Hexcel Hexply® 8552S AS4 GP 3k 8HS fabric with 38% RC 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-17-1G—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, Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC Material Allowables Qualification Statistical Analysis Report NCP-RP-2019-013 Rev - . The qualification material was procured to NCAMP Material Specification NMS 128/4 Revision -, dated May 07, 2018. The qualification test panels were cured in accordance with NCAMP Process Specification NPS 81228 Revision B dated April 14, 2011 with Baseline “M” Cure Cycle. The NCAMP Test Plan NTP 1528Q1 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-17-1G. 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-17-1G are adequate for the given

program.

Aircraft companies should not use the data published in this report without specifying NCAMP Material Specification NMS 128/4. NMS 128/4 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 128/4.* NMS 128/4 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

ν_{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
ν_{12}^{c}	major Poisson's Ratio, compression
ν_{21}^{c}	minor Poisson's Ratio, compression
F_{12}^{su}	in-plane shear ultimate peak strength
F_{12}^{smax}	in-plane shear peak strength before 5% strain
$F_{12}^{s5\% \text{ strain}}$	in-plane shear strength at 5% strain
$F_{12}^{s0.2\%}$	in-plane shear strength at 0.2% offset
G_{12}^{s}	in-plane shear modulus

Superscripts

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

Subscripts

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

Acronyms and Definitions

ASTM	American Society for Testing and Materials
B – Basis	95% lower confidence limit on the tenth population percentile
CV	Coefficient of variation
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

NIAR NCAMP— Hexcel 8552 Test Coupon Naming Format

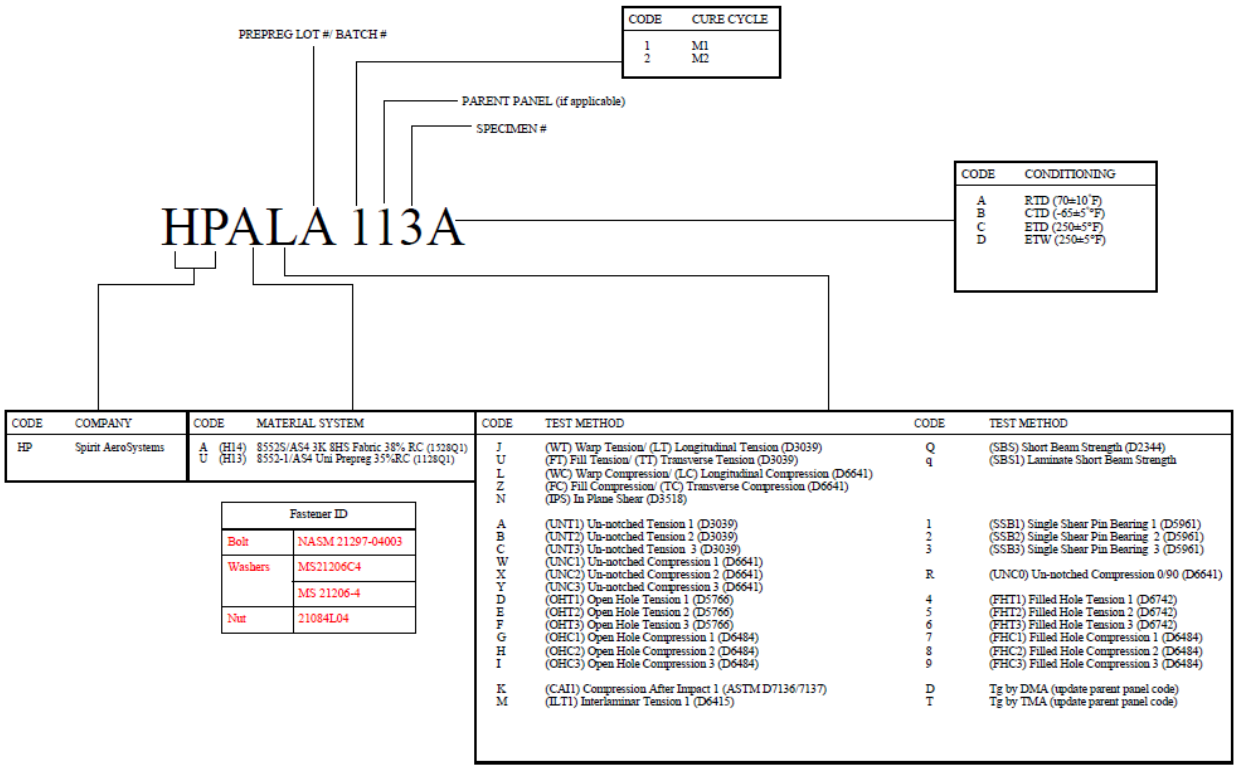


Figure 1-1: Naming Format

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-11 – Standard Test Method for Open Hole Tensile Strength of Polymer Matrix Composite Laminates
- ASTM D5961/D5961M-10 – 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-09 – Standard Test Method for Open-Hole Compressive Strength of Polymer Matrix Composite Laminates
- ASTM D6641/D6641M-09 – 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.

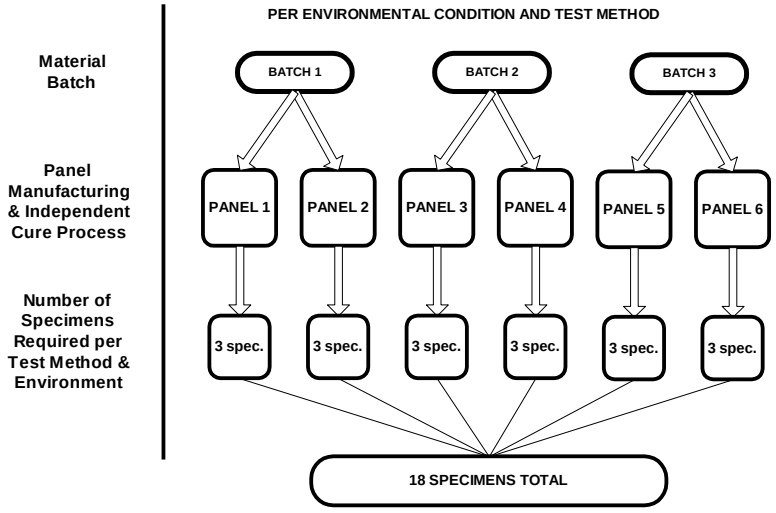


Figure 1-2: Specimen Selection Methodology

All panels were fabricated in accordance with NCAMP Process Specification 81228 “M” 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.

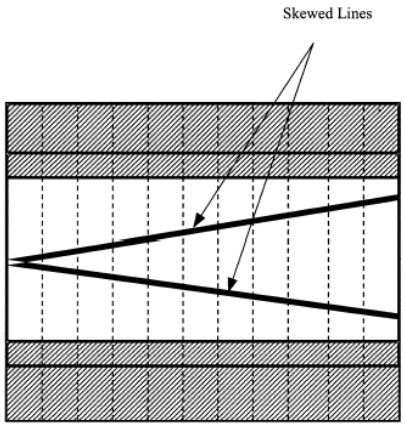


Figure 1-3: Specimen Traceability Line

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 the coupons within the same bag.

Caul plate was used during panel fabrication.

For filled-hole tension tests, the fasteners were installed to 85±5 in-lb. For filled-hole compression and bearing tests, the fasteners were installed to 30±5 in-lb. 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 21297-04004 bolts with NASM 21084 nuts and MS21206 washers for FHT and FHC
2) NASM 21297-04016 bolts with MS 21084 nuts and MS21206 washers for SSB

For bearing tests, procedures and fixtures are in accordance with ASTM D5961 procedure C. Typical fixture thickness is 0.805”.

1.5.2.3Specimen Strain Device Used

Uniaxial gages were used on:

All of CTD Tension specimens except Warp Tension specimens.

Two of RTD Tension specimens except Warp Tension for obtaining full stress strain curves.

All conditions of combined loading compression specimens.

Two of RTD Open Hole Compression specimens for detecting buckling.

One of CAI specimen for balancing.

Biaxial gages were used on:

All conditions of IPS specimens.

All of CTD Warp Tension specimens.

Two of RTD Warp Tension specimens for obtaining full stress strain curves.

Uniaxial Extensometers were used on:

All of RTD and ETW Tension specimens except Warp Tension specimens.

Biaxial Extensometers were used on:

All of RTD and ETW Warp Tension specimens.

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) (5)	Test Type and Direction	Property	Number of Batches x Number of Panels x Number of Test Specimens			
			Test Temperature/Moisture Condition			
			CTD	RTD	ETD	ETW
$[0]_{4S}$	ASTM D3039 Warp Tension	Strength, Modulus, and Poisson's Ratio	3x2x3	3x2x3 (4)		3x2x3
$[0]_{4S}$	ASTM D6641 Warp Compression	Strength and Modulus	3x2x3	3x2x3 (1) (4)	1x2x3	3x2x3 (3)
$[90]_{4S}$	ASTM D3039 Fill Tension	Strength and Modulus	3x2x3	3x2x3 (4)		3x2x3
$[90]_{4S}$	ASTM D6641 Fill Compression	Strength and Modulus	3x2x3	3x2x3 (1) (4)	1x2x3	3x2x3 (3)
$[45/-45]_{2S}$	ASTM D3518 In-Plane Shear (2)	Strength and Modulus	3x2x3	3x2x3 (4)		3x2x3
$[0]_{18}$	ASTM D2344 Short Beam	Strength	3x2x3	3x2x3	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.

Note 5: "S" denotes symmetry with respect to warp face; alternate warp face up and warp face down in accordance with Figure 1 of NPS 81228 to avoid panel warpage.

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.

In the case of the fabric materials, certain laminates, such as the quasi isotropic layup, have an unequal number of +45° and -45° plies. While such lay-ups are mid-plane symmetric, there exists the possibility of differences in warp and fill modulus values leading to a slight deviation from perfect balanced – i.e. the A_{16} and A_{26} terms in the in plane stiffness matrix are nonzero. Again, the effect on in plane stiffness and strength properties is expected to be minimal and if anything will yield slightly conservative results.

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.

(%0º/%±45º/%90º) 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	ETW
(25/50/25 - QI) UNT1	ASTM D3039 Un-notched Tension [45/0/-45/90]S	Strength & modulus	3x2x3	3x2x3 (7)	3x2x3
(10/80/10) UNT2	ASTM D3039 Un-notched Tension [45/-45/90/45/-45]S	Strength & modulus	3x2x3	3x2x3 (7)	3x2x3
(40/20/40) UNT3	ASTM D3039 Un-notched Tension [0/90/45/0/90]S	Strength & modulus	3x2x3	3x2x3 (7)	3x2x3
(25/50/25 - QI) UNC1	ASTM D6641 Un-notched Compression [45/0/-45/90]S	Strength & modulus		3x2x3 (4&7)	3x2x3 (6)
(10/80/10) UNC2	ASTM D6641 Un-notched Compression [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]S	Strength & modulus		3x2x3 (4&7)	3x2x3 (6)
(25/50/25 - QI) SBS1	ASTM D2344 Short Beam [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]S	Strength	3x2x3	3x2x3	3x2x3
(10/80/10) OHT2	ASTM D5766 Open Hole Tension (1) [45/-45/90/45/-45]S	Strength	3x2x3	3x2x3	3x2x3
(40/20/40) OHT3	ASTM D5766 Open Hole Tension (1) [0/90/45/0/90]S	Strength	3x2x3	3x2x3	3x2x3
(25/50/25 - QI) FHT1	ASTM D6742 Filled Hole Tension (2) [45/0/-45/90]S	Strength	3x2x3	3x2x3	3x2x3
(10/80/10) FHT2	ASTM D6742 Filled Hole Tension (2) [45/-45/90/45/-45]S	Strength	3x2x3	3x2x3	3x2x3
(40/20/40) FHT3	ASTM D6742 Filled Hole Tension (2) [0/90/45/0/90]S	Strength	3x2x3	3x2x3	3x2x3
(25/50/25 - QI) OHC1	ASTM D6484 Open Hole Compression (1) [45/0/-45/90/-45/90]S	Strength		3x2x3 (4)	3x2x3
(10/80/10) OHC2	ASTM D6484 Open Hole Compression (1) [45/-45/90/45/-45]S	Strength		3x2x3 (4)	3x2x3
(40/20/40) OHC3	ASTM D6484 Open Hole Compression (1) [0/90/45/0/90]S	Strength		3x2x3 (4)	3x2x3
(25/50/25 - QI) FHC1	ASTM D6742 Filled Hole Compression (2) [45/0/-45/90/-45/90]S	Strength		3x2x3	3x2x3
(10/80/10) FHC2	ASTM D6742 Filled Hole Compression (2) [45/-45/90/45/-45]S	Strength		3x2x3	3x2x3
(40/20/40) FHC3	ASTM D6742 Filled Hole Compression (2) [0/90/45/0/90]S	Strength		3x2x3	3x2x3
(25/50/25 - QI) SSB1	ASTM D5961 Single Shear Bearing (3) [45/0/-45/90]S	Strength & Deformation		3x2x3	3x2x3
(10/80/10) SSB2	ASTM D5961 Single Shear Bearing (3) [45/-45/90/-45/45]S	Strength & Deformation		3x2x3	3x2x3
(40/20/40) SSB3	ASTM D5961 Single Shear Bearing (3) [0/90/45/90/0]S	Strength & Deformation		3x2x3	3x2x3
(50/0/50) ILT	ASTM D6415 Interlaminar Tension [0]11	Strength	1x1x6	1x1x6	1x1x6
(25/50/25 - QI) CAI1	ASTM D7136 & D7137 Compression After Impact (1500 in.lb/in) (8) [45/0/-45/90/-45/90]S	Strength		1x1x6	

Table 1-2: Laminate Level Test Matrix

Note 1: Open-hole test configuration: 0.25” hole diameter, 1.5” width.
Note 2: Filled-hole test configuration: 0.25” hole 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 D5961-17 Procedure C.
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.
Note 8: Back-to-back strain gages on two locations (a total of four strain gages) are needed on the first specimen. The specimen should be equivalent to the test specimens in terms of material, layup, and geometry, shall be un-damaged. Alternatively, an instrumented metallic plate, equivalent in thickness to the test specimens to within ±.25 mm [±.010 in.], may be used.

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 D3171-15	All data from mechanical test specimens
Laminate Density	ASTM D792-13	3
Fiber Volume, % by Volume	ASTM D3171-15 (Note 2)	3
Resin Content, % by Weight	ASTM D3171-15 (Note 2)	3
Void Content, % by Volume	ASTM D3171-15	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 TMA (alternate option)	Dry and Wet – HSP-T2 Rev 1 (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

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: HSP-T2 Revision 1 is a Hexcel non-proprietary test method standard which may be obtained from NCAMP or Hexcel. HSP-T2 is similar but not equivalent to ASTM E2092. Data for TMA is not presented in this report but is an alternate test method for obtaining material Tg.

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
ETD = 250±5°F, dry
ETW = 250±5°F, wet

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.

For dry testing, specimens were dried at 160°F±5°F for 120-130 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 160°F±5°F for 120-130 hours before being conditioned to equilibrium at 160°F±5°F and 85% ± 5% RH. 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 $[0°]_{18}$ lamina level specimens dried at 160°F±5°F for 120-130 hours 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	250°F	FS11ET
ASTM D1655 Jet A Fuel (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	250°F	FS12ET
MIL-PRF-5606 Hydraulic Oil	90 days min. @ 70°F±10°F	70°F	FS13RT
	90 days min. @ 70°F±10°F	250°F	FS13ET
MIL-PRF-83282 Hydraulic Oil	90 days min. @ 70°F±10°F	70°F	FS14RT
	90 days min. @ 70°F±10°F	250°F	FS14ET
MIL-PRF-7808 Engine Oil	90 days min. @ 70°F±10°F	70°F	FS15RT
	90 days min. @ 70°F±10°F	250°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	250°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	250°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	250°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	250°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	250°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	250°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	250°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	250°F	FS31ET
Dry	Dried per section 1.5.5	70°F	FS32RT
	Dried per section 1.5.5	250°F	FS32ET
85% Relative Humidity	Per section 1.5.5	70°F	FS33RT
	Per section 1.5.5	250°F	FS33ET

Table 1-4: Fluid Sensitivity Screening

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 theoretically cured ply thickness of 0.0150 inches has been used as the nominal cured ply thickness (CPT) for normalization purpose. The following normalization formula was used:

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

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.

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.

2. Test Results

2.1 Lamina Level Test Summary

Prepreg Material:	Hexcel Hexply® 8552S AS4 GP 3k 8HS				**Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC Lamina Properties Summary**
Material Specification:	NMS 128/4				
Process Specification:	NPS 81228				
Fabric:	Hexcel AS4 GP 3k 8HS	**Resin:**	Hexcel 8552S		
Tg(dry):	384.1°F	**Tg(wet):**	301.6°F	**Tg METHOD:**	ASTM D7028

Date of fiber manufacture	Sep-17 to Dec-17	**Date of testing**	Jul-18 to Oct-19
Date of resin manufacture	Feb-18	**Date of data submittal**	Jan-20
Date of prepreg manufacture	Feb-18		
Date of composite manufacture	Jun-18 to Sep-18		

LAMINA MECHANICAL PROPERTY SUMMARY
Data reported as: Normalized & Measured
(Normalized by CPT=0.015 inch)

	-65/D Mean		70F/D Mean		250F/D Mean		250F/W Mean	
Properties	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
F_1^{tu} [ksi]	120.8	122.9	139.4	144.8			140.1	134.0
E_1^t [Msi]	9.699	9.861	9.431	9.833			9.461	9.047
ν_{12}^{τ}		0.0602		0.0525				0.0469
F_2^{tu} [ksi]	109.5	110.7	121.7	123.6			119.0	116.0
E_2^t [Msi]	9.088	9.201	8.865	9.006			8.931	8.699
F_1^{cu} [ksi]	145.2	140.4	120.9	126.1	91.25	91.09	69.61	68.34
E_1^c [Msi]	8.905	8.603	8.888	9.324	8.767	8.752	8.628	8.878
F_2^{cu} [ksi]	121.6	117.6	109.9	111.5	86.16	85.21	64.24	62.52
E_2^c [Msi]	8.542	8.260	8.340	8.561	8.251	8.159	8.154	8.002
$F_{12}^{s0.2\%}$ [ksi]		11.09		8.083				3.028
$F_{12}^{s5\%strain}$ [ksi]				13.33				5.149
F_{12}^{smax} [ksi]		16.18						
G_{12}^s [Msi]		0.8552		0.7296				0.2885
SBS [ksi]		14.02		11.97		8.210		5.901

Table 2-1: Lamina Summary Data

2.2 Laminate Level Test Summary

Prepreg Material:	Hexcel Hexply® 8552S AS4 GP 3k 8HS			**Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC Laminate Properties Summary**
Material Specification:	NMS 128/4			
Process Specification:	NPS 81228			
Fabric:	Hexcel AS4 GP 3k 8HS	**Resin:**	Hexcel 8552S	
Tg(dry):	384.1°F	**Tg(wet):**	301.6°F	**Tg METHOD:** ASTM D7028

Date of fiber manufacture	Sep-17 to Dec-17	**Date of testing**	Jul-18 to Oct-19
Date of resin manufacture	Feb-18	**Date of data submittal**	Jan-20
Date of prepreg manufacture	Feb-18		
Date of composite manufacture	Jun-18 to Sep-18		

LAMINATE MECHANICAL PROPERTY SUMMARY
Data reported as: Normalized & Measured
(Normalized by CPT=0.015 inch)

	Layup	25/50/25 (Quasi)		10/80/10 (Soft)		40/20/40 (Hard)	
Properties	**Test Condition[1]**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
OHT Strength [ksi]	**CTD**	41.38	40.94	40.45	39.57	50.12	49.27
	RTD	45.73	45.73	40.06	40.18	58.85	58.61
	ETW	50.70	48.92	29.76	28.48	65.89	63.19
OHC Strength [ksi]	**RTD**	50.04	50.19	38.78	39.15	57.57	57.58
	ETW	31.85	31.36	22.89	22.56	33.38	33.27
UNT Strength [ksi]	**CTD**	82.56	84.21	51.94	52.68	100.9	100.8
	RTD	90.93	95.56	53.58	55.89	117.2	122.0
	ETW	87.75	84.47	44.48	43.18	116.8	113.4
UNT Modulus [Msi]	**CTD**	6.924	7.063	4.736	4.802	8.535	8.525
	RTD	6.643	6.982	4.394	4.588	8.303	8.642
	ETW	6.157	5.928	3.448	3.349	8.062	7.817
UNC Strength [ksi]	**RTD**	91.68	96.48	55.76	59.51	93.71	98.40
	ETW	53.12	55.21	30.11	31.59	59.85	61.77
UNC Modulus [Msi]	**RTD**	6.328	6.673	4.226	4.511	7.867	8.262
	ETW	5.705	5.460	3.382	3.306	7.627	7.289
FHT Strength [ksi]	**CTD**	44.06	43.58	44.05	42.88	50.11	49.23
	RTD	48.02	47.81	43.17	43.24	55.85	55.41
	ETW	50.39	48.06	32.21	30.80	58.24	55.50
FHC Strength [ksi]	**RTD**	85.23	85.41	-- [2]	-- [2]	88.69	89.30
	ETW	49.74	49.31	-- [2]	-- [2]	56.34	56.55
SBS1 Strength [ksi]	**RTD**		9.953				
	ETW		5.043				
SSB Initial Peak Strength [ksi]	**RTD**		112.6				107.6
	ETW		88.13				78.42
SSB 2% Offset Strength [ksi]	**RTD**	105.4	111.0	108.6	113.7	101.6	107.2
	ETW	86.84	87.60	86.86	87.84	75.91	75.78
SSB Ultimate Strength [ksi]	**RTD**	129.2	136.0	132.3	138.6	119.7	126.3
	ETW	94.99	95.17	97.75	98.89	86.62	86.52
CBS[3] [lb]	**CTD**		346.5				
	RTD		352.3				
	ETW		115.7				
ILT[3] [ksi]	**CTD**		11.84				
	RTD		11.96				
	ETW		3.876				
CAI Strength [ksi]	**RTD**	34.01	34.19				

[1]Test Condition: CTD is -65F/D; RTD is 70F/D; ETD is 250F/D and ETW is 250F/W

[2]Values for FHC data is not reported because FHC values are greater than or equal to UNC values. In such scenarios, NCAMP and CMH17 do not recommend the use of FHC values for design. UNC values are recommended for use instead.

[3] The actual layup for ILT is [0]11, (100/0/0).

Table 2-2: Laminate Summary Data

2.3 Individual Test Summaries

2.3.1 Warp Tension Properties (WT)

Material:	Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC							**Tension, 1-axis** Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC [0]4S		
Resin content:	35.1 % wt		**Comp. density:**	1.577 g/cc						
Fiber volume:	57.2 % vol									
Ply count:	8									
Test method:	ASTM D3039-17		**Modulus calculation:**	1000-3000 microstrain						
Normalized by:	0.0150	in. CPT								
			CTD		**RTD**		**ETW**			
Test Temperature [°F]			-65		70		250			
Moisture Conditioning			Dry		Dry		Equilibrium			
Equilibrium at T, RH							160F,85%			
Source code			HPAJX XXXB		HPAJX XXXA		HPAJX XXXD			
			Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**		
	Mean		120.8	122.9	139.4	144.8	140.1	134.0		
	Minimum		113.5	111.0	125.5	130.0	124.6	119.6		
	Maximum		127.2	138.0	145.2	155.7	150.4	145.0		
F_1^{tu} [ksi]	**C.V.(%)**		3.856	6.274	3.808	5.488	4.923	5.820		
	No. Specimens		19		19		18			
	No. Prepreg Lots		3		3		3			
	Mean		9.699	9.861	9.431	9.833	9.461	9.047		
	Minimum		9.487	9.354	9.322	9.115	9.295	8.521		
	Maximum		9.985	10.55	9.694	10.42	9.598	9.341		
E_1^t [Msi]	**C.V.(%)**		1.399	4.052	0.9721	4.089	0.8910	2.076		
	No. Specimens		19		18		18			
	No. Prepreg Lots		3		3		3			
	Mean			0.0602		0.0525		0.0469		
	Minimum			0.0482		0.0471		0.0355		
	Maximum			0.0679		0.0570		0.0544		
ν_{12}^{ε}	**C.V.(%)**			8.597		5.221		10.60		
	No. Specimens		18		18		16			
	No. Prepreg Lots		3		3		3			

2.3.2 Fill Tension Properties (FT)

Material:	Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC							**Tension, 2-axis** Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC [90]4S	
Resin content:	37.5 % wt		**Comp. density:**	1.560 g/cc					
Fiber volume:	54.5 % vol								
Ply count:	8								
Test method:	ASTM D3039-17		**Modulus calculation:**	1000-3000 microstrain					
Normalized by:	0.0150	in. CPT							
			CTD		**RTD**		**ETW**		
Test Temperature [°F]			-65		70		250		
Moisture Conditioning			Dry		Dry		Equilibrium		
Equilibrium at T, RH							160F,85%		
Source code			HPAUX XXXB		HPAUX XXXA		HPAUX XXXD		
			Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	
	Mean		109.5	110.7	121.7	123.6	119.0	116.0	
	Minimum		94.30	93.27	116.5	116.9	109.8	107.1	
	Maximum		124.1	124.5	135.7	135.5	130.8	129.2	
F_2^{tu} [ksi]	**C.V.(%)**		6.871	7.243	4.328	4.916	4.889	5.832	
	No. Specimens		20		18		18		
	No. Prepreg Lots		3		3		3		
	Mean		9.088	9.201	8.865	9.006	8.931	8.699	
	Minimum		8.856	8.934	8.586	8.451	8.698	8.432	
	Maximum		9.291	9.640	8.968	9.509	9.115	8.980	
E_2^t [Msi]	**C.V.(%)**		1.170	2.353	1.103	3.494	1.166	1.940	
	No. Specimens		18		18		19		
	No. Prepreg Lots		3		3		3		

2.3.3 Warp Compression Properties (WC)

Material: Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

Resin content: 36.8 % wt **Comp. density:** 1.570 g/cc
Fiber volume: 55.4 % vol
Ply count: 8

Test method: ASTM D6641-16ε1 **Modulus calculation:** 1000-3000 microstrain

Normalized by: 0.0150 in. CPT

Compression, 1-axis
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
[0]4S

		CTD		RTD		ETD		ETW	
Test Temperature [°F]		-65		70		250		250	
Moisture Conditioning		Dry		Dry		Dry		Equilibrium	
Equilibrium at T, RH								160F,85%	
Source code		HPALX XXXB		HPALX XXXA		HPALX XXXC		HPALX XXXD	
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
F_1^{cu} [ksi]	**Mean**	145.2	140.4	120.9	126.1	91.25	91.09	69.61	68.34
	Minimum	139.4	133.1	111.4	120.2	86.76	84.21	58.46	57.66
	Maximum	157.0	145.9	126.5	134.5	99.08	96.47	79.41	77.81
	C.V.(%)	3.303	2.958	3.929	3.415	5.133	5.970	8.234	7.906
	No. Specimens	15		18		6		21	
	No. Prepreg Lots	3		3		1		3	
E_1^c [Msi]	**Mean**	8.905	8.603	8.888	9.324	8.767	8.752	8.628	8.878
	Minimum	8.744	8.119	8.631	8.445	8.623	8.420	8.463	7.732
	Maximum	9.204	9.116	9.230	10.49	8.902	9.208	8.988	9.789
	C.V.(%)	1.470	2.412	1.941	6.306	1.248	3.478	1.343	6.445
	No. Specimens	18		18		6		18	
	No. Prepreg Lots	3		3		1		3	

2.3.4 Fill Compression Properties (FC)

Material: Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

Compression, 2-axis
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC [90]4S

Resin content: 36.0 % wt **Comp. density:** 1.569 g/cc
Fiber volume: 56.1 % vol
Ply count: 8

Test method: ASTM D6641-16ε1 **Modulus calculation:** 1000-3000 microstrain

Normalized by: 0.0150 in. CPT

		CTD		RTD		ETD		ETW	
Test Temperature [°F]		-65		70		250		250	
Moisture Conditioning		Dry		Dry		Dry		Equilibrium	
Equilibrium at T, RH								160F,85%	
Source code		HPAZX XXXB		HPAZX XXXA		HPAZX XXXC		HPAZX XXXD	
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean	121.6	117.6	109.9	111.5	86.16	85.21	64.24	62.52
	Minimum	111.1	108.0	102.0	103.2	83.15	80.97	53.93	52.03
	Maximum	131.2	126.6	115.7	121.6	89.01	91.44	71.33	69.94
F_2^{cu} [ksi]	**C.V.(%)**	5.003	4.671	3.691	4.589	2.476	4.343	8.192	8.459
	No. Specimens	18		18		6		18	
	No. Prepreg Lots	3		3		1		3	
	Mean	8.542	8.260	8.340	8.561	8.251	8.159	8.154	8.002
	Minimum	8.281	7.928	8.219	8.084	8.199	7.988	7.808	7.665
	Maximum	8.746	8.518	8.579	9.318	8.327	8.763	8.401	8.284
E_2^c [Msi]	**C.V.(%)**	1.433	2.109	1.120	4.315	0.5765	3.641	1.926	2.342
	No. Specimens	18		18		6		18	
	No. Prepreg Lots	3		3		1		3	

2.3.5 In-Plane Shear Properties (IPS)

Material:	Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC						**In-Plane Shear** Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC [45/-45]2S		
Resin content:	34.7 % wt	**Comp. density:**	1.581 g/cc						
Fiber volume:	57.7 % vol								
Ply count:	8								
Test method:	ASTM D3518-18	**Modulus calculation:**	2000-6000 microstrain						
Normalized by:	NA								
		CTD		**RTD**		**ETW**			
Test Temperature [°F]		-65		70		250			
Moisture Conditioning		Dry		Dry		Equilibrium			
Equilibrium at T, RH						160F,85%			
Source code		HPANX XXXB		HPANX XXXA		HPANX XXXD			
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**		
	Mean		11.09		8.083		3.028		
	Minimum		10.57		7.697		2.895		
	Maximum		12.22		8.728		3.181		
$F_{12}^{s0.2\%}$ **[ksi]**	**C.V.(%)**		4.114		3.921		3.026		
	No. Specimens		18		19		18		
	No. Prepreg Lots		3		3		3		
	Mean				13.33		5.149		
	Minimum				12.88		4.940		
	Maximum				13.76		5.443		
$F_{12}^{s5\%strain}$ **[ksi]**	**C.V.(%)**				1.653		2.896		
	No. Specimens				19		18		
	No. Prepreg Lots				3		3		
	Mean		16.18						
	Minimum		15.43						
	Maximum		17.10						
F_{12}^{smax} **[ksi]**	**C.V.(%)**		3.198						
	No. Specimens		18						
	No. Prepreg Lots		3						
	Mean		0.8552		0.7296		0.2885		
	Minimum		0.8039		0.6832		0.2777		
	Maximum		0.9776		0.8130		0.3030		
G_{12}^{s} **[Msi]**	**C.V.(%)**		5.813		5.368		2.684		
	No. Specimens		18		19		18		
	No. Prepreg Lots		3		3		3		

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

Material: Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

Unnotched Tension 1
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
[45/0/-45/90]S

Resin content: 34.1 % wt **Comp. density:** 1.583 g/cc
Fiber volume: 58.3 % vol
Ply count: 8

Test method: ASTM D3039-17 **Modulus calculation:** 1000-3000 microstrain

Normalized by: 0.0150 in. CPT

		CTD		RTD		ETW	
Test Temperature [°F]		-65		70		250	
Moisture Conditioning		Dry		Dry		Equilibrium	
Equilibrium at T, RH						160F,85%	
Source code		HPAAX XXXB		HPAAX XXXA		HPAAX XXXD	
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
UNT1 Strength [ksi]	**Mean**	82.56	84.21	90.93	95.56	87.75	84.47
	Minimum	76.18	74.68	85.37	86.95	83.12	80.71
	Maximum	86.59	92.91	97.53	105.8	91.85	89.20
	C.V.(%)	3.538	5.011	3.493	5.174	3.249	3.173
	No. Specimens	18		18		18	
	No. Prepreg Lots	3		3		3	
UNT1 Modulus [Msi]	**Mean**	6.924	7.063	6.643	6.982	6.157	5.928
	Minimum	6.711	6.801	6.490	6.575	5.999	5.682
	Maximum	7.157	7.790	6.760	7.412	6.284	6.174
	C.V.(%)	1.399	4.329	1.269	4.078	1.042	2.151
	No. Specimens	18		18		18	
	No. Prepreg Lots	3		3		3	

2.3.7 “10/80/10” Unnotched Tension 2 Properties (UNT2)

Material: Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

Unnotched Tension 2
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
[45/-45/90/45/-45]S

Resin content: 34.7 % wt **Comp. density:** 1.581 g/cc
Fiber volume: 57.7 % vol
Ply count: 10

Test method: ASTM D3039-17 **Modulus calculation:** 1000-3000 microstrain

Normalized by: 0.0150 in. CPT

		CTD		RTD		ETW	
Test Temperature [°F]		-65		70		250	
Moisture Conditioning		Dry		Dry		Equilibrium	
Equilibrium at T, RH						160F,85%	
Source code		HPABX XXXB		HPABX XXXA		HPABX XXXD	
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
UNT2 Strength [ksi]	**Mean**	51.94	52.68	53.58	55.89	44.48	43.18
	Minimum	48.63	47.89	51.11	53.15	41.87	40.11
	Maximum	56.22	59.32	55.95	61.82	46.33	46.50
	C.V.(%)	4.538	7.135	3.297	3.652	3.170	3.825
	No. Specimens	18		19		18	
	No. Prepreg Lots	3		3		3	
UNT2 Modulus [Msi]	**Mean**	4.736	4.802	4.394	4.588	3.448	3.349
	Minimum	4.569	4.463	4.071	4.113	3.339	3.170
	Maximum	4.863	5.348	4.630	5.208	3.589	3.765
	C.V.(%)	1.796	5.160	2.651	5.640	2.088	4.271
	No. Specimens	18		19		18	
	No. Prepreg Lots	3		3		3	

2.3.8 “40/20/40” Unnotched Tension 3 Properties (UNT3)

Material: Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

Unnotched Tension 3
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
[0/90/45/0/90]S

Resin content: 35.2 % wt **Comp. density:** 1.580 g/cc
Fiber volume: 57.2 % vol
Ply count: 10

Test method: ASTM D3039-17 **Modulus calculation:** 1000-3000 microstrain

Normalized by: 0.0150 in. CPT

		CTD		RTD		ETW	
Test Temperature [°F]		-65		70		250	
Moisture Conditioning		Dry		Dry		Equilibrium	
Equilibrium at T, RH						160F,85%	
Source code		HPACX XXXB		HPACX XXXA		HPACX XXXD	
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean	100.9	100.8	117.2	122.0	116.8	113.4
	Minimum	90.91	88.82	109.4	110.6	97.49	93.95
	Maximum	110.3	114.8	124.5	132.0	127.1	121.6
UNT3 Strength [ksi]	**C.V.(%)**	6.130	8.112	3.600	5.036	5.515	5.528
	No. Specimens	18		18		16	
	No. Prepreg Lots	3		3		3	
	Mean	8.535	8.525	8.303	8.642	8.062	7.817
	Minimum	8.331	8.079	8.112	8.143	7.847	7.416
	Maximum	8.791	9.310	8.485	9.391	8.242	7.998
UNT3 Modulus [Msi]	**C.V.(%)**	1.331	4.301	1.410	4.013	1.351	2.078
	No. Specimens	18		18		20	
	No. Prepreg Lots	3		3		3	

2.3.9 “25/50/25” Unnotched Compression 1 Properties (UNC1)

Material: Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

Resin content: 37.1 % wt **Comp. density:** 1.571 g/cc
Fiber volume: 55.2 % vol
Ply count: 8

Test method: ASTM D6641-16ε1 **Modulus calculation:** 1000-3000 microstrain

Normalized by: 0.0150 in. CPT

Unnotched Compression 1
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC [45/0/-45/90]S

		RTD		ETW					
Test Temperature [°F]		70		250					
Moisture Conditioning		Dry		Equilibrium					
Equilibrium at T, RH				160F,85%					
Source code		HPAWX XXXA		HPAWX XXXD					
		Normalized	**Measured**	**Normalized**	**Measured**				
	Mean	91.68	96.48	53.12	55.21				
	Minimum	77.59	86.99	46.89	49.38				
	Maximum	101.3	106.2	57.06	59.80				
UNC1 Strength [ksi]	**C.V.(%)**	6.459	4.295	5.934	5.520				
	No. Specimens	18		21					
	No. Prepreg Lots	3		3					
	Mean	6.328	6.673	5.705	5.460				
	Minimum	6.162	6.155	5.408	5.034				
	Maximum	6.474	7.513	5.984	5.839				
UNC1 Modulus [Msi]	**C.V.(%)**	1.688	5.072	3.307	4.630				
	No. Specimens	18		18					
	No. Prepreg Lots	3		3					

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

Unnotched Compression 2
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
[45/-45/90/45/-45]S

Material:	Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC								
Resin content:	36.9 % wt		**Comp. density:**	1.570 g/cc					
Fiber volume:	55.4 % vol								
Ply count:	10								
Test method:	ASTM D6641-16ε1		**Modulus calculation:**	1000-3000 microstrain					
Normalized by:	0.0150	in. CPT							
			RTD		**ETW**				
Test Temperature [°F]			70		250				
Moisture Conditioning			Dry		Equilibrium				
Equilibrium at T, RH					160F,85%				
Source code			HPAXX XXXA		HPAXX XXXD				
			Normalized	**Measured**	**Normalized**	**Measured**			
	Mean		55.76	59.51	30.11	31.59			
	Minimum		50.70	53.11	26.58	29.21			
	Maximum		60.39	63.23	33.34	34.35			
UNC2 Strength [ksi]	**C.V.(%)**		3.769	3.915	5.704	4.696			
	No. Specimens		18		21				
	No. Prepreg Lots		3		3				
	Mean		4.226	4.511	3.382	3.306			
	Minimum		4.023	4.116	3.154	3.008			
	Maximum		4.383	4.754	3.706	3.692			
UNC2 Modulus [Msi]	**C.V.(%)**		2.664	3.556	4.631	6.166			
	No. Specimens		18		18				
	No. Prepreg Lots		3		3				

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

Material:	Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC						**Unnotched Compression 3** Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC [0/90/45/0/90]S		
Resin content:	37.0 % wt		**Comp. density:**	1.571 g/cc					
Fiber volume:	55.3 % vol								
Ply count:	10								
Test method:	ASTM D6641-16ε1		**Modulus calculation:**	1000-3000 microstrain					
Normalized by:	0.0150	in. CPT							
			RTD		**ETW**				
Test Temperature [°F]			70		250				
Moisture Conditioning			Dry		Equilibrium				
Equilibrium at T, RH					160F,85%				
Source code			HPAYX XXXA		HPAYX XXXD				
			Normalized	**Measured**	**Normalized**	**Measured**			
	Mean		93.71	98.40	59.85	61.77			
	Minimum		86.29	89.59	46.38	52.83			
	Maximum		104.9	113.6	69.82	67.90			
UNC3 Strength [ksi]	**C.V.(%)**		4.562	6.576	10.18	6.599			
	No. Specimens		18		23				
	No. Prepreg Lots		3		3				
	Mean		7.867	8.262	7.627	7.289			
	Minimum		7.394	7.587	7.348	6.863			
	Maximum		8.095	9.116	7.823	7.747			
UNC3 Modulus [Msi]	**C.V.(%)**		2.253	5.309	1.658	3.690			
	No. Specimens		18		18				
	No. Prepreg Lots		3		3				

2.3.12 Lamina Short-Beam Strength Properties (SBS)

Material:	Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC		
Resin content:	34.1 % wt	**Comp. density:**	1.584 g/cc
Fiber volume:	58.3 % vol		
Ply count:	18		
Test method:	ASTM D2344-16		
Normalized by:	NA		

Short-Beam Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
[0]18

		CTD		RTD		ETD		ETW	
Test Temperature [°F]		-65		70		250		250	
Moisture Conditioning		Dry		Dry		Dry		Equilibrium	
Equilibrium at T, RH								160F,85%	
Source code		HPAQX XXXB		HPAQX XXXA		HPAQX XXXC		HPAQX XXXD	
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
SBS [ksi]	**Mean**		14.02		11.97		8.210		5.901
	Minimum		12.07		10.58		7.959		5.330
	Maximum		15.71		12.50		8.643		6.370
	C.V.(%)		7.894		4.367		3.264		5.012
	No. Specimens		18		18		6		18
	No. Prepreg Lots		3		3		1		3

2.3.13 Laminate Short-Beam Strength Properties (SBS1)

Material:	Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC					**Laminate Short-Beam Strength** Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC [45/0/-45/90/45/90]S		
Resin content:	see OHC1	**Comp. density:**	see OHC1					
Fiber volume:	see OHC1							
Ply count:	12							
Test method:	ASTM D2344-16							
Normalized by:	NA							
		RTD		**ETW**				
Test Temperature [°F]		70		250				
Moisture Conditioning		Dry		Equilibrium				
Equilibrium at T, RH				160F,85%				
Source code		HPAqX XXXA		HPAqX XXXD				
		Normalized	**Measured**	**Normalized**	**Measured**			
SBS1 Strength [ksi]	**Mean**		9.953		5.043			
	Minimum		9.073		4.774			
	Maximum		11.03		5.261			
	C.V.(%)		5.370		3.279			
	No. Specimens		18		18			
	No. Prepreg Lots		3		3			

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

Material: Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

Open-Hole Tension 1
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
[45/0/-45/90]S

Resin content: 38.0 % wt **Comp. density:** 1.564 g/cc
Fiber volume: 54.1 % vol
Ply count: 8

Test method: ASTM D5766-11(2018)

Normalized by: 0.0150 in. CPT

		CTD		RTD		ETW	
Test Temperature [°F]		-65		70		250	
Moisture Conditioning		Dry		Dry		Equilibrium	
Equilibrium at T, RH						160F,85%	
Source code		HPADX XXXB		HPADX XXXA		HPADX XXXD	
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
OHT1 Strength [ksi]	**Mean**	41.38	40.94	45.65	45.38	50.70	48.92
	Minimum	37.36	36.83	41.92	40.47	47.15	45.47
	Maximum	44.82	48.30	48.36	50.85	54.51	52.23
	C.V.(%)	4.777	8.050	3.442	6.051	3.934	3.808
	No. Specimens	18		18		18	
	No. Prepreg Lots	3		3		3	

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

Material:	Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC							**Open-Hole Tension 2** Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC [45/-45/90/45/-45]S		
Resin content:	37.5 % wt		**Comp. density:**	1.567 g/cc						
Fiber volume:	54.7 % vol									
Ply count:	10									
Test method:	ASTM D5766-11(2018)									
Normalized by:	0.0150	in. CPT								
			CTD		**RTD**		**ETW**			
Test Temperature [°F]			-65		70		250			
Moisture Conditioning			Dry		Dry		Equilibrium			
Equilibrium at T, RH							160F,85%			
Source code			HPAEX XXXB		HPAEX XXXA		HPAEX XXXD			
			Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**		
	Mean		40.45	39.57	40.06	40.18	29.76	28.48		
	Minimum		38.40	36.99	38.30	38.53	28.59	27.13		
	Maximum		42.41	43.89	42.47	42.07	31.45	29.98		
OHT2 Strength [ksi]	**C.V.(%)**		3.001	4.379	2.801	3.096	2.420	2.482		
	No. Specimens		18		18		18			
	No. Prepreg Lots		3		3		3			

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

Material:	Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC							**Open-Hole Tension 3** Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC [0/90/45/0/90]S			
Resin content:	37.7 % wt		**Comp. density:**	1.566 g/cc							
Fiber volume:	54.5 % vol										
Ply count:	10										
Test method:	ASTM D5766-11(2018)										
Normalized by:	0.0150	in. CPT									
			CTD		**RTD**		**ETW**				
Test Temperature [°F]			-65		70		250				
Moisture Conditioning			Dry		Dry		Equilibrium				
Equilibrium at T, RH							160F,85%				
Source code			HPAFX XXXB		HPAFX XXXA		HPAFX XXXD				
			Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**			
	Mean		50.12	49.27	58.85	58.61	65.89	63.19			
	Minimum		45.56	42.85	52.80	49.72	60.66	56.96			
	Maximum		56.43	61.03	62.67	67.53	68.80	66.21			
OHT3 Strength [ksi]	**C.V.(%)**		5.866	9.243	4.609	8.996	2.918	3.248			
	No. Specimens		18		18		18				
	No. Prepreg Lots		3		3		3				

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

Material:	Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC							**Filled-Hole Tension 1** Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC [45/0/-45/90]S			
Resin content:	38.1 % wt		**Comp. density:**	1.560 g/cc							
Fiber volume:	54.0 % vol										
Ply count:	8										
Test method:	ASTM D6742-17										
Normalized by:	0.0150	in. CPT									
			CTD		**RTD**		**ETW**				
Test Temperature [°F]			-65		70		250				
Moisture Conditioning			Dry		Dry		Equilibrium				
Equilibrium at T, RH							160F,85%				
Source code			HPA4X XXXB		HPA4X XXXA		HPA4X XXXD				
			Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**			
	Mean		44.06	43.58	48.02	47.81	50.39	48.06			
	Minimum		40.02	40.26	43.46	43.55	48.18	45.91			
	Maximum		48.56	47.78	52.04	53.48	53.68	50.77			
FHT1 Strength [ksi]	**C.V.(%)**		5.901	5.417	4.264	5.879	3.891	3.220			
	No. Specimens		18		18		18				
	No. Prepreg Lots		3		3		3				

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

Material: Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

Resin content: 38.0 % wt **Comp. density:** 1.567 g/cc
Fiber volume: 54.3 % vol
Ply count: 10

Test method: ASTM D6742-17

Normalized by: 0.0150 in. CPT

Filled-Hole Tension 2
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
[45/-45/90/45/-45]S

		CTD		RTD		ETW	
Test Temperature [°F]		-65		70		250	
Moisture Conditioning		Dry		Dry		Equilibrium	
Equilibrium at T, RH						160F,85%	
Source code		HPA5X XXXB		HPA5X XXXA		HPA5X XXXD	
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean	44.05	42.88	43.17	43.24	32.21	30.80
	Minimum	42.52	39.81	41.33	40.49	30.87	29.24
	Maximum	46.95	47.23	44.66	46.00	33.63	32.19
FHT2 Strength [ksi]	**C.V.(%)**	2.322	4.867	1.977	3.781	2.318	2.366
	No. Specimens	18		18		18	
	No. Prepreg Lots	3		3		3	

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

Material:	Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC							**Filled-Hole Tension 3** Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC [0/90/45/0/90]S			
Resin content:	37.7 % wt		**Comp. density:**	1.561 g/cc							
Fiber volume:	54.4 % vol										
Ply count:	10										
Test method:	ASTM D6742-17										
Normalized by:	0.0150	in. CPT									
			CTD		**RTD**		**ETW**				
Test Temperature [°F]			-65		70		250				
Moisture Conditioning			Dry		Dry		Equilibrium				
Equilibrium at T, RH							160F,85%				
Source code			HPA6X XXXB		HPA6X XXXA		HPA6X XXXD				
			Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**			
	Mean		50.11	49.23	55.85	55.41	58.24	55.50			
	Minimum		46.22	45.07	48.59	46.07	53.74	51.86			
	Maximum		53.85	56.86	60.25	59.66	63.40	60.04			
FHT3 Strength [ksi]	**C.V.(%)**		4.413	6.313	4.743	5.811	4.202	4.312			
	No. Specimens		18		18		18				
	No. Prepreg Lots		3		3		3				

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

Material:	Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC					**Open-Hole Compression 1** Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC [45/0/-45/90/-45/90]S			
Resin content:	38.8 % wt		**Comp. density:**	1.560 g/cc					
Fiber volume:	53.3 % vol								
Ply count:	12								
Test method:	ASTM D6484-14								
Normalized by:	0.0150	in. CPT							
			RTD		**ETW**				
Test Temperature [°F]			70		250				
Moisture Conditioning			Dry		Equilibrium				
Equilibrium at T, RH					160F,85%				
Source code			HPAGX XXXA		HPAGX XXXD				
			Normalized	**Measured**	**Normalized**	**Measured**			
	Mean		50.04	50.19	31.85	31.36			
	Minimum		46.29	47.43	29.97	29.85			
	Maximum		52.32	55.35	33.37	33.53			
OHC1 Strength [ksi]	**C.V.(%)**		3.530	3.930	2.699	3.415			
	No. Specimens		18		18				
	No. Prepreg Lots		3		3				

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

Material:	Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC					**Open-Hole Compression 2** Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC [45/-45/90/45/-45]S			
Resin content:	39.8 % wt		**Comp. density:**	1.553 g/cc					
Fiber volume:	52.3 % vol								
Ply count:	10								
Test method:	ASTM D6484-14								
Normalized by:	0.0150	in. CPT							
			RTD		**ETW**				
Test Temperature [°F]			70		250				
Moisture Conditioning			Dry		Equilibrium				
Equilibrium at T, RH					160F,85%				
Source code			HPAHX XXXA		HPAHX XXXD				
			Normalized	**Measured**	**Normalized**	**Measured**			
	Mean		38.78	39.15	22.89	22.56			
	Minimum		36.46	37.33	20.76	21.23			
	Maximum		41.08	41.56	25.53	25.55			
OHC2 Strength [ksi]	**C.V.(%)**		3.799	3.249	4.964	5.019			
	No. Specimens		18		18				
	No. Prepreg Lots		3		3				

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

Material:	Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC						**Open-Hole Compression 3** Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC [0/90/45/0/90]S			
Resin content:	37.4 % wt		**Comp. density:**	1.565 g/cc						
Fiber volume:	54.8 % vol									
Ply count:	10									
Test method:	ASTM D6484-14									
Normalized by:	0.0150	in. CPT								
			RTD		**ETW**					
Test Temperature [°F]			70		250					
Moisture Conditioning			Dry		Equilibrium					
Equilibrium at T, RH					160F,85%					
Source code			HPAIX XXXA		HPAIX XXXD					
			Normalized	**Measured**	**Normalized**	**Measured**				
	Mean		57.57	57.58	33.38	33.27				
	Minimum		51.68	52.56	30.75	29.65				
	Maximum		62.55	62.81	34.86	36.97				
OHC3 Strength [ksi]	**C.V.(%)**		4.857	5.134	3.942	5.708				
	No. Specimens		18		18					
	No. Prepreg Lots		3		3					

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

Material:	Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC					**Filled-Hole Compression 1** Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC [45/0/-45/90/-45/90]S			
Resin content:	38.5 % wt		**Comp. density:**	1.556 g/cc					
Fiber volume:	53.5 % vol								
Ply count:	12								
Test method:	ASTM D6742-17								
Normalized by:	0.0150	in. CPT							
			RTD		**ETW**				
Test Temperature [°F]			70		250				
Moisture Conditioning			Dry		Equilibrium				
Equilibrium at T, RH					160F,85%				
Source code			HPA7X XXXA		HPA7X XXXD				
			Normalized	**Measured**	**Normalized**	**Measured**			
	Mean		85.23	85.41	49.74	49.31			
	Minimum		77.51	79.38	45.67	46.88			
	Maximum		94.19	90.93	54.64	52.02			
FHC1 Strength [ksi]	**C.V.(%)**		6.086	3.742	5.378	2.684			
	No. Specimens		18		18				
	No. Prepreg Lots		3		3				

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

Data reported for reference only. FHC2 values are equal to or greater than UNC2 values, therefore CMH17 and NCAMP recommend the use of UNC2 values for design purposes.

Filled-Hole Compression 2
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
[45/-45/90/45/-45]S

Material:	Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC								
Resin content:	38.4 % wt		**Comp. density:**	1.557 g/cc					
Fiber volume:	53.6 % vol								
Ply count:	10								
Test method:	ASTM D6742-17								
Normalized by:	0.0150	in. CPT							
			RTD		**ETW**				
Test Temperature [°F]			70		250				
Moisture Conditioning			Dry		Equilibrium				
Equilibrium at T, RH					160F,85%				
Source code			HPA8X XXXA		HPA8X XXXD				
			Normalized	**Measured**	**Normalized**	**Measured**			
	Mean		57.39	57.77	31.44	31.34			
	Minimum		51.93	55.31	27.62	28.48			
	Maximum		60.48	60.22	35.20	35.80			
FHC2 Strength [ksi]	**C.V.(%)**		3.561	2.320	6.230	5.145			
	No. Specimens		19		18				
	No. Prepreg Lots		3		3				

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

Filled-Hole Compression 3
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC [0/90/45/0/90]S

Material:	Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC								
Resin content:	39.1 % wt		**Comp. density:**	1.579 g/cc					
Fiber volume:	53.6 % vol								
Ply count:	10								
Test method:	ASTM D6742-17								
Normalized by:	0.0150	in. CPT							
			RTD		**ETW**				
Test Temperature [°F]			70		250				
Moisture Conditioning			Dry		Equilibrium				
Equilibrium at T, RH					160F,85%				
Source code			HPA9X XXXA		HPA9X XXXD				
			Normalized	**Measured**	**Normalized**	**Measured**			
	Mean		88.69	89.30	56.34	56.55			
	Minimum		74.45	79.87	51.25	52.62			
	Maximum		98.45	95.96	61.42	60.32			
FHC3 Strength [ksi]	**C.V.(%)**		5.942	4.105	5.714	3.409			
	No. Specimens		19		18				
	No. Prepreg Lots		3		3				

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

Material:	Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC			**Single-Shear Bearing 1** Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC [45/0/-45/90]S	
Resin content:	37.6 % wt	**Comp. density:**	1.562 g/cc		
Fiber volume:	54.5 % vol				
Ply count:	8				
Test method:	ASTM D5961-17				
Normalized by:	0.0150	in. CPT			

		RTD		ETW					
Test Temperature [°F]		70		250					
Moisture Conditioning		Dry		Equilibrium					
Equilibrium at T, RH				160F,85%					
Source code		HPA1X XXXA		HPA1X XXXD					
		Normalized	**Measured**	**Normalized**	**Measured**				
SSB1 Initial Peak Strength [ksi]	**Mean**		112.6		88.13				
	Minimum		104.5		85.33				
	Maximum		121.7		90.25				
	C.V.(%)		5.455		2.871				
	No. Specimens		6		3				
	No. Prepreg Lots		2		3				
SSB1 2% Offset Strength [ksi]	**Mean**	105.4	111.0	86.84	87.60				
	Minimum	92.35	91.30	71.15	68.76				
	Maximum	117.5	123.7	97.81	97.97				
	C.V.(%)	7.580	6.959	7.698	9.332				
	No. Specimens		18		16				
	No. Prepreg Lots		3		3				
SSB1 Ultimate Strength [ksi]	**Mean**	129.2	136.0	94.99	95.17				
	Minimum	119.6	121.0	83.26	78.97				
	Maximum	149.7	149.8	110.2	109.3				
	C.V.(%)	5.763	5.622	6.785	8.400				
	No. Specimens		18		19				
	No. Prepreg Lots		3		3				

Initial Peak reported for reference only.

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

Material:	Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC						**Single-Shear Bearing 2** Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC [45/-45/90/45/-45]S			
Resin content:	36.9 % wt		**Comp. density:**	1.567 g/cc						
Fiber volume:	55.3 % vol									
Ply count:	10									
Test method:	ASTM D5961-17									
Normalized by:	0.0150	in. CPT								
			RTD		**ETW**					
Test Temperature [°F]			70		250					
Moisture Conditioning			Dry		Equilibrium					
Equilibrium at T, RH					160F,85%					
Source code			HPA2X XXXA		HPA2X XXXD					
			Normalized	**Measured**	**Normalized**	**Measured**				
SSB2 2% Offset Strength [ksi]	**Mean**		108.6	113.7	86.86	87.84				
	Minimum		99.59	102.2	78.01	80.99				
	Maximum		119.1	122.0	93.53	97.63				
	C.V.(%)		5.784	4.579	5.063	4.505				
	No. Specimens		18		18					
	No. Prepreg Lots		3		3					
SSB2 Ultimate Strength [ksi]	**Mean**		132.3	138.6	97.75	98.89				
	Minimum		119.6	129.4	91.27	88.09				
	Maximum		142.5	146.3	103.7	104.5				
	C.V.(%)		4.429	4.012	3.725	4.002				
	No. Specimens		18		18					
	No. Prepreg Lots		3		3					

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

Material:	Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC						**Single-Shear Bearing 3** Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC [0/90/45/0/90]S			
Resin content:	38.2 % wt		**Comp. density:**	1.559 g/cc						
Fiber volume:	53.8 % vol									
Ply count:	10									
Test method:	ASTM D5961-17									
Normalized by:	0.0150	in. CPT								
			RTD		**ETW**					
Test Temperature [°F]			70		250					
Moisture Conditioning			Dry		Equilibrium					
Equilibrium at T, RH					160F,85%					
Source code			HPA3X XXXA		HPA3X XXXD					
			Normalized	**Measured**	**Normalized**	**Measured**				
SSB3 Initial Peak Strength [ksi]	**Mean**			107.6		78.42				
	Minimum			105.8		71.91				
	Maximum			110.8		85.39				
	C.V.(%)			2.159		5.625				
	No. Specimens			4		12				
	No. Prepreg Lots			3		3				
SSB3 2% Offset Strength [ksi]	**Mean**		101.6	107.2	75.91	75.78				
	Minimum		93.60	101.5	67.76	70.21				
	Maximum		110.2	118.7	83.41	82.87				
	C.V.(%)		4.871	4.274	4.800	4.704				
	No. Specimens			18		18				
	No. Prepreg Lots			3		3				
SSB3 Ultimate Strength [ksi]	**Mean**		119.7	126.3	86.62	86.52				
	Minimum		107.9	119.8	81.62	81.04				
	Maximum		130.9	133.5	91.98	93.45				
	C.V.(%)		5.187	3.408	2.957	4.086				
	No. Specimens			18		18				
	No. Prepreg Lots			3		3				

Initial Peak reported for reference only.

2.3.29 “25/50/25” Compression After Impact 1 Properties (CAI1)

Material:	Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC										
Resin content:	35.5 % wt		**Comp. density:**	1.572 g/cc							
Fiber volume:	56.7 % vol										
Ply count:	12										
Test method:	ASTM D7136-15/D7137-17										
Normalized by:	0.0150	in. CPT									
			RTD								
Test Temperature [°F]			70								
Moisture Conditioning			Dry								
Equilibrium at T, RH											
Source code			HPAKX XXXA								
		Normalized	**Measured**								
	Mean	34.01	34.19								
	Minimum	33.37	33.17								
	Maximum	34.72	35.70								
CAI1 Strength [ksi]	**C.V.(%)**	1.691	2.643								
	No. Specimens		6								
	No. Prepreg Lots		1								

Compression After Impact 1
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
[45/0/-45/90/45/90]S

2.3.30 Interlaminar Tension Properties (ILT)

Material: Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

Resin content: 38.0 % wt **Comp. density:** 1.562 g/cc
Fiber volume: 54.1 % vol
Ply count: 11

Test method: ASTM D6415-06a(2013)

Normalized by: NA

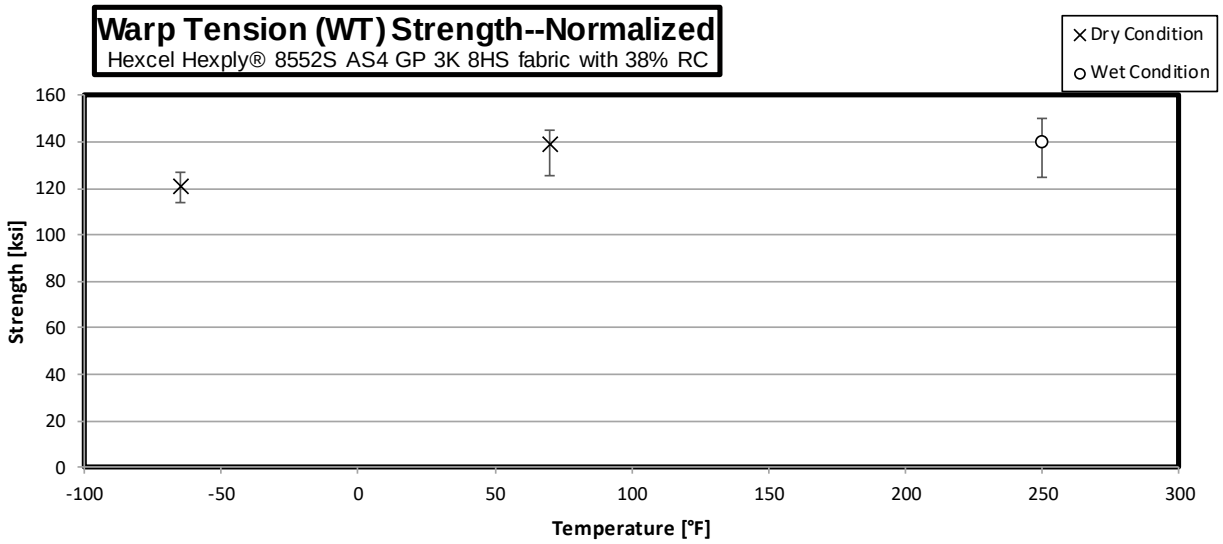
Interlaminar Tension
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
[0]11

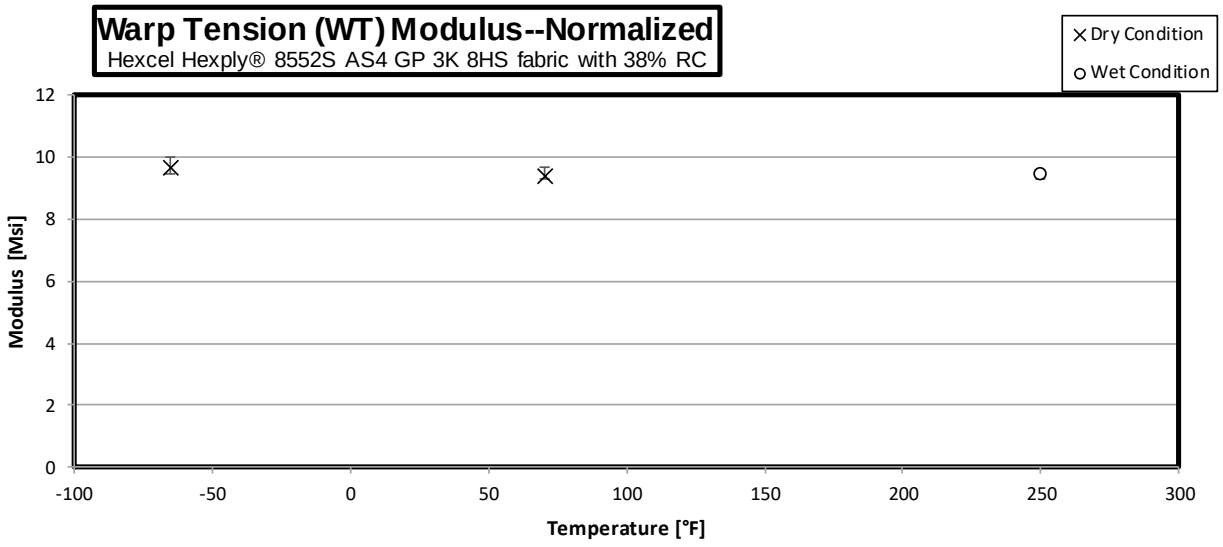
		CTD		RTD		ETW			
Test Temperature [°F]		-65		70		250			
Moisture Conditioning		Dry		Dry		Equilibrium			
Equilibrium at T, RH						160F,85%			
Source code		HPAMX XXXB		HPAMX XXXA		HPAMX XXXD			
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**		
CBS [lb]	**Mean**		346.5		352.3		115.7		
	Minimum		330.9		341.5		98.55		
	Maximum		358.3		378.7		134.6		
	C.V.(%)		3.151		4.141		11.52		
	No. Specimens		6		6		6		
	No. Prepreg Lots		1		1		1		
ILT [ksi]	**Mean**		11.84		11.96		3.876		
	Minimum		11.28		11.61		3.340		
	Maximum		12.46		12.86		4.520		
	C.V.(%)		3.655		4.087		11.24		
	No. Specimens		6		6		6		
	No. Prepreg Lots		1		1		1		

3. Individual Test Charts

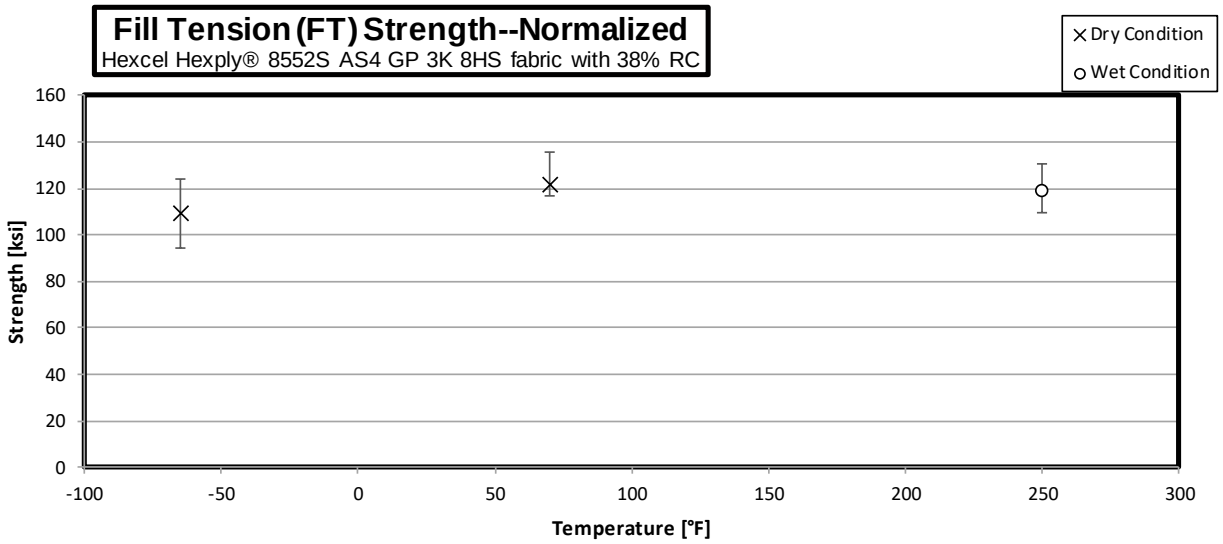
These charts combine all three batches of data and plot the minimum and maximum modulus and strength range based on the test temperature.

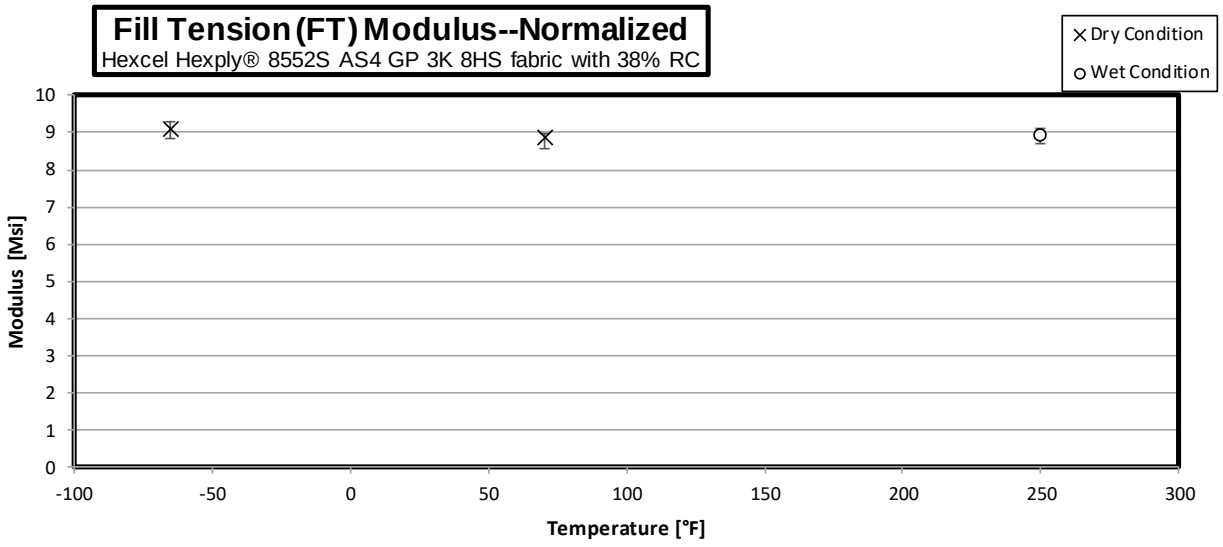
3.1 Warp Tension Properties (WT)



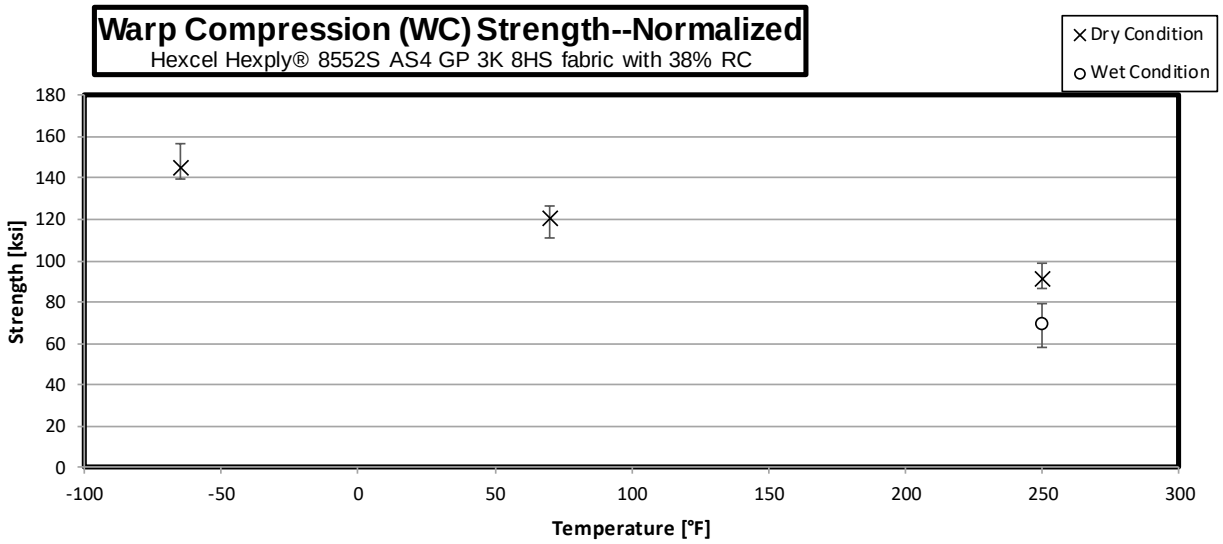


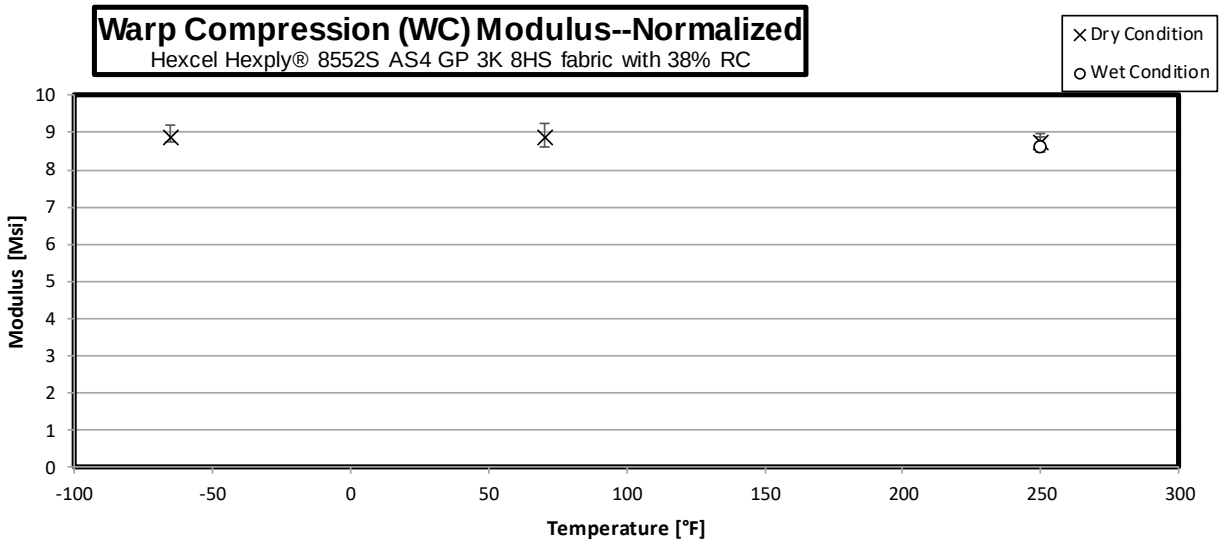
3.2 Fill Tension Properties (FT)



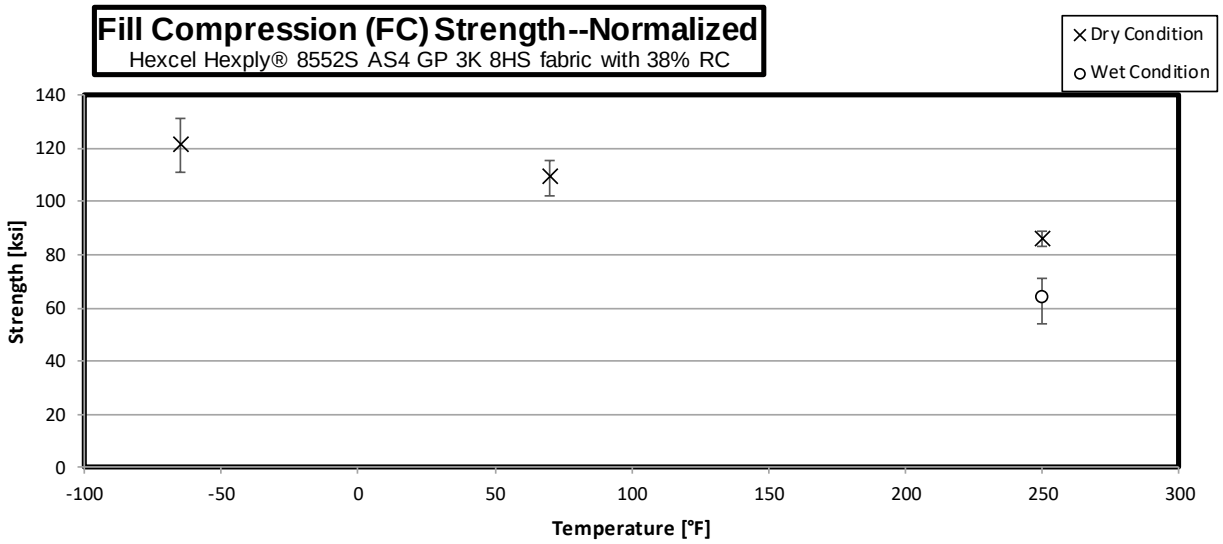


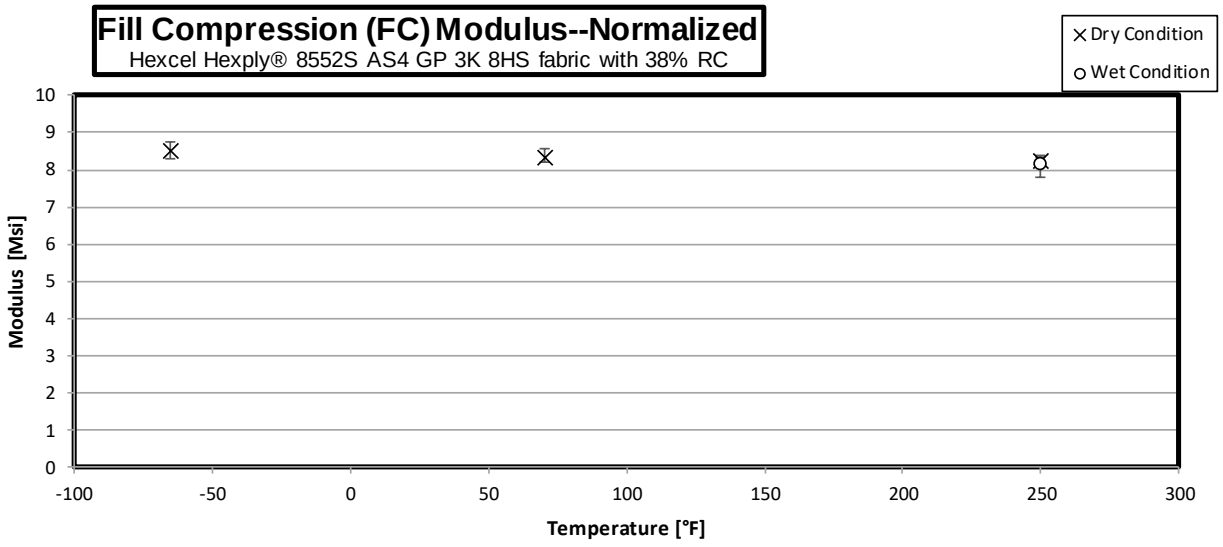
3.3 Warp Compression Properties (WC)



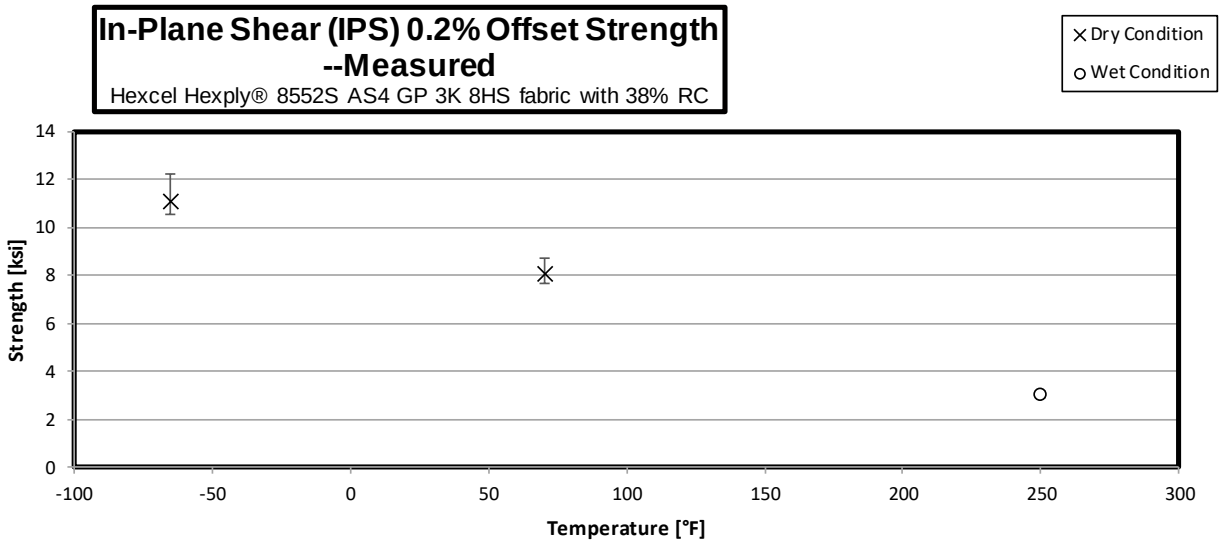


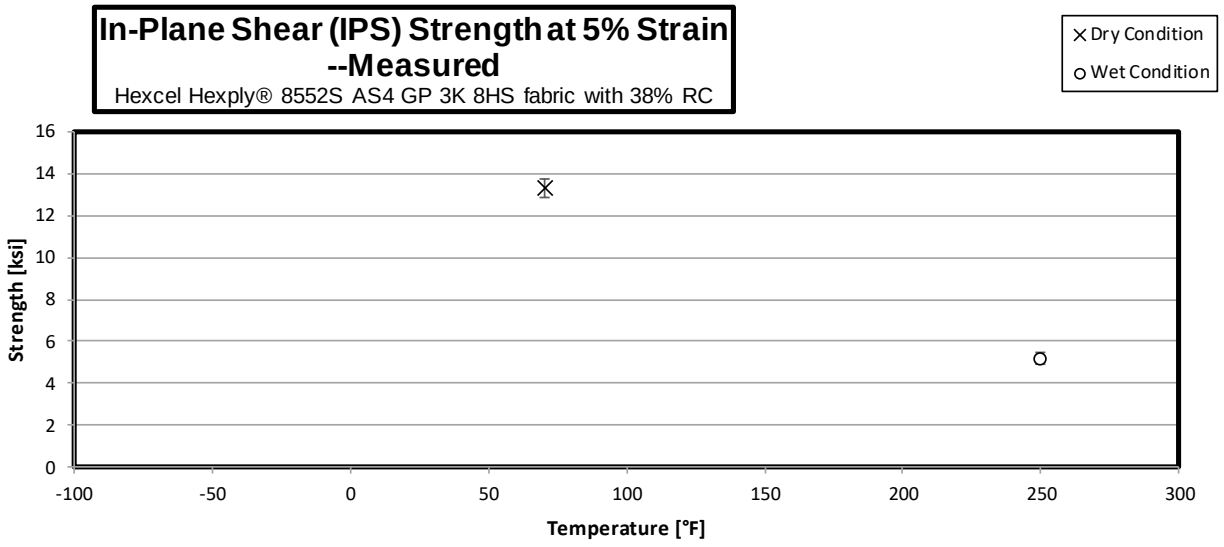
3.4 Fill Compression Properties (FC)

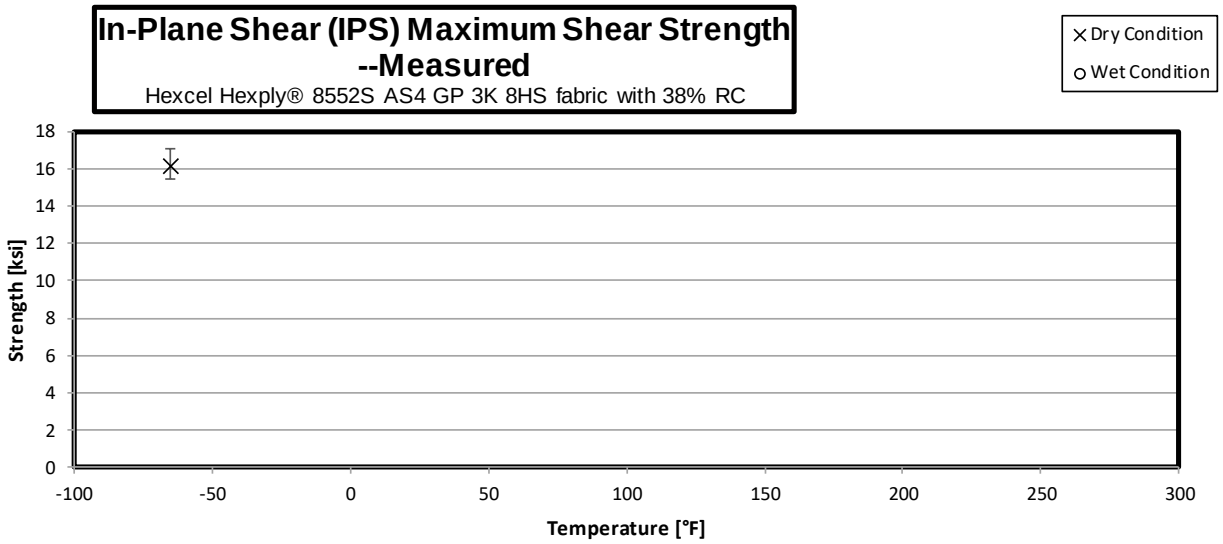


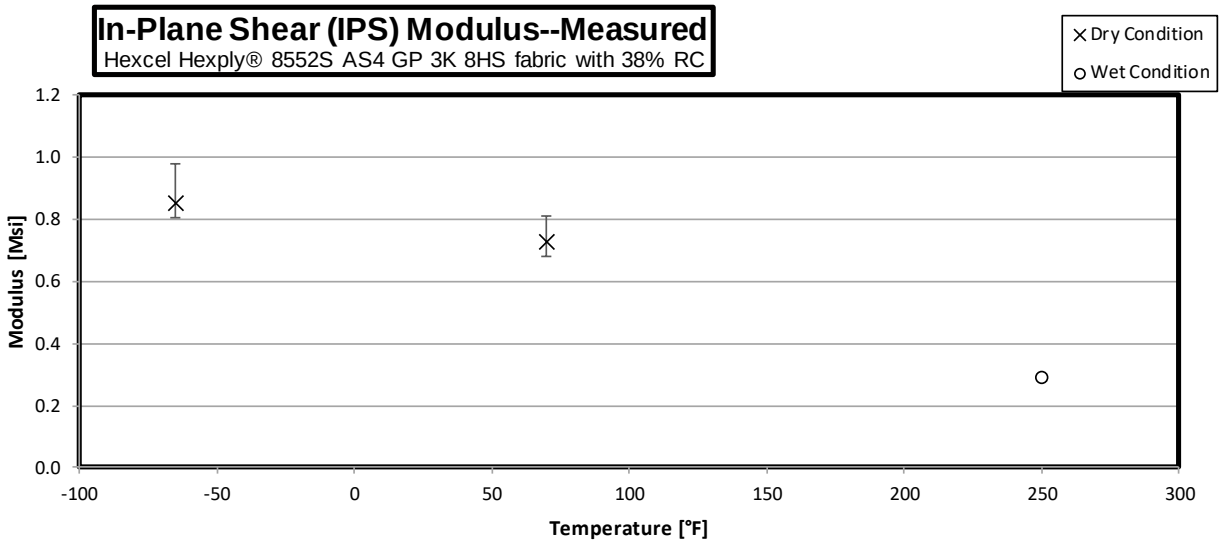


3.5 In-Plane Shear Properties (IPS)

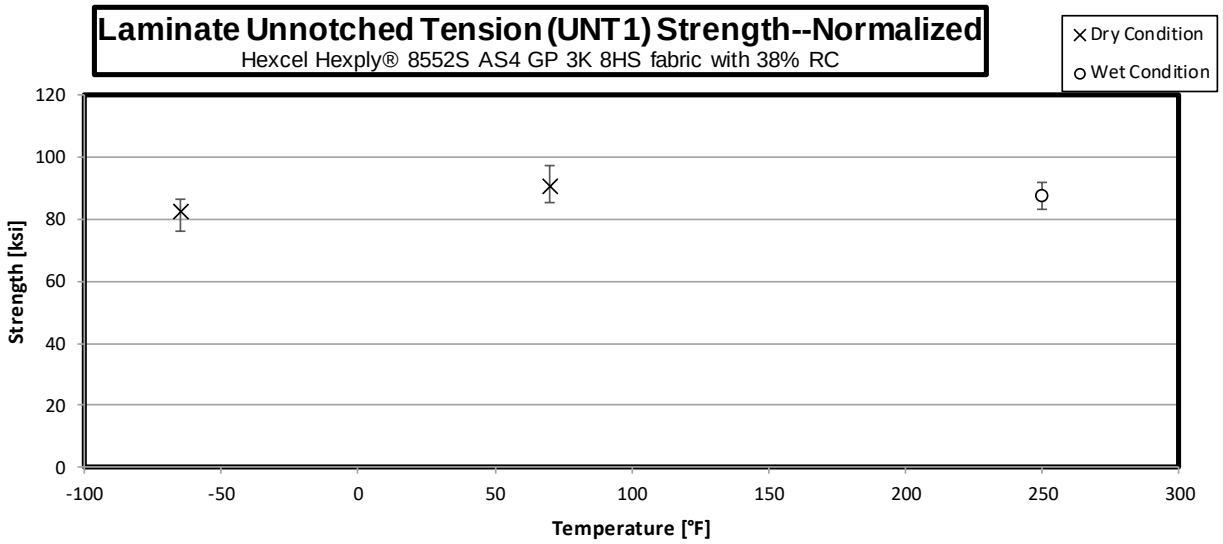


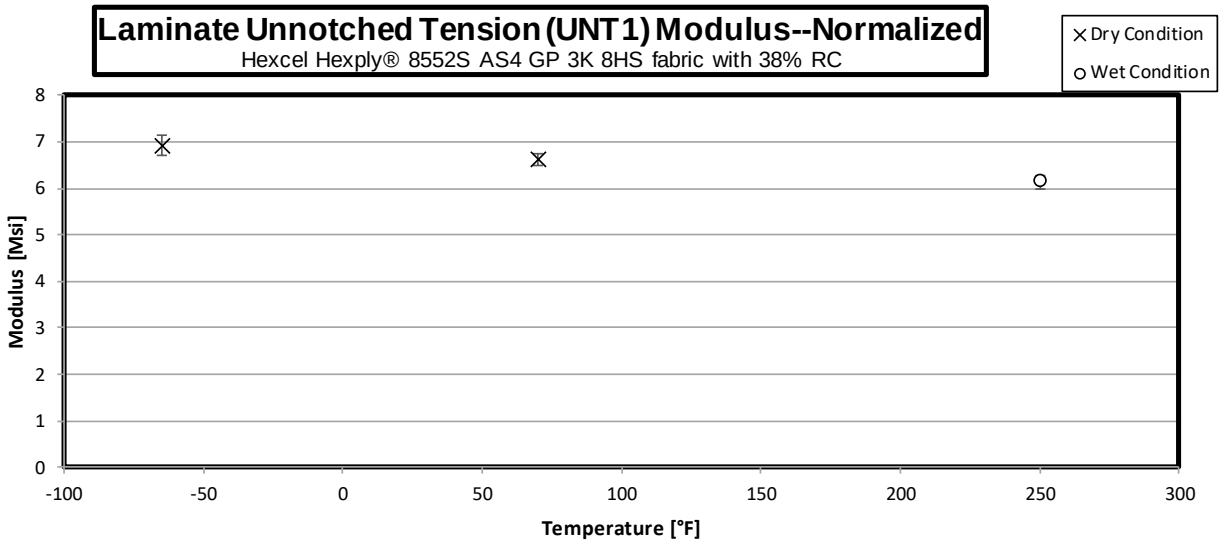



In-Plane Shear (IPS) Maximum Shear Strength --Measured
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Dry Condition
Wet Condition
Strength [ksi]
0
2
4
6
8
10
12
14
16
18
-100
-50
0
50
100
150
200
250
300
Temperature [°F]

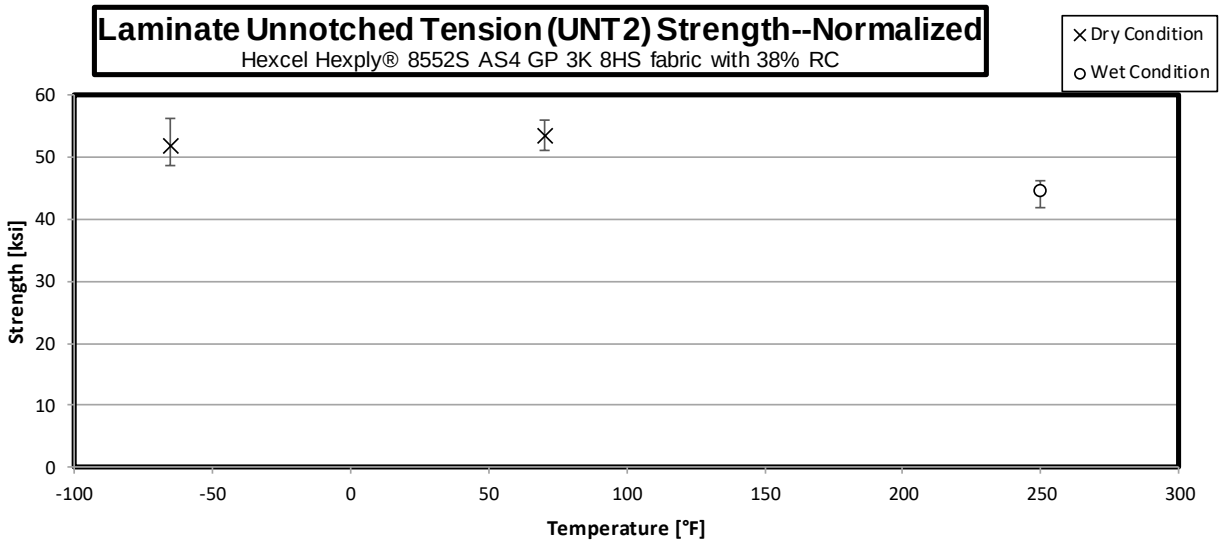

In-Plane Shear (IPS) Modulus--Measured
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Dry Condition
Wet Condition
Modulus [Msi]
0.0
0.2
0.4
0.6
0.8
1.0
1.2
-100
-50
0
50
100
150
200
250
300
Temperature [°F]

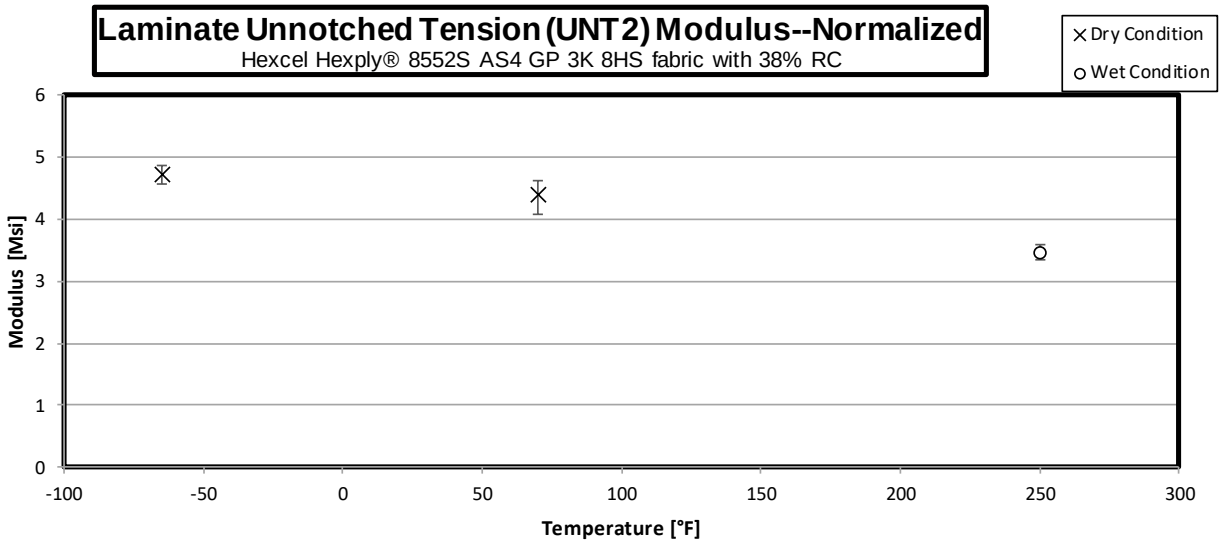
3.6 “25/50/25” Unnotched Tension 1 Properties (UNT1)



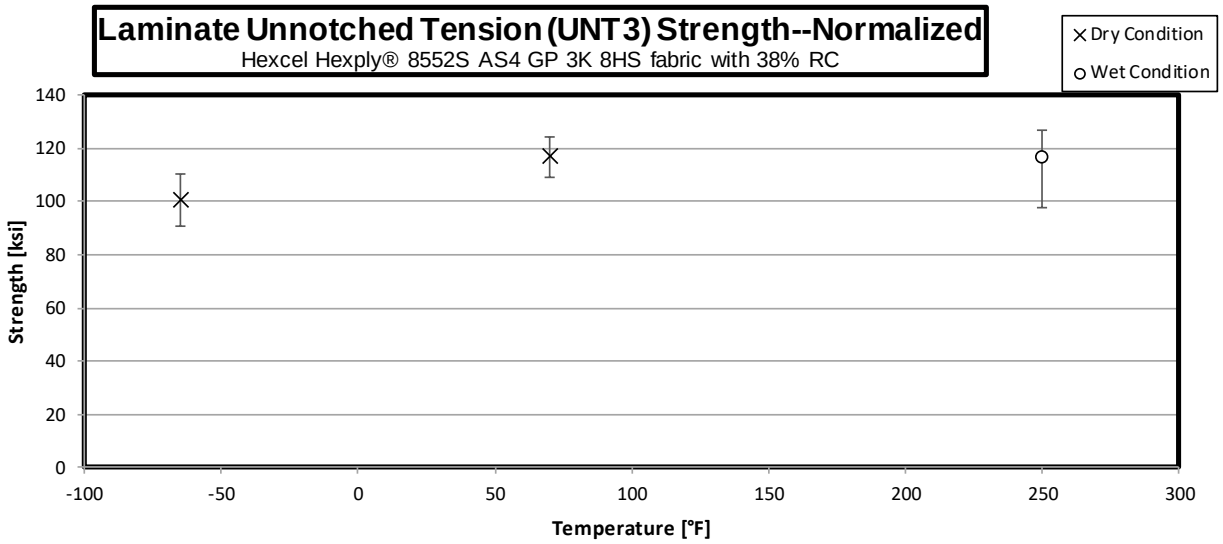


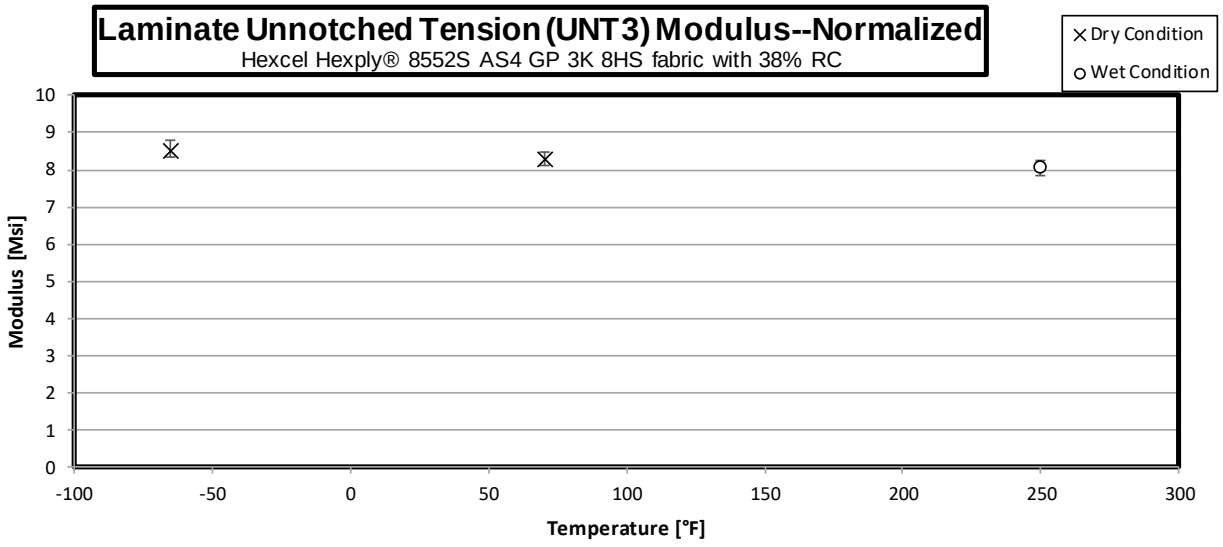
3.7 “10/80/10” Unnotched Tension 2 Properties (UNT2)



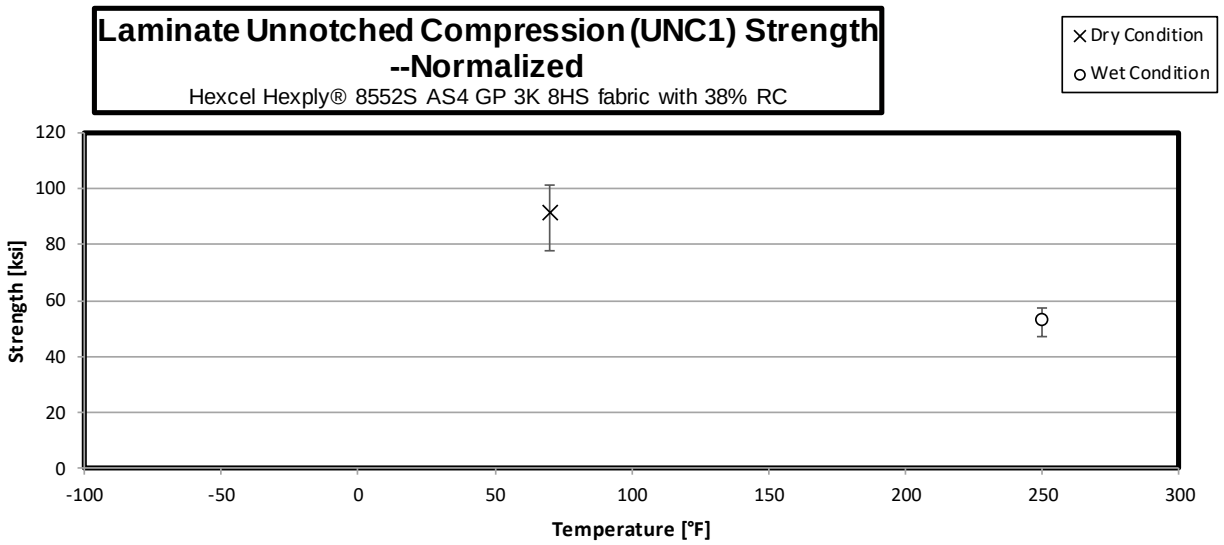


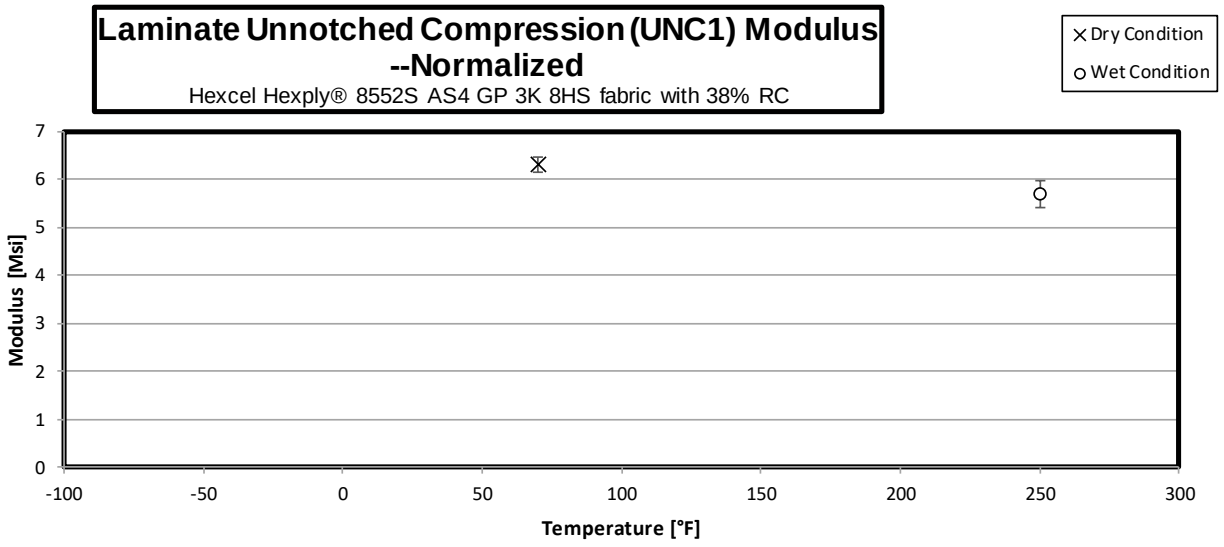
3.8 “40/20/40” Unnotched Tension 3 Properties (UNT3)



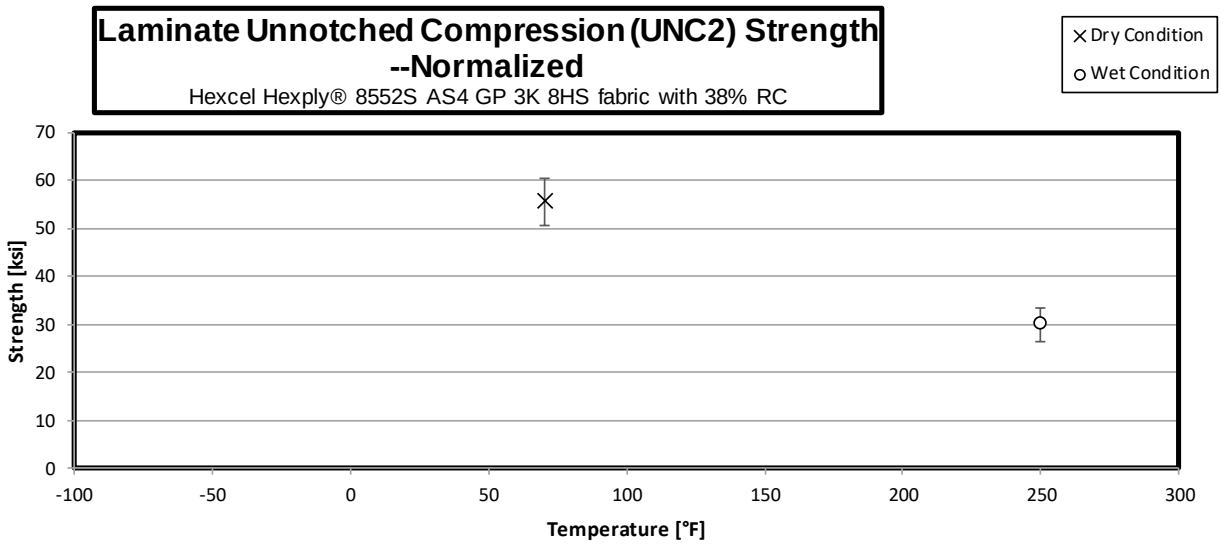


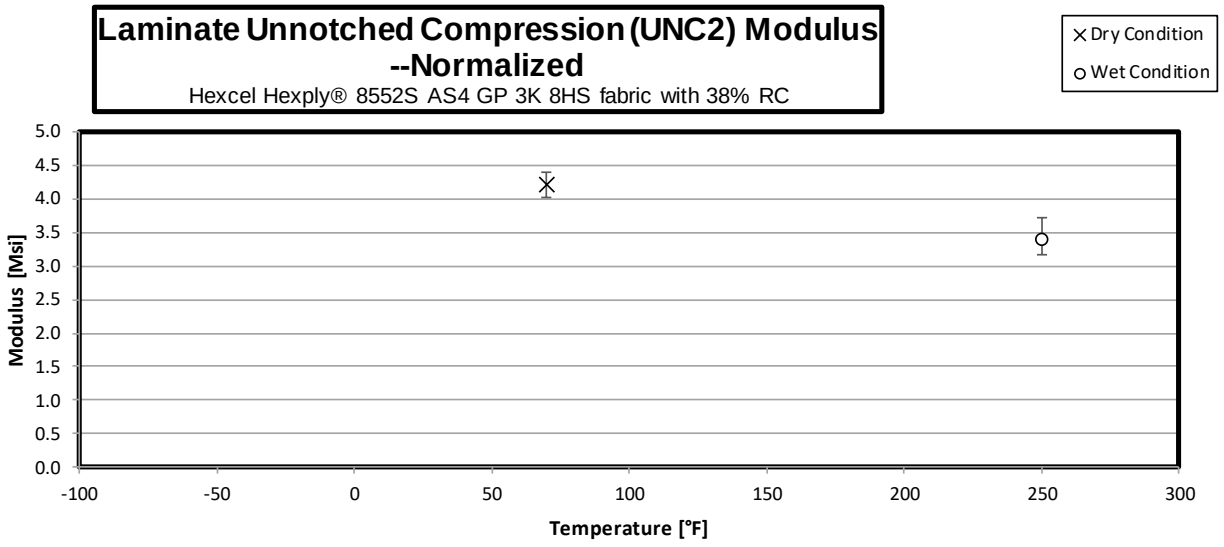
3.9 “25/50/25” Unnotched Compression 1 Properties (UNC1)



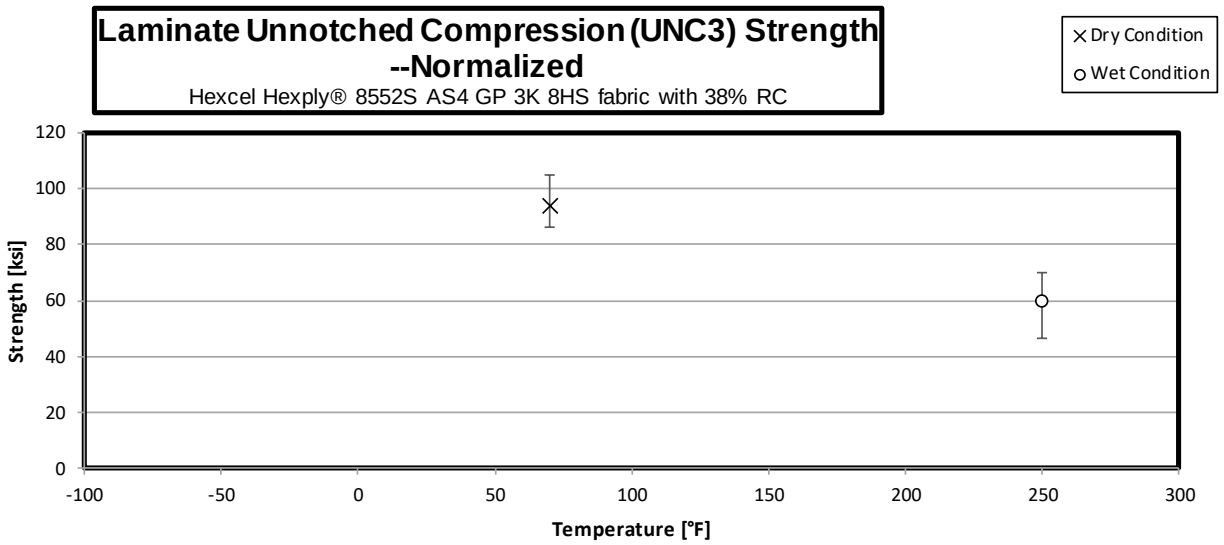


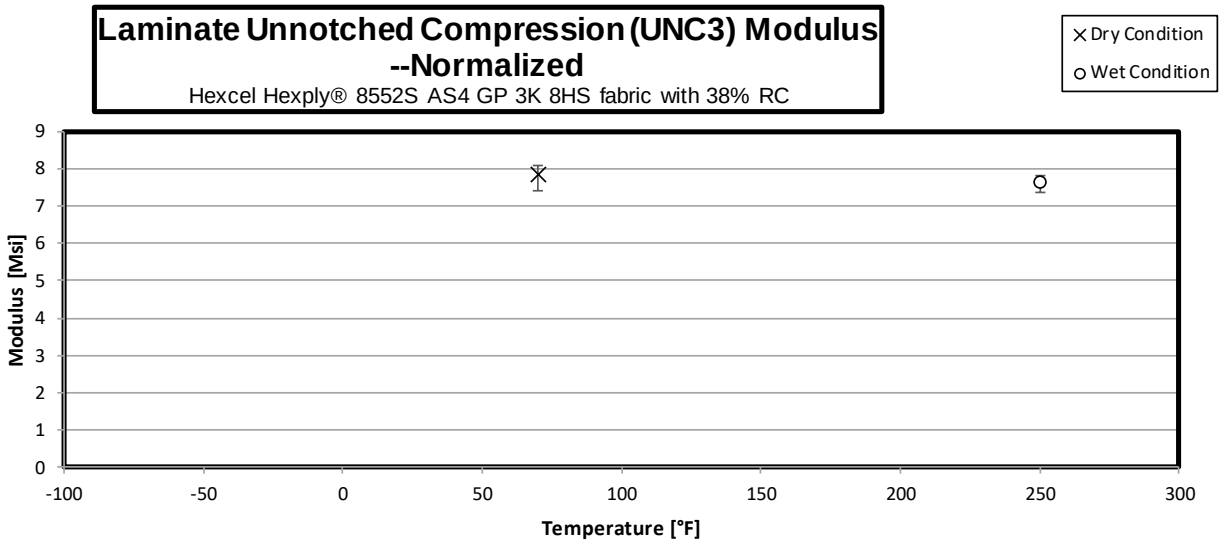
3.10 "10/80/10" Unnotched Compression 2 Properties (UNC2)



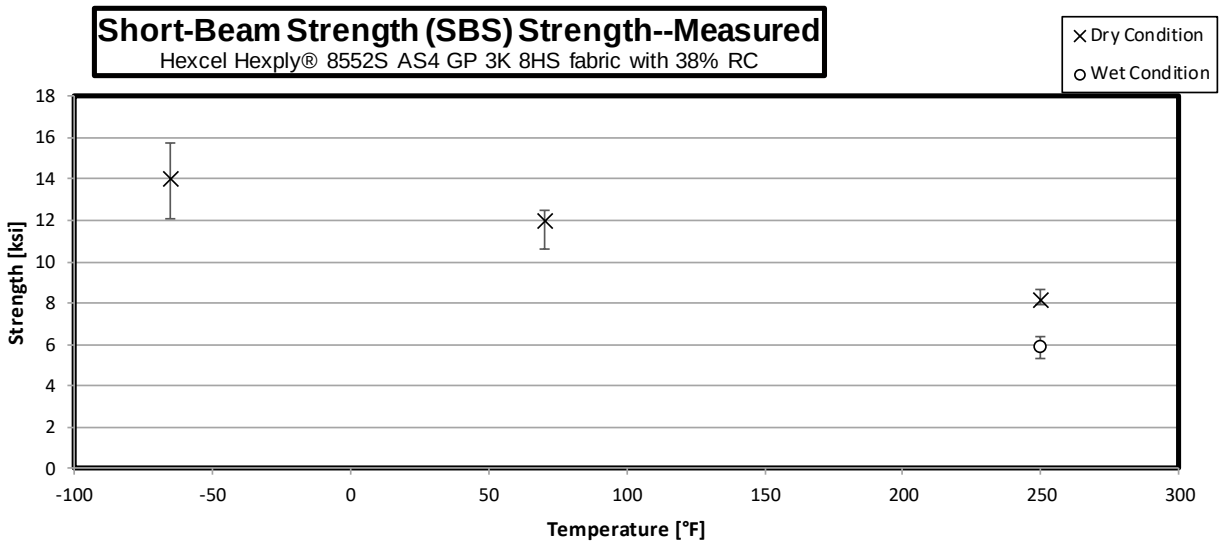


3.11 "40/20/40" Unnotched Compression 3 Properties (UNC3)

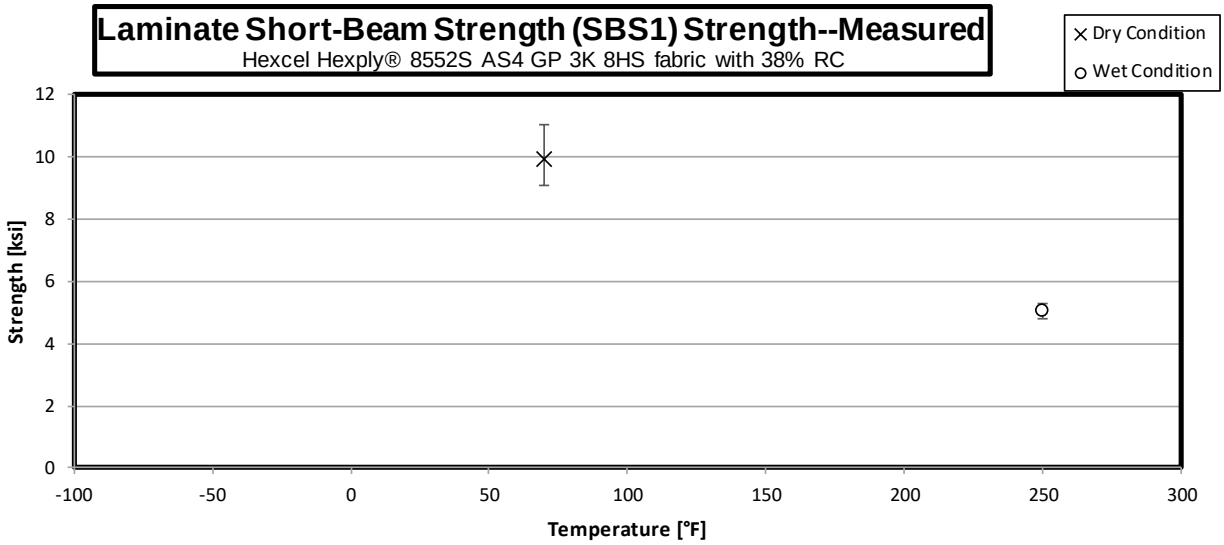




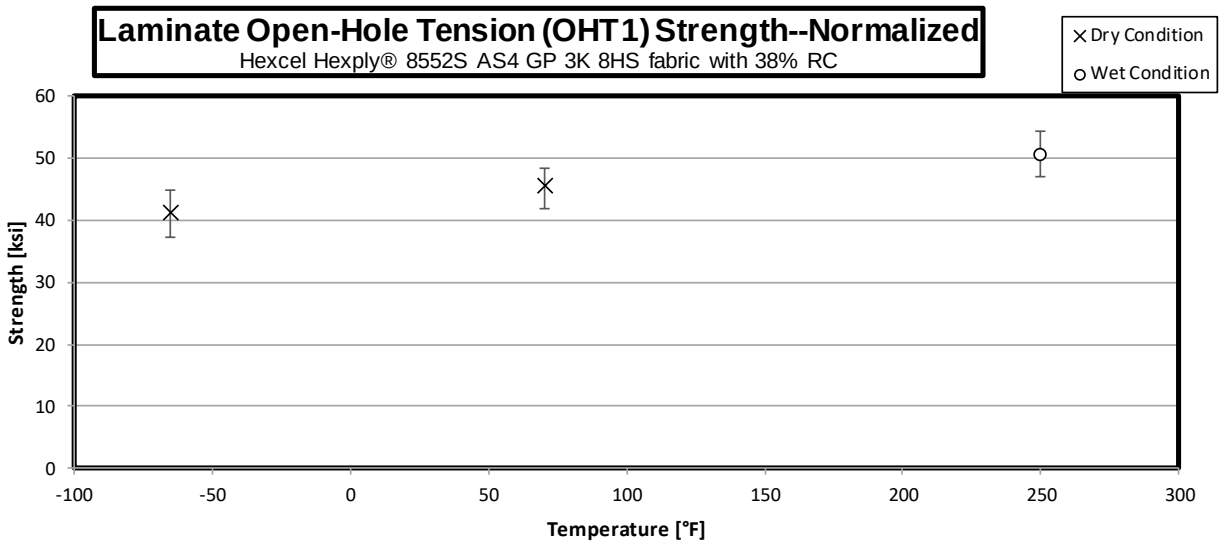
3.12 Lamina Short-Beam Strength Properties (SBS)



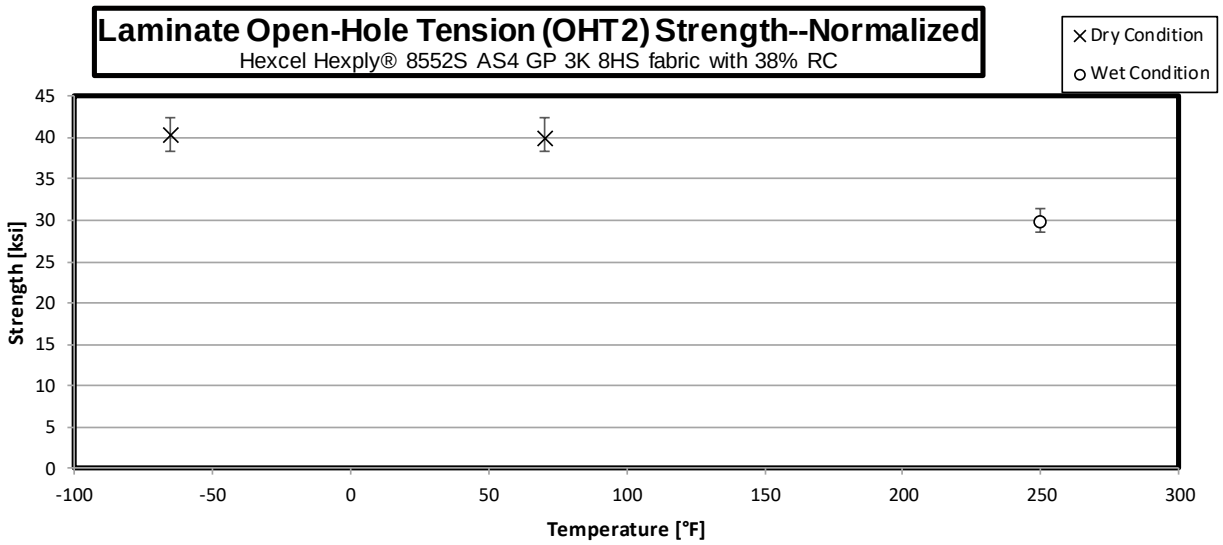
3.13 Laminate Short-Beam Strength Properties (SBS1)



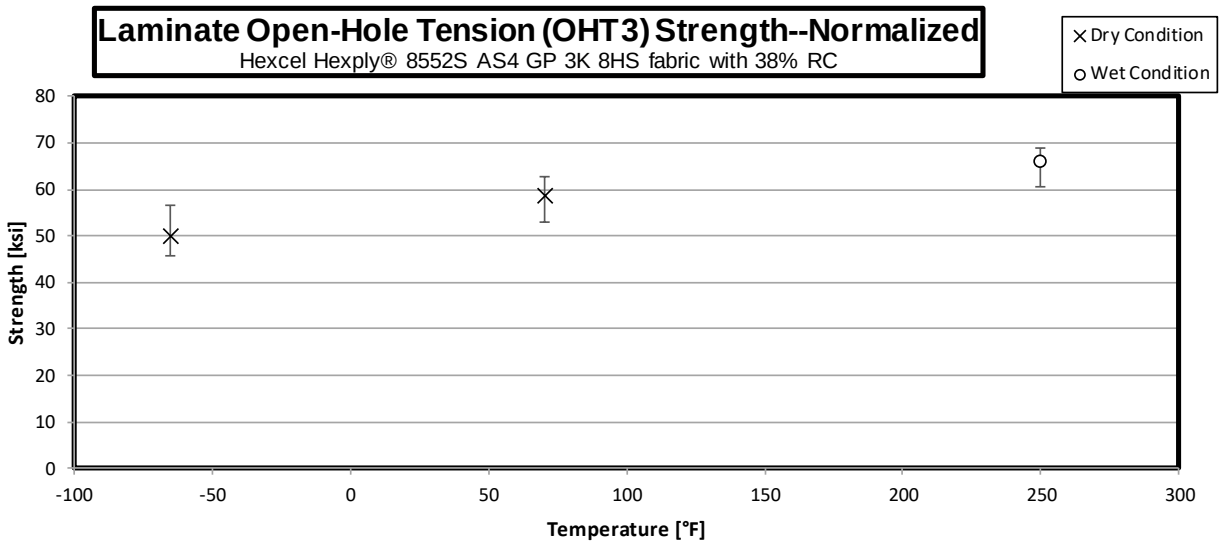
3.14 “25/50/25” Open-Hole Tension 1 Properties (OHT1)



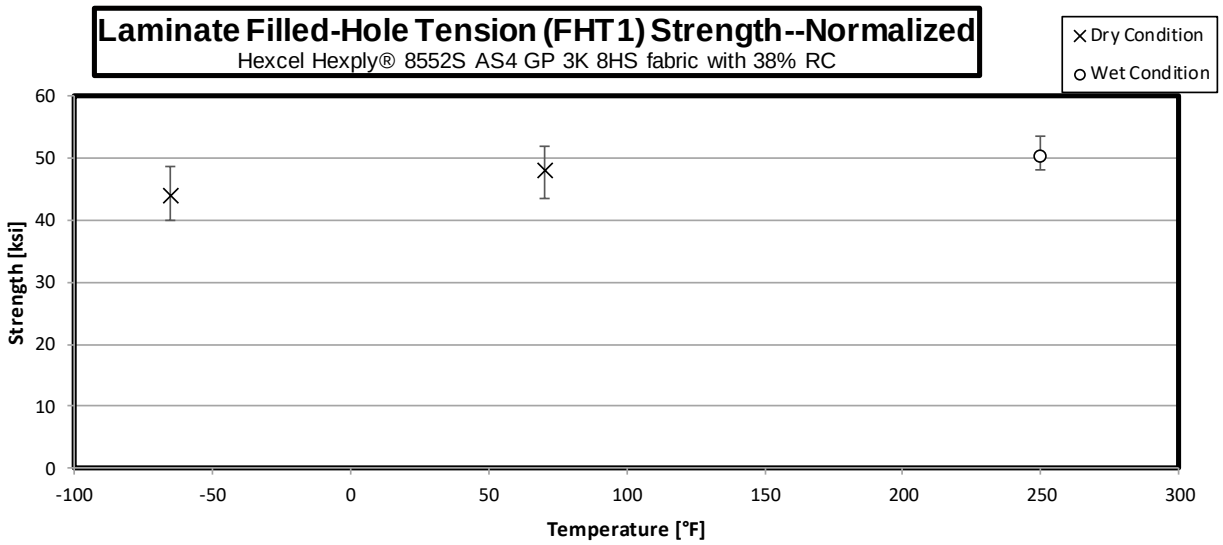
3.15 “10/80/10” Open-Hole Tension 2 Properties (OHT2)



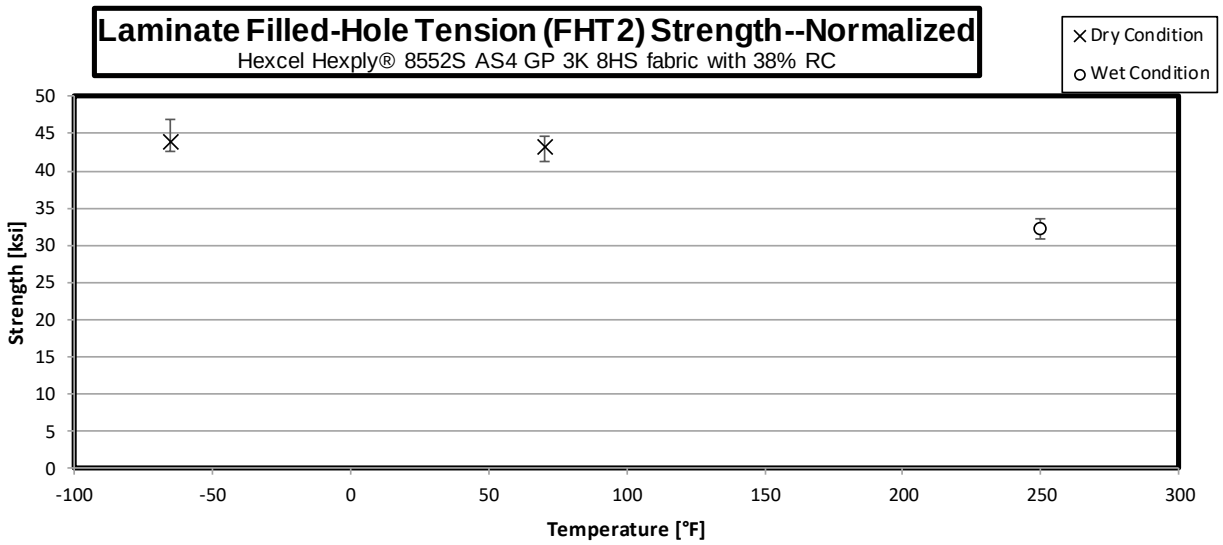
3.16 “40/20/40” Open-Hole Tension 3 Properties (OHT3)



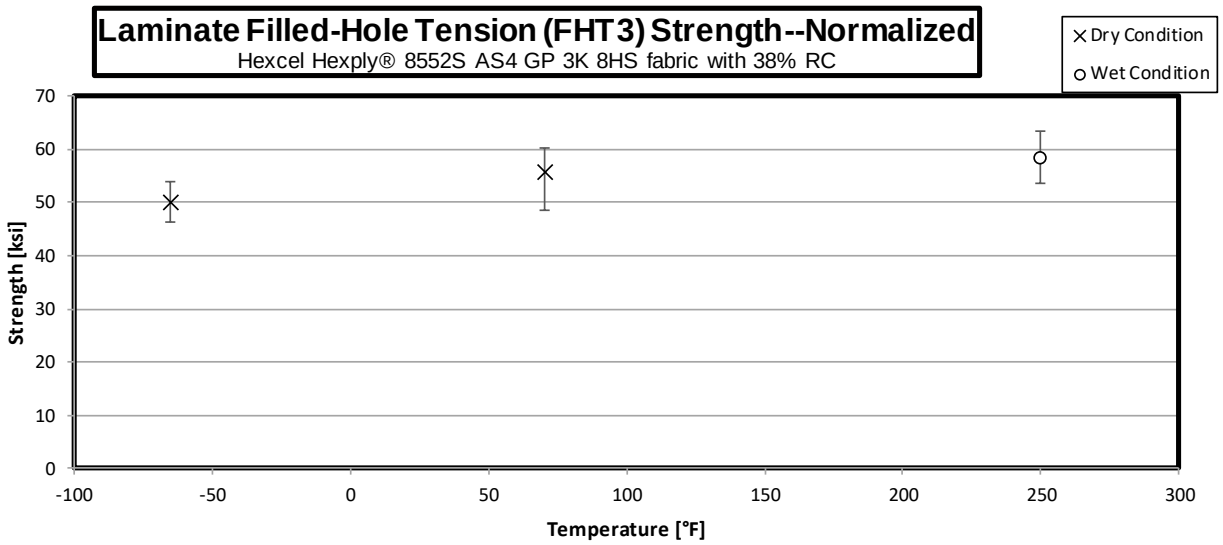
3.17 “25/50/25” Filled-Hole Tension 1 Properties (FHT1)



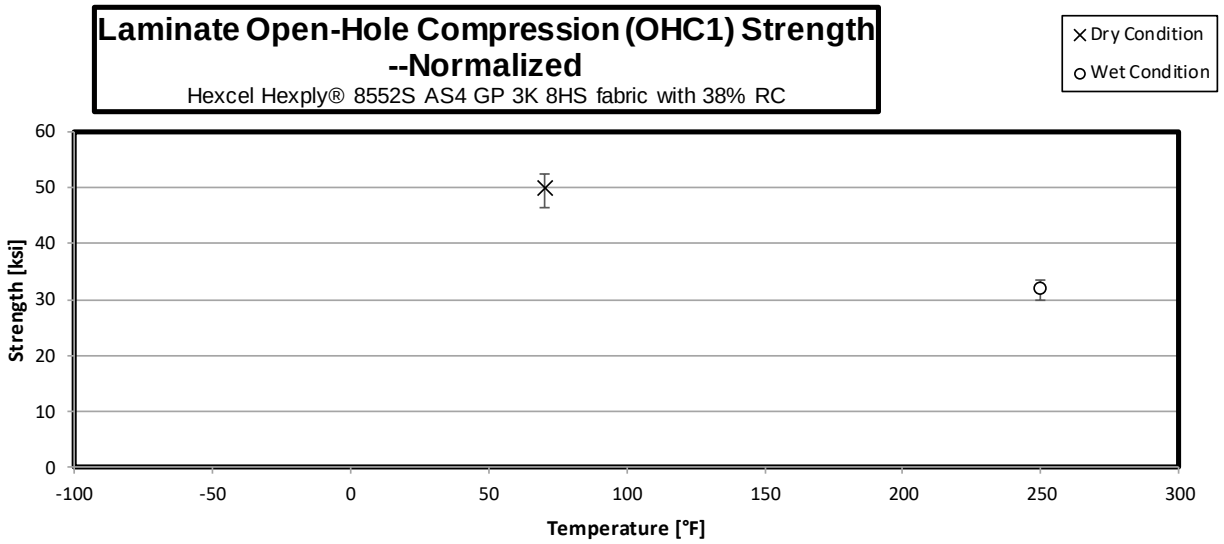
3.18 “10/80/10” Filled-Hole Tension 2 Properties (FHT2)



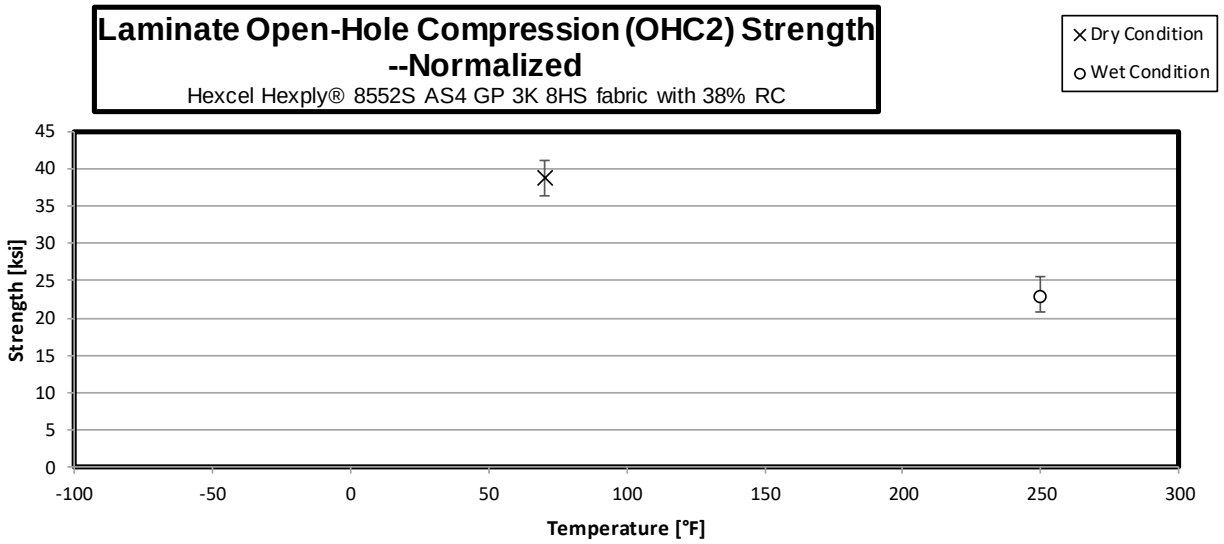
3.19 “40/20/40” Filled-Hole Tension 3 Properties (FHT3)



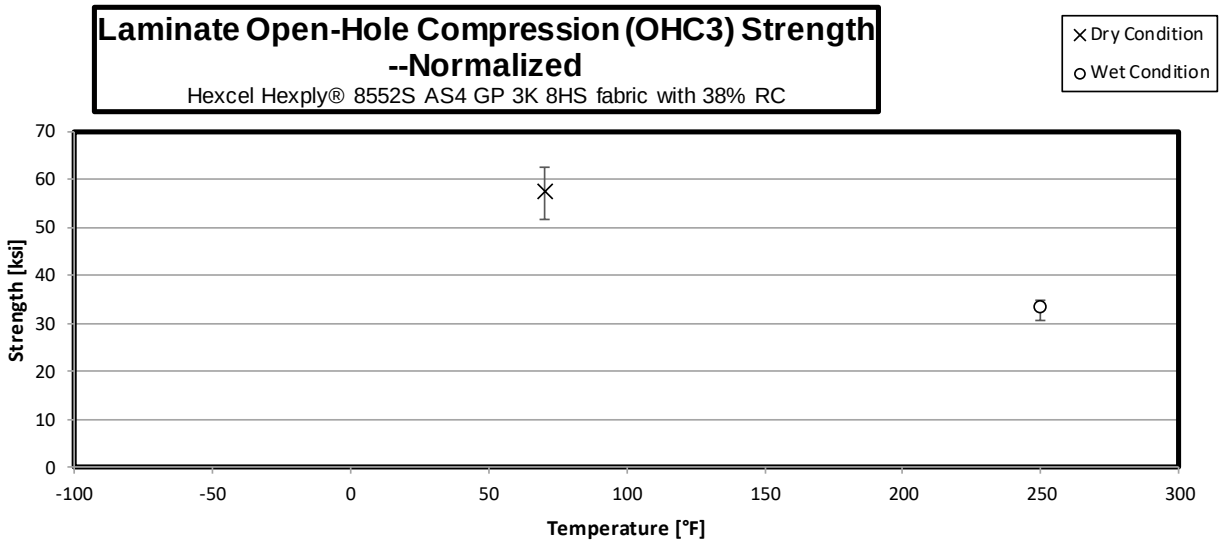
3.20 “25/50/25” Open-Hole Compression 1 Properties (OHC1)



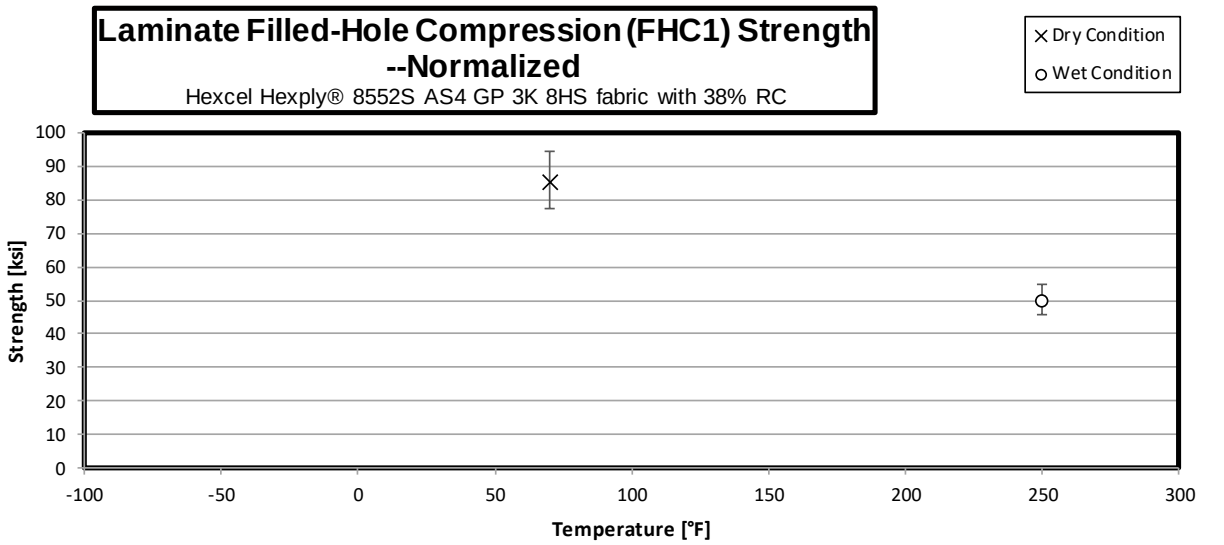
3.21 “10/80/10” Open-Hole Compression 2 Properties (OHC2)



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

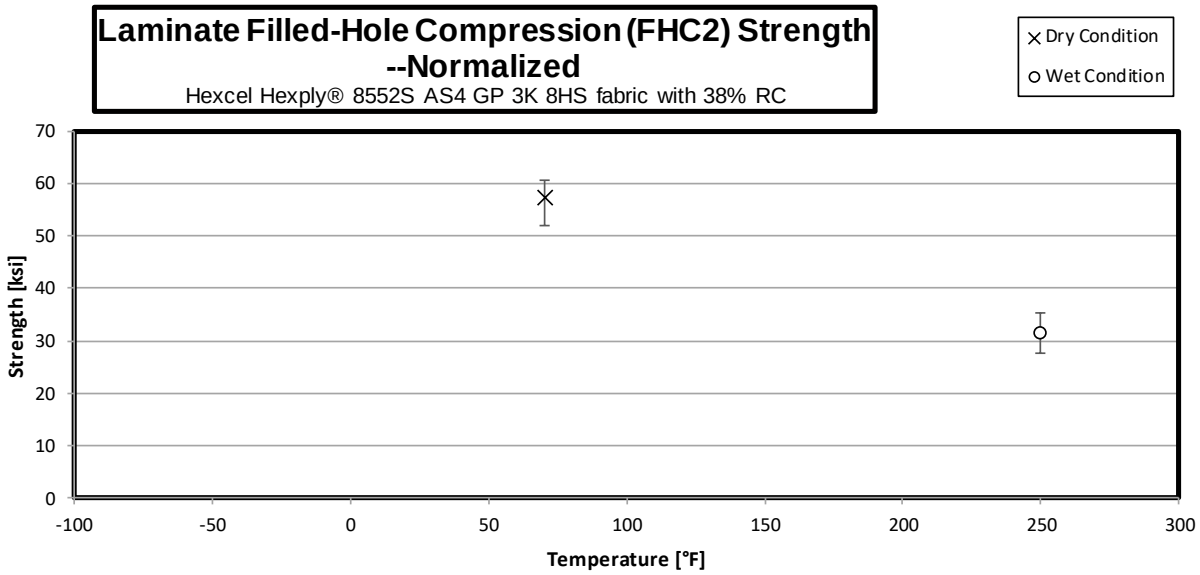


3.23 "25/50/25" Filled-Hole Compression 1 Properties (FHC1)

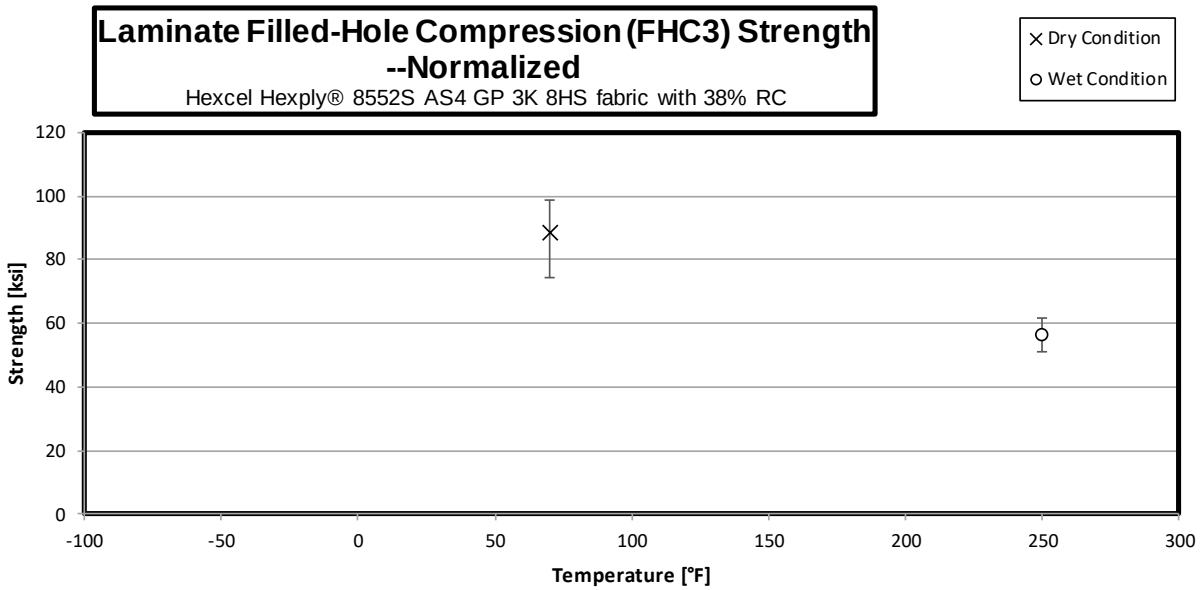


3.24 "10/80/10" Filled-Hole Compression 2 Properties (FHC2)

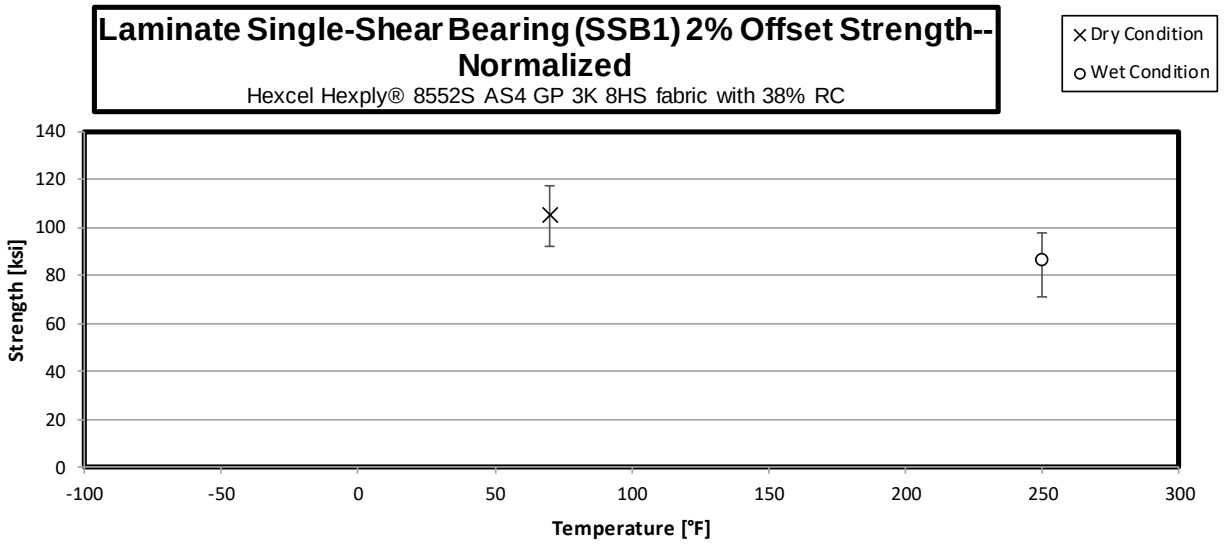
Data reported for reference only. FHC2 values are equal to or greater than UNC2 values, therefore CMH17 and NCAMP recommend the use of UNC2 values for design purposes.

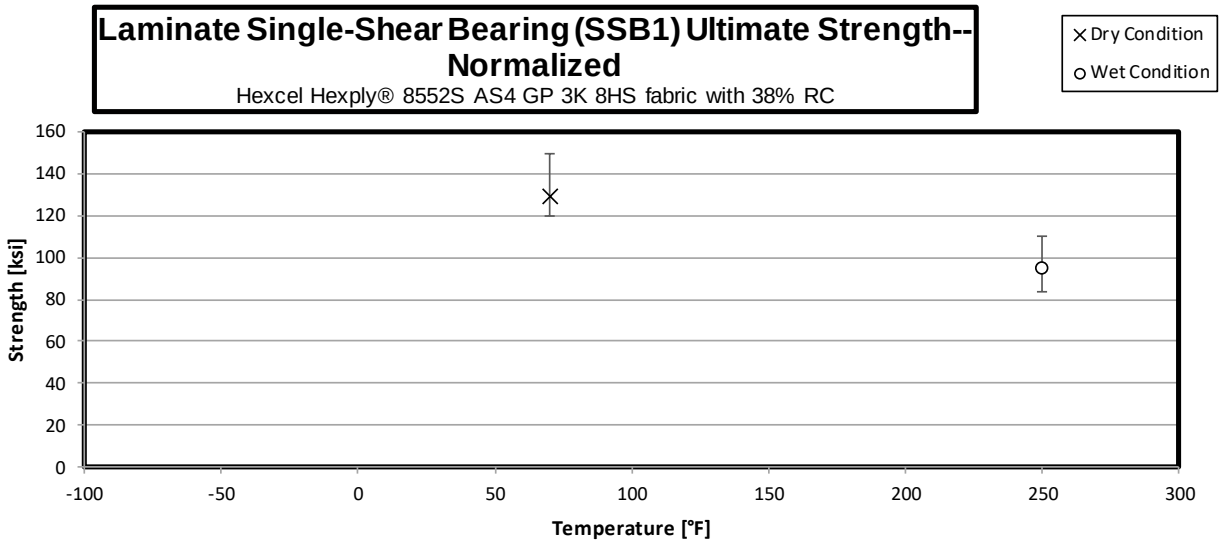


3.25 "40/20/40" Filled-Hole Compression 3 Properties (FHC3)

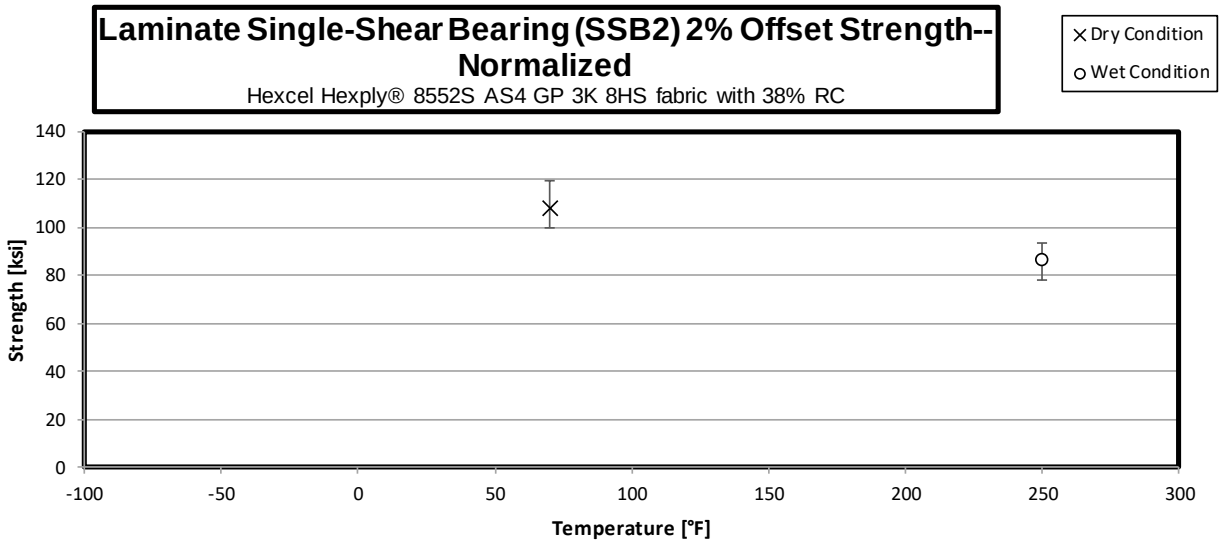


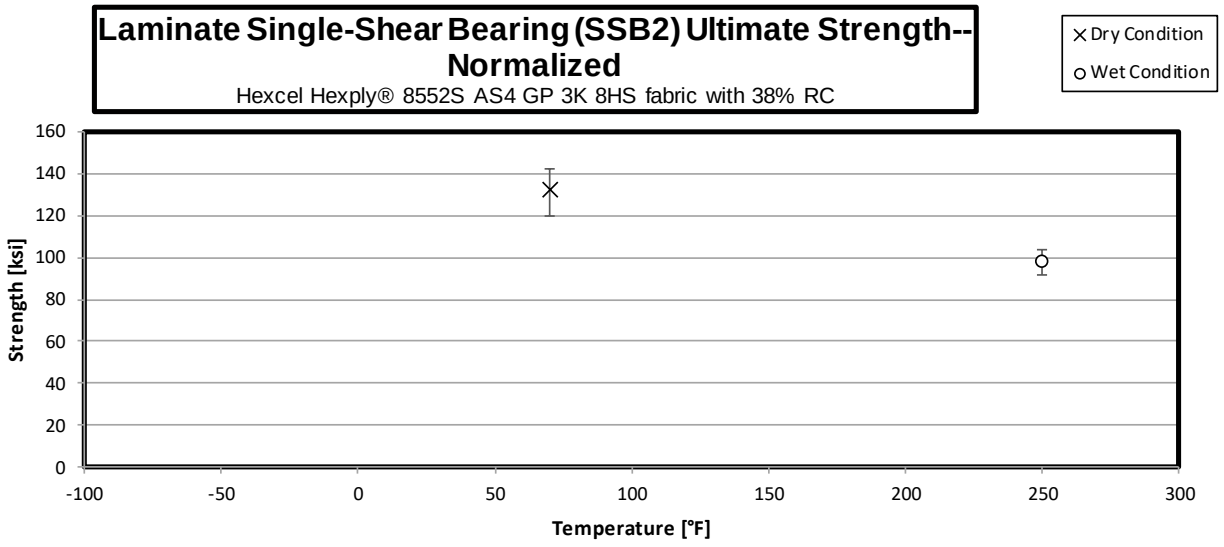
3.26 "25/50/25" Single-Shear Bearing 1 Properties (SSB1)



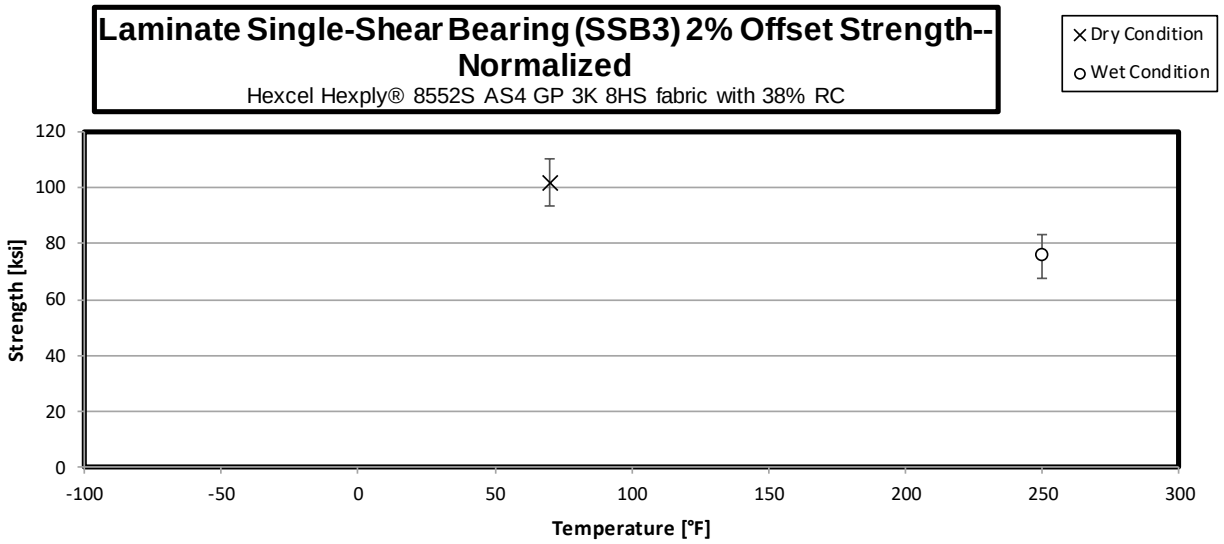


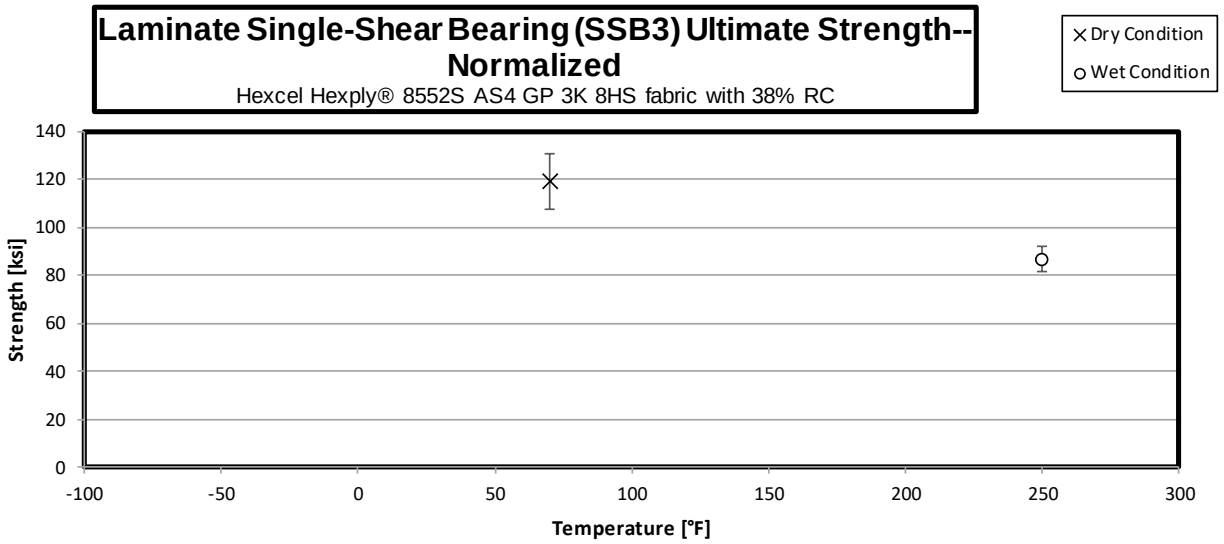
3.27 "10/80/10" Single-Shear Bearing 2 Properties (SSB2)



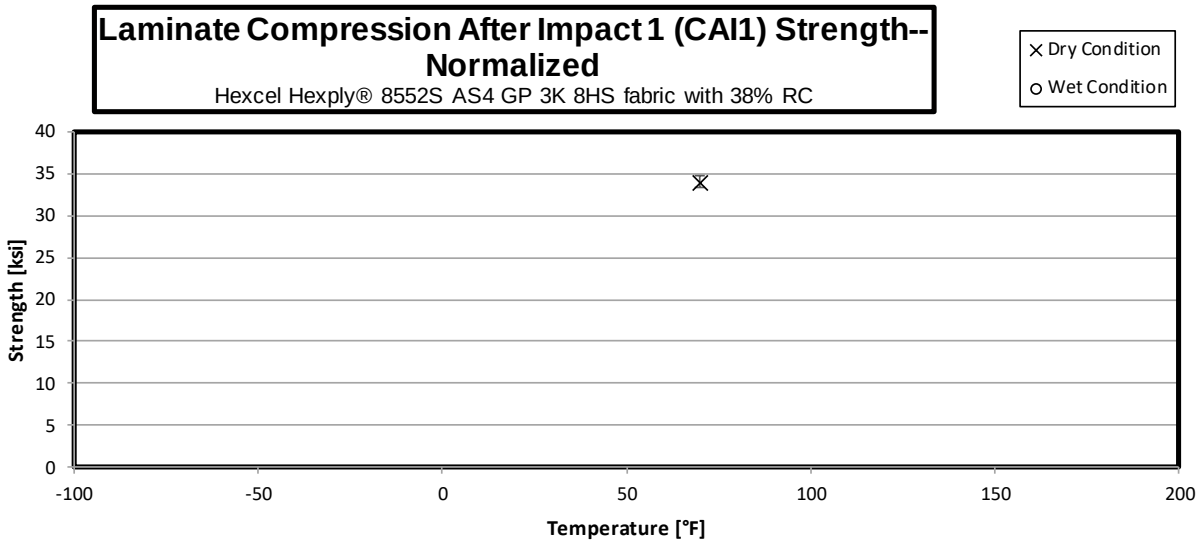


3.28 “40/20/40” Single-Shear Bearing 3 Properties (SSB3)

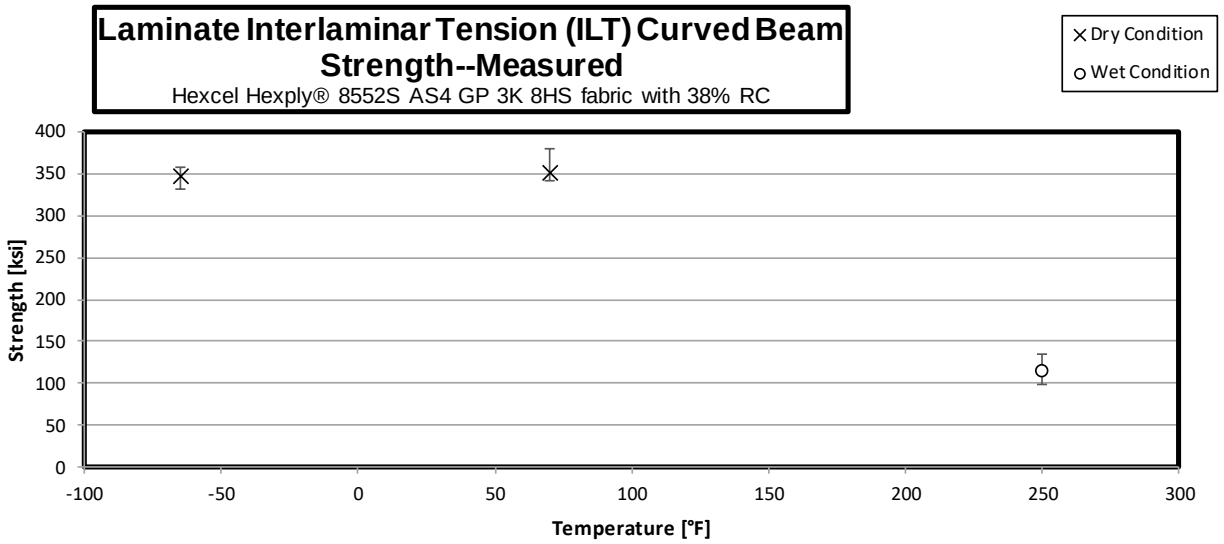


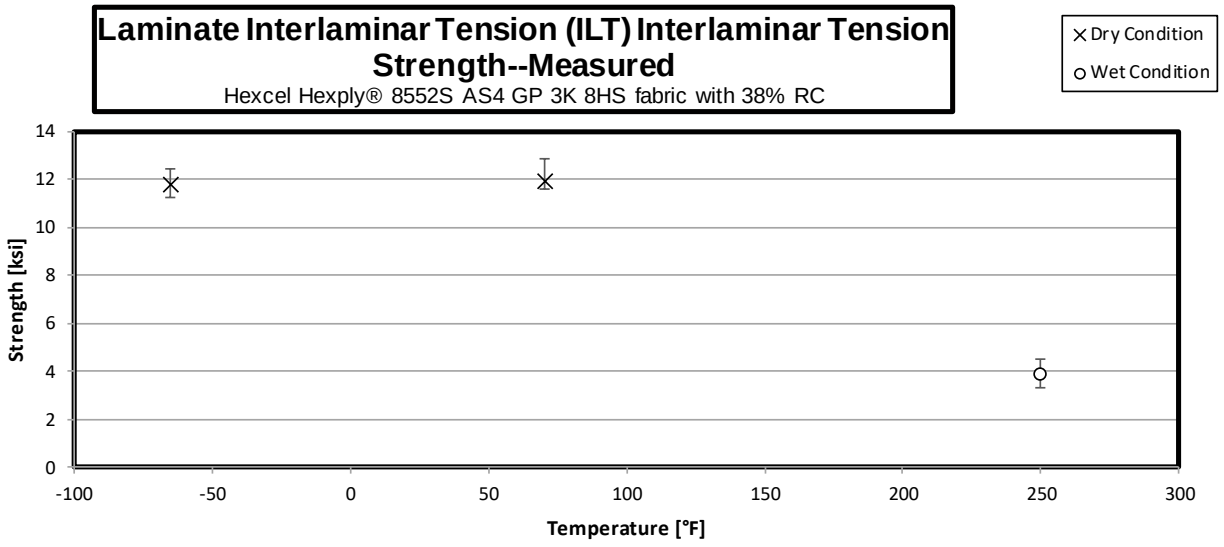


3.29 “25/50/25” Compression After Impact 1 Properties (CAI1)



3.30 Interlaminar Tension Properties (ILT)





4. Raw Data

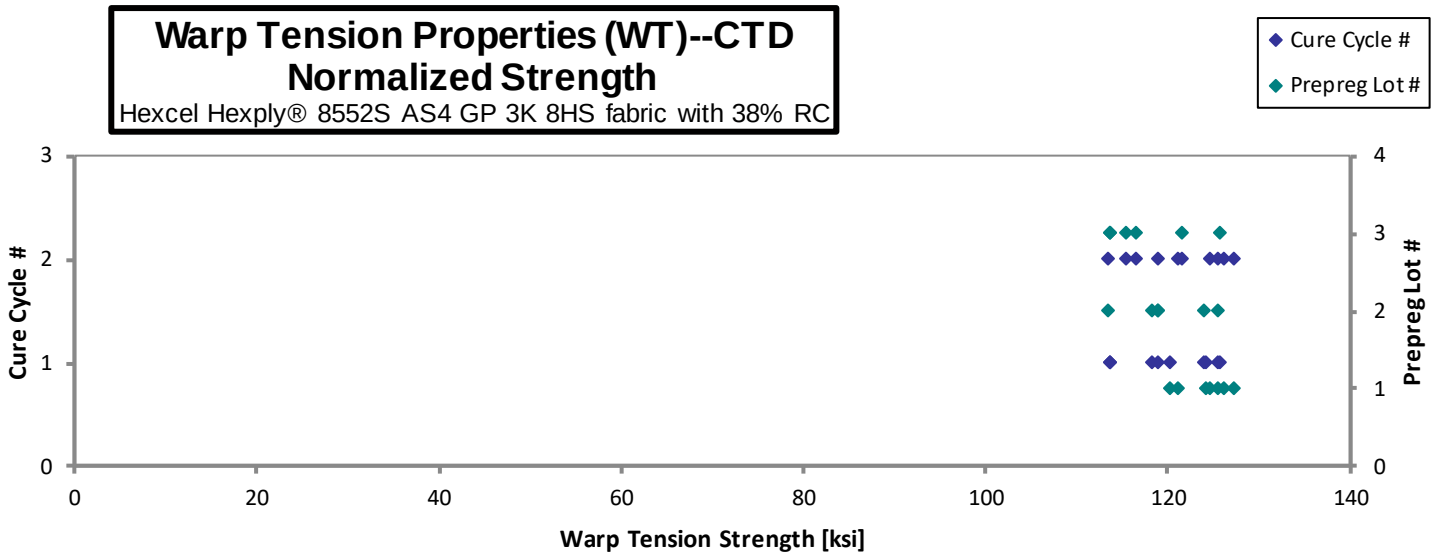
4.1 Warp Tension Properties (WT)

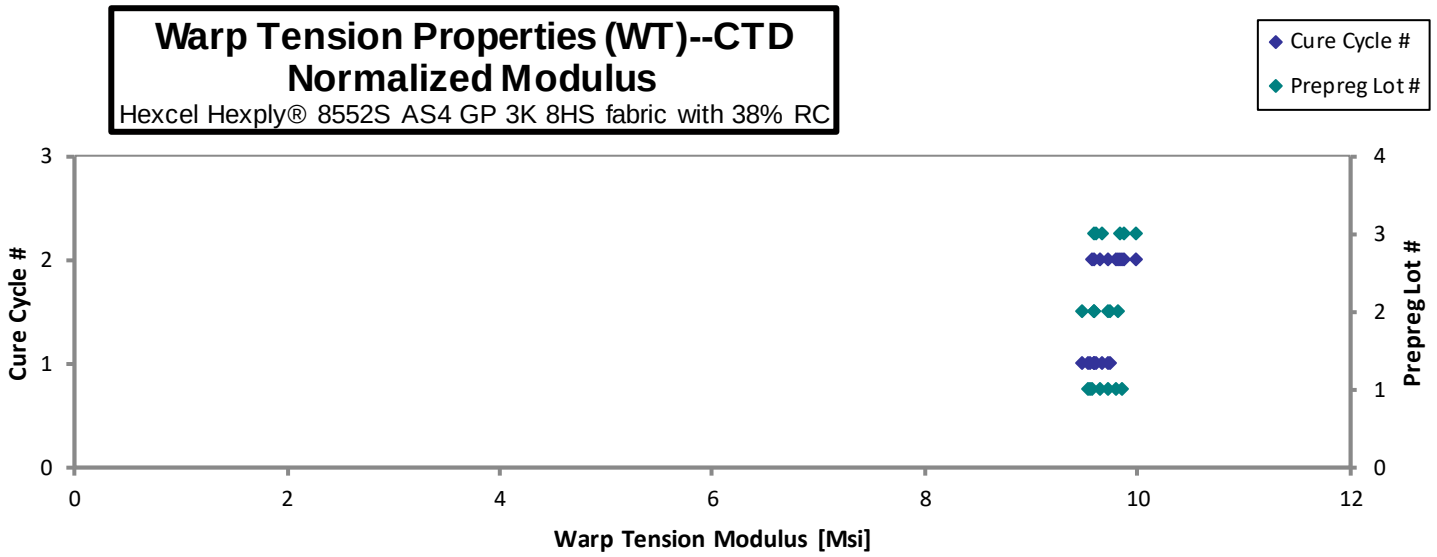
Warp Tension Properties (WT)--CTD
Strength & Modulus
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit 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]
HPAJA111B	A	M1	1	1	117.8	9.363	0.0631	0.1226	8	LGM	0.0153	120.3	9.562
HPAJA112B	A	M1	1	1	124.9	9.682	0.0596	0.1206	8	LWB	0.0151	125.5	9.730
HPAJA113B	A	M1	1	1	134.1	10.31	0.0650	0.1111	8	LGM	0.0139	124.1	9.541
HPAJA211B	A	M2	1	2	124.7	9.798	0.0624	0.1200	8	LGM	0.0150	124.7	9.794
HPAJA212B	A	M2	1	2	125.8	9.826	0.0679	0.1205	8	LWB	0.0151	126.3	9.865
HPAJA213B	A	M2	1	2	138.0	10.47	0.0605	0.1106	8	LGM	0.0138	127.2	9.652
HPAJA214B	A	M2	1	2	124.6	9.844	0.0497	0.1168	8	LAB	0.0146	121.2	9.580
HPAJB111B	B	M1	2	1	113.6	9.354	0.0601	0.1251	8	LWB	0.0156	118.4	9.748
HPAJB112B	B	M1	2	1	130.3	10.40	0.0575	0.1095	8	LWB	0.0137	118.9	9.487
HPAJB113B	B	M1	2	1	123.6	9.559	0.0608	0.1204	8	LWB	0.0151	124.0	9.592
HPAJB211B	B	M2	2	2	117.7	9.712	0.0633	0.1214	8	LGM	0.0152	119.0	9.821
HPAJB212B	B	M2	2	2	125.5	9.732	0.0631	0.1200	8	LGM	0.0150	125.5	9.729
HPAJB213B	B	M2	2	2	121.0	10.23	0.0567	0.1126	8	LWT	0.0141	113.5	9.600
HPAJC111B	C	M1	3	1	111.2	9.407	0.0555	0.1227	8	LWB	0.0153	113.6	9.616
HPAJC112B	C	M1	3	1	111.0	9.369	0.0482	0.1229	8	LWB	0.0154	113.7	9.597
HPAJC113B	C	M1	3	1	134.2	10.33	0.0616	0.1124	8	LWB	0.0140	125.6	9.673
HPAJC211B	C	M2	3	2	114.5	9.794	0.0619	0.1210	8	LGM	0.0151	115.4	9.874
HPAJC212B	C	M2	3	2	118.9	9.624	0.0664	0.1227	8	LGM	0.0153	121.5	9.837
HPAJC213B	C	M2	3	2	123.2	10.55		0.1136	8	LGB	0.0142	116.5	9.985

	Strength	Modulus	Poisson's Ratio		$Strength_{norm}$	$Modulus_{norm}$
Average	**122.9**	**9.861**	**0.0602**	**$Average_{norm}$**	**0.0148**	**120.8**	**9.699**
Standard Dev.	**7.708**	**0.3996**	**0.005174**	**Standard $Dev._{norm}$**		**4.658**	**0.1357**
Coeff. of Var. [%]	**6.274**	**4.052**	**8.597**	**Coeff. of Var. $[\%]_{norm}$**		**3.856**	**1.399**
Min.	**111.0**	**9.354**	**0.0482**	**Min.**	**0.0137**	**113.5**	**9.487**
Max.	**138.0**	**10.55**	**0.0679**	**Max.**	**0.0156**	**127.2**	**9.985**
Number of Spec.	**19**	**19**	**18**	**Number of Spec.**	**19**	**19**	**19**


Warp Tension Properties (WT)--CTD
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
0
1
2
3
4
0
20
40
60
80
100
120
140
Warp Tension Strength [ksi]


Warp Tension Properties (WT)--CTD
Normalized Modulus
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
0
1
2
3
4
0
2
4
6
8
10
12
Warp Tension Modulus [Msi]

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

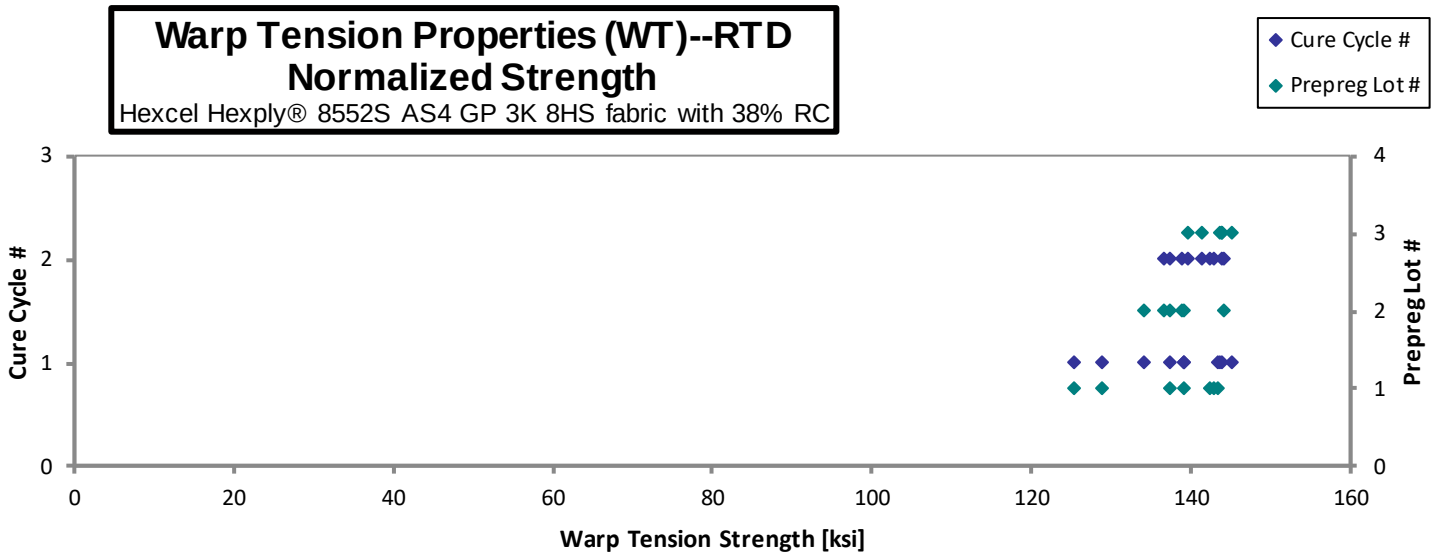
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

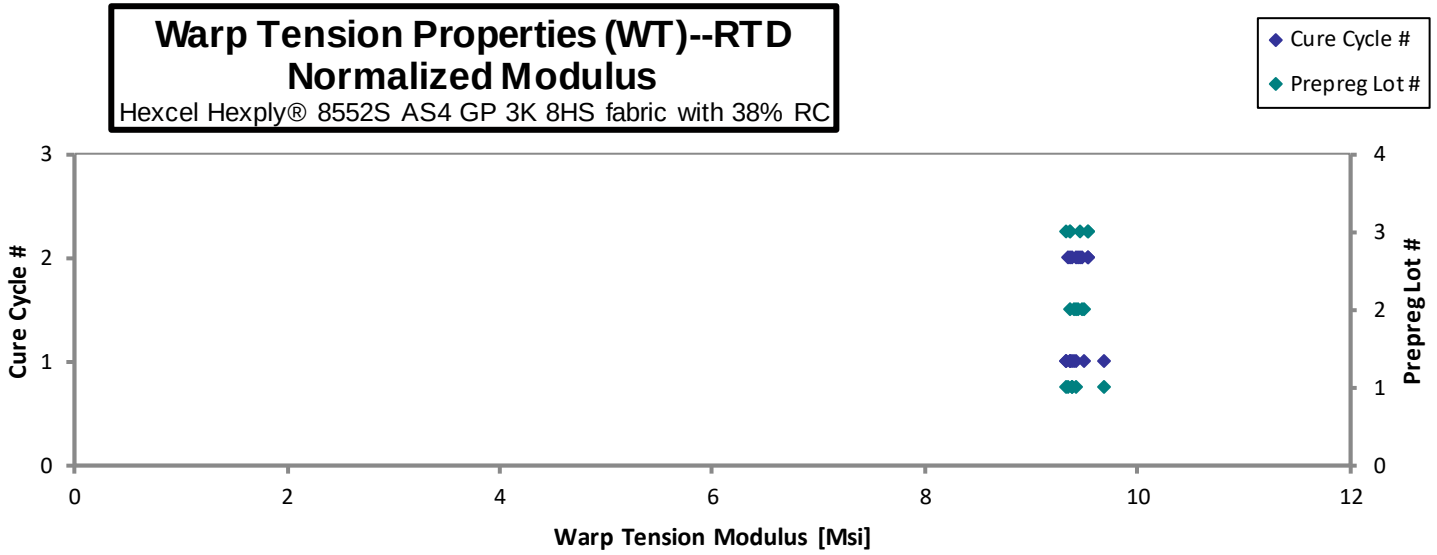
normalizing t_{ply} [in]: 0.0150

Specimen Number	Spirit Batch #	Spirit 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]
HPAJA111A	A	M1	1	1	136.6	10.15	0.0525	0.1103	8	LWT	0.0138	125.5	9.326
HPAJA112A	A	M1	1	1	130.0	9.780	0.0484	0.1190	8	LWB	0.0149	128.9	9.694
HPAJA113A	A	M1	1	1	139.5	9.115	0.0543	0.1235	8	LWB	0.0154	143.6	9.382
HPAJA114A	A	M1	1	1	134.2			0.1243	8	LWT	0.0155	139.1	
HPAJA211A	A	M2	1	2	153.3	10.42	0.0471	0.1077	8	LWB	0.0135	137.5	9.349
HPAJA212A	A	M2	1	2	151.6	9.984	0.0520	0.1128	8	LGT	0.0141	142.5	9.387
HPAJA213A	A	M2	1	2	147.8	9.739	0.0530	0.1162	8	LGM	0.0145	143.1	9.428
HPAJB111A	B	M1	2	1	152.3	10.41	0.0485	0.1084	8	LGT	0.0136	137.6	9.408
HPAJB112A	B	M1	2	1	143.8	9.742	0.0517	0.1162	8	LGT	0.0145	139.2	9.430
HPAJB113A	B	M1	2	1	130.7	9.239	0.0532	0.1233	8	LGM	0.0154	134.3	9.493
HPAJB211A	B	M2	2	2	152.6	10.30	0.0510	0.1093	8	LGM	0.0137	138.9	9.375
HPAJB212A	B	M2	2	2	142.3	9.859	0.0540	0.1153	8	LGM	0.0144	136.7	9.472
HPAJB213A	B	M2	2	2	145.8	9.542	0.0536	0.1188	8	LGM	0.0148	144.3	9.444
HPAJC111A	C	M1	3	1	155.1	10.09	0.0500	0.1114	8	LWB	0.0139	143.9	9.361
HPAJC112A	C	M1	3	1	148.3	9.561	0.0559	0.1175	8	LGM	0.0147	145.2	9.363
HPAJC113A	C	M1	3	1	143.0	9.274	0.0564	0.1206	8	LGM	0.0151	143.7	9.322
HPAJC211A	C	M2	3	2	155.7	10.31	0.0535	0.1109	8	LGM	0.0139	143.9	9.528
HPAJC212A	C	M2	3	2	147.3	9.926	0.0528	0.1152	8	LWB	0.0144	141.5	9.532
HPAJC213A	C	M2	3	2	141.1	9.567	0.0570	0.1188	8	LWB	0.0148	139.6	9.467

Average	**144.8**	**9.833**	**0.0525**
Standard Dev.	**7.945**	**0.4020**	**0.002741**
Coeff. of Var. [%]	**5.488**	**4.089**	**5.221**
Min.	**130.0**	**9.115**	**0.0471**
Max.	**155.7**	**10.42**	**0.0570**
Number of Spec.	**19**	**18**	**18**

$Average_{norm}$	**0.0145**	**139.4**	**9.431**
Standard $Dev._{norm}$		**5.309**	**0.0917**
Coeff. of Var. $[\%]_{norm}$		**3.808**	**0.9721**
Min.	**0.0135**	**125.5**	**9.322**
Max.	**0.0155**	**145.2**	**9.694**
Number of Spec.	**19**	**19**	**18**


Warp Tension Properties (WT)--RTD
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Warp Tension Strength [ksi]
0
20
40
60
80
100
120
140
160
0
1
2
3
4


Warp Tension Properties (WT)--RTD
Normalized Modulus
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Warp Tension Modulus [Msi]
0
2
4
6
8
10
12
0
1
2
3
4

Warp Tension Properties (WT)--ETW
Strength & Modulus

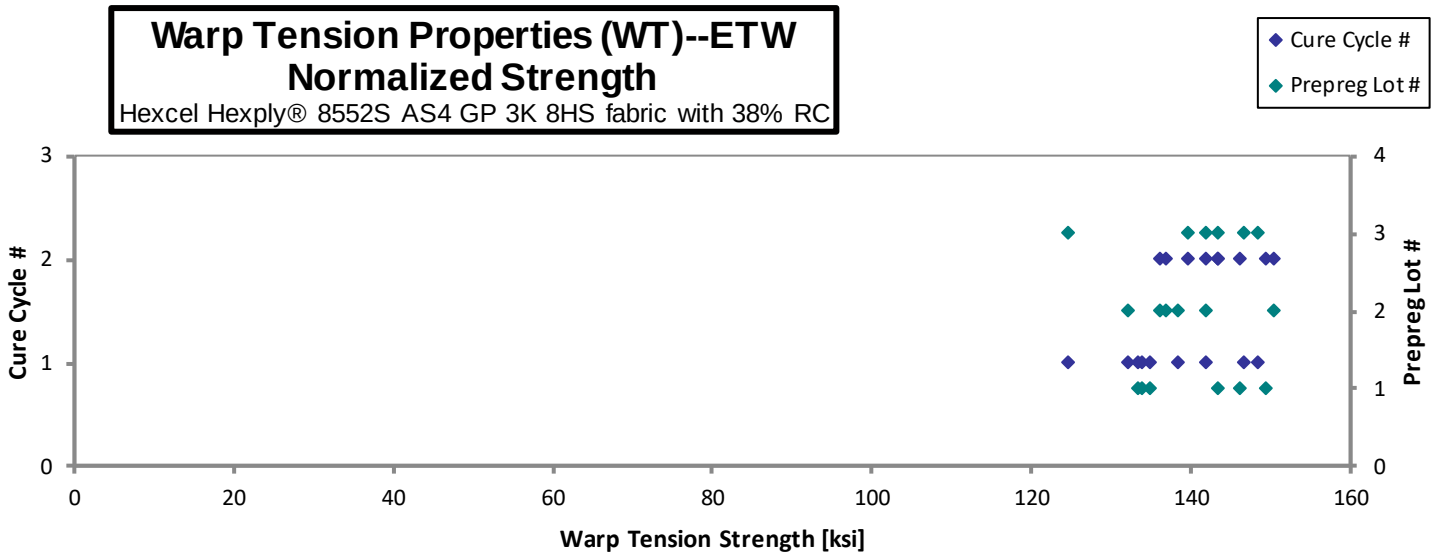
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

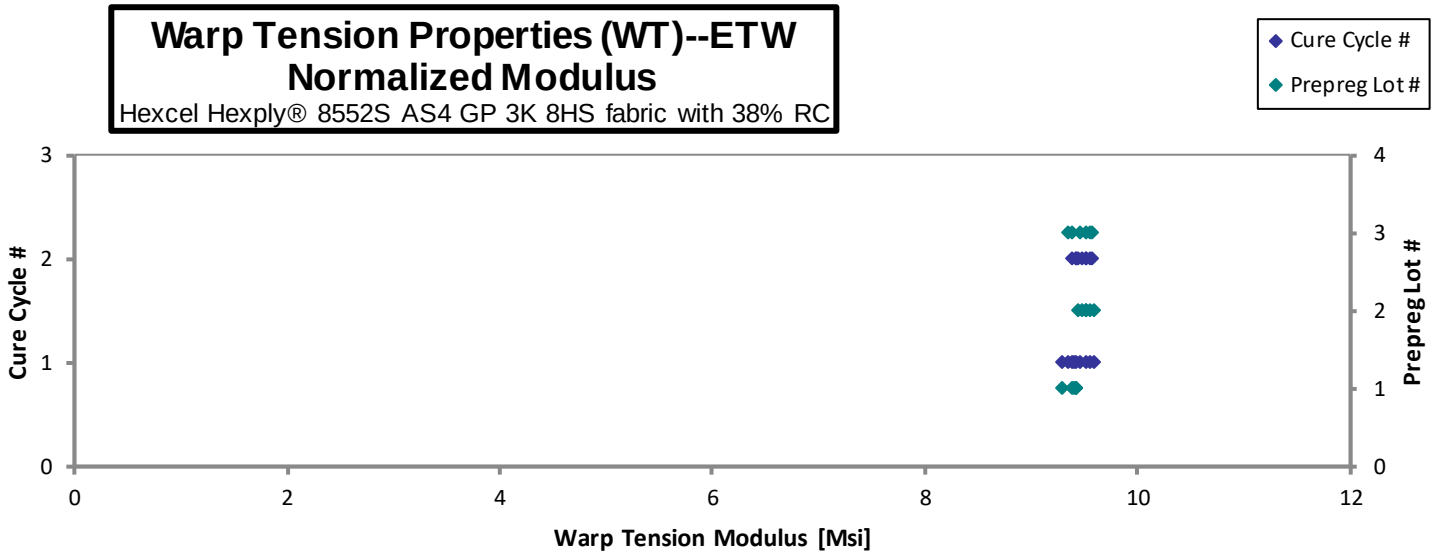
normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit 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]
HPAJA111D*	A	M1	1	1	129.9	9.165		0.1233	8	LWB	0.0154	133.5	9.418
HPAJA112D	A	M1	1	1	129.0	8.992	0.0425	0.1254	8	LWT, LWB	0.0157	134.8	9.400
HPAJA113D	A	M1	1	1	129.1	8.961	0.0447	0.1245	8	LGT	0.0156	133.9	9.295
HPAJA211D	A	M2	1	2	145.0	9.341	0.0355	0.1211	8	LWT, LWB	0.0151	146.3	9.422
HPAJA212D*	A	M2	1	2	138.9	9.087		0.1239	8	LGM	0.0155	143.3	9.379
HPAJA213D	A	M2	1	2	144.1	9.097	0.0525	0.1244	8	LGB	0.0156	149.4	9.432
HPAJB111D	B	M1	2	1	132.2	9.092	0.0500	0.1256	8	LAB, LWT	0.0157	138.4	9.517
HPAJB112D	B	M1	2	1	126.6	8.521	0.0485	0.1345	8	LGB	0.0168	141.8	9.549
HPAJB113D	B	M1	2	1	120.3	8.732	0.0433	0.1319	8	LGM	0.0165	132.2	9.598
HPAJB211D	B	M2	2	2	131.8	9.173	0.0457	0.1241	8	LWB	0.0155	136.2	9.482
HPAJB212D	B	M2	2	2	143.2	9.000	0.0431	0.1260	8	LWB, LWT	0.0158	150.4	9.450
HPAJB213D	B	M2	2	2	130.0	9.027	0.0521	0.1265	8	LWB, LWT	0.0158	137.0	9.513
HPAJC111D	C	M1	3	1	144.6	9.147	0.0544	0.1232	8	LWB	0.0154	148.4	9.387
HPAJC112D	C	M1	3	1	119.6	8.966	0.0431	0.1250	8	LAT	0.0156	124.6	9.341
HPAJC113D	C	M1	3	1	140.4	9.063	0.0526	0.1253	8	LGM	0.0157	146.6	9.465
HPAJC211D	C	M2	3	2	136.2	9.292	0.0501	0.1230	8	LGM	0.0154	139.6	9.522
HPAJC212D	C	M2	3	2	135.7	9.157	0.0452	0.1256	8	LWB, LWT	0.0157	142.0	9.581
HPAJC213D	C	M2	3	2	135.8	9.033	0.0468	0.1269	8	LGB, LAT	0.0159	143.6	9.550

*Poissons not reported due to non linear data.

Average	**134.0**	**9.047**	**0.0469**	**Average$_{norm}$**	**0.0157**	**140.1**	**9.461**
Standard Dev.	**7.800**	**0.1878**	**0.004968**	**Standard Dev.$_{norm}$**		**6.899**	**0.0843**
Coeff. of Var. [%]	**5.820**	**2.076**	**10.60**	**Coeff. of Var. [%]$_{norm}$**		**4.923**	**0.8910**
Min.	**119.6**	**8.521**	**0.0355**	**Min.**	**0.0151**	**124.6**	**9.295**
Max.	**145.0**	**9.341**	**0.0544**	**Max.**	**0.0168**	**150.4**	**9.598**
Number of Spec.	**18**	**18**	**16**	**Number of Spec.**	**18**	**18**	**18**


Warp Tension Properties (WT)--ETW
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Warp Tension Strength [ksi]
0
20
40
60
80
100
120
140
160
0
1
2
3
4


Warp Tension Properties (WT)--ETW
Normalized Modulus
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Warp Tension Modulus [Msi]
0
2
4
6
8
10
12
0
1
2
3
4

4.2 Fill Tension Properties (FT)

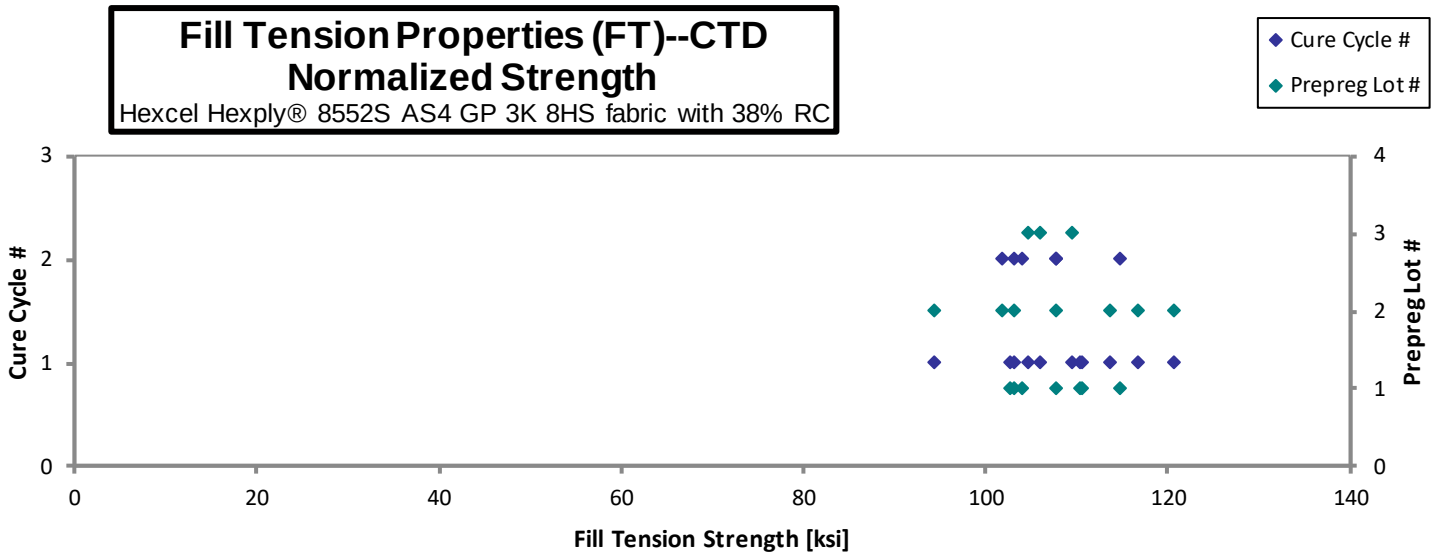
Fill Tension Properties (FT)--CTD
Strength & Modulus
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

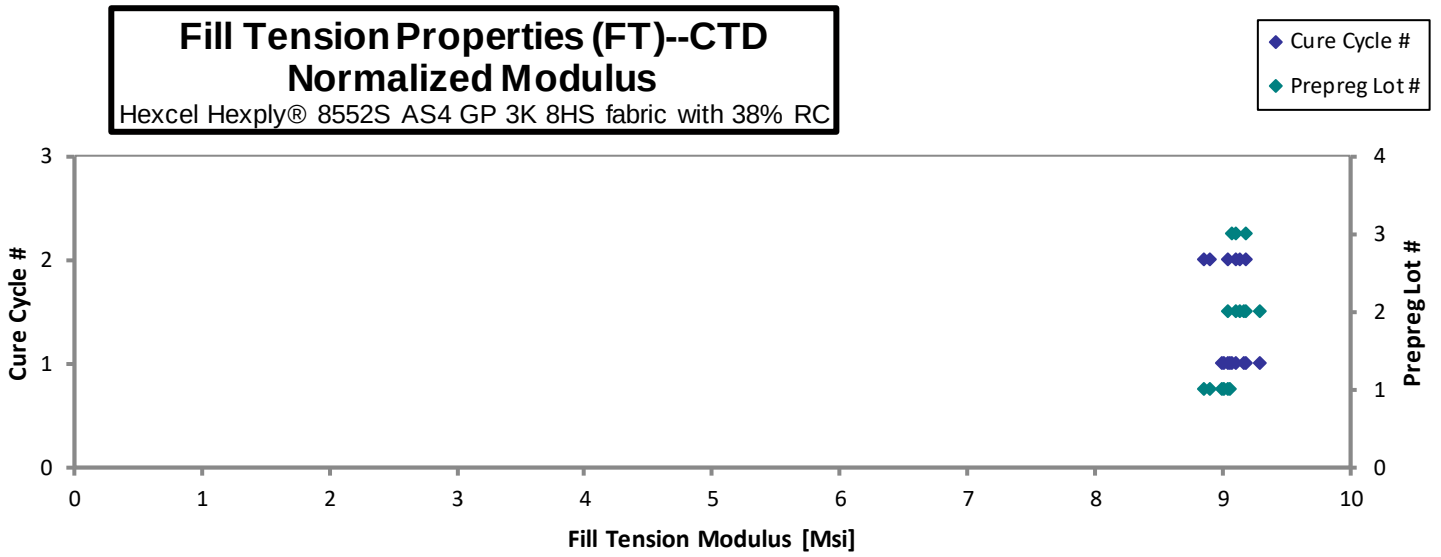
normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit 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]
HPAUA1R1B	A	M1	1	1	104.2	9.095	0.1188	8	LGM	0.0149	103.1	9.004
HPAUA1R2B	A	M1	1	1	111.6	9.132	0.1191	8	LWT	0.0149	110.7	9.059
HPAUA1R3B	A	M1	1	1	117.0	9.566	0.1131	8	LAB	0.0141	110.3	9.015
HPAUA1R4B	A	M1	1	1	104.2		0.1184	8	LWB	0.0148	102.8	
HPAUA2R1B	A	M2	1	2	115.1	8.934	0.1196	8	LGB	0.0150	114.8	8.906
HPAUA2R2B	A	M2	1	2	108.1	9.077	0.1195	8	LAT	0.0149	107.7	9.039
HPAUA2R3B	A	M2	1	2	108.6	9.239	0.1150	8	LGM, LGT	0.0144	104.1	8.856
HPAUB1R1B	B	M1	2	1	112.4	9.075	0.1213	8	LAB	0.0152	113.6	9.170
HPAUB1R2B	B	M1	2	1	93.27	9.190	0.1213	8	LAB	0.0152	94.30	9.291
HPAUB1R3B	B	M1	2	1	119.4	9.247	0.1174	8	LAB	0.0147	116.8	9.046
HPAUB1R4B	B	M1	2	1	117.4		0.1234	8	LAB	0.0154	120.7	
HPAUB2R1B	B	M2	2	2	106.3	9.059	0.1216	8	LGT	0.0152	107.7	9.178
HPAUB2R2B	B	M2	2	2	101.8	8.983	0.1216	8	LGM	0.0152	103.1	9.101
HPAUB2R3B	B	M2	2	2	105.3	9.454	0.1160	8	LAB	0.0145	101.8	9.136
HPAUC1R1B	C	M1	3	1	103.1	8.958	0.1220	8	LGB	0.0152	104.8	9.106
HPAUC1R2B	C	M1	3	1	105.0	8.981	0.1212	8	LAB	0.0152	106.1	9.072
HPAUC1R3B	C	M1	3	1	114.9	9.640	0.1144	8	LAT	0.0143	109.5	9.187
HPAUC2R1B	C	M2	3	2	124.5	9.222	0.1196	8	LAT, LAB	0.0150	124.1	9.194
HPAUC2R2B	C	M2	3	2	121.9	9.237	0.1191	8	LWB, LAT	0.0149	121.0	9.167
HPAUC2R3B	C	M2	3	2	120.1	9.530	0.1140	8	LGB	0.0143	114.1	9.054

	Strength [ksi]	Modulus [Msi]
Average	**110.7**	**9.201**
Standard Dev.	**8.019**	**0.2165**
Coeff. of Var. [%]	**7.243**	**2.353**
Min.	**93.27**	**8.934**
Max.	**124.5**	**9.640**
Number of Spec.	**20**	**18**

	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
$Average_{norm}$	**0.0149**	**109.5**	**9.088**
Standard $Dev._{norm}$		**7.527**	**0.1063**
Coeff. of Var. $[\%]_{norm}$		**6.871**	**1.170**
Min.	**0.0141**	**94.30**	**8.856**
Max.	**0.0154**	**124.1**	**9.291**
Number of Spec.	**20**	**20**	**18**


Fill Tension Properties (FT)--CTD
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Fill Tension Strength [ksi]
0
20
40
60
80
100
120
140
0
1
2
3
4


Fill Tension Properties (FT)--CTD
Normalized Modulus
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Fill Tension Modulus [Msi]
0
1
2
3
4
5
6
7
8
9
10
0
1
2
3
4

Fill Tension Properties (FT)--RTD
Strength & Modulus

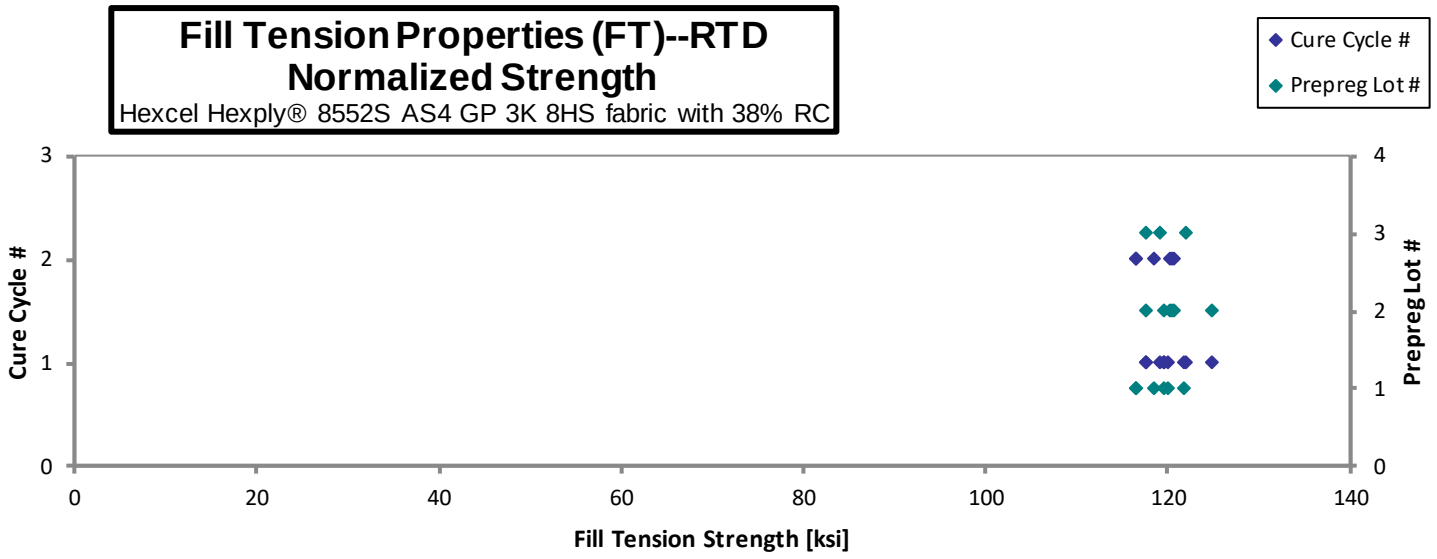
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

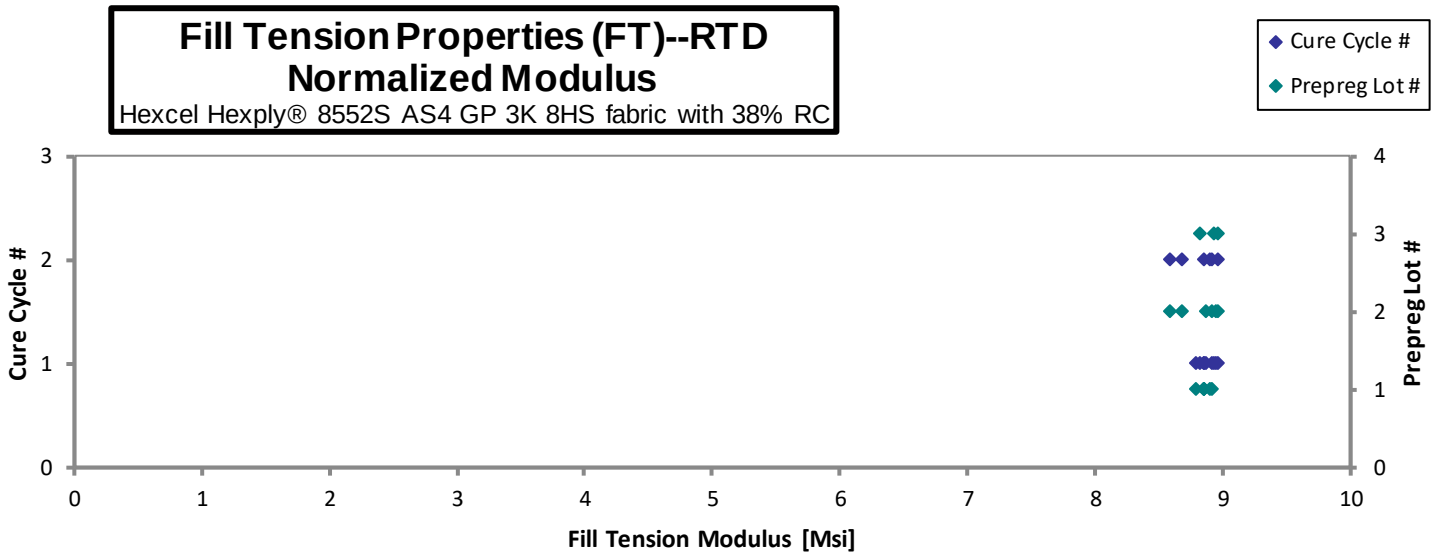
normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit 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]
HPAUA1R1A	A	M1	1	1	130.3	9.402	0.1122	8	LGB	0.0140	121.8	8.791
HPAUA1R2A	A	M1	1	1	122.2	9.044	0.1175	8	LWT	0.0147	119.6	8.854
HPAUA1R3A	A	M1	1	1	120.9	8.925	0.1191	8	LGB	0.0149	120.0	8.857
HPAUA2R1A	A	M2	1	2	125.0	9.509	0.1118	8	LGB	0.0140	116.5	8.862
HPAUA2R2A	A	M2	1	2	117.8	9.028	0.1186	8	LGB	0.0148	116.5	8.923
HPAUA2R3A	A	M2	1	2	118.7	8.920	0.1198	8	LGM	0.0150	118.6	8.907
HPAUB1R1A	B	M1	2	1	121.3	9.193	0.1164	8	LGB	0.0146	117.7	8.918
HPAUB1R2A	B	M1	2	1	122.7	8.728	0.1221	8	LWT	0.0153	124.9	8.879
HPAUB1R3A	B	M1	2	1	116.9	8.753	0.1227	8	LGB	0.0153	119.5	8.946
HPAUB2R1A	B	M2	2	2	126.1	9.375	0.1147	8	LAB	0.0143	120.5	8.958
HPAUB2R2A	B	M2	2	2	119.0	8.456	0.1219	8	LWB	0.0152	120.8	8.586
HPAUB2R3A	B	M2	2	2	117.0	8.451	0.1233	8	LGM	0.0154	120.2	8.685
HPAUC1R1A	C	M1	3	1	125.6	9.429	0.1124	8	LGM	0.0141	117.6	8.832
HPAUC1R2A	C	M1	3	1	119.4	8.985	0.1198	8	LGB	0.0150	119.2	8.968
HPAUC1R3A	C	M1	3	1	119.4	8.736	0.1227	8	LGT	0.0153	122.0	8.931
HPAUC2R1A	C	M2	3	2	134.9	9.279	0.1145	8	LWB	0.0143	128.7	8.851
HPAUC2R2A	C	M2	3	2	132.8	8.958	0.1189	8	LGB	0.0149	131.6	8.877
HPAUC2R3A	C	M2	3	2	135.5	8.937	0.1202	8	LGT, LWB	0.0150	135.7	8.948

Average	**123.6**	**9.006**	
Standard Dev.	**6.077**	**0.3146**	
Coeff. of Var. [%]	**4.916**	**3.494**	
Min.	**116.9**	**8.451**	
Max.	**135.5**	**9.509**	
Number of Spec.	**18**	**18**	

$Average_{norm}$	**0.0148**	**121.7**	**8.865**
$Standard\ Dev._{norm}$		**5.269**	**0.0978**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**4.328**	**1.103**
Min.	**0.0140**	**116.5**	**8.586**
Max.	**0.0154**	**135.7**	**8.968**
Number of Spec.	**18**	**18**	**18**


Fill Tension Properties (FT)--RTD
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Fill Tension Strength [ksi]
0
20
40
60
80
100
120
140
0
1
2
3
4


Fill Tension Properties (FT)--RTD
Normalized Modulus
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Fill Tension Modulus [Msi]
0
1
2
3
4
5
6
7
8
9
10
0
1
2
3
4

Fill Tension Properties (FT)--ETW
Strength & Modulus

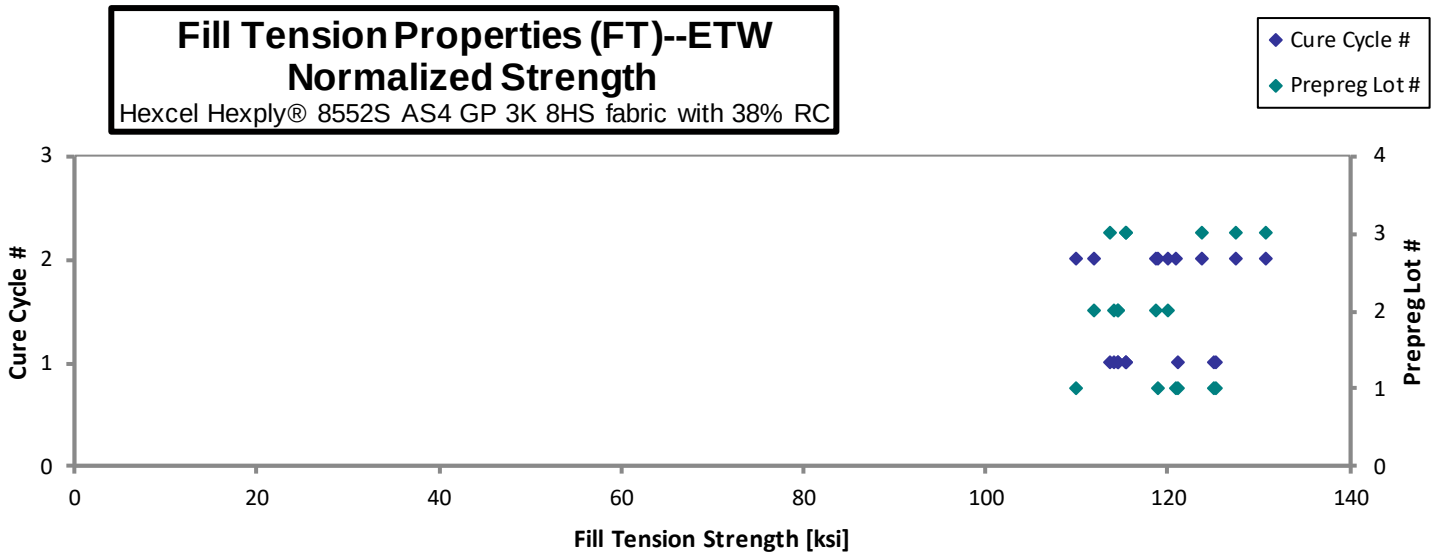
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

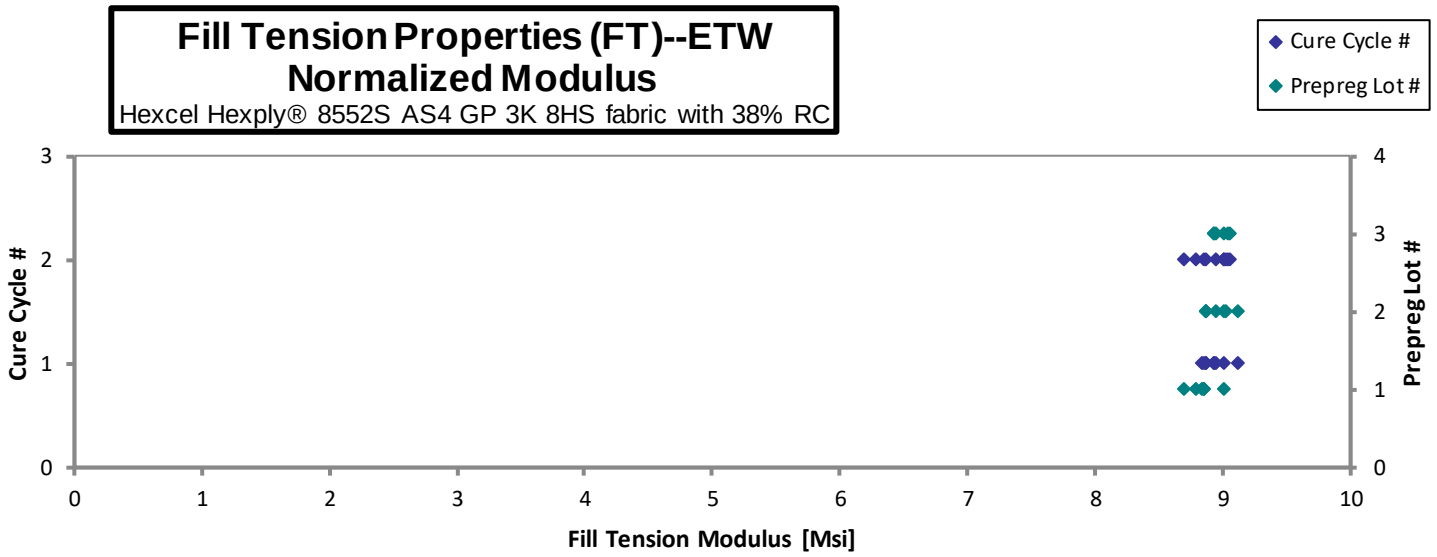
normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit 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]
HPAUA1R1D	A	M1	1	1	124.0	8.931	0.1210	8	LWT, LWB	0.0151	125.0	9.007
HPAUA1R2D	A	M1	1	1	119.3	8.730	0.1218	8	LWT, LWB	0.0152	121.0	8.860
HPAUA1R3D	A	M1	1	1	124.5	8.785	0.1208	8	LWT, LWB	0.0151	125.3	8.842
HPAUA2R1D	A	M2	1	2	117.2	8.432	0.1238	8	LGM	0.0155	120.9	8.698
HPAUA2R2D	A	M2	1	2	115.1	8.520	0.1239	8	LGB, LAT	0.0155	118.9	8.797
HPAUA2R3D	A	M2	1	2	107.1	8.638	0.1230	8	LAT	0.0154	109.8	8.856
HPAUB1R1D	B	M1	2	1	110.4	8.581	0.1240	8	LGT	0.0155	114.1	8.865
HPAUB1R2D	B	M1	2	1	112.2	8.928	0.1225	8	LWT	0.0153	114.5	9.115
HPAUB1R3D	B	M1	2	1	112.6	8.703	0.1223	8	LWT	0.0153	114.7	8.867
HPAUB2R1D*	B	M2	2	2		8.559	0.1254	8	LIB	0.0157		8.943
HPAUB2R2D	B	M2	2	2	115.7	8.677	0.1246	8	LAB	0.0156	120.1	9.006
HPAUB2R3D	B	M2	2	2	108.6	8.772	0.1235	8	LAT	0.0154	111.8	9.029
HPAUB2R4D	B	M2	2	2	115.7	8.643	0.1231	8	LGM	0.0154	118.7	8.868
HPAUC1R1D	C	M1	3	1	108.7	8.552	0.1254	8	LWT, LWB	0.0157	113.6	8.935
HPAUC1R2D	C	M1	3	1	109.7	8.515	0.1262	8	LAT	0.0158	115.4	8.954
HPAUC1R3D	C	M1	3	1	110.1	8.523	0.1257	8	LWT, LWB	0.0157	115.3	8.929
HPAUC2R1D	C	M2	3	2	125.7	8.904	0.1218	8	LGT	0.0152	127.6	9.040
HPAUC2R2D	C	M2	3	2	129.2	8.902	0.1215	8	LGT	0.0152	130.8	9.010
HPAUC2R3D	C	M2	3	2	122.6	8.980	0.1212	8	LWT	0.0151	123.8	9.066

*Strength not reported due to unacceptable failure mode

	Strength [ksi]	Modulus [Msi]		t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
Average	**116.0**	**8.699**	**$Average_{norm}$**	**0.0154**	**119.0**	**8.931**
Standard Dev.	**6.766**	**0.1687**	**Standard Dev.$_{norm}$**		**5.815**	**0.1042**
Coeff. of Var. [%]	**5.832**	**1.940**	**Coeff. of Var. [%]$_{norm}$**		**4.889**	**1.166**
Min.	**107.1**	**8.432**	**Min.**	**0.0151**	**109.8**	**8.698**
Max.	**129.2**	**8.980**	**Max.**	**0.0158**	**130.8**	**9.115**
Number of Spec.	**18**	**19**	**Number of Spec.**	**19**	**18**	**19**


Fill Tension Properties (FT)--ETW
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Fill Tension Strength [ksi]
0
20
40
60
80
100
120
140
0
1
2
3
4


Fill Tension Properties (FT)--ETW
Normalized Modulus
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Fill Tension Modulus [Msi]
0
1
2
3
4
5
6
7
8
9
10
0
1
2
3
4

4.3 Warp Compression Properties (WC)

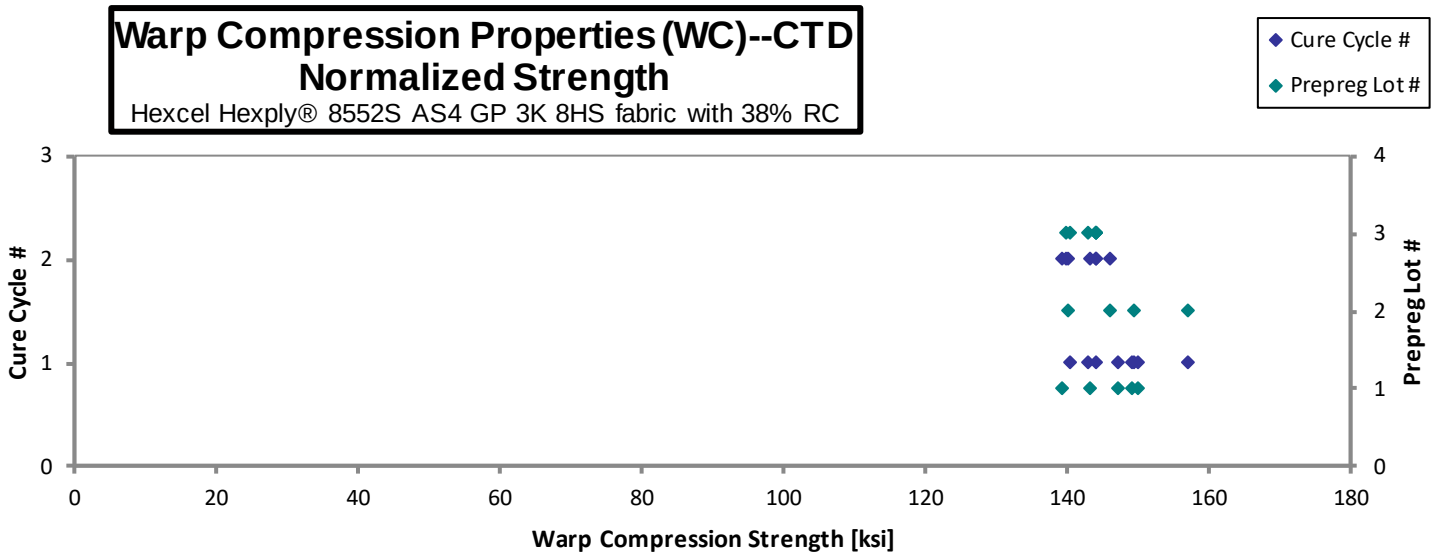
Warp Compression Properties (WC)--CTD
Strength & Modulus
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

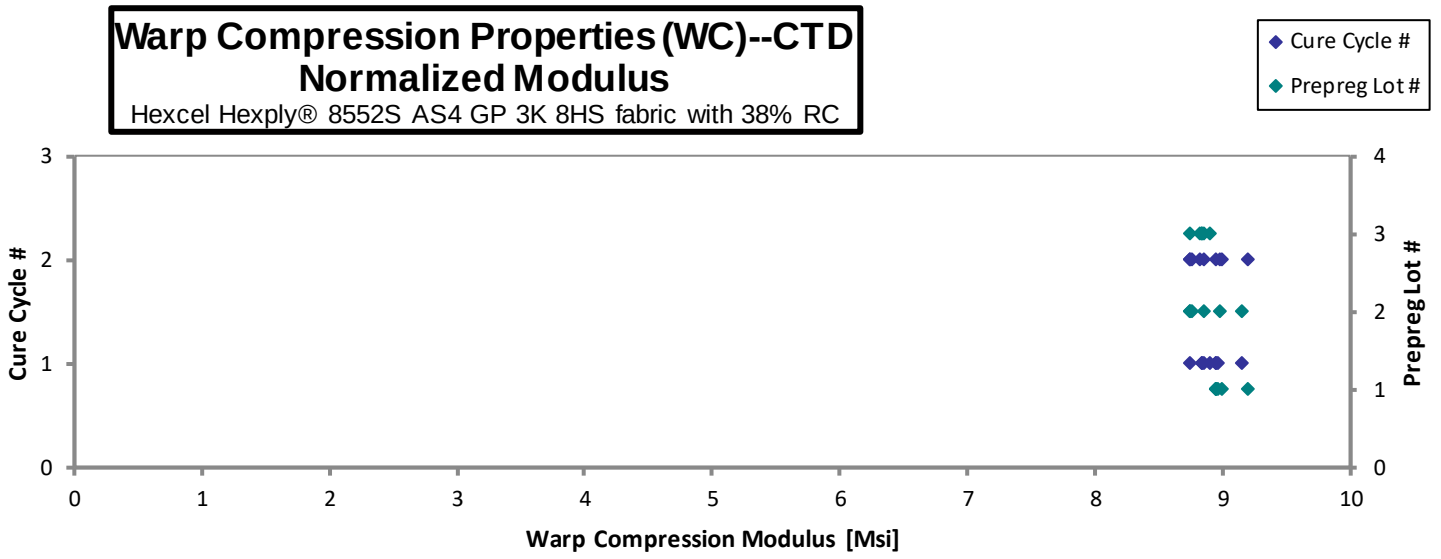
normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit 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]
HPALA111B	A	M1	1	1	145.9	8.753	0.1228	8	BGM	0.0153	149.2	8.955
HPALA112B	A	M1	1	1	141.7	8.608	0.1249	8	BGM	0.0156	147.4	8.956
HPALA113B	A	M1	1	1	145.1	8.676	0.1241	8	BGM	0.0155	150.0	8.971
HPALA211B	A	M2	1	2	142.1	9.116	0.1212	8	BAB	0.0151	143.4	9.204
HPALA212B*	A	M2	1	2		8.781	0.1222	8	BGM, CIB	0.0153		8.944
HPALA213B	A	M2	1	2	133.1	8.585	0.1257	8	BGM	0.0157	139.4	8.994
HPALB111B	B	M1	2	1	142.0	8.422	0.1262	8	BAT	0.0158	149.4	8.860
HPALB112B	B	M1	2	1	145.7	8.119	0.1293	8	BGM	0.0162	157.0	8.751
HPALB113B*	B	M1	2	1		8.388	0.1311	8	BGM, CIB	0.0164		9.161
HPALB211B*	B	M2	2	2		8.669	0.1214	8	BAB, CIB	0.0152		8.768
HPALB212B	B	M2	2	2	142.4	8.512	0.1233	8	BGM	0.0154	146.3	8.744
HPALB213B	B	M2	2	2	135.4	8.670	0.1243	8	BGM	0.0155	140.2	8.980
HPALC111B	C	M1	3	1	137.9	8.525	0.1244	8	BGM	0.0156	143.0	8.840
HPALC112B	C	M1	3	1	135.2	8.506	0.1247	8	BGM	0.0156	140.5	8.841
HPALC113B	C	M1	3	1	140.8	8.698	0.1228	8	BGM	0.0153	144.1	8.899
HPALC211B	C	M2	3	2	143.1	8.750	0.1209	8	BGM	0.0151	144.2	8.818
HPALC212B	C	M2	3	2	140.5	8.643	0.1231	8	BGM	0.0154	144.1	8.862
HPALC213B	C	M2	3	2	134.8	8.428	0.1246	8	BGM	0.0156	140.0	8.750

*Strength not reported due to unacceptable failure mode.

Average	**140.4**	**8.603**	**Average$_{norm}$**	**0.0155**	**145.2**	**8.905**
Standard Dev.	**4.152**	**0.2075**	**Standard Dev.$_{norm}$**		**4.797**	**0.1309**
Coeff. of Var. [%]	**2.958**	**2.412**	**Coeff. of Var. [%]$_{norm}$**		**3.303**	**1.470**
Min.	**133.1**	**8.119**	**Min.**	**0.0151**	**139.4**	**8.744**
Max.	**145.9**	**9.116**	**Max.**	**0.0164**	**157.0**	**9.204**
Number of Spec.	**15**	**18**	**Number of Spec.**	**18**	**15**	**18**


Warp Compression Properties (WC)--CTD
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Warp Compression Strength [ksi]
0
20
40
60
80
100
120
140
160
180
0
1
2
3
4


Warp Compression Properties (WC)--CTD
Normalized Modulus
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Warp Compression Modulus [Msi]
0
1
2
3
4
5
6
7
8
9
10
0
1
2
3
4

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

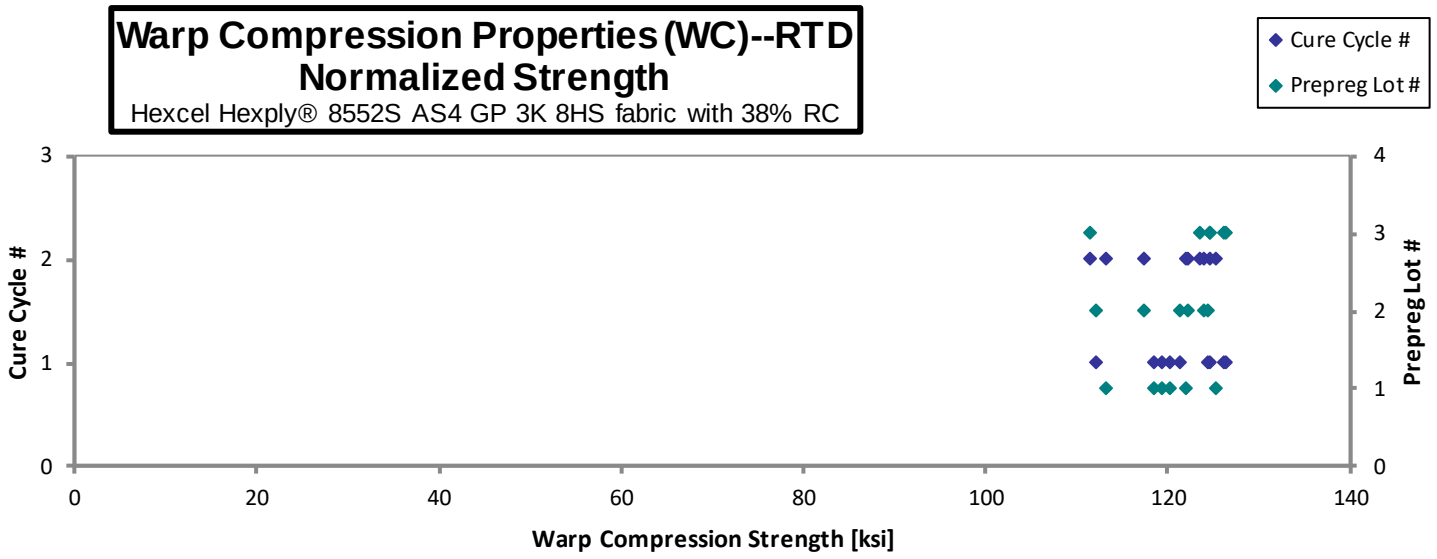
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

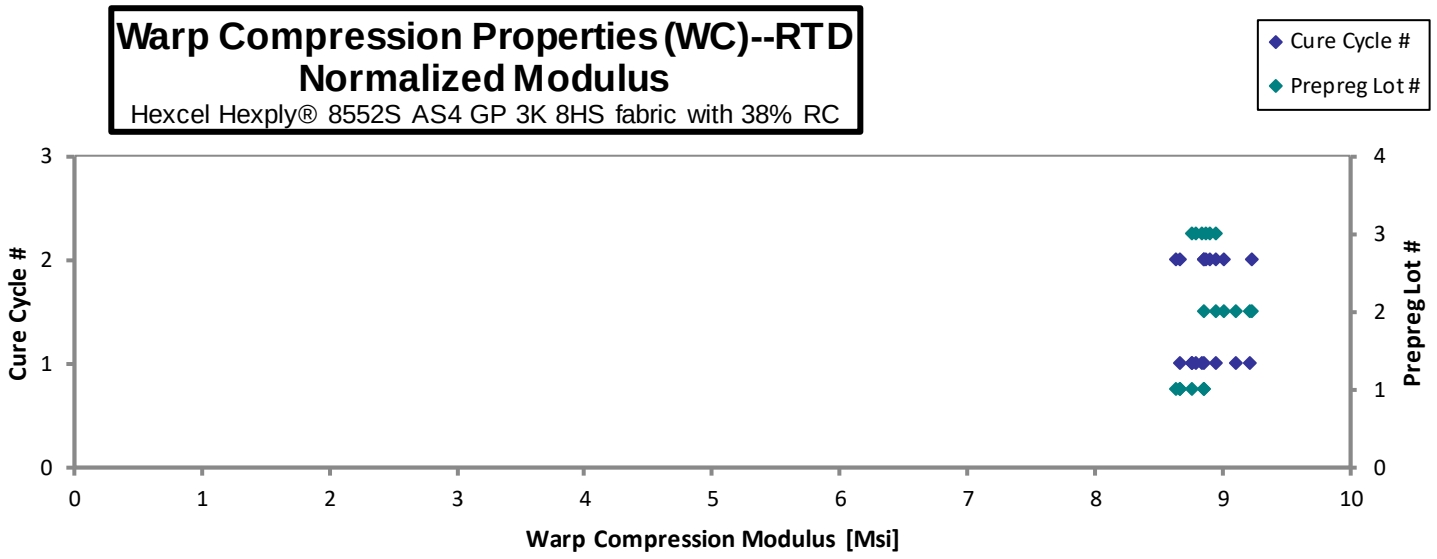
normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit 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]
HPALA111A	A	M1	1	1	132.2	9.890	0.1075	8	BGM	0.0134	118.5	8.862
HPALA112A	A	M1	1	1	126.7	9.241	0.1139	8	HAT, HIT	0.0142	120.3	8.769
HPALA113A	A	M1	1	1	121.0	8.796	0.1183	8	BGM, HIB	0.0148	119.3	8.671
HPALA211A	A	M2	1	2	126.9	9.929	0.1071	8	HAT	0.0134	113.2	8.860
HPALA212A	A	M2	1	2	129.7	8.979	0.1159	8	HAT	0.0145	125.2	8.669
HPALA213A	A	M2	1	2	126.3	8.936	0.1159	8	BGM	0.0145	122.0	8.631
HPALB111A	B	M1	2	1	131.2	10.49	0.1025	8	BGM	0.0128	112.1	8.958
HPALB112A	B	M1	2	1	134.5	9.850	0.1110	8	BGM	0.0139	124.4	9.107
HPALB113A	B	M1	2	1	124.4	9.453	0.1171	8	BGM	0.0146	121.4	9.220
HPALB211A*	B	M2	2	2		9.935	0.1115	8	CIT	0.0139		9.230
HPALB212A	B	M2	2	2	122.8	9.428	0.1148	8	BGM	0.0144	117.5	9.020
HPALB213A	B	M2	2	2	126.7	9.047	0.1175	8	BGM	0.0147	124.1	8.858
HPALB214A	B	M2	2	2	122.5		0.1197	8	BGM	0.0150	122.2	
HPALC111A	C	M1	3	1	121.5	8.521	0.1246	8	BGM	0.0156	126.1	8.845
HPALC112A	C	M1	3	1	120.2	8.452	0.1244	8	BGM, HIB	0.0156	124.6	8.764
HPALC113A	C	M1	3	1	121.4	8.445	0.1250	8	HAB, HIB	0.0156	126.5	8.795
HPALC211A	C	M2	3	2	123.0	9.890	0.1086	8	BGM	0.0136	111.4	8.954
HPALC212A	C	M2	3	2	130.8	9.395	0.1133	8	BGM	0.0142	123.4	8.869
HPALC213A	C	M2	3	2	128.1	9.152	0.1167	8	BGM	0.0146	124.6	8.899

*Strength not reported due to unacceptable failure mode.

	Strength [ksi]	Modulus [Msi]				
Average	**126.1**	**9.324**	**$Average_{norm}$**	**0.0144**	**120.9**	**8.888**
Standard Dev.	**4.307**	**0.5880**	**$Standard\ Dev._{norm}$**		**4.751**	**0.1725**
Coeff. of Var. [%]	**3.415**	**6.306**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**3.929**	**1.941**
Min.	**120.2**	**8.445**	**Min.**	**0.0128**	**111.4**	**8.631**
Max.	**134.5**	**10.49**	**Max.**	**0.0156**	**126.5**	**9.230**
Number of Spec.	**18**	**18**	**Number of Spec.**	**19**	**18**	**18**


Warp Compression Properties (WC)--RTD
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
0
1
2
3
4
0
20
40
60
80
100
120
140
Warp Compression Strength [ksi]


Warp Compression Properties (WC)--RTD
Normalized Modulus
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
0
1
2
3
4
0
1
2
3
4
5
6
7
8
9
10
Warp Compression Modulus [Msi]

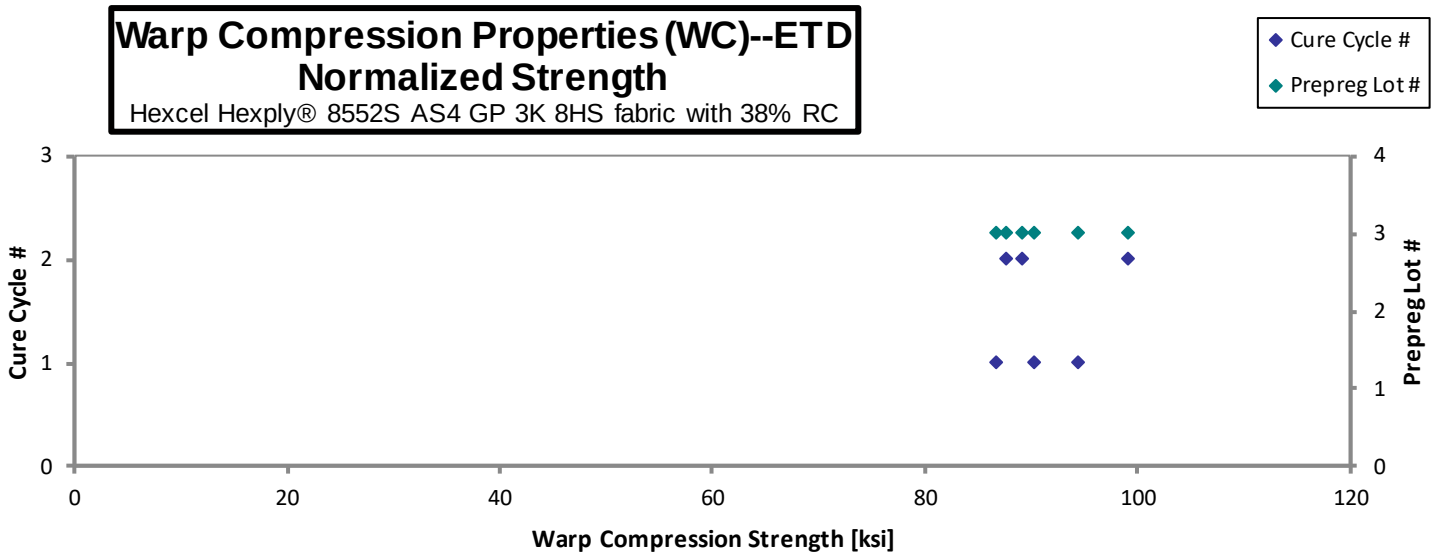
Warp Compression Properties (WC)--ETD
Strength & Modulus

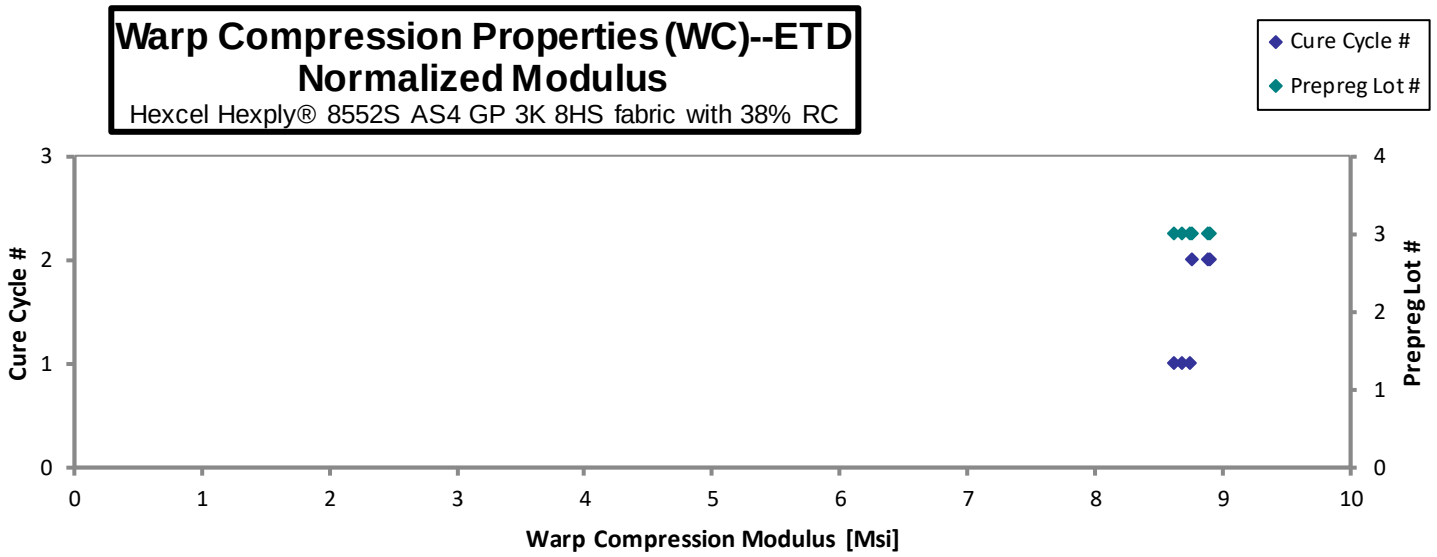
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit 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]
HPALC111C	C	M1	3	1	95.75	8.807	0.1184	8	BAB	0.0148	94.47	8.689
HPALC112C	C	M1	3	1	89.18	8.988	0.1168	8	BGM	0.0146	86.76	8.744
HPALC113C	C	M1	3	1	96.47	9.208	0.1124	8	BAT	0.0140	90.33	8.623
HPALC211C	C	M2	3	2	95.23	8.541	0.1249	8	M(B,H)AT	0.0156	99.08	8.886
HPALC212C	C	M2	3	2	85.69	8.420	0.1248	8	BAT	0.0156	89.14	8.759
HPALC213C	C	M2	3	2	84.21	8.547	0.1250	8	BAT	0.0156	87.71	8.902

Average	**91.09**	**8.752**	**Average$_{norm}$**	**0.0150**	**91.25**	**8.767**
Standard Dev.	**5.438**	**0.3044**	**Standard Dev.$_{norm}$**		**4.684**	**0.1094**
Coeff. of Var. [%]	**5.970**	**3.478**	**Coeff. of Var. [%]$_{norm}$**		**5.133**	**1.248**
Min.	**84.21**	**8.420**	**Min.**	**0.0140**	**86.76**	**8.623**
Max.	**96.47**	**9.208**	**Max.**	**0.0156**	**99.08**	**8.902**
Number of Spec.	**6**	**6**	**Number of Spec.**	**6**	**6**	**6**


Warp Compression Properties (WC)--ETD
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
20
40
60
80
100
120
Warp Compression Strength [ksi]


Warp Compression Properties (WC)--ETD
Normalized Modulus
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
1
2
3
4
5
6
7
8
9
10
Warp Compression Modulus [Msi]

Warp Compression Properties (WC)--ETW
Strength & Modulus

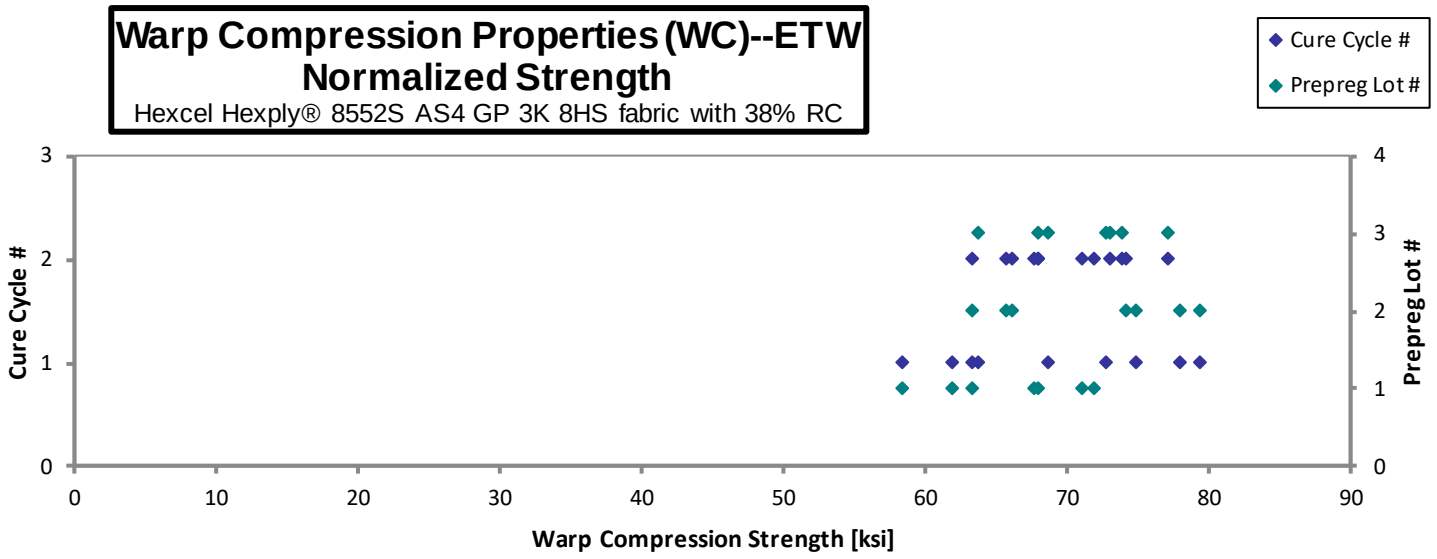
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

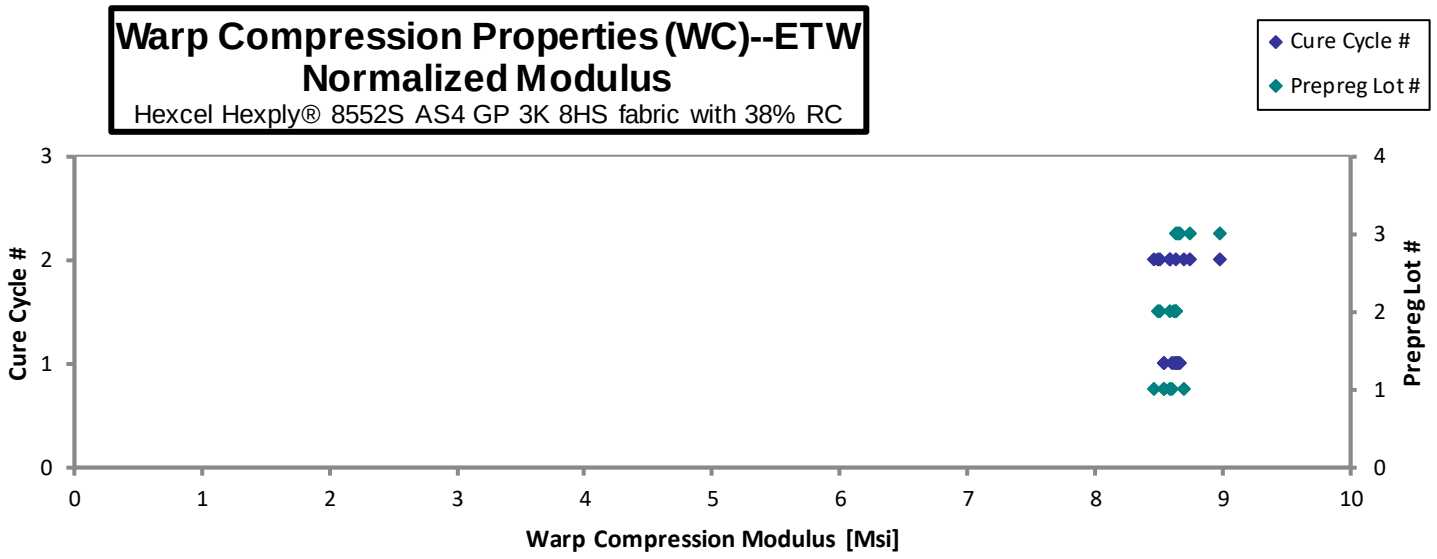
normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit 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]
HPALA111D	A	M1	1	1		8.110	0.1264	8	BGM	0.0158		8.542
HPALA112D	A	M1	1	1		9.501	0.1080	8	HGM	0.0135		8.550
HPALA113D	A	M1	1	1		9.083	0.1137	8	BGM	0.0142		8.606
HPALA114D	A	M1	1	1	62.82		0.1182	8	BGM	0.0148	61.88	
HPALA115D	A	M1	1	1	57.66		0.1217	8	M(B,H)GM	0.0152	58.46	
HPALA116D	A	M1	1	1	60.85		0.1251	8	BGM	0.0156	63.42	
HPALA211D	A	M2	1	2		8.032	0.1264	8	BGM	0.0158		8.463
HPALA212D	A	M2	1	2		9.336	0.1103	8	BGM	0.0138		8.584
HPALA213D	A	M2	1	2		9.044	0.1155	8	HGM	0.0144		8.704
HPALA214D	A	M2	1	2	72.30		0.1181	8	M(B,H)GM	0.0148	71.12	
HPALA215D	A	M2	1	2	67.01		0.1212	8	BGM	0.0151	67.66	
HPALA216D	A	M2	1	2	70.25		0.1229	8	BGM	0.0154	71.96	
HPALA217D	A	M2	1	2	65.34		0.1249	8	HGM	0.0156	68.01	
HPALB111D	B	M1	2	1		7.732	0.1338	8	BGM	0.0167		8.622
HPALB112D	B	M1	2	1		9.789	0.1059	8	BGM	0.0132		8.640
HPALB113D	B	M1	2	1		9.230	0.1124	8	BGM	0.0140		8.644
HPALB115D	B	M1	2	1	77.81		0.1225	8	BGM	0.0153	79.41	
HPALB116D	B	M1	2	1	75.32		0.1244	8	BGM	0.0155	78.06	
HPALB117D	B	M1	2	1	71.55		0.1257	8	BGM	0.0157	74.92	
HPALB211D	B	M2	2	2		8.094	0.1261	8	BGM	0.0158		8.505
HPALB212D	B	M2	2	2		9.299	0.1109	8	BGM	0.0139		8.590
HPALB213D	B	M2	2	2		8.939	0.1141	8	BGM	0.0143		8.501
HPALB214D	B	M2	2	2	67.17		0.1174	8	BGM	0.0147	65.71	
HPALB215D	B	M2	2	2	66.10		0.1202	8	BGM	0.0150	66.18	
HPALB216D	B	M2	2	2	73.10		0.1219	8	BGM	0.0152	74.27	
HPALB217D	B	M2	2	2	61.40		0.1237	8	BGM	0.0155	63.28	
HPALC111D	C	M1	3	1		8.986	0.1157	8	BGM	0.0145		8.664
HPALC112D	C	M1	3	1		8.818	0.1179	8	BGM	0.0147		8.660
HPALC113D	C	M1	3	1		8.667	0.1198	8	BGM	0.0150		8.652
HPALC114D	C	M1	3	1	62.83		0.1217	8	BGM	0.0152	63.74	
HPALC115D	C	M1	3	1	66.64		0.1237	8	BGM	0.0155	68.67	
HPALC116D	C	M1	3	1	70.79		0.1235	8	BGM	0.0154	72.83	
HPALC211D	C	M2	3	2		9.512	0.1134	8	BGM	0.0142		8.988
HPALC212D	C	M2	3	2		8.990	0.1167	8	M(B,H)GM	0.0146		8.745
HPALC213D	C	M2	3	2		8.642	0.1200	8	BAT	0.0150		8.642
HPALC214D	C	M2	3	2	72.23		0.1215	8	BGM	0.0152	73.10	
HPALC215D	C	M2	3	2	75.68		0.1223	8	BGM	0.0153	77.13	
HPALC216D	C	M2	3	2	66.17		0.1233	8	BGM	0.0154	68.00	
HPALC217D	C	M2	3	2	72.08		0.1231	8	BAB, HIB	0.0154	73.95	

	Strength	Modulus
Average	**68.34**	**8.878**
Standard Dev.	**5.403**	**0.5721**
Coeff. of Var. [%]	**7.906**	**6.445**
Min.	**57.66**	**7.732**
Max.	**77.81**	**9.789**
Number of Spec.	**21**	**18**

	t_{ply}	$Strength_{norm}$	$Modulus_{norm}$
$Average_{norm}$	**0.0150**	**69.61**	**8.628**
Standard $Dev._{norm}$		**5.732**	**0.1159**
Coeff. of Var. $[\%]_{norm}$		**8.234**	**1.343**
Min.	**0.0132**	**58.46**	**8.463**
Max.	**0.0167**	**79.41**	**8.988**
Number of Spec.	**39**	**21**	**18**


Warp Compression Properties (WC)--ETW
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Warp Compression Strength [ksi]
0
10
20
30
40
50
60
70
80
90
0
1
2
3
4


Warp Compression Properties (WC)--ETW
Normalized Modulus
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Warp Compression Modulus [Msi]
0
1
2
3
4
5
6
7
8
9
10
0
1
2
3
4

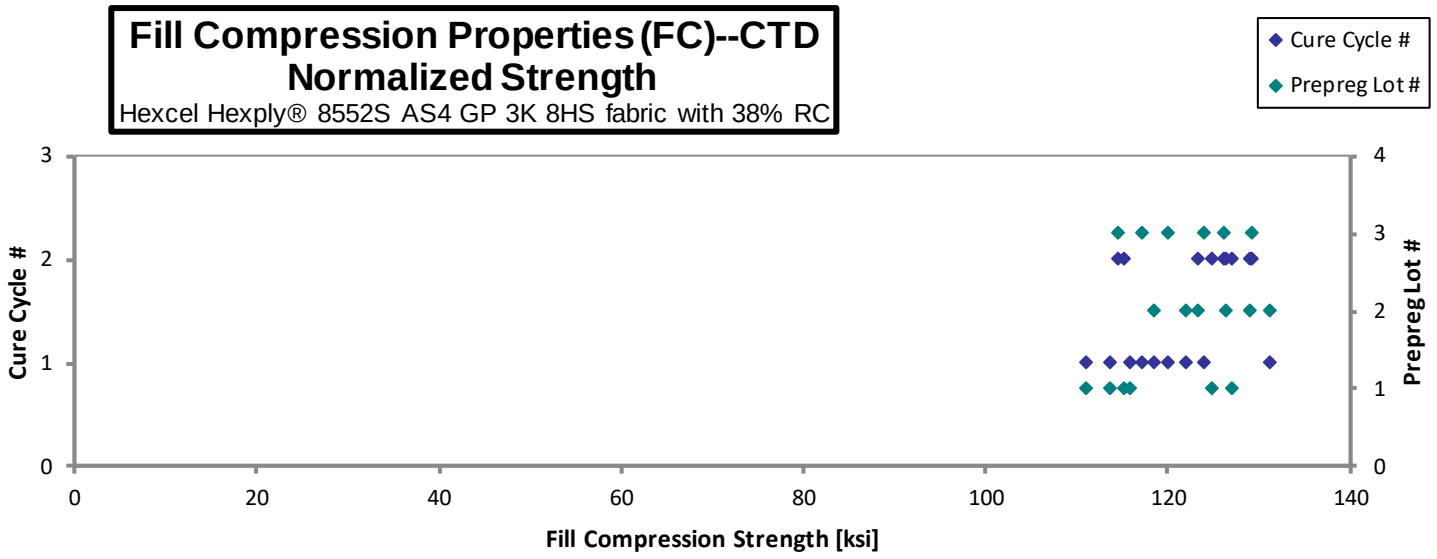
4.4 Fill Compression Properties (FC)

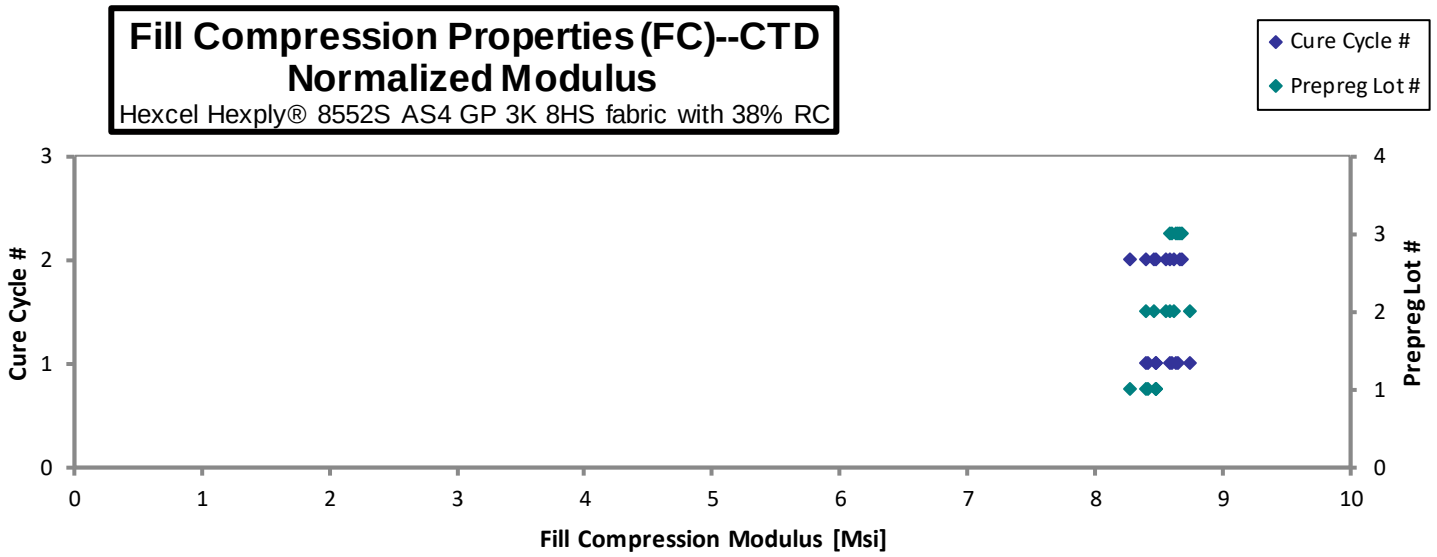
Fill Compression Properties (FC)--CTD
Strength & Modulus
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit 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]
HPAZA1R1B	A	M1	1	1	112.1	8.214	0.1239	8	BGM	0.0155	115.8	8.482
HPAZA1R2B	A	M1	1	1	109.8	8.187	0.1243	8	BGM	0.0155	113.7	8.479
HPAZA1R3B	A	M1	1	1	108.0	8.188	0.1235	8	BGM	0.0154	111.1	8.425
HPAZA2R1B	A	M2	1	2	121.6	7.928	0.1253	8	BGM	0.0157	127.1	8.281
HPAZA2R2B	A	M2	1	2	119.2	8.100	0.1256	8	BGM	0.0157	124.8	8.481
HPAZA2R4B	A	M2	1	2	110.8	8.091	0.1247	8	BGM	0.0156	115.1	8.405
HPAZB1R1B	B	M1	2	1	117.5	8.418	0.1247	8	BGM	0.0156	122.1	8.746
HPAZB1R2B	B	M1	2	1	113.9	8.259	0.1248	8	BGM	0.0156	118.4	8.591
HPAZB1R3B	B	M1	2	1	126.6	8.110	0.1243	8	BGM	0.0155	131.2	8.402
HPAZB2R1B	B	M2	2	2	120.6	8.223	0.1257	8	BGM	0.0157	126.4	8.615
HPAZB2R2B	B	M2	2	2	123.1	8.066	0.1258	8	BGM	0.0157	129.1	8.458
HPAZB2R3B	B	M2	2	2	117.7	8.164	0.1257	8	BGM	0.0157	123.3	8.553
HPAZC1R1B	C	M1	3	1	121.9	8.498	0.1221	8	BGM	0.0153	124.0	8.643
HPAZC1R2B	C	M1	3	1	118.3	8.518	0.1218	8	BGM	0.0152	120.1	8.645
HPAZC1R3B	C	M1	3	1	115.7	8.503	0.1214	8	BGM	0.0152	117.1	8.604
HPAZC2R1B	C	M2	3	2	121.9	8.399	0.1242	8	BGM	0.0155	126.1	8.689
HPAZC2R2B	C	M2	3	2	125.3	8.405	0.1239	8	BGM	0.0155	129.3	8.675
HPAZC2R3B	C	M2	3	2	112.1	8.406	0.1226	8	BGM	0.0153	114.5	8.588

Average	**117.6**	**8.260**	**Average$_{norm}$**	**0.0155**	**121.6**	**8.542**
Standard Dev.	**5.492**	**0.1742**	**Standard Dev.$_{norm}$**		**6.085**	**0.1224**
Coeff. of Var. [%]	**4.671**	**2.109**	**Coeff. of Var. [%]$_{norm}$**		**5.003**	**1.433**
Min.	**108.0**	**7.928**	**Min.**	**0.0152**	**111.1**	**8.281**
Max.	**126.6**	**8.518**	**Max.**	**0.0157**	**131.2**	**8.746**
Number of Spec.	**18**	**18**	**Number of Spec.**	**18**	**18**	**18**


Fill Compression Properties (FC)--CTD
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Fill Compression Strength [ksi]
0
20
40
60
80
100
120
140
0
1
2
3
4


Fill Compression Properties (FC)--CTD
Normalized Modulus
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Fill Compression Modulus [Msi]
0
1
2
3
4
5
6
7
8
9
10
0
1
2
3
4

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

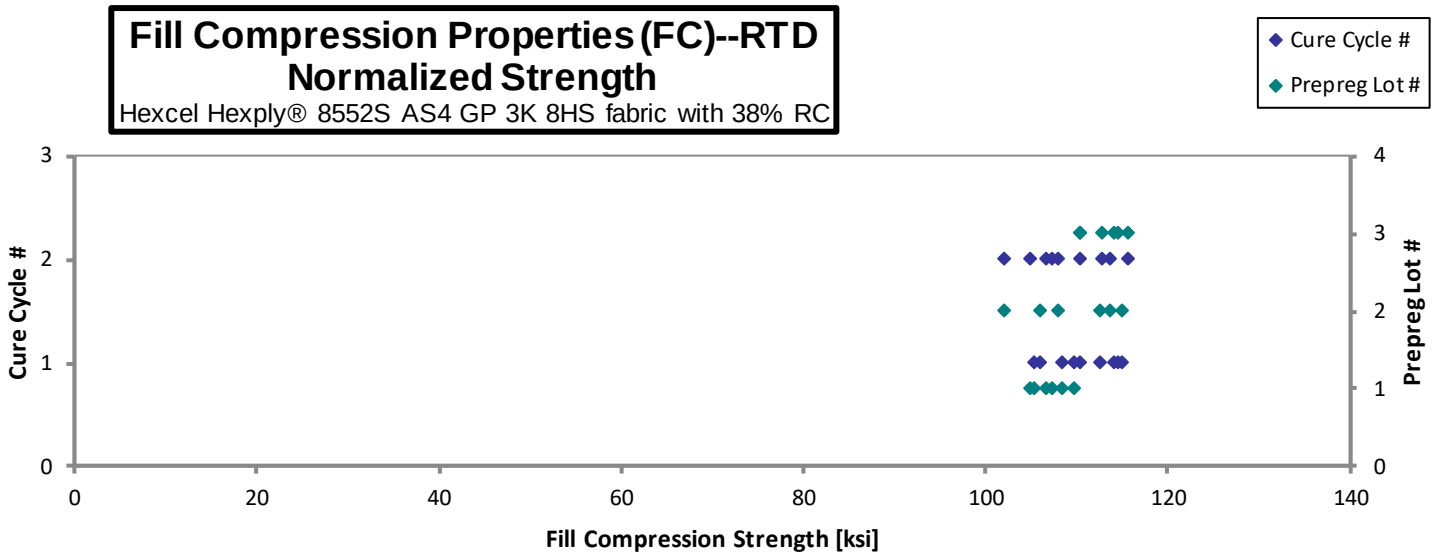
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

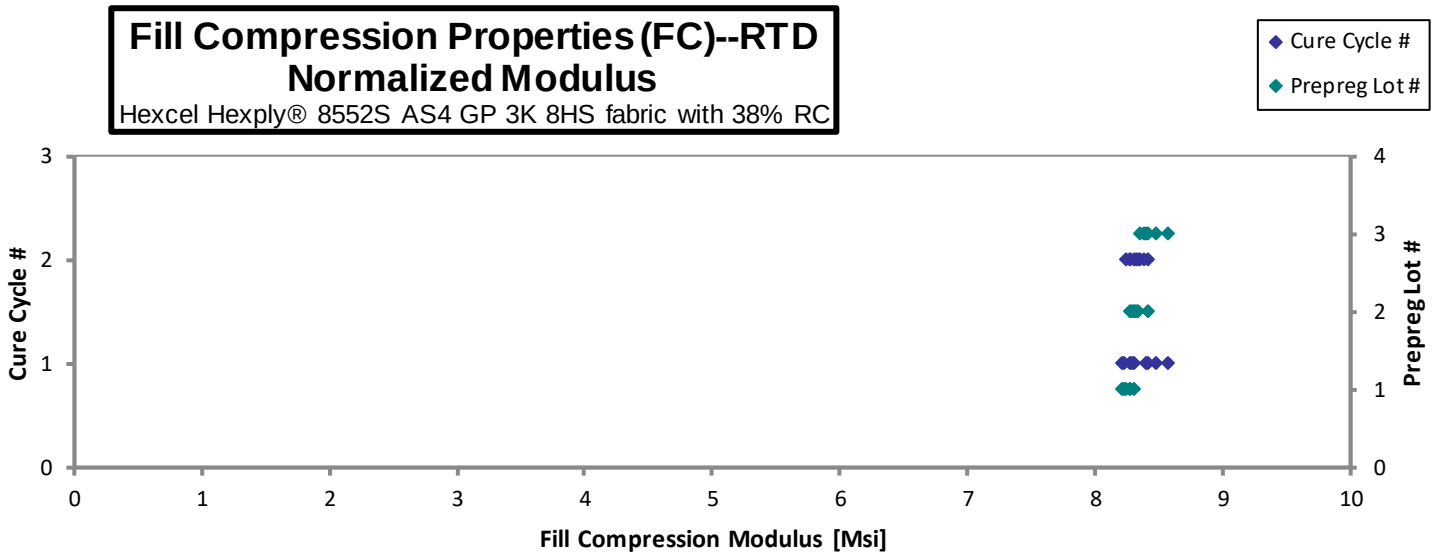
normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit 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]
HPAZA1R1A	A	M1	1	1	115.2	9.008	0.1096	8	BGM	0.0137	105.3	8.230
HPAZA1R2A	A	M1	1	1	111.3	8.447	0.1168	8	BGM	0.0146	108.3	8.219
HPAZA1R3A	A	M1	1	1	109.0	8.208	0.1209	8	BGM	0.0151	109.8	8.270
HPAZA2R1A	A	M2	1	2	114.8	8.819	0.1121	8	HAB	0.0140	107.3	8.240
HPAZA2R2A*	A	M2	1	2		8.412	0.1185	8	HIT	0.0148		8.306
HPAZA2R3A	A	M2	1	2	103.3	8.153	0.1219	8	BGM	0.0152	104.9	8.281
HPAZA2R4A	A	M2	1	2	103.2		0.1242	8	BGM	0.0155	106.7	
HPAZB1R1A*	B	M1	2	1		9.318	0.1070	8	HIB	0.0134		8.309
HPAZB1R2A	B	M1	2	1	116.4	8.574	0.1161	8	BGM	0.0145	112.7	8.297
HPAZB1R3A	B	M1	2	1	105.0	8.346	0.1211	8	BGM	0.0151	105.9	8.420
HPAZB1R4A	B	M1	2	1	111.3		0.1242	8	BGM	0.0155	115.1	
HPAZB2R1A	B	M2	2	2	108.4	8.857	0.1129	8	BGM	0.0141	102.0	8.333
HPAZB2R2A	B	M2	2	2	113.9	8.283	0.1198	8	BGM	0.0150	113.8	8.269
HPAZB2R3A	B	M2	2	2	104.8	8.084	0.1236	8	BGM	0.0155	107.9	8.328
HPAZC1R1A	C	M1	3	1	121.6	9.137	0.1127	8	BGM	0.0141	114.2	8.579
HPAZC1R2A	C	M1	3	1	111.6	8.488	0.1188	8	BGM	0.0149	110.5	8.403
HPAZC1R3A*	C	M1	3	1		8.400	0.1211	8	HIB	0.0151		8.475
HPAZC1R4A	C	M1	3	1	112.9		0.1217	8	BGM	0.0152	114.5	
HPAZC2R1A	C	M2	3	2	117.8	8.972	0.1125	8	BGM	0.0141	110.4	8.413
HPAZC2R2A	C	M2	3	2	113.3	8.432	0.1194	8	BGM	0.0149	112.8	8.392
HPAZC2R3A	C	M2	3	2	112.8	8.153	0.1230	8	BGM	0.0154	115.7	8.358

*Strength not reported due to unacceptable failure mode.

	Strength [ksi]	Modulus [Msi]			$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
Average	**111.5**	**8.561**		**$Average_{norm}$**	**0.0147**	**109.9**	**8.340**
Standard Dev.	**5.116**	**0.3694**		**Standard Dev.$_{norm}$**		**4.055**	**0.0934**
Coeff. of Var. [%]	**4.589**	**4.315**		**Coeff. of Var. [%]$_{norm}$**		**3.691**	**1.120**
Min.	**103.2**	**8.084**		**Min.**	**0.0134**	**102.0**	**8.219**
Max.	**121.6**	**9.318**		**Max.**	**0.0155**	**115.7**	**8.579**
Number of Spec.	**18**	**18**		**Number of Spec.**	**21**	**18**	**18**


Fill Compression Properties (FC)--RTD
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Fill Compression Strength [ksi]
0
20
40
60
80
100
120
140
0
1
2
3
4


Fill Compression Properties (FC)--RTD
Normalized Modulus
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Fill Compression Modulus [Msi]
0
1
2
3
4
5
6
7
8
9
10
0
1
2
3
4

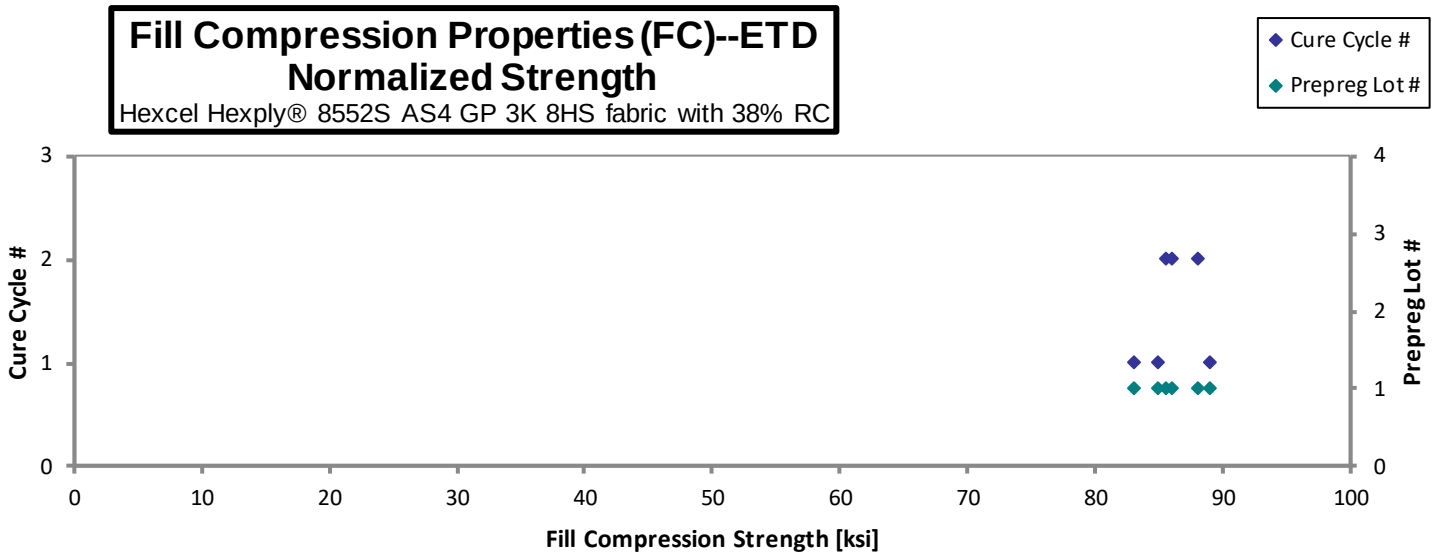
Fill Compression Properties (FC)--ETD
Strength & Modulus

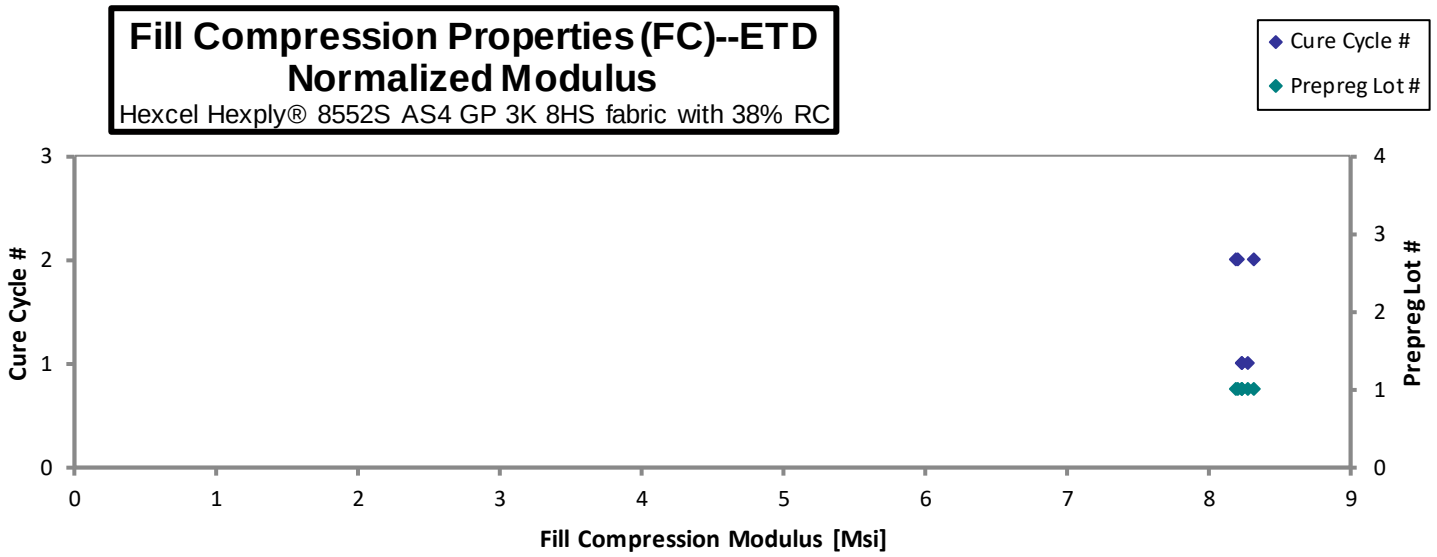
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit 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]
HPAZA1R1C	A	M1	1	1	82.89	8.040	0.1231	8	BGM	0.0154	85.01	8.245
HPAZA1R2C	A	M1	1	1	80.97	8.064	0.1232	8	HAT	0.0154	83.15	8.281
HPAZA1R3C	A	M1	1	1	86.83	8.039	0.1230	8	BGM, HAT, HIT	0.0154	89.01	8.241
HPAZA2R1C	A	M2	1	2	83.38	8.062	0.1240	8	BGM	0.0155	86.12	8.327
HPAZA2R2C	A	M2	1	2	85.74	7.988	0.1233	8	BGM	0.0154	88.12	8.210
HPAZA2R3C	A	M2	1	2	91.44	8.763	0.1123	8	BGM	0.0140	85.55	8.199

	Strength [ksi]	Modulus [Msi]				
Average	**85.21**	**8.159**	**$Average_{norm}$**	**0.0152**	**86.16**	**8.251**
Standard Dev.	**3.700**	**0.2971**	**Standard $Dev._{norm}$**		**2.133**	**0.0476**
Coeff. of Var. [%]	**4.343**	**3.641**	**Coeff. of Var. $[\%]_{norm}$**		**2.476**	**0.5765**
Min.	**80.97**	**7.988**	**Min.**	**0.0140**	**83.15**	**8.199**
Max.	**91.44**	**8.763**	**Max.**	**0.0155**	**89.01**	**8.327**
Number of Spec.	**6**	**6**	**Number of Spec.**	**6**	**6**	**6**


Fill Compression Properties (FC)--ETD
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Fill Compression Strength [ksi]
0
10
20
30
40
50
60
70
80
90
100
0
1
2
3
4


Fill Compression Properties (FC)--ETD
Normalized Modulus
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Fill Compression Modulus [Msi]
0
1
2
3
4
5
6
7
8
9
0
1
2
3
4

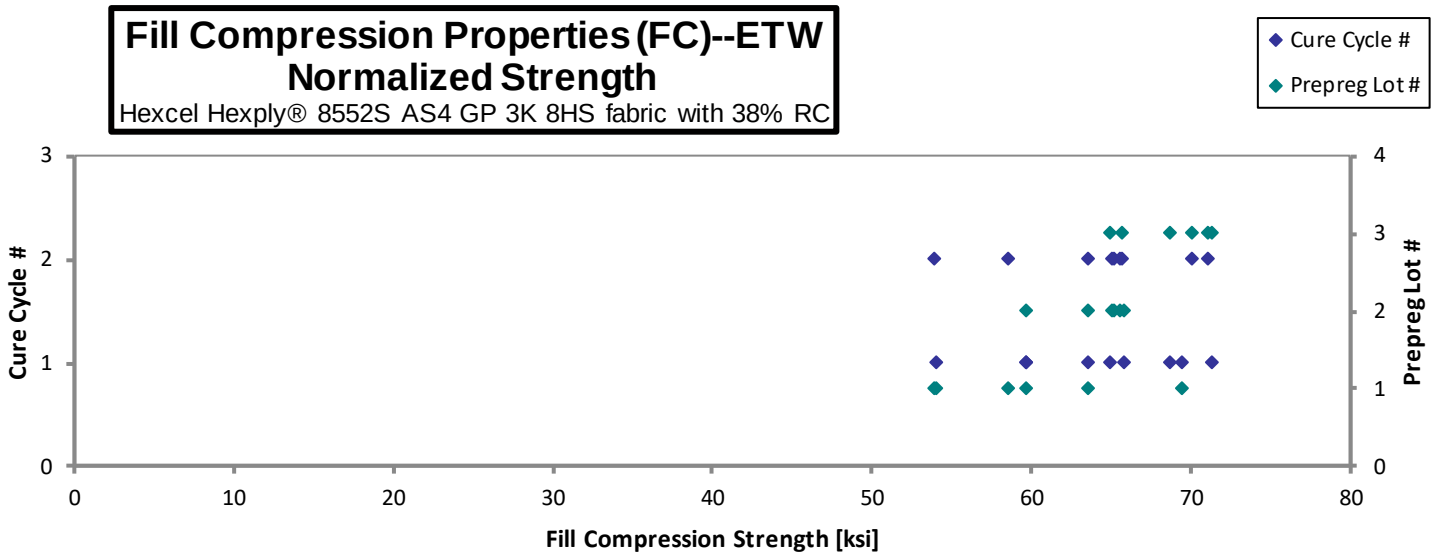
Fill Compression Properties (FC)--ETW
Strength & Modulus

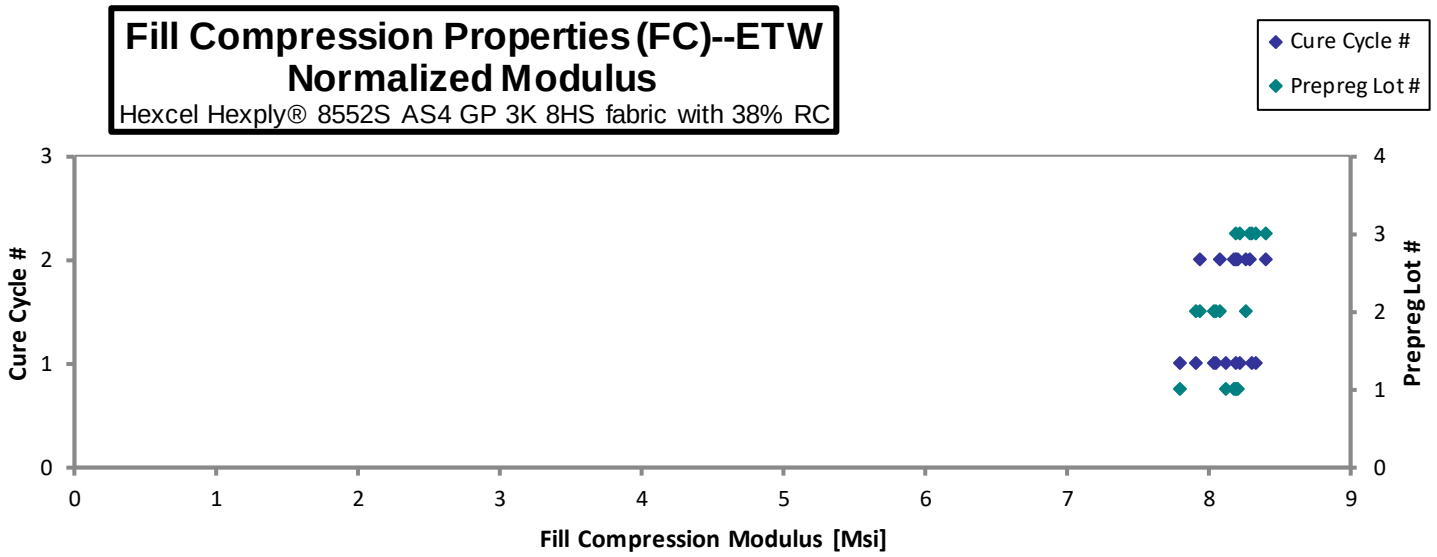
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit 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]
HPAZA1R1D	A	M1	1	1		8.014	0.1169	8	BGM	0.0146		7.808
HPAZA1R2D	A	M1	1	1		8.016	0.1217	8	CIB	0.0152		8.126
HPAZA1R3D	A	M1	1	1		8.006	0.1228	8	BGM	0.0154		8.193
HPAZA1R4D	A	M1	1	1	67.60		0.1233	8	BGM	0.0154	69.47	
HPAZA1R5D	A	M1	1	1	52.81		0.1230	8	BGM	0.0154	54.11	
HPAZA1R6D	A	M1	1	1	58.62		0.1223	8	HGM	0.0153	59.72	
HPAZA2R1D	A	M2	1	2		8.125	0.1213	8	HGM	0.0152		8.214
HPAZA2R2D	A	M2	1	2		7.976	0.1231	8	CIB	0.0154		8.183
HPAZA2R3D	A	M2	1	2		7.909	0.1243	8	HGM	0.0155		8.190
HPAZA2R4D	A	M2	1	2	52.03		0.1244	8	BGM	0.0155	53.93	
HPAZA2R5D	A	M2	1	2	61.56		0.1239	8	MB,H)GM	0.0155	63.57	
HPAZA2R6D	A	M2	1	2	56.95		0.1234	8	HAB	0.0154	58.55	
HPAZB1R1D	B	M1	2	1		7.830	0.1234	8	BGM	0.0154		8.050
HPAZB1R2D	B	M1	2	1		7.824	0.1234	8	BGM	0.0154		8.042
HPAZB1R3D	B	M1	2	1		7.692	0.1235	8	HGM	0.0154		7.916
HPAZB1R4D	B	M1	2	1	58.06		0.1234	8	HGM	0.0154	59.69	
HPAZB1R5D	B	M1	2	1	63.85		0.1237	8	BGM	0.0155	65.81	
HPAZB1R6D	B	M1	2	1	61.86		0.1235	8	HGM	0.0154	63.64	
HPAZB2R1D	B	M2	2	2		7.969	0.1244	8	M(B,H)AT	0.0156		8.263
HPAZB2R2D	B	M2	2	2		7.665	0.1243	8	BGM	0.0155		7.937
HPAZB2R3D	B	M2	2	2		7.816	0.1241	8	BGM	0.0155		8.083
HPAZB2R4D	B	M2	2	2	63.16		0.1245	8	BGM	0.0156	65.52	
HPAZB2R6D	B	M2	2	2	62.44		0.1252	8	BGM	0.0156	65.13	
HPAZB2R7D	B	M2	2	2	62.28		0.1256	8	HGM	0.0157	65.17	
HPAZC1R1D	C	M1	3	1		8.156	0.1210	8	M(B,H)GM	0.0151		8.226
HPAZC1R2D	C	M1	3	1		8.284	0.1209	8	BGM	0.0151		8.344
HPAZC1R3D	C	M1	3	1		8.243	0.1210	8	BGM	0.0151		8.309
HPAZC1R4D	C	M1	3	1	64.19		0.1214	8	HGM	0.0152	64.94	
HPAZC1R5D	C	M1	3	1	67.56		0.1221	8	HGM	0.0153	68.72	
HPAZC1R6D	C	M1	3	1	69.94		0.1224	8	BGM	0.0153	71.33	
HPAZC2R1D	C	M2	3	2		8.274	0.1218	8	CIB	0.0152		8.401
HPAZC2R2D	C	M2	3	2		8.161	0.1220	8	CIB	0.0152		8.295
HPAZC2R3D	C	M2	3	2		8.072	0.1219	8	BGM	0.0152		8.199
HPAZC2R4D	C	M2	3	2	69.04		0.1218	8	BGM	0.0152	70.09	
HPAZC2R5D	C	M2	3	2	69.43		0.1229	8	BGM	0.0154	71.11	
HPAZC2R6D	C	M2	3	2	63.96		0.1234	8	HGM	0.0154	65.75	

	Strength	Modulus		$Strength_{norm}$	$Modulus_{norm}$
Average	**62.52**	**8.002**	**$Average_{norm}$**	**0.0154**	**64.24**	**8.154**
Standard Dev.	**5.288**	**0.1874**	**$Standard\ Dev._{norm}$**		**5.262**	**0.1570**
Coeff. of Var. [%]	**8.459**	**2.342**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**8.192**	**1.926**
Min.	**52.03**	**7.665**	**Min.**	**0.0146**	**53.93**	**7.808**
Max.	**69.94**	**8.284**	**Max.**	**0.0157**	**71.33**	**8.401**
Number of Spec.	**18**	**18**	**Number of Spec.**	**36**	**18**	**18**


Fill Compression Properties (FC)--ETW
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Fill Compression Strength [ksi]
0
10
20
30
40
50
60
70
80
0
1
2
3
4


Fill Compression Properties (FC)--ETW
Normalized Modulus
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Fill Compression Modulus [Msi]
0
1
2
3
4
5
6
7
8
9
0
1
2
3
4

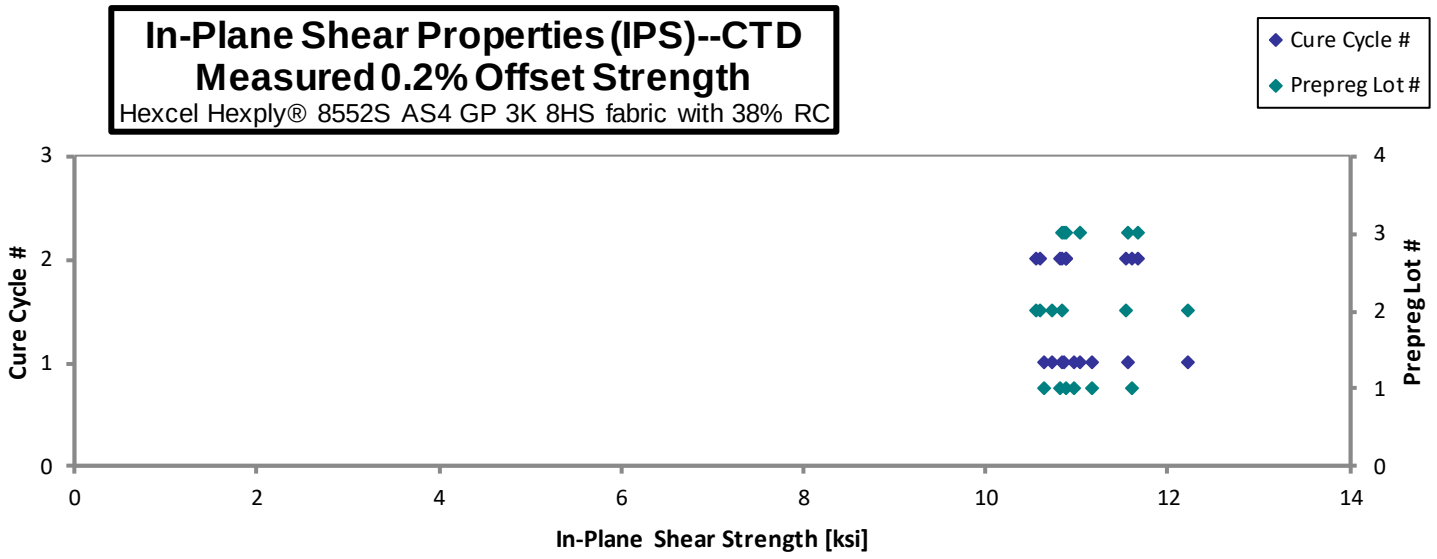
4.5 In-Plane Shear Properties (IPS)

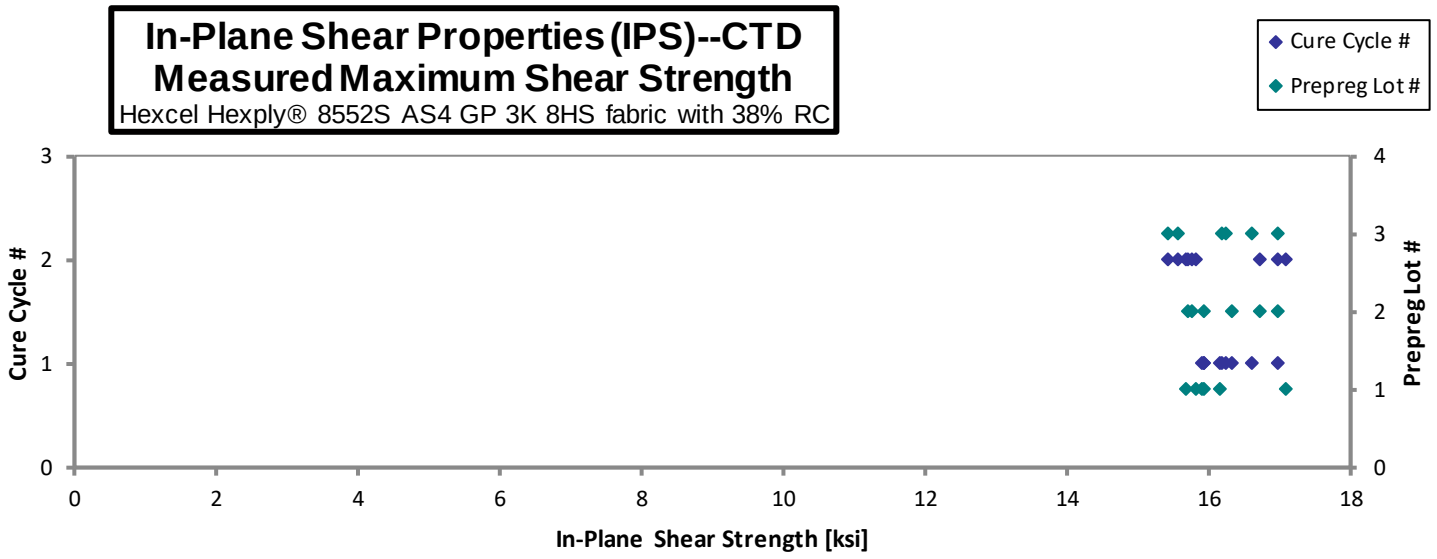
In-Plane Shear Properties (IPS)--CTD
Strength & Modulus
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

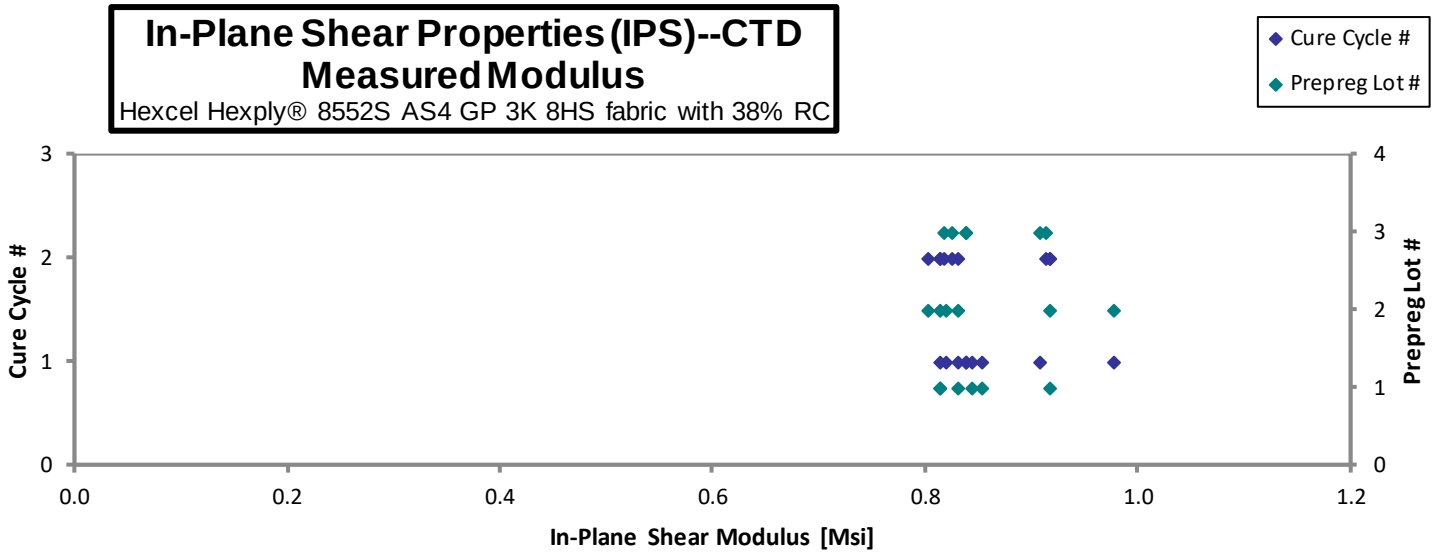
Specimen Number	Spirit Batch #	Spirit Cure Cycle	Prepreg Lot #	Cure Cycle #	0.2% Offset Strength [ksi]	Maximum Shear Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Avg. t_{ply} [in]	Failure Mode
HPANA111B	A	M1	1	1	10.98	15.91	0.8455	0.1194	8	0.0149	AWT
HPANA112B	A	M1	1	1	11.18	15.94	0.8543	0.1193	8	0.0149	AWB
HPANA113B	A	M1	1	1	10.64	16.17	0.8155	0.1219	8	0.0152	AWB
HPANA211B	A	M2	1	2	10.82	15.69	0.8147	0.1229	8	0.0154	AWB
HPANA212B	A	M2	1	2	10.89	15.84	0.8324	0.1212	8	0.0152	AWT
HPANA213B	A	M2	1	2	11.62	17.10	0.9189	0.1087	8	0.0136	AGB
HPANB111B	B	M1	2	1	10.85	16.33	0.8317	0.1244	8	0.0156	AWB
HPANB112B	B	M1	2	1	10.72	15.93	0.8211	0.1255	8	0.0157	AWT
HPANB113B	B	M1	2	1	12.22	16.99	0.9776	0.1044	8	0.0130	AGT
HPANB211B	B	M2	2	2	10.57	15.71	0.8039	0.1269	8	0.0159	AWT
HPANB212B	B	M2	2	2	10.60	15.77	0.8141	0.1270	8	0.0159	AWT
HPANB213B	B	M2	2	2	11.55	16.73	0.9181	0.1094	8	0.0137	AGT
HPANC112B	C	M1	3	1	11.05	16.20	0.8400	0.1212	8	0.0152	AWB
HPANC113B	C	M1	3	1	11.56	16.62	0.9080	0.1104	8	0.0138	AGT
HPANC114B	C	M1	3	1	10.86	16.25	0.8385	0.1185	8	0.0148	AWB
HPANC211B	C	M2	3	2	10.85	15.43	0.8177	0.1221	8	0.0153	AWB
HPANC212B	C	M2	3	2	10.89	15.58	0.8261	0.1213	8	0.0152	AWB
HPANC213B	C	M2	3	2	11.69	16.99	0.9151	0.1114	8	0.0139	AWT

Maximum Shear Strength reported occurred prior to reaching 5% strain

Average	**11.09**	**16.18**	**0.8552**	**0.0148**
Standard Dev.	**0.4561**	**0.5173**	**0.0497**	
Coeff. of Var. [%]	**4.114**	**3.198**	**5.813**	
Min.	**10.57**	**15.43**	**0.8039**	**0.0130**
Max.	**12.22**	**17.10**	**0.9776**	**0.0159**
Number of Spec.	**18**	**18**	**18**	**18**


In-Plane Shear Properties (IPS)--CTD
Measured 0.2% Offset Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
In-Plane Shear Strength [ksi]
0
1
2
3
4
0
2
4
6
8
10
12
14

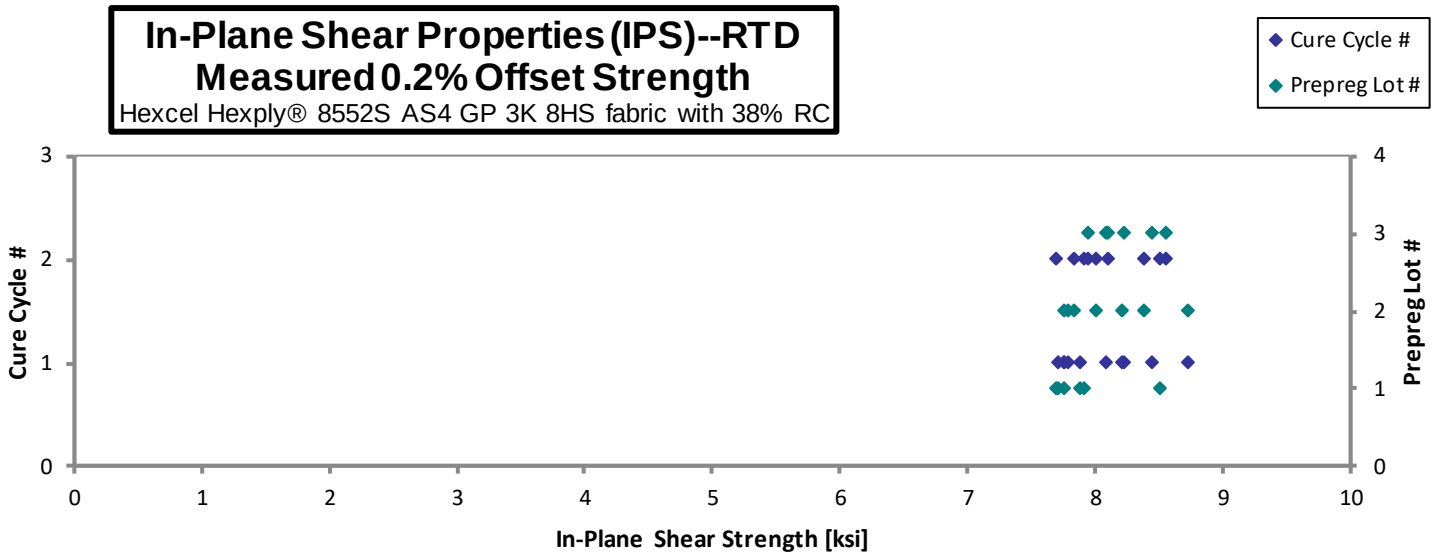

In-Plane Shear Properties (IPS)--CTD
Measured Maximum Shear Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
In-Plane Shear Strength [ksi]
0
1
2
3
4
0
2
4
6
8
10
12
14
16
18

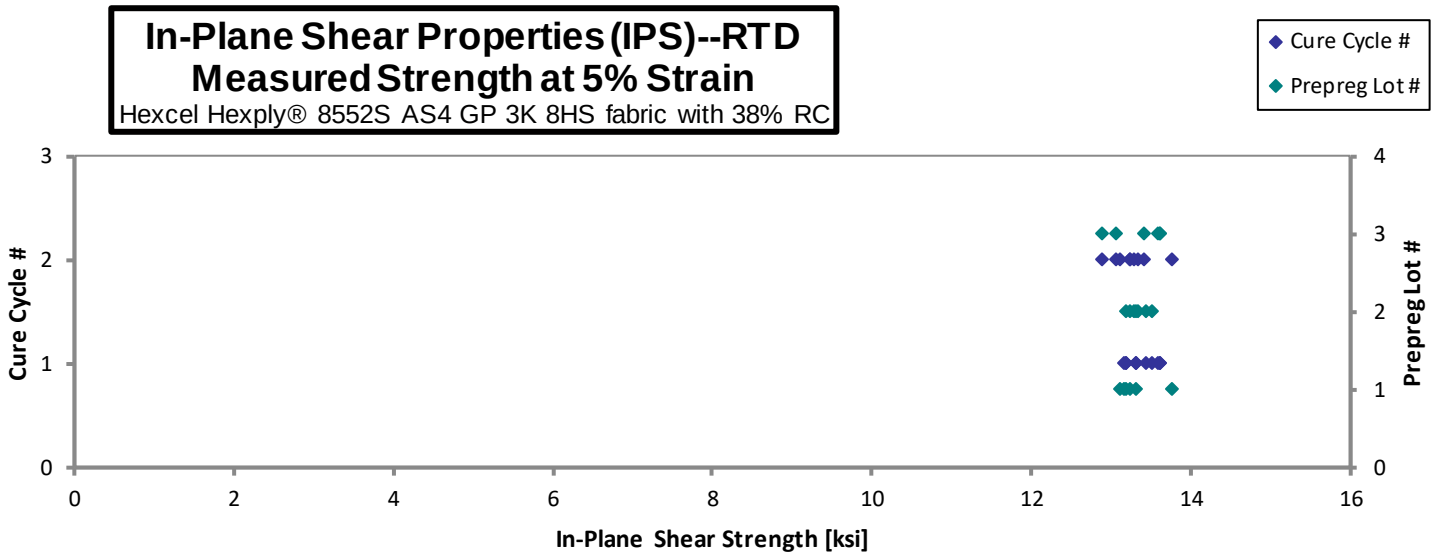

In-Plane Shear Properties (IPS)--CTD
Measured Modulus
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
In-Plane Shear Modulus [Msi]
0.0
0.2
0.4
0.6
0.8
1.0
1.2
0
1
2
3
4

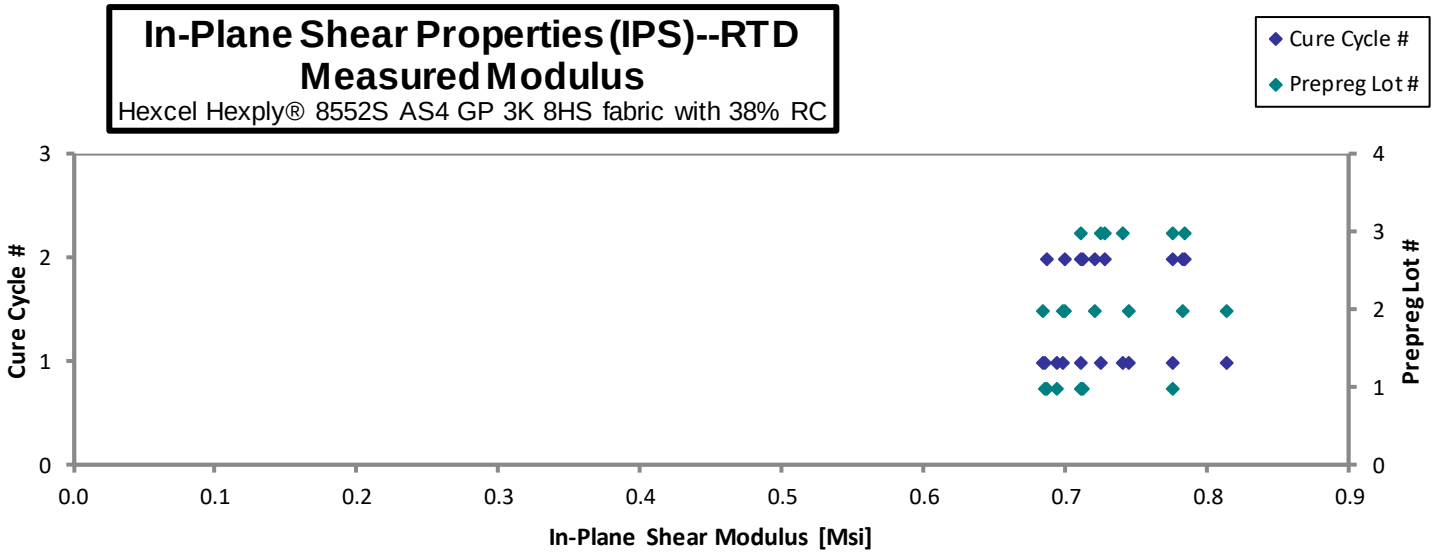
In-Plane Shear Properties (IPS)--RTD
Strength & Modulus

Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

Specimen Number	Spirit Batch #	Spirit 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]	Failure Mode
HPANA111A	A	M1	1	1	7.892	13.31	0.7099	0.1162	8	0.0145	AGM
HPANA112A	A	M1	1	1	7.753	13.19	0.6932	0.1197	8	0.0150	AWB
HPANA113A	A	M1	1	1	7.712	13.17	0.6856	0.1212	8	0.0151	AGB
HPANA211A	A	M2	1	2	8.506	13.76	0.7758	0.1063	8	0.0133	AGT
HPANA212A	A	M2	1	2	7.914	13.25	0.7118	0.1152	8	0.0144	AGB
HPANA213A	A	M2	1	2	7.697	13.12	0.6862	0.1199	8	0.0150	AWB
HPANB111A	B	M1	2	1	8.728	13.45	0.8130	0.1042	8	0.0130	AGB
HPANB112A	B	M1	2	1	8.208	13.51	0.7438	0.1139	8	0.0142	AGT
HPANB113A	B	M1	2	1	7.797	13.19	0.6979	0.1213	8	0.0152	AGB
HPANB114A	B	M1	2	1	7.764	13.32	0.6832	0.1236	8	0.0155	AGB
HPANB211A	B	M2	2	2	8.387	13.35	0.7823	0.1100	8	0.0137	AGT
HPANB212A	B	M2	2	2	8.003	13.28	0.7200	0.1172	8	0.0147	AGT
HPANB213A	B	M2	2	2	7.840	13.23	0.6989	0.1212	8	0.0151	AWB
HPANC111A	C	M1	3	1	8.452	13.60	0.7753	0.1074	8	0.0134	AGT
HPANC112A	C	M1	3	1	8.223	13.61	0.7398	0.1145	8	0.0143	AGT
HPANC113A	C	M1	3	1	8.088	13.62	0.7239	0.1180	8	0.0148	AGB
HPANC211A	C	M2	3	2	8.555	13.42	0.7833	0.1086	8	0.0136	AWB
HPANC212A	C	M2	3	2	8.098	13.07	0.7273	0.1156	8	0.0144	AWB
HPANC213A	C	M2	3	2	7.951	12.88	0.7105	0.1191	8	0.0149	AGB
				Average	**8.083**	**13.33**	**0.7296**			**0.0144**	
				Standard Dev.	**0.3169**	**0.2204**	**0.0392**				
				Coeff. of Var. [%]	**3.921**	**1.653**	**5.368**				
				Min.	**7.697**	**12.88**	**0.6832**			**0.0130**	
				Max.	**8.728**	**13.76**	**0.8130**			**0.0155**	
				Number of Spec.	**19**	**19**	**19**			**19**	


In-Plane Shear Properties (IPS)--RTD
Measured 0.2% Offset Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
In-Plane Shear Strength [ksi]
0
1
2
3
4
5
6
7
8
9
10


In-Plane Shear Properties (IPS)--RTD
Measured Strength at 5% Strain
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
In-Plane Shear Strength [ksi]
0
2
4
6
8
10
12
14
16


In-Plane Shear Properties (IPS)--RTD
Measured Modulus
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
In-Plane Shear Modulus [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

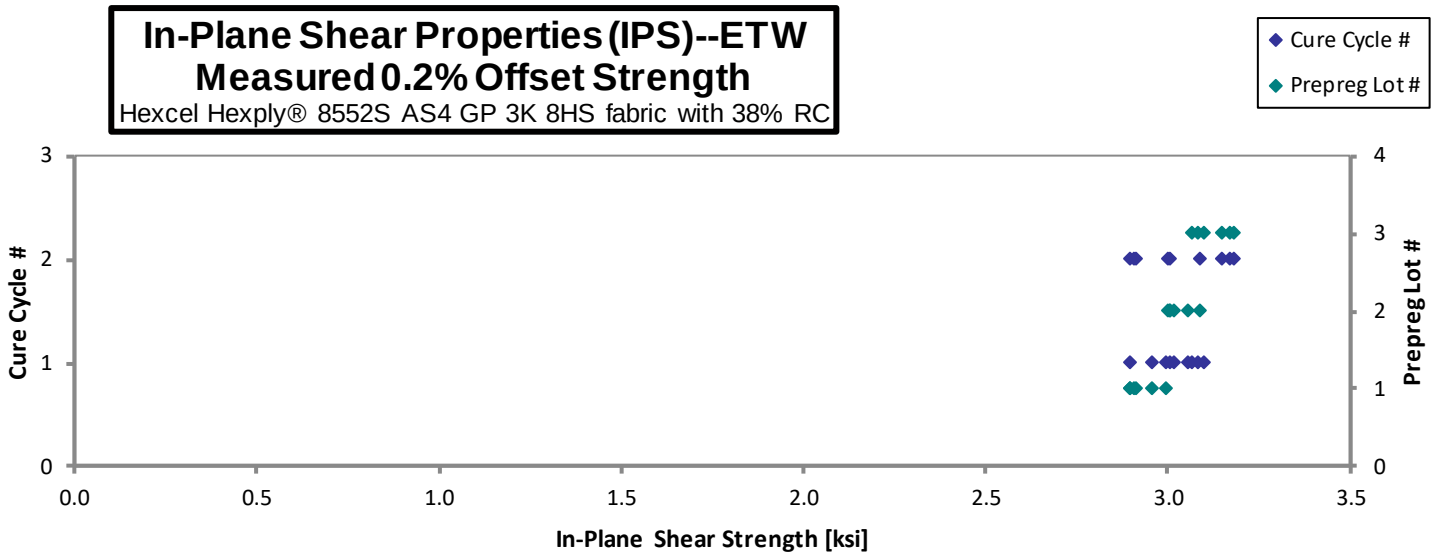
In-Plane Shear Properties (IPS)--ETW
Strength & Modulus

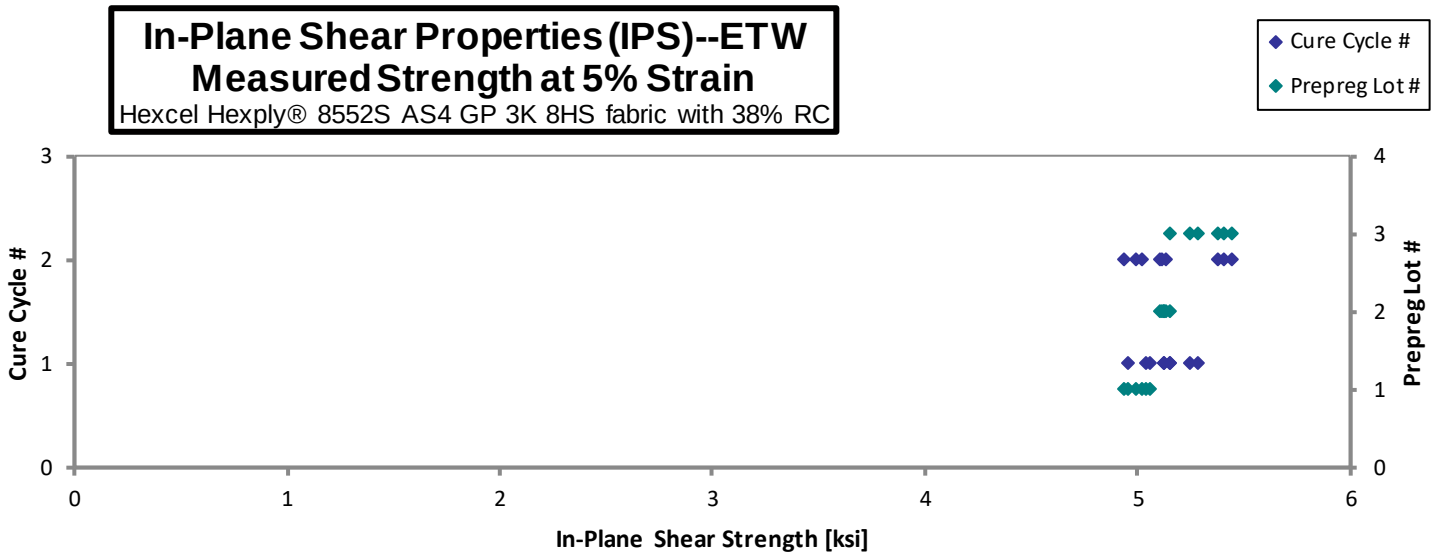
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

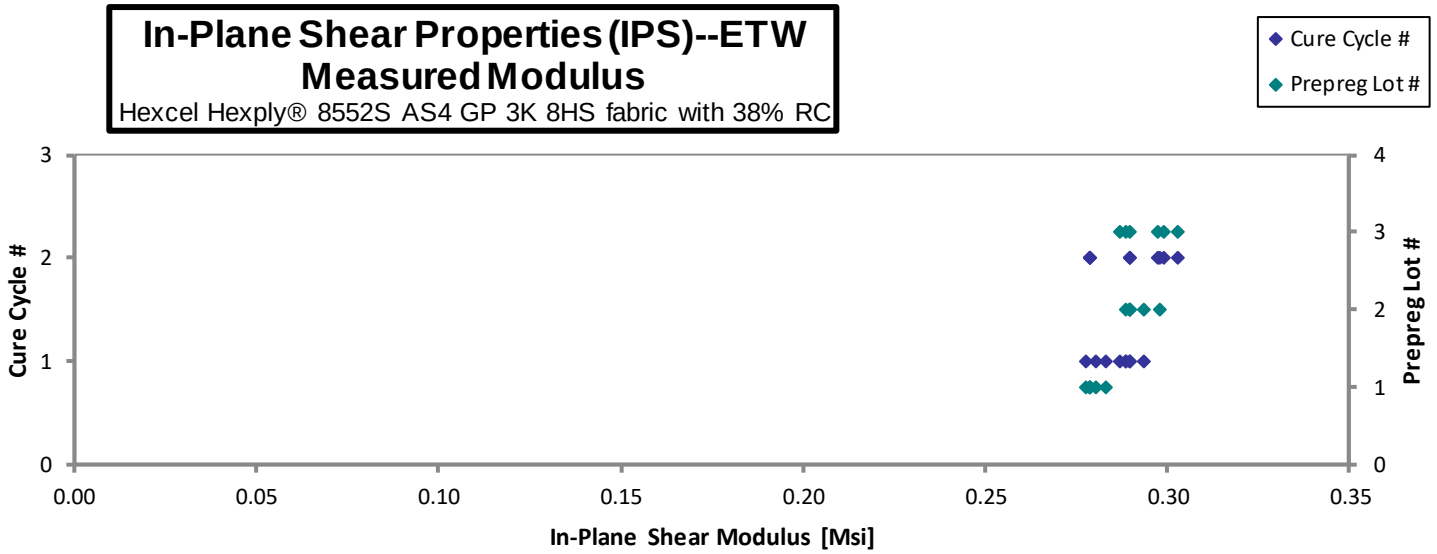
Specimen Number	Spirit Batch #	Spirit Cure Cycle	Prepreg Lot #	Cure Cycle #	0.2% Offset Strength [ksi]	Strength at 5% Strain [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Avg. t_{ply} [in]	Failure Mode
HPANA111D	A	M1	1	1	2.995	5.058	0.2804	0.1269	8	0.0159	AGM, AGT
HPANA112D	A	M1	1	1	2.895	4.952	0.2777	0.1269	8	0.0159	AGM
HPANA113D	A	M1	1	1	2.955	5.038	0.2834	0.1249	8	0.0156	AGM
HPANA211D	A	M2	1	2	2.910	4.940	0.2789	0.1250	8	0.0156	AGM
HPANA212D	A	M2	1	2	2.912	4.998	0.2787	0.1279	8	0.0160	AGT
HPANA213D	A	M2	1	2	2.896	5.019	0.2785	0.1284	8	0.0160	AGB
HPANB111D	B	M1	2	1	3.058	5.125	0.2934	0.1257	8	0.0157	AGM
HPANB112D	B	M1	2	1	3.019	5.124	0.2899	0.1299	8	0.0162	AGB
HPANB113D	B	M1	2	1	3.008	5.155	0.2888	0.1305	8	0.0163	AGM
HPANB211D	B	M2	2	2	3.091	5.138	0.2978	0.1243	8	0.0155	AGT
HPANB212D	B	M2	2	2	3.009	5.118	0.2900	0.1291	8	0.0161	AGT
HPANB213D	B	M2	2	2	3.003	5.109	0.2899	0.1316	8	0.0165	AGT
HPANC111D	C	M1	3	1	3.081	5.158	0.2872	0.1238	8	0.0155	*
HPANC112D	C	M1	3	1	3.100	5.282	0.2899	0.1263	8	0.0158	AGT
HPANC113D	C	M1	3	1	3.069	5.244	0.2886	0.1269	8	0.0159	AGT
HPANC211D	C	M2	3	2	3.171	5.404	0.3030	0.1232	8	0.0154	AGM
HPANC212D	C	M2	3	2	3.146	5.379	0.2971	0.1255	8	0.0157	AGT
HPANC213D	C	M2	3	2	3.181	5.443	0.2993	0.1257	8	0.0157	AGT

* Machine actuator maxed out prior to reaching ultimate failure

Average	**3.028**	**5.149**	**0.2885**	**0.0158**
Standard Dev.	**0.0916**	**0.1491**	**0.007742**	
Coeff. of Var. [%]	**3.026**	**2.896**	**2.684**	
Min.	**2.895**	**4.940**	**0.2777**	**0.0154**
Max.	**3.181**	**5.443**	**0.3030**	**0.0165**
Number of Spec.	**18**	**18**	**18**	**18**


In-Plane Shear Properties (IPS)--ETW
Measured 0.2% Offset Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% 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
In-Plane Shear Strength [ksi]


In-Plane Shear Properties (IPS)--ETW
Measured Strength at 5% Strain
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
1
2
3
4
5
6
In-Plane Shear Strength [ksi]


In-Plane Shear Properties (IPS)--ETW
Measured Modulus
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
In-Plane Shear Modulus [Msi]

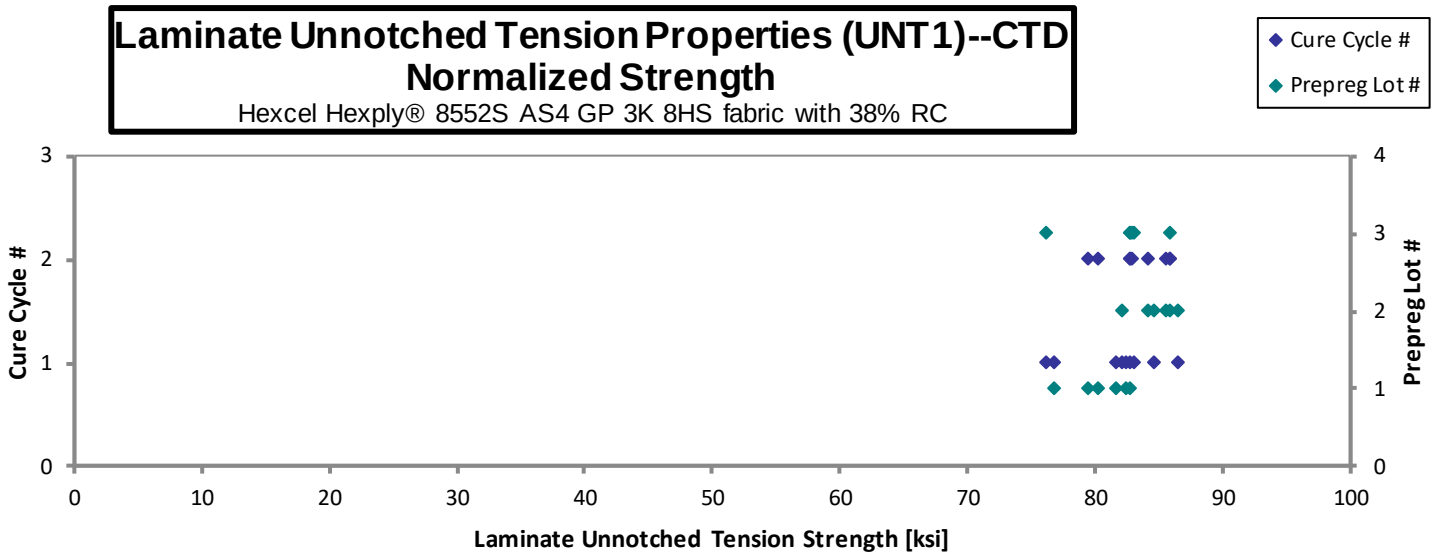
4.6 "25/50/25" Unnotched Tension 1 Properties (UNT1)

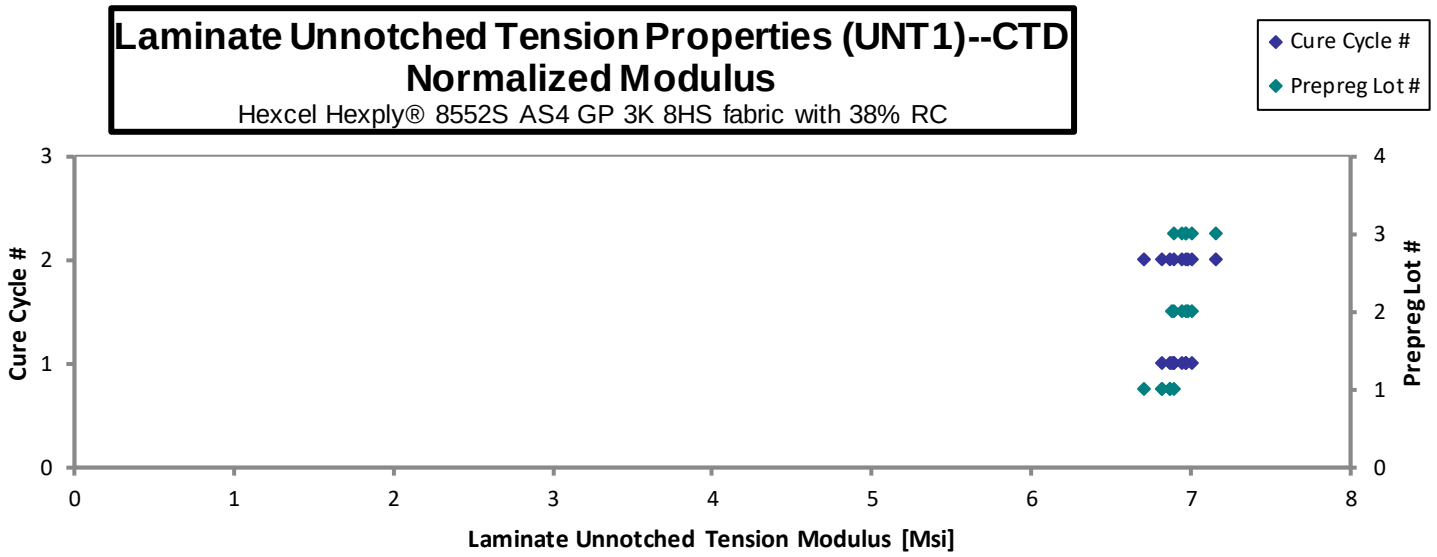
Laminate Unnotched Tension Properties (UNT1)--CTD
Strength & Modulus
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit 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]
HPAAA111B	A	M1	1	1	82.22	6.859	0.1203	8	LGM	0.0150	82.39	6.873
HPAAA112B	A	M1	1	1	81.67	6.903	0.1200	8	LGM	0.0150	81.67	6.903
HPAAA113B	A	M1	1	1	83.28	7.394	0.1106	8	LGM	0.0138	76.77	6.816
HPAAA211B	A	M2	1	2	80.51	6.834	0.1197	8	LGM	0.0150	80.33	6.818
HPAAA212B	A	M2	1	2	83.19	6.901	0.1194	8	LGM	0.0149	82.77	6.867
HPAAA213B	A	M2	1	2	84.40	7.124	0.1130	8	LGM	0.0141	79.50	6.711
HPAAB111B	B	M1	2	1	83.38	6.841	0.1218	8	LGM	0.0152	84.65	6.945
HPAAB112B	B	M1	2	1	85.04	6.885	0.1222	8	LGM	0.0153	86.59	7.012
HPAAB113B	B	M1	2	1	90.48	7.579	0.1089	8	LGM	0.0136	82.14	6.880
HPAAB211B	B	M2	2	2	84.66	6.908	0.1213	8	LGT	0.0152	85.60	6.985
HPAAB212B	B	M2	2	2	83.63	6.917	0.1209	8	LGM	0.0151	84.25	6.968
HPAAB213B	B	M2	2	2	92.91	7.454	0.1110	8	LGM	0.0139	85.90	6.892
HPAAC111B	C	M1	3	1	80.68	6.801	0.1231	8	LGM	0.0154	82.76	6.977
HPAAC112B	C	M1	3	1	74.68	6.838	0.1224	8	LGM	0.0153	76.18	6.974
HPAAC113B	C	M1	3	1	88.41	7.337	0.1128	8	LGM	0.0141	83.07	6.894
HPAAC211B	C	M2	3	2	84.59	6.902	0.1218	8	LGM	0.0152	85.88	7.007
HPAAC212B	C	M2	3	2	82.00	6.874	0.1214	8	LGB	0.0152	82.92	6.951
HPAAC213B	C	M2	3	2	90.04	7.790	0.1103	8	LGM	0.0138	82.72	7.157

Average	**84.21**	**7.063**	**Average$_{norm}$**	**0.0147**	**82.56**	**6.924**
Standard Dev.	**4.220**	**0.3058**	**Standard Dev.$_{norm}$**		**2.921**	**0.0969**
Coeff. of Var. [%]	**5.011**	**4.329**	**Coeff. of Var. [%]$_{norm}$**		**3.538**	**1.399**
Min.	**74.68**	**6.801**	**Min.**	**0.0136**	**76.18**	**6.711**
Max.	**92.91**	**7.790**	**Max.**	**0.0154**	**86.59**	**7.157**
Number of Spec.	**18**	**18**	**Number of Spec.**	**18**	**18**	**18**


Laminate Unnotched Tension Properties (UNT1)--CTD
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Unnotched Tension Strength [ksi]
0
10
20
30
40
50
60
70
80
90
100
0
1
2
3
4


Laminate Unnotched Tension Properties (UNT1)--CTD
Normalized Modulus
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Unnotched Tension Modulus [Msi]
0
1
2
3
4
5
6
7
8
0
1
2
3
4

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

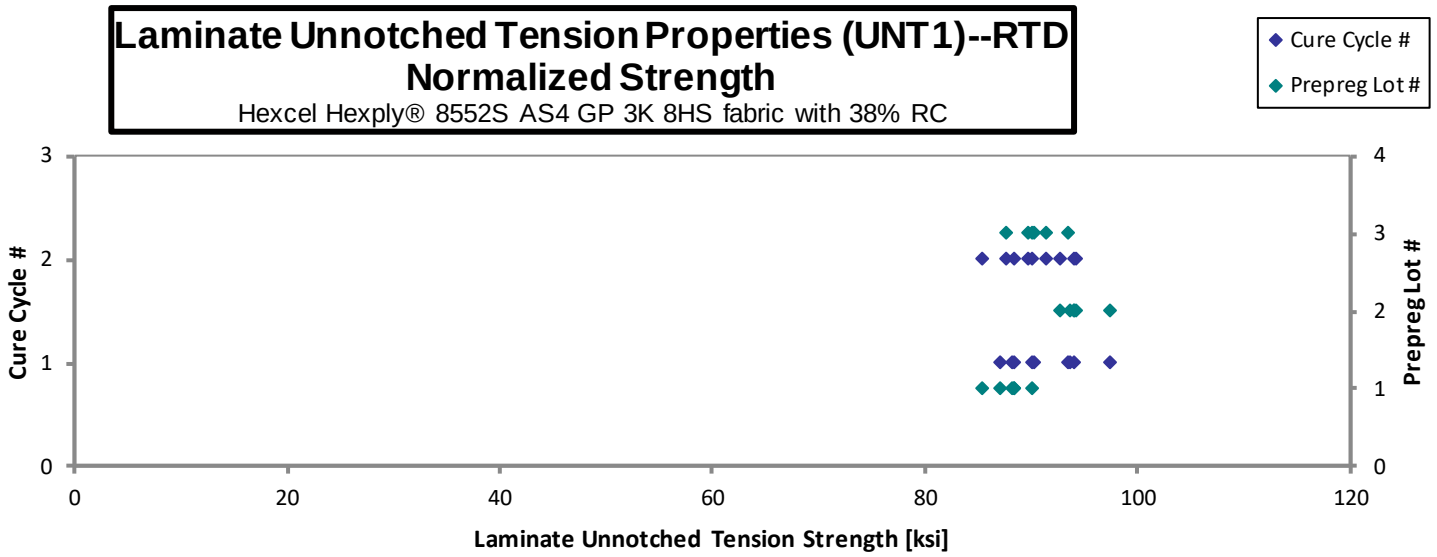
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

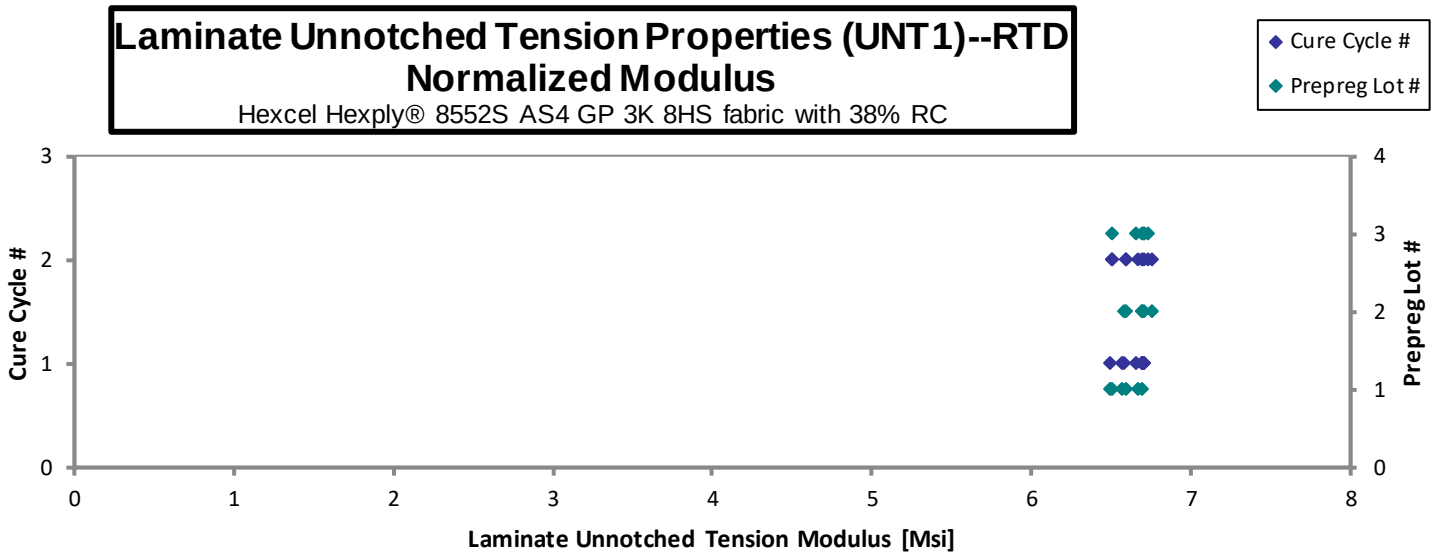
normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit 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]
HPAAA111A*	A	M1	1	1	96.88	7.301	0.1079	8	LGM	0.0135	87.13	6.565
HPAAA112A*	A	M1	1	1	92.80	7.042	0.1141	8	LGM	0.0143	88.23	6.695
HPAAA113A	A	M1	1	1	90.30	6.626	0.1175	8	LGM	0.0147	88.44	6.490
HPAAA211A*	A	M2	1	2	95.25	7.018	0.1113	8	LWT	0.0139	88.37	6.511
HPAAA212A*	A	M2	1	2	86.95	6.790	0.1178	8	LWB	0.0147	85.37	6.666
HPAAA213A	A	M2	1	2	89.84	6.575	0.1203	8	LWB	0.0150	90.08	6.592
HPAAB111A	B	M1	2	1	105.8	7.412	0.1067	8	LGM	0.0133	94.04	6.588
HPAAB112A	B	M1	2	1	98.36	7.038	0.1143	8	LGM	0.0143	93.66	6.701
HPAAB113A	B	M1	2	1	98.76	6.793	0.1185	8	LWB	0.0148	97.53	6.708
HPAAB211A	B	M2	2	2	102.6	7.410	0.1085	8	LWB	0.0136	92.78	6.701
HPAAB212A	B	M2	2	2	98.97	7.093	0.1144	8	LGM	0.0143	94.32	6.760
HPAAB213A	B	M2	2	2	95.81	6.721	0.1178	8	LWT	0.0147	94.05	6.598
HPAAC111A	C	M1	3	1	99.25	7.319	0.1092	8	LGM	0.0137	90.33	6.661
HPAAC112A	C	M1	3	1	93.55	6.966	0.1155	8	LGM	0.0144	90.01	6.703
HPAAC113A	C	M1	3	1	93.22	6.674	0.1204	8	LWT	0.0151	93.55	6.697
HPAAC211A	C	M2	3	2	100.0	7.371	0.1097	8	LWB	0.0137	91.39	6.736
HPAAC212A	C	M2	3	2	91.29	6.768	0.1153	8	LGM	0.0144	87.73	6.504
HPAAC213A	C	M2	3	2	90.45	6.760	0.1190	8	LGM	0.0149	89.71	6.705

*Strain data is obtained from strain gages instead of extensometers.

Average	**95.56**	**6.982**		**$Average_{norm}$**	**0.0143**	**90.93**	**6.643**
Standard Dev.	**4.944**	**0.2847**		**$Standard\ Dev._{norm}$**		**3.176**	**0.0843**
Coeff. of Var. [%]	**5.174**	**4.078**		**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**3.493**	**1.269**
Min.	**86.95**	**6.575**		**Min.**	**0.0133**	**85.37**	**6.490**
Max.	**105.8**	**7.412**		**Max.**	**0.0151**	**97.53**	**6.760**
Number of Spec.	**18**	**18**		**Number of Spec.**	**18**	**18**	**18**


Laminate Unnotched Tension Properties (UNT1)--RTD
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
20
40
60
80
100
120
Laminate Unnotched Tension Strength [ksi]


Laminate Unnotched Tension Properties (UNT1)--RTD
Normalized Modulus
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
1
2
3
4
5
6
7
8
Laminate Unnotched Tension Modulus [Msi]

Laminate Unnotched Tension Properties (UNT1)--ETW
Strength & Modulus

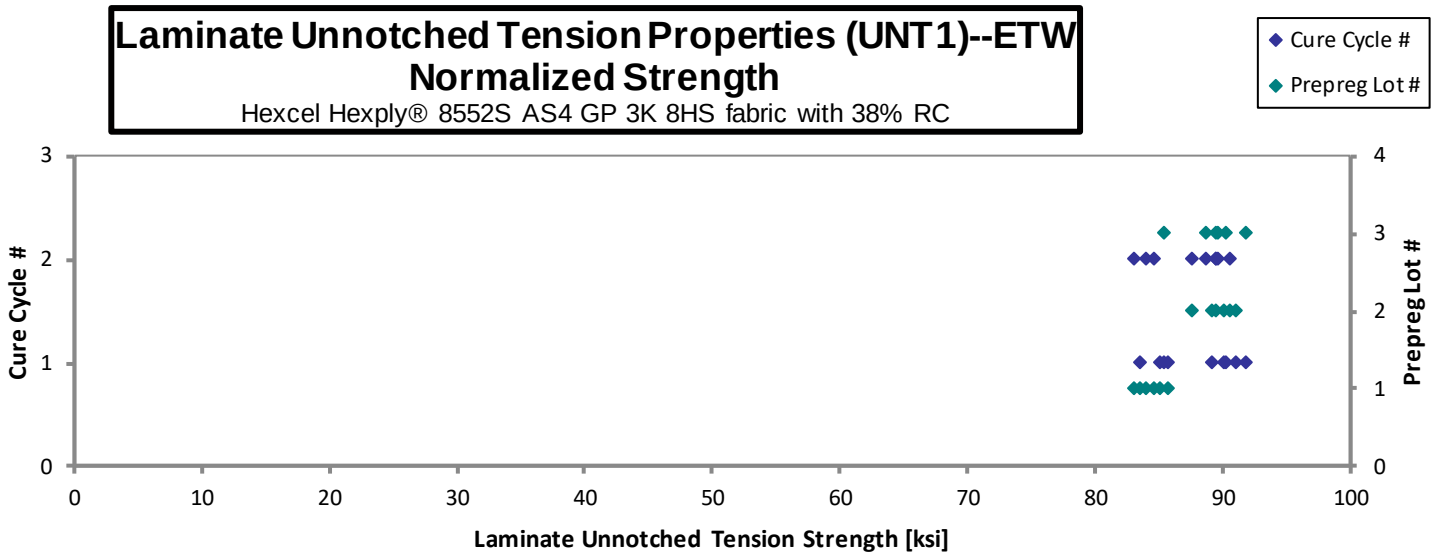
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

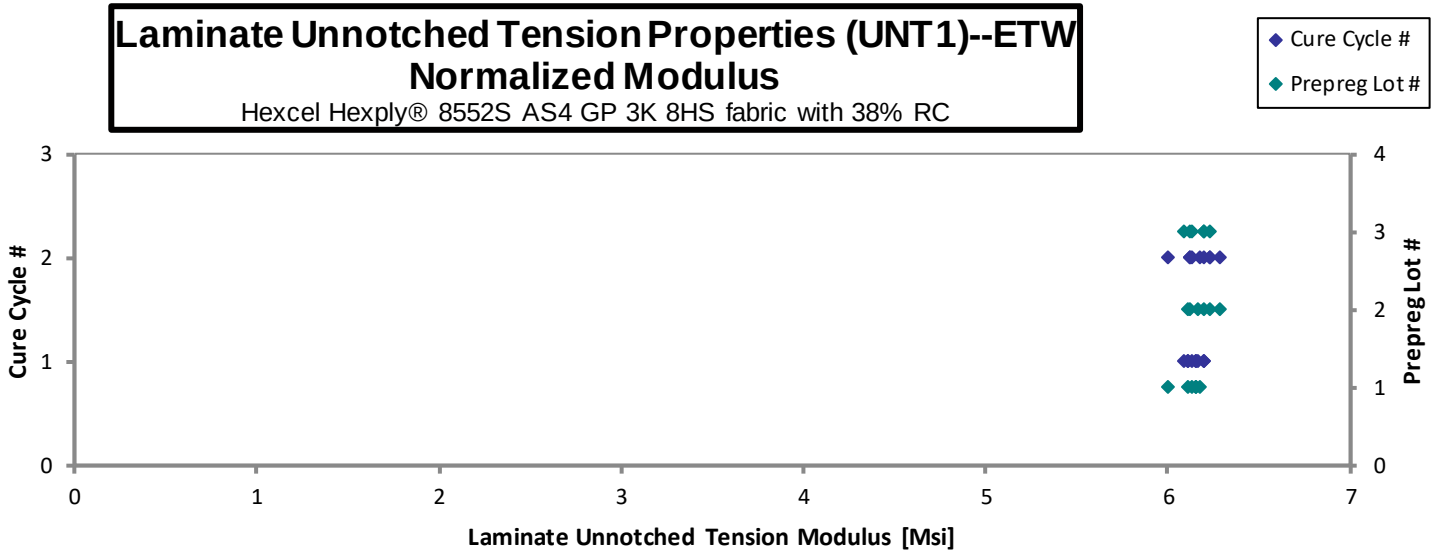
normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit 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]
HPAAA111D	A	M1	1	1	85.08	6.108	0.1210	8	LGT	0.0151	85.80	6.160
HPAAA112D	A	M1	1	1	80.95	5.923	0.1238	8	LWT, LWB	0.0155	83.52	6.110
HPAAA113D	A	M1	1	1	81.74	5.906	0.1250	8	LWT, LWB	0.0156	85.13	6.151
HPAAA211D	A	M2	1	2	80.71	5.955	0.1236	8	LWT, LWB	0.0154	83.12	6.133
HPAAA212D	A	M2	1	2	80.97	5.959	0.1245	8	LWT, LWB	0.0156	83.98	6.181
HPAAA213D	A	M2	1	2	82.10	5.815	0.1238	8	LGB	0.0155	84.70	5.999
HPAAB111D	B	M1	2	1	89.20	6.138	0.1213	8	LWT, M(A,L)WB	0.0152	90.16	6.204
HPAAB112D	B	M1	2	1	85.77	5.887	0.1247	8	LWT, M(A,L)WB	0.0156	89.12	6.117
HPAAB113D	B	M1	2	1	86.62	5.867	0.1261	8	LWT, M(A,L)WB	0.0158	91.03	6.165
HPAAB211D	B	M2	2	2	87.89	6.174	0.1221	8	LWT, M(A,L)WB	0.0153	89.45	6.284
HPAAB212D	B	M2	2	2	87.13	5.994	0.1247	8	LGT	0.0156	90.54	6.229
HPAAB213D	B	M2	2	2	84.05	5.871	0.1251	8	LWT, LWB	0.0156	87.61	6.119
HPAAC111D	C	M1	3	1	81.50	5.810	0.1258	8	LGT, M(A,L)WB	0.0157	85.44	6.091
HPAAC112D	C	M1	3	1	83.65	5.682	0.1295	8	LGT	0.0162	90.23	6.130
HPAAC113D	C	M1	3	1	85.21	5.754	0.1294	8	LGB, LWT	0.0162	91.85	6.203
HPAAC211D	C	M2	3	2	87.88	6.005	0.1223	8	LWT, LWB	0.0153	89.59	6.122
HPAAC212D	C	M2	3	2	85.11	5.950	0.1251	8	LWT, LWB	0.0156	88.69	6.200
HPAAC213D	C	M2	3	2	84.83	5.903	0.1266	8	LGT	0.0158	89.48	6.227

	Strength [ksi]	Modulus [Msi]
Average	**84.47**	**5.928**
Standard Dev.	**2.680**	**0.1275**
Coeff. of Var. [%]	**3.173**	**2.151**
Min.	**80.71**	**5.682**
Max.	**89.20**	**6.174**
Number of Spec.	**18**	**18**

	t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
$Average_{norm}$	**0.0156**	**87.75**	**6.157**
Standard $Dev._{norm}$		**2.851**	**0.0641**
Coeff. of Var. $[\%]_{norm}$		**3.249**	**1.042**
Min.	**0.0151**	**83.12**	**5.999**
Max.	**0.0162**	**91.85**	**6.284**
Number of Spec.	**18**	**18**	**18**


Laminate Unnotched Tension Properties (UNT1)--ETW
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
0
1
2
3
4
0
10
20
30
40
50
60
70
80
90
100
Laminate Unnotched Tension Strength [ksi]


Laminate Unnotched Tension Properties (UNT1)--ETW
Normalized Modulus
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
0
1
2
3
4
0
1
2
3
4
5
6
7
Laminate Unnotched Tension Modulus [Msi]

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

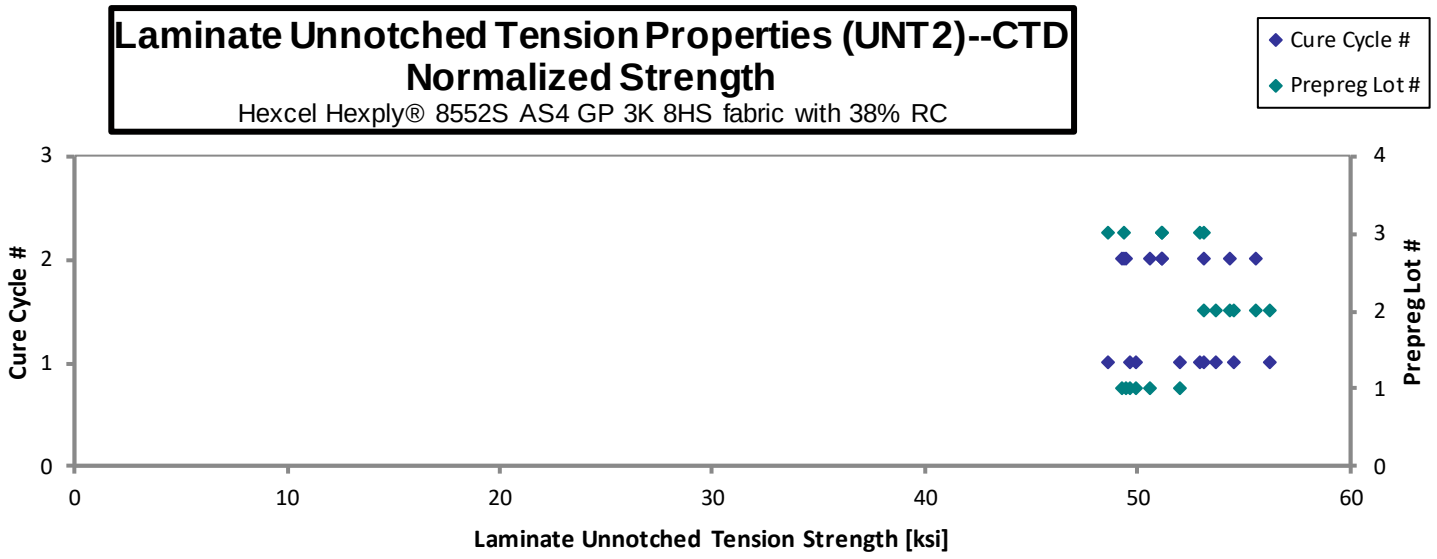
Laminate Unnotched Tension Properties (UNT2)--CTD
Strength & Modulus
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

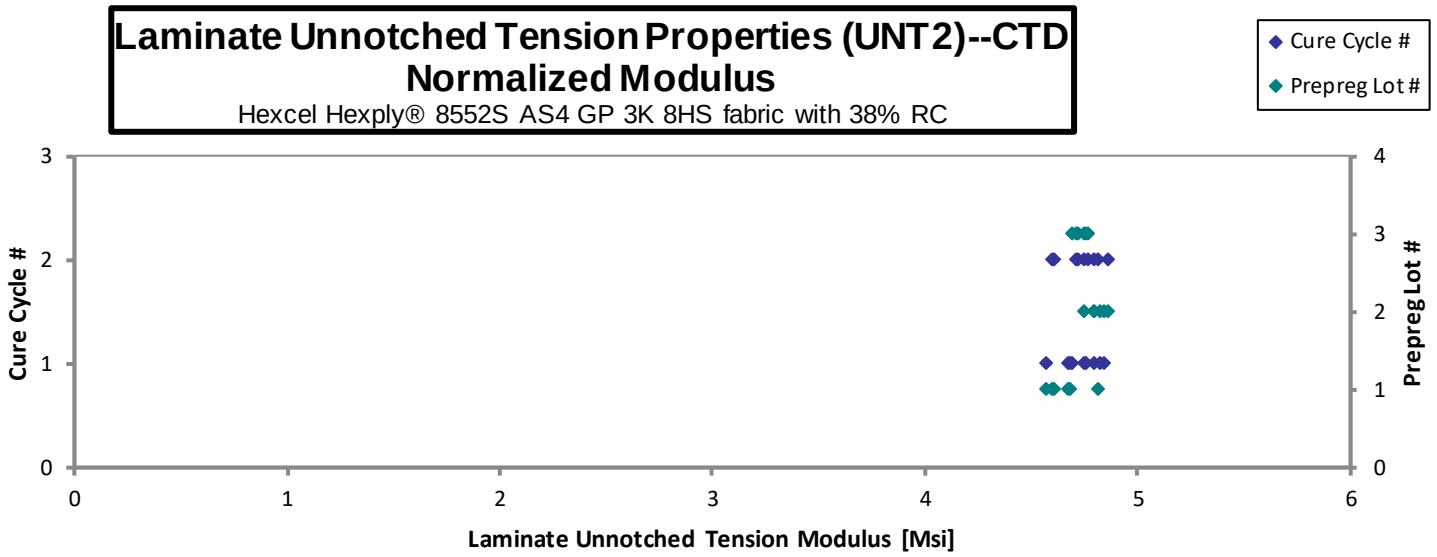
normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit 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]
HPABA111B	A	M1	1	1	49.87	4.678	0.1502	10	AGM	0.0150	49.93	4.684
HPABA112B	A	M1	1	1	49.56	4.671	0.1502	10	AGM	0.0150	49.62	4.676
HPABA113B	A	M1	1	1	57.48	5.053	0.1357	10	AGM	0.0136	51.98	4.569
HPABA211B	A	M2	1	2	49.23	4.688	0.1542	10	AWT	0.0154	50.61	4.819
HPABA212B	A	M2	1	2	47.89	4.463	0.1545	10	AWT	0.0154	49.32	4.596
HPABA213B	A	M2	1	2	48.57	4.526	0.1528	10	AGM	0.0153	49.48	4.610
HPABB111B	B	M1	2	1	53.73	4.752	0.1523	10	AWT	0.0152	54.56	4.826
HPABB112B	B	M1	2	1	55.42	4.731	0.1522	10	AGB	0.0152	56.22	4.799
HPABB113B	B	M1	2	1	59.32	5.348	0.1358	10	AGM	0.0136	53.69	4.841
HPABB211B	B	M2	2	2	53.48	4.779	0.1490	10	AWB	0.0149	53.13	4.747
HPABB212B	B	M2	2	2	55.15	4.934	0.1478	10	AWB	0.0148	54.35	4.863
HPABB213B	B	M2	2	2	58.85	5.070	0.1418	10	AWB	0.0142	55.63	4.792
HPABC111B	C	M1	3	1	51.65	4.581	0.1538	10	AGT	0.0154	52.96	4.698
HPABC112B	C	M1	3	1	52.16	4.673	0.1528	10	AGT	0.0153	53.12	4.759
HPABC113B	C	M1	3	1	50.96	4.978	0.1431	10	AWB	0.0143	48.63	4.750
HPABC211B	C	M2	3	2	49.94	4.655	0.1538	10	AGB	0.0154	51.21	4.773
HPABC212B	C	M2	3	2	48.13	4.610	0.1538	10	AWB	0.0154	49.34	4.725
HPABC213B	C	M2	3	2	56.92	5.242	0.1349	10	AGM	0.0135	51.17	4.713

Average	**52.68**	**4.802**	
Standard Dev.	**3.759**	**0.2478**	
Coeff. of Var. [%]	**7.135**	**5.160**	
Min.	**47.89**	**4.463**	
Max.	**59.32**	**5.348**	
Number of Spec.	**18**	**18**	

$Average_{norm}$	**0.0148**	**51.94**	**4.736**
Standard $Dev._{norm}$		**2.357**	**0.0850**
Coeff. of Var. $[\%]_{norm}$		**4.538**	**1.796**
Min.	**0.0135**	**48.63**	**4.569**
Max.	**0.0154**	**56.22**	**4.863**
Number of Spec.	**18**	**18**	**18**


Laminate Unnotched Tension Properties (UNT2)--CTD
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Unnotched Tension Strength [ksi]
0
10
20
30
40
50
60
0
1
2
3
4


Laminate Unnotched Tension Properties (UNT2)--CTD
Normalized Modulus
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Unnotched Tension Modulus [Msi]
0
1
2
3
4
5
6
0
1
2
3
4

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

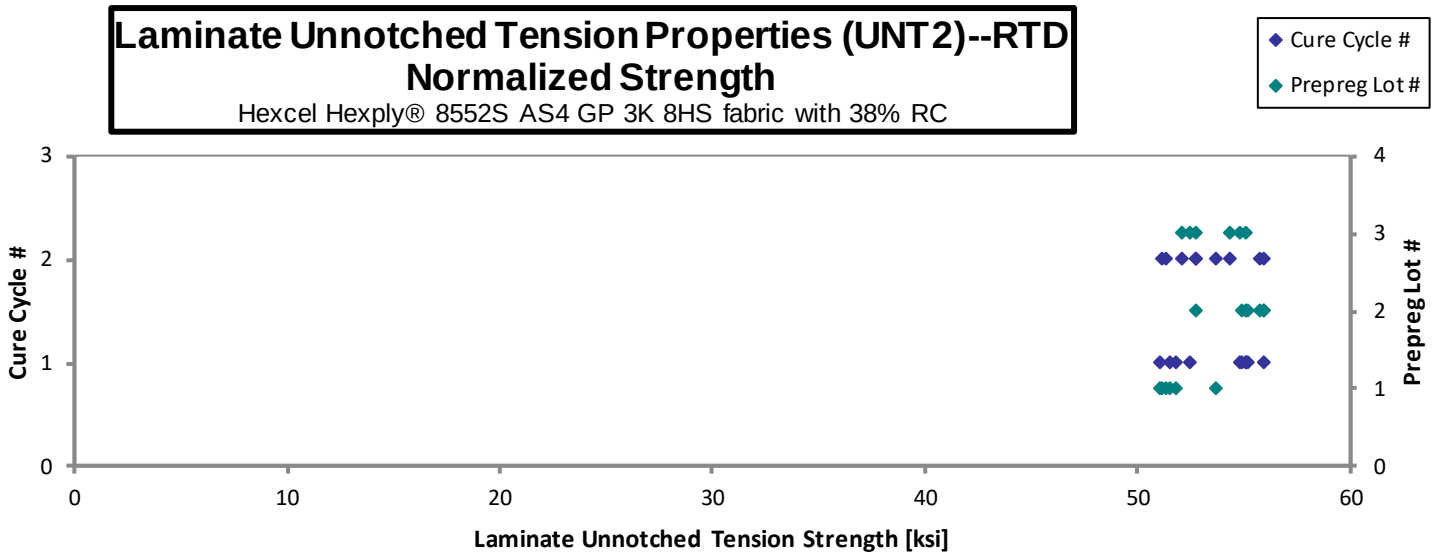
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

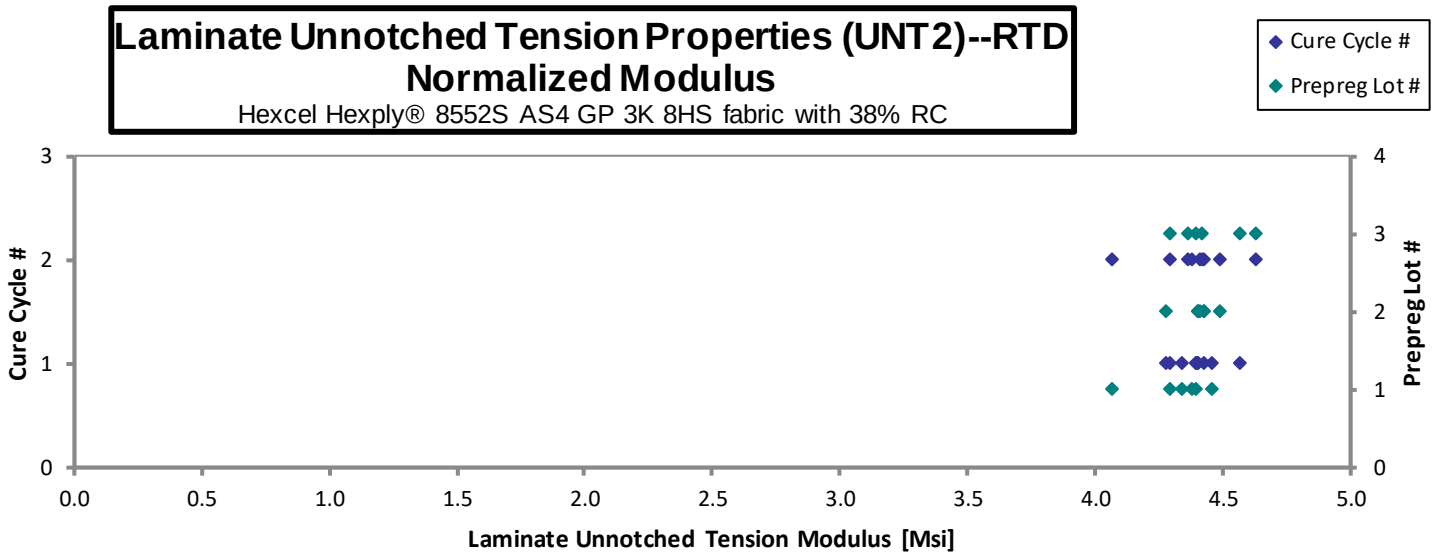
normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit 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]
HPABA111A*	A	M1	1	1	57.61	5.025	0.1331	10	AGM	0.0133	51.11	4.458
HPABA112A*	A	M1	1	1	54.73	4.612	0.1412	10	AGM	0.0141	51.52	4.342
HPABA113A	A	M1	1	1	53.15	4.515	0.1462	10	AGM	0.0146	51.80	4.400
HPABA211A	A	M2	1	2	55.98	4.793	0.1371	10	AWT	0.0137	51.16	4.380
HPABA212A	A	M2	1	2	53.89	4.507	0.1430	10	AWB	0.0143	51.38	4.297
HPABA213A	A	M2	1	2	54.22	4.113	0.1485	10	AGB	0.0148	53.67	4.071
HPABB111A	B	M1	2	1	61.82	4.802	0.1338	10	AGM	0.0134	55.14	4.283
HPABB112A	B	M1	2	1	57.32	4.596	0.1438	10	AGM	0.0144	54.96	4.407
HPABB113A	B	M1	2	1	56.27	4.427	0.1492	10	AWT	0.0149	55.95	4.402
HPABB114A	B	M1	2	1	54.56	4.382	0.1517	10	AWB	0.0152	55.18	4.431
HPABB211A	B	M2	2	2	56.62	4.754	0.1398	10	AGB	0.0140	52.75	4.429
HPABB212A	B	M2	2	2	55.94	4.502	0.1496	10	AWT	0.0150	55.81	4.491
HPABB213A	B	M2	2	2	55.39	4.374	0.1514	10	AWT	0.0151	55.92	4.416
HPABC111A	C	M1	3	1	55.86	4.681	0.1410	10	AGM	0.0141	52.51	4.400
HPABC112A	C	M1	3	1	55.58	4.635	0.1479	10	AGT	0.0148	54.79	4.570
HPABC113A	C	M1	3	1	54.67	4.257	0.1512	10	AGB	0.0151	55.11	4.292
HPABC211A	C	M2	3	2	58.64	5.208	0.1333	10	AGT	0.0133	52.13	4.630
HPABC212A	C	M2	3	2	56.39	4.584	0.1447	10	AWT	0.0145	54.39	4.421
HPABC213A	C	M2	3	2	53.25	4.403	0.1488	10	AGM	0.0149	52.80	4.366

*Strain data is obtained from strain gages instead of extensometers.

Average	**55.89**	**4.588**	**Average$_{norm}$**	**0.0144**	**53.58**	**4.394**
Standard Dev.	**2.041**	**0.2588**	**Standard Dev.$_{norm}$**		**1.767**	**0.1165**
Coeff. of Var. [%]	**3.652**	**5.640**	**Coeff. of Var. [%]$_{norm}$**		**3.297**	**2.651**
Min.	**53.15**	**4.113**	**Min.**	**0.0133**	**51.11**	**4.071**
Max.	**61.82**	**5.208**	**Max.**	**0.0152**	**55.95**	**4.630**
Number of Spec.	**19**	**19**	**Number of Spec.**	**19**	**19**	**19**


Laminate Unnotched Tension Properties (UNT2)--RTD
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
10
20
30
40
50
60
Laminate Unnotched Tension Strength [ksi]


Laminate Unnotched Tension Properties (UNT2)--RTD
Normalized Modulus
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% 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
Laminate Unnotched Tension Modulus [Msi]

Laminate Unnotched Tension Properties (UNT2)--ETW
Strength & Modulus

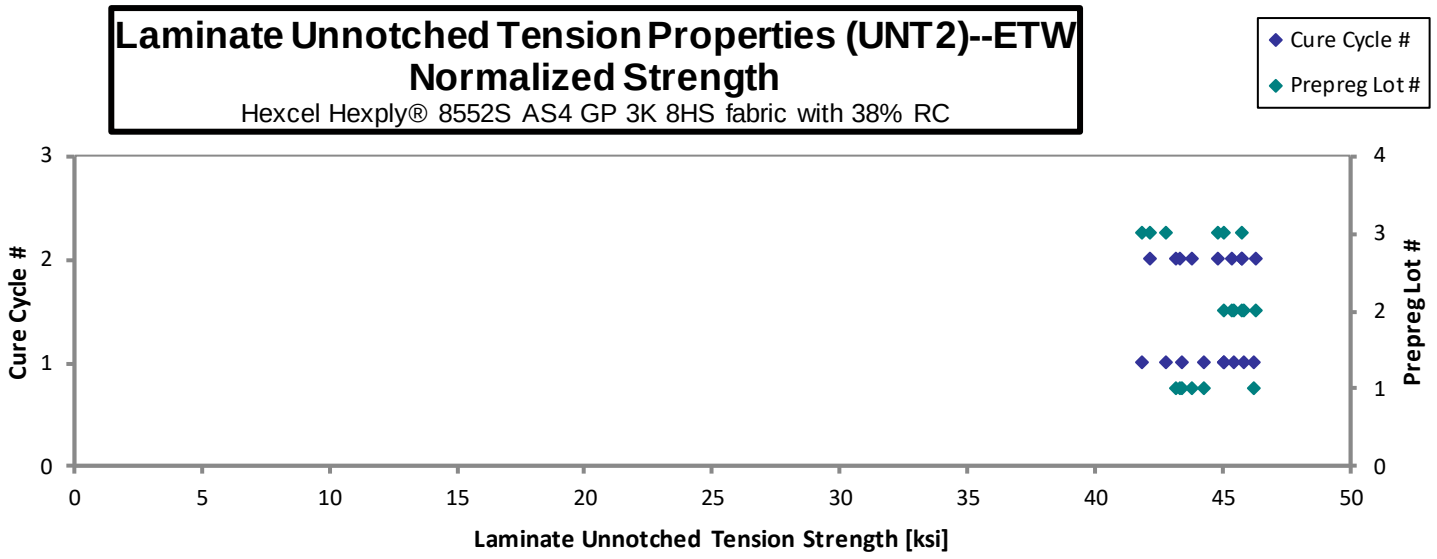
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

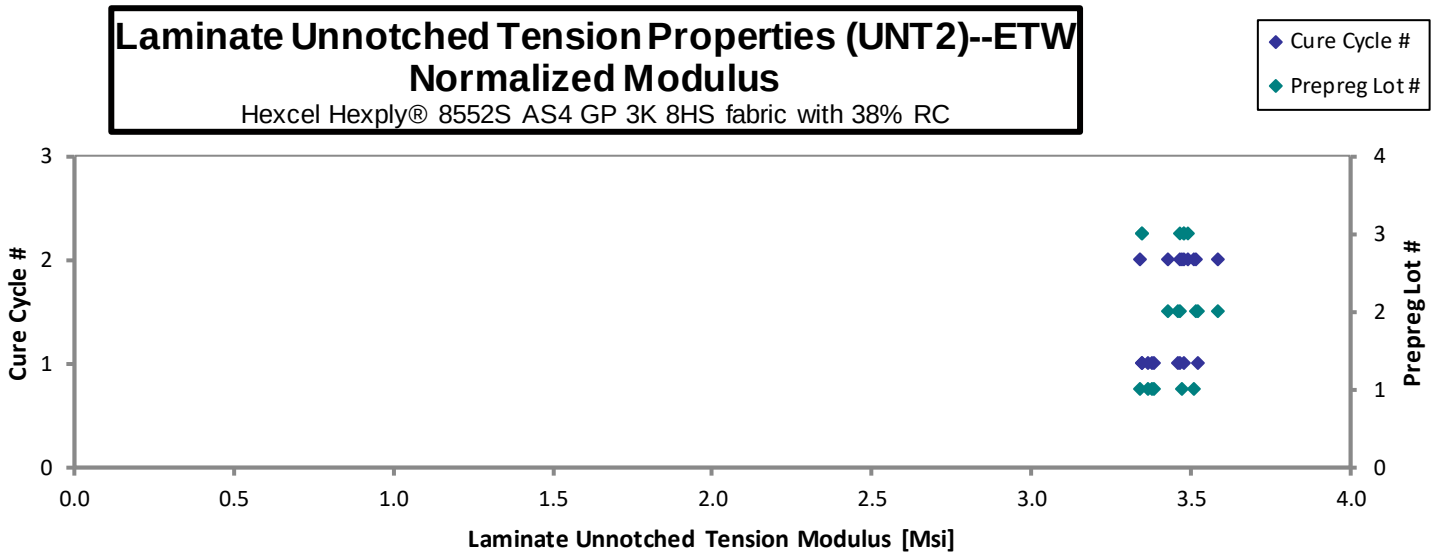
normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit 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]
HPABA111D	A	M1	1	1	43.29	3.355	0.1504	10	M(A,D)GM	0.0150	43.41	3.365
HPABA112D	A	M1	1	1	42.96	3.274	0.1547	10	M(A,D)GM	0.0155	44.31	3.377
HPABA113D	A	M1	1	1	44.42	3.253	0.1562	10	M(A,D)GM	0.0156	46.26	3.388
HPABA211D	A	M2	1	2	46.50	3.765	0.1399	10	M(A,D)GM	0.0140	43.37	3.511
HPABA212D	A	M2	1	2	44.92	3.615	0.1443	10	M(A,D)GM	0.0144	43.20	3.476
HPABA213D	A	M2	1	2	44.64	3.402	0.1472	10	M(A,D)GM	0.0147	43.82	3.339
HPABB111D	B	M1	2	1	43.63	3.351	0.1548	10	M(A,D)GM	0.0155	45.03	3.458
HPABB112D	B	M1	2	1	43.06	3.285	0.1583	10	M(A,D)GM	0.0158	45.43	3.467
HPABB113D	B	M1	2	1	43.12	3.318	0.1594	10	DGM, AGB	0.0159	45.82	3.525
HPABB211D	B	M2	2	2	44.74	3.397	0.1553	10	M(A,D)GM	0.0155	46.33	3.517
HPABB212D	B	M2	2	2	43.10	3.406	0.1581	10	DGM	0.0158	45.41	3.589
HPABB213D	B	M2	2	2	43.10	3.225	0.1594	10	DGM	0.0159	45.80	3.428
HPABC111D	C	M1	3	1	40.32	3.224	0.1558	10	M(A,D)GM	0.0156	41.87	3.348
HPABC112D	C	M1	3	1	40.40	3.287	0.1588	10	M(A,D)GM	0.0159	42.76	3.479
HPABC113D	C	M1	3	1	42.65	3.170	0.1584	10	M(A,D)GM	0.0158	45.04	3.348
HPABC211D	C	M2	3	2	43.58	3.370	0.1544	10	M(A,D)GB	0.0154	44.84	3.468
HPABC212D	C	M2	3	2	40.11	3.321	0.1577	10	M(A,D)GM	0.0158	42.18	3.492
HPABC213D	C	M2	3	2	42.81	3.258	0.1603	10	M(A,D)GT	0.0160	45.75	3.481

Average	**43.18**	**3.349**	
Standard Dev.	**1.652**	**0.1430**	
Coeff. of Var. [%]	**3.825**	**4.271**	
Min.	**40.11**	**3.170**	
Max.	**46.50**	**3.765**	
Number of Spec.	**18**	**18**	

$Average_{norm}$	**0.0155**	**44.48**	**3.448**
$Standard\ Dev._{norm}$		**1.410**	**0.0720**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**3.170**	**2.088**
Min.	**0.0140**	**41.87**	**3.339**
Max.	**0.0160**	**46.33**	**3.589**
Number of Spec.	**18**	**18**	**18**


Laminate Unnotched Tension Properties (UNT2)--ETW
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
5
10
15
20
25
30
35
40
45
50
Laminate Unnotched Tension Strength [ksi]


Laminate Unnotched Tension Properties (UNT2)--ETW
Normalized Modulus
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% 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
Laminate Unnotched Tension Modulus [Msi]

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

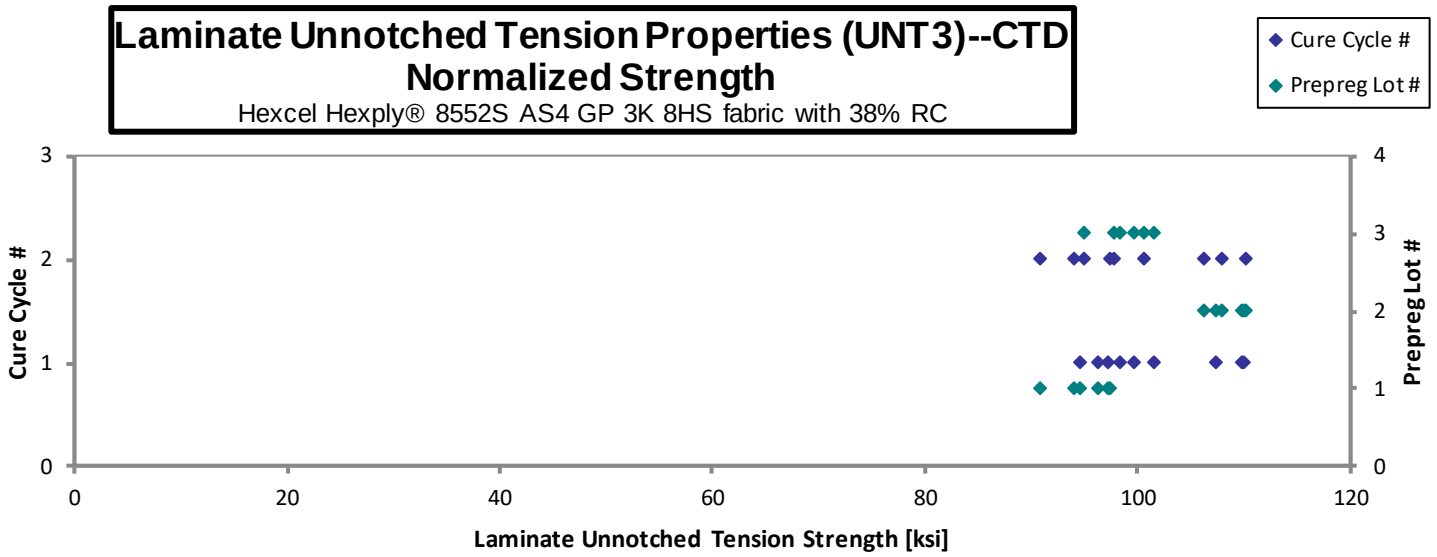
Laminate Unnotched Tension Properties (UNT3)--CTD
Strength & Modulus
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

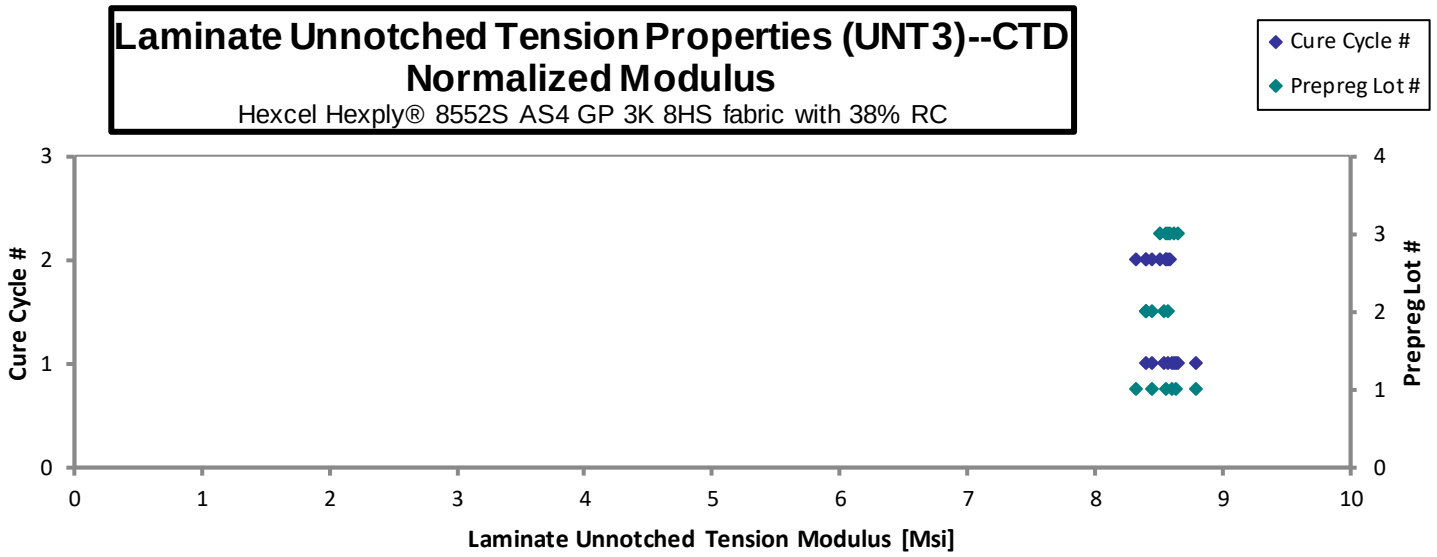
normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit 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]
HPACA111B	A	M1	1	1	91.16	8.238	0.1601	10	LWB	0.0160	97.28	8.791
HPACA112B	A	M1	1	1	88.82	8.079	0.1599	10	LGT	0.0160	94.68	8.612
HPACA113B	A	M1	1	1	91.56	8.202	0.1579	10	LGM	0.0158	96.38	8.634
HPACA211B	A	M2	1	2	90.14	8.260	0.1513	10	LGM	0.0151	90.91	8.331
HPACA212B	A	M2	1	2	93.42	8.385	0.1511	10	LWB	0.0151	94.12	8.448
HPACA213B	A	M2	1	2	106.0	9.310	0.1380	10	LGB	0.0138	97.46	8.563
HPACB1R1B	B	M1	2	1	106.9	8.501	0.1506	10	LGT	0.0151	107.4	8.537
HPACB1R2B	B	M1	2	1	109.6	8.422	0.1504	10	LGT	0.0150	110.0	8.445
HPACB1R4B	B	M1	2	1	109.7	8.394	0.1501	10	LWT, LWB	0.0150	109.8	8.398
HPACB2R1B	B	M2	2	2	106.4	8.444	0.1522	10	LGT	0.0152	107.9	8.567
HPACB2R2B	B	M2	2	2	104.5	8.269	0.1525	10	LGT	0.0152	106.2	8.404
HPACB2R3B	B	M2	2	2	114.8	8.752	0.1441	10	LGM	0.0144	110.3	8.405
HPACC111B	C	M1	3	1	99.10	8.410	0.1537	10	LGT	0.0154	101.6	8.619
HPACC112B	C	M1	3	1	95.71	8.345	0.1541	10	LGM	0.0154	98.31	8.571
HPACC113B	C	M1	3	1	106.7	9.264	0.1401	10	LGM	0.0140	99.63	8.650
HPACC211B	C	M2	3	2	96.37	8.427	0.1522	10	LWT	0.0152	97.81	8.552
HPACC212B	C	M2	3	2	94.68	8.558	0.1507	10	LGM	0.0151	95.09	8.596
HPACC213B	C	M2	3	2	108.7	9.188	0.1389	10	LWT	0.0139	100.7	8.510

Average	**100.8**	**8.525**	
Standard Dev.	**8.177**	**0.3666**	
Coeff. of Var. [%]	**8.112**	**4.301**	
Min.	**88.82**	**8.079**	
Max.	**114.8**	**9.310**	
Number of Spec.	**18**	**18**	

$Average_{norm}$	**0.0150**	**100.9**	**8.535**
Standard $Dev._{norm}$		**6.183**	**0.1136**
Coeff. of Var. $[\%]_{norm}$		**6.130**	**1.331**
Min.	**0.0138**	**90.91**	**8.331**
Max.	**0.0160**	**110.3**	**8.791**
Number of Spec.	**18**	**18**	**18**


Laminate Unnotched Tension Properties (UNT3)--CTD
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Unnotched Tension Strength [ksi]
0
20
40
60
80
100
120
0
1
2
3
4


Laminate Unnotched Tension Properties (UNT3)--CTD
Normalized Modulus
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Unnotched Tension Modulus [Msi]
0
1
2
3
4
5
6
7
8
9
10
0
1
2
3
4

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

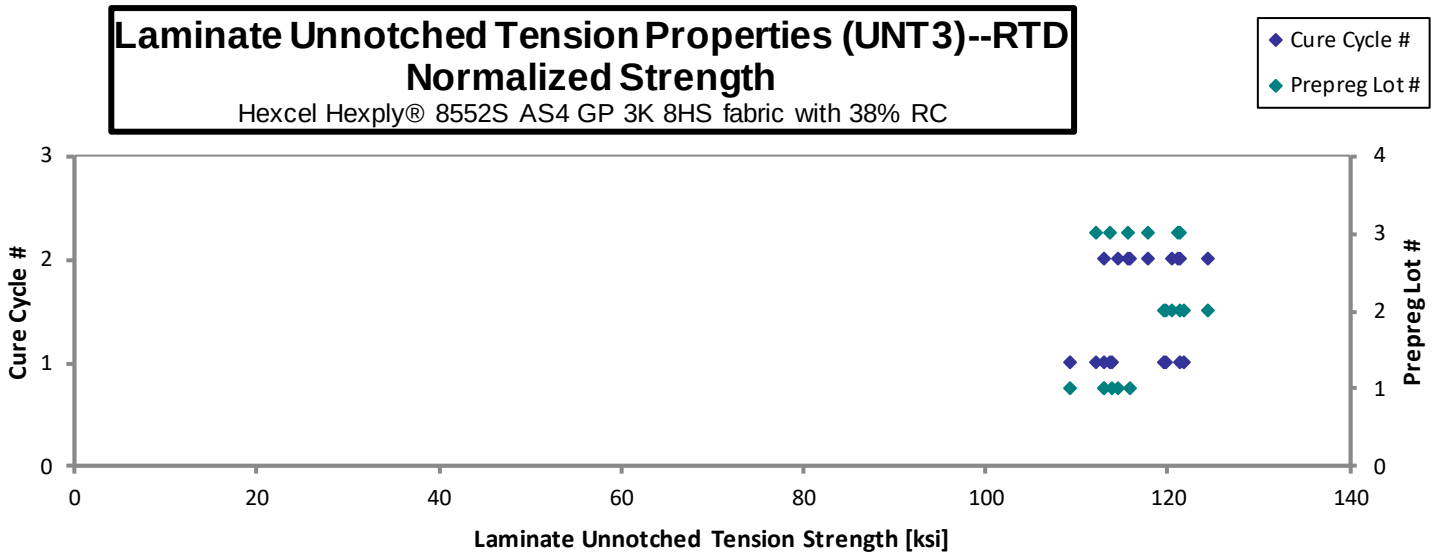
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

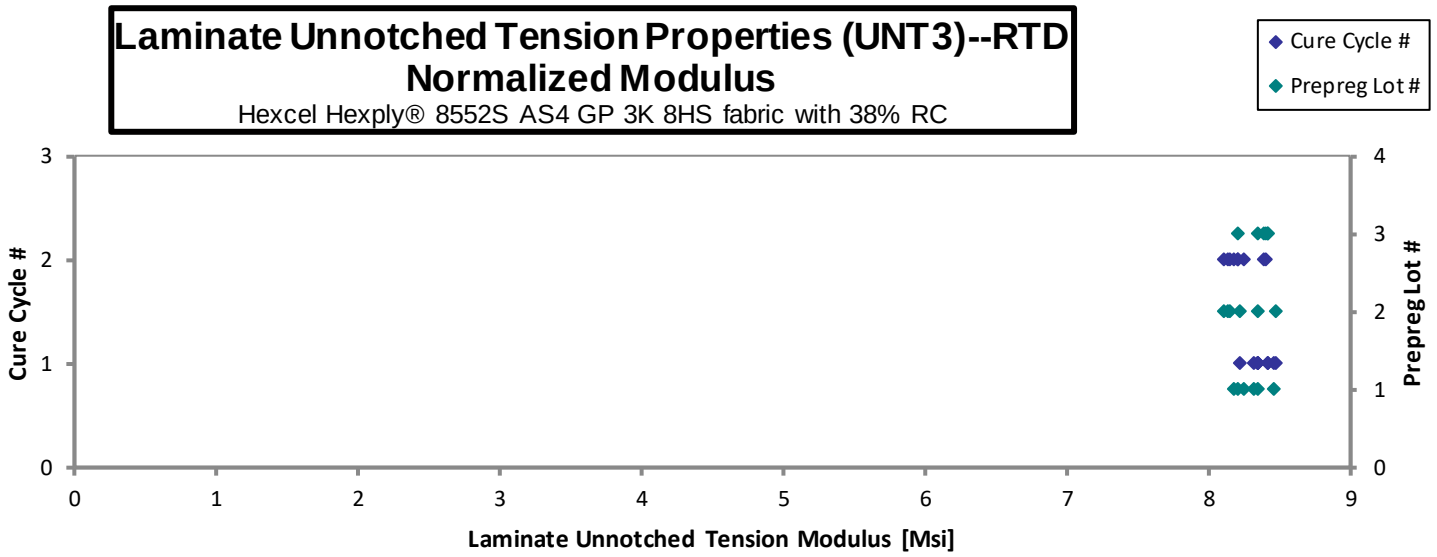
normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit 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]
HPACA111A*	A	M1	1	1	126.5	9.391	0.1351	10	LGT	0.0135	114.0	8.460
HPACA112A*	A	M1	1	1	112.6	8.598	0.1458	10	LGB	0.0146	109.4	8.354
HPACA113A	A	M1	1	1	110.6	8.143	0.1533	10	LGM	0.0153	113.0	8.324
HPACA211A	A	M2	1	2	125.6	9.091	0.1350	10	LGM	0.0135	113.0	8.182
HPACA212A	A	M2	1	2	121.9	8.629	0.1427	10	LGM	0.0143	116.0	8.211
HPACA213A	A	M2	1	2	116.4	8.389	0.1476	10	LWT	0.0148	114.5	8.252
HPACB1R1A	B	M1	2	1	128.5	8.816	0.1399	10	LGB	0.0140	119.9	8.224
HPACB1R2A	B	M1	2	1	122.5	8.548	0.1466	10	LWB, LWT	0.0147	119.7	8.354
HPACB1R3A	B	M1	2	1	122.5	8.534	0.1491	10	LGT	0.0149	121.8	8.485
HPACB2R1A	B	M2	2	2	128.7	8.593	0.1416	10	LGT	0.0142	121.5	8.112
HPACB2R2A	B	M2	2	2	126.4	8.290	0.1477	10	LWT	0.0148	124.5	8.160
HPACB2R3A	B	M2	2	2	120.9	8.167	0.1496	10	LGM	0.0150	120.5	8.142
HPACC111A	C	M1	3	1	124.1	9.195	0.1375	10	LWT, LWB	0.0137	113.8	8.427
HPACC112A	C	M1	3	1	124.9	8.663	0.1457	10	M(A,L)GM	0.0146	121.3	8.415
HPACC113A	C	M1	3	1	111.4	8.291	0.1511	10	LWT	0.0151	112.2	8.349
HPACC211A	C	M2	3	2	132.0	8.959	0.1376	10	LWT	0.0138	121.0	8.215
HPACC212A	C	M2	3	2	122.7	8.758	0.1439	10	LGT	0.0144	117.7	8.403
HPACC213A	C	M2	3	2	117.1	8.497	0.1481	10	LWB	0.0148	115.6	8.387

*Strain data is obtained from strain gages instead of extensometers.

Average	**122.0**	**8.642**		**Average$_{norm}$**	**0.0144**	**117.2**	**8.303**
Standard Dev.	**6.141**	**0.3468**		**Standard Dev.$_{norm}$**		**4.219**	**0.1171**
Coeff. of Var. [%]	**5.036**	**4.013**		**Coeff. of Var. [%]$_{norm}$**		**3.600**	**1.410**
Min.	**110.6**	**8.143**		**Min.**	**0.0135**	**109.4**	**8.112**
Max.	**132.0**	**9.391**		**Max.**	**0.0153**	**124.5**	**8.485**
Number of Spec.	**18**	**18**		**Number of Spec.**	**18**	**18**	**18**


Laminate Unnotched Tension Properties (UNT3)--RTD
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
20
40
60
80
100
120
140
Laminate Unnotched Tension Strength [ksi]


Laminate Unnotched Tension Properties (UNT3)--RTD
Normalized Modulus
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
1
2
3
4
5
6
7
8
9
Laminate Unnotched Tension Modulus [Msi]

Laminate Unnotched Tension Properties (UNT3)--ETW
Strength & Modulus

Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

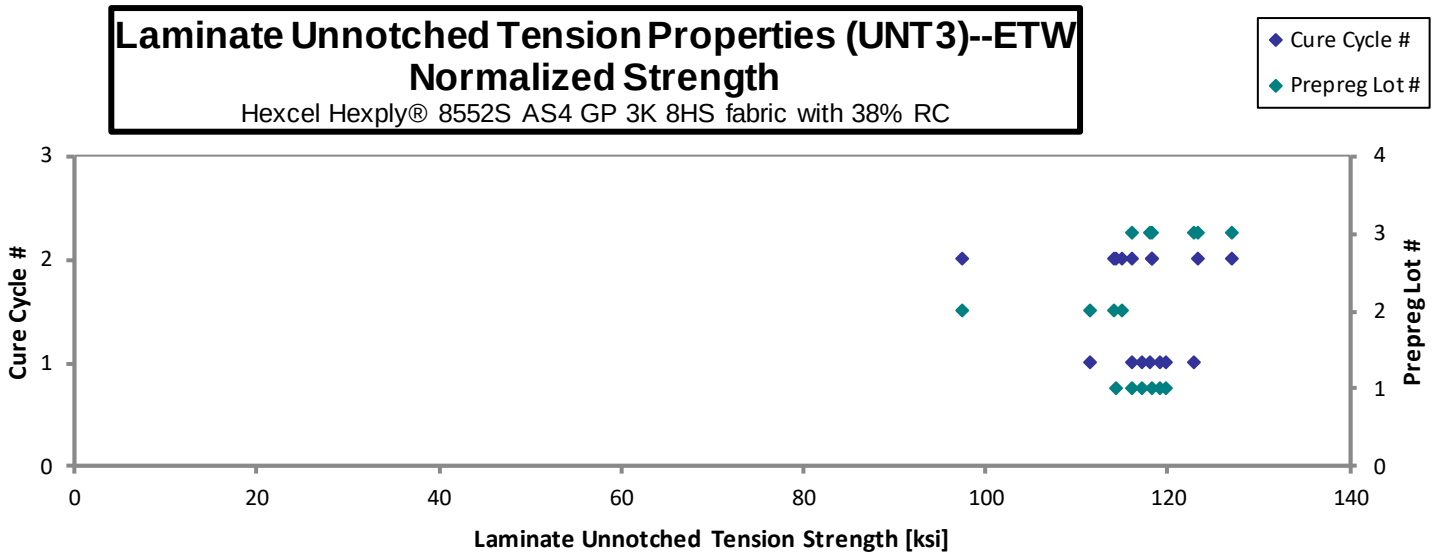
normalizing t_{ply} [in]
0.0150

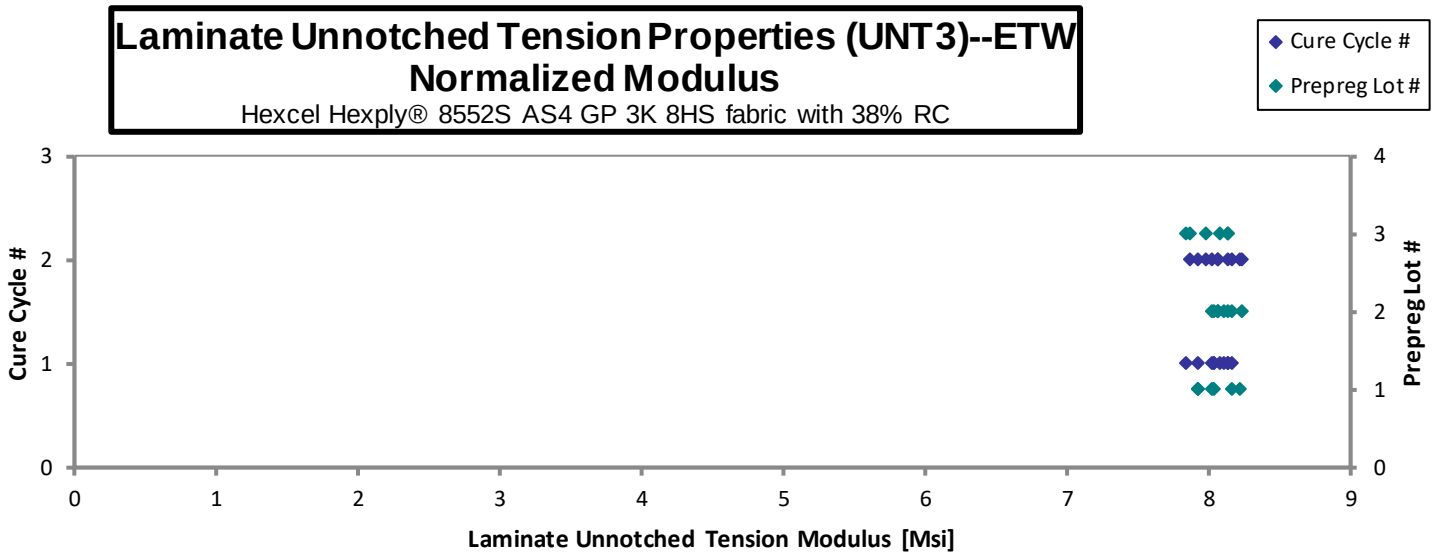
Specimen Number	Spirit Batch #	Spirit Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
HPACA111D	A	M1	1	1	118.3	7.997	0.1487	10	LGM	0.0149	117.3	7.925
HPACA112D	A	M1	1	1	118.5	7.952	0.1516	10	LGT	0.0152	119.8	8.038
HPACA113D	A	M1	1	1	116.6	7.993	0.1532	10	LGB, M(A,L)WT	0.0153	119.1	8.164
HPACA211D	A	M2	1	2	117.5	7.871	0.1511	10	LGB, LWT	0.0151	118.4	7.930
HPACA212D	A	M2	1	2	111.2	7.998	0.1542	10	LGB	0.0154	114.3	8.222
HPACA213D	A	M2	1	2	111.6	7.716	0.1560	10	LGB, LIT	0.0156	116.1	8.023
HPACB1R1D	B	M1	2	1	109.0	7.948	0.1535	10	LWT, LWB	0.0154	111.5	8.133
HPACB1R2D*	B	M1	2	1		7.791	0.1547	10	LIB	0.0155		8.033
HPACB1R3D*	B	M1	2	1		7.814	0.1557	10	LIB	0.0156		8.112
HPACB1R4D*	B	M1	2	1		7.692	0.1569	10	LIB	0.0157		8.047
HPACB2R1D	B	M2	2	2	112.3	7.880	0.1537	10	M(L,A)GB	0.0154	115.1	8.076
HPACB2R2D	B	M2	2	2	93.95	7.943	0.1557	10	LAB	0.0156	97.49	8.242
HPACB2R3D	B	M2	2	2	109.7	7.840	0.1562	10	M(L,A)GT, M(L,A)WT	0.0156	114.2	8.161
HPACB2R4D*	B	M2	2	2		7.771	0.1557	10	LIB	0.0156		8.065
HPACC111D	C	M1	3	1	113.3	7.886	0.1538	10	M(A,L)GT, LWB	0.0154	116.2	8.087
HPACC112D	C	M1	3	1	112.8	7.781	0.1568	10	LWT	0.0157	118.0	8.135
HPACC113D	C	M1	3	1	116.1	7.416	0.1587	10	LWT, LWB	0.0159	122.9	7.847
HPACC211D	C	M2	3	2	115.5	7.940	0.1537	10	LGB, LAT	0.0154	118.4	8.133
HPACC212D	C	M2	3	2	121.6	7.528	0.1568	10	LGB	0.0157	127.1	7.869
HPACC213D	C	M2	3	2	117.1	7.587	0.1580	10	LGB	0.0158	123.3	7.991

*Strength not reported due to unacceptable failure mode.

	Strength [ksi]	Modulus [Msi]
Average	**113.4**	**7.817**
Standard Dev.	**6.271**	**0.1625**
Coeff. of Var. [%]	**5.528**	**2.078**
Min.	**93.95**	**7.416**
Max.	**121.6**	**7.998**
Number of Spec.	**16**	**20**

	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
$Average_{norm}$	**0.0155**	**116.8**	**8.062**
Standard $Dev._{norm}$		**6.442**	**0.1089**
Coeff. of Var. $[\%]_{norm}$		**5.515**	**1.351**
Min.	**0.0149**	**97.49**	**7.847**
Max.	**0.0159**	**127.1**	**8.242**
Number of Spec.	**20**	**16**	**20**


Laminate Unnotched Tension Properties (UNT3)--ETW
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
20
40
60
80
100
120
140
Laminate Unnotched Tension Strength [ksi]


Laminate Unnotched Tension Properties (UNT3)--ETW
Normalized Modulus
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
1
2
3
4
5
6
7
8
9
Laminate Unnotched Tension Modulus [Msi]

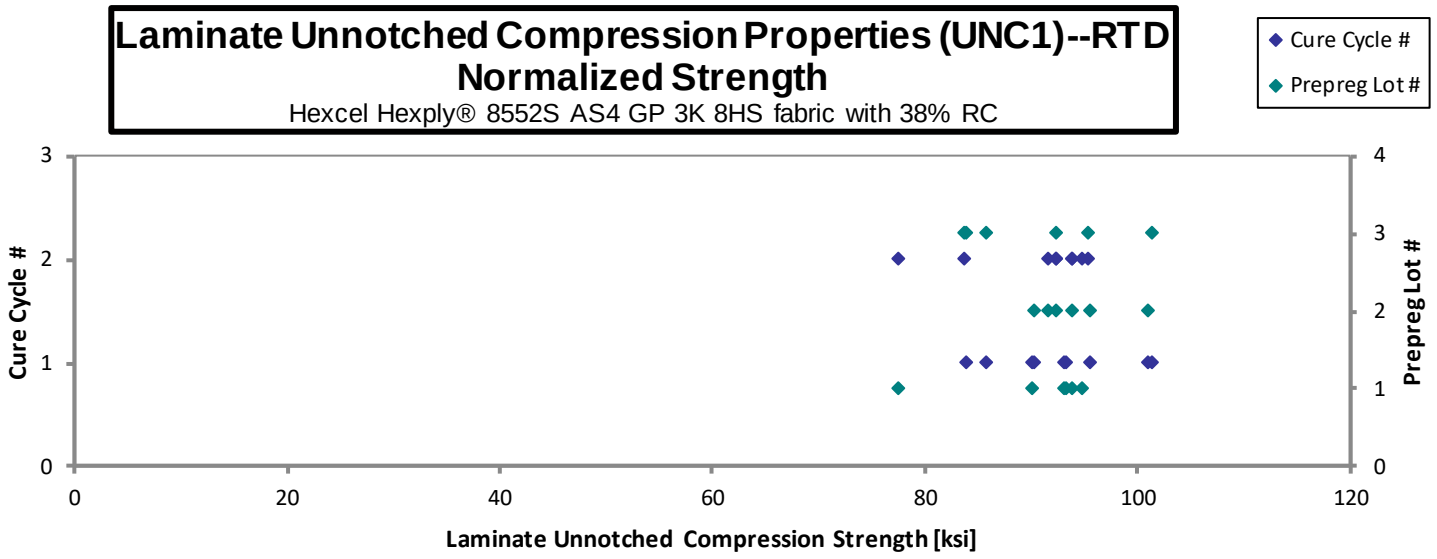
4.9 "25/50/25" Unnotched Compression 1 Properties (UNC1)

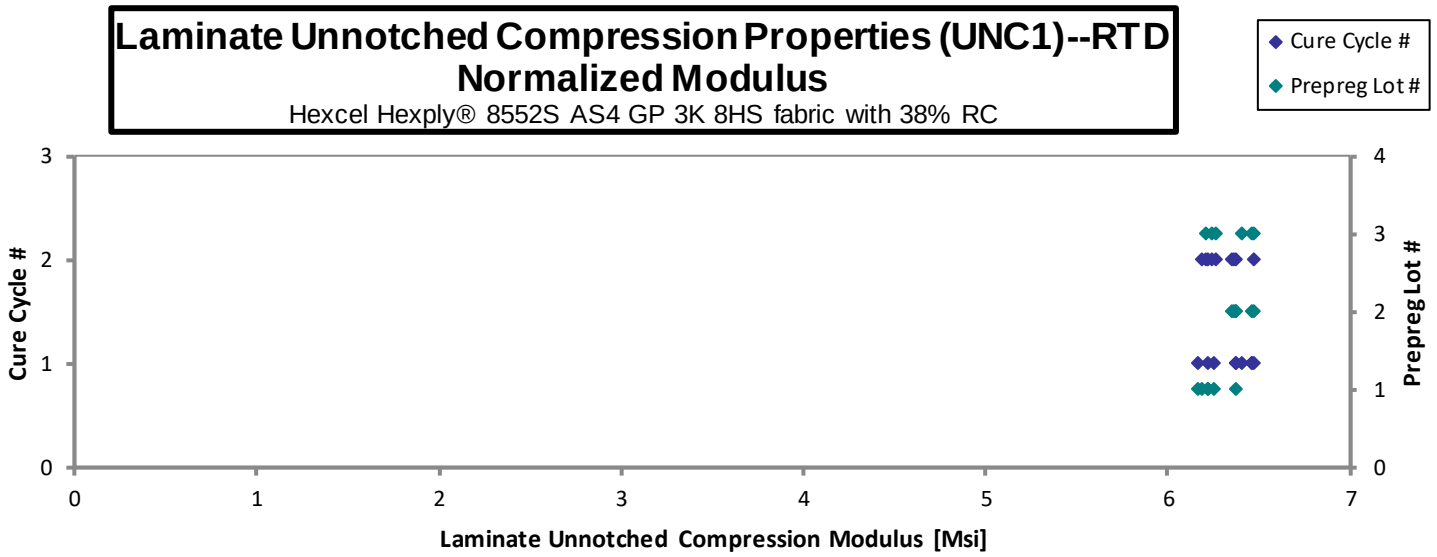
Laminate Unnotched Compression Properties (UNC1)--RTD
Strength & Modulus
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit 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]
HPAWA111A	A	M1	1	1	101.7	6.790	0.1099	8	BGM	0.0137	93.15	6.218
HPAWA112A	A	M1	1	1	97.87	6.462	0.1144	8	BGM	0.0143	93.33	6.162
HPAWA113A	A	M1	1	1	91.45	6.353	0.1182	8	BGM	0.0148	90.10	6.259
HPAWA211A	A	M2	1	2	86.99	6.979	0.1070	8	BGM	0.0134	77.59	6.225
HPAWA212A	A	M2	1	2	99.69	6.572	0.1130	8	BAB	0.0141	93.87	6.189
HPAWA213A	A	M2	1	2	96.90	6.512	0.1175	8	BGM	0.0147	94.85	6.374
HPAWB111A	B	M1	2	1	96.55	6.811	0.1123	8	BGM	0.0140	90.32	6.371
HPAWB112A	B	M1	2	1	96.47	6.519	0.1190	8	BGM	0.0149	95.63	6.462
HPAWB113A	B	M1	2	1	97.39	6.155	0.1244	8	BGM	0.0155	100.9	6.379
HPAWB211A	B	M2	2	2	99.92	6.999	0.1110	8	BGM	0.0139	92.42	6.473
HPAWB212A	B	M2	2	2	96.25	6.675	0.1142	8	BGM	0.0143	91.59	6.351
HPAWB213A	B	M2	2	2	95.26	6.452	0.1184	8	BGM	0.0148	93.96	6.365
HPAWC111A	C	M1	3	1	97.41	7.513	0.1034	8	BGM	0.0129	83.94	6.474
HPAWC112A	C	M1	3	1	93.63	7.055	0.1100	8	BGM	0.0137	85.81	6.465
HPAWC113A	C	M1	3	1	106.2	6.722	0.1145	8	BAT	0.0143	101.3	6.412
HPAWC211A	C	M2	3	2	92.88	6.896	0.1081	8	BGM	0.0135	83.63	6.210
HPAWC212A	C	M2	3	2	95.70	6.486	0.1159	8	BGM	0.0145	92.44	6.265
HPAWC213A	C	M2	3	2	94.25	6.171	0.1214	8	BGM	0.0152	95.37	6.244

Average	**96.48**	**6.673**	**Average$_{norm}$**	**0.0143**	**91.68**	**6.328**
Standard Dev.	**4.144**	**0.3384**	**Standard Dev.$_{norm}$**		**5.922**	**0.1068**
Coeff. of Var. [%]	**4.295**	**5.072**	**Coeff. of Var. [%]$_{norm}$**		**6.459**	**1.688**
Min.	**86.99**	**6.155**	**Min.**	**0.0129**	**77.59**	**6.162**
Max.	**106.2**	**7.513**	**Max.**	**0.0155**	**101.3**	**6.474**
Number of Spec.	**18**	**18**	**Number of Spec.**	**18**	**18**	**18**


Laminate Unnotched Compression Properties (UNC1)--RTD
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
20
40
60
80
100
120
Laminate Unnotched Compression Strength [ksi]


Laminate Unnotched Compression Properties (UNC1)--RTD
Normalized Modulus
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
1
2
3
4
5
6
7
Laminate Unnotched Compression Modulus [Msi]

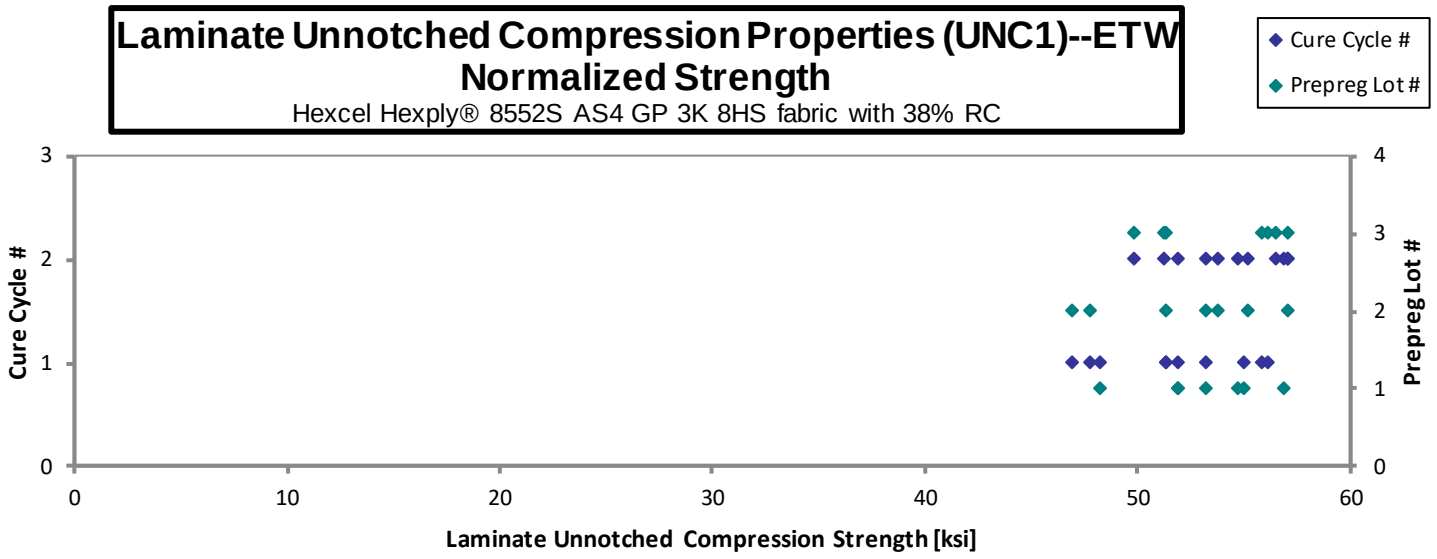
Laminate Unnotched Compression Properties (UNC1)--ETW
Strength & Modulus

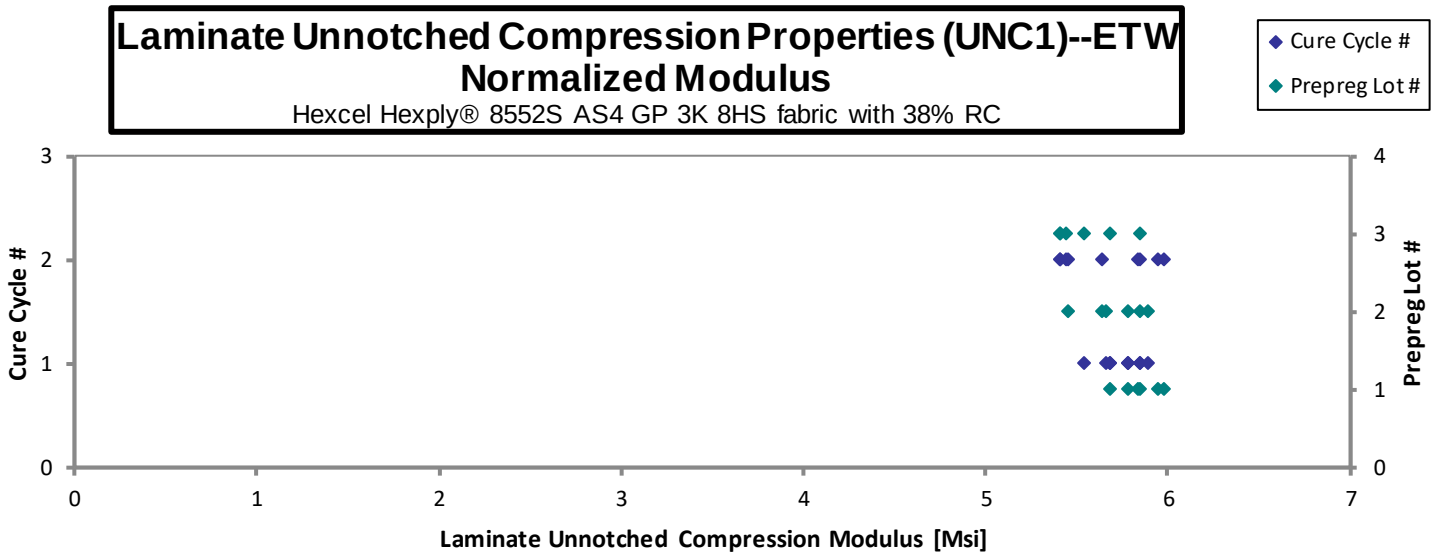
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit 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]
HPAWA111D	A	M1	1	1		5.755	0.1220	8	BGM	0.0153		5.852
HPAWA112D	A	M1	1	1		5.556	0.1228	8	BGM	0.0154		5.685
HPAWA113D	A	M1	1	1		5.586	0.1242	8	BGM	0.0155		5.780
HPAWA114D	A	M1	1	1	57.32		0.1115	8	BGM	0.0139	53.26	
HPAWA115D	A	M1	1	1	50.29		0.1152	8	BGM	0.0144	48.29	
HPAWA116D	A	M1	1	1	52.47		0.1188	8	BGM	0.0149	51.96	
HPAWA117D	A	M1	1	1	54.28		0.1217	8	BGM	0.0152	55.03	
HPAWA211D	A	M2	1	2		5.839	0.1230	8	BGM	0.0154		5.984
HPAWA212D	A	M2	1	2		5.622	0.1246	8	BGM	0.0156		5.837
HPAWA213D	A	M2	1	2		5.701	0.1252	8	BGM	0.0157		5.949
HPAWA214D	A	M2	1	2	58.50		0.1066	8	BGM	0.0133	51.96	
HPAWA215D	A	M2	1	2	58.26		0.1127	8	BGM	0.0141	54.69	
HPAWA216D	A	M2	1	2	57.97		0.1178	8	BGM	0.0147	56.92	
HPAWB111D	B	M1	2	1		5.227	0.1299	8	BGM	0.0162		5.659
HPAWB112D	B	M1	2	1		5.277	0.1315	8	BGM	0.0164		5.781
HPAWB113D	B	M1	2	1		5.339	0.1324	8	BGM	0.0166		5.892
HPAWB114D	B	M1	2	1	51.19		0.1099	8	BGM	0.0137	46.89	
HPAWB115D	B	M1	2	1	49.38		0.1161	8	BGM	0.0145	47.76	
HPAWB116D	B	M1	2	1	50.79		0.1212	8	BGM	0.0152	51.31	
HPAWB211D	B	M2	2	2		5.554	0.1219	8	BGM	0.0152		5.641
HPAWB212D	B	M2	2	2		5.273	0.1241	8	BGM	0.0155		5.453
HPAWB213D	B	M2	2	2		5.609	0.1251	8	BGM	0.0156		5.846
HPAWB214D	B	M2	2	2	57.12		0.1119	8	BGM	0.0140	53.24	
HPAWB215D	B	M2	2	2	57.05		0.1162	8	BGM	0.0145	55.23	
HPAWB216D	B	M2	2	2	53.69		0.1202	8	BGM	0.0150	53.78	
HPAWB217D	B	M2	2	2	55.31		0.1238	8	BGM	0.0155	57.06	
HPAWC111D	C	M1	3	1		5.517	0.1206	8	BGM	0.0151		5.542
HPAWC112D	C	M1	3	1		5.758	0.1218	8	BAT	0.0152		5.845
HPAWC113D	C	M1	3	1		5.486	0.1244	8	BGM	0.0155		5.685
HPAWC114D	C	M1	3	1	58.51		0.1053	8	BGM	0.0132	51.33	
HPAWC115D	C	M1	3	1	59.80		0.1122	8	BGM	0.0140	55.90	
HPAWC116D	C	M1	3	1	57.38		0.1174	8	BGM	0.0147	56.12	
HPAWC211D	C	M2	3	2		5.102	0.1272	8	BGM	0.0159		5.408
HPAWC212D	C	M2	3	2		5.040	0.1288	8	BGM	0.0161		5.409
HPAWC213D	C	M2	3	2		5.034	0.1297	8	BGM	0.0162		5.441
HPAWC214D	C	M2	3	2	54.82		0.1092	8	BGM	0.0136	49.88	
HPAWC215D	C	M2	3	2	53.31		0.1155	8	BGM	0.0144	51.30	
HPAWC216D	C	M2	3	2	56.47		0.1201	8	BGM	0.0150	56.51	
HPAWC217D	C	M2	3	2	55.53		0.1233	8	BAT	0.0154	57.06	

	Strength	Modulus		$Strength_{norm}$	$Modulus_{norm}$
Average	**55.21**	**5.460**	**$Average_{norm}$**	**0.0150**	**53.12**	**5.705**
Standard Dev.	**3.048**	**0.2528**	**Standard $Dev._{norm}$**		**3.152**	**0.1887**
Coeff. of Var. [%]	**5.520**	**4.630**	**Coeff. of Var. $[\%]_{norm}$**		**5.934**	**3.307**
Min.	**49.38**	**5.034**	**Min.**	**0.0132**	**46.89**	**5.408**
Max.	**59.80**	**5.839**	**Max.**	**0.0166**	**57.06**	**5.984**
Number of Spec.	**21**	**18**	**Number of Spec.**	**39**	**21**	**18**


Laminate Unnotched Compression Properties (UNC1)--ETW
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
0
10
20
30
40
50
60
Laminate Unnotched Compression Strength [ksi]


Laminate Unnotched Compression Properties (UNC1)--ETW
Normalized Modulus
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
0
1
2
3
4
5
6
7
Laminate Unnotched Compression Modulus [Msi]

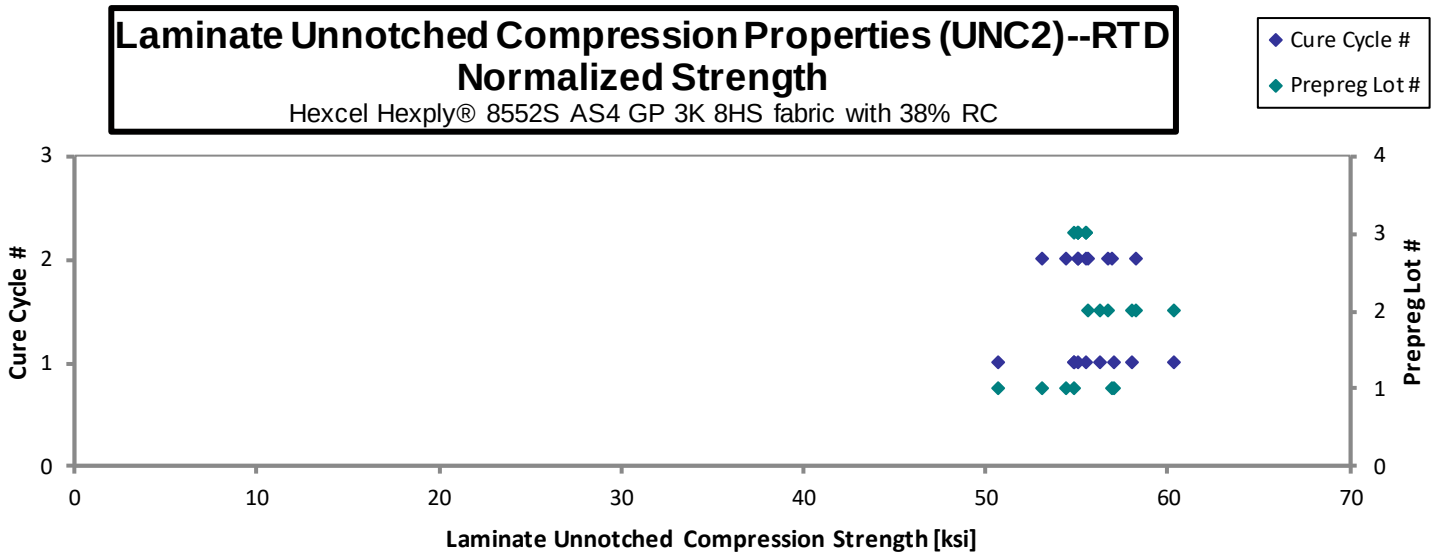
4.10 "10/80/10" Unnotched Compression 2 Properties (UNC2)

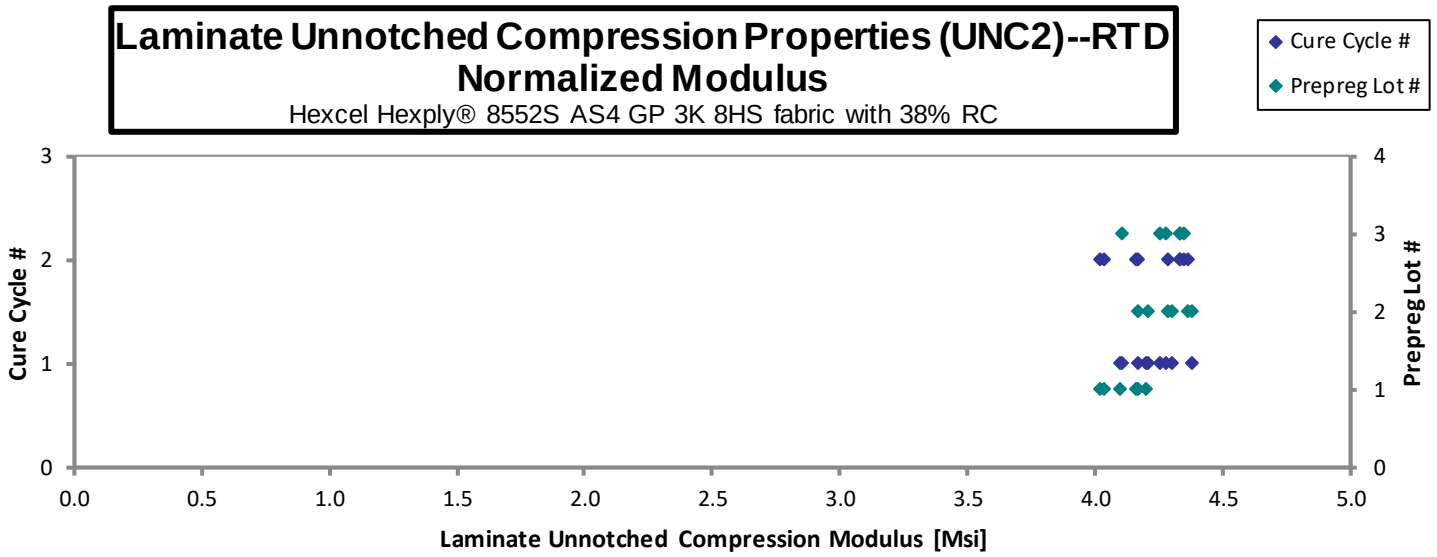
Laminate Unnotched Compression Properties (UNC2)--RTD
Strength & Modulus
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit 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]
HPAXA111A	A	M1	1	1	60.78	4.651	0.1354	10	BGM	0.0135	54.88	4.200
HPAXA112A	A	M1	1	1	53.11	4.367	0.1432	10	BGM	0.0143	50.70	4.168
HPAXA113A	A	M1	1	1	57.28	4.116	0.1493	10	BGM	0.0149	57.03	4.098
HPAXA211A	A	M2	1	2	60.47	4.579	0.1318	10	BGM	0.0132	53.13	4.023
HPAXA212A	A	M2	1	2	60.03	4.449	0.1360	10	BGM	0.0136	54.43	4.034
HPAXA213A	A	M2	1	2	60.79	4.440	0.1406	10	BGM	0.0141	56.99	4.163
HPAXB111A	B	M1	2	1	63.00	4.754	0.1383	10	BGM	0.0138	58.09	4.383
HPAXB112A	B	M1	2	1	58.34	4.362	0.1448	10	BGM	0.0145	56.31	4.210
HPAXB113A	B	M1	2	1	60.51	4.311	0.1497	10	BGM	0.0150	60.39	4.301
HPAXB211A	B	M2	2	2	60.88	4.559	0.1372	10	BGM	0.0137	55.68	4.170
HPAXB212A	B	M2	2	2	60.25	4.630	0.1414	10	BGM	0.0141	56.78	4.364
HPAXB213A	B	M2	2	2	59.96	4.410	0.1458	10	BGM	0.0146	58.27	4.286
HPAXC111A	C	M1	3	1	63.23	4.717	0.1306	10	BGM	0.0131	55.06	4.108
HPAXC112A	C	M1	3	1	60.03	4.653	0.1372	10	BGM	0.0137	54.90	4.255
HPAXC113A	C	M1	3	1	58.60	4.518	0.1420	10	BGM	0.0142	55.47	4.277
HPAXC211A	C	M2	3	2	59.32	4.636	0.1403	10	BGM	0.0140	55.49	4.337
HPAXC212A	C	M2	3	2	57.78	4.547	0.1429	10	BGM	0.0143	55.04	4.332
HPAXC213A	C	M2	3	2	56.90	4.495	0.1452	10	BGM	0.0145	55.08	4.351

Average	**59.51**	**4.511**	**Average$_{norm}$**	**0.0141**	**55.76**	**4.226**
Standard Dev.	**2.330**	**0.1604**	**Standard Dev.$_{norm}$**		**2.102**	**0.1126**
Coeff. of Var. [%]	**3.915**	**3.556**	**Coeff. of Var. [%]$_{norm}$**		**3.769**	**2.664**
Min.	**53.11**	**4.116**	**Min.**	**0.0131**	**50.70**	**4.023**
Max.	**63.23**	**4.754**	**Max.**	**0.0150**	**60.39**	**4.383**
Number of Spec.	**18**	**18**	**Number of Spec.**	**18**	**18**	**18**


Laminate Unnotched Compression Properties (UNC2)--RTD
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
10
20
30
40
50
60
70
Laminate Unnotched Compression Strength [ksi]


Laminate Unnotched Compression Properties (UNC2)--RTD
Normalized Modulus
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% 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
Laminate Unnotched Compression Modulus [Msi]

Laminate Unnotched Compression Properties (UNC2)--ETW
Strength & Modulus

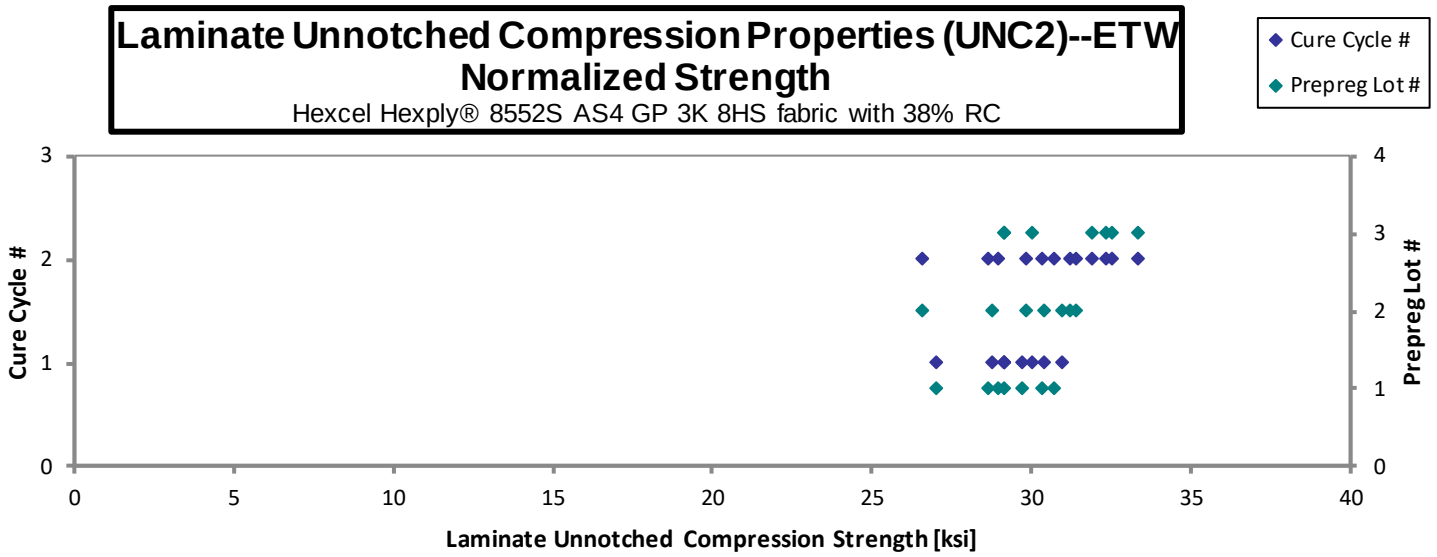
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

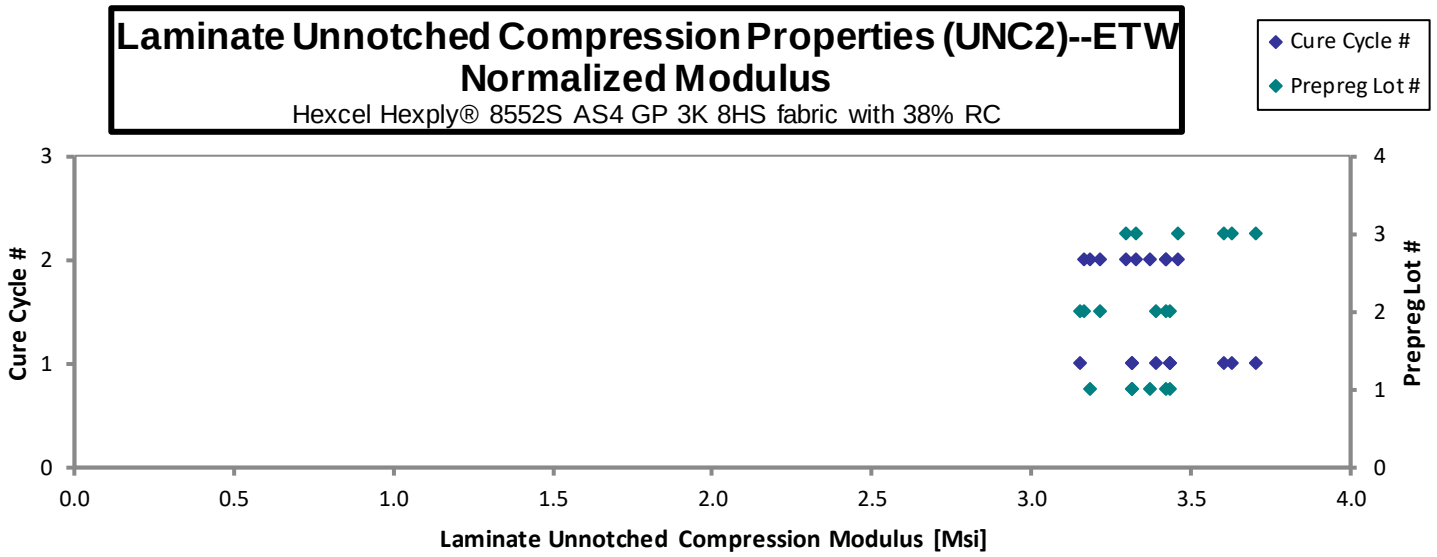
normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit 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]
HPAXA111D	A	M1	1	1		3.145	0.1582	10	BGM	0.0158		3.317
HPAXA112D	A	M1	1	1		3.188	0.1618	10	BGM	0.0162		3.437
HPAXA113D	A	M1	1	1		3.079	0.1615	10	BGM	0.0162		3.316
HPAXA114D	A	M1	1	1	30.00		0.1350	10	BGM	0.0135	27.01	
HPAXA115D	A	M1	1	1	30.66		0.1428	10	BGM	0.0143	29.18	
HPAXA116D	A	M1	1	1	30.07		0.1483	10	BGM	0.0148	29.74	
HPAXA211D	A	M2	1	2		3.486	0.1474	10	BGM	0.0147		3.424
HPAXA212D	A	M2	1	2		3.390	0.1492	10	BGM	0.0149		3.372
HPAXA213D	A	M2	1	2		3.183	0.1502	10	BGM	0.0150		3.188
HPAXA214D	A	M2	1	2	33.81		0.1345	10	BGM	0.0135	30.32	
HPAXA215D	A	M2	1	2	31.23		0.1393	10	BGM	0.0139	28.99	
HPAXA216D	A	M2	1	2	30.05		0.1430	10	BGM	0.0143	28.64	
HPAXA217D	A	M2	1	2	31.33		0.1471	10	BGM	0.0147	30.71	
HPAXB111D	B	M1	2	1		3.325	0.1550	10	BGM	0.0155		3.437
HPAXB112D	B	M1	2	1		3.008	0.1573	10	BGM	0.0157		3.154
HPAXB113D	B	M1	2	1		3.217	0.1581	10	BGM	0.0158		3.391
HPAXB114D	B	M1	2	1	31.45		0.1373	10	BGM	0.0137	28.79	
HPAXB115D	B	M1	2	1	31.72		0.1439	10	BGM	0.0144	30.43	
HPAXB116D	B	M1	2	1	31.15		0.1492	10	BGM	0.0149	30.99	
HPAXB211D	B	M2	2	2		3.387	0.1516	10	BGM	0.0152		3.423
HPAXB212D	B	M2	2	2		3.151	0.1532	10	BGM	0.0153		3.217
HPAXB213D	B	M2	2	2		3.054	0.1554	10	BGM	0.0155		3.164
HPAXB214D	B	M2	2	2	29.21		0.1365	10	BGM	0.0137	26.58	
HPAXB215D	B	M2	2	2	33.20		0.1421	10	BGM	0.0142	31.44	
HPAXB216D	B	M2	2	2	30.52		0.1468	10	BGM	0.0147	29.86	
HPAXB217D	B	M2	2	2	31.06		0.1508	10	BGM	0.0151	31.22	
HPAXC111D	C	M1	3	1		3.640	0.1487	10	BGM	0.0149		3.608
HPAXC112D	C	M1	3	1		3.692	0.1506	10	BGM	0.0151		3.706
HPAXC113D	C	M1	3	1		3.587	0.1519	10	BGM	0.0152		3.631
HPAXC114D	C	M1	3	1	32.47		0.1347	10	BGM	0.0135	29.16	
HPAXC115D	C	M1	3	1	31.82		0.1417	10	BGM	0.0142	30.06	
HPAXC116D	C	M1	3	1	29.72		0.1470	10	BGM	0.0147	29.13	
HPAXC211D	C	M2	3	2		3.460	0.1502	10	BGM	0.0150		3.464
HPAXC212D	C	M2	3	2		3.286	0.1520	10	BGM	0.0152		3.330
HPAXC213D	C	M2	3	2		3.235	0.1531	10	BGM	0.0153		3.301
HPAXC214D	C	M2	3	2	34.35		0.1413	10	BGM	0.0141	32.36	
HPAXC215D	C	M2	3	2	33.26		0.1439	10	BGM	0.0144	31.90	
HPAXC216D	C	M2	3	2	33.93		0.1474	10	BGM	0.0147	33.34	
HPAXC217D	C	M2	3	2	32.41		0.1505	10	BGM	0.0151	32.52	

	Strength [ksi]	Modulus [Msi]
Average	**31.59**	**3.306**
Standard Dev.	**1.484**	**0.2039**
Coeff. of Var. [%]	**4.696**	**6.166**
Min.	**29.21**	**3.008**
Max.	**34.35**	**3.692**
Number of Spec.	**21**	**18**

	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
$Average_{norm}$	**0.0148**	**30.11**	**3.382**
Standard $Dev._{norm}$		**1.718**	**0.1566**
Coeff. of Var. $[\%]_{norm}$		**5.704**	**4.631**
Min.	**0.0135**	**26.58**	**3.154**
Max.	**0.0162**	**33.34**	**3.706**
Number of Spec.	**39**	**21**	**18**


Laminate Unnotched Compression Properties (UNC2)--ETW
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Unnotched Compression Strength [ksi]
0
5
10
15
20
25
30
35
40
0
1
2
3
4


Laminate Unnotched Compression Properties (UNC2)--ETW
Normalized Modulus
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Unnotched Compression Modulus [Msi]
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
0
1
2
3
4

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

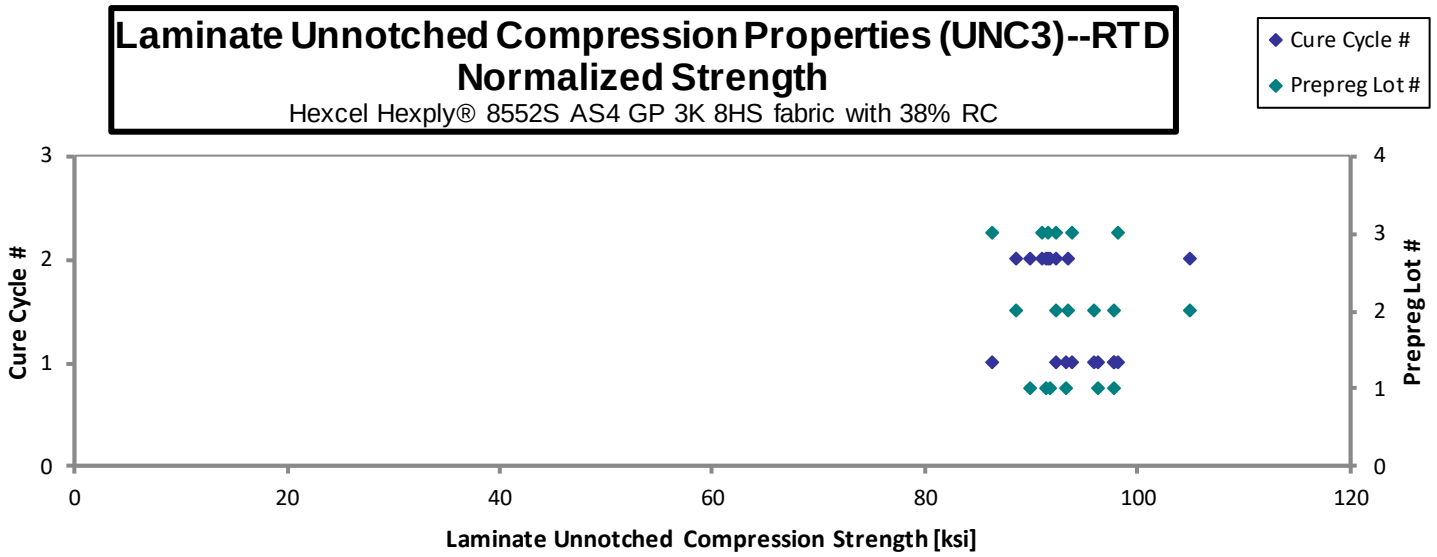
Laminate Unnotched Compression Properties (UNC3)--RTD
Strength & Modulus
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

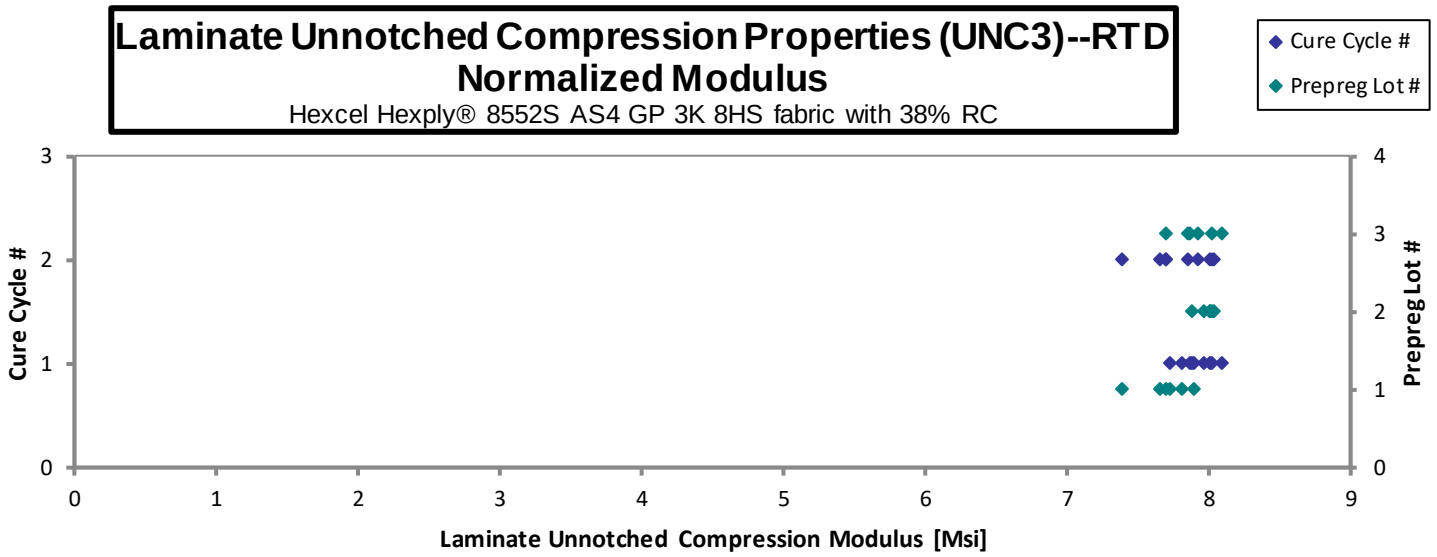
normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit 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]
HPAYA111A	A	M1	1	1	107.9	8.714	0.1359	10	BGM	0.0136	97.76	7.895
HPAYA112A	A	M1	1	1	96.19	8.059	0.1454	10	BGM	0.0145	93.25	7.812
HPAYA113A	A	M1	1	1	94.51	7.587	0.1528	10	BGM	0.0153	96.29	7.729
HPAYA211A	A	M2	1	2	99.89	8.520	0.1349	10	BGM	0.0135	89.83	7.663
HPAYA212A	A	M2	1	2	97.69	8.195	0.1409	10	BGM	0.0141	91.76	7.697
HPAYA213A	A	M2	1	2	94.34	7.633	0.1453	10	BGM	0.0145	91.39	7.394
HPAYB112A	B	M1	2	1	104.4	8.547	0.1406	10	BGM	0.0141	97.83	8.011
HPAYB113A	B	M1	2	1	94.46	8.070	0.1466	10	BGM	0.0147	92.34	7.889
HPAYB114A	B	M1	2	1	92.97	7.716	0.1549	10	BGM	0.0155	96.00	7.968
HPAYB211A	B	M2	2	2	103.5	8.892	0.1354	10	BGM	0.0135	93.42	8.024
HPAYB212A	B	M2	2	2	92.24	8.334	0.1442	10	BAT	0.0144	88.69	8.013
HPAYB213A	B	M2	2	2	105.1	8.056	0.1497	10	BGM	0.0150	104.9	8.041
HPAYC111A	C	M1	3	1	113.6	9.116	0.1296	10	BGM	0.0130	98.14	7.876
HPAYC112A	C	M1	3	1	101.6	8.761	0.1386	10	BGM	0.0139	93.86	8.095
HPAYC113A	C	M1	3	1	89.59	8.336	0.1445	10	BGM	0.0144	86.29	8.029
HPAYC211A	C	M2	3	2	98.33	8.360	0.1409	10	BGM	0.0141	92.34	7.851
HPAYC212A	C	M2	3	2	93.67	7.918	0.1459	10	BGM	0.0146	91.10	7.701
HPAYC213A	C	M2	3	2	91.25	7.903	0.1505	10	BGM	0.0150	91.54	7.927

Average	**98.40**	**8.262**	
Standard Dev.	**6.471**	**0.4386**	
Coeff. of Var. [%]	**6.576**	**5.309**	
Min.	**89.59**	**7.587**	
Max.	**113.6**	**9.116**	
Number of Spec.	**18**	**18**	

$Average_{norm}$	**0.0143**	**93.71**	**7.867**
$Standard\ Dev._{norm}$		**4.275**	**0.1773**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**4.562**	**2.253**
Min.	**0.0130**	**86.29**	**7.394**
Max.	**0.0155**	**104.9**	**8.095**
Number of Spec.	**18**	**18**	**18**


Laminate Unnotched Compression Properties (UNC3)--RTD
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
0
1
2
3
4
0
20
40
60
80
100
120
Laminate Unnotched Compression Strength [ksi]


Laminate Unnotched Compression Properties (UNC3)--RTD
Normalized Modulus
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
0
1
2
3
4
0
1
2
3
4
5
6
7
8
9
Laminate Unnotched Compression Modulus [Msi]

Laminate Unnotched Compression Properties (UNC3)--ETW
Strength & Modulus

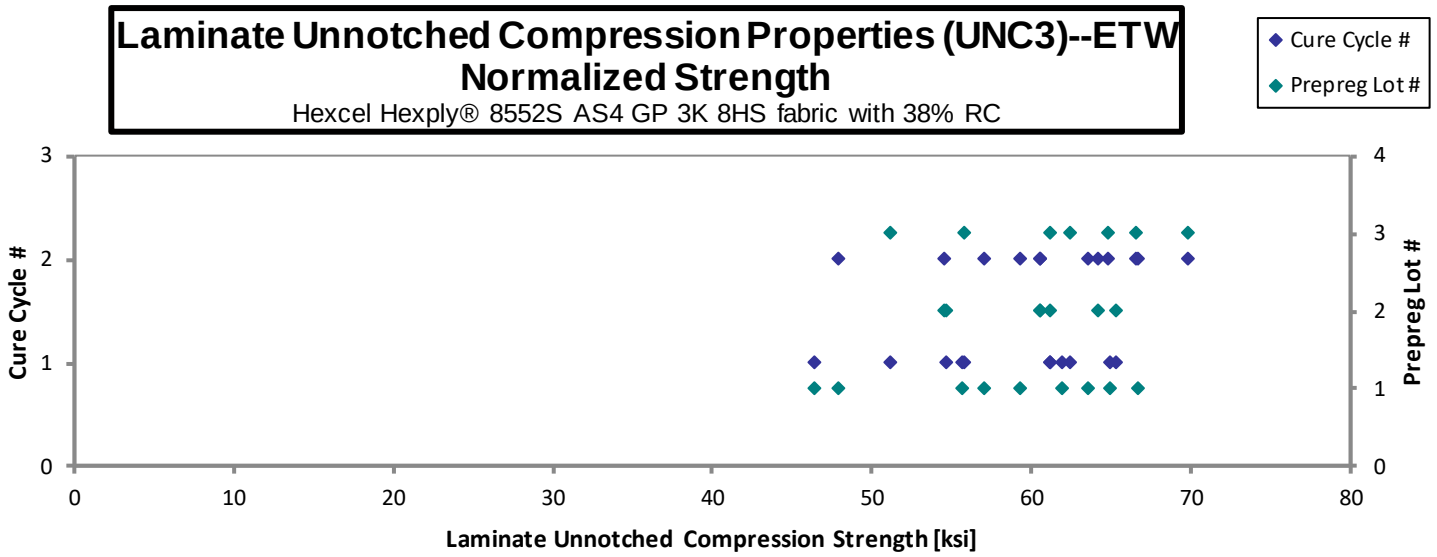
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

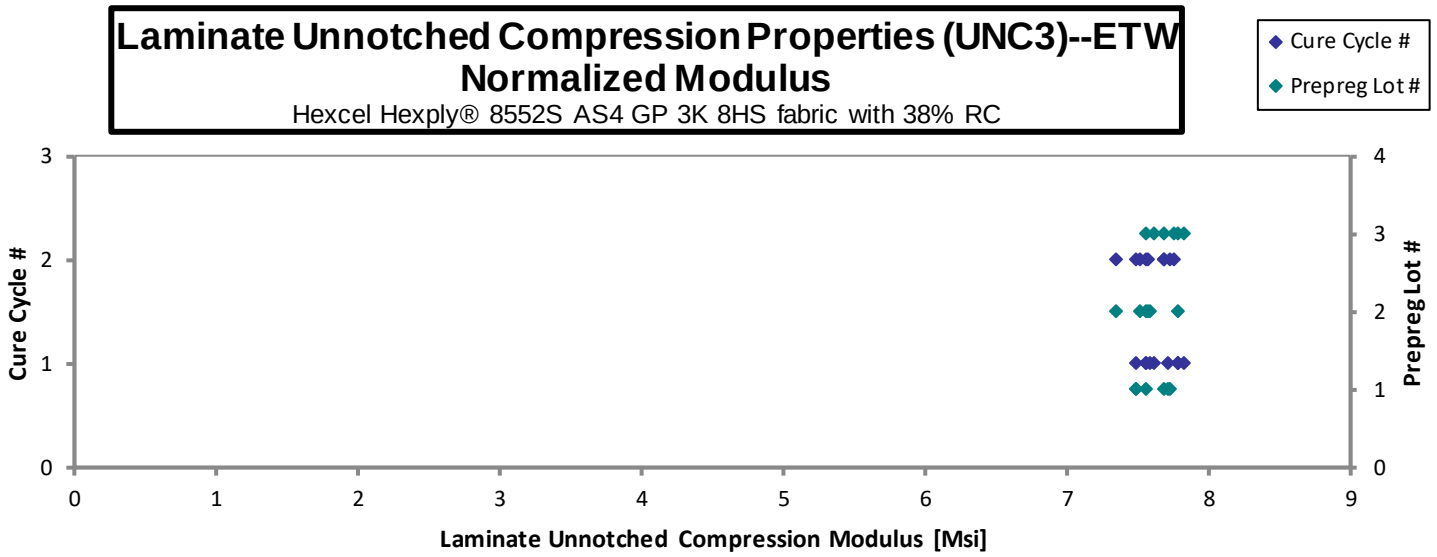
normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit 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]
HPAYA111D	A	M1	1	1		7.030	0.1615	10	CIT, BGM	0.0161		7.569
HPAYA112D	A	M1	1	1		6.878	0.1634	10	HGM	0.0163		7.491
HPAYA113D	A	M1	1	1		7.019	0.1649	10	CIT, BGM	0.0165		7.717
HPAYA114D	A	M1	1	1	52.92		0.1315	10	BGM	0.0131	46.38	
HPAYA115D	A	M1	1	1	59.08		0.1415	10	BGM	0.0141	55.73	
HPAYA116D	A	M1	1	1	65.59		0.1484	10	BGM	0.0148	64.90	
HPAYA117D	A	M1	1	1	60.69		0.1532	10	HAB	0.0153	61.98	
HPAYA211D	A	M2	1	2		7.429	0.1512	10	CIT, BGM	0.0151		7.489
HPAYA212D	A	M2	1	2		7.636	0.1519	10	BGM	0.0152		7.730
HPAYA213D	A	M2	1	2		7.547	0.1528	10	BGM	0.0153		7.690
HPAYA214D	A	M2	1	2	52.83		0.1360	10	BAB	0.0136	47.90	
HPAYA215D	A	M2	1	2	60.03		0.1427	10	BGM	0.0143	57.10	
HPAYA216D	A	M2	1	2	60.65		0.1468	10	BGM	0.0147	59.35	
HPAYA217D	A	M2	1	2	66.18		0.1511	10	BAT	0.0151	66.67	
HPAYA218D	A	M2	1	2	61.95		0.1538	10	BAT	0.0154	63.53	
HPAYB111D	B	M1	2	1		7.728	0.1511	10	M(B,H)GM	0.0151		7.783
HPAYB112D	B	M1	2	1		7.261	0.1569	10	M(B,H)GM	0.0157		7.593
HPAYB113D	B	M1	2	1		7.171	0.1581	10	M(C,H)IB, CIT	0.0158		7.560
HPAYB114D	B	M1	2	1	61.15		0.1341	10	BGM	0.0134	54.66	
HPAYB115D	B	M1	2	1	64.58		0.1422	10	HGM	0.0142	61.21	
HPAYB116D	B	M1	2	1	66.20		0.1481	10	BGM	0.0148	65.37	
HPAYB211D	B	M2	2	2		7.204	0.1567	10	BAT	0.0157		7.525
HPAYB212D	B	M2	2	2		7.090	0.1602	10	BGM	0.0160		7.571
HPAYB213D	B	M2	2	2		6.863	0.1606	10	BGM	0.0161		7.348
HPAYB214D	B	M2	2	2	61.59		0.1329	10	BGM	0.0133	54.56	
HPAYB215D	B	M2	2	2	64.23		0.1415	10	BGM	0.0141	60.56	
HPAYB216D	B	M2	2	2	64.89		0.1484	10	BGM	0.0148	64.21	
HPAYB217D	B	M2	2	2	59.30		0.1534	10	BGM	0.0153	60.62	
HPAYC111D	C	M1	3	1		7.747	0.1515	10	BGM	0.0151		7.823
HPAYC112D	C	M1	3	1		7.363	0.1551	10	BGM	0.0155		7.612
HPAYC113D	C	M1	3	1		7.506	0.1555	10	BGM	0.0156		7.783
HPAYC114D	C	M1	3	1	63.50		0.1320	10	HGM	0.0132	55.86	
HPAYC115D	C	M1	3	1	54.74		0.1402	10	M(B,H)GM	0.0140	51.15	
HPAYC116D	C	M1	3	1	63.82		0.1467	10	BGM	0.0147	62.43	
HPAYC117D	C	M1	3	1	60.82		0.1508	10	HGM	0.0151	61.14	
HPAYC211D	C	M2	3	2		7.242	0.1567	10	BGM	0.0157		7.565
HPAYC212D	C	M2	3	2		7.317	0.1590	10	BAT	0.0159		7.756
HPAYC213D	C	M2	3	2		7.172	0.1607	10	BAT	0.0161		7.684
HPAYC217D	C	M2	3	2	65.68		0.1521	10	BGM	0.0152	66.58	
HPAYC218D	C	M2	3	2	67.90		0.1543	10	BGM	0.0154	69.82	
HPAYC219D	C	M2	3	2	62.28		0.1561	10	BGM	0.0156	64.83	

	Strength	Modulus
Average	**61.77**	**7.289**
Standard Dev.	**4.076**	**0.2690**
Coeff. of Var. [%]	**6.599**	**3.690**
Min.	**52.83**	**6.863**
Max.	**67.90**	**7.747**
Number of Spec.	**23**	**18**

	t_{ply}	$Strength_{norm}$	$Modulus_{norm}$
$Average_{norm}$	**0.0150**	**59.85**	**7.627**
Standard $Dev._{norm}$		**6.090**	**0.1265**
Coeff. of Var. [%]$_{norm}$		**10.18**	**1.658**
Min.	**0.0131**	**46.38**	**7.348**
Max.	**0.0165**	**69.82**	**7.823**
Number of Spec.	**41**	**23**	**18**


Laminate Unnotched Compression Properties (UNC3)--ETW
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Unnotched Compression Strength [ksi]
0
10
20
30
40
50
60
70
80
0
1
2
3
4

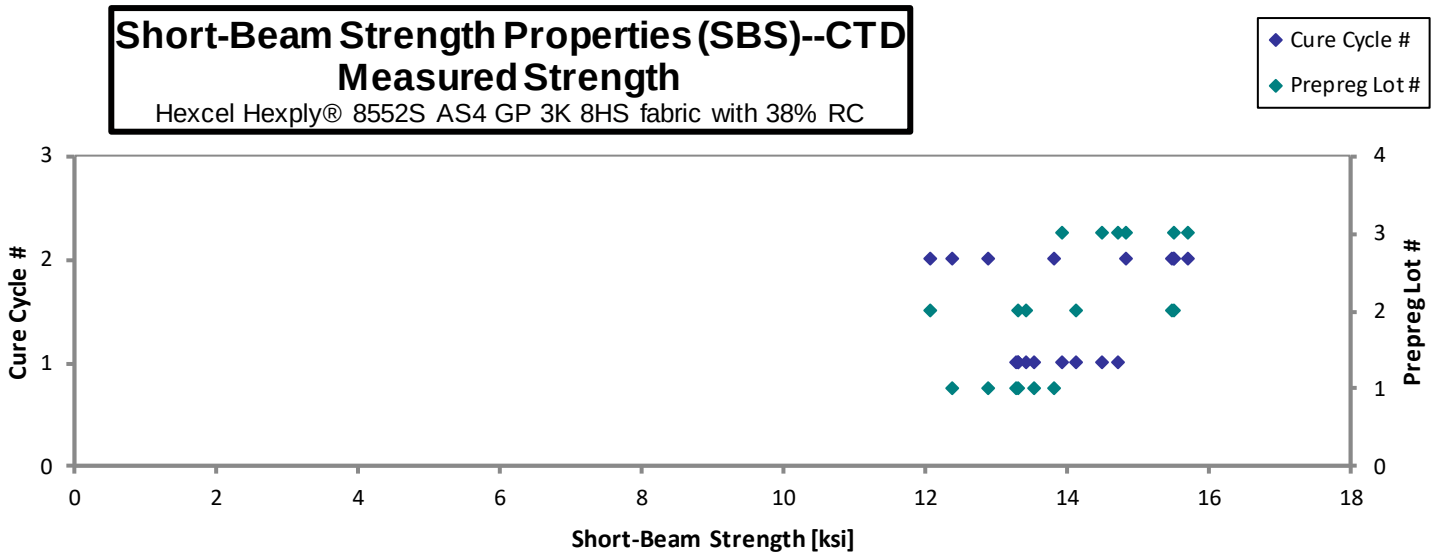

Laminate Unnotched Compression Properties (UNC3)--ETW
Normalized Modulus
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Unnotched Compression Modulus [Msi]
0
1
2
3
4
5
6
7
8
9
0
1
2
3
4

4.12 Lamina Short-Beam Strength Properties (SBS)

Short-Beam Strength Properties (SBS)--CTD
Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

Specimen Number	Spirit Batch #	Spirit Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Avg. t_{ply} [in]	Failure Mode
HPAQA111B	A	M1	1	1	13.30	0.2746	18	0.0153	INTERLAMINAR SHEAR
HPAQA112B	A	M1	1	1	13.31	0.2732	18	0.0152	INTERLAMINAR SHEAR
HPAQA113B	A	M1	1	1	13.55	0.2708	18	0.0150	INTERLAMINAR SHEAR
HPAQA211B	A	M2	1	2	13.84	0.2936	18	0.0163	INTERLAMINAR SHEAR
HPAQA212B	A	M2	1	2	12.38	0.2952	18	0.0164	INTERLAMINAR SHEAR
HPAQA213B	A	M2	1	2	12.89	0.2868	18	0.0159	INTERLAMINAR SHEAR
HPAQB111B (Redo)	B	M1	2	1	14.13	0.2495	18	0.0139	INTERLAMINAR SHEAR
HPAQB112B (Redo)	B	M1	2	1	13.31	0.2498	18	0.0139	INTERLAMINAR SHEAR
HPAQB113B (Redo)	B	M1	2	1	13.43	0.2530	18	0.0141	INTERLAMINAR SHEAR
HPAQB211B (Redo)	B	M2	2	2	15.51	0.2426	18	0.0135	INTERLAMINAR SHEAR
HPAQB212B (Redo)	B	M2	2	2	15.50	0.2461	18	0.0137	INTERLAMINAR SHEAR
HPAQB213B (Redo)	B	M2	2	2	12.07	0.2481	18	0.0138	INTERLAMINAR SHEAR
HPAQC111B	C	M1	3	1	14.50	0.2465	18	0.0137	INTERLAMINAR SHEAR
HPAQC112B	C	M1	3	1	13.93	0.2435	18	0.0135	INTERLAMINAR SHEAR
HPAQC113B	C	M1	3	1	14.72	0.2409	18	0.0134	INTERLAMINAR SHEAR
HPAQC211B	C	M2	3	2	15.71	0.2426	18	0.0135	INTERLAMINAR SHEAR
HPAQC212B	C	M2	3	2	14.84	0.2422	18	0.0135	INTERLAMINAR SHEAR
HPAQC213B	C	M2	3	2	15.53	0.2412	18	0.0134	INTERLAMINAR SHEAR

Average	**14.02**	**0.0143**
Standard Dev.	**1.107**	
Coeff. of Var. [%]	**7.894**	
Min.	**12.07**	**0.0134**
Max.	**15.71**	**0.0164**
Number of Spec.	**18**	**18**

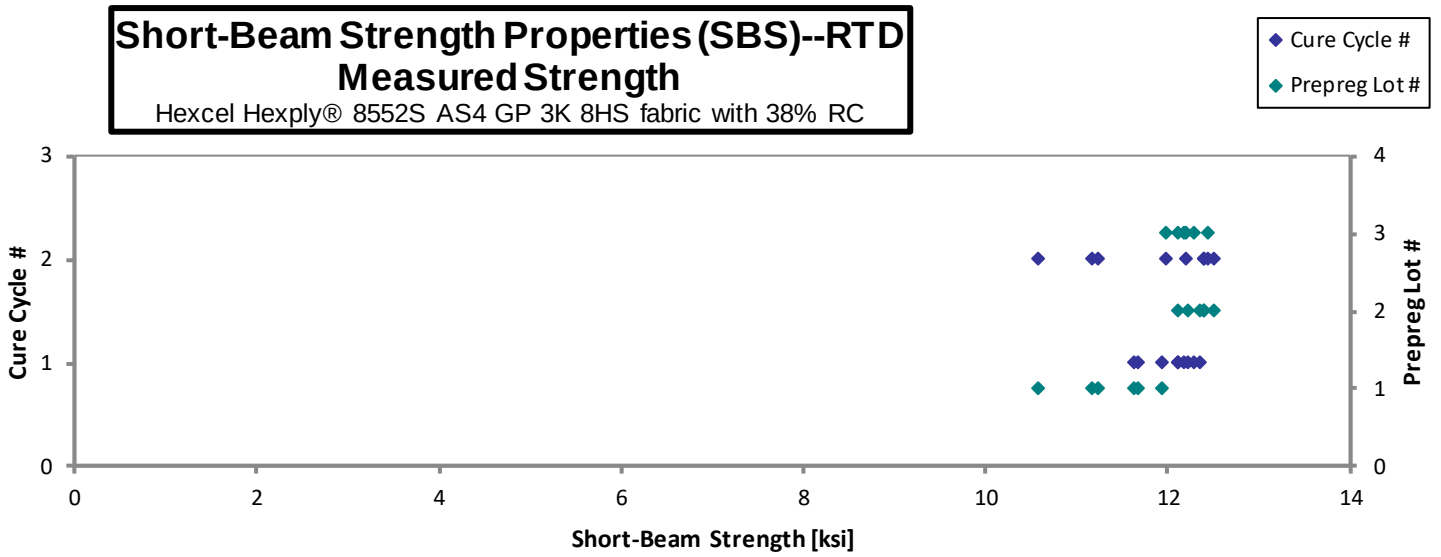

Short-Beam Strength Properties (SBS)--CTD
Measured Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Short-Beam Strength [ksi]
0
1
2
3
4
0
2
4
6
8
10
12
14
16
18

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

Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

Specimen Number	Spirit Batch #	Spirit Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Avg. t_{ply} [in]	Failure Mode
HPAQA111A	A	M1	1	1	11.95	0.2708	18	0.0150	INTERLAMINAR SHEAR
HPAQA112A	A	M1	1	1	11.68	0.2725	18	0.0151	INTERLAMINAR SHEAR
HPAQA113A	A	M1	1	1	11.63	0.2747	18	0.0153	INTERLAMINAR SHEAR
HPAQA211A	A	M2	1	2	10.58	0.2762	18	0.0153	INTERLAMINAR SHEAR
HPAQA212A	A	M2	1	2	11.17	0.2863	18	0.0159	INTERLAMINAR SHEAR
HPAQA213A	A	M2	1	2	11.23	0.2920	18	0.0162	INTERLAMINAR SHEAR
HPAQB111A (Redo)	B	M1	2	1	12.12	0.2516	18	0.0140	INTERLAMINAR SHEAR
HPAQB112A (Redo)	B	M1	2	1	12.22	0.2500	18	0.0139	INTERLAMINAR SHEAR
HPAQB113A (Redo)	B	M1	2	1	12.35	0.2509	18	0.0139	INTERLAMINAR SHEAR
HPAQB211A (Redo)	B	M2	2	2	12.39	0.2487	18	0.0138	INTERLAMINAR SHEAR
HPAQB212A (Redo)	B	M2	2	2	12.50	0.2470	18	0.0137	INTERLAMINAR SHEAR
HPAQB213A (Redo)	B	M2	2	2	12.40	0.2445	18	0.0136	INTERLAMINAR SHEAR
HPAQC111A	C	M1	3	1	12.29	0.2373	18	0.0132	INTERLAMINAR SHEAR
HPAQC112A	C	M1	3	1	12.18	0.2423	18	0.0135	INTERLAMINAR SHEAR
HPAQC113A	C	M1	3	1	12.11	0.2452	18	0.0136	INTERLAMINAR SHEAR
HPAQC211A	C	M2	3	2	12.45	0.2342	18	0.0130	INTERLAMINAR SHEAR
HPAQC212A	C	M2	3	2	12.20	0.2372	18	0.0132	INTERLAMINAR SHEAR
HPAQC213A	C	M2	3	2	11.97	0.2406	18	0.0134	INTERLAMINAR SHEAR

Average	**11.97**	**0.0142**
Standard Dev.	**0.5227**	
Coeff. of Var. [%]	**4.367**	
Min.	**10.58**	**0.0130**
Max.	**12.50**	**0.0162**
Number of Spec.	**18**	**18**

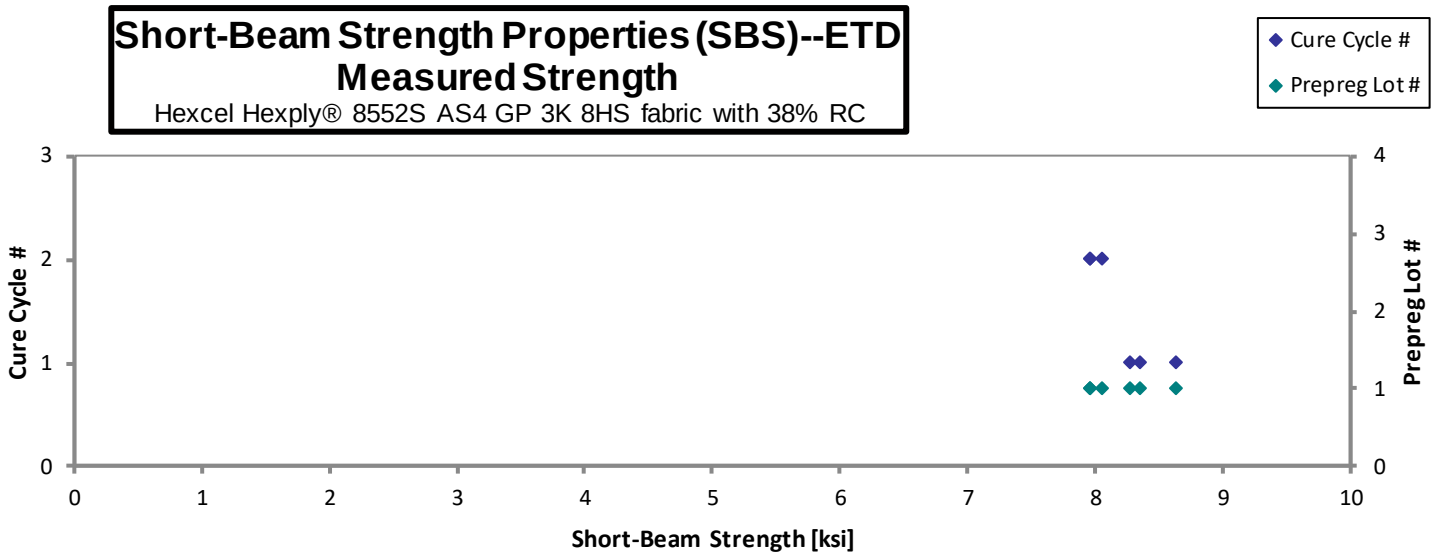

Short-Beam Strength Properties (SBS)--RTD
Measured Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Short-Beam Strength [ksi]
0
1
2
3
4
0
2
4
6
8
10
12
14

Short-Beam Strength Properties (SBS)--ETD
Strength

Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

Specimen Number	Spirit Batch #	Spirit Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Avg. t_{ply} [in]	Failure Mode
HPAQA111C	A	M1	1	1	8.643	0.2766	18	0.0154	INTERLAMINAR SHEAR
HPAQA112C	A	M1	1	1	8.360	0.2783	18	0.0155	INTERLAMINAR SHEAR
HPAQA113C	A	M1	1	1	8.274	0.2799	18	0.0155	INTERLAMINAR SHEAR
HPAQA211C	A	M2	1	2	7.969	0.2797	18	0.0155	INTERLAMINAR SHEAR
HPAQA212C	A	M2	1	2	7.959	0.2732	18	0.0152	INTERLAMINAR SHEAR
HPAQA213C	A	M2	1	2	8.055	0.2804	18	0.0156	INTERLAMINAR SHEAR

Average	**8.210**	**0.0154**
Standard Dev.	**0.2680**	
Coeff. of Var. [%]	**3.264**	
Min.	**7.959**	**0.0152**
Max.	**8.643**	**0.0156**
Number of Spec.	**6**	**6**

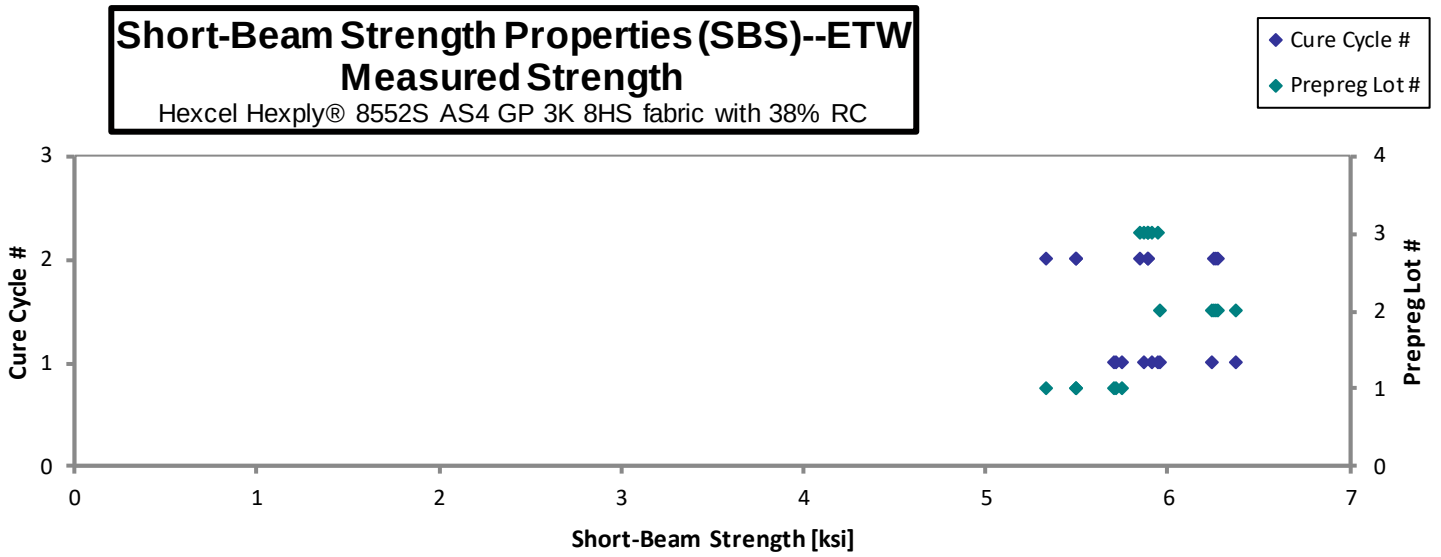

Short-Beam Strength Properties (SBS)--ETD
Measured Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Short-Beam Strength [ksi]
0
1
2
3
4
5
6
7
8
9
10

Short-Beam Strength Properties (SBS)--ETW
Strength

Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

Specimen Number	Spirit Batch #	Spirit Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Avg. t_{ply} [in]	Failure Mode
HPAQA111D	A	M1	1	1	5.748	0.2801	18	0.0156	INTERLAMINAR SHEAR
HPAQA112D	A	M1	1	1	5.717	0.2786	18	0.0155	INTERLAMINAR SHEAR
HPAQA113D	A	M1	1	1	5.701	0.2756	18	0.0153	INTERLAMINAR SHEAR
HPAQA212D	A	M2	1	2	5.501	0.2948	18	0.0164	INTERLAMINAR SHEAR
HPAQA213D	A	M2	1	2	5.330	0.2902	18	0.0161	INTERLAMINAR SHEAR
HPAQA215D	A	M2	1	2	5.499	0.2963	18	0.0165	INTERLAMINAR SHEAR
HPAQB111D (Redo)	B	M1	2	1	5.955	0.2533	18	0.0141	INTERLAMINAR SHEAR, INELASTIC DEFORMATION
HPAQB112D (Redo)	B	M1	2	1	6.242	0.2474	18	0.0137	INTERLAMINAR SHEAR, INELASTIC DEFORMATION
HPAQB114D (Redo)	B	M1	2	1	6.370	0.2436	18	0.0135	INTERLAMINAR SHEAR, INELASTIC DEFORMATION
HPAQB211D (Redo)	B	M2	2	2	6.261	0.2486	18	0.0138	INTERLAMINAR SHEAR, INELASTIC DEFORMATION
HPAQB212D (Redo)	B	M2	2	2	6.274	0.2474	18	0.0137	INTERLAMINAR SHEAR, INELASTIC DEFORMATION
HPAQB213D (Redo)	B	M2	2	2	6.258	0.2460	18	0.0137	INTERLAMINAR SHEAR, INELASTIC DEFORMATION
HPAQC112D	C	M1	3	1	5.913	0.2565	18	0.0143	INTERLAMINAR SHEAR
HPAQC113D	C	M1	3	1	5.869	0.2582	18	0.0143	INTERLAMINAR SHEAR
HPAQC114D	C	M1	3	1	5.949	0.2580	18	0.0143	INTERLAMINAR SHEAR
HPAQC212D	C	M2	3	2	5.896	0.2532	18	0.0141	INTERLAMINAR SHEAR
HPAQC213D	C	M2	3	2	5.889	0.2515	18	0.0140	INTERLAMINAR SHEAR
HPAQC214D	C	M2	3	2	5.848	0.2487	18	0.0138	INTERLAMINAR SHEAR

Average	**5.901**	**0.0146**
Standard Dev.	**0.2958**	
Coeff. of Var. [%]	**5.012**	
Min.	**5.330**	**0.0135**
Max.	**6.370**	**0.0165**
Number of Spec.	**18**	**18**

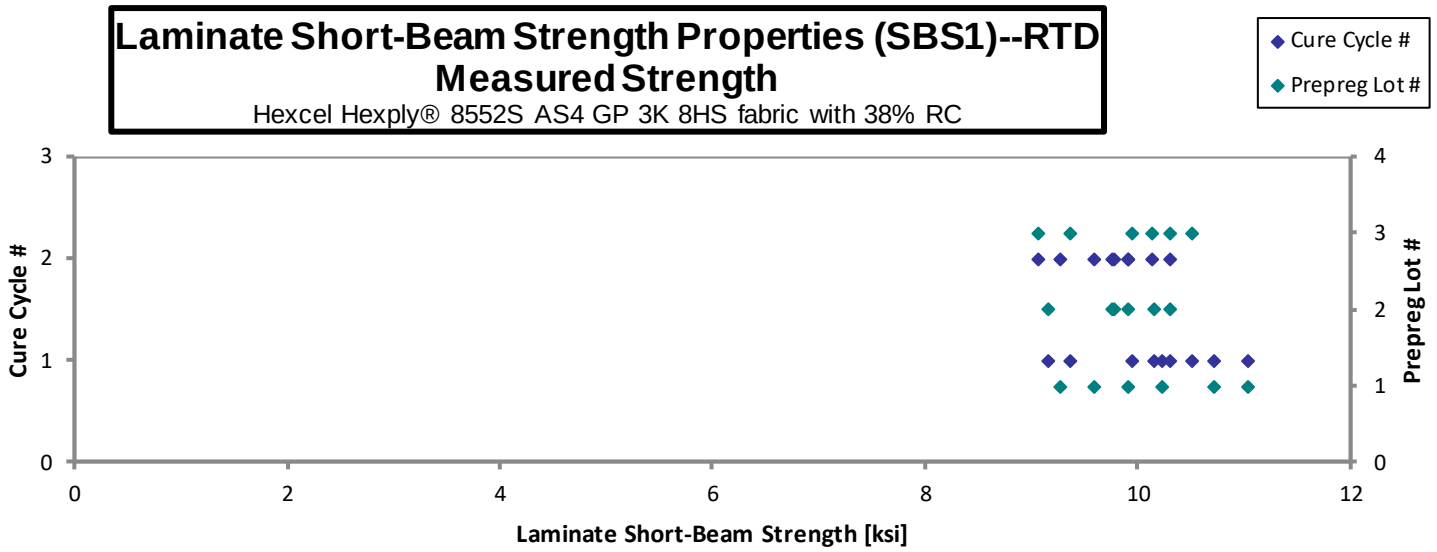

Short-Beam Strength Properties (SBS)--ETW
Measured Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Short-Beam Strength [ksi]
0
1
2
3
4
5
6
7

4.13 Laminate Short-Beam Strength Properties (SBS1)

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

Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

Specimen Number	Spirit Batch #	Spirit Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Avg. t_{ply} [in]	Failure Mode
HPAqA1G11A	A	M1	1	1	11.03	0.1745	12	0.0145	INTERLAMINAR SHEAR
HPAqA1G12A	A	M1	1	1	10.72	0.1750	12	0.0146	INTERLAMINAR SHEAR
HPAqA1G13A	A	M1	1	1	10.23	0.1661	12	0.0138	INTERLAMINAR SHEAR
HPAqA2G11A	A	M2	1	2	9.589	0.1695	12	0.0141	INTERLAMINAR SHEAR
HPAqA2G12A	A	M2	1	2	9.919	0.1700	12	0.0142	INTERLAMINAR SHEAR
HPAqA2G13A	A	M2	1	2	9.281	0.1698	12	0.0141	INTERLAMINAR SHEAR
HPAqB1G11A	B	M1	2	1	10.30	0.1712	12	0.0143	INTERLAMINAR SHEAR
HPAqB1G12A	B	M1	2	1	10.16	0.1608	12	0.0134	INTERLAMINAR SHEAR
HPAqB1G13A	B	M1	2	1	9.165	0.1561	12	0.0130	INTERLAMINAR SHEAR
HPAqB2G11A	B	M2	2	2	9.752	0.1891	12	0.0158	INTERLAMINAR SHEAR
HPAqB2G12A	B	M2	2	2	9.902	0.1894	12	0.0158	INTERLAMINAR SHEAR
HPAqB2G13A	B	M2	2	2	9.772	0.1894	12	0.0158	INTERLAMINAR SHEAR
HPAqC1G11A	C	M1	3	1	10.50	0.1762	12	0.0147	INTERLAMINAR SHEAR
HPAqC1G12A	C	M1	3	1	9.363	0.1643	12	0.0137	INTERLAMINAR SHEAR
HPAqC1G13A	C	M1	3	1	9.948	0.1679	12	0.0140	INTERLAMINAR SHEAR
HPAqC2G11A	C	M2	3	2	10.31	0.1751	12	0.0146	INTERLAMINAR SHEAR
HPAqC2G12A	C	M2	3	2	9.073	0.1694	12	0.0141	INTERLAMINAR SHEAR
HPAqC2G13A	C	M2	3	2	10.13	0.1731	12	0.0144	INTERLAMINAR SHEAR
				Average	**9.953**			**0.0144**	
				Standard Dev.	**0.5344**				
				Coeff. of Var. [%]	**5.370**				
				Min.	**9.073**			**0.0130**	
				Max.	**11.03**			**0.0158**	
				Number of Spec.	**18**			**18**	

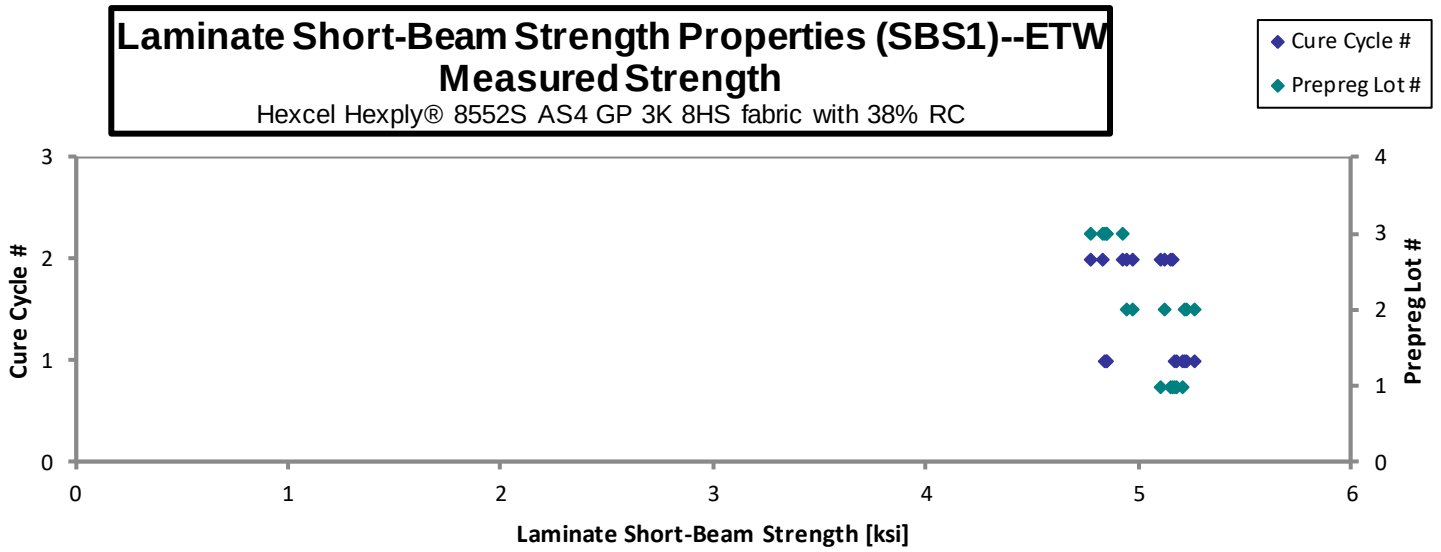

Laminate Short-Beam Strength Properties (SBS1)--RTD
Measured Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Short-Beam Strength [ksi]
0
1
2
3
4
0
2
4
6
8
10
12

Laminate Short-Beam Strength Properties (SBS1)--ETW
Strength

Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

Specimen Number	Spirit Batch #	Spirit Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Avg. t_{ply} [in]	Failure Mode
HPAqA1G11D	A	M1	1	1	5.202	0.1736	12	0.0145	INELASTIC DEFORMATION, INTERLAMINAR SHEAR
HPAqA1G14D	A	M1	1	1	5.169	0.1749	12	0.0146	INELASTIC DEFORMATION, INTERLAMINAR SHEAR
HPAqA1G15D	A	M1	1	1	5.179	0.1708	12	0.0142	INELASTIC DEFORMATION, INTERLAMINAR SHEAR
HPAqA2G11D	A	M2	1	2	5.161	0.1699	12	0.0142	INELASTIC DEFORMATION, INTERLAMINAR SHEAR
HPAqA2G12D	A	M2	1	2	5.154	0.1690	12	0.0141	INELASTIC DEFORMATION, INTERLAMINAR SHEAR
HPAqA2G13D	A	M2	1	2	5.100	0.1705	12	0.0142	INELASTIC DEFORMATION, INTERLAMINAR SHEAR
HPAqB1G11D	B	M1	2	1	5.261	0.1689	12	0.0141	INELASTIC DEFORMATION, INTERLAMINAR SHEAR
HPAqB1G12D	B	M1	2	1	5.214	0.1704	12	0.0142	INELASTIC DEFORMATION, INTERLAMINAR SHEAR
HPAqB1G13D	B	M1	2	1	5.226	0.1712	12	0.0143	INELASTIC DEFORMATION, INTERLAMINAR SHEAR
HPAqB2G11D	B	M2	2	2	5.122	0.1877	12	0.0156	INELASTIC DEFORMATION, INTERLAMINAR SHEAR
HPAqB2G12D	B	M2	2	2	4.974	0.1860	12	0.0155	INELASTIC DEFORMATION, INTERLAMINAR SHEAR
HPAqB2G13D	B	M2	2	2	4.938	0.1837	12	0.0153	INELASTIC DEFORMATION, INTERLAMINAR SHEAR
HPAqC1G11D	C	M1	3	1	4.853	0.1756	12	0.0146	INELASTIC DEFORMATION, INTERLAMINAR SHEAR
HPAqC1G12D	C	M1	3	1	4.853	0.1722	12	0.0143	INELASTIC DEFORMATION, INTERLAMINAR SHEAR
HPAqC1G14D	C	M1	3	1	4.839	0.1738	12	0.0145	INELASTIC DEFORMATION, INTERLAMINAR SHEAR
HPAqC2G11D	C	M2	3	2	4.926	0.1789	12	0.0149	INELASTIC DEFORMATION, INTERLAMINAR SHEAR
HPAqC2G12D	C	M2	3	2	4.834	0.1807	12	0.0151	INELASTIC DEFORMATION, INTERLAMINAR SHEAR
HPAqC2G13D	C	M2	3	2	4.774	0.1808	12	0.0151	INELASTIC DEFORMATION, INTERLAMINAR SHEAR

Average	**5.043**	**0.0146**
Standard Dev.	**0.1654**	
Coeff. of Var. [%]	**3.279**	
Min.	**4.774**	**0.0141**
Max.	**5.261**	**0.0156**
Number of Spec.	**18**	**18**


Laminate Short-Beam Strength Properties (SBS1)--ETW
Measured Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Short-Beam Strength [ksi]
0
1
2
3
4
5
6

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

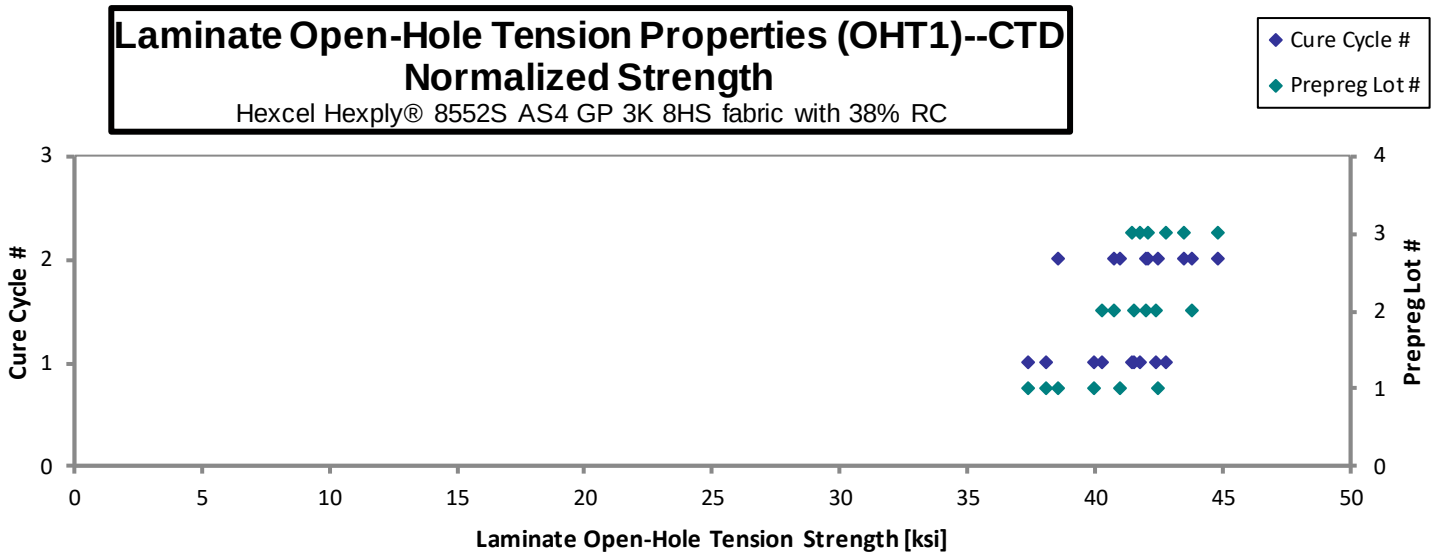
Laminate Open-Hole Tension Properties (OHT1)--CTD
Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HPADA111B	A	M1	1	1	36.83	0.1217	8	LGM	0.0152	37.36
HPADA112B	A	M1	1	1	37.44	0.1221	8	LGM	0.0153	38.10
HPADA113B	A	M1	1	1	39.30	0.1220	8	LGM	0.0152	39.94
HPADA211B	A	M2	1	2	40.67	0.1252	8	LGM	0.0157	42.45
HPADA212B	A	M2	1	2	37.02	0.1251	8	LGM	0.0156	38.59
HPADA213B	A	M2	1	2	43.01	0.1145	8	LGM	0.0143	41.03
HPADB111B	B	M1	2	1	38.25	0.1264	8	LGM	0.0158	40.27
HPADB112B	B	M1	2	1	40.32	0.1263	8	LGM	0.0158	42.43
HPADB113B	B	M1	2	1	44.12	0.1130	8	LGM	0.0141	41.53
HPADB211B	B	M2	2	2	38.35	0.1275	8	LGM	0.0159	40.76
HPADB212B	B	M2	2	2	39.86	0.1265	8	LGM	0.0158	42.00
HPADB213B	B	M2	2	2	46.91	0.1122	8	LGM	0.0140	43.84
HPADC111B	C	M1	3	1	39.15	0.1272	8	LGM	0.0159	41.49
HPADC112B	C	M1	3	1	40.56	0.1266	8	LGM	0.0158	42.79
HPADC113B	C	M1	3	1	44.40	0.1129	8	LGM	0.0141	41.78
HPADC211B	C	M2	3	2	40.18	0.1258	8	LGM	0.0157	42.11
HPADC212B	C	M2	3	2	42.28	0.1236	8	LGM	0.0154	43.53
HPADC213B	C	M2	3	2	48.30	0.1114	8	LGM	0.0139	44.82

Average	**40.94**	
Standard Dev.	**3.296**	
Coeff. of Var. [%]	**8.050**	
Min.	**36.83**	
Max.	**48.30**	
Number of Spec.	**18**	

$Average_{norm}$	**0.0152**	**41.38**
$Standard\ Dev._{norm}$		**1.977**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**4.777**
Min.	**0.0139**	**37.36**
Max.	**0.0159**	**44.82**
Number of Spec.	**18**	**18**


Laminate Open-Hole Tension Properties (OHT1)--CTD
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Open-Hole Tension Strength [ksi]
0
1
2
3
4
0
5
10
15
20
25
30
35
40
45
50

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

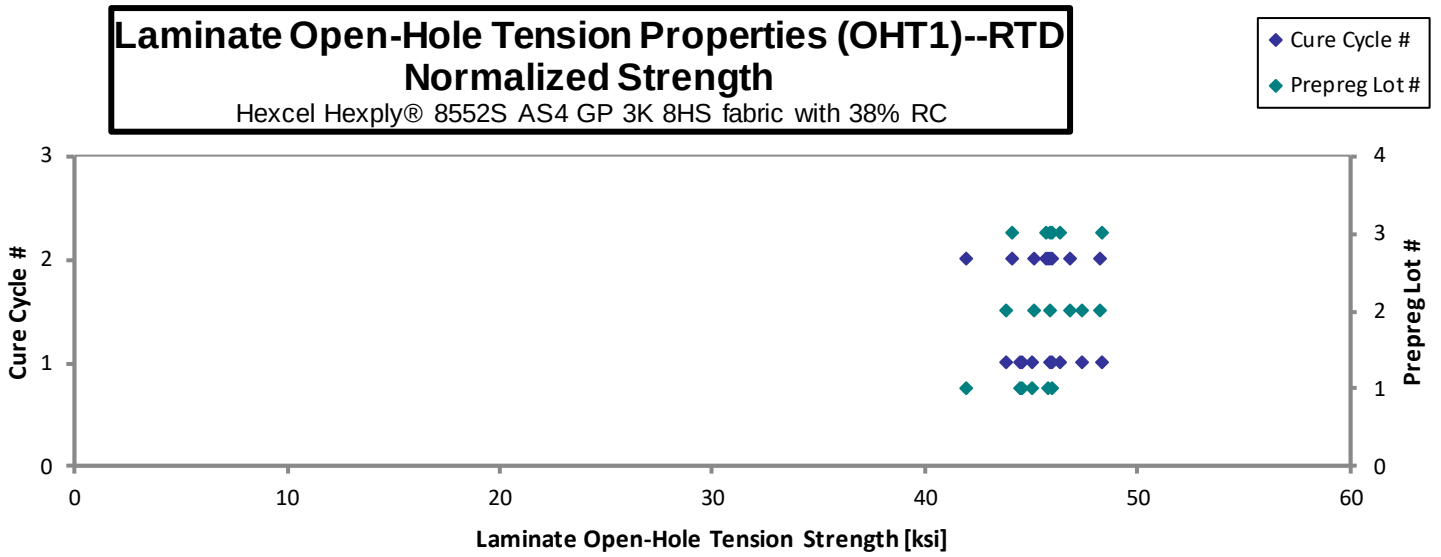
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

normalizing t_{ply} [in]: 0.0150

Specimen Number	Spirit Batch #	Spirit Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HPADA111A	A	M1	1	1	46.62	0.1145	8	LGM	0.0143	44.46
HPADA112A	A	M1	1	1	43.77	0.1222	8	LGM	0.0153	44.58
HPADA113A	A	M1	1	1	43.49	0.1243	8	LGM	0.0155	45.03
HPADA211A	A	M2	1	2	48.27	0.1144	8	LGM	0.0143	46.02
HPADA212A	A	M2	1	2	40.47	0.1243	8	LGM	0.0155	41.92
HPADA213A	A	M2	1	2	43.90	0.1252	8	LGM	0.0157	45.81
HPADB111A	B	M1	2	1	50.85	0.1119	8	LGM	0.0140	47.41
HPADB112A	B	M1	2	1	45.12	0.1221	8	LGM	0.0153	45.90
HPADB113A	B	M1	2	1	41.86	0.1258	8	LGM	0.0157	43.88
HPADB211A	B	M2	2	2	47.77	0.1134	8	LGM	0.0142	45.15
HPADB212A	B	M2	2	2	48.14	0.1202	8	LGM	0.0150	48.22
HPADB213A	B	M2	2	2	44.90	0.1253	8	LGM	0.0157	46.88
HPADC111A	C	M1	3	1	48.88	0.1138	8	LGM	0.0142	46.35
HPADC112A	C	M1	3	1	47.95	0.1210	8	LGM	0.0151	48.36
HPADC113A	C	M1	3	1	44.04	0.1253	8	LGM	0.0157	45.97
HPADC212A	C	M2	3	2	43.54	0.1217	8	LGM	0.0152	44.14
HPADC213A	C	M2	3	2	43.66	0.1257	8	LGM	0.0157	45.71
HPADC214A	C	M2	3	2	43.67	0.1261	8	LGM	0.0158	45.88

Average	**45.38**	
Standard Dev.	**2.746**	
Coeff. of Var. [%]	**6.051**	
Min.	**40.47**	
Max.	**50.85**	
Number of Spec.	**18**	

$Average_{norm}$	**0.0151**	**45.65**
$Standard\ Dev._{norm}$		**1.571**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**3.442**
Min.	**0.0140**	**41.92**
Max.	**0.0158**	**48.36**
Number of Spec.	**18**	**18**


Laminate Open-Hole Tension Properties (OHT1)--RTD
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
10
20
30
40
50
60
Laminate Open-Hole Tension Strength [ksi]

Laminate Open-Hole Tension Properties (OHT1)--ETW
Strength

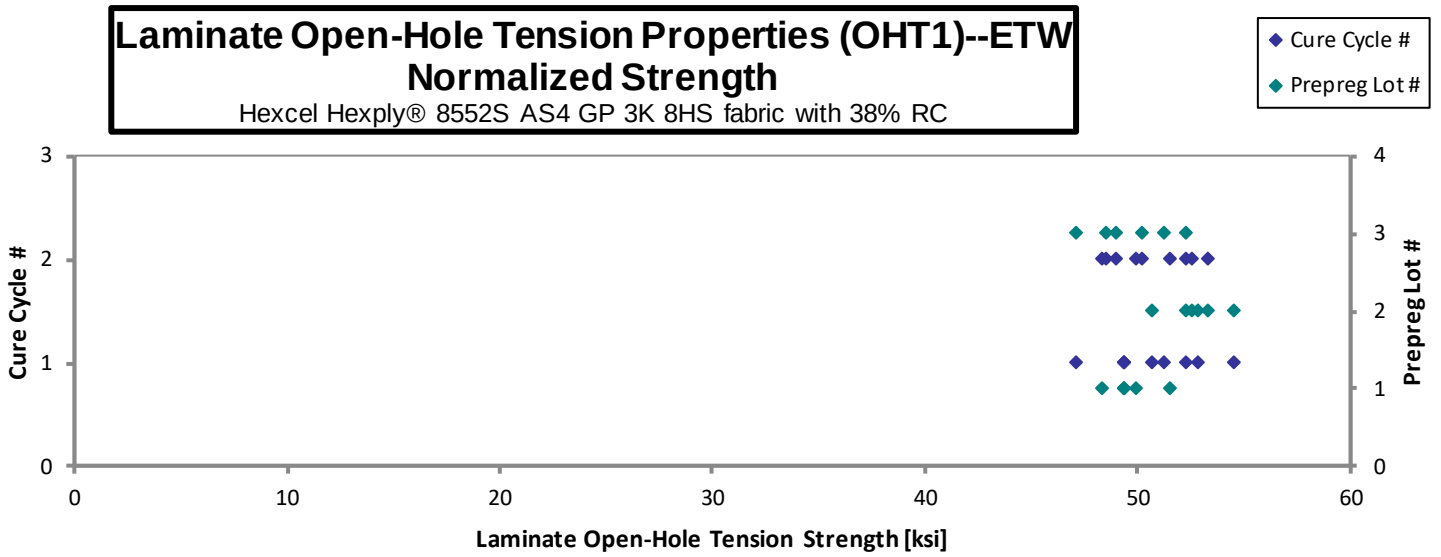
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HPADA111D	A	M1	1	1	48.08	0.1234	8	M(A,L)GM	0.0154	49.42
HPADA112D	A	M1	1	1	47.13	0.1256	8	M(A,L)GM	0.0157	49.34
HPADA113D	A	M1	1	1	47.53	0.1246	8	M(A,L)GM	0.0156	49.37
HPADA211D	A	M2	1	2	48.43	0.1237	8	M(A,L)GM	0.0155	49.93
HPADA212D	A	M2	1	2	46.91	0.1237	8	M(A,L)GM	0.0155	48.35
HPADA213D	A	M2	1	2	50.03	0.1235	8	M(A,L)GM	0.0154	51.50
HPADB111D	B	M1	2	1	52.23	0.1253	8	M(A,L)GM	0.0157	54.51
HPADB112D	B	M1	2	1	48.26	0.1261	8	M(A,L)GM	0.0158	50.72
HPADB113D	B	M1	2	1	50.22	0.1264	8	M(A,L)GM	0.0158	52.90
HPADB211D	B	M2	2	2	51.80	0.1235	8	M(A,L)GM	0.0154	53.29
HPADB212D	B	M2	2	2	50.09	0.1254	8	M(A,L)GM	0.0157	52.34
HPADB213D	B	M2	2	2	50.37	0.1252	8	M(A,L)GM	0.0157	52.56
HPADC111D	C	M1	3	1	51.31	0.1224	8	M(A,L)GM	0.0153	52.32
HPADC112D	C	M1	3	1	45.47	0.1244	8	M(A,L)GM	0.0156	47.15
HPADC113D	C	M1	3	1	49.18	0.1250	8	M(A,L)GM	0.0156	51.21
HPADC211D	C	M2	3	2	48.94	0.1231	8	M(A,L)GM	0.0154	50.19
HPADC212D	C	M2	3	2	47.50	0.1239	8	M(A,L)GM	0.0155	49.03
HPADC213D	C	M2	3	2	47.13	0.1235	8	M(A,L)GM	0.0154	48.50

Average	**48.92**	
Standard Dev.	**1.863**	
Coeff. of Var. [%]	**3.808**	
Min.	**45.47**	
Max.	**52.23**	
Number of Spec.	**18**	

$Average_{norm}$	**0.0155**	**50.70**
$Standard\ Dev._{norm}$		**1.994**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**3.934**
Min.	**0.0153**	**47.15**
Max.	**0.0158**	**54.51**
Number of Spec.	**18**	**18**


Laminate Open-Hole Tension Properties (OHT1)--ETW
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Open-Hole Tension Strength [ksi]
0
10
20
30
40
50
60
0
1
2
3
4

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

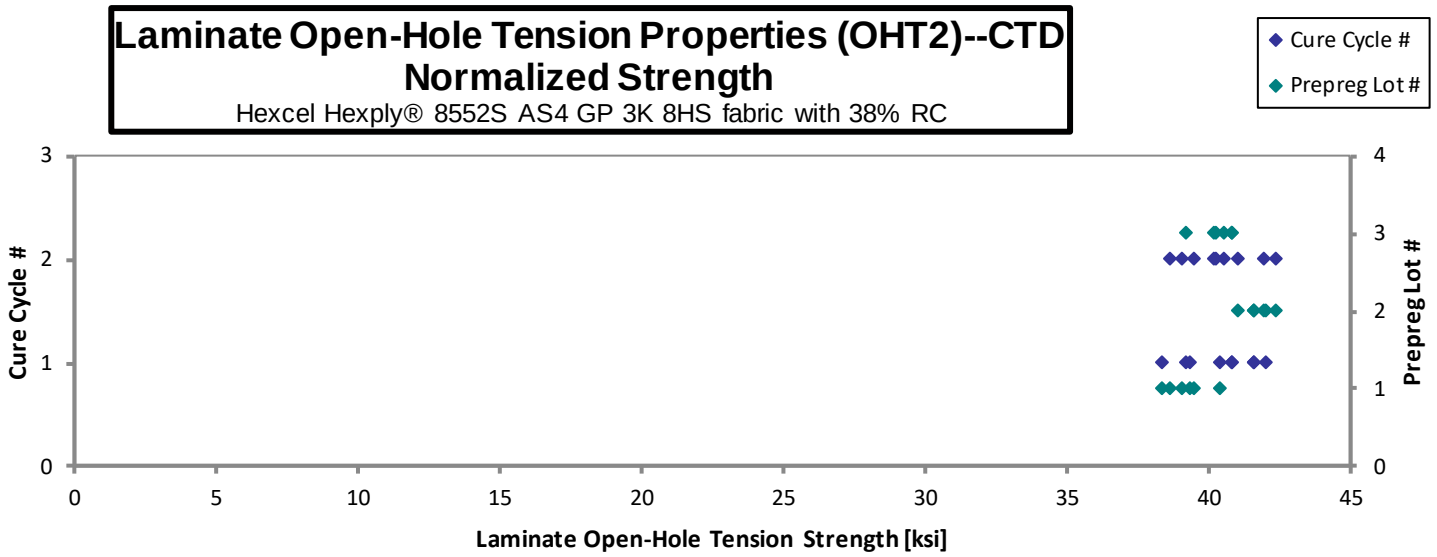
Laminate Open-Hole Tension Properties (OHT2)--CTD
Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HPAEA111B	A	M1	1	1	36.99	0.1596	10	AGM	0.0160	39.36
HPAEA112B	A	M1	1	1	38.96	0.1556	10	AGM	0.0156	40.42
HPAEA113B	A	M1	1	1	40.83	0.1411	10	AGM	0.0141	38.40
HPAEA211B	A	M2	1	2	37.69	0.1557	10	AGM	0.0156	39.11
HPAEA212B	A	M2	1	2	37.42	0.1550	10	AGM	0.0155	38.66
HPAEA213B	A	M2	1	2	38.86	0.1525	10	AGM	0.0152	39.50
HPAEB111B	B	M1	2	1	39.88	0.1581	10	LGM	0.0158	42.04
HPAEB112B	B	M1	2	1	39.80	0.1567	10	LGM	0.0157	41.59
HPAEB113B	B	M1	2	1	40.92	0.1526	10	LGM	0.0153	41.62
HPAEB211B	B	M2	2	2	39.49	0.1595	10	AGM	0.0160	42.00
HPAEB212B	B	M2	2	2	40.40	0.1575	10	AGM	0.0157	42.41
HPAEB213B	B	M2	2	2	40.43	0.1522	10	AGM	0.0152	41.03
HPAEC111B	C	M1	3	1	38.59	0.1589	10	AGM	0.0159	40.87
HPAEC112B	C	M1	3	1	39.09	0.1568	10	AGM	0.0157	40.87
HPAEC113B	C	M1	3	1	42.31	0.1390	10	AGM	0.0139	39.19
HPAEC211B	C	M2	3	2	38.10	0.1582	10	AGM	0.0158	40.19
HPAEC212B	C	M2	3	2	38.65	0.1563	10	AGM	0.0156	40.27
HPAEC213B	C	M2	3	2	43.89	0.1386	10	AGM	0.0139	40.55

Average	**39.57**	
Standard Dev.	**1.733**	
Coeff. of Var. [%]	**4.379**	
Min.	**36.99**	
Max.	**43.89**	
Number of Spec.	**18**	

$Average_{norm}$	**0.0154**	**40.45**
$Standard\ Dev._{norm}$		**1.214**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**3.001**
Min.	**0.0139**	**38.40**
Max.	**0.0160**	**42.41**
Number of Spec.	**18**	**18**


Laminate Open-Hole Tension Properties (OHT2)--CTD
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Open-Hole Tension Strength [ksi]
0
1
2
3
4
0
5
10
15
20
25
30
35
40
45

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

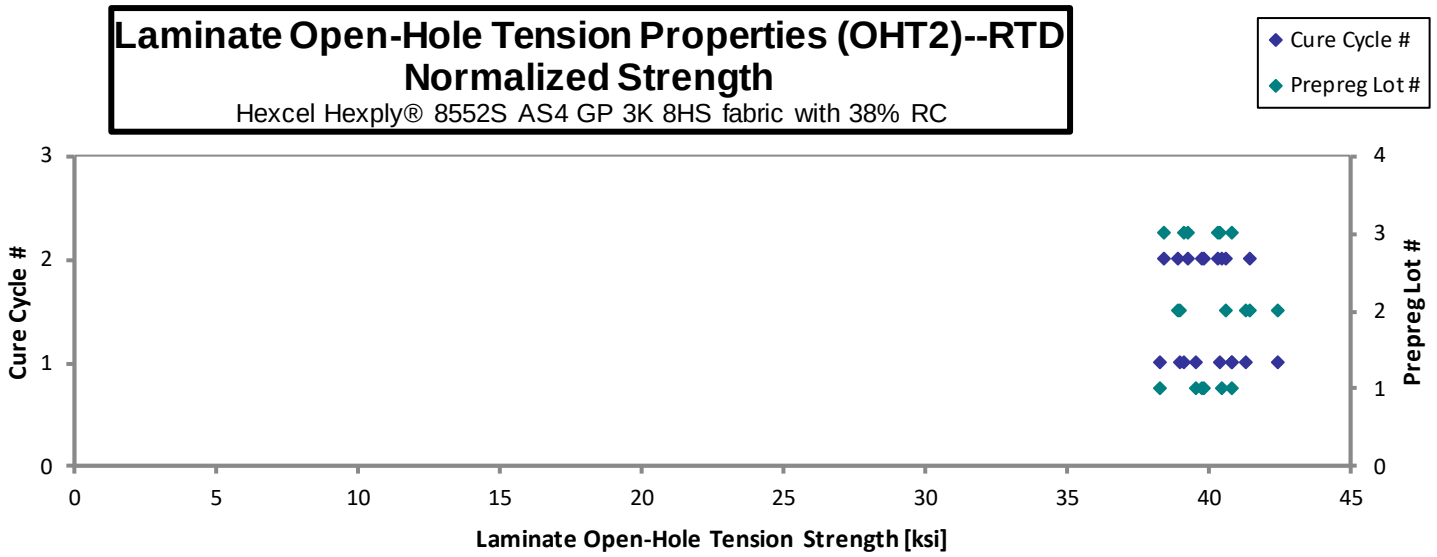
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HPAEA111A	A	M1	1	1	41.29	0.1392	10	AGM	0.0139	38.30
HPAEA112A	A	M1	1	1	38.67	0.1534	10	AGM	0.0153	39.54
HPAEA113A	A	M1	1	1	38.53	0.1589	10	AGM	0.0159	40.82
HPAEA211A	A	M2	1	2	41.55	0.1439	10	AGM	0.0144	39.86
HPAEA212A	A	M2	1	2	38.85	0.1537	10	AGM	0.0154	39.81
HPAEA213A	A	M2	1	2	38.80	0.1566	10	AGM	0.0157	40.49
HPAEB111A	B	M1	2	1	42.07	0.1390	10	AGM	0.0139	38.99
HPAEB112A	B	M1	2	1	41.34	0.1501	10	AGM	0.0150	41.36
HPAEB113A	B	M1	2	1	40.97	0.1555	10	AGM	0.0155	42.47
HPAEB211A	B	M2	2	2	41.44	0.1409	10	AGM	0.0141	38.91
HPAEB212A	B	M2	2	2	39.83	0.1530	10	AGM	0.0153	40.62
HPAEB213A	B	M2	2	2	39.43	0.1578	10	AGM	0.0158	41.48
HPAEC111A	C	M1	3	1	41.71	0.1407	10	AGM	0.0141	39.13
HPAEC112A	C	M1	3	1	40.06	0.1513	10	AGM	0.0151	40.41
HPAEC113A	C	M1	3	1	39.06	0.1569	10	AGM	0.0157	40.84
HPAEC211A	C	M2	3	2	41.25	0.1398	10	AGM	0.0140	38.44
HPAEC212A	C	M2	3	2	39.52	0.1492	10	AGM	0.0149	39.30
HPAEC213A	C	M2	3	2	38.95	0.1554	10	AGM	0.0155	40.36

Average	**40.18**	
Standard Dev.	**1.244**	
Coeff. of Var. [%]	**3.096**	
Min.	**38.53**	
Max.	**42.07**	
Number of Spec.	**18**	

$Average_{norm}$	**0.0150**	**40.06**
$Standard\ Dev._{norm}$		**1.122**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**2.801**
Min.	**0.0139**	**38.30**
Max.	**0.0159**	**42.47**
Number of Spec.	**18**	**18**


Laminate Open-Hole Tension Properties (OHT2)--RTD
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Open-Hole Tension Strength [ksi]
0
1
2
3
4
0
5
10
15
20
25
30
35
40
45

Laminate Open-Hole Tension Properties (OHT2)--ETW
Strength

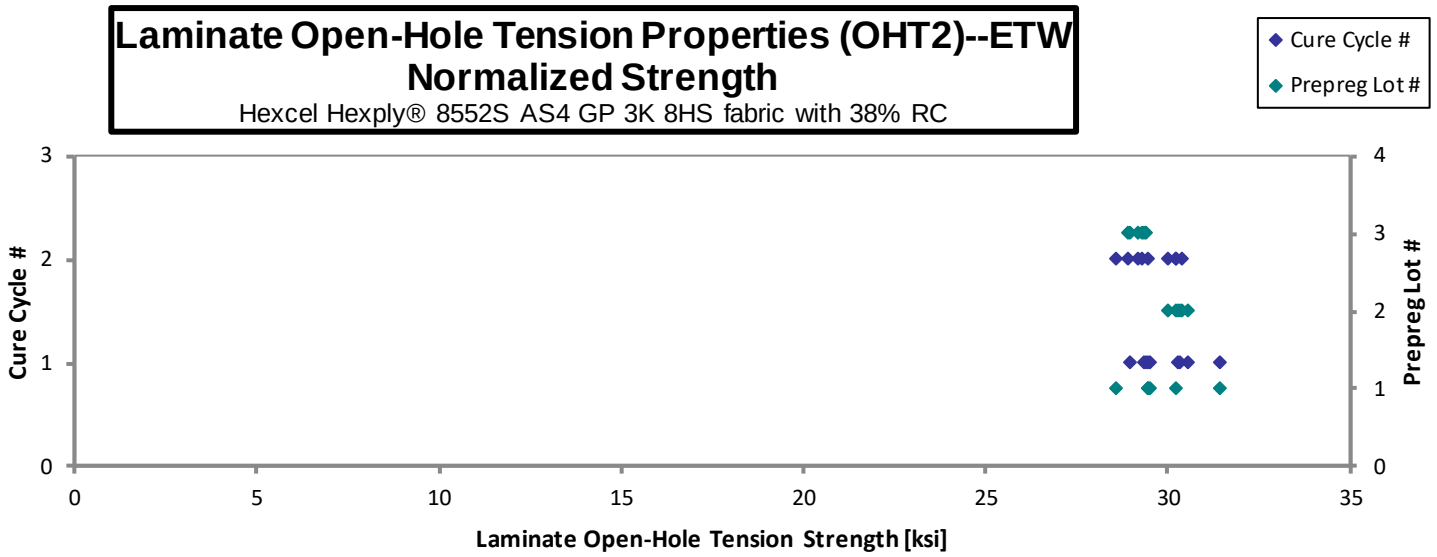
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HPAEA111D	A	M1	1	1	27.92	0.1583	10	AGM	0.0158	29.45
HPAEA112D	A	M1	1	1	29.60	0.1594	10	AGM	0.0159	31.45
HPAEA113D	A	M1	1	1	28.00	0.1581	10	AGM	0.0158	29.51
HPAEA211D	A	M2	1	2	28.58	0.1546	10	AGM	0.0155	29.46
HPAEA212D	A	M2	1	2	27.13	0.1581	10	AGM	0.0158	28.59
HPAEA213D	A	M2	1	2	28.71	0.1579	10	AGM	0.0158	30.23
HPAEB111D	B	M1	2	1	29.98	0.1516	10	AGM	0.0152	30.30
HPAEB112D	B	M1	2	1	28.84	0.1590	10	AGM	0.0159	30.57
HPAEB113D	B	M1	2	1	28.36	0.1603	10	AGM	0.0160	30.31
HPAEB211D	B	M2	2	2	29.63	0.1531	10	AGM	0.0153	30.23
HPAEB212D	B	M2	2	2	28.28	0.1592	10	AGM	0.0159	30.02
HPAEB213D	B	M2	2	2	28.35	0.1608	10	AGM	0.0161	30.39
HPAEC111D	C	M1	3	1	28.68	0.1539	10	AGM	0.0154	29.42
HPAEC112D	C	M1	3	1	28.21	0.1559	10	AGM	0.0156	29.33
HPAEC113D	C	M1	3	1	27.83	0.1561	10	AGM	0.0156	28.96
HPAEC211D	C	M2	3	2	28.62	0.1535	10	AGM	0.0153	29.28
HPAEC212D	C	M2	3	2	27.87	0.1557	10	AGM	0.0156	28.93
HPAEC213D	C	M2	3	2	28.10	0.1557	10	AGM	0.0156	29.17

Average	**28.48**	
Standard Dev.	**0.7071**	
Coeff. of Var. [%]	**2.482**	
Min.	**27.13**	
Max.	**29.98**	
Number of Spec.	**18**	

$Average_{norm}$	**0.0157**	**29.76**
$Standard\ Dev._{norm}$		**0.7201**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**2.420**
Min.	**0.0152**	**28.59**
Max.	**0.0161**	**31.45**
Number of Spec.	**18**	**18**


Laminate Open-Hole Tension Properties (OHT2)--ETW
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Open-Hole Tension Strength [ksi]
0
1
2
3
4
0
5
10
15
20
25
30
35

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

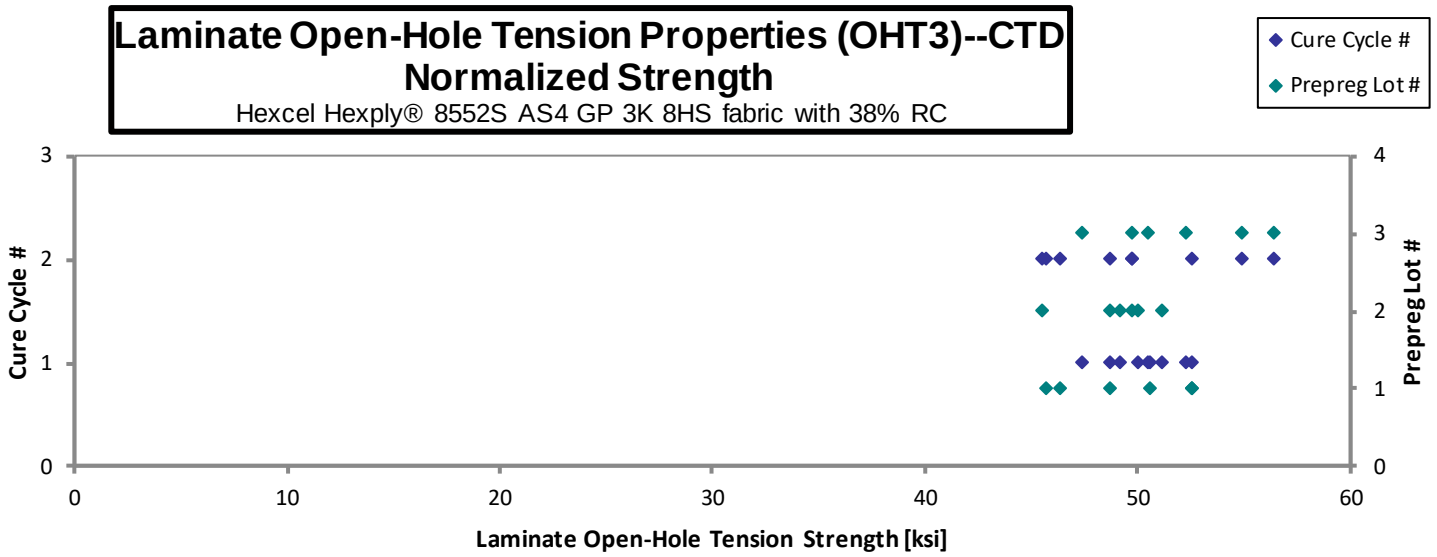
Laminate Open-Hole Tension Properties (OHT3)--CTD
Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HPAFA111B	A	M1	1	1	45.24	0.1617	10	LGM	0.0162	48.76
HPAFA112B	A	M1	1	1	48.13	0.1576	10	LGM	0.0158	50.56
HPAFA113B	A	M1	1	1	55.96	0.1408	10	LGM	0.0141	52.54
HPAFA211B	A	M2	1	2	45.67	0.1524	10	LGM	0.0152	46.41
HPAFA212B	A	M2	1	2	42.96	0.1595	10	LGM	0.0159	45.67
HPAFA213B	A	M2	1	2	49.72	0.1586	10	LGM	0.0159	52.55
HPAFB111B	B	M1	2	1	49.36	0.1521	10	LGM	0.0152	50.05
HPAFB112B	B	M1	2	1	54.12	0.1418	10	LGM	0.0142	51.16
HPAFB113B	B	M1	2	1	48.21	0.1531	10	LGM	0.0153	49.19
HPAFB211B	B	M2	2	2	45.71	0.1599	10	LGM	0.0160	48.74
HPAFB212B	B	M2	2	2	42.85	0.1595	10	LGM	0.0159	45.56
HPAFB213B	B	M2	2	2	48.17	0.1549	10	LGM	0.0155	49.72
HPAFC111B	C	M1	3	1	49.58	0.1582	10	LGM	0.0158	52.28
HPAFC112B	C	M1	3	1	48.57	0.1561	10	LGM	0.0156	50.54
HPAFC113B	C	M1	3	1	50.55	0.1408	10	LGM	0.0141	47.43
HPAFC211B	C	M2	3	2	47.82	0.1561	10	LGM	0.0156	49.76
HPAFC212B	C	M2	3	2	53.13	0.1550	10	LGM	0.0155	54.89
HPAFC213B	C	M2	3	2	61.03	0.1387	10	LGM	0.0139	56.43

Average	**49.27**	
Standard Dev.	**4.554**	
Coeff. of Var. [%]	**9.243**	
Min.	**42.85**	
Max.	**61.03**	
Number of Spec.	**18**	

$Average_{norm}$	**0.0153**	**50.12**
$Standard\ Dev._{norm}$		**2.940**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**5.866**
Min.	**0.0139**	**45.56**
Max.	**0.0162**	**56.43**
Number of Spec.	**18**	**18**


Laminate Open-Hole Tension Properties (OHT3)--CTD
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
10
20
30
40
50
60
Laminate Open-Hole Tension Strength [ksi]

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

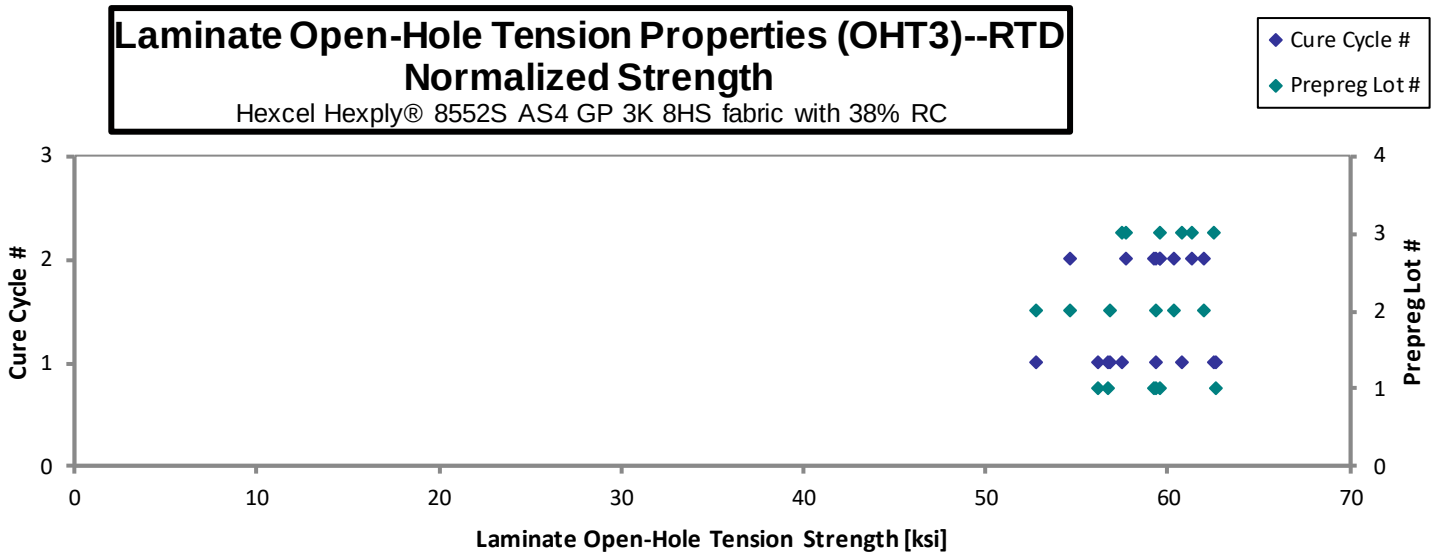
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HPAFA111A	A	M1	1	1	67.53	0.1392	10	LGM	0.0139	62.67
HPAFA112A	A	M1	1	1	55.06	0.1547	10	LGM	0.0155	56.77
HPAFA113A	A	M1	1	1	52.30	0.1612	10	LGM	0.0161	56.19
HPAFA211A	A	M2	1	2	64.59	0.1384	10	LGM	0.0138	59.60
HPAFA212A	A	M2	1	2	58.85	0.1514	10	LGM	0.0151	59.39
HPAFA213A	A	M2	1	2	56.18	0.1582	10	LGM	0.0158	59.25
HPAFB111A	B	M1	2	1	49.72	0.1593	10	LGM	0.0159	52.80
HPAFB112A	B	M1	2	1	52.84	0.1615	10	LGM	0.0161	56.89
HPAFB113A	B	M1	2	1	55.51	0.1603	10	LGM	0.0160	59.32
HPAFB211A	B	M2	2	2	65.81	0.1413	10	LGM	0.0141	61.98
HPAFB212A	B	M2	2	2	54.13	0.1514	10	LGM	0.0151	54.62
HPAFB213A	B	M2	2	2	57.81	0.1566	10	LGM	0.0157	60.37
HPAFC111A	C	M1	3	1	64.55	0.1413	10	LGM	0.0141	60.79
HPAFC112A	C	M1	3	1	62.29	0.1506	10	LGM	0.0151	62.56
HPAFC113A	C	M1	3	1	55.44	0.1556	10	LGM	0.0156	57.50
HPAFC211A	C	M2	3	2	64.07	0.1396	10	LGM	0.0140	59.61
HPAFC212A	C	M2	3	2	61.92	0.1486	10	LGM	0.0149	61.33
HPAFC213A	C	M2	3	2	56.42	0.1534	10	LGM	0.0153	57.70

Average	**58.61**	
Standard Dev.	**5.273**	
Coeff. of Var. [%]	**8.996**	
Min.	**49.72**	
Max.	**67.53**	
Number of Spec.	**18**	

$Average_{norm}$	**0.0151**	**58.85**
$Standard\ Dev._{norm}$		**2.712**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**4.609**
Min.	**0.0138**	**52.80**
Max.	**0.0161**	**62.67**
Number of Spec.	**18**	**18**


Laminate Open-Hole Tension Properties (OHT3)--RTD
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Open-Hole Tension Strength [ksi]
0
1
2
3
4
0
10
20
30
40
50
60
70

Laminate Open-Hole Tension Properties (OHT3)--ETW
Strength

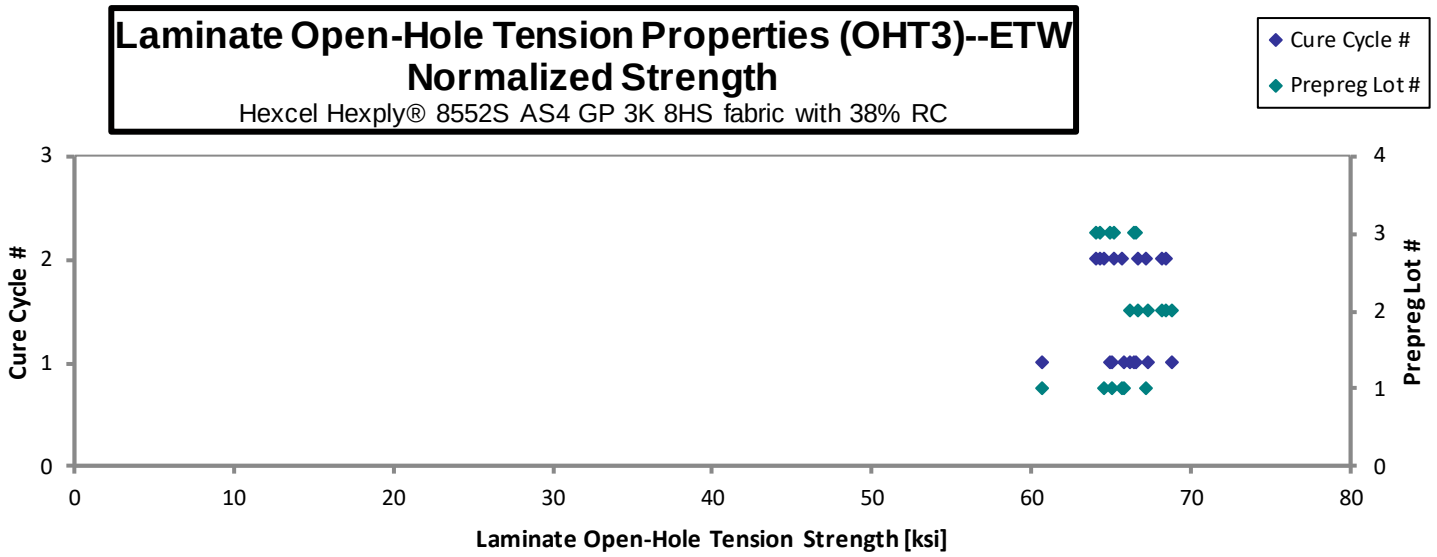
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HPAFA111D	A	M1	1	1	61.60	0.1584	10	LGM	0.0158	65.05
HPAFA112D	A	M1	1	1	56.96	0.1597	10	LGM	0.0160	60.66
HPAFA113D	A	M1	1	1	62.13	0.1589	10	LGM	0.0159	65.81
HPAFA211D	A	M2	1	2	66.21	0.1489	10	M(A,L)GM	0.0149	65.71
HPAFA212D	A	M2	1	2	60.91	0.1592	10	LGM	0.0159	64.62
HPAFA213D	A	M2	1	2	63.80	0.1579	10	M(A,L)GM	0.0158	67.16
HPAFB111D	B	M1	2	1	62.91	0.1578	10	LGM	0.0158	66.16
HPAFB112D	B	M1	2	1	65.11	0.1585	10	LGM	0.0158	68.80
HPAFB113D	B	M1	2	1	64.60	0.1562	10	M(A,L)GM	0.0156	67.29
HPAFB212D	B	M2	2	2	63.82	0.1568	10	LGM	0.0157	66.71
HPAFB213D	B	M2	2	2	64.28	0.1599	10	LGM	0.0160	68.53
HPAFB214D	B	M2	2	2	63.89	0.1601	10	LGM	0.0160	68.19
HPAFC111D	C	M1	3	1	65.16	0.1529	10	LGM	0.0153	66.43
HPAFC112D	C	M1	3	1	63.02	0.1545	10	M(A,L)GM	0.0154	64.90
HPAFC113D	C	M1	3	1	64.16	0.1557	10	M(A,L)GM	0.0156	66.57
HPAFC211D	C	M2	3	2	63.92	0.1529	10	LGM	0.0153	65.15
HPAFC212D	C	M2	3	2	62.28	0.1543	10	LGM	0.0154	64.08
HPAFC213D	C	M2	3	2	62.58	0.1541	10	LGM	0.0154	64.29

Average	**63.19**	
Standard Dev.	**2.052**	
Coeff. of Var. [%]	**3.248**	
Min.	**56.96**	
Max.	**66.21**	
Number of Spec.	**18**	

$Average_{norm}$	**0.0156**	**65.89**
$Standard\ Dev._{norm}$		**1.923**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**2.918**
Min.	**0.0149**	**60.66**
Max.	**0.0160**	**68.80**
Number of Spec.	**18**	**18**


Laminate Open-Hole Tension Properties (OHT3)--ETW
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Open-Hole Tension Strength [ksi]
0
10
20
30
40
50
60
70
80
0
1
2
3
4

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

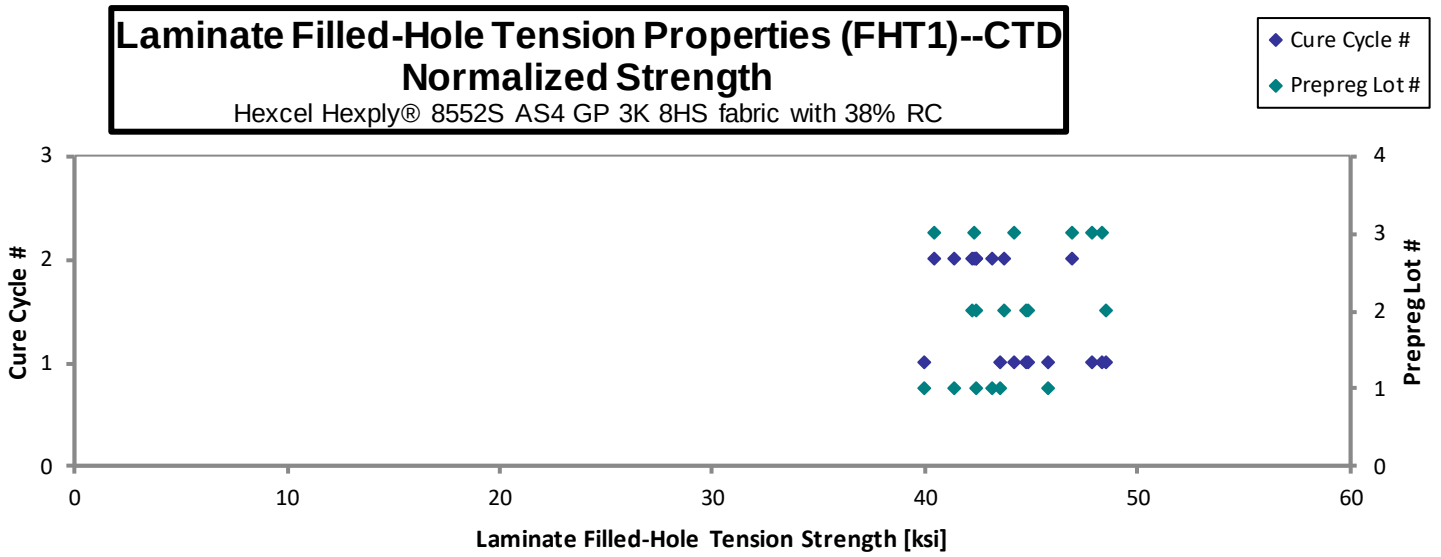
Laminate Filled-Hole Tension Properties (FHT1)--CTD
Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HPA4A111B	A	M1	1	1	40.79	0.1282	8	LGM	0.0160	43.58
HPA4A112B	A	M1	1	1	43.33	0.1269	8	LGM	0.0159	45.82
HPA4A113B	A	M1	1	1	44.16	0.1088	8	LGM	0.0136	40.02
HPA4A211B	A	M2	1	2	44.34	0.1121	8	LGM	0.0140	41.41
HPA4A212B	A	M2	1	2	42.19	0.1207	8	LGM	0.0151	42.44
HPA4A213B	A	M2	1	2	41.41	0.1250	8	LGM	0.0156	43.14
HPA4B111B	B	M1	2	1	41.25	0.1306	8	LGM	0.0163	44.88
HPA4B112B	B	M1	2	1	45.37	0.1284	8	LGM	0.0161	48.56
HPA4B113B	B	M1	2	1	47.78	0.1124	8	LGM	0.0140	44.73
HPA4B211B	B	M2	2	2	40.95	0.1282	8	LGM	0.0160	43.74
HPA4B212B	B	M2	2	2	40.26	0.1266	8	LGM	0.0158	42.46
HPA4B213B	B	M2	2	2	44.41	0.1142	8	LGM	0.0143	42.25
HPA4C111B	C	M1	3	1	45.27	0.1268	8	LGM	0.0159	47.85
HPA4C112B	C	M1	3	1	46.26	0.1255	8	LGM	0.0157	48.36
HPA4C113B	C	M1	3	1	47.04	0.1127	8	LGM	0.0141	44.19
HPA4C211B	C	M2	3	2	41.21	0.1234	8	LGM	0.0154	42.37
HPA4C212B	C	M2	3	2	45.92	0.1227	8	LGM	0.0153	46.95
HPA4C213B	C	M2	3	2	42.41	0.1143	8	LGM	0.0143	40.40

Average	**43.58**	
Standard Dev.	**2.361**	
Coeff. of Var. [%]	**5.417**	
Min.	**40.26**	
Max.	**47.78**	
Number of Spec.	**18**	

$Average_{norm}$	**0.0152**	**44.06**
$Standard\ Dev._{norm}$		**2.600**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**5.901**
Min.	**0.0136**	**40.02**
Max.	**0.0163**	**48.56**
Number of Spec.	**18**	**18**


Laminate Filled-Hole Tension Properties (FHT1)--CTD
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Filled-Hole Tension Strength [ksi]
0
10
20
30
40
50
60
0
1
2
3
4

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

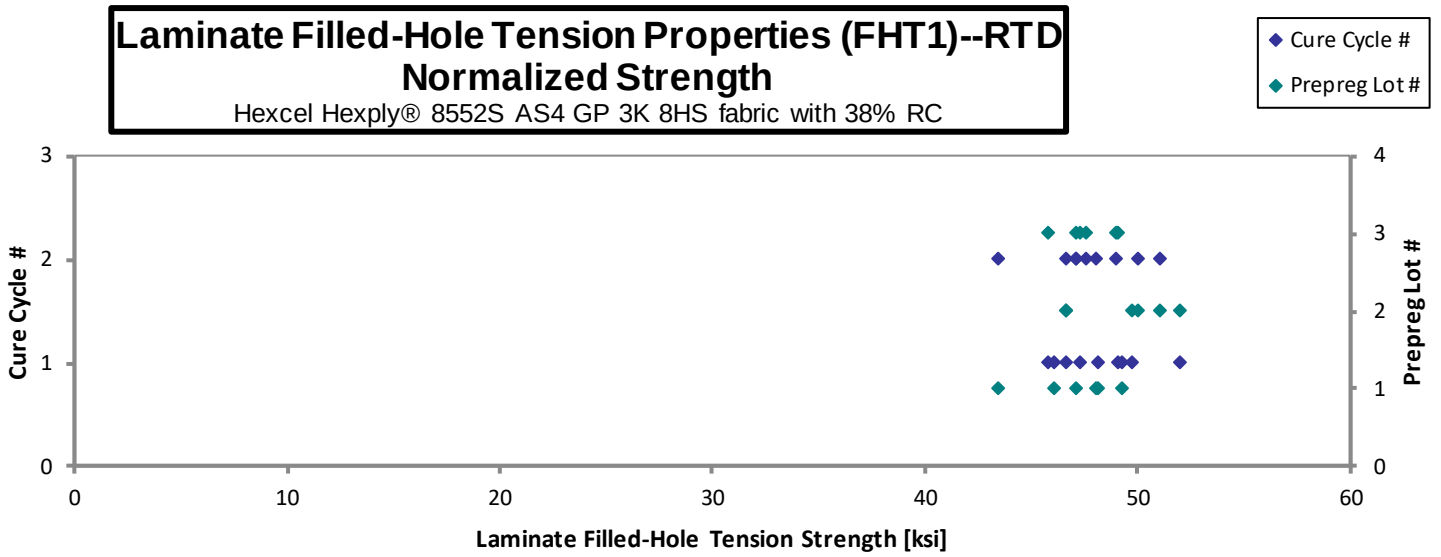
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HPA4A111A	A	M1	1	1	52.43	0.1103	8	LGM	0.0138	48.17
HPA4A112A	A	M1	1	1	48.32	0.1224	8	LGM	0.0153	49.28
HPA4A113A	A	M1	1	1	43.55	0.1271	8	LGM	0.0159	46.11
HPA4A211A	A	M2	1	2	46.28	0.1127	8	LGM	0.0141	43.46
HPA4A212A	A	M2	1	2	47.63	0.1212	8	LGM	0.0151	48.09
HPA4A213A	A	M2	1	2	45.37	0.1246	8	LGM	0.0156	47.11
HPA4B111A	B	M1	2	1	51.08	0.1169	8	LGM	0.0146	49.74
HPA4B112A	B	M1	2	1	45.26	0.1237	8	LGM	0.0155	46.66
HPA4B113A	B	M1	2	1	48.40	0.1290	8	LGM	0.0161	52.04
HPA4B211A	B	M2	2	2	53.48	0.1146	8	LGM	0.0143	51.05
HPA4B212A	B	M2	2	2	48.79	0.1231	8	LGM	0.0154	50.03
HPA4B213A	B	M2	2	2	44.09	0.1271	8	LGM	0.0159	46.68
HPA4C111A	C	M1	3	1	48.61	0.1131	8	LGM	0.0141	45.81
HPA4C112A	C	M1	3	1	46.13	0.1231	8	LGM	0.0154	47.33
HPA4C113A	C	M1	3	1	46.51	0.1266	8	LGM	0.0158	49.06
HPA4C211A	C	M2	3	2	51.50	0.1141	8	LGM	0.0143	48.98
HPA4C212A	C	M2	3	2	46.88	0.1206	8	LGM	0.0151	47.10
HPA4C213A	C	M2	3	2	46.33	0.1233	8	LGM	0.0154	47.59

Average	**47.81**	
Standard Dev.	**2.811**	
Coeff. of Var. [%]	**5.879**	
Min.	**43.55**	
Max.	**53.48**	
Number of Spec.	**18**	

$Average_{norm}$	**0.0151**	**48.02**
$Standard\ Dev._{norm}$		**2.048**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**4.264**
Min.	**0.0138**	**43.46**
Max.	**0.0161**	**52.04**
Number of Spec.	**18**	**18**


Laminate Filled-Hole Tension Properties (FHT1)--RTD
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Filled-Hole Tension Strength [ksi]
0
1
2
3
4
0
10
20
30
40
50
60

Laminate Filled-Hole Tension Properties (FHT1)--ETW
Strength

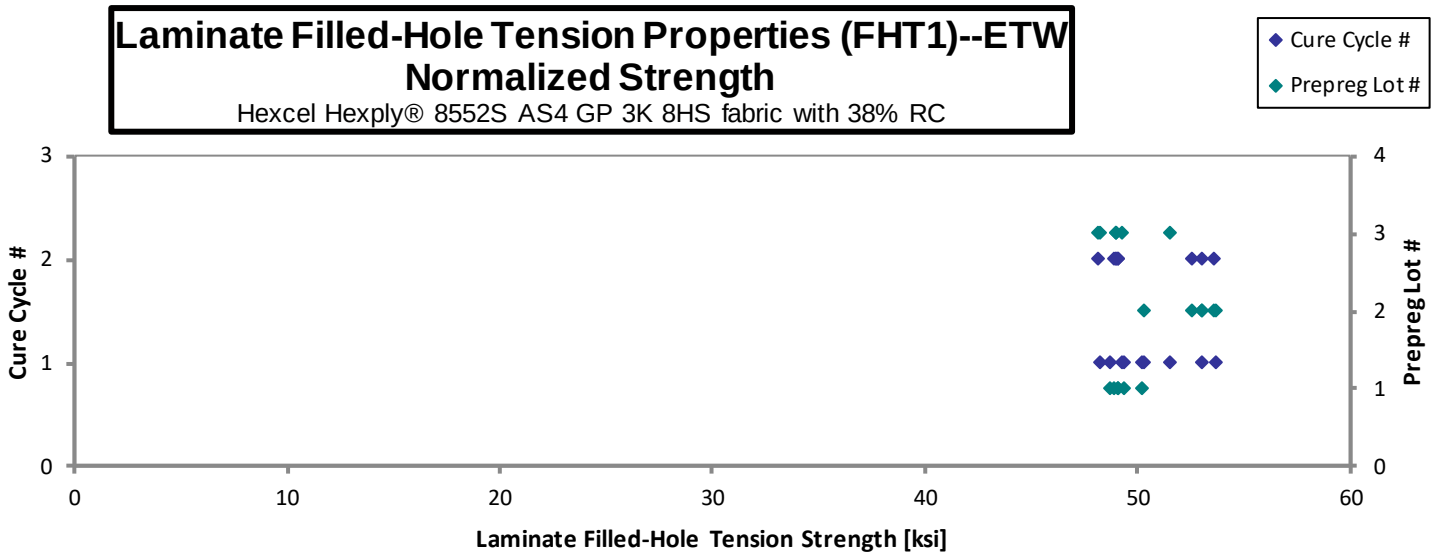
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HPA4A111D	A	M1	1	1	48.14	0.1253	8	M(A,L)GM	0.0157	50.25
HPA4A112D	A	M1	1	1	46.32	0.1262	8	M(A,L)GM	0.0158	48.71
HPA4A113D	A	M1	1	1	47.15	0.1257	8	M(A,L)GM	0.0157	49.37
HPA4A211D	A	M2	1	2	46.48	0.1268	8	M(A,L)GM	0.0158	49.10
HPA4A212D	A	M2	1	2	46.48	0.1267	8	M(A,L)GM	0.0158	49.09
HPA4A213D	A	M2	1	2	47.25	0.1242	8	M(A,L)GM	0.0155	48.89
HPA4B111D	B	M1	2	1	49.46	0.1286	8	M(A,L)GM	0.0161	53.02
HPA4B112D	B	M1	2	1	50.39	0.1279	8	M(A,L)GM	0.0160	53.68
HPA4B113D	B	M1	2	1	48.08	0.1255	8	M(A,L)GM	0.0157	50.28
HPA4B211D	B	M2	2	2	50.26	0.1256	8	M(A,L)GM	0.0157	52.60
HPA4B212D	B	M2	2	2	50.77	0.1268	8	M(A,L)GM	0.0159	53.65
HPA4B213D	B	M2	2	2	50.08	0.1272	8	M(A,L)GM	0.0159	53.06
HPA4C111D	C	M1	3	1	45.91	0.1262	8	M(A,L)GM	0.0158	48.29
HPA4C112D	C	M1	3	1	48.95	0.1263	8	M(A,L)GM	0.0158	51.51
HPA4C113D	C	M1	3	1	47.35	0.1250	8	M(A,L)GM	0.0156	49.30
HPA4C211D	C	M2	3	2	47.02	0.1230	8	M(A,L)GM	0.0154	48.18
HPA4C212D	C	M2	3	2	47.49	0.1239	8	M(A,L)GM	0.0155	49.05
HPA4C213D	C	M2	3	2	47.57	0.1236	8	M(A,L)GM	0.0155	49.00

Average	**48.06**	
Standard Dev.	**1.548**	
Coeff. of Var. [%]	**3.220**	
Min.	**45.91**	
Max.	**50.77**	
Number of Spec.	**18**	

$Average_{norm}$	**0.0157**	**50.39**
$Standard\ Dev._{norm}$		**1.961**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**3.891**
Min.	**0.0154**	**48.18**
Max.	**0.0161**	**53.68**
Number of Spec.	**18**	**18**


Laminate Filled-Hole Tension Properties (FHT1)--ETW
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Filled-Hole Tension Strength [ksi]
0
1
2
3
4
0
10
20
30
40
50
60

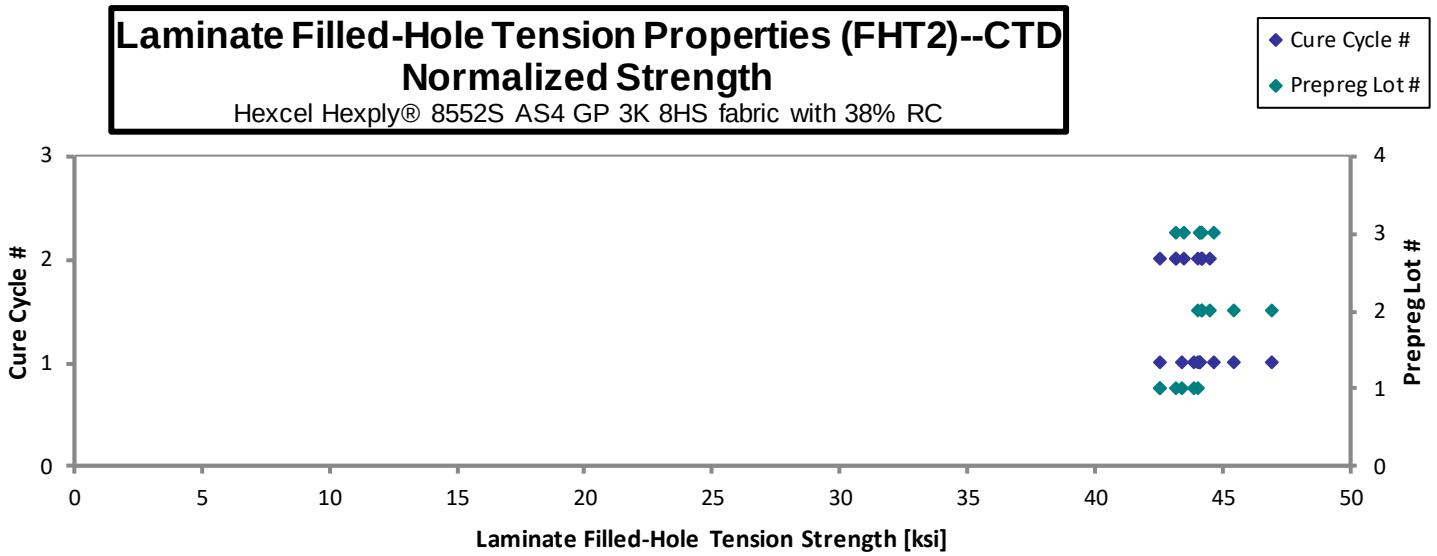
4.18 "10/80/10" Filled-Hole Tension 2 Properties (FHT2)

Laminate Filled-Hole Tension Properties (FHT2)--CTD
Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HPA5A111B	A	M1	1	1	41.34	0.1577	10	AGM	0.0158	43.45
HPA5A112B	A	M1	1	1	41.05	0.1554	10	M(A,L) GM	0.0155	42.52
HPA5A113B	A	M1	1	1	43.72	0.1505	10	AGM	0.0150	43.87
HPA5A211B	A	M2	1	2	39.81	0.1603	10	M(A,L) GM	0.0160	42.55
HPA5A212B	A	M2	1	2	41.53	0.1591	10	M(A,L) GM	0.0159	44.06
HPA5A213B	A	M2	1	2	42.01	0.1542	10	M(A,L) GM	0.0154	43.20
HPA5B111B	B	M1	2	1	44.19	0.1594	10	M(A,L) GM	0.0159	46.95
HPA5B112B	B	M1	2	1	42.90	0.1589	10	M(A,L) GM	0.0159	45.45
HPA5B113B	B	M1	2	1	46.46	0.1423	10	M(A,L) GM	0.0142	44.08
HPA5B211B	B	M2	2	2	41.19	0.1610	10	M(A,L) GM	0.0161	44.20
HPA5B212B	B	M2	2	2	41.79	0.1587	10	M(A,L) GM	0.0159	44.20
HPA5B213B	B	M2	2	2	43.69	0.1529	10	M(A,L) GM	0.0153	44.54
HPA5C111B	C	M1	3	1	42.36	0.1561	10	M(A,L) GM	0.0156	44.09
HPA5C112B	C	M1	3	1	43.48	0.1541	10	M(A,L) GM	0.0154	44.68
HPA5C113B	C	M1	3	1	47.23	0.1402	10	M(A,L) GM	0.0140	44.15
HPA5C211B	C	M2	3	2	41.40	0.1577	10	AGM	0.0158	43.51
HPA5C212B	C	M2	3	2	41.34	0.1568	10	AGM	0.0157	43.20
HPA5C213B	C	M2	3	2	46.39	0.1428	10	AGM	0.0143	44.17

Average	**42.88**	**Average$_{norm}$**	**0.0154**	**44.05**
Standard Dev.	**2.087**	**Standard Dev.$_{norm}$**		**1.023**
Coeff. of Var. [%]	**4.867**	**Coeff. of Var. [%]$_{norm}$**		**2.322**
Min.	**39.81**	**Min.**	**0.0140**	**42.52**
Max.	**47.23**	**Max.**	**0.0161**	**46.95**
Number of Spec.	**18**	**Number of Spec.**	**18**	**18**


Laminate Filled-Hole Tension Properties (FHT2)--CTD
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Filled-Hole Tension Strength [ksi]
0
1
2
3
4
0
5
10
15
20
25
30
35
40
45
50

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

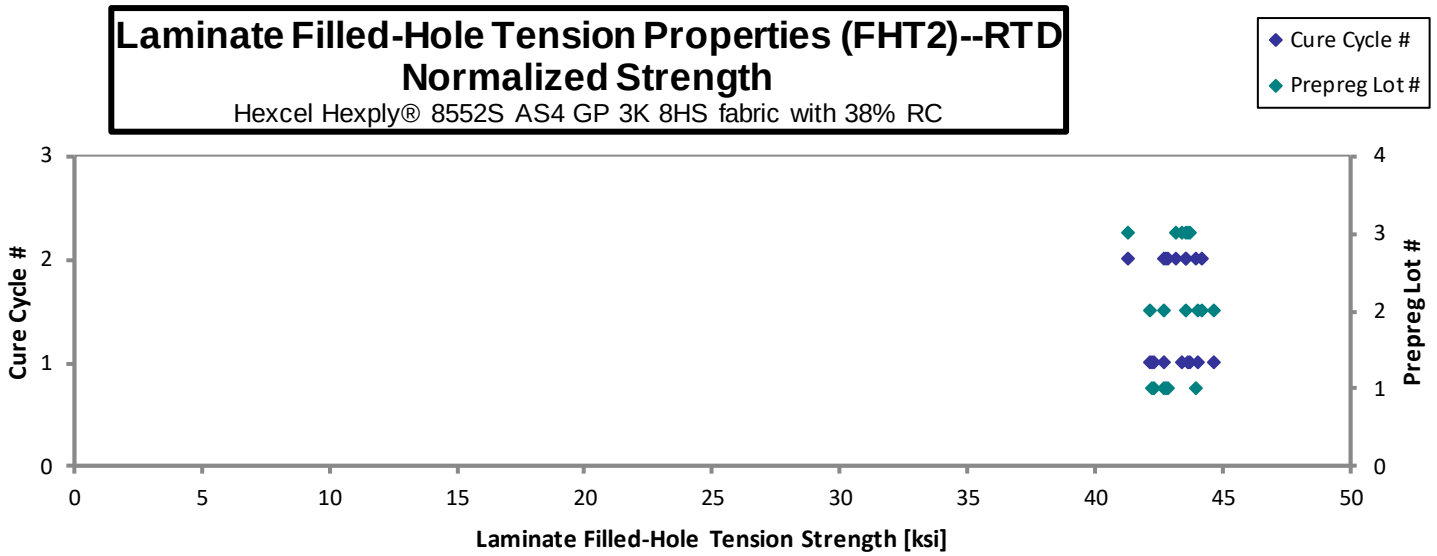
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HPA5A111A	A	M1	1	1	45.10	0.1407	10	M(A,L) GM	0.0141	42.29
HPA5A112A	A	M1	1	1	41.61	0.1523	10	M(A,L) GM	0.0152	42.23
HPA5A113A	A	M1	1	1	40.49	0.1584	10	AGM	0.0158	42.75
HPA5A211A	A	M2	1	2	45.81	0.1400	10	M(A,L) GM	0.0140	42.76
HPA5A212A	A	M2	1	2	42.51	0.1513	10	M(A,L) GM	0.0151	42.86
HPA5A213A	A	M2	1	2	41.97	0.1570	10	AGM	0.0157	43.93
HPA5B111A	B	M1	2	1	44.63	0.1416	10	M(A,L) GM	0.0142	42.13
HPA5B112A	B	M1	2	1	42.54	0.1554	10	M(A,L) GM	0.0155	44.07
HPA5B113A	B	M1	2	1	42.07	0.1592	10	M(A,L) GM	0.0159	44.66
HPA5B211A	B	M2	2	2	45.64	0.1404	10	M(A,L) GM	0.0140	42.72
HPA5B212A	B	M2	2	2	43.28	0.1509	10	AGM	0.0151	43.54
HPA5B213A	B	M2	2	2	42.26	0.1570	10	M(A,L) GM	0.0157	44.23
HPA5C111A	C	M1	3	1	46.00	0.1417	10	M(A,L) GM	0.0142	43.45
HPA5C112A	C	M1	3	1	43.17	0.1517	10	M(A,L) GM	0.0152	43.66
HPA5C113A	C	M1	3	1	42.11	0.1557	10	M(A,L) GM	0.0156	43.70
HPA5C211A	C	M2	3	2	44.29	0.1400	10	AGM	0.0140	41.33
HPA5C212A	C	M2	3	2	43.18	0.1515	10	AGM	0.0151	43.59
HPA5C213A	C	M2	3	2	41.65	0.1556	10	AGM	0.0156	43.19

	Strength [ksi]
Average	**43.24**
Standard Dev.	**1.635**
Coeff. of Var. [%]	**3.781**
Min.	**40.49**
Max.	**46.00**
Number of Spec.	**18**

	t_{ply} [in]	$Strength_{norm}$ [ksi]
$Average_{norm}$	**0.0150**	**43.17**
Standard $Dev._{norm}$		**0.8536**
Coeff. of Var. $[\%]_{norm}$		**1.977**
Min.	**0.0140**	**41.33**
Max.	**0.0159**	**44.66**
Number of Spec.	**18**	**18**


Laminate Filled-Hole Tension Properties (FHT2)--RTD
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Filled-Hole Tension Strength [ksi]
0
1
2
3
4
0
5
10
15
20
25
30
35
40
45
50

Laminate Filled-Hole Tension Properties (FHT2)--ETW
Strength

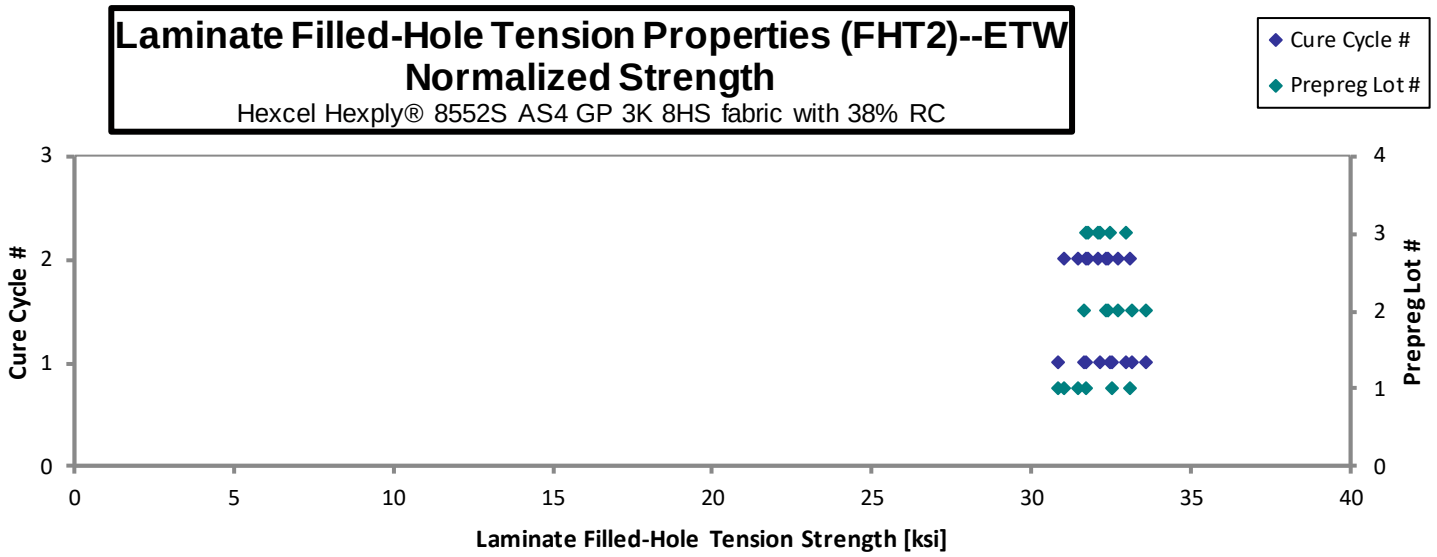
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HPA5A111D	A	M1	1	1	30.36	0.1525	10	AGM	0.0153	30.87
HPA5A112D	A	M1	1	1	30.84	0.1581	10	AGM	0.0158	32.51
HPA5A115D	A	M1	1	1	30.55	0.1556	10	AGM	0.0156	31.70
HPA5A211D	A	M2	1	2	30.40	0.1531	10	AGM	0.0153	31.03
HPA5A212D	A	M2	1	2	31.24	0.1588	10	AGM	0.0159	33.08
HPA5A213D	A	M2	1	2	29.24	0.1615	10	AGM	0.0161	31.48
HPA5B111D	B	M1	2	1	31.92	0.1580	10	AGM	0.0158	33.63
HPA5B112D	B	M1	2	1	29.75	0.1596	10	AGM	0.0160	31.65
HPA5B113D	B	M1	2	1	31.26	0.1591	10	AGM	0.0159	33.15
HPA5B211D	B	M2	2	2	32.19	0.1526	10	AGM	0.0153	32.74
HPA5B212D	B	M2	2	2	30.69	0.1584	10	AGM	0.0158	32.41
HPA5B213D	B	M2	2	2	30.04	0.1614	10	AGM	0.0161	32.33
HPA5C111D	C	M1	3	1	31.27	0.1559	10	AGM	0.0156	32.49
HPA5C112D	C	M1	3	1	30.79	0.1566	10	AGM	0.0157	32.14
HPA5C113D	C	M1	3	1	31.58	0.1567	10	AGM	0.0157	32.99
HPA5C211D	C	M2	3	2	30.87	0.1543	10	AGM	0.0154	31.75
HPA5C212D	C	M2	3	2	30.53	0.1562	10	AGM	0.0156	31.79
HPA5C213D	C	M2	3	2	30.81	0.1562	10	AGM	0.0156	32.09

Average	**30.80**	
Standard Dev.	**0.7287**	
Coeff. of Var. [%]	**2.366**	
Min.	**29.24**	
Max.	**32.19**	
Number of Spec.	**18**	

$Average_{norm}$	**0.0157**	**32.21**
$Standard\ Dev._{norm}$		**0.7466**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**2.318**
Min.	**0.0153**	**30.87**
Max.	**0.0161**	**33.63**
Number of Spec.	**18**	**18**


Laminate Filled-Hole Tension Properties (FHT2)--ETW
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Filled-Hole Tension Strength [ksi]
0
1
2
3
4
0
5
10
15
20
25
30
35
40

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

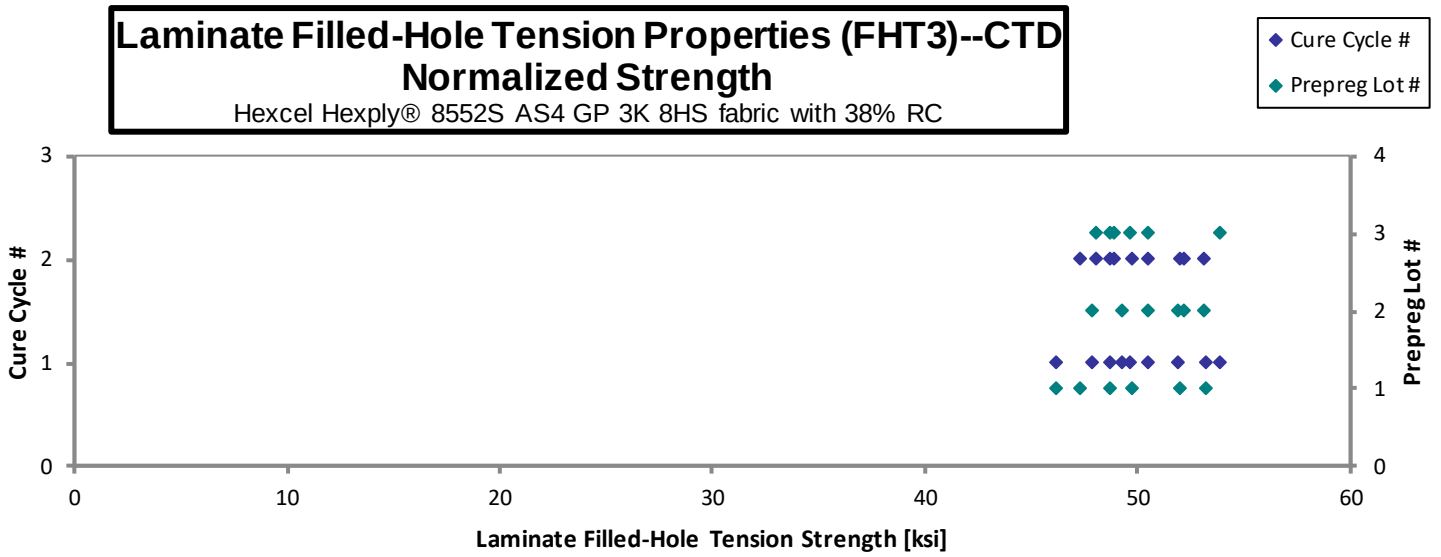
Laminate Filled-Hole Tension Properties (FHT3)--CTD
Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HPA6A111B	A	M1	1	1	50.10	0.1595	10	LGM	0.0159	53.25
HPA6A112B	A	M1	1	1	46.42	0.1573	10	LGM	0.0157	48.68
HPA6A113B	A	M1	1	1	49.18	0.1410	10	LGM	0.0141	46.22
HPA6A211B	A	M2	1	2	45.60	0.1638	10	LGM	0.0164	49.80
HPA6A212B	A	M2	1	2	49.88	0.1422	10	LGM	0.0142	47.30
HPA6A213B	A	M2	1	2	51.90	0.1503	10	LGM	0.0150	52.00
HPA6B111B	B	M1	2	1	45.07	0.1594	10	LGM	0.0159	47.91
HPA6B112B	B	M1	2	1	46.78	0.1580	10	LGM	0.0158	49.27
HPA6B113B	B	M1	2	1	54.16	0.1437	10	LGM	0.0144	51.88
HPA6B211B	B	M2	2	2	49.83	0.1572	10	LGM	0.0157	52.22
HPA6B212B	B	M2	2	2	48.45	0.1564	10	LGM	0.0156	50.52
HPA6B213B	B	M2	2	2	51.82	0.1538	10	LGM	0.0154	53.14
HPA6C111B	C	M1	3	1	47.37	0.1572	10	LGM	0.0157	49.63
HPA6C112B	C	M1	3	1	48.59	0.1560	10	LGM	0.0156	50.53
HPA6C113B	C	M1	3	1	56.86	0.1421	10	LGM	0.0142	53.85
HPA6C211B	C	M2	3	2	45.82	0.1574	10	LGM	0.0157	48.07
HPA6C212B	C	M2	3	2	47.42	0.1547	10	LGM	0.0155	48.91
HPA6C213B	C	M2	3	2	50.82	0.1438	10	LGM	0.0144	48.72

Average	**49.23**	
Standard Dev.	**3.108**	
Coeff. of Var. [%]	**6.313**	
Min.	**45.07**	
Max.	**56.86**	
Number of Spec.	**18**	

$Average_{norm}$	**0.0153**	**50.11**
$Standard\ Dev._{norm}$		**2.211**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**4.413**
Min.	**0.0141**	**46.22**
Max.	**0.0164**	**53.85**
Number of Spec.	**18**	**18**


Laminate Filled-Hole Tension Properties (FHT3)--CTD
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Filled-Hole Tension Strength [ksi]
0
1
2
3
4
0
10
20
30
40
50
60

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

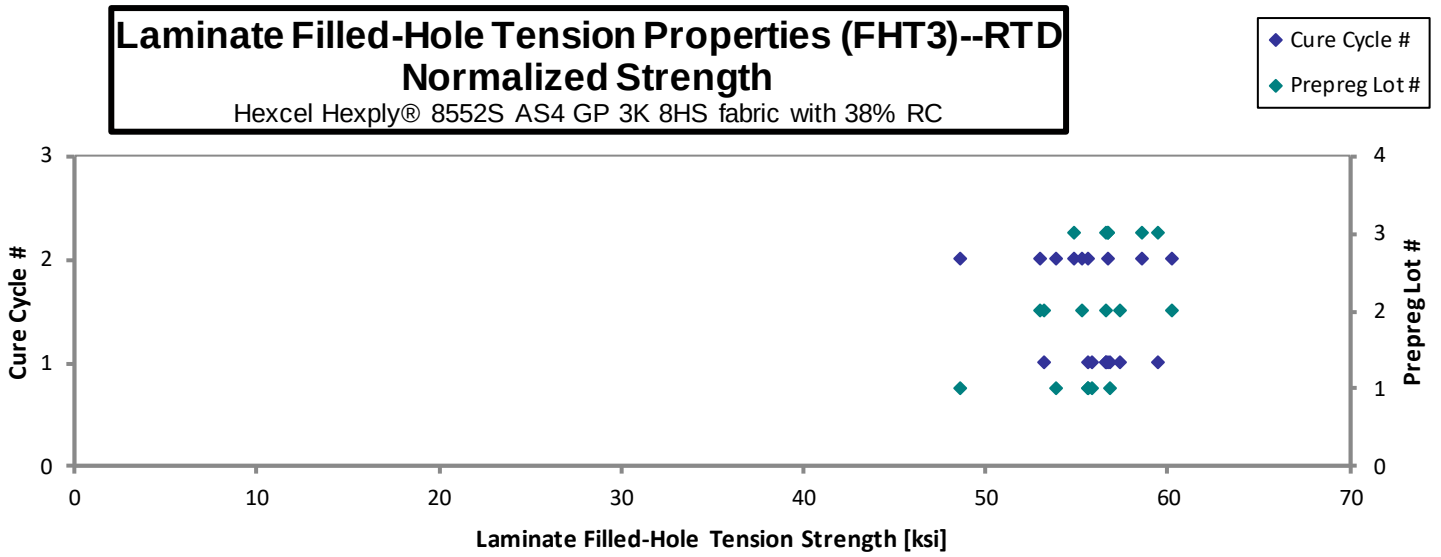
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HPA6A111A	A	M1	1	1	59.50	0.1432	10	LGM	0.0143	56.80
HPA6A112A	A	M1	1	1	54.40	0.1533	10	LGM	0.0153	55.61
HPA6A113A	A	M1	1	1	52.62	0.1591	10	LGM	0.0159	55.80
HPA6A211A	A	M2	1	2	58.07	0.1438	10	LGM	0.0144	55.67
HPA6A212A	A	M2	1	2	53.18	0.1520	10	LGM	0.0152	53.89
HPA6A213A	A	M2	1	2	46.07	0.1582	10	LGM	0.0158	48.59
HPA6B111A	B	M1	2	1	54.89	0.1454	10	LGM	0.0145	53.19
HPA6B112A	B	M1	2	1	54.36	0.1562	10	LGM	0.0156	56.61
HPA6B113A	B	M1	2	1	53.97	0.1595	10	LGM	0.0160	57.39
HPA6B211A	B	M2	2	2	55.08	0.1445	10	LGM	0.0144	53.05
HPA6B212A	B	M2	2	2	58.63	0.1541	10	LGM	0.0154	60.25
HPA6B213A	B	M2	2	2	52.74	0.1574	10	LGM	0.0157	55.36
HPA6C111A	C	M1	3	1	59.66	0.1427	10	LGM	0.0143	56.76
HPA6C112A	C	M1	3	1	56.17	0.1513	10	LGM	0.0151	56.66
HPA6C113A	C	M1	3	1	57.30	0.1558	10	LGM	0.0156	59.52
HPA6C211A	C	M2	3	2	57.97	0.1421	10	LGM	0.0142	54.90
HPA6C212A	C	M2	3	2	56.28	0.1511	10	LGM	0.0151	56.71
HPA6C213A	C	M2	3	2	56.38	0.1560	10	LGM	0.0156	58.63

Average	**55.41**	
Standard Dev.	**3.220**	
Coeff. of Var. [%]	**5.811**	
Min.	**46.07**	
Max.	**59.66**	
Number of Spec.	**18**	

$Average_{norm}$	**0.0151**	**55.85**
$Standard\ Dev._{norm}$		**2.649**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**4.743**
Min.	**0.0142**	**48.59**
Max.	**0.0160**	**60.25**
Number of Spec.	**18**	**18**


Laminate Filled-Hole Tension Properties (FHT3)--RTD
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Filled-Hole Tension Strength [ksi]
0
1
2
3
4
0
10
20
30
40
50
60
70

Laminate Filled-Hole Tension Properties (FHT3)--ETW
Strength

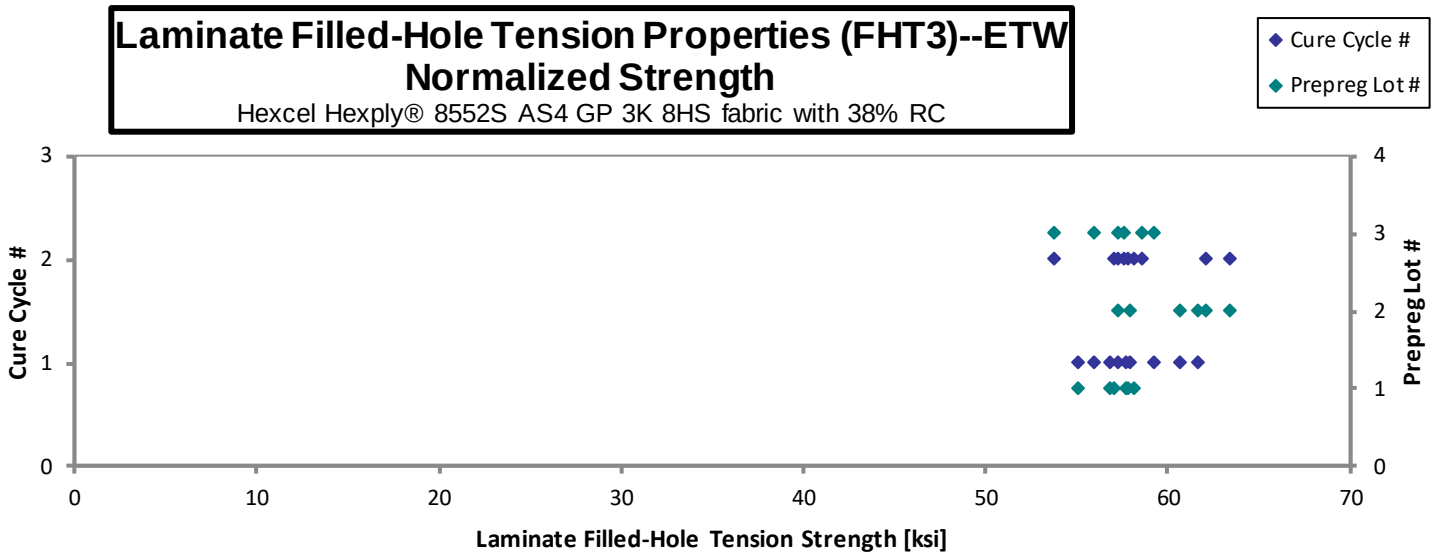
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HPA6A111D	A	M1	1	1	55.09	0.1572	10	LGM	0.0157	57.72
HPA6A112D	A	M1	1	1	52.09	0.1587	10	LGM	0.0159	55.12
HPA6A113D	A	M1	1	1	54.24	0.1571	10	LGM	0.0157	56.82
HPA6A211D	A	M2	1	2	55.08	0.1584	10	LGM	0.0158	58.14
HPA6A212D	A	M2	1	2	54.21	0.1600	10	LGM	0.0160	57.82
HPA6A213D	A	M2	1	2	53.97	0.1588	10	LGM	0.0159	57.11
HPA6B111D	B	M1	2	1	58.69	0.1576	10	LGM	0.0158	61.65
HPA6B112D	B	M1	2	1	57.64	0.1580	10	LGM	0.0158	60.72
HPA6B113D	B	M1	2	1	55.16	0.1577	10	LGM	0.0158	57.97
HPA6B211D	B	M2	2	2	60.02	0.1552	10	LGM	0.0155	62.08
HPA6B212D	B	M2	2	2	60.04	0.1584	10	LGM	0.0158	63.40
HPA6B213D	B	M2	2	2	53.73	0.1600	10	LGM	0.0160	57.29
HPA6C111D	C	M1	3	1	57.33	0.1552	10	LGM	0.0155	59.30
HPA6C112D	C	M1	3	1	54.83	0.1566	10	LGM	0.0157	57.24
HPA6C113D	C	M1	3	1	53.62	0.1565	10	LGM	0.0156	55.92
HPA6C211D	C	M2	3	2	51.86	0.1554	10	LGM	0.0155	53.74
HPA6C212D	C	M2	3	2	55.37	0.1562	10	LGM	0.0156	57.66
HPA6C213D	C	M2	3	2	55.97	0.1571	10	LGM	0.0157	58.62

Average	**55.50**	
Standard Dev.	**2.393**	
Coeff. of Var. [%]	**4.312**	
Min.	**51.86**	
Max.	**60.04**	
Number of Spec.	**18**	

$Average_{norm}$	**0.0157**	**58.24**
$Standard\ Dev._{norm}$		**2.447**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**4.202**
Min.	**0.0155**	**53.74**
Max.	**0.0160**	**63.40**
Number of Spec.	**18**	**18**


Laminate Filled-Hole Tension Properties (FHT3)--ETW
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Filled-Hole Tension Strength [ksi]
0
10
20
30
40
50
60
70
0
1
2
3
4

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

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

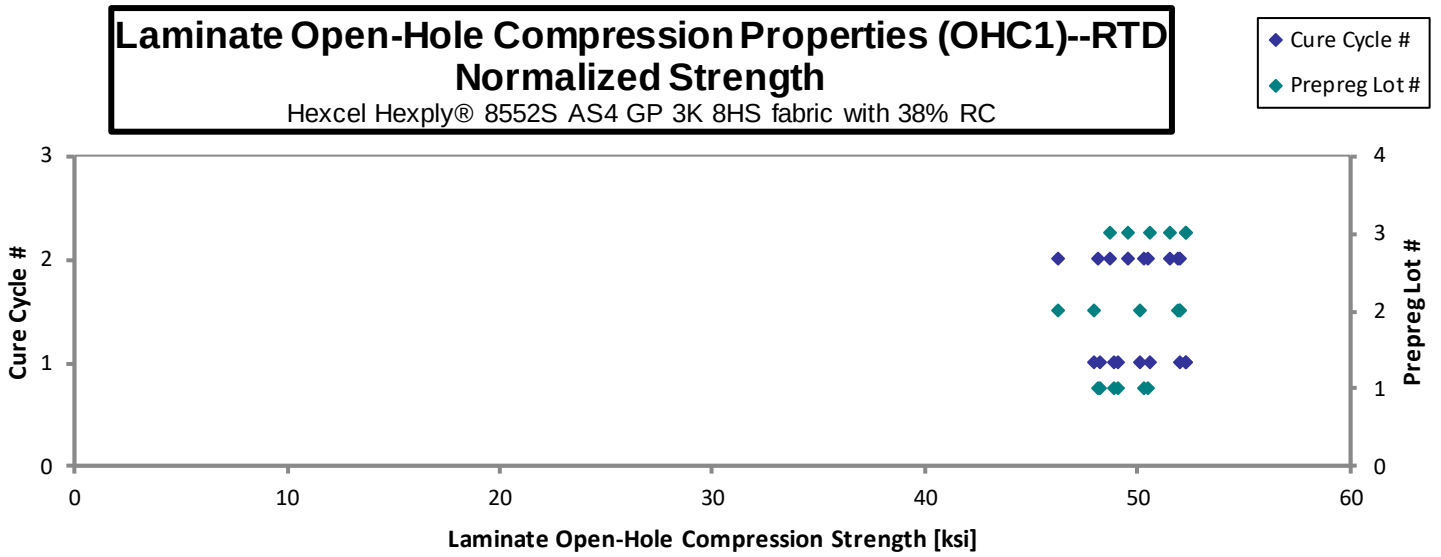
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HPAGA111A	A	M1	1	1	51.37	0.1721	12	M(L,A)GM	0.0143	49.11
HPAGA112A	A	M1	1	1	49.47	0.1780	12	M(L,A)GM	0.0148	48.92
HPAGA113A	A	M1	1	1	47.58	0.1826	12	M(L,A)GM	0.0152	48.26
HPAGA211A	A	M2	1	2	51.72	0.1677	12	AGM	0.0140	48.19
HPAGA212A	A	M2	1	2	50.20	0.1811	12	M(L,A)GM	0.0151	50.50
HPAGA213A	A	M2	1	2	48.55	0.1867	12	M(L,A)GM	0.0156	50.36
HPAGB111A	B	M1	2	1	50.65	0.1706	12	M(L,A)GM	0.0142	48.00
HPAGB112A	B	M1	2	1	50.75	0.1843	12	M(L,A)GM	0.0154	51.96
HPAGB113A	B	M1	2	1	47.60	0.1895	12	M(L,A)GM	0.0158	50.12
HPAGB211A	B	M2	2	2	47.43	0.1757	12	M(L,A)GM	0.0146	46.29
HPAGB212A	B	M2	2	2	49.47	0.1893	12	M(L,A)GM	0.0158	52.03
HPAGB213A	B	M2	2	2	51.03	0.1831	12	M(L,A)GM	0.0153	51.90
HPAGC111A	C	M1	3	1	50.92	0.1850	12	M(L,A)GM	0.0154	52.32
HPAGC112A	C	M1	3	1	50.67	0.1799	12	M(L,A)GM	0.0150	50.63
HPAGC113A	C	M1	3	1	55.35	0.1700	12	M(L,A)GM	0.0142	52.28
HPAGC211A	C	M2	3	2	51.75	0.1695	12	M(L,A)GM	0.0141	48.74
HPAGC212A	C	M2	3	2	51.07	0.1816	12	M(L,A)GM	0.0151	51.51
HPAGC213A	C	M2	3	2	47.79	0.1867	12	M(L,A)GM	0.0156	49.58

Average	**50.19**	
Standard Dev.	**1.972**	
Coeff. of Var. [%]	**3.930**	
Min.	**47.43**	
Max.	**55.35**	
Number of Spec.	**18**	

$Average_{norm}$	**0.0150**	**50.04**
$Standard\ Dev._{norm}$		**1.766**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**3.530**
Min.	**0.0140**	**46.29**
Max.	**0.0158**	**52.32**
Number of Spec.	**18**	**18**


Laminate Open-Hole Compression Properties (OHC1)--RTD
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Open-Hole Compression Strength [ksi]
0
1
2
3
4
0
10
20
30
40
50
60

Laminate Open-Hole Compression Properties (OHC1)--ETW Strength

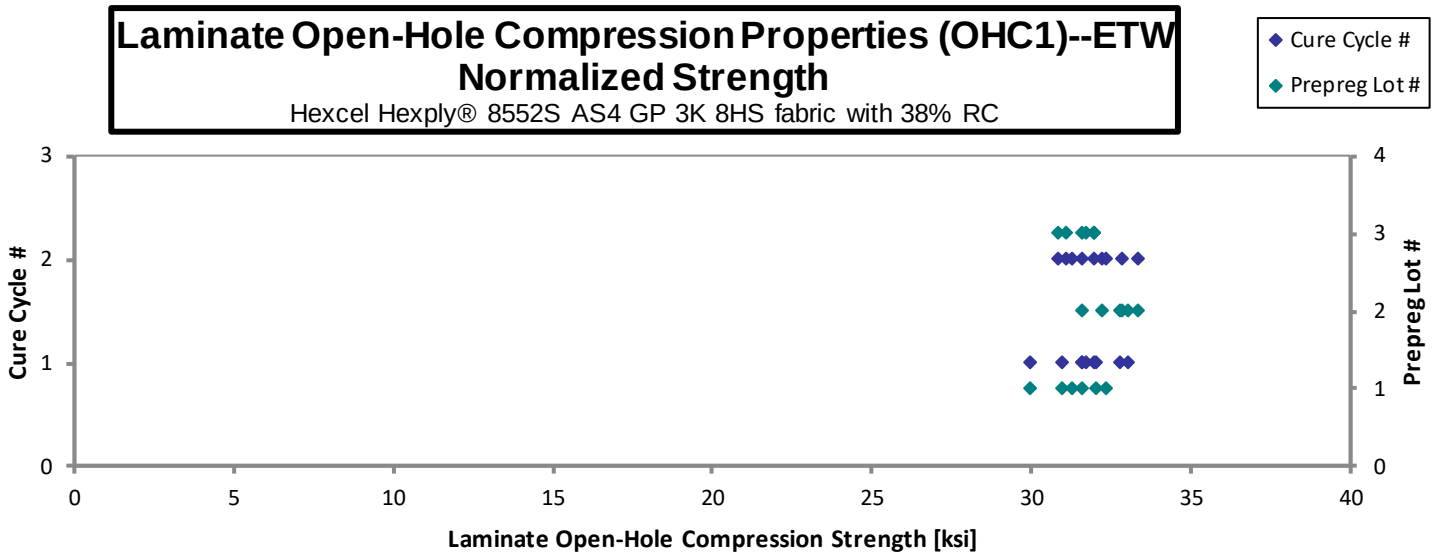
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HPAGA111D	A	M1	1	1	31.87	0.1693	12	M(A,L)GM	0.0141	29.97
HPAGA112D	A	M1	1	1	32.24	0.1790	12	M(A,L)GM	0.0149	32.06
HPAGA113D	A	M1	1	1	30.50	0.1826	12	M(A,L)GM	0.0152	30.95
HPAGA211D	A	M2	1	2	30.64	0.1900	12	M(A,L)GM	0.0158	32.34
HPAGA212D	A	M2	1	2	33.08	0.1703	12	M(A,L)GM	0.0142	31.29
HPAGA213D	A	M2	1	2	31.26	0.1820	12	M(A,L)GM	0.0152	31.60
HPAGB111D	B	M1	2	1	33.20	0.1713	12	LGM	0.0143	31.58
HPAGB112D	B	M1	2	1	31.98	0.1859	12	LGM	0.0155	33.03
HPAGB113D	B	M1	2	1	30.77	0.1918	12	M(A,L)GM	0.0160	32.78
HPAGB211D	B	M2	2	2	31.27	0.1893	12	M(A,L)GM	0.0158	32.89
HPAGB212D	B	M2	2	2	31.26	0.1921	12	LGM	0.0160	33.37
HPAGB213D	B	M2	2	2	30.26	0.1917	12	LGM	0.0160	32.22
HPAGC111D	C	M1	3	1	30.73	0.1873	12	M(A,L)GM	0.0156	31.97
HPAGC112D	C	M1	3	1	30.44	0.1878	12	LGM	0.0157	31.75
HPAGC113D	C	M1	3	1	30.68	0.1853	12	LGM	0.0154	31.57
HPAGC211D	C	M2	3	2	33.53	0.1715	12	LGM	0.0143	31.95
HPAGC212D	C	M2	3	2	30.93	0.1809	12	LGM	0.0151	31.09
HPAGC213D	C	M2	3	2	29.85	0.1860	12	M(A,L)GM	0.0155	30.84

Average	**31.36**	
Standard Dev.	**1.071**	
Coeff. of Var. [%]	**3.415**	
Min.	**29.85**	
Max.	**33.53**	
Number of Spec.	**18**	

$Average_{norm}$	**0.0152**	**31.85**
$Standard\ Dev._{norm}$		**0.8597**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**2.699**
Min.	**0.0141**	**29.97**
Max.	**0.0160**	**33.37**
Number of Spec.	**18**	**18**


Laminate Open-Hole Compression Properties (OHC1)--ETW
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Open-Hole Compression Strength [ksi]
0
1
2
3
4
0
5
10
15
20
25
30
35
40

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

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

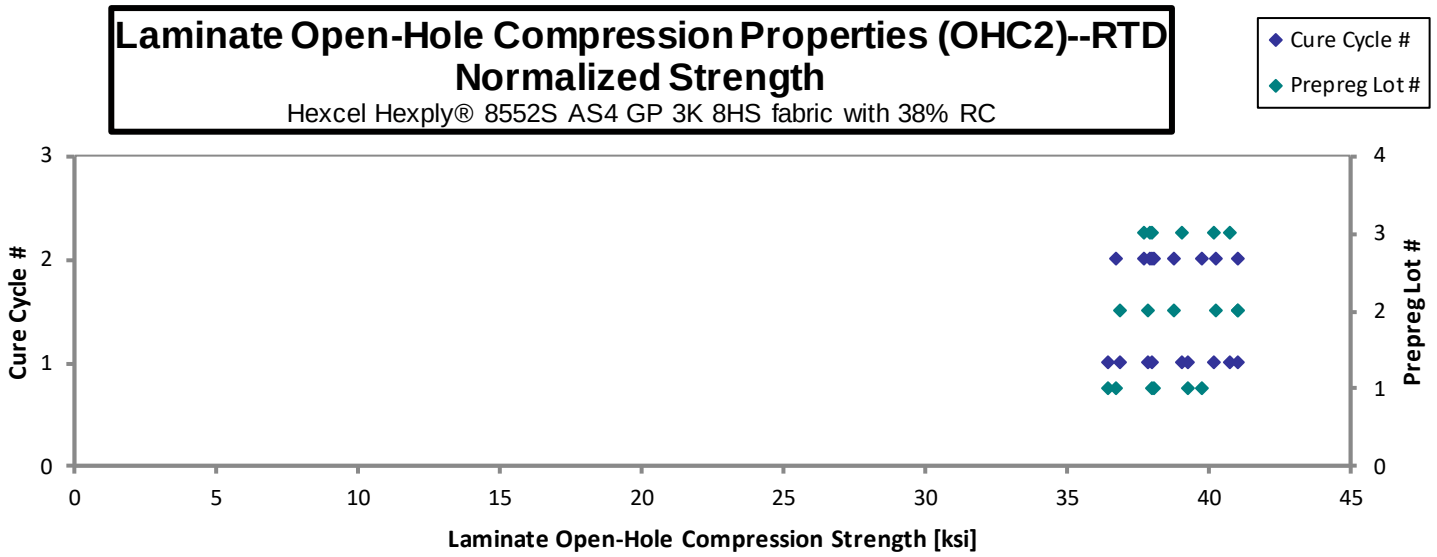
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HPAHA111A	A	M1	1	1	40.01	0.1367	10	AGM	0.0137	36.46
HPAHA112A	A	M1	1	1	38.91	0.1465	10	AGM	0.0146	37.99
HPAHA113A	A	M1	1	1	38.19	0.1543	10	AGM	0.0154	39.28
HPAHA211A	A	M2	1	2	38.96	0.1415	10	AGM	0.0141	36.75
HPAHA212A	A	M2	1	2	37.79	0.1513	10	AGM	0.0151	38.10
HPAHA213A	A	M2	1	2	37.56	0.1588	10	AGM	0.0159	39.77
HPAHB111A	B	M1	2	1	40.07	0.1382	10	AGM	0.0138	36.92
HPAHB112A	B	M1	2	1	37.49	0.1517	10	AGM	0.0152	37.91
HPAHB113A	B	M1	2	1	38.82	0.1585	10	AGM	0.0159	41.02
HPAHB211A	B	M2	2	2	41.36	0.1407	10	AGM	0.0141	38.78
HPAHB212A	B	M2	2	2	39.25	0.1540	10	AGM	0.0154	40.28
HPAHB213A	B	M2	2	2	38.73	0.1591	10	AGM	0.0159	41.08
HPAHC111A	C	M1	3	1	41.56	0.1410	10	AGM	0.0141	39.06
HPAHC112A	C	M1	3	1	39.81	0.1514	10	AGM	0.0151	40.17
HPAHC113A	C	M1	3	1	39.30	0.1556	10	AGM	0.0156	40.78
HPAHC211A	C	M2	3	2	40.85	0.1395	10	AGM	0.0139	37.98
HPAHC212A	C	M2	3	2	38.79	0.1461	10	M(A,L)GM	0.0146	37.77
HPAHC213A	C	M2	3	2	37.33	0.1527	10	M(A,L)GM	0.0153	38.00

Average	**39.15**	
Standard Dev.	**1.272**	
Coeff. of Var. [%]	**3.249**	
Min.	**37.33**	
Max.	**41.56**	
Number of Spec.	**18**	

$Average_{norm}$	**0.0149**	**38.78**
$Standard\ Dev._{norm}$		**1.473**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**3.799**
Min.	**0.0137**	**36.46**
Max.	**0.0159**	**41.08**
Number of Spec.	**18**	**18**


Laminate Open-Hole Compression Properties (OHC2)--RTD
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
5
10
15
20
25
30
35
40
45
Laminate Open-Hole Compression Strength [ksi]

Laminate Open-Hole Compression Properties (OHC2)--ETW Strength

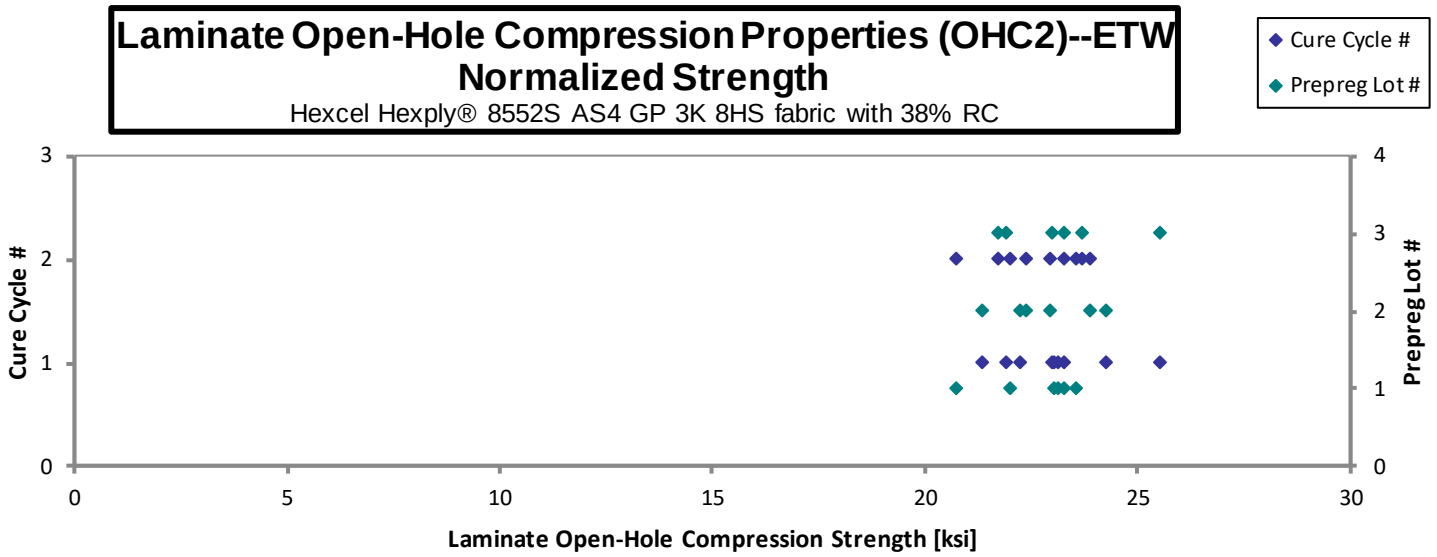
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HPAHA111D	A	M1	1	1	21.34	0.1620	10	AGM	0.0162	23.05
HPAHA112D	A	M1	1	1	21.25	0.1634	10	M(A,L)GM	0.0163	23.15
HPAHA113D	A	M1	1	1	21.93	0.1591	10	LGM	0.0159	23.26
HPAHA211D	A	M2	1	2	21.54	0.1641	10	M(A,L)GM	0.0164	23.55
HPAHA212D	A	M2	1	2	22.81	0.1365	10	M(A,L)GM	0.0137	20.76
HPAHA213D	A	M2	1	2	21.64	0.1526	10	M(A,L)GM	0.0153	22.01
HPAHB111D	B	M1	2	1	22.62	0.1609	10	M(A,L)GM	0.0161	24.26
HPAHB112D	B	M1	2	1	22.99	0.1393	10	LGM	0.0139	21.35
HPAHB113D	B	M1	2	1	22.19	0.1505	10	M(A,L)GM	0.0150	22.26
HPAHB211D	B	M2	2	2	25.55	0.1403	10	M(A,L)GM	0.0140	23.90
HPAHB212D	B	M2	2	2	21.23	0.1580	10	M(A,L)GM	0.0158	22.37
HPAHB213D	B	M2	2	2	21.90	0.1573	10	LGM	0.0157	22.97
HPAHC111D	C	M1	3	1	24.30	0.1576	10	M(A,L)GM	0.0158	25.53
HPAHC112D	C	M1	3	1	22.96	0.1433	10	LGM	0.0143	21.93
HPAHC113D	C	M1	3	1	22.73	0.1517	10	LGM	0.0152	22.98
HPAHC211D	C	M2	3	2	22.23	0.1599	10	AGM	0.0160	23.69
HPAHC212D	C	M2	3	2	23.32	0.1397	10	M(A,L)GM	0.0140	21.72
HPAHC213D	C	M2	3	2	23.52	0.1486	10	M(A,L)GM	0.0149	23.29

Average	**22.56**	
Standard Dev.	**1.132**	
Coeff. of Var. [%]	**5.019**	
Min.	**21.23**	
Max.	**25.55**	
Number of Spec.	**18**	

$Average_{norm}$	**0.0152**	**22.89**
$Standard\ Dev._{norm}$		**1.136**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**4.964**
Min.	**0.0137**	**20.76**
Max.	**0.0164**	**25.53**
Number of Spec.	**18**	**18**


Laminate Open-Hole Compression Properties (OHC2)--ETW
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Open-Hole Compression Strength [ksi]
0
1
2
3
4
0
5
10
15
20
25
30

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

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

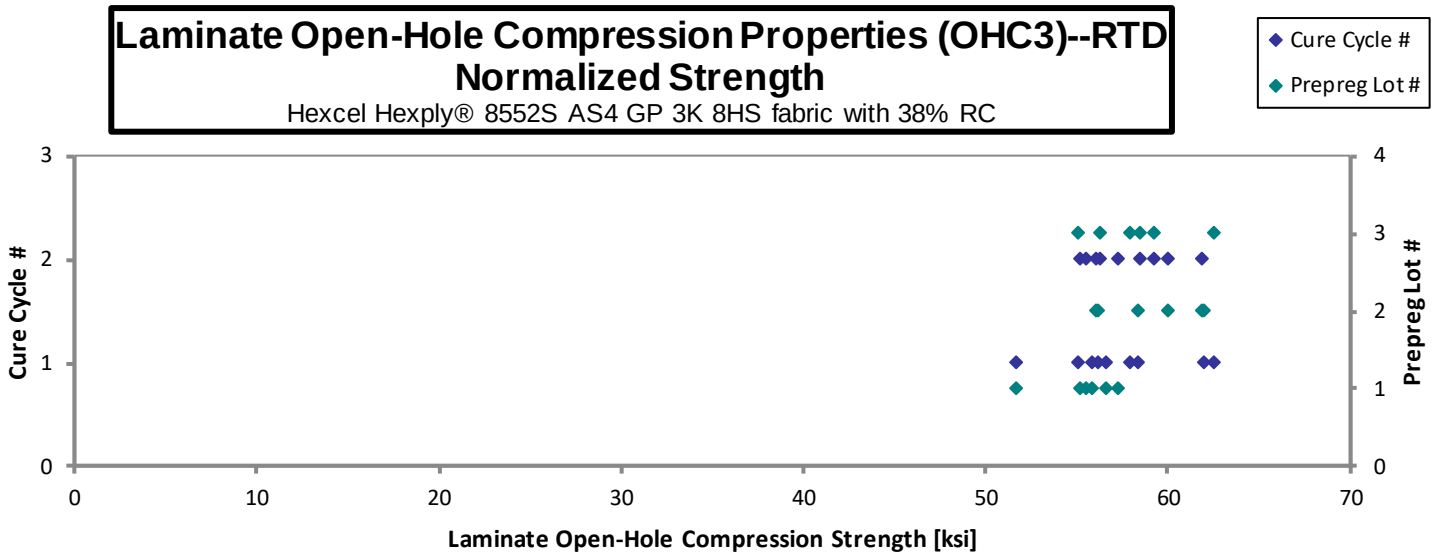
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HPAIA111A	A	M1	1	1	54.63	0.1419	10	LGM	0.0142	51.68
HPAIA112A	A	M1	1	1	54.32	0.1543	10	LGM	0.0154	55.88
HPAIA113A	A	M1	1	1	53.06	0.1601	10	LGM	0.0160	56.64
HPAIA211A	A	M2	1	2	60.19	0.1383	10	LGM	0.0138	55.50
HPAIA212A	A	M2	1	2	55.81	0.1541	10	LGM	0.0154	57.32
HPAIA213A	A	M2	1	2	52.56	0.1576	10	LGM	0.0158	55.23
HPAIB111A	B	M1	2	1	60.56	0.1392	10	M(A,L) GM	0.0139	56.18
HPAIB112A	B	M1	2	1	58.54	0.1496	10	M(A,L) GM	0.0150	58.37
HPAIB113A	B	M1	2	1	59.23	0.1569	10	M(A,L) GM	0.0157	61.95
HPAIB211A	B	M2	2	2	61.77	0.1502	10	M(A,L) GM	0.0150	61.85
HPAIB212A	B	M2	2	2	54.76	0.1536	10	M(A,L) GM	0.0154	56.07
HPAIB213A	B	M2	2	2	58.40	0.1542	10	M(A,L) GM	0.0154	60.04
HPAIC111A	C	M1	3	1	58.76	0.1406	10	LGM	0.0141	55.09
HPAIC112A	C	M1	3	1	62.81	0.1494	10	LGM	0.0149	62.55
HPAIC113A	C	M1	3	1	56.49	0.1539	10	LGM	0.0154	57.94
HPAIC211A	C	M2	3	2	59.52	0.1419	10	LGM	0.0142	56.30
HPAIC212A	C	M2	3	2	58.26	0.1526	10	LGM	0.0153	59.25
HPAIC213A	C	M2	3	2	56.74	0.1545	10	LGM	0.0155	58.45

Average	**57.58**	
Standard Dev.	**2.956**	
Coeff. of Var. [%]	**5.134**	
Min.	**52.56**	
Max.	**62.81**	
Number of Spec.	**18**	

$Average_{norm}$	**0.0150**	**57.57**
$Standard\ Dev._{norm}$		**2.796**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**4.857**
Min.	**0.0138**	**51.68**
Max.	**0.0160**	**62.55**
Number of Spec.	**18**	**18**


Laminate Open-Hole Compression Properties (OHC3)--RTD
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Open-Hole Compression Strength [ksi]
0
10
20
30
40
50
60
70
0
1
2
3
4

Laminate Open-Hole Compression Properties (OHC3)--ETW Strength

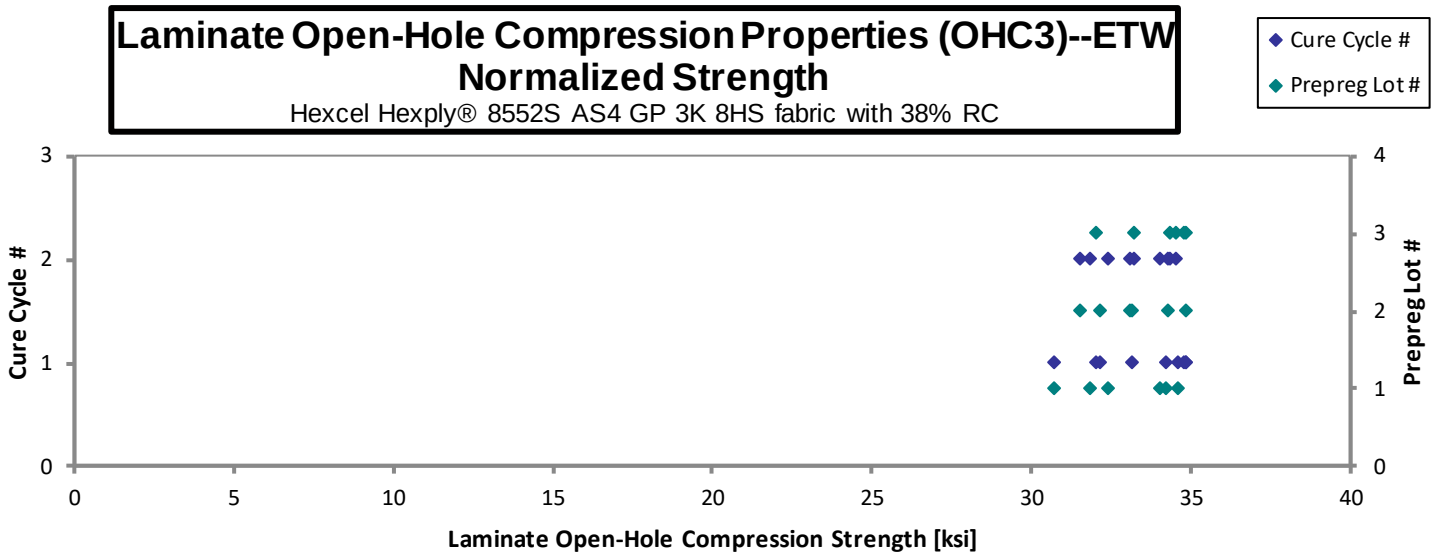
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HPAIA111D	A	M1	1	1	31.68	0.1621	10	LGM	0.0162	34.23
HPAIA112D	A	M1	1	1	32.84	0.1582	10	LGM	0.0158	34.62
HPAIA113D	A	M1	1	1	32.84	0.1405	10	LGM	0.0140	30.75
HPAIA211D	A	M2	1	2	29.65	0.1640	10	LGM	0.0164	32.42
HPAIA212D	A	M2	1	2	31.53	0.1621	10	LGM	0.0162	34.06
HPAIA213D	A	M2	1	2	30.40	0.1570	10	LGM	0.0157	31.83
HPAIB111D	B	M1	2	1	35.68	0.1396	10	LGM	0.0140	33.19
HPAIB112D	B	M1	2	1	31.87	0.1512	10	LGM	0.0151	32.14
HPAIB113D	B	M1	2	1	33.32	0.1569	10	LGM	0.0157	34.85
HPAIB211D	B	M2	2	2	33.66	0.1406	10	LGM	0.0141	31.55
HPAIB212D	B	M2	2	2	35.39	0.1403	10	LGM	0.0140	33.11
HPAIB213D	B	M2	2	2	35.20	0.1462	10	LGM	0.0146	34.31
HPAIC111D	C	M1	3	1	33.36	0.1568	10	LGM	0.0157	34.86
HPAIC112D	C	M1	3	1	36.97	0.1413	10	LGM	0.0141	34.82
HPAIC113D	C	M1	3	1	32.25	0.1489	10	LGM	0.0149	32.02
HPAIC211D	C	M2	3	2	33.12	0.1564	10	LGM	0.0156	34.52
HPAIC212D	C	M2	3	2	34.69	0.1437	10	LGM	0.0144	33.24
HPAIC213D	C	M2	3	2	34.31	0.1503	10	LGM	0.0150	34.37

Average	**33.27**	
Standard Dev.	**1.899**	
Coeff. of Var. [%]	**5.708**	
Min.	**29.65**	
Max.	**36.97**	
Number of Spec.	**18**	

$Average_{norm}$	**0.0151**	**33.38**
$Standard\ Dev._{norm}$		**1.316**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**3.942**
Min.	**0.0140**	**30.75**
Max.	**0.0164**	**34.86**
Number of Spec.	**18**	**18**


Laminate Open-Hole Compression Properties (OHC3)--ETW
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Open-Hole Compression Strength [ksi]
0
1
2
3
4
0
5
10
15
20
25
30
35
40

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

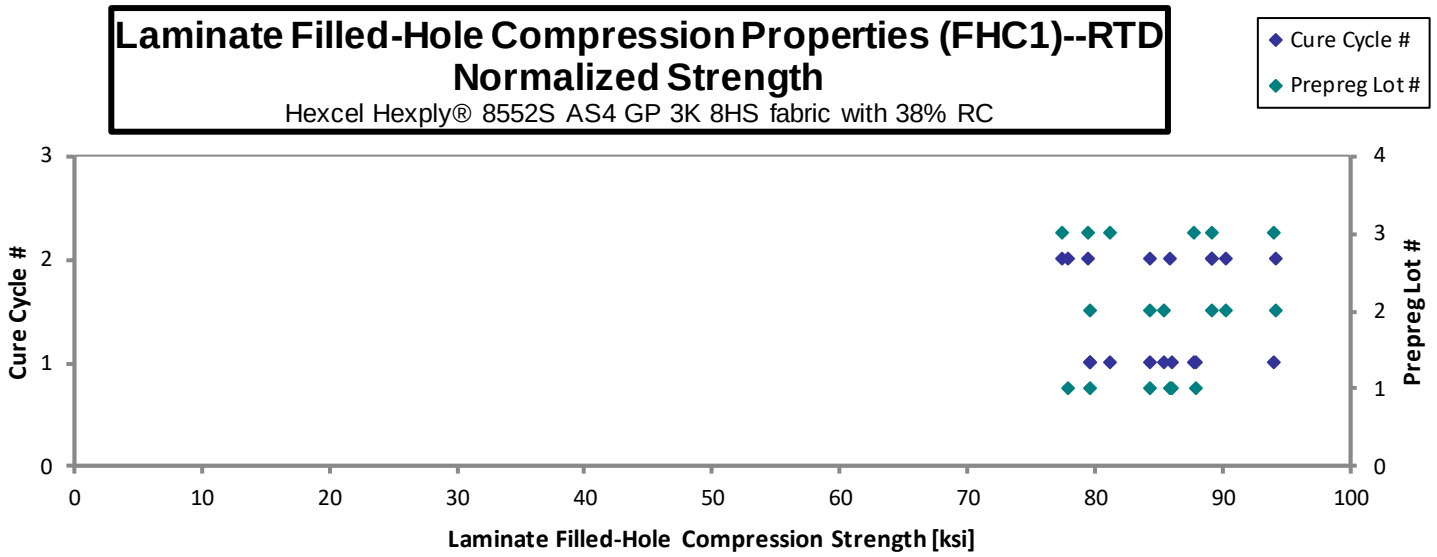
Laminate Filled-Hole Compression Properties (FHC1)--RTD Strength

Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HPA7A111A	A	M1	1	1	85.03	0.1686	12	LWB	0.0140	79.64
HPA7A112A	A	M1	1	1	89.23	0.1775	12	LGT	0.0148	87.97
HPA7A113A	A	M1	1	1	84.50	0.1834	12	M(A,L)GF	0.0153	86.10
HPA7A211A	A	M2	1	2	84.69	0.1655	12	M(A,L)GF	0.0138	77.86
HPA7A212A	A	M2	1	2	84.84	0.1788	12	LGB	0.0149	84.28
HPA7A213A	A	M2	1	2	84.48	0.1830	12	LGF, LGB	0.0153	85.88
HPA7B111A	B	M1	2	1	85.02	0.1688	12	M(A,L)GF	0.0141	79.71
HPA7B112A	B	M1	2	1	83.53	0.1840	12	M(A,L)GF	0.0153	85.39
HPA7B113A	B	M1	2	1	79.88	0.1899	12	M(A,L)GF	0.0158	84.26
HPA7B211A	B	M2	2	2	85.90	0.1869	12	LGF, LGT	0.0156	89.18
HPA7B212A	B	M2	2	2	90.84	0.1866	12	LGB	0.0156	94.19
HPA7B213A	B	M2	2	2	88.96	0.1828	12	LGF, LGB	0.0152	90.35
HPA7C111A	C	M1	3	1	84.69	0.1727	12	M(A,L)GF	0.0144	81.26
HPA7C112A	C	M1	3	1	86.42	0.1829	12	LGF, LGT	0.0152	87.79
HPA7C113A	C	M1	3	1	90.93	0.1861	12	M(A,L)GF	0.0155	94.00
HPA7C211A	C	M2	3	2	82.30	0.1695	12	LGF	0.0141	77.51
HPA7C212A	C	M2	3	2	79.38	0.1801	12	LGF	0.0150	79.44
HPA7C213A	C	M2	3	2	86.72	0.1853	12	M(A,L)GF	0.0154	89.25

Average	**85.41**	**Average$_{norm}$**	**0.0150**	**85.23**
Standard Dev.	**3.196**	**Standard Dev.$_{norm}$**		**5.186**
Coeff. of Var. [%]	**3.742**	**Coeff. of Var. [%]$_{norm}$**		**6.086**
Min.	**79.38**	**Min.**	**0.0138**	**77.51**
Max.	**90.93**	**Max.**	**0.0158**	**94.19**
Number of Spec.	**18**	**Number of Spec.**	**18**	**18**


Laminate Filled-Hole Compression Properties (FHC1)--RTD
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
10
20
30
40
50
60
70
80
90
100
Laminate Filled-Hole Compression Strength [ksi]

Laminate Filled-Hole Compression Properties (FHC1)--ETW Strength

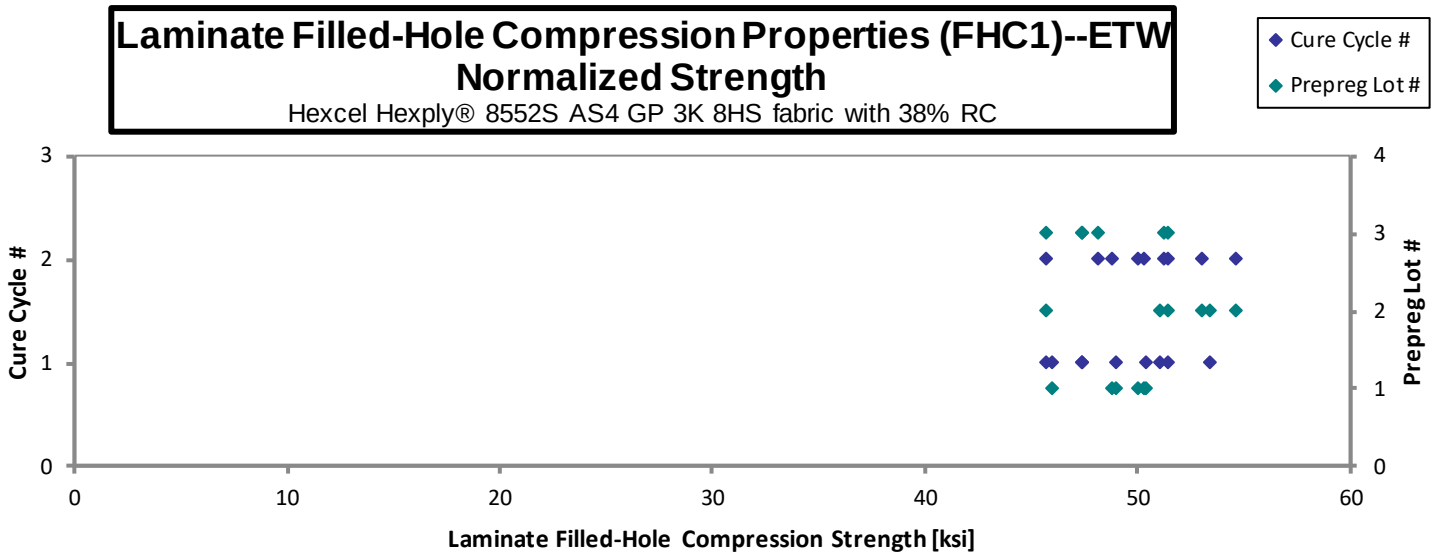
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HPA7A111D	A	M1	1	1	49.12	0.1686	12	LGT, LGF	0.0141	46.01
HPA7A112D	A	M1	1	1	51.10	0.1775	12	LGB, LWB	0.0148	50.38
HPA7A113D	A	M1	1	1	48.28	0.1827	12	LGT, LWT	0.0152	49.00
HPA7A211D	A	M2	1	2	49.24	0.1840	12	LGF	0.0153	50.34
HPA7A212D	A	M2	1	2	48.52	0.1857	12	LGF	0.0155	50.04
HPA7A213D	A	M2	1	2	47.75	0.1838	12	LGT	0.0153	48.77
HPA7B111D	B	M1	2	1	48.49	0.1696	12	LWT	0.0141	45.67
HPA7B112D	B	M1	2	1	50.18	0.1831	12	LGF	0.0153	51.06
HPA7B113D	B	M1	2	1	50.99	0.1887	12	LWB	0.0157	53.45
HPA7B211D	B	M2	2	2	48.93	0.1893	12	LGF, LGT	0.0158	51.45
HPA7B212D	B	M2	2	2	52.02	0.1891	12	LGF, LGB	0.0158	54.64
HPA7B213D	B	M2	2	2	50.78	0.1881	12	LGT, LWT	0.0157	53.06
HPA7C111D	C	M1	3	1	49.61	0.1868	12	M(A,L)GF	0.0156	51.49
HPA7C112D	C	M1	3	1	50.07	0.1704	12	LGT, LWT	0.0142	47.39
HPA7C113D	C	M1	3	1	46.88	0.1820	12	LWB	0.0152	47.39
HPA7C211D	C	M2	3	2	48.85	0.1889	12	M(A,L)GF	0.0157	51.26
HPA7C212D	C	M2	3	2	48.45	0.1697	12	M(A,L)WB	0.0141	45.67
HPA7C213D	C	M2	3	2	48.31	0.1796	12	LGB, LGF	0.0150	48.20

Average	**49.31**	
Standard Dev.	**1.323**	
Coeff. of Var. [%]	**2.684**	
Min.	**46.88**	
Max.	**52.02**	
Number of Spec.	**18**	

$Average_{norm}$	**0.0151**	**49.74**
$Standard\ Dev._{norm}$		**2.675**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**5.378**
Min.	**0.0141**	**45.67**
Max.	**0.0158**	**54.64**
Number of Spec.	**18**	**18**


Laminate Filled-Hole Compression Properties (FHC1)--ETW
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Filled-Hole Compression Strength [ksi]
0
10
20
30
40
50
60
0
1
2
3
4

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

Data reported for reference only. FHC2 values are equal to or greater than UNC2 values, therefore CMH17 and NCAMP recommend the use of UNC2 values for design purposes.

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

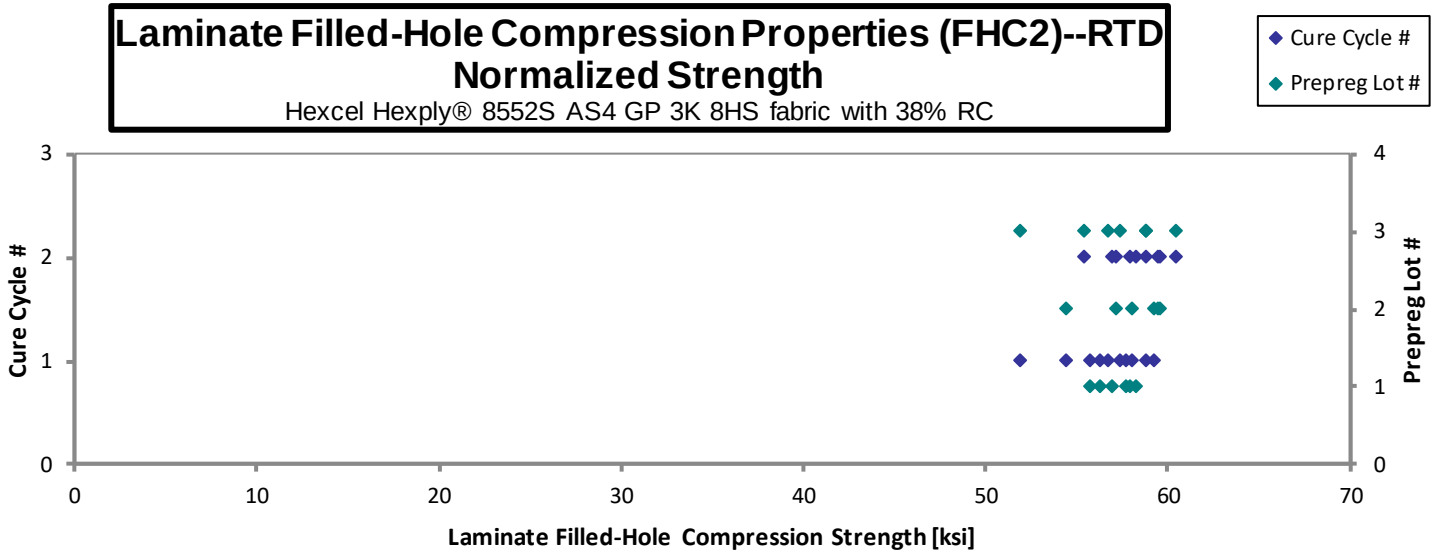
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HPA8A111A	A	M1	1	1	58.65	0.1427	10	AGF	0.0143	55.80
HPA8A112A	A	M1	1	1	59.04	0.1430	10	AGF	0.0143	56.27
HPA8A113A	A	M1	1	1	56.33	0.1538	10	AGF	0.0154	57.74
HPA8A211A	A	M2	1	2	60.22	0.1418	10	AGF	0.0142	56.91
HPA8A212A	A	M2	1	2	57.81	0.1502	10	AGF	0.0150	57.89
HPA8A213A	A	M2	1	2	57.33	0.1524	10	AGF	0.0152	58.23
HPA8B111A	B	M1	2	1	59.27	0.1377	10	M(A,L)GF	0.0138	54.42
HPA8B112A	B	M1	2	1	57.65	0.1509	10	M(A,L)GF	0.0151	58.00
HPA8B113A	B	M1	2	1	56.65	0.1570	10	M(A,L)GF	0.0157	59.29
HPA8B211A	B	M2	2	2	59.96	0.1430	10	M(A,L)GF	0.0143	57.17
HPA8B212A	B	M2	2	2	58.73	0.1521	10	M(A,L)GF	0.0152	59.56
HPA8B213A	B	M2	2	2	57.55	0.1551	10	M(A,L)GF	0.0155	59.51
HPA8C111A	C	M1	3	1	55.84	0.1395	10	M(A,L)GF	0.0139	51.93
HPA8C112A	C	M1	3	1	56.31	0.1513	10	M(A,L)WB	0.0151	56.78
HPA8C113A	C	M1	3	1	57.15	0.1545	10	AGF	0.0154	58.85
HPA8C114A	C	M1	3	1	55.31	0.1556	10	AGF	0.0156	57.36
HPA8C211A	C	M2	3	2	58.09	0.1431	10	M(A,L)GT	0.0143	55.40
HPA8C212A	C	M2	3	2	57.98	0.1523	10	AGF	0.0152	58.85
HPA8C213A	C	M2	3	2	57.77	0.1570	10	AGF	0.0157	60.48

Average	**57.77**	
Standard Dev.	**1.341**	
Coeff. of Var. [%]	**2.320**	
Min.	**55.31**	
Max.	**60.22**	
Number of Spec.	**19**	

$Average_{norm}$	**0.0149**	**57.39**
$Standard\ Dev._{norm}$		**2.044**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**3.561**
Min.	**0.0138**	**51.93**
Max.	**0.0157**	**60.48**
Number of Spec.	**19**	**19**


Laminate Filled-Hole Compression Properties (FHC2)--RTD
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
10
20
30
40
50
60
70
Laminate Filled-Hole Compression Strength [ksi]

Laminate Filled-Hole Compression Properties (FHC2)--ETW Strength

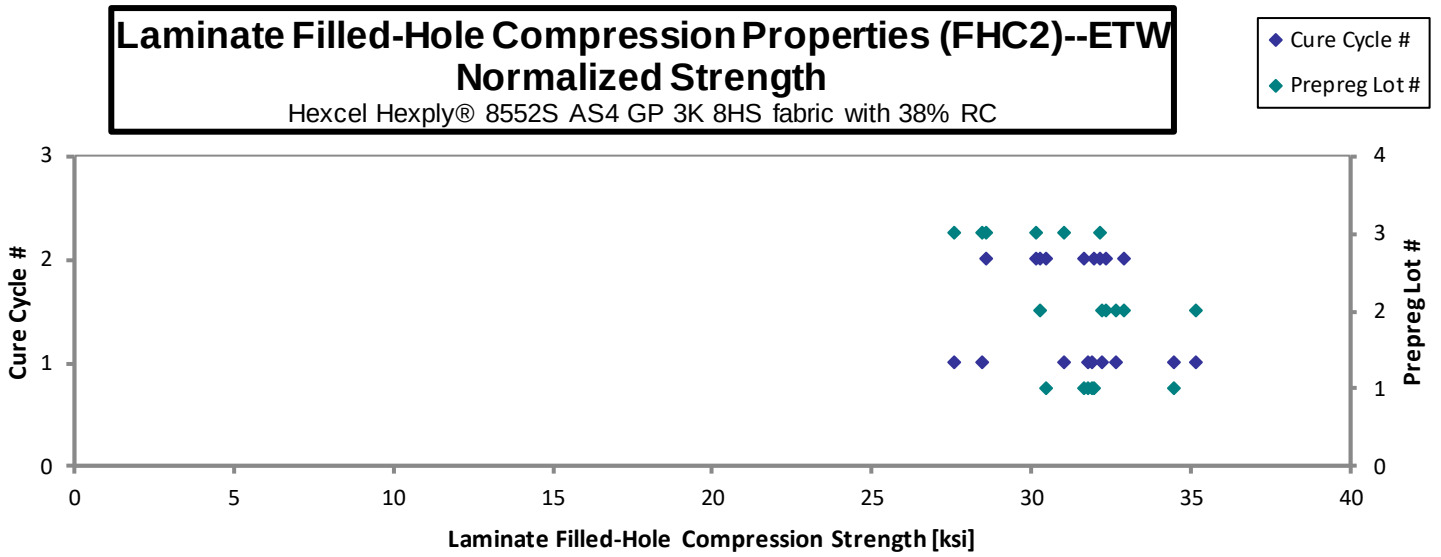
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HPA8A111D	A	M1	1	1	30.87	0.1551	10	M(A,L)GF, LGT	0.0155	31.91
HPA8A112D	A	M1	1	1	30.85	0.1546	10	M(A,L)GB, M(A,L)WB	0.0155	31.80
HPA8A113D	A	M1	1	1	33.15	0.1559	10	M(A,L)GT, M(A,L)WT	0.0156	34.46
HPA8A211D	A	M2	1	2	31.92	0.1432	10	M(A,L)GT	0.0143	30.47
HPA8A212D	A	M2	1	2	31.67	0.1513	10	M(A,L)GT	0.0151	31.96
HPA8A213D	A	M2	1	2	30.84	0.1541	10	M(A,L)GT	0.0154	31.67
HPA8B111D	B	M1	2	1	32.91	0.1604	10	M(A,L)GF, M(A,L)GB	0.0160	35.20
HPA8B112D	B	M1	2	1	35.80	0.1368	10	M(A,L)GF, M(A,L)GT	0.0137	32.64
HPA8B113D	B	M1	2	1	32.40	0.1493	10	M(A,L)GF, M(A,L)WT	0.0149	32.24
HPA8B211D	B	M2	2	2	31.57	0.1439	10	M(A,L)GT, M(A,L)WT	0.0144	30.29
HPA8B212D	B	M2	2	2	31.59	0.1536	10	M(A,L)GT	0.0154	32.34
HPA8B213D	B	M2	2	2	31.45	0.1569	10	M(A,L)GT	0.0157	32.89
HPA8C111D	C	M1	3	1	30.08	0.1546	10	M(A,L)GT, M(A,L)WT	0.0155	31.01
HPA8C112D	C	M1	3	1	29.60	0.1400	10	M(A,L)GT, M(A,L)WT	0.0140	27.62
HPA8C113D	C	M1	3	1	28.48	0.1498	10	M(A,L)GT, M(A,L)WT	0.0150	28.45
HPA8C211D	C	M2	3	2	30.72	0.1569	10	M(A,L)GT, M(A,L)WT	0.0157	32.14
HPA8C212D	C	M2	3	2	30.13	0.1424	10	M(A,L)GF, M(A,L)WB	0.0142	28.60
HPA8C213D	C	M2	3	2	30.09	0.1502	10	M(A,L)GB, M(A,L)WB	0.0150	30.14

Average	**31.34**	
Standard Dev.	**1.612**	
Coeff. of Var. [%]	**5.145**	
Min.	**28.48**	
Max.	**35.80**	
Number of Spec.	**18**	

$Average_{norm}$	**0.0151**	**31.44**
$Standard\ Dev._{norm}$		**1.958**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**6.230**
Min.	**0.0137**	**27.62**
Max.	**0.0160**	**35.20**
Number of Spec.	**18**	**18**


Laminate Filled-Hole Compression Properties (FHC2)--ETW
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
5
10
15
20
25
30
35
40
Laminate Filled-Hole Compression Strength [ksi]

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

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

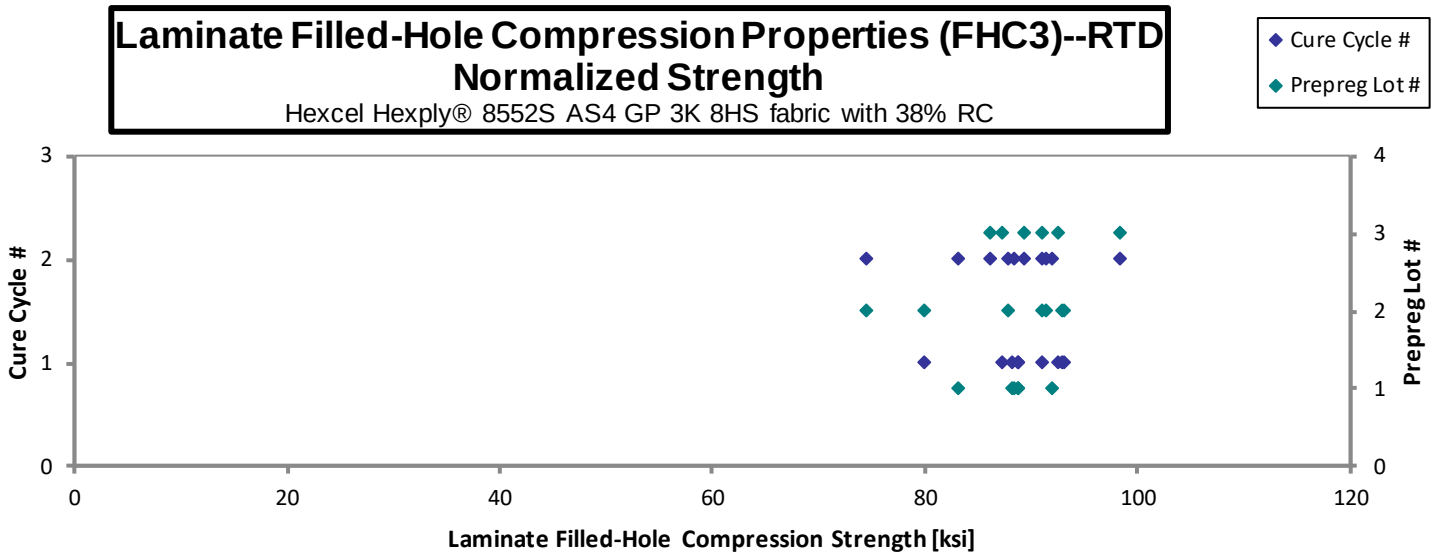
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HPA9A111A	A	M1	1	1	94.42	0.1410	10	LGF	0.0141	88.77
HPA9A112A	A	M1	1	1	89.07	0.1494	10	LGF	0.0149	88.72
HPA9A113A	A	M1	1	1	86.83	0.1524	10	LGF	0.0152	88.23
HPA9A211A	A	M2	1	2	89.36	0.1395	10	LGF	0.0140	83.11
HPA9A212A	A	M2	1	2	88.33	0.1502	10	LGF	0.0150	88.47
HPA9A213A	A	M2	1	2	89.61	0.1541	10	LGF	0.0154	92.07
HPA9B111A	B	M1	2	1	84.03	0.1426	10	LGF	0.0143	79.88
HPA9B112A	B	M1	2	1	92.02	0.1518	10	LGF	0.0152	93.12
HPA9B113A	B	M1	2	1	88.78	0.1571	10	LGF	0.0157	93.00
HPA9B211A	B	M2	2	2	79.87	0.1398	10	LGF	0.0140	74.45
HPA9B212A	B	M2	2	2	87.72	0.1503	10	LGF	0.0150	87.91
HPA9B213A	B	M2	2	2	87.94	0.1553	10	LGF	0.0155	91.03
HPA9B214A	B	M2	2	2	86.91	0.1579	10	LGF	0.0158	91.46
HPA9C111A	C	M1	3	1	93.71	0.1398	10	LGB	0.0140	87.30
HPA9C112A	C	M1	3	1	91.75	0.1488	10	LGF	0.0149	91.02
HPA9C113A	C	M1	3	1	90.77	0.1530	10	LGF	0.0153	92.58
HPA9C211A	C	M2	3	2	90.70	0.1424	10	LGF	0.0142	86.12
HPA9C212A	C	M2	3	2	88.98	0.1508	10	LGF	0.0151	89.42
HPA9C213A	C	M2	3	2	95.96	0.1539	10	LGF	0.0154	98.45

Average	**89.30**	
Standard Dev.	**3.666**	
Coeff. of Var. [%]	**4.105**	
Min.	**79.87**	
Max.	**95.96**	
Number of Spec.	**19**	

$Average_{norm}$	**0.0149**	**88.69**
$Standard\ Dev._{norm}$		**5.270**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**5.942**
Min.	**0.0140**	**74.45**
Max.	**0.0158**	**98.45**
Number of Spec.	**19**	**19**


Laminate Filled-Hole Compression Properties (FHC3)--RTD
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Filled-Hole Compression Strength [ksi]
0
20
40
60
80
100
120
0
1
2
3
4

Laminate Filled-Hole Compression Properties (FHC3)--ETW Strength

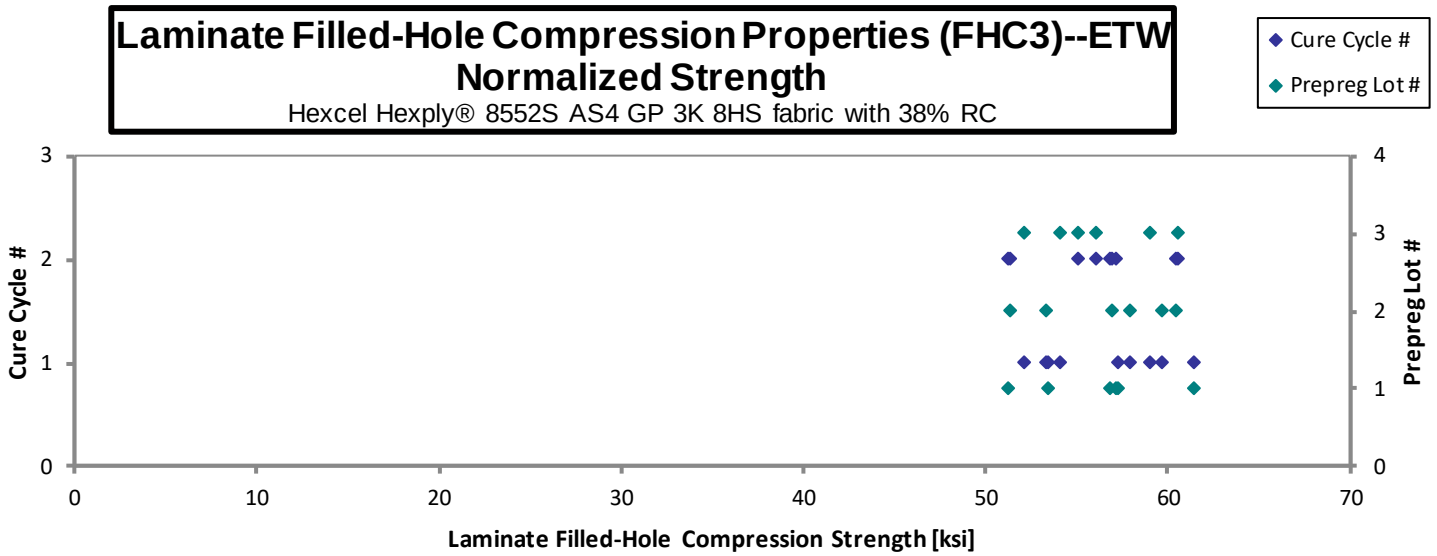
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
HPA9A111D	A	M1	1	1	59.84	0.1540	10	LGF	0.0154	61.42
HPA9A112D	A	M1	1	1	55.42	0.1550	10	LGF	0.0155	57.26
HPA9A113D	A	M1	1	1	52.62	0.1523	10	LGF	0.0152	53.42
HPA9A211D	A	M2	1	2	56.01	0.1373	10	LGB, LWB	0.0137	51.25
HPA9A212D	A	M2	1	2	56.68	0.1504	10	M(A,L)GF	0.0150	56.84
HPA9A213D	A	M2	1	2	55.00	0.1559	10	LGF	0.0156	57.16
HPA9B111D	B	M1	2	1	56.48	0.1586	10	LGF	0.0159	59.70
HPA9B112D	B	M1	2	1	56.33	0.1420	10	LGF	0.0142	53.33
HPA9B113D	B	M1	2	1	57.82	0.1503	10	LWB	0.0150	57.91
HPA9B211D	B	M2	2	2	55.18	0.1397	10	LGT, LWT	0.0140	51.40
HPA9B212D	B	M2	2	2	60.32	0.1504	10	LGT, LWT	0.0150	60.49
HPA9B213D	B	M2	2	2	54.63	0.1563	10	LGF	0.0156	56.91
HPA9C111D	C	M1	3	1	56.68	0.1561	10	LGF	0.0156	59.00
HPA9C112D	C	M1	3	1	56.41	0.1387	10	LGF	0.0139	52.16
HPA9C113D	C	M1	3	1	54.84	0.1478	10	LWB	0.0148	54.05
HPA9C211D	C	M2	3	2	58.75	0.1547	10	LWT	0.0155	60.59
HPA9C212D	C	M2	3	2	58.47	0.1414	10	LGF	0.0141	55.13
HPA9C213D	C	M2	3	2	56.39	0.1491	10	LGF, LGB	0.0149	56.03

Average	**56.55**	
Standard Dev.	**1.928**	
Coeff. of Var. [%]	**3.409**	
Min.	**52.62**	
Max.	**60.32**	
Number of Spec.	**18**	

$Average_{norm}$	**0.0149**	**56.34**
$Standard\ Dev._{norm}$		**3.219**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**5.714**
Min.	**0.0137**	**51.25**
Max.	**0.0159**	**61.42**
Number of Spec.	**18**	**18**


Laminate Filled-Hole Compression Properties (FHC3)--ETW
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
10
20
30
40
50
60
70
Laminate Filled-Hole Compression Strength [ksi]

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

Laminate Single-Shear Bearing Properties (SSB1)--RTD Strength

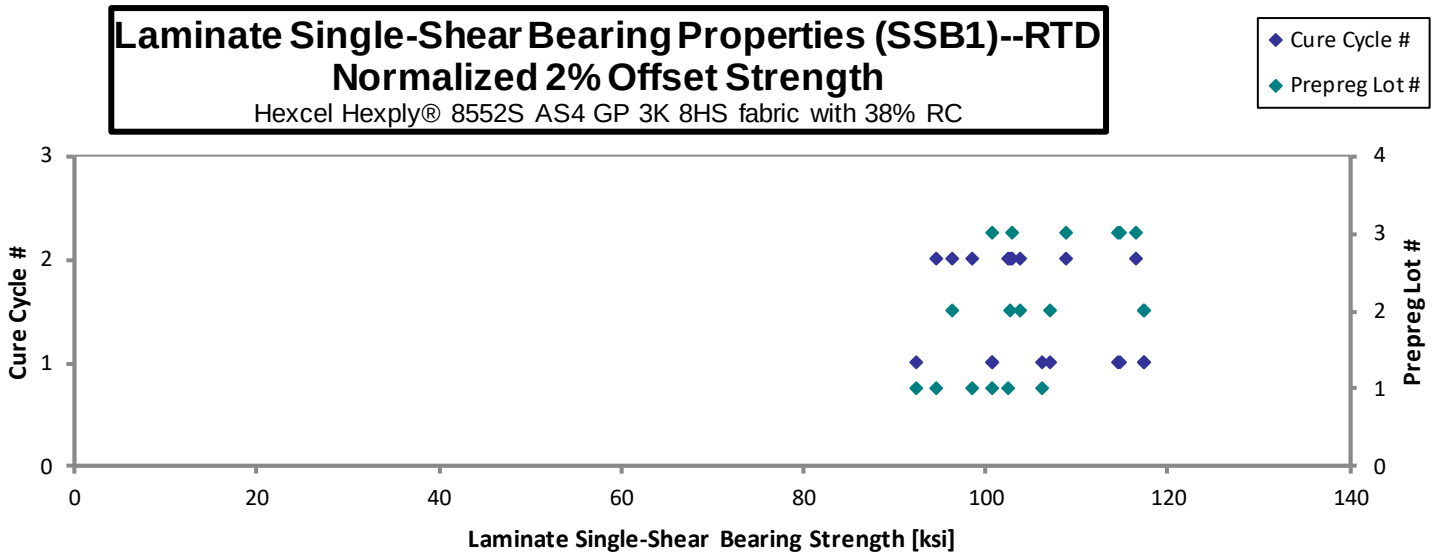
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

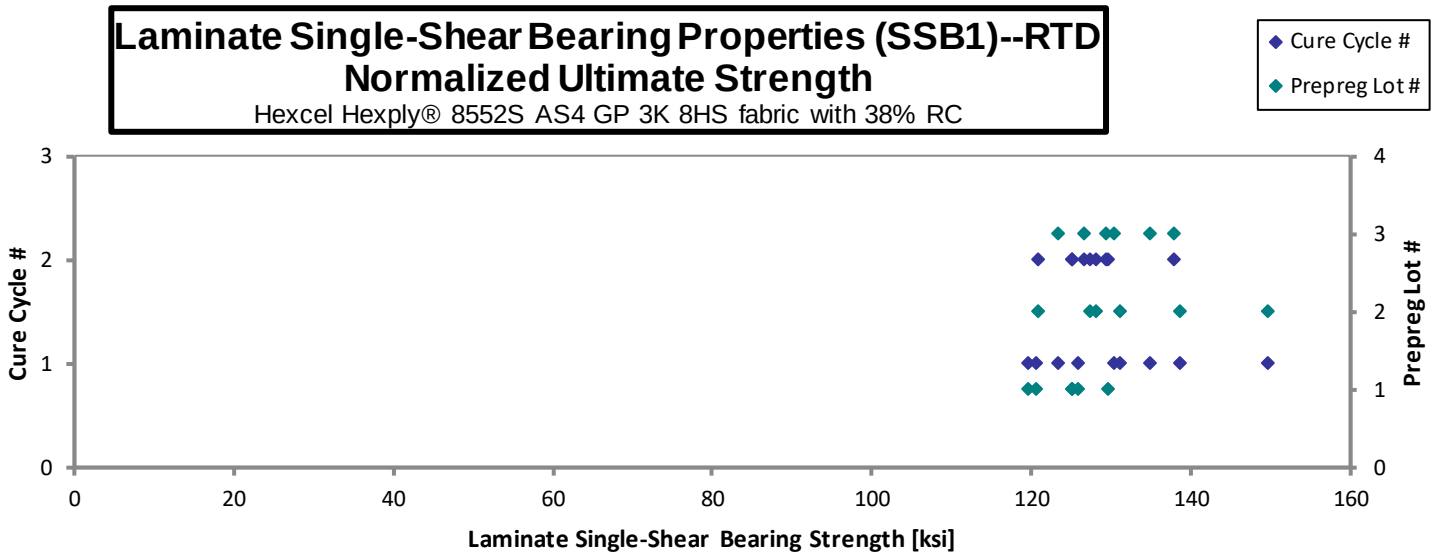
normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit Cure Cycle	Prepreg Lot #	Cure Cycle #	Initial Peak Strength [ksi]	2% Offset Strength [ksi]	Ultimate Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	2% Offset $Strength_{norm}$ [ksi]	Ultimate $Strength_{norm}$ [ksi]
HPA1A111A	A	M1	1	1	108.7	108.3	140.3	0.1023	8	B1I	0.0128	92.35	119.6
HPA1A112A	A	M1	1	1		113.0	141.2	0.1070	8	B1I	0.0134	100.7	125.9
HPA1A113A	A	M1	1	1	121.7	117.8	133.9	0.1082	8	B1I	0.0135	106.3	120.8
HPA1A211A	A	M2	1	2		115.4	140.8	0.1066	8	B1I	0.0133	102.5	125.1
HPA1A212A	A	M2	1	2	110.0	107.1	140.8	0.1104	8	B1I	0.0138	98.61	129.6
HPA1A213A	A	M2	1	2	104.5	101.9	134.9	0.1114	8	B1I	0.0139	94.63	125.3
HPA1B111A	B	M1	2	1		113.6	147.0	0.1133	8	B1I	0.0142	107.2	138.7
HPA1B112A	B	M1	2	1		118.8	132.8	0.1185	8	B1I	0.0148	117.4	131.2
HPA1B113A	B	M1	2	1		117.6	149.8	0.1199	8	B1I	0.0150	117.5	149.7
HPA1B211A	B	M2	2	2		112.0	130.6	0.1112	8	B1I	0.0139	103.8	121.0
HPA1B212A	B	M2	2	2		99.03	123.6	0.1244	8	B1I	0.0156	102.7	128.2
HPA1B213A	B	M2	2	2		91.30	121.0	0.1265	8	B1I	0.0158	96.25	127.5
HPA1C111A	C	M1	3	1		123.7	140.8	0.1111	8	B1I	0.0139	114.5	130.3
HPA1C112A	C	M1	3	1		109.9	134.7	0.1100	8	B1I	0.0137	100.7	123.4
HPA1C113A	C	M1	3	1		109.3	128.4	0.1261	8	B1I	0.0158	114.8	134.9
HPA1C211A	C	M2	3	2	114.0	112.2	141.1	0.1100	8	B1I	0.0137	102.8	129.3
HPA1C212A	C	M2	3	2	116.7	110.8	128.7	0.1180	8	B1I	0.0147	109.0	126.6
HPA1C213A	C	M2	3	2		116.5	138.0	0.1199	8	B1I	0.0150	116.5	137.9

Initial Peak is not included in statistical analysis due to small sample size

Average	**112.6**	**111.0**	**136.0**	**$Average_{norm}$**	**0.0143**	**105.4**	**129.2**
Standard Dev.	**6.143**	**7.726**	**7.647**	**$Standard\ Dev._{norm}$**		**7.993**	**7.443**
Coeff. of Var. [%]	**5.455**	**6.959**	**5.622**	**Coeff. of Var. $[\%]_{norm}$**		**7.580**	**5.763**
Min.	**104.5**	**91.30**	**121.0**	**Min.**	**0.0128**	**92.35**	**119.6**
Max.	**121.7**	**123.7**	**149.8**	**Max.**	**0.0158**	**117.5**	**149.7**
Number of Spec.	**6**	**18**	**18**	**Number of Spec.**	**18**	**18**	**18**


Laminate Single-Shear Bearing Properties (SSB1)--RTD
Normalized 2% Offset Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Single-Shear Bearing Strength [ksi]
0
20
40
60
80
100
120
140
0
1
2
3
4


Laminate Single-Shear Bearing Properties (SSB1)--RTD
Normalized Ultimate Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Single-Shear Bearing Strength [ksi]
0
20
40
60
80
100
120
140
160
0
1
2
3
4

Laminate Single-Shear Bearing Properties (SSB1)--ETW Strength

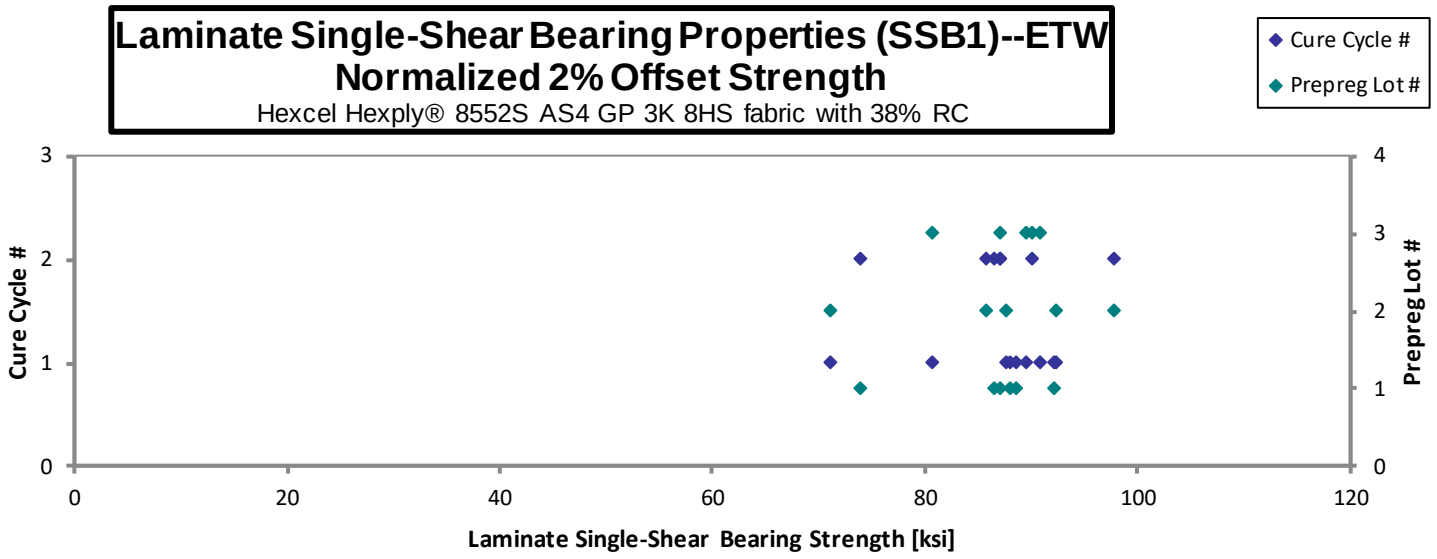
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

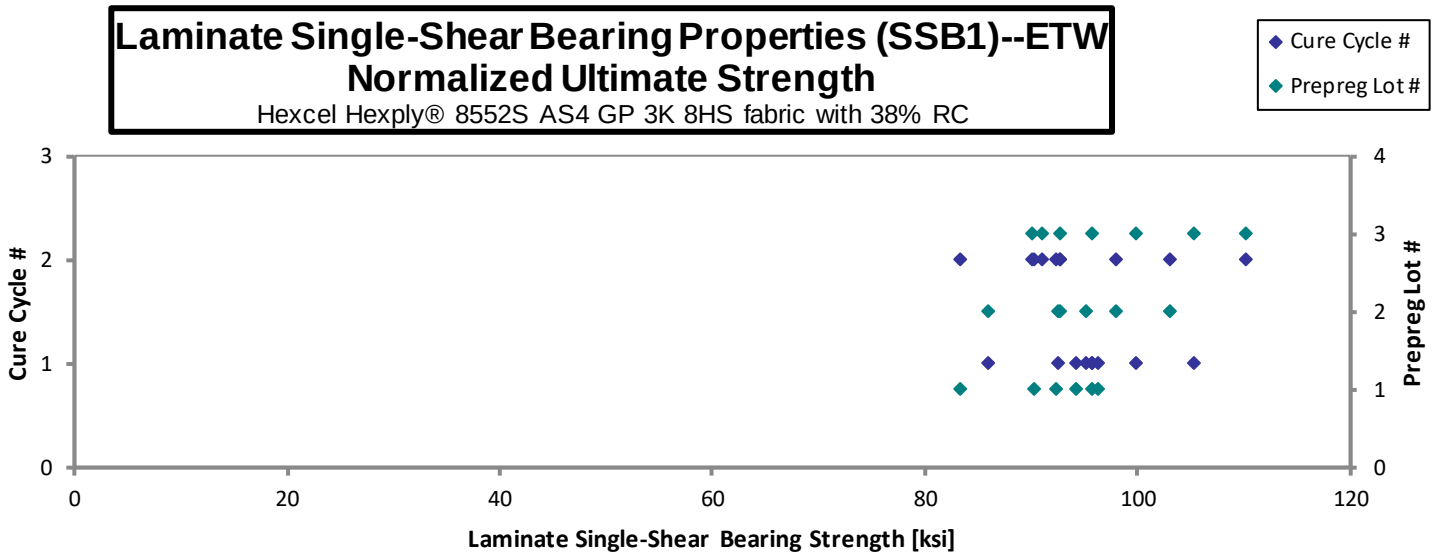
normalizing t_{ply} [in]: 0.0150

Specimen Number	Spirit Batch #	Spirit Cure Cycle	Prepreg Lot #	Cure Cycle #	Initial Peak Strength [ksi]	2% Offset Strength [ksi]	Ultimate Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	2% Offset $Strength_{norm}$ [ksi]	Ultimate $Strength_{norm}$ [ksi]
HPA1A111D	A	M1	1	1		95.29	102.1	0.1108	8	B1I	0.0138	87.96	94.20
HPA1A112D	A	M1	1	1		92.89	96.59	0.1191	8	B1I	0.0149	92.15	95.82
HPA1A113D	A	M1	1	1		86.59	94.07	0.1229	8	B1I	0.0154	88.68	96.34
HPA1A211D	A	M2	1	2		95.45	101.3	0.1094	8	B1I	0.0137	87.02	92.32
HPA1A212D	A	M2	1	2	85.33	84.32	88.07	0.1231	8	B1I	0.0154	86.46	90.30
HPA1A213D	A	M2	1	2		70.08	78.97	0.1265	8	B1I	0.0158	73.88	83.26
HPA1B111D	B	M1	2	1		93.20	98.27	0.1129	8	B1I	0.0141	87.70	92.47
HPA1B112D	B	M1	2	1		90.01	92.80	0.1231	8	B1I	0.0154	92.32	95.18
HPA1B113D	B	M1	2	1		68.76	83.02	0.1242	8	B1I	0.0155	71.15	85.91
HPA1B211D	B	M2	2	2	90.25	89.28	96.52	0.1154	8	B1I	0.0144	85.82	92.78
HPA1B212D	B	M2	2	2		91.13	91.27	0.1288	8	B1I	0.0161	97.81	97.96
HPA1B213D	B	M2	2	2			94.59	0.1308	8	B1I	0.0164		103.1
HPA1C111D	C	M1	3	1		87.86	108.6	0.1104	8	B1I	0.0138	80.79	99.87
HPA1C112D	C	M1	3	1	88.81	88.15	103.6	0.1220	8	B1I	0.0153	89.63	105.4
HPA1C113D	C	M1	3	1		87.55	92.36	0.1245	8	B1I	0.0156	90.80	95.78
HPA1C211D	C	M2	3	2		97.97	98.98	0.1104	8	B1I	0.0138	90.14	91.07
HPA1C212D*	C	M2	3	2			109.3	0.1210	8	B1I	0.0151		110.2
HPA1C213D	C	M2	3	2		83.14	85.98	0.1257	8	B1I	0.0157	87.11	90.09
HPA1C215D*	C	M2	3	2			91.85	0.1211	8	B1I	0.0151		92.71

*Ultimate strength occurs before 2% offset.
Initial Peak is not included in statistical analysis due to small sample size

Average	**88.13**	**87.60**	**95.17**	**$Average_{norm}$**	**0.0150**	**86.84**	**94.99**
Standard Dev.	**2.530**	**8.175**	**7.994**	**$Standard\ Dev._{norm}$**		**6.685**	**6.445**
Coeff. of Var. [%]	**2.871**	**9.332**	**8.400**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**7.698**	**6.785**
Min.	**85.33**	**68.76**	**78.97**	**Min.**	**0.0137**	**71.15**	**83.26**
Max.	**90.25**	**97.97**	**109.3**	**Max.**	**0.0164**	**97.81**	**110.2**


Laminate Single-Shear Bearing Properties (SSB1)--ETW
Normalized 2% Offset Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Single-Shear Bearing Strength [ksi]
0
20
40
60
80
100
120
0
1
2
3
4


Laminate Single-Shear Bearing Properties (SSB1)--ETW
Normalized Ultimate Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Single-Shear Bearing Strength [ksi]
0
20
40
60
80
100
120
0
1
2
3
4

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

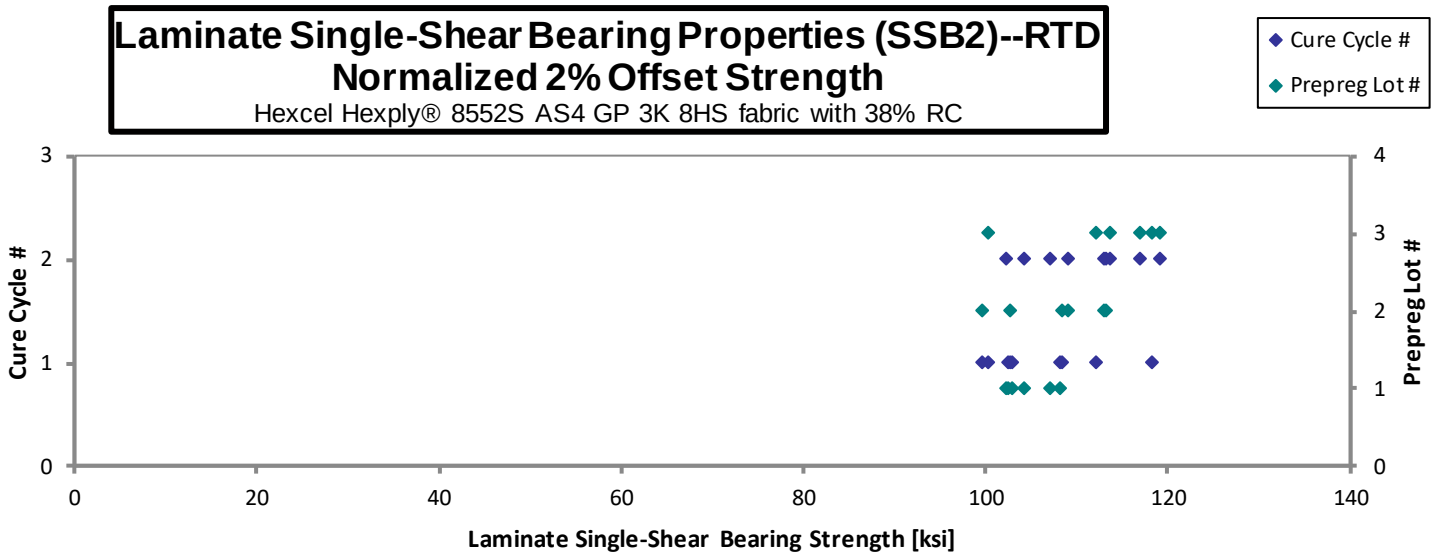
Laminate Single-Shear Bearing Properties (SSB2)--RTD Strength

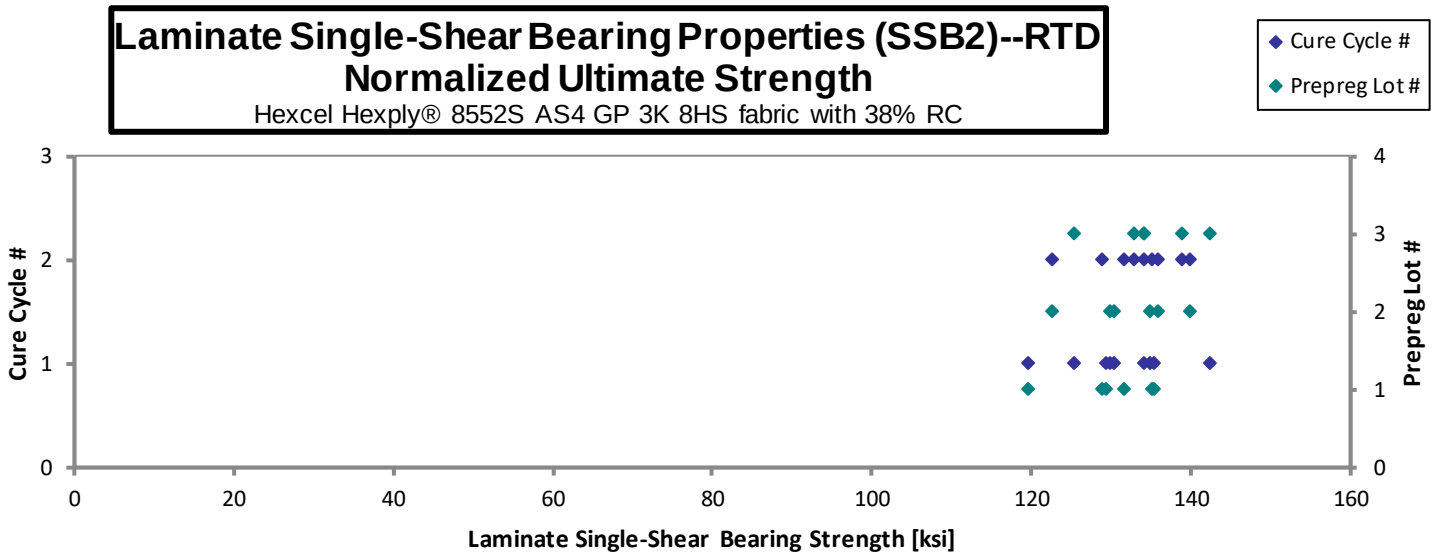
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit Cure Cycle	Prepreg Lot #	Cure Cycle #	2% Offset Strength [ksi]	Ultimate Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	2% Offset $Strength_{norm}$ [ksi]	Ultimate $Strength_{norm}$ [ksi]
HPA2A111A	A	M1	1	1	118.5	137.6	0.1303	10	B1I, E3S	0.0130	103.0	119.6
HPA2A112A	A	M1	1	1	112.8	142.4	0.1365	10	B1I, E3S	0.0136	102.6	129.5
HPA2A113A	A	M1	1	1	116.9	146.3	0.1388	10	B1I, E3S	0.0139	108.2	135.4
HPA2A211A	A	M2	1	2	114.9	145.0	0.1334	10	B1I, E3S	0.0133	102.3	129.0
HPA2A212A	A	M2	1	2	115.3	141.7	0.1394	10	B1I, E3S	0.0139	107.2	131.7
HPA2A213A	A	M2	1	2	111.1	144.0	0.1408	10	B1I, E3S	0.0141	104.3	135.1
HPA2B111A	B	M1	2	1	117.1	141.0	0.1388	10	B1I, E3S	0.0139	108.3	130.4
HPA2B112A	B	M1	2	1	102.2	138.5	0.1462	10	B1I, E3S	0.0146	99.59	135.0
HPA2B113A	B	M1	2	1	102.8	129.9	0.1499	10	B1I, E3S	0.0150	102.7	129.8
HPA2B211A	B	M2	2	2	116.8	131.2	0.1401	10	B1I, E3S	0.0140	109.1	122.6
HPA2B212A	B	M2	2	2	114.7	142.2	0.1476	10	B1I, E3S	0.0148	112.9	139.9
HPA2B213A	B	M2	2	2	111.7	134.0	0.1521	10	B1I, E3S	0.0152	113.3	135.9
HPA2C111A	C	M1	3	1	119.7	143.1	0.1406	10	B1I, E3S	0.0141	112.2	134.1
HPA2C112A	C	M1	3	1	112.6	140.9	0.1336	10	B1I, E3S	0.0134	100.3	125.5
HPA2C113A	C	M1	3	1	112.2	135.2	0.1581	10	B1I, E3S	0.0158	118.3	142.5
HPA2C211A	C	M2	3	2	122.0	142.5	0.1399	10	B1I, E3S	0.0140	113.8	133.0
HPA2C212A	C	M2	3	2	115.9	130.5	0.1542	10	B1I, E3S	0.0154	119.1	134.2
HPA2C213A	C	M2	3	2	108.9	129.4	0.1611	10	B1I, E3S	0.0161	116.9	139.0

Average	**113.7**	**138.6**	**$Average_{norm}$**	**0.0143**	**108.6**	**132.3**
Standard Dev.	**5.206**	**5.562**	**Standard $Dev._{norm}$**		**6.279**	**5.862**
Coeff. of Var. [%]	**4.579**	**4.012**	**Coeff. of Var. $[\%]_{norm}$**		**5.784**	**4.429**
Min.	**102.2**	**129.4**	**Min.**	**0.0130**	**99.59**	**119.6**
Max.	**122.0**	**146.3**	**Max.**	**0.0161**	**119.1**	**142.5**
Number of Spec.	**18**	**18**	**Number of Spec.**	**18**	**18**	**18**


Laminate Single-Shear Bearing Properties (SSB2)--RTD
Normalized 2% Offset Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
20
40
60
80
100
120
140
Laminate Single-Shear Bearing Strength [ksi]


Laminate Single-Shear Bearing Properties (SSB2)--RTD
Normalized Ultimate Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
20
40
60
80
100
120
140
160
Laminate Single-Shear Bearing Strength [ksi]

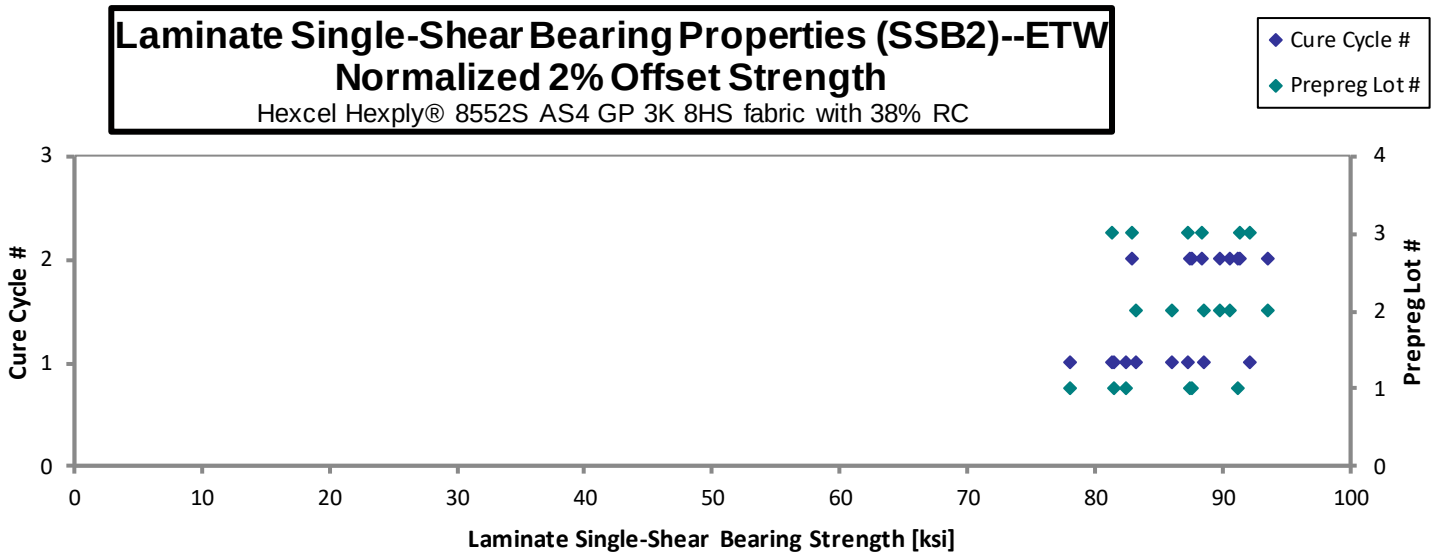
Laminate Single-Shear Bearing Properties (SSB2)--ETW Strength

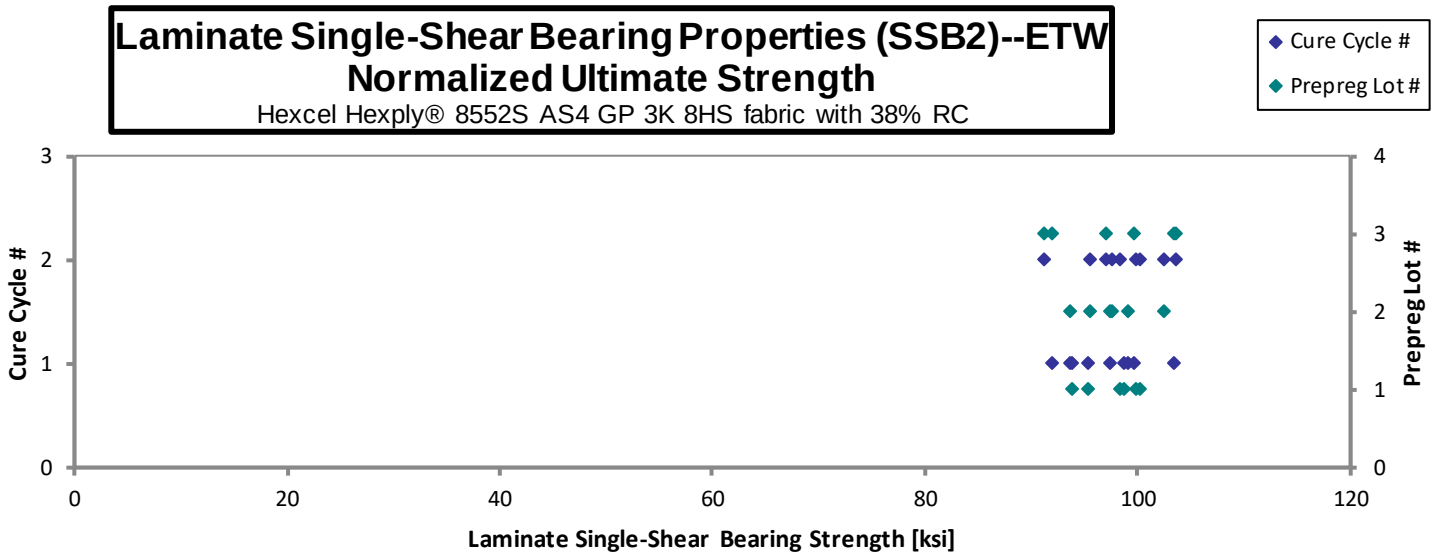
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit Cure Cycle	Prepreg Lot #	Cure Cycle #	2% Offset Strength [ksi]	Ultimate Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	2% Offset $Strength_{norm}$ [ksi]	Ultimate $Strength_{norm}$ [ksi]
HPA2A111D	A	M1	1	1	85.56	104.5	0.1368	10	B1I	0.0137	78.01	95.29
HPA2A112D	A	M1	1	1	88.54	102.0	0.1380	10	B1I	0.0138	81.46	93.86
HPA2A113D	A	M1	1	1	81.45	97.68	0.1518	10	B1I	0.0152	82.42	98.84
HPA2A211D	A	M2	1	2	85.68	98.05	0.1534	10	B1I	0.0153	87.61	100.3
HPA2A212D	A	M2	1	2	86.37	94.45	0.1585	10	B1I	0.0158	91.25	99.80
HPA2A213D	A	M2	1	2	90.06	101.4	0.1456	10	B1I	0.0146	87.44	98.43
HPA2B111D	B	M1	2	1	87.51	104.2	0.1426	10	B1I	0.0143	83.19	99.09
HPA2B112D	B	M1	2	1	86.39	94.92	0.1539	10	B1I	0.0154	88.63	97.39
HPA2B113D	B	M1	2	1	80.99	88.09	0.1595	10	B1I	0.0160	86.12	93.68
HPA2B211D	B	M2	2	2	88.89	95.84	0.1528	10	B1I	0.0153	90.54	97.62
HPA2B212D	B	M2	2	2	93.52	99.55	0.1441	10	B1I	0.0144	89.85	95.63
HPA2B213D	B	M2	2	2	90.25	98.94	0.1555	10	B1I	0.0155	93.53	102.5
HPA2C111D	C	M1	3	1	88.11	99.74	0.1384	10	B1I	0.0138	81.29	92.01
HPA2C112D	C	M1	3	1	85.29	97.37	0.1535	10	B1I	0.0153	87.27	99.63
HPA2C113D	C	M1	3	1	88.71	99.55	0.1558	10	B1I	0.0156	92.11	103.4
HPA2C211D	C	M2	3	2	97.63	100.8	0.1358	10	B1I	0.0136	88.38	91.27
HPA2C212D	C	M2	3	2	85.19	99.65	0.1460	10	B1I	0.0146	82.91	96.99
HPA2C213D	C	M2	3	2	90.91	103.2	0.1508	10	B1I	0.0151	91.39	103.7

Average	**87.84**	**98.89**	**Average$_{norm}$**	**0.0148**	**86.86**	**97.75**
Standard Dev.	**3.957**	**3.957**	**Standard Dev.$_{norm}$**		**4.397**	**3.641**
Coeff. of Var. [%]	**4.505**	**4.002**	**Coeff. of Var. [%]$_{norm}$**		**5.063**	**3.725**
Min.	**80.99**	**88.09**	**Min.**	**0.0136**	**78.01**	**91.27**
Max.	**97.63**	**104.5**	**Max.**	**0.0160**	**93.53**	**103.7**
Number of Spec.	**18**	**18**	**Number of Spec.**	**18**	**18**	**18**


Laminate Single-Shear Bearing Properties (SSB2)--ETW
Normalized 2% Offset Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Single-Shear Bearing Strength [ksi]
0
10
20
30
40
50
60
70
80
90
100
0
1
2
3
4


Laminate Single-Shear Bearing Properties (SSB2)--ETW
Normalized Ultimate Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Single-Shear Bearing Strength [ksi]
0
20
40
60
80
100
120
0
1
2
3
4

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

Laminate Single-Shear Bearing Properties (SSB3)--RTD Strength

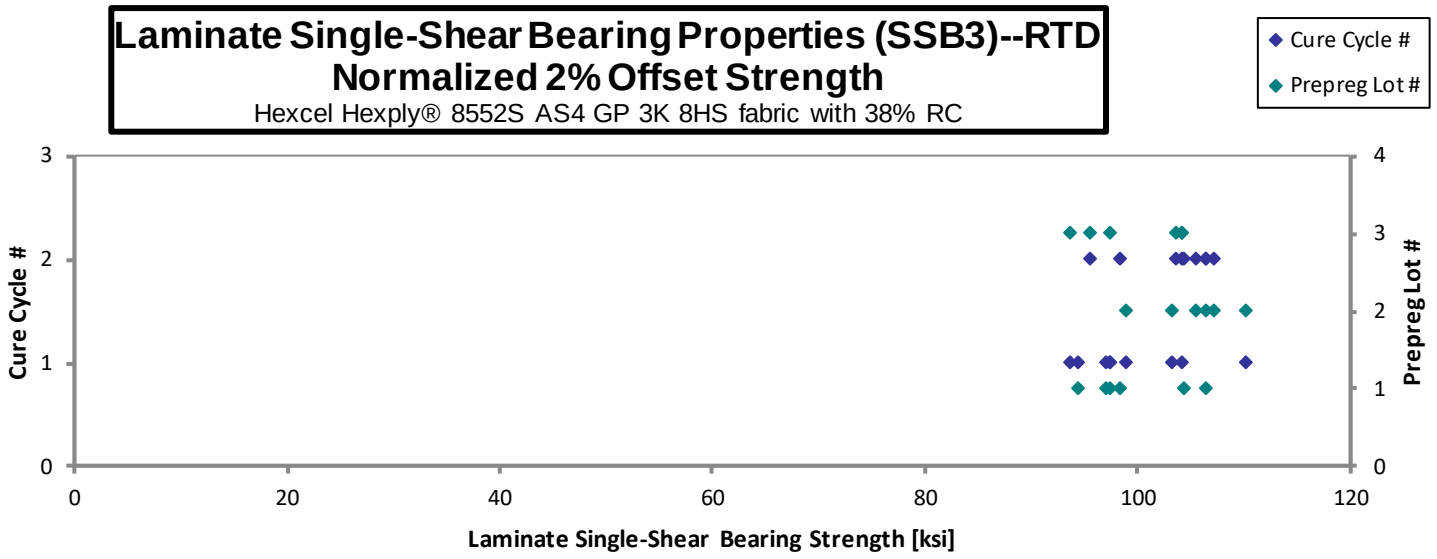
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

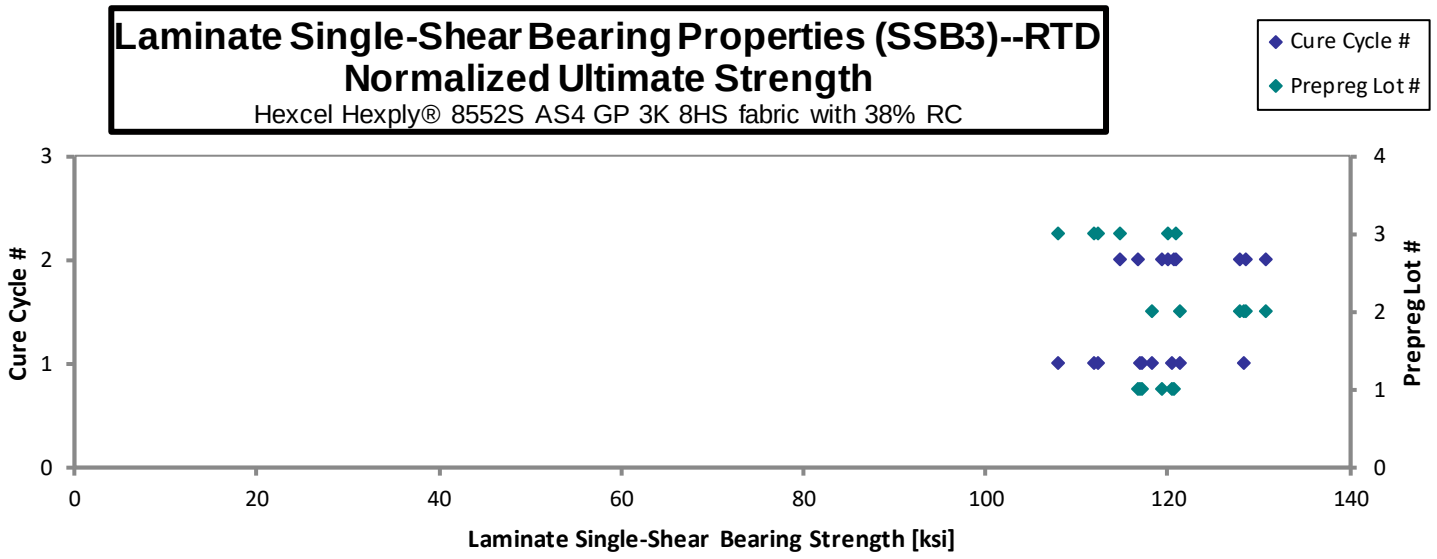
normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit Cure Cycle	Prepreg Lot #	Cure Cycle #	Initial Peak Strength [ksi]	2% Offset Strength [ksi]	Ultimate Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	2% Offset $Strength_{norm}$ [ksi]	Ultimate $Strength_{norm}$ [ksi]
HPA3A111A	A	M1	1	1		107.9	133.5	0.1314	10	B1I	0.0131	94.48	116.9
HPA3A112A	A	M1	1	1		105.1	130.4	0.1386	10	B1I	0.0139	97.12	120.5
HPA3A113A	A	M1	1	1	105.8	104.6	125.9	0.1397	10	B1I	0.0140	97.44	117.2
HPA3A211A	A	M2	1	2		118.7	133.3	0.1345	10	B1I	0.0134	106.4	119.5
HPA3A212A	A	M2	1	2		111.5	128.9	0.1404	10	B1I	0.0140	104.4	120.7
HPA3A213A	A	M2	1	2	106.0	103.6	122.8	0.1425	10	B1I	0.0143	98.41	116.7
HPA3B111A	B	M1	2	1	110.8	107.2	128.3	0.1384	10	B1I	0.0138	98.90	118.3
HPA3B112A	B	M1	2	1		101.8	119.8	0.1520	10	B1I	0.0152	103.2	121.4
HPA3B113A	B	M1	2	1		104.4	121.6	0.1583	10	B1I	0.0158	110.2	128.3
HPA3B211A	B	M2	2	2		110.1	133.4	0.1438	10	B1I, E3S	0.0144	105.5	127.8
HPA3B212A	B	M2	2	2		104.0	124.9	0.1545	10	B1I, E3S	0.0155	107.1	128.7
HPA3B213A	B	M2	2	2		101.5	124.8	0.1572	10	B1I, E3S, D1I	0.0157	106.4	130.9
HPA3C111A	C	M1	3	1		106.4	122.2	0.1374	10	B1I	0.0137	97.50	111.9
HPA3C112A	C	M1	3	1	107.5	105.1	126.2	0.1336	10	B1I	0.0134	93.60	112.4
HPA3C113A	C	M1	3	1		116.1	120.2	0.1346	10	B1I	0.0135	104.2	107.9
HPA3C211A	C	M2	3	2		104.9	125.8	0.1368	10	B1I	0.0137	95.65	114.7
HPA3C212A	C	M2	3	2		109.2	126.7	0.1432	10	B1I	0.0143	104.3	121.0
HPA3C213A	C	M2	3	2		107.7	124.6	0.1444	10	B1I	0.0144	103.7	120.0

Initial Peak is not included in statistical analysis due to small sample size

Average	**107.6**	**107.2**	**126.3**	**$Average_{norm}$**	**0.0142**	**101.6**	**119.7**
Standard Dev.	**2.322**	**4.582**	**4.305**	**$Standard\ Dev._{norm}$**		**4.948**	**6.210**
Coeff. of Var. [%]	**2.159**	**4.274**	**3.408**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**4.871**	**5.187**
Min.	**105.8**	**101.5**	**119.8**	**Min.**	**0.0131**	**93.60**	**107.9**
Max.	**110.8**	**118.7**	**133.5**	**Max.**	**0.0158**	**110.2**	**130.9**
Number of Spec.	**4**	**18**	**18**	**Number of Spec.**	**18**	**18**	**18**


Laminate Single-Shear Bearing Properties (SSB3)--RTD
Normalized 2% Offset Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Single-Shear Bearing Strength [ksi]
0
20
40
60
80
100
120
0
1
2
3
4


Laminate Single-Shear Bearing Properties (SSB3)--RTD
Normalized Ultimate Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Single-Shear Bearing Strength [ksi]
0
20
40
60
80
100
120
140
0
1
2
3
4

Laminate Single-Shear Bearing Properties (SSB3)--ETW Strength

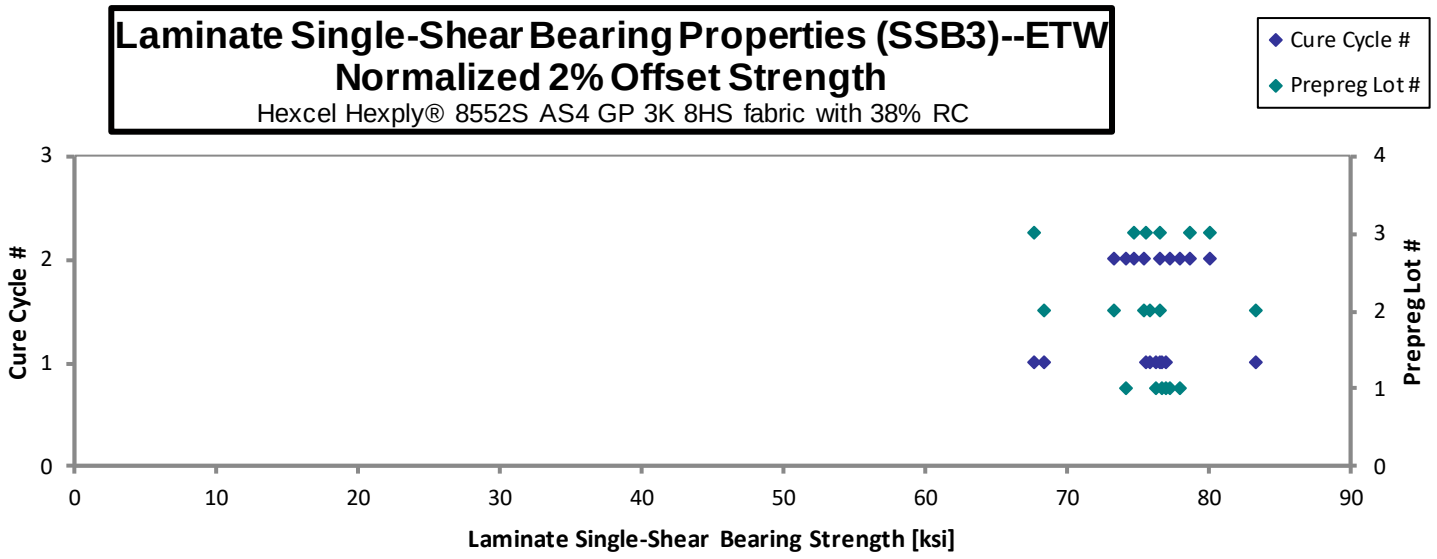
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

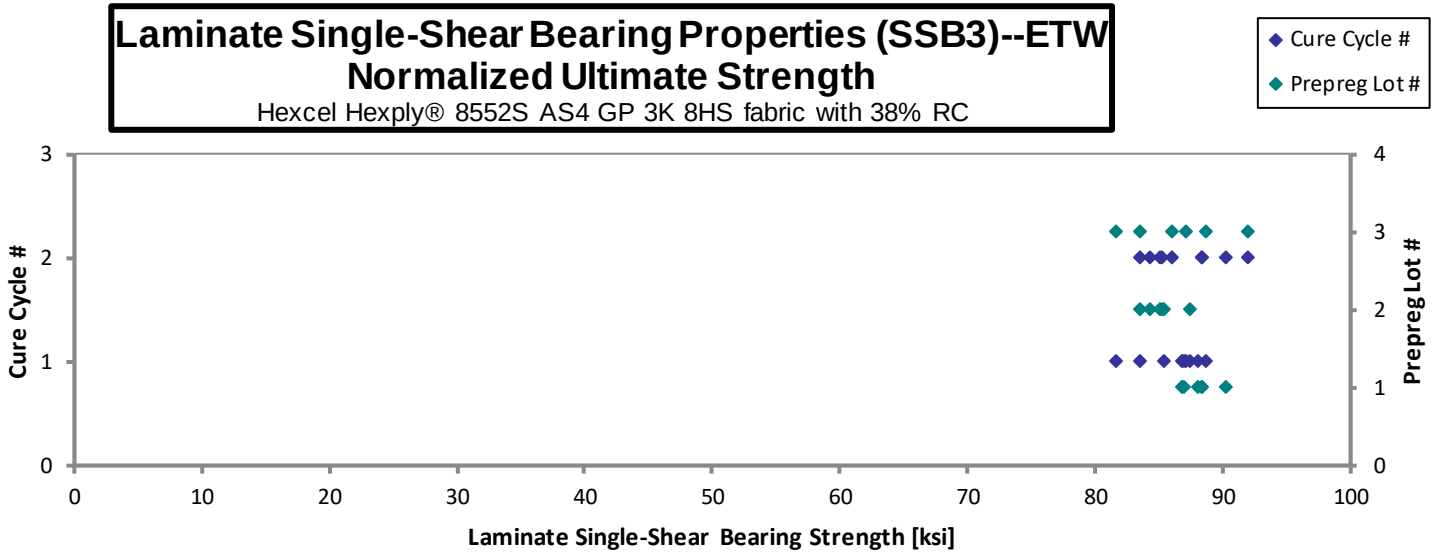
normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit Cure Cycle	Prepreg Lot #	Cure Cycle #	Initial Peak Strength [ksi]	2% Offset Strength [ksi]	Ultimate Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	2% Offset $Strength_{norm}$ [ksi]	Ultimate $Strength_{norm}$ [ksi]
HPA3A111D	A	M1	1	1	84.38	80.84	93.45	0.1415	10	B1I	0.0142	76.27	88.16
HPA3A112D	A	M1	1	1		75.81	85.94	0.1520	10	B1I	0.0152	76.79	87.05
HPA3A113D	A	M1	1	1	74.84	73.76	83.13	0.1567	10	B1I	0.0157	77.07	86.87
HPA3A211D	A	M2	1	2	82.79	81.61	93.37	0.1420	10	B1I	0.0142	77.24	88.37
HPA3A212D	A	M2	1	2	76.23	75.86	87.79	0.1542	10	B1I	0.0154	77.96	90.22
HPA3A213D	A	M2	1	2	72.52	70.21	83.62	0.1586	10	B1I	0.0159	74.25	88.44
HPA3B111D	B	M1	2	1	77.48	73.25	82.34	0.1555	10	B1I	0.0155	75.93	85.35
HPA3B112D	B	M1	2	1	81.68	73.54	89.79	0.1395	10	B1I	0.0139	68.38	83.48
HPA3B113D	B	M1	2	1	85.39	82.87	86.86	0.1510	10	B1I	0.0151	83.41	87.43
HPA3B211D	B	M2	2	2		79.53	89.73	0.1422	10	B1I	0.0142	75.41	85.09
HPA3B212D	B	M2	2	2		72.93	84.78	0.1510	10	B1I	0.0151	73.39	85.31
HPA3B213D	B	M2	2	2		75.28	82.99	0.1525	10	B1I	0.0153	76.55	84.39
HPA3C111D	C	M1	3	1	77.26	72.86	87.76	0.1395	10	B1I	0.0140	67.76	81.62
HPA3C112D	C	M1	3	1	77.04	74.48	87.39	0.1524	10	B1I	0.0152	75.68	88.79
HPA3C113D	C	M1	3	1	71.91	71.26	81.04	0.1613	10	B1I	0.0161	76.63	87.14
HPA3C211D	C	M2	3	2		78.13	87.36	0.1435	10	B1I	0.0143	74.72	83.55
HPA3C212D	C	M2	3	2	79.52	76.60	83.61	0.1543	10	B1I	0.0154	78.78	85.99
HPA3C213D	C	M2	3	2		75.21	86.32	0.1598	10	B1I	0.0160	80.15	91.98

Initial Peak is not included in statistical analysis due to small sample size

Average	**78.42**	**75.78**	**86.52**	**$Average_{norm}$**	**0.0150**	**75.91**	**86.62**
Standard Dev.	**4.411**	**3.565**	**3.535**	**$Standard\ Dev._{norm}$**		**3.643**	**2.562**
Coeff. of Var. [%]	**5.625**	**4.704**	**4.086**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**4.800**	**2.957**
Min.	**71.91**	**70.21**	**81.04**	**Min.**	**0.0139**	**67.76**	**81.62**
Max.	**85.39**	**82.87**	**93.45**	**Max.**	**0.0161**	**83.41**	**91.98**
Number of Spec.	**12**	**18**	**18**	**Number of Spec.**	**18**	**18**	**18**


Laminate Single-Shear Bearing Properties (SSB3)--ETW
Normalized 2% Offset Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Single-Shear Bearing Strength [ksi]
0
10
20
30
40
50
60
70
80
90
0
1
2
3
4


Laminate Single-Shear Bearing Properties (SSB3)--ETW
Normalized Ultimate Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
Laminate Single-Shear Bearing Strength [ksi]
0
10
20
30
40
50
60
70
80
90
100
0
1
2
3
4

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

Laminate Compression After Impact 1 Properties (CAI1)--RTD Strength

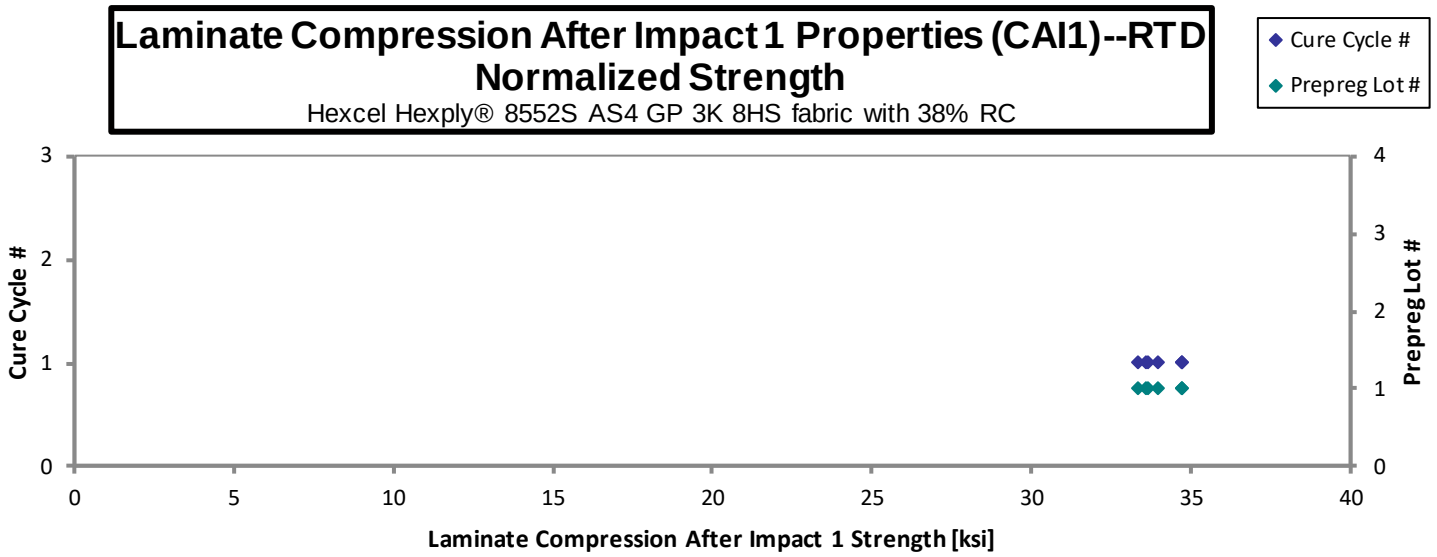
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

normalizing t_{ply} [in]
0.0150

Specimen Number	Spirit Batch #	Spirit 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]
HPAKA111A	A	M1	1	1	34.21	267.2	0.1769	12	LDM	0.0147	33.62
HPAKA112A	A	M1	1	1	33.43	278.6	0.1869	12	LDM	0.0156	34.71
HPAKA113A	A	M1	1	1	34.05	263.5	0.1764	12	LDM	0.0147	33.37
HPAKA114A	A	M1	1	1	34.58	262.5	0.1753	12	LDM	0.0146	33.68
HPAKA115A	A	M1	1	1	35.70	262.7	0.1750	12	LDM	0.0146	34.72
HPAKA116A	A	M1	1	1	33.17	279.1	0.1845	12	LDM	0.0154	33.99

Average	**34.19**	
Standard Dev.	**0.9037**	
Coeff. of Var. [%]	**2.643**	
Min.	**33.17**	
Max.	**35.70**	
Number of Spec.	**6**	

$Average_{norm}$	**0.0149**	**34.01**
$Standard\ Dev._{norm}$		**0.5751**
$Coeff.\ of\ Var.\ [\%]_{norm}$		**1.691**
Min.	**0.0146**	**33.37**
Max.	**0.0156**	**34.72**
Number of Spec.	**6**	**6**

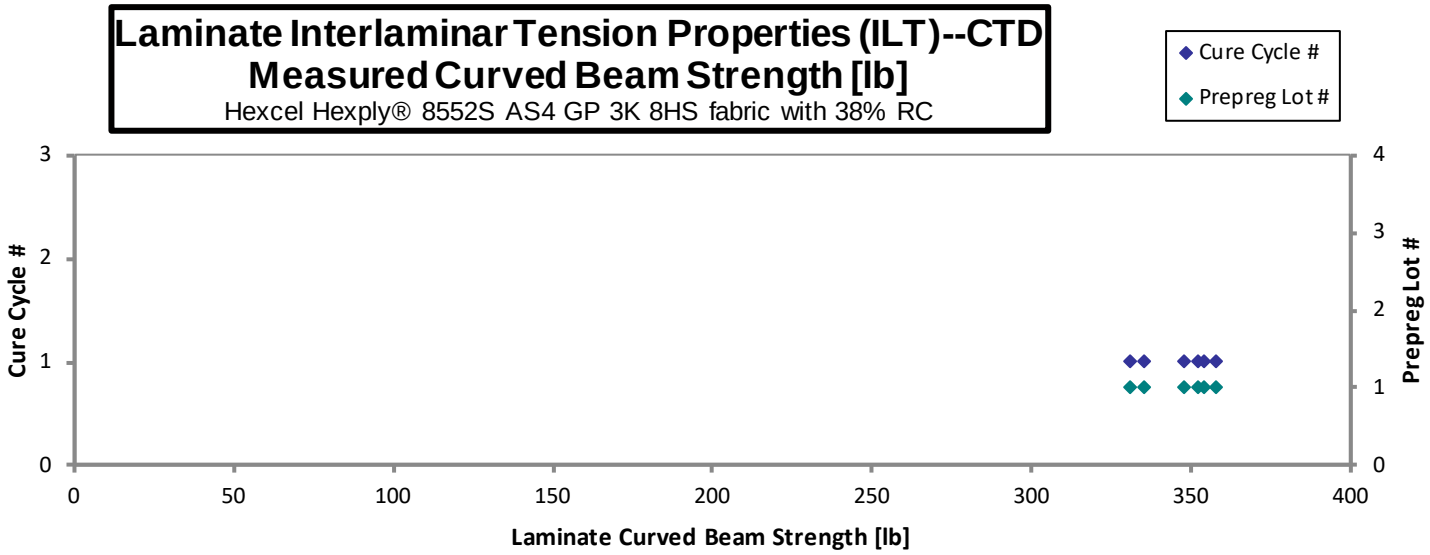

Laminate Compression After Impact 1 Properties (CAI1)--RTD
Normalized Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
5
10
15
20
25
30
35
40
Laminate Compression After Impact 1 Strength [ksi]

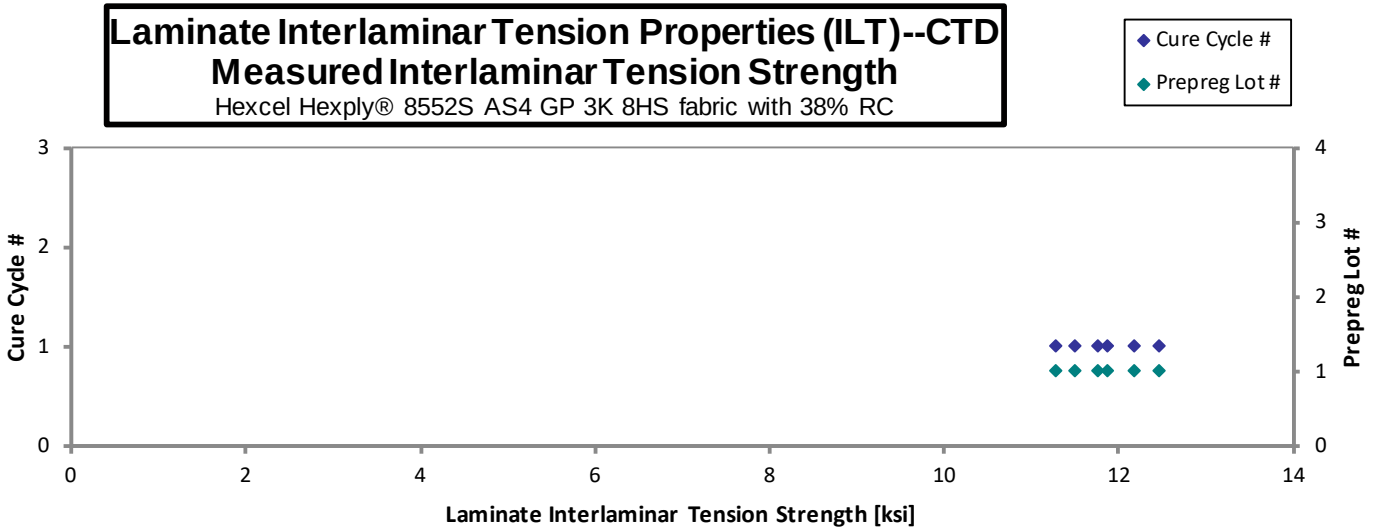
4.30 Interlaminar Tension Properties (ILT)

Laminate Interlaminar Tension Properties (ILT)--CTD Strength

Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

Specimen Number	Spirit Batch #	Spirit 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
HPAMA111B	A	M1	1	1	354.0	12.17	0.1398	11	0.0127	INTERLAMINAR FAILURE
HPAMA112B	A	M1	1	1	330.9	11.28	0.1408	11	0.0128	INTERLAMINAR FAILURE
HPAMA113B	A	M1	1	1	335.4	11.49	0.1402	11	0.0127	INTERLAMINAR FAILURE
HPAMA114B	A	M1	1	1	352.4	11.88	0.1421	11	0.0129	INTERLAMINAR FAILURE
HPAMA115B	A	M1	1	1	358.3	12.46	0.1384	11	0.0126	INTERLAMINAR FAILURE
HPAMA116B	A	M1	1	1	347.7	11.77	0.1416	11	0.0129	INTERLAMINAR FAILURE
				Average	**346.5**	**11.84**			**0.0128**	
				Standard Dev.	**10.92**	**0.4328**				
				Coeff. of Var. [%]	**3.151**	**3.655**				
				Min.	**330.9**	**11.28**			**0.0126**	
				Max.	**358.3**	**12.46**			**0.0129**	
				Number of Spec.	**6**	**6**			**6**	

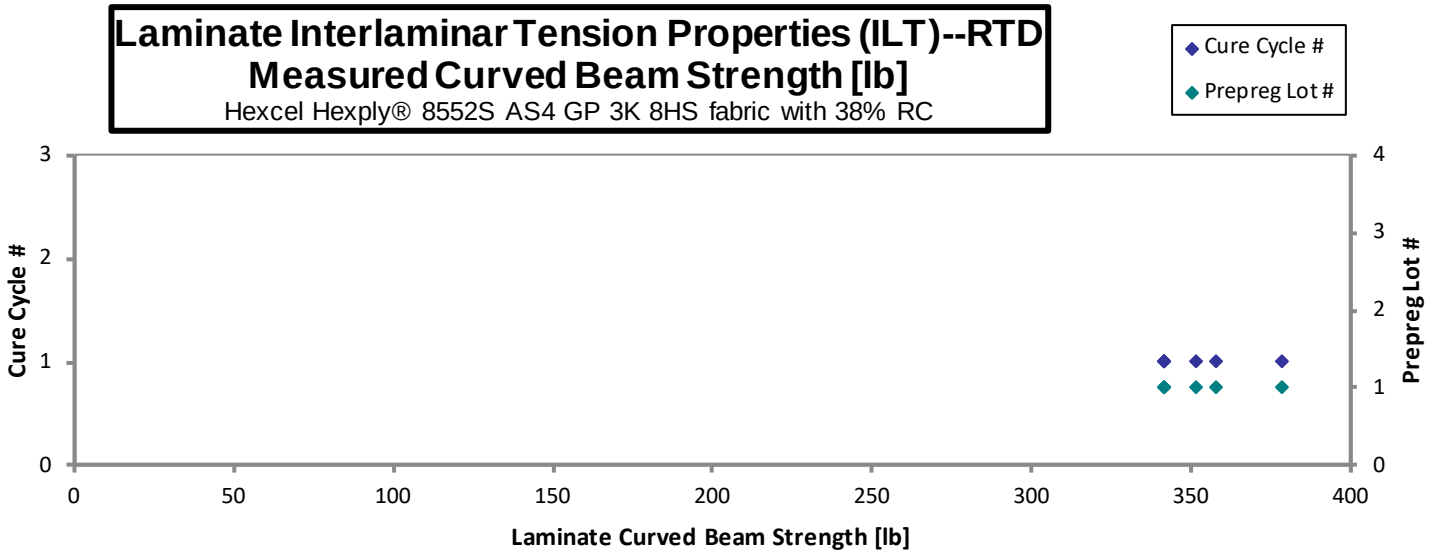

Laminate Interlaminar Tension Properties (ILT)--CTD
Measured Curved Beam Strength [lb]
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
50
100
150
200
250
300
350
400
Laminate Curved Beam Strength [lb]

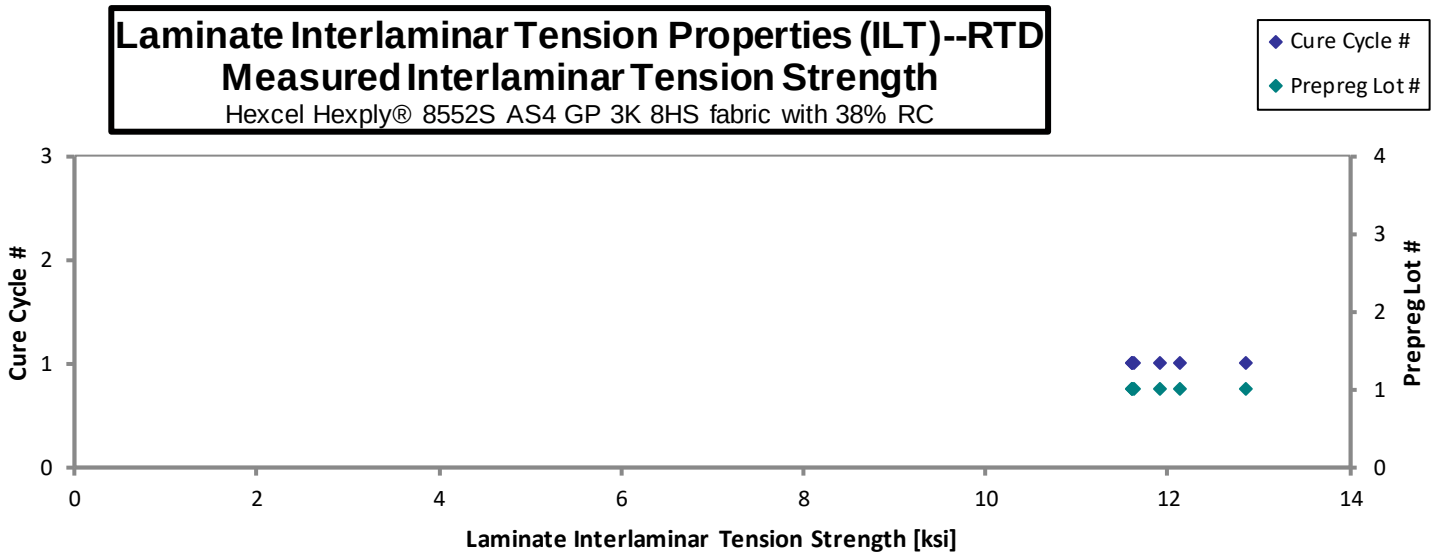

Laminate Interlaminar Tension Properties (ILT)--CTD
Measured Interlaminar Tension Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
2
4
6
8
10
12
14
Laminate Interlaminar Tension Strength [ksi]

Laminate Interlaminar Tension Properties (ILT)--RTD Strength

Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

Specimen Number	Spirit Batch #	Spirit 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
HPAMA111A	A	M1	1	1	378.7	12.86	0.1413	11	0.0128	INTERLAMINAR FAILURE
HPAMA112A	A	M1	1	1	351.7	11.91	0.1416	11	0.0129	INTERLAMINAR FAILURE
HPAMA113A	A	M1	1	1	358.1	12.14	0.1414	11	0.0129	INTERLAMINAR FAILURE
HPAMA114A	A	M1	1	1	341.5	11.63	0.1409	11	0.0128	INTERLAMINAR FAILURE
HPAMA115A	A	M1	1	1	341.8	11.62	0.1411	11	0.0128	INTERLAMINAR FAILURE
HPAMA116A	A	M1	1	1	342.0	11.61	0.1413	11	0.0128	INTERLAMINAR FAILURE
				Average	**352.3**	**11.96**			**0.0128**	
				Standard Dev.	**14.59**	**0.4889**				
				Coeff. of Var. [%]	**4.141**	**4.087**				
				Min.	**341.5**	**11.61**			**0.0128**	
				Max.	**378.7**	**12.86**			**0.0129**	
				Number of Spec.	**6**	**6**			**6**	

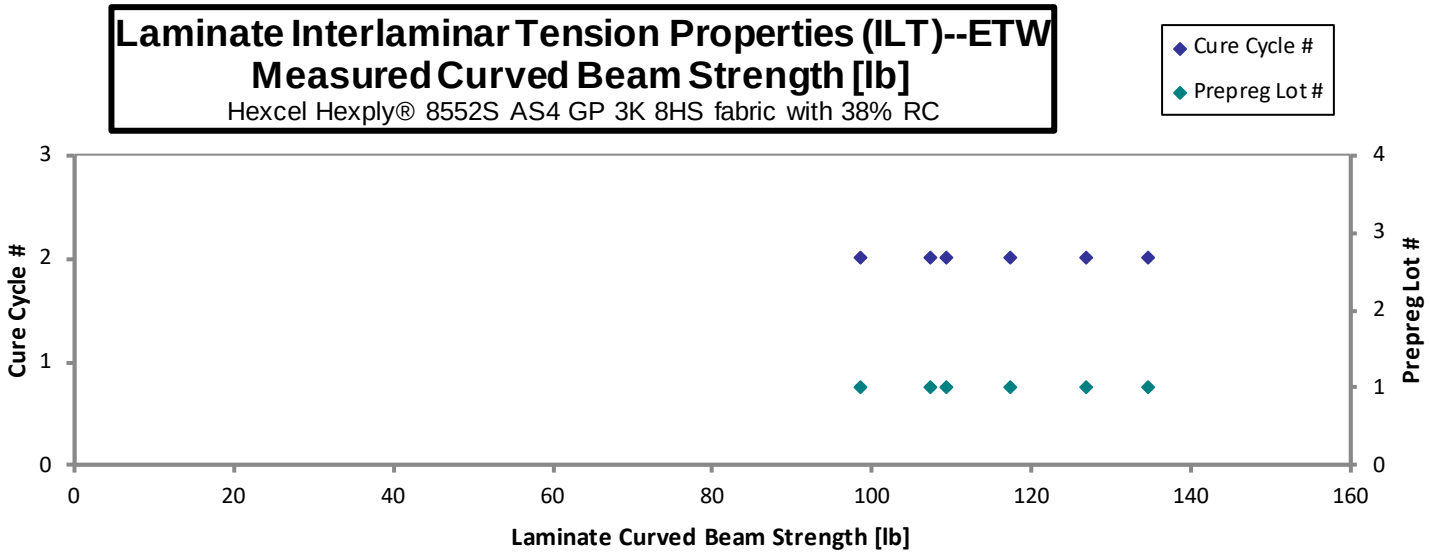

Laminate Interlaminar Tension Properties (ILT)--RTD
Measured Curved Beam Strength [lb]
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
50
100
150
200
250
300
350
400
Laminate Curved Beam Strength [lb]

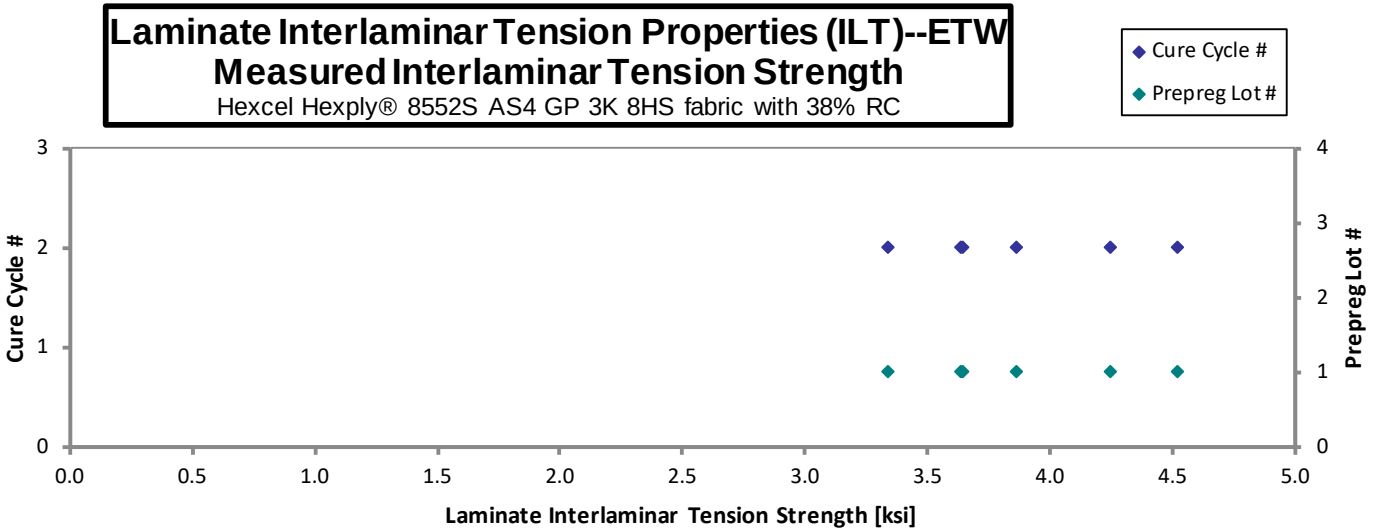

Laminate Interlaminar Tension Properties (ILT)--RTD
Measured Interlaminar Tension Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
2
4
6
8
10
12
14
Laminate Interlaminar Tension Strength [ksi]

Laminate Interlaminar Tension Properties (ILT)--ETW Strength

Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

Specimen Number	Spirit Batch #	Spirit 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
HPAMA211D	A	M2	1	2	107.5	3.639	0.1416	11	0.0129	INTERLAMINAR TENSILE FAILURE
HPAMA212D	A	M2	1	2	98.55	3.340	0.1415	11	0.0129	INTERLAMINAR TENSILE FAILURE
HPAMA213D	A	M2	1	2	117.3	3.863	0.1450	11	0.0132	INTERLAMINAR TENSILE FAILURE
HPAMA214D	A	M2	1	2	134.6	4.520	0.1426	11	0.0130	INTERLAMINAR TENSILE FAILURE
HPAMA215D	A	M2	1	2	109.3	3.648	0.1434	11	0.0130	INTERLAMINAR TENSILE FAILURE
HPAMA216D	A	M2	1	2	126.9	4.248	0.1430	11	0.0130	INTERLAMINAR TENSILE FAILURE
				Average	**115.7**	**3.876**			**0.0130**	
				Standard Dev.	**13.33**	**0.4356**				
				Coeff. of Var. [%]	**11.52**	**11.24**				
				Min.	**98.55**	**3.340**			**0.0129**	
				Max.	**134.6**	**4.520**			**0.0132**	
				Number of Spec.	**6**	**6**			**6**	

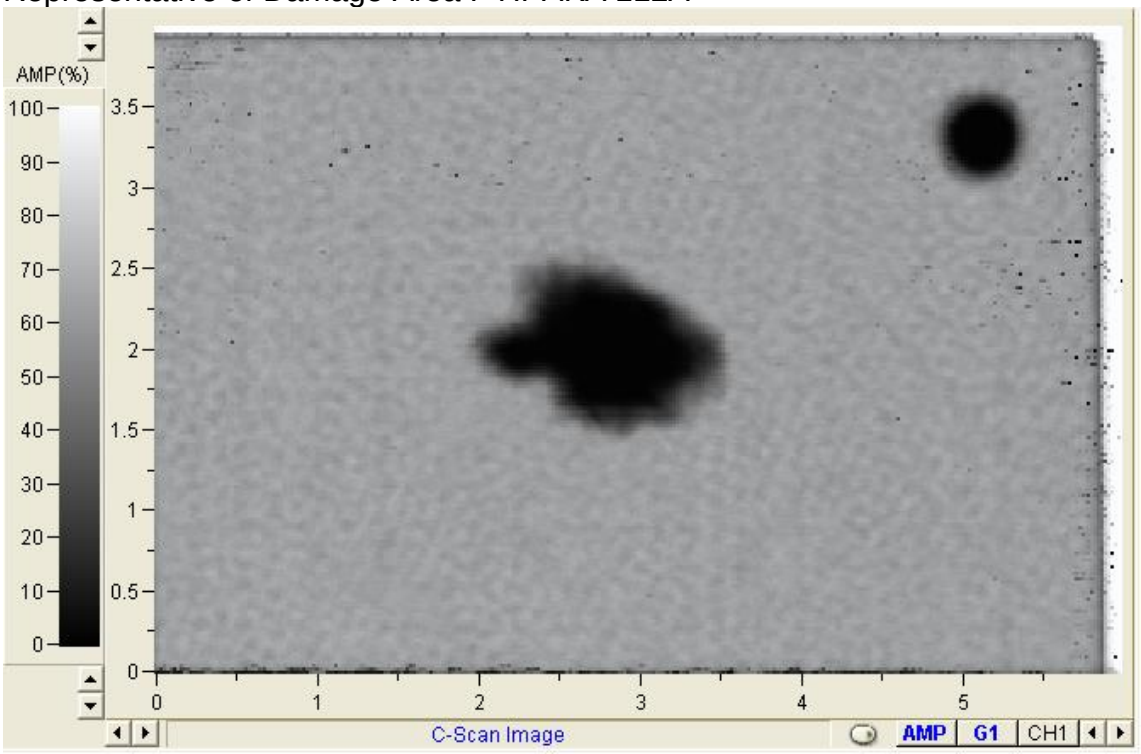

Laminate Interlaminar Tension Properties (ILT)--ETW
Measured Curved Beam Strength [lb]
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC
Cure Cycle #
Prepreg Lot #
Cure Cycle #
Prepreg Lot #
0
1
2
3
4
0
20
40
60
80
100
120
140
160
Laminate Curved Beam Strength [lb]


Laminate Interlaminar Tension Properties (ILT)--ETW
Measured Interlaminar Tension Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% 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
Laminate Interlaminar Tension Strength [ksi]

5. Additional Compression After Impact Data

Impactor Diameter: 0.625”

Representative of Damage Area :- HPAKA 112A

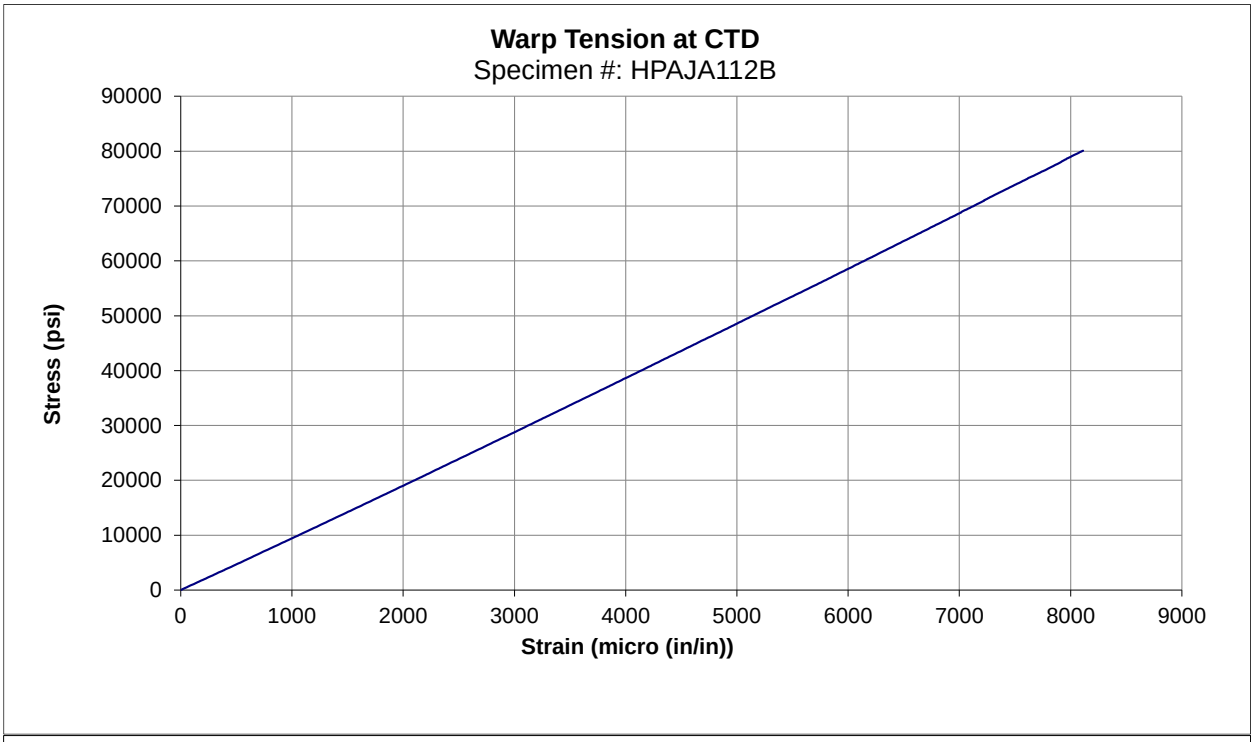


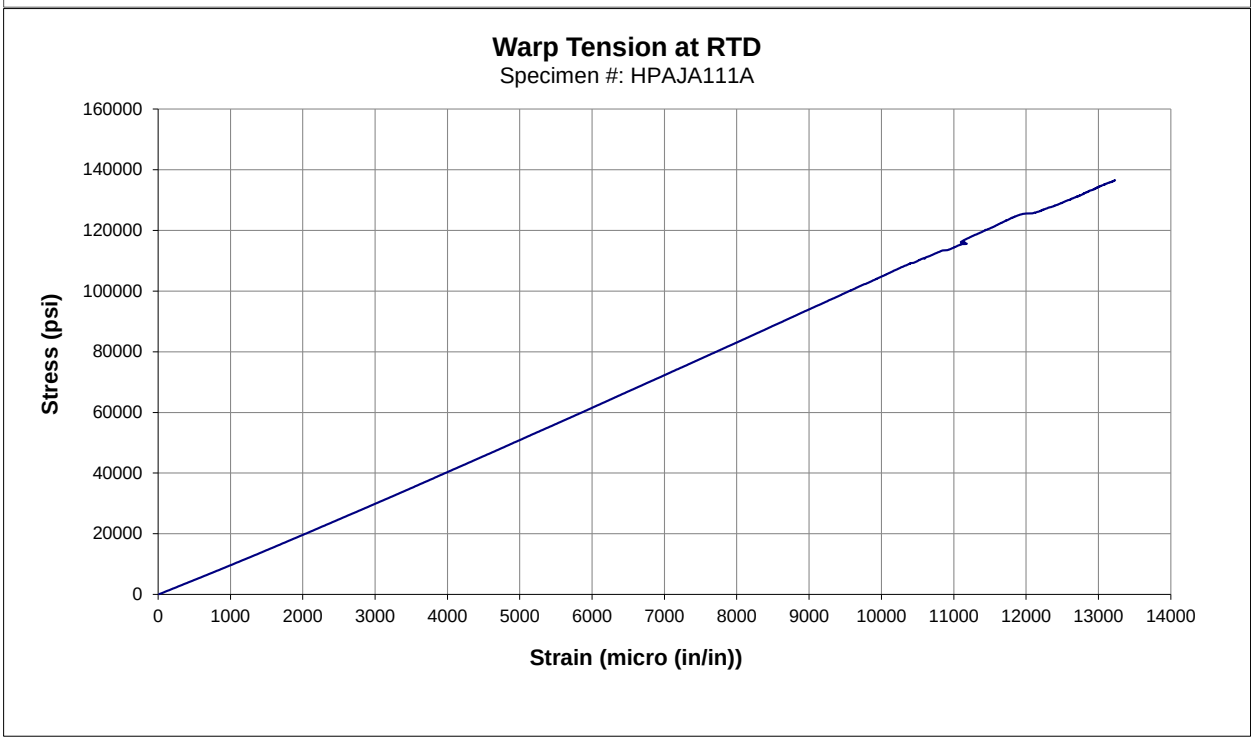
Damage Area and Dent Depth Summary:

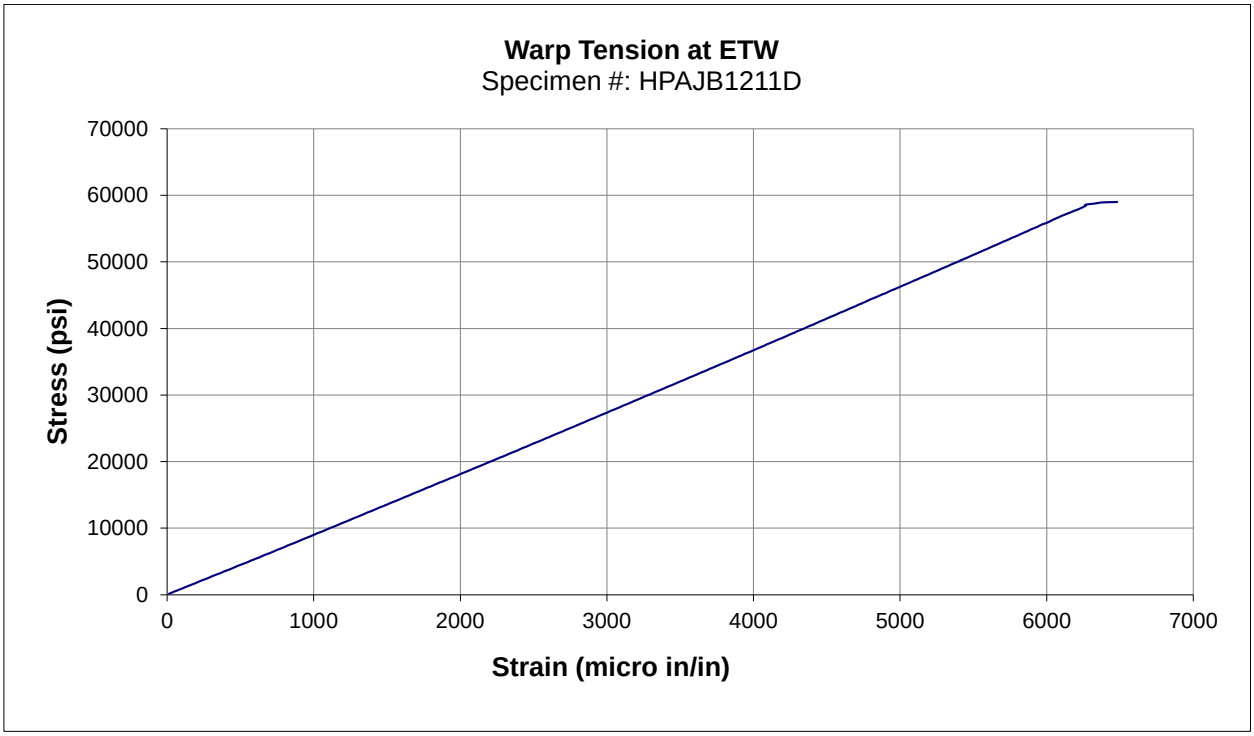
Specimen ID	Damage Area (inch^2)	Dent Depth (inch)
HPAKA111A	0.974	0.0355
HPAKA112A	0.925	0.0345
HPAKA113A	0.800	0.0365
HPAKA114A	0.902	0.0335
HPAKA115A	0.739	0.0325
HPAKA116A	0.865	0.0420

6. Stress vs. Strain Curve

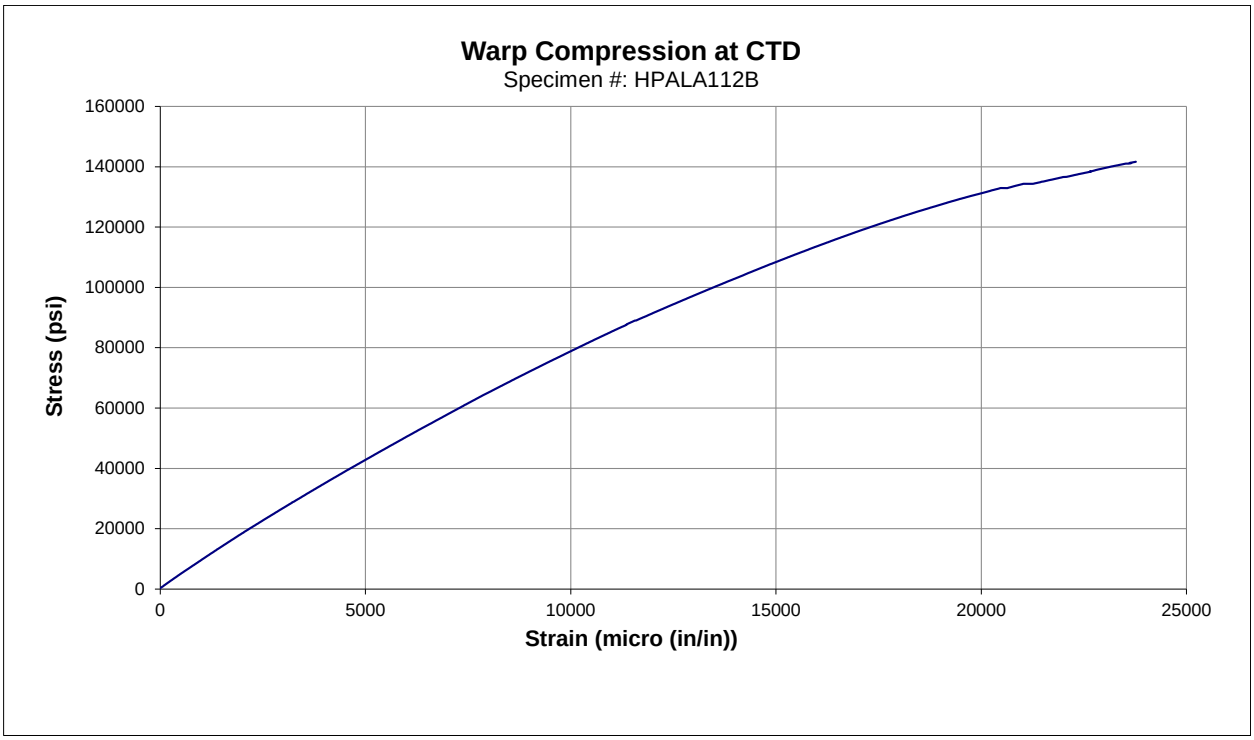
6.1 Warp Tension Properties (WT)

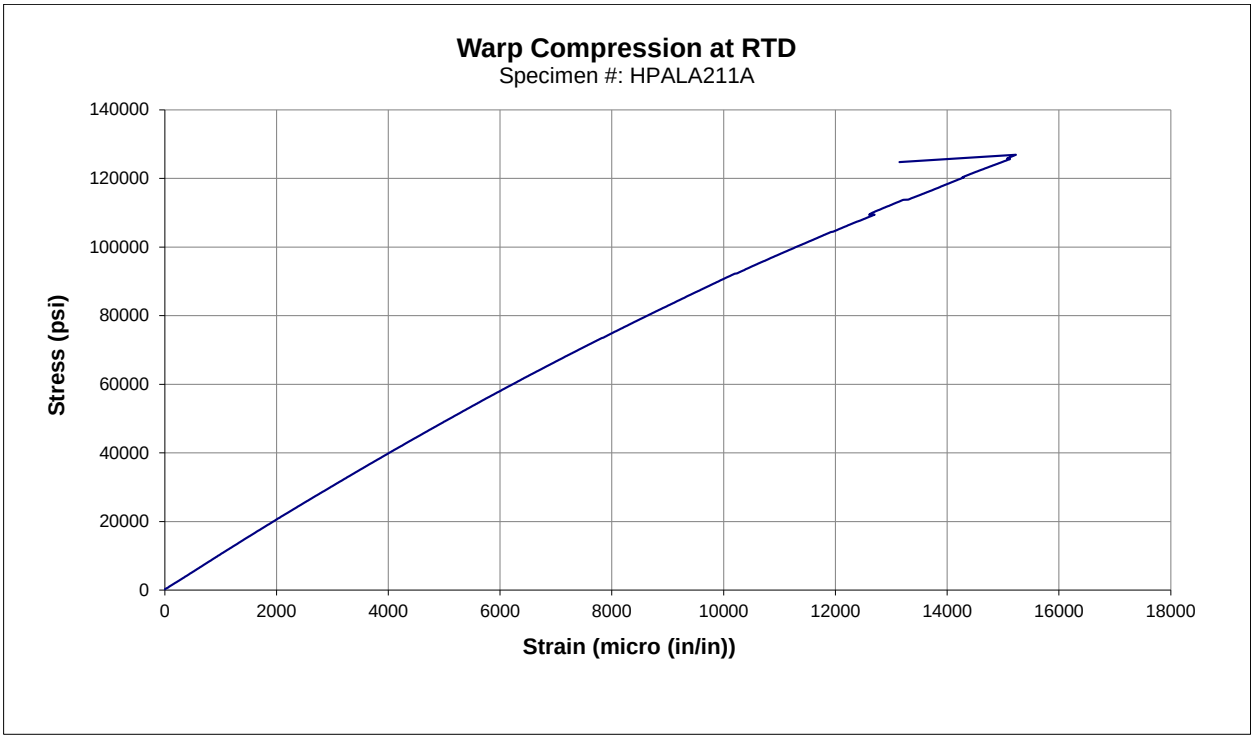


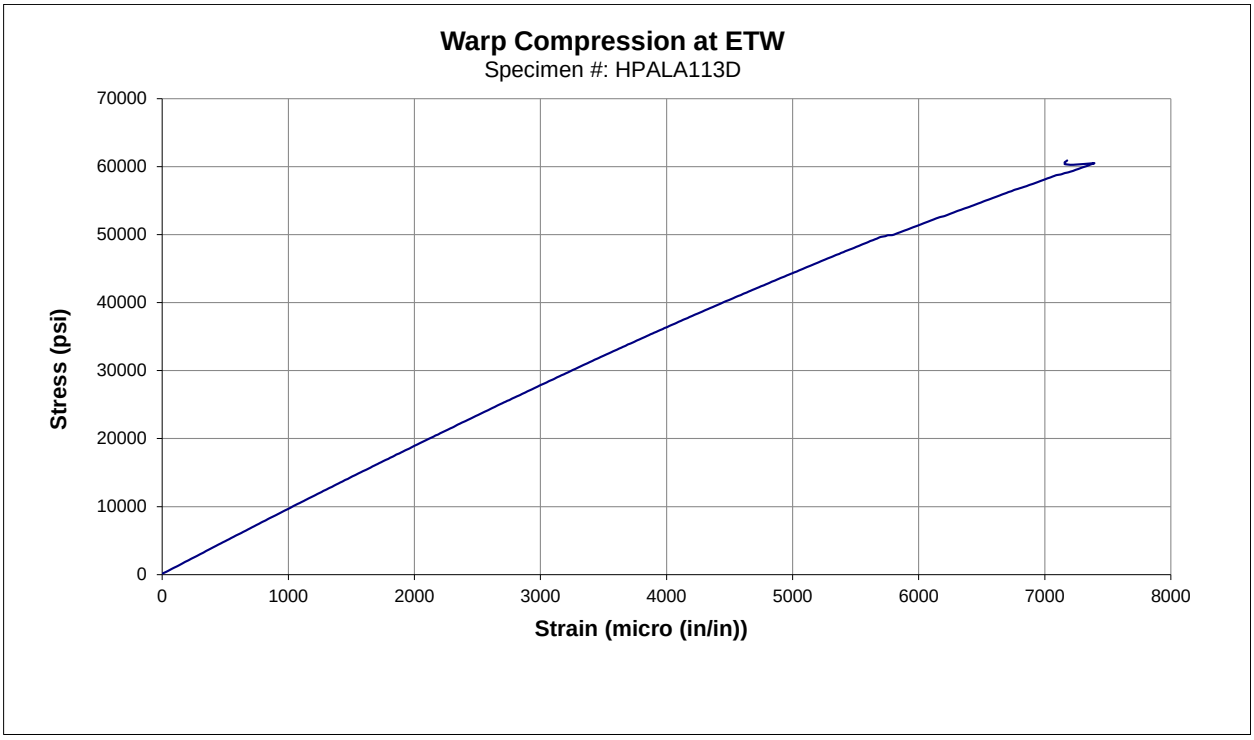



Warp Tension at ETW
Specimen #: HPAJB1211D
Stress (psi)
70000
60000
50000
40000
30000
20000
10000
0
0
1000
2000
3000
4000
5000
6000
7000
Strain (micro in/in)

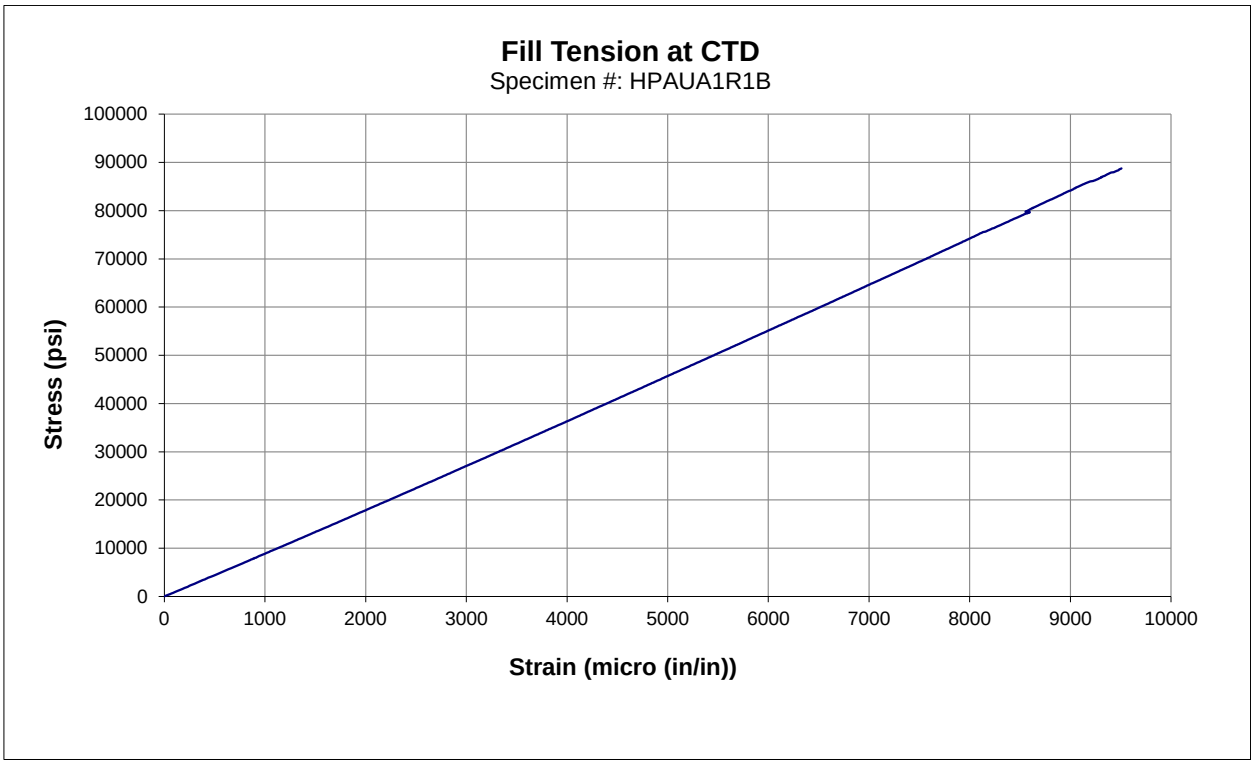
6.2 Warp Compression Properties (WC)

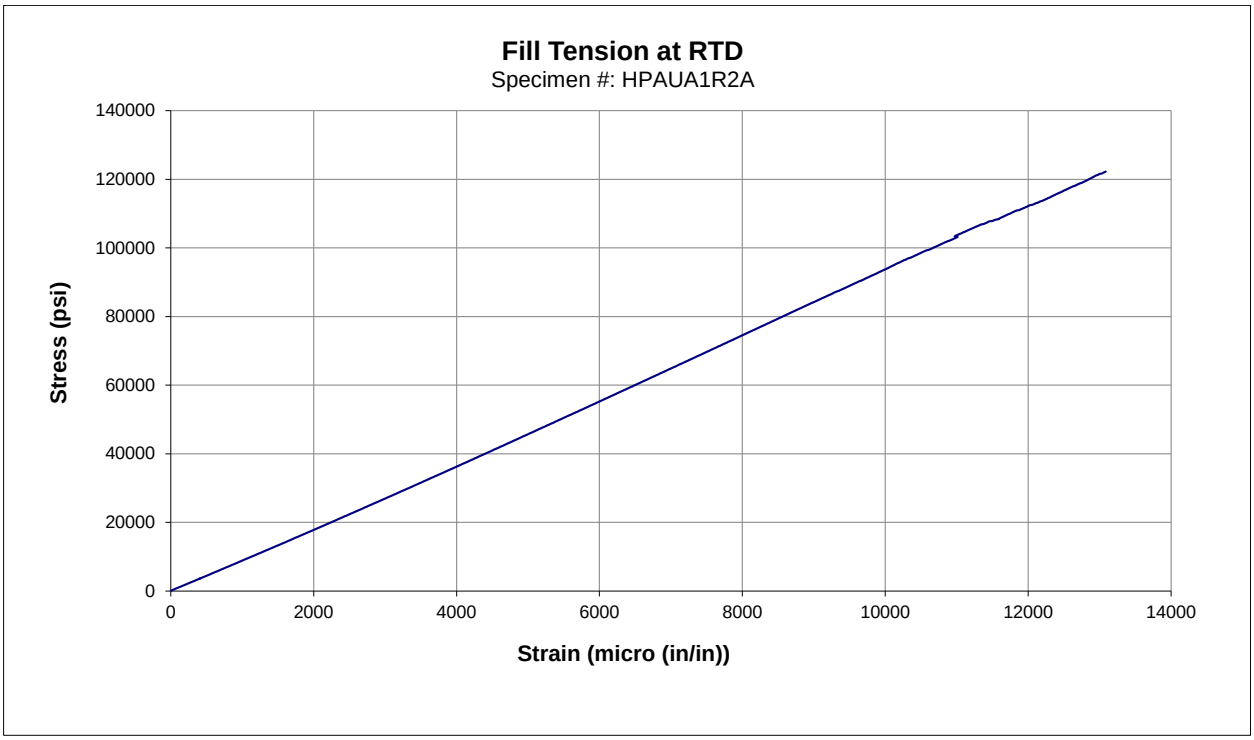


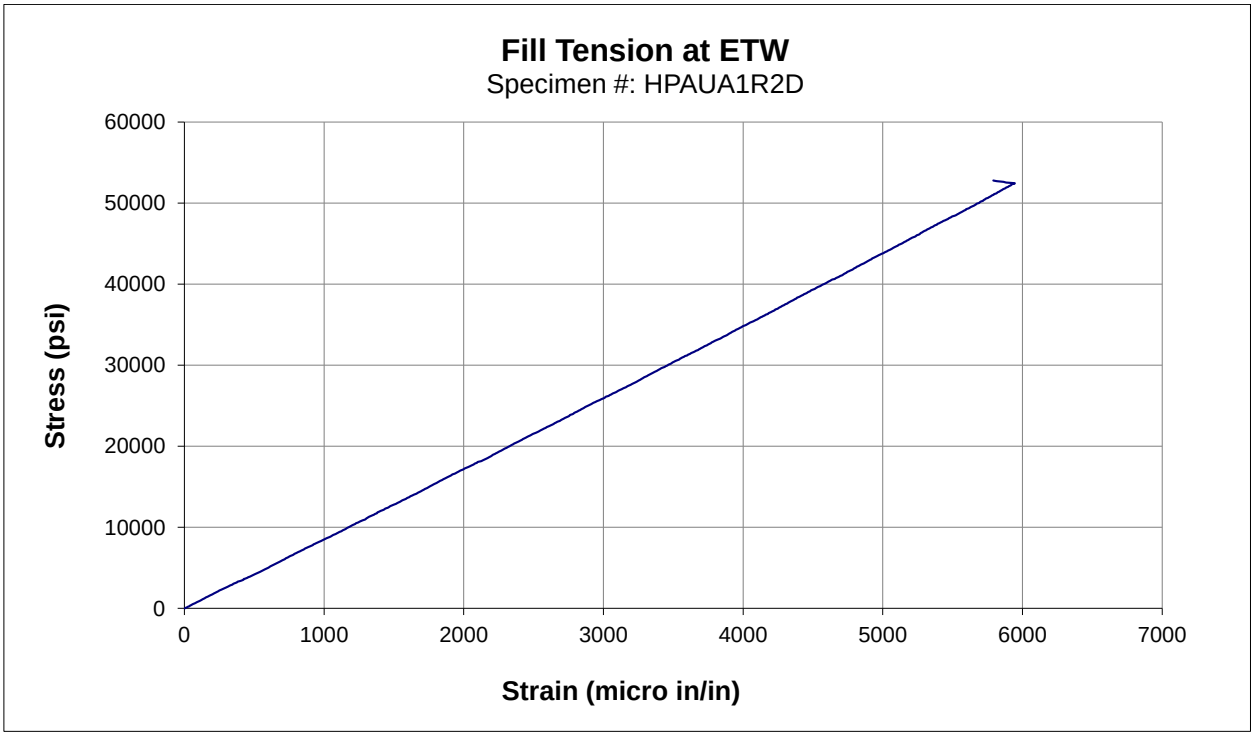



Warp Compression at ETW
Specimen #: HPALA113D
Stress (psi)
70000
60000
50000
40000
30000
20000
10000
0
0
1000
2000
3000
4000
5000
6000
7000
8000
Strain (micro (in/in))

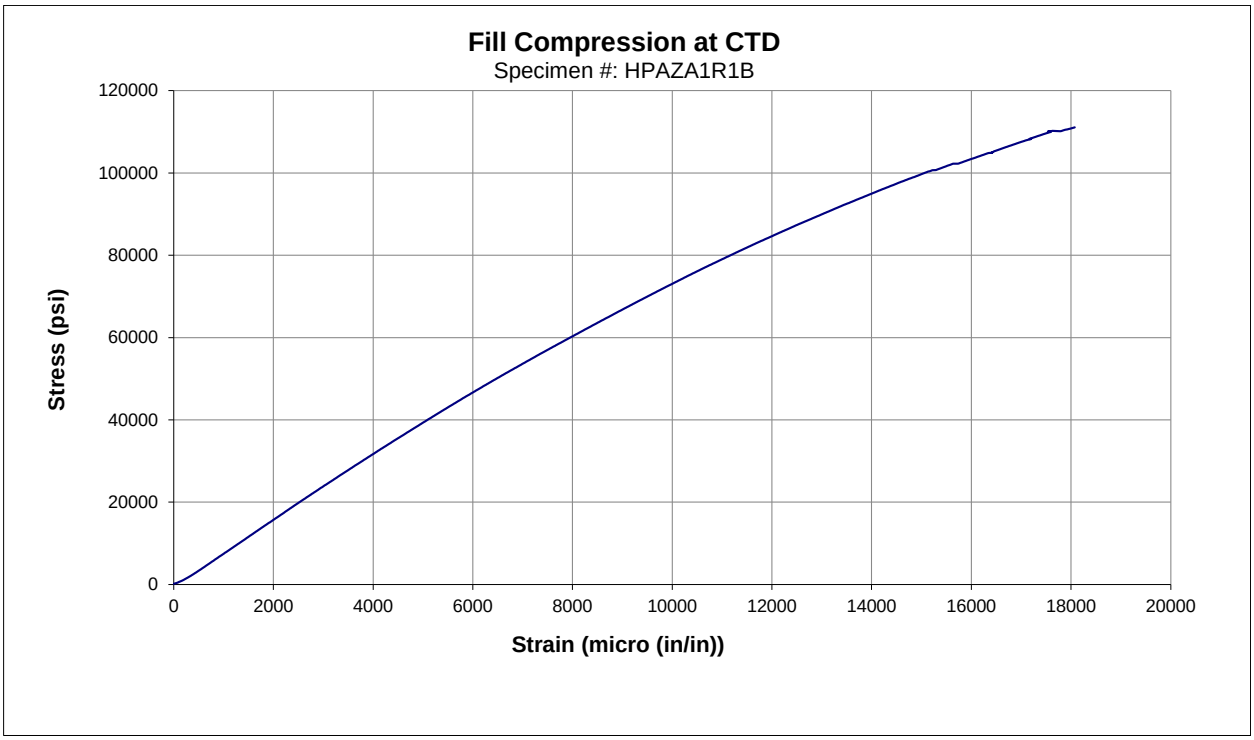
6.3 Fill Tension Properties (FT)

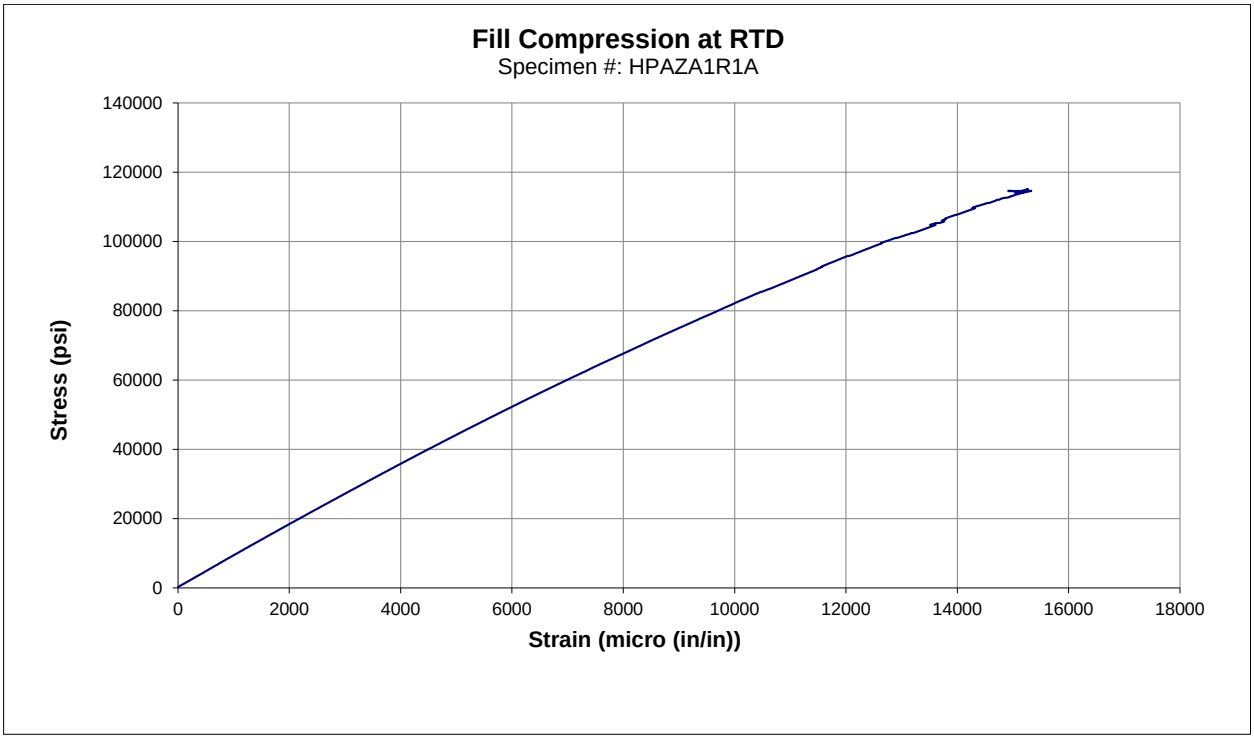


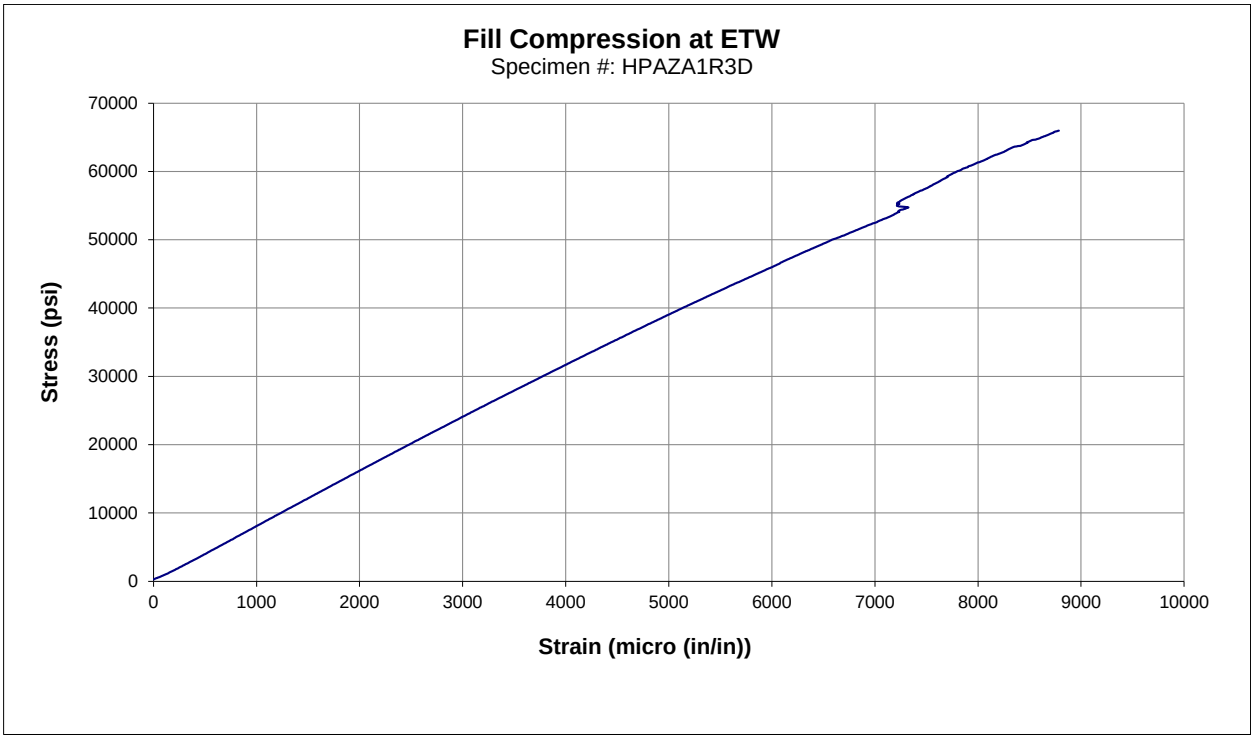



Fill Tension at ETW
Specimen #: HPAUA1R2D
Stress (psi)
60000
50000
40000
30000
20000
10000
0
0
1000
2000
3000
4000
5000
6000
7000
Strain (micro in/in)

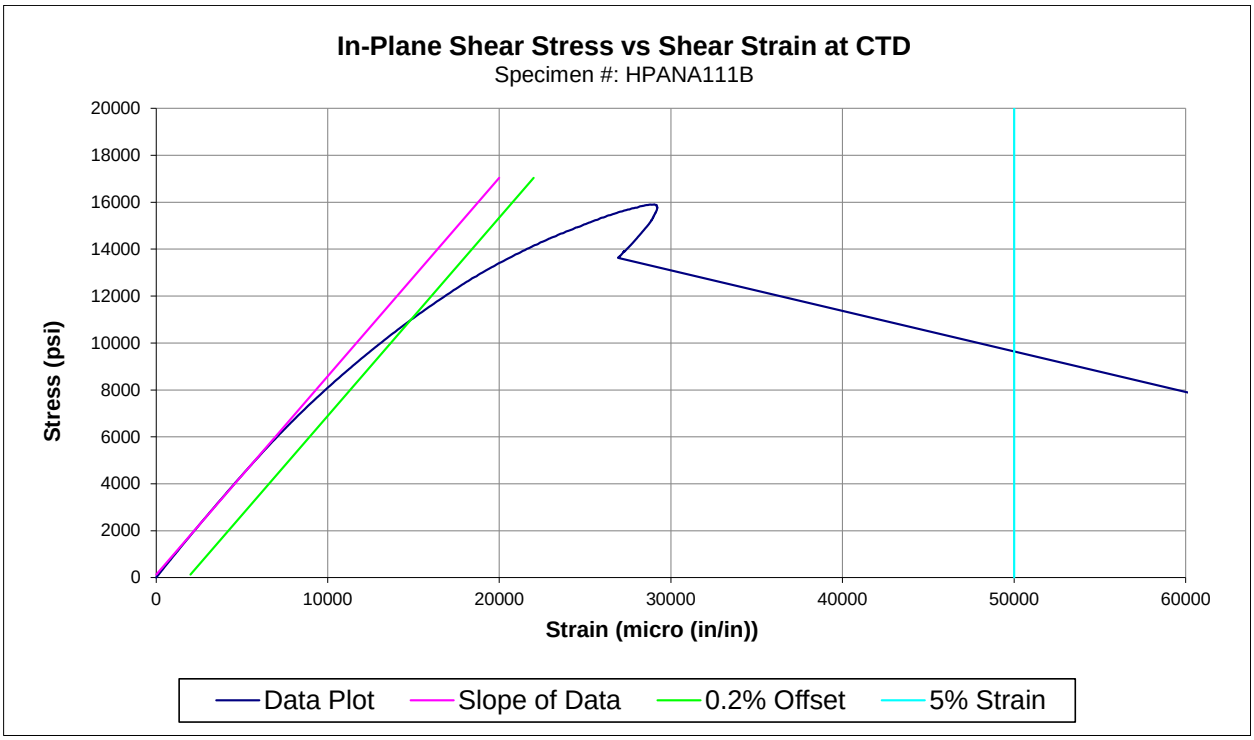
6.4 Fill Compression Properties (FC)

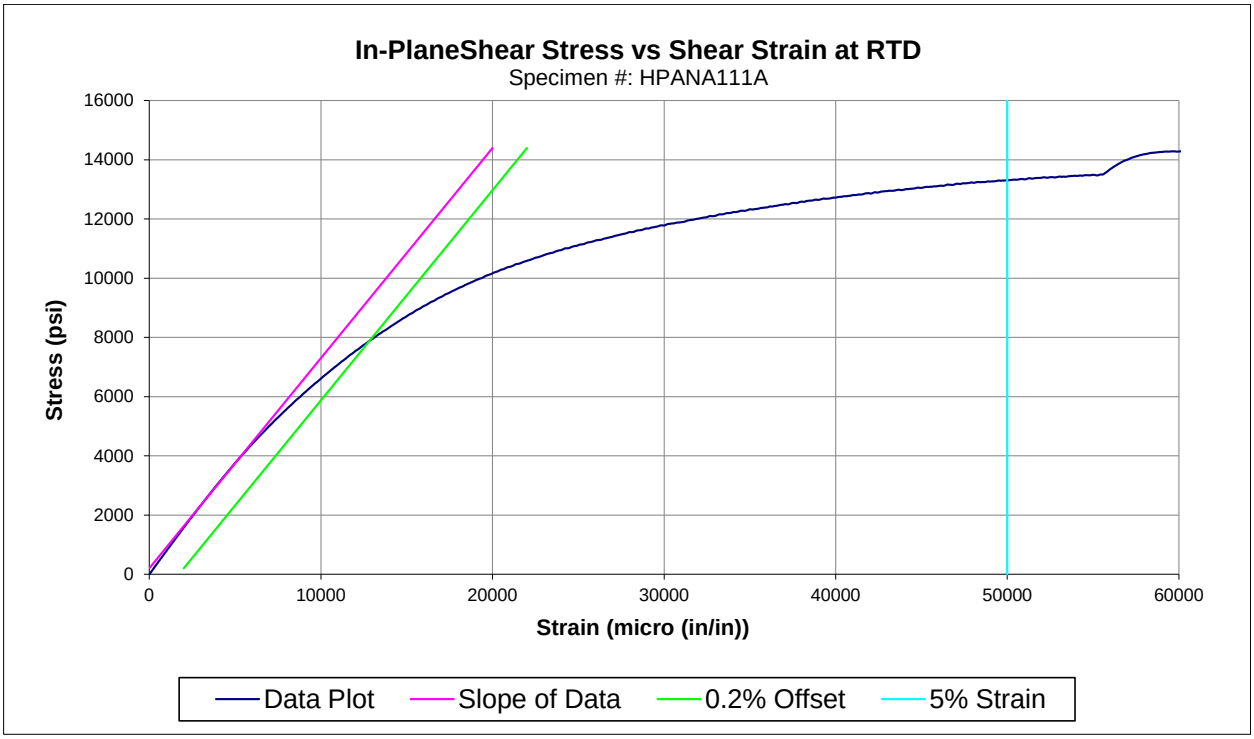


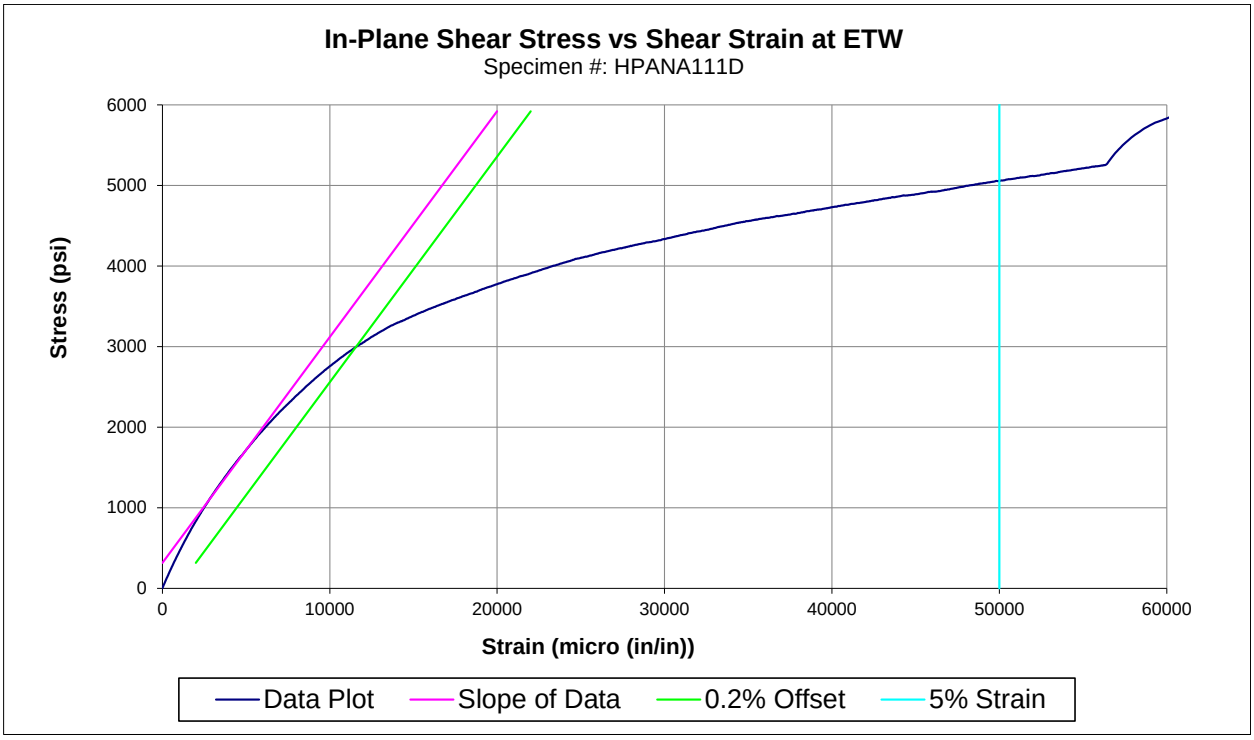



Fill Compression at ETW
Specimen #: HPAZA1R3D
Stress (psi)
70000
60000
50000
40000
30000
20000
10000
0
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000
Strain (micro (in/in))

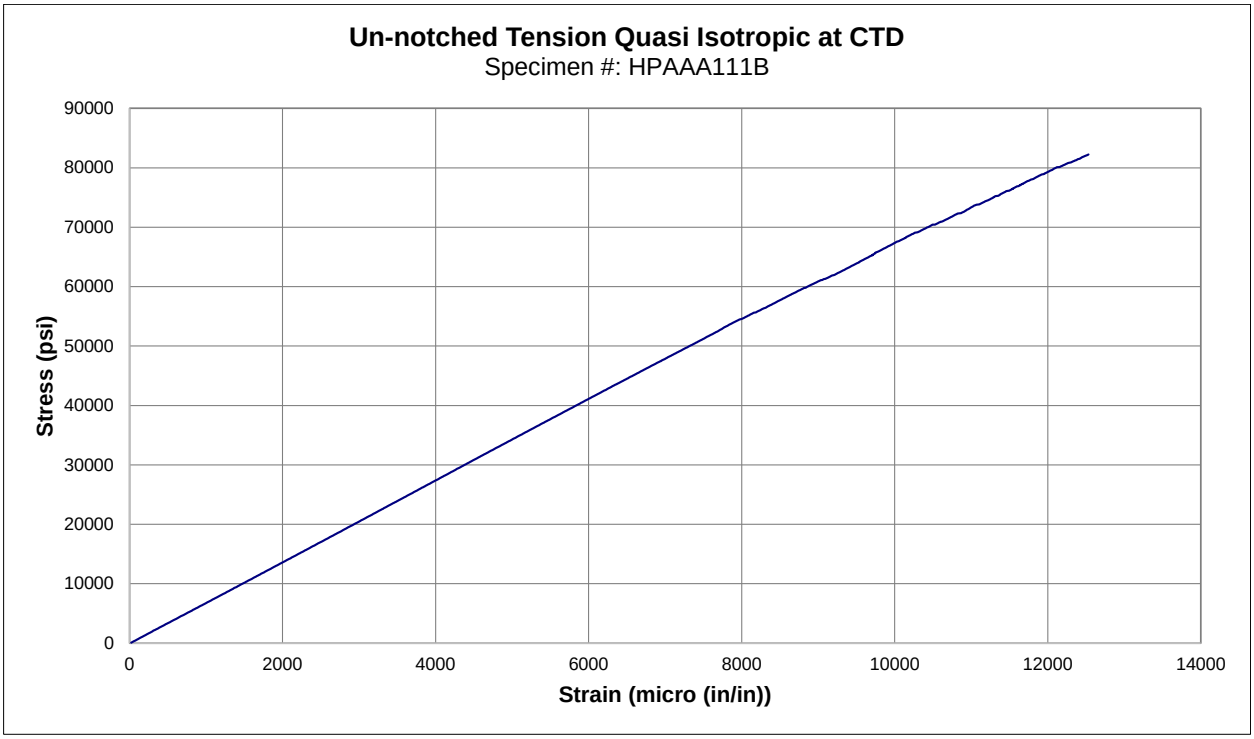
6.5 In-Plane Shear Properties (IPS)

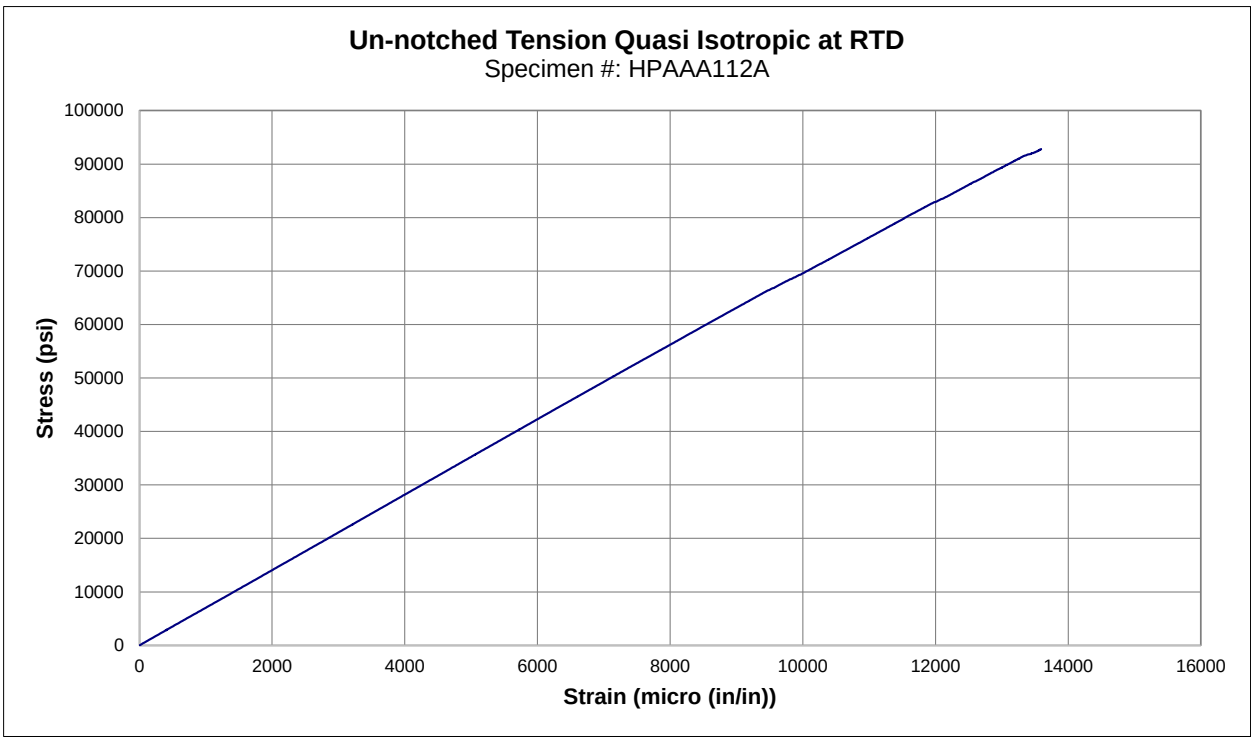


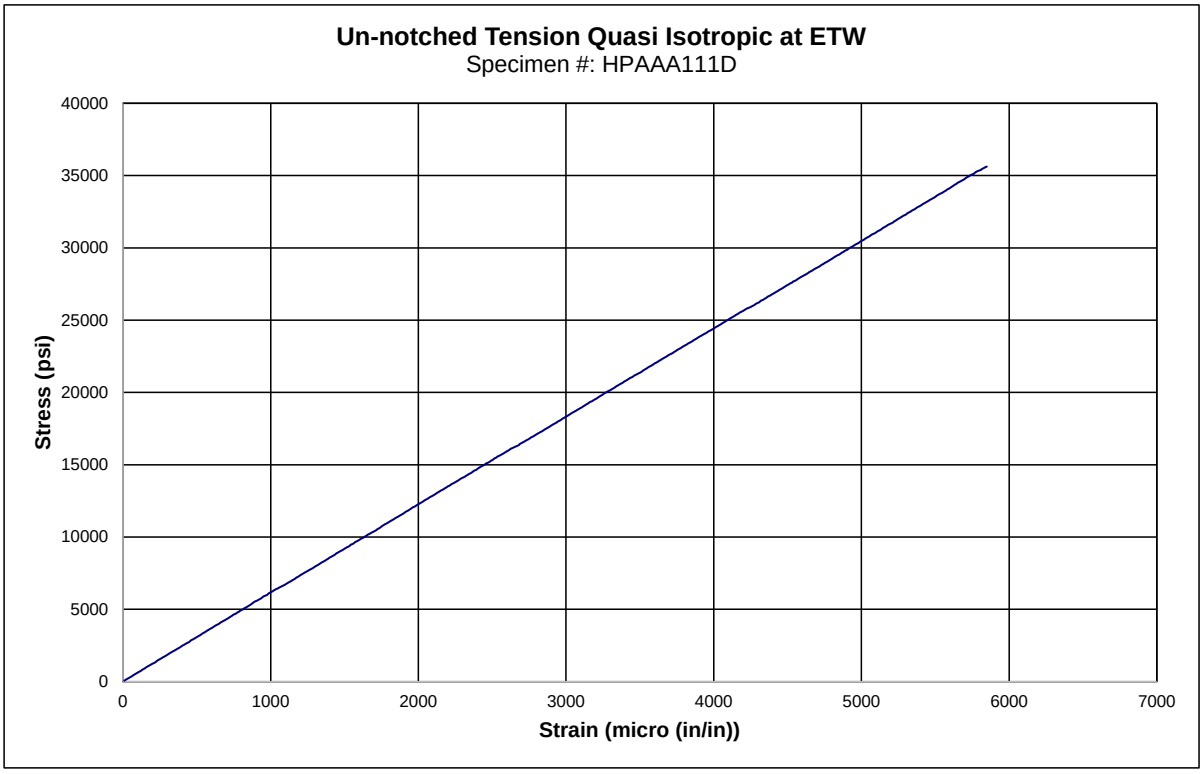



In-Plane Shear Stress vs Shear Strain at ETW
Specimen #: HPANA111D
Stress (psi)
6000
5000
4000
3000
2000
1000
0
0
10000
20000
30000
40000
50000
60000
Strain (micro (in/in))
Data Plot
Slope of Data
0.2% Offset
5% Strain

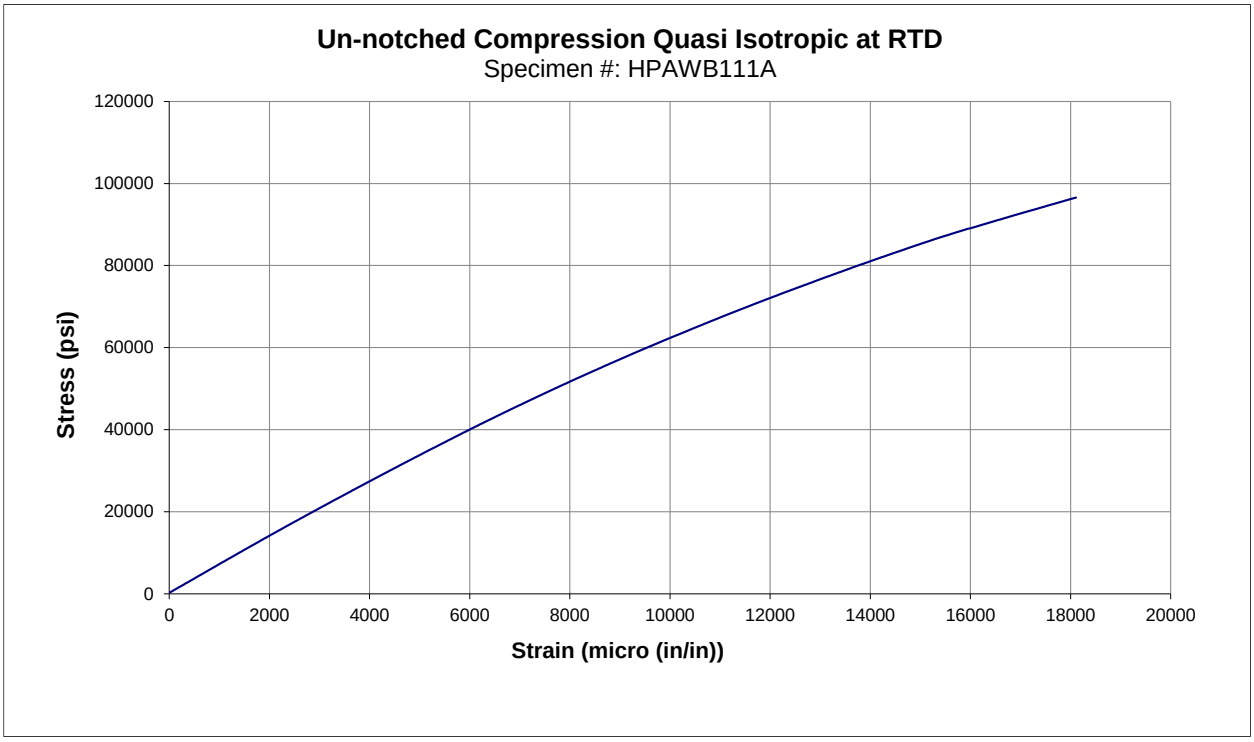
6.6 “25/50/25” Unnotched Tension 1 Properties (UNT1)

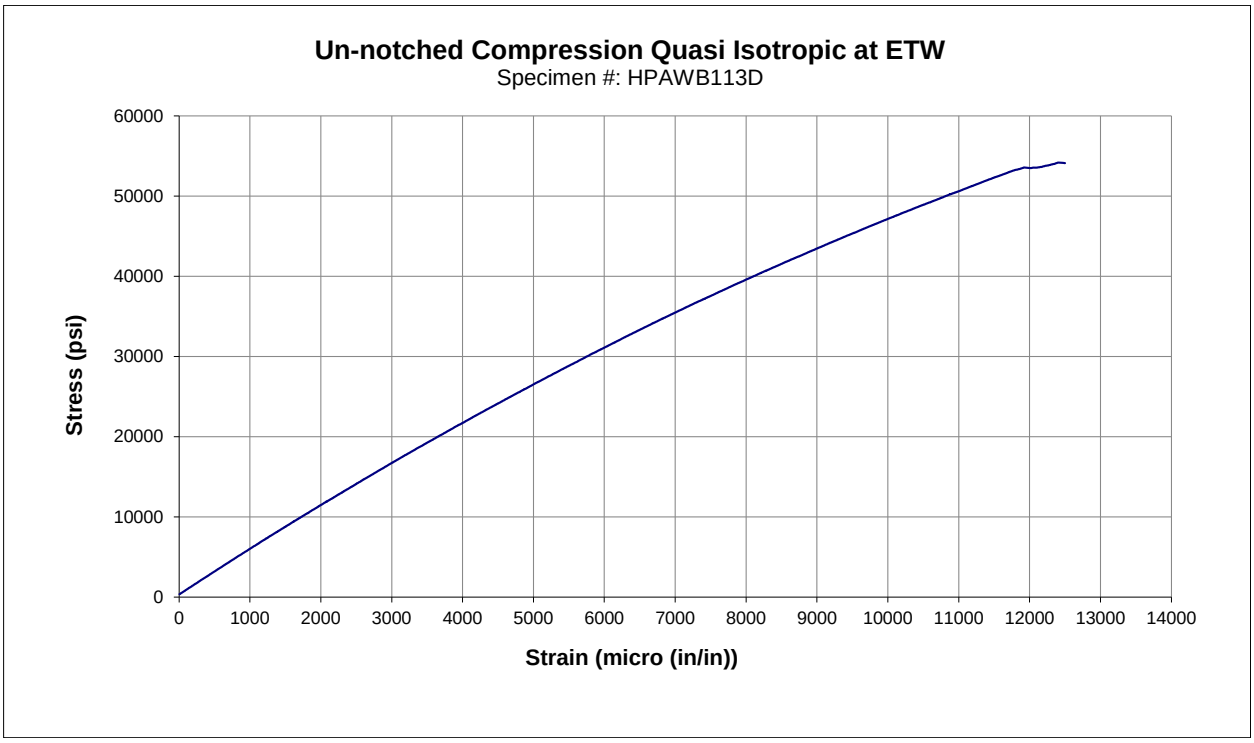





Un-notched Tension Quasi Isotropic at ETW
Specimen #: HPAAA111D
Stress (psi)
40000
35000
30000
25000
20000
15000
10000
5000
0
0
1000
2000
3000
4000
5000
6000
7000
Strain (micro (in/in))

6.7 “25/50/25” Unnotched Compression 1 Properties (UNC1)





7. Fluid Sensitivity Comparison

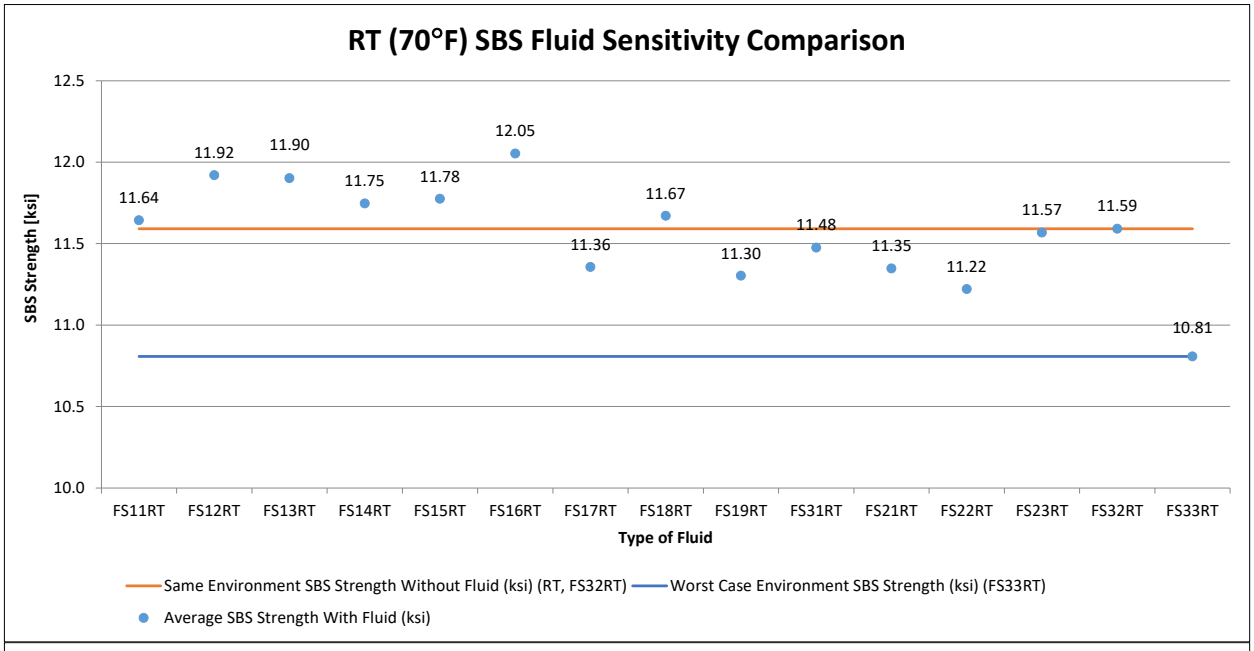
7.1 Room Temperature Test Data

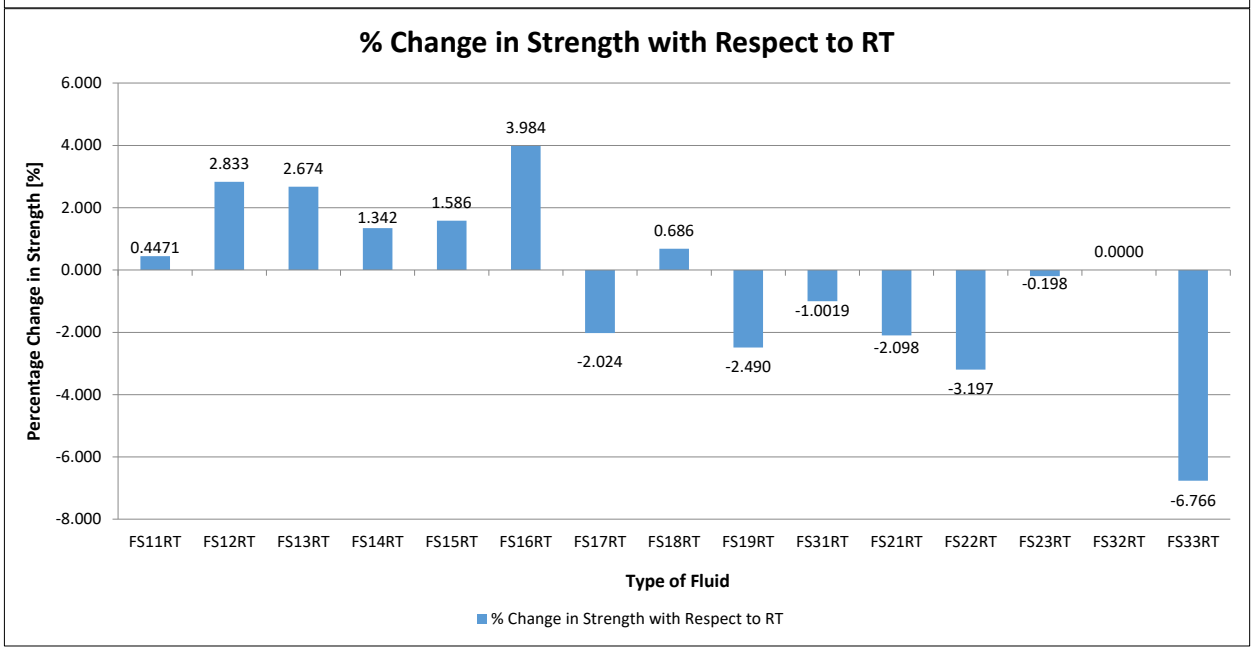
Code	Type of Fluid	Exposure
FS11RT	100 Low Lead Fuel	90 days min @ 70°F ± 10F
FS12RT	Jet A Fuel	
FS13RT	MIL-PRF-5606 Hydraulic Oil	
FS14RT	MIL-PRF-83282 Hydraulic Oil	
FS15RT	MIL-PRF-7808 Engine Oil	
FS16RT	MIL-PRF-23699 Engine Oil	
FS17RT	Salt Water	
FS18RT	Skydrol LD-4	
FS19RT	50% Water w/ 50% Skydrol	
FS31RT	Distilled Water	
FS21RT	MEK washing fluid	90 mins @ 70°F ± 10F
FS22RT	Polypropylene Glycol Deicer	
FS23RT	Isopropyl Alcohol Deicing	48±4 hrs @ 70°F ± 10F
FS31ET	Distilled Water	Per Test Plan
FS32RT	Dry	
FS33RT	85% Relative Humidity	

Fluid Sensitivity Screening
Short Beam Strength Properties--RT (70°F) Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

Fluid Code	Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Avg. t_{ply} [in]	Failure Mode	Average
FS11RT	HPAQA11RT2	A	C1	1	1	11.20	0.2574	18	0.0143	INTERLAMINAR SHEAR	11.64
	HPAQA11RT3	A	C1	1	1	11.50	0.2612	18	0.0145	INTERLAMINAR SHEAR	
	HPAQA11RT4	A	C1	1	1	11.87	0.2663	18	0.0148	INTERLAMINAR SHEAR	
	HPAQA11RT5	A	C1	1	1	12.00	0.2689	18	0.0149	INTERLAMINAR SHEAR	
FS12RT	HPAQA12RT1	A	C1	1	1	12.05	0.2708	18	0.0150	INTERLAMINAR SHEAR	11.92
	HPAQA12RT2	A	C1	1	1	12.06	0.2678	18	0.0149	INTERLAMINAR SHEAR	
	HPAQA12RT3	A	C1	1	1	11.97	0.2704	18	0.0150	INTERLAMINAR SHEAR	
	HPAQA12RT4	A	C1	1	1	11.87	0.2665	18	0.0148	INTERLAMINAR SHEAR	
	HPAQA12RT5	A	C1	1	1	11.65	0.2558	18	0.0142	INTERLAMINAR SHEAR	
FS13RT	HPAQA13RT1	A	C1	1	1	11.87	0.2674	18	0.0149	INTERLAMINAR SHEAR	11.90
	HPAQA13RT2	A	C1	1	1	11.93	0.2714	18	0.0151	INTERLAMINAR SHEAR	
	HPAQA13RT3	A	C1	1	1	11.75	0.2701	18	0.0150	INTERLAMINAR SHEAR	
	HPAQA13RT4	A	C1	1	1	12.15	0.2697	18	0.0150	INTERLAMINAR SHEAR	
	HPAQA13RT5	A	C1	1	1	11.81	0.2712	18	0.0151	INTERLAMINAR SHEAR	
FS14RT	HPAQA14RT1	A	C1	1	1	11.76	0.2776	18	0.0154	INTERLAMINAR SHEAR	11.75
	HPAQA14RT2	A	C1	1	1	11.84	0.2770	18	0.0154	INTERLAMINAR SHEAR	
	HPAQA14RT3	A	C1	1	1	11.73	0.2779	18	0.0154	INTERLAMINAR SHEAR	
	HPAQA14RT4	A	C1	1	1	11.55	0.2776	18	0.0154	INTERLAMINAR SHEAR	
	HPAQA14RT5	A	C1	1	1	11.85	0.2776	18	0.0154	INTERLAMINAR SHEAR	
FS15RT	HPAQA15RT1	A	C1	1	1	11.92	0.2766	18	0.0154	INTERLAMINAR SHEAR	11.78
	HPAQA15RT2	A	C1	1	1	11.87	0.2744	18	0.0152	INTERLAMINAR SHEAR	
	HPAQA15RT3	A	C1	1	1	11.61	0.2709	18	0.0150	INTERLAMINAR SHEAR	
	HPAQA15RT4	A	C1	1	1	11.86	0.2644	18	0.0147	INTERLAMINAR SHEAR	
	HPAQA15RT5	A	C1	1	1	11.62	0.2602	18	0.0145	INTERLAMINAR SHEAR	
FS16RT	HPAQA16RT1	A	C1	1	1	11.96	0.2594	18	0.0144	INTERLAMINAR SHEAR	12.05
	HPAQA16RT2	A	C1	1	1	12.00	0.2613	18	0.0145	INTERLAMINAR SHEAR	
	HPAQA16RT3	A	C1	1	1	11.97	0.2618	18	0.0145	INTERLAMINAR SHEAR	
	HPAQA16RT4	A	C1	1	1	12.20	0.2626	18	0.0146	INTERLAMINAR SHEAR	
	HPAQA16RT5	A	C1	1	1	12.14	0.2627	18	0.0146	INTERLAMINAR SHEAR	
FS17RT	HPAQA17RT1	A	C1	1	1	11.55	0.2567	18	0.0143	INTERLAMINAR SHEAR	11.36
	HPAQA17RT2	A	C1	1	1	11.02	0.2623	18	0.0146	INTERLAMINAR SHEAR	
	HPAQA17RT3	A	C1	1	1	11.45	0.2659	18	0.0148	INTERLAMINAR SHEAR	
	HPAQA17RT4	A	C1	1	1	11.17	0.2705	18	0.0150	INTERLAMINAR SHEAR	
	HPAQA17RT5	A	C1	1	1	11.60	0.2730	18	0.0152	INTERLAMINAR SHEAR	
FS18RT	HPAQA18RT1	A	C1	1	1	11.87	0.2753	18	0.0153	INTERLAMINAR SHEAR	11.67
	HPAQA18RT2	A	C1	1	1	11.75	0.2728	18	0.0152	INTERLAMINAR SHEAR	
	HPAQA18RT3	A	C1	1	1	11.70	0.2689	18	0.0149	INTERLAMINAR SHEAR	
	HPAQA18RT4	A	C1	1	1	11.56	0.2638	18	0.0147	INTERLAMINAR SHEAR	
	HPAQA18RT5	A	C1	1	1	11.47	0.2587	18	0.0144	INTERLAMINAR SHEAR	
FS19RT	HPAQB19RT1	B	C1	2	1	11.25	0.2779	18	0.0154	INTERLAMINAR SHEAR	11.30
	HPAQB19RT2	B	C1	2	1	11.32	0.2800	18	0.0156	INTERLAMINAR SHEAR	
	HPAQB19RT3	B	C1	2	1	11.55	0.2806	18	0.0156	INTERLAMINAR SHEAR	
	HPAQB19RT4	B	C1	2	1	10.99	0.2798	18	0.0155	INTERLAMINAR SHEAR	
	HPAQB19RT5	B	C1	2	1	11.41	0.2790	18	0.0155	INTERLAMINAR SHEAR	
FS21RT	HPAQB21RT1	B	C1	2	1	11.59	0.2509	18	0.0139	INTERLAMINAR SHEAR	11.35
	HPAQB21RT2	B	C1	2	1	10.84	0.2531	18	0.0141	INTERLAMINAR SHEAR	
	HPAQB21RT3	B	C1	2	1	11.44	0.2727	18	0.0151	INTERLAMINAR SHEAR,	
	HPAQB21RT4	B	C1	2	1	11.21	0.2711	18	0.0151	INTERLAMINAR SHEAR,	
	HPAQB21RT5	B	C1	2	1	11.66	0.2770	18	0.0154	INTERLAMINAR SHEAR,	
FS22RT*	HPAQB22ET1	B	C1	2	1	11.44	0.2718	18	0.0151	INTERLAMINAR SHEAR	11.22
	HPAQB22ET2	B	C1	2	1	11.27	0.2650	18	0.0147	INTERLAMINAR SHEAR	
	HPAQB22RT3	B	C1	2	1	11.16	0.2828	18	0.0157	INTERLAMINAR SHEAR,	
	HPAQB22RT4	B	C1	2	1	10.74	0.2634	18	0.0146	INTERLAMINAR SHEAR	
	HPAQB22ET5	B	C1	2	1	11.50	0.2563	18	0.0142	INTERLAMINAR SHEAR	
FS23RT	HPAQB23RT1	B	C1	2	1	11.18	0.2814	18	0.0156	INTERLAMINAR SHEAR	11.57
	HPAQB23RT2	B	C1	2	1	11.66	0.2772	18	0.0154	INTERLAMINAR SHEAR	
	HPAQB23RT3	B	C1	2	1	11.55	0.2848	18	0.0158	INTERLAMINAR SHEAR,	
	HPAQB23RT4	B	C1	2	1	11.71	0.2865	18	0.0159	INTERLAMINAR SHEAR	
	HPAQB23RT5	B	C1	2	1	11.74	0.2871	18	0.0159	INTERLAMINAR SHEAR	
FS31RT	HPAQB31RT1	B	C1	2	1	11.35	0.2707	18	0.0150	INTERLAMINAR SHEAR	11.48
	HPAQB31RT2	B	C1	2	1	11.58	0.2668	18	0.0148	INTERLAMINAR SHEAR	
	HPAQB31RT3	B	C1	2	1	11.53	0.2761	18	0.0153	INTERLAMINAR SHEAR	
	HPAQB31RT4	B	C1	2	1	11.18	0.2570	18	0.0143	INTERLAMINAR SHEAR	
	HPAQB31RT5	B	C1	2	1	11.74	0.2555	18	0.0142	INTERLAMINAR SHEAR	
FS32RT	HPAQB32RT1	B	C1	2	1	11.59	0.2658	18	0.0148	INTERLAMINAR SHEAR	11.59
	HPAQB32RT2	B	C1	2	1	11.78	0.2873	18	0.0160	INTERLAMINAR SHEAR,	
	HPAQB32RT3	B	C1	2	1	11.83	0.2709	18	0.0150	INTERLAMINAR SHEAR	
	HPAQB32RT4	B	C1	2	1	11.30	0.2797	18	0.0155	INTERLAMINAR SHEAR	
	HPAQB32RT5	B	C1	2	1	11.45	0.2843	18	0.0158	INTERLAMINAR SHEAR,	
FS33RT	HPAQB33RT1	B	C1	2	1	11.28	0.2597	18	0.0144	INTERLAMINAR SHEAR	10.81
	HPAQB33RT2	B	C1	2	1	11.09	0.2566	18	0.0143	INTERLAMINAR SHEAR	
	HPAQB33RT3	B	C1	2	1	10.88	0.2583	18	0.0143	INTERLAMINAR SHEAR	
	HPAQB33RT4	B	C1	2	1	10.07	0.2529	18	0.0140	INTERLAMINAR SHEAR	
	HPAQB33RT5	B	C1	2	1	10.72	0.2745	18	0.0152	INTERLAMINAR SHEAR	

*specimens from ET was tested in RT condition


RT (70°F) SBS Fluid Sensitivity Comparison
SBS Strength [ksi]
12.5
12.0
11.5
11.0
10.5
10.0
11.64
11.92
11.90
11.75
11.78
12.05
11.36
11.67
11.30
11.48
11.35
11.22
11.57
11.59
10.81
FS11RT FS12RT FS13RT FS14RT FS15RT FS16RT FS17RT FS18RT FS19RT FS31RT FS21RT FS22RT FS23RT FS32RT FS33RT
Type of Fluid
Same Environment SBS Strength Without Fluid (ksi) (RT, FS32RT)
Worst Case Environment SBS Strength (ksi) (FS33RT)
Average SBS Strength With Fluid (ksi)


% Change in Strength with Respect to RT
Percentage Change in Strength [%]
6.000
4.000
2.000
0.000
-2.000
-4.000
-6.000
-8.000
0.4471
2.833
2.674
1.342
1.586
3.984
-2.024
0.686
-2.490
-1.0019
-2.098
-3.197
-0.198
0.0000
-6.766
FS11RT FS12RT FS13RT FS14RT FS15RT FS16RT FS17RT FS18RT FS19RT FS31RT FS21RT FS22RT FS23RT FS32RT FS33RT
Type of Fluid
% Change in Strength with Respect to RT

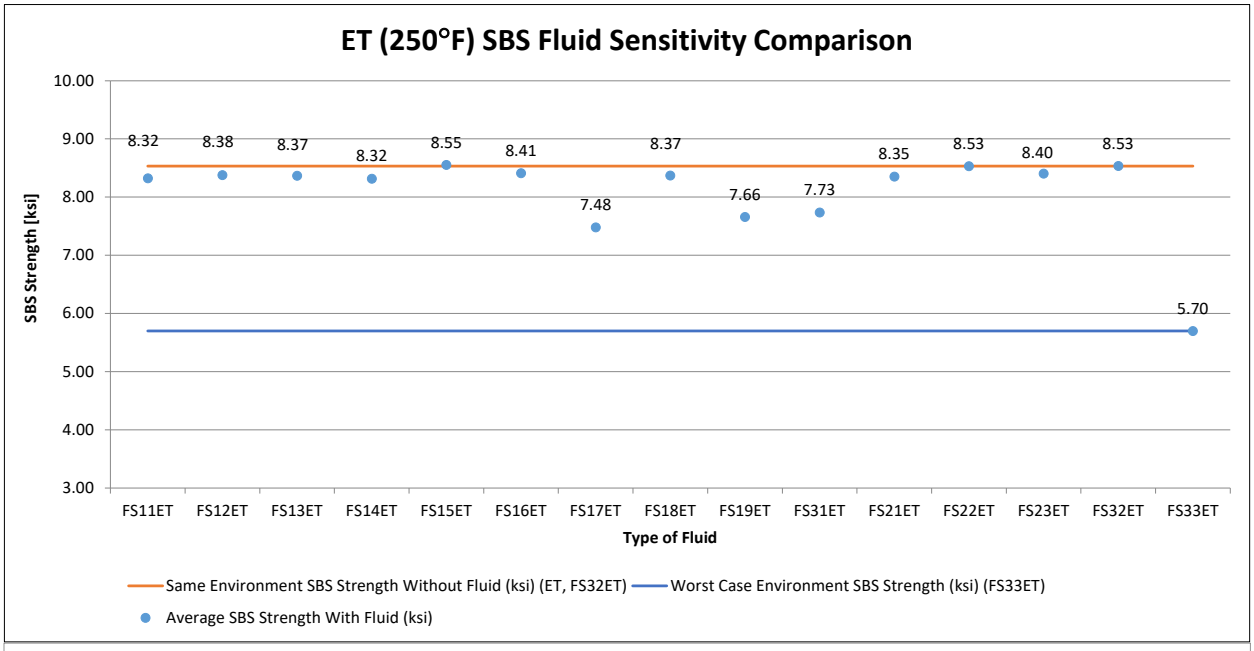
7.2 Elevated Temperature Test Data

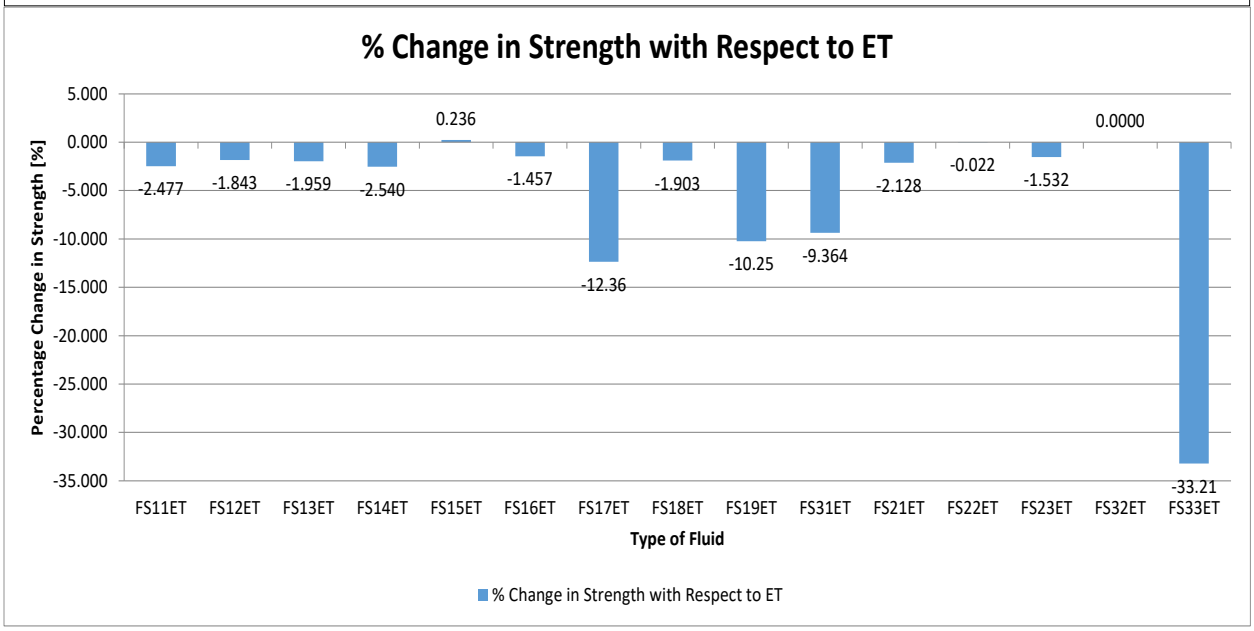
Code	Type of Fluid	Exposure
FS11ET	100 Low lead Fuel	90 days min @ 70°F ± 10F
FS12ET	Jet A Fuel	
FS13ET	MIL-PRF-5606 Hydraulic Oil	
FS14ET	MIL-PRF-83282 Hydraulic Oil	
FS15ET	MIL-PRF-7808 Engine Oil	
FS16ET	MIL-PRF-23699 Engine Oil	
FS17ET	Salt Water	
FS18ET	Skydrol LD-4	
FS19ET	50% Water w/ 50% Skydrol	
FS31ET	Distilled Water	
FS21ET	MEK washing fluid	90 mins @ 70°F ± 10F
FS22ET	Polypropylene Glycol Deicer	
FS23ET	Isopropyl Alcohol Deicing	48±4 hrs @ 70°F ± 10F
FS31ET	Distilled Water	Per Test Plan
FS32ET	Dry	
FS33ET	85% Relative Humidity	

Fluid Sensitivity Screening
Short Beam Strength Properties--ET (250°F) Strength
Hexcel Hexply® 8552S AS4 GP 3K 8HS fabric with 38% RC

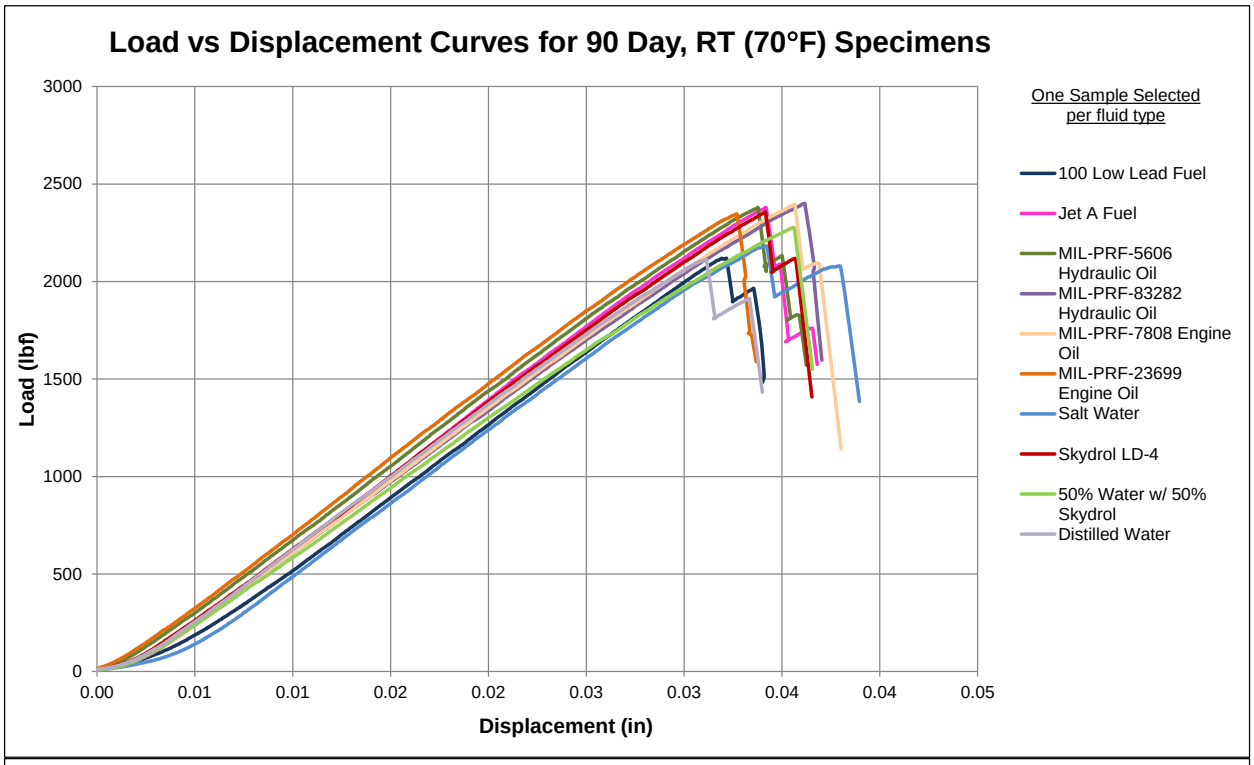
Fluid Code	Specimen Number	Hexcel Batch #	Hexcel Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickness [in]	# Plies in Laminate	Avg. t_{ply} [in]	Failure Mode	Average
	HPAQA11ET1	A	CE	1	1	8.31	0.2701	18	0.0150	INTERLAMINAR SHEAR	
	HPAQA11ET2	A	CE	1	1	8.29	0.2719	18	0.0151	INTERLAMINAR SHEAR	
FS11ET	HPAQA11ET3	A	CE	1	1	8.33	0.2725	18	0.0151	INTERLAMINAR SHEAR	8.321
	HPAQA11ET4	A	CE	1	1	8.38	0.2718	18	0.0151	INTERLAMINAR SHEAR	
	HPAQA11ET5	A	CE	1	1	8.28	0.2713	18	0.0151	INTERLAMINAR SHEAR	
	HPAQA12ET1	A	CE	1	2	8.37	0.2509	18	0.0139	INTERLAMINAR SHEAR	
	HPAQA12ET2	A	CE	1	2	8.39	0.2554	18	0.0142	INTERLAMINAR SHEAR	
FS12ET	HPAQA12ET3	A	CE	1	2	8.39	0.2595	18	0.0144	INTERLAMINAR SHEAR	8.376
	HPAQA12ET4	A	CE	1	2	8.36	0.2641	18	0.0147	INTERLAMINAR SHEAR	
	HPAQA12ET5	A	CE	1	2	8.37	0.2667	18	0.0148	INTERLAMINAR SHEAR	
	HPAQA13ET1	A	CE	1	3	8.31	0.2710	18	0.0151	INTERLAMINAR SHEAR	
	HPAQA13ET2	A	CE	1	3	8.47	0.2665	18	0.0148	INTERLAMINAR SHEAR	
FS13ET	HPAQA13ET3	A	CE	1	3	8.23	0.2658	18	0.0148	INTERLAMINAR SHEAR	8.366
	HPAQA13ET4	A	CE	1	3	8.40	0.2596	18	0.0144	INTERLAMINAR SHEAR	
	HPAQA13ET5	A	CE	1	3	8.43	0.2544	18	0.0141	INTERLAMINAR SHEAR	
	HPAQA14ET1	A	CE	1	4	8.33	0.2553	18	0.0142	INTERLAMINAR SHEAR	
	HPAQA14ET2	A	CE	1	4	8.36	0.2605	18	0.0145	INTERLAMINAR SHEAR	
FS14ET	HPAQA14ET3	A	CE	1	4	8.38	0.2655	18	0.0148	INTERLAMINAR SHEAR	8.316
	HPAQA14ET4	A	CE	1	4	8.30	0.2700	18	0.0150	INTERLAMINAR SHEAR	
	HPAQA14ET5	A	CE	1	4	8.21	0.2734	18	0.0152	INTERLAMINAR SHEAR	
	HPAQA15ET1	A	CE	1	5	8.64	0.2422	18	0.0135	INTERLAMINAR SHEAR	
	HPAQA15ET2	A	CE	1	5	8.54	0.2471	18	0.0137	INTERLAMINAR SHEAR	
FS15ET	HPAQA15ET3	A	CE	1	5	8.58	0.2518	18	0.0140	INTERLAMINAR SHEAR	8.553
	HPAQA15ET4	A	CE	1	5	8.56	0.2550	18	0.0142	INTERLAMINAR SHEAR	
	HPAQA15ET5	A	CE	1	5	8.45	0.2583	18	0.0143	INTERLAMINAR SHEAR	
	HPAQA16ET1	A	CE	1	6	8.45	0.2599	18	0.0144	INTERLAMINAR SHEAR	
	HPAQA16ET2	A	CE	1	6	8.39	0.2580	18	0.0143	INTERLAMINAR SHEAR	
FS16ET	HPAQA16ET3	A	CE	1	6	8.38	0.2570	18	0.0143	INTERLAMINAR SHEAR	8.408
	HPAQA16ET4	A	CE	1	6	8.48	0.2528	18	0.0140	INTERLAMINAR SHEAR	
	HPAQA16ET5	A	CE	1	6	8.35	0.2490	18	0.0138	INTERLAMINAR SHEAR	
	HPAQA17ET1	A	CE	1	7	7.49	0.2751	18	0.0153	INTERLAMINAR SHEAR	
	HPAQA17ET2	A	CE	1	7	7.50	0.2768	18	0.0154	INTERLAMINAR SHEAR	
FS17ET	HPAQA17ET3	A	CE	1	7	7.45	0.2799	18	0.0155	INTERLAMINAR SHEAR	7.478
	HPAQA17ET4	A	CE	1	7	7.47	0.2785	18	0.0155	INTERLAMINAR SHEAR	
	HPAQA17ET5	A	CE	1	7	7.49	0.2768	18	0.0154	INTERLAMINAR SHEAR	
	HPAQB18ET1	B	CE	2	8	8.35	0.2529	18	0.0141	INTERLAMINAR SHEAR	
	HPAQB18ET2	B	CE	2	8	8.48	0.2615	18	0.0145	INTERLAMINAR SHEAR	
FS18ET	HPAQB18ET3	B	CE	2	8	8.29	0.2743	18	0.0152	INTERLAMINAR SHEAR	8.370
	HPAQB18ET4	B	CE	2	8	8.36	0.2721	18	0.0151	INTERLAMINAR SHEAR	
	HPAQB18ET5	B	CE	2	8	8.36	0.2771	18	0.0154	INTERLAMINAR SHEAR	
	HPAQB19ET1	B	CE	2	9	7.83	0.2541	18	0.0141	INTERLAMINAR SHEAR	
	HPAQB19ET2	B	CE	2	9	7.64	0.2738	18	0.0152	INTERLAMINAR SHEAR	
FS19ET	HPAQB19ET3	B	CE	2	9	7.59	0.2713	18	0.0151	INTERLAMINAR SHEAR	7.658
	HPAQB19ET4	B	CE	2	9	7.49	0.2669	18	0.0148	INTERLAMINAR SHEAR	
	HPAQB19ET5	B	CE	2	9	7.75	0.2596	18	0.0144	INTERLAMINAR SHEAR	
	HPAQB21ET1	B	CE	2	1	8.40	0.2817	18	0.0156	INTERLAMINAR SHEAR	
	HPAQB21ET2	B	CE	2	1	8.38	0.2846	18	0.0158	INTERLAMINAR SHEAR	
FS21ET	HPAQB21ET3	B	CE	2	1	8.36	0.2874	18	0.0160	INTERLAMINAR SHEAR	8.351
	HPAQB21ET4	B	CE	2	1	8.32	0.2879	18	0.0160	INTERLAMINAR SHEAR	
	HPAQB21ET5	B	CE	2	1	8.29	0.2885	18	0.0160	INTERLAMINAR SHEAR	
	HPAQB22RT1	B	CR	2	2	8.67	0.2875	18	0.0160	INTERLAMINAR SHEAR	
	HPAQB22RT2	B	CR	2	2	8.54	0.2857	18	0.0159	INTERLAMINAR SHEAR	
FS22ET*	HPAQB22ET3	B	CE	2	2	8.39	0.2560	18	0.0142	INTERLAMINAR SHEAR	8.531
	HPAQB22ET4	B	CE	2	2	8.46	0.2640	18	0.0147	INTERLAMINAR SHEAR	
	HPAQB22RT5	B	CR	2	2	8.58	0.2598	18	0.0144	INTERLAMINAR SHEAR	
	HPAQB23ET1	B	CE	2	3	8.41	0.2868	18	0.0159	INTERLAMINAR SHEAR	
	HPAQB23ET2	B	CE	2	3	8.44	0.2863	18	0.0159	INTERLAMINAR SHEAR	
FS23ET	HPAQB23ET3	B	CE	2	3	8.39	0.2835	18	0.0157	INTERLAMINAR SHEAR	8.402
	HPAQB23ET4	B	CE	2	3	8.42	0.2801	18	0.0156	INTERLAMINAR SHEAR	
	HPAQB23ET5	B	CE	2	3	8.36	0.2530	18	0.0141	INTERLAMINAR SHEAR	
	HPAQB31ET1	B	CE	2	1	7.77	0.2628	18	0.0146	INTERLAMINAR SHEAR	
	HPAQB31ET2	B	CE	2	1	7.92	0.2418	18	0.0134	INTERLAMINAR SHEAR	
FS31ET	HPAQB31ET3	B	CE	2	1	7.48	0.2901	18	0.0161	INTERLAMINAR SHEAR	7.734
	HPAQB31ET4	B	CE	2	1	7.75	0.2627	18	0.0146	INTERLAMINAR SHEAR	
	HPAQB31ET5	B	CE	2	1	7.74	0.2679	18	0.0149	INTERLAMINAR SHEAR	
	HPAQB32ET1	B	CE	2	2	8.61	0.2877	18	0.0160	INTERLAMINAR SHEAR	
	HPAQB32ET2	B	CE	2	2	8.63	0.2568	18	0.0143	INTERLAMINAR SHEAR	
FS32ET	HPAQB32ET3	B	CE	2	2	8.34	0.2408	18	0.0134	INTERLAMINAR SHEAR	8.533
	HPAQB32ET4	B	CE	2	2	8.60	0.2728	18	0.0152	INTERLAMINAR SHEAR	
	HPAQB32ET5	B	CE	2	2	8.47	0.2464	18	0.0137	INTERLAMINAR SHEAR	
	HPAQB33ET3	B	CE	2	3	5.76	0.2714	18	0.0151	INTERLAMINAR SHEAR	
	HPAQB33ET4	B	CE	2	3	5.73	0.2753	18	0.0153	INTERLAMINAR SHEAR	
FS33ET	HPAQB33ET6	B	CE	2	3	5.66	0.2778	18	0.0154	INTERLAMINAR SHEAR	5.699
	HPAQB33ET11	3	C3	2	3	5.62	0.2760	18	0.0153	INTERLAMINAR SHEAR	
	HPAQB33ET12	3	C3	2	3	5.72	0.2742	18	0.0152	INTERLAMINAR SHEAR	

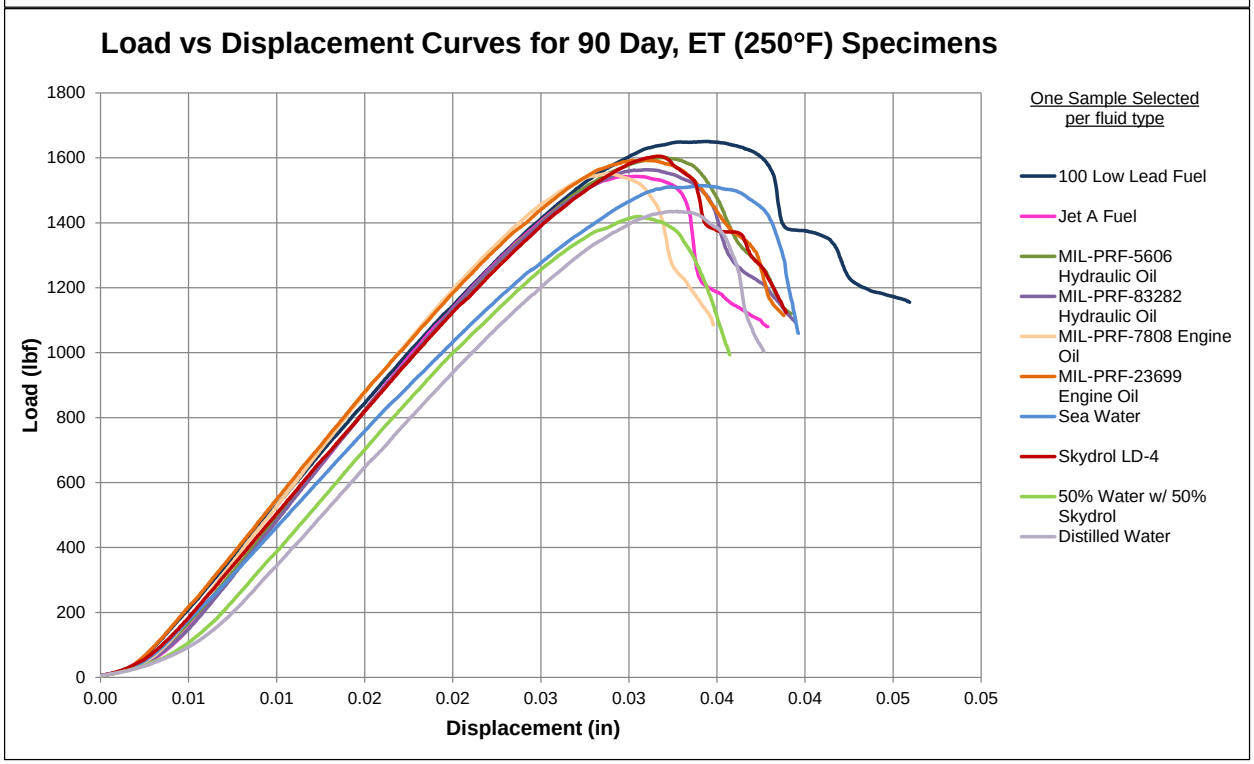
*specimens from RT was tested in ET condition

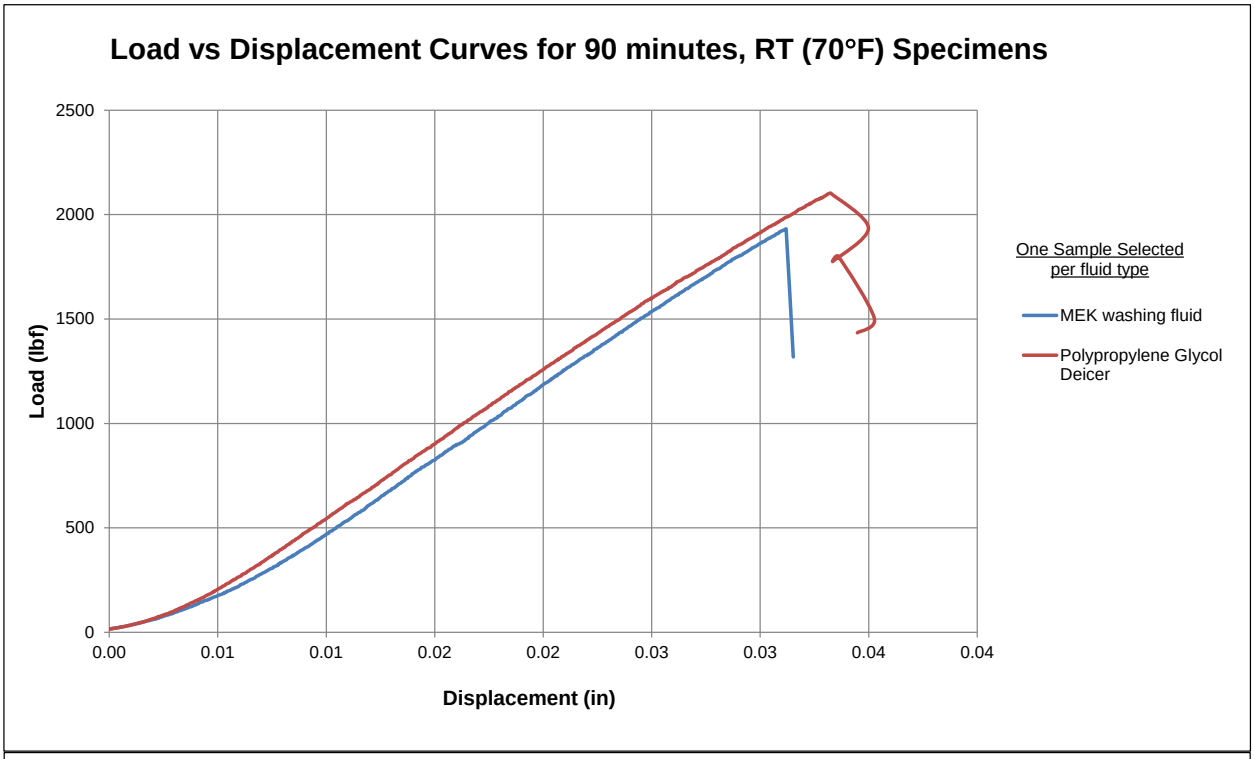

ET (250°F) SBS Fluid Sensitivity Comparison
SBS Strength [ksi]
10.00
9.00
8.00
7.00
6.00
5.00
4.00
3.00
8.32
8.38
8.37
8.32
8.55
8.41
7.48
8.37
7.66
7.73
8.35
8.53
8.40
8.53
5.70
FS11ET
FS12ET
FS13ET
FS14ET
FS15ET
FS16ET
FS17ET
FS18ET
FS19ET
FS31ET
FS21ET
FS22ET
FS23ET
FS32ET
FS33ET
Type of Fluid
Same Environment SBS Strength Without Fluid (ksi) (ET, FS32ET)
Worst Case Environment SBS Strength (ksi) (FS33ET)
Average SBS Strength With Fluid (ksi)

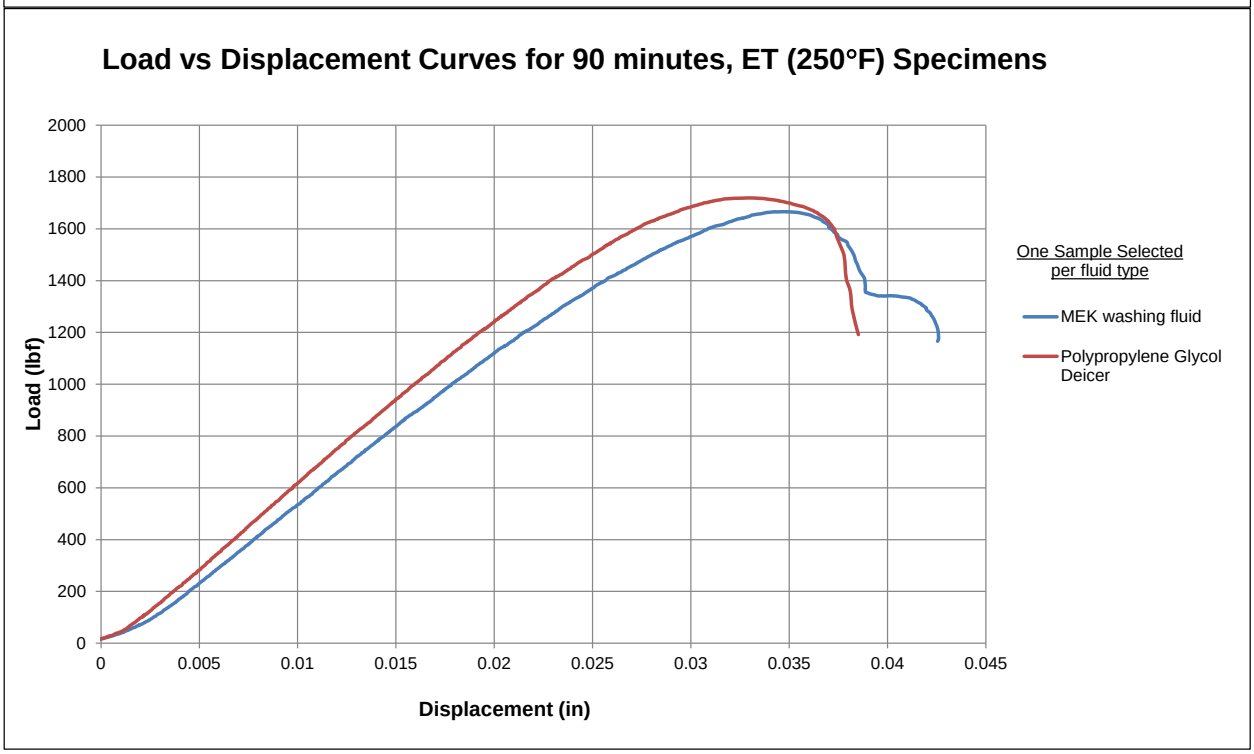

% Change in Strength with Respect to ET
Percentage Change in Strength [%]
5.000
0.000
-5.000
-10.000
-15.000
-20.000
-25.000
-30.000
-35.000
-2.477
-1.843
-1.959
-2.540
0.236
-1.457
-12.36
-1.903
-10.25
-9.364
-2.128
-0.022
-1.532
0.0000
-33.21
FS11ET
FS12ET
FS13ET
FS14ET
FS15ET
FS16ET
FS17ET
FS18ET
FS19ET
FS31ET
FS21ET
FS22ET
FS23ET
FS32ET
FS33ET
Type of Fluid
% Change in Strength with Respect to ET

7.3 Load Displacement Curves

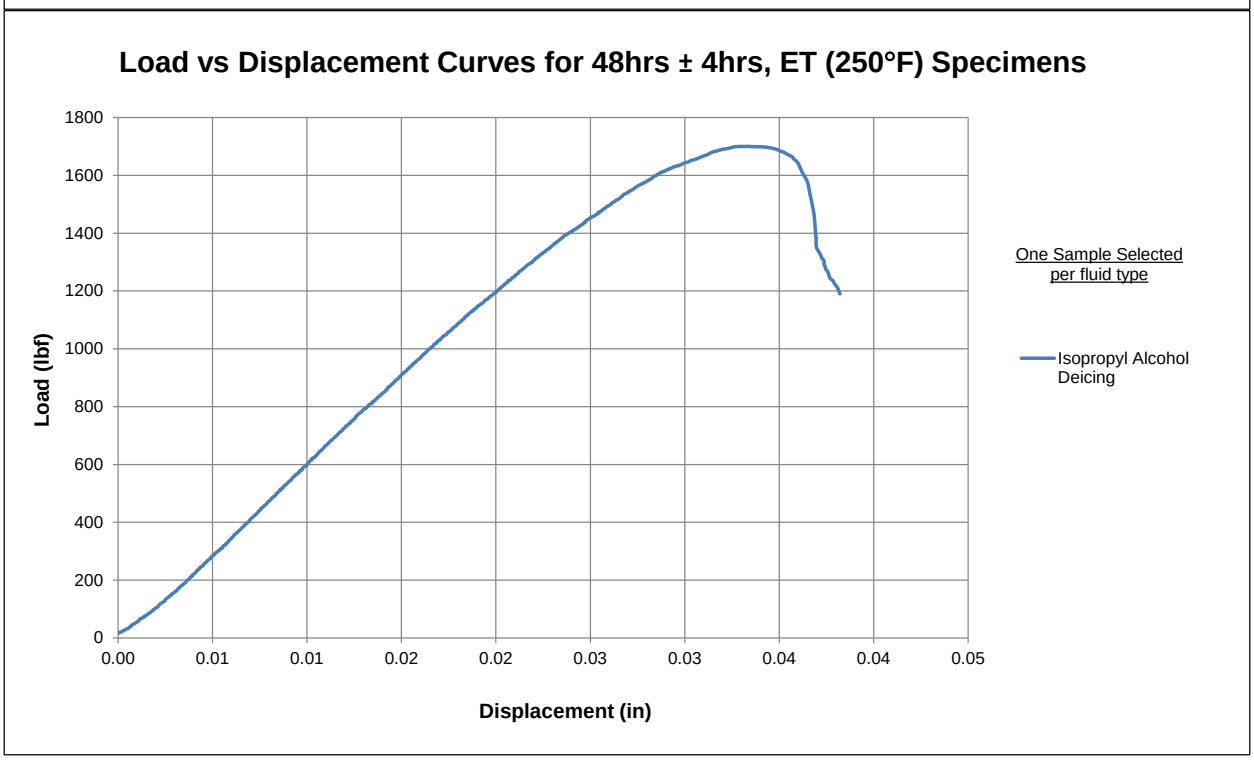


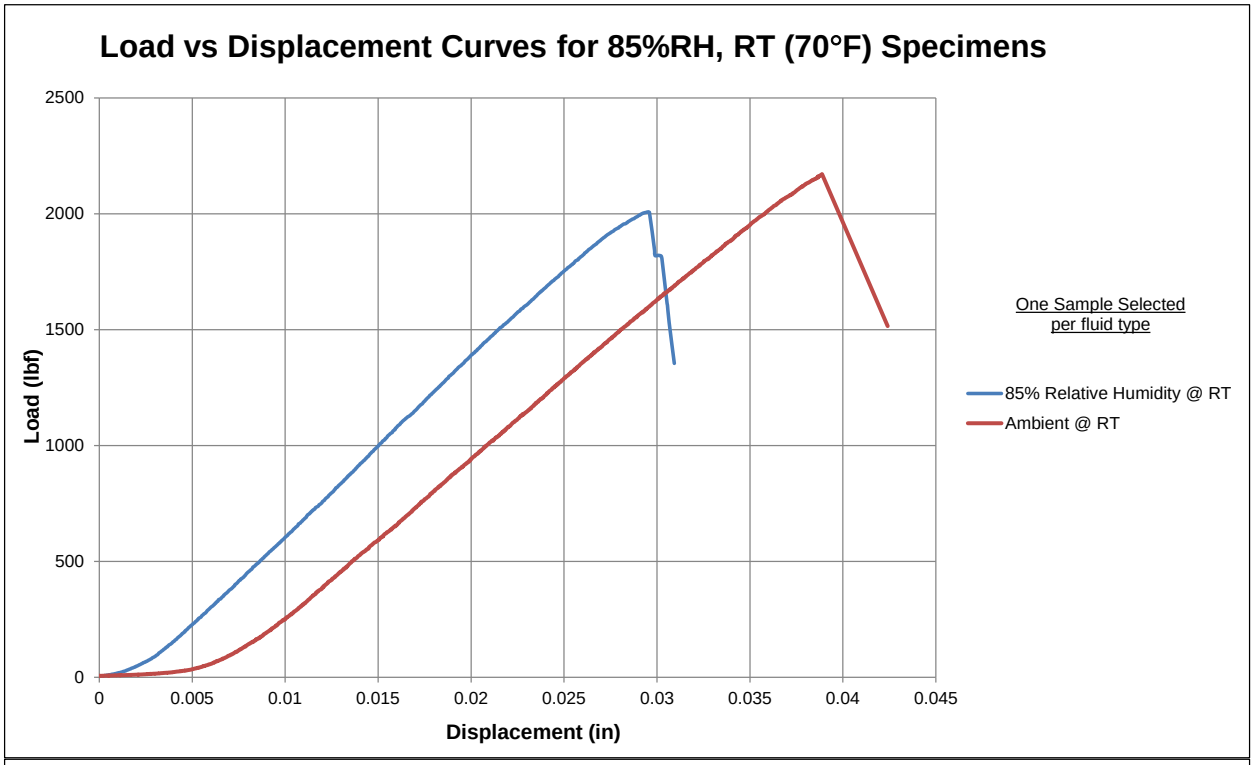


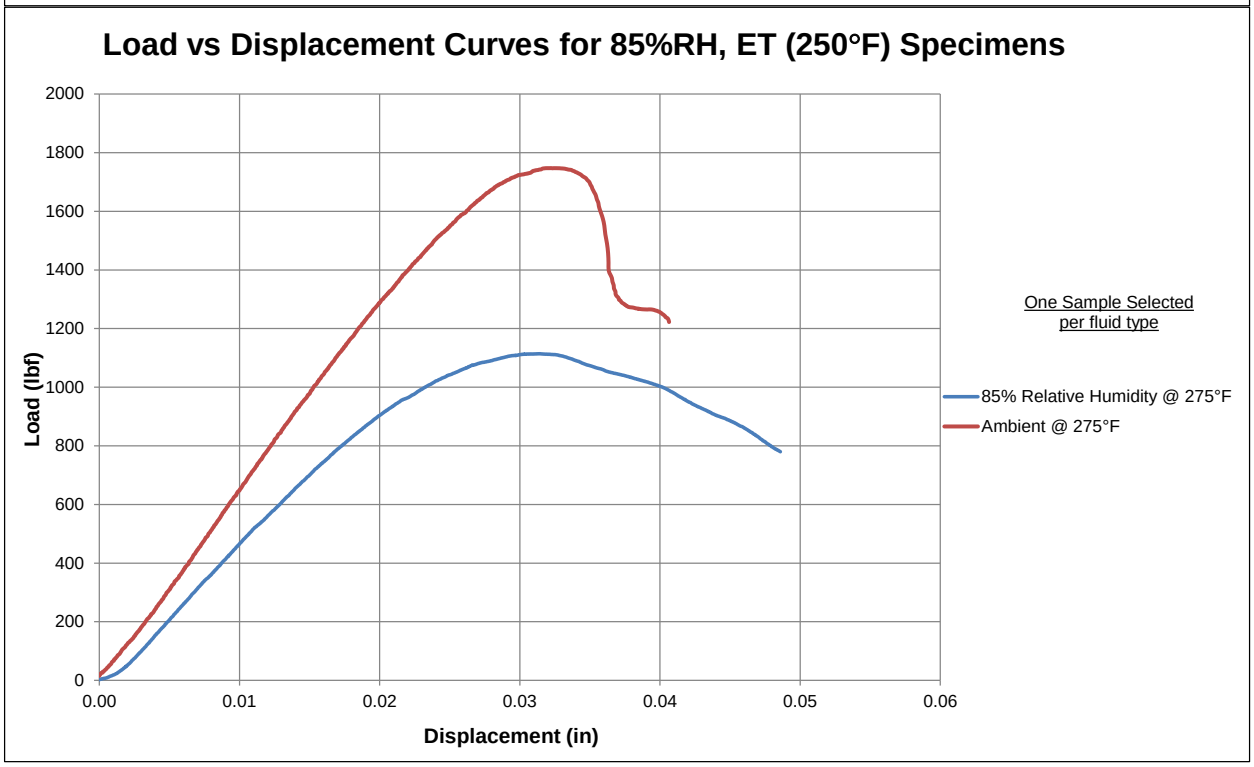

Load vs Displacement Curves for 90 minutes, RT (70°F) Specimens
Load (lbf)
2500
2000
1500
1000
500
0
0.00
0.01
0.01
0.02
0.02
0.03
0.03
0.04
0.04
Displacement (in)
One Sample Selected per fluid type
MEK washing fluid
Polypropylene Glycol Deicer


Load vs Displacement Curves for 90 minutes, ET (250°F) Specimens
Load (lbf)
2000
1800
1600
1400
1200
1000
800
600
400
200
0
0
0.005
0.01
0.015
0.02
0.025
0.03
0.035
0.04
0.045
Displacement (in)
One Sample Selected per fluid type
MEK washing fluid
Polypropylene Glycol Deicer


Load vs Displacement Curves for 48hrs ± 4hrs, RT (70°F) Specimens
Load (lbf)
3000
2500
2000
1500
1000
500
0
0.00
0.01
0.02
0.03
0.04
0.05
Displacement (in)
One Sample Selected per fluid type
Isopropyl Alcohol Deicing

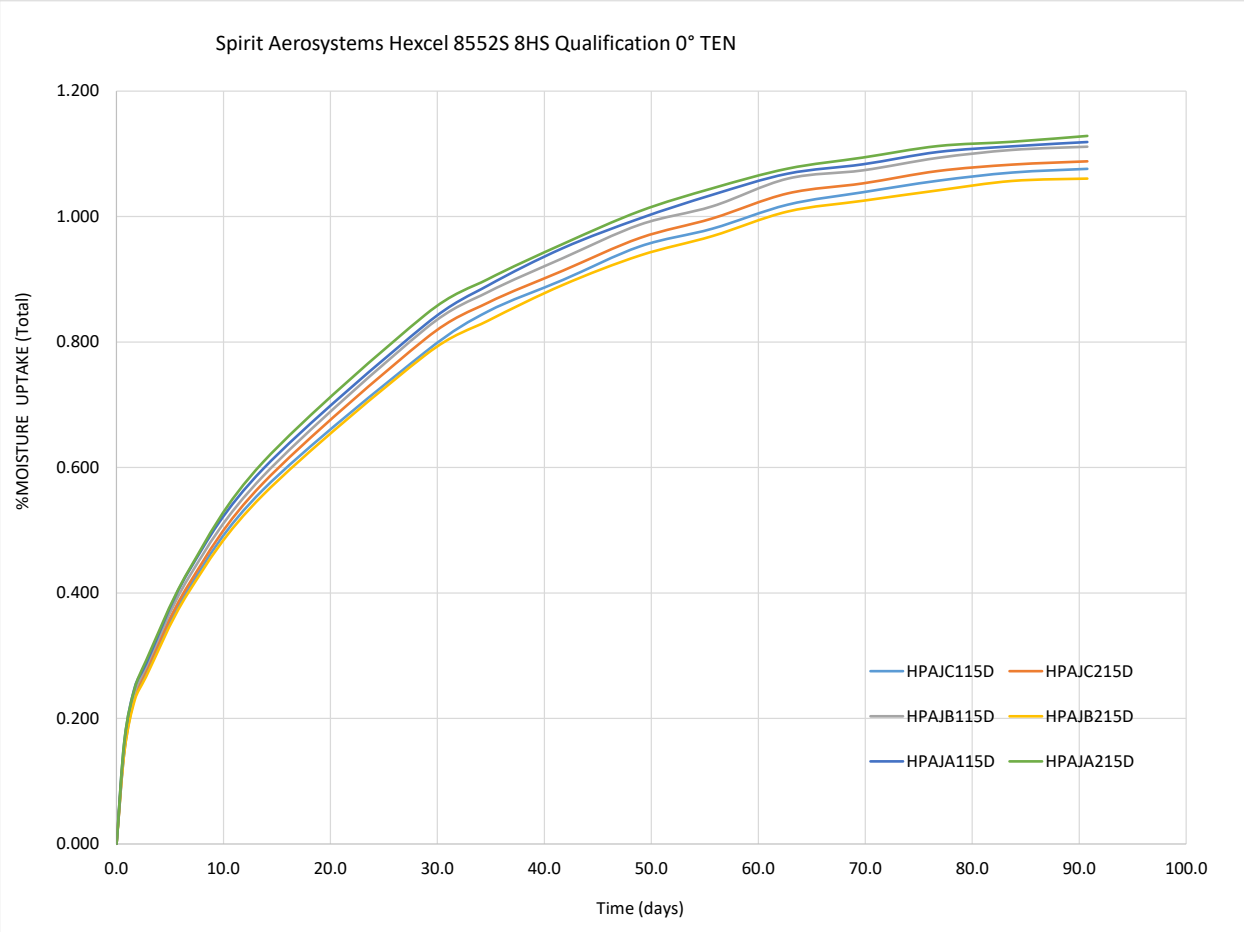

Load vs Displacement Curves for 48hrs ± 4hrs, ET (250°F) Specimens
Load (lbf)
1800
1600
1400
1200
1000
800
600
400
200
0
0.00
0.01
0.01
0.02
0.02
0.03
0.03
0.04
0.04
0.05
Displacement (in)
One Sample Selected per fluid type
Isopropyl Alcohol Deicing


Load vs Displacement Curves for 85%RH, RT (70°F) Specimens
Load (lbf)
2500
2000
1500
1000
500
0
0
0.005
0.01
0.015
0.02
0.025
0.03
0.035
0.04
0.045
Displacement (in)
One Sample Selected per fluid type
85% Relative Humidity @ RT
Ambient @ RT

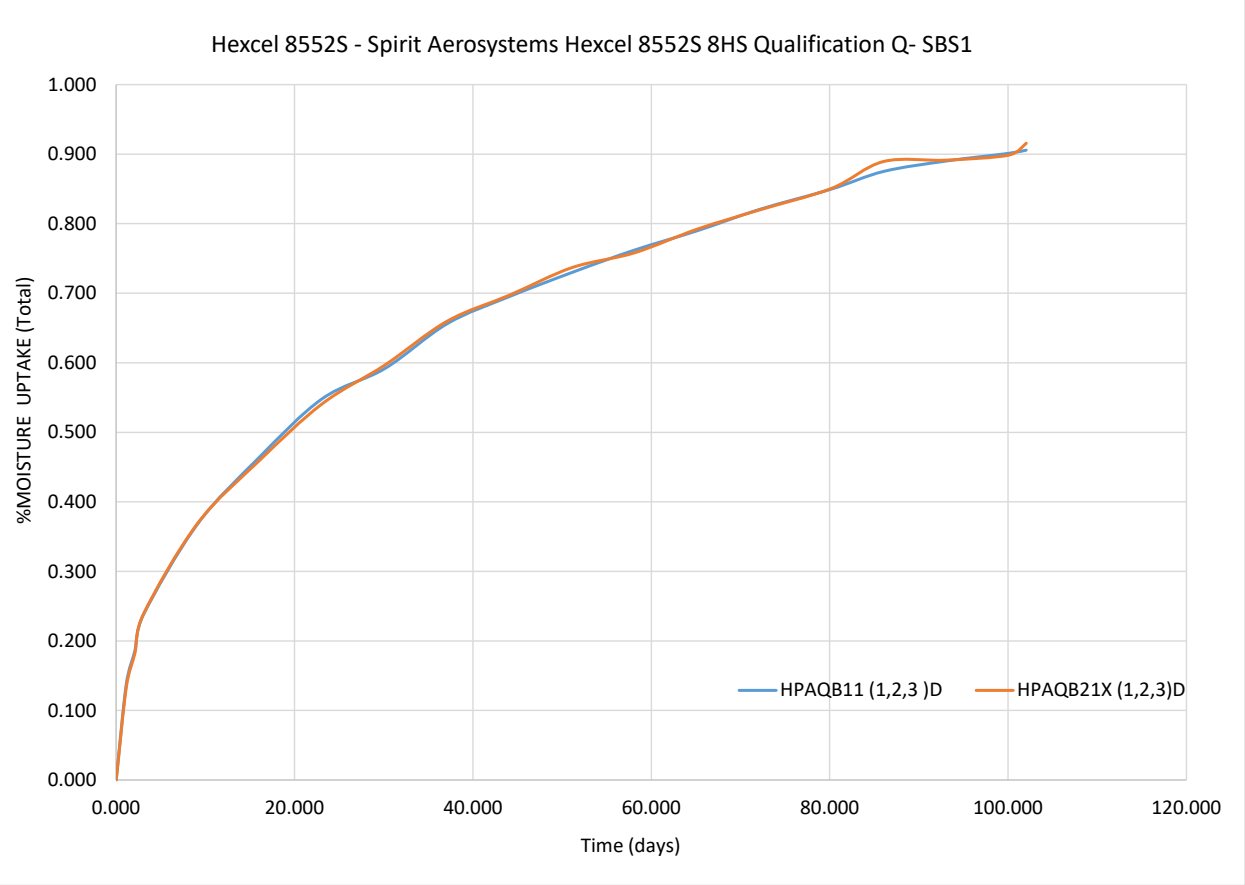

Load vs Displacement Curves for 85%RH, ET (250°F) Specimens
Load (lbf)
2000
1800
1600
1400
1200
1000
800
600
400
200
0
0.00
0.01
0.02
0.03
0.04
0.05
0.06
Displacement (in)
One Sample Selected per fluid type
85% Relative Humidity @ 275°F
Ambient @ 275°F

8. Moisture Conditioning Charts

8.1 Longitudinal Tension - Thinner Panel



8.2 Short-Beam Strength - Thicker Panel



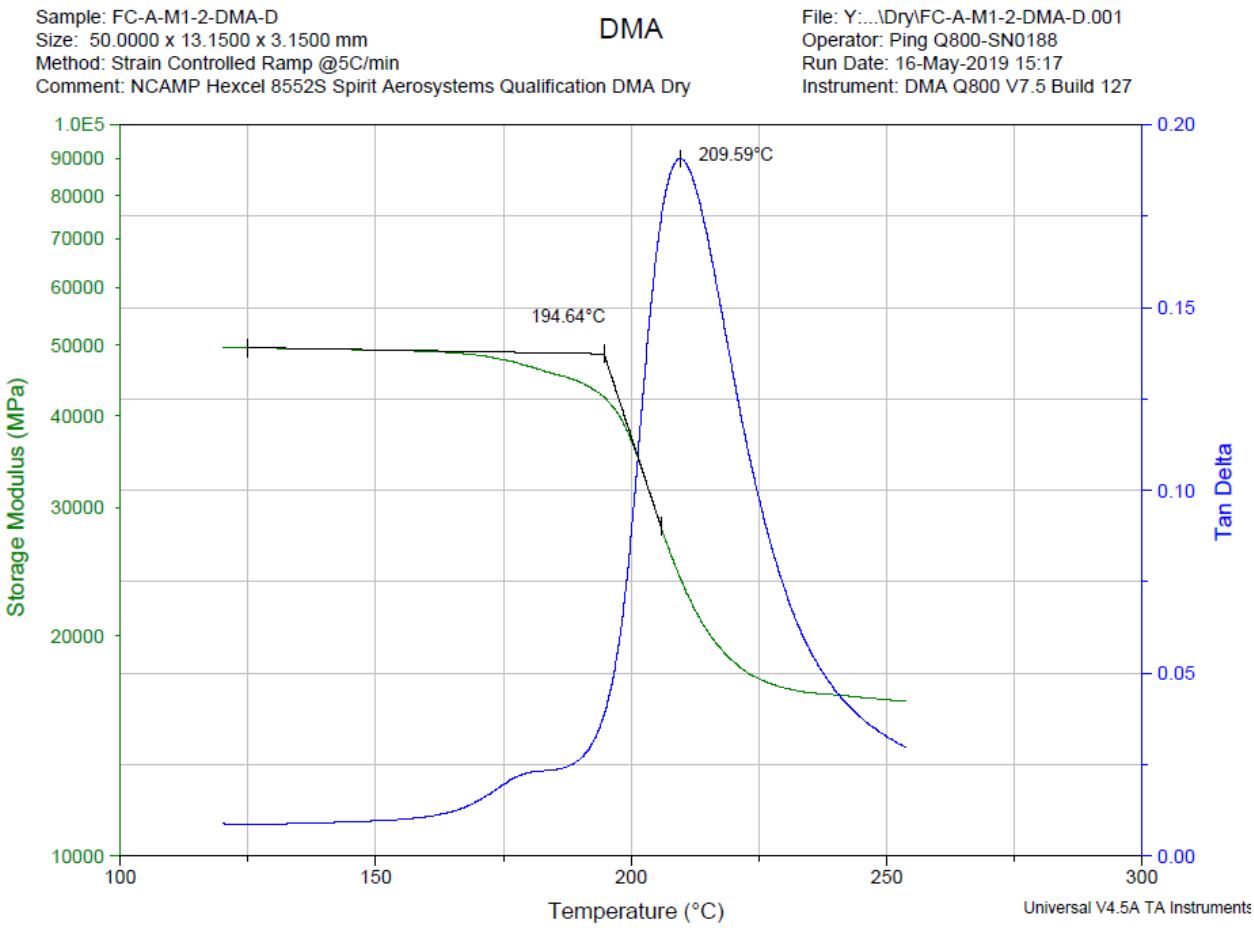
9. DMA Results

9.1 Dry DMA Data

DMA Results Summary

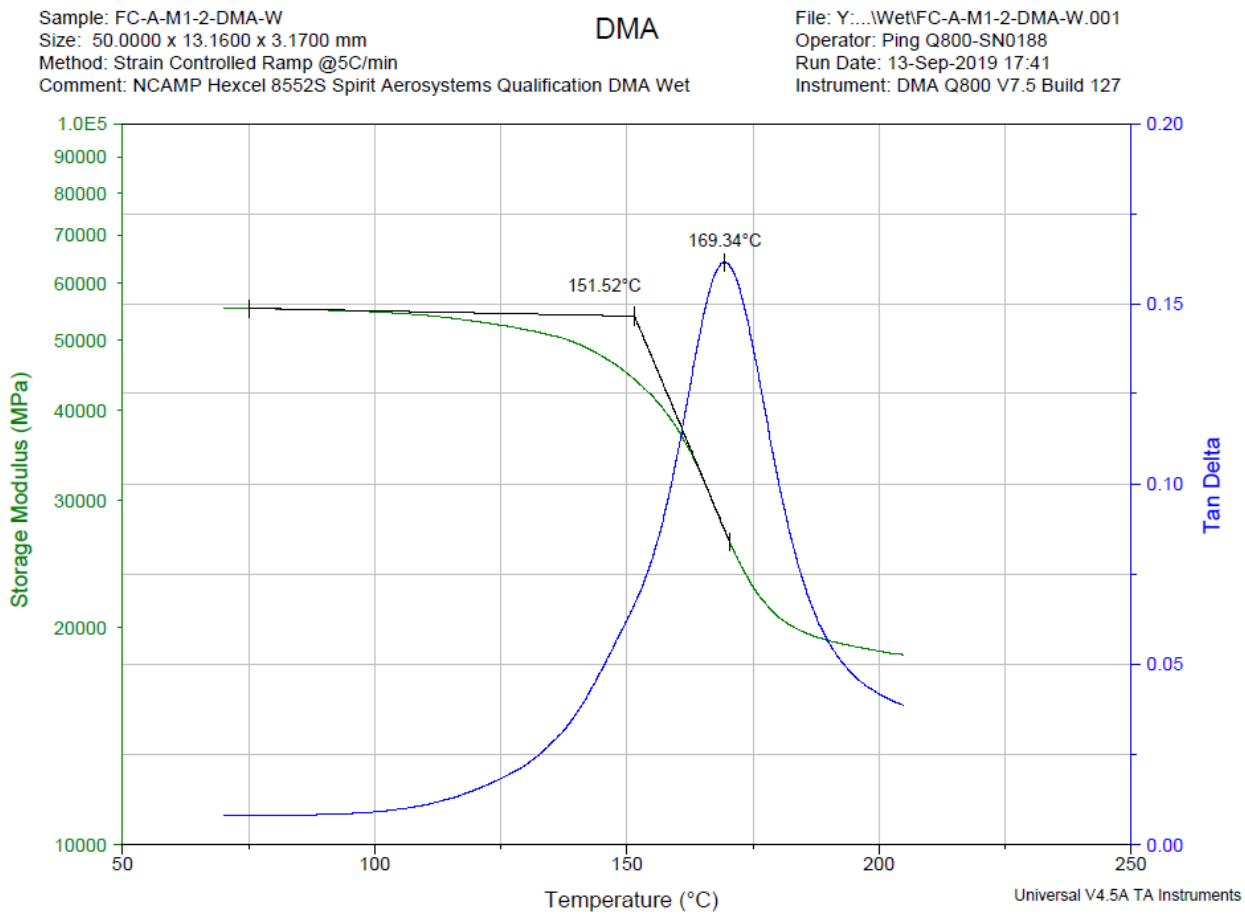
Hexcel 8552S 8HS Spirit Aerosystems Qualification DMA Dry

Sample #	Onset Storage Modulus		Peak of Tangent Delta	
	T_g [°C]	T_g [°F]	T_g [°C]	T_g [°F]
FC-A-M1-2-DMA-D	194.64	382.35	209.59	409.26
FC-A-M2-2-DMA-D	198.27	388.89	213.48	416.26
FHC1-A-M1-1-DMA-D	193.81	380.86	209.22	408.60
FHC1-A-M2-1-DMA-D	196.99	386.58	212.13	413.83
FHT1-A-M1-1-DMA-D	191.78	377.20	208.94	408.09
FHT1-A-M2-1-DMA-D	193.42	380.16	209.77	409.59
FHT1-B-M1-1-DMA-D	195.70	384.26	213.51	416.32
FHT1-C-M2-1-DMA-D	193.43	380.17	211.08	411.94
FT-A-M1-2-DMA-D	195.99	384.78	210.56	411.01
FT-A-M2-2-DMA-D	197.45	387.41	210.54	410.97
FT-B-M1-2-DMA-D	196.92	386.46	210.89	411.60
FT-B-M2-2-DMA-D	199.28	390.70	213.87	416.97
FT-C-M1-2-DMA-D	198.79	389.82	213.53	416.35
FT-C-M2-2-DMA-D	199.52	391.14	214.44	417.99
OHC1-A-M1-1-DMA-D	193.11	379.60	208.34	407.01
OHC1-B-M2-1-DMA-D	199.87	391.77	214.99	418.98
OHC1-C-M1-1-DMA-D	198.04	388.47	213.43	416.17
OHC1-C-M2-1-DMA-D	197.42	387.36	212.71	414.88
OHT1-B-M2-1-DMA-D	195.08	383.14	212.96	415.33
OHT1-C-M1-1-DMA-D	193.24	379.83	211.38	412.48
OHT1-C-M2-1-DMA-D	194.06	381.31	212.50	414.50
SBS-A-M1-1-DMA-D	194.20	381.56	206.66	403.99
SSB1-B-M1-1-DMA-D	195.79	384.42	212.92	415.26
SSB1-C-M1-1-DMA-D	194.17	381.51	212.13	413.83
SSB2-A-M1-1-DMA-D	193.23	379.81	211.43	412.57
SSB2-B-M1-1-DMA-D	195.35	383.63	213.30	415.94
SSB2-B-M2-1-DMA-D	195.67	384.21	213.59	416.46
UNT1-A-M1-1-DMA-D	193.45	380.21	209.78	409.60
UNT1-A-M2-1-DMA-D	193.31	379.96	209.59	409.26
UNT1-B-M1-1-DMA-D	196.83	386.29	213.81	416.86
UNT1-B-M2-1-DMA-D	196.09	384.96	213.56	416.41
UNT1-C-M1-1-DMA-D	195.60	384.08	212.33	414.19
UNT1-C-M2-1-DMA-D	195.33	383.59	212.33	414.19
UNT3-B-M1-2-DMA-D	194.54	382.17	209.11	408.40
UNT3-B-M2-2-DMA-D	195.67	384.21	209.94	409.89
WT-A-M1-1-DMA-D	195.43	383.77	209.80	409.64
WT-A-M2-1-DMA-D	195.07	383.13	209.21	408.58
WT-B-M1-1-DMA-D	197.25	387.05	212.42	414.36
Average	195.63	384.13	211.57	412.83
Standard Deviation	2.01	3.61	1.99	3.57


Sample: FC-A-M1-2-DMA-D
Size: 50.0000 x 13.1500 x 3.1500 mm
Method: Strain Controlled Ramp @5C/min
Comment: NCAMP Hexcel 8552S Spirit Aerosystems Qualification DMA Dry
DMA
File: Y:...\Dry\FC-A-M1-2-DMA-D.001
Operator: Ping Q800-SN0188
Run Date: 16-May-2019 15:17
Instrument: DMA Q800 V7.5 Build 127
209.59°C
194.64°C
Storage Modulus (MPa)
Tan Delta
Temperature (°C)
Universal V4.5A TA Instruments

9.2 Wet DMA Data

DMA Results Summary Hexcel 8552S 8HS Spirit Aerosystems Qualification DMA Wet				
Sample #	Onset Storage Modulus		Peak of Tangent Delta	
	T_g [°C]	T_g [°F]	T_g [°C]	T_g [°F]
FC-A-M1-2-DMA-W	151.52	304.74	169.34	336.81
FC-B-M1-2-DMA-W	154.53	310.15	171.53	340.75
FHC1-A-M1-1-DMA-W	151.49	304.68	172.32	342.18
FHC1-A-M2-1-DMA-W	151.71	305.08	171.82	341.28
FHT1-A-M1-1-DMA-W	143.97	291.15	166.28	331.30
FHT1-A-M2-1-DMA-W	147.42	297.36	168.31	334.96
FHT1-B-M1-1-DMA-W	146.08	294.94	168.55	335.39
FHT1-C-M2-1-DMA-W	145.34	293.61	166.55	331.79
FT-A-M1-2-DMA-W	153.57	308.43	169.43	336.97
FT-A-M2-2-DMA-W	152.43	306.37	168.79	335.82
FT-B-M1-2-DMA-W	152.09	305.76	170.25	338.45
FT-B-M2-2-DMA-W	154.63	310.33	171.79	341.22
FT-C-M1-2-DMA-W	154.40	309.92	171.43	340.57
FT-C-M2-2-DMA-W	154.54	310.17	170.79	339.42
OHC1-A-M1-1-DMA-W	153.39	308.10	172.21	341.98
OHC1-B-M2-1-DMA-W	152.67	306.81	173.15	343.67
OHC1-C-M1-1-DMA-W	151.03	303.85	171.15	340.07
OHC1-C-M2-1-DMA-W	152.40	306.32	171.32	340.38
OHT1-B-M2-1-DMA-W	146.89	296.40	169.40	336.92
OHT1-C-M1-1-DMA-W	147.34	297.21	167.94	334.29
OHT1-C-M2-1-DMA-W	146.62	295.92	168.78	335.80
SBS-A-M1-1-DMA-W	151.11	304.00	171.58	340.84
SSB1-B-M1-1-DMA-W	147.76	297.97	169.71	337.48
SSB1-C-M1-1-DMA-W	145.44	293.79	166.84	332.31
SSB2-A-M1-1-DMA-W	143.78	290.80	170.20	338.36
SSB2-B-M1-1-DMA-W	144.65	292.37	170.29	338.52
SSB2-B-M2-1-DMA-W	144.78	292.60	170.36	338.65
UNT1-A-M1-1-DMA-W	150.08	302.14	170.59	339.06
UNT1-A-M2-1-DMA-W	146.44	295.59	168.01	334.42
UNT1-B-M1-1-DMA-W	148.04	298.47	170.04	338.07
UNT1-B-M2-1-DMA-W	147.46	297.43	170.20	338.36
UNT1-C-M1-1-DMA-W	147.45	297.41	169.18	336.52
UNT1-C-M2-1-DMA-W	146.97	296.55	168.72	335.70
UNT3-B-M1-2-DMA-W	152.43	306.37	170.87	339.57
UNT3-B-M2-2-DMA-W	153.41	308.14	170.64	339.15
WT-A-M1-1-DMA-W	152.51	306.52	169.20	336.56
WT-A-M2-1-DMA-W	152.39	306.30	168.54	335.37
WT-B-M1-1-DMA-W	153.32	307.98	169.84	337.71
Average	149.79	301.62	169.89	337.81
Standard Deviation	3.47	6.24	1.62	2.91



10. Deviations

N/A