUHDC11BF | C | C1 | 3 | 1 | 50.190 | 0.123 | 16 | LGM | 0.0077 | 49.946 |
| CUHDC11CF | C | C1 | 3 | 1 | 46.914 | 0.122 | 16 | LGM | 0.0076 | 46.559 |
| CUHDC11DF | C | C1 | 3 | 1 | 46.294 | 0.123 | 16 | LGM | 0.0077 | 46.213 |
| CUHDC21AF | C | C2 | 3 | 2 | 47.865 | 0.124 | 16 | LGM | 0.0077 | 48.156 |
| CUHDC21BF | C | C2 | 3 | 2 | 45.719 | 0.124 | 16 | LGM | 0.0078 | 46.035 |
| CUHDC21CF | C | C2 | 3 | 2 | 48.659 | 0.124 | 16 | LGM | 0.0077 | 48.890 |

| | | |
|---|---|---|
| **Average** | **48.558** | |
| **Standard Dev.** | **1.611** | |
| **Coeff. of Var. [%]** | **3.318** | |
| **Min.** | **45.719** | |
| **Max.** | **53.001** | |
| **Number of Spec.** | **19** | |

| | | |
|---|---|---|
| **$Average_{norm}$** | **0.0077** | **48.634** |
| **$Standard\ Dev._{norm}$** | | **1.669** |
| **$Coeff.\ of\ Var.\ [\%]_{norm}$** | | **3.432** |
| **Min.** | **0.0076** | **46.035** |
| **Max.** | **0.0079** | **53.216** |
| **Number of Spec.** | **19** | **19** |


Laminate Open-Hole Tension Properties (OHT1)--(ETW2)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
10.0
20.0
30.0
40.0
50.0
60.0
Laminate Open-Hole Tension Strength (OHT1) [ksi]

## 4.15 "10/80/10" Open-Hole Tension 2 Properties (OHT2)

**Laminate Open-Hole Tension Properties (OHT2)--CTD Strength**

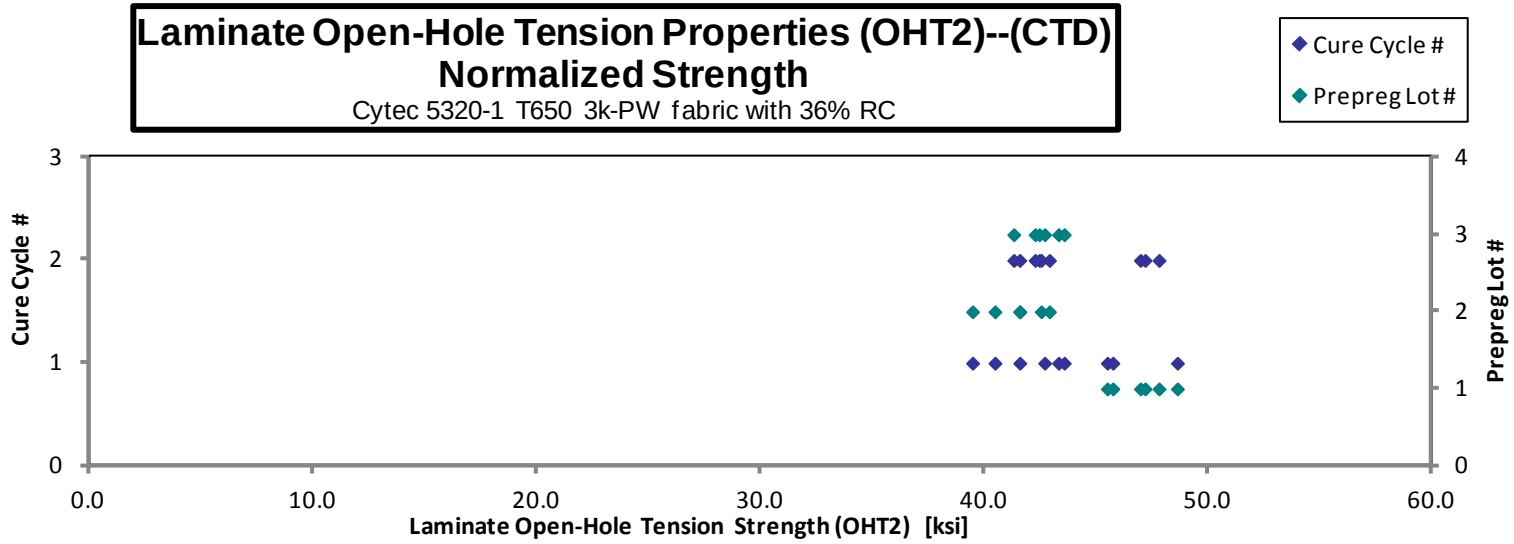
Cytec 5320-1 T650 3k-PW fabric with 36% RC

| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] |
|---|---|---|---|---|---|---|---|---|---|---|
| CUHEA115B | A | C1 | 1 | 1 | 48.432 | 0.155 | 20 | LGM | 0.0077 | 48.605 |
| CUHEA117B | A | C1 | 1 | 1 | 45.375 | 0.154 | 20 | LGM | 0.0077 | 45.474 |
| CUHEA118B | A | C1 | 1 | 1 | 46.080 | 0.153 | 20 | LGM | 0.0076 | 45.721 |
| CUHEA215B | A | C2 | 1 | 2 | 46.952 | 0.155 | 20 | LGM | 0.0077 | 47.160 |
| CUHEA216B | A | C2 | 1 | 2 | 47.221 | 0.156 | 20 | LGM | 0.0078 | 47.783 |
| CUHEA217B | A | C2 | 1 | 2 | 47.522 | 0.152 | 20 | LGM | 0.0076 | 46.951 |
| CUHEB115B | B | C1 | 2 | 1 | 42.307 | 0.151 | 20 | LGM | 0.0076 | 41.560 |
| CUHEB116B | B | C1 | 2 | 1 | 41.014 | 0.152 | 20 | LGM | 0.0076 | 40.450 |
| CUHEB117B | B | C1 | 2 | 1 | 40.159 | 0.151 | 20 | LGM | 0.0076 | 39.450 |
| CUHEB215B | B | C2 | 2 | 2 | 42.828 | 0.153 | 20 | LGM | 0.0076 | 42.518 |
| CUHEB216B | B | C2 | 2 | 2 | 43.628 | 0.151 | 20 | LGM | 0.0076 | 42.887 |
| CUHEB217B | B | C2 | 2 | 2 | 42.401 | 0.151 | 20 | LGM | 0.0075 | 41.557 |
| CUHEC115B | C | C1 | 3 | 1 | 43.313 | 0.152 | 20 | LGM | 0.0076 | 42.671 |
| CUHEC116B | C | C1 | 3 | 1 | 43.906 | 0.152 | 20 | LGM | 0.0076 | 43.293 |
| CUHEC117B | C | C1 | 3 | 1 | 43.814 | 0.153 | 20 | LGM | 0.0077 | 43.549 |
| CUHEC215B | C | C2 | 3 | 2 | 41.896 | 0.156 | 20 | LGM | 0.0078 | 42.431 |
| CUHEC216B | C | C2 | 3 | 2 | 40.888 | 0.156 | 20 | LGM | 0.0078 | 41.291 |
| CUHEC217B | C | C2 | 3 | 2 | 42.319 | 0.154 | 20 | LGM | 0.0077 | 42.245 |

| | | |
|---|---|---|
| **Average** | **43.892** | |
| **Standard Dev.** | **2.488** | |
| **Coeff. of Var. [%]** | **5.668** | |
| **Min.** | **40.159** | |
| **Max.** | **48.432** | |
| **Number of Spec.** | **18** | |

| | | |
|---|---|---|
| **$Average_{norm}$** | **0.0077** | **43.644** |
| **$Standard\ Dev._{norm}$** | | **2.669** |
| **$Coeff.\ of\ Var.\ [\%]_{norm}$** | | **6.115** |
| **Min.** | **0.0075** | **39.450** |
| **Max.** | **0.0078** | **48.605** |
| **Number of Spec.** | **18** | **18** |


Laminate Open-Hole Tension Properties (OHT2)--(CTD)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
10.0
20.0
30.0
40.0
50.0
60.0
Laminate Open-Hole Tension Strength (OHT2) [ksi]

## Laminate Open-Hole Tension Properties (OHT2)--RTD Strength

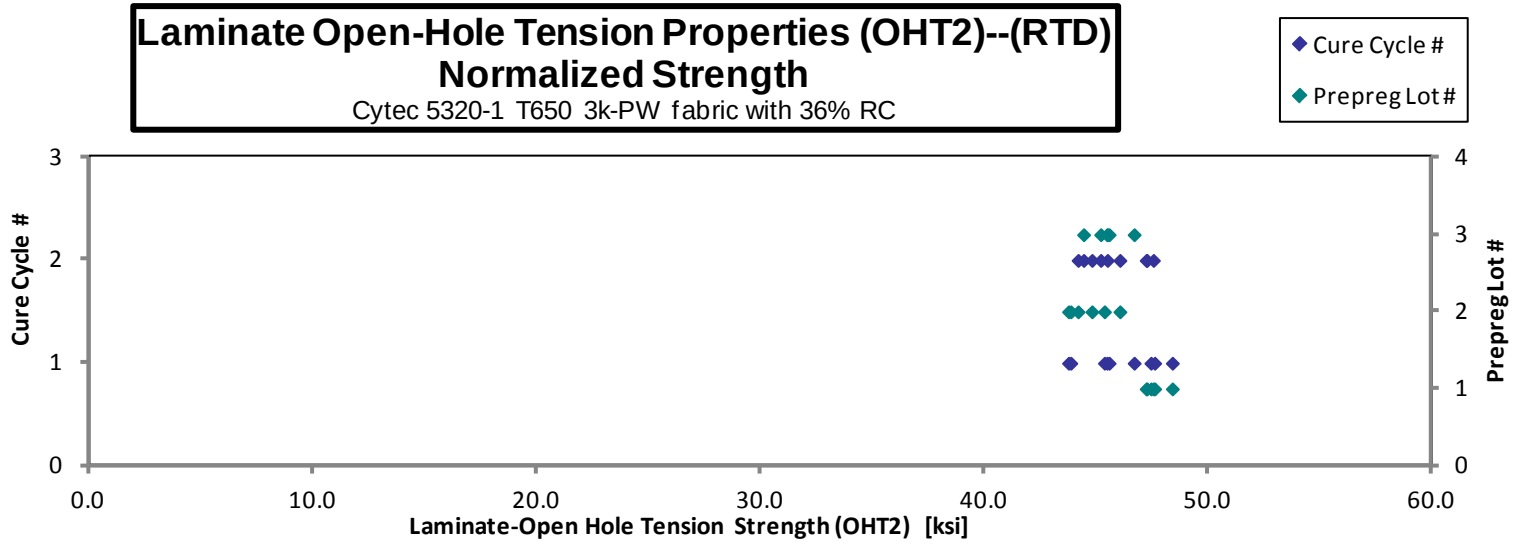
Cytec 5320-1 T650 3k-PW fabric with 36% RC

| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] |
|---|---|---|---|---|---|---|---|---|---|---|
| CUHEA111A | A | C1 | 1 | 1 | 47.074 | 0.156 | 20 | MGM | 0.0078 | 47.588 |
| CUHEA112A | A | C1 | 1 | 1 | 47.410 | 0.154 | 20 | MGM | 0.0077 | 47.421 |
| CUHEA113A | A | C1 | 1 | 1 | 47.728 | 0.156 | 20 | MGM | 0.0078 | 48.378 |
| CUHEA211A | A | C2 | 1 | 2 | 46.901 | 0.155 | 20 | AGM | 0.0078 | 47.241 |
| CUHEA212A | A | C2 | 1 | 2 | 47.052 | 0.156 | 20 | MGM | 0.0078 | 47.531 |
| CUHEA213A | A | C2 | 1 | 2 | 46.585 | 0.156 | 20 | AGM | 0.0078 | 47.211 |
| CUHEB111A | B | C1 | 2 | 1 | 44.881 | 0.150 | 20 | LGM | 0.0075 | 43.739 |
| CUHEB112A | B | C1 | 2 | 1 | 46.797 | 0.149 | 20 | LGM | 0.0075 | 45.344 |
| CUHEB113A | B | C1 | 2 | 1 | 44.199 | 0.153 | 20 | LGM | 0.0076 | 43.840 |
| CUHEB211A | B | C2 | 2 | 2 | 45.188 | 0.151 | 20 | LGM | 0.0075 | 44.165 |
| CUHEB212A | B | C2 | 2 | 2 | 45.705 | 0.151 | 20 | LGM | 0.0075 | 44.785 |
| CUHEB213A | B | C2 | 2 | 2 | 46.513 | 0.152 | 20 | LGM | 0.0076 | 46.035 |
| CUHEC111A | C | C1 | 3 | 1 | 46.473 | 0.151 | 20 | MGM | 0.0075 | 45.457 |
| CUHEC112A | C | C1 | 3 | 1 | 47.556 | 0.151 | 20 | MGM | 0.0076 | 46.671 |
| CUHEC113A | C | C1 | 3 | 1 | 46.143 | 0.152 | 20 | LGM | 0.0076 | 45.554 |
| CUHEC211A | C | C2 | 3 | 2 | 44.869 | 0.152 | 20 | LGM | 0.0076 | 44.412 |
| CUHEC212A | C | C2 | 3 | 2 | 45.398 | 0.154 | 20 | LGM | 0.0077 | 45.476 |
| CUHEC213A | C | C2 | 3 | 2 | 45.314 | 0.154 | 20 | LGM | 0.0077 | 45.177 |

| | | |
|---|---|---|
| **Average** | **46.210** | |
| **Standard Dev.** | **1.044** | |
| **Coeff. of Var. [%]** | **2.258** | |
| **Min.** | **44.199** | |
| **Max.** | **47.728** | |
| **Number of Spec.** | **18** | |

| | | |
|---|---|---|
| **$Average_{norm}$** | **0.0076** | **45.890** |
| **$Standard\ Dev._{norm}$** | | **1.431** |
| **$Coeff.\ of\ Var.\ [\%]_{norm}$** | | **3.118** |
| **Min.** | **0.0075** | **43.739** |
| **Max.** | **0.0078** | **48.378** |
| **Number of Spec.** | **18** | **18** |


Laminate Open-Hole Tension Properties (OHT2)--(RTD)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
10.0
20.0
30.0
40.0
50.0
60.0
Laminate-Open Hole Tension Strength (OHT2) [ksi]

## Laminate Open-Hole Tension Properties (OHT2)--ETW2
## Strength

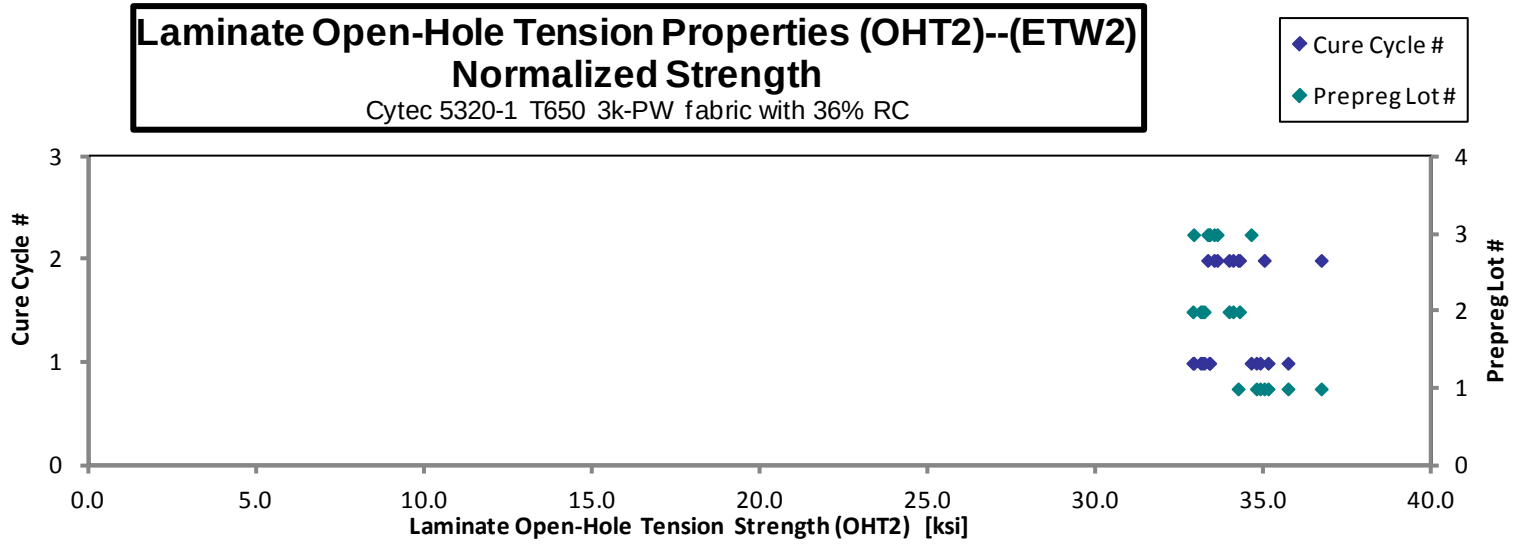
Cytec 5320-1 T650 3k-PW fabric with 36% RC

| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] |
|---|---|---|---|---|---|---|---|---|---|---|
| CUHEA11AF | A | C1 | 1 | 1 | 34.636 | 0.156 | 20 | AGM | 0.0078 | 35.105 |
| CUHEA11BF | A | C1 | 1 | 1 | 34.124 | 0.157 | 20 | AGM | 0.0078 | 34.756 |
| CUHEA11CF | A | C1 | 1 | 1 | 35.403 | 0.155 | 20 | AGM | 0.0078 | 35.698 |
| CUHEA11EF | A | C1 | 1 | 1 | 35.105 | 0.153 | 20 | AGM | 0.0076 | 34.866 |
| CUHEA21AF | A | C2 | 1 | 2 | 34.193 | 0.154 | 20 | AGM | 0.0077 | 34.212 |
| CUHEA21BF | A | C2 | 1 | 2 | 36.029 | 0.157 | 20 | AGM | 0.0078 | 36.688 |
| CUHEA21CF | A | C2 | 1 | 2 | 34.704 | 0.155 | 20 | AGM | 0.0078 | 34.990 |
| CUHEB11AF | B | C1 | 2 | 1 | 33.540 | 0.151 | 20 | AGM | 0.0075 | 32.865 |
| CUHEB11BF | B | C1 | 2 | 1 | 33.880 | 0.151 | 20 | AGM | 0.0075 | 33.202 |
| CUHEB11CF | B | C1 | 2 | 1 | 33.314 | 0.153 | 20 | AGM | 0.0077 | 33.145 |
| CUHEB11DF | B | C1 | 2 | 1 | 33.660 | 0.151 | 20 | AGM | 0.0076 | 33.092 |
| CUHEB21AF | B | C2 | 2 | 2 | 34.769 | 0.152 | 20 | AGM | 0.0076 | 34.254 |
| CUHEB21BF | B | C2 | 2 | 2 | 34.452 | 0.152 | 20 | AGM | 0.0076 | 33.941 |
| CUHEB21CF | B | C2 | 2 | 2 | 34.606 | 0.152 | 20 | AGM | 0.0076 | 34.059 |
| CUHEC11AF | C | C1 | 3 | 1 | 34.760 | 0.153 | 20 | AGM | 0.0077 | 34.598 |
| CUHEC11BF | C | C1 | 3 | 1 | 33.719 | 0.152 | 20 | AGM | 0.0076 | 33.350 |
| CUHEC11CF | C | C1 | 3 | 1 | 32.812 | 0.154 | 20 | AGM | 0.0077 | 32.886 |
| CUHEC11EF | C | C1 | 3 | 1 | 33.737 | 0.152 | 20 | AGM | 0.0076 | 33.365 |
| CUHEC21AF | C | C2 | 3 | 2 | 33.080 | 0.156 | 20 | AGM | 0.0078 | 33.495 |
| CUHEC21BF | C | C2 | 3 | 2 | 33.493 | 0.154 | 20 | AGM | 0.0077 | 33.587 |
| CUHEC21CF | C | C2 | 3 | 2 | 33.164 | 0.155 | 20 | AGM | 0.0077 | 33.304 |

| | | |
|---|---|---|
| **Average** | **34.152** | |
| **Standard Dev.** | **0.827** | |
| **Coeff. of Var. [%]** | **2.423** | |
| **Min.** | **32.812** | |
| **Max.** | **36.029** | |
| **Number of Spec.** | **21** | |

| | | |
|---|---|---|
| **$Average_{norm}$** | **0.0077** | **34.069** |
| **$Standard\ Dev._{norm}$** | | **1.011** |
| **$Coeff.\ of\ Var.\ [\%]_{norm}$** | | **2.969** |
| **Min.** | **0.0075** | **32.865** |
| **Max.** | **0.0078** | **36.688** |
| **Number of Spec.** | **21** | **21** |


Laminate Open-Hole Tension Properties (OHT2)--(ETW2)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
Laminate Open-Hole Tension Strength (OHT2) [ksi]

## 4.16 "40/20/40" Open-Hole Tension 3 Properties (OHT3)

**Laminate Open-Hole Tension Properties (OHT3)--CTD Strength**

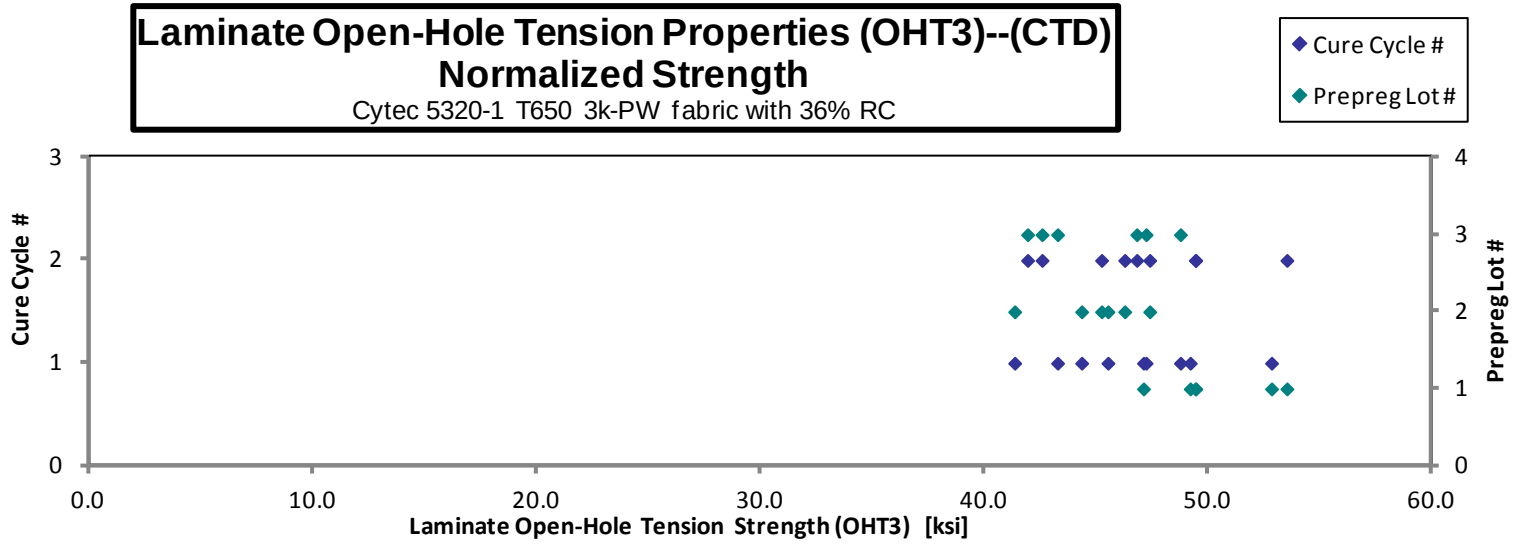
Cytec 5320-1 T650 3k-PW fabric with 36% RC

| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] |
|---|---|---|---|---|---|---|---|---|---|---|
| CUHFA115B | A | C1 | 1 | 1 | 46.578 | 0.117 | 15 | LGM | 0.0078 | 47.088 |
| CUHFA116B | A | C1 | 1 | 1 | 47.960 | 0.118 | 15 | LGM | 0.0079 | 49.178 |
| CUHFA117B | A | C1 | 1 | 1 | 52.797 | 0.116 | 15 | LGM | 0.0077 | 52.812 |
| CUHFA215B | A | C2 | 1 | 2 | 48.935 | 0.117 | 15 | LGM | 0.0078 | 49.408 |
| CUHFA216B | A | C2 | 1 | 2 | 53.367 | 0.116 | 15 | LGM | 0.0077 | 53.498 |
| CUHFA217B | A | C2 | 1 | 2 | 49.416 | 0.116 | 15 | LGM | 0.0077 | 49.423 |
| CUHFB115B | B | C1 | 2 | 1 | 42.116 | 0.113 | 15 | LGM | 0.0076 | 41.332 |
| CUHFB116B | B | C1 | 2 | 1 | 46.105 | 0.114 | 15 | LGM | 0.0076 | 45.500 |
| CUHFB117B | B | C1 | 2 | 1 | 45.473 | 0.113 | 15 | LGM | 0.0075 | 44.325 |
| CUHFB214B | B | C2 | 2 | 2 | 47.836 | 0.114 | 15 | LGM | 0.0076 | 47.366 |
| CUHFB215B | B | C2 | 2 | 2 | 46.845 | 0.114 | 15 | LGM | 0.0076 | 46.250 |
| CUHFB218B | B | C2 | 2 | 2 | 45.938 | 0.114 | 15 | LGM | 0.0076 | 45.216 |
| CUHFC117B | C | C1 | 3 | 1 | 49.511 | 0.114 | 15 | LGM | 0.0076 | 48.740 |
| CUHFC118B | C | C1 | 3 | 1 | 47.826 | 0.114 | 15 | LGM | 0.0076 | 47.205 |
| CUHFC119B | C | C1 | 3 | 1 | 43.551 | 0.115 | 15 | LGM | 0.0076 | 43.249 |
| CUHFC215B | C | C2 | 3 | 2 | 46.097 | 0.117 | 15 | LGM | 0.0078 | 46.789 |
| CUHFC216B | C | C2 | 3 | 2 | 41.050 | 0.118 | 15 | LGM | 0.0079 | 41.909 |
| CUHFC217B | C | C2 | 3 | 2 | 42.470 | 0.116 | 15 | LGM | 0.0077 | 42.555 |

| | | |
|---|---|---|
| **Average** | **46.882** | |
| **Standard Dev.** | **3.335** | |
| **Coeff. of Var. [%]** | **7.113** | |
| **Min.** | **41.050** | |
| **Max.** | **53.367** | |
| **Number of Spec.** | **18** | |

| | | |
|---|---|---|
| **$Average_{norm}$** | **0.0077** | **46.769** |
| **$Standard\ Dev._{norm}$** | | **3.428** |
| **$Coeff.\ of\ Var.\ [\%]_{norm}$** | | **7.329** |
| **Min.** | **0.0075** | **41.332** |
| **Max.** | **0.0079** | **53.498** |
| **Number of Spec.** | **18** | **18** |


Laminate Open-Hole Tension Properties (OHT3)--(CTD)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
10.0
20.0
30.0
40.0
50.0
60.0
Laminate Open-Hole Tension Strength (OHT3) [ksi]

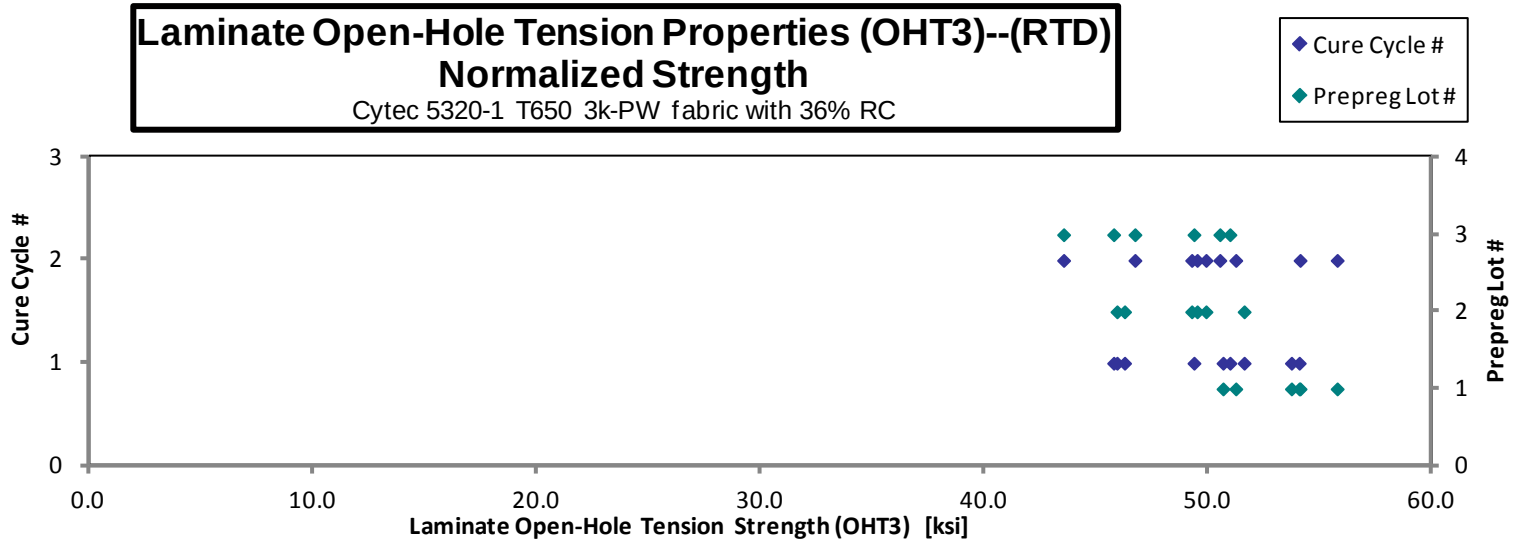
## Laminate Open-Hole Tension Properties (OHT3)--RTD Strength

Cytec 5320-1 T650 3k-PW fabric with 36% RC

| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] |
|---|---|---|---|---|---|---|---|---|---|---|
| CUHFA111A | A | C1 | 1 | 1 | 50.782 | 0.115 | 15 | LGM | 0.0077 | 50.643 |
| CUHFA112A | A | C1 | 1 | 1 | 54.229 | 0.115 | 15 | LGM | 0.0077 | 54.049 |
| CUHFA113A | A | C1 | 1 | 1 | 52.333 | 0.119 | 15 | LGM | 0.0079 | 53.699 |
| CUHFA211A | A | C2 | 1 | 2 | 56.305 | 0.114 | 15 | LGM | 0.0076 | 55.745 |
| CUHFA212A | A | C2 | 1 | 2 | 53.700 | 0.116 | 15 | LGM | 0.0078 | 54.087 |
| CUHFA213A | A | C2 | 1 | 2 | 50.356 | 0.117 | 15 | LGM | 0.0078 | 51.213 |
| CUHFB111A | B | C1 | 2 | 1 | 47.444 | 0.112 | 15 | LGM | 0.0075 | 45.903 |
| CUHFB112A | B | C1 | 2 | 1 | 52.971 | 0.112 | 15 | LGM | 0.0075 | 51.587 |
| CUHFB113A | B | C1 | 2 | 1 | 47.322 | 0.113 | 15 | LGM | 0.0075 | 46.243 |
| CUHFB211A | B | C2 | 2 | 2 | 50.258 | 0.113 | 15 | LGM | 0.0075 | 49.243 |
| CUHFB212A | B | C2 | 2 | 2 | 49.743 | 0.115 | 15 | LGM | 0.0077 | 49.485 |
| CUHFB213A | B | C2 | 2 | 2 | 51.205 | 0.113 | 15 | LGM | 0.0075 | 49.882 |
| CUHFC112A | C | C1 | 3 | 1 | 50.334 | 0.117 | 15 | LGM | 0.0078 | 50.952 |
| CUHFC114A | C | C1 | 3 | 1 | 46.094 | 0.115 | 15 | LGM | 0.0076 | 45.755 |
| CUHFC115A | C | C1 | 3 | 1 | 49.153 | 0.116 | 15 | LGM | 0.0077 | 49.344 |
| CUHFC211A | C | C2 | 3 | 2 | 46.726 | 0.115 | 15 | LGM | 0.0077 | 46.706 |
| CUHFC212A | C | C2 | 3 | 2 | 50.139 | 0.116 | 15 | LGM | 0.0078 | 50.501 |
| CUHFC213A | C | C2 | 3 | 2 | 42.979 | 0.117 | 15 | LGM | 0.0078 | 43.519 |

| | | | | |
|---|---|---|---|---|
| **Average** | **50.115** | **Average$_{norm}$** | **0.0077** | **49.920** |
| **Standard Dev.** | **3.231** | **Standard Dev.$_{norm}$** | | **3.328** |
| **Coeff. of Var. [%]** | **6.448** | **Coeff. of Var. [%]$_{norm}$** | | **6.667** |
| **Min.** | **42.979** | **Min.** | **0.0075** | **43.519** |
| **Max.** | **56.305** | **Max.** | **0.0079** | **55.745** |
| **Number of Spec.** | **18** | **Number of Spec.** | **18** | **18** |


Laminate Open-Hole Tension Properties (OHT3)--(RTD)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
10.0
20.0
30.0
40.0
50.0
60.0
Laminate Open-Hole Tension Strength (OHT3) [ksi]

## Laminate Open-Hole Tension Properties (OHT3)--ETW2
## Strength

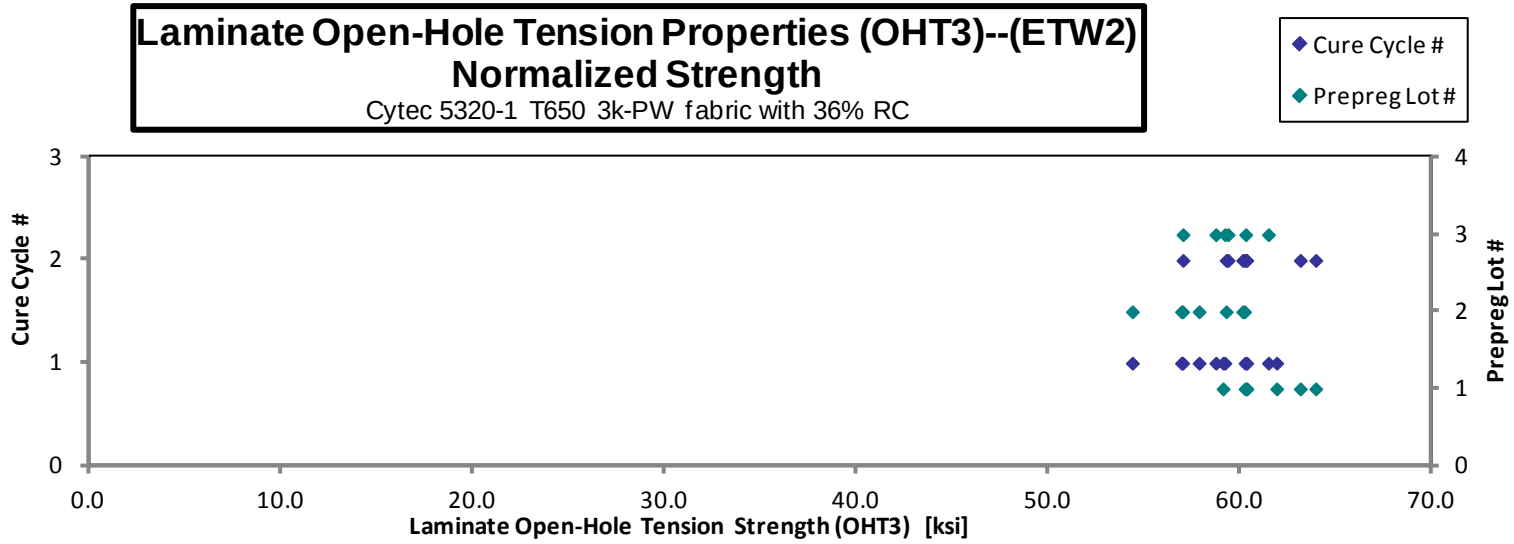
Cytec 5320-1 T650 3k-PW fabric with 36% RC

| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] |
|---|---|---|---|---|---|---|---|---|---|---|
| CUHFA11AF | A | C1 | 1 | 1 | 59.408 | 0.117 | 15 | LGM | 0.0078 | 60.231 |
| CUHFA11BF | A | C1 | 1 | 1 | 58.967 | 0.118 | 15 | LGM | 0.0079 | 60.319 |
| CUHFA11CF | A | C1 | 1 | 1 | 60.854 | 0.117 | 15 | LGM | 0.0078 | 61.882 |
| CUHFA11DF | A | C1 | 1 | 1 | 57.980 | 0.118 | 15 | LGM | 0.0078 | 59.084 |
| CUHFA21AF | A | C2 | 1 | 2 | 60.661 | 0.115 | 15 | LGM | 0.0077 | 60.320 |
| CUHFA21BF | A | C2 | 1 | 2 | 63.076 | 0.116 | 15 | LGM | 0.0077 | 63.113 |
| CUHFA21CF | A | C2 | 1 | 2 | 63.607 | 0.116 | 15 | LGM | 0.0077 | 63.919 |
| CUHFB11AF | B | C1 | 2 | 1 | 57.735 | 0.114 | 15 | LGM | 0.0076 | 56.919 |
| CUHFB11BF | B | C1 | 2 | 1 | 58.195 | 0.113 | 15 | LGM | 0.0075 | 56.977 |
| CUHFB11CF | B | C1 | 2 | 1 | 59.142 | 0.113 | 15 | LGM | 0.0075 | 57.836 |
| CUHFB11DF | B | C1 | 2 | 1 | 55.338 | 0.113 | 15 | LGM | 0.0076 | 54.356 |
| CUHFB21AF | B | C2 | 2 | 2 | 60.635 | 0.115 | 15 | LGM | 0.0076 | 60.206 |
| CUHFB21BF | B | C2 | 2 | 2 | 61.207 | 0.113 | 15 | LGM | 0.0076 | 60.111 |
| CUHFB21CF | B | C2 | 2 | 2 | 60.266 | 0.114 | 15 | LGM | 0.0076 | 59.249 |
| CUHFC11BF | C | C1 | 3 | 1 | 59.447 | 0.114 | 15 | LGM | 0.0076 | 58.709 |
| CUHFC11CF | C | C1 | 3 | 1 | 58.916 | 0.116 | 15 | LGM | 0.0077 | 59.180 |
| CUHFC11DF | C | C1 | 3 | 1 | 62.378 | 0.114 | 15 | LGM | 0.0076 | 61.451 |
| CUHFC21AF | C | C2 | 3 | 2 | 56.121 | 0.117 | 15 | LGM | 0.0078 | 56.996 |
| CUHFC21BF | C | C2 | 3 | 2 | 59.274 | 0.117 | 15 | LGM | 0.0078 | 60.266 |
| CUHFC21CF | C | C2 | 3 | 2 | 58.555 | 0.117 | 15 | LGM | 0.0078 | 59.349 |

| | | |
|---|---|---|
| **Average** | **59.588** | |
| **Standard Dev.** | **2.094** | |
| **Coeff. of Var. [%]** | **3.515** | |
| **Min.** | **55.338** | |
| **Max.** | **63.607** | |
| **Number of Spec.** | **20** | |

| | | |
|---|---|---|
| **$Average_{norm}$** | **0.0077** | **59.524** |
| **$Standard\ Dev._{norm}$** | | **2.235** |
| **$Coeff.\ of\ Var.\ [\%]_{norm}$** | | **3.755** |
| **Min.** | **0.0075** | **54.356** |
| **Max.** | **0.0079** | **63.919** |
| **Number of Spec.** | **20** | **20** |


Laminate Open-Hole Tension Properties (OHT3)--(ETW2)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
Laminate Open-Hole Tension Strength (OHT3) [ksi]

## 4.17 "25/50/25" Filled-Hole Tension 1 Properties (FHT1)

**Laminate Filled-Hole Tension Properties (FHT1)--CTD Strength**

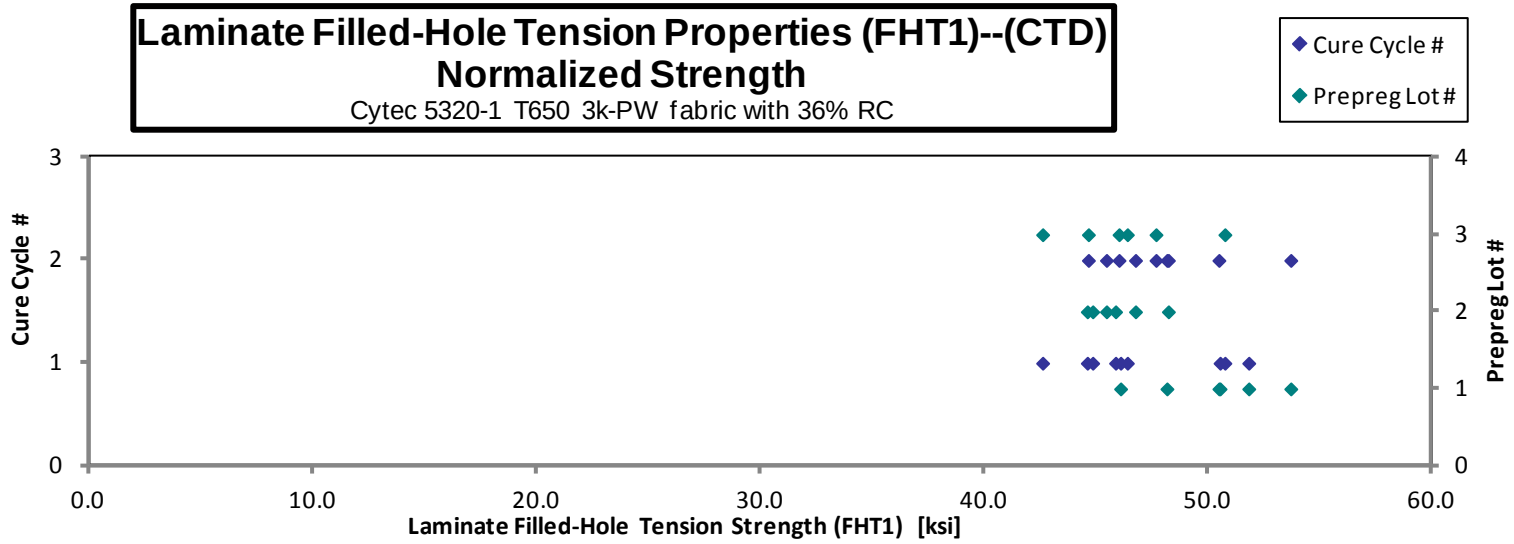
Cytec 5320-1 T650 3k-PW fabric with 36% RC

| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] |
|---|---|---|---|---|---|---|---|---|---|---|
| CUH4A1D4B | A | C1 | 1 | 1 | 50.336 | 0.127 | 16 | LGM | 0.0079 | 51.793 |
| CUH4A1D8B | A | C1 | 1 | 1 | 49.983 | 0.125 | 16 | LGM | 0.0078 | 50.511 |
| CUH4A1DDB | A | C1 | 1 | 1 | 45.324 | 0.125 | 16 | LGM | 0.0078 | 46.066 |
| CUH4A2D4B | A | C2 | 1 | 2 | 50.487 | 0.123 | 16 | LGM | 0.0077 | 50.459 |
| CUH4A24EB | A | C2 | 1 | 2 | 48.058 | 0.123 | 16 | LGM | 0.0077 | 48.136 |
| CUH4A24AB | A | C2 | 1 | 2 | 53.254 | 0.124 | 16 | LGM | 0.0078 | 53.671 |
| CUH4B14CB | B | C1 | 2 | 1 | 45.364 | 0.122 | 16 | LGM | 0.0076 | 44.818 |
| CUH4B14DB | B | C1 | 2 | 1 | 45.060 | 0.122 | 16 | LGM | 0.0076 | 44.578 |
| CUH4B14EB | B | C1 | 2 | 1 | 47.234 | 0.120 | 16 | LGM | 0.0075 | 45.841 |
| CUH4B244B | B | C2 | 2 | 2 | 47.346 | 0.122 | 16 | LGM | 0.0076 | 46.731 |
| CUH4B248B | B | C2 | 2 | 2 | 48.696 | 0.122 | 16 | LGM | 0.0076 | 48.202 |
| CUH4B249B | B | C2 | 2 | 2 | 46.164 | 0.121 | 16 | LGM | 0.0076 | 45.434 |
| CUH4C14CB | C | C1 | 3 | 1 | 51.058 | 0.122 | 16 | LGM | 0.0077 | 50.726 |
| CUH4C14DB | C | C1 | 3 | 1 | 46.895 | 0.122 | 16 | LGM | 0.0076 | 46.368 |
| CUH4C14EB | C | C1 | 3 | 1 | 42.807 | 0.123 | 16 | LGM | 0.0077 | 42.581 |
| CUH4C244B | C | C2 | 3 | 2 | 44.651 | 0.123 | 16 | LGM | 0.0077 | 44.627 |
| CUH4C248B | C | C2 | 3 | 2 | 46.064 | 0.123 | 16 | LGM | 0.0077 | 45.995 |
| CUH4C249B | C | C2 | 3 | 2 | 47.372 | 0.124 | 16 | LGM | 0.0077 | 47.648 |

| | | |
|---|---|---|
| **Average** | **47.564** | |
| **Standard Dev.** | **2.660** | |
| **Coeff. of Var. [%]** | **5.592** | |
| **Min.** | **42.807** | |
| **Max.** | **53.254** | |
| **Number of Spec.** | **18** | |

| | | |
|---|---|---|
| **$Average_{norm}$** | **0.0077** | **47.455** |
| **$Standard\ Dev._{norm}$** | | **2.941** |
| **$Coeff.\ of\ Var.\ [\%]_{norm}$** | | **6.197** |
| **Min.** | **0.0075** | **42.581** |
| **Max.** | **0.0079** | **53.671** |
| **Number of Spec.** | **18** | **18** |


Laminate Filled-Hole Tension Properties (FHT1)--(CTD)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
10.0
20.0
30.0
40.0
50.0
60.0
Laminate Filled-Hole Tension Strength (FHT1) [ksi]

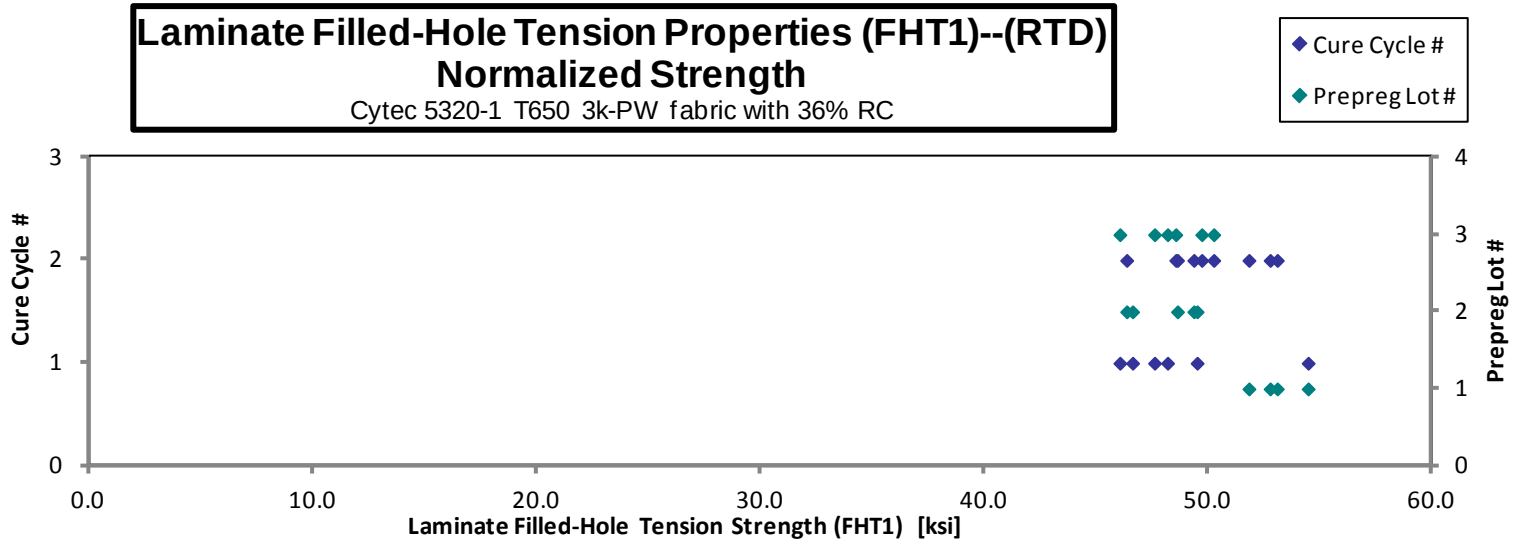
## Laminate Filled-Hole Tension Properties (FHT1)--RTD Strength

Cytec 5320-1 T650 3k-PW fabric with 36% RC

normalizing $t_{ply}$ [in]: 0.0077

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] |
|---|---|---|---|---|---|---|---|---|---|---|
| CUH4A1DEA | A | C1 | 1 | 1 | 53.650 | 0.125 | 16 | LGM | 0.0078 | 54.448 |
| CUH4A2D6A | A | C2 | 1 | 2 | 52.514 | 0.124 | 16 | LGM | 0.0077 | 52.749 |
| CUH4A2D9A | A | C2 | 1 | 2 | 53.372 | 0.123 | 16 | LGM | 0.0077 | 53.068 |
| CUH4A2DEA | A | C2 | 1 | 2 | 51.247 | 0.125 | 16 | LGM | 0.0078 | 51.802 |
| CUH4B1D4A | B | C1 | 2 | 1 | 47.639 | 0.121 | 16 | LGM | 0.0075 | 46.601 |
| CUH4B1D8A | B | C1 | 2 | 1 | 50.020 | 0.122 | 16 | LGM | 0.0076 | 49.485 |
| CUH4B24DA | B | C2 | 2 | 2 | 47.038 | 0.121 | 16 | LGM | 0.0076 | 46.338 |
| CUH4B24EA | B | C2 | 2 | 2 | 49.822 | 0.120 | 16 | LGM | 0.0075 | 48.609 |
| CUH4B2DAA | B | C2 | 2 | 2 | 50.153 | 0.121 | 16 | LGM | 0.0076 | 49.339 |
| CUH4C1D4A | C | C1 | 3 | 1 | 46.071 | 0.123 | 16 | LGM | 0.0077 | 46.034 |
| CUH4C1DAA | C | C1 | 3 | 1 | 48.618 | 0.122 | 16 | LGM | 0.0076 | 48.164 |
| CUH4C1DEA | C | C1 | 3 | 1 | 48.111 | 0.122 | 16 | LGM | 0.0076 | 47.583 |
| CUH4C24DA | C | C2 | 3 | 2 | 49.572 | 0.124 | 16 | LGM | 0.0077 | 49.693 |
| CUH4C24EA | C | C2 | 3 | 2 | 48.756 | 0.123 | 16 | LGM | 0.0077 | 48.532 |
| CUH4C2D4A | C | C2 | 3 | 2 | 49.931 | 0.124 | 16 | LGM | 0.0077 | 50.228 |

| | Strength [ksi] | | $Strength_{norm}$ [ksi] |
|---|---|---|---|
| Average | 49.768 | $Average_{norm}$ | 0.0077 | 49.512 |
| Standard Dev. | 2.217 | $Standard\ Dev._{norm}$ | | 2.553 |
| Coeff. of Var. [%] | 4.455 | $Coeff.\ of\ Var.\ [\%]_{norm}$ | | 5.157 |
| Min. | 46.071 | Min. | 0.0075 | 46.034 |
| Max. | 53.650 | Max. | 0.0078 | 54.448 |
| Number of Spec. | 15 | Number of Spec. | 15 | 15 |


Laminate Filled-Hole Tension Properties (FHT1)--(RTD)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
10.0
20.0
30.0
40.0
50.0
60.0
Laminate Filled-Hole Tension Strength (FHT1) [ksi]

## Laminate Filled-Hole Tension Properties (FHT1)--ETW1
## Strength

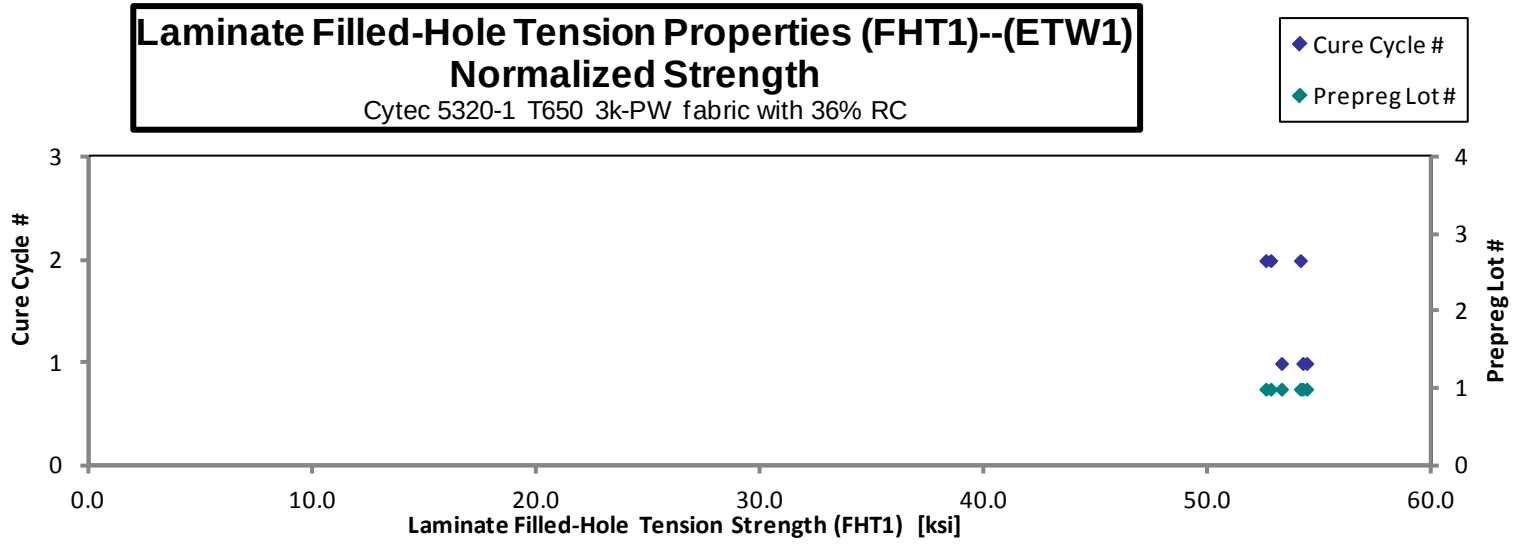
Cytec 5320-1 T650 3k-PW fabric with 36% RC

| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] |
|---|---|---|---|---|---|---|---|---|---|---|
| CUH4A119D | A | C1 | 1 | 1 | 53.794 | 0.125 | 16 | LGM | 0.0078 | 54.384 |
| CUH4A11AD | A | C1 | 1 | 1 | 53.270 | 0.125 | 16 | LGM | 0.0078 | 54.207 |
| CUH4A11BD | A | C1 | 1 | 1 | 52.574 | 0.125 | 16 | LGM | 0.0078 | 53.257 |
| CUH4A217D | A | C2 | 1 | 2 | 52.626 | 0.124 | 16 | LGM | 0.0077 | 52.775 |
| CUH4A218D | A | C2 | 1 | 2 | 54.418 | 0.122 | 16 | LGM | 0.0077 | 54.102 |
| CUH4A219D | A | C2 | 1 | 2 | 52.535 | 0.123 | 16 | LGM | 0.0077 | 52.557 |

| | | |
|---|---|---|
| **Average** | **53.203** | |
| **Standard Dev.** | **0.775** | |
| **Coeff. of Var. [%]** | **1.457** | |
| **Min.** | **52.535** | |
| **Max.** | **54.418** | |
| **Number of Spec.** | **6** | |

| | | |
|---|---|---|
| **$Average_{norm}$** | **0.0078** | **53.547** |
| **Standard $Dev._{norm}$** | | **0.788** |
| **Coeff. of Var. $[\%]_{norm}$** | | **1.471** |
| **Min.** | **0.0077** | **52.557** |
| **Max.** | **0.0078** | **54.384** |
| **Number of Spec.** | **6** | **6** |


Laminate Filled-Hole Tension Properties (FHT1)--(ETW1)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
10.0
20.0
30.0
40.0
50.0
60.0
Laminate Filled-Hole Tension Strength (FHT1) [ksi]

## Laminate Filled-Hole Tension Properties (FHT1)--ETW2
## Strength

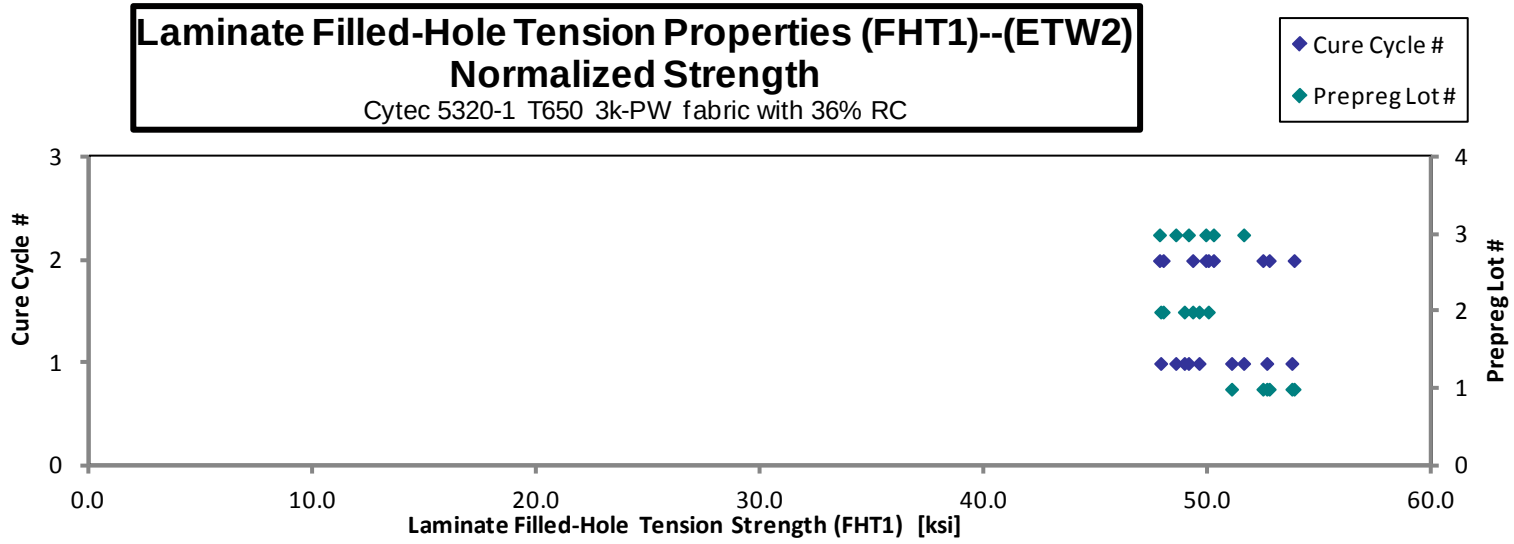
Cytec 5320-1 T650 3k-PW fabric with 36% RC

| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] |
|---|---|---|---|---|---|---|---|---|---|---|
| CUH4A11CF | A | C1 | 1 | 1 | 50.594 | 0.124 | 16 | LGM | 0.0078 | 51.025 |
| CUH4A11DF | A | C1 | 1 | 1 | 52.141 | 0.124 | 16 | LGM | 0.0078 | 52.599 |
| CUH4A11EF | A | C1 | 1 | 1 | 53.705 | 0.123 | 16 | LGM | 0.0077 | 53.720 |
| CUH4A21BF | A | C2 | 1 | 2 | 51.981 | 0.124 | 16 | LGM | 0.0078 | 52.424 |
| CUH4A21CF | A | C2 | 1 | 2 | 52.150 | 0.125 | 16 | LGM | 0.0078 | 52.707 |
| CUH4A21DF | A | C2 | 1 | 2 | 54.046 | 0.123 | 16 | LGM | 0.0077 | 53.819 |
| CUH4B119F | B | C1 | 2 | 1 | 49.591 | 0.122 | 16 | LGM | 0.0076 | 48.913 |
| CUH4B11AF | B | C1 | 2 | 1 | 50.287 | 0.121 | 16 | LGM | 0.0076 | 49.572 |
| CUH4B11BF | B | C1 | 2 | 1 | 48.354 | 0.122 | 16 | LGM | 0.0076 | 47.857 |
| CUH4B21AF | B | C2 | 2 | 2 | 49.549 | 0.123 | 16 | LGM | 0.0077 | 49.288 |
| CUH4B21BF | B | C2 | 2 | 2 | 50.285 | 0.122 | 16 | LGM | 0.0077 | 49.986 |
| CUH4B21CF | B | C2 | 2 | 2 | 48.289 | 0.122 | 16 | LGM | 0.0076 | 47.969 |
| CUH4C119F | C | C1 | 3 | 1 | 49.575 | 0.122 | 16 | LGM | 0.0076 | 49.099 |
| CUH4C11AF | C | C1 | 3 | 1 | 48.854 | 0.122 | 16 | LGM | 0.0076 | 48.531 |
| CUH4C11BF | C | C1 | 3 | 1 | 52.066 | 0.122 | 16 | LGM | 0.0076 | 51.566 |
| CUH4C21AF | C | C2 | 3 | 2 | 49.597 | 0.124 | 16 | LGM | 0.0077 | 49.872 |
| CUH4C21BF | C | C2 | 3 | 2 | 49.838 | 0.124 | 16 | LGM | 0.0078 | 50.216 |
| CUH4C21CF | C | C2 | 3 | 2 | 47.798 | 0.123 | 16 | LGM | 0.0077 | 47.804 |

| | | |
|---|---|---|
| **Average** | **50.483** | |
| **Standard Dev.** | **1.820** | |
| **Coeff. of Var. [%]** | **3.606** | |
| **Min.** | **47.798** | |
| **Max.** | **54.046** | |
| **Number of Spec.** | **18** | |

| | | |
|---|---|---|
| **$Average_{norm}$** | **0.0077** | **50.387** |
| **$Standard\ Dev._{norm}$** | | **1.995** |
| **$Coeff.\ of\ Var.\ [\%]_{norm}$** | | **3.959** |
| **Min.** | **0.0076** | **47.804** |
| **Max.** | **0.0078** | **53.819** |
| **Number of Spec.** | **18** | **18** |


Laminate Filled-Hole Tension Properties (FHT1)--(ETW2)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
10.0
20.0
30.0
40.0
50.0
60.0
Laminate Filled-Hole Tension Strength (FHT1) [ksi]

## 4.18 "10/80/10" Filled-Hole Tension 2 Properties (FHT2)

**Laminate Filled-Hole Tension Properties (FHT2)--CTD Strength**

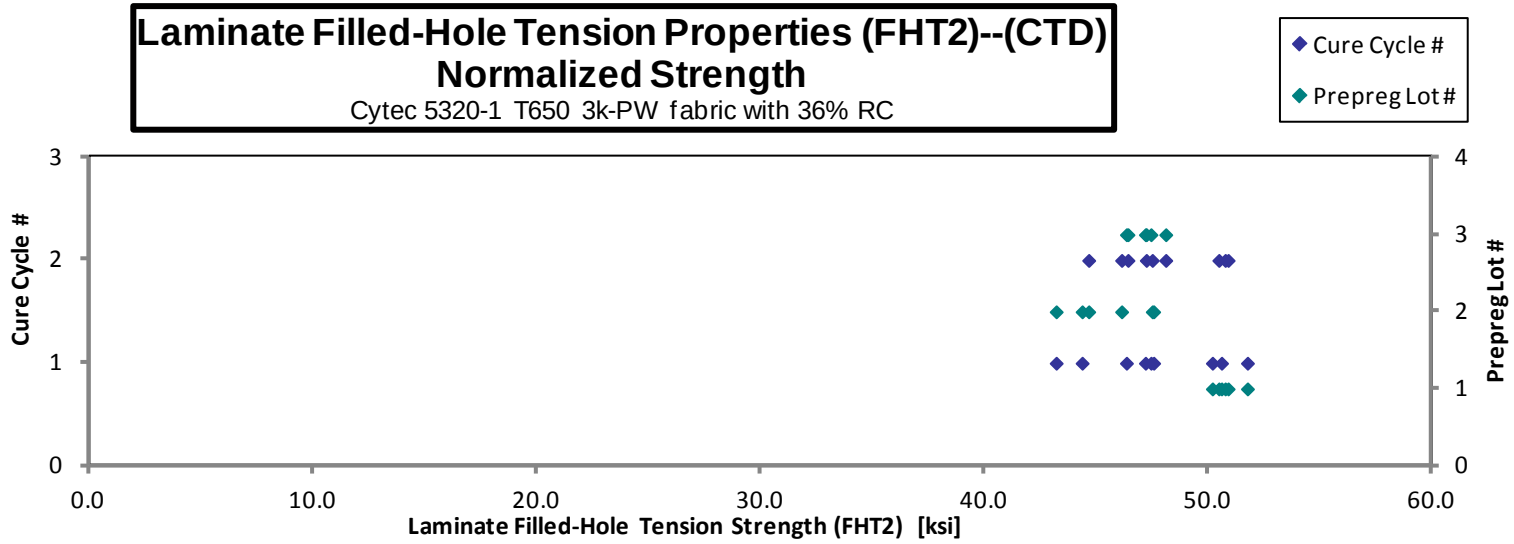
Cytec 5320-1 T650 3k-PW fabric with 36% RC

| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] |
|---|---|---|---|---|---|---|---|---|---|---|
| CUH5A153B | A | C1 | 1 | 1 | 49.880 | 0.156 | 20 | LGM | 0.0078 | 50.577 |
| CUH5A15DB | A | C1 | 1 | 1 | 49.668 | 0.156 | 20 | LGM | 0.0078 | 50.168 |
| CUH5A15EB | A | C1 | 1 | 1 | 51.495 | 0.155 | 20 | LGM | 0.0077 | 51.735 |
| CUH5A254B | A | C2 | 1 | 2 | 51.346 | 0.152 | 20 | LGM | 0.0076 | 50.740 |
| CUH5A258B | A | C2 | 1 | 2 | 51.871 | 0.151 | 20 | LGM | 0.0076 | 50.872 |
| CUH5A259B | A | C2 | 1 | 2 | 51.048 | 0.152 | 20 | LGM | 0.0076 | 50.456 |
| CUH5B15CB | B | C1 | 2 | 1 | 44.950 | 0.152 | 20 | LGM | 0.0076 | 44.347 |
| CUH5B15DB | B | C1 | 2 | 1 | 48.800 | 0.150 | 20 | LGM | 0.0075 | 47.543 |
| CUH5B15EB | B | C1 | 2 | 1 | 44.153 | 0.151 | 20 | LGM | 0.0075 | 43.187 |
| CUH5B254B | B | C2 | 2 | 2 | 47.906 | 0.153 | 20 | LGM | 0.0076 | 47.481 |
| CUH5B258B | B | C2 | 2 | 2 | 45.557 | 0.151 | 20 | LGM | 0.0075 | 44.640 |
| CUH5B259B | B | C2 | 2 | 2 | 46.971 | 0.151 | 20 | LGM | 0.0076 | 46.111 |
| CUH5C15CB | C | C1 | 3 | 1 | 46.332 | 0.157 | 20 | LGM | 0.0078 | 47.175 |
| CUH5C15DB | C | C1 | 3 | 1 | 46.023 | 0.155 | 20 | LGM | 0.0078 | 46.327 |
| CUH5C15EB | C | C1 | 3 | 1 | 47.977 | 0.152 | 20 | LGM | 0.0076 | 47.422 |
| CUH5C254B | C | C2 | 3 | 2 | 47.851 | 0.155 | 20 | LGM | 0.0077 | 48.084 |
| CUH5C258B | C | C2 | 3 | 2 | 47.846 | 0.152 | 20 | LGM | 0.0076 | 47.214 |
| CUH5C259B | C | C2 | 3 | 2 | 46.270 | 0.154 | 20 | LGM | 0.0077 | 46.395 |

| | | |
|---|---|---|
| **Average** | **48.108** | |
| **Standard Dev.** | **2.368** | |
| **Coeff. of Var. [%]** | **4.922** | |
| **Min.** | **44.153** | |
| **Max.** | **51.871** | |
| **Number of Spec.** | **18** | |

| | | |
|---|---|---|
| **$Average_{norm}$** | **0.0077** | **47.804** |
| **$Standard\ Dev._{norm}$** | | **2.488** |
| **$Coeff.\ of\ Var.\ [\%]_{norm}$** | | **5.205** |
| **Min.** | **0.0075** | **43.187** |
| **Max.** | **0.0078** | **51.735** |
| **Number of Spec.** | **18** | **18** |


Laminate Filled-Hole Tension Properties (FHT2)--(CTD)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
10.0
20.0
30.0
40.0
50.0
60.0
Laminate Filled-Hole Tension Strength (FHT2) [ksi]

## Laminate Filled-Hole Tension Properties (FHT2)--RTD Strength

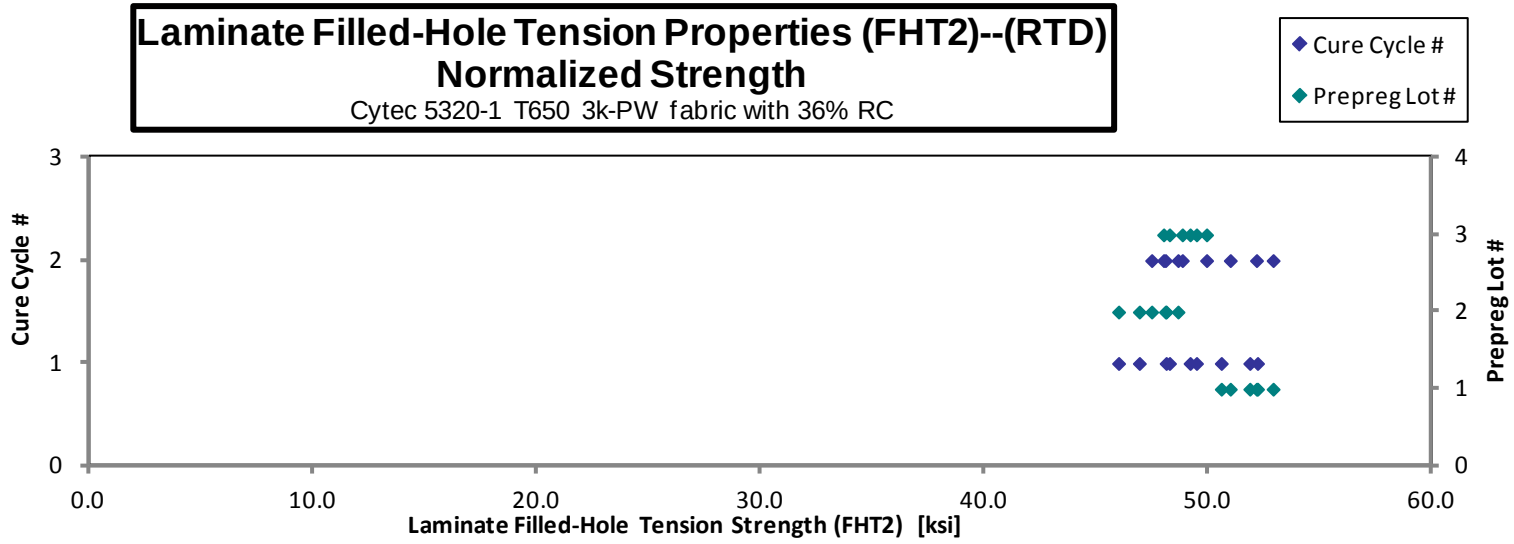
Cytec 5320-1 T650 3k-PW fabric with 36% RC

| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] |
|---|---|---|---|---|---|---|---|---|---|---|
| CUH5A1E4A | A | C1 | 1 | 1 | 51.301 | 0.156 | 20 | AGM | 0.0078 | 51.840 |
| CUH5A1E9A | A | C1 | 1 | 1 | 51.965 | 0.155 | 20 | LGM | 0.0077 | 52.185 |
| CUH5A1EDA | A | C1 | 1 | 1 | 49.442 | 0.158 | 20 | LGM | 0.0079 | 50.565 |
| CUH5A2E4A | A | C2 | 1 | 2 | 51.024 | 0.157 | 20 | LGM | 0.0079 | 52.139 |
| CUH5A2E8A | A | C2 | 1 | 2 | 51.129 | 0.154 | 20 | MGM | 0.0077 | 50.968 |
| CUH5A2E9A | A | C2 | 1 | 2 | 52.877 | 0.154 | 20 | MGM | 0.0077 | 52.883 |
| CUH5B1E4A | B | C1 | 2 | 1 | 46.367 | 0.153 | 20 | LGM | 0.0076 | 45.976 |
| CUH5B1E8A | B | C1 | 2 | 1 | 49.269 | 0.150 | 20 | LGM | 0.0075 | 48.102 |
| CUH5B1E9A | B | C1 | 2 | 1 | 47.862 | 0.151 | 20 | LGM | 0.0075 | 46.904 |
| CUH5B2E4A | B | C2 | 2 | 2 | 49.179 | 0.152 | 20 | LGM | 0.0076 | 48.631 |
| CUH5B2E8A | B | C2 | 2 | 2 | 48.842 | 0.152 | 20 | LGM | 0.0076 | 48.070 |
| CUH5B2E9A | B | C2 | 2 | 2 | 48.370 | 0.151 | 20 | LGM | 0.0076 | 47.454 |
| CUH5C1E4A | C | C1 | 3 | 1 | 50.026 | 0.152 | 20 | LGM | 0.0076 | 49.457 |
| CUH5C1E8A | C | C1 | 3 | 1 | 48.977 | 0.152 | 20 | LGM | 0.0076 | 48.250 |
| CUH5C1E9A | C | C1 | 3 | 1 | 49.552 | 0.153 | 20 | LGM | 0.0076 | 49.171 |
| CUH5C254A | C | C2 | 3 | 2 | 47.848 | 0.154 | 20 | LGM | 0.0077 | 47.987 |
| CUH5C25DA | C | C2 | 3 | 2 | 49.581 | 0.155 | 20 | LGM | 0.0078 | 49.908 |
| CUH5C25EA | C | C2 | 3 | 2 | 49.396 | 0.152 | 20 | LGM | 0.0076 | 48.824 |

| | | |
|---|---|---|
| **Average** | **49.611** | |
| **Standard Dev.** | **1.593** | |
| **Coeff. of Var. [%]** | **3.211** | |
| **Min.** | **46.367** | |
| **Max.** | **52.877** | |
| **Number of Spec.** | **18** | |

| | | |
|---|---|---|
| **$Average_{norm}$** | **0.0077** | **49.406** |
| **$Standard\ Dev._{norm}$** | | **1.984** |
| **$Coeff.\ of\ Var.\ [\%]_{norm}$** | | **4.015** |
| **Min.** | **0.0075** | **45.976** |
| **Max.** | **0.0079** | **52.883** |
| **Number of Spec.** | **18** | **18** |


Laminate Filled-Hole Tension Properties (FHT2)--(RTD)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
10.0
20.0
30.0
40.0
50.0
60.0
Laminate Filled-Hole Tension Strength (FHT2) [ksi]

## Laminate Filled-Hole Tension Properties (FHT2)--ETW2
## Strength

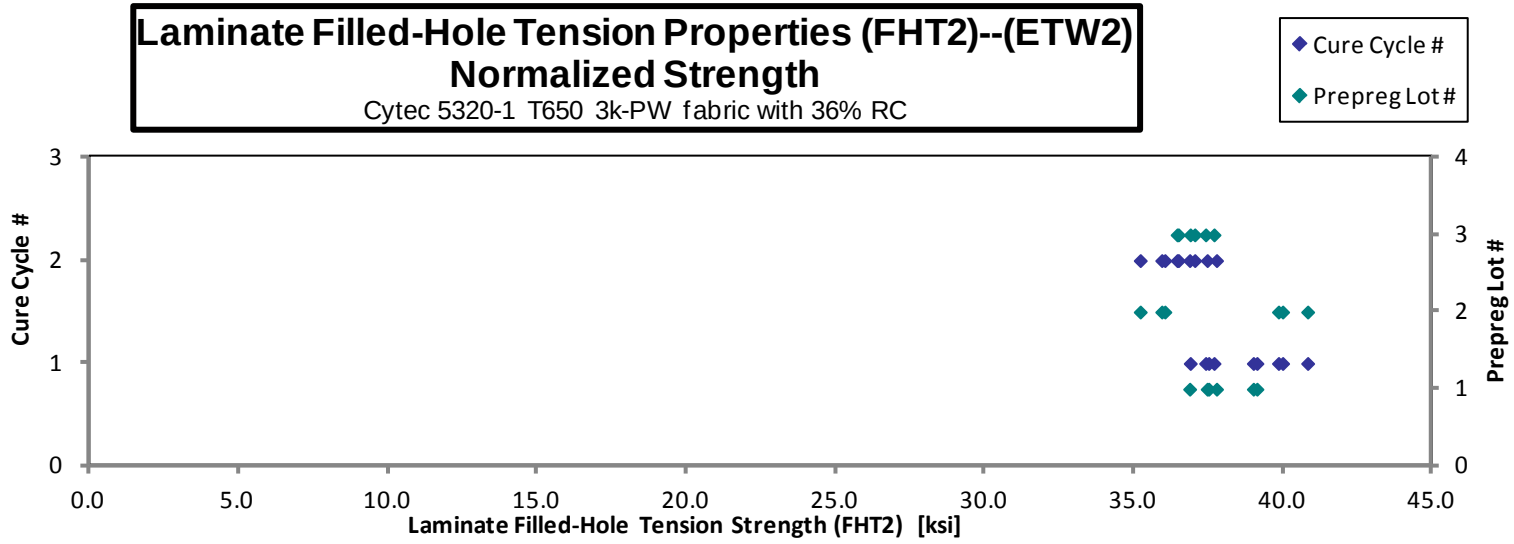
Cytec 5320-1 T650 3k-PW fabric with 36% RC

| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] |
|---|---|---|---|---|---|---|---|---|---|---|
| CUH5A11AF | A | C1 | 1 | 1 | 38.278 | 0.157 | 20 | AGM | 0.0078 | 38.999 |
| CUH5A11BF | A | C1 | 1 | 1 | 38.617 | 0.156 | 20 | AGM | 0.0078 | 39.119 |
| CUH5A11CF | A | C1 | 1 | 1 | 37.208 | 0.155 | 20 | AGM | 0.0078 | 37.502 |
| CUH5A21AF | A | C2 | 1 | 2 | 37.675 | 0.154 | 20 | AGM | 0.0077 | 37.765 |
| CUH5A21BF | A | C2 | 1 | 2 | 37.664 | 0.153 | 20 | AGM | 0.0077 | 37.452 |
| CUH5A21CF | A | C2 | 1 | 2 | 36.760 | 0.154 | 20 | AGM | 0.0077 | 36.864 |
| CUH5B119F | B | C1 | 2 | 1 | 41.566 | 0.151 | 20 | AGM | 0.0076 | 40.819 |
| CUH5B11AF | B | C1 | 2 | 1 | 40.766 | 0.151 | 20 | AGM | 0.0076 | 39.980 |
| CUH5B11BF | B | C1 | 2 | 1 | 40.423 | 0.152 | 20 | AGM | 0.0076 | 39.841 |
| CUH5B21AF | B | C2 | 2 | 2 | 35.683 | 0.152 | 20 | AGM | 0.0076 | 35.208 |
| CUH5B21BF | B | C2 | 2 | 2 | 36.530 | 0.151 | 20 | AGM | 0.0076 | 35.929 |
| CUH5B21DF | B | C2 | 2 | 2 | 36.624 | 0.152 | 20 | AGM | 0.0076 | 36.033 |
| CUH5C119F | C | C1 | 3 | 1 | 37.444 | 0.154 | 20 | AGM | 0.0077 | 37.399 |
| CUH5C11AF | C | C1 | 3 | 1 | 36.992 | 0.154 | 20 | AGM | 0.0077 | 36.884 |
| CUH5C11BF | C | C1 | 3 | 1 | 37.506 | 0.155 | 20 | AGM | 0.0077 | 37.681 |
| CUH5C21AF | C | C2 | 3 | 2 | 36.217 | 0.155 | 20 | AGM | 0.0078 | 36.488 |
| CUH5C21BF | C | C2 | 3 | 2 | 36.027 | 0.156 | 20 | AGM | 0.0078 | 36.444 |
| CUH5C21CF | C | C2 | 3 | 2 | 36.595 | 0.156 | 20 | AGM | 0.0078 | 37.034 |

| | | |
|---|---|---|
| **Average** | **37.699** | |
| **Standard Dev.** | **1.671** | |
| **Coeff. of Var. [%]** | **4.433** | |
| **Min.** | **35.683** | |
| **Max.** | **41.566** | |
| **Number of Spec.** | **18** | |

| | | |
|---|---|---|
| **$Average_{norm}$** | **0.0077** | **37.636** |
| **$Standard\ Dev._{norm}$** | | **1.540** |
| **$Coeff.\ of\ Var.\ [\%]_{norm}$** | | **4.092** |
| **Min.** | **0.0076** | **35.208** |
| **Max.** | **0.0078** | **40.819** |
| **Number of Spec.** | **18** | **18** |


Laminate Filled-Hole Tension Properties (FHT2)--(ETW2)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
Laminate Filled-Hole Tension Strength (FHT2) [ksi]

## 4.19 "40/20/40" Filled-Hole Tension 3 Properties (FHT3)

### Laminate Filled-Hole Tension Properties (FHT3)--CTD Strength

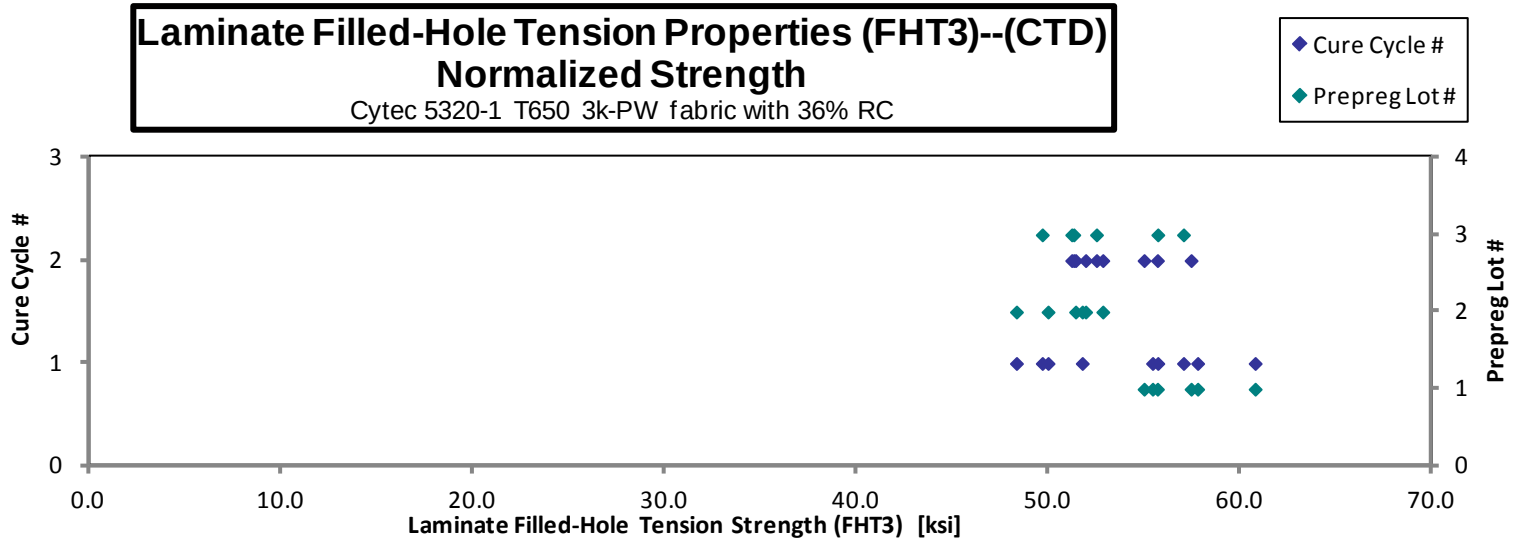
Cytec 5320-1 T650 3k-PW fabric with 36% RC

| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] |
|---|---|---|---|---|---|---|---|---|---|---|
| CUH6A16CB | A | C1 | 1 | 1 | 59.861 | 0.117 | 15 | LGM | 0.0078 | 60.759 |
| CUH6A16DB | A | C1 | 1 | 1 | 54.910 | 0.117 | 15 | LGM | 0.0078 | 55.409 |
| CUH6A16EB | A | C1 | 1 | 1 | 57.686 | 0.116 | 15 | LGM | 0.0077 | 57.761 |
| CUH6A264B | A | C2 | 1 | 2 | 58.022 | 0.114 | 15 | LGM | 0.0076 | 57.419 |
| CUH6A269B | A | C2 | 1 | 2 | 55.862 | 0.114 | 15 | LGM | 0.0076 | 54.968 |
| CUH6A26DB | A | C2 | 1 | 2 | 55.648 | 0.116 | 15 | LGM | 0.0077 | 55.664 |
| CUH6B16CB | B | C1 | 2 | 1 | 49.013 | 0.114 | 15 | LGM | 0.0076 | 48.313 |
| CUH6B16DB | B | C1 | 2 | 1 | 52.648 | 0.114 | 15 | LGM | 0.0076 | 51.744 |
| CUH6B16EB | B | C1 | 2 | 1 | 50.492 | 0.114 | 15 | LGM | 0.0076 | 49.960 |
| CUH6B264B | B | C2 | 2 | 2 | 51.822 | 0.115 | 15 | LGM | 0.0076 | 51.396 |
| CUH6B268B | B | C2 | 2 | 2 | 53.092 | 0.113 | 15 | LGM | 0.0075 | 51.920 |
| CUH6B269B | B | C2 | 2 | 2 | 53.612 | 0.114 | 15 | LGM | 0.0076 | 52.815 |
| CUH6C161B | C | C1 | 3 | 1 | 49.861 | 0.115 | 15 | LGM | 0.0077 | 49.660 |
| CUH6C1FAB | C | C1 | 3 | 1 | 57.823 | 0.114 | 15 | LGM | 0.0076 | 57.022 |
| CUH6C1FEB | C | C1 | 3 | 1 | 56.457 | 0.114 | 15 | LGM | 0.0076 | 55.684 |
| CUH6C264B | C | C2 | 3 | 2 | 51.660 | 0.115 | 15 | LGM | 0.0076 | 51.302 |
| CUH6C268B | C | C2 | 3 | 2 | 51.225 | 0.115 | 15 | LGM | 0.0077 | 51.195 |
| CUH6C269B | C | C2 | 3 | 2 | 52.876 | 0.115 | 15 | LGM | 0.0076 | 52.486 |

| | | |
|---|---|---|
| **Average** | **54.032** | |
| **Standard Dev.** | **3.144** | |
| **Coeff. of Var. [%]** | **5.819** | |
| **Min.** | **49.013** | |
| **Max.** | **59.861** | |
| **Number of Spec.** | **18** | |

| | | |
|---|---|---|
| **$Average_{norm}$** | **0.0076** | **53.638** |
| **$Standard\ Dev._{norm}$** | | **3.337** |
| **$Coeff.\ of\ Var.\ [\%]_{norm}$** | | **6.222** |
| **Min.** | **0.0075** | **48.313** |
| **Max.** | **0.0078** | **60.759** |
| **Number of Spec.** | **18** | **18** |


Laminate Filled-Hole Tension Properties (FHT3)--(CTD)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
Laminate Filled-Hole Tension Strength (FHT3) [ksi]

## Laminate Filled-Hole Tension Properties (FHT3)--RTD Strength

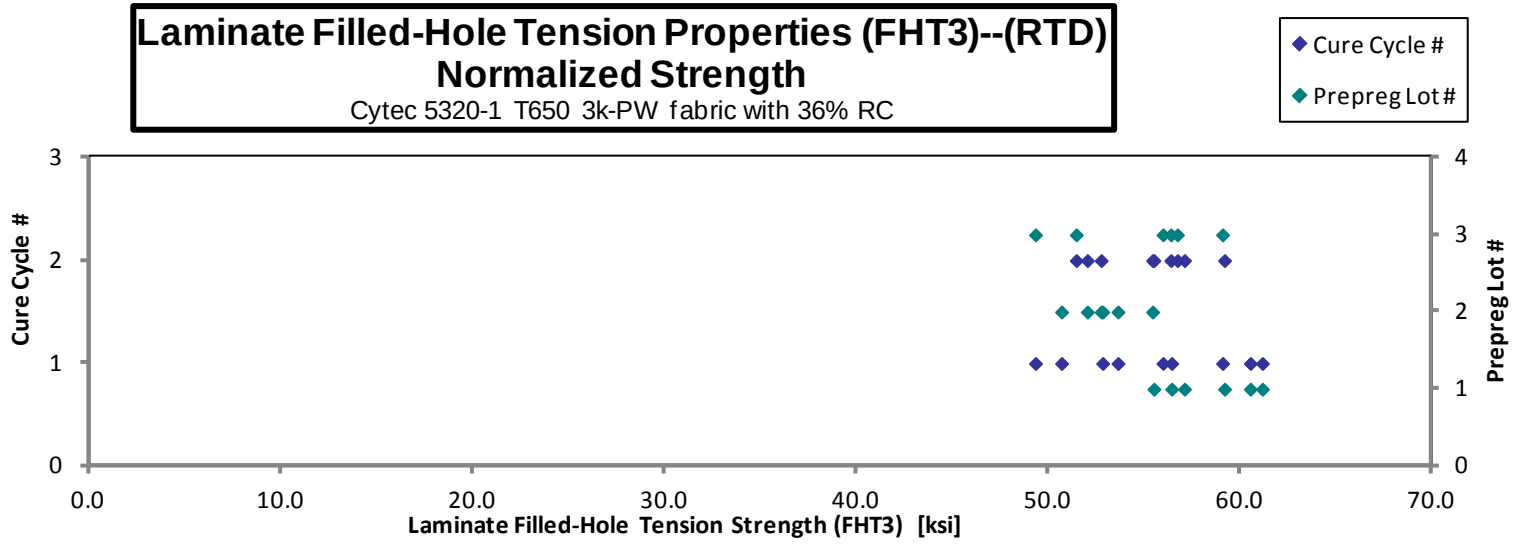
Cytec 5320-1 T650 3k-PW fabric with 36% RC

| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] |
|---|---|---|---|---|---|---|---|---|---|---|
| CUH6A1F4A | A | C1 | 1 | 1 | 60.354 | 0.117 | 15 | LGM | 0.0078 | 61.138 |
| CUH6A1F8A | A | C1 | 1 | 1 | 59.709 | 0.117 | 15 | LGM | 0.0078 | 60.510 |
| CUH6A1F9A | A | C1 | 1 | 1 | 56.326 | 0.116 | 15 | LGM | 0.0077 | 56.407 |
| CUH6A26EA | A | C2 | 1 | 2 | 55.617 | 0.115 | 15 | LGM | 0.0077 | 55.481 |
| CUH6A2F4A | A | C2 | 1 | 2 | 59.541 | 0.115 | 15 | LGM | 0.0077 | 59.163 |
| CUH6A2F8A | A | C2 | 1 | 2 | 57.124 | 0.115 | 15 | LGM | 0.0077 | 57.074 |
| CUH6B1F4A | B | C1 | 2 | 1 | 53.465 | 0.114 | 15 | LGM | 0.0076 | 52.809 |
| CUH6B1F8A | B | C1 | 2 | 1 | 55.150 | 0.112 | 15 | LGM | 0.0075 | 53.606 |
| CUH6B1F9A | B | C1 | 2 | 1 | 51.621 | 0.113 | 15 | LGM | 0.0076 | 50.667 |
| CUH6B26DA | B | C2 | 2 | 2 | 56.363 | 0.114 | 15 | LGM | 0.0076 | 55.411 |
| CUH6B26EA | B | C2 | 2 | 2 | 53.091 | 0.113 | 15 | LGM | 0.0075 | 52.011 |
| CUH6B2F9A | B | C2 | 2 | 2 | 54.114 | 0.113 | 15 | LGM | 0.0075 | 52.732 |
| CUH6C16DA | C | C1 | 3 | 1 | 56.310 | 0.115 | 15 | LGM | 0.0077 | 55.953 |
| CUH6C16EA | C | C1 | 3 | 1 | 60.199 | 0.113 | 15 | LGM | 0.0076 | 59.061 |
| CUH6C1F6A | C | C1 | 3 | 1 | 50.154 | 0.114 | 15 | LGM | 0.0076 | 49.307 |
| CUH6C26DA | C | C2 | 3 | 2 | 57.395 | 0.114 | 15 | LGM | 0.0076 | 56.708 |
| CUH6C26EA | C | C2 | 3 | 2 | 57.088 | 0.114 | 15 | LGM | 0.0076 | 56.363 |
| CUH6C2F4A | C | C2 | 3 | 2 | 50.918 | 0.117 | 15 | LGM | 0.0078 | 51.433 |

| | | |
|---|---|---|
| **Average** | **55.808** | |
| **Standard Dev.** | **3.120** | |
| **Coeff. of Var. [%]** | **5.590** | |
| **Min.** | **50.154** | |
| **Max.** | **60.354** | |
| **Number of Spec.** | **18** | |

| | | |
|---|---|---|
| **$Average_{norm}$** | **0.0076** | **55.324** |
| **$Standard\ Dev._{norm}$** | | **3.405** |
| **$Coeff.\ of\ Var.\ [\%]_{norm}$** | | **6.154** |
| **Min.** | **0.0075** | **49.307** |
| **Max.** | **0.0078** | **61.138** |
| **Number of Spec.** | **18** | **18** |


Laminate Filled-Hole Tension Properties (FHT3)--(RTD)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
Laminate Filled-Hole Tension Strength (FHT3) [ksi]

## Laminate Filled-Hole Tension Properties (FHT3)--ETW2
## Strength

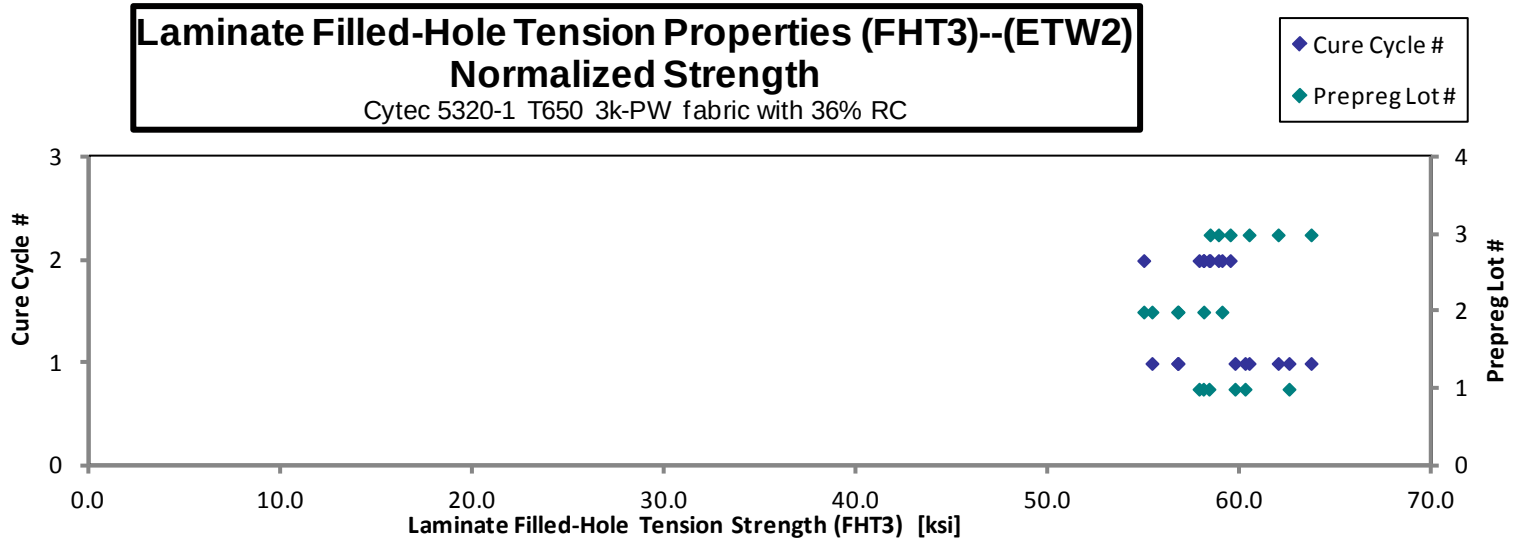
Cytec 5320-1 T650 3k-PW fabric with 36% RC

| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] |
|---|---|---|---|---|---|---|---|---|---|---|
| CUH6A119F | A | C1 | 1 | 1 | 60.172 | 0.116 | 15 | LGM | 0.0077 | 60.233 |
| CUH6A11AF | A | C1 | 1 | 1 | 59.474 | 0.116 | 15 | LGM | 0.0077 | 59.706 |
| CUH6A11BF | A | C1 | 1 | 1 | 61.416 | 0.118 | 15 | LGM | 0.0078 | 62.524 |
| CUH6A21AF | A | C2 | 1 | 2 | 58.570 | 0.115 | 15 | LGM | 0.0077 | 58.351 |
| CUH6A21BF | A | C2 | 1 | 2 | 57.692 | 0.116 | 15 | LGM | 0.0077 | 57.833 |
| CUH6A21CF | A | C2 | 1 | 2 | 58.401 | 0.115 | 15 | LGM | 0.0077 | 58.056 |
| CUH6B119F | B | C1 | 2 | 1 | 57.843 | 0.113 | 15 | LGM | 0.0076 | 56.741 |
| CUH6B11AF | B | C1 | 2 | 1 | 55.984 | 0.114 | 15 | LGM | 0.0076 | 55.378 |
| CUH6B11BF | B | C1 | 2 | 1 | 57.218 | 0.114 | 15 | LGM | 0.0076 | 56.715 |
| CUH6B21AF | B | C2 | 2 | 2 | 55.568 | 0.114 | 15 | LGM | 0.0076 | 54.951 |
| CUH6B21BF | B | C2 | 2 | 2 | 59.726 | 0.114 | 15 | LGM | 0.0076 | 59.028 |
| CUH6B21CF | B | C2 | 2 | 2 | 58.186 | 0.115 | 15 | LGM | 0.0077 | 58.077 |
| CUH6C118F | C | C1 | 3 | 1 | 62.146 | 0.112 | 15 | LGM | 0.0075 | 60.442 |
| CUH6C119F | C | C1 | 3 | 1 | 62.201 | 0.115 | 15 | LGM | 0.0077 | 61.958 |
| CUH6C11CF | C | C1 | 3 | 1 | 64.231 | 0.115 | 15 | LGM | 0.0076 | 63.675 |
| CUH6C21AF | C | C2 | 3 | 2 | 59.186 | 0.115 | 15 | LGM | 0.0077 | 58.844 |
| CUH6C21BF | C | C2 | 3 | 2 | 59.518 | 0.115 | 15 | LGM | 0.0077 | 59.458 |
| CUH6C21CF | C | C2 | 3 | 2 | 58.867 | 0.115 | 15 | LGM | 0.0076 | 58.408 |

| | | |
|---|---|---|
| **Average** | **59.244** | |
| **Standard Dev.** | **2.210** | |
| **Coeff. of Var. [%]** | **3.730** | |
| **Min.** | **55.568** | |
| **Max.** | **64.231** | |
| **Number of Spec.** | **18** | |

| | | |
|---|---|---|
| **$Average_{norm}$** | **0.0077** | **58.910** |
| **$Standard\ Dev._{norm}$** | | **2.313** |
| **$Coeff.\ of\ Var.\ [\%]_{norm}$** | | **3.926** |
| **Min.** | **0.0075** | **54.951** |
| **Max.** | **0.0078** | **63.675** |
| **Number of Spec.** | **18** | **18** |


Laminate Filled-Hole Tension Properties (FHT3)--(ETW2)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
Laminate Filled-Hole Tension Strength (FHT3) [ksi]

## 4.20 "25/50/25" Open-Hole Compression 1 Properties (OHC1)

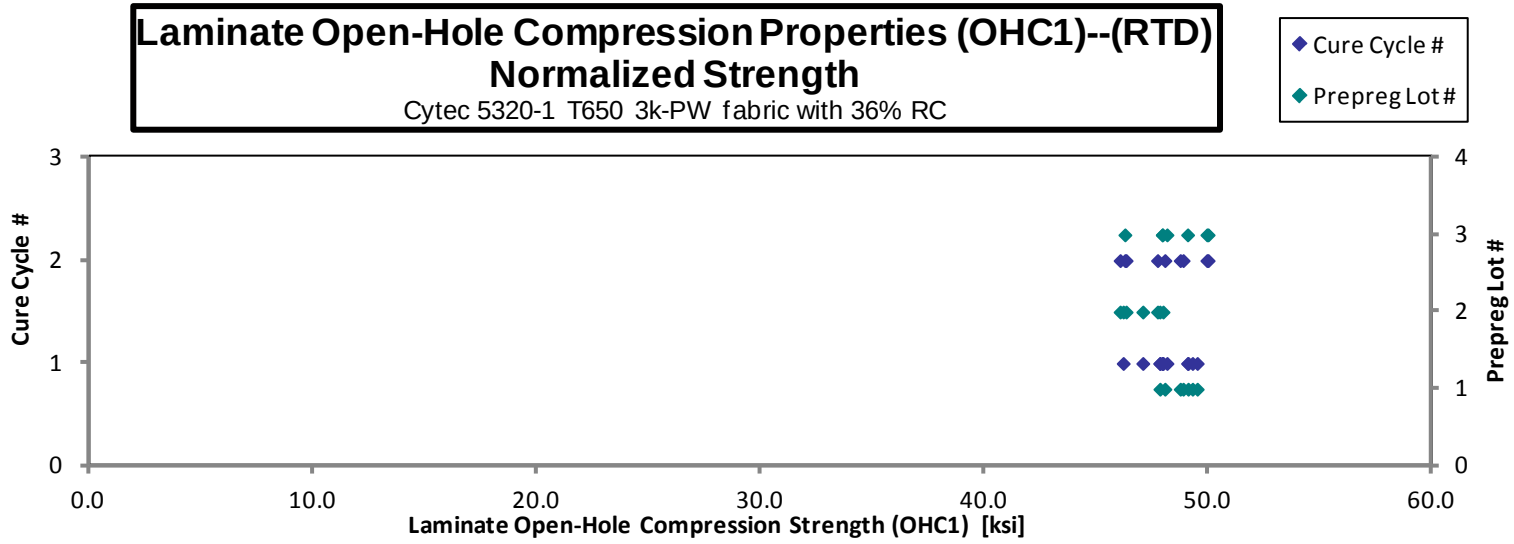
**Laminate Open-Hole Compression Properties (OHC1)--RTD Strength**

Cytec 5320-1 T650 3k-PW fabric with 36% RC

| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] |
|---|---|---|---|---|---|---|---|---|---|---|
| CUHGA111A | A | C1 | 1 | 1 | 49.447 | 0.154 | 20 | AGM | 0.0077 | 49.490 |
| CUHGA112A | A | C1 | 1 | 1 | 48.624 | 0.155 | 20 | MGM/AGM | 0.0078 | 49.082 |
| CUHGA113A | A | C1 | 1 | 1 | 48.551 | 0.156 | 20 | AGM/MGM | 0.0078 | 49.276 |
| CUHGA114A | A | C1 | 1 | 1 | 47.316 | 0.156 | 20 | MGM | 0.0078 | 47.823 |
| CUHGA211A | A | C2 | 1 | 2 | 47.514 | 0.156 | 20 | LGM | 0.0078 | 48.044 |
| CUHGA212A | A | C2 | 1 | 2 | 48.706 | 0.154 | 20 | LGM | 0.0077 | 48.732 |
| CUHGA213A | A | C2 | 1 | 2 | 48.383 | 0.156 | 20 | LGM/AGM | 0.0078 | 48.860 |
| CUHGB111A | B | C1 | 2 | 1 | 47.283 | 0.150 | 20 | MGM | 0.0075 | 46.183 |
| CUHGB112A | B | C1 | 2 | 1 | 48.233 | 0.150 | 20 | MGM/LGM | 0.0075 | 47.058 |
| CUHGB113A | B | C1 | 2 | 1 | 48.586 | 0.152 | 20 | MGM/LGM | 0.0076 | 47.819 |
| CUHGB114A | B | C1 | 2 | 1 | 48.599 | 0.152 | 20 | LGM | 0.0076 | 47.962 |
| CUHGB211A | B | C2 | 2 | 2 | 46.881 | 0.151 | 20 | LGM/MGM | 0.0076 | 46.044 |
| CUHGB212A | B | C2 | 2 | 2 | 46.524 | 0.153 | 20 | LGM | 0.0077 | 46.312 |
| CUHGB213A | B | C2 | 2 | 2 | 48.233 | 0.152 | 20 | MGM | 0.0076 | 47.716 |
| CUHGC111A | C | C1 | 3 | 1 | 48.880 | 0.151 | 20 | LGM | 0.0076 | 47.927 |
| CUHGC112A | C | C1 | 3 | 1 | 48.222 | 0.153 | 20 | MGM/LGM | 0.0077 | 47.935 |
| CUHGC113A | C | C1 | 3 | 1 | 48.869 | 0.155 | 20 | MGM/AGM | 0.0077 | 49.060 |
| CUHGC114A | C | C1 | 3 | 1 | 48.585 | 0.153 | 20 | LGM/AGM | 0.0076 | 48.138 |
| CUHGC211A | C | C2 | 3 | 2 | 46.672 | 0.153 | 20 | MGM | 0.0076 | 46.258 |
| CUHGC212A | C | C2 | 3 | 2 | 49.913 | 0.154 | 20 | MGM | 0.0077 | 49.978 |
| CUHGC213A | C | C2 | 3 | 2 | 49.579 | 0.155 | 20 | MGM/LGM | 0.0078 | 49.922 |

| | | | | |
|---|---|---|---|---|
| **Average** | **48.267** | **Average$_{norm}$** | **0.0077** | **48.077** |
| **Standard Dev.** | **0.928** | **Standard Dev.$_{norm}$** | | **1.204** |
| **Coeff. of Var. [%]** | **1.923** | **Coeff. of Var. [%]$_{norm}$** | | **2.504** |
| **Min.** | **46.524** | **Min.** | **0.0075** | **46.044** |
| **Max.** | **49.913** | **Max.** | **0.0078** | **49.978** |
| **Number of Spec.** | **21** | **Number of Spec.** | **21** | **21** |


Laminate Open-Hole Compression Properties (OHC1)--(RTD)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
10.0
20.0
30.0
40.0
50.0
60.0
Laminate Open-Hole Compression Strength (OHC1) [ksi]

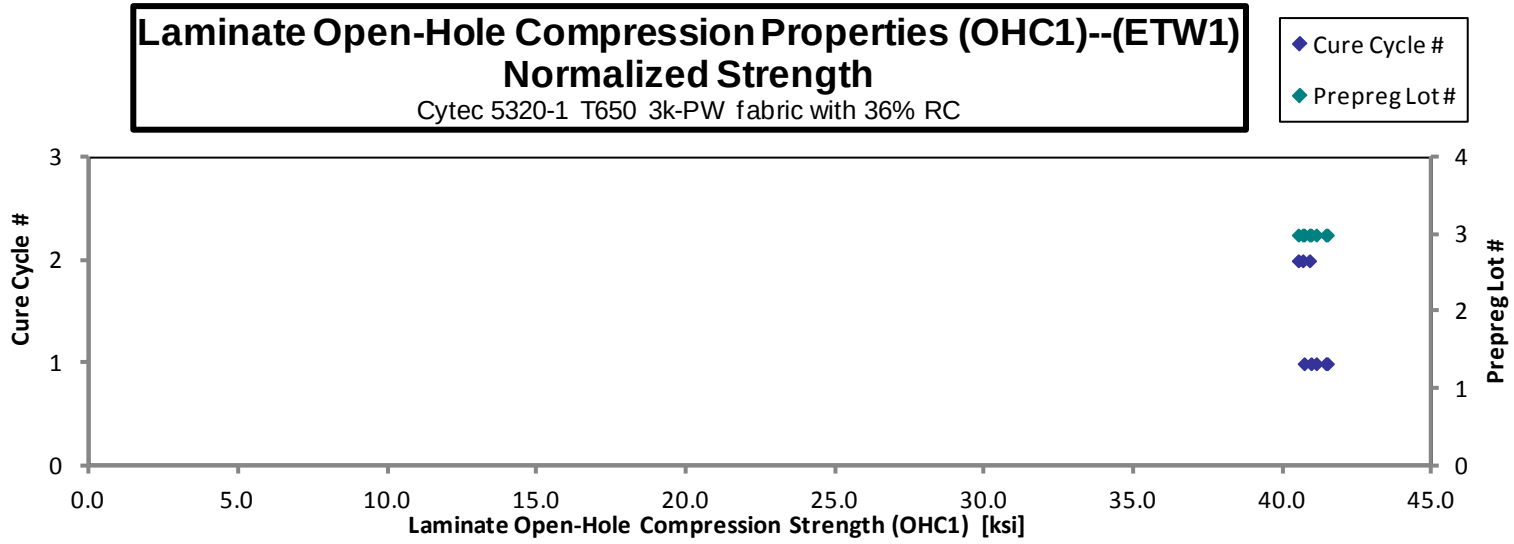
## Laminate Open-Hole Compression Properties (OHC1)--ETW1
## Strength

Cytec 5320-1 T650 3k-PW fabric with 36% RC

| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] |
|---|---|---|---|---|---|---|---|---|---|---|
| CUHGC115D | C | C1 | 3 | 1 | 41.251 | 0.153 | 20 | LGM / AGM | 0.0076 | 40.934 |
| CUHGC116D | C | C1 | 3 | 1 | 42.031 | 0.152 | 20 | LGM / AGM | 0.0076 | 41.435 |
| CUHGC117D | C | C1 | 3 | 1 | 41.621 | 0.151 | 20 | LGM / AGM | 0.0075 | 40.702 |
| CUHGC118D | C | C1 | 3 | 1 | 42.510 | 0.150 | 20 | LGM / AGM | 0.0075 | 41.479 |
| CUHGC119D | C | C1 | 3 | 1 | 41.458 | 0.153 | 20 | LGM / AGM | 0.0076 | 41.108 |
| CUHGC215D | C | C2 | 3 | 2 | 40.558 | 0.154 | 20 | AGM / LGM | 0.0077 | 40.655 |
| CUHGC216D | C | C2 | 3 | 2 | 40.998 | 0.154 | 20 | AGM / LGM | 0.0077 | 40.882 |
| CUHGC217D | C | C2 | 3 | 2 | 40.770 | 0.153 | 20 | AGM / LGM | 0.0077 | 40.506 |

| | Strength | | $Strength_{norm}$ |
|---|---|---|---|
| **Average** | **41.400** | **$Average_{norm}$** | **40.963** |
| **Standard Dev.** | **0.651** | **$Standard\ Dev._{norm}$** | **0.357** |
| **Coeff. of Var. [%]** | **1.574** | **Coeff. of Var. [%]$_{norm}$** | **0.870** |
| **Min.** | **40.558** | **Min.** | **40.506** |
| **Max.** | **42.510** | **Max.** | **41.479** |
| **Number of Spec.** | **8** | **Number of Spec.** | **8** |


Laminate Open-Hole Compression Properties (OHC1)--(ETW1)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
Laminate Open-Hole Compression Strength (OHC1) [ksi]

## Laminate Open-Hole Compression Properties (OHC1)--ETW2
## Strength

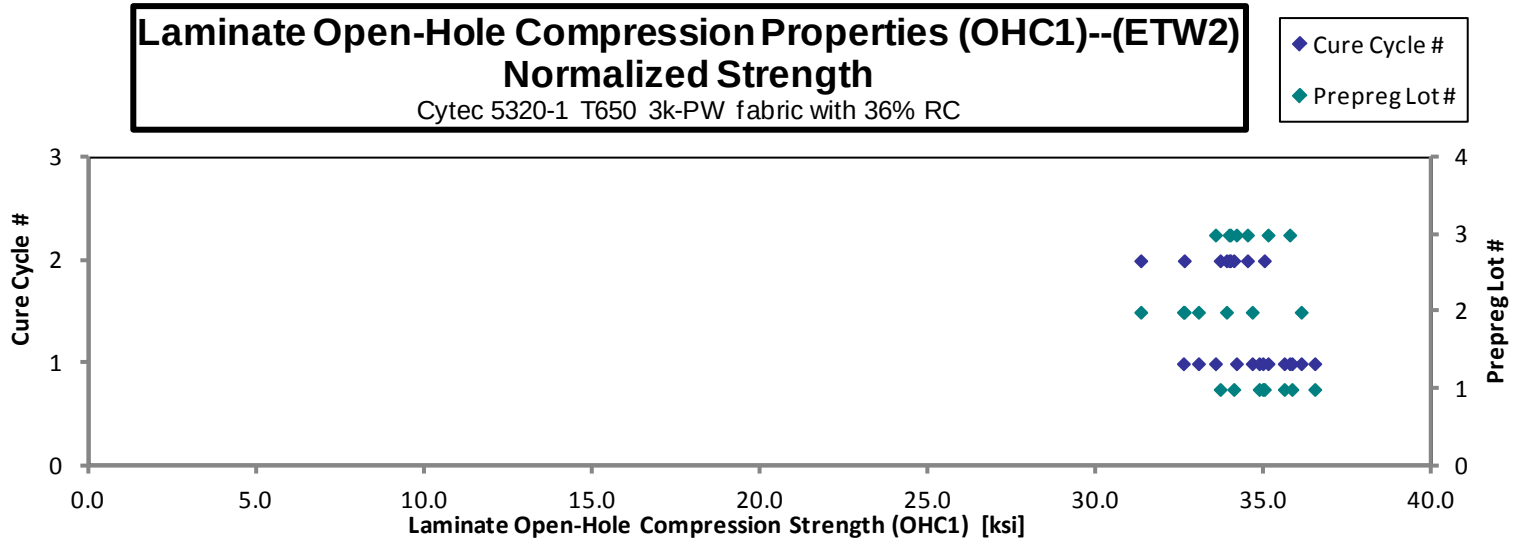
Cytec 5320-1 T650 3k-PW fabric with 36% RC

| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] |
|---|---|---|---|---|---|---|---|---|---|---|
| CUHGA117F | A | C1 | 1 | 1 | 35.035 | 0.154 | 20 | LGM | 0.0077 | 34.948 |
| CUHGA118F | A | C1 | 1 | 1 | 34.776 | 0.154 | 20 | LGM | 0.0077 | 34.840 |
| CUHGA119F | A | C1 | 1 | 1 | 35.353 | 0.155 | 20 | LGM | 0.0078 | 35.587 |
| CUHGA11AF | A | C1 | 1 | 1 | 35.439 | 0.156 | 20 | LGM | 0.0078 | 35.815 |
| CUHGA11BF | A | C1 | 1 | 1 | 36.028 | 0.156 | 20 | LGM | 0.0078 | 36.496 |
| CUHGA216F | A | C2 | 1 | 2 | 34.842 | 0.155 | 20 | LGM | 0.0077 | 34.993 |
| CUHGA217F | A | C2 | 1 | 2 | 33.126 | 0.157 | 20 | LGM | 0.0078 | 33.678 |
| CUHGA218F | A | C2 | 1 | 2 | 33.899 | 0.155 | 20 | LGM | 0.0077 | 34.083 |
| CUHGB117F | B | C1 | 2 | 1 | 33.336 | 0.151 | 20 | LGM | 0.0075 | 32.582 |
| CUHGB119F | B | C1 | 2 | 1 | 33.560 | 0.152 | 20 | LGM | 0.0076 | 33.030 |
| CUHGB11AF | B | C1 | 2 | 1 | 35.219 | 0.151 | 20 | LGM | 0.0076 | 34.632 |
| CUHGB11BF | B | C1 | 2 | 1 | 36.606 | 0.152 | 20 | LGM | 0.0076 | 36.091 |
| CUHGB216F | B | C2 | 2 | 2 | 31.741 | 0.152 | 20 | LGM | 0.0076 | 31.311 |
| CUHGB218F | B | C2 | 2 | 2 | 32.903 | 0.153 | 20 | LGM | 0.0076 | 32.608 |
| CUHGB219F | B | C2 | 2 | 2 | 34.032 | 0.153 | 20 | LGM | 0.0077 | 33.866 |
| CUHGC11AF | C | C1 | 3 | 1 | 35.410 | 0.153 | 20 | LGM / AGM | 0.0076 | 35.103 |
| CUHGC11BF | C | C1 | 3 | 1 | 34.366 | 0.153 | 20 | LGM | 0.0077 | 34.162 |
| CUHGC11CF | C | C1 | 3 | 1 | 33.628 | 0.154 | 20 | LGM | 0.0077 | 33.537 |
| CUHGC11DF | C | C1 | 3 | 1 | 36.388 | 0.151 | 20 | LGM | 0.0076 | 35.750 |
| CUHGC21AF | C | C2 | 3 | 2 | 33.845 | 0.154 | 20 | LGM | 0.0077 | 33.944 |
| CUHGC21BF | C | C2 | 3 | 2 | 33.734 | 0.155 | 20 | AGM / LGM | 0.0078 | 33.982 |
| CUHGC21CF | C | C2 | 3 | 2 | 34.408 | 0.154 | 20 | LGM | 0.0077 | 34.490 |

| | | |
|---|---|---|
| **Average** | **34.440** | |
| **Standard Dev.** | **1.202** | |
| **Coeff. of Var. [%]** | **3.491** | |
| **Min.** | **31.741** | |
| **Max.** | **36.606** | |
| **Number of Spec.** | **22** | |

| | | |
|---|---|---|
| **$Average_{norm}$** | **0.0077** | **34.342** |
| **$Standard\ Dev._{norm}$** | | **1.269** |
| **$Coeff.\ of\ Var.\ [\%]_{norm}$** | | **3.696** |
| **Min.** | **0.0075** | **31.311** |
| **Max.** | **0.0078** | **36.496** |
| **Number of Spec.** | **22** | **22** |


Laminate Open-Hole Compression Properties (OHC1)--(ETW2)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
Laminate Open-Hole Compression Strength (OHC1) [ksi]

## 4.21 "10/80/10" Open-Hole Compression 2 Properties (OHC2)

**Laminate Open-Hole Compression Properties (OHC2)--RTD Strength**

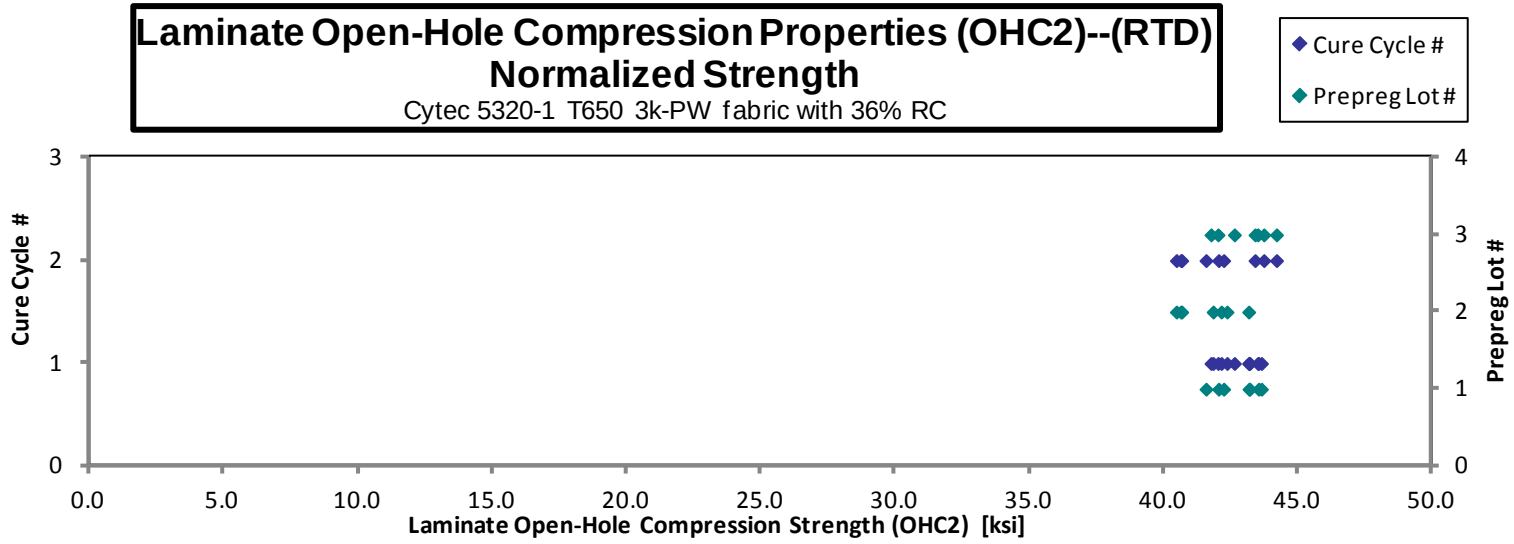
Cytec 5320-1 T650 3k-PW fabric with 36% RC

| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] |
|---|---|---|---|---|---|---|---|---|---|---|
| CUHHA111A | A | C1 | 1 | 1 | 43.377 | 0.153 | 20 | MGM | 0.0077 | 43.171 |
| CUHHA112A | A | C1 | 1 | 1 | 43.155 | 0.154 | 20 | MGM | 0.0077 | 43.197 |
| CUHHA113A | A | C1 | 1 | 1 | 43.321 | 0.155 | 20 | MGM | 0.0077 | 43.528 |
| CUHHA114A | A | C1 | 1 | 1 | 43.273 | 0.155 | 20 | MGM | 0.0078 | 43.634 |
| CUHHA211A | A | C2 | 1 | 2 | 41.923 | 0.153 | 20 | MGM | 0.0076 | 41.569 |
| CUHHA212A | A | C2 | 1 | 2 | 42.179 | 0.153 | 20 | MGM | 0.0077 | 42.038 |
| CUHHA213A | A | C2 | 1 | 2 | 41.761 | 0.156 | 20 | MGM | 0.0078 | 42.227 |
| CUHHB111A | B | C1 | 2 | 1 | 43.310 | 0.150 | 20 | MGM | 0.0075 | 42.138 |
| CUHHB112A | B | C1 | 2 | 1 | 44.045 | 0.151 | 20 | MGM | 0.0075 | 43.159 |
| CUHHB113A | B | C1 | 2 | 1 | 42.839 | 0.152 | 20 | AGM | 0.0076 | 42.352 |
| CUHHB116A | B | C1 | 2 | 1 | 42.549 | 0.151 | 20 | MGM | 0.0076 | 41.835 |
| CUHHB211A | B | C2 | 2 | 2 | 40.757 | 0.153 | 20 | MGM | 0.0076 | 40.466 |
| CUHHB212A | B | C2 | 2 | 2 | 41.055 | 0.153 | 20 | MGM | 0.0076 | 40.664 |
| CUHHB213A | B | C2 | 2 | 2 | 40.376 | 0.155 | 20 | MGM | 0.0077 | 40.630 |
| CUHHC111A | C | C1 | 3 | 1 | 42.683 | 0.151 | 20 | MGM | 0.0075 | 41.755 |
| CUHHC112A | C | C1 | 3 | 1 | 42.631 | 0.152 | 20 | MGM | 0.0076 | 42.017 |
| CUHHC113A | C | C1 | 3 | 1 | 43.525 | 0.154 | 20 | MGM | 0.0077 | 43.497 |
| CUHHC115A | C | C1 | 3 | 1 | 42.798 | 0.153 | 20 | MGM | 0.0077 | 42.627 |
| CUHHC211A | C | C2 | 3 | 2 | 43.965 | 0.153 | 20 | MGM | 0.0077 | 43.722 |
| CUHHC212A | C | C2 | 3 | 2 | 43.202 | 0.155 | 20 | MGM | 0.0077 | 43.394 |
| CUHHC213A | C | C2 | 3 | 2 | 44.114 | 0.154 | 20 | MGM | 0.0077 | 44.195 |

| | | |
|---|---|---|
| **Average** | **42.707** | |
| **Standard Dev.** | **1.044** | |
| **Coeff. of Var. [%]** | **2.444** | |
| **Min.** | **40.376** | |
| **Max.** | **44.114** | |
| **Number of Spec.** | **21** | |

| | | |
|---|---|---|
| **$Average_{norm}$** | **0.0077** | **42.467** |
| **Standard $Dev._{norm}$** | | **1.082** |
| **Coeff. of Var. $[\%]_{norm}$** | | **2.548** |
| **Min.** | **0.0075** | **40.466** |
| **Max.** | **0.0078** | **44.195** |
| **Number of Spec.** | **21** | **21** |


Laminate Open-Hole Compression Properties (OHC2)--(RTD)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
50.0
Laminate Open-Hole Compression Strength (OHC2) [ksi]

## Laminate Open-Hole Compression Properties (OHC2)--ETW2
## Strength

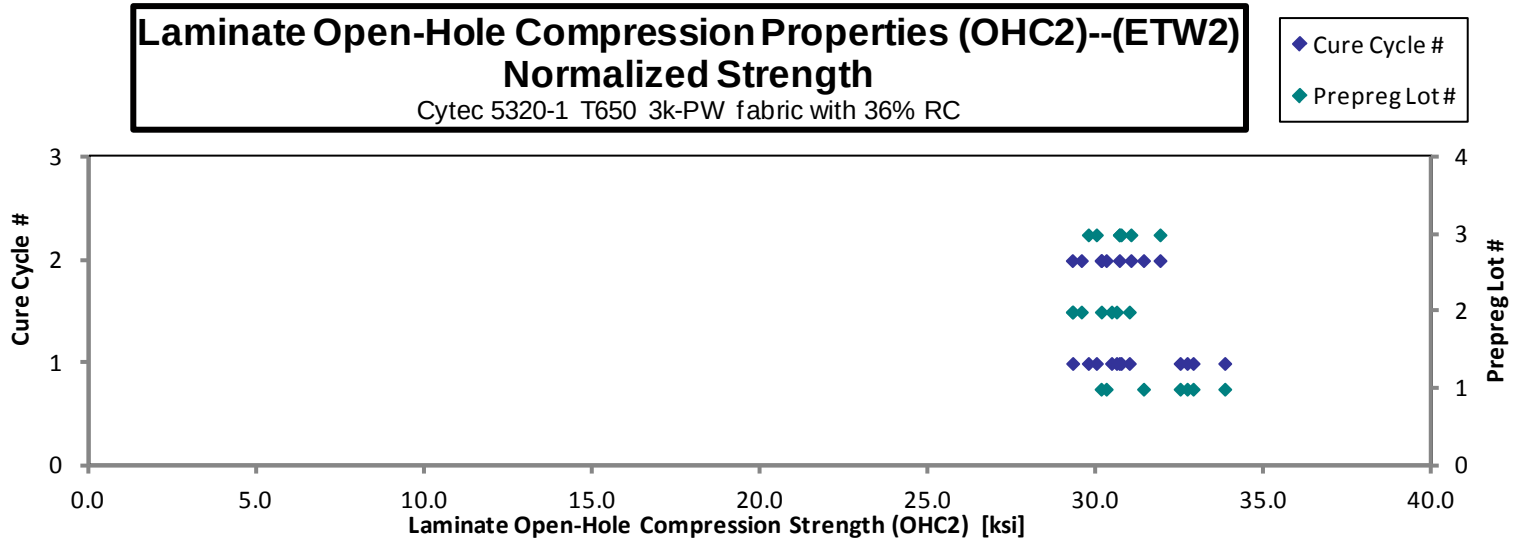
Cytec 5320-1 T650 3k-PW fabric with 36% RC

| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] |
|---|---|---|---|---|---|---|---|---|---|---|
| CUHHA117F | A | C1 | 1 | 1 | 34.128 | 0.153 | 20 | LGM / AGM | 0.0076 | 33.814 |
| CUHHA118F | A | C1 | 1 | 1 | 32.608 | 0.153 | 20 | LGM / AGM | 0.0077 | 32.484 |
| CUHHA119F | A | C1 | 1 | 1 | 32.754 | 0.155 | 20 | LGM / AGM | 0.0077 | 32.871 |
| CUHHA11AF | A | C1 | 1 | 1 | 32.064 | 0.157 | 20 | MGM | 0.0079 | 32.692 |
| CUHHA216F | A | C2 | 1 | 2 | 30.370 | 0.154 | 20 | LGM / AGM | 0.0077 | 30.281 |
| CUHHA217F | A | C2 | 1 | 2 | 30.122 | 0.154 | 20 | LGM / AGM | 0.0077 | 30.129 |
| CUHHA219F | A | C2 | 1 | 2 | 31.077 | 0.156 | 20 | LGM | 0.0078 | 31.394 |
| CUHHB117F | B | C1 | 2 | 1 | 31.127 | 0.151 | 20 | LGM / AGM | 0.0075 | 30.440 |
| CUHHB118F | B | C1 | 2 | 1 | 29.927 | 0.151 | 20 | LGM / AGM | 0.0075 | 29.283 |
| CUHHB119F | B | C1 | 2 | 1 | 31.012 | 0.152 | 20 | LGM / AGM | 0.0076 | 30.589 |
| CUHHB11AF | B | C1 | 2 | 1 | 31.374 | 0.152 | 20 | LGM / AGM | 0.0076 | 30.970 |
| CUHHB216F | B | C2 | 2 | 2 | 30.176 | 0.154 | 20 | LGM / AGM | 0.0077 | 30.137 |
| CUHHB217F | B | C2 | 2 | 2 | 29.221 | 0.156 | 20 | LGM | 0.0078 | 29.541 |
| CUHHB218F | B | C2 | 2 | 2 | 29.252 | 0.154 | 20 | MGM | 0.0077 | 29.271 |
| CUHHC117F | C | C1 | 3 | 1 | 30.504 | 0.151 | 20 | MGM | 0.0076 | 29.989 |
| CUHHC118F | C | C1 | 3 | 1 | 30.064 | 0.152 | 20 | LGM | 0.0076 | 29.749 |
| CUHHC119F | C | C1 | 3 | 1 | 30.809 | 0.153 | 20 | MGM | 0.0077 | 30.673 |
| CUHHC11AF | C | C1 | 3 | 1 | 30.858 | 0.153 | 20 | LGM / AGM | 0.0077 | 30.725 |
| CUHHC216F | C | C2 | 3 | 2 | 30.962 | 0.153 | 20 | MGM | 0.0076 | 30.674 |
| CUHHC217F | C | C2 | 3 | 2 | 31.227 | 0.153 | 20 | LGM / MGM | 0.0076 | 31.018 |
| CUHHC218F | C | C2 | 3 | 2 | 31.506 | 0.156 | 20 | AGM / MGM | 0.0078 | 31.885 |

| | | |
|---|---|---|
| **Average** | **31.007** | |
| **Standard Dev.** | **1.171** | |
| **Coeff. of Var. [%]** | **3.778** | |
| **Min.** | **29.221** | |
| **Max.** | **34.128** | |
| **Number of Spec.** | **21** | |

| | | |
|---|---|---|
| **$Average_{norm}$** | **0.0077** | **30.886** |
| **Standard $Dev._{norm}$** | | **1.237** |
| **Coeff. of Var. $[\%]_{norm}$** | | **4.005** |
| **Min.** | **0.0075** | **29.271** |
| **Max.** | **0.0079** | **33.814** |
| **Number of Spec.** | **21** | **21** |


Laminate Open-Hole Compression Properties (OHC2)--(ETW2)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
Laminate Open-Hole Compression Strength (OHC2) [ksi]

## 4.22 "40/20/40" Open-Hole Compression 3 Properties (OHC3)

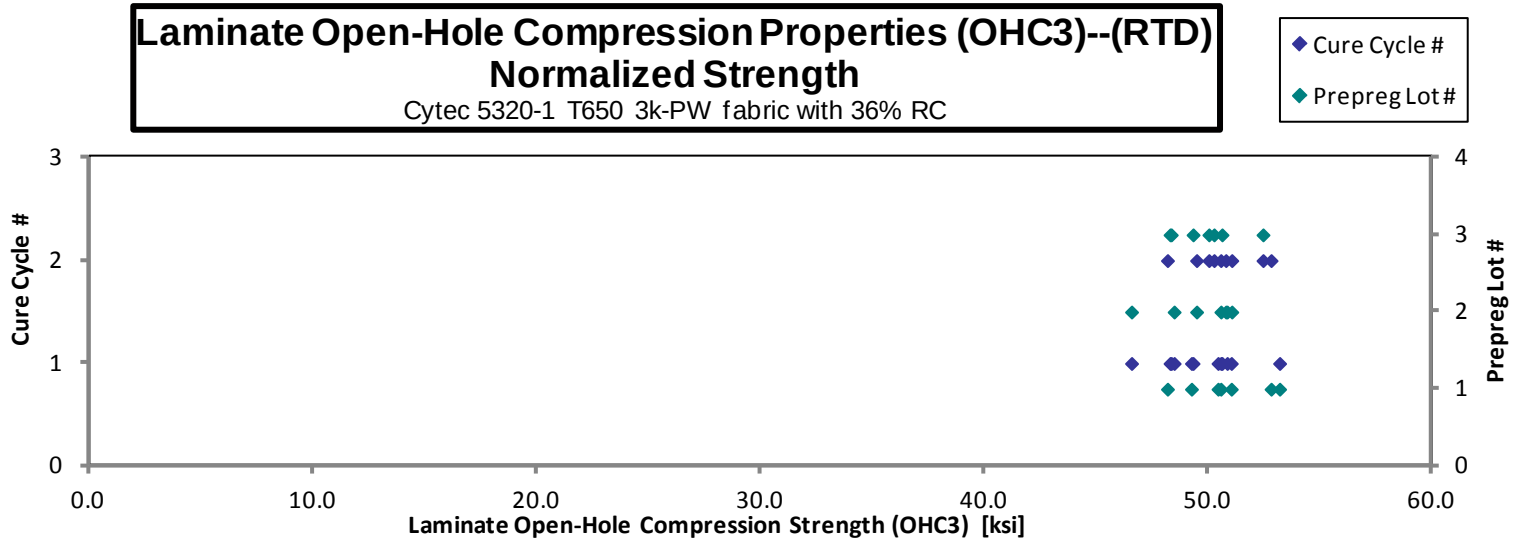
**Laminate Open-Hole Compression Properties (OHC3)--RTD Strength**

Cytec 5320-1 T650 3k-PW fabric with 36% RC

| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] |
|---|---|---|---|---|---|---|---|---|---|---|
| CUHIA111A | A | C1 | 1 | 1 | 50.887 | 0.154 | 20 | LGM | 0.0077 | 51.013 |
| CUHIA113A | A | C1 | 1 | 1 | 52.874 | 0.155 | 20 | LGM | 0.0077 | 53.172 |
| CUHIA114A | A | C1 | 1 | 1 | 48.400 | 0.157 | 20 | MGM | 0.0078 | 49.233 |
| CUHIA115A | A | C1 | 1 | 1 | 49.587 | 0.157 | 20 | MGM | 0.0078 | 50.419 |
| CUHIA211A | A | C2 | 1 | 2 | 48.113 | 0.154 | 20 | LGM | 0.0077 | 48.160 |
| CUHIA212A | A | C2 | 1 | 2 | 50.153 | 0.155 | 20 | MGM | 0.0078 | 50.544 |
| CUHIA213A | A | C2 | 1 | 2 | 52.445 | 0.155 | 20 | MGM | 0.0078 | 52.791 |
| CUHIB111A | B | C1 | 2 | 1 | 47.339 | 0.151 | 20 | LGM | 0.0076 | 46.555 |
| CUHIB112A | B | C1 | 2 | 1 | 51.089 | 0.152 | 20 | LGM | 0.0076 | 50.548 |
| CUHIB113A | B | C1 | 2 | 1 | 48.818 | 0.153 | 20 | MGM | 0.0076 | 48.458 |
| CUHIB115A | B | C1 | 2 | 1 | 51.428 | 0.152 | 20 | MGM | 0.0076 | 50.827 |
| CUHIB211A | B | C2 | 2 | 2 | 50.140 | 0.152 | 20 | LGM | 0.0076 | 49.462 |
| CUHIB212A | B | C2 | 2 | 2 | 51.951 | 0.151 | 20 | MGM | 0.0076 | 51.035 |
| CUHIB213A | B | C2 | 2 | 2 | 50.850 | 0.154 | 20 | MGM | 0.0077 | 50.767 |
| CUHIC111A | C | C1 | 3 | 1 | 51.298 | 0.152 | 20 | LGM | 0.0076 | 50.598 |
| CUHIC113A | C | C1 | 3 | 1 | 48.428 | 0.154 | 20 | LGM | 0.0077 | 48.276 |
| CUHIC114A | C | C1 | 3 | 1 | 49.573 | 0.153 | 20 | LGM | 0.0077 | 49.305 |
| CUHIC115A | C | C1 | 3 | 1 | 49.204 | 0.151 | 20 | LGM | 0.0076 | 48.331 |
| CUHIC211A | C | C2 | 3 | 2 | 50.508 | 0.153 | 20 | LGM | 0.0077 | 50.241 |
| CUHIC212A | C | C2 | 3 | 2 | 49.812 | 0.155 | 20 | LGM | 0.0077 | 50.011 |
| CUHIC213A | C | C2 | 3 | 2 | 52.052 | 0.155 | 20 | LGM | 0.0078 | 52.430 |

| | | | | |
|---|---|---|---|---|
| **Average** | **50.236** | **Average$_{norm}$** | **0.0077** | **50.104** |
| **Standard Dev.** | **1.515** | **Standard Dev.$_{norm}$** | | **1.625** |
| **Coeff. of Var. [%]** | **3.016** | **Coeff. of Var. [%]$_{norm}$** | | **3.244** |
| **Min.** | **47.339** | **Min.** | **0.0076** | **46.555** |
| **Max.** | **52.874** | **Max.** | **0.0078** | **53.172** |
| **Number of Spec.** | **21** | **Number of Spec.** | **21** | **21** |


Laminate Open-Hole Compression Properties (OHC3)--(RTD)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
10.0
20.0
30.0
40.0
50.0
60.0
Laminate Open-Hole Compression Strength (OHC3) [ksi]

## Laminate Open-Hole Compression Properties (OHC3)--ETW2
## Strength

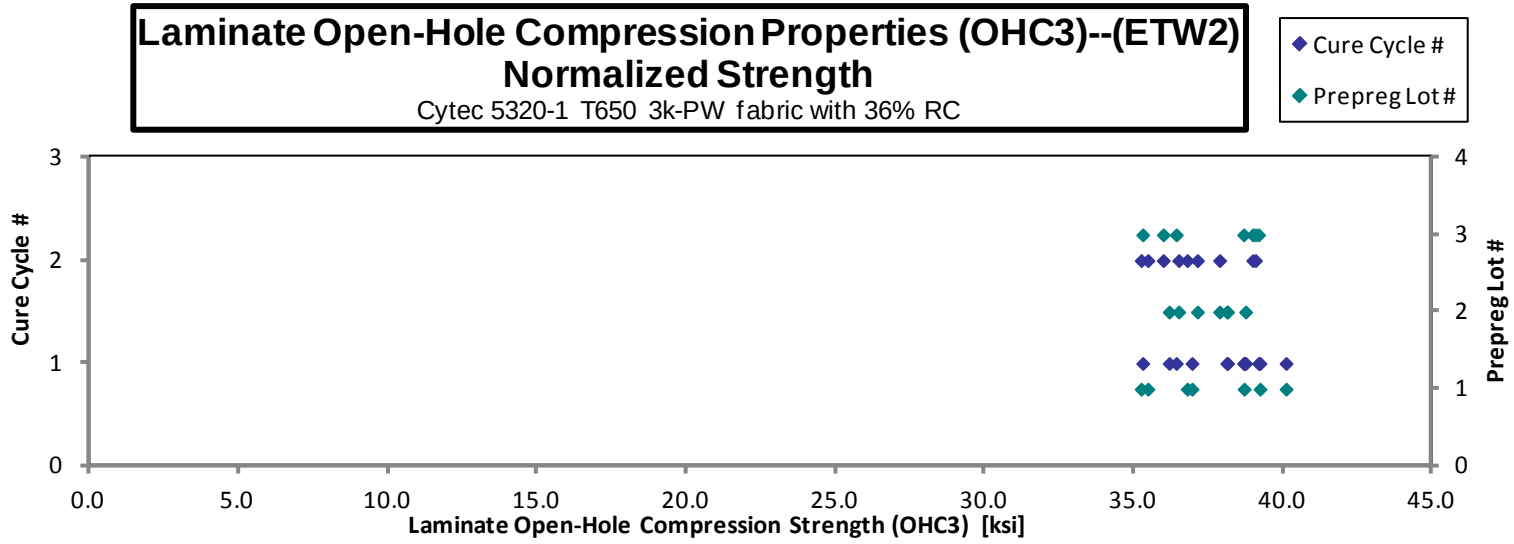
Cytec 5320-1 T650 3k-PW fabric with 36% RC

| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] |
|---|---|---|---|---|---|---|---|---|---|---|
| CUHIA119F | A | C1 | 1 | 1 | 36.979 | 0.154 | 20 | LGM | 0.0077 | 36.943 |
| CUHIA11AF | A | C1 | 1 | 1 | 39.863 | 0.155 | 20 | LGM | 0.0077 | 40.096 |
| CUHIA11BF | A | C1 | 1 | 1 | 38.293 | 0.156 | 20 | LGM | 0.0078 | 38.691 |
| CUHIA11DF | A | C1 | 1 | 1 | 39.252 | 0.154 | 20 | LGM | 0.0077 | 39.223 |
| CUHIA216F | A | C2 | 1 | 2 | 35.239 | 0.155 | 20 | LGM | 0.0077 | 35.464 |
| CUHIA217F | A | C2 | 1 | 2 | 35.004 | 0.155 | 20 | LGM | 0.0078 | 35.239 |
| CUHIA218F | A | C2 | 1 | 2 | 36.553 | 0.155 | 20 | LGM | 0.0077 | 36.782 |
| CUHIB118F | B | C1 | 2 | 1 | 39.371 | 0.152 | 20 | LGM | 0.0076 | 38.740 |
| CUHIB119F | B | C1 | 2 | 1 | 38.763 | 0.152 | 20 | LGM | 0.0076 | 38.134 |
| CUHIB11AF | B | C1 | 2 | 1 | 38.740 | 0.152 | 20 | AGM | 0.0076 | 38.111 |
| CUHIB11BF | B | C1 | 2 | 1 | 36.363 | 0.153 | 20 | LGM | 0.0077 | 36.178 |
| CUHIB216F | B | C2 | 2 | 2 | 37.022 | 0.152 | 20 | LGM | 0.0076 | 36.498 |
| CUHIB217F | B | C2 | 2 | 2 | 37.580 | 0.152 | 20 | LGM | 0.0076 | 37.124 |
| CUHIB218F | B | C2 | 2 | 2 | 38.316 | 0.152 | 20 | LGM | 0.0076 | 37.868 |
| CUHIC117F | C | C1 | 3 | 1 | 39.213 | 0.152 | 20 | LGM | 0.0076 | 38.674 |
| CUHIC118F | C | C1 | 3 | 1 | 36.658 | 0.153 | 20 | LGM | 0.0076 | 36.416 |
| CUHIC119F | C | C1 | 3 | 1 | 35.538 | 0.153 | 20 | LGM | 0.0076 | 35.292 |
| CUHIC11AF | C | C1 | 3 | 1 | 39.394 | 0.153 | 20 | LGM | 0.0077 | 39.173 |
| CUHIC216F | C | C2 | 3 | 2 | 38.777 | 0.155 | 20 | LGM | 0.0078 | 39.071 |
| CUHIC217F | C | C2 | 3 | 2 | 38.357 | 0.157 | 20 | LGM | 0.0078 | 38.980 |
| CUHIC218F | C | C2 | 3 | 2 | 35.588 | 0.156 | 20 | LGM | 0.0078 | 35.980 |

| | | |
|---|---|---|
| **Average** | **37.660** | |
| **Standard Dev.** | **1.536** | |
| **Coeff. of Var. [%]** | **4.078** | |
| **Min.** | **35.004** | |
| **Max.** | **39.863** | |
| **Number of Spec.** | **21** | |

| | | |
|---|---|---|
| **$Average_{norm}$** | **0.0077** | **37.556** |
| **$Standard\ Dev._{norm}$** | | **1.478** |
| **$Coeff.\ of\ Var.\ [\%]_{norm}$** | | **3.935** |
| **Min.** | **0.0076** | **35.239** |
| **Max.** | **0.0078** | **40.096** |
| **Number of Spec.** | **21** | **21** |


Laminate Open-Hole Compression Properties (OHC3)--(ETW2)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
Laminate Open-Hole Compression Strength (OHC3) [ksi]

## 4.23 "25/50/25" Filled-Hole Compression 1 Properties (FHC1)

**Laminate Filled-Hole Compression Properties (FHC1)--RTD Strength**

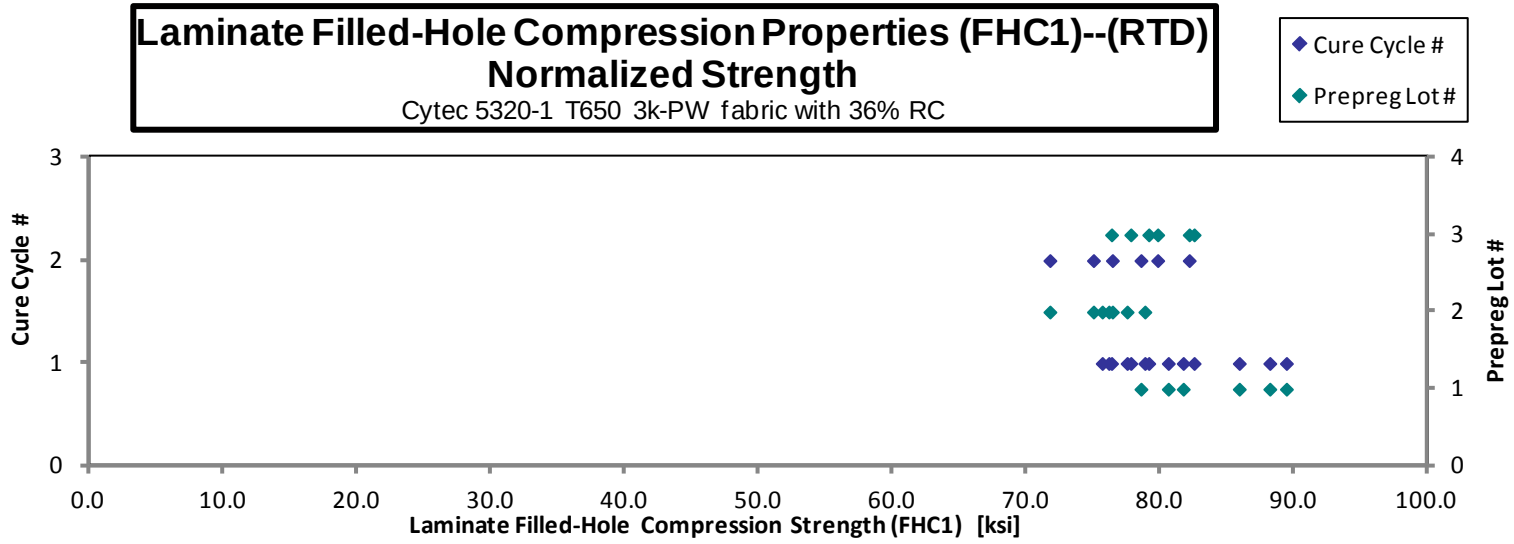
Cytec 5320-1 T650 3k-PW fabric with 36% RC

| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] |
|---|---|---|---|---|---|---|---|---|---|---|
| CUH7A111A | A | C1 | 1 | 1 | 81.632 | 0.154 | 20 | MGF | 0.0077 | 81.694 |
| CUH7A112A | A | C1 | 1 | 1 | 80.821 | 0.154 | 20 | LGF | 0.0077 | 80.576 |
| CUH7A113A | A | C1 | 1 | 1 | 87.696 | 0.155 | 20 | LGF | 0.0077 | 88.162 |
| CUH7A114A | A | C1 | 1 | 1 | 84.329 | 0.157 | 20 | LGF | 0.0078 | 85.881 |
| CUH7A115A | A | C1 | 1 | 1 | 89.016 | 0.155 | 20 | LGF | 0.0077 | 89.402 |
| CUH7A211A | A | C2 | 1 | 2 | 78.559 | 0.154 | 20 | LGF | 0.0077 | 78.534 |
| CUH7B111A | B | C1 | 2 | 1 | 76.934 | 0.152 | 20 | LGF | 0.0076 | 76.135 |
| CUH7B112A | B | C1 | 2 | 1 | 77.694 | 0.154 | 20 | LGF | 0.0077 | 77.501 |
| CUH7B113A | B | C1 | 2 | 1 | 76.285 | 0.153 | 20 | LGF | 0.0076 | 75.641 |
| CUH7B114A | B | C1 | 2 | 1 | 78.938 | 0.154 | 20 | MGF | 0.0077 | 78.827 |
| CUH7B211A | B | C2 | 2 | 2 | 72.939 | 0.151 | 20 | LGF | 0.0076 | 71.731 |
| CUH7B212A | B | C2 | 2 | 2 | 77.670 | 0.151 | 20 | MGF | 0.0076 | 76.401 |
| CUH7B215A | B | C2 | 2 | 2 | 75.417 | 0.153 | 20 | LGF | 0.0077 | 74.985 |
| CUH7C111A | C | C1 | 3 | 1 | 80.921 | 0.151 | 20 | LGF | 0.0075 | 79.117 |
| CUH7C112A | C | C1 | 3 | 1 | 82.686 | 0.154 | 20 | LGF | 0.0077 | 82.507 |
| CUH7C113A | C | C1 | 3 | 1 | 76.786 | 0.153 | 20 | LGF | 0.0077 | 76.337 |
| CUH7C114A | C | C1 | 3 | 1 | 78.131 | 0.153 | 20 | LGF | 0.0077 | 77.775 |
| CUH7C211A | C | C2 | 3 | 2 | 79.262 | 0.155 | 20 | LGF | 0.0078 | 79.785 |
| CUH7C212A | C | C2 | 3 | 2 | 82.034 | 0.154 | 20 | LGF | 0.0077 | 82.140 |

| | | |
|---|---|---|
| **Average** | **79.882** | |
| **Standard Dev.** | **4.062** | |
| **Coeff. of Var. [%]** | **5.084** | |
| **Min.** | **72.939** | |
| **Max.** | **89.016** | |
| **Number of Spec.** | **19** | |

| | | |
|---|---|---|
| **$Average_{norm}$** | **0.0077** | **79.638** |
| **$Standard\ Dev._{norm}$** | | **4.537** |
| **$Coeff.\ of\ Var.\ [\%]_{norm}$** | | **5.697** |
| **Min.** | **0.0075** | **71.731** |
| **Max.** | **0.0078** | **89.402** |
| **Number of Spec.** | **19** | **19** |


Laminate Filled-Hole Compression Properties (FHC1)--(RTD)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
Laminate Filled-Hole Compression Strength (FHC1) [ksi]

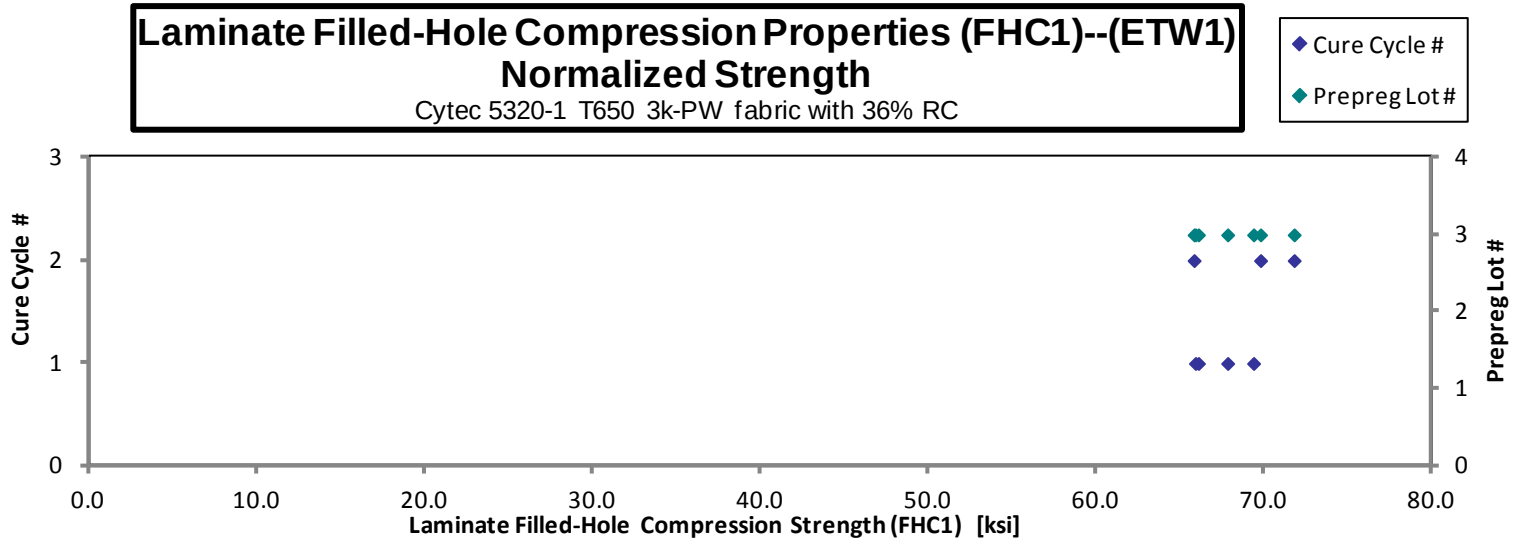
## Laminate Filled-Hole Compression Properties (FHC1)--ETW1
## Strength

Cytec 5320-1 T650 3k-PW fabric with 36% RC

| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] |
|---|---|---|---|---|---|---|---|---|---|---|
| CUH7C115D | C | C1 | 3 | 1 | 66.636 | 0.153 | 20 | LGF | 0.0076 | 66.059 |
| CUH7C117D | C | C1 | 3 | 1 | 66.472 | 0.153 | 20 | LGF | 0.0076 | 65.882 |
| CUH7C118D | C | C1 | 3 | 1 | 68.935 | 0.151 | 20 | LGF | 0.0076 | 67.801 |
| CUH7C119D | C | C1 | 3 | 1 | 69.579 | 0.153 | 20 | LGF | 0.0077 | 69.346 |
| CUH7C215D | C | C2 | 3 | 2 | 69.633 | 0.154 | 20 | LGF | 0.0077 | 69.762 |
| CUH7C216D | C | C2 | 3 | 2 | 71.110 | 0.155 | 20 | LGF | 0.0078 | 71.764 |
| CUH7C217D | C | C2 | 3 | 2 | 65.545 | 0.155 | 20 | LGF | 0.0077 | 65.800 |

| | | | | |
|---|---|---|---|---|
| **Average** | **68.273** | | **Average$_{norm}$** | **0.0077** | **68.059** |
| **Standard Dev.** | **2.058** | | **Standard Dev.$_{norm}$** | | **2.316** |
| **Coeff. of Var. [%]** | **3.014** | | **Coeff. of Var. [%]$_{norm}$** | | **3.403** |
| **Min.** | **65.545** | | **Min.** | **0.0076** | **65.800** |
| **Max.** | **71.110** | | **Max.** | **0.0078** | **71.764** |
| **Number of Spec.** | **7** | | **Number of Spec.** | **7** | **7** |


Laminate Filled-Hole Compression Properties (FHC1)--(ETW1)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
Laminate Filled-Hole Compression Strength (FHC1) [ksi]

## Laminate Filled-Hole Compression Properties (FHC1)--ETW2
## Strength

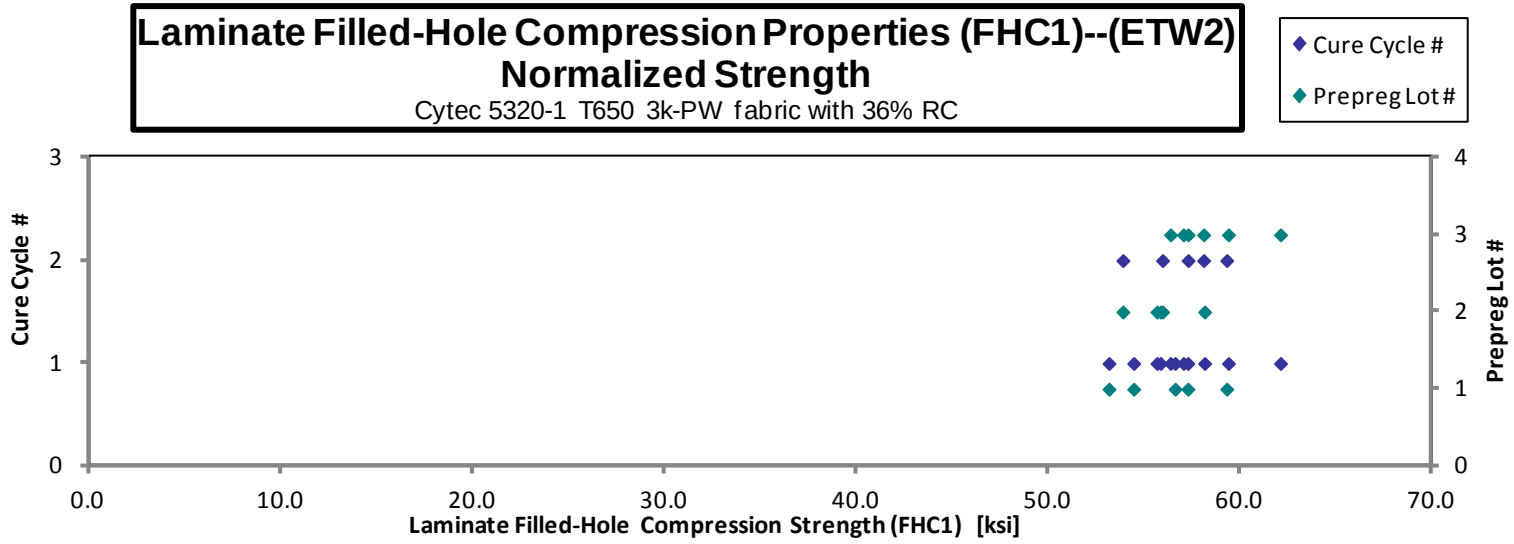
Cytec 5320-1 T650 3k-PW fabric with 36% RC

| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] |
|---|---|---|---|---|---|---|---|---|---|---|
| CUH7A117F | A | C1 | 1 | 1 | 57.320 | 0.154 | 20 | LGF | 0.0077 | 57.251 |
| CUH7A118F | A | C1 | 1 | 1 | 53.150 | 0.154 | 20 | LGF | 0.0077 | 53.139 |
| CUH7A119F | A | C1 | 1 | 1 | 56.041 | 0.156 | 20 | LGF | 0.0078 | 56.586 |
| CUH7A11AF | A | C1 | 1 | 1 | 54.035 | 0.155 | 20 | LGF | 0.0078 | 54.427 |
| CUH7A218F | A | C2 | 1 | 2 | 58.990 | 0.155 | 20 | LGF | 0.0077 | 59.278 |
| CUH7B119F | B | C1 | 2 | 1 | 56.024 | 0.153 | 20 | LGM | 0.0076 | 55.636 |
| CUH7B11AF | B | C1 | 2 | 1 | 58.748 | 0.152 | 20 | LGM | 0.0076 | 58.125 |
| CUH7B11CF | B | C1 | 2 | 1 | 56.079 | 0.153 | 20 | LGF | 0.0077 | 55.824 |
| CUH7B217F | B | C2 | 2 | 2 | 54.292 | 0.153 | 20 | LGF | 0.0076 | 53.863 |
| CUH7B218F | B | C2 | 2 | 2 | 56.711 | 0.152 | 20 | LGF | 0.0076 | 55.932 |
| CUH7C11AF | C | C1 | 3 | 1 | 59.335 | 0.154 | 20 | LGF | 0.0077 | 59.367 |
| CUH7C11BF | C | C1 | 3 | 1 | 57.001 | 0.154 | 20 | LGF | 0.0077 | 57.020 |
| CUH7C11DF | C | C1 | 3 | 1 | 62.109 | 0.154 | 20 | LGF | 0.0077 | 62.082 |
| CUH7C11EF | C | C1 | 3 | 1 | 56.816 | 0.153 | 20 | LGF | 0.0076 | 56.348 |
| CUH7C21AF | C | C2 | 3 | 2 | 57.859 | 0.155 | 20 | LGF | 0.0077 | 58.072 |
| CUH7C21BF | C | C2 | 3 | 2 | 56.693 | 0.156 | 20 | LGF | 0.0078 | 57.264 |

| | | |
|---|---|---|
| **Average** | **56.950** | |
| **Standard Dev.** | **2.210** | |
| **Coeff. of Var. [%]** | **3.880** | |
| **Min.** | **53.150** | |
| **Max.** | **62.109** | |
| **Number of Spec.** | **16** | |

| | | |
|---|---|---|
| **$Average_{norm}$** | **0.0077** | **56.888** |
| **Standard $Dev._{norm}$** | | **2.241** |
| **Coeff. of Var. $[\%]_{norm}$** | | **3.939** |
| **Min.** | **0.0076** | **53.139** |
| **Max.** | **0.0078** | **62.082** |
| **Number of Spec.** | **16** | **16** |


Laminate Filled-Hole Compression Properties (FHC1)--(ETW2)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
Laminate Filled-Hole Compression Strength (FHC1) [ksi]

## 4.24 "10/80/10" Filled-Hole Compression 2 Properties (FHC2)

**Laminate Filled-Hole Compression Properties (FHC2)--RTD Strength**

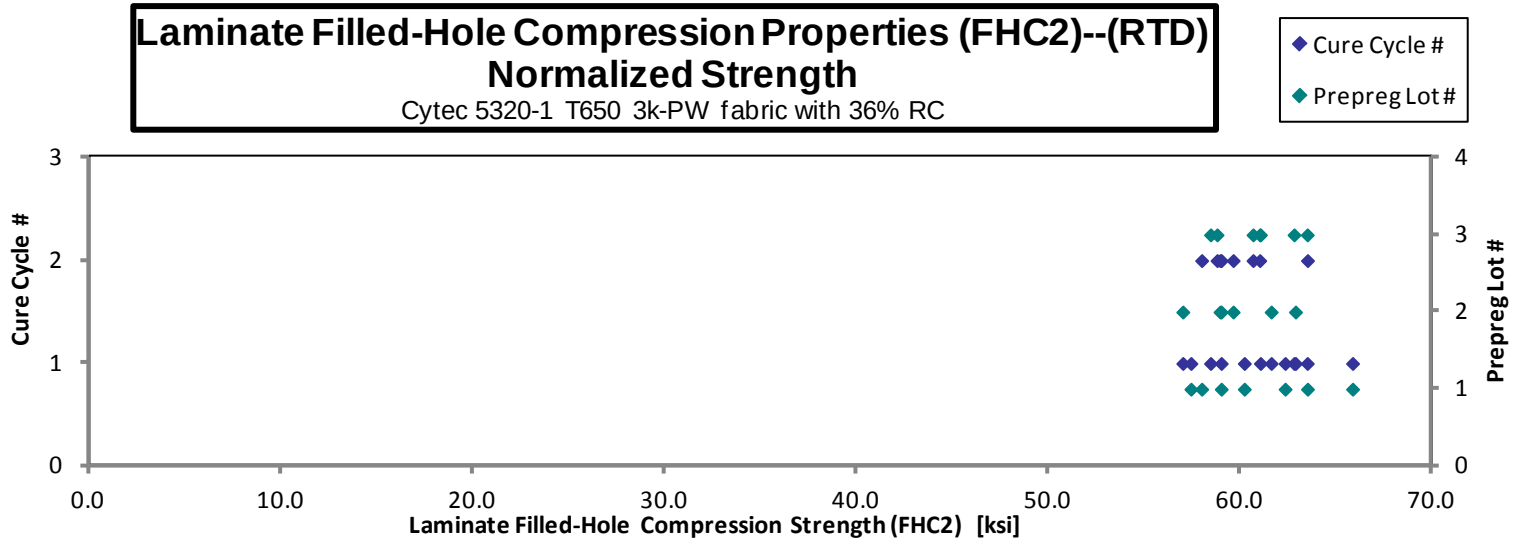
Cytec 5320-1 T650 3k-PW fabric with 36% RC

| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] |
|---|---|---|---|---|---|---|---|---|---|---|
| CUH8A111A | A | C1 | 1 | 1 | 58.222 | 0.152 | 20 | MGF | 0.0076 | 57.409 |
| CUH8A112A | A | C1 | 1 | 1 | 60.064 | 0.154 | 20 | AGF | 0.0077 | 60.194 |
| CUH8A113A | A | C1 | 1 | 1 | 65.175 | 0.156 | 20 | MGF | 0.0078 | 65.838 |
| CUH8A114A | A | C1 | 1 | 1 | 61.456 | 0.156 | 20 | MGF | 0.0078 | 62.320 |
| CUH8A211A | A | C2 | 1 | 2 | 58.134 | 0.154 | 20 | LGF | 0.0077 | 57.970 |
| CUH8A212A | A | C2 | 1 | 2 | 58.839 | 0.154 | 20 | MGF | 0.0077 | 58.991 |
| CUH8A213A | A | C2 | 1 | 2 | 63.584 | 0.154 | 20 | MGF | 0.0077 | 63.487 |
| CUH8B111A | B | C1 | 2 | 1 | 58.035 | 0.151 | 20 | LGF | 0.0076 | 56.986 |
| CUH8B112A | B | C1 | 2 | 1 | 62.646 | 0.151 | 20 | LGF | 0.0076 | 61.595 |
| CUH8B114A | B | C1 | 2 | 1 | 59.831 | 0.152 | 20 | MGF | 0.0076 | 58.989 |
| CUH8B115A | B | C1 | 2 | 1 | 63.176 | 0.153 | 20 | LGF | 0.0077 | 62.862 |
| CUH8B211A | B | C2 | 2 | 2 | 58.966 | 0.154 | 20 | AGF | 0.0077 | 58.927 |
| CUH8B212A | B | C2 | 2 | 2 | 59.304 | 0.155 | 20 | MGF | 0.0077 | 59.612 |
| CUH8C111A | C | C1 | 3 | 1 | 58.994 | 0.153 | 20 | MGF | 0.0076 | 58.432 |
| CUH8C112A | C | C1 | 3 | 1 | 61.100 | 0.154 | 20 | MGF | 0.0077 | 61.034 |
| CUH8C113A | C | C1 | 3 | 1 | 63.815 | 0.153 | 20 | MGF | 0.0077 | 63.477 |
| CUH8C114A | C | C1 | 3 | 1 | 63.348 | 0.153 | 20 | MGM | 0.0076 | 62.786 |
| CUH8C211A | C | C2 | 3 | 2 | 59.280 | 0.153 | 20 | MGF | 0.0076 | 58.773 |
| CUH8C212A | C | C2 | 3 | 2 | 60.785 | 0.154 | 20 | MGF | 0.0077 | 60.647 |
| CUH8C215A | C | C2 | 3 | 2 | 59.832 | 0.157 | 20 | LGF | 0.0079 | 60.998 |

| | | |
|---|---|---|
| **Average** | **60.729** | |
| **Standard Dev.** | **2.186** | |
| **Coeff. of Var. [%]** | **3.599** | |
| **Min.** | **58.035** | |
| **Max.** | **65.175** | |
| **Number of Spec.** | **20** | |

| | | |
|---|---|---|
| **$Average_{norm}$** | **0.0077** | **60.566** |
| **$Standard\ Dev._{norm}$** | | **2.357** |
| **$Coeff.\ of\ Var.\ [\%]_{norm}$** | | **3.891** |
| **Min.** | **0.0076** | **56.986** |
| **Max.** | **0.0079** | **65.838** |
| **Number of Spec.** | **20** | **20** |


Laminate Filled-Hole Compression Properties (FHC2)--(RTD)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
Laminate Filled-Hole Compression Strength (FHC2) [ksi]

## Laminate Filled-Hole Compression Properties (FHC2)--ETW2
## Strength

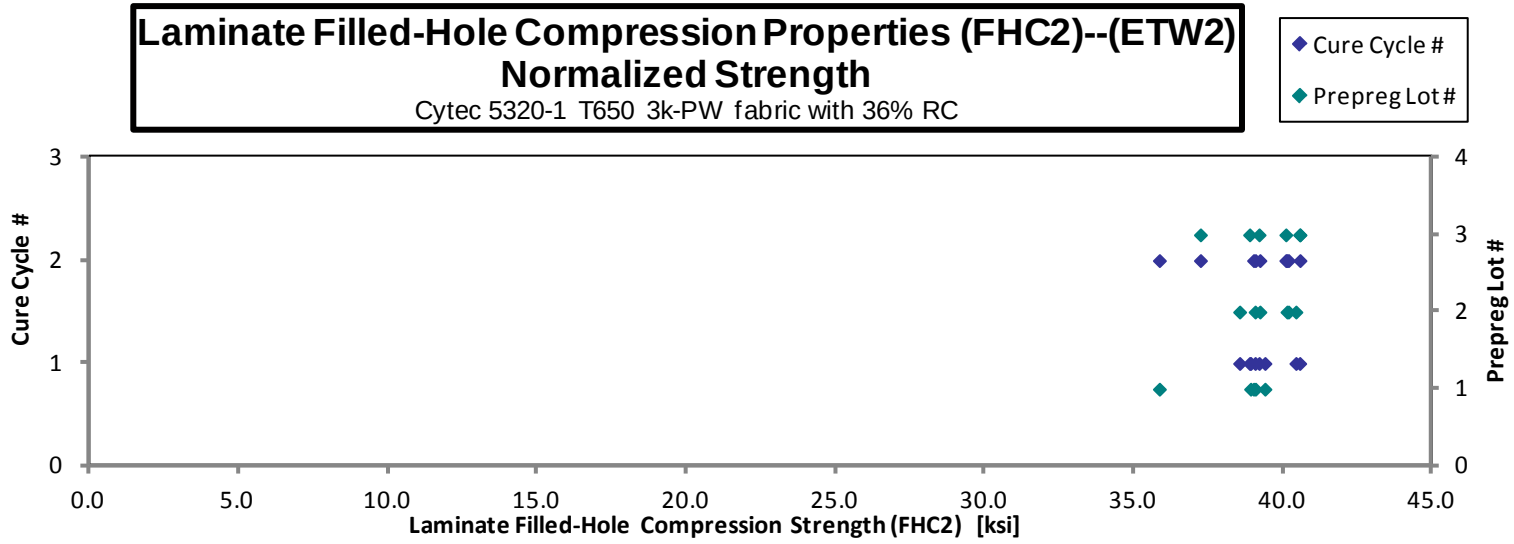
Cytec 5320-1 T650 3k-PW fabric with 36% RC

| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] |
|---|---|---|---|---|---|---|---|---|---|---|
| CUH8A117F | A | C1 | 1 | 1 | 38.907 | 0.154 | 20 | MGF | 0.0077 | 38.907 |
| CUH8A118F | A | C1 | 1 | 1 | 39.374 | 0.154 | 20 | AGM | 0.0077 | 39.387 |
| CUH8A216F | A | C2 | 1 | 2 | 36.013 | 0.153 | 20 | AGM | 0.0077 | 35.850 |
| CUH8A217F | A | C2 | 1 | 2 | 39.214 | 0.153 | 20 | LGF | 0.0077 | 39.006 |
| CUH8A218F | A | C2 | 1 | 2 | 38.833 | 0.155 | 20 | MGM | 0.0077 | 39.069 |
| CUH8B118F | B | C1 | 2 | 1 | 39.300 | 0.151 | 20 | AGM | 0.0076 | 38.539 |
| CUH8B119F | B | C1 | 2 | 1 | 39.459 | 0.152 | 20 | LGF | 0.0076 | 39.058 |
| CUH8B11BF | B | C1 | 2 | 1 | 40.199 | 0.155 | 20 | LGF | 0.0077 | 40.425 |
| CUH8B216F | B | C2 | 2 | 2 | 39.583 | 0.153 | 20 | MGF | 0.0076 | 39.219 |
| CUH8B217F | B | C2 | 2 | 2 | 40.587 | 0.152 | 20 | MGF | 0.0076 | 40.126 |
| CUH8B218F | B | C2 | 2 | 2 | 40.514 | 0.153 | 20 | MGF | 0.0076 | 40.176 |
| CUH8C118F | C | C1 | 3 | 1 | 39.191 | 0.153 | 20 | MGF | 0.0076 | 38.873 |
| CUH8C119F | C | C1 | 3 | 1 | 40.175 | 0.155 | 20 | MGF | 0.0078 | 40.553 |
| CUH8C11AF | C | C1 | 3 | 1 | 39.162 | 0.154 | 20 | MGF | 0.0077 | 39.192 |
| CUH8C216F | C | C2 | 3 | 2 | 40.571 | 0.152 | 20 | LGF | 0.0076 | 40.088 |
| CUH8C217F | C | C2 | 3 | 2 | 40.496 | 0.154 | 20 | AGF | 0.0077 | 40.562 |
| CUH8C218F | C | C2 | 3 | 2 | 36.717 | 0.156 | 20 | LGF | 0.0078 | 37.225 |

| | | |
|---|---|---|
| **Average** | **39.312** | |
| **Standard Dev.** | **1.268** | |
| **Coeff. of Var. [%]** | **3.227** | |
| **Min.** | **36.013** | |
| **Max.** | **40.587** | |
| **Number of Spec.** | **17** | |

| | | |
|---|---|---|
| **$Average_{norm}$** | **0.0077** | **39.191** |
| **$Standard\ Dev._{norm}$** | | **1.216** |
| **$Coeff.\ of\ Var.\ [\%]_{norm}$** | | **3.102** |
| **Min.** | **0.0076** | **35.850** |
| **Max.** | **0.0078** | **40.562** |
| **Number of Spec.** | **17** | **17** |


Laminate Filled-Hole Compression Properties (FHC2)--(ETW2)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
Laminate Filled-Hole Compression Strength (FHC2) [ksi]

## 4.25 "40/20/40" Filled-Hole Compression 3 Properties (FHC3)

**Laminate Filled-Hole Compression Properties (FHC3)--RTD Strength**

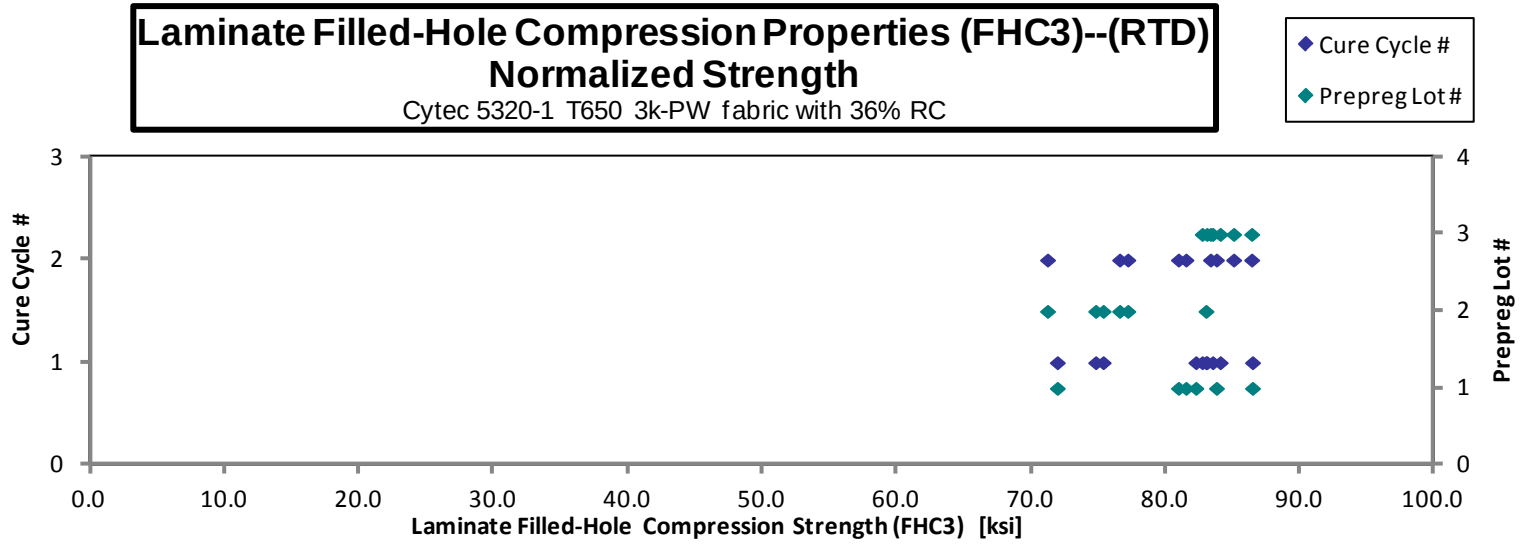
Cytec 5320-1 T650 3k-PW fabric with 36% RC

| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] |
|---|---|---|---|---|---|---|---|---|---|---|
| CUH9A111A | A | C1 | 1 | 1 | 87.272 | 0.153 | 20 | LGF | 0.0076 | 86.497 |
| CUH9A114A | A | C1 | 1 | 1 | 81.814 | 0.155 | 20 | LGF | 0.0077 | 82.283 |
| CUH9A115A | A | C1 | 1 | 1 | 71.680 | 0.155 | 20 | LGF | 0.0077 | 71.974 |
| CUH9A211A | A | C2 | 1 | 2 | 82.176 | 0.153 | 20 | LGF | 0.0076 | 81.545 |
| CUH9A212A | A | C2 | 1 | 2 | 81.056 | 0.154 | 20 | LGF | 0.0077 | 80.986 |
| CUH9A215A | A | C2 | 1 | 2 | 83.391 | 0.155 | 20 | LGF | 0.0077 | 83.815 |
| CUH9B111A | B | C1 | 2 | 1 | 83.991 | 0.152 | 20 | LGF | 0.0076 | 83.036 |
| CUH9B114A | B | C1 | 2 | 1 | 75.440 | 0.153 | 20 | LGF | 0.0076 | 74.828 |
| CUH9B115A | B | C1 | 2 | 1 | 76.103 | 0.153 | 20 | LGF | 0.0076 | 75.386 |
| CUH9B213A | B | C2 | 2 | 2 | 78.289 | 0.151 | 20 | LGF | 0.0075 | 76.611 |
| CUH9B214A | B | C2 | 2 | 2 | 72.717 | 0.151 | 20 | LGF | 0.0075 | 71.245 |
| CUH9B215A | B | C2 | 2 | 2 | 78.599 | 0.151 | 20 | LGF | 0.0076 | 77.220 |
| CUH9C112A | C | C1 | 3 | 1 | 84.802 | 0.153 | 20 | LGF | 0.0076 | 84.096 |
| CUH9C113A | C | C1 | 3 | 1 | 83.334 | 0.154 | 20 | LGF | 0.0077 | 83.099 |
| CUH9C114A | C | C1 | 3 | 1 | 83.913 | 0.153 | 20 | LGF | 0.0077 | 83.532 |
| CUH9C115A | C | C1 | 3 | 1 | 83.042 | 0.153 | 20 | LGF | 0.0077 | 82.755 |
| CUH9C211A | C | C2 | 3 | 2 | 84.384 | 0.152 | 20 | LGF | 0.0076 | 83.371 |
| CUH9C212A | C | C2 | 3 | 2 | 87.325 | 0.152 | 20 | LGF | 0.0076 | 86.436 |
| CUH9C213A | C | C2 | 3 | 2 | 85.790 | 0.153 | 20 | LGF | 0.0076 | 85.093 |

| | | |
|---|---|---|
| **Average** | **81.322** | |
| **Standard Dev.** | **4.622** | |
| **Coeff. of Var. [%]** | **5.684** | |
| **Min.** | **71.680** | |
| **Max.** | **87.325** | |
| **Number of Spec.** | **19** | |

| | | |
|---|---|---|
| **$Average_{norm}$** | **0.0076** | **80.727** |
| **$Standard\ Dev._{norm}$** | | **4.702** |
| **$Coeff.\ of\ Var.\ [\%]_{norm}$** | | **5.825** |
| **Min.** | **0.0075** | **71.245** |
| **Max.** | **0.0077** | **86.497** |
| **Number of Spec.** | **19** | **19** |


Laminate Filled-Hole Compression Properties (FHC3)--(RTD)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
Laminate Filled-Hole Compression Strength (FHC3) [ksi]

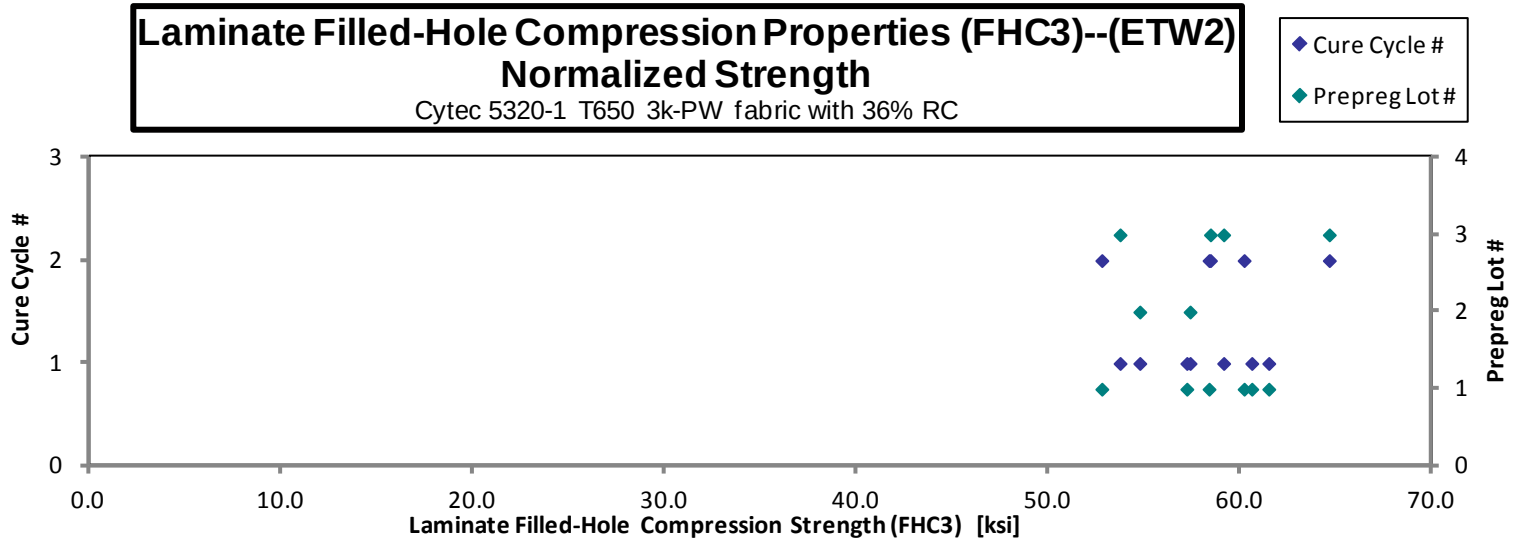
## Laminate Filled-Hole Compression Properties (FHC3)--ETW2
## Strength

Cytec 5320-1 T650 3k-PW fabric with 36% RC

normalizing $t_{ply}$ [in]: 0.0077

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] |
|---|---|---|---|---|---|---|---|---|---|---|
| CUH9A117F | A | C1 | 1 | 1 | 61.280 | 0.152 | 20 | LGF | 0.0076 | 60.584 |
| CUH9A118F | A | C1 | 1 | 1 | 57.671 | 0.153 | 20 | LGF | 0.0076 | 57.197 |
| CUH9A11AF | A | C1 | 1 | 1 | 61.060 | 0.155 | 20 | LGF | 0.0078 | 61.470 |
| CUH9A217F | A | C2 | 1 | 2 | 60.138 | 0.154 | 20 | LGF | 0.0077 | 60.184 |
| CUH9A218F | A | C2 | 1 | 2 | 53.081 | 0.153 | 20 | LGF | 0.0077 | 52.765 |
| CUH9A219F | A | C2 | 1 | 2 | 58.368 | 0.154 | 20 | LGF | 0.0077 | 58.355 |
| CUH9B117F | B | C1 | 2 | 1 | 58.032 | 0.152 | 20 | LGM/MGM | 0.0076 | 57.366 |
| CUH9B119F | B | C1 | 2 | 1 | 55.716 | 0.151 | 20 | LGM | 0.0076 | 54.745 |
| CUH9C118F | C | C1 | 3 | 1 | 59.778 | 0.152 | 20 | LGM/AGM | 0.0076 | 59.118 |
| CUH9C11AF | C | C1 | 3 | 1 | 53.867 | 0.154 | 20 | AGM | 0.0077 | 53.716 |
| CUH9C216F | C | C2 | 3 | 2 | 59.635 | 0.151 | 20 | LGM | 0.0075 | 58.428 |
| CUH9C218F | C | C2 | 3 | 2 | 65.397 | 0.152 | 20 | LGF | 0.0076 | 64.625 |

| | Strength | | $Strength_{norm}$ |
|---|---|---|---|
| Average | 58.669 | $Average_{norm}$ | 58.213 |
| Standard Dev. | 3.393 | $Standard\ Dev._{norm}$ | 3.382 |
| Coeff. of Var. [%] | 5.783 | $Coeff.\ of\ Var.\ [\%]_{norm}$ | 5.809 |
| Min. | 53.081 | Min. | 52.765 |
| Max. | 65.397 | Max. | 64.625 |
| Number of Spec. | 12 | Number of Spec. | 12 |


Laminate Filled-Hole Compression Properties (FHC3)--(ETW2)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
Laminate Filled-Hole Compression Strength (FHC3) [ksi]

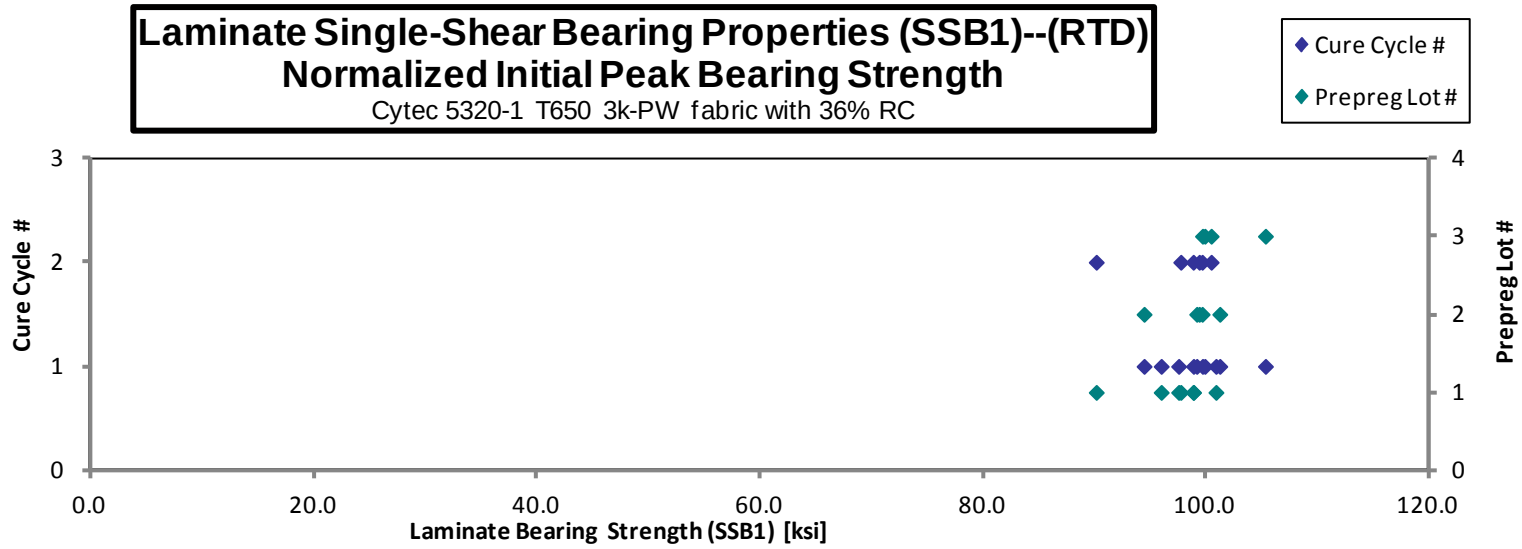
# 4.26 "25/50/25" Single-Shear Bearing 1 Properties (SSB1)

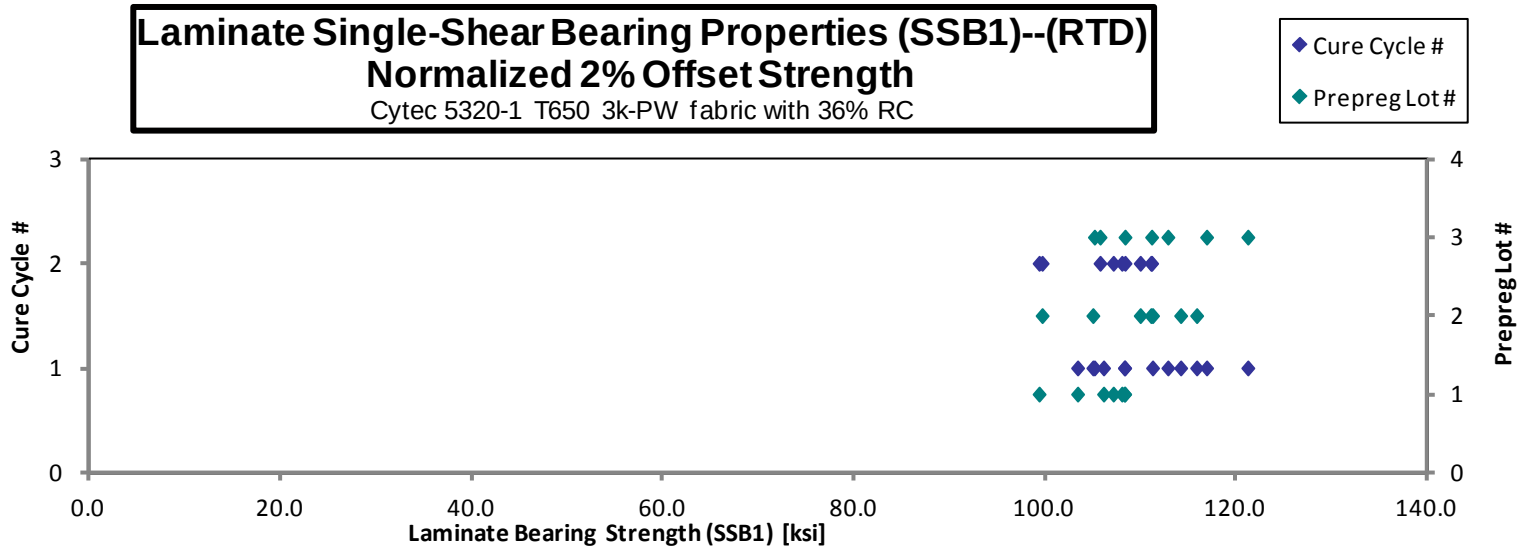
**Single-Shear Bearing 1 Properties (SSB1)--RTD Strength**
Cytec 5320-1 T650 3k-PW fabric with 36% RC

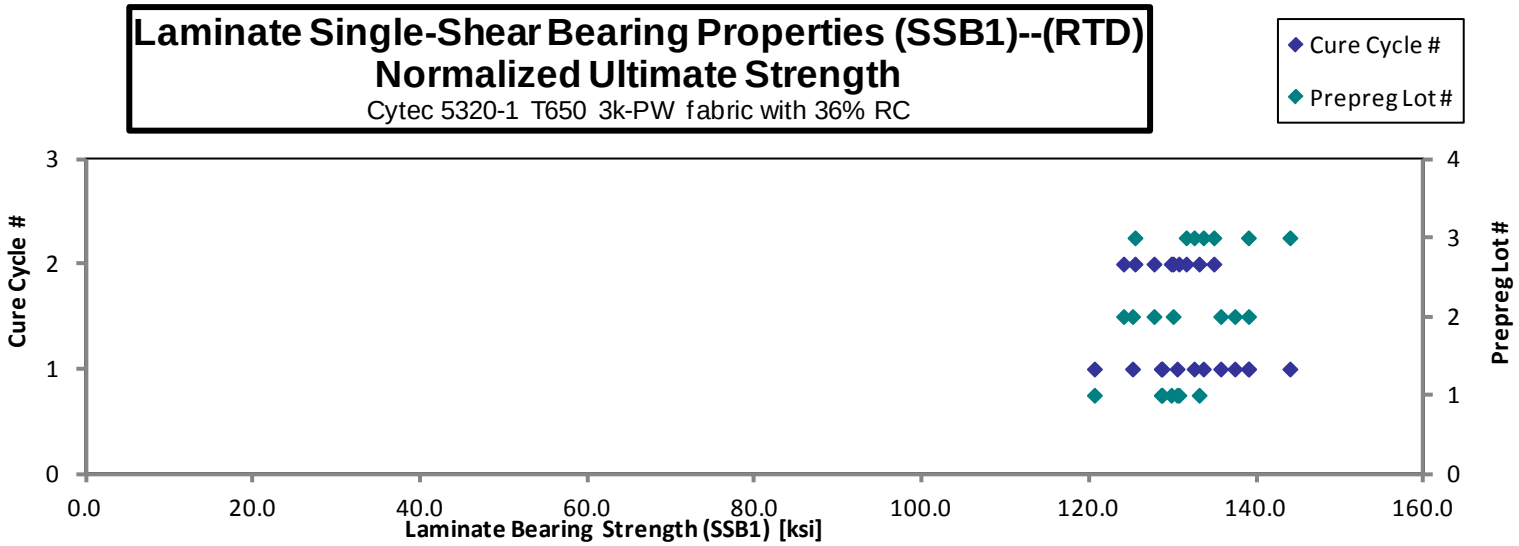
normalizing $t_{ply}$ [in]: 0.0077

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Initial Peak Bearing Strength [ksi] | 2% Offset Strength [ksi] | Ultimate Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Comments | Avg. $t_{ply}$ [in] | Initial Peak Bearing $Strength_{norm}$ [ksi] | 2% Offset $Strength_{norm}$ [ksi] | Ultimate $Strength_{norm}$ [ksi] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CUH1A111A | A | C1 | 1 | 1 | 96.867 | 103.804 | 118.027 | 0.126 | 16 | B1I | 0.0079 | 98.951 | 106.037 | 120.566 |
| CUH1A112A | A | C1 | 1 | 1 | 99.457 | 106.603 | 126.730 | 0.125 | 16 | B1I | 0.0078 | 100.964 | 108.218 | 128.650 |
| CUH1A113A | A | C1 | 1 | 1 | 93.773 | 105.675 | 127.354 | 0.126 | 16 | B1I | 0.0079 | 96.056 | 108.248 | 130.455 |
| CUH1A114A | A | C1 | 1 | 1 | 95.604 | 101.185 | 125.897 | 0.126 | 16 | B1I | 0.0079 | 97.621 | 103.321 | 128.554 |
| CUH1A211A | A | C2 | 1 | 2 | 88.839 | 97.761 | 127.747 | 0.125 | 16 | B1I | 0.0078 | 90.233 | 99.295 | 129.752 |
| CUH1A212A | A | C2 | 1 | 2 | 98.608 | 106.706 | 132.655 | 0.124 | 16 | B1I | 0.0077 | 98.928 | 107.053 | 133.086 |
| CUH1A213A | A | C2 | 1 | 2 | 97.258 | 107.340 | 129.928 | 0.124 | 16 | B1I | 0.0077 | 97.811 | 107.950 | 130.666 |
| CUH1B111A | B | C1 | 2 | 1 | | 106.856 | 127.439 | 0.121 | 16 | B1I | 0.0076 | | 104.919 | 125.129 |
| CUH1B112A | B | C1 | 2 | 1 | 97.530 | 119.460 | 139.984 | 0.119 | 16 | B1I | 0.0075 | 94.522 | 115.776 | 135.666 |
| CUH1B113A | B | C1 | 2 | 1 | 103.650 | 113.731 | 142.209 | 0.120 | 16 | B1I | 0.0075 | 101.309 | 111.162 | 138.996 |
| CUH1B114A | B | C1 | 2 | 1 | 101.101 | 116.241 | 139.925 | 0.121 | 16 | B1I | 0.0076 | 99.241 | 114.102 | 137.351 |
| CUH1B211A | B | C2 | 2 | 2 | | 101.914 | 126.921 | 0.120 | 16 | B1I | 0.0075 | | 99.611 | 124.054 |
| CUH1B212A | B | C2 | 2 | 2 | 101.696 | 113.181 | 132.542 | 0.121 | 16 | B1I | 0.0076 | 99.729 | 110.992 | 129.978 |
| CUH1B213A | B | C2 | 2 | 2 | 101.455 | 112.072 | 130.247 | 0.121 | 16 | B1I | 0.0075 | 99.465 | 109.874 | 127.692 |
| CUH1C111A | C | C1 | 3 | 1 | | 113.471 | 134.427 | 0.122 | 16 | B1I | 0.0077 | | 112.765 | 133.590 |
| CUH1C112A | C | C1 | 3 | 1 | 100.636 | 117.597 | 144.899 | 0.122 | 16 | B1I | 0.0076 | 99.969 | 116.817 | 143.939 |
| CUH1C113A | C | C1 | 3 | 1 | 100.167 | 105.509 | 133.030 | 0.123 | 16 | B1I | 0.0077 | 99.760 | 105.081 | 132.490 |
| CUH1C114A | C | C1 | 3 | 1 | 106.555 | 122.453 | 140.497 | 0.122 | 16 | B1I | 0.0076 | 105.402 | 121.128 | 138.976 |
| CUH1C211A | C | C2 | 3 | 2 | | 107.829 | 127.984 | 0.121 | 16 | B1I | 0.0075 | | 105.670 | 125.421 |
| CUH1C212A | C | C2 | 3 | 2 | 101.706 | 109.540 | 133.072 | 0.122 | 16 | B1I | 0.0076 | 100.537 | 108.280 | 131.541 |
| CUH1C213A | C | C2 | 3 | 2 | | 112.944 | 137.128 | 0.121 | 16 | B1I | 0.0076 | | 111.065 | 134.846 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Average** | **99.056** | **109.613** | **132.316** | **$Average_{norm}$** | **0.0077** | **98.781** | **108.922** | **131.495** |
| **Standard Dev.** | **4.163** | **6.331** | **6.605** | **$Standard\ Dev._{norm}$** | | **3.296** | **5.389** | **5.606** |
| **Coeff. of Var. [%]** | **4.203** | **5.776** | **4.991** | **Coeff. of Var. $[\%]_{norm}$** | | **3.337** | **4.948** | **4.263** |
| **Min.** | **88.839** | **97.761** | **118.027** | **Min.** | **0.0075** | **90.233** | **99.295** | **120.566** |
| **Max.** | **106.555** | **122.453** | **144.899** | **Max.** | **0.0079** | **105.402** | **121.128** | **143.939** |
| **Number of Spec.** | **16** | **21** | **21** | **Number of Spec.** | **21** | **16** | **21** | **21** |


Laminate Single-Shear Bearing Properties (SSB1)--(RTD)
Normalized Initial Peak Bearing Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
20.0
40.0
60.0
80.0
100.0
120.0
Laminate Bearing Strength (SSB1) [ksi]


Laminate Single-Shear Bearing Properties (SSB1)--(RTD)
Normalized 2% Offset Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
20.0
40.0
60.0
80.0
100.0
120.0
140.0
Laminate Bearing Strength (SSB1) [ksi]


Laminate Single-Shear Bearing Properties (SSB1)--(RTD)
Normalized Ultimate Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
20.0
40.0
60.0
80.0
100.0
120.0
140.0
160.0
Laminate Bearing Strength (SSB1) [ksi]

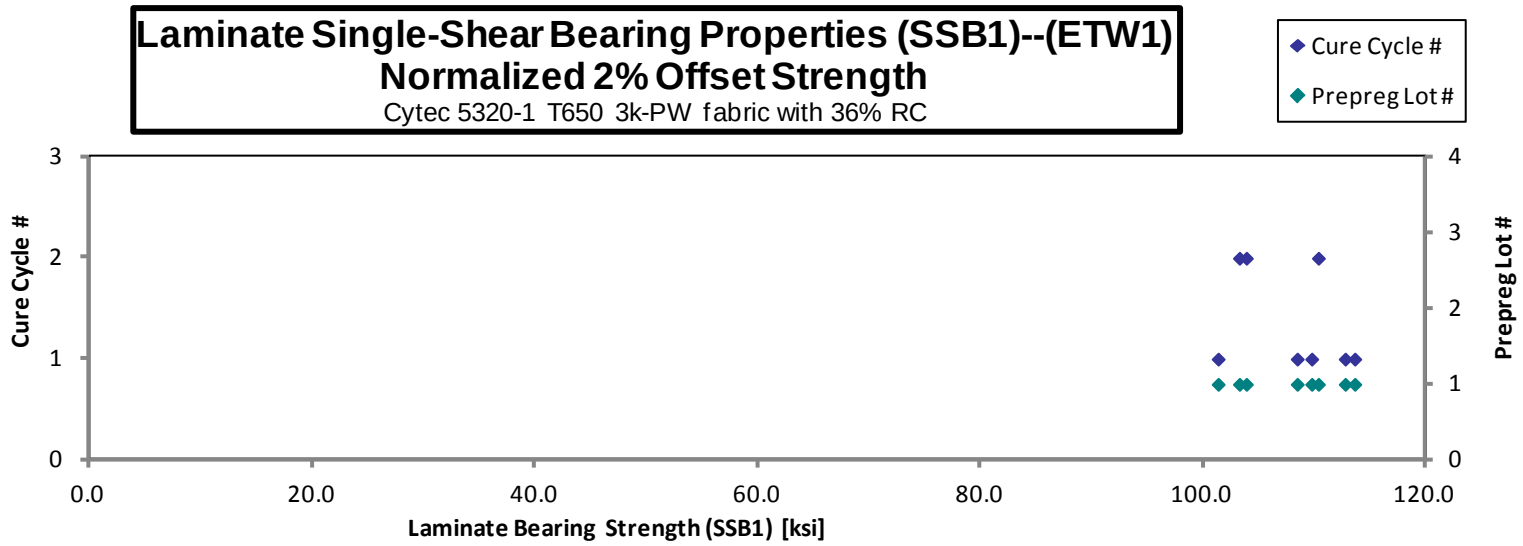
## Single-Shear Bearing 1 Properties (SSB1)--ETW1 Strength

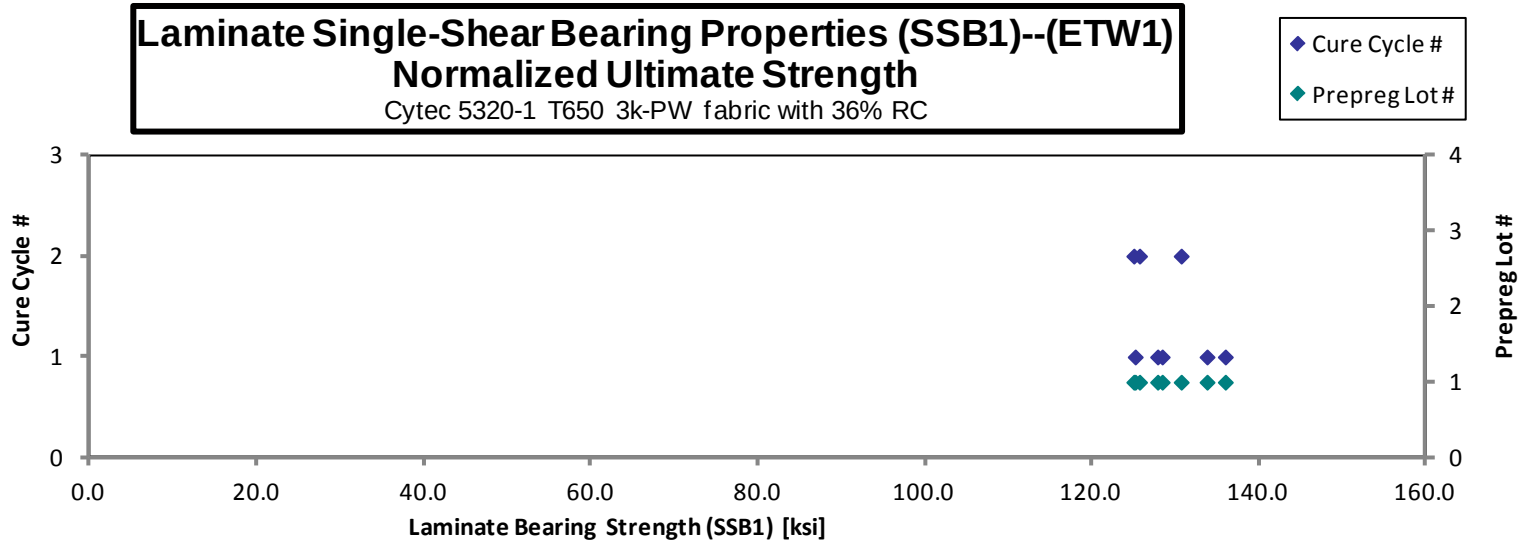
Cytec 5320-1 T650 3k-PW fabric with 36% RC

| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | 2% Offset Strength [ksi] | Ultimate Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Comments | Avg. $t_{ply}$ [in] | 2% Offset $Strength_{norm}$ [ksi] | Ultimate $Strength_{norm}$ [ksi] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CUH1A117D | A | C1 | 1 | 1 | 100.994 | 124.759 | 0.124 | 16 | B1I | 0.0077 | 101.322 | 125.164 |
| CUH1A118D | A | C1 | 1 | 1 | 106.490 | 125.567 | 0.125 | 16 | B1I | 0.0078 | 108.421 | 127.844 |
| CUH1A119D | A | C1 | 1 | 1 | 108.157 | 126.562 | 0.125 | 16 | B1I | 0.0078 | 109.722 | 128.394 |
| CUH1A11AD | A | C1 | 1 | 1 | 111.714 | 131.555 | 0.125 | 16 | B1I | 0.0078 | 113.588 | 133.762 |
| CUH1A11BD | A | C1 | 1 | 1 | 111.657 | 134.657 | 0.124 | 16 | B1I | 0.0078 | 112.729 | 135.950 |
| CUH1A217D | A | C2 | 1 | 2 | 103.211 | 124.223 | 0.124 | 16 | B1I | 0.0077 | 103.853 | 124.996 |
| CUH1A218D | A | C2 | 1 | 2 | 109.273 | 124.483 | 0.124 | 16 | B1I | 0.0078 | 110.322 | 125.679 |
| CUH1A219D | A | C2 | 1 | 2 | 102.495 | 129.738 | 0.124 | 16 | B1I | 0.0078 | 103.230 | 130.668 |

| | | | | | |
|---|---|---|---|---|---|
| **Average** | **106.749** | **127.693** | **$Average_{norm}$** | **0.0078** | **107.898** | **129.057** |
| **Standard Dev.** | **4.156** | **3.861** | **$Standard\ Dev._{norm}$** | | **4.576** | **4.092** |
| **Coeff. of Var. [%]** | **3.893** | **3.024** | **$Coeff.\ of\ Var.\ [\%]_{norm}$** | | **4.241** | **3.171** |
| **Min.** | **100.994** | **124.223** | **Min.** | **0.0077** | **101.322** | **124.996** |
| **Max.** | **111.714** | **134.657** | **Max.** | **0.0078** | **113.588** | **135.950** |
| **Number of Spec.** | **8** | **8** | **Number of Spec.** | **8** | **8** | **8** |


Laminate Single-Shear Bearing Properties (SSB1)--(ETW1)
Normalized 2% Offset Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
20.0
40.0
60.0
80.0
100.0
120.0
Laminate Bearing Strength (SSB1) [ksi]


Laminate Single-Shear Bearing Properties (SSB1)--(ETW1)
Normalized Ultimate Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
20.0
40.0
60.0
80.0
100.0
120.0
140.0
160.0
Laminate Bearing Strength (SSB1) [ksi]

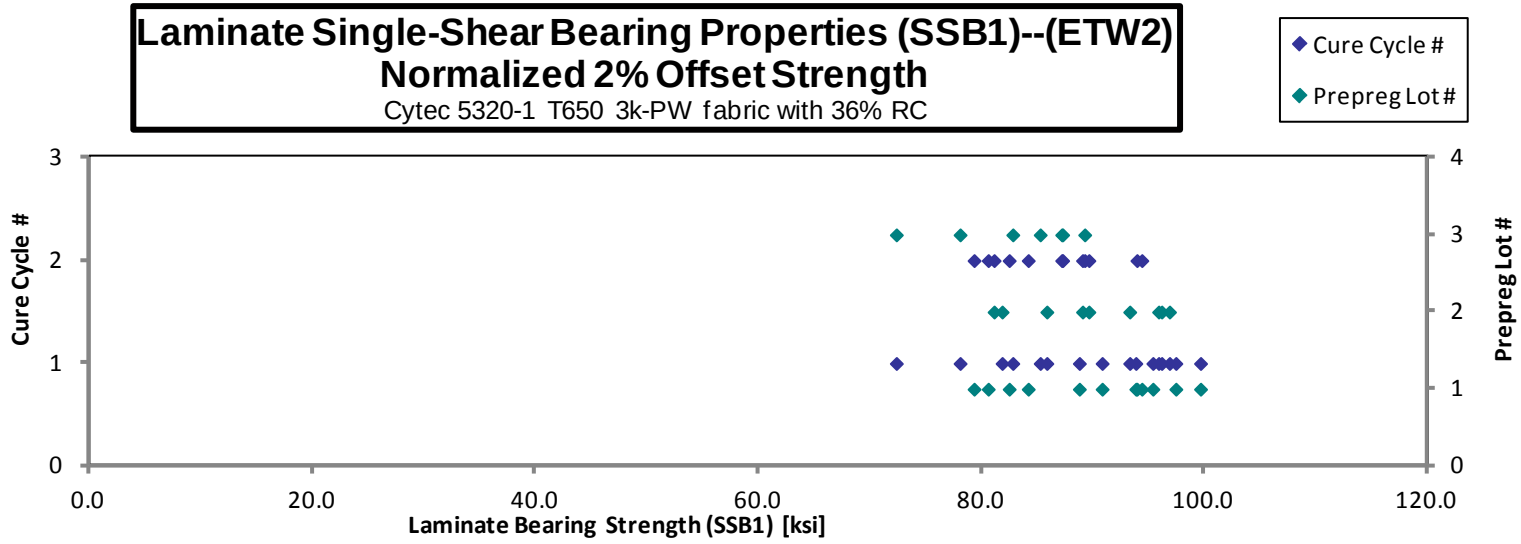
## Single-Shear Bearing 1 Properties (SSB1)--ETW2 Strength

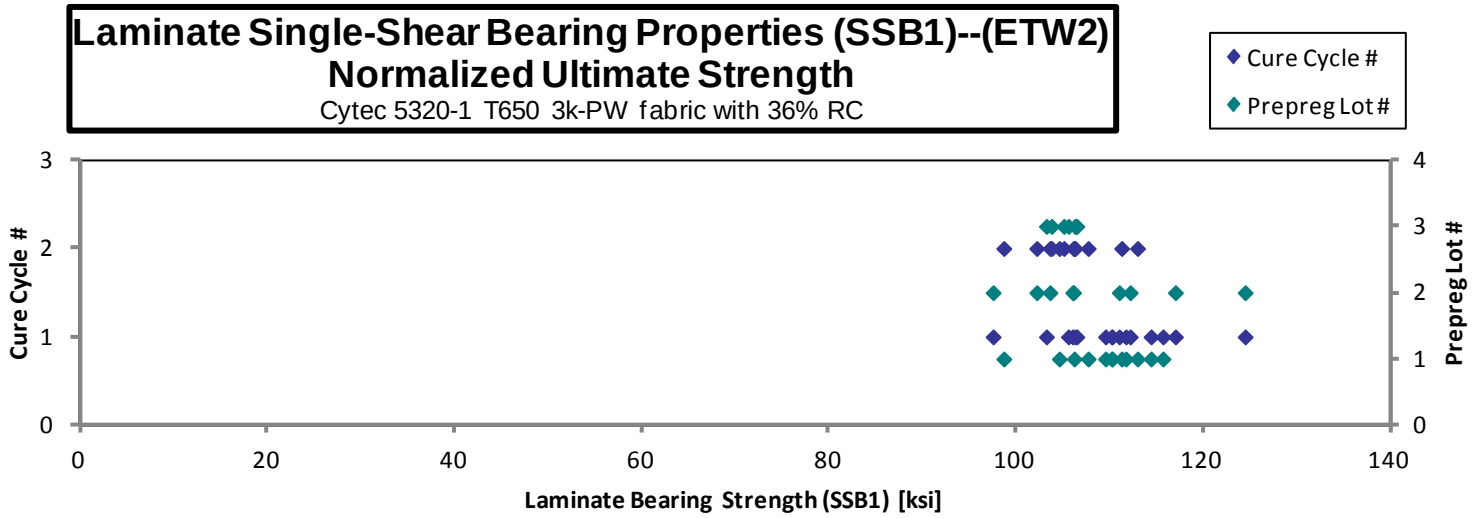
Cytec 5320-1 T650 3k-PW fabric with 36% RC

| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | 2% Offset Strength [ksi] | Ultimate Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Comments | Avg. $t_{ply}$ [in] | 2% Offset $Strength_{norm}$ [ksi] | Ultimate $Strength_{norm}$ [ksi] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CUH1A11DF | A | C1 | 1 | 1 | 99.584 | 110.383 | 0.123 | 16 | B1I | 0.0077 | 99.584 | 110.383 |
| CUH1A11EF | A | C1 | 1 | 1 | 94.830 | 112.791 | 0.127 | 16 | B1I | 0.0079 | 97.371 | 115.813 |
| CUH1A11FF | A | C1 | 1 | 1 | 87.687 | 109.044 | 0.125 | 16 | B1I | 0.0078 | 88.719 | 110.328 |
| CUH1A11GF | A | C1 | 1 | 1 | 88.639 | 109.234 | 0.126 | 16 | B1I | 0.0079 | 90.762 | 111.849 |
| CUH1A11HF | A | C1 | 1 | 1 | 94.848 | 113.982 | 0.124 | 16 | B1I | 0.0077 | 95.310 | 114.537 |
| CUH1A11IF | A | C1 | 1 | 1 | 93.706 | 109.584 | 0.123 | 16 | B1I | 0.0077 | 93.782 | 109.673 |
| CUH1A21DF | A | C2 | 1 | 2 | 81.339 | 104.928 | 0.125 | 16 | B1I | 0.0078 | 82.428 | 106.333 |
| CUH1A21EF | A | C2 | 1 | 2 | 93.050 | 110.411 | 0.124 | 16 | B1I | 0.0078 | 93.881 | 111.397 |
| CUH1A21FF | A | C2 | 1 | 2 | 93.460 | 112.062 | 0.124 | 16 | B1I | 0.0078 | 94.320 | 113.093 |
| CUH1A21GF | A | C2 | 1 | 2 | 79.964 | 103.976 | 0.124 | 16 | B1I | 0.0078 | 80.548 | 104.735 |
| CUH1A21HF | A | C2 | 1 | 2 | 78.326 | 106.524 | 0.125 | 16 | B1I | 0.0078 | 79.280 | 107.821 |
| CUH1A21IF | A | C2 | 1 | 2 | 83.998 | 98.645 | 0.123 | 16 | B1I | 0.0077 | 84.135 | 98.805 |
| CUH1B117F | B | C1 | 2 | 1 | 97.339 | 114.088 | 0.121 | 16 | B1I | 0.0076 | 95.824 | 112.313 |
| CUH1B118F | B | C1 | 2 | 1 | 98.687 | 127.948 | 0.120 | 16 | B1I | 0.0075 | 96.097 | 124.590 |
| CUH1B119F | B | C1 | 2 | 1 | 96.500 | 110.793 | 0.124 | 16 | B1I | 0.0077 | 96.800 | 111.138 |
| CUH1B11AF | B | C1 | 2 | 1 | 94.682 | 118.956 | 0.121 | 16 | B1I | 0.0076 | 93.234 | 117.138 |
| CUH1B11BF | B | C1 | 2 | 1 | 87.315 | 108.036 | 0.121 | 16 | B1I | 0.0076 | 85.803 | 106.165 |
| CUH1B11CF | B | C1 | 2 | 1 | 83.881 | 100.157 | 0.120 | 16 | B1I | 0.0075 | 81.793 | 97.664 |
| CUH1B216F | B | C2 | 2 | 2 | 91.111 | 106.195 | 0.120 | 16 | B1I | 0.0075 | 89.004 | 103.738 |
| CUH1B217F | B | C2 | 2 | 2 | 90.651 | 103.556 | 0.122 | 16 | BI1 | 0.0076 | 89.572 | 102.323 |
| CUH1B218F | B | C2 | 2 | 2 | 82.276 | 107.829 | 0.121 | 16 | BI1 | 0.0076 | 81.073 | 106.253 |
| CUH1C117F | C | C1 | 3 | 1 | 78.461 | 106.297 | 0.123 | 16 | B1I | 0.0077 | 78.026 | 105.707 |
| CUH1C118F | C | C1 | 3 | 1 | 82.673 | 106.503 | 0.123 | 16 | B1I | 0.0077 | 82.751 | 106.604 |
| CUH1C119F | C | C1 | 3 | 1 | 84.660 | 102.691 | 0.124 | 16 | B1I | 0.0078 | 85.210 | 103.358 |
| CUH1C11BF | C | C1 | 3 | 1 | 71.592 | 105.380 | 0.124 | 16 | B1I | 0.0078 | 72.309 | 106.435 |
| CUH1C216F | C | C2 | 3 | 2 | 86.563 | 103.129 | 0.124 | 16 | B1I | 0.0078 | 87.219 | 103.910 |
| CUH1C217F | C | C2 | 3 | 2 | 86.599 | 104.571 | 0.124 | 16 | B1I | 0.0077 | 87.138 | 105.222 |
| CUH1C218F | C | C2 | 3 | 2 | 89.403 | 106.670 | 0.123 | 16 | B1I | 0.0077 | 89.198 | 106.425 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Average** | **88.279** | **108.370** | **$Average_{norm}$** | **0.0077** | **88.256** | **108.348** |
| **Standard Dev.** | **7.001** | **5.863** | **$Standard\ Dev._{norm}$** | | **6.879** | **5.688** |
| **Coeff. of Var. [%]** | **7.931** | **5.410** | **$Coeff.\ of\ Var.\ [\%]_{norm}$** | | **7.794** | **5.250** |
| **Min.** | **71.592** | **98.645** | **Min.** | **0.0075** | **72.309** | **97.664** |
| **Max.** | **99.584** | **127.948** | **Max.** | **0.0079** | **99.584** | **124.590** |
| **Number of Spec.** | **28** | **28** | **Number of Spec.** | **28** | **28** | **28** |


Laminate Single-Shear Bearing Properties (SSB1)--(ETW2)
Normalized 2% Offset Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
20.0
40.0
60.0
80.0
100.0
120.0
Laminate Bearing Strength (SSB1) [ksi]


Laminate Single-Shear Bearing Properties (SSB1)--(ETW2)
Normalized Ultimate Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
20
40
60
80
100
120
140
Laminate Bearing Strength (SSB1) [ksi]

# 4.27 "10/80/10" Single-Shear Bearing 2 Properties (SSB2)

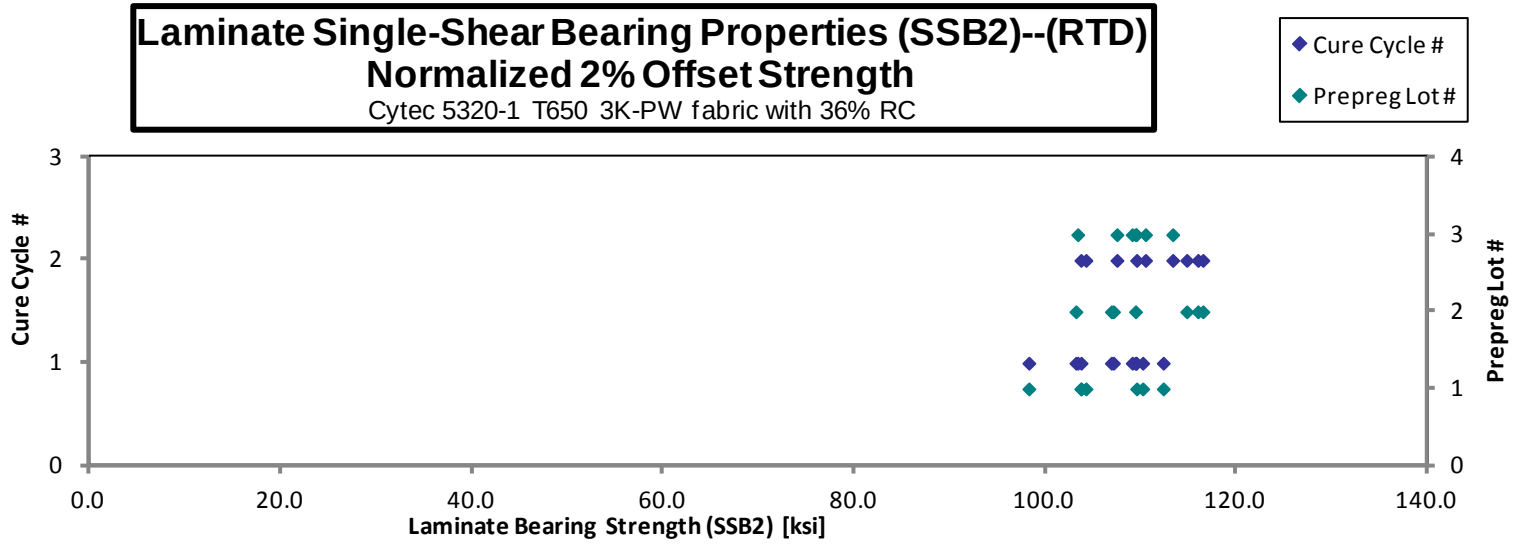
**Single-Shear Bearing 2 Properties (SSB2)--RTD Strength**

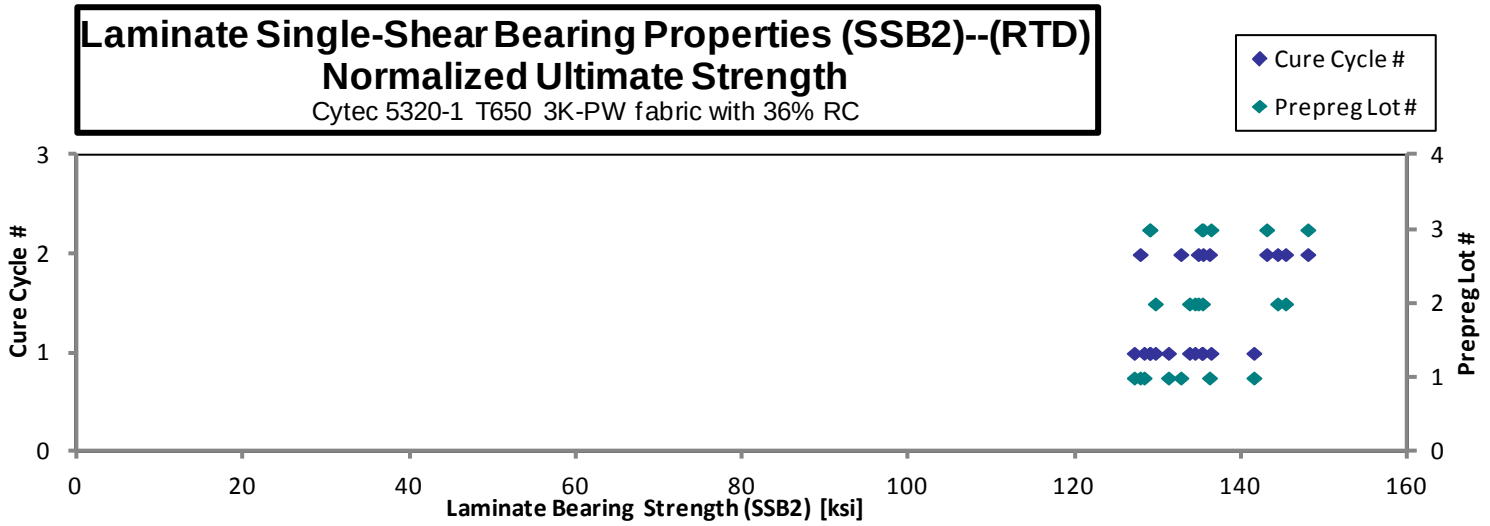
Cytec 5320-1 T650 3K-PW fabric with 36% RC

| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | 2% Offset Strength [ksi] | Ultimate Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Comments | Avg. $t_{ply}$ [in] | 2% Offset $Strength_{norm}$ [ksi] | Ultimate $Strength_{norm}$ [ksi] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CUH2A111A | A | C1 | 1 | 1 | 98.244 | 131.260 | 0.154 | 20 | B1I | 0.0077 | 98.223 | 131.232 |
| CUH2A112A | A | C1 | 1 | 1 | 110.063 | 128.223 | 0.154 | 20 | B1I | 0.0077 | 110.134 | 128.307 |
| CUH2A113A | A | C1 | 1 | 1 | 112.161 | 141.343 | 0.154 | 20 | B1I | 0.0077 | 112.283 | 141.496 |
| CUH2A114A | A | C1 | 1 | 1 | 103.052 | 126.342 | 0.155 | 20 | B1I | 0.0077 | 103.687 | 127.122 |
| CUH2A211A | A | C2 | 1 | 2 | 103.132 | 127.170 | 0.155 | 20 | B1I | 0.0077 | 103.668 | 127.830 |
| CUH2A212A | A | C2 | 1 | 2 | 109.902 | 133.209 | 0.153 | 20 | B1I | 0.0077 | 109.498 | 132.719 |
| CUH2A213A | A | C2 | 1 | 2 | 103.455 | 135.198 | 0.155 | 20 | B1I | 0.0078 | 104.194 | 136.164 |
| CUH2B111A | B | C1 | 2 | 1 | 106.344 | 139.517 | 0.149 | 20 | B1I | 0.0075 | 103.144 | 135.319 |
| CUH2B112A | B | C1 | 2 | 1 | 110.680 | 134.017 | 0.149 | 20 | B1I | 0.0074 | 107.075 | 129.651 |
| CUH2B113A | B | C1 | 2 | 1 | 112.610 | 137.705 | 0.150 | 20 | B1I | 0.0075 | 109.380 | 133.756 |
| CUH2B114A | B | C1 | 2 | 1 | 110.836 | 139.419 | 0.148 | 20 | B1I | 0.0074 | 106.854 | 134.410 |
| CUH2B211A | B | C2 | 2 | 2 | 119.308 | 138.148 | 0.150 | 20 | B1I | 0.0075 | 116.429 | 134.814 |
| CUH2B212A | B | C2 | 2 | 2 | 119.690 | 150.048 | 0.149 | 20 | B1I | 0.0075 | 115.907 | 145.306 |
| CUH2B213A | B | C2 | 2 | 2 | 115.930 | 145.847 | 0.152 | 20 | B1I | 0.0076 | 114.738 | 144.347 |
| CUH2C111A | C | C1 | 3 | 1 | 103.854 | 129.620 | 0.153 | 20 | B1I | 0.0077 | 103.337 | 128.975 |
| CUH2C112A | C | C1 | 3 | 1 | 110.108 | 136.042 | 0.153 | 20 | B1I | 0.0077 | 109.453 | 135.232 |
| CUH2C113A | C | C1 | 3 | 1 | 108.639 | 135.415 | 0.155 | 20 | B1I | 0.0078 | 109.380 | 136.339 |
| CUH2C114A | C | C1 | 3 | 1 | 109.580 | 129.654 | 0.153 | 20 | B1I | 0.0077 | 109.034 | 129.008 |
| CUH2C211A | C | C2 | 3 | 2 | 110.892 | 139.737 | 0.149 | 20 | B1I | 0.0075 | 107.436 | 135.381 |
| CUH2C212A | C | C2 | 3 | 2 | 114.990 | 150.221 | 0.152 | 20 | B1I | 0.0076 | 113.273 | 147.978 |
| CUH2C213A | C | C2 | 3 | 2 | 112.149 | 145.266 | 0.152 | 20 | B1I | 0.0076 | 110.425 | 143.033 |

| | | | | | |
|---|---|---|---|---|---|
| **Average** | **109.791** | **136.829** | **$Average_{norm}$** | **0.0076** | **108.455** | **135.163** |
| **Standard Dev.** | **5.420** | **7.035** | **$Standard\ Dev._{norm}$** | | **4.667** | **6.132** |
| **Coeff. of Var. [%]** | **4.936** | **5.142** | **Coeff. of Var. $[\%]_{norm}$** | | **4.304** | **4.537** |
| **Min.** | **98.244** | **126.342** | **Min.** | **0.0074** | **98.223** | **127.122** |
| **Max.** | **119.690** | **150.221** | **Max.** | **0.0078** | **116.429** | **147.978** |
| **Number of Spec.** | **21** | **21** | **Number of Spec.** | **21** | **21** | **21** |


Laminate Single-Shear Bearing Properties (SSB2)--(RTD)
Normalized 2% Offset Strength
Cytec 5320-1 T650 3K-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
20.0
40.0
60.0
80.0
100.0
120.0
140.0
Laminate Bearing Strength (SSB2) [ksi]


Laminate Single-Shear Bearing Properties (SSB2)--(RTD)
Normalized Ultimate Strength
Cytec 5320-1 T650 3K-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
20
40
60
80
100
120
140
160
Laminate Bearing Strength (SSB2) [ksi]

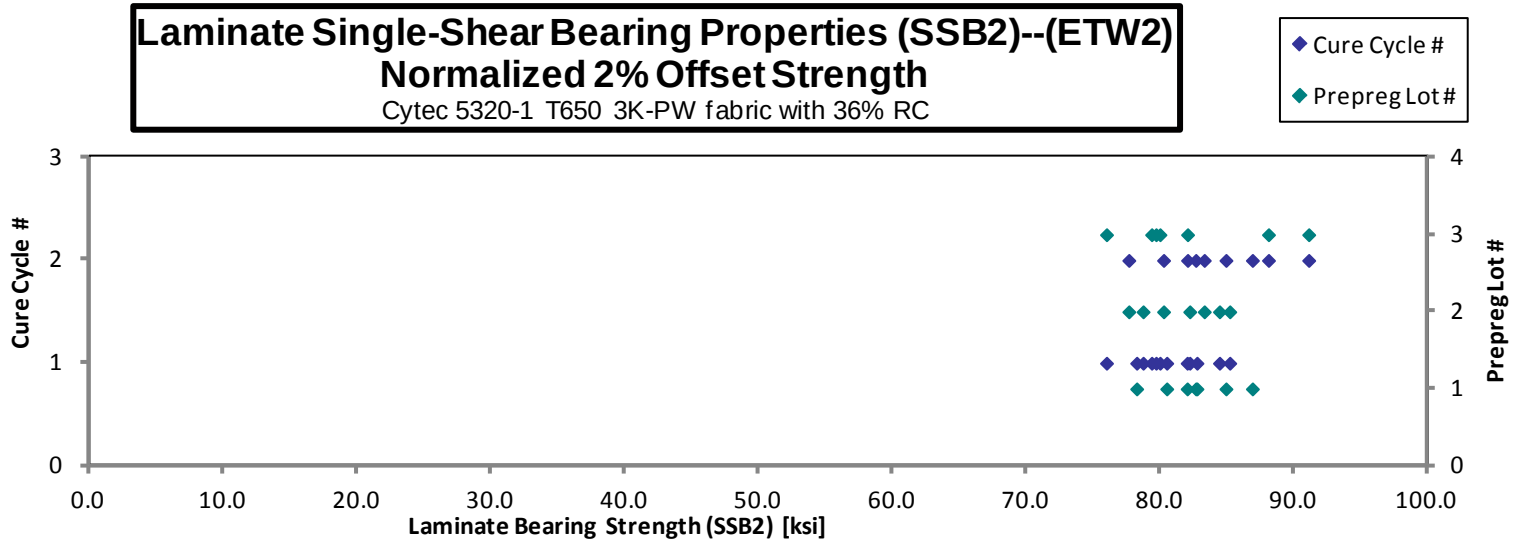
## Single-Shear Bearing 2 Properties (SSB2)--ETW2 Strength

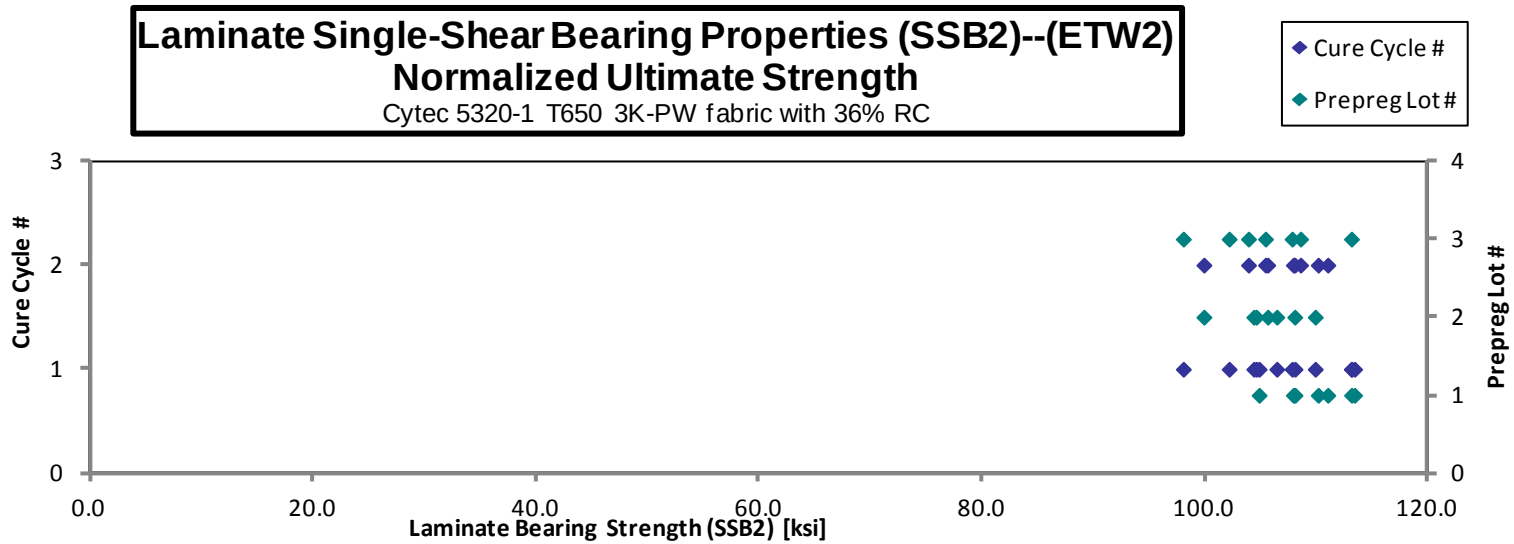
Cytec 5320-1 T650 3K-PW fabric with 36% RC

| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | 2% Offset Strength [ksi] | Ultimate Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Comments | Avg. $t_{ply}$ [in] | 2% Offset $Strength_{norm}$ [ksi] | Ultimate $Strength_{norm}$ [ksi] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CUH2A117F | A | C1 | 1 | 1 | 77.635 | 112.556 | 0.155 | 20 | B1I | 0.0078 | 78.215 | 113.397 |
| CUH2A118F | A | C1 | 1 | 1 | 79.941 | 112.393 | 0.155 | 20 | B1I | 0.0078 | 80.461 | 113.123 |
| CUH2A119F | A | C1 | 1 | 1 | 79.896 | 105.298 | 0.158 | 20 | B1I | 0.0079 | 81.988 | 108.055 |
| CUH2A11AF | A | C1 | 1 | 1 | 82.415 | 104.453 | 0.155 | 20 | B1I | 0.0077 | 82.718 | 104.838 |
| CUH2A216F | A | C2 | 1 | 2 | 82.256 | 109.637 | 0.155 | 20 | B1I | 0.0077 | 82.630 | 110.135 |
| CUH2A217F | A | C2 | 1 | 2 | 86.032 | 109.937 | 0.155 | 20 | B1I | 0.0078 | 86.861 | 110.996 |
| CUH2A218F | A | C2 | 1 | 2 | 84.868 | 107.882 | 0.154 | 20 | B1I | 0.0077 | 84.886 | 107.905 |
| CUH2B117F | B | C1 | 2 | 1 | 86.871 | 112.064 | 0.151 | 20 | B1I | 0.0075 | 85.169 | 109.869 |
| CUH2B118F | B | C1 | 2 | 1 | 84.157 | 108.981 | 0.150 | 20 | B1I | 0.0075 | 82.180 | 106.421 |
| CUH2B119F | B | C1 | 2 | 1 | 79.923 | 105.988 | 0.152 | 20 | B1I | 0.0076 | 78.695 | 104.359 |
| CUH2B11AF | B | C1 | 2 | 1 | 84.907 | 105.210 | 0.153 | 20 | B1I | 0.0077 | 84.402 | 104.583 |
| CUH2B216F | B | C2 | 2 | 2 | 82.621 | 102.871 | 0.150 | 20 | B1I | 0.0075 | 80.225 | 99.887 |
| CUH2B218F | B | C2 | 2 | 2 | 84.976 | 107.777 | 0.151 | 20 | B1I | 0.0075 | 83.265 | 105.607 |
| CUH2B219F | B | C2 | 2 | 2 | 78.598 | 109.381 | 0.152 | 20 | B1I | 0.0076 | 77.628 | 108.031 |
| CUH2C117F | C | C1 | 3 | 1 | 75.585 | 107.259 | 0.155 | 20 | B1I | 0.0077 | 75.961 | 107.793 |
| CUH2C118F | C | C1 | 3 | 1 | 79.627 | 112.650 | 0.155 | 20 | B1I | 0.0077 | 79.954 | 113.113 |
| CUH2C119F | C | C1 | 3 | 1 | 79.289 | 97.989 | 0.154 | 20 | B1I | 0.0077 | 79.332 | 98.042 |
| CUH2C11AF | C | C1 | 3 | 1 | 80.240 | 102.896 | 0.153 | 20 | B1I | 0.0076 | 79.658 | 102.150 |
| CUH2C216F | C | C2 | 3 | 2 | 93.342 | 106.476 | 0.150 | 20 | B1I | 0.0075 | 91.069 | 103.884 |
| CUH2C217F | C | C2 | 3 | 2 | 82.571 | 106.119 | 0.153 | 20 | B1I | 0.0076 | 82.017 | 105.407 |
| CUH2C218F | C | C2 | 3 | 2 | 89.036 | 109.753 | 0.152 | 20 | B1I | 0.0076 | 88.063 | 108.553 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Average** | **82.609** | **107.503** | **$Average_{norm}$** | **0.0077** | **82.161** | **106.960** |
| **Standard Dev.** | **4.137** | **3.716** | **$Standard\ Dev._{norm}$** | | **3.687** | **4.136** |
| **Coeff. of Var. [%]** | **5.008** | **3.457** | **$Coeff.\ of\ Var.\ [\%]_{norm}$** | | **4.488** | **3.867** |
| **Min.** | **75.585** | **97.989** | **Min.** | **0.0075** | **75.961** | **98.042** |
| **Max.** | **93.342** | **112.650** | **Max.** | **0.0079** | **91.069** | **113.397** |
| **Number of Spec.** | **21** | **21** | **Number of Spec.** | **21** | **21** | **21** |


Laminate Single-Shear Bearing Properties (SSB2)--(ETW2)
Normalized 2% Offset Strength
Cytec 5320-1 T650 3K-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
Laminate Bearing Strength (SSB2) [ksi]


Laminate Single-Shear Bearing Properties (SSB2)--(ETW2)
Normalized Ultimate Strength
Cytec 5320-1 T650 3K-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
20.0
40.0
60.0
80.0
100.0
120.0
Laminate Bearing Strength (SSB2) [ksi]

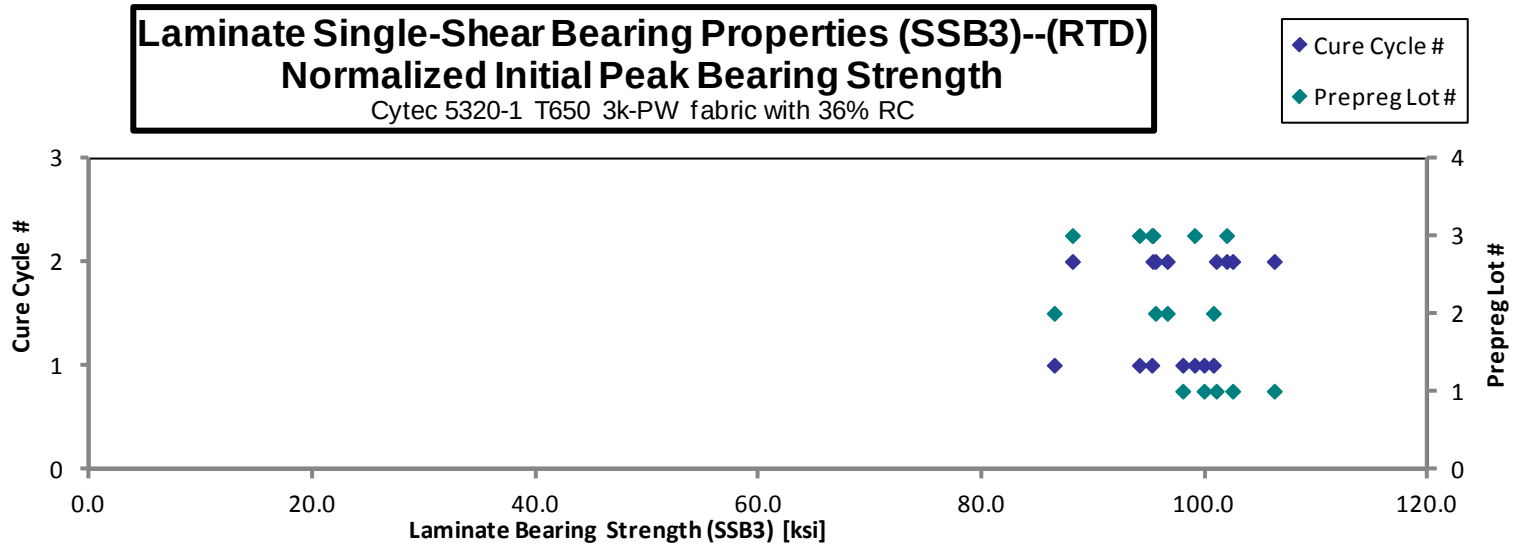
# 4.28 "40/20/40" Single-Shear Bearing 3 Properties (SSB3)

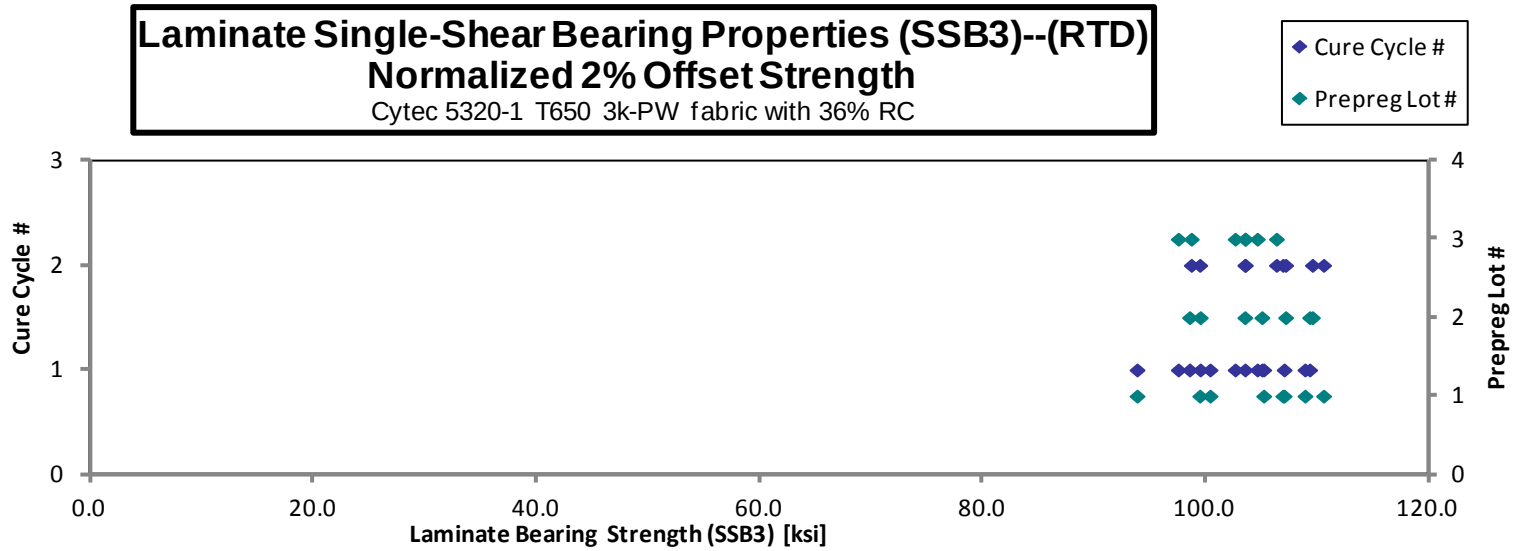
**Single-Shear Bearing 3 Properties (SSB3)--RTD Strength**
Cytec 5320-1 T650 3k-PW fabric with 36% RC

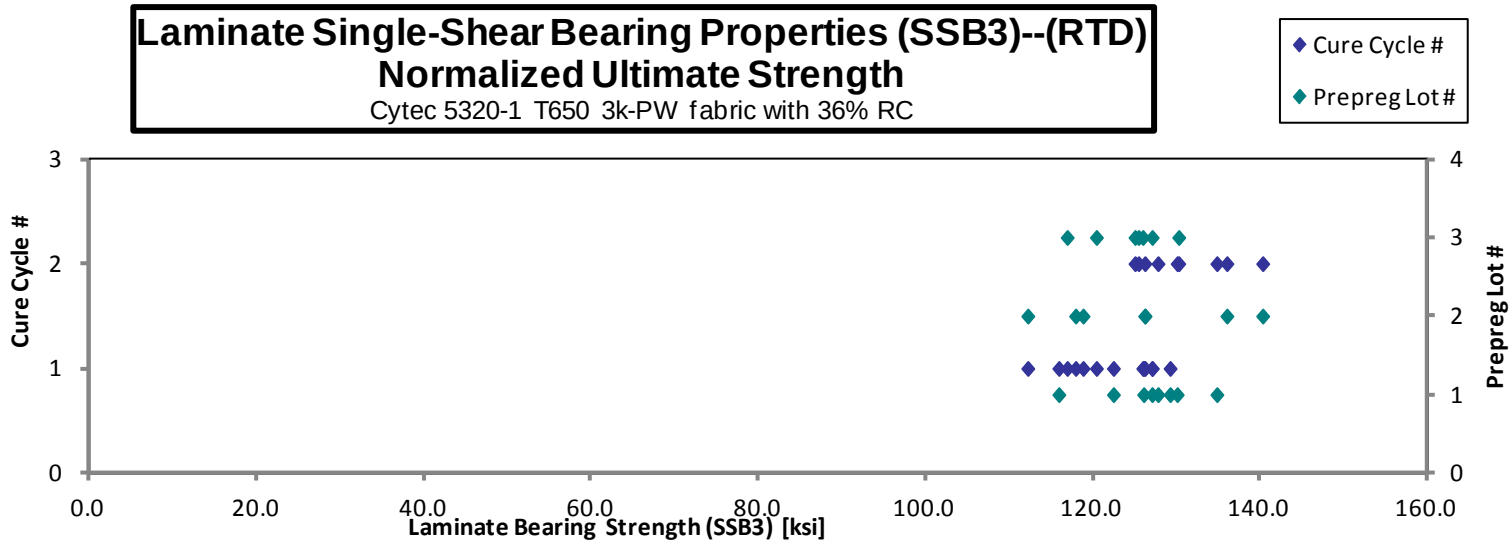
normalizing $t_{ply}$ [in]: 0.0077

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Initial Peak Bearing Strength [ksi] | 2% Offset Strength [ksi] | Ultimate Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Comments | Avg. $t_{ply}$ [in] | Initial Peak Bearing $Strength_{norm}$ [ksi] | 2% Offset $Strength_{norm}$ [ksi] | Ultimate $Strength_{norm}$ [ksi] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CUH3A111A | A | C1 | 1 | 1 | | 106.493 | 115.205 | 0.155 | 20 | S1I | 0.0077 | | 107.081 | 115.841 |
| CUH3A112A | A | C1 | 1 | 1 | | 104.343 | 121.315 | 0.155 | 20 | B1I | 0.0078 | | 105.246 | 122.365 |
| CUH3A113A | A | C1 | 1 | 1 | 99.549 | 108.570 | 126.546 | 0.155 | 20 | B1I | 0.0077 | 99.894 | 108.946 | 126.985 |
| CUH3A114A | A | C1 | 1 | 1 | 97.409 | 93.337 | 128.376 | 0.155 | 20 | B1I | 0.0077 | 97.989 | 93.892 | 129.140 |
| CUH3A115A | A | C1 | 1 | 1 | | 99.524 | 124.831 | 0.155 | 20 | B1I | 0.0078 | | 100.439 | 125.979 |
| CUH3A211A | A | C2 | 1 | 2 | 101.798 | 100.309 | 135.805 | 0.153 | 20 | B1I | 0.0076 | 100.994 | 99.516 | 134.732 |
| CUH3A212A | A | C2 | 1 | 2 | 108.293 | 112.801 | 132.556 | 0.151 | 20 | B1I | 0.0076 | 106.196 | 110.616 | 129.988 |
| CUH3A213A | A | C2 | 1 | 2 | 103.294 | 107.830 | 128.723 | 0.153 | 20 | B1I | 0.0076 | 102.467 | 106.966 | 127.692 |
| CUH3B111A | B | C1 | 2 | 1 | 102.038 | 99.878 | 120.273 | 0.152 | 20 | B1I | 0.0076 | 100.735 | 98.603 | 118.737 |
| CUH3B112A | B | C1 | 2 | 1 | | 106.272 | 113.393 | 0.152 | 20 | B1I | 0.0076 | | 105.088 | 112.129 |
| CUH3B114A | B | C1 | 2 | 1 | | 112.109 | 129.290 | 0.150 | 20 | B1I | 0.0075 | | 109.367 | 126.128 |
| CUH3B115A | B | C1 | 2 | 1 | 88.735 | 102.170 | 120.933 | 0.150 | 20 | B1I | 0.0075 | 86.469 | 99.561 | 117.844 |
| CUH3B211A | B | C2 | 2 | 2 | 101.822 | 113.012 | 143.279 | 0.146 | 20 | B1I | 0.0073 | 96.598 | 107.214 | 135.929 |
| CUH3B212A | B | C2 | 2 | 2 | | 113.421 | 130.505 | 0.149 | 20 | B1I | 0.0074 | | 109.616 | 126.127 |
| CUH3B213A | B | C2 | 2 | 2 | 98.438 | 106.698 | 144.464 | 0.149 | 20 | B1I | 0.0075 | 95.540 | 103.557 | 140.211 |
| CUH3C111A | C | C1 | 3 | 1 | 95.108 | 98.636 | 118.090 | 0.152 | 20 | B1I | 0.0076 | 94.099 | 97.589 | 116.838 |
| CUH3C112A | C | C1 | 3 | 1 | | 104.005 | 121.874 | 0.152 | 20 | B1I | 0.0076 | | 102.688 | 120.330 |
| CUH3C113A | C | C1 | 3 | 1 | 98.543 | 103.046 | 125.239 | 0.155 | 20 | B1I | 0.0077 | 99.045 | 103.570 | 125.876 |
| CUH3C114A | C | C1 | 3 | 1 | 95.194 | 104.650 | 126.968 | 0.154 | 20 | B1I | 0.0077 | 95.215 | 104.672 | 126.996 |
| CUH3C211A | C | C2 | 3 | 2 | 102.892 | 107.402 | 131.410 | 0.153 | 20 | B1I | 0.0076 | 101.923 | 106.391 | 130.173 |
| CUH3C212A | C | C2 | 3 | 2 | 96.047 | 104.398 | 125.911 | 0.153 | 20 | B1I | 0.0076 | 95.309 | 103.596 | 124.943 |
| CUH3C213A | C | C2 | 3 | 2 | 89.828 | 100.696 | 127.829 | 0.151 | 20 | B1I | 0.0076 | 88.098 | 98.756 | 125.367 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Average** | **98.599** | **104.982** | **126.946** | **$Average_{norm}$** | **0.0076** | **97.371** | **103.771** | **125.470** |
| **Standard Dev.** | **5.167** | **5.195** | **7.790** | **Standard $Dev._{norm}$** | | **5.257** | **4.470** | **6.777** |
| **Coeff. of Var. [%]** | **5.240** | **4.949** | **6.136** | **Coeff. of Var. $[\%]_{norm}$** | | **5.399** | **4.308** | **5.401** |
| **Min.** | **88.735** | **93.337** | **113.393** | **Min.** | **0.0073** | **86.469** | **93.892** | **112.129** |
| **Max.** | **108.293** | **113.421** | **144.464** | **Max.** | **0.0078** | **106.196** | **110.616** | **140.211** |
| **Number of Spec.** | **15** | **22** | **22** | **Number of Spec.** | **22** | **15** | **22** | **22** |


Laminate Single-Shear Bearing Properties (SSB3)--(RTD)
Normalized Initial Peak Bearing Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
20.0
40.0
60.0
80.0
100.0
120.0
Laminate Bearing Strength (SSB3) [ksi]


Laminate Single-Shear Bearing Properties (SSB3)--(RTD)
Normalized 2% Offset Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
20.0
40.0
60.0
80.0
100.0
120.0
Laminate Bearing Strength (SSB3) [ksi]


Laminate Single-Shear Bearing Properties (SSB3)--(RTD)
Normalized Ultimate Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
20.0
40.0
60.0
80.0
100.0
120.0
140.0
160.0
Laminate Bearing Strength (SSB3) [ksi]

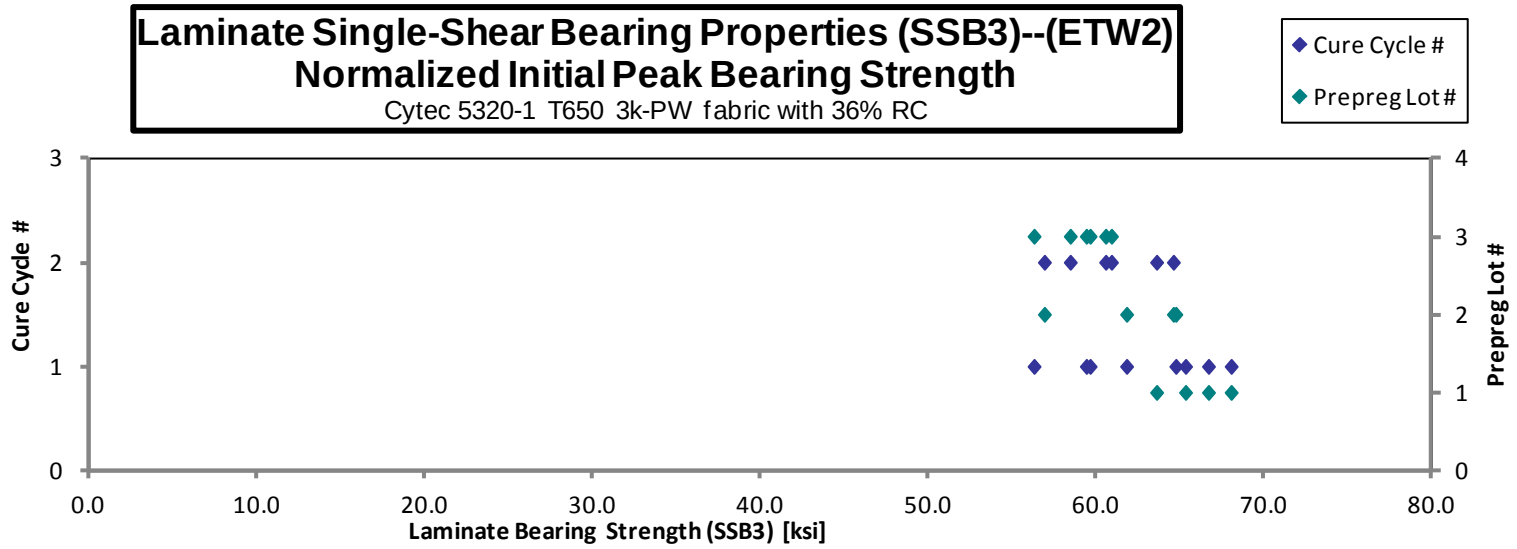
## Single-Shear Bearing 3 Properties (SSB3)--ETW2
## Strength

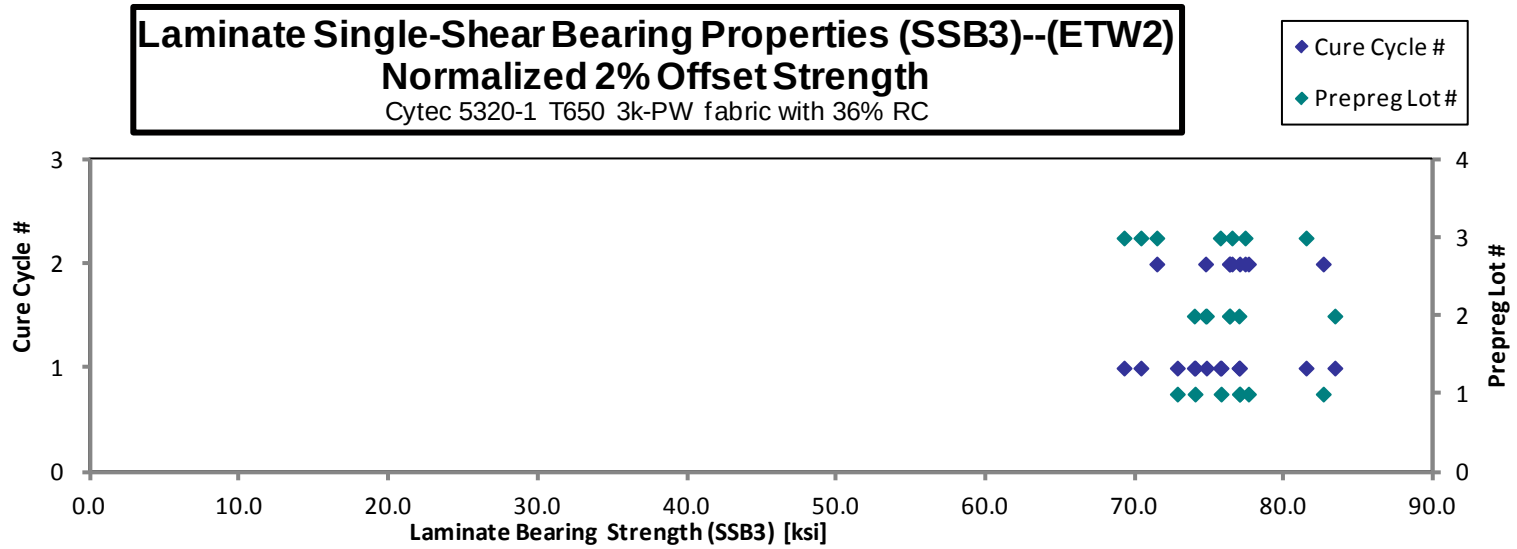
Cytec 5320-1 T650 3k-PW fabric with 36% RC

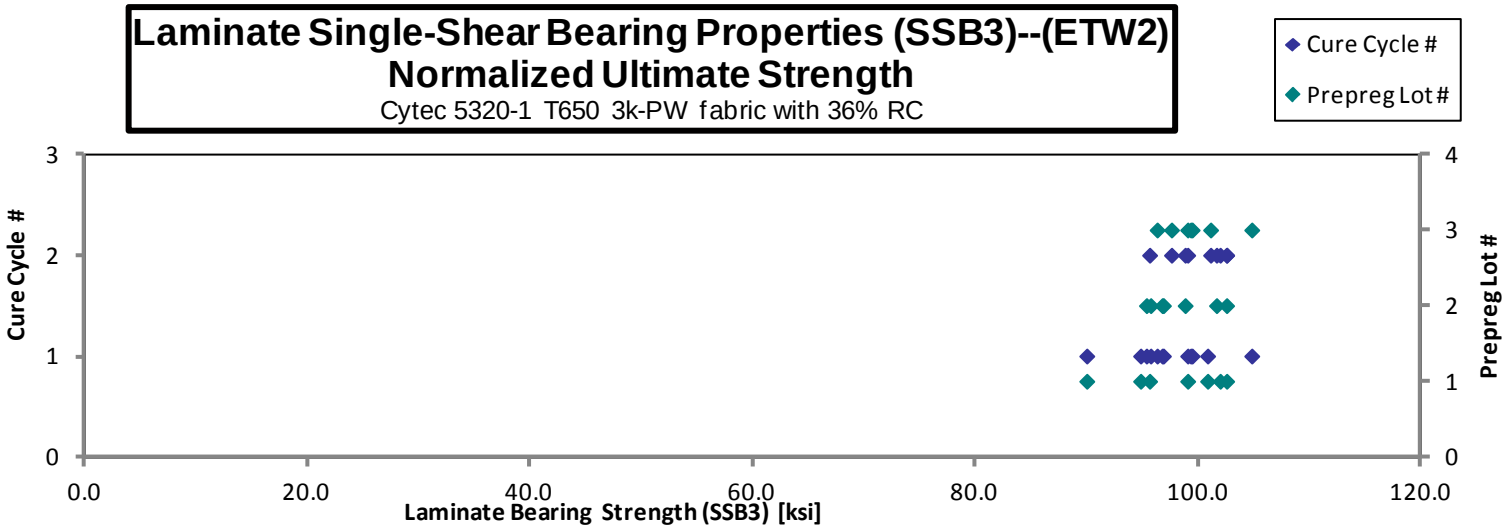
| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Initial Peak Bearing Strength [ksi] | 2% Offset Strength [ksi] | Ultimate Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Comments | Avg. $t_{ply}$ [in] | Initial Peak Bearing $Strength_{norm}$ [ksi] | 2% Offset $Strength_{norm}$ [ksi] | Ultimate $Strength_{norm}$ [ksi] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CUH3A117F | A | C1 | 1 | 1 | | 73.907 | 98.780 | 0.154 | 20 | B1I | 0.0077 | | 74.091 | 99.025 |
| CUH3A118F | A | C1 | 1 | 1 | 67.282 | 72.120 | 99.735 | 0.156 | 20 | B1I | 0.0078 | 68.010 | 72.901 | 100.814 |
| CUH3A119F | A | C1 | 1 | 1 | 66.014 | 75.103 | 93.882 | 0.156 | 20 | B1I | 0.0078 | 66.657 | 75.835 | 94.797 |
| CUH3A11AF | A | C1 | 1 | 1 | 64.960 | 76.677 | 89.506 | 0.155 | 20 | B1I | 0.0077 | 65.291 | 77.067 | 89.961 |
| CUH3A216F | A | C2 | 1 | 2 | | 84.012 | 97.140 | 0.152 | 20 | B1I | 0.0076 | | 82.685 | 95.605 |
| CUH3A217F | A | C2 | 1 | 2 | 64.381 | 78.068 | 103.248 | 0.152 | 20 | B1I | 0.0076 | 63.566 | 77.080 | 101.941 |
| CUH3A218F | A | C2 | 1 | 2 | | 76.936 | 101.558 | 0.155 | 20 | B1I | 0.0078 | | 77.669 | 102.525 |
| CUH3B117F | B | C1 | 2 | 1 | 66.056 | 76.406 | 98.748 | 0.151 | 20 | B1I | 0.0075 | 64.712 | 74.852 | 96.738 |
| CUH3B118F | B | C1 | 2 | 1 | | 74.859 | 96.757 | 0.152 | 20 | B1I | 0.0076 | | 74.040 | 95.700 |
| CUH3B119F | B | C1 | 2 | 1 | 62.646 | 78.114 | 98.205 | 0.152 | 20 | B1I | 0.0076 | 61.778 | 77.032 | 96.844 |
| CUH3B11AF | B | C1 | 2 | 1 | | 84.514 | 96.523 | 0.152 | 20 | B1I | 0.0076 | | 83.462 | 95.322 |
| CUH3B216F | B | C2 | 2 | 2 | | 77.401 | 106.091 | 0.149 | 20 | B1I | 0.0074 | | 74.796 | 102.520 |
| CUH3B217F | B | C2 | 2 | 2 | 58.172 | 78.123 | 103.919 | 0.151 | 20 | B1I | 0.0075 | 56.881 | 76.390 | 101.614 |
| CUH3B218F | B | C2 | 2 | 2 | 66.076 | 78.196 | 101.105 | 0.150 | 20 | B1I | 0.0075 | 64.567 | 76.411 | 98.797 |
| CUH3C117F | C | C1 | 3 | 1 | | 82.056 | 105.452 | 0.153 | 20 | B1I | 0.0077 | | 81.532 | 104.779 |
| CUH3C118F | C | C1 | 3 | 1 | 56.942 | 71.308 | 100.623 | 0.152 | 20 | B1I | 0.0076 | 56.264 | 70.459 | 99.425 |
| CUH3C119F | C | C1 | 3 | 1 | 59.277 | 69.210 | 99.125 | 0.154 | 20 | B1I | 0.0077 | 59.379 | 69.330 | 99.297 |
| CUH3C11AF | C | C1 | 3 | 1 | 60.231 | 76.577 | 97.293 | 0.152 | 20 | B1I | 0.0076 | 59.606 | 75.781 | 96.282 |
| CUH3C216F | C | C2 | 3 | 2 | 58.663 | 71.821 | 99.434 | 0.153 | 20 | B1I | 0.0077 | 58.422 | 71.526 | 99.025 |
| CUH3C217F | C | C2 | 3 | 2 | 61.200 | 76.972 | 98.091 | 0.153 | 20 | B1I | 0.0077 | 60.876 | 76.564 | 97.571 |
| CUH3C218F | C | C2 | 3 | 2 | 60.256 | 77.094 | 100.625 | 0.155 | 20 | B1I | 0.0077 | 60.530 | 77.444 | 101.082 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Average** | **62.297** | **76.642** | **99.326** | **$Average_{norm}$** | **0.0076** | **61.896** | **76.045** | **98.555** |
| **Standard Dev.** | **3.467** | **3.846** | **3.771** | **$Standard\ Dev._{norm}$** | | **3.647** | **3.570** | **3.406** |
| **Coeff. of Var. [%]** | **5.566** | **5.018** | **3.796** | **Coeff. of Var. $[\%]_{norm}$** | | **5.891** | **4.695** | **3.456** |
| **Min.** | **56.942** | **69.210** | **89.506** | **Min.** | **0.0074** | **56.264** | **69.330** | **89.961** |
| **Max.** | **67.282** | **84.514** | **106.091** | **Max.** | **0.0078** | **68.010** | **83.462** | **104.779** |
| **Number of Spec.** | **14** | **21** | **21** | **Number of Spec.** | **21** | **14** | **21** | **21** |


Laminate Single-Shear Bearing Properties (SSB3)--(ETW2)
Normalized Initial Peak Bearing Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
Laminate Bearing Strength (SSB3) [ksi]


Laminate Single-Shear Bearing Properties (SSB3)--(ETW2)
Normalized 2% Offset Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
Laminate Bearing Strength (SSB3) [ksi]


Laminate Single-Shear Bearing Properties (SSB3)--(ETW2)
Normalized Ultimate Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
20.0
40.0
60.0
80.0
100.0
120.0
Laminate Bearing Strength (SSB3) [ksi]

## 4.29 "25/50/25" Compression After Impact 1 Properties (CAI1)

**Laminate Compression After Impact Properties (CAI1)--RTD Strength**

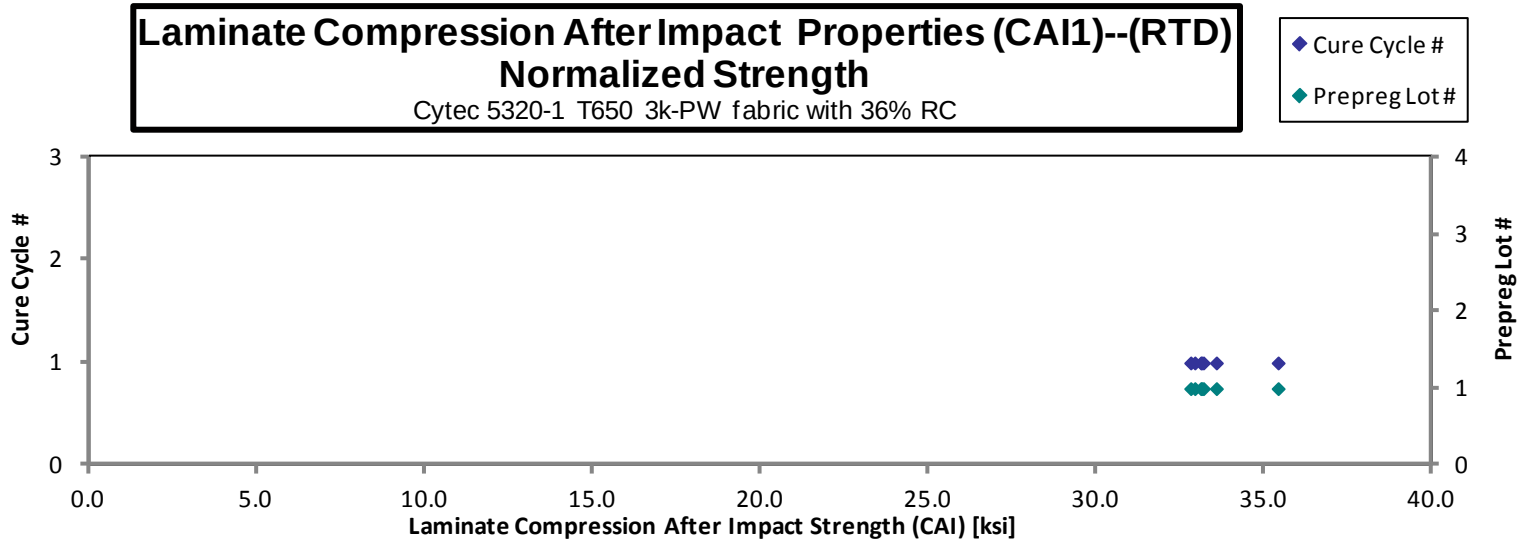
Cytec 5320-1 T650 3k-PW fabric with 36% RC

| normalizing $t_{ply}$ [in] |
|---|
| 0.0077 |

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Strength [ksi] | Measured Impact Energy (in-lbf) | Avg. Specimen Thickness [in] | # Plies in Laminate | Failure Mode | Avg. $t_{ply}$ [in] | $Strength_{norm}$ [ksi] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CUHKA111A | A | C1 | 1 | 1 | 32.919 | 278.420 | 0.185 | 24 | LDM | 0.0077 | 32.922 |
| CUHKA112A | A | C1 | 1 | 1 | 32.605 | 275.900 | 0.186 | 24 | LDM | 0.0077 | 32.800 |
| CUHKA113A | A | C1 | 1 | 1 | 33.127 | 274.480 | 0.185 | 24 | LDM | 0.0077 | 33.127 |
| CUHKA114A | A | C1 | 1 | 1 | 35.252 | 279.600 | 0.186 | 24 | LDM | 0.0077 | 35.405 |
| CUHKA115A | A | C1 | 1 | 1 | 32.821 | 280.770 | 0.187 | 24 | LDM | 0.0078 | 33.178 |
| CUHKA116A | A | C1 | 1 | 1 | 33.290 | 281.770 | 0.186 | 24 | LDM | 0.0078 | 33.564 |
| CUHKA117A | A | C1 | 1 | 1 | 33.090 | 274.580 | 0.185 | 24 | LDM | 0.0077 | 33.101 |

| | | |
|---|---|---|
| **Average** | **33.301** | |
| **Standard Dev.** | **0.889** | |
| **Coeff. of Var. [%]** | **2.669** | |
| **Min.** | **32.605** | |
| **Max.** | **35.252** | |
| **Number of Spec.** | **7** | |

| | | |
|---|---|---|
| **$Average_{norm}$** | **0.0077** | **33.442** |
| **Standard $Dev._{norm}$** | | **0.898** |
| **Coeff. of Var. $[\%]_{norm}$** | | **2.684** |
| **Min.** | **0.0077** | **32.800** |
| **Max.** | **0.0078** | **35.405** |
| **Number of Spec.** | **7** | **7** |


Laminate Compression After Impact Properties (CAI1)--(RTD)
Normalized Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
Laminate Compression After Impact Strength (CAI) [ksi]

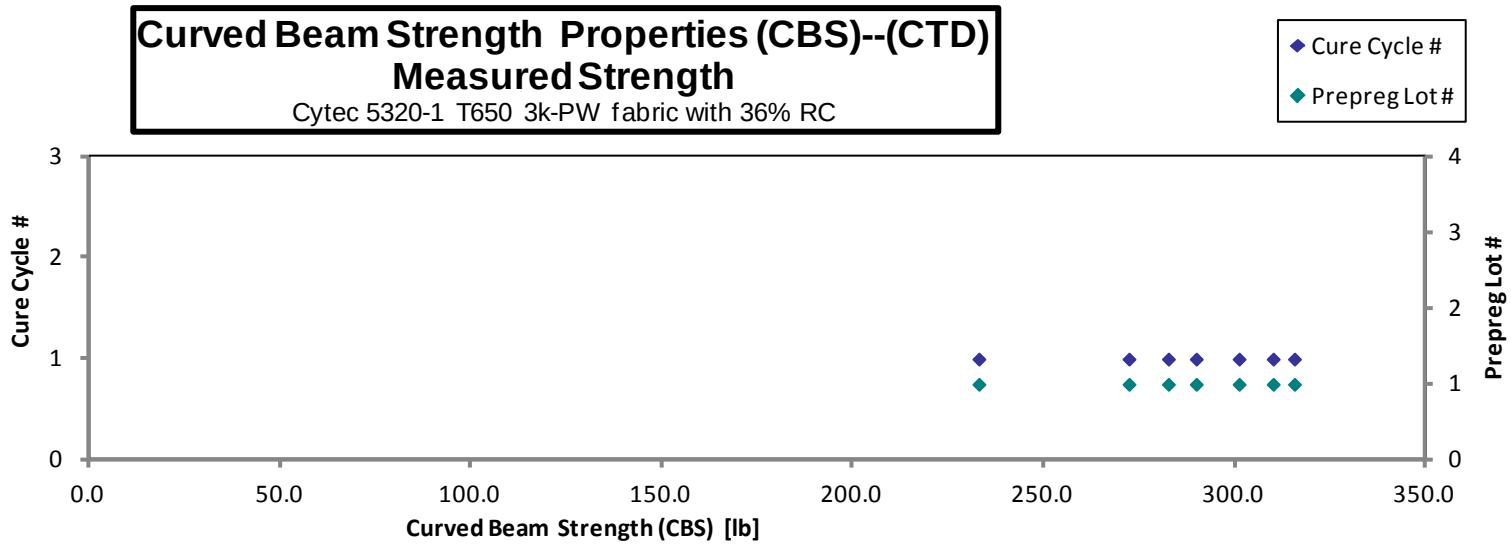
## 4.30 Interlaminar Tension Properties (ILT)

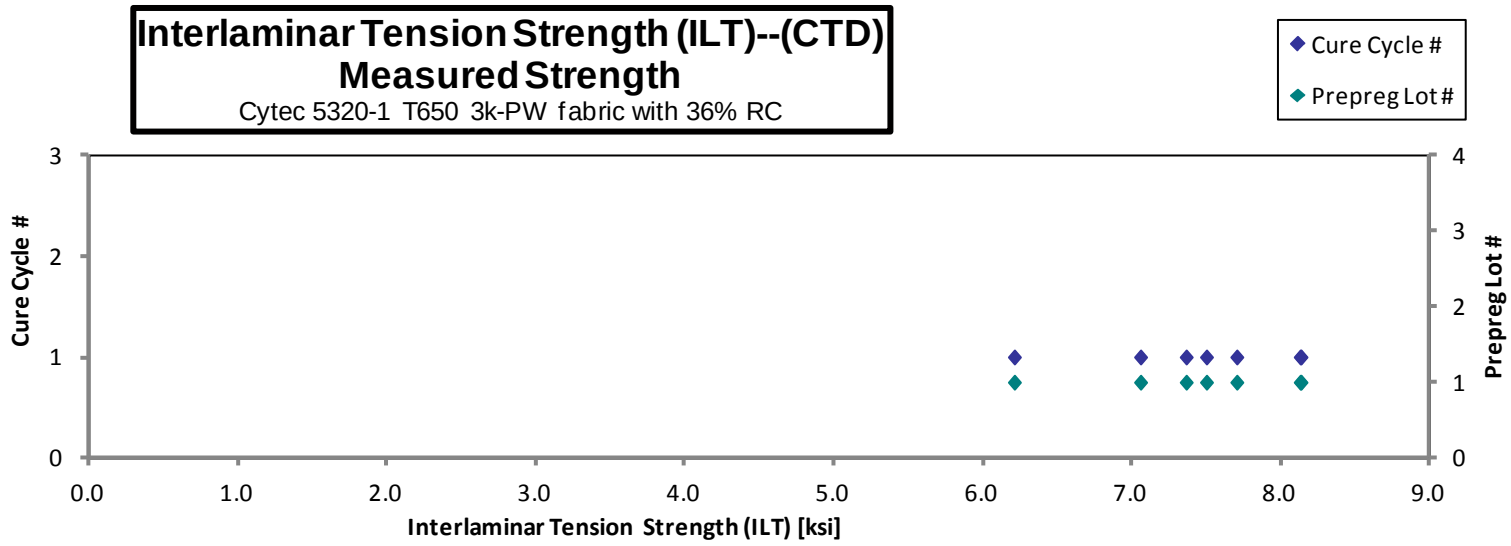
**Interlaminar Tension Properties (ILT)--CTD Strength**

Cytec 5320-1 T650 3k-PW fabric with 36% RC

| Specimen Number | Cytec Batch # | Cytec 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 |
|---|---|---|---|---|---|---|---|---|---|---|
| CUHMA118B | A | C1 | 1 | 1 | 232.859 | 6.208 | 0.173 | 21 | 0.0082 | ILT |
| CUHMA119B | A | C1 | 1 | 1 | 272.169 | 7.055 | 0.177 | 21 | 0.0084 | ILT |
| CUHMA11AB | A | C1 | 1 | 1 | 289.782 | 7.497 | 0.177 | 21 | 0.0084 | ILT |
| CUHMA11BB | A | C1 | 1 | 1 | 315.503 | 8.127 | 0.178 | 21 | 0.0085 | ILT |
| CUHMA11CB | A | C1 | 1 | 1 | 282.493 | 7.361 | 0.176 | 21 | 0.0084 | ILT |
| CUHMA11DB | A | C1 | 1 | 1 | 301.001 | 7.701 | 0.179 | 21 | 0.0085 | ILT |
| CUHMA11EB | A | C1 | 1 | 1 | 309.933 | 8.132 | 0.175 | 21 | 0.0083 | ILT |

| | | | | |
|---|---|---|---|---|
| **Average** | **286.249** | **7.440** | **Average** | **0.0084** |
| **Standard Dev.** | **28.017** | **0.670** | **Standard Dev.** | |
| **Coeff. of Var. [%]** | **9.788** | **9.008** | **Coeff. of Var. [%]** | |
| **Min.** | **232.859** | **6.208** | **Min.** | **0.0082** |
| **Max.** | **315.503** | **8.132** | **Max.** | **0.0085** |
| **Number of Spec.** | **7** | **7** | **Number of Spec.** | **7** |


Curved Beam Strength Properties (CBS)--(CTD)
Measured Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
50.0
100.0
150.0
200.0
250.0
300.0
350.0
Curved Beam Strength (CBS) [lb]

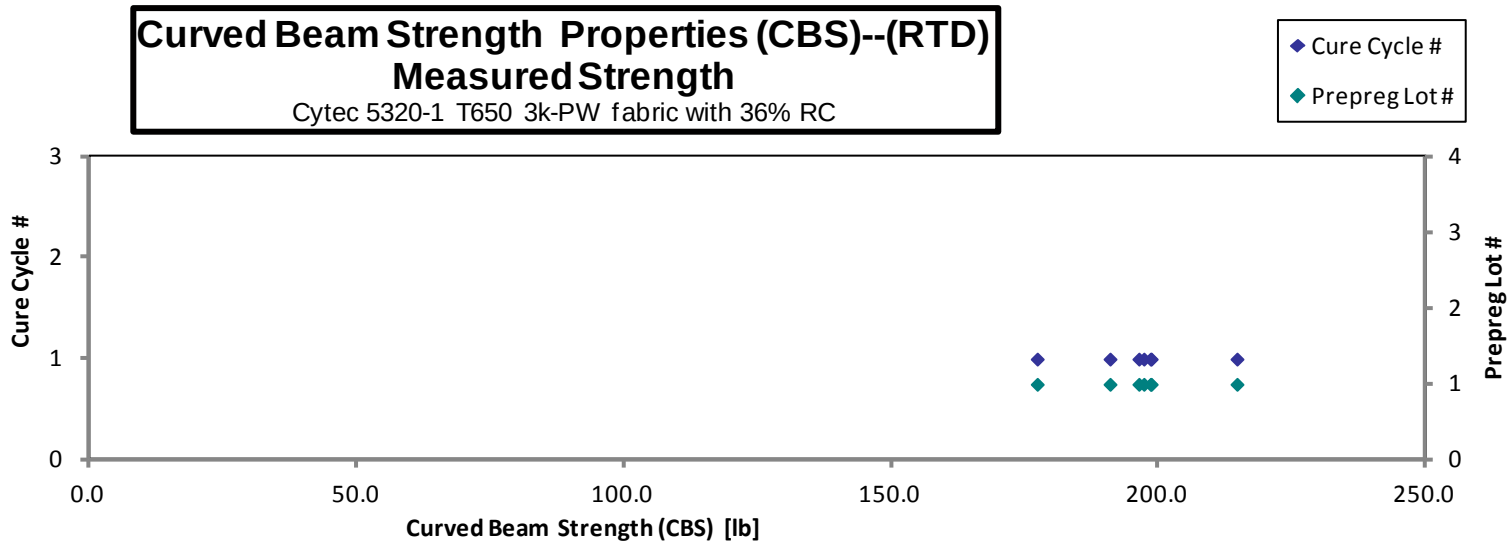

Interlaminar Tension Strength (ILT)--(CTD)
Measured Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
Interlaminar Tension Strength (ILT) [ksi]

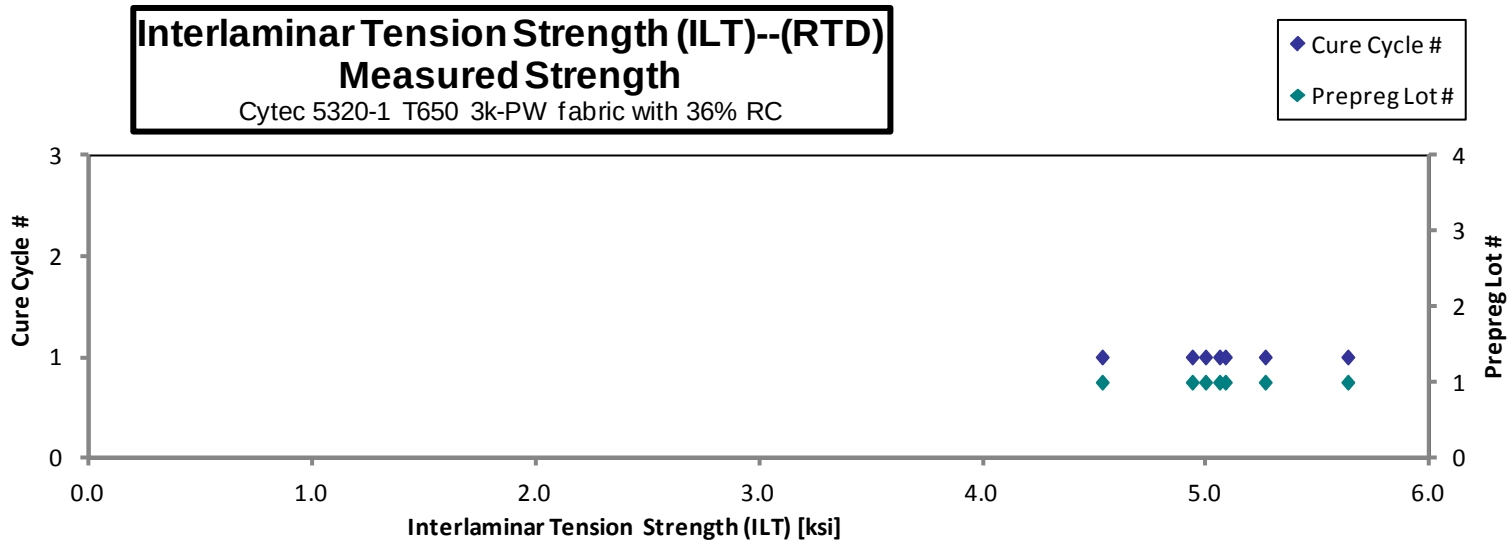
## Interlaminar Tension Properties (ILT)--RTD Strength

Cytec 5320-1 T650 3k-PW fabric with 36% RC

| Specimen Number | Cytec Batch # | Cytec 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 |
|---|---|---|---|---|---|---|---|---|---|---|
| CUHMA111A | A | C1 | 1 | 1 | 214.607 | 5.631 | 0.175 | 21 | 0.0083 | ILT |
| CUHMA112A | A | C1 | 1 | 1 | 198.561 | 4.994 | 0.182 | 21 | 0.0086 | ILT |
| CUHMA113A | A | C1 | 1 | 1 | 190.855 | 4.934 | 0.177 | 21 | 0.0085 | ILT |
| CUHMA114A | A | C1 | 1 | 1 | 196.253 | 5.057 | 0.178 | 21 | 0.0085 | ILT |
| CUHMA115A | A | C1 | 1 | 1 | 177.240 | 4.531 | 0.179 | 21 | 0.0085 | ILT |
| CUHMA116A | A | C1 | 1 | 1 | 198.424 | 5.082 | 0.179 | 21 | 0.0085 | ILT |
| CUHMA117A | A | C1 | 1 | 1 | 197.181 | 5.261 | 0.173 | 21 | 0.0082 | ILT |

| | | | | | |
|---|---|---|---|---|---|
| **Average** | **196.160** | **5.070** | **Average** | **0.0085** | |
| **Standard Dev.** | **11.093** | **0.333** | **Standard Dev.** | | |
| **Coeff. of Var. [%]** | **5.655** | **6.569** | **Coeff. of Var. [%]** | | |
| **Min.** | **177.240** | **4.531** | **Min.** | **0.0082** | |
| **Max.** | **214.607** | **5.631** | **Max.** | **0.0086** | |
| **Number of Spec.** | **7** | **7** | **Number of Spec.** | **7** | |


Curved Beam Strength Properties (CBS)--(RTD)
Measured Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
50.0
100.0
150.0
200.0
250.0
Curved Beam Strength (CBS) [lb]

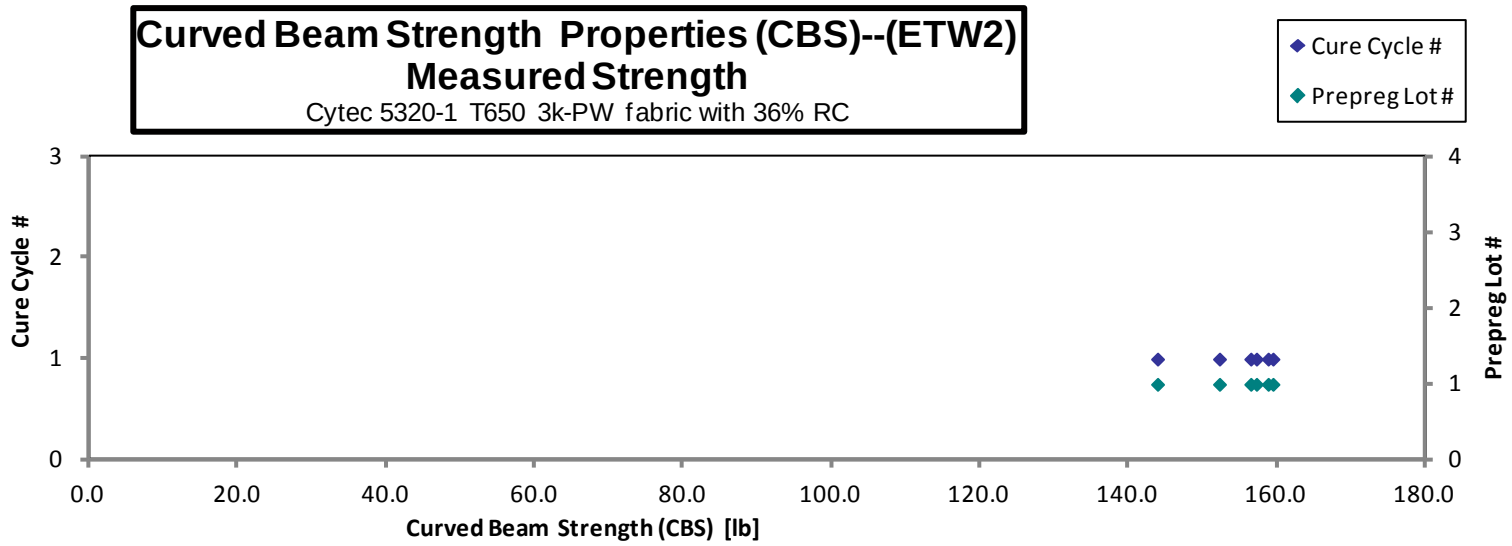

Interlaminar Tension Strength (ILT)--(RTD)
Measured Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
1.0
2.0
3.0
4.0
5.0
6.0
Interlaminar Tension Strength (ILT) [ksi]

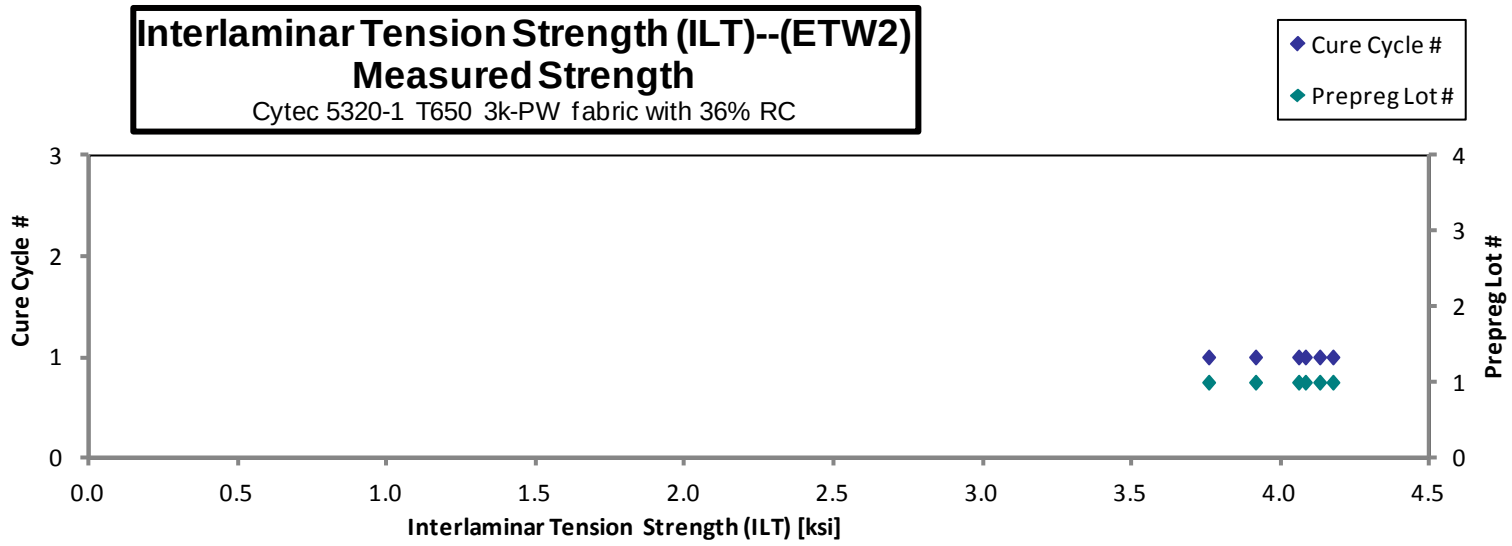
## Interlaminar Tension Properties (ILT)--ETW2 Strength

Cytec 5320-1 T650 3k-PW fabric with 36% RC

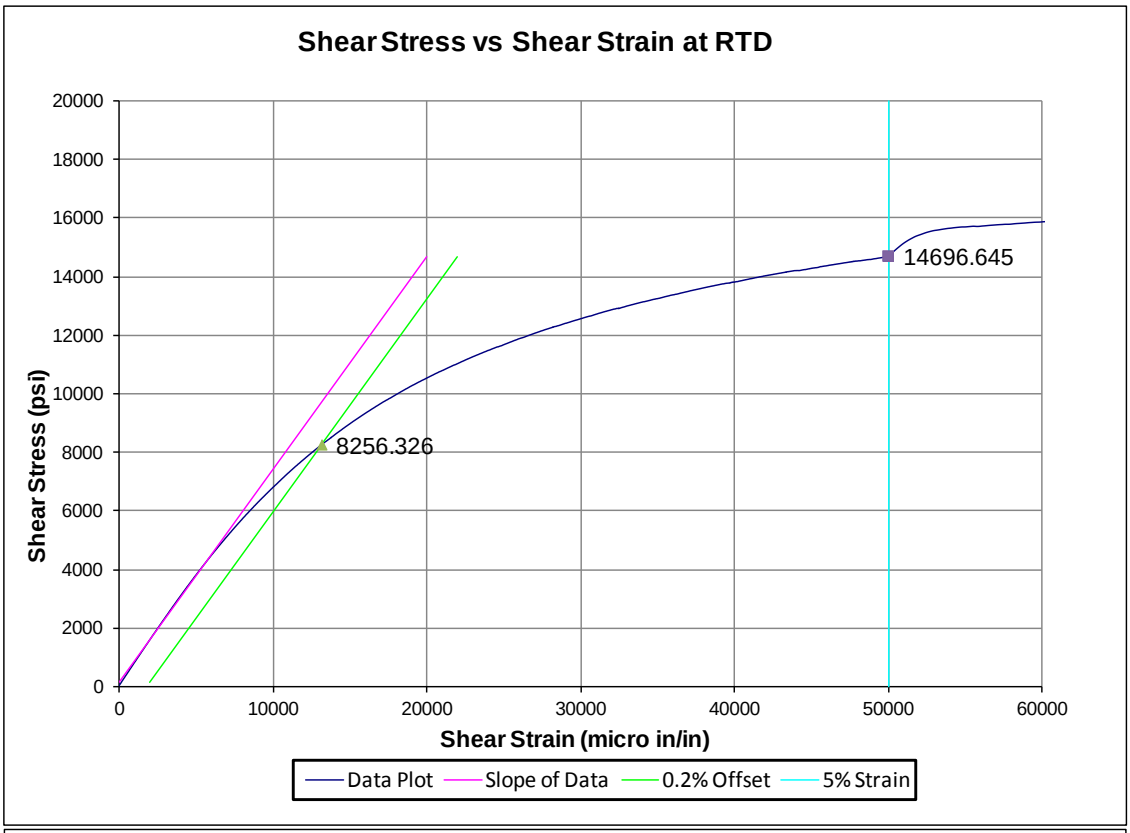
| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Cure Cycle # | Curved Beam Strength [lb] | Interlaminar Tension Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Avg. $t_{ply}$ [in] | Failure Mode |
|---|---|---|---|---|---|---|---|---|---|---|
| CUHMA11FF | A | C1 | 1 | 1 | 152.160 | 3.913 | 0.178 | 21 | 0.0085 | ILT |
| CUHMA11GF | A | C1 | 1 | 1 | 158.715 | 4.129 | 0.177 | 21 | 0.0084 | ILT |
| CUHMA11HF | A | C1 | 1 | 1 | 156.374 | 4.173 | 0.173 | 21 | 0.0082 | ILT |
| CUHMA11IF | A | C1 | 1 | 1 | 143.817 | 3.756 | 0.176 | 21 | 0.0084 | ILT |
| CUHMA11JF | A | C1 | 1 | 1 | 159.361 | 4.081 | 0.179 | 21 | 0.0085 | ILT |
| CUHMA11KF | A | C1 | 1 | 1 | 157.139 | 4.058 | 0.178 | 21 | 0.0085 | ILT |

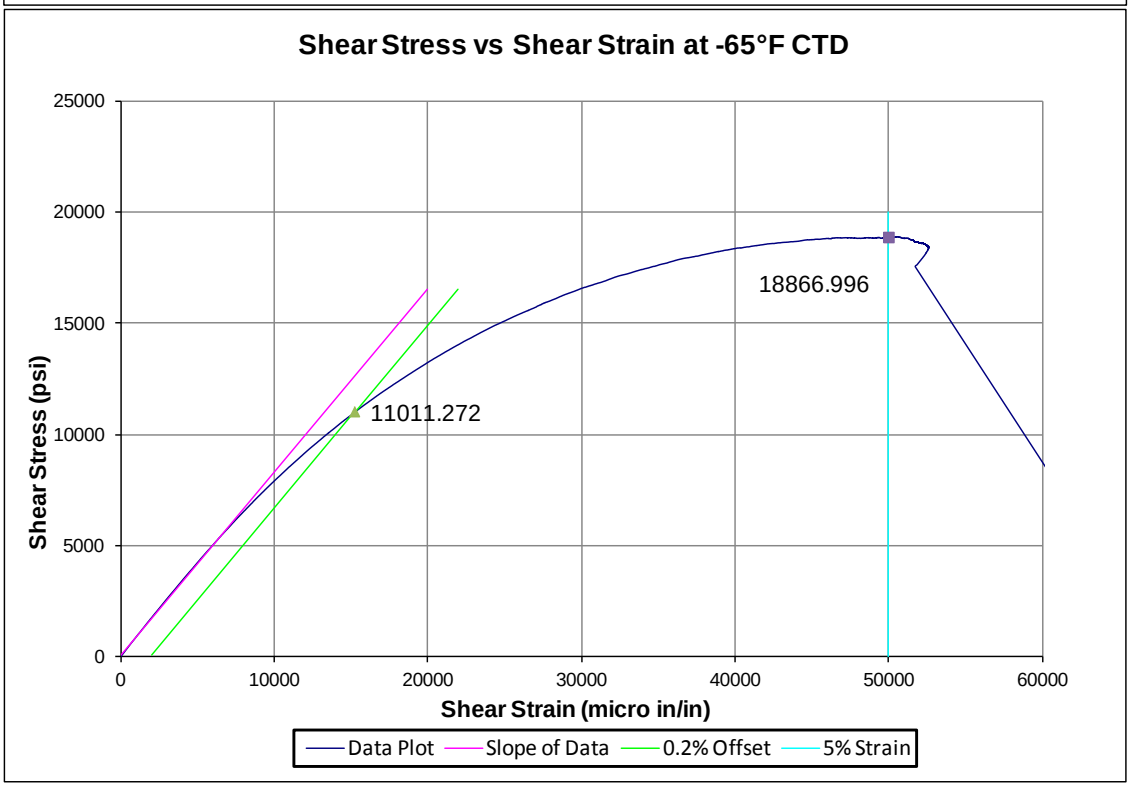
| | | | | |
|---|---|---|---|---|
| **Average** | **154.594** | **4.018** | **Average** | **0.0084** |
| **Standard Dev.** | **5.856** | **0.156** | **Standard Dev.** | |
| **Coeff. of Var. [%]** | **3.788** | **3.878** | **Coeff. of Var. [%]** | |
| **Min.** | **143.817** | **3.756** | **Min.** | **0.0082** |
| **Max.** | **159.361** | **4.173** | **Max.** | **0.0085** |
| **Number of Spec.** | **6** | **6** | **Number of Spec.** | **6** |

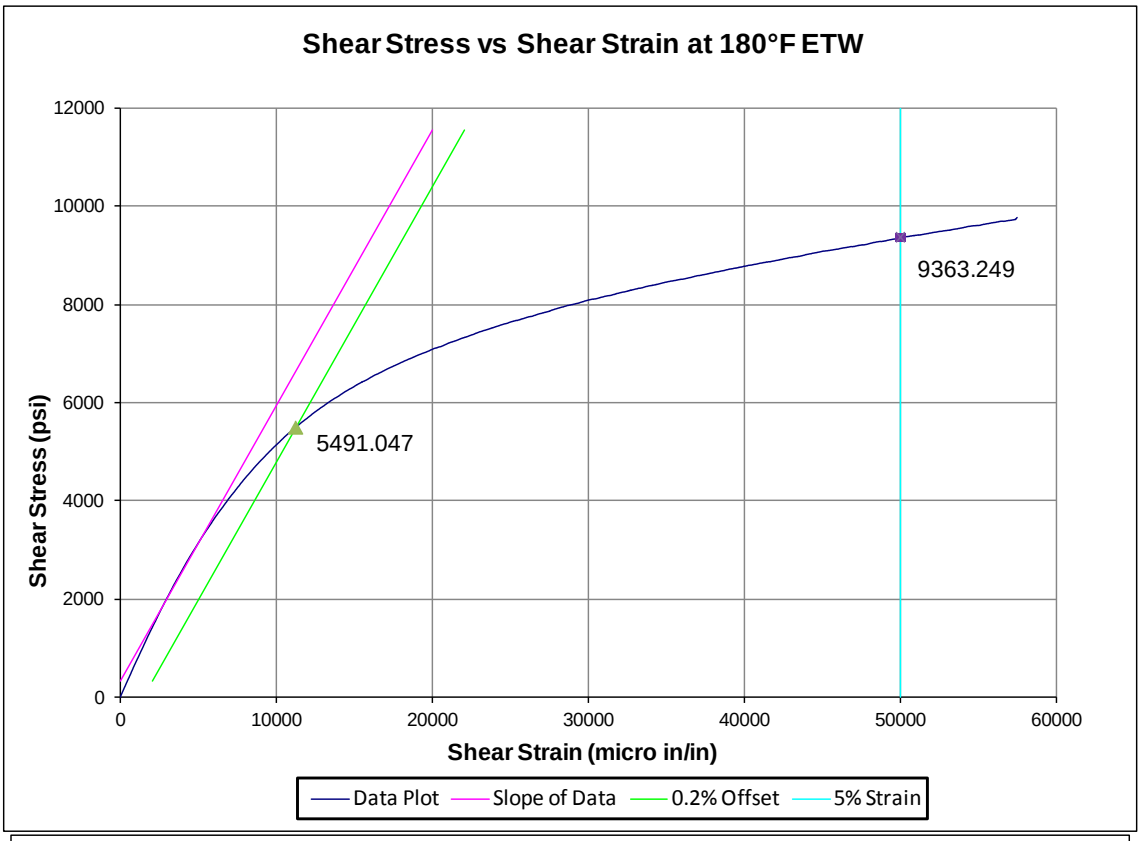

Curved Beam Strength Properties (CBS)--(ETW2)
Measured Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
20.0
40.0
60.0
80.0
100.0
120.0
140.0
160.0
180.0
Curved Beam Strength (CBS) [lb]

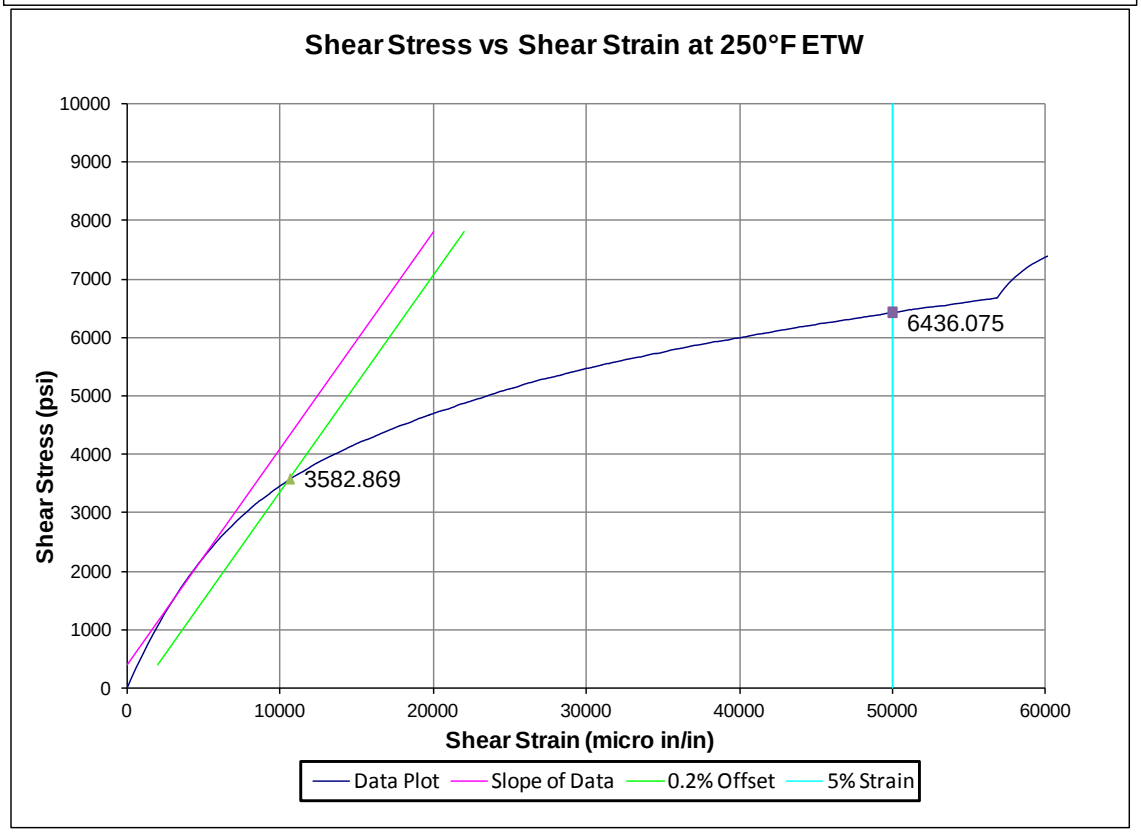

Interlaminar Tension Strength (ILT)--(ETW2)
Measured Strength
Cytec 5320-1 T650 3k-PW fabric with 36% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
Interlaminar Tension Strength (ILT) [ksi]

## 5. Full Shear Stress vs. Shear Strain Curve




Shear Stress vs Shear Strain at 180°F ETW
Shear Stress (psi)
Shear Strain (micro in/in)
0
2000
4000
6000
8000
10000
12000
0
10000
20000
30000
40000
50000
60000
5491.047
9363.249
Data Plot
Slope of Data
0.2% Offset
5% Strain


Shear Stress vs Shear Strain at 250°F ETW
Shear Stress (psi)
Shear Strain (micro in/in)
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000
0
10000
20000
30000
40000
50000
60000
3582.869
6436.075
Data Plot
Slope of Data
0.2% Offset
5% Strain

# 6. Fluid Sensitivity Comparison

## 6.1 Room Temperature Test Data

| | Fluid | Exposure |
|---|---|---|
| a | 100 Low lead Fuel | 90 days min @ 70°F ± 10F |
| b | Jet A Fuel | |
| c | Mil-H-5606 Hydraulic Oil | |
| d | Mil-H-83282 Hydraulic Oil | |
| e | Engine Lube Oil Mil-L-7808 | |
| f | Engine Lube Oil Mil-L-23699 | |
| g | Salt Water | |
| h | Skydrol LD-4 | |
| i | 50% Water w/ 50% Skydrol | |
| r | Distilled Water | |
| j | MEK washing fluid | 90 mins @ 70°F ± 10F |
| k | Polypropylene Glycol Deicer | |
| q | Isopropyl Alcohol Deicing | 48±4 hrs @ 70°F ± 10F |
| A | Dry | Per section 6.1 Test Plan |
| t | 85% Relative Humidity | |

| Fluid | Average Short-Beam Strength With Fluid (ksi) | Same Environment Short-Beam Strength Without Fluid (ksi) (RTD) | Worst Case Environment Short-Beam Strength (ksi) (RTW) | % Strength Reduction With Respect to RTD |
|---|---|---|---|---|
| a | 11.567 | 13.211 | 12.521 | 12.444 |
| b | 11.863 | 13.211 | 12.521 | 10.207 |
| c | 12.070 | 13.211 | 12.521 | 8.638 |
| d | 12.911 | 13.211 | 12.521 | 2.274 |
| e | 12.310 | 13.211 | 12.521 | 6.821 |
| f | 13.231 | 13.211 | 12.521 | -0.150 |
| g | 11.727 | 13.211 | 12.521 | 11.238 |
| h | 13.382 | 13.211 | 12.521 | -1.290 |
| i | 13.016 | 13.211 | 12.521 | 1.480 |
| j | 13.144 | 13.211 | 12.521 | 0.511 |
| k | 13.818 | 13.211 | 12.521 | -4.589 |
| q | 12.819 | 13.211 | 12.521 | 2.972 |
| r | 13.292 | 13.211 | 12.521 | -0.614 |
| A | 13.211 | 13.211 | 12.521 | 0.000 |
| t | 12.521 | 13.211 | 12.521 | 5.223 |

**Fluid Sensitivity Screening**
**Short-Beam Strength Properties (FSSBS)--RT Strength**
Cytec 5320-1 T650 3k-PW fabric with 36% RC

| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Fluid | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Avg. $t_{ply}$ [in] | Failure Mode | Average |
|---|---|---|---|---|---|---|---|---|---|---|
| CUHQB131a | B | C1 | 2 | a | 11.301 | 0.108 | 15 | 0.0072 | ILS | |
| CUHQB132a | B | C1 | 2 | a | 11.284 | 0.109 | 15 | 0.0073 | ILS | |
| CUHQB133a | B | C1 | 2 | a | 11.691 | 0.110 | 15 | 0.0073 | ILS | 11.567 |
| CUHQB134a | B | C1 | 2 | a | 11.682 | 0.110 | 15 | 0.0073 | ILS | |
| CUHQB135a | B | C1 | 2 | a | 11.711 | 0.110 | 15 | 0.0073 | ILS | |
| CUHQB136a | B | C1 | 2 | a | 11.735 | 0.109 | 15 | 0.0073 | ILS | |
| CUHQB13Fb | B | C1 | 2 | b | 11.392 | 0.109 | 15 | 0.0072 | ILS | |
| CUHQB13Gb | B | C1 | 2 | b | 11.770 | 0.108 | 15 | 0.0072 | ILS | |
| CUHQB13Hb | B | C1 | 2 | b | 11.683 | 0.108 | 15 | 0.0072 | ILS | 11.863 |
| CUHQB13Ib | B | C1 | 2 | b | 12.323 | 0.107 | 15 | 0.0072 | ILS | |
| CUHQB13Jb | B | C1 | 2 | b | 12.108 | 0.108 | 15 | 0.0072 | ILS | |
| CUHQB13Kb | B | C1 | 2 | b | 11.901 | 0.108 | 15 | 0.0072 | ILS | |
| CUHQB141c | B | C1 | 2 | c | 10.601 | 0.109 | 15 | 0.0072 | ILS | |
| CUHQB142c | B | C1 | 2 | c | 12.033 | 0.108 | 15 | 0.0072 | ILS | |
| CUHQB143c | B | C1 | 2 | c | 12.271 | 0.110 | 15 | 0.0073 | ILS | 12.070 |
| CUHQB144c | B | C1 | 2 | c | 12.712 | 0.110 | 15 | 0.0074 | ILS | |
| CUHQB145c | B | C1 | 2 | c | 12.216 | 0.111 | 15 | 0.0074 | ILS | |
| CUHQB146c | B | C1 | 2 | c | 12.588 | 0.111 | 15 | 0.0074 | ILS | |
| CUHQB14Fd | B | C1 | 2 | d | 12.956 | 0.111 | 15 | 0.0074 | ILS | |
| CUHQB14Gd | B | C1 | 2 | d | 12.338 | 0.109 | 15 | 0.0073 | ILS | |
| CUHQB14Hd | B | C1 | 2 | d | 13.162 | 0.110 | 15 | 0.0073 | ILS | 12.911 |
| CUHQB14Id | B | C1 | 2 | d | 13.020 | 0.110 | 15 | 0.0073 | ILS | |
| CUHQB14Jd | B | C1 | 2 | d | 12.683 | 0.109 | 15 | 0.0073 | ILS | |
| CUHQB14Kd | B | C1 | 2 | d | 13.305 | 0.109 | 15 | 0.0073 | ILS | |
| CUHQB151e | B | C1 | 2 | e | 11.852 | 0.110 | 15 | 0.0073 | ILS | |
| CUHQB152e | B | C1 | 2 | e | 11.571 | 0.110 | 15 | 0.0074 | ILS | |
| CUHQB153e | B | C1 | 2 | e | 12.628 | 0.111 | 15 | 0.0074 | ILS | 12.310 |
| CUHQB154e | B | C1 | 2 | e | 12.658 | 0.112 | 15 | 0.0075 | ILS | |
| CUHQB155e | B | C1 | 2 | e | 12.342 | 0.112 | 15 | 0.0075 | ILS | |
| CUHQB156e | B | C1 | 2 | e | 12.809 | 0.113 | 15 | 0.0075 | ILS | |
| CUHQB15Ff | B | C1 | 2 | f | 13.430 | 0.112 | 15 | 0.0074 | ILS | |
| CUHQB15Gf | B | C1 | 2 | f | 12.872 | 0.111 | 15 | 0.0074 | ILS | |
| CUHQB15Hf | B | C1 | 2 | f | 13.335 | 0.111 | 15 | 0.0074 | ILS | 13.231 |
| CUHQB15If | B | C1 | 2 | f | 13.065 | 0.113 | 15 | 0.0075 | ILS | |
| CUHQB15Jf | B | C1 | 2 | f | 13.440 | 0.112 | 15 | 0.0074 | ILS | |
| CUHQB15Kf | B | C1 | 2 | f | 13.244 | 0.111 | 15 | 0.0074 | ILS | |
| CUHQB161g | B | C1 | 2 | g | 10.179 | 0.109 | 15 | 0.0073 | ILS | |
| CUHQB162g | B | C1 | 2 | g | 10.613 | 0.110 | 15 | 0.0073 | ILS | |
| CUHQB163g | B | C1 | 2 | g | 12.176 | 0.110 | 15 | 0.0074 | ILS | 11.727 |
| CUHQB164g | B | C1 | 2 | g | 12.155 | 0.111 | 15 | 0.0074 | ILS | |
| CUHQB165g | B | C1 | 2 | g | 12.869 | 0.108 | 15 | 0.0072 | ILS | |
| CUHQB166g | B | C1 | 2 | g | 12.369 | 0.112 | 15 | 0.0075 | ILS | |
| CUHQB16Fh | B | C1 | 2 | h | 13.308 | 0.111 | 15 | 0.0074 | ILS | |
| CUHQB16Gh | B | C1 | 2 | h | 13.583 | 0.111 | 15 | 0.0074 | ILS | |
| CUHQB16Hh | B | C1 | 2 | h | 12.954 | 0.111 | 15 | 0.0074 | ILS | 13.382 |
| CUHQB16Ih | B | C1 | 2 | h | 13.578 | 0.111 | 15 | 0.0074 | ILS | |
| CUHQB16Jh | B | C1 | 2 | h | 13.304 | 0.112 | 15 | 0.0075 | ILS | |
| CUHQB16Kh | B | C1 | 2 | h | 13.563 | 0.111 | 15 | 0.0074 | ILS | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| CUHQB171i | B | C1 | 2 | i | 12.446 | 0.111 | 15 | 0.0074 | ILS | |
| CUHQB172i | B | C1 | 2 | i | 12.884 | 0.112 | 15 | 0.0074 | ILS | |
| CUHQB173i | B | C1 | 2 | i | 13.004 | 0.112 | 15 | 0.0075 | ILS | 13.016 |
| CUHQB174i | B | C1 | 2 | i | 13.111 | 0.112 | 15 | 0.0075 | ILS | |
| CUHQB175i | B | C1 | 2 | i | 13.301 | 0.113 | 15 | 0.0075 | ILS | |
| CUHQB176i | B | C1 | 2 | i | 13.348 | 0.111 | 15 | 0.0074 | ILS | |
| CUHQB181j | B | C1 | 2 | j | 12.119 | 0.110 | 15 | 0.0073 | ILS | |
| CUHQB182j | B | C1 | 2 | j | 12.666 | 0.110 | 15 | 0.0073 | ILS | |
| CUHQB183j | B | C1 | 2 | j | 13.434 | 0.112 | 15 | 0.0074 | ILS | 13.144 |
| CUHQB184j | B | C1 | 2 | j | 13.610 | 0.111 | 15 | 0.0074 | ILS | |
| CUHQB185j | B | C1 | 2 | j | 13.890 | 0.113 | 15 | 0.0075 | ILS | |
| CUHQB18Dk | B | C1 | 2 | k | 13.234 | 0.112 | 15 | 0.0075 | ILS | |
| CUHQB18Ek | B | C1 | 2 | k | 14.248 | 0.112 | 15 | 0.0075 | ILS | |
| CUHQB18Fk | B | C1 | 2 | k | 13.410 | 0.112 | 15 | 0.0075 | ILS | 13.818 |
| CUHQB18Gk | B | C1 | 2 | k | 13.984 | 0.112 | 15 | 0.0075 | ILS | |
| CUHQB18Ik | B | C1 | 2 | k | 14.211 | 0.113 | 15 | 0.0075 | ILS | |
| CUHQB191q | B | C1 | 2 | q | 11.843 | 0.111 | 15 | 0.0074 | ILS | |
| CUHQB192q | B | C1 | 2 | q | 12.197 | 0.114 | 15 | 0.0076 | ILS | |
| CUHQB193q | B | C1 | 2 | q | 13.029 | 0.112 | 15 | 0.0075 | ILS | 12.819 |
| CUHQB194q | B | C1 | 2 | q | 12.848 | 0.113 | 15 | 0.0075 | ILS | |
| CUHQB195q | B | C1 | 2 | q | 14.176 | 0.114 | 15 | 0.0076 | ILS | |
| CUHQB19Fr | B | C1 | 2 | r | 13.380 | 0.114 | 15 | 0.0076 | ILS | |
| CUHQB19Gr | B | C1 | 2 | r | 13.320 | 0.112 | 15 | 0.0075 | ILS | |
| CUHQB19Hr | B | C1 | 2 | r | 13.432 | 0.112 | 15 | 0.0075 | ILS | 13.292 |
| CUHQB19Ir | B | C1 | 2 | r | 13.618 | 0.113 | 15 | 0.0075 | ILS | |
| CUHQB19Jr | B | C1 | 2 | r | 12.867 | 0.113 | 15 | 0.0076 | ILS | |
| CUHQB19Kr | B | C1 | 2 | r | 13.137 | 0.112 | 15 | 0.0075 | ILS | |
| CUHQB1A1A | B | C1 | 2 | A | 12.011 | 0.109 | 15 | 0.0073 | ILS | |
| CUHQB1A2A | B | C1 | 2 | A | 12.808 | 0.109 | 15 | 0.0073 | ILS | |
| CUHQB1A3A | B | C1 | 2 | A | 13.427 | 0.110 | 15 | 0.0074 | ILS | 13.211 |
| CUHQB1A4A | B | C1 | 2 | A | 13.910 | 0.111 | 15 | 0.0074 | ILS | |
| CUHQB1A5A | B | C1 | 2 | A | 13.900 | 0.112 | 15 | 0.0075 | ILS | |
| CUHQB1AFt | B | C1 | 2 | t | 11.958 | 0.113 | 15 | 0.0075 | ILS | |
| CUHQB1AGt | B | C1 | 2 | t | 12.622 | 0.111 | 15 | 0.0074 | ILS | |
| CUHQB1AHt | B | C1 | 2 | t | 12.434 | 0.112 | 15 | 0.0075 | ILS | 12.521 |
| CUHQB1AIt | B | C1 | 2 | t | 13.074 | 0.113 | 15 | 0.0075 | ILS | |
| CUHQB1AJt | B | C1 | 2 | t | 12.883 | 0.113 | 15 | 0.0075 | ILS | |
| CUHQB1AKt | B | C1 | 2 | t | 12.157 | 0.111 | 15 | 0.0074 | ILS | |

| | |
|---|---|
| **Average** | **12.701** |
| **Standard Dev.** | **0.837** |
| **Coeff. of Var. [%]** | **6.591** |
| **Min.** | **10.179** |
| **Max.** | **14.248** |
| **Number of Spec.** | **86** |

## 6.2 Elevated Temperature Test Data

| | Fluid | Exposure |
|---|---|---|
| 1 | 100 Low lead Fuel | 90 days min @ 70°F ± 10F |
| 2 | Jet A Fuel | |
| 3 | Mil-H-5606 Hydraulic Oil | |
| 4 | Mil-H-83282 Hydraulic Oil | |
| 5 | Engine Lube Oil Mil-L-7808 | |
| 6 | Engine Lube Oil Mil-L-23699 | |
| 7 | Salt Water | |
| 8 | Skydrol LD-4 | |
| 9 | 50% Water w/ 50% Skydrol | |
| s | Distilled Water | |
| m | MEK washing fluid | 90 mins @ 70°F ± 10F |
| n | Polypropylene Glycol Deicer | |
| p | Isopropyl Alcohol Deicing | 48±4 hrs @ 70°F ± 10F |
| C | Dry | Per section 6.1 Test Plan |
| D | 85% Relative Humidity | |

| Fluid | Average Short-Beam Strength With Fluid (ksi) | Same Environment Short-Beam Strength Without Fluid (ksi) (ETD) | Worst Case Environment Short-Beam Strength (ksi) (ETW) | % Strength Reduction With Respect to ETD |
|---|---|---|---|---|
| 1 | 10.260 | 10.554 | 9.290 | 2.783 |
| 2 | 10.106 | 10.554 | 9.290 | 4.245 |
| 3 | 10.672 | 10.554 | 9.290 | -1.113 |
| 4 | 10.728 | 10.554 | 9.290 | -1.651 |
| 5 | 11.131 | 10.554 | 9.290 | -5.469 |
| 6 | 10.718 | 10.554 | 9.290 | -1.557 |
| 7 | 9.663 | 10.554 | 9.290 | 8.439 |
| 8 | 11.016 | 10.554 | 9.290 | -4.372 |
| 9 | 9.864 | 10.554 | 9.290 | 6.538 |
| m | 11.448 | 10.554 | 9.290 | -8.470 |
| n | 11.390 | 10.554 | 9.290 | -7.918 |
| p | 11.453 | 10.554 | 9.290 | -8.513 |
| s | 9.672 | 10.554 | 9.290 | 8.363 |
| C | 10.554 | 10.554 | 9.290 | 0.000 |
| D | 9.290 | 10.554 | 9.290 | 11.979 |

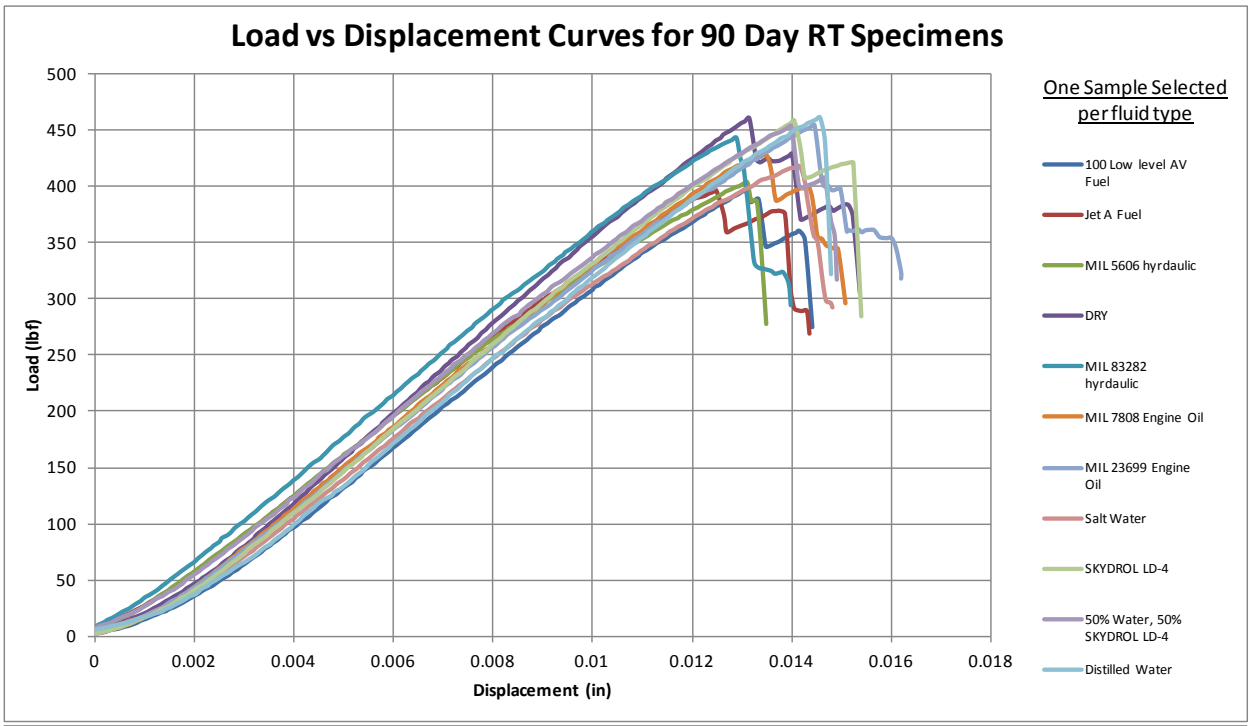
**Fluid Sensitivity Screening**
**Short-Beam Strength Properties (FSSBS)--ET Strength**
Cytec 5320-1 T650 3k-PW fabric with 36% RC

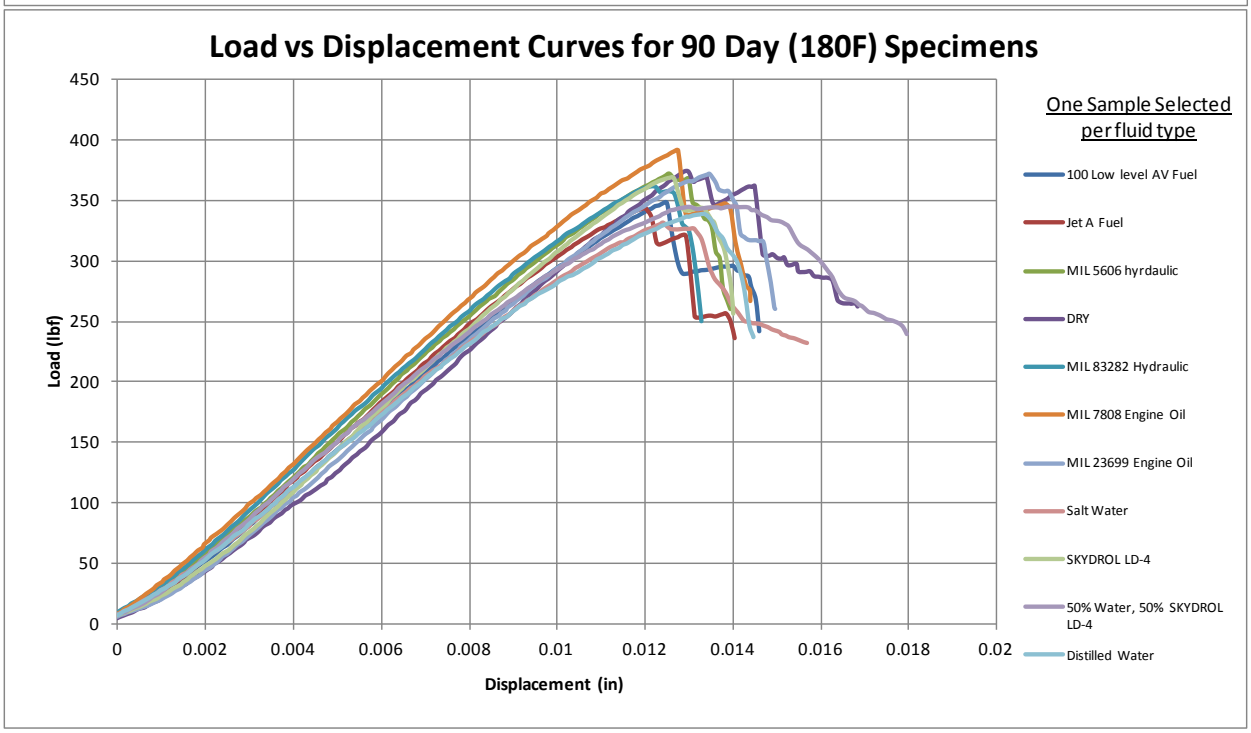
| Specimen Number | Cytec Batch # | Cytec Cure Cycle | Prepreg Lot # | Fluid | Strength [ksi] | Avg. Specimen Thickness [in] | # Plies in Laminate | Avg. $t_{ply}$ [in] | Failure Mode | Average |
|---|---|---|---|---|---|---|---|---|---|---|
| CUHQB1381 | B | C1 | 2 | 1 | 10.466 | 0.110 | 15 | 0.0073 | ILS | |
| CUHQB1391 | B | C1 | 2 | 1 | 10.445 | 0.109 | 15 | 0.0073 | ILS | |
| CUHQB13A1 | B | C1 | 2 | 1 | 10.058 | 0.109 | 15 | 0.0073 | ILS | 10.260 |
| CUHQB13B1 | B | C1 | 2 | 1 | 10.334 | 0.109 | 15 | 0.0073 | ILS | |
| CUHQB13C1 | B | C1 | 2 | 1 | 10.157 | 0.110 | 15 | 0.0074 | ILS | |
| CUHQB13D1 | B | C1 | 2 | 1 | 10.102 | 0.109 | 15 | 0.0073 | ILS | |
| CUHQB13M2 | B | C1 | 2 | 2 | 10.457 | 0.107 | 15 | 0.0071 | ILS | |
| CUHQB13N2 | B | C1 | 2 | 2 | 9.702 | 0.108 | 15 | 0.0072 | ILS | |
| CUHQB13O2 | B | C1 | 2 | 2 | 9.468 | 0.108 | 15 | 0.0072 | ILS | 10.106 |
| CUHQB13P2 | B | C1 | 2 | 2 | 10.200 | 0.109 | 15 | 0.0073 | ILS | |
| CUHQB13Q2 | B | C1 | 2 | 2 | 10.360 | 0.109 | 15 | 0.0073 | ILS | |
| CUHQB13R2 | B | C1 | 2 | 2 | 10.449 | 0.110 | 15 | 0.0073 | ILS | |
| CUHQB1483 | B | C1 | 2 | 3 | 10.881 | 0.111 | 15 | 0.0074 | ILS | |
| CUHQB1493 | B | C1 | 2 | 3 | 10.585 | 0.111 | 15 | 0.0074 | ILS | |
| CUHQB14A3 | B | C1 | 2 | 3 | 10.904 | 0.110 | 15 | 0.0074 | ILS | 10.672 |
| CUHQB14B3 | B | C1 | 2 | 3 | 10.430 | 0.112 | 15 | 0.0074 | ILS | |
| CUHQB14C3 | B | C1 | 2 | 3 | 10.679 | 0.111 | 15 | 0.0074 | ILS | |
| CUHQB14D3 | B | C1 | 2 | 3 | 10.551 | 0.110 | 15 | 0.0073 | ILS | |
| CUHQB14M4 | B | C1 | 2 | 4 | 11.128 | 0.109 | 15 | 0.0073 | ILS | |
| CUHQB14N4 | B | C1 | 2 | 4 | 11.009 | 0.109 | 15 | 0.0073 | ILS | |
| CUHQB14O4 | B | C1 | 2 | 4 | 10.607 | 0.109 | 15 | 0.0072 | ILS | 10.728 |
| CUHQB14P4 | B | C1 | 2 | 4 | 10.766 | 0.108 | 15 | 0.0072 | ILS | |
| CUHQB14Q4 | B | C1 | 2 | 4 | 10.490 | 0.110 | 15 | 0.0073 | ILS | |
| CUHQB14R4 | B | C1 | 2 | 4 | 10.369 | 0.110 | 15 | 0.0073 | ILS | |
| CUHQB1585 | B | C1 | 2 | 5 | 11.283 | 0.112 | 15 | 0.0075 | ILS | |
| CUHQB1595 | B | C1 | 2 | 5 | 10.666 | 0.112 | 15 | 0.0075 | ILS | |
| CUHQB15A5 | B | C1 | 2 | 5 | 11.311 | 0.113 | 15 | 0.0075 | ILS | 11.131 |
| CUHQB15B5 | B | C1 | 2 | 5 | 11.220 | 0.111 | 15 | 0.0074 | ILS | |
| CUHQB15C5 | B | C1 | 2 | 5 | 11.237 | 0.112 | 15 | 0.0074 | ILS | |
| CUHQB15D5 | B | C1 | 2 | 5 | 11.070 | 0.112 | 15 | 0.0074 | ILS | |
| CUHQB15M6 | B | C1 | 2 | 6 | 10.857 | 0.111 | 15 | 0.0074 | ILS | |
| CUHQB15N6 | B | C1 | 2 | 6 | 10.861 | 0.110 | 15 | 0.0073 | ILS | |
| CUHQB15O6 | B | C1 | 2 | 6 | 10.875 | 0.110 | 15 | 0.0073 | ILS | 10.718 |
| CUHQB15P6 | B | C1 | 2 | 6 | 10.671 | 0.109 | 15 | 0.0072 | ILS | |
| CUHQB15Q6 | B | C1 | 2 | 6 | 10.831 | 0.110 | 15 | 0.0074 | ILS | |
| CUHQB15R6 | B | C1 | 2 | 6 | 10.216 | 0.111 | 15 | 0.0074 | ILS | |
| CUHQB1687 | B | C1 | 2 | 7 | 9.671 | 0.111 | 15 | 0.0074 | ILS | |
| CUHQB1697 | B | C1 | 2 | 7 | 9.797 | 0.111 | 15 | 0.0074 | ILS | |
| CUHQB16A7 | B | C1 | 2 | 7 | 9.381 | 0.113 | 15 | 0.0075 | ILS | 9.663 |
| CUHQB16B7 | B | C1 | 2 | 7 | 9.763 | 0.111 | 15 | 0.0074 | ILS | |
| CUHQB16C7 | B | C1 | 2 | 7 | 9.763 | 0.111 | 15 | 0.0074 | ILS | |
| CUHQB16D7 | B | C1 | 2 | 7 | 9.606 | 0.113 | 15 | 0.0075 | ILS | |

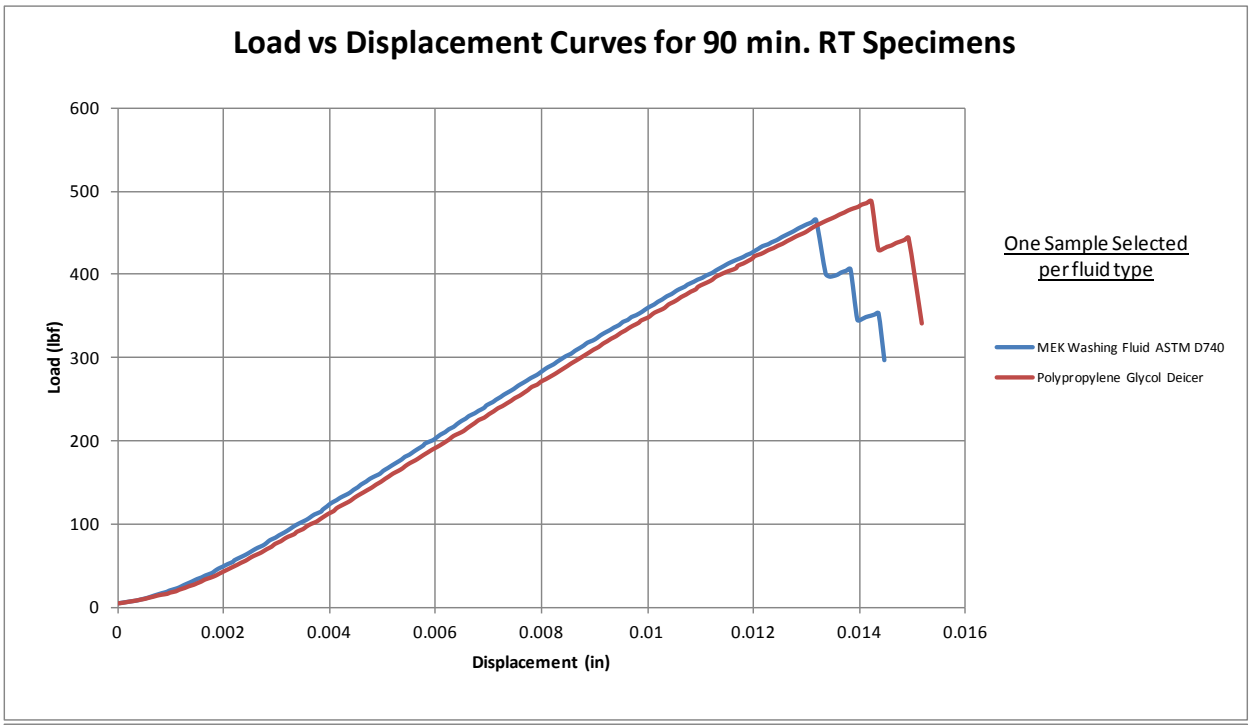
| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| CUHQB16M8 | B | C1 | 2 | 8 | 11.389 | 0.110 | 15 | 0.0073 | ILS | |
| CUHQB16N8 | B | C1 | 2 | 8 | 11.208 | 0.110 | 15 | 0.0073 | ILS | |
| CUHQB16O8 | B | C1 | 2 | 8 | 11.216 | 0.110 | 15 | 0.0073 | ILS | 11.016 |
| CUHQB16P8 | B | C1 | 2 | 8 | 10.915 | 0.109 | 15 | 0.0073 | ILS | |
| CUHQB16Q8 | B | C1 | 2 | 8 | 10.723 | 0.109 | 15 | 0.0073 | ILS | |
| CUHQB16R8 | B | C1 | 2 | 8 | 10.642 | 0.109 | 15 | 0.0073 | ILS | |
| CUHQB1789 | B | C1 | 2 | 9 | 9.895 | 0.112 | 15 | 0.0075 | ILS | |
| CUHQB1799 | B | C1 | 2 | 9 | 10.070 | 0.112 | 15 | 0.0075 | ILS | |
| CUHQB17A9 | B | C1 | 2 | 9 | 9.724 | 0.112 | 15 | 0.0074 | ILS | 9.864 |
| CUHQB17B9 | B | C1 | 2 | 9 | 10.031 | 0.112 | 15 | 0.0075 | ILS | |
| CUHQB17C9 | B | C1 | 2 | 9 | 9.663 | 0.111 | 15 | 0.0074 | ILS | |
| CUHQB17D9 | B | C1 | 2 | 9 | 9.801 | 0.110 | 15 | 0.0073 | ILS | |
| CUHQB187m | B | C1 | 2 | m | 11.868 | 0.112 | 15 | 0.0075 | ILS | |
| CUHQB188m | B | C1 | 2 | m | 11.106 | 0.112 | 15 | 0.0075 | ILS | |
| CUHQB189m | B | C1 | 2 | m | 11.910 | 0.113 | 15 | 0.0075 | ILS | 11.448 |
| CUHQB18Am | B | C1 | 2 | m | 11.131 | 0.113 | 15 | 0.0076 | ILS | |
| CUHQB18Bm | B | C1 | 2 | m | 11.226 | 0.112 | 15 | 0.0075 | ILS | |
| CUHQB18Kn | B | C1 | 2 | n | 11.737 | 0.113 | 15 | 0.0075 | ILS | |
| CUHQB18Ln | B | C1 | 2 | n | 11.363 | 0.112 | 15 | 0.0075 | ILS | |
| CUHQB18Nn | B | C1 | 2 | n | 11.304 | 0.111 | 15 | 0.0074 | ILS | 11.390 |
| CUHQB18On | B | C1 | 2 | n | 11.243 | 0.111 | 15 | 0.0074 | ILS | |
| CUHQB18Pn | B | C1 | 2 | n | 11.302 | 0.109 | 15 | 0.0073 | ILS | |
| CUHQB198p | B | C1 | 2 | p | 12.009 | 0.113 | 15 | 0.0075 | ILS | |
| CUHQB199p | B | C1 | 2 | p | 11.043 | 0.114 | 15 | 0.0076 | ILS | |
| CUHQB19Ap | B | C1 | 2 | p | 11.585 | 0.114 | 15 | 0.0076 | ILS | 11.453 |
| CUHQB19Bp | B | C1 | 2 | p | 10.863 | 0.116 | 15 | 0.0077 | ILS | |
| CUHQB19Cp | B | C1 | 2 | p | 11.763 | 0.113 | 15 | 0.0075 | ILS | |
| CUHQB19Ms | B | C1 | 2 | s | 9.761 | 0.112 | 15 | 0.0075 | ILS | |
| CUHQB19Ns | B | C1 | 2 | s | 9.947 | 0.111 | 15 | 0.0074 | ILS | |
| CUHQB19Os | B | C1 | 2 | s | 9.729 | 0.111 | 15 | 0.0074 | ILS | 9.672 |
| CUHQB19Ps | B | C1 | 2 | s | 9.659 | 0.110 | 15 | 0.0073 | ILS | |
| CUHQB19Qs | B | C1 | 2 | s | 9.340 | 0.111 | 15 | 0.0074 | ILS | |
| CUHQB19Rs | B | C1 | 2 | s | 9.593 | 0.110 | 15 | 0.0074 | ILS | |
| CUHQB1A7C | B | C1 | 2 | C | 11.447 | 0.112 | 15 | 0.0075 | ILS | |
| CUHQB1A8C | B | C1 | 2 | C | 10.771 | 0.112 | 15 | 0.0075 | ILS | |
| CUHQB1AAC | B | C1 | 2 | C | 11.138 | 0.112 | 15 | 0.0075 | ILS | 10.554 |
| CUHQB1ACC | B | C1 | 2 | C | 7.045 | 0.112 | 15 | 0.0075 | ILS | |
| CUHQB1ADC | B | C1 | 2 | C | 11.491 | 0.113 | 15 | 0.0075 | ILS | |
| CUHQB1AEC | B | C1 | 2 | C | 11.433 | 0.112 | 15 | 0.0075 | ILS | |
| CUHQB1AMD | B | C1 | 2 | D | 9.437 | 0.111 | 15 | 0.0074 | ILS | |
| CUHQB1AND | B | C1 | 2 | D | 9.403 | 0.110 | 15 | 0.0074 | ILS | |
| CUHQB1AOD | B | C1 | 2 | D | 9.413 | 0.111 | 15 | 0.0074 | ILS | 9.290 |
| CUHQB1APD | B | C1 | 2 | D | 9.344 | 0.110 | 15 | 0.0073 | ILS | |
| CUHQB1AQD | B | C1 | 2 | D | 8.994 | 0.111 | 15 | 0.0074 | ILS | |
| CUHQB1ARD | B | C1 | 2 | D | 9.149 | 0.110 | 15 | 0.0074 | ILS | |

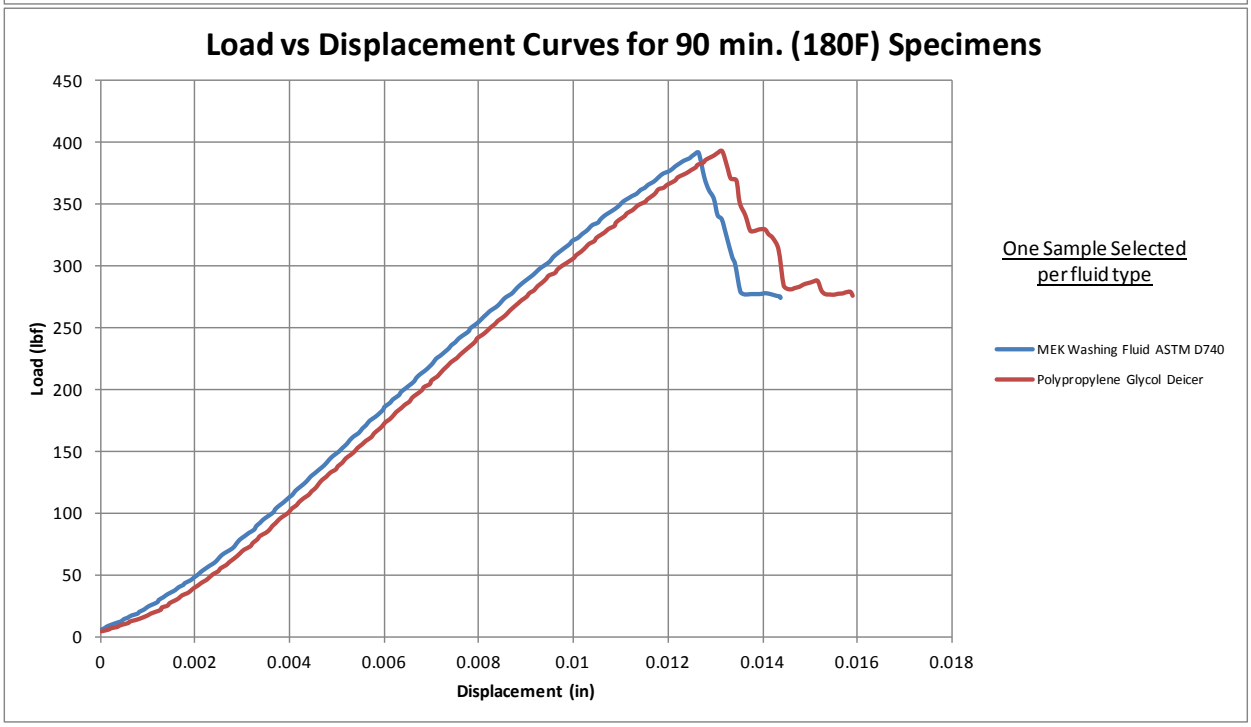
| | |
|---|---|
| **Average** | **10.500** |
| **Standard Dev.** | **0.827** |
| **Coeff. of Var. [%]** | **7.877** |
| **Min.** | **7.045** |
| **Max.** | **12.009** |
| **Number of Spec.** | **87** |

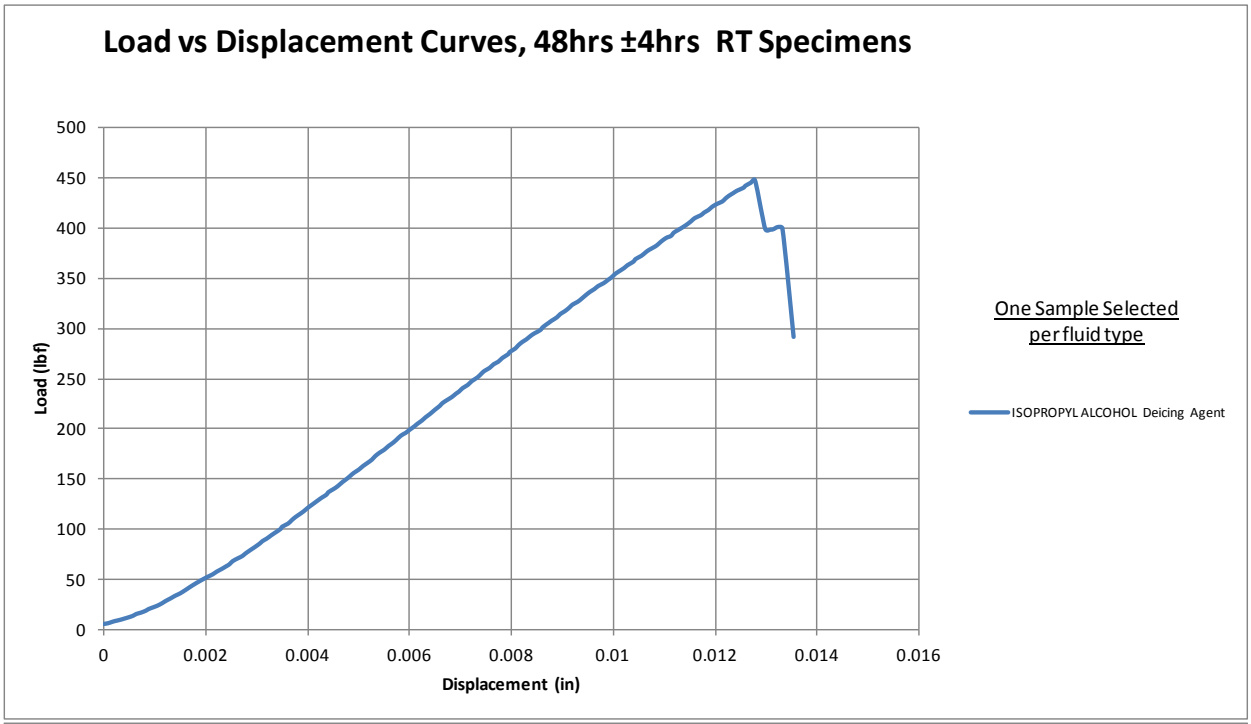
## 6.3 Load Displacement Curves

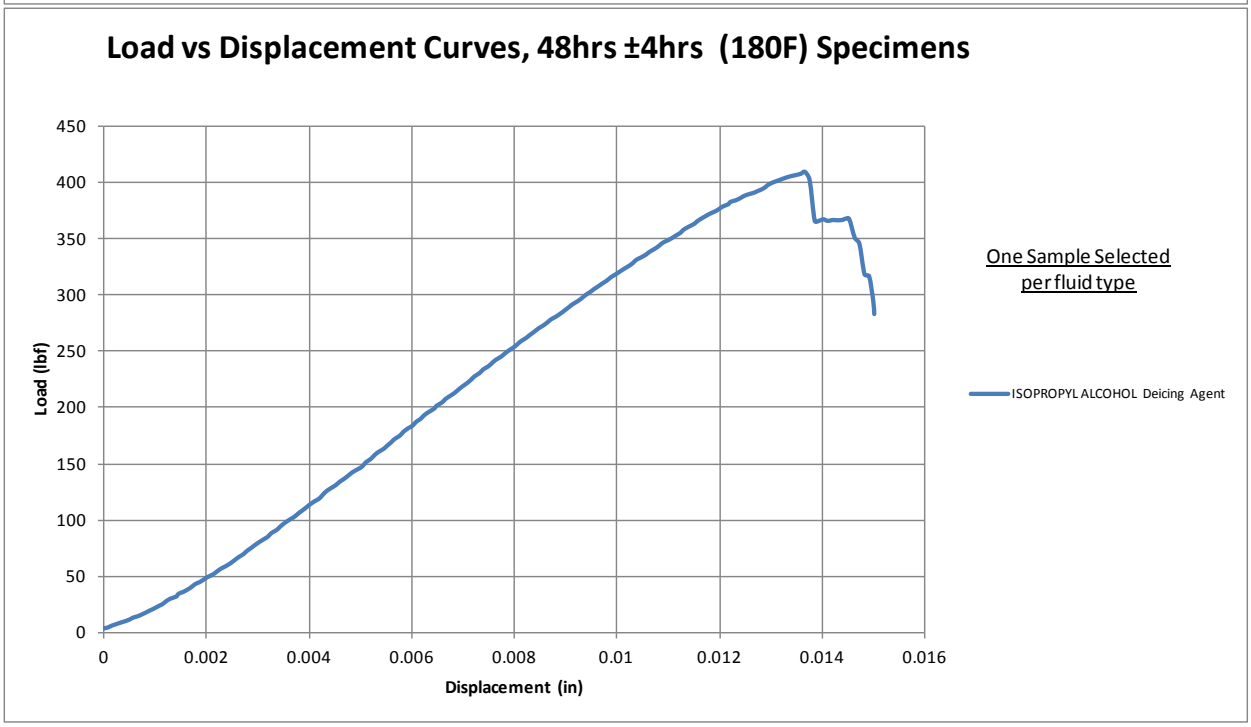


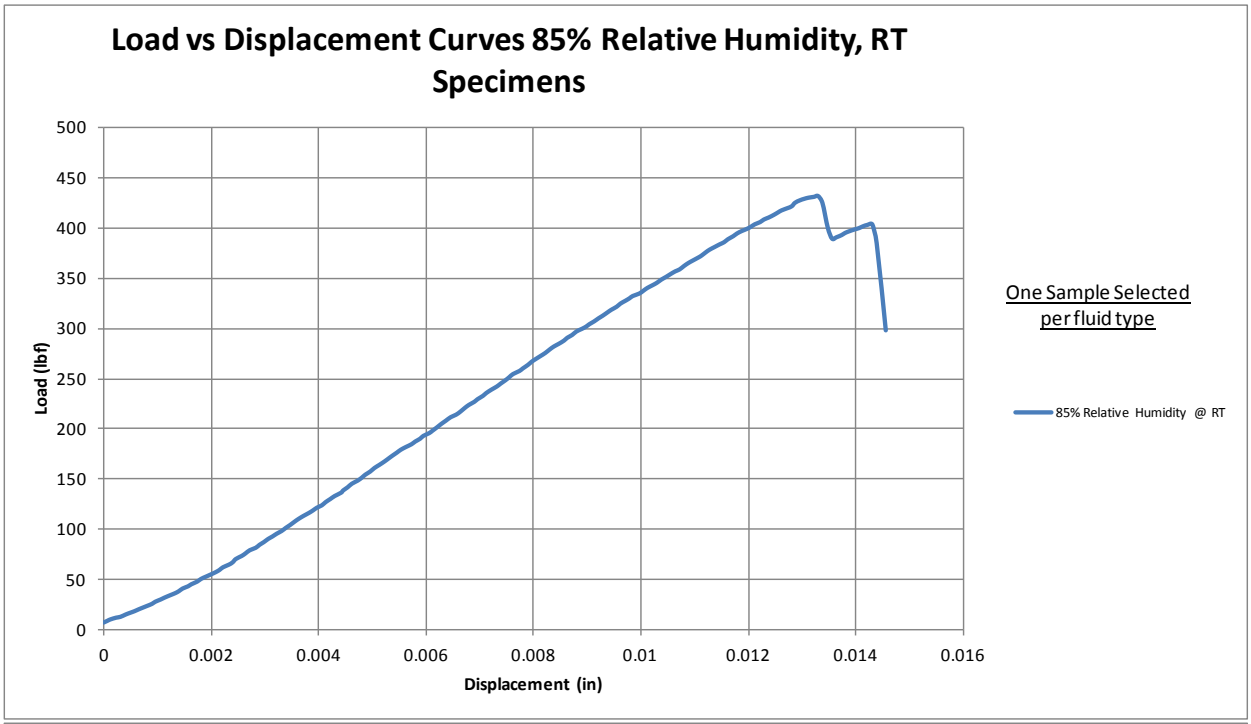



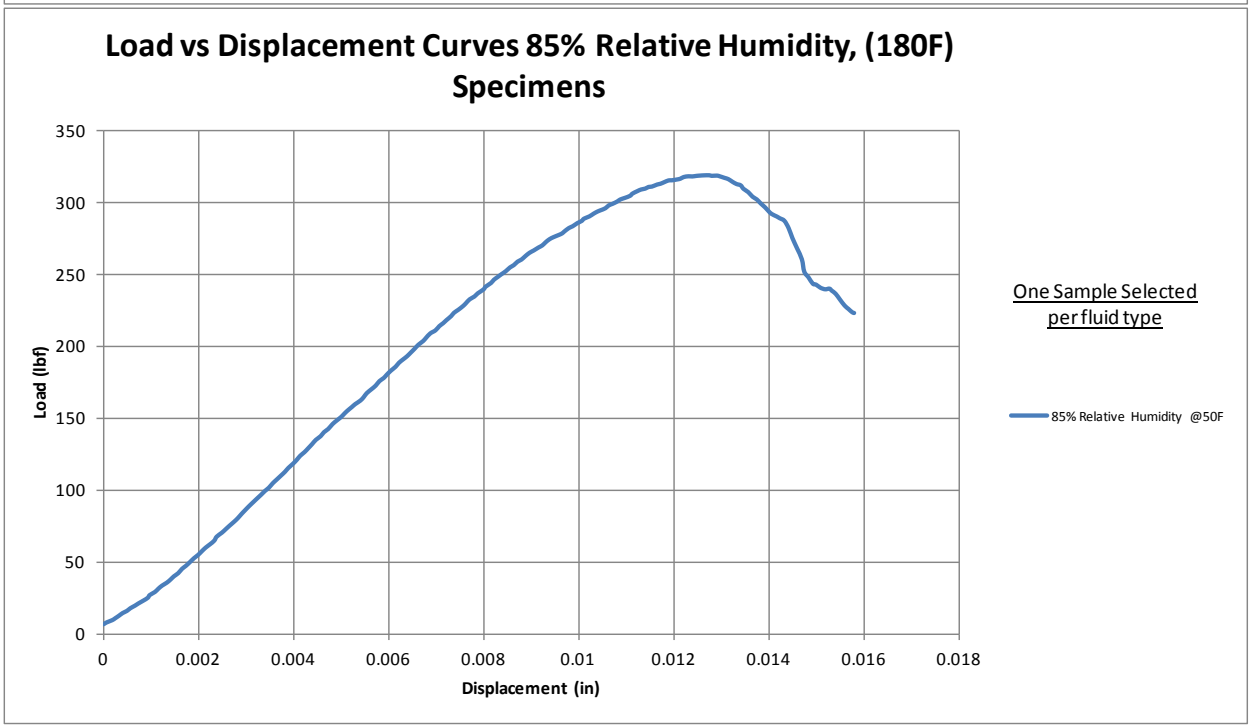

Load vs Displacement Curves for 90 min. RT Specimens
600
500
400
300
200
100
0
Load (lbf)
0
0.002
0.004
0.006
0.008
0.01
0.012
0.014
0.016
Displacement (in)
One Sample Selected per fluid type
MEK Washing Fluid ASTM D740
Polypropylene Glycol Deicer


Load vs Displacement Curves for 90 min. (180F) Specimens
450
400
350
300
250
200
150
100
50
0
Load (lbf)
0
0.002
0.004
0.006
0.008
0.01
0.012
0.014
0.016
0.018
Displacement (in)
One Sample Selected per fluid type
MEK Washing Fluid ASTM D740
Polypropylene Glycol Deicer


Load vs Displacement Curves, 48hrs ±4hrs RT Specimens
Load (lbf)
500
450
400
350
300
250
200
150
100
50
0
0
0.002
0.004
0.006
0.008
0.01
0.012
0.014
0.016
Displacement (in)
One Sample Selected per fluid type
ISOPROPYL ALCOHOL Deicing Agent

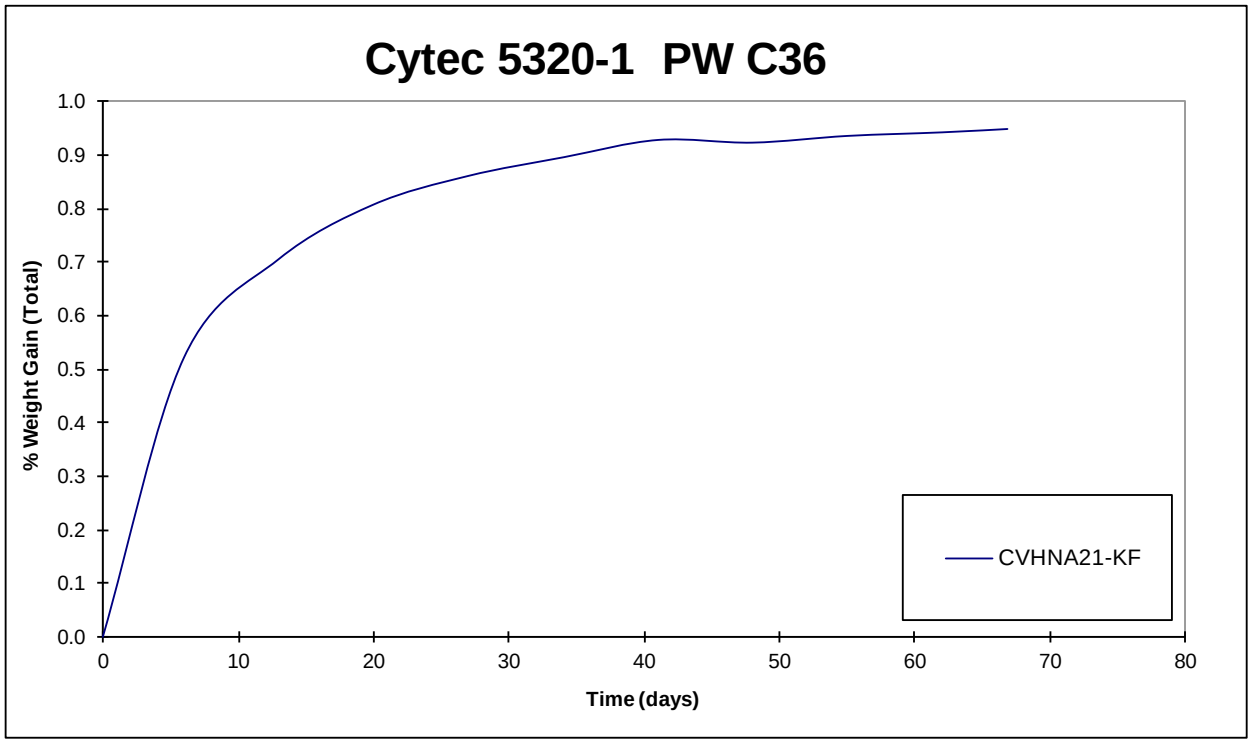

Load vs Displacement Curves, 48hrs ±4hrs (180F) Specimens
Load (lbf)
450
400
350
300
250
200
150
100
50
0
0
0.002
0.004
0.006
0.008
0.01
0.012
0.014
0.016
Displacement (in)
One Sample Selected per fluid type
ISOPROPYL ALCOHOL Deicing Agent


Load vs Displacement Curves 85% Relative Humidity, RT Specimens
Load (lbf)
500
450
400
350
300
250
200
150
100
50
0
0
0.002
0.004
0.006
0.008
0.01
0.012
0.014
0.016
Displacement (in)
One Sample Selected per fluid type
85% Relative Humidity @ RT

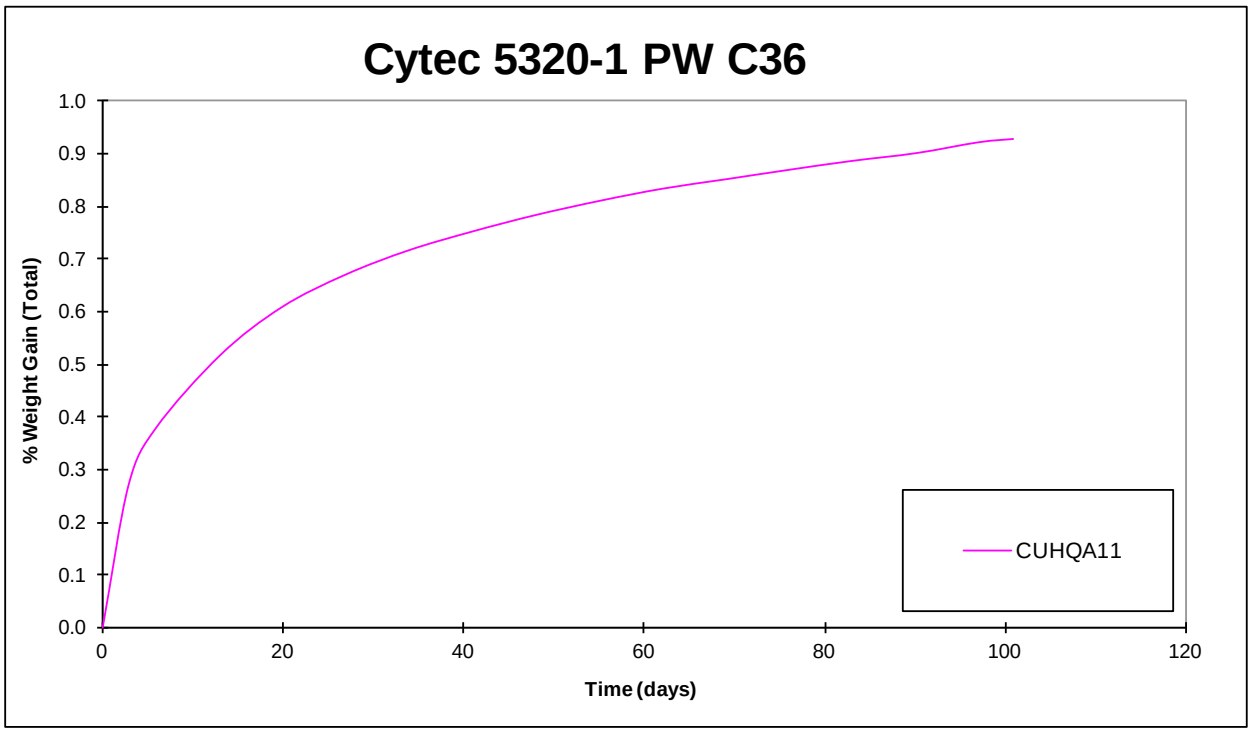

Load vs Displacement Curves 85% Relative Humidity, (180F) Specimens
Load (lbf)
350
300
250
200
150
100
50
0
0
0.002
0.004
0.006
0.008
0.01
0.012
0.014
0.016
0.018
Displacement (in)
One Sample Selected per fluid type
85% Relative Humidity @50F

# 7. Moisture Conditioning Charts

## 7.1 In-Plane Shear - Thinnest Panel



## 7.2 Short-Beam Strength - Thickest Panel



## 8. DMA Results

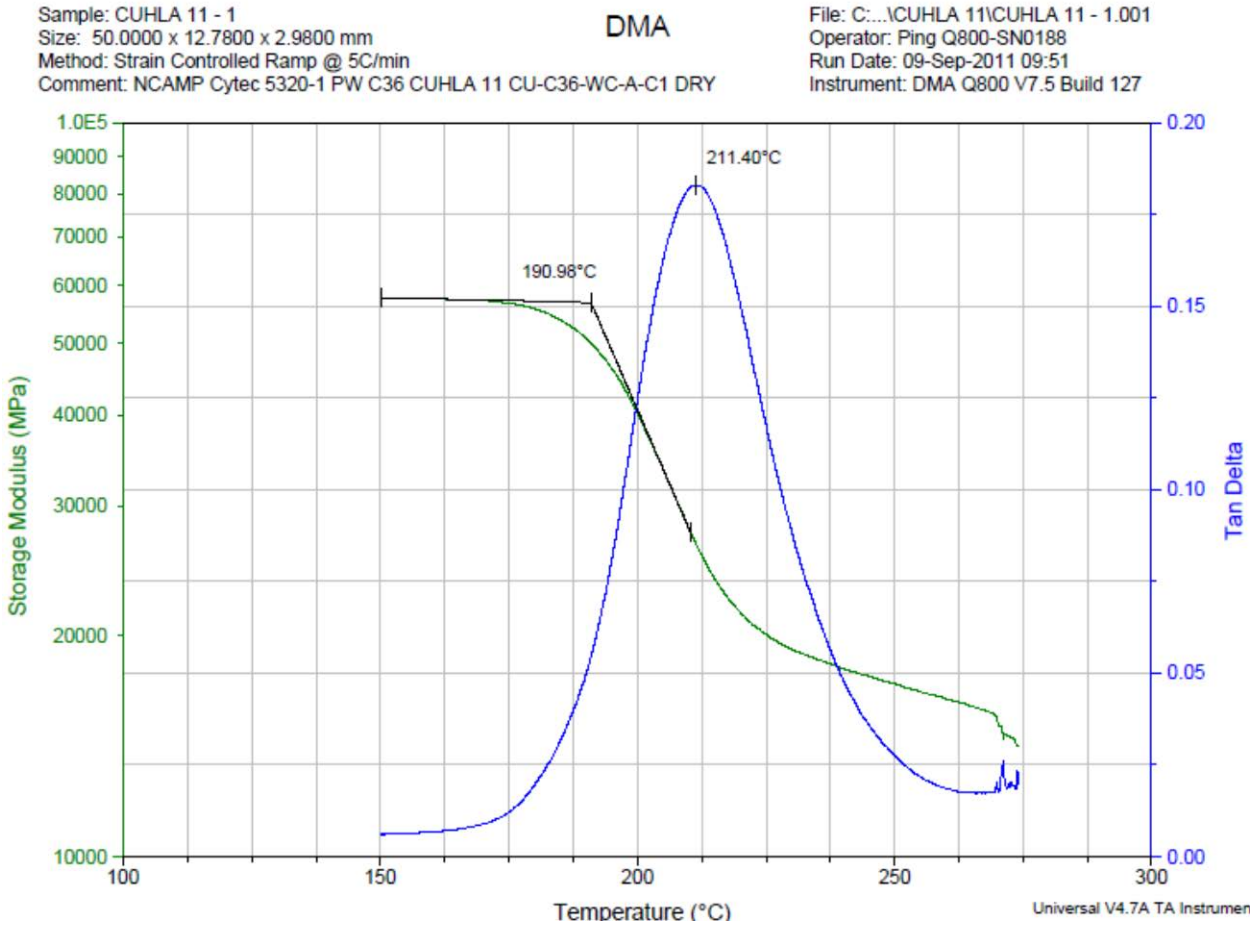
| DMA Results Summary | | | | |
|---|---|---|---|---|
| Cytec 5320-1 PW (C36) Gulfstream Aerospace CUHDX XX DMA DRY | | | | |
| Sample # | Onset Storage Modulus Average | | Peak of Tangent Delta Average | |
| | Tg [°C] | Tg [°F] | Tg [°C] | Tg [°F] |
| CUHDA 16 - 1 | 188.74 | 371.73 | 211.80 | 413.24 |
| CUHDA 16 - 2 | 188.42 | 371.16 | 209.49 | 409.08 |
| CUHDA 26 - 1 | 184.20 | 363.56 | 206.96 | 404.53 |
| CUHDA 26 - 2 | 184.62 | 364.32 | 208.15 | 406.67 |
| CUHDB 16 - 1 | 188.69 | 371.64 | 211.34 | 412.41 |
| CUHDB 16 - 2 | 188.19 | 370.74 | 210.61 | 411.10 |
| CUHDB 26 - 1 | 186.78 | 368.20 | 209.00 | 408.20 |
| CUHDB 26 - 2 | 183.97 | 363.15 | 205.59 | 402.06 |
| CUHDC 16 - 1 | 188.23 | 370.81 | 211.32 | 412.38 |
| CUHDC 16 - 2 | 187.53 | 369.55 | 208.72 | 407.70 |
| CUHDC 26 - 1 | 187.32 | 369.18 | 208.96 | 408.13 |
| CUHDC 26 - 2 | 185.74 | 366.33 | 207.11 | 404.80 |
| CUHDA 1H - 1 | 187.28 | 369.10 | 209.53 | 409.15 |
| CUHDA 1H - 2 | 190.69 | 375.24 | 211.40 | 412.52 |
| CUHDA 2H - 1 | 189.55 | 373.19 | 211.66 | 412.99 |
| CUHDA 2H - 2 | 190.23 | 374.41 | 211.61 | 412.90 |
| CUHDB 1H - 1 | 189.03 | 372.25 | 210.53 | 410.95 |
| CUHDB 1H - 2 | 189.46 | 373.03 | 210.92 | 411.66 |
| CUHDB 2H - 1 | 188.90 | 372.02 | 210.93 | 411.67 |
| CUHDB 2H - 2 | 189.80 | 373.64 | 211.23 | 412.21 |
| CUHDC 1H - 1 | 191.89 | 377.40 | 213.09 | 415.56 |
| CUHDC 1H - 2 | 191.37 | 376.47 | 213.27 | 415.89 |
| CUHDC 2H - 1 | 192.43 | 378.37 | 212.31 | 414.16 |
| CUHDC 2H - 2 | 192.29 | 378.12 | 212.29 | 414.12 |
| CUHDA 1L - 1 | 190.98 | 375.76 | 211.40 | 412.52 |
| CUHDA 1L - 2 | 192.33 | 378.19 | 210.38 | 410.68 |
| CUHDA 1L - 3 | 190.06 | 374.11 | 210.22 | 410.40 |
| CUHDA 1L - 4 | 188.76 | 371.77 | 211.28 | 412.30 |
| CUHDA 2L - 1 | 196.97 | 386.55 | 215.66 | 420.19 |
| CUHDA 2L - 2 | 195.71 | 384.28 | 217.00 | 422.60 |
| CUHDA 2L - 3 | 194.88 | 382.78 | 215.77 | 420.39 |
| CUHDA 2L - 4 | 196.97 | 386.55 | 214.63 | 418.33 |
| CUHDB 1L - 1 | 191.63 | 376.93 | 210.47 | 410.85 |
| CUHDB 1L - 2 | 191.92 | 377.46 | 210.85 | 411.53 |
| CUHDB 1L - 3 | 190.85 | 375.53 | 210.20 | 410.36 |
| CUHDB 1L - 4 | 190.63 | 375.13 | 210.15 | 410.27 |
| CUHDB 2L - 1 | 191.42 | 376.56 | 211.02 | 411.84 |
| CUHDB 2L - 2 | 192.07 | 377.73 | 211.83 | 413.29 |
| CUHDB 2L - 3 | 191.05 | 375.89 | 212.06 | 413.71 |
| CUHDB 2L - 4 | 191.14 | 376.05 | 210.37 | 410.67 |
| CUHDC 1L - 1 | 190.95 | 375.71 | 209.91 | 409.84 |
| CUHDC 1L - 2 | 190.43 | 374.77 | 209.52 | 409.14 |
| CUHDC 1L - 3 | 190.50 | 374.90 | 209.08 | 408.34 |
| CUHDC 1L - 4 | 191.60 | 376.88 | 208.50 | 407.30 |
| CUHDC 2L - 1 | 193.05 | 379.49 | 211.96 | 413.53 |
| CUHDC 2L - 2 | 192.99 | 379.38 | 211.18 | 412.12 |
| CUHDC 2L - 3 | 195.76 | 384.37 | 211.36 | 412.45 |
| CUHDC 2L - 4 | 193.36 | 380.05 | 211.24 | 412.23 |
| **Average** | | **374.80** | | **411.64** |

# DMA Results Summary

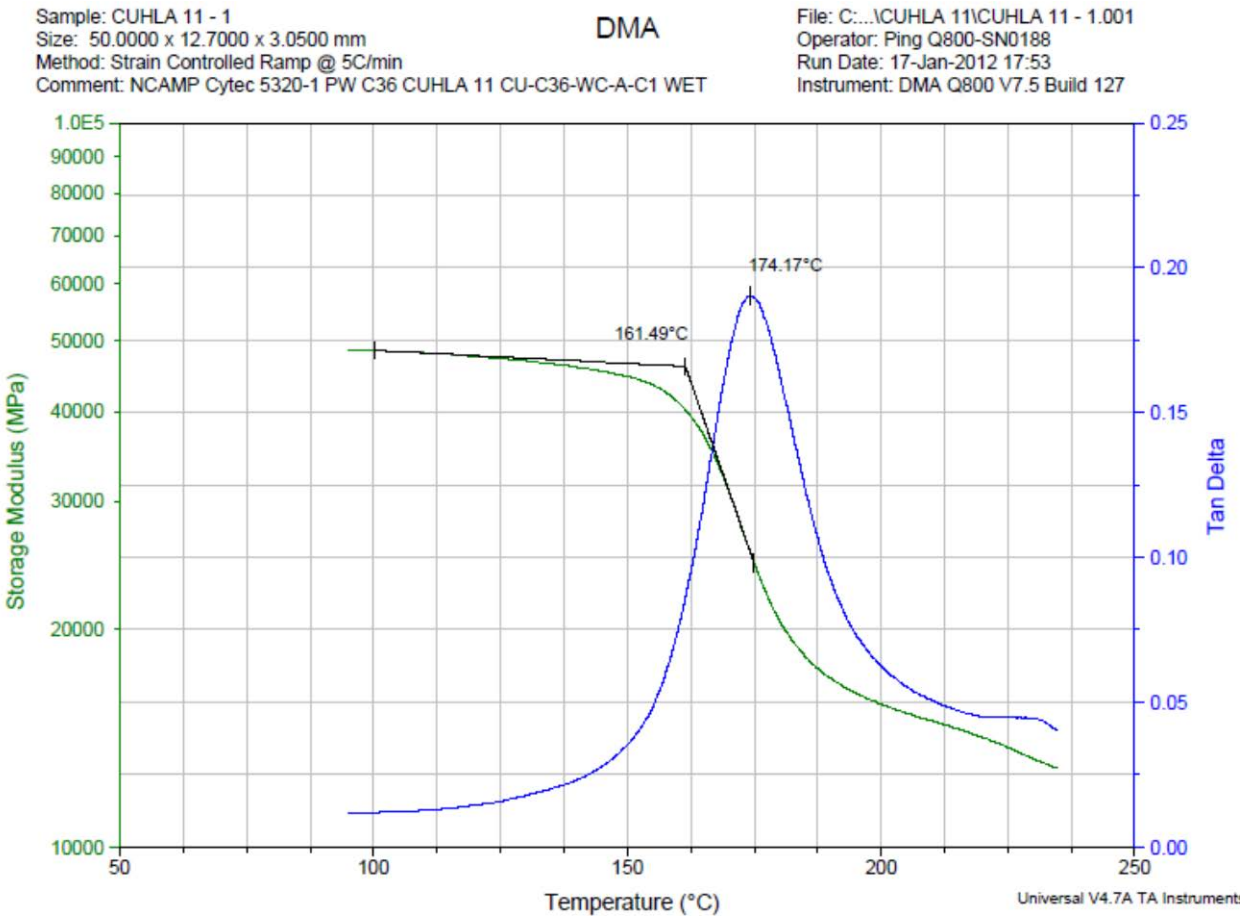
## Cytec 5320-1 PW (C36) Gulfstream Aerospace CUHDX XX DMA WET

| Sample # | Onset Storage Modulus | | Peak of Tangent Delta | |
|---|---|---|---|---|
| | Average | | Average | |
| | Tg [°C] | Tg [°F] | Tg [°C] | Tg [°F] |
| CUHDA 16 - 1 | 159.10 | 318.38 | 172.18 | 341.92 |
| CUHDA 16 - 2 | 157.74 | 315.93 | 172.26 | 342.07 |
| CUHDA 26 - 1 | 157.89 | 316.20 | 171.97 | 341.55 |
| CUHDA 26 - 2 | 157.38 | 315.28 | 171.76 | 341.17 |
| CUHDB 16 - 1 | 158.15 | 316.67 | 172.05 | 341.69 |
| CUHDB 16 - 2 | 158.50 | 317.30 | 172.10 | 341.78 |
| CUHDB 26 - 1 | 158.12 | 316.62 | 172.28 | 342.10 |
| CUHDB 26 - 2 | 158.62 | 317.52 | 172.12 | 341.82 |
| CUHDC 16 - 1 | 159.38 | 318.88 | 172.08 | 341.74 |
| CUHDC 16 - 2 | 157.50 | 315.50 | 172.05 | 341.70 |
| CUHDC 26 - 1 | 158.31 | 316.96 | 172.35 | 342.23 |
| CUHDC 26 - 2 | 159.05 | 318.29 | 172.61 | 342.70 |
| CUHDA 1H - 1 | 157.39 | 315.30 | 173.53 | 344.35 |
| CUHDA 1H - 2 | 157.01 | 314.62 | 173.71 | 344.68 |
| CUHDA 2H - 1 | 156.09 | 312.96 | 173.55 | 344.39 |
| CUHDA 2H - 2 | 157.58 | 315.64 | 174.01 | 345.22 |
| CUHDB 1H - 1 | 160.78 | 321.40 | 171.99 | 341.58 |
| CUHDB 1H - 2 | 157.06 | 314.71 | 172.87 | 343.17 |
| CUHDB 2H - 1 | 156.69 | 314.04 | 173.32 | 343.98 |
| CUHDB 2H - 2 | 156.40 | 313.52 | 173.41 | 344.14 |
| CUHDC 1H - 1 | 156.79 | 314.22 | 173.29 | 343.92 |
| CUHDC 1H - 2 | 156.90 | 314.42 | 172.83 | 343.09 |
| CUHDC 2H - 1 | 156.78 | 314.20 | 174.85 | 346.73 |
| CUHDC 2H - 2 | 157.73 | 315.91 | 174.66 | 346.39 |
| CUHDA 1L - 1 | 161.49 | 322.68 | 174.17 | 345.51 |
| CUHDA 1L - 2 | 161.42 | 322.56 | 175.05 | 347.09 |
| CUHDA 1L - 3 | 160.41 | 320.74 | 173.40 | 344.12 |
| CUHDA 1L - 4 | 161.42 | 322.56 | 174.23 | 345.61 |
| CUHDA 2L - 1 | 161.28 | 322.30 | 173.79 | 344.82 |
| CUHDA 2L - 2 | 161.29 | 322.32 | 174.21 | 345.58 |
| CUHDA 2L - 3 | 161.30 | 322.34 | 173.83 | 344.89 |
| CUHDA 2L - 4 | 160.71 | 321.28 | 174.14 | 345.45 |
| CUHDB 1L - 1 | 160.16 | 320.29 | 173.85 | 344.93 |
| CUHDB 1L - 2 | 160.23 | 320.41 | 174.10 | 345.38 |
| CUHDB 1L - 3 | 160.06 | 320.11 | 174.32 | 345.78 |
| CUHDB 1L - 4 | 160.42 | 320.76 | 173.41 | 344.14 |
| CUHDB 2L - 1 | 161.14 | 322.05 | 174.60 | 346.28 |
| CUHDB 2L - 2 | 161.23 | 322.21 | 174.70 | 346.46 |
| CUHDB 2L - 3 | 160.90 | 321.62 | 174.61 | 346.30 |
| CUHDB 2L - 4 | 161.97 | 323.55 | 174.49 | 346.08 |
| CUHDC 1L - 1 | 160.31 | 320.56 | 173.63 | 344.53 |
| CUHDC 1L - 2 | 160.09 | 320.16 | 172.95 | 343.31 |
| CUHDC 1L - 3 | 161.20 | 322.16 | 173.98 | 345.16 |
| CUHDC 1L - 4 | 160.84 | 321.51 | 173.81 | 344.86 |
| CUHDC 2L - 1 | 159.60 | 319.28 | 174.17 | 345.51 |
| CUHDC 2L - 2 | 158.22 | 316.80 | 173.94 | 345.09 |
| CUHDC 2L - 3 | 160.30 | 320.54 | 173.49 | 344.28 |
| CUHDC 2L - 4 | 160.33 | 320.59 | 172.90 | 343.22 |
| **Average** | | **318.62** | | **344.14** |

## 8.1 DMA Dry Batch A



## 8.2 DMA Wet Batch A



# 9. Analysis of Laminate Porosity

A small study was conducted to examine the panel quality produced. The images below shows the C-Scan images of panels that are 15 plies thick. Figure Figure 9-1 provides an example of the baseline image for a 15 ply laminate.

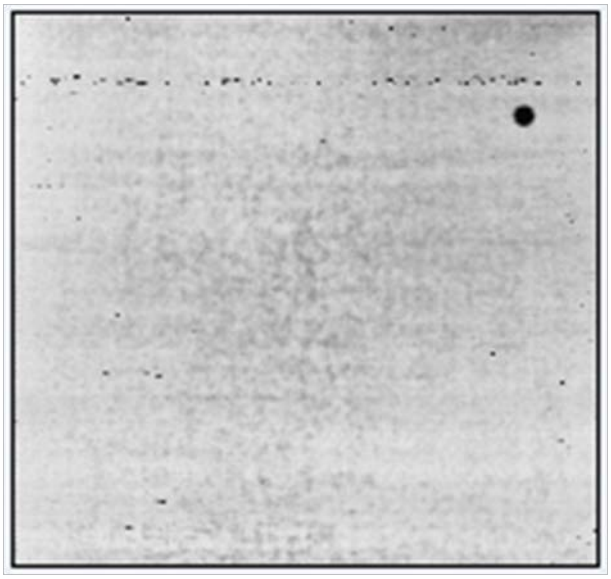
## 9.1 Interpretation of Results

In the C-scan column the ”Good” means the image is generally a lighter color compared to other panels while “Bad” indicates the image is a darker color than other panels.

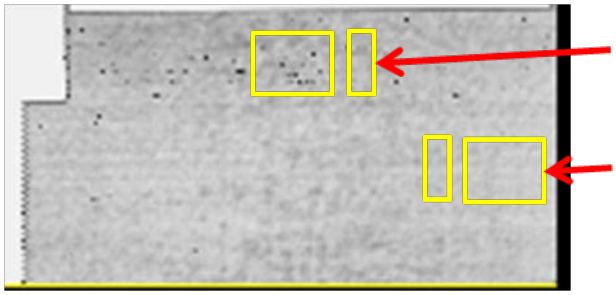
For the Visual Panel column, “Good” indicates that void cannot be seen visually (by the naked eye) on the cross-sectional area of the laminate. A “Bad” result indicates that voids can be visually observed (by the naked eye) on the cross-sectional area of the laminate.

Void content was obtained by image analysis (indicated as Imaging %) and acid digestion (indicated as Acid %); both results are shown.

| | Warp Compression (15plies) | | | | |
|---|---|---|---|---|---|
| String Name | Cscan | Visual Panel | 0deg (in) | 90deg (in) | Thickness (in) |
| CVHLA11X | Good | Good | 15 | 14 | 0.116406 |



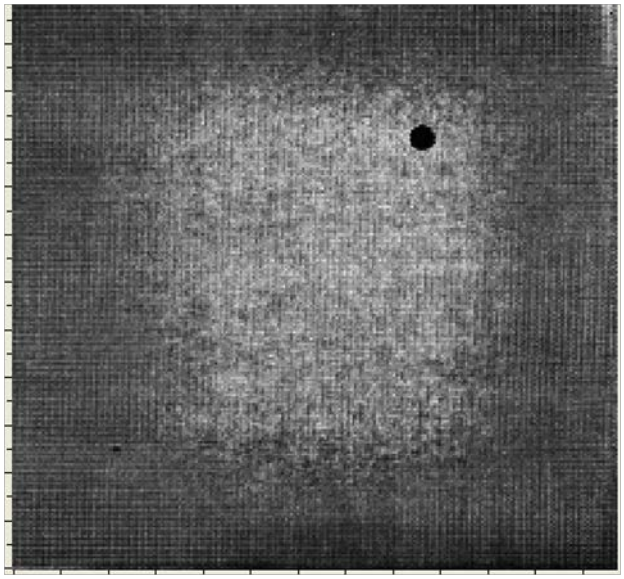
Example of baseline NDI panel for 15 plies

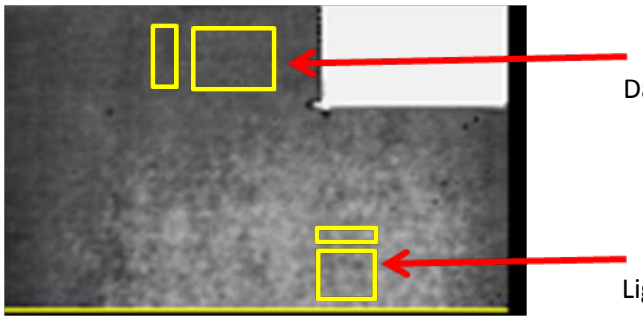


| | Imaging % | Acid % |
|---|---|---|
| Dark | 0.26 | 0.59 |
| Light | 0.08 | 0.82 |

**Figure 9-1**

| | Fill Compression (15plies) | | | | |
|---|---|---|---|---|---|
| String Name | Cscan | Visual Panel | 0deg (in) | 90deg (in) | Thickness (in) |
| CUHZA21X | Bad | Bad | 13 | 11.5 | 0.11582 |

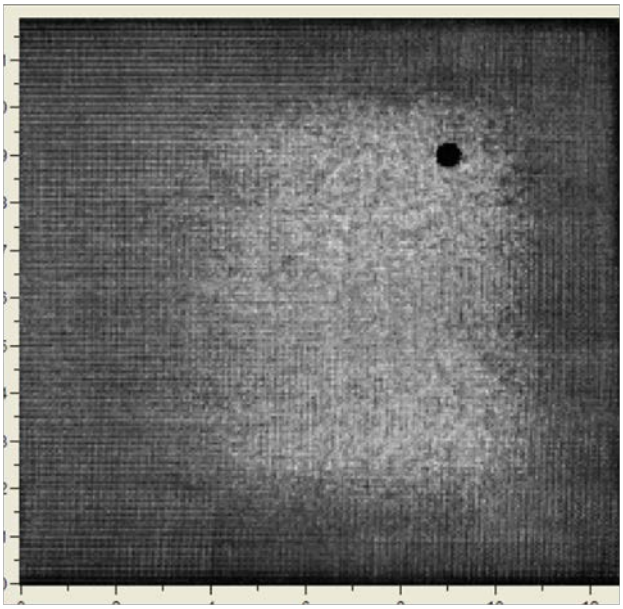


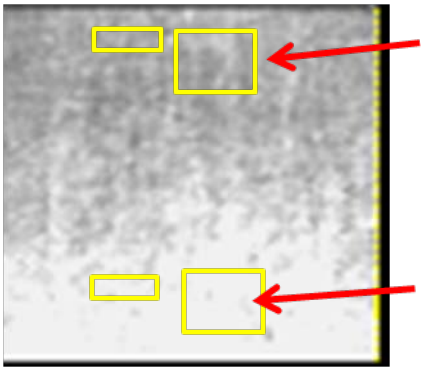


| | Imaging % | Acid % |
|---|---|---|
| Dark | 4.93 | 3.69 |
| Light | 0.70 | 0.29 |

**Figure 9-2**

| | Fill Compression (15plies) | | | | |
|---|---|---|---|---|---|
| String Name | Cscan | Visual Panel | 0deg (in) | 90deg (in) | Thickness (in) |
| CUHZB21X | Bad | Good | 13 | 11.5 | 0.11689 |





| | Imaging % | Acid % |
|---|---|---|
| Dark | 2.00 | 4.31 |
| Light | 0.80 | 1.38 |

**Figure 9-3**

## 10. Deviations

1. For Fluid Sensitivity Screening, Jet A fuel was used instead of SAE AMS 2629 Jet Reference Fluid.