Advanced General Aviation Transport Experiments

A – Basis and B – Basis Design Allowables for Epoxy – Based Prepreg

TORAY T700SC-12K-50C/#2510 Plain Weave Fabric [SI Units]

AGATE-WP3.3-033051-134

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1. INTRODUCTION

This material characterization program was performed to characterize the lamina properties of Toray Composites (America), T700SC-12K-50C/#2510, 190 g/m^2, plain weave fabric, herein designated F6273C-07M. The F6273C-07M prepreg material system designation shall be used to refer the material in this report. The material qualification was conducted under FAA project number TC1616SE-A through Lancair Company that wanted to use the aforementioned material prepreg system on their LC40 aircraft.

This report contains the test results obtained from the tests conducted for the material qualification of F6273C-07M in accordance with FAA Document DOT/FAA/AR-00/47: *Material Qualification and Equivalency for Polymer Matrix Composite Material Systems* and Toray Composites (America), Inc. (TCA) Material Process Specification, TCSPF-T-FC05, Revision 1 dated February 4, 2000. Toray Composites (America), Inc. (TCA), Integrated Technologies (Intec), National Institute for Aviation Research (NIAR) and Rose Consulting performed the testing on the unexposed and exposed prepreg materials for lamina baseline test properties in accordance with ASTM test methods, SACMA test methods, and TCA test work instructions.

Three batches of F6273C-07M and the corresponding mixed resins were tested for baseline test properties. The data reported herein will be used to set material acceptance criteria for future material production and material receipt. The Raw Test Data, Inspection Records, Fabrication Records, Processing Records and all other relevant documents of this report, TCQAL-T-1013, are archived at Toray Composites (America), Inc., and it is available only upon request.

The physical and chemical tests were performed on the mixed resins, the uncured prepreg materials and cured prepreg laminates. The mixed resins were evaluated for cured neat resin density. The uncured prepreg samples were evaluated for resin content, fiber areal weight, volatile content, gel time, flow, IR (Infrared Spectroscopy), HPLC (High Performance Liquid Chromatography) and DSC (Differential Scanning Calorimetry). The cured prepreg laminates were tested for fiber volume, resin volume, void content, cured ply thickness and Tg (glass transition temperature) by DMA (Dynamic Mechanical Analyzer).

TCA Test Laboratories performed all the physical and chemical tests on the mixed resins, the uncured prepreg materials and cured prepreg laminates, except for fiber volume, resin volume and void content that Intec performed and cured laminate glass transition temperature, dry and wet conditions, that Rose Consulting performed.

TCA Test Laboratories performed the fabrication of all the test panels and test specimens, ultrasonic inspection, chemical and humidity conditioning, except for 0° and 90° Compressive Strength specimens that NIAR tabbed and machined.

Also, the TCA Test Laboratories performed the attachment of strain gauges and mechanical testing, except for specimens tested at –65 °F (Dry) that Intec performed. Moreover, TCA Test Laboratories performed the fluid sensitivity on one qualification batch by testing in-plane (iosipescu) shear strength only.

All TCA and Intec test equipments were calibrated with standards traceable to the NIST.

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. These properties are considered to provide the initial base of the "building block" approach. Additional coupon level tests and sub-element tests may be required to fully substantiate the full-scale design.

The test methods and results contained in this document are consistent with MIL-HDBK-17-1E,2D,3E - Military Handbook for Polymer Matrix Composites. All material, specimens, fixtures and test results contained within this document were traceable and conformed by the Federal Aviation Administration (FAA). It should be noted that before application of the basis values presented in this document to design, demonstration of the ability to consistently produce equivalent material properties as that evaluated during this program should be substantiated through an acceptable test program.

1.2. Symbols Used

ν_{12}^{tu}	major Poisson's ratio, tension
$\mu\varepsilon$	micro-strain
E_1^c	compressive modulus, longitudinal
E_1^t	tensile modulus, longitudinal
E_2^c	compressive modulus, transverse
E_2^t	tensile modulus, transverse
F_{12}^{su}	in – plane shear strength
F_{13}^{su}	apparent interlaminar shear strength
F_1^{cu}	compressive strength, longitudinal
F_1^{tu}	tensile strength, longitudinal
F_2^{cu}	compressive strength, transverse
F_2^{tu}	tensile strength, transverse
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	1 – axis; longitudinal (parallel to warp direction of reinforcement)
2	2 – axis; transverse (parallel to fill direction of reinforcement)
12	in – plane shear
13	interlaminar shear (apparent)

1.3. Acronyms and Definitions

A – Basis	95% lower confidence limit on the first population percentile
AGATE	Advanced General Aviation Transport Experiments
ASTM	American Society for Testing and Materials
B – Basis	95% lower confidence limit on the tenth population percentile
C. V.	coefficient of variation
CTD	cold temperature dry
CPT	cured ply thickness
DMA	dynamic mechanical analysis
Dry	specimen tested with an “as fabricated” moisture content
ETD	elevated temperature dry
ETW	elevated temperature wet
FAR	Federal Aviation Regulations
FAW	fiber areal weight
Gr/Ep	graphite/epoxy
NASA	National Aeronautics and Space Administration
RTD	room temperature dry
SACMA	Suppliers of Advanced Composite Materials Association
SRM	SACMA Recommended Method
T_g	glass transition temperature
t_{ply}	cured ply thickness
wet	specimen tested with an equilibrium moisture content per section 1.5.2

1.4. References

ASTM Standards

D 792-91 "Standard Test Method for Density and Specific Gravity of Plastics by Displacement," American Society for Testing and Materials, Philadelphia, PA 1991.

D2344 "Standard Test Method for Apparent Interlaminar Shear Strength of Parallel Fiber Composites by Short-Beam Method," American Society for Testing and Materials, Philadelphia, PA.

D2734 "Standard Test Method for Void Content of Reinforced Plastics," American Society for Testing and Materials, Philadelphia, PA 1994

D3039 "Standard Test Method for Tensile Properties of Polymeric Matrix Composite Materials," American Society for Testing and Materials, Philadelphia, PA 1995.

D3171-90 "Standard Test Method for Fiber Content of Resin-Matrix Composites by Matrix Digestion," American Society for Testing and Materials, Philadelphia, PA 1990

D3530-90 "Standard Test Method for Volatiles Content of Epoxy Matrix Prepreg" American Society for Testing and Materials, Philadelphia, PA 1990

D3531-76 "Standard Test Method for Resin Flow of Carbon Fiber-Epoxy Prepreg," American Society for Testing and Materials, Philadelphia, PA.

D3532 "Standard Test Method for Gel Time of Carbon Fiber-Epoxy Prepreg," American Society for Testing and Materials, Philadelphia, PA.

D4065-93 "Standard Practice for Determining and Reporting Dynamic Mechanical Properties of Plastics," American Society for Testing and Materials, Philadelphia, PA 1993.

D4473 " Standard Practice for Determining Cure Behavior of Thermosetting Resins Using dynamic Mechanical Procedures," American Society for Testing and Materials, Philadelphia, PA.

D5379-98 "Shear Properties of Composite Materials by the V-Notched Beam Method," American Society for Testing and Materials, Philadelphia, PA 1998.

E168 "General Techniques of Infrared Quantitative Analysis," American Society for Testing and Materials, Philadelphia, PA 1992.

E1252 "Standard Practice for General Techniques for Qualitative Infrared Analysis," American Society for Testing and Materials, Philadelphia, PA 1995.

E1356 "Glass Transition Termperature by Differential Scanning Calorimetry or Differential Thermal Analysis," American Society for Testing and Materials, Philadelphia, PA 1995.

SACMA Standards

SRM-1R-94 "Compressive Properties of Oriented Fiber-Resin Composites," Suppliers of Advanced Composite Materials Association, 1994.

SRM-18R-94 "Glass Transition Temperature (Tg) Determination by DMA of Oriented Fiber-Resin Composites," Suppliers of Advanced Composite Materials Association, 1994.

SRM-19R-94 "Viscosity characteristics of Matrix Resins," Suppliers of Advanced Composite Materials Association, 1994.

SRM-20R-94 "High Performance Liquid Chromatography of Thermoset Resins," Suppliers of Advanced Composite Materials Association, 1994.

SRM-22R-94 "Determining the Resin Flow of Preimpregnated "B" Staged Material," Suppliers of Advanced Composite Materials Association, 1994.

SRM-23R-94 "Determination of Resin Content and Fiber Areal Weight of

Thermoset Prepreg with Destructive Technique," Suppliers of Advanced Composite Materials Association, 1994.

SRM-25R-94 "Onset Temperature and Peak Temperature for Composite System Resins Using Differential Scanning Calorimetry (DSC)," Suppliers of Advanced Composite Materials Association, 1994.

Toray Documents

TCSPF-T-FC05 "Material Process Specification for Torayca Plain Weave Carbon Fiber Fabric Preimpregnated with Epoxy Resin (EP-resin) Prepreg Fabric – 250°F Curing System," Revision 1, Toray Composites (America), Inc., Puyallup, WA, February 4, 2000.

TCWIN-U-C002 "Fourier Transform Infrared Analysis," Toray Composites (America), Inc., Puyallup, WA, 1998.

TCWIN-U-C003 "Differential Scanning Calorimetry," Toray Composites (America), Inc., Puyallup, WA, 1998.

TCWIN-U-C004 "High Performance Liquid Chromatography," Toray Composites (America), Inc., Puyallup, WA, 1998.

TCWIN-U-M003 "Lay-up/Vacuum Debulking," Toray Composites (America), Inc., Puyallup, WA, 1998.

TCWIN-U-M006 "Autoclave Curing," Toray Composites (America), Inc., Puyallup, WA, 1998.

TCWIN-U-M008 "Panel Tabbing," Toray Composites (America), Inc., Puyallup, WA, 1998.

TCWIN-U-M101 "Tensile Specimen Machining," Toray Composites (America), Inc., Puyallup, WA, 1998.

TCWIN-U-M102 "Compression Specimen Machining," Toray Composites (America), Inc., Puyallup, WA, 1998.

TCWIN-U-M103 "Compression Modulus Specimen Machining," Toray Composites (America), Inc., Puyallup, WA, 1998.

TCWIN-U-M111 “90 Degree Tensile Specimen Machining," Toray Composites (America), Inc., Puyallup, WA, 1998.

TCWIN-U-M201 “Tensile Testing,” Toray Composites (America), Inc., Puyallup, WA, 1998.

TCWIN-U-M204 “Compressive Strength Testing," Toray Composites (America), Inc., Puyallup, WA, 1998.

TCWIN-U-M206 “Compressive Modulus Testing,” Toray Composites (America), Inc., Puyallup, WA, 1998.

TCWIN-U-M214 “Strain Gauge Attachment," Toray Composites (America), Inc., Puyallup, WA, 1998.

TCWIN-U-M215 “Laminate Density/Fiber Volume Testing," Toray Composites (America), Inc., Puyallup, WA, 1998.

TCWIN-U-M216 “Strain Gauge Calibration," Toray Composites (America), Inc., Puyallup, WA, 1998.

TCWIN-U-P001 “Volatile Content," Toray Composites (America), Inc., Puyallup, WA, 1998.

TCWIN-U-P004 “Resin Content/Fiber Areal Weight," Toray Composites (America), Inc., Puyallup, WA, 1998.

TCWIN-U-P007 “Gel Time," Toray Composites America), Inc., Puyallup, WA, 1998.

TCWIN-U-P008 “Flow," Toray Composites (America), Inc., Puyallup, WA, 1998

Other Documents

FAA Document DOT/FAA/AR-00/47: Material Qualification and Equivalency for Polymer Matrix Composite Material Systems, J.S. Tomblin, Y.C. Ng and K.S. Raju, 2001.

MIL-HDBK-17 1E, 2D, 3E – Military Handbook for Polymer Matrix Composites

1.5. Methodology

1.5.1. Test Matrix

Testing was performed according to the test methods delineated in the test matrix, with modifications as referenced in FAA Document DOT/FAA/AR-00/47: *Material Qualification and Equivalency for Polymer Matrix Composite Material Systems*. The test matrix for properties included in this document is listed on the next page, with the following notation cited in each column:

 # x #

where the first # represents the required number of prepreg batches, defined as: Prepreg containing T700 12K graphite fibers from one mill roll, impregnated with one batch of resin in one continuous manufacturing operation with traceability to all components. The second # represents the required number of replicates per prepreg batch. For example, "3 x 6" refers to three prepreg batches of material and six specimens per prepreg batch for a total requirement of 18 test specimens.

Table 1.5.1: Minimum Recommended Test Matrix and Standards Used for Testing

TEST	METHOD	NO. OF REPLICATES PER TEST CONDITION			
		CTD[1]	RTD[2]	ETW[3]	ETD[4]
0^o (warp) Tension Strength	ASTM D3039-95	1x4	3x4	3x4	3x4
0^o (warp) Tension Modulus, Strength and Poisson's Ratio	ASTM D3039-95	1x2	3x2	3x2	3x2
90^o (fill) Tension Strength	ASTM D3039-95	1x4	3x4	3x4	3x4
90^o (fill) Tension Modulus and Strength	ASTM D3039-95	1x2	3x2	3x2	3x2
0^o (warp) Compression Strength	SACMA SRM 1-94	1x6	3x6	3x6	3x6
0^o (warp) Compression Modulus	SACMA SRM 1-94	1x2	3x2	3x2	3x2
90^o (fill) Compression Strength	SACMA SRM 1-94	1x6	3x6	3x6	3x6
90^o (fill) Compression Modulus	SACMA SRM 1-94	1x2	3x2	3x2	3x2
In-Plane Shear Strength	ASTM D5379-93	1x4	3x4	3x4	3x4
In-Plane Shear Modulus and Strength	ASTM D5379-93	1x2	3x2	3x2	3x2
Short Beam Shear	ASTM D2344-89	1x6	3x6	3x6	3x6
Fiber Volume	ASTM D3171-90	One sample per panel			
Resin Volume	ASTM D3171-90	One sample per panel			
Void Content	ASTM D2734-94	One sample per panel			
Cured Neat Resin Density	---	Supplied by manufacturer for material			
Glass Transition Temperature	SACMA SRM 18-94	3 dry, 3 wet per prepreg batch			

Notes :

1 CTD: One prepreg batch of material tested (test temperature = -65 ± 5^o F, moisture content = as fabricated, soak time at –65 was 5 min.)

2 RTD: Three prepreg batches of material tested (test temperature = 70 ± 10^o F, moisture content = as fabricated)

3 ETW: Three prepreg batches of material tested (test temperature = 180 ± 5^o F, moisture content = equilibrium per section 1.5.2, soak time at 180 was 2 min.)

4 ETD: Three prepreg batches of material tested (test temperature = 180 ± 5^o F, moisture content = as fabricated, soak time at 180 was 2 min.)

1.5.2. Environmental Conditioning

All 'wet' conditioned samples were exposed to elevated temperature and humidity conditions to establish moisture saturation of the material. Specimens were exposed to 85 ± 5 % relative humidity and 145 ± 5 °F until an equilibrium moisture weight gain of traveler, or witness coupons (1" x 1" x specimen thickness) was achieved. ASTM D5229 and SACMA SRM 11 were used as guidelines for environmental conditioning and moisture absorption.

Effective moisture equilibrium was achieved when the average moisture content of the traveler specimen changed by less than 0.05% for two consecutive readings within a span of 7 ± 0.5 days and was expressed by:

$$\frac{W_i - W_{i-1}}{W_b} < 0.0005$$

where W_i = weight at current time
W_{i-1} = weight at previous time
W_b = baseline weight prior to conditioning

It is common to see small fluctuations in an unfitted plot of the weight gain vs. time curve. There were no fluctuations that made significant errors in results or caused rejection in the moisture equilibrium criteria. Once the traveler coupons passed the criteria for two consecutive readings, the samples were removed from the environmental chamber and placed in a sealed bag with a moist paper or cotton towel for a maximum of 14 days until mechanical testing. Strain gauged specimens were removed from the controlled environment for a maximum of 2 hours for application of gages in ambient laboratory conditions.

1.5.3. Fluid Sensitivity Screening

Although epoxy-based materials historically have not been shown to be sensitive to fluids other than water or moisture, the influence of some fluids other than water or moisture on the mechanical properties were characterized. These fluids fell into two exposure classifications. The first class was considered to be in contact with the material for an extended period of time, and the second class was considered to be wiped on and off (or evaporate) with relatively short exposure times.

To assess the degree of sensitivity of fluids other than water or moisture, Table 1.5.2 shows the fluids which were used in this qualification plan.

Table 1.5.2: Fluid Types Used for Sensitivity Studies

Fluid Type	Specification	Exposure Classification
Jet Fuel (JP-4)	MIL-T-5624	Extended Period
Hydraulic Fluid (Tri-N-butyl phosphate ester)	MIL-H-5606G	Extended Period
Solvent (Methyl Ethyl Ketone)	Laboratory Grade	Extended Period

To assess the influence of various fluids types, a test method sensitive to matrix degradation was used as an indicator of fluid sensitivity and compared to the unexposed results at both room temperature dry and elevated temperature dry conditions. Table 1.5.3 describes the fluid sensitivity-testing matrix with respect to the fluids defined in Table 1.5.2. Engineering judgment and statistical tests were used to assess the degree of material degradation. The results of this screening are included following the data sheets in section 3.2.2.

Table 1.5.3: Material Qualification Program for Fluid Resistance

Fluid Type	Test Method	Test Temp. (^{o} F)	Exposure[1]	Number of Replicates[2]
Jet Fuel JP-4	ASTM D5379[3]	180	See note 4	5
Hydraulic Fluid	ASTM D5379[3]	180	See note 5	5
Solvent (MEK)	ASTM D5379[3]	Ambient	See note 5	5

Notes :

1 Soaking in fluid at ambient temperature (immersion).
2 Only a single batch of material is required.
3 Shear strength only.
4 Immersion duration = 500 hours $\pm$ 50 hours
5 Immersion duration = 60 to 90 minutes

1.5.4. Normalization Procedures

The normalization procedure attempts to reduce variability in fiber-dominated material properties by adjusting raw test values to a specified fiber volume content. Only the following properties were normalized:

- 0° (warp) and 90° (fill) Tensile Strength and Modulus
- 0° (warp) and 90° (fill) Compression Strength and Modulus

The normalization procedure was adopted from MIL-HDBK-17-1E, section 2.4.3.3. The procedure which was used to normalize the data is based on two primary assumptions:

- The relationship between fiber volume fraction and ultimate laminate strength is linear over the entire range of fiber/resin ratios. (It neglects the effects of resin starvation at high fiber contents.)

- Fiber volume is not commonly measured for each test sample, so this method accounts for the fiber volume variation between individual test specimens by utilizing a relationship between fiber volume fraction and laminate cured ply thickness. This relationship is virtually linear in the 0.45 to 0.65 fiber volume fraction range.

Additional information is detailed in FAA Document DOT/FAA/AR-00/47: *Material Qualification and Equivalency for Polymer Matrix Composite Material Systems.* For all normalized data contained in this document, the test values are normalized by cured ply thickness according to:

$$Normalized\ \ Value = Test\ Value \times \frac{CPT_{specimen}}{CPT_{normalizing}}$$

where:

$$CPT_{specimen} = \frac{Average\ \ Sample\ Thickness}{\#\ of\ \ plies}$$

1.5.5. Statistical Analysis

When compared to metallic materials, fiber reinforced composite materials exhibit a high degree of material property variability. This variability is due to many factors, including but not limited to: raw material and prepreg manufacture, material handling, part fabrication techniques, ply stacking sequence, environmental conditions, and testing techniques. This inherent variability drives up the cost of composite testing and tends to render smaller data sets than those produced for metallic materials. This necessitates the usage of statistical techniques for determining reasonable design allowables for composites.

The analyses and design allowable generation for both A and B basis values were performed using the procedure detailed in section 5.3 of FAA Document DOT/FAA/AR-00/47: *Material Qualification and Equivalency for Polymer Matrix Composite Material Systems*.

1.5.6. Material Performance Envelope and Interpolation

Using the B-basis numbers, a material performance envelope may be generated for the material system by plotting these values as a function of temperature. Figure 1.5.1 shows an example material performance envelope using B-basis values.

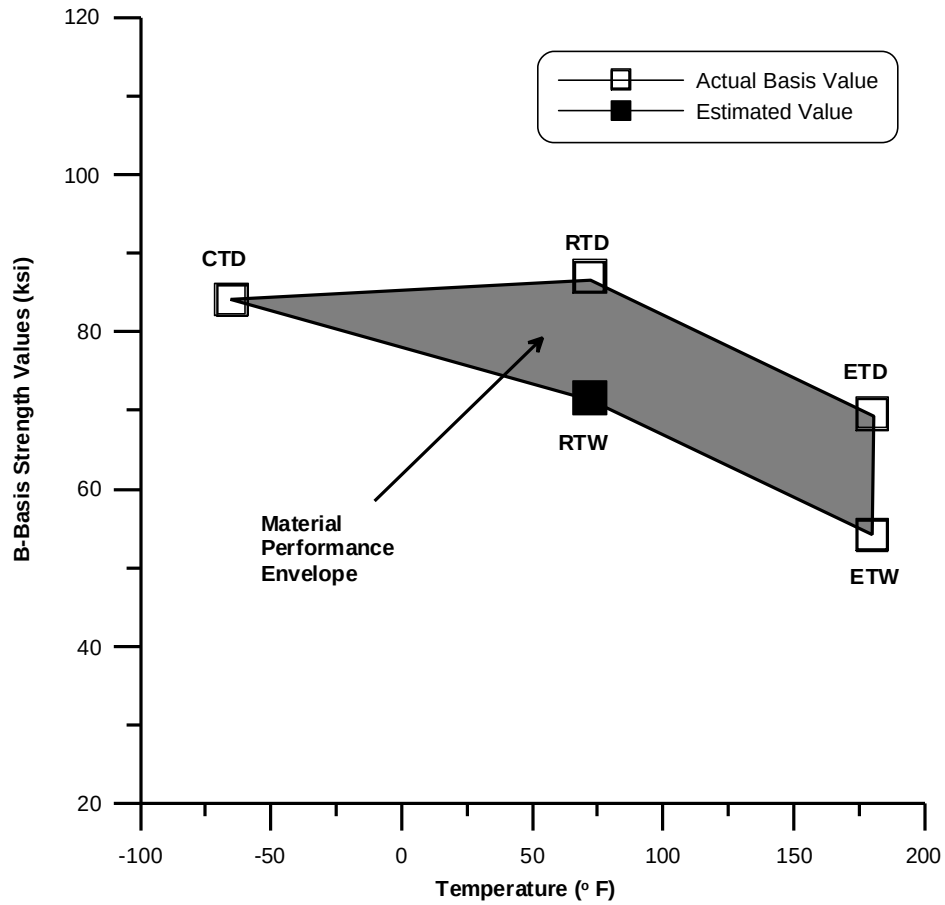


Figure 1.5.1 Material performance envelope.

Since each specific aircraft application of the qualified material may have different Material Operational Limits (MOL) than those tested in the material qualification (which is usually the upper limit), some applications may require a reduced MOL. In this case, simple linear interpolation may be used to obtain the corresponding basis values at the new application MOL.

This interpolation may be accomplished using the following simple relationships assuming $T_{RTD} < T_{MOL} < T_{ETD}$:

For the corresponding MOL "dry" basis value, the "interpolated" basis value using the qualification data is

$$B_{MOL} = B_{RTD} - \frac{(B_{RTD} - B_{ETD})(T_{RTD} - T_{MOL})}{(T_{RTD} - T_{ETD})}$$

where B_{MOL} = new application basis value interpolated to T_{MOL}
B_{RTD} = basis RTD strength value
B_{ETD} = basis ETD strength value
T_{RTD} = RTD test temperature
T_{ETD} = ETD test temperature
T_{MOL} = new application MOL temperature

For the corresponding MOL "wet" basis value, an estimated Room Temperature Wet (RTW) value must be calculated. This may be accomplished by the simple relation

$$B_{RTW} = B_{RTD} - (B_{ETD} - B_{ETW})$$

The "interpolated" wet basis value using the qualification data may then be obtained by

$$B_{MOL} = B_{RTW} - \frac{(B_{RTW} - B_{ETW})(T_{RTW} - T_{MOL})}{(T_{RTW} - T_{ETW})}$$

where: B_{MOL} = new application basis value interpolated to T_{MOL}
B_{RTW} = estimated basis RTW strength value
B_{ETW} = basis ETW strength value
T_{RTW} = RTW (i.e., RTD) test temperature
T_{ETW} = ETW test temperature
T_{MOL} = new application MOL temperature

These equations may also be used for interpolated mean strengths as well as A-basis values with the appropriate substitutions. It should be noted that because unforeseen material property drop-offs with respect to temperature and environment can occur, *extrapolation* to a higher MOL should not be attempted without additional testing and verification. In addition, the interpolation equations shown above are practical for materials obeying *typical* mechanical behavior. In most cases, some minimal amount of testing may also be required to verify the interpolated values.

1.5.6.1. Interpolation Example

This section provides an example of linear interpolations to a specific application environment less than the tested upper material limit used in qualification.

Assuming a specific application environment of 150° F, Figure 1.5.2 depicts the linear interpolation of the B-basis design allowable to this environment. Using the above equations along with the nominal testing temperatures (see Table 1.5.1), the interpolated basis values at 150° F become

$$\text{ETD} \quad : \quad B_{MOL} = 75.106 \text{ ksi}$$

$$\text{ETW} \quad : \quad B_{MOL} = 59.746 \text{ ksi}$$

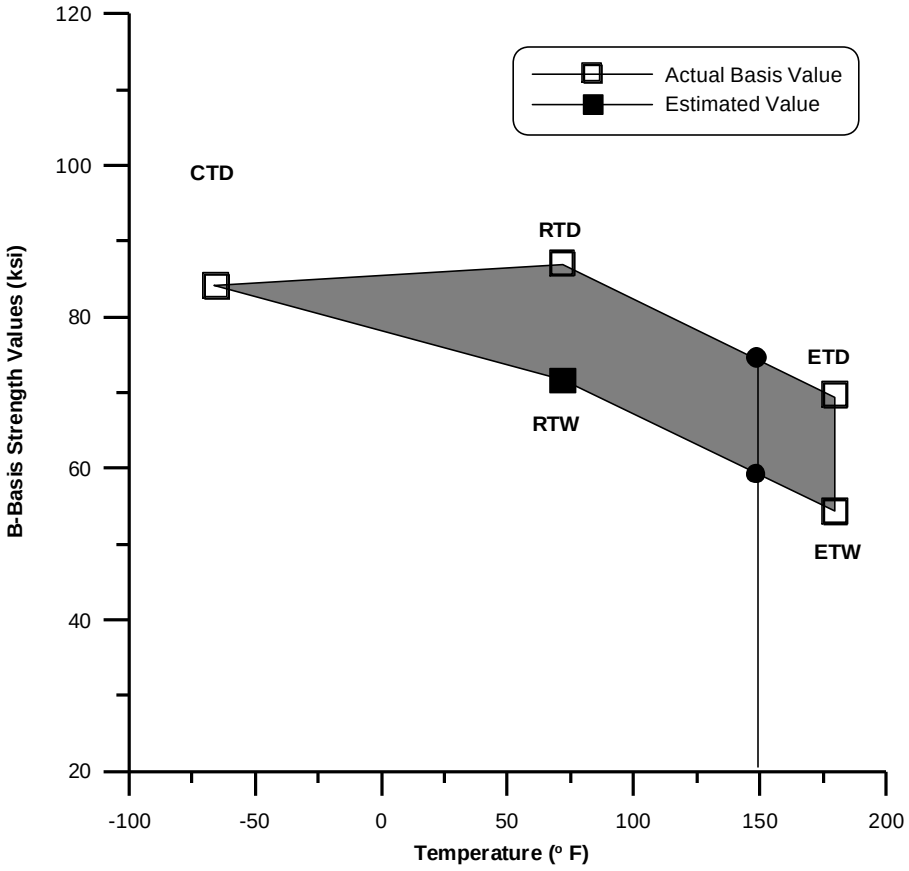


Figure 1.5.2 Example of 150° F interpolation for B-basis values.

2. TORAY T700SC-12K-50C/#2510 PROCEDURES AND PREPREG PROPERTIES

2.1. GENERAL

All of the testing described in the report took place at Toray Composites (America), Inc. in Tacoma, Washington, except for the following tests:

Test Laboratory	*Test Property*
Integrated Technologies (Intec), Bothell, WA	*acid digestions (fiber volume, resin volume, laminate density and void content)*
	-65°F (Dry) mechanical tests (0° & 90° Tension, 0° & 90° Comp. Modulus and In-plane Shear)
Rose Consultant, Half Moon Bay, CA	*cured laminate transition glass temperature, Tg*
NIAR	*Short Beam Shear (Additional tests)*

2.1.1. Materials

The T700SC-12K-50C/#2510, F6273C-07M, Plain Weave Fabric prepreg batches were manufactured by the hot melt method of resin impregnation. Toray, Ehime of Japan and Carbon Fibers America (CFA) in Decatur, Alabama manufactured the carbon fiber. Sakai Composites of Japan performed the weaving of the plain weave fabric. The resin mixing and impregnation were done by Toray Composites (America), Inc. at the Frederickson, WA facilities.

This material qualification program characterized the physical, chemical and mechanical properties of F6273C-07M prepreg material, namely; batches AF991009, AF991010 and AF991011. The prepreg batches were manufactured with two lots of plain weave carbon fabric and three batches of resin matrix. The F6273C-07M batches were manufactured to nominal uncured resin content of 42 % (by weight) and a fiber areal weight (FAW) of 190 grams per square meter.

2.1.2. Lay-up/Bagging

TCA Test Laboratories manufactured all the mechanical test laminates by laying up plies of the F6273C-07M prepreg material in the desired orientations, and by vacuum bag cure. Both the ply orientation and vacuum bag assembly for cure were in accordance with Advanced General Aviation Transport Experiments (AGATE) “Material Qualification Methodology for Epoxy-Based Prepreg Composite Material System”, dated February 1999, TCA Material Process Specification, TCSPF-T-FC05, Revision 1 dated February 4, 2000, and TCA work instructions. Figure 2-1 describes the vacuum bag assembly for cure of

the test laminates. The test laminates were vacuum debulked in accordance with TCA work instructions, TCWIN-U-M003.

2.1.3. Cure

The test panels were cured in accordance with TCWIN-Q-M006 and per Figure 2-2. For the specimen selection methodology and batch traceability of each test property, batch replicates were sampled from at least two different panels covering at least two independent cycles per Figure 2-3. Test specimens were selected from each individual test panel. The test specimens were extracted from panel areas that were good, visually and based on non-destructive inspection techniques.

2.1.4. Non-Destructive Inspection (NDI)

Laminates fabricated for mechanical testing were non-destructively inspected using a Sonix/KrautKramer Branson Ultrasonic equipment at 5MHz pulse.

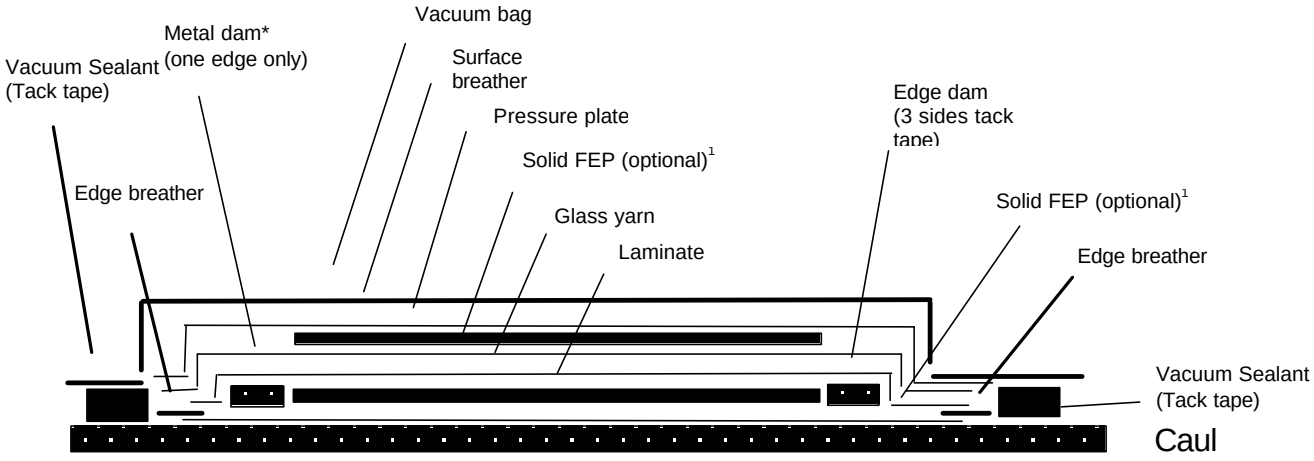
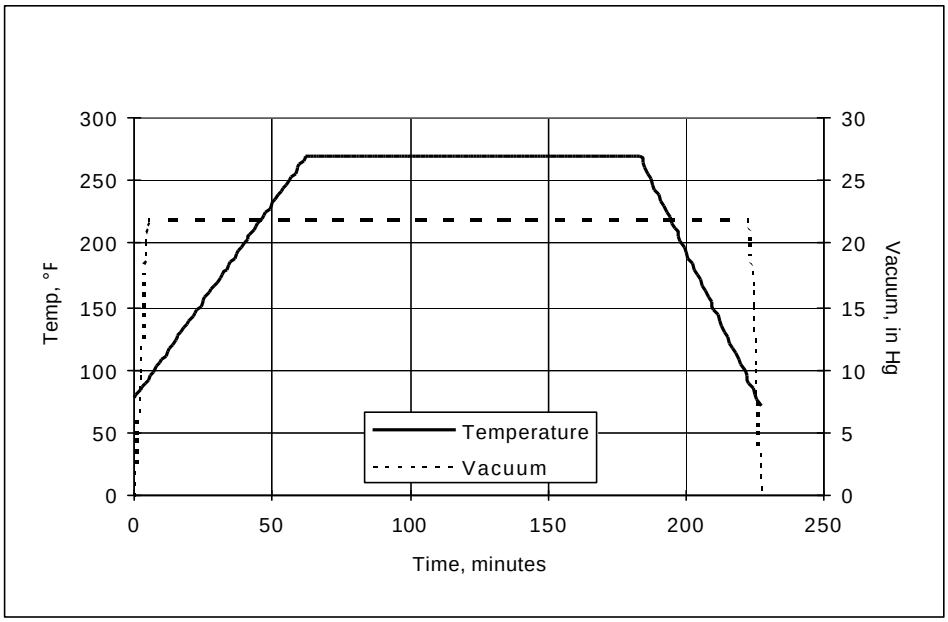


Figure 2-1. Vacuum Bagging Stack Sequence

[1] The solid FEP may not be necessary when the caul plate is treated with a release agent, for example, Frekote release agent.



Notes:

(1) *Apply 22 inches Hg minimum vacuum to the vacuum bag assembly and check for leak before beginning the cure cycle. The leak rate shall be less than 2.0 inches Hg over 5 minutes.*

(2) *Apply the temperature ramp from ambient to 270 ± 10 °F at a rate of 3.0 ± 1.0 °F per minute.*

(3) Maintain the cure temperature at 270 ± 10 °F for 120 ~ 150 minutes.

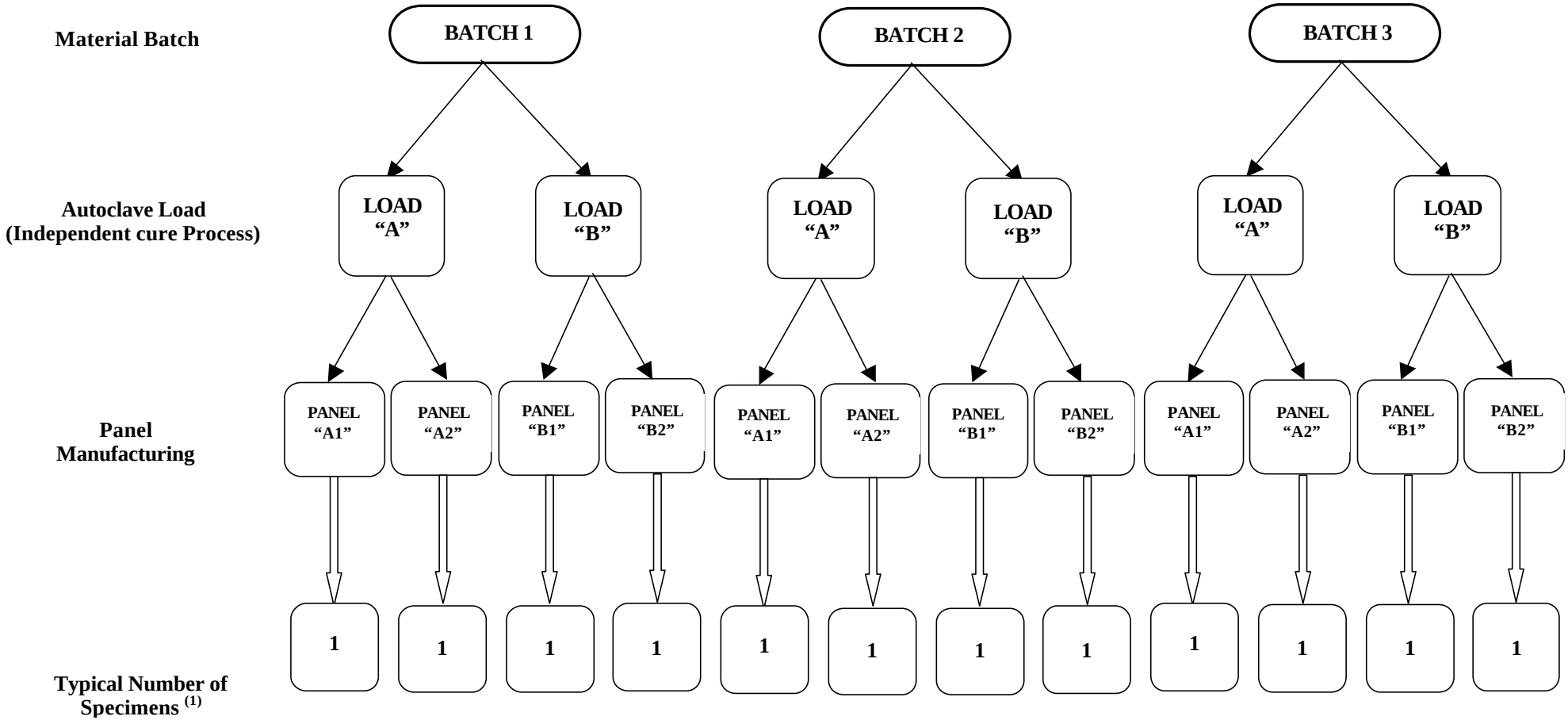
(4) Cool down the temperature to 170 °F or lower at a rate of 4.5 ± 0.5 °F per minute before removing the vacuum.

(5) Remove the bagged laminates from the autoclave and de-bag for inspection.

FIGURE 2-2. #2510 CURE CYCLE

FIGURE 2-3: SPECIMEN SELECTION METHODOLOGY AND BATCH TRACEABILITY

PER ENVIRONMENTAL CONDITION AND TEST METHOD



(1) 6 specimens for Tension, Compression Strength, In-plane Shear and Interlaminar Shear
2 specimens for Compression Modulus

2.1.5. Tabbing

Tabs were used to ensure the accuracy of the tensile and compressive strength specimens. Tabs were applied to the tension and compression strength specimens in accordance with Section 3.1.4 of the AGATE " Material Qualification Methodology for Epoxy-Based Prepreg Composite Material System", dated February 1999, with the following exceptions;

1.) AF 163-2 film adhesive used to bond the tabs to the test specimens described below was further cured by placing the test specimens in a temperature chamber at 180 °F for 24 hours. This was because the AF163 was not fully cured, initially, at 180°F for 5 hours. The 180°F cure temperature was selected because it was the maximum temperature allowed by the AGATE methodology, described in section 3.1.4, since the cure temperature of the P707AG-15 was 270 ± 10°F

a.) 0° (warp) & 90° (fill) tension specimens for testing at -65°F (Dry), 75°F (Dry), 180°F (Dry) and 180°F (Wet).

2.) Hysol EA9628 film adhesive used to bond the tabs to the specimens described below was cured up to 260 °F for up to 120 minutes.

a.) 0° (warp) & 90° (fill) compressive strength tested -65°F (Dry), 75°F (Dry), 180°F (Dry) and 180°F (Wet).

The same material or strain compatible material tabs as the test coupon were used for compressive strength specimens. Fiberglass tabs were used for tension specimens. To retard the absorption of moisture into the tabs and bond lines of the tension specimens tested at hot/wet condition, the tab section (including the edges) were masked with a room-temperature curing "Plasti Dip" rubber coating prior to humidity conditioning. The rubber coat was peeled off just before testing. The National Institute for Aviation Research (NIAR) of Wichita State University bonded the tabs and machined the 0° (warp) & 90° (fill) compressive strength specimens.

2.1.6. FAA Test Coupon Conformity and Test Witness

The material traceability and test specimen conformity were performed for the cured laminate mechanical test properties of the program. For the physical properties, material traceability was verified by TCA inspection section only.

2.1.6.1. Test Coupon Conformity

A conformity traveler accompanied each group of test specimens for cured lamina mechanical properties. The conformity traveler recorded the materials and process definition, completion and verification by inspection of each process, that included lay-up, cure cycle, tabbing and final coupon dimensions. Mr. Wing C. Chin, FAA Designated Airworthiness Representative (DAR) performed the test specimen conformity and reviewed the completeness of traveler conformity records. Finally, Mr. Wing C. Chin, FAA DAR prepared a statement of conformity, FAA 8130-3 tags

for all the test panels and test specimens, prior to environmental conditioning and testing of the test specimens. The conformity of all the test panels was performed November 15, 1999. However, additional test panels, specifically for compressive strength test, were fabricated and conformed on March 24, 2000 due to problems in the testing process, for example, tabbing and machining of specimens. The conformed additional test panels, for compressive strength test, were replacements for previously fabricated test panels. The conformity of all the test specimens was performed December 13, 1999. However, the additional compressive strength specimens were conformed April 14, 2000 and April 21, 2000, to replace the test specimen with "out-of-mode" failure, for example, tab failure due to adhesive failure and end broom failure.

2.1.6.2. Test Witness

Mr. Moto Ashizawa, FAA Designated Engineering Representative (DER) witnessed all the cured lamina mechanical test property testing of at least one batch of the prepreg material for the program. TCA personnel that were authorized to witness on behalf of Mr. Moto Ashizawa, FAA DER witnessed the rest of the tests. The test dates of the lamina mechanical test properties were described in the tables of test results.

2.2. Prepreg Documentation by Prepreg Lot

Prepreg Documentation	**Prepreg Manufacturer & Product ID: Toray Composites F6273C-07M** **Material Identification (weave, form, class, etc.): Carbon/Epoxy Plain Weave Fabric** **Impregnation Method: Hot Melt**		
Prepreg Batch or Lot #	AF991009	AF991010	AF991011
Batch (Lot) ID as labeled on samples	**910-056**	**910-057**	**910-058**
Date of Manufacture	10/20/1999	10/20/1999	10/20/1999
Expiration Date	10/20/2001	10/20/2001	10/20/2001
Resin Content [%]	41.5%	41.7%	41.4%
Reinforcement Areal Weight & Test Method	194 g/m^2 SACMA SRM 23R-94	190 g/m^2 SACMA SRM 23R-94	193 g/m^2 SACMA SRM 23R-94
Resin Flow & Test Conditions	23.5% @ 250°F	23.5% @ 250°F	23.5% @ 250°F
Gel Time & Test Conditions	8.0 minutes @ 250°F	7.9 minutes @ 250°F	9.0 minutes @ 250°F
Volatile Content	0.13%	0.21%	0.18%
Reinforcement Documentation	**Fiber Manufacturer & Product ID: Toray T700S-12K-50C** **Fabric Manufacturer & Product ID: Sakai CK6273C** **Precursor Type: PAN** **Nominal Filament Count: 12K** **Finish/Sizing Type and %: 50C (1.0%)** **Nominal tow or yarn count/inch: 3.05/inch** **Twist: Never twisted**		
Fabric Batch or Lot #	138043	138051	138051
Date of Manufacture	04/1998	05/1998	05/1998
Average Fiber Density per Lot & Test Method	Warp 1.78 g/cc Fill 1.80 g/cc TY-030B-02	Warp 1.78 g/cc Fill 1.78 g/cc TY-030B-02	Warp 1.78 g/cc Fill 1.78 g/cc TY-030B-02
Matrix Documentation	Resin Manufacturer & Product ID: Toray Composites #2510		
Matrix Batch or Lot #	3-CCH	3-CCG	2-BFC
Date of Manufacture	10/01/1999	10/01/1999	10/04/1999
Average Neat Resin Density by Lot & Test Method	1.267 ASTM D792	1.267 ASTM D792	1.266 ASTM D792

Prepreg Documentation	**Prepreg Manufacturer & Product ID: Toray Composites F6273C-07M** **Material Identification (weave, form, class, etc.): Carbon/Epoxy Plain Weave Fabric** **Impregnation Method: Hot Melt**			
Prepreg Batch or Lot #	AF020224	AF020324	AF020422	AF020522
Batch (Lot) ID as labeled on samples	**A-49, B-50**	**A-51, B-52**	**A-53, B-54**	**A-55, B-56**
Date of Manufacture	02/21/2002	03/18/2002	04/19/2002	05/01/2002
Expiration Date	02/21/2004	03/18/2004	04/19/2002	05/01/2004
Resin Content [%]	40.8%	41.6%	41.3%	41.0%
Reinforcement Areal Weight & Test Method	193 g/m^2 SACMA SRM 23R-94	191 g/m^2 SACMA SRM 23R-94	191 g/m^2 SACMA SRM 23R-94	193 g/m^2 SACMA SRM 23R-94
Resin Flow & Test Conditions	-	-	-	-
Gel Time & Test Conditions	9.6 minutes @ 250°F	12 minutes @ 250°F	10 minutes @ 250°F	13 minutes @ 250°F
Volatile Content	0.06%	0.19%	0.16%	0.23%

Reinforcement Documentation	**Fiber Manufacturer & Product ID: Toray T700S-12K-50C** **Fabric Manufacturer & Product ID: Sakai CK6273C** **Precursor Type: PAN** **Nominal Filament Count: 12K** **Finish/Sizing Type and %: 50C (1.0%)** **Nominal tow or yarn count/inch: 3.05/inch** **Twist: Never twisted**			
Fiber Batch or Lot #	131121	132021	121031	121041
Date of Manufacture	12/2001	02/2002	03/2001	04/2001
Average Fiber Density per Lot & Test Method	Warp 1.80g/cc Fill 1.80 g/cc TY-030B-02	Warp 1.80g/cc Fill 1.80 g/cc TY-030B-02	Warp 1.80g/cc Fill 1.80 g/cc TY-030B-02	Warp 1.80g/cc Fill 1.80 g/cc TY-030B-02

Matrix Documentation	**Resin Manufacturer & Product ID: Toray Composites #2510**			
Matrix Batch or Lot #	2-CMP, 2-CNK, 2-COP	2-COQ, 2-CPF	2-CQW, 2-CQX	2-CRB, 2-CQY
Date of Manufacture	12/29/2001, 01/19/2002, 02/19/2002	02/20/2002, 03/05/2002	04/14/2002, 04/15/2002	04/17/2002, 04/15/2002
Average Neat Resin Density by Lot & Test Method	-	-	-	-

Notes: (1)Test methods to determine resin content, reinforcement areal weight, resin flow, gel time, and volatile content are defined in TORAY Material Specifications (see reference section). (2) These information and test results were submitted to NIAR by TORAY Composites (AMERICA), Inc.

2.3. Data Documentation

MATERIAL IDENTIFICATION		
R	material identification	T700SC-12K-50C/#2510 Plain Weave Fabric
R	material class	Carbon/Epoxy
PREPREG ANALYSIS		
R	ply manufacturer	Toray Composites (America), Inc
R	date of manufacture	10/1999, 02/2002, 03/2002, 04/2002, 05/2002
R	material lot number	AF991009, AF991010, AF991011, AF020224, AF020324, AF020422, AF020522
R	commercial designation	F6273C-07M
R	material form	Plain Weave Fabric Prepreg
R	reinforcement areal weight	185 – 201 g/m^2
	reinforcement areal weight test method	Solvent Extraction
R	resin content	39 – 45 %
REINFORCEMENT ANALYSIS		
F	precursor type	PAN
R	commercial designation	T700SC-12K-50C
R	manufacturer	Torayca
R	date of manufacture (fabric)	05/1998, 07/1998, 03/2001, 04/2001, 12/2001, 02/2002
R	date of manufacture (fiber)	01/1998, 03/1998, 11/2000, 12/2000, 03/2001, 06/2001
R	lot number (fabric)	138043, 138051, 131121, 132021, 121031, 121041
R	lot number (fiber)	818012, 818013, 818014, 818033, 811062, 811032, 810112, 810113, 810124
R	surface treatment (Y/N)	Y
R	surface finish (sizing) identification	50C
R	density (Average per lot)	1.78 g/cm^3
	density test method	JIS R 7601
R	nominal filament count	12000/tow
R	nominal tow or yarn count/inch	3.0
R	twist	No Twist
R	fiber areal weight (when applicable)	185 – 201 g/m^2
	fiber areal weight test method	SRM 23
MATRIX MATERIAL ANALYSIS		
R	commercial designation	#2510
R	manufacturer	Toray Composites (America), Inc
R	date of manufacture	10/1999, 12/2001, 01/2002, 02/2002, 03/2002, 04/2002
R	lot number (R – not prepregged, F – prepregged)	3-CCH, 3-CCG, 2-BFC, 2-CMP, 2-CNK, 2-COP, 2-COQ, 2-CPF, 2-CQW, 2-CQX, 2-CRB, 2-CQY
R	nominal density and test method	1.267 g/cc ASTM D792
PROCESSING INFORMATION		
F	part (panel) manufacturer	Toray Composites (America), Inc
R	date of manufacture (date completed)	original QT: 10/1999 – 3/2000
cure cycle (for each state)		additional QT: 05/2002
R	process stage type	Cure Cycle
R	process time	120 +10/-0 minutes
R	process temperature	270 ± 3 °F
R	process pressure	none
R	other critical control parameters	minimum 22 inHg vacuum

LAMINA ANALYSIS		
R	form (panel, tube, etc.)	Panel
R	ply count	12 – warp & fill tensile; 12 – warp & fill Comp strength; 14 – warp & fill comp modulus; 16 – IPS; 12 – ILSS
R	lay-up code	$(warp)_{12}$ – warp tensile; $(fill)_{12}$ – fill tensile; $(warp)_{12}$ – warp comp strength; $(fill)_{12}$ – fill comp strength; $(warp)_{14}$ – warp comp modulus; $(fill)_{14}$ – fill comp modulus; $(warp/fill)_{4S}$ – IPS; $(warp)_{12}$ – ILSS
R	fiber volume	49.6% Average
F	void content	2.3% Average
	density	1.501g/cc Average
R	glass transition temperature (wet, nominal)	267°F
R	glass transition temperature (dry, nominal)	294°F
R	glass transition temperature test method	DMA E'
SPECIMEN PREPARATION		
R	specimen orientation	fill, warp, fill/warp
F	tab adhesive curing temperature (nominal)	up to 260°F
MECHANICAL TESTING		
R	number of specimens	See data files
R	test procedure (citing all deviations from standard procedures including reporting requirements)	ASTM D 3039 (Tensile), SACMA SRM 1 (Comp), ASTM D 5379 (IPS), ASTM D 2344 (ILSS)
R	date of applicable standard	1995(Ten), 1994(Comp), 1993(IPS), 1989(ILSS)
R	date of testing	original QT: 12/1999 – 7/2000 additional QT: 05/2002 – 06/2002
R	specimen thickness for each specimen	nominal: 0.1032"(warp & fill tensile), 0.1032"(warp & fill comp strength), 0.1204" (warp & fill comp modulus), 0.1376" (IPS), 0.1032" (ILSS)
R	specimen conditioning method	DOT/FAA/AR-00/47 Section 3.2, Sept. 2000
R	conditioning temperature	145 ± 5°F
R	conditioning humidity	85 ± 5%
R	conditioning time	until saturation (10 to 16 weeks)
R	conditioning environment (if not lab air)	for fluid sensitivity: Jet Fuel, Hydraulic Fluid & MEK (IPS only)
R	fastener type (if any)	N/A
R	fastener torque-up conditions (if any)	N/A
R	test temperature	-65 ± 5°F, 75 ± 5°F, 180 ± 5°F
F	moisture content	Dry : 0.2 - 0.5 % Wet : 1.4 - 2.0%
R	soak time at test conditions	-65°F: 5 – 6 minutes 180°F: 2 – 3 minutes
R	failure mode identification and location	Per specimen
R	all non-normalized (raw) data	Per specimen
R	method of calculating modulus	1000 – 3000 microstrain (Tens) 1000 – 3000 microstrain (Comp) 2500 – 6500 microstrain (IPS)
	nominal ply thickness	0.0086 in.
	nominal fiber density	1.78 g/cm^3
	nominal fiber areal weight	193 g/m^2

R – Required for all data
F – Required for fully-approved data
These requirements are current for MIL-HDBK-17-1E, which supercedes for any discrepancies.

3. TORAY T700SC-12K-50C/#2510 LAMINA PROPERTIES

3.1. Test Results

3.1.1. Summary

MATERIAL:	T700SC-12K-50C/#2510 Plain Weave Fabric		**T700 PW/#2510 Summary**
PREPREG:	Toray Composites F6273C-07M		
FIBER:	Toray T700S-12K-50C	**RESIN:**	Toray Composites #2510
T_g (dry): 146 °C	**T_g (wet):** 131 °C	**T_g METHOD:**	DMA (SRM 18-94)
PROCESSING:	Vacuum bag cure (minimum 560 mmHg): 132 ± 2 °C for 120 +10/-0 minutes		

Date of fiber manufacture	01/1998 – 02/2002	**Date of testing**	12/1999 – 06/2002
Date of resin manufacture	10/1999 - 04/2002	**Date of data submittal**	04/2002 – 07/2002
Date of prepreg manufacture	10/1999 - 05/2002	**Date of analysis**	07/2002 – 09/2002
Date of composite manufacture	10/1999 – 05/2002		

LAMINA MECHANICAL PROPERTY SUMMARY
Data Reported as: Measured
(Normalized by CPT= 0.2184 mm)

	CTD		RTD		ETD		ETW	
	B-Basis	**Mean**	**B-Basis**	**Mean**	**B-Basis**	**Mean**	**B-Basis**	**Mean**
F_1^{tu} (MPa)	738.480 (737.897)	802.874 (803.236)	853.790 (847.726)	917.599 (912.052)	901.601 (896.912)	968.984 (964.970)	978.797 (975.143)	1051.949 (1049.137)
E_1^t (GPa)	---	0.057 (0.057)	---	0.056 (0.056)	---	0.056 (0.056)	---	0.058 (0.058)
ν_{12}^{tu}	---	0.085	---	0.042	---	0.037	---	0.029
F_2^{tu} (MPa)	614.325 (616.820)	718.773 (722.602)	677.690 (673.994)	775.382 (771.977)	733.095 (727.913)	838.774 (833.734)	780.537 (779.024)	893.055 (892.276)
E_2^t (GPa)	---	0.056 (0.056)	---	0.055 (0.055)	---	0.054 (0.055)	---	0.054 (0.054)
F_1^{cu} (MPa)	621.925 (621.623)	747.203 (749.955)	605.822 (603.589)	708.869 (708.742)	571.291 (565.607)	668.465 (664.143)	404.168 (404.402)	472.915 (474.854)
E_1^c (GPa)	---	0.055 (0.055)	---	0.055 (0.056)	---	0.056 (0.056)	---	0.055 (0.055)
F_2^{cu} (MPa)	654.992 (653.537)	744.535 (741.866)	629.671 (626.087)	702.974 (698.158)	581.719 (579.039)	649.439 (645.694)	529.870 (429.285)	479.913 (478.702)
E_2^c (GPa)	---	0.049 (0.048)	---	0.053 (0.054)	---	0.053 (0.053)	---	0.055 (0.055)
F_{12}^{su} (MPa)	144.345	154.888	124.746	132.570	99.938	106.206	70.168	74.569
G_{12}^s (GPa)	---	0.004	---	0.004	---	0.004	---	0.003
F_{13}^{su**} (MPa)	---	---	55.317	59.935	---	---	---	---

** *Apparent* interlaminar shear strength

3.1.2. Individual Test Summaries

3.1.2.1. Tension, 1-axis

Tension, 1-axis
Gr/Ep
TCA T700S-12K-50C/#2510 Plain Weave Fabric
$[0]_{12}$

Material:	Toray - TCA T700S-12K-50C/#2510 Plain Weave Fabric		
Resin content:	39 - 45 wt%	**Comp. density:**	1.48 - 1.52 g/cc
Fiber volume:	47 - 55 %	**Void content:**	1.0 - 3.0 %
Ply thickness:	0.2113 - 0.2229 mm		
Ply range:	12 plies		
Test method:	D3039-95	**Modulus calculation:**	linear fit from 1000 - 3000με
Normalized by:	0.2184 mm ply thickness		

		CTD		RTD		ETD		ETW	
Test Temperature [°C]		-53.89		23.89		82.22		82.22	
Moisture Conditioning		dry		dry		dry		equilibrium	
Equilibrium at T, RH		as fabricated		as fabricated		as fabricated		62.78 °C, 85%	
Source code									
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean	803.236	802.874	912.052	917.599	964.970	968.984	1049.137	1051.949
	Minimum	756.865	752.490	846.883	842.606	864.643	880.860	1003.433	1002.461
	Maximum	848.175	843.194	994.092	998.737	1014.012	1015.816	1109.689	1106.526
	C.V.(%)	4.672	4.720	4.394	4.596	4.567	4.241	3.046	2.938
F_1^{tu} (MPa)	**B-value**	737.897	738.480	847.726	853.790	896.912	901.601	975.143	978.797
	A-value	701.302	702.415	805.025	811.431	851.733	856.870	926.023	930.236
	No. Specimens	6		18		18		18	
	No. Prepreg Lots	1		3		3		3	
	Mean	0.057	0.057	0.056	0.056	0.056	0.056	0.058	0.058
	Minimum	0.055	0.055	0.054	0.054	0.053	0.053	0.053	0.054
	Maximum	0.059	0.060	0.061	0.062	0.063	0.063	0.063	0.063
E_1^t (GPa)	**C.V.(%)**	3.298	3.514	3.265	3.553	4.481	4.463	4.606	4.288
	No. Specimens	4		12		12		12	
	No. Prepreg Lots	1		3		3		3	
	Mean		0.085		0.042		0.037		0.029
n_{12}^t	**No. Specimens**	4		12		12		12	
	No. Prepreg Lots	1		3		3		3	

3.1.2.2. Tension, 2-axis

Tension, 2-axis
Gr/Ep
TCA T700S-12K-50C/#2510 Plain Weave Fabric
$[0]_{12}$

Material:	Toray - TCA T700S-12K-50C/#2510 Plain Weave Fabric		
Resin content:	39 - 45 wt%	**Comp. density:**	1.49 - 1.52 g/cc
Fiber volume:	47 - 54 %	**Void content:**	1.3 - 3.7 %
Ply thickness:	0.2131 - 0.2210 mm		
Ply range:	12 plies		
Test method:	D3039-95	**Modulus calculation:**	linear fit from 1000 - 3000με
Normalized by:	0.2184 mm ply thickness		

		CTD		RTD		ETD		ETW	
Test Temperature [°C]		-53.89		23.89		82.22		82.22	
Moisture Conditioning		dry		dry		dry		equilibrium	
Equilibrium at T, RH		as fabricated		as fabricated		as fabricated		62.78 °C, 85%	
Source code									
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean	722.602	718.773	771.977	775.382	833.734	838.774	892.276	893.055
	Minimum	696.157	688.155	688.601	687.602	722.975	728.125	752.772	759.543
	Maximum	746.775	742.458	852.207	858.027	943.274	942.857	1008.063	1004.365
	C.V.(%)	2.788	2.725	7.359	7.512	7.895	7.792	7.883	7.677
F_2^{tu}	**B-value**	616.820	614.325	673.994	677.690	727.913	733.095	779.024	780.537
(MPa)	**A-value**	557.575	555.826	608.950	612.839	657.665	662.941	703.844	705.844
	No. Specimens	6		18		18		18	
	No. Prepreg Lots	1		3		3		3	
	Mean	0.056	0.056	0.055	0.055	0.054	0.055	0.054	0.054
	Minimum	0.056	0.055	0.054	0.053	0.052	0.052	0.051	0.052
	Maximum	0.057	0.057	0.056	0.056	0.056	0.057	0.058	0.057
E_2^t	**C.V.(%)**	1.471	1.536	1.419	1.581	2.207	2.256	2.941	2.502
(GPa)									
	No. Specimens	4		12		12		12	
	No. Prepreg Lots	1		3		3		3	

3.1.2.3. Compression, 1-axis

Compression, 1-axis
Gr/Ep
TCA T700S-12K-50C/#2510 Plain Weave Fabric
$[0]_{12}$, $[0]_{14}$

Material:	Toray - TCA T700S-12K-50C/#2510 Plain Weave Fabric		
Resin content:	39 - 45 wt%	**Comp. density:**	1.49 - 1.51 g/cc
Fiber volume:	46 - 54 %	**Void content:**	1.1 - 3.1 %
Ply thickness:	0.2132 - 0.2216 mm		
Ply range:	12 - 14 plies		
Test method:	SRM 1-94	**Modulus calculation:**	linear fit from 1000 - 3000με
Normalized by:	0.2184 mm ply thickness		

		CTD		RTD		ETD		ETW	
Test Temperature [°C]		-53.89		23.89		82.22		82.22	
Moisture Conditioning		dry		dry		dry		equilibrium	
Equilibrium at T, RH		as fabricated		as fabricated		as fabricated		62.78 °C, 85%	
Source code									
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean	749.955	747.203	708.742	708.869	664.143	668.465	474.854	472.915
	Minimum	704.469	701.885	589.686	593.713	573.899	580.651	396.111	394.658
	Maximum	848.082	844.971	780.970	782.660	765.078	774.079	539.716	531.983
	C.V.(%)	6.862	6.862	8.151	7.966	8.753	8.759	9.502	9.126
F_1^{cu}	**B-value**	621.623	621.925	603.589	605.822	565.607	571.291	404.402	404.168
(MPa)	**A-value**	549.748	551.760	533.785	537.415	500.195	506.784	357.633	358.531
	No. Specimens	6		18		18		18	
	No. Prepreg Lots	1		3		3		3	
	Mean	0.055	0.055	0.055	0.056	0.056	0.056	0.055	0.055
	Minimum	0.054	0.054	0.051	0.052	0.054	0.054	0.051	0.051
	Maximum	0.055	0.055	0.057	0.058	0.061	0.062	0.062	0.063
E_{1c}	**C.V.(%)**	1.527	1.527	3.391	3.932	4.715	5.436	7.418	7.863
(GPa)									
	No. Specimens	2		6		6		6	
	No. Prepreg Lots	1		3		3		3	

3.1.2.4. Compression, 2-axis

Compression, 2-axis
Gr/Ep
TCA T700S-12K-50C/#2510 Plain Weave Fabric
$[0]_{12}$, $[0]_{14}$

Material:	Toray - TCA T700S-12K-50C/#2510 Plain Weave Fabric		
Resin content:	39 - 45 wt%	**Comp. density:**	1.48 - 1.51 g/cc
Fiber volume:	47 - 51 %	**Void content:**	1.3 - 3.1 %
Ply thickness:	0.2159 - 0.2251 mm		
Ply range:	12 - 14 plies		
Test method:	SRM 1-94	**Modulus calculation:**	linear fit from 1000 - 3000με
Normalized by:	0.2184 mm ply thickness		

		CTD		RTD		ETD		ETW	
Test Temperature [°C]		-53.89		23.89		82.22		82.22	
Moisture Conditioning		dry		dry		dry		equilibrium	
Equilibrium at T, RH		as fabricated		as fabricated		as fabricated		62.78 °C, 85%	
Source code									
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean	741.866	744.535	698.158	702.974	645.694	649.439	478.702	479.913
	Minimum	634.596	636.880	640.837	638.979	555.232	556.310	433.678	435.238
	Maximum	828.187	831.167	765.583	774.590	703.056	707.857	519.773	523.323
	C.V.(%)	9.888	9.888	5.168	5.261	6.108	6.175	5.185	5.249
F_2^{cu}	**B-value**	653.537	654.992	626.087	629.671	579.039	581.719	429.285	429.870
(MPa)	**A-value**	604.067	604.841	578.243	581.010	534.790	536.764	396.481	396.650
	No. Specimens	6		18		18		18	
	No. Prepreg Lots	1		3		3		3	
	Mean	0.049	0.048	0.053	0.054	0.053	0.053	0.055	0.055
	Minimum	0.048	0.048	0.051	0.051	0.051	0.052	0.049	0.049
	Maximum	0.049	0.049	0.056	0.057	0.056	0.056	0.058	0.059
E_{2c}	**C.V.(%)**	1.260	2.192	3.831	3.915	2.845	2.984	5.588	5.798
(MPa)									
	No. Specimens	2		6		6		6	
	No. Prepreg Lots	1		3		3		3	

3.1.2.5. Shear, 12 axis

Shear, 12-axis
Gr/Ep
TCA T700S-12K-50C/#2510 Plain Weave Fabric
$[0/90]_{4s}$

Material:	Toray - TCA T700S-12K-50C/#2510 Plain Weave Fabric		
Resin content:	39 - 45 wt%	**Comp. density:**	1.48 - 1.51 g/cc
Fiber volume:	47 - 51 %	**Void content:**	1.7 - 2.9 %
Ply thickness:	0.2142 - .2214 mm		
Ply range:	16 plies		
Test method:	D5379-93	**Modulus calculation:**	linear fit from 1000 - 6000με
Normalized by:	N/A		

		CTD		RTD		ETD		ETW			
Test Temperature [°C]		-53.89		23.89		82.22		82.22			
Moisture Conditioning		dry		dry		dry		equilibrium			
Equilibrium at T, RH		as fabricated		as fabricated		as fabricated		62.78 °C, 85%			
Source code											
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**		
	Mean		154.888		132.570		106.206		74.569		
	Minimum		140.140		119.133		99.529		68.150		
	Maximum		164.811		139.524		110.741		77.954		
	C.V.(%)		5.806		3.676		2.735		2.865		
$F1_2^{su}$	**B-value**		144.345		124.746		99.938		70.168		
(MPa)	**A-value**		138.440		119.552		95.777		67.247		
	No. Specimens	6		18		18		18			
	No. Prepreg Lots	1		3		3		3			
	Mean		0.004		0.004		0.004		0.003		
	Minimum		0.004		0.004		0.003		0.003		
	Maximum		0.005		0.005		0.004		0.004		
$G1_{2s}$	**C.V.(%)**		10.252		5.266		4.995		7.029		
(GPa)											
	No. Specimens	4		12		12		12			
	No. Prepreg Lots	1		3		3		3			

3.1.2.6. Shear, 13 axis

Shear, 13-axis
Gr/Ep
TCA T700S-12K-50C/#2510 Plain Weave Fabric
$[0]_{12}$

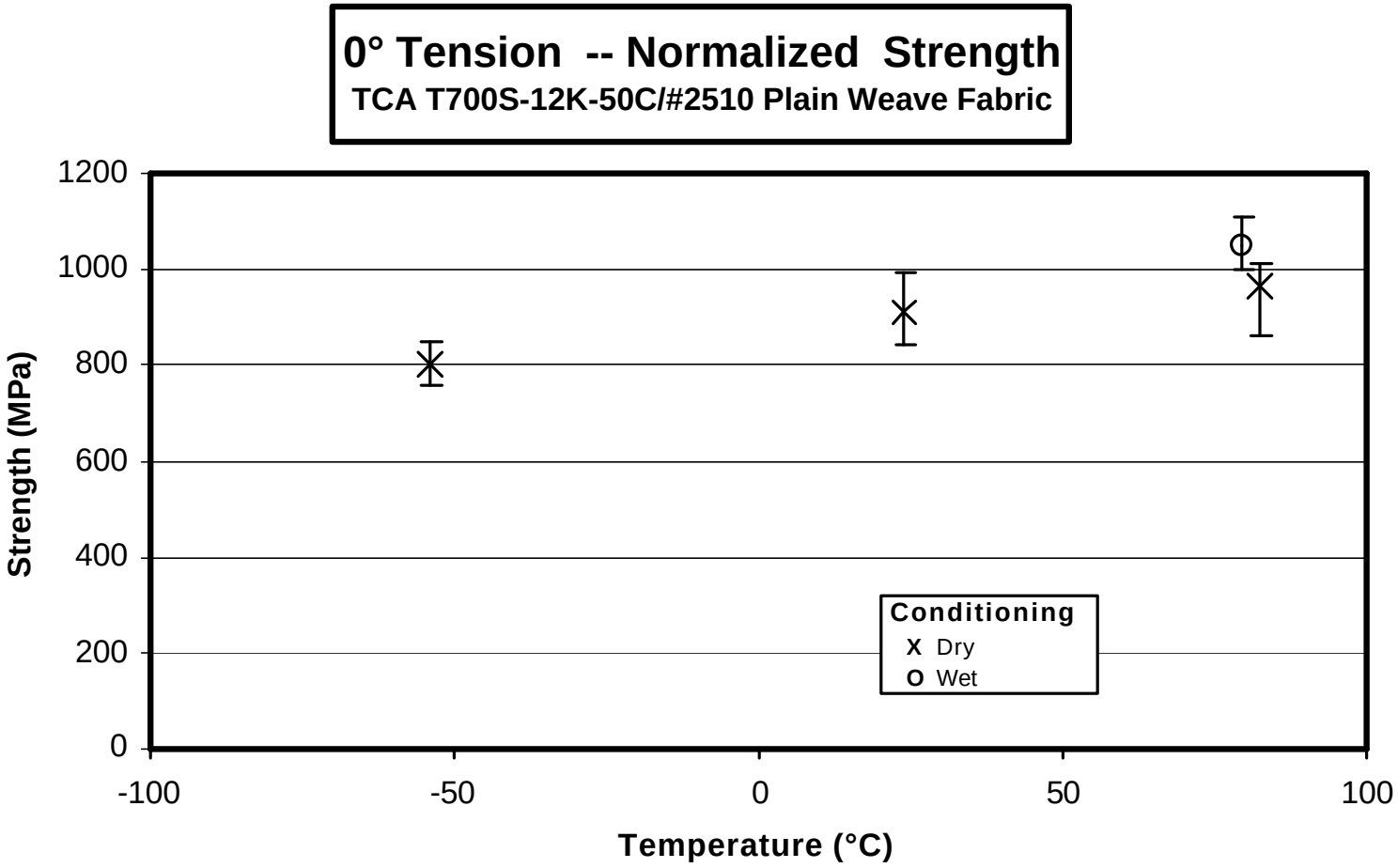
Material:	Toray - TCA T700S-12K-50C/#2510 Plain Weave Fabric		
Resin content:	39 - 45 wt%	**Comp. density:**	1.45 - 1.55 g/cc
Fiber volume:	47 - 54%	**Void content:**	0.4 - 3.0 %
Ply thickness:	0.1976 - .2210 mm		
Ply range:	12 plies		
Test method:	D2344-89	**Modulus calculation:**	linear fit from 1000 - 6000με
Normalized by:	N/A		

		CTD		RTD		ETD		ETW			
Test Temperature [°C]		-53.89		23.89		82.22		82.22			
Moisture Conditioning		dry		dry		dry		equilibrium			
Equilibrium at T, RH		as fabricated		as fabricated		as fabricated		62.78 °C, 85%			
Source code											
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**		
	Mean				59.935						
	Minimum				52.403						
	Maximum				68.707						
	C.V.(%)				5.213						
$F1_3^{su}$	**B-value**				55.317						
(MPa)	**A-value**				51.771						
	No. Specimens			149							
	No. Prepreg Lots			7							

NOTES: These values represent the apparent interlaminar shear properties and are to be used for quality control purposes only. Do not use these values for interlaminar shear strength design values.

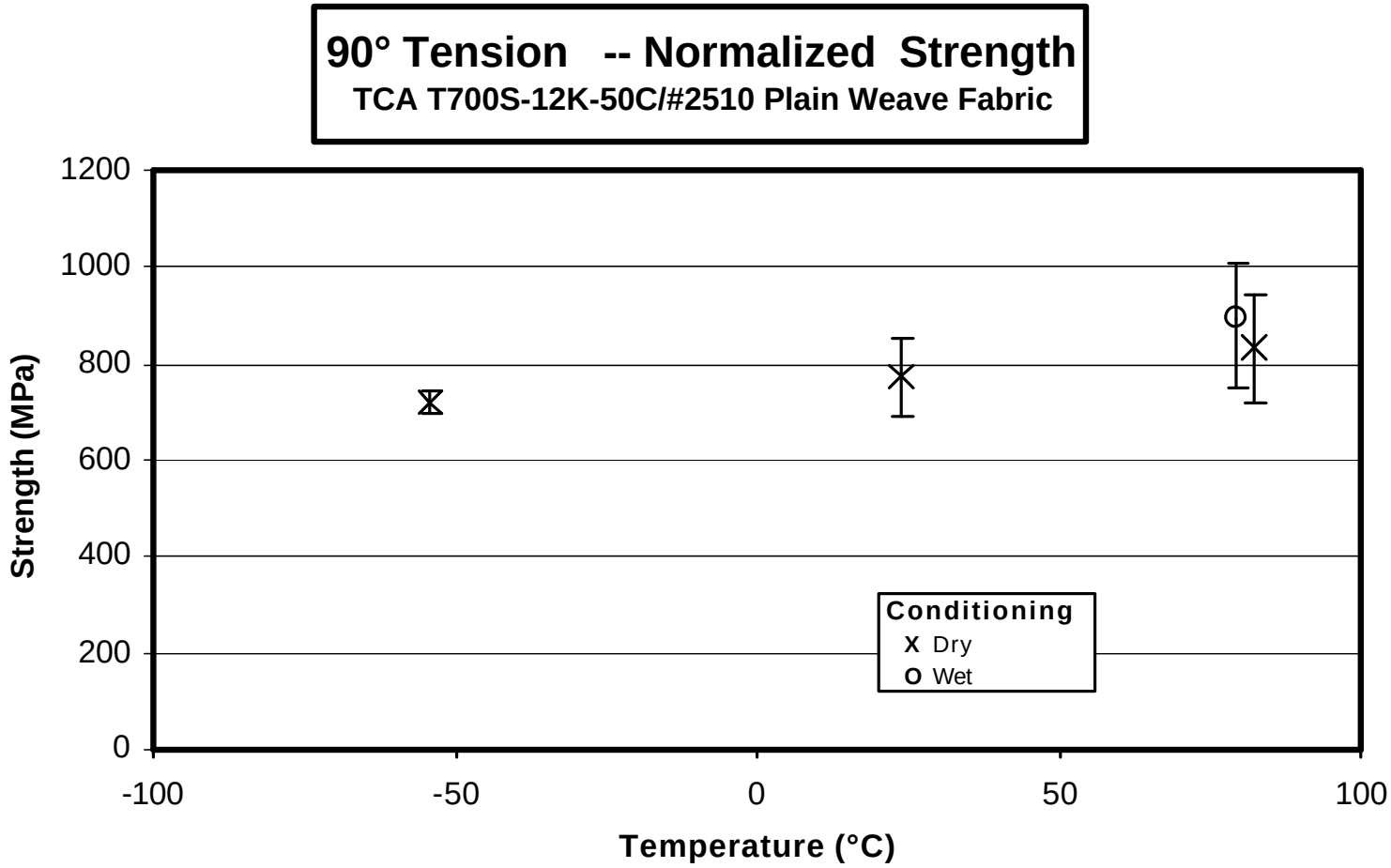
3.1.3. Individual Test Charts

3.1.3.1. Tension, 1-axis



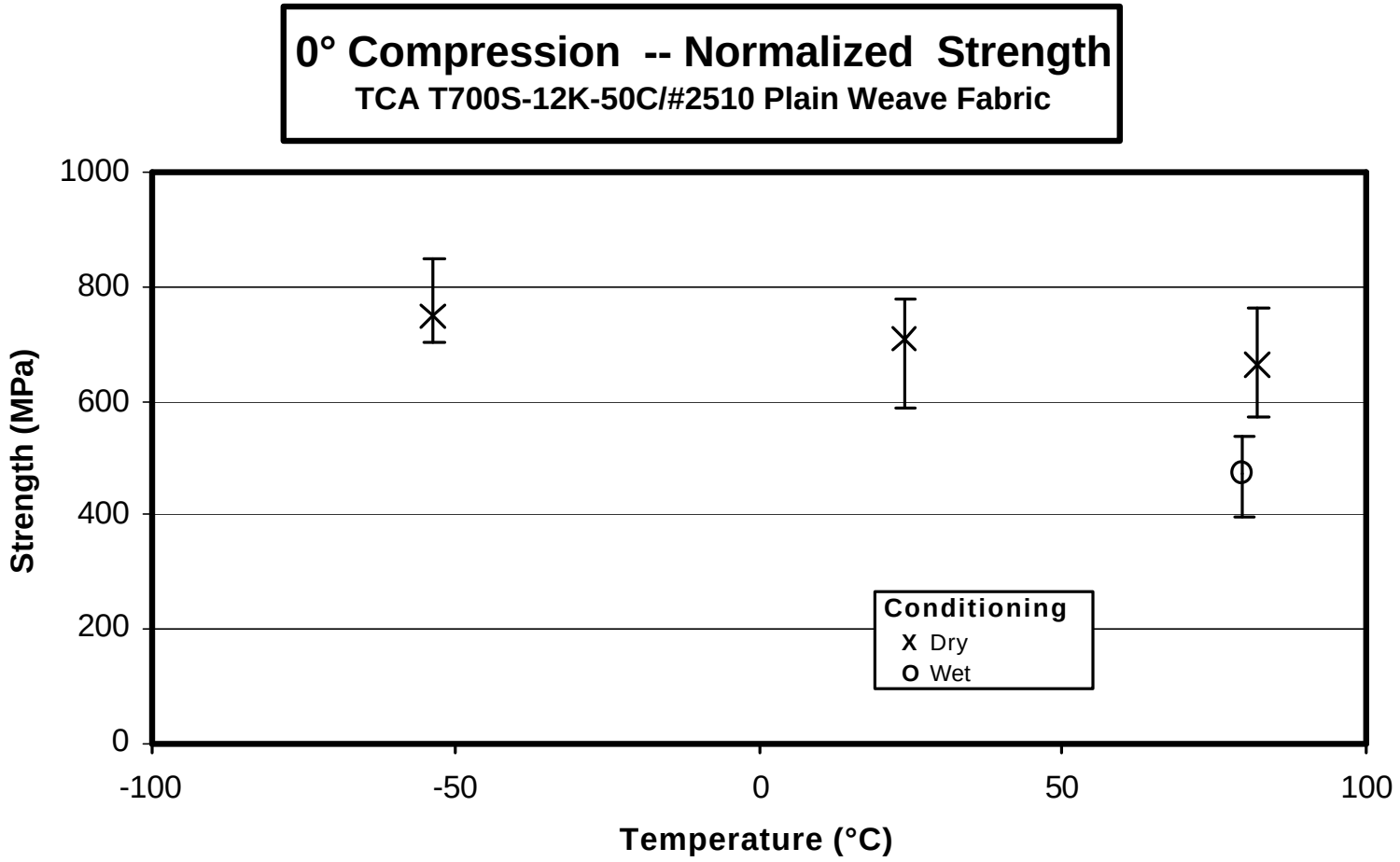
NOTE: The symbols represent the 'pooled' average of all tests, and the bars represent the upper and lower limit of the data. The 180° dry and wet data has been staggered for clarity

3.1.3.2. Tension, 2-axis



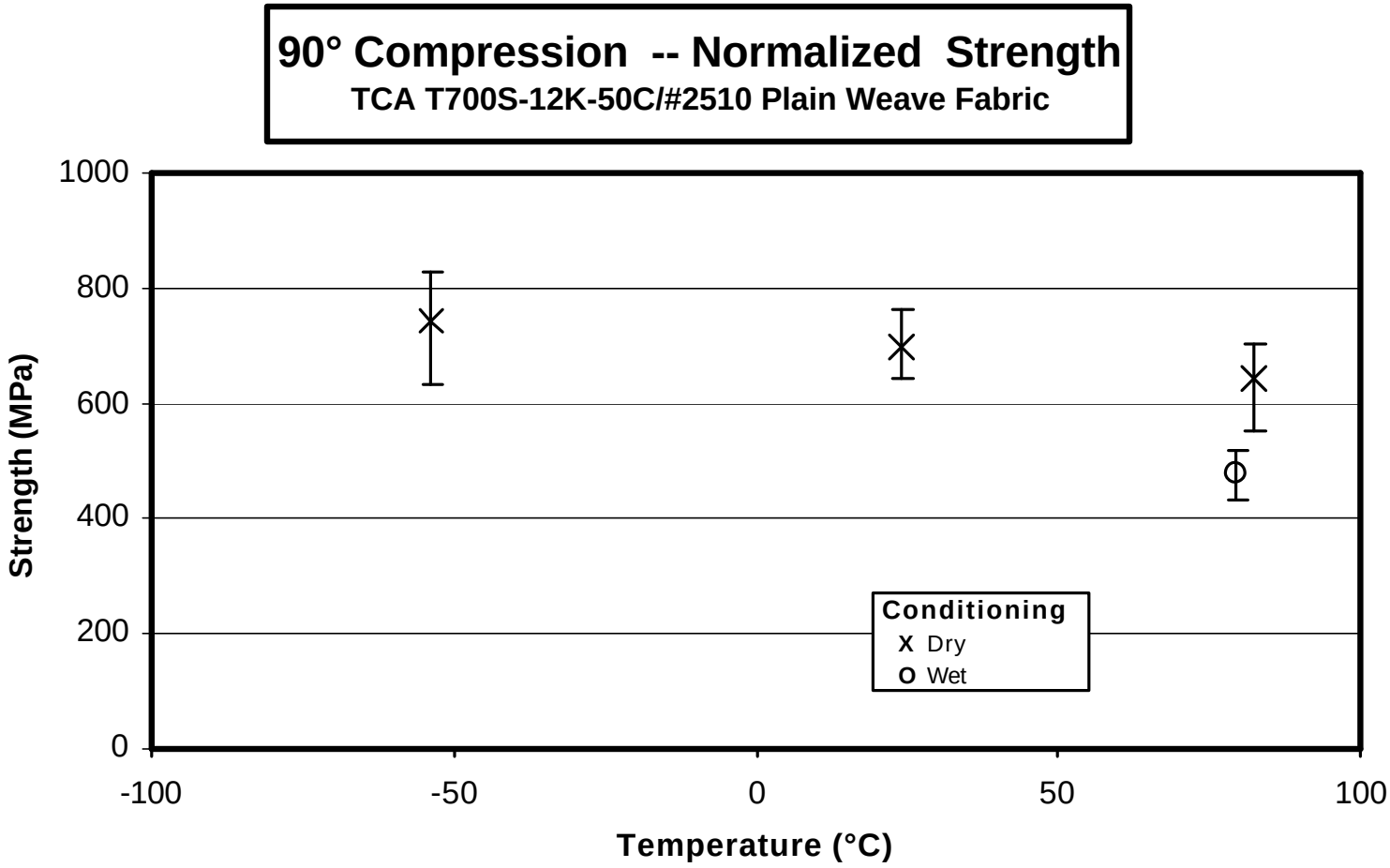
NOTE: The symbols represent the 'pooled' average of all tests, and the bars represent the upper and lower limit of the data. The 180° dry and wet data has been staggered for clarity.

3.1.3.3. Compression, 1-axis



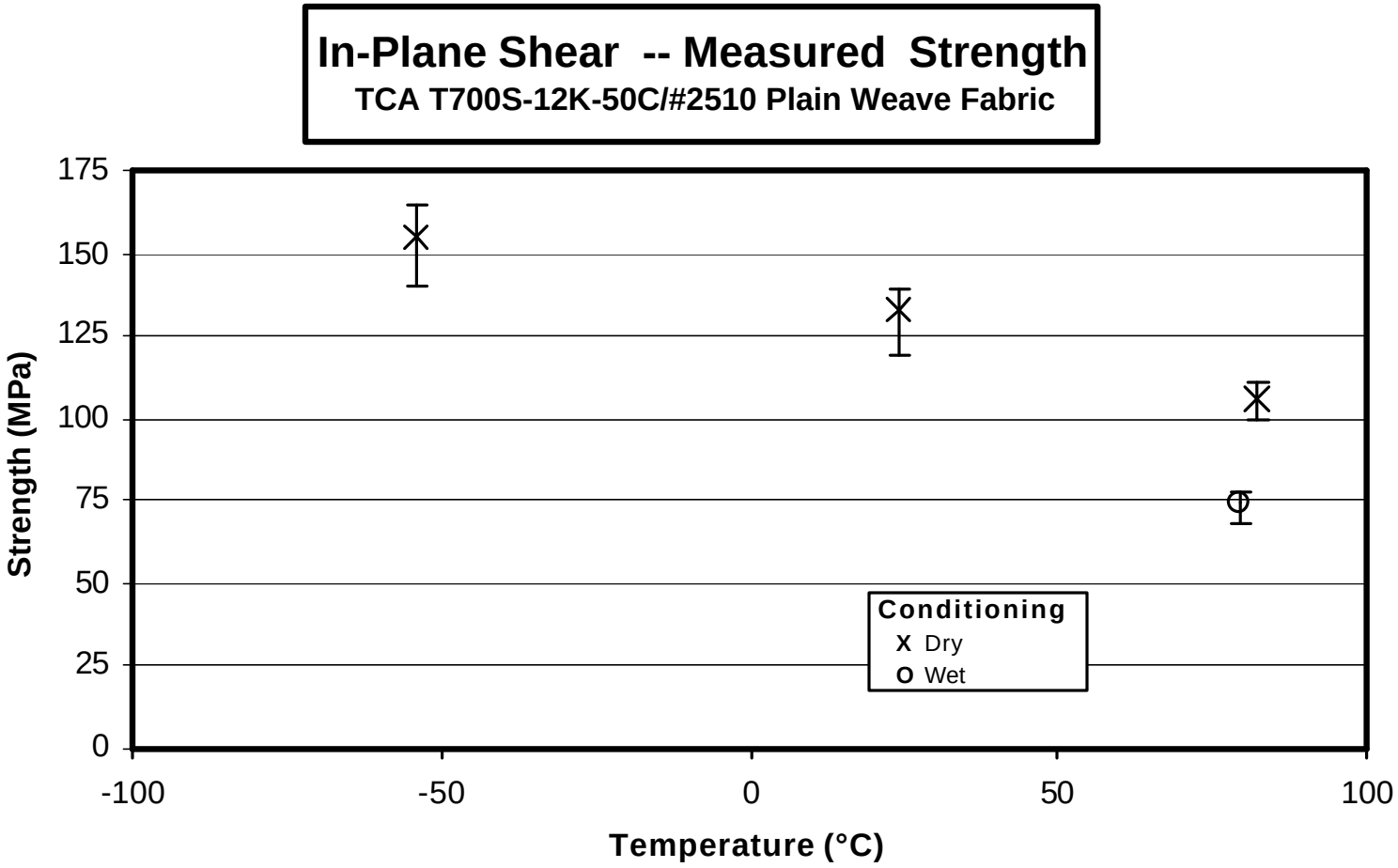
NOTE: The symbols represent the 'pooled' average of all tests, and the bars represent the upper and lower limit of the data. The 180° dry and wet data has been staggered for clarity.

3.1.3.4. Compression, 2-axis



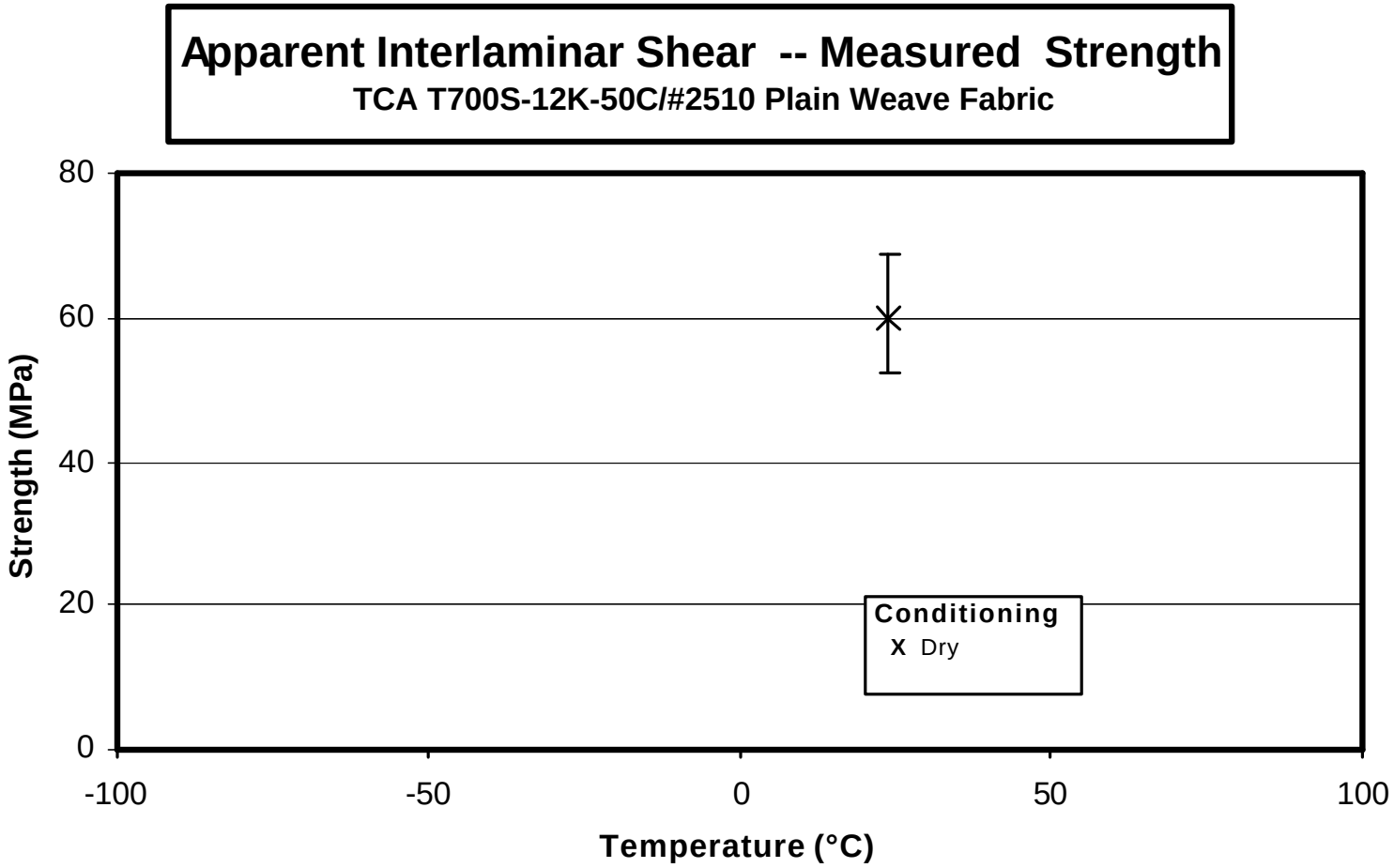
NOTE: The symbols represent the 'pooled' average of all tests, and the bars represent the upper and lower limit of the data. The 180° dry and wet data has been staggered for clarity.

3.1.3.5. Shear, 12 axis



NOTE: The symbols represent the 'pooled' average of all tests, and the bars represent the upper and lower limit of the data. The 180° dry and wet data has been staggered for clarity

3.1.3.6. Shear, 13 axis



NOTE: The symbols represent the 'pooled' average of all tests, and the bars represent the upper and lower limit of the data. The 180° dry and wet data has been staggered for clarity.

3.2. Raw Data

Specimen Naming Convention

Test coupons were identified using a ten-digit specimen code, with the significance of each digit delineated below. A representative sample ID is shown for reference purposes.

A1 – 910-041 – 1-3
0° Tension

1st Character: Independent Cure Cycle
'A' designates a cure cycle that was independently cured from 'B' cure cycle

2nd Character: Panel Number
Numeric order of the panel fabricated for each cure cycle

3rd ~ 8th Character: Master Roll Number
Prepreg Master Roll number used to fabricate the panel

9th ~ 10th Character: Sample Number
The samples cut from each panel, increasing numerically.

Panel Type ID
Panels/specimens were also identified with the test type

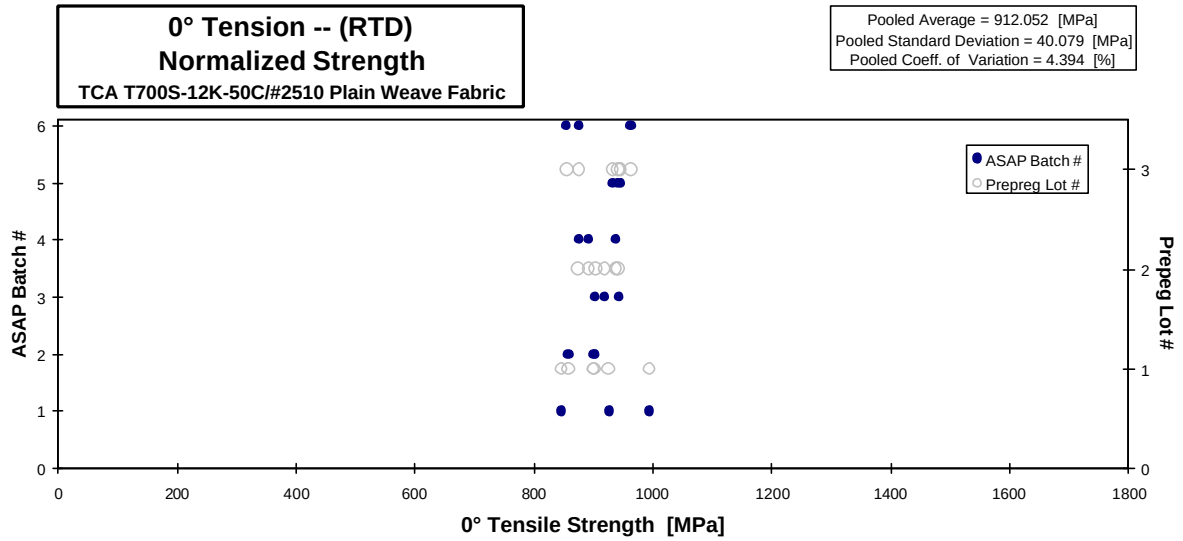
3.2.1. Raw Data Spreadsheets and Scatter Charts

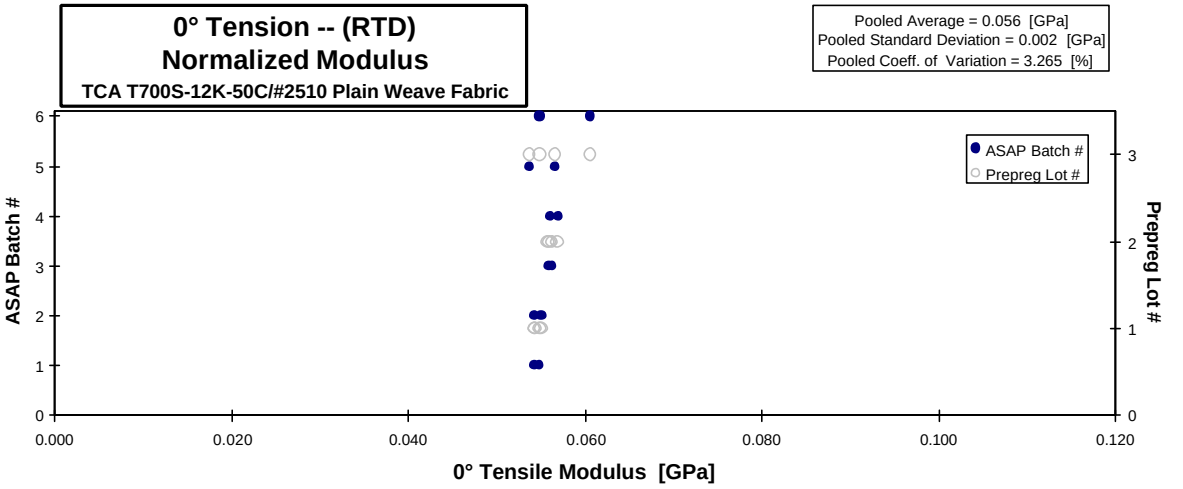
0° Tension -- (RTD)
Strength & Modulus
TCA T700S-12K-50C/#2510 Plain Weave Fabric

normalizing t_{ply} [mm]: 0.2184

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [MPa]	Modulus [GPa]	Poisson's Ratio	Avg. Specimen Thickn. [mm]	# Plies in Laminate	Avg. t_{ply} [mm]	$Strength_{norm}$ [MPa]	$Modulus_{norm}$ [GPa]
A1-910-056-1-1	A	1	1	931.083	0.055	0.025	2.608	12	0.21734	926.392	0.054
A2-910-056-1-1	A	1	1	854.083	0.055	0.015	2.599	12	0.21660	846.883	0.055
A1-910-056-1-6	A	1	1	998.737			2.609	12	0.21742	994.092	
B1-910-056-1-1	B	1	2	901.475	0.054	0.020	2.623	12	0.21861	902.174	0.054
B2-910-056-1-1	B	1	2	931.011	0.057	0.040	2.536	12	0.21135	900.790	0.055
B1-910-056-1-6	B	1	2	842.606			2.670	12	0.22253	858.364	
A1-910-057-1-1	A	2	3	925.146	0.057	0.025	2.604	12	0.21700	919.050	0.056
A2-910-057-1-1	A	2	3	949.049	0.056	0.040	2.604	12	0.21700	942.795	0.056
A1-910-057-1-6	A	2	3	906.782			2.614	12	0.21785	904.322	
B1-910-057-1-1	B	2	4	943.333	0.057	0.045	2.607	12	0.21721	938.031	0.057
B2-910-057-1-1	B	2	4	892.232	0.056	0.025	2.623	12	0.21855	892.664	0.056
B1-910-057-1-6	B	2	4	881.665			2.604	12	0.21696	875.685	
A1-910-058-1-7	A	3	5	950.632	0.054	0.050	2.608	12	0.21734	945.842	0.054
A2-910-058-1-7	A	3	5	939.799	0.057	0.135	2.602	12	0.21681	932.787	0.057
A1-910-058-1-6	A	3	5	943.037			2.618	12	0.21816	941.849	
B1-910-058-1-7	B	3	6	977.498	0.056	0.045	2.584	12	0.21531	963.479	0.055
B2-910-058-1-7	B	3	6	869.287	0.062	0.035	2.579	12	0.21495	855.388	0.061
B1-910-058-1-6	B	3	6	879.324			2.612	12	0.21770	876.342	

Average	**917.599**	**0.056**	**0.042**	**$Average_{norm}$**	**0.21715**	**912.052**	**0.056**
Standard Dev.	**42.177**	**0.002**	**0.031**	**$Standard\ Dev._{norm}$**		**40.079**	**0.002**
Coeff. of Var. [%]	**4.596**	**3.553**	**75.433**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**4.394**	**3.265**
Min.	**842.606**	**0.054**	**0.015**	**Min.**	**0.2113**	**846.883**	**0.054**
Max.	**998.737**	**0.062**	**0.135**	**Max.**	**0.2225**	**994.092**	**0.061**
Number of Spec.	**18**	**12**	**12**	**Number of Spec.**		**18**	**12**


0° Tension -- (RTD)
Normalized Strength
TCA T700S-12K-50C/#2510 Plain Weave Fabric
Pooled Average = 912.052 [MPa]
Pooled Standard Deviation = 40.079 [MPa]
Pooled Coeff. of Variation = 4.394 [%]
ASAP Batch #
Prepreg Lot #
ASAP Batch #
Prepreg Lot #
0° Tensile Strength [MPa]
0
200
400
600
800
1000
1200
1400
1600
1800

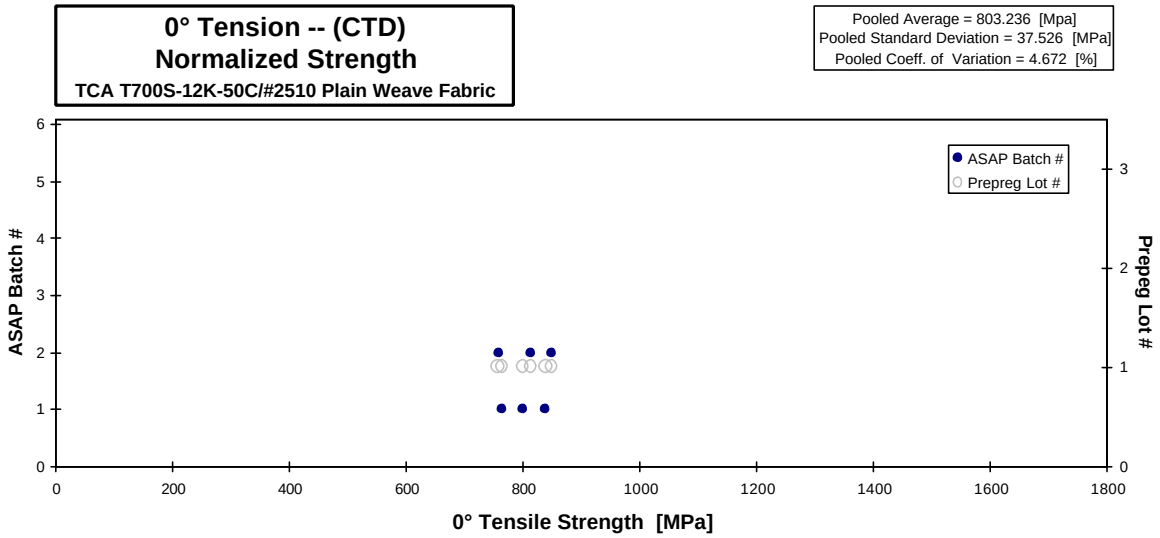

0° Tension -- (RTD)
Normalized Modulus
TCA T700S-12K-50C/#2510 Plain Weave Fabric
Pooled Average = 0.056 [GPa]
Pooled Standard Deviation = 0.002 [GPa]
Pooled Coeff. of Variation = 3.265 [%]
ASAP Batch #
Prepreg Lot #
ASAP Batch #
Prepreg Lot #
0° Tensile Modulus [GPa]
0.000
0.020
0.040
0.060
0.080
0.100
0.120

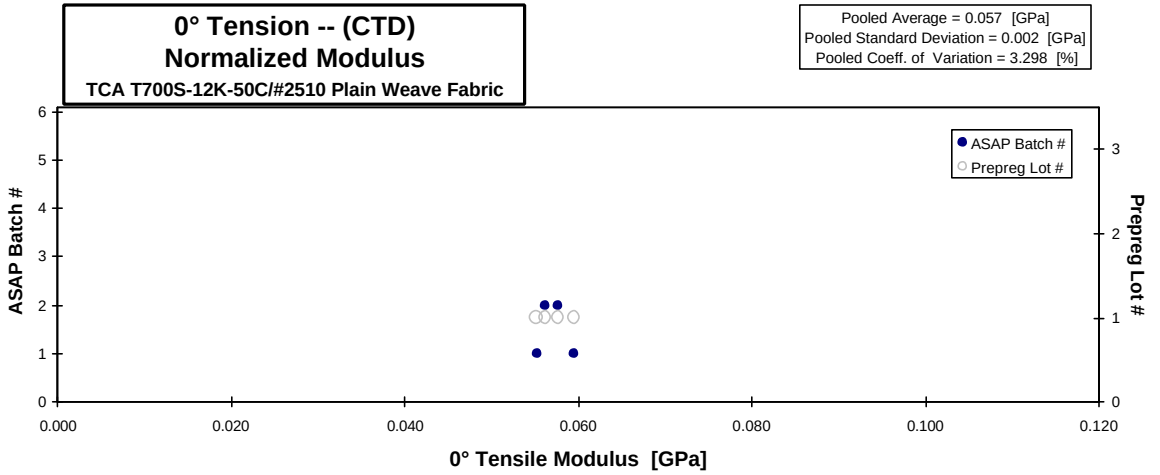
0° Tension -- (CTD)
Strength & Modulus
TCA T700S-12K-50C/#2510 Plain Weave Fabric

normalizing t_{ply} [mm]: 0.2184

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [MPa]	Modulus [GPa]	Poisson's Ratio	Avg. Specimen Thickn. [mm]	# Plies in Laminate	Avg. t_{ply} [mm]	$Strength_{norm}$ [MPa]	$Modulus_{norm}$ [GPa]
A1-910-056-1-7	A	1	1	843.194	0.060	0.110	2.606	12	0.21717	838.291	0.059
A2-910-056-1-7	A	1	1	765.594	0.055	0.070	2.616	12	0.21802	764.111	0.055
A2-910-056-1-8	A	1	1	802.934			2.609	12	0.21738	799.044	
B1-910-056-1-7	B	1	2	810.573	0.056	0.090	2.629	12	0.21908	812.929	0.056
B2-910-056-1-7	B	1	2	842.461	0.057	0.070	2.639	12	0.21992	848.175	0.058
B2-910-056-1-8	B	1	2	752.490			2.637	12	0.21971	756.865	

	Strength [MPa]	Modulus [GPa]	Poisson's Ratio		t_{ply} [mm]	$Strength_{norm}$ [MPa]	$Modulus_{norm}$ [GPa]
Average	**802.874**	**0.057**	**0.085**	**$Average_{norm}$**	**0.21855**	**803.236**	**0.057**
Standard Dev.	**37.896**	**0.002**	**0.019**	**Standard Dev.$_{norm}$**		**37.526**	**0.002**
Coeff. of Var. [%]	**4.720**	**3.514**	**22.528**	**Coeff. of Var. [%]$_{norm}$**		**4.672**	**3.298**
Min.	**752.490**	**0.055**	**0.070**	**Min.**	**0.2172**	**756.865**	**0.055**
Max.	**843.194**	**0.060**	**0.110**	**Max.**	**0.2199**	**848.175**	**0.059**
Number of Spec.	**6**	**4**	**4**	**Number of Spec.**		**6**	**4**


0° Tension -- (CTD)
Normalized Strength
TCA T700S-12K-50C/#2510 Plain Weave Fabric
Pooled Average = 803.236 [Mpa]
Pooled Standard Deviation = 37.526 [MPa]
Pooled Coeff. of Variation = 4.672 [%]
ASAP Batch #
Prepreg Lot #
ASAP Batch #
Prepeg Lot #
0° Tensile Strength [MPa]

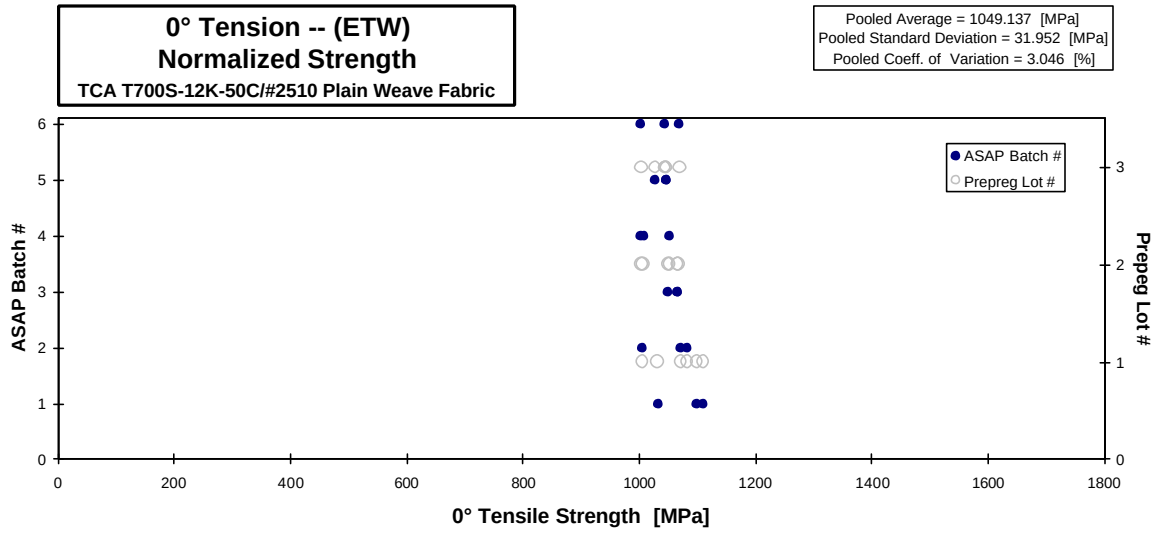

0° Tension -- (CTD)
Normalized Modulus
TCA T700S-12K-50C/#2510 Plain Weave Fabric
Pooled Average = 0.057 [GPa]
Pooled Standard Deviation = 0.002 [GPa]
Pooled Coeff. of Variation = 3.298 [%]
ASAP Batch #
Prepreg Lot #
ASAP Batch #
Prepreg Lot #
0° Tensile Modulus [GPa]

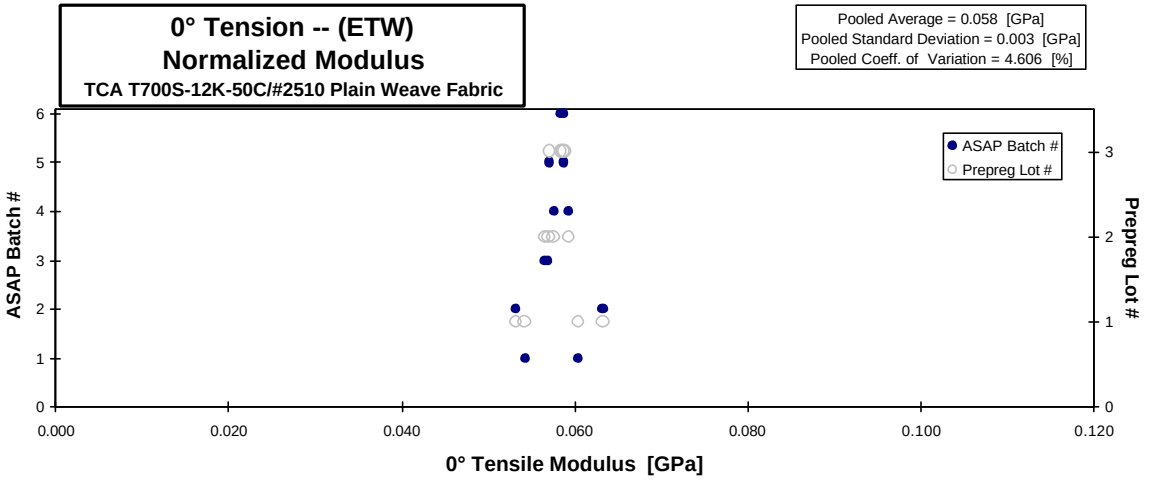
0° Tension -- (ETW)
Strength & Modulus
TCA T700S-12K-50C/#2510 Plain Weave Fabric

normalizing t_{ply} [mm]: 0.2184

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [MPa]	Modulus [GPa]	Poisson's Ratio	Avg. Specimen Thickn. [mm]	# Plies in Laminate	Avg. t_{ply} [mm]	$Strength_{norm}$ [MPa]	$Modulus_{norm}$ [GPa]
A1-910-056-1-3	A	1	1	1029.085	0.054	0.029	2.628	12	0.21903	1031.877	0.054
A2-910-056-1-3	A	1	1	1106.526	0.061	0.026	2.603	12	0.21692	1098.806	0.060
A1-910-056-1-4	A	1	1	1105.084			2.632	12	0.21935	1109.689	
B1-910-056-1-3	B	1	2	1074.110	0.063	0.035	2.640	12	0.22003	1081.916	0.063
B2-910-056-1-3	B	1	2	1031.145	0.055	0.033	2.557	12	0.21308	1005.866	0.053
B1-910-056-1-4	B	1	2	1056.629			2.660	12	0.22166	1072.192	
A1-910-057-1-3	A	2	3	1074.747	0.057	0.036	2.603	12	0.21689	1067.145	0.057
A2-910-047-1-3	A	2	3	1063.688	0.056	0.029	2.626	12	0.21886	1065.749	0.057
A1-910-057-1-4	A	2	3	1063.892			2.586	12	0.21554	1049.768	
B1-910-057-1-5	B	2	4	1003.072	0.059	0.038	2.623	12	0.21861	1003.849	0.059
B2-910-057-1-3	B	2	4	1051.592	0.058	0.017	2.624	12	0.21869	1052.814	0.058
B1-910-057-1-4	B	2	4	1007.153			2.622	12	0.21850	1007.446	
A1-910-058-1-3	A	3	5	1046.771	0.057	0.028	2.618	12	0.21819	1045.554	0.057
A2-910-058-1-3	A	3	5	1055.648	0.059	0.032	2.598	12	0.21654	1046.442	0.059
A1-910-058-1-4	A	3	5	1027.570			2.622	12	0.21848	1027.769	
B1-910-058-1-3	B	3	6	1077.413	0.059	0.041	2.604	12	0.21700	1070.314	0.059
B2-910-058-1-3	B	3	6	1058.495	0.059	0.011	2.585	12	0.21541	1043.828	0.058
B1-910-058-1-4	B	3	6	1002.461			2.624	12	0.21865	1003.433	

Average	**1051.949**	**0.058**	**0.029**	**$Average_{norm}$**	**0.21786**	**1049.137**	**0.058**
Standard Dev.	**30.909**	**0.002**	**0.009**	**$Standard\ Dev._{norm}$**		**31.952**	**0.003**
Coeff. of Var. [%]	**2.938**	**4.288**	**29.313**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**3.046**	**4.606**
Min.	**1002.461**	**0.054**	**0.011**	**Min.**	**0.2131**	**1003.433**	**0.053**
Max.	**1106.526**	**0.063**	**0.041**	**Max.**	**0.2217**	**1109.689**	**0.063**
Number of Spec.	**18**	**12**	**12**	**Number of Spec.**		**18**	**12**


0° Tension -- (ETW)
Normalized Strength
TCA T700S-12K-50C/#2510 Plain Weave Fabric
Pooled Average = 1049.137 [MPa]
Pooled Standard Deviation = 31.952 [MPa]
Pooled Coeff. of Variation = 3.046 [%]
ASAP Batch #
Prepreg Lot #
ASAP Batch #
Prepreg Lot #
0° Tensile Strength [MPa]
0
200
400
600
800
1000
1200
1400
1600
1800

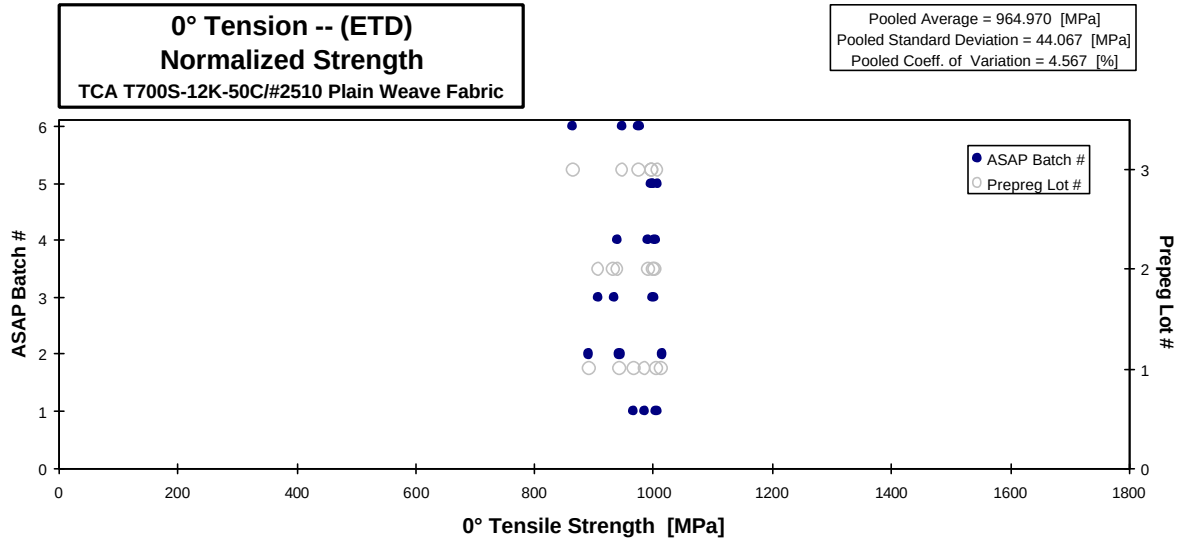

0° Tension -- (ETW)
Normalized Modulus
TCA T700S-12K-50C/#2510 Plain Weave Fabric
Pooled Average = 0.058 [GPa]
Pooled Standard Deviation = 0.003 [GPa]
Pooled Coeff. of Variation = 4.606 [%]
ASAP Batch #
Prepreg Lot #
ASAP Batch #
Prepreg Lot #
0° Tensile Modulus [GPa]
0.000
0.020
0.040
0.060
0.080
0.100
0.120

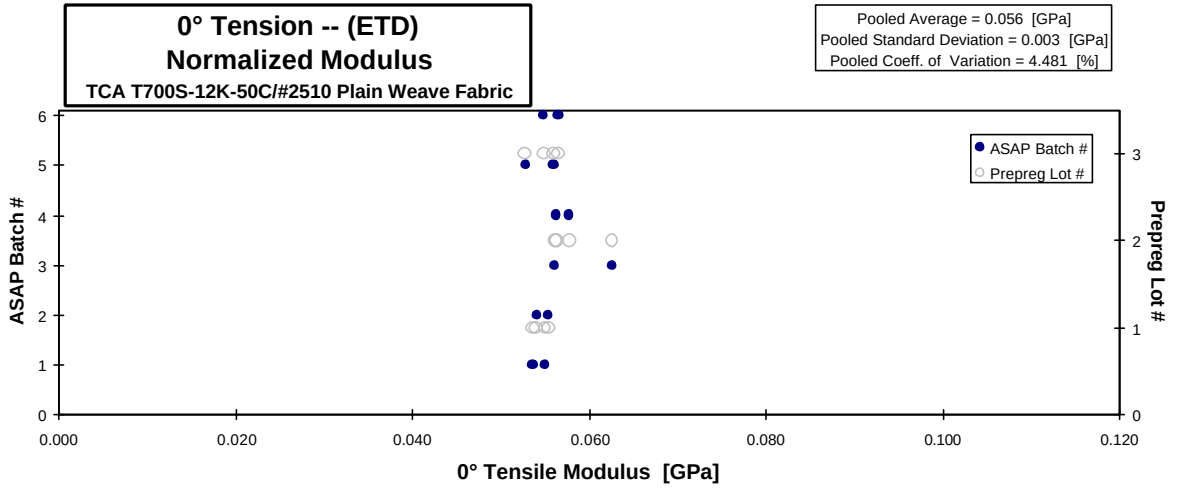
0° Tension -- (ETD)
Strength & Modulus
TCA T700S-12K-50C/#2510 Plain Weave Fabric

normalizing t_{ply} [mm]: 0.2184

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [MPa]	Modulus [GPa]	Poisson's Ratio	Avg. Specimen Thickn. [mm]	# Plies in Laminate	Avg. t_{ply} [mm]	$Strength_{norm}$ [MPa]	$Modulus_{norm}$ [GPa]
A1-910-056-1-2	A	1	1	969.265	0.054	0.035	2.615	12	0.21795	967.105	0.054
A2-910-056-1-2	A	1	1	989.999	0.055	0.065	2.609	12	0.21738	985.203	0.055
A2-910-056-1-6	A	1	1	984.976			2.675	12	0.22293	1005.210	
B1-910-056-1-2	B	1	2	936.392	0.054	0.035	2.642	12	0.22013	943.651	0.054
B2-910-056-1-2	B	1	2	910.994	0.057	0.020	2.566	12	0.21383	891.750	0.055
B2-910-056-1-6	B	1	2	1005.439			2.644	12	0.22030	1014.012	
A1-910-057-1-2	A	2	3	909.322	0.063	0.070	2.614	12	0.21785	906.855	0.063
A2-910-057-1-2	A	2	3	931.598	0.056	0.025	2.625	12	0.21872	932.772	0.056
A2-910-057-1-6	A	2	3	997.251			2.628	12	0.21903	999.957	
B1-910-057-1-2	B	2	4	1002.260	0.058	0.015	2.623	12	0.21855	1002.746	0.058
B2-910-057-1-2	B	2	4	990.633	0.056	0.025	2.623	12	0.21859	991.305	0.056
B2-910-057-1-6	B	2	4	939.436			2.622	12	0.21848	939.619	
A1-910-058-1-8	A	3	5	1009.674	0.057	0.045	2.589	12	0.21575	997.249	0.056
A2-910-058-1-8	A	3	5	1006.581	0.053	0.050	2.598	12	0.21649	997.608	0.053
A2-910-058-1-6	A	3	5	1015.816			2.598	12	0.21649	1006.761	
B1-910-058-1-8	B	3	6	1000.107	0.056	0.050	2.558	12	0.21315	975.879	0.055
B2-910-058-1-8	B	3	6	880.860	0.058	0.005	2.573	12	0.21442	864.643	0.056
B2-910-058-1-6	B	3	6	961.103			2.583	12	0.21527	947.133	

	Strength	Modulus	Poisson's Ratio			$Strength_{norm}$	$Modulus_{norm}$
Average	**968.984**	**0.056**	**0.037**	**Average $_{norm}$**	**0.21752**	**964.970**	**0.056**
Standard Dev.	**41.099**	**0.003**	**0.020**	**Standard Dev.$_{norm}$**		**44.067**	**0.003**
Coeff. of Var. [%]	**4.241**	**4.463**	**54.338**	**Coeff. of Var. [%]$_{norm}$**		**4.567**	**4.481**
Min.	**880.860**	**0.053**	**0.005**	**Min.**	**0.2131**	**864.643**	**0.053**
Max.	**1015.816**	**0.063**	**0.070**	**Max.**	**0.2229**	**1014.012**	**0.063**
Number of Spec.	**18**	**12**	**12**	**Number of Spec.**		**18**	**12**


0° Tension -- (ETD)
Normalized Strength
TCA T700S-12K-50C/#2510 Plain Weave Fabric
Pooled Average = 964.970 [MPa]
Pooled Standard Deviation = 44.067 [MPa]
Pooled Coeff. of Variation = 4.567 [%]
ASAP Batch #
Prepreg Lot #
ASAP Batch #
Prepreg Lot #
0° Tensile Strength [MPa]
0
200
400
600
800
1000
1200
1400
1600
1800

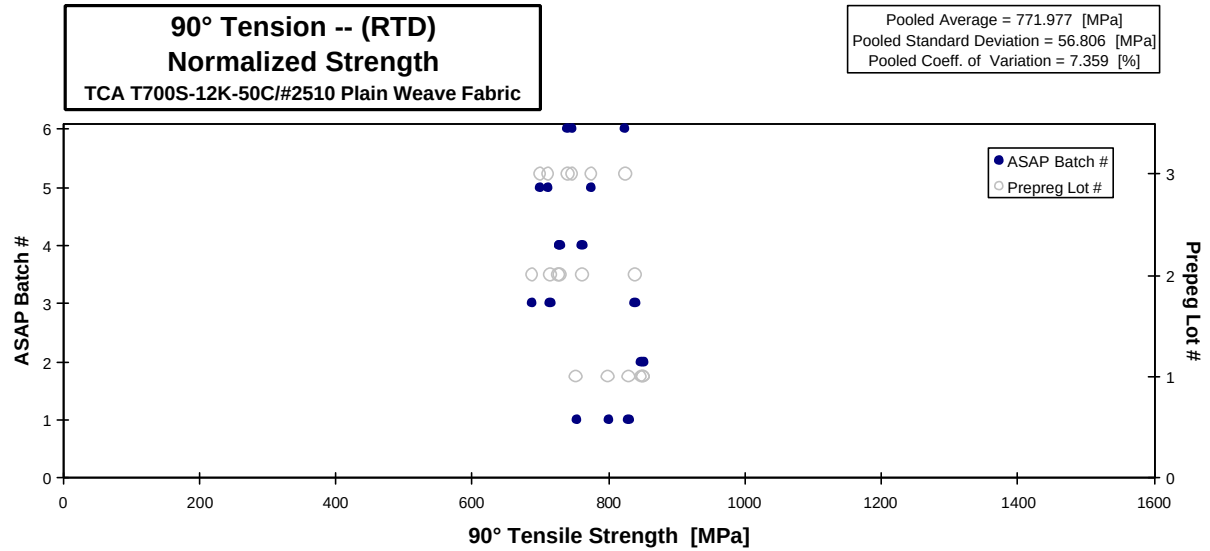

0° Tension -- (ETD)
Normalized Modulus
TCA T700S-12K-50C/#2510 Plain Weave Fabric
Pooled Average = 0.056 [GPa]
Pooled Standard Deviation = 0.003 [GPa]
Pooled Coeff. of Variation = 4.481 [%]
ASAP Batch #
Prepreg Lot #
ASAP Batch #
Prepreg Lot #
0° Tensile Modulus [GPa]
0.000
0.020
0.040
0.060
0.080
0.100
0.120

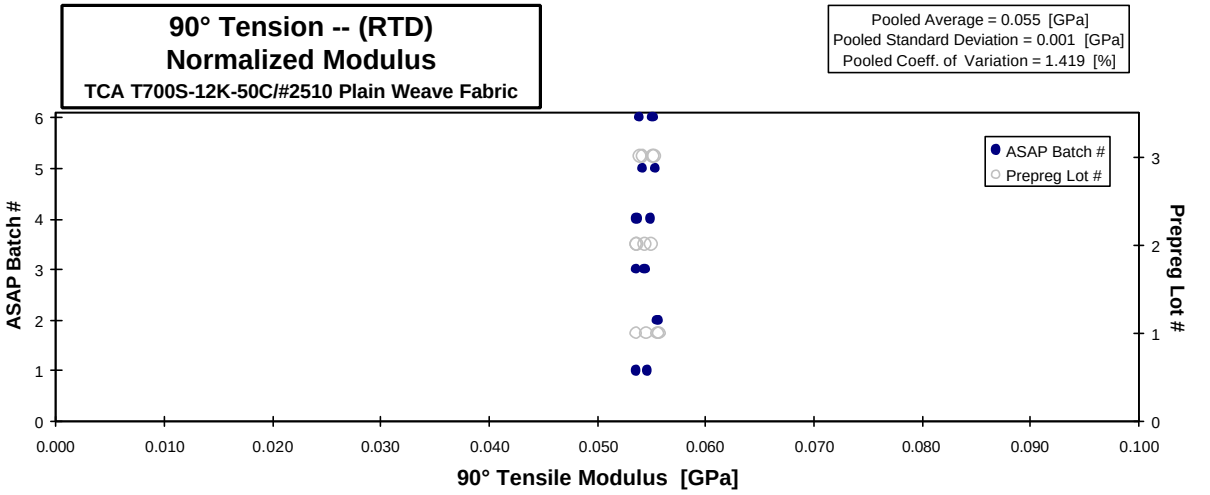
90° Tension -- (RTD)
Strength & Modulus
TCA T700S-12K-50C/#2510 Plain Weave Fabric

normalizing t_{ply} [mm]: 0.2184

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [MPa]	Modulus [GPa]	Avg. Specimen Thickn. [mm]	# Plies in Laminate	Avg. t_{ply} [mm]	$Strength_{norm}$ [MPa]	$Modulus_{norm}$ [GPa]
A1-910-056-1-6	A	1	1	746.858	0.053	2.644	12	0.22030	753.227	0.054
A2-910-056-1-1	A	1	1	850.979	0.056	2.557	12	0.21311	830.199	0.055
A1-910-056-1-9	A	1	1	807.172		2.600	12	0.21664	800.524	
B1-910-056-1-1	B	1	2	844.361	0.055	2.632	12	0.21935	847.879	0.056
B2-910-056-1-1	B	1	2	852.066	0.056	2.617	12	0.21812	850.827	0.056
B1-910-056-1-9	B	1	2	858.027		2.604	12	0.21696	852.207	
A1-910-057-1-1	A	2	3	845.191	0.054	2.603	12	0.21692	839.294	0.054
A2-910-057-1-1	A	2	3	721.069	0.055	2.599	12	0.21658	714.921	0.054
A1-910-057-1-6	A	2	3	687.602		2.625	12	0.21876	688.601	
B1-910-057-1-1	B	2	4	762.646	0.055	2.620	12	0.21829	762.128	0.055
B2-910-057-1-1	B	2	4	736.201	0.054	2.590	12	0.21586	727.498	0.054
B1-910-057-1-6	B	2	4	733.458		2.606	12	0.21713	729.051	
A1-910-058-1-7	A	3	5	705.490	0.056	2.600	12	0.21668	699.816	0.055
A2-910-058-1-7	A	3	5	786.398	0.055	2.583	12	0.21527	774.967	0.054
A1-910-058-1-6	A	3	5	707.472		2.638	12	0.21982	711.928	
B1-910-058-1-7	B	3	6	749.836	0.055	2.612	12	0.21766	747.148	0.055
B2-910-058-1-7	B	3	6	740.118	0.054	2.623	12	0.21855	740.477	0.054
B1-910-058-1-6	B	3	6	821.938		2.631	12	0.21922	824.885	

Average	**775.382**	**0.055**	**$Average_{norm}$**	**0.21751**	**771.977**	**0.055**
Standard Dev.	**58.245**	**0.001**	**Standard Dev.$_{norm}$**		**56.806**	**0.001**
Coeff. of Var. [%]	**7.512**	**1.581**	**Coeff. of Var. [%]$_{norm}$**		**7.359**	**1.419**
Min.	**687.602**	**0.053**	**Min.**	**0.2131**	**688.601**	**0.054**
Max.	**858.027**	**0.056**	**Max.**	**0.2203**	**852.207**	**0.056**
Number of Spec.	**18**	**12**	**Number of Spec.**		**18**	**12**


90° Tension -- (RTD)
Normalized Strength
TCA T700S-12K-50C/#2510 Plain Weave Fabric
Pooled Average = 771.977 [MPa]
Pooled Standard Deviation = 56.806 [MPa]
Pooled Coeff. of Variation = 7.359 [%]
ASAP Batch #
Prepreg Lot #
ASAP Batch #
Prepeg Lot #
90° Tensile Strength [MPa]
0
200
400
600
800
1000
1200
1400
1600
0
1
2
3
4
5
6

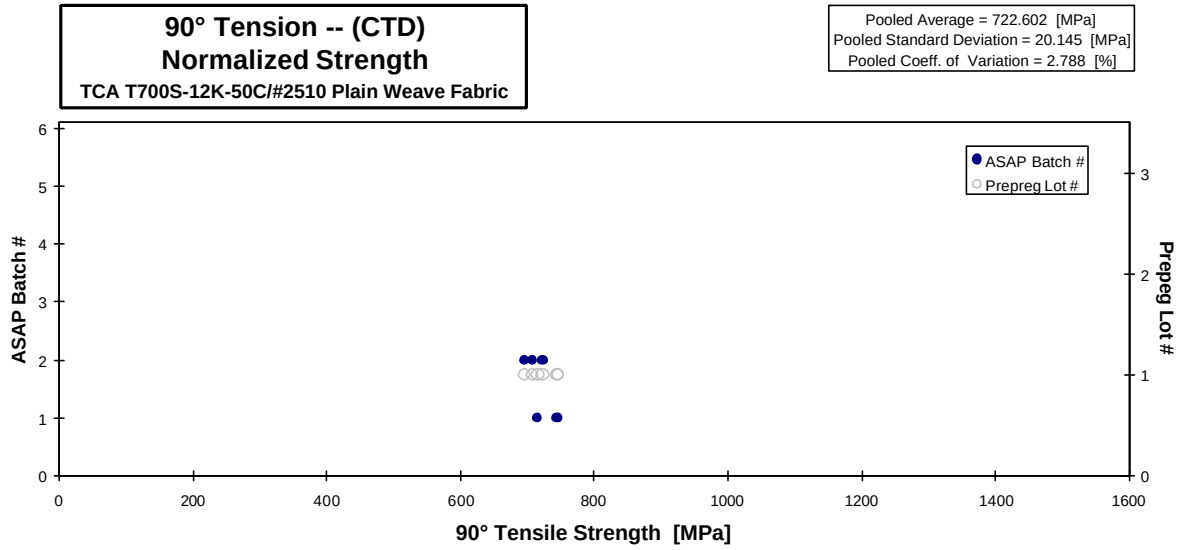

90° Tension -- (RTD)
Normalized Modulus
TCA T700S-12K-50C/#2510 Plain Weave Fabric
Pooled Average = 0.055 [GPa]
Pooled Standard Deviation = 0.001 [GPa]
Pooled Coeff. of Variation = 1.419 [%]
ASAP Batch #
Prepreg Lot #
ASAP Batch #
Prepreg Lot #
90° Tensile Modulus [GPa]
0.000
0.010
0.020
0.030
0.040
0.050
0.060
0.070
0.080
0.090
0.100
0
1
2
3
4
5
6

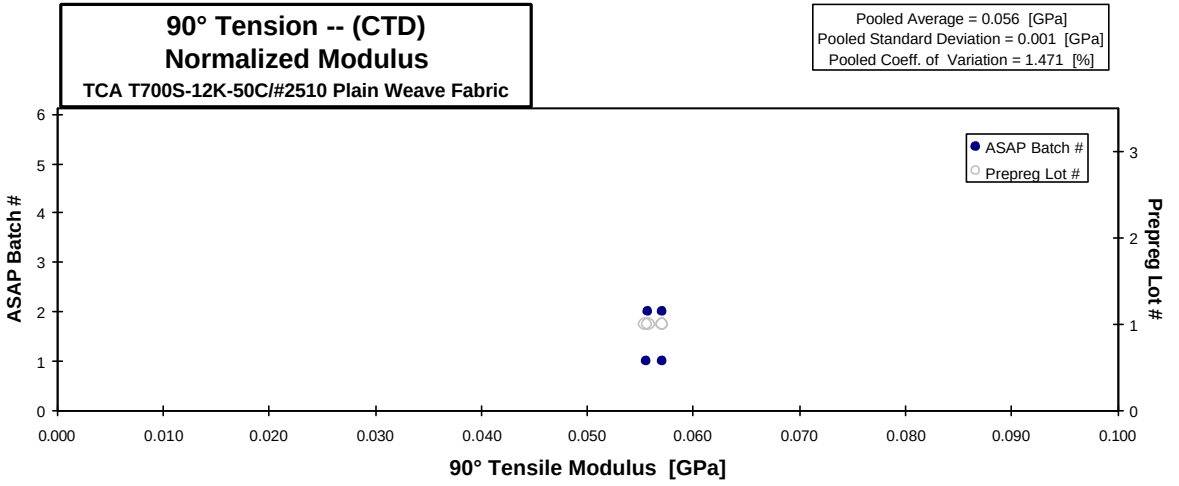
90° Tension -- (CTD)
Strength & Modulus
TCA T700S-12K-50C/#2510 Plain Weave Fabric

normalizing t_{ply} [mm]: 0.2184

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [MPa]	Modulus [GPa]	Avg. Specimen Thickn. [mm]	# Plies in Laminate	Avg. t_{ply} [mm]	$Strength_{norm}$ [MPa]	$Modulus_{norm}$ [GPa]
A1-910-056-1-7	A	1	1	742.458	0.057	2.637	12	0.21971	746.775	0.057
A2-910-056-1-7	A	1	1	736.290	0.055	2.652	12	0.22098	744.851	0.056
A1-910-056-1-8	A	1	1	718.240		2.614	12	0.21781	716.152	
B1-910-056-1-7	B	1	2	688.155	0.056	2.652	12	0.22098	696.157	0.057
B2-910-056-1-7	B	1	2	719.311	0.055	2.637	12	0.21971	723.493	0.056
B1-910-056-1-8	B	1	2	708.183		2.621	12	0.21844	708.183	

Average	**718.773**	**0.056**	**$Average_{norm}$**	**0.21960**	**722.602**	**0.056**
Standard Dev.	**19.586**	**0.001**	**$Standard\ Dev._{norm}$**		**20.145**	**0.001**
Coeff. of Var. [%]	**2.725**	**1.536**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**2.788**	**1.471**
Min.	**688.155**	**0.055**	**Min.**	**0.2178**	**696.157**	**0.056**
Max.	**742.458**	**0.057**	**Max.**	**0.2210**	**746.775**	**0.057**
Number of Spec.	**6**	**4**	**Number of Spec.**		**6**	**4**


90° Tension -- (CTD)
Normalized Strength
TCA T700S-12K-50C/#2510 Plain Weave Fabric
Pooled Average = 722.602 [MPa]
Pooled Standard Deviation = 20.145 [MPa]
Pooled Coeff. of Variation = 2.788 [%]
ASAP Batch #
Prepreg Lot #
ASAP Batch #
Prepeg Lot #
90° Tensile Strength [MPa]
0
200
400
600
800
1000
1200
1400
1600
1
2
3
4
5
6

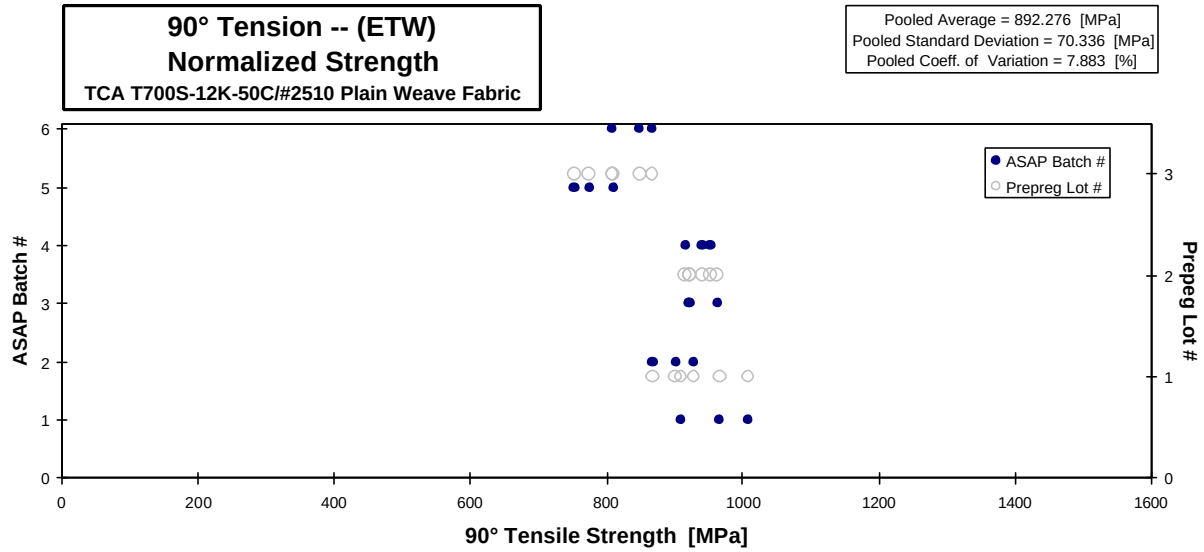

90° Tension -- (CTD)
Normalized Modulus
TCA T700S-12K-50C/#2510 Plain Weave Fabric
Pooled Average = 0.056 [GPa]
Pooled Standard Deviation = 0.001 [GPa]
Pooled Coeff. of Variation = 1.471 [%]
ASAP Batch #
Prepreg Lot #
ASAP Batch #
Prepreg Lot #
90° Tensile Modulus [GPa]
0.000
0.010
0.020
0.030
0.040
0.050
0.060
0.070
0.080
0.090
0.100

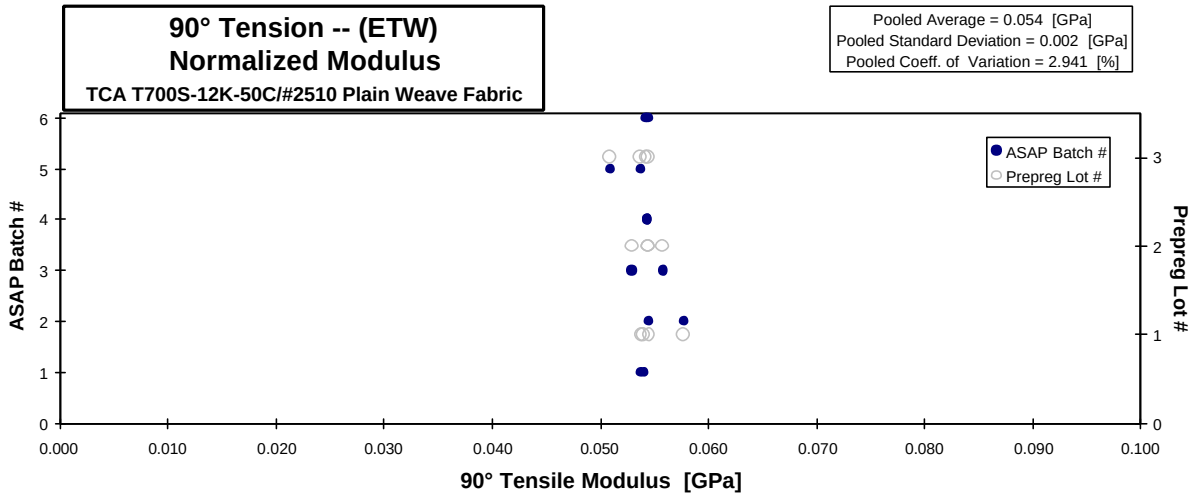
90° Tension -- (ETW)
Strength & Modulus
TCA T700S-12K-50C/#2510 Plain Weave Fabric

normalizing t_{ply} [mm]: 0.2184

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [MPa]	Modulus [GPa]	Avg. Specimen Thickn. [mm]	# Plies in Laminate	Avg. t_{ply} [mm]	$Strength_{norm}$ [MPa]	$Modulus_{norm}$ [GPa]
A1-910-056-1-3	A	1	1	1004.365	0.054	2.631	12	0.21924	1008.063	0.054
A2-910-056-1-3	A	1	1	910.374	0.054	2.618	12	0.21819	909.316	0.054
A1-910-056-1-4	A	1	1	959.089		2.641	12	0.22007	966.245	
B1-910-056-1-3	B	1	2	892.883	0.057	2.647	12	0.22056	901.535	0.058
B2-910-056-1-3	B	1	2	939.668	0.055	2.590	12	0.21584	928.468	0.055
B1-910-056-1-4	B	1	2	860.894		2.645	12	0.22039	868.569	
A1-910-057-1-3	A	2	3	922.318	0.053	2.620	12	0.21829	921.692	0.053
A2-910-057-1-3	A	2	3	926.701	0.056	2.610	12	0.21749	922.660	0.056
A1-910-057-1-4	A	2	3	964.121		2.618	12	0.21819	963.000	
B1-910-057-1-3	B	2	4	940.165	0.054	2.624	12	0.21865	941.076	0.054
B2-910-057-1-3	B	2	4	956.127	0.055	2.612	12	0.21764	952.606	0.054
B1-910-057-1-4	B	2	4	917.293		2.617	12	0.21812	915.960	
A1-910-058-1-3	A	3	5	759.543	0.054	2.598	12	0.21649	752.772	0.054
A2-910-058-1-3	A	3	5	788.752	0.052	2.575	12	0.21457	774.766	0.051
A1-910-058-1-4	A	3	5	807.087		2.631	12	0.21922	809.980	
B1-910-058-1-3	B	3	6	866.181	0.054	2.624	12	0.21869	867.188	0.054
B2-910-058-1-3	B	3	6	807.541	0.054	2.624	12	0.21869	808.480	0.054
B1-910-058-1-4	B	3	6	851.891		2.611	12	0.21759	848.589	

Average	**893.055**	**0.054**	**$Average_{norm}$**	**0.21822**	**892.276**	**0.054**
Standard Dev.	**68.559**	**0.001**	**$Standard\ Dev._{norm}$**		**70.336**	**0.002**
Coeff. of Var. [%]	**7.677**	**2.502**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**7.883**	**2.941**
Min.	**759.543**	**0.052**	**Min.**	**0.2146**	**752.772**	**0.051**
Max.	**1004.365**	**0.057**	**Max.**	**0.2206**	**1008.063**	**0.058**
Number of Spec.	**18**	**12**	**Number of Spec.**		**18**	**12**


90° Tension -- (ETW)
Normalized Strength
TCA T700S-12K-50C/#2510 Plain Weave Fabric
Pooled Average = 892.276 [MPa]
Pooled Standard Deviation = 70.336 [MPa]
Pooled Coeff. of Variation = 7.883 [%]
ASAP Batch #
Prepreg Lot #
ASAP Batch #
Prepeg Lot #
90° Tensile Strength [MPa]
0
200
400
600
800
1000
1200
1400
1600
0
1
2
3
4
5
6

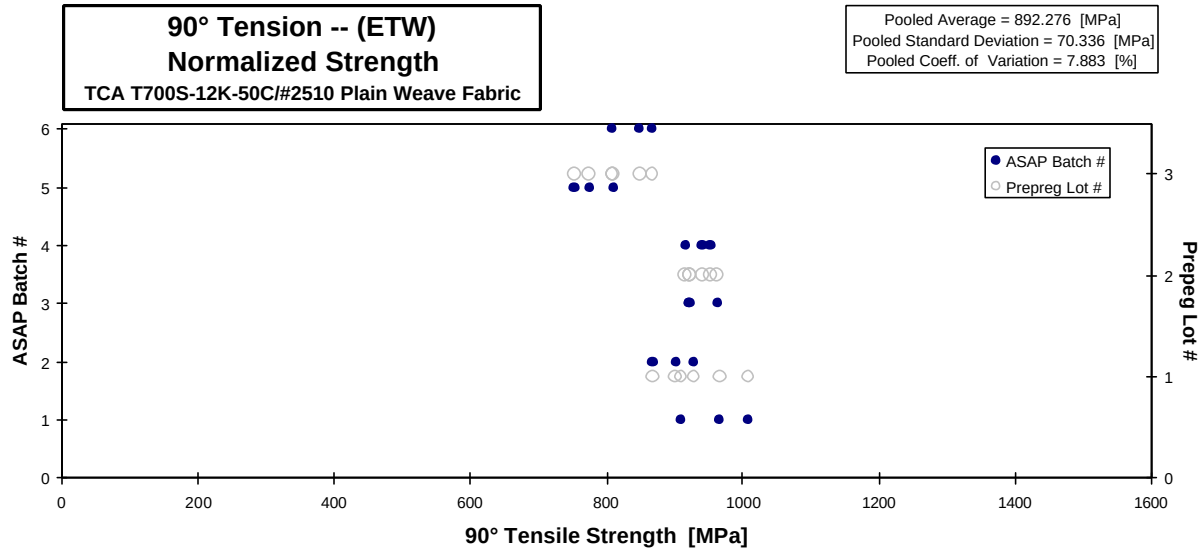

90° Tension -- (ETW)
Normalized Modulus
TCA T700S-12K-50C/#2510 Plain Weave Fabric
Pooled Average = 0.054 [GPa]
Pooled Standard Deviation = 0.002 [GPa]
Pooled Coeff. of Variation = 2.941 [%]
ASAP Batch #
Prepreg Lot #
ASAP Batch #
Prepreg Lot #
90° Tensile Modulus [GPa]
0.000
0.010
0.020
0.030
0.040
0.050
0.060
0.070
0.080
0.090
0.100
0
1
2
3
4
5
6

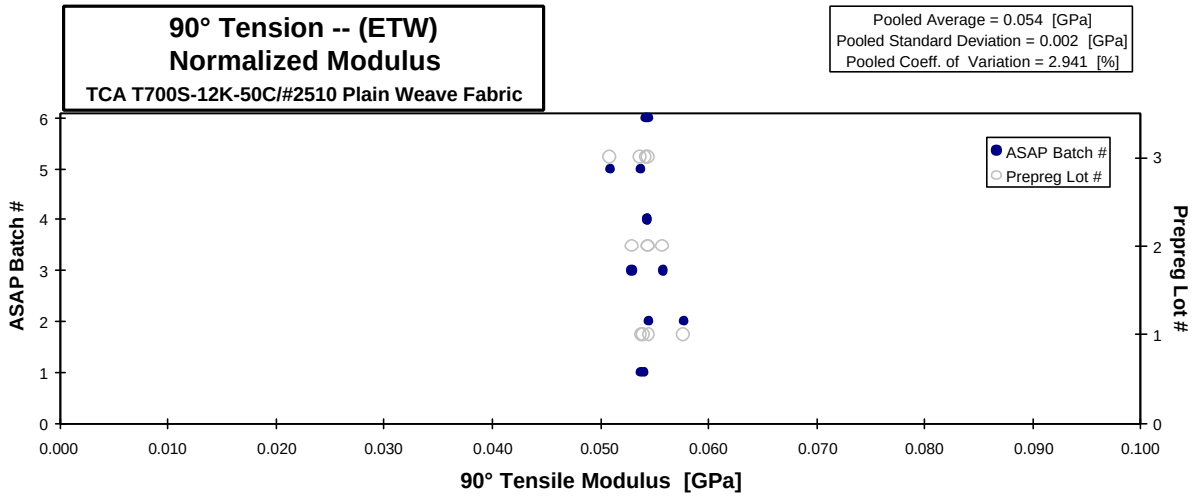
90° Tension -- (ETD)
Strength & Modulus
TCA T700S-12K-50C/#2510 Plain Weave Fabric

normalizing t_{ply} [mm]: 0.2184

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [MPa]	Modulus [GPa]	Avg. Specimen Thickn. [mm]	# Plies in Laminate	Avg. t_{ply} [mm]	$Strength_{norm}$ [MPa]	$Modulus_{norm}$ [GPa]
A1-910-056-1-2	A	1	1	942.543	0.054	2.623	12	0.21861	943.274	0.054
A2-910-056-1-2	A	1	1	940.611	0.054	2.576	12	0.21463	924.205	0.053
A1-910-056-1-9	A	1	1	942.857		2.598	12	0.21654	934.635	
B1-910-056-1-2	B	1	2	850.558	0.055	2.601	12	0.21679	844.130	0.055
B2-910-056-1-2	B	1	2	837.930	0.056	2.590	12	0.21584	827.943	0.055
B1-910-056-1-9	B	1	2	913.203		2.633	12	0.21939	917.185	
A1-910-057-1-2	A	2	3	747.872	0.056	2.618	12	0.21819	747.003	0.056
A2-910-057-1-2	A	2	3	728.125	0.052	2.603	12	0.21689	722.975	0.052
A2-910-057-1-6	A	2	3	859.851		2.615	12	0.21791	857.768	
B1-910-057-1-2	B	2	4	838.631	0.054	2.622	12	0.21850	838.875	0.054
B2-910-057-1-2	B	2	4	786.527	0.055	2.602	12	0.21681	780.658	0.054
B2-910-057-1-6	B	2	4	840.919		2.621	12	0.21844	840.919	
A1-910-058-1-8	A	3	5	760.737	0.054	2.582	12	0.21520	749.459	0.054
A2-910-058-1-8	A	3	5	774.174	0.056	2.609	12	0.21742	770.573	0.056
A2-910-058-1-6	A	3	5	815.034		2.584	12	0.21533	803.424	
B1-910-058-1-8	B	3	6	823.343	0.057	2.584	12	0.21537	811.775	0.056
B2-910-058-1-8	B	3	6	841.968	0.055	2.610	12	0.21749	838.296	0.055
B2-910-058-1-6	B	3	6	853.039		2.625	12	0.21872	854.113	

Average	**838.774**	**0.055**	**$Average_{norm}$**	**0.21711**	**833.734**	**0.054**
Standard Dev.	**65.356**	**0.001**	**$Standard\ Dev._{norm}$**		**65.826**	**0.001**
Coeff. of Var. [%]	**7.792**	**2.256**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**7.895**	**2.207**
Min.	**728.125**	**0.052**	**Min.**	**0.2146**	**722.975**	**0.052**
Max.	**942.857**	**0.057**	**Max.**	**0.2194**	**943.274**	**0.056**
Number of Spec.	**18**	**12**	**Number of Spec.**		**18**	**12**


90° Tension -- (ETW)
Normalized Strength
TCA T700S-12K-50C/#2510 Plain Weave Fabric
Pooled Average = 892.276 [MPa]
Pooled Standard Deviation = 70.336 [MPa]
Pooled Coeff. of Variation = 7.883 [%]
ASAP Batch #
Prepreg Lot #
ASAP Batch #
Prepeg Lot #
90° Tensile Strength [MPa]

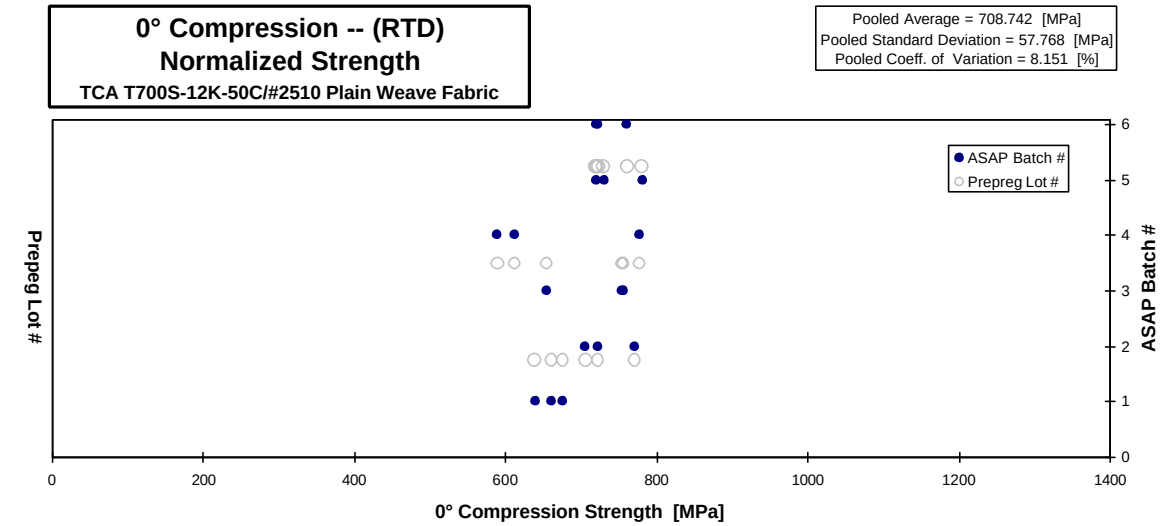

90° Tension -- (ETW)
Normalized Modulus
TCA T700S-12K-50C/#2510 Plain Weave Fabric
Pooled Average = 0.054 [GPa]
Pooled Standard Deviation = 0.002 [GPa]
Pooled Coeff. of Variation = 2.941 [%]
ASAP Batch #
Prepreg Lot #
ASAP Batch #
Prepreg Lot #
90° Tensile Modulus [GPa]

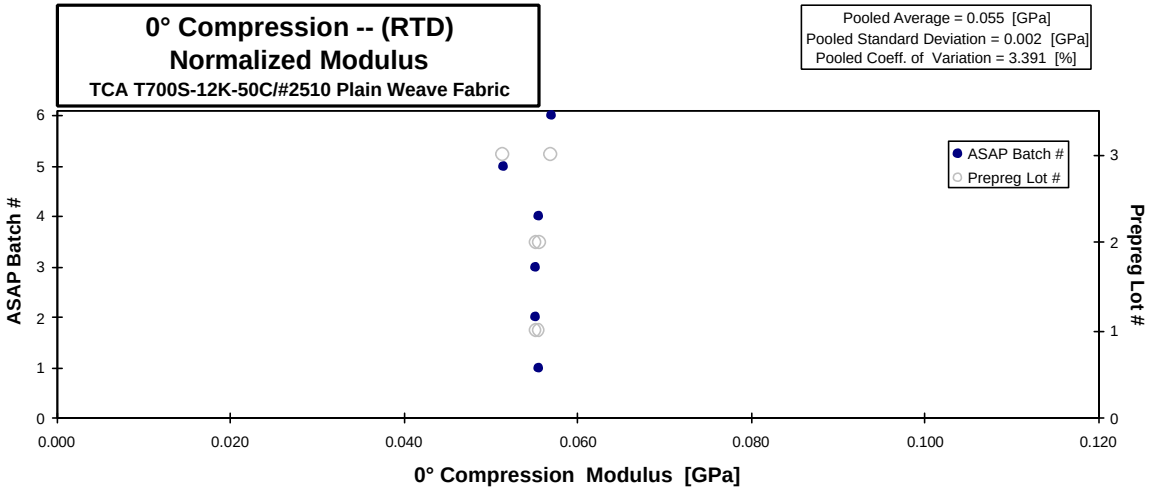
0° Compression -- (RTD)
Strength & Modulus
TCA T700S-12K-50C/#2510 Plain Weave Fabric

normalizing t_{ply} [mm]: 0.2184

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [MPa]	Modulus [GPa]	Avg. Specimen Thickn. [mm]	# Plies in Laminate	Avg. t_{ply} [mm]	$Strength_{norm}$ [MPa]	$Modulus_{norm}$ [GPa]
A1-910-056-1-8	A	1	1	677.158		2.616	12	0.21802	675.845	
A2-910-056-1-5	A	1	1	662.500		2.616	12	0.21802	661.216	
A1-910-056-1-10	A	1	1	640.284		2.616	12	0.21802	639.043	
A2-910-056-1-1	A	1	1		0.056	3.009	14	0.21490		0.055
B1-910-056-1-5	B	1	2	773.197		2.616	12	0.21802	771.698	
B2-910-056-1-7	B	1	2	724.194		2.616	12	0.21802	722.791	
B2-910-056-1-8	B	1	2	707.896		2.616	12	0.21802	706.524	
B2-910-056-1-1	B	1	2		0.056	3.011	14	0.21508		0.055
A1-910-057-1-5	A	2	3	659.142		2.604	12	0.21696	654.671	
A2-910-057-1-7	A	2	3	761.160		2.604	12	0.21696	755.997	
A2-910-057-1-8	A	2	3	759.365		2.604	12	0.21696	754.215	
A2-910-057-1-1	A	2	3		0.056	3.019	14	0.21566		0.055
B1-910-057-1-5	B	2	4	782.660		2.604	12	0.21696	777.351	
B2-910-057-1-7	B	2	4	616.231		2.604	12	0.21696	612.051	
B2-910-057-1-8	B	2	4	593.713		2.604	12	0.21696	589.686	
B2-910-057-1-1	B	2	4		0.057	2.985	14	0.21323		0.056
A1-910-058-1-4	A	3	5	774.963		2.642	12	0.22013	780.970	
A1-910-058-1-5	A	3	5	724.387		2.642	12	0.22013	730.003	
A2-910-058-1-4	A	3	5	714.168		2.642	12	0.22013	719.705	
A2-910-058-1-1	A	3	5		0.052	3.051	14	0.21793		0.051
B1-910-058-1-4	B	3	6	717.585		2.642	12	0.22013	723.147	
B1-910-058-1-5	B	3	6	715.597		2.642	12	0.22013	721.145	
B2-910-058-1-4	B	3	6	755.441		2.642	12	0.22013	761.297	
B2-910-058-1-1	B	3	6		0.058	3.013	14	0.21521		0.057

Average	**708.869**	**0.056**	**$Average_{norm}$**	**0.21761**	**708.742**	**0.055**
Standard Dev.	**56.467**	**0.002**	**$Standard\ Dev._{norm}$**		**57.768**	**0.002**
Coeff. of Var. [%]	**7.966**	**3.932**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**8.151**	**3.391**
Min.	**593.713**	**0.052**	**Min.**	**0.2132**	**589.686**	**0.051**
Max.	**782.660**	**0.058**	**Max.**	**0.2201**	**780.970**	**0.057**
Number of Spec.	**18**	**6**	**Number of Spec.**		**18**	**6**


0° Compression -- (RTD)
Normalized Strength
TCA T700S-12K-50C/#2510 Plain Weave Fabric
Pooled Average = 708.742 [MPa]
Pooled Standard Deviation = 57.768 [MPa]
Pooled Coeff. of Variation = 8.151 [%]
ASAP Batch #
Prepreg Lot #
Prepreg Lot #
ASAP Batch #
0° Compression Strength [MPa]
0
200
400
600
800
1000
1200
1400
0
1
2
3
4
5
6

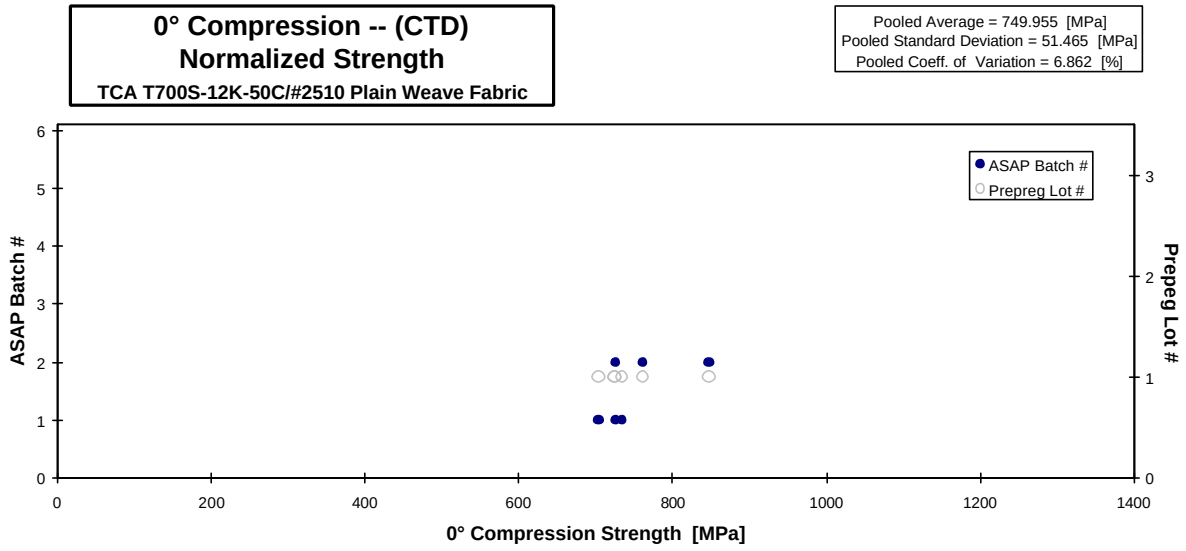

0° Compression -- (RTD)
Normalized Modulus
TCA T700S-12K-50C/#2510 Plain Weave Fabric
Pooled Average = 0.055 [GPa]
Pooled Standard Deviation = 0.002 [GPa]
Pooled Coeff. of Variation = 3.391 [%]
ASAP Batch #
Prepreg Lot #
ASAP Batch #
Prepreg Lot #
0° Compression Modulus [GPa]
0.000
0.020
0.040
0.060
0.080
0.100
0.120
0
1
2
3
4
5
6

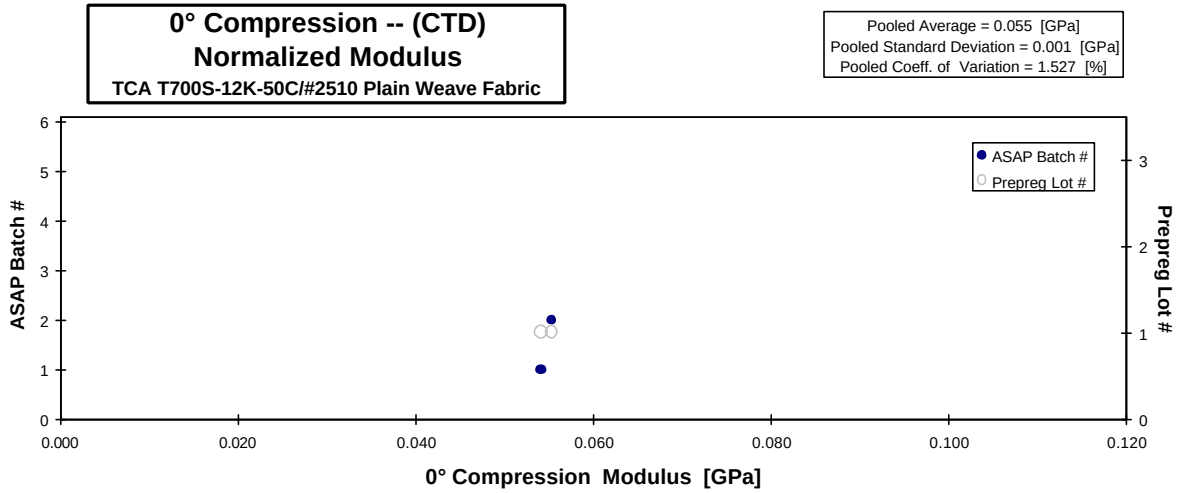
0° Compression -- (CTD)
Strength & Modulus
TCA T700S-12K-50C/#2510 Plain Weave Fabric

normalizing t_{ply} [mm]: 0.2184

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [MPa]	Modulus [GPa]	Avg. Specimen Thickn. [mm]	# Plies in Laminate	Avg. t_{ply} [mm]	$Strength_{norm}$ [MPa]	$Modulus_{norm}$ [GPa]
A1-910-056-1-4	A	1	1	723.024		2.631	12	0.21924	725.687	
A1-910-056-1-5	A	1	1	701.885		2.631	12	0.21924	704.469	
A2-910-056-1-4	A	1	1	731.741		2.631	12	0.21924	734.435	
A2-910-056-1-6	A	1	1		0.054	3.071	14	0.21935		0.054
B1-910-056-1-4	B	1	2	844.971		2.631	12	0.21924	848.082	
B2-910-056-1-4	B	1	2	758.523		2.631	12	0.21924	761.316	
B2-910-056-1-5	B	1	2	723.076		2.631	12	0.21924	725.739	
B2-910-056-1-6	B	1	2		0.055	3.071	14	0.21935		0.055

Average	**747.203**	**0.055**	**$Average_{norm}$**	**0.21927**	**749.955**	**0.055**
Standard Dev.	**51.276**	**0.001**	**$Standard\ Dev._{norm}$**		**51.465**	**0.001**
Coeff. of Var. [%]	**6.862**	**1.527**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**6.862**	**1.527**
Min.	**701.885**	**0.054**	**Min.**	**0.2192**	**704.469**	**0.054**
Max.	**844.971**	**0.055**	**Max.**	**0.2193**	**848.082**	**0.055**
Number of Spec.	**6**	**2**	**Number of Spec.**		**6**	**2**


0° Compression -- (CTD)
Normalized Strength
TCA T700S-12K-50C/#2510 Plain Weave Fabric
Pooled Average = 749.955 [MPa]
Pooled Standard Deviation = 51.465 [MPa]
Pooled Coeff. of Variation = 6.862 [%]
ASAP Batch #
Prepreg Lot #
ASAP Batch #
Prepeg Lot #
0° Compression Strength [MPa]
0
200
400
600
800
1000
1200
1400


0° Compression -- (CTD)
Normalized Modulus
TCA T700S-12K-50C/#2510 Plain Weave Fabric
Pooled Average = 0.055 [GPa]
Pooled Standard Deviation = 0.001 [GPa]
Pooled Coeff. of Variation = 1.527 [%]
ASAP Batch #
Prepreg Lot #
ASAP Batch #
Prepreg Lot #
0° Compression Modulus [GPa]
0.000
0.020
0.040
0.060
0.080
0.100
0.120

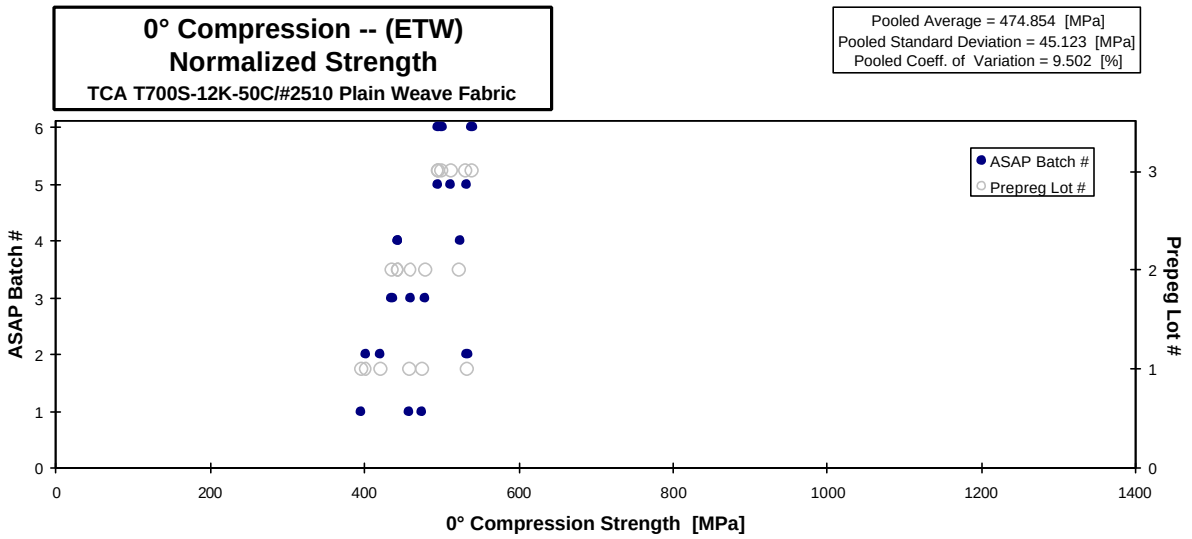
.

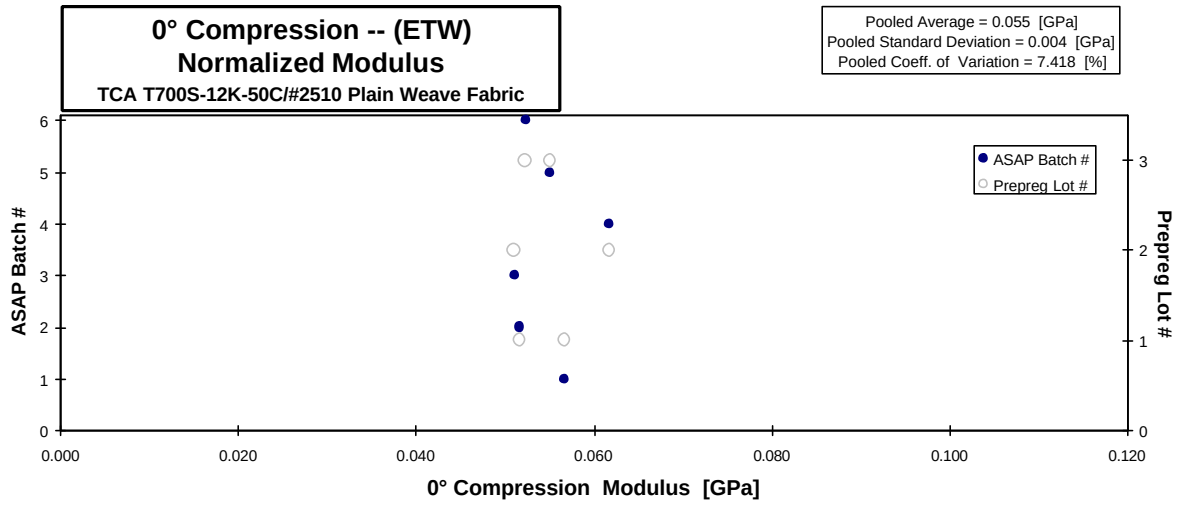
0° Compression -- (ETW)
Strength & Modulus
TCA T700S-12K-50C/#2510 Plain Weave Fabric

normalizing t_{ply} [mm]: 0.2184

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [MPa]	Modulus [GPa]	Avg. Specimen Thickn. [mm]	# Plies in Laminate	Avg. t_{ply} [mm]	$Strength_{norm}$ [MPa]	$Modulus_{norm}$ [GPa]
A1-910-056-1-1	A	1	1	456.991		2.631	12	0.21924	458.673	
A1-910-056-1-2	A	1	1	473.407		2.631	12	0.21924	475.150	
A2-910-056-1-1	A	1	1	394.658		2.631	12	0.21924	396.111	
A2-910-056-1-3	A	1	1		0.057	3.037	14	0.21690		0.057
B1-910-056-1-2	B	1	2	419.416		2.631	12	0.21924	420.960	
B1-910-056-1-1	B	1	2	400.440		2.631	12	0.21924	401.914	
B2-910-056-1-1	B	1	2	531.552		2.631	12	0.21924	533.509	
B2-910-056-1-3	B	1	2		0.052	3.043	14	0.21739		0.052
A1-910-057-1-1	A	2	3	482.242		2.604	12	0.21696	478.971	
A1-910-057-1-2	A	2	3	463.025		2.604	12	0.21696	459.884	
A2-910-057-1-1	A	2	3	439.285		2.604	12	0.21696	436.305	
A2-910-057-1-3	A	2	3		0.051	3.050	14	0.21784		0.051
B1-910-057-1-1	B	2	4	527.114		2.604	12	0.21696	523.539	
B1-910-057-1-2	B	2	4	446.287		2.604	12	0.21696	443.260	
B2-910-057-1-1	B	2	4	446.260		2.604	12	0.21696	443.233	
B2-910-057-1-3	B	2	4		0.063	3.012	14	0.21512		0.062
A1-910-058-1-1	A	3	5	524.241		2.659	12	0.22162	531.861	
A2-910-058-1-1	A	3	5	504.937		2.659	12	0.22162	512.276	
A2-910-058-1-2	A	3	5	488.704		2.659	12	0.22162	495.807	
A2-910-058-1-3	A	3	5		0.055	3.042	14	0.21732		0.055
B1-910-058-1-1	B	3	6	531.983		2.659	12	0.22162	539.716	
B2-910-058-1-1	B	3	6	488.411		2.659	12	0.22162	495.510	
B2-910-058-1-2	B	3	6	493.512		2.659	12	0.22162	500.685	
B2-910-058-1-3	B	3	6		0.053	3.041	14	0.21722		0.052

	Strength	Modulus			Strength	Modulus
Average	**472.915**	**0.055**	**$Average_{norm}$**	**0.21870**	**474.854**	**0.055**
Standard Dev.	**43.159**	**0.004**	**$Standard\ Dev._{norm}$**		**45.123**	**0.004**
Coeff. of Var. [%]	**9.126**	**7.863**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**9.502**	**7.418**
Min.	**394.658**	**0.051**	**Min.**	**0.2151**	**396.111**	**0.051**
Max.	**531.983**	**0.063**	**Max.**	**0.2216**	**539.716**	**0.062**
Number of Spec.	**18**	**6**	**Number of Spec.**		**18**	**6**


0° Compression -- (ETW)
Normalized Strength
TCA T700S-12K-50C/#2510 Plain Weave Fabric
Pooled Average = 474.854 [MPa]
Pooled Standard Deviation = 45.123 [MPa]
Pooled Coeff. of Variation = 9.502 [%]
ASAP Batch #
Prepreg Lot #
ASAP Batch #
Prepreg Lot #
0° Compression Strength [MPa]
0
200
400
600
800
1000
1200
1400
0
1
2
3
4
5
6

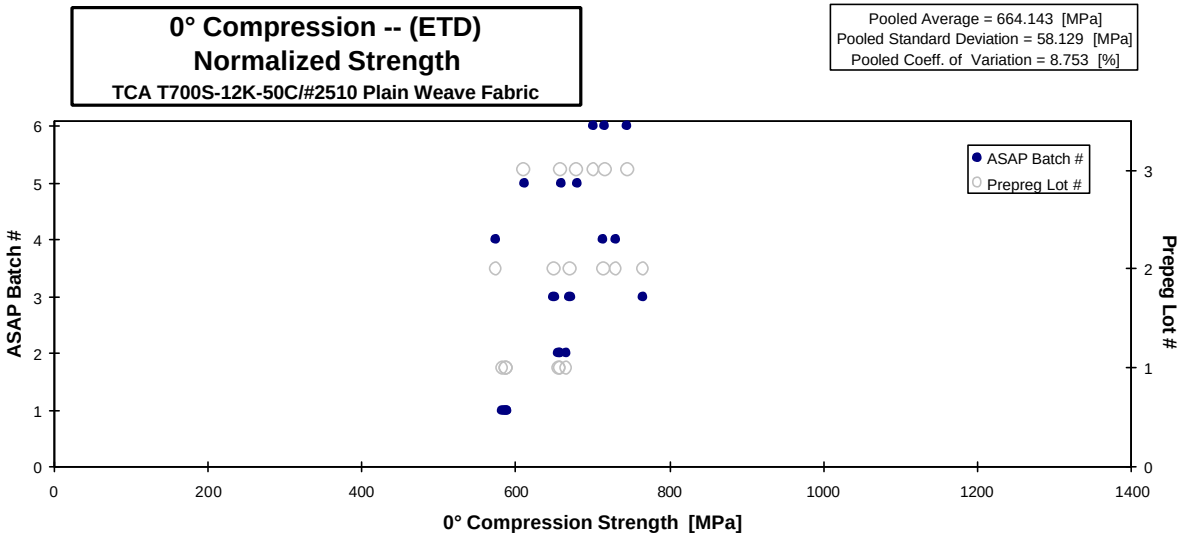

0° Compression -- (ETW)
Normalized Modulus
TCA T700S-12K-50C/#2510 Plain Weave Fabric
Pooled Average = 0.055 [GPa]
Pooled Standard Deviation = 0.004 [GPa]
Pooled Coeff. of Variation = 7.418 [%]
ASAP Batch #
Prepreg Lot #
ASAP Batch #
Prepreg Lot #
0° Compression Modulus [GPa]
0.000
0.020
0.040
0.060
0.080
0.100
0.120
0
1
2
3
4
5
6

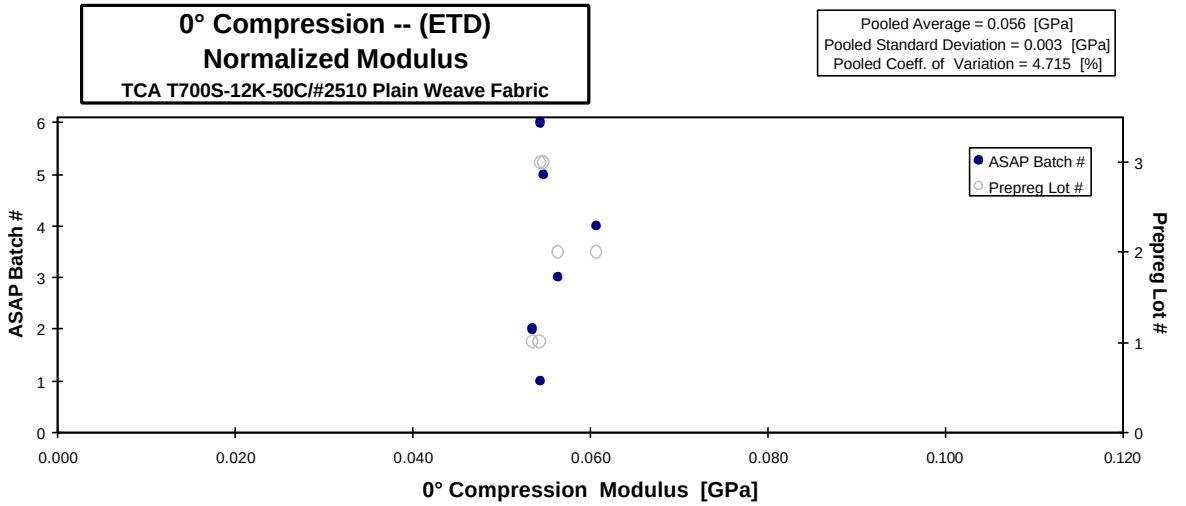
0° Compression -- (ETD)
Strength & Modulus
TCA T700S-12K-50C/#2510 Plain Weave Fabric

normalizing t_{ply} [mm]: 0.2184

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [MPa]	Modulus [GPa]	Avg. Specimen Thickn. [mm]	# Plies in Laminate	Avg. t_{ply} [mm]	$Strength_{norm}$ [MPa]	$Modulus_{norm}$ [GPa]
A1-910-056-1-9	A	1	1	591.862		2.604	12	0.21696	587.847	
A2-910-056-1-8	A	1	1	592.073		2.604	12	0.21696	588.057	
A2-910-056-1-9	A	1	1	586.996		2.604	12	0.21696	583.014	
A2-910-056-1-2	A	1	1		0.055	3.017	14	0.21550		0.054
B1-910-056-1-8	B	1	2	660.847		2.604	12	0.21696	656.365	
B1-910-056-1-9	B	1	2	661.520		2.604	12	0.21696	657.033	
B2-910-056-1-9	B	1	2	670.195		2.604	12	0.21696	665.649	
B2-910-056-1-2	B	1	2		0.054	3.028	14	0.21630		0.054
A1-910-057-1-8	A	2	3	678.870		2.591	12	0.21590	670.976	
A1-910-057-1-9	A	2	3	774.079		2.591	12	0.21590	765.078	
A2-910-057-1-9	A	2	3	658.037		2.591	12	0.21590	650.386	
A2-910-057-1-2	A	2	3		0.057	3.040	14	0.21717		0.056
B1-910-057-1-8	B	2	4	722.308		2.591	12	0.21590	713.909	
B1-910-057-1-9	B	2	4	738.506		2.591	12	0.21590	729.919	
B2-910-057-1-9	B	2	4	580.651		2.591	12	0.21590	573.899	
B2-910-057-1-2	B	2	4		0.062	2.991	14	0.21367		0.061
A1-910-058-1-9	A	3	5	659.631		2.619	12	0.21823	658.992	
A2-910-058-1-5	A	3	5	680.408		2.619	12	0.21823	679.749	
A2-910-058-1-9	A	3	5	611.657		2.619	12	0.21823	611.064	
A2-910-058-1-2	A	3	5		0.055	3.042	14	0.21726		0.055
B1-910-058-1-9	B	3	6	701.614		2.619	12	0.21823	700.934	
B2-910-058-1-5	B	3	6	716.942		2.619	12	0.21823	716.248	
B2-910-058-1-9	B	3	6	746.174		2.619	12	0.21823	745.451	
B2-910-058-1-6	B	3	6		0.054	3.083	14	0.22022		0.054

Average	**668.465**	**0.056**		**Average$_{norm}$**	**0.21694**	**664.143**	**0.056**
Standard Dev.	**58.548**	**0.003**		**Standard Dev.$_{norm}$**		**58.129**	**0.003**
Coeff. of Var. [%]	**8.759**	**5.436**		**Coeff. of Var. [%]$_{norm}$**		**8.753**	**4.715**
Min.	**580.651**	**0.054**		**Min.**	**0.2137**	**573.899**	**0.054**
Max.	**774.079**	**0.062**		**Max.**	**0.2202**	**765.078**	**0.061**
Number of Spec.	**18**	**6**		**Number of Spec.**		**18**	**6**


0° Compression -- (ETD)
Normalized Strength
TCA T700S-12K-50C/#2510 Plain Weave Fabric
Pooled Average = 664.143 [MPa]
Pooled Standard Deviation = 58.129 [MPa]
Pooled Coeff. of Variation = 8.753 [%]
ASAP Batch #
Prepreg Lot #
ASAP Batch #
Prepreg Lot #
0° Compression Strength [MPa]
0
200
400
600
800
1000
1200
1400

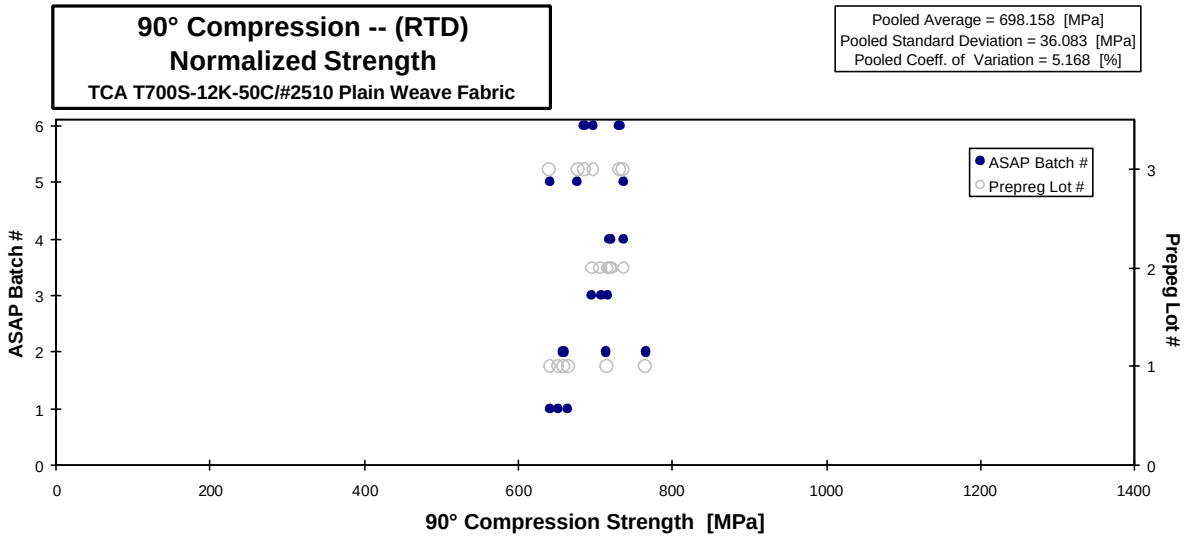

0° Compression -- (ETD)
Normalized Modulus
TCA T700S-12K-50C/#2510 Plain Weave Fabric
Pooled Average = 0.056 [GPa]
Pooled Standard Deviation = 0.003 [GPa]
Pooled Coeff. of Variation = 4.715 [%]
ASAP Batch #
Prepreg Lot #
ASAP Batch #
Prepreg Lot #
0° Compression Modulus [GPa]
0.000
0.020
0.040
0.060
0.080
0.100
0.120

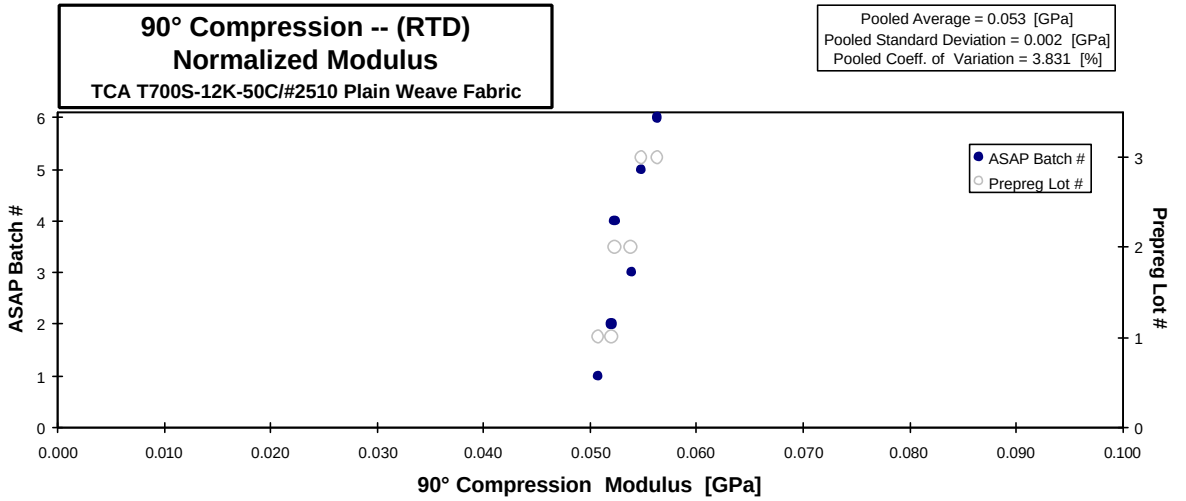
90° Compression -- (RTD)
Strength & Modulus
TCA T700S-12K-50C/#2510 Plain Weave Fabric

normalizing t_{ply} [mm]: 0.2184

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [MPa]	Modulus [GPa]	Avg. Specimen Thickn. [mm]	# Plies in Laminate	Avg. t_{ply} [mm]	$Strength_{norm}$ [MPa]	$Modulus_{norm}$ [GPa]
A1-910-056-1-5	A	1	1	672.954		2.591	12	0.21590	665.129	
A2-910-056-1-8	A	1	1	659.447		2.591	12	0.21590	651.779	
A2-910-056-1-9	A	1	1	649.514		2.591	12	0.21590	641.962	
A2-910-056-1-1	A	1	1		0.051	3.033	14	0.21666		0.051
B1-910-056-1-5	B	1	2	666.617		2.591	12	0.21590	658.866	
B1-910-056-1-8	B	1	2	723.408		2.591	12	0.21590	714.997	
B2-910-056-1-4	B	1	2	774.590		2.591	12	0.21590	765.583	
B2-910-056-1-1	B	1	2		0.052	3.071	14	0.21938		0.052
A1-910-057-1-8	A	2	3	715.706		2.591	12	0.21590	707.384	
A2-910-057-1-4	A	2	3	724.567		2.591	12	0.21590	716.142	
A2-910-057-1-5	A	2	3	704.268		2.591	12	0.21590	696.079	
A2-910-057-1-1	A	2	3		0.054	3.064	14	0.21884		0.054
B1-910-057-1-7	B	2	4	729.546		2.591	12	0.21590	721.063	
B2-910-057-1-4	B	2	4	745.664		2.591	12	0.21590	736.993	
B2-910-057-1-5	B	2	4	728.080		2.591	12	0.21590	719.614	
B2-910-057-1-1	B	2	4		0.053	3.029	14	0.21639		0.052
A1-910-058-1-4	A	3	5	734.190		2.629	12	0.21908	736.325	
A1-910-058-1-5	A	3	5	638.979		2.629	12	0.21908	640.837	
A2-910-058-1-4	A	3	5	675.819		2.629	12	0.21908	677.783	
A2-910-058-1-1	A	3	5		0.055	3.062	14	0.21871		0.055
B1-910-058-1-4	B	3	6	696.084		2.629	12	0.21908	698.107	
B1-910-058-1-5	B	3	6	684.123		2.629	12	0.21908	686.112	
B2-910-058-1-4	B	3	6	729.969		2.629	12	0.21908	732.091	
B2-910-058-1-1	B	3	6		0.057	3.028	14	0.21626		0.056

Average	**702.974**	**0.054**		**$Average_{norm}$**	**0.21715**	**698.158**	**0.053**
Standard Dev.	**36.981**	**0.002**		**$Standard\ Dev._{norm}$**		**36.083**	**0.002**
Coeff. of Var. [%]	**5.261**	**3.915**		**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**5.168**	**3.831**
Min.	**638.979**	**0.051**		**Min.**	**0.2159**	**640.837**	**0.051**
Max.	**774.590**	**0.057**		**Max.**	**0.2194**	**765.583**	**0.056**
Number of Spec.	**18**	**6**		**Number of Spec.**		**18**	**6**


90° Compression -- (RTD)
Normalized Strength
TCA T700S-12K-50C/#2510 Plain Weave Fabric
Pooled Average = 698.158 [MPa]
Pooled Standard Deviation = 36.083 [MPa]
Pooled Coeff. of Variation = 5.168 [%]
ASAP Batch #
Prepreg Lot #
ASAP Batch #
Prepreg Lot #
0
1
2
3
4
5
6
0
200
400
600
800
1000
1200
1400
90° Compression Strength [MPa]

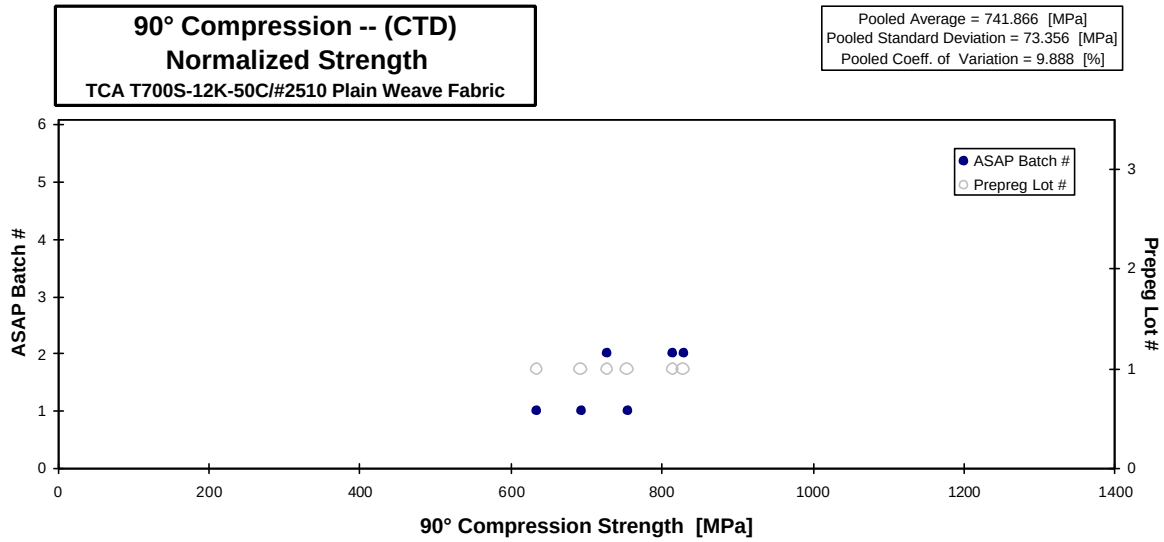

90° Compression -- (RTD)
Normalized Modulus
TCA T700S-12K-50C/#2510 Plain Weave Fabric
Pooled Average = 0.053 [GPa]
Pooled Standard Deviation = 0.002 [GPa]
Pooled Coeff. of Variation = 3.831 [%]
ASAP Batch #
Prepreg Lot #
ASAP Batch #
Prepreg Lot #
0
1
2
3
4
5
6
0.000
0.010
0.020
0.030
0.040
0.050
0.060
0.070
0.080
0.090
0.100
90° Compression Modulus [GPa]

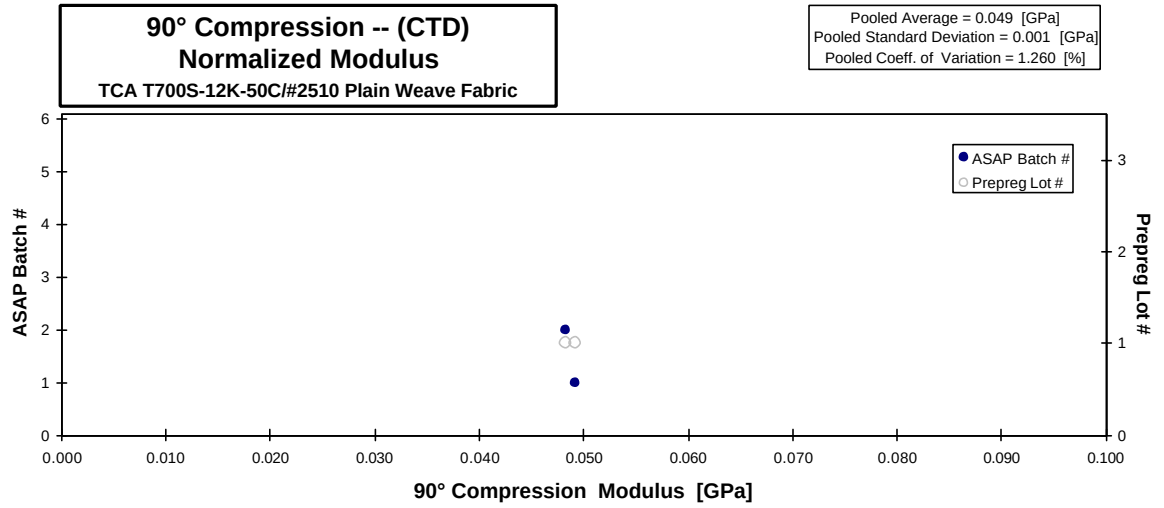
90° Compression -- (CTD)
Strength & Modulus
TCA T700S-12K-50C/#2510 Plain Weave Fabric

normalizing t_{ply} [mm]: 0.2184

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [MPa]	Modulus [GPa]	Avg. Specimen Thickn. [mm]	# Plies in Laminate	Avg. t_{ply} [mm]	$Strength_{norm}$ [MPa]	$Modulus_{norm}$ [GPa]
A1-910-056-1-4	A	1	1	756.768		2.612	12	0.21766	754.055	
A2-910-056-1-4	A	1	1	636.880		2.612	12	0.21766	634.596	
A2-910-056-1-5	A	1	1	695.550		2.612	12	0.21766	693.056	
A2-910-056-1-6	A	1	1		0.049	3.063	14	0.21880		0.049
B1-910-056-1-3	B	1	2	729.911		2.612	12	0.21766	727.294	
B1-910-056-1-4	B	1	2	831.167		2.612	12	0.21766	828.187	
B2-910-056-1-3	B	1	2	816.935		2.612	12	0.21766	814.006	
B2-910-056-1-6	B	1	2		0.048	3.104	14	0.22171		0.048

Average	**744.535**	**0.048**	**$Average_{norm}$**	**0.21831**	**741.866**	**0.049**
Standard Dev.	**73.620**	**0.001**	**Standard Dev.$_{norm}$**		**73.356**	**0.001**
Coeff. of Var. [%]	**9.888**	**2.192**	**Coeff. of Var. [%]$_{norm}$**		**9.888**	**1.260**
Min.	**636.880**	**0.048**	**Min.**	**0.2177**	**634.596**	**0.048**
Max.	**831.167**	**0.049**	**Max.**	**0.2217**	**828.187**	**0.049**
Number of Spec.	**6**	**2**	**Number of Spec.**		**6**	**2**


90° Compression -- (CTD)
Normalized Strength
TCA T700S-12K-50C/#2510 Plain Weave Fabric
Pooled Average = 741.866 [MPa]
Pooled Standard Deviation = 73.356 [MPa]
Pooled Coeff. of Variation = 9.888 [%]
ASAP Batch #
Prepreg Lot #
ASAP Batch #
Prepeg Lot #
90° Compression Strength [MPa]

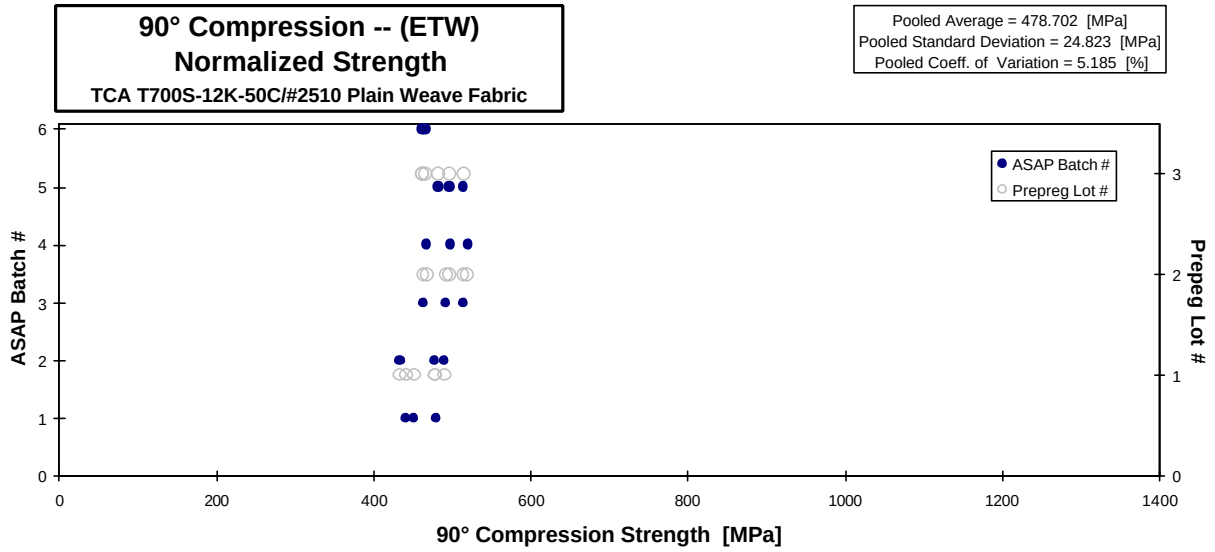

90° Compression -- (CTD)
Normalized Modulus
TCA T700S-12K-50C/#2510 Plain Weave Fabric
Pooled Average = 0.049 [GPa]
Pooled Standard Deviation = 0.001 [GPa]
Pooled Coeff. of Variation = 1.260 [%]
ASAP Batch #
Prepreg Lot #
ASAP Batch #
Prepreg Lot #
90° Compression Modulus [GPa]

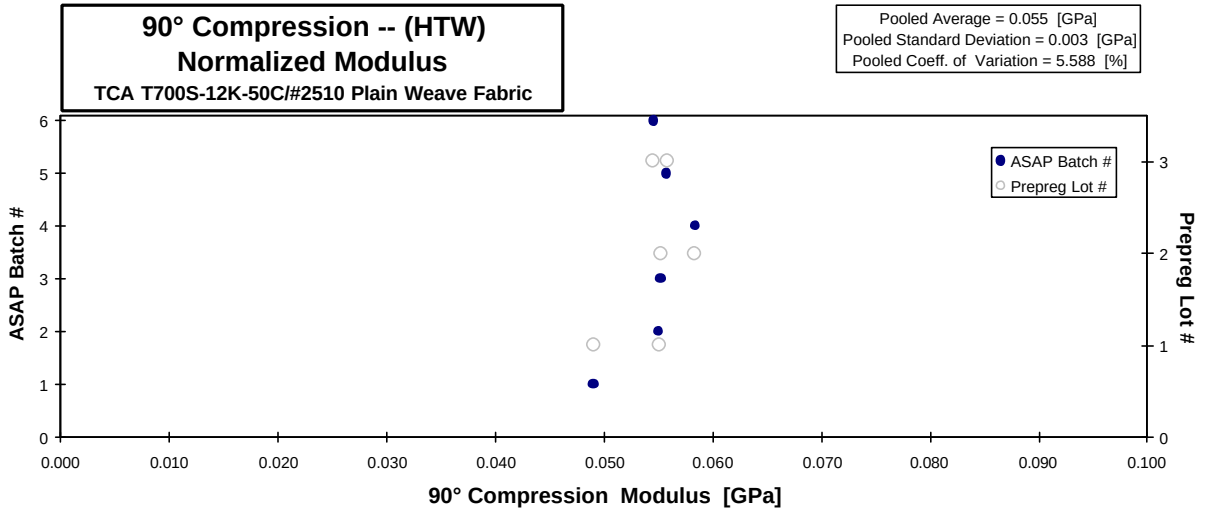
90° Compression -- (ETW)
Strength & Modulus
TCA T700S-12K-50C/#2510 Plain Weave Fabric

normalizing t_{ply} [mm]: 0.2184

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [MPa]	Modulus [GPa]	Avg. Specimen Thickn. [mm]	# Plies in Laminate	Avg. t_{ply} [mm]	$Strength_{norm}$ [MPa]	$Modulus_{norm}$ [GPa]
A1-910-056-1-1	A	1	1	443.124		2.612	12	0.21766	441.536	
A2-910-056-1-1	A	1	1	481.103		2.612	12	0.21766	479.378	
A2-910-056-1-2	A	1	1	453.010		2.612	12	0.21766	451.386	
A2-910-056-1-3	A	1	1		0.049	3.046	14	0.21759		0.049
B1-910-056-1-1	B	1	2	435.238		2.612	12	0.21766	433.678	
B2-910-056-1-1	B	1	2	492.096		2.612	12	0.21766	490.332	
B2-910-056-1-2	B	1	2	479.735		2.612	12	0.21766	478.015	
B2-910-056-1-3	B	1	2		0.055	3.081	14	0.22004		0.055
A1-910-057-1-1	A	2	3	495.807		2.604	12	0.21696	492.444	
A1-910-057-1-2	A	2	3	518.135		2.604	12	0.21696	514.621	
A2-910-057-1-1	A	2	3	466.330		2.604	12	0.21696	463.167	
A2-910-057-1-3	A	2	3		0.054	3.152	14	0.22512		0.055
B1-910-057-1-1	B	2	4	471.276		2.604	12	0.21696	468.080	
B2-910-057-1-1	B	2	4	501.172		2.604	12	0.21696	497.772	
B2-910-057-1-2	B	2	4	523.323		2.604	12	0.21696	519.773	
B2-910-057-1-3	B	2	4		0.059	3.026	14	0.21617		0.058
A1-910-058-1-1	A	3	5	513.293		2.629	12	0.21908	514.785	
A2-910-058-1-1	A	3	5	481.238		2.629	12	0.21908	482.637	
A2-910-058-1-2	A	3	5	495.435		2.629	12	0.21908	496.875	
A2-910-058-1-3	A	3	5		0.056	3.061	14	0.21868		0.056
B1-910-058-1-1	B	3	6	465.136		2.629	12	0.21908	466.489	
B2-910-058-1-1	B	3	6	461.665		2.629	12	0.21908	463.007	
B2-910-058-1-2	B	3	6	461.324		2.629	12	0.21908	462.665	
B2-910-058-1-3	B	3	6		0.055	3.036	14	0.21684		0.055

	Strength	Modulus			$Strength_{norm}$	$Modulus_{norm}$
Average	**479.913**	**0.055**	**$Average_{norm}$**	**0.21819**	**478.702**	**0.055**
Standard Dev.	**25.188**	**0.003**	**Standard $Dev._{norm}$**		**24.823**	**0.003**
Coeff. of Var. [%]	**5.249**	**5.798**	**Coeff. of Var. $[\%]_{norm}$**		**5.185**	**5.588**
Min.	**435.238**	**0.049**	**Min.**	**0.2162**	**433.678**	**0.049**
Max.	**523.323**	**0.059**	**Max.**	**0.2251**	**519.773**	**0.058**
Number of Spec.	**18**	**6**	**Number of Spec.**		**18**	**6**


90° Compression -- (ETW)
Normalized Strength
TCA T700S-12K-50C/#2510 Plain Weave Fabric
Pooled Average = 478.702 [MPa]
Pooled Standard Deviation = 24.823 [MPa]
Pooled Coeff. of Variation = 5.185 [%]
ASAP Batch #
Prepreg Lot #
ASAP Batch #
Prepeg Lot #
90° Compression Strength [MPa]

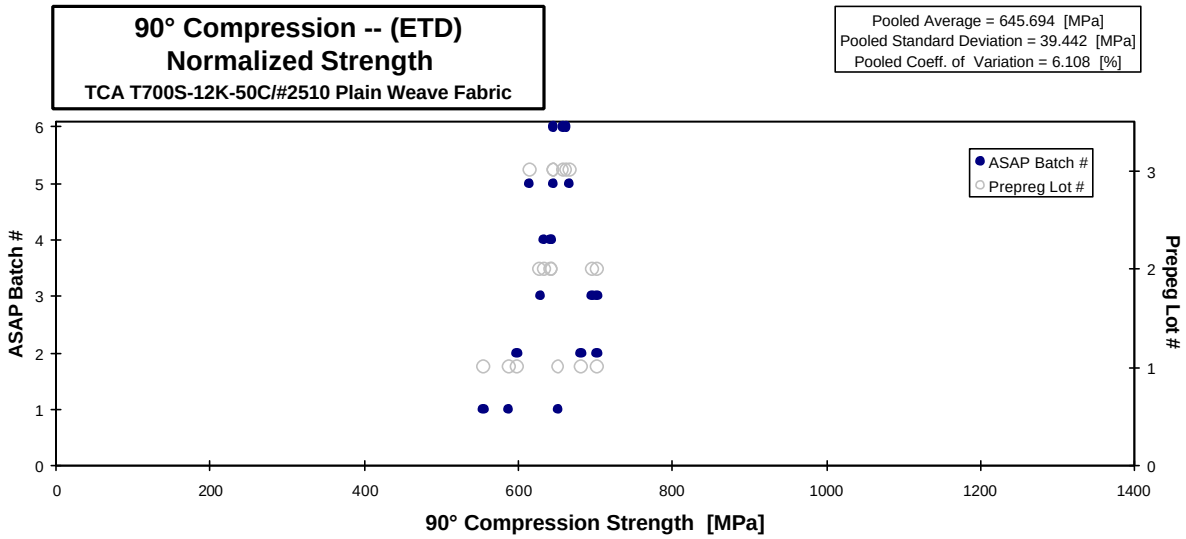

90° Compression -- (HTW)
Normalized Modulus
TCA T700S-12K-50C/#2510 Plain Weave Fabric
Pooled Average = 0.055 [GPa]
Pooled Standard Deviation = 0.003 [GPa]
Pooled Coeff. of Variation = 5.588 [%]
ASAP Batch #
Prepreg Lot #
ASAP Batch #
Prepreg Lot #
90° Compression Modulus [GPa]

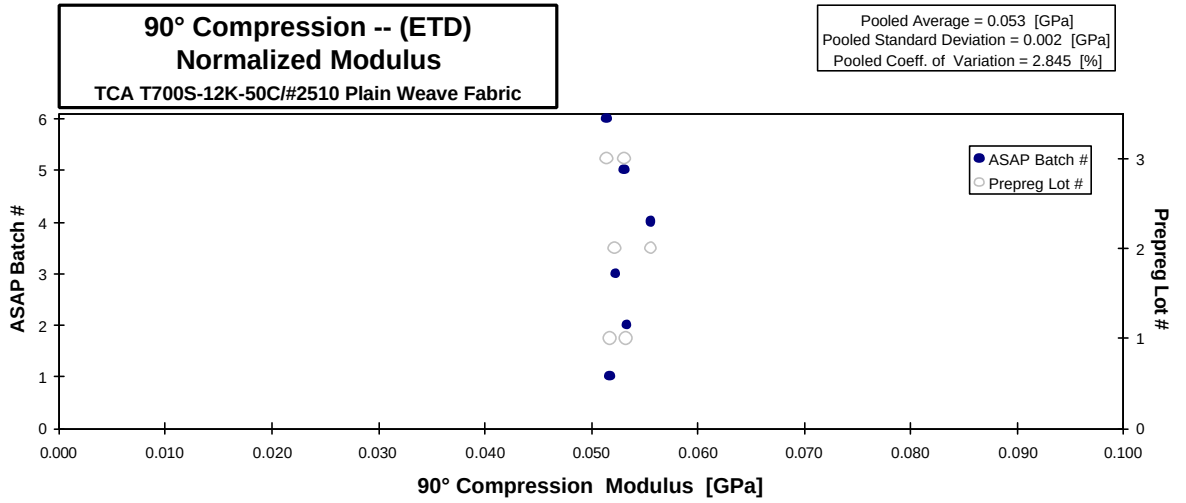
90° Compression -- (ETD)
Strength & Modulus
TCA T700S-12K-50C/#2510 Plain Weave Fabric

normalizing t_{ply} [mm]: 0.2184

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [MPa]	Modulus [GPa]	Avg. Specimen Thickn. [mm]	# Plies in Laminate	Avg. t_{ply} [mm]	$Strength_{norm}$ [MPa]	$Modulus_{norm}$ [GPa]
A1-910-056-1-7	A	1	1	653.659		2.616	12	0.21802	652.392	
A1-910-056-1-8	A	1	1	556.310		2.616	12	0.21802	555.232	
A2-910-056-1-10	A	1	1	589.406		2.616	12	0.21802	588.264	
A2-910-056-1-2	A	1	1		0.052	3.040	14	0.21712		0.052
B1-910-056-1-9	B	1	2	600.151		2.616	12	0.21802	598.988	
B2-910-056-1-5	B	1	2	683.364		2.616	12	0.21802	682.040	
B2-910-056-1-9	B	1	2	703.935		2.616	12	0.21802	702.571	
B2-910-056-1-2	B	1	2		0.053	3.075	14	0.21962		0.053
A1-910-057-1-10	A	2	3	632.877		2.604	12	0.21696	628.584	
A2-910-057-1-8	A	2	3	701.496		2.604	12	0.21696	696.737	
A2-910-057-1-9	A	2	3	707.857		2.604	12	0.21696	703.056	
A2-910-057-1-2	A	2	3		0.052	3.061	14	0.21866		0.052
B1-910-057-1-8	B	2	4	646.723		2.604	12	0.21696	642.336	
B2-910-057-1-10	B	2	4	648.515		2.604	12	0.21696	644.116	
B2-910-057-1-11	B	2	4	638.429		2.604	12	0.21696	634.098	
B2-910-057-1-2	B	2	4		0.056	3.030	14	0.21641		0.056
A1-910-058-1-9	A	3	5	673.102		2.599	12	0.21660	667.428	
A2-910-058-1-8	A	3	5	651.037		2.599	12	0.21660	645.549	
A2-910-058-1-9	A	3	5	620.254		2.599	12	0.21660	615.025	
A2-910-058-1-6	A	3	5		0.053	3.052	14	0.21799		0.053
B1-910-058-1-9	B	3	6	651.003		2.599	12	0.21660	645.515	
B2-910-058-1-8	B	3	6	664.063		2.599	12	0.21660	658.465	
B2-910-058-1-9	B	3	6	667.730		2.599	12	0.21660	662.101	
B2-910-058-1-2	B	3	6		0.052	3.033	14	0.21663		0.051

Average	**649.439**	**0.053**	**$Average_{norm}$**	**0.21733**	**645.694**	**0.053**
Standard Dev.	**40.100**	**0.002**	**$Standard\ Dev._{norm}$**		**39.442**	**0.002**
Coeff. of Var. [%]	**6.175**	**2.984**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**6.108**	**2.845**
Min.	**556.310**	**0.052**	**Min.**	**0.2164**	**555.232**	**0.051**
Max.	**707.857**	**0.056**	**Max.**	**0.2196**	**703.056**	**0.056**
Number of Spec.	**18**	**6**	**Number of Spec.**		**18**	**6**

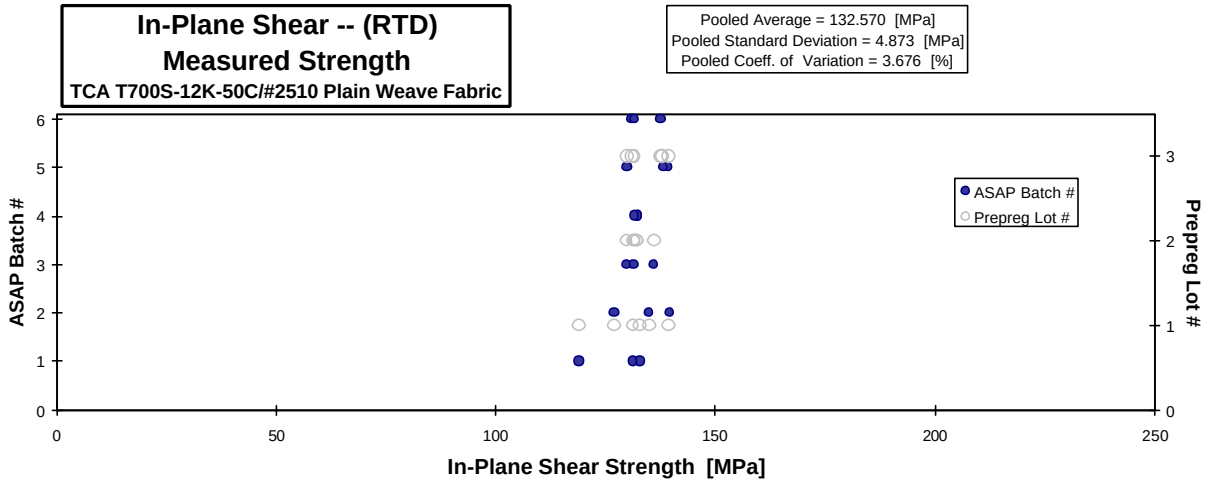

90° Compression -- (ETD)
Normalized Strength
TCA T700S-12K-50C/#2510 Plain Weave Fabric
Pooled Average = 645.694 [MPa]
Pooled Standard Deviation = 39.442 [MPa]
Pooled Coeff. of Variation = 6.108 [%]
ASAP Batch #
Prepreg Lot #
ASAP Batch #
Prepreg Lot #
0
200
400
600
800
1000
1200
1400
90° Compression Strength [MPa]

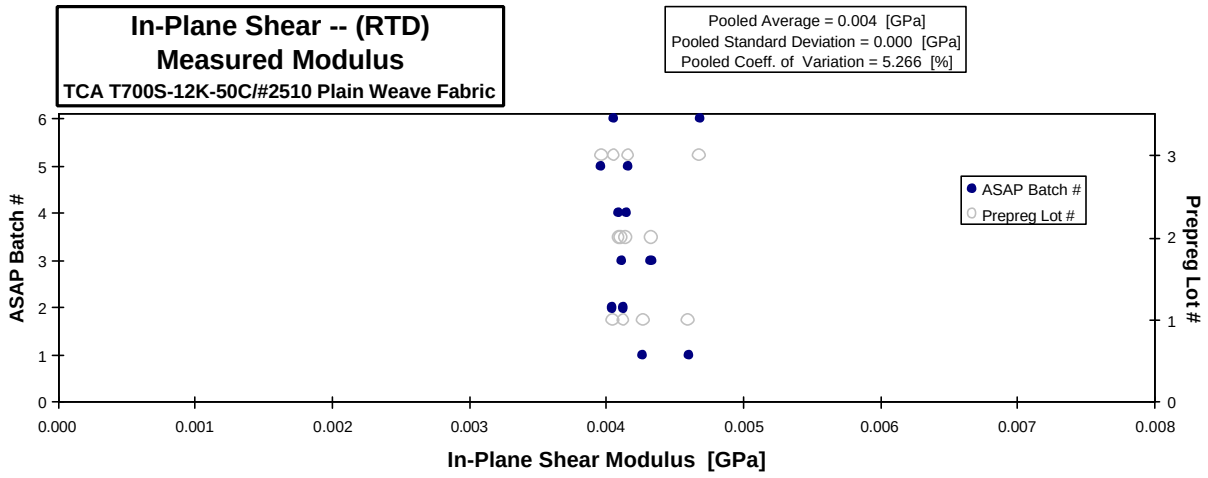

90° Compression -- (ETD)
Normalized Modulus
TCA T700S-12K-50C/#2510 Plain Weave Fabric
Pooled Average = 0.053 [GPa]
Pooled Standard Deviation = 0.002 [GPa]
Pooled Coeff. of Variation = 2.845 [%]
ASAP Batch #
Prepreg Lot #
ASAP Batch #
Prepreg Lot #
0.000
0.010
0.020
0.030
0.040
0.050
0.060
0.070
0.080
0.090
0.100
90° Compression Modulus [GPa]

In-Plane Shear -- (RTD)
Strength & Modulus
TCA T700S-12K-50C/#2510 Plain Weave Fabric

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [MPa]	Modulus [GPa]	Avg. Specimen Thickn. [mm]	# Plies in Laminate	Avg. t_{ply} [mm]
A1-910-056-1-5	A	1	1	132.930	0.004	3.529	16	0.22058
A1-910-056-1-6	A	1	1	131.264	0.005	3.538	16	0.22111
A1-910-056-1-27	A	1	1	119.133		3.524	16	0.22023
B1-910-056-1-5	B	1	2	135.001	0.004	3.529	16	0.22058
B1-910-056-1-6	B	1	2	139.524	0.004	3.522	16	0.22011
B1-910-056-1-27	B	1	2	127.040		3.498	16	0.21863
A1-910-057-1-1	A	2	3	131.403	0.004	3.505	16	0.21908
A1-910-057-1-2	A	2	3	136.107	0.004	3.498	16	0.21863
A1-910-057-1-11	A	2	3	129.827		3.483	16	0.21768
B1-910-057-1-1	B	2	4	132.209	0.004	3.4628	16	0.21642
B1-910-057-1-2	B	2	4	132.249	0.004	3.4943	16	0.21839
B1-910-057-1-11	B	2	4	131.599		3.4595	16	0.21622
A1-910-058-1-1	A	3	5	139.408	0.004	3.438	16	0.21487
A1-910-058-1-2	A	3	5	138.150	0.004	3.452	16	0.21574
A1-910-058-1-11	A	3	5	129.980		3.447	16	0.21542
B1-910-058-1-1	B	3	6	131.098	0.005	3.443	16	0.21522
B1-910-058-1-2	B	3	6	131.647	0.004	3.458	16	0.21611
B1-910-058-1-11	B	3	6	137.698		3.445	16	0.21531

Average	**132.570**	**0.004**	**Average**	**0.2178**
Standard Dev.	**4.873**	**0.000**		
Coeff. of Var. [%]	**3.676**	**5.266**		
Min.	**119.133**	**0.004**	**Min.**	**0.2149**
Max.	**139.524**	**0.005**	**Max.**	**0.2211**
Number of Spec.	**18**	**12**		

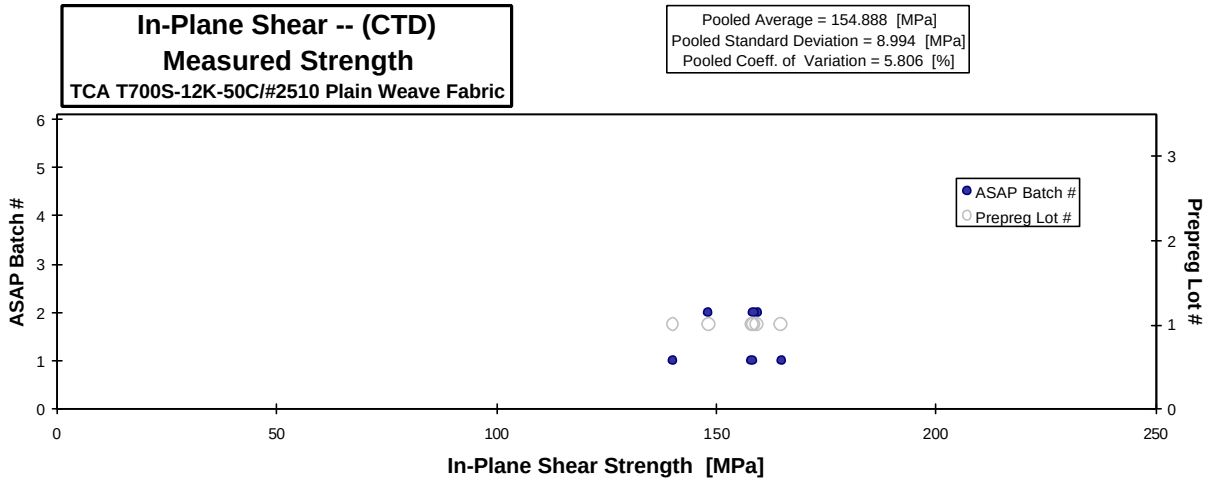

In-Plane Shear -- (RTD)
Measured Strength
TCA T700S-12K-50C/#2510 Plain Weave Fabric
Pooled Average = 132.570 [MPa]
Pooled Standard Deviation = 4.873 [MPa]
Pooled Coeff. of Variation = 3.676 [%]
ASAP Batch #
Prepreg Lot #
ASAP Batch #
Prepreg Lot #
In-Plane Shear Strength [MPa]
0
50
100
150
200
250
0
1
2
3
4
5
6

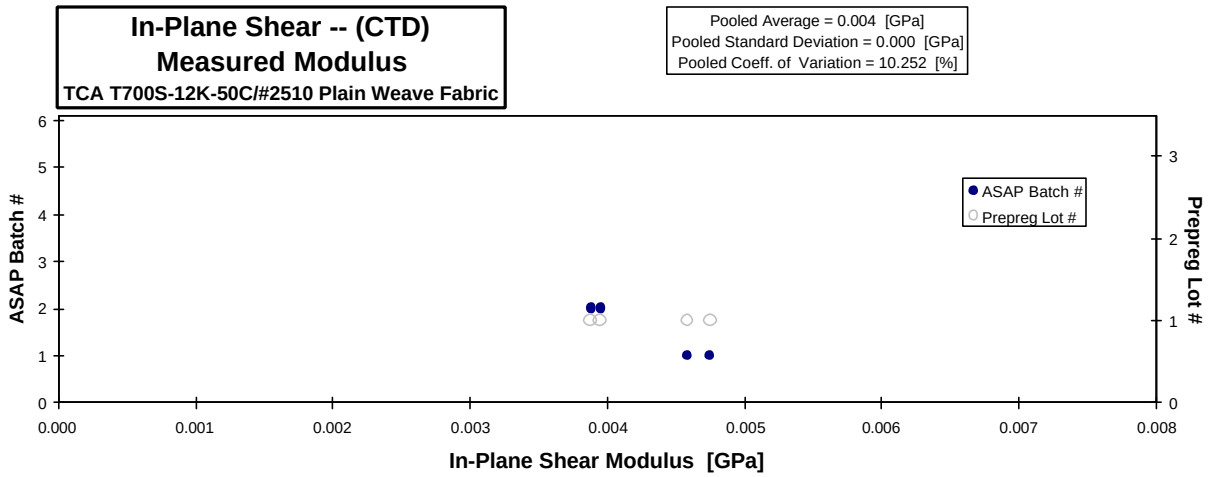

In-Plane Shear -- (RTD)
Measured Modulus
TCA T700S-12K-50C/#2510 Plain Weave Fabric
Pooled Average = 0.004 [GPa]
Pooled Standard Deviation = 0.000 [GPa]
Pooled Coeff. of Variation = 5.266 [%]
ASAP Batch #
Prepreg Lot #
ASAP Batch #
Prepreg Lot #
In-Plane Shear Modulus [GPa]
0.000
0.001
0.002
0.003
0.004
0.005
0.006
0.007
0.008
0
1
2
3
4
5
6

In-Plane Shear -- (CTD)
Strength & Modulus
TCA T700S-12K-50C/#2510 Plain Weave Fabric

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [MPa]	Modulus [GPa]	Avg. Specimen Thickn. [mm]	# Plies in Laminate	Avg. t_{ply} [mm]
A1-910-056-1-1	A	1	1	164.811	0.005	3.526	16	0.22035
A2-910-056-1-2	A	1	1	158.190	0.005	3.518	16	0.21987
A1-910-056-1-3	A	1	1	140.140		3.523	16	0.22019
B1-910-056-1-1	B	1	2	159.376	0.004	3.526	16	0.22035
B2-910-056-1-2	B	1	2	158.554	0.004	3.528	16	0.22050
B1-910-056-1-3	B	1	2	148.258		3.533	16	0.22082

Average	**154.888**	**0.004**	**Average**	**0.2203**
Standard Dev.	**8.994**	**0.000**		
Coeff. of Var. [%]	**5.806**	**10.252**		
Min.	**140.140**	**0.004**	**Min.**	**0.2199**
Max.	**164.811**	**0.005**	**Max.**	**0.2208**
Number of Spec.	**6**	**4**		

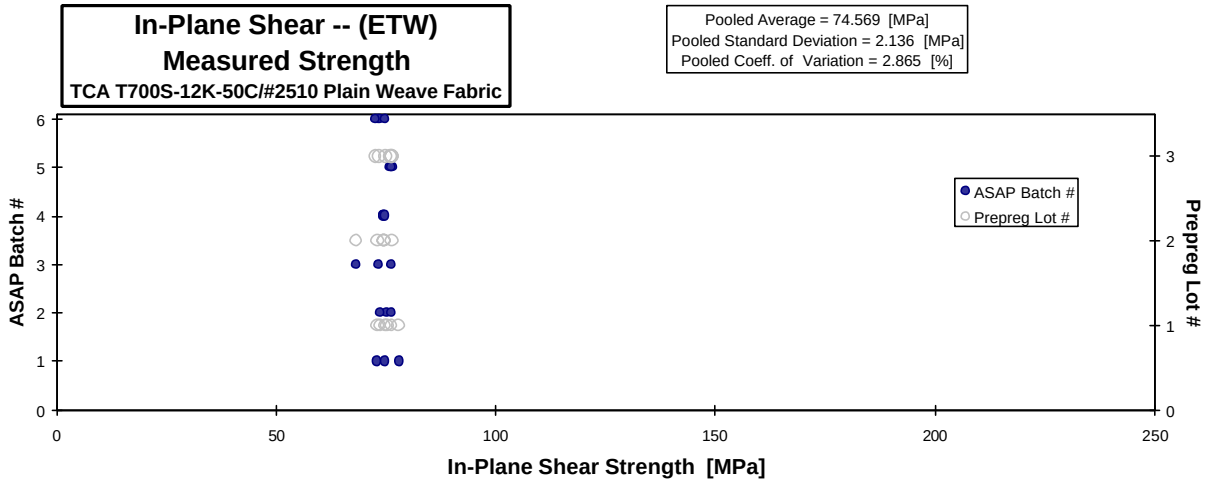

In-Plane Shear -- (CTD)
Measured Strength
TCA T700S-12K-50C/#2510 Plain Weave Fabric
Pooled Average = 154.888 [MPa]
Pooled Standard Deviation = 8.994 [MPa]
Pooled Coeff. of Variation = 5.806 [%]
ASAP Batch #
Prepreg Lot #
ASAP Batch #
Prepreg Lot #
In-Plane Shear Strength [MPa]
0
50
100
150
200
250
0
1
2
3
4
5
6

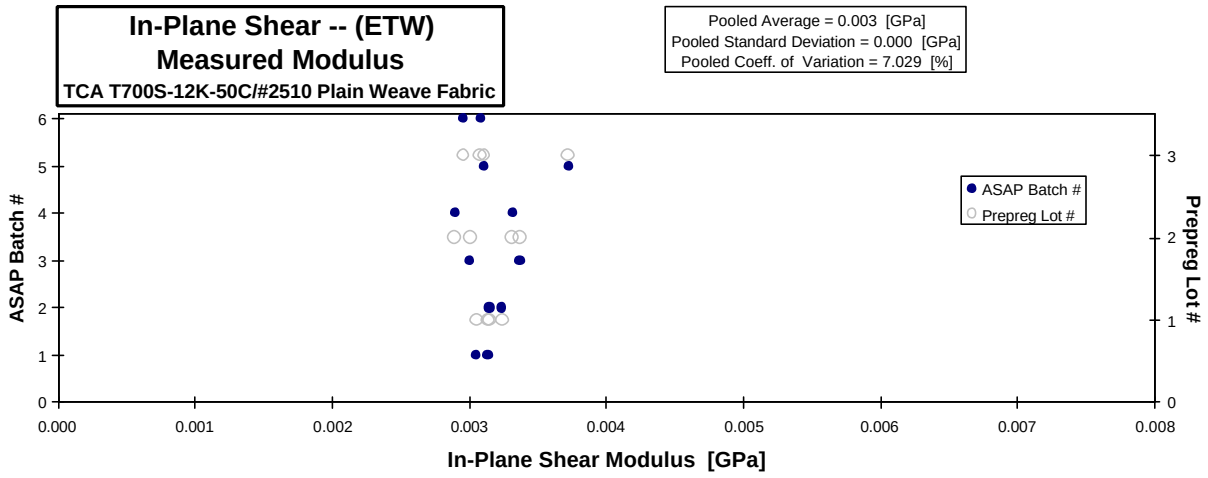

In-Plane Shear -- (CTD)
Measured Modulus
TCA T700S-12K-50C/#2510 Plain Weave Fabric
Pooled Average = 0.004 [GPa]
Pooled Standard Deviation = 0.000 [GPa]
Pooled Coeff. of Variation = 10.252 [%]
ASAP Batch #
Prepreg Lot #
ASAP Batch #
Prepreg Lot #
In-Plane Shear Modulus [GPa]
0.000
0.001
0.002
0.003
0.004
0.005
0.006
0.007
0.008
0
1
2
3
4
5
6

In-Plane Shear -- (ETW)
Strength & Modulus
TCA T700S-12K-50C/#2510 Plain Weave Fabric

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [MPa]	Modulus [GPa]	Avg. Specimen Thickn. [mm]	# Plies in Laminate	Avg. t_{ply} [mm]
A1-910-056-1-10	A	1	1	74.777	0.003	3.533	16	0.22082
A1-910-056-1-13	A	1	1	77.954	0.003	3.462	16	0.21638
A1-910-056-1-9	A	1	1	73.069		3.539	16	0.22117
B1-910-056-1-9	B	1	2	75.230	0.003	3.482	16	0.21760
B1-910-056-1-10	B	1	2	76.201	0.003	3.462	16	0.21634
B1-910-056-1-11	B	1	2	73.632		3.436	16	0.21474
A1-910-057-1-5	A	2	3	76.311	0.003	3.511	16	0.21942
A1-910-057-1-6	A	2	3	68.150	0.003	3.510	16	0.21936
A1-910-057-1-7	A	2	3	73.249		3.513	16	0.21958
B1-910-057-1-5	B	2	4	74.530	0.003	3.480	16	0.21752
B1-910-057-1-6	B	2	4	74.540	0.003	3.490	16	0.21812
B1-910-057-1-7	B	2	4	74.732		3.483	16	0.21769
A1-910-058-1-5	A	3	5	76.030	0.004	3.473	16	0.21709
A1-910-058-1-6	A	3	5	76.421	0.003	3.471	16	0.21693
A1-910-058-1-7	A	3	5	76.375		3.469	16	0.21682
B1-910-058-1-5	B	3	6	73.480	0.003	3.478	16	0.21736
B1-910-058-1-6	B	3	6	72.642	0.003	3.489	16	0.21809
B1-910-058-1-7	B	3	6	74.919		3.487	16	0.21796

Average	**74.569**	**0.003**	**Average**	**0.2179**
Standard Dev.	**2.136**	**0.000**		
Coeff. of Var. [%]	**2.865**	**7.029**		
Min.	**68.150**	**0.003**	**Min.**	**0.2147**
Max.	**77.954**	**0.004**	**Max.**	**0.2212**
Number of Spec.	**18**	**12**		

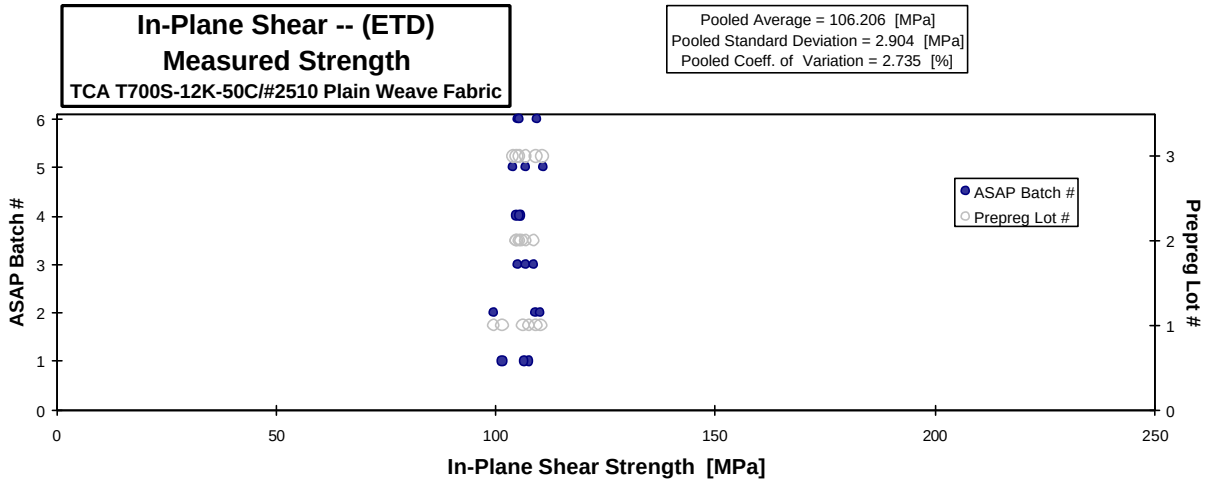

In-Plane Shear -- (ETW)
Measured Strength
TCA T700S-12K-50C/#2510 Plain Weave Fabric
Pooled Average = 74.569 [MPa]
Pooled Standard Deviation = 2.136 [MPa]
Pooled Coeff. of Variation = 2.865 [%]
ASAP Batch #
Prepreg Lot #
ASAP Batch #
Prepreg Lot #
In-Plane Shear Strength [MPa]
0
50
100
150
200
250
0
1
2
3
4
5
6

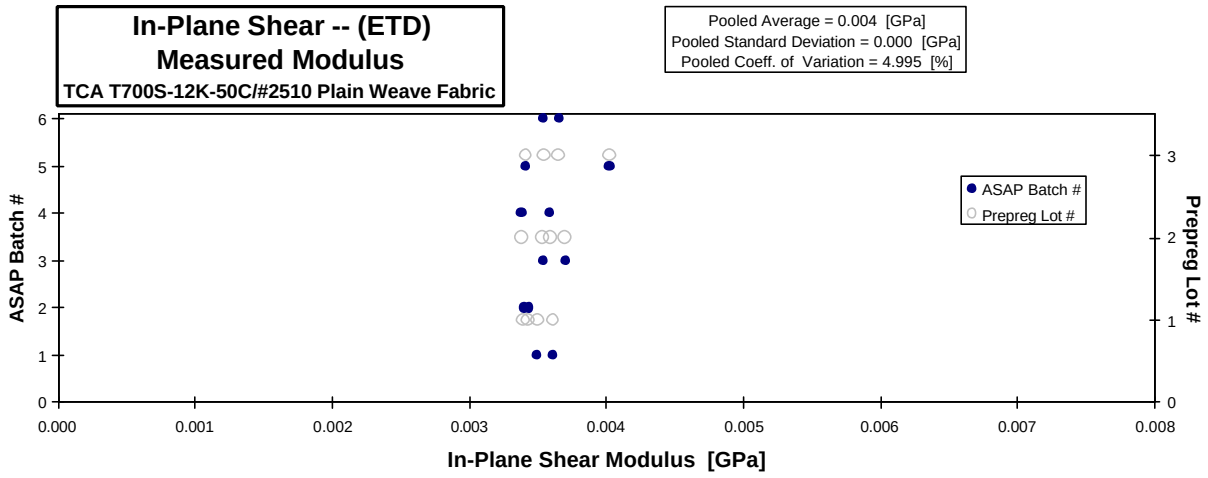

In-Plane Shear -- (ETW)
Measured Modulus
TCA T700S-12K-50C/#2510 Plain Weave Fabric
Pooled Average = 0.003 [GPa]
Pooled Standard Deviation = 0.000 [GPa]
Pooled Coeff. of Variation = 7.029 [%]
ASAP Batch #
Prepreg Lot #
ASAP Batch #
Prepreg Lot #
In-Plane Shear Modulus [GPa]
0.000
0.001
0.002
0.003
0.004
0.005
0.006
0.007
0.008
0
1
2
3
4
5
6

In-Plane Shear -- (ETD)
Strength & Modulus
TCA T700S-12K-50C/#2510 Plain Weave Fabric

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [MPa]	Modulus [MPa]	Avg. Specimen Thickn. [mm]	# Plies in Laminate	Avg. t_{ply} [mm]
A1-910-056-1-7	A	1	1	107.616	0.004	3.536	16	0.22103
A1-910-056-1-8	A	1	1	106.355	0.003	3.542	16	0.22138
A1-910-056-1-28	A	1	1	101.556		3.524	16	0.22023
B1-910-056-1-7	B	1	2	109.170	0.003	3.512	16	0.21947
B1-910-056-1-8	B	1	2	110.242	0.003	3.501	16	0.21879
B1-910-056-1-28	B	1	2	99.529		3.505	16	0.21908
A1-910-057-1-3	A	2	3	106.805	0.004	3.501	16	0.21881
A1-910-057-1-4	A	2	3	108.718	0.004	3.506	16	0.21915
A1-910-057-1-12	A	2	3	104.875		3.466	16	0.21665
B1-910-057-1-3	B	2	4	105.847	0.003	3.495	16	0.21844
B1-910-057-1-4	B	2	4	104.682	0.004	3.485	16	0.21781
B1-910-057-1-12	B	2	4	105.336		3.459	16	0.21622
A1-910-058-1-3	A	3	5	110.741	0.004	3.457	16	0.21606
A1-910-058-1-4	A	3	5	106.868	0.003	3.466	16	0.21665
A1-910-058-1-12	A	3	5	103.851		3.448	16	0.21550
B1-910-058-1-3	B	3	6	104.875	0.004	3.466	16	0.21661
B1-910-058-1-4	B	3	6	105.366	0.004	3.470	16	0.21690
B1-910-058-1-12	B	3	6	109.275		3.428	16	0.21423

Average	**106.206**	**0.004**	**Average**	**0.2179**
Standard Dev.	**2.904**	**0.000**		
Coeff. of Var. [%]	**2.735**	**4.995**		
Min.	**99.529**	**0.003**	**Min.**	**0.2142**
Max.	**110.741**	**0.004**	**Max.**	**0.2214**
Number of Spec.	**18**	**12**		


In-Plane Shear -- (ETD)
Measured Strength
TCA T700S-12K-50C/#2510 Plain Weave Fabric
Pooled Average = 106.206 [MPa]
Pooled Standard Deviation = 2.904 [MPa]
Pooled Coeff. of Variation = 2.735 [%]
ASAP Batch #
Prepreg Lot #
ASAP Batch #
Prepreg Lot #
In-Plane Shear Strength [MPa]
0
50
100
150
200
250
0
1
2
3
4
5
6


In-Plane Shear -- (ETD)
Measured Modulus
TCA T700S-12K-50C/#2510 Plain Weave Fabric
Pooled Average = 0.004 [GPa]
Pooled Standard Deviation = 0.000 [GPa]
Pooled Coeff. of Variation = 4.995 [%]
ASAP Batch #
Prepreg Lot #
ASAP Batch #
Prepreg Lot #
In-Plane Shear Modulus [GPa]
0.000
0.001
0.002
0.003
0.004
0.005
0.006
0.007
0.008
0
1
2
3
4
5
6

Apparent Interlaminar Shear -- (RTD) Strength

TCA T700S-12K-50C/#2510 Plain Weave Fabric

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [MPa]	Avg. Specimen Thickn. [mm]	# Plies in Laminate	Avg. t_{ply} [mm]
A1-910-056-1-1	A	1	1	57.920	2.642	12	0.22013
A1-910-056-1-2	A	1	1	58.551	2.640	12	0.22003
A1-910-056-1-3	A	1	1	57.803	2.652	12	0.22098
B1-910-056-1-1	B	1	2	60.352	2.457	12	0.20479
B1-910-056-1-2	B	1	2	60.745	2.413	12	0.20108
B1-910-056-1-3	B	1	2	58.369	2.371	12	0.19759
A1-910-057-1-1	A	2	3	60.601	2.619	12	0.21823
A1-910-057-1-2	A	2	3	59.346	2.631	12	0.21929
A1-910-057-1-3	A	2	3	61.704	2.637	12	0.21971
B1-910-057-1-1	B	2	4	60.376	2.648	12	0.22066
B1-910-057-1-2	B	2	4	54.675	2.650	12	0.22087
B1-910-057-1-3	B	2	4	57.335	2.648	12	0.22066
A1-910-058-1-1	A	3	5	59.497	2.610	12	0.21749
A1-910-058-1-2	A	3	5	59.855	2.597	12	0.21643
A1-910-058-1-3	A	3	5	59.073	2.652	12	0.22098
B1-910-058-1-1	B	3	6	57.103	2.634	12	0.21950
B1-910-058-1-2	B	3	6	59.581	2.629	12	0.21908
B1-910-058-1-3	B	3	6	55.447	2.630	12	0.21918
A-49-1-1	A	4	7	61.863	2.558	12	0.21315
A-49-1-3	A	4	7	62.396	2.549	12	0.21241
A-49-1-5	A	4	7	63.195	2.554	12	0.21283
A-49-4-7	A	4	7	55.749	2.588	12	0.21569
A-49-4-9	A	4	7	56.031	2.596	12	0.21632
A-49-4-11	A	4	7	61.862	2.586	12	0.21548
A-49-8-19	A	4	7	55.962	2.637	12	0.21971
A-49-8-15	A	4	7	54.073	2.634	12	0.21950
A-49-1-2	A	4	7	57.560	2.554	12	0.21283
A-49-1-4	A	4	7	58.535	2.551	12	0.21262
A-49-1-6	A	4	7	59.580	2.582	12	0.21516
A-49-4-8	A	4	7	55.659	2.584	12	0.21537
A-49-4-10	A	4	7	54.701	2.581	12	0.21505
A-49-4-12	A	4	7	62.263	2.592	12	0.21601
A-19-8-14	A	4	7	57.602	2.629	12	0.21908
A-19-8-16	A	4	7	54.034	2.637	12	0.21971
A-19-8-18	A	4	7	56.668	2.643	12	0.22024

NOTE: This table is continued in next four pages.

Apparent Interlaminar Shear -- (RTD) Strength

TCA T700S-12K-50C/#2510 Plain Weave Fabric

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [MPa]	Avg. Specimen Thickn. [mm]	# Plies in Laminate	Avg. t_{ply} [mm]
B-50-1-1	B	4	8	60.383	2.570	12	0.21421
B-50-1-3	B	4	8	59.713	2.573	12	0.21442
B-50-1-5	B	4	8	59.096	2.582	12	0.21516
B-50-4-7	B	4	8	62.109	2.541	12	0.21177
B-50-4-9	B	4	8	66.875	2.554	12	0.21283
B-50-4-11	B	4	8	63.098	2.548	12	0.21230
B-50-8-13	B	4	8	62.651	2.546	12	0.21220
B-50-8-15	B	4	8	62.481	2.549	12	0.21241
B-50-1-2	B	4	8	60.359	2.573	12	0.21442
B-50-1-4	B	4	8	59.635	2.576	12	0.21463
B-50-1-6	B	4	8	62.105	2.564	12	0.21368
B-50-4-8	B	4	8	60.448	2.545	12	0.21209
B-50-4-10	B	4	8	61.147	2.548	12	0.21230
B-50-4-12	B	4	8	62.881	2.548	12	0.21230
B-50-8-14	B	4	8	57.243	2.549	12	0.21241
B-50-8-16	B	4	8	59.439	2.546	12	0.21220
B-50-8-18	B	4	8	61.484	2.551	12	0.21262
A-51-2-1	A	5	9	58.579	2.609	12	0.21738
A-51-2-3	A	5	9	56.016	2.600	12	0.21664
A-51-2-5	A	5	9	53.355	2.592	12	0.21601
A-51-5-7	A	5	9	59.925	2.582	12	0.21516
A-51-5-9	A	5	9	58.768	2.574	12	0.21452
A-51-5-11	A	5	9	56.709	2.574	12	0.21452
A-51-8-13	A	5	9	59.538	2.563	12	0.21357
A-51-8-15	A	5	9	57.405	2.549	12	0.21241
A-51-2-2	A	5	9	56.428	2.606	12	0.21717
A-51-2-4	A	5	9	55.804	2.593	12	0.21611
A-51-2-6	A	5	9	59.361	2.596	12	0.21632
A-51-5-8	A	5	9	59.384	2.577	12	0.21474
A-51-5-10	A	5	9	56.773	2.568	12	0.21400
A-51-5-12	A	5	9	59.957	2.565	12	0.21378
A-51-8-14	A	5	9	61.007	2.554	12	0.21283
A-51-8-16	A	5	9	57.059	2.553	12	0.21273

Apparent Interlaminar Shear -- (RTD) Strength

TCA T700S-12K-50C/#2510 Plain Weave Fabric

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [MPa]	Avg. Specimen Thickn. [mm]	# Plies in Laminate	Avg. t_{ply} [mm]
B-52-2-1	B	5	10	58.841	2.629	12	0.21908
B-52-2-3	B	5	10	62.585	2.631	12	0.21929
B-52-2-5	B	5	10	58.986	2.638	12	0.21982
B-52-5-7	B	5	10	58.822	2.573	12	0.21442
B-52-5-9	B	5	10	63.797	2.572	12	0.21431
B-52-5-11	B	5	10	62.302	2.579	12	0.21495
B-52-8-13	B	5	10	60.569	2.496	12	0.20796
B-52-8-15	B	5	10	57.056	2.496	12	0.20796
B-52-2-2	B	5	10	55.612	2.630	12	0.21918
B-52-2-4	B	5	10	56.155	2.642	12	0.22013
B-52-2-6	B	5	10	56.251	2.634	12	0.21950
B-52-5-8	B	5	10	58.946	2.577	12	0.21474
B-52-5-10	B	5	10	58.941	2.573	12	0.21442
B-52-5-12	B	5	10	57.519	2.581	12	0.21505
B-52-8-14	B	5	10	60.910	2.496	12	0.20796
B-52-8-16	B	5	10	59.357	2.498	12	0.20817
A-53-1-1	A	6	11	54.943	2.567	12	0.21389
A-53-1-3	A	6	11	63.995	2.563	12	0.21357
A-53-1-5	A	6	11	59.350	2.574	12	0.21452
A-53-6-7	A	6	11	62.989	2.630	12	0.21918
A-53-6-9	A	6	11	66.662	2.628	12	0.21897
A-53-6-11	A	6	11	61.593	2.635	12	0.21960
A-53-7-13	A	6	11	60.238	2.635	12	0.21960
A-53-7-15	A	6	11	59.058	2.634	12	0.21950
A-53-1-2	A	6	11	60.611	2.562	12	0.21347
A-53-1-4	A	6	11	58.794	2.567	12	0.21389
A-53-1-6	A	6	11	62.150	2.572	12	0.21431
A-53-6-8	A	6	11	64.657	2.630	12	0.21918
A-53-6-10	A	6	11	61.962	2.631	12	0.21929
A-53-6-12	A	6	11	63.132	2.640	12	0.22003
A-53-7-14	A	6	11	57.863	2.638	12	0.21982
A-53-7-16	A	6	11	57.380	2.639	12	0.21992

Apparent Interlaminar Shear -- (RTD) Strength

TCA T700S-12K-50C/#2510 Plain Weave Fabric

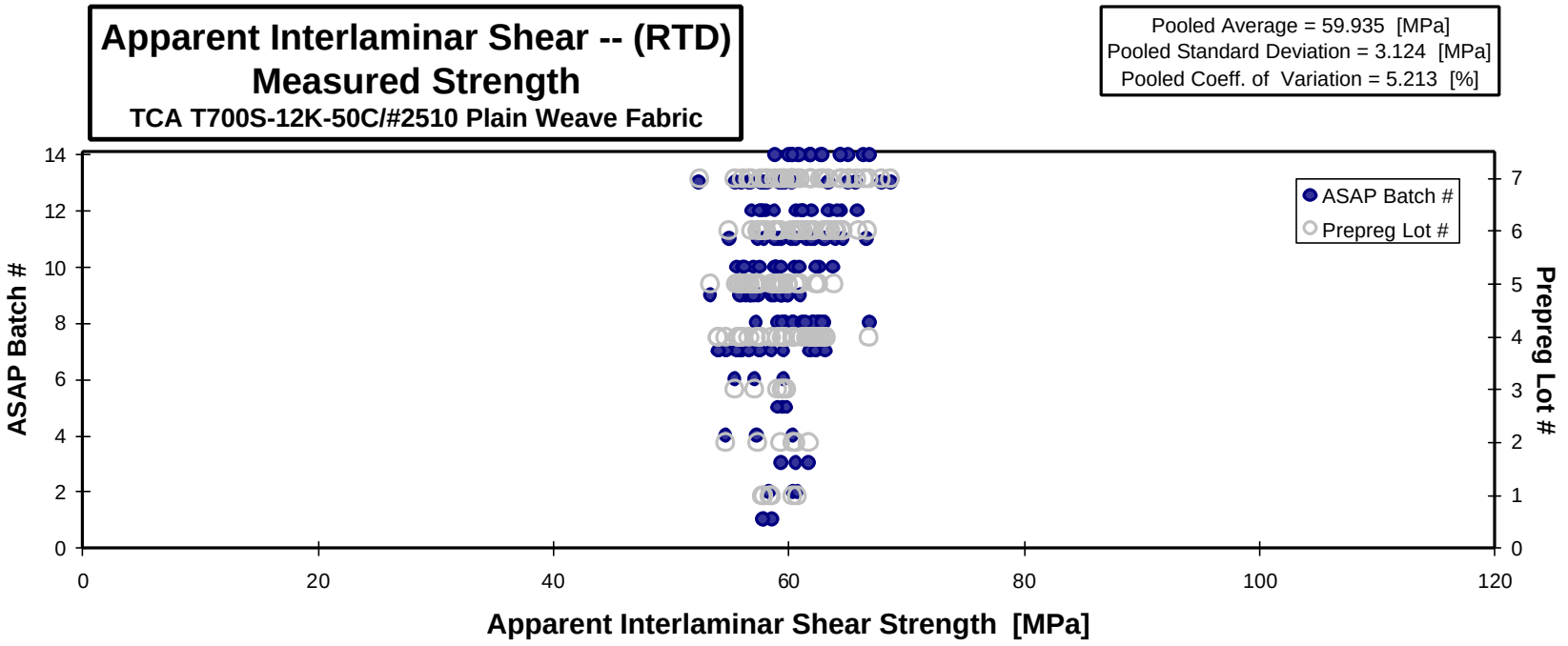
Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [MPa]	Avg. Specimen Thickn. [mm]	# Plies in Laminate	Avg. t_{ply} [mm]
B-54-1-1	B	6	12	58.083	2.560	12	0.21336
B-54-1-3	B	6	12	60.695	2.568	12	0.21400
B-54-1-5	B	6	12	64.497	2.573	12	0.21442
B-54-6-7	B	6	12	65.876	2.590	12	0.21579
B-54-6-9	B	6	12	61.291	2.591	12	0.21590
B-54-6-11	B	6	12	63.554	2.586	12	0.21548
B-54-7-13	B	6	12	61.054	2.592	12	0.21601
B-54-7-15	B	6	12	56.860	2.595	12	0.21622
B-54-1-2	B	6	12	57.750	2.564	12	0.21368
B-54-1-4	B	6	12	58.821	2.570	12	0.21421
B-54-B-6	B	6	12	63.336	2.570	12	0.21421
B-54-6-8	B	6	12	64.157	2.590	12	0.21579
B-54-6-10	B	6	12	61.997	2.593	12	0.21611
B-54-6-12	B	6	12	61.184	2.591	12	0.21590
B-54-7-14	B	6	12	57.644	2.590	12	0.21579
B-54-7-16	B	6	12	57.504	2.593	12	0.21611
A-55-1-1	A	7	13	59.698	2.569	12	0.21410
A-55-1-3	A	7	13	58.242	2.545	12	0.21209
A-55-1-5	A	7	13	57.977	2.577	12	0.21474
A-55-3-7	A	7	13	67.924	2.564	12	0.21368
A-55-3-9	A	7	13	68.707	2.529	12	0.21071
A-55-3-11	A	7	13	65.772	2.559	12	0.21325
A-55-8-13	A	7	13	60.305	2.507	12	0.20892
A-55-8-15	A	7	13	59.223	2.507	12	0.20892
A-55-1-2	A	7	13	56.621	2.551	12	0.21262
A-55-1-4	A	7	13	56.811	2.559	12	0.21325
A-55-1-6	A	7	13	55.460	2.581	12	0.21505
A-55-3-8	A	7	13	65.113	2.540	12	0.21167
A-55-1-3-10	A	7	13	59.485	2.545	12	0.21209
A-55-3-12	A	7	13	63.402	2.572	12	0.21431
A-55-8-14	A	7	13	52.403	2.502	12	0.20849
A-55-8-16	A	7	13	57.681	2.513	12	0.20944
A-55-8-18	A	7	13	56.039	2.535	12	0.21124

Apparent Interlaminar Shear -- (RTD) Strength

TCA T700S-12K-50C/#2510 Plain Weave Fabric

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [MPa]	Avg. Specimen Thickn. [mm]	# Plies in Laminate	Avg. t_{ply} [mm]
B-56-1-1	B	7	14	60.252	2.558	12	0.21315
B-56-1-3	B	7	14	64.434	2.564	12	0.21368
B-56-1-5	B	7	14	61.858	2.559	12	0.21325
B-56-3-7	B	7	14	66.401	2.574	12	0.21452
B-56-3-9	B	7	14	65.081	2.582	12	0.21516
B-56-3-11	B	7	14	64.469	2.572	12	0.21431
B-56-8-13	B	7	14	61.837	2.634	12	0.21950
B-56-8-15	B	7	14	62.762	2.642	12	0.22013
B-56-1-2	B	7	14	61.919	2.560	12	0.21336
B-56-1-4	B	7	14	62.915	2.564	12	0.21368
B-56-1-6	B	7	14	60.770	2.546	12	0.21220
B-56-3-8	B	7	14	66.881	2.577	12	0.21474
B-59-3-10	B	7	14	60.064	2.578	12	0.21484
B-56-3-12	B	7	14	58.835	2.559	12	0.21325
B-56-8-14	B	7	14	60.979	2.635	12	0.21960
B-56-8-16	B	7	14	60.349	2.643	12	0.22024

Average	**59.935**	**Average**	**0.2150**
Standard Dev.	**3.124**		
Coeff. of Var. [%]	**5.213**		
Min.	**52.403**	**Min.**	**0.1976**
Max.	**68.707**	**Max.**	**0.2210**
Number of Spec.	**149**		


Apparent Interlaminar Shear -- (RTD)
Measured Strength
TCA T700S-12K-50C/#2510 Plain Weave Fabric
Pooled Average = 59.935 [MPa]
Pooled Standard Deviation = 3.124 [MPa]
Pooled Coeff. of Variation = 5.213 [%]
ASAP Batch #
Prepreg Lot #
ASAP Batch #
Prepreg Lot #
0
2
4
6
8
10
12
14
0
1
2
3
4
5
6
7
0
20
40
60
80
100
120
Apparent Interlaminar Shear Strength [MPa]

3.2.2. Fluid Sensitivity Raw Data Spreadsheets and Scatter Charts

In-Plane Shear -- (MEK - RTD) Strength

TCA T700S-12K-50C/#2510 Plain Weave Fabric

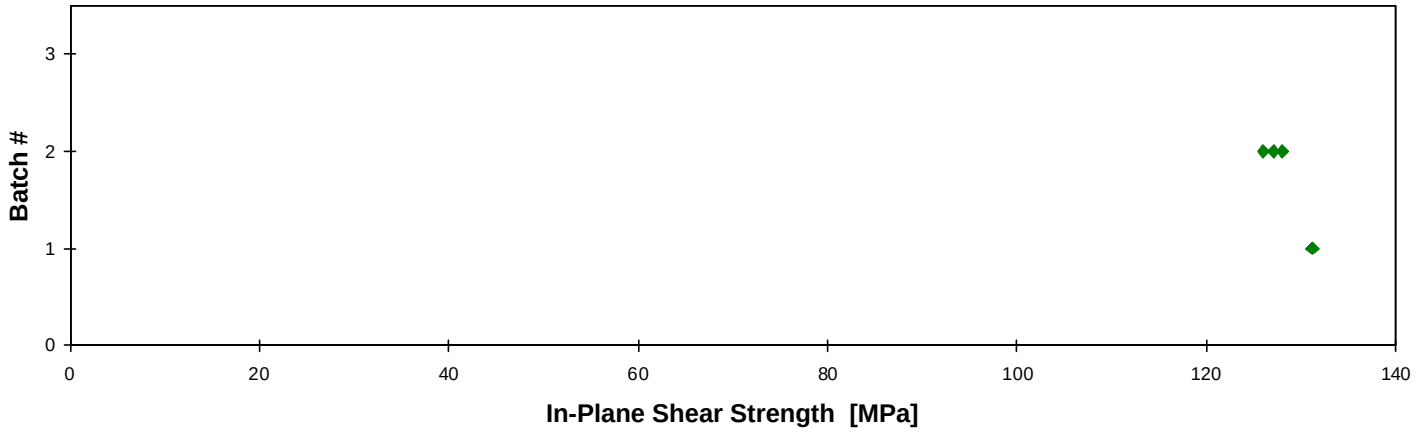
Specimen Number	Batch Number	Strength [MPa]	Avg. Specimen Thickn. [mm]	# Plies in Laminate	Avg. t_{ply} [mm]
A1-910-056-1-23	1	131.221	3.491	16	0.21817
A1-910-056-1-24	1	131.218	3.463	16	0.21646
B1-910-056-1-23	2	128.020	3.506	16	0.21912
B1-910-056-1-24	2	126.021	3.494	16	0.21839
B1-910-056-1-25	2	127.089	3.468	16	0.21677

Average	**128.714**		**0.2178**
Standard Dev.	**2.394**		
Coeff. of Var. [%]	**1.860**		
Min.	**126.021**	**Min.**	**0.2165**
Max.	**131.221**	**Max.**	**0.2191**
Number of Spec.	**5**		

In-Plane Shear -- (MEK - RTD) Measured Strength

TCA T700S-12K-50C/#2510 Plain Weave Fabric

Pooled Average = 128.714 [MPa]
Pooled Standard Deviation = 2.394 [MPa]
Pooled Coeff. of Variation = 1.860 [%]



In-Plane Shear -- (JP-4 JET FUEL - ETD) Strength

TCA T700S-12K-50C/#2510 Plain Weave Fabric

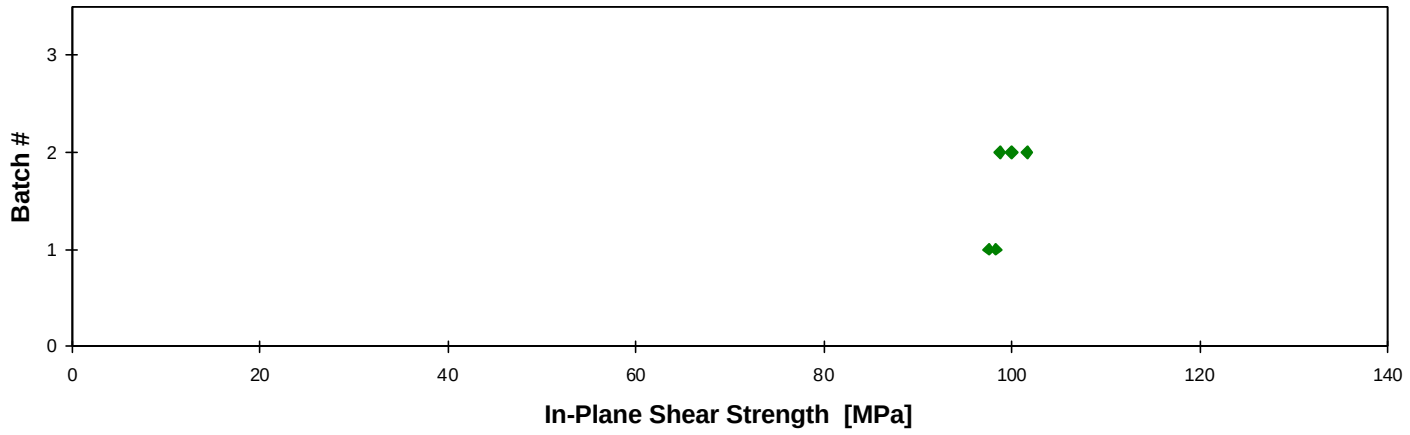
Specimen Number	Batch Number	Strength [MPa]	Avg. Specimen Thickn. [mm]	# Plies in Laminate	Avg. t_{ply} [mm]
A1-910-056-1-15	1	98.341	3.492	16	0.21825
A1-910-056-1-16	1	97.558	3.494	16	0.21839
B1-910-056-1-16	2	98.739	3.515	16	0.21968
B1-910-056-1-17	2	101.630	3.520	16	0.22003
B1-910-056-1-18	2	99.987	3.528	16	0.22047

Average	**99.251**		**0.2194**
Standard Dev.	**1.594**		
Coeff. of Var. [%]	**1.606**		
Min.	**97.558**	**Min.**	**0.2182**
Max.	**101.630**	**Max.**	**0.2205**
Number of Spec.	**5**		

In-Plane Shear -- (JP-4 JET FUEL - ETD) Measured Strength

TCA T700S-12K-50C/#2510 Plain Weave Fabric

Pooled Average = 99.251 [Mpa]
Pooled Standard Deviation = 1.594 [Mpa]
Pooled Coeff. of Variation = 1.606[%]



In-Plane Shear -- (Hydraulic Fluid - ETD) Strength

TCA T700S-12K-50C/#2510 Plain Weave Fabric

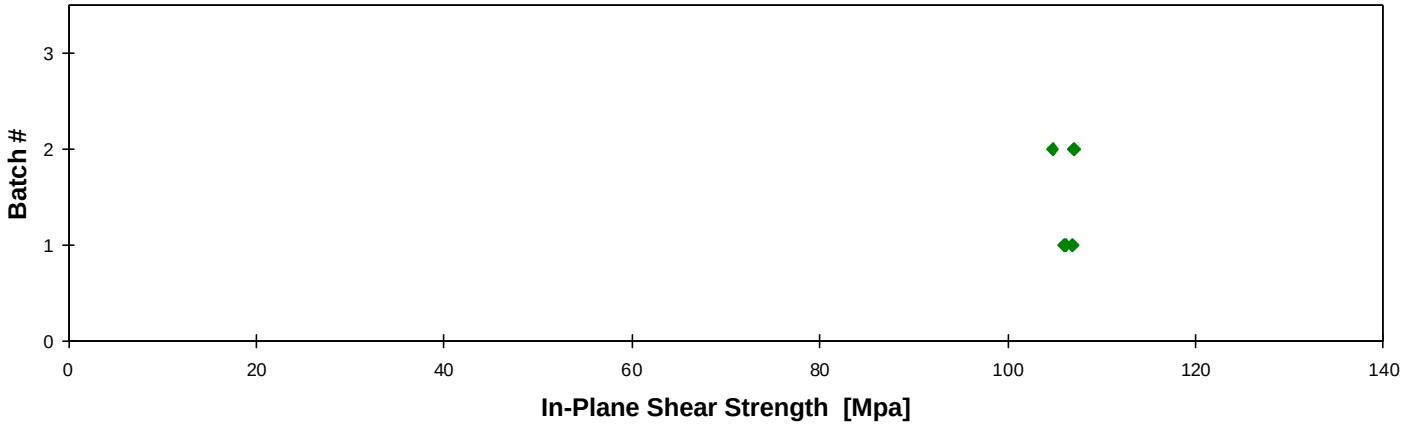
Specimen Number	Batch Number	Strength [MPa]	Avg. Specimen Thickn. [mm]	# Plies in Laminate	Avg. t_{ply} [mm]
A1-910-056-1-19	1	106.900	3.510	16	0.21934
A1-910-056-1-20	1	106.192	3.514	16	0.21963
A1-910-056-1-21	1	106.000	3.515	16	0.21971
B1-910-056-1-19	2	104.771	3.531	16	0.22071
B1-910-056-1-20	2	107.037	3.530	16	0.22063

Average	**106.180**		**0.2200**
Standard Dev.	**0.904**		
Coeff. of Var. [%]	**0.851**		
Min.	**104.771**	**Min.**	**0.2193**
Max.	**107.037**	**Max.**	**0.2207**
Number of Spec.	**5**		

In-Plane Shear -- (Hydraulic Fluid - ETD) Measured Strength

TCA T700S-12K-50C/#2510 Plain Weave Fabric

Pooled Average = 106.180 [Mpa]
Pooled Standard Deviation = 0.904 [Mpa]
Pooled Coeff. of Variation = 0.851 [%]



Fluid Sensitivity Comparison:

Average In-Plane Shear Strength with Fluid (MPa)	Same Environment In-Plane Shear Strength without Fluid (MPa)	Worst Case Environment In-Plane Shear Strength (MPa)
MEK (RTD)	(RTD)	(ETW)
128.714	132.570	74.569

The RTD average in-plane shear strength was reduced by 3% after exposure to MEK. However, it remained 73% higher than water exposure in ETW condition.

Average In-Plane Shear Strength with Fluid (MPa)	Same Environment In-Plane Shear Strength without Fluid (MPa)	Worst Case Environment In-Plane Shear Strength (MPa)
JP-4 JET FUEL (ETD)	(ETD)	(ETW)
99.251	106.206	74.569

The ETD average in-plane shear strength was reduced by 6.5% after exposure to JP-4 Jet Fuel. However it remained 33% higher than water exposure in ETW condition.

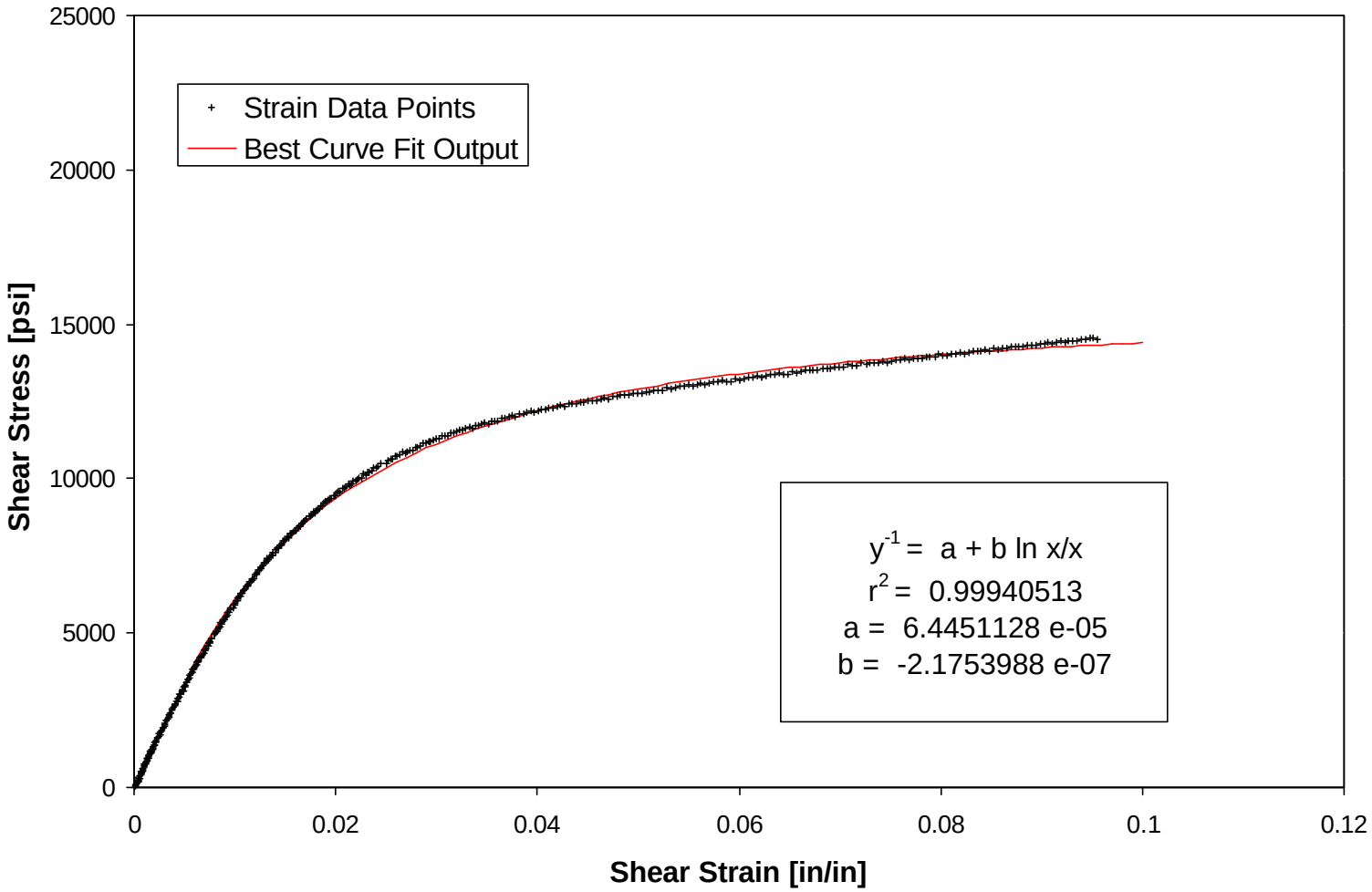
Average In-Plane Shear Strength with Fluid (MPa)	Same Environment In-Plane Shear Strength without Fluid (MPa)	Worst Case Environment In-Plane Shear Strength (MPa)
HYDRAULIC FLUID (ETD)	(ETD)	(ETW)
106.180	106.206	74.569

The ETD average in-plane shear strength was not reduced after exposure to Hydraulic Fluid.

3.2.3. Representative Shear Stress-Strain Curve

The following stress-strain curve is representative of the TORAY T700SC-12K-50C/#2510 Plain Weave Fabric prepreg system. The tension and compression stress-strain curves are not presented in graphical form. If strain design allowables from these tests are required, simple one-dimensional linear stress-strain relationships may be used to obtain corresponding strain design values. This process should approximate tensile and compressive strain behavior relatively well but may produce extremely conservative strain values in shear due to the nonlinear behavior. A more realistic approach for shear strain design allowables is to use a maximum strain value of 5% (reference MIL-HDBK-17-1E, section 5.7.6). If a nonlinear analysis of the material's shear behavior is required, the curve-fit of the shear stress-strain curve may be used. The representative shear stress-strain curve was obtained by taking the average of all the sample shear curves and determining the best-fit line through the data. The actual data points are also presented on the chart to demonstrate material variability.

Shear Stress vs. Shear Strain, RTD



3.3. Statistical Results

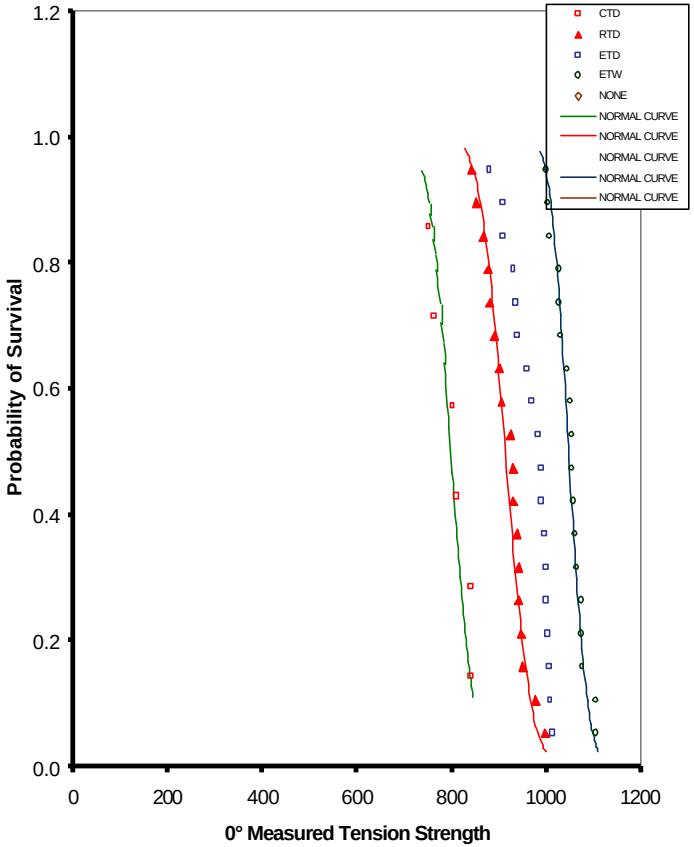
DISTRIBUTION OF DATA & NORMAL CURVES

Mil-17 eg

TCA T700S-12K-50C/#2510 Plain Weave Fabric

WICHITA STATE UNIVERSITY

DISTRIBUTION OF DATA AT INDIVIDUAL TEST CONDITIONS



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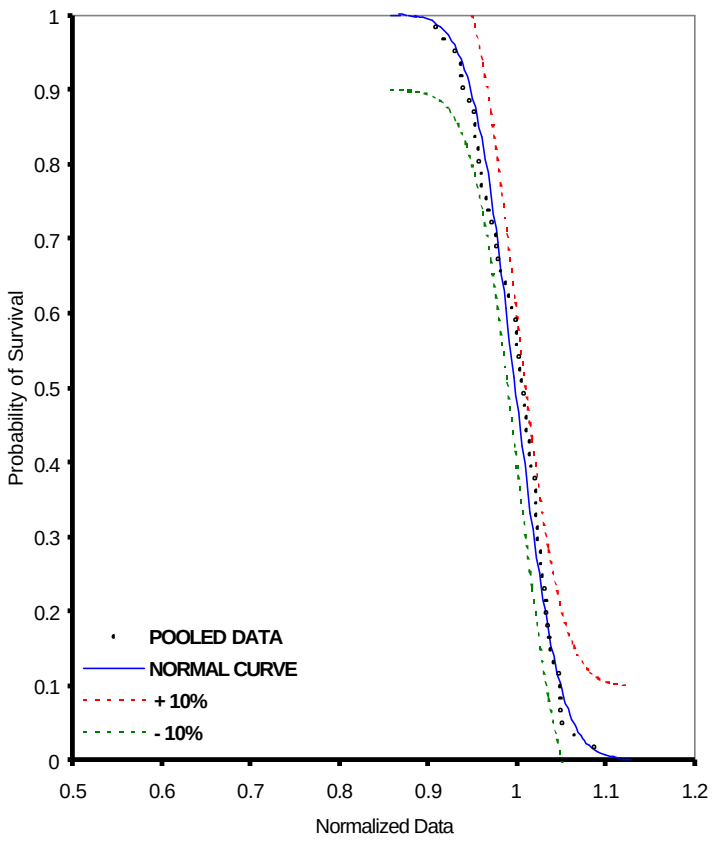

DISTRIBUTION OF DATA & NORMAL CURVES

Mil-17 eg

TCA T700S-12K-50C/#2510 Plain Weave Fabric

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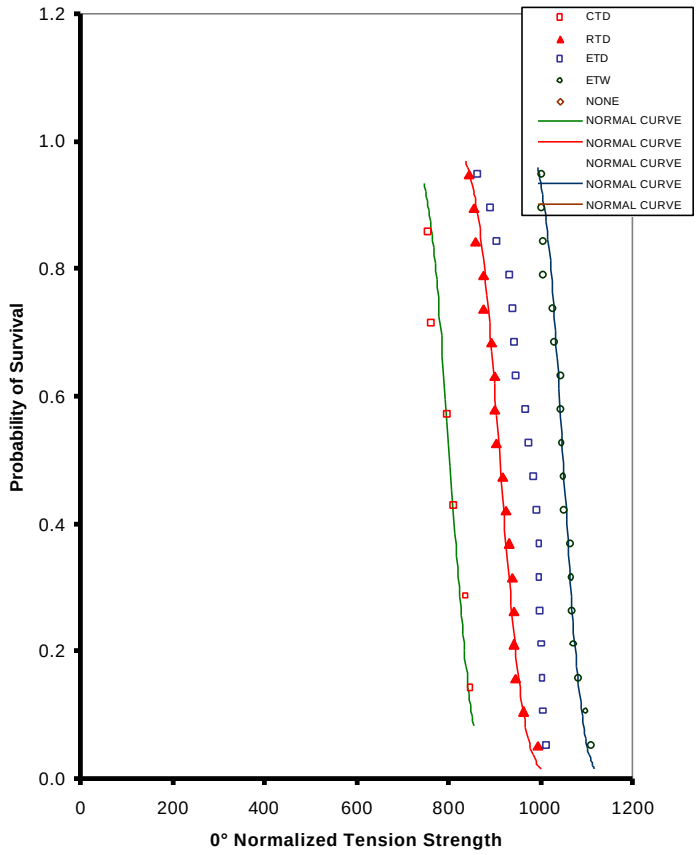
DISTRIBUTION OF DATA AT INDIVIDUAL TEST CONDITIONS



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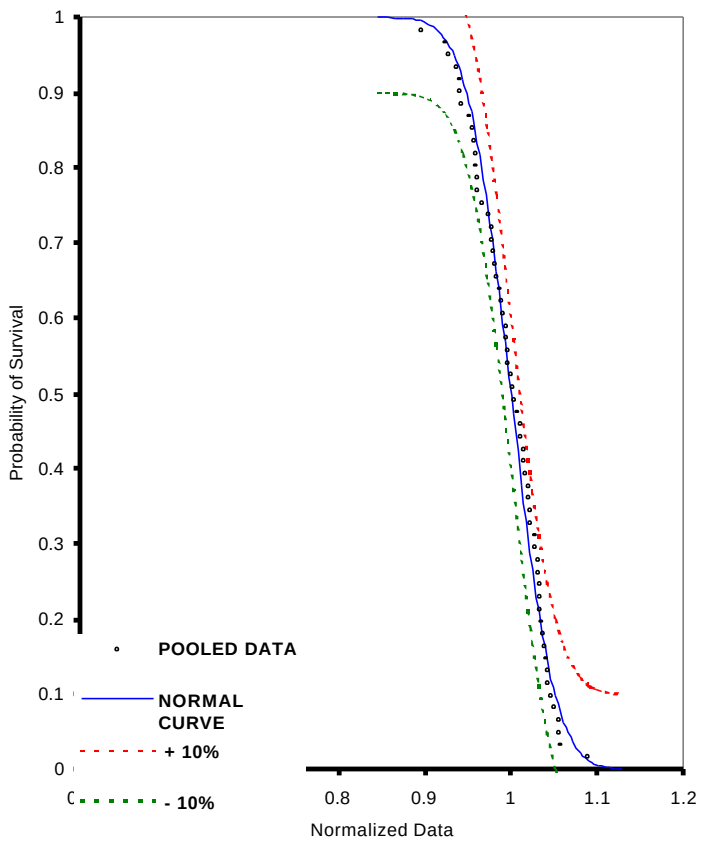

DISTRIBUTION OF DATA & NORMAL CURVES

Mil-17 eg

TCA T700S-12K-50C/#2510 Plain Weave Fabric

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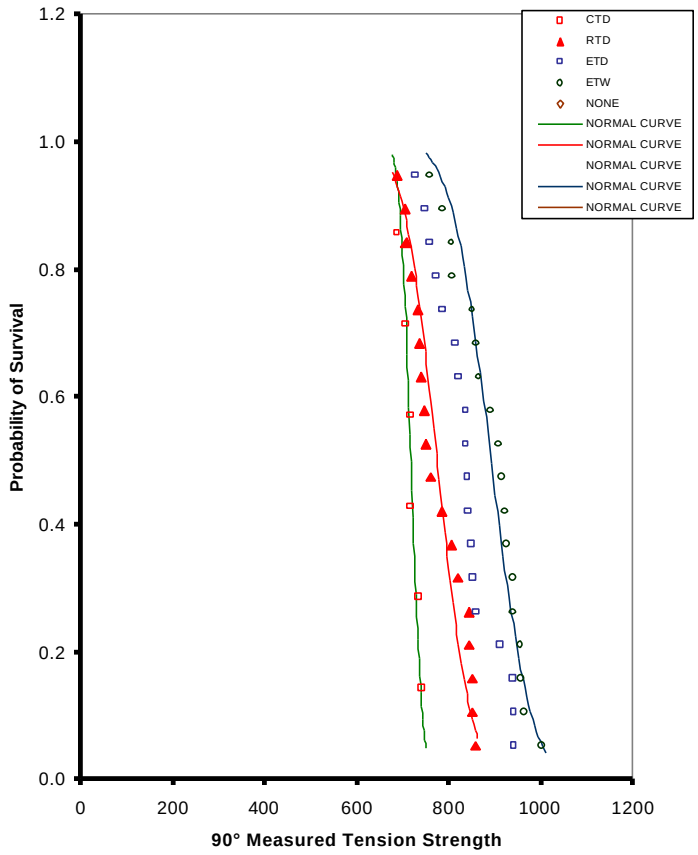
DISTRIBUTION OF DATA AT INDIVIDUAL TEST CONDITIONS



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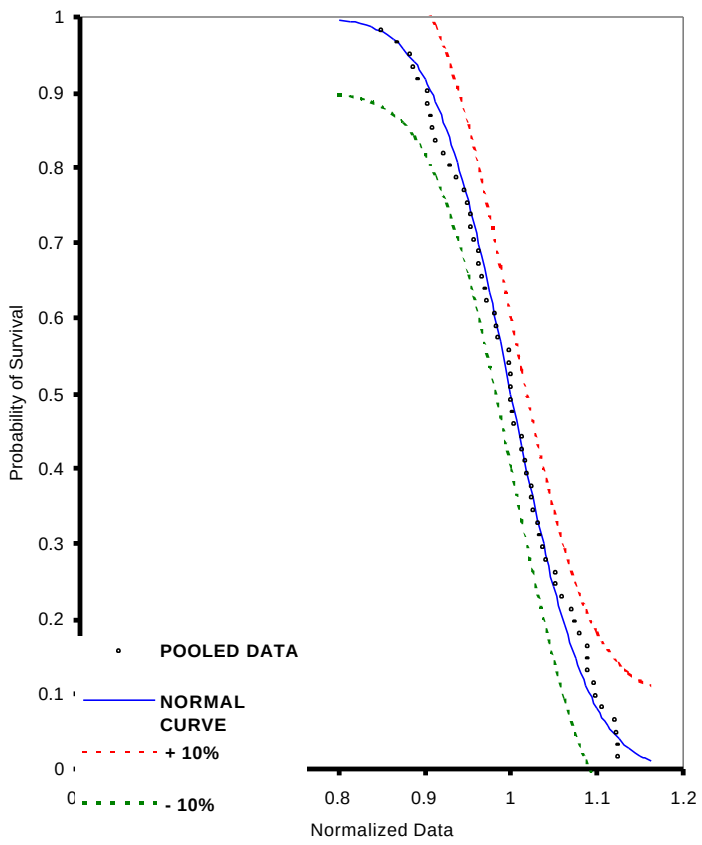

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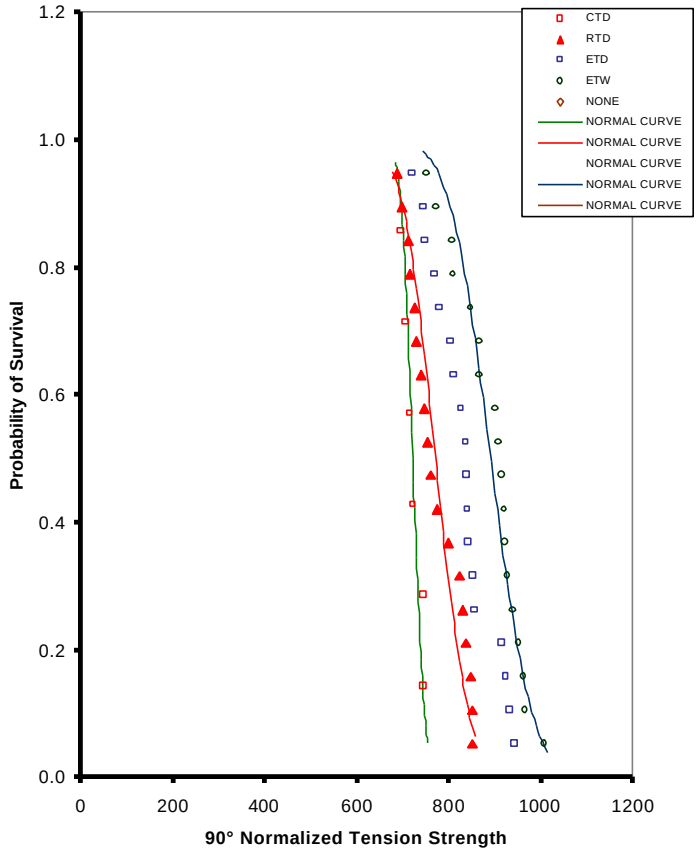
DISTRIBUTION OF DATA AT INDIVIDUAL TEST CONDITIONS



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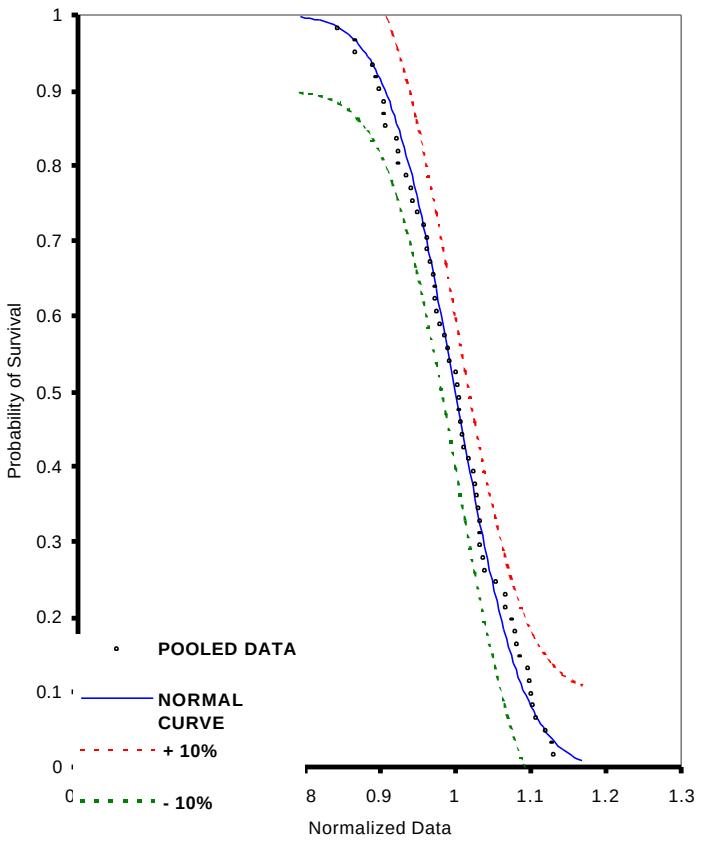

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Mil-17 eg

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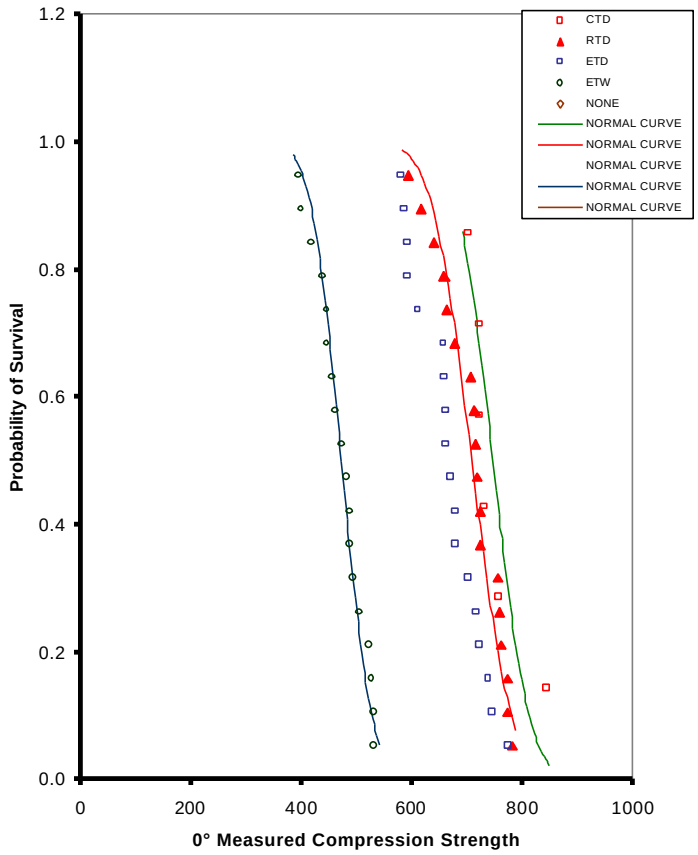
DISTRIBUTION OF DATA AT INDIVIDUAL TEST CONDITIONS



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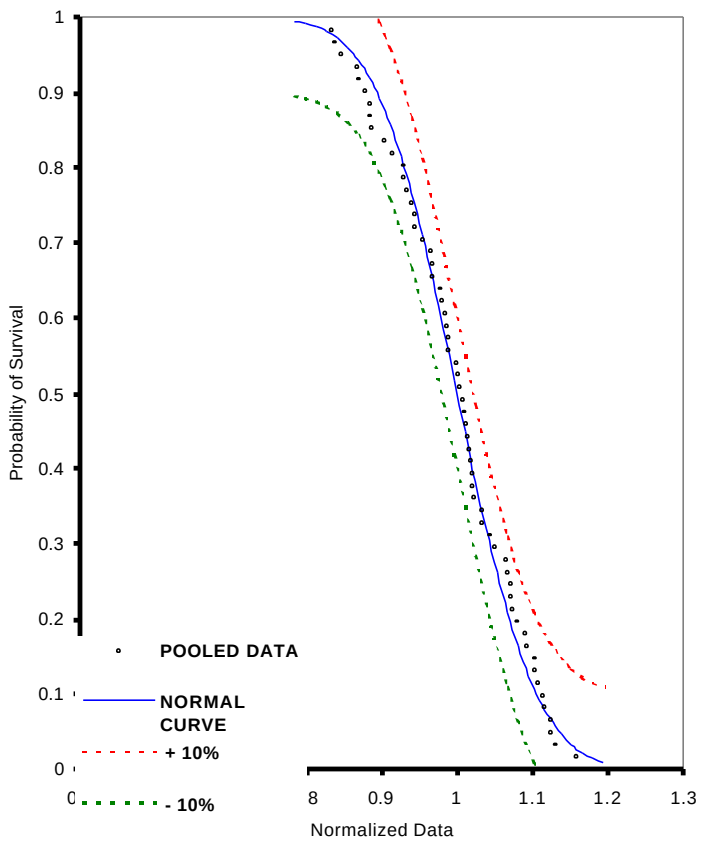

DISTRIBUTION OF DATA & NORMAL CURVES

Mil-17 eg

TCA T700S-12K-50C/#2510 Plain Weave Fabric

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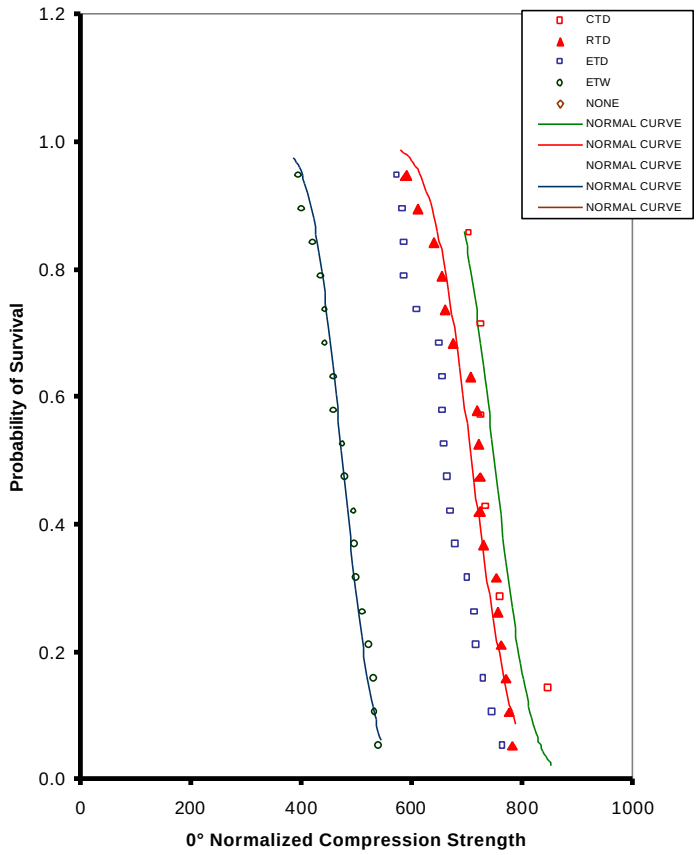
DISTRIBUTION OF DATA AT INDIVIDUAL TEST CONDITIONS



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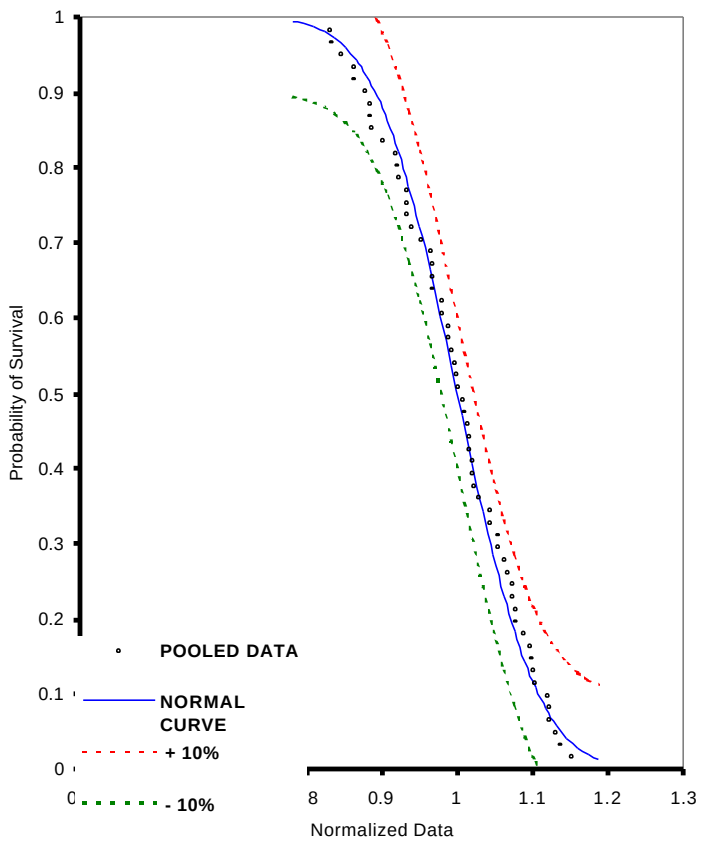

DISTRIBUTION OF DATA & NORMAL CURVES

Mil-17 eg

TCA T700S-12K-50C/#2510 Plain Weave Fabric

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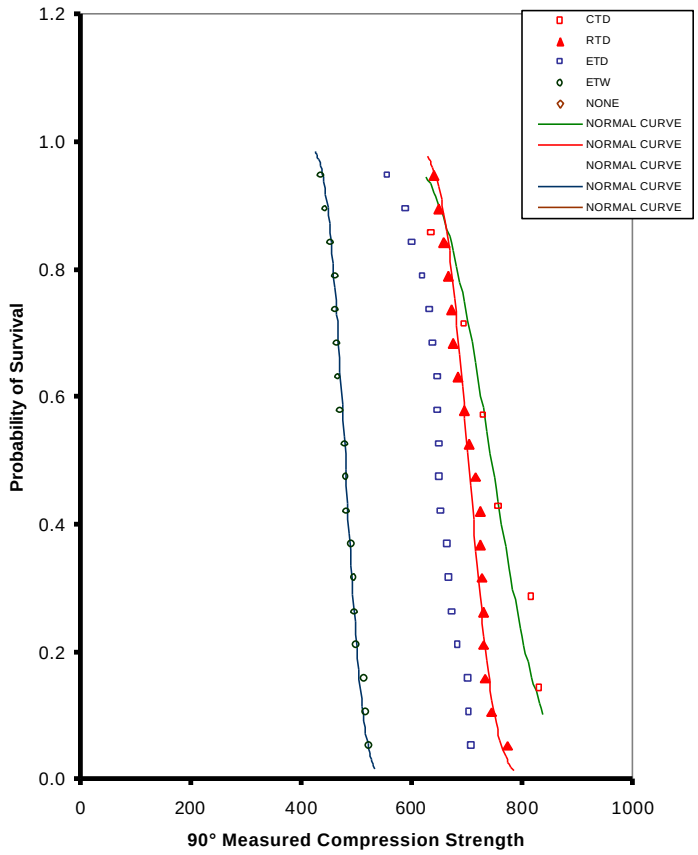
DISTRIBUTION OF DATA AT INDIVIDUAL TEST CONDITIONS



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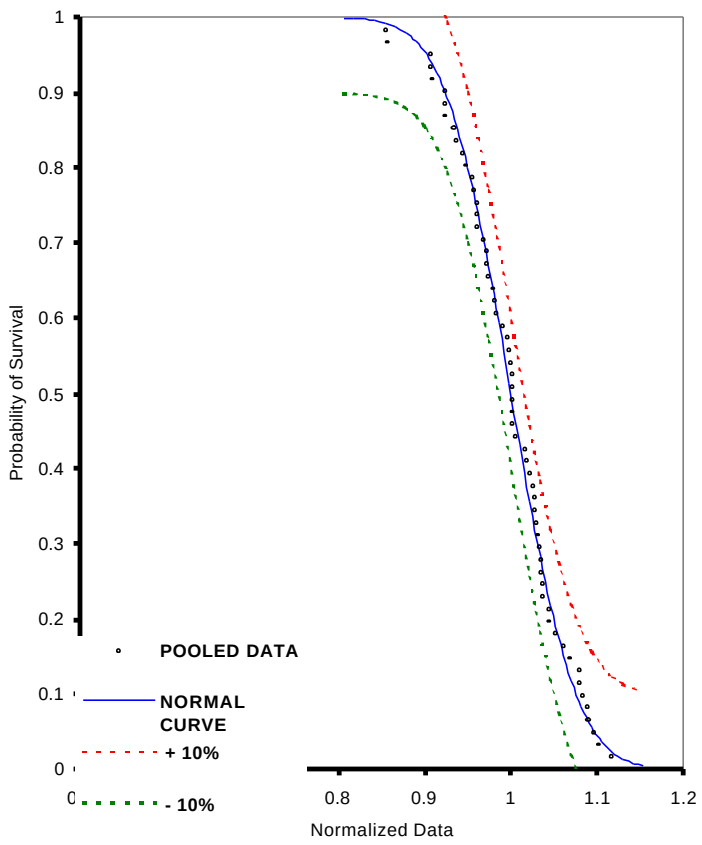

DISTRIBUTION OF DATA & NORMAL CURVES

Mil-17 eg

TCA T700S-12K-50C/#2510 Plain Weave Fabric

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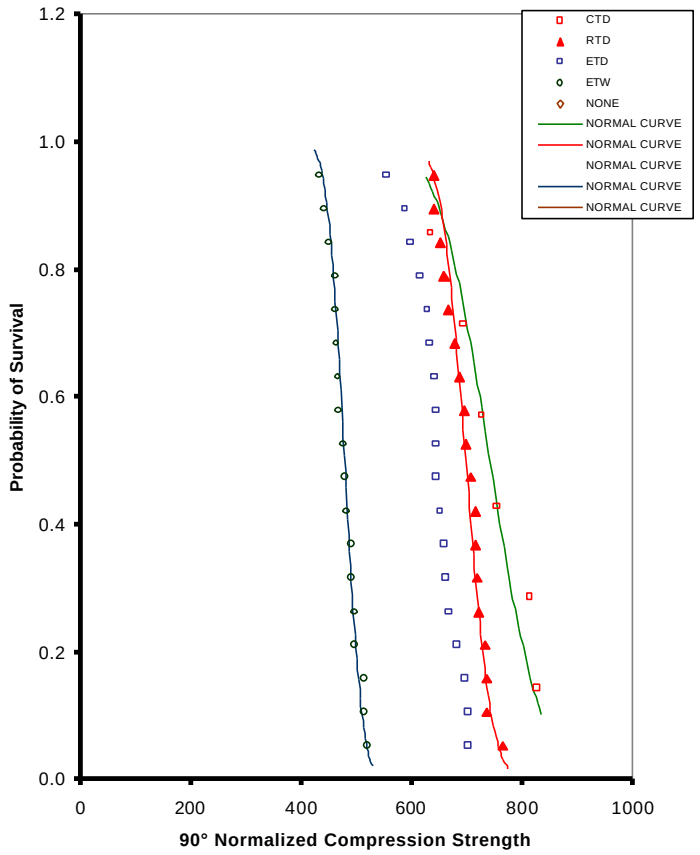
DISTRIBUTION OF DATA AT INDIVIDUAL TEST CONDITIONS



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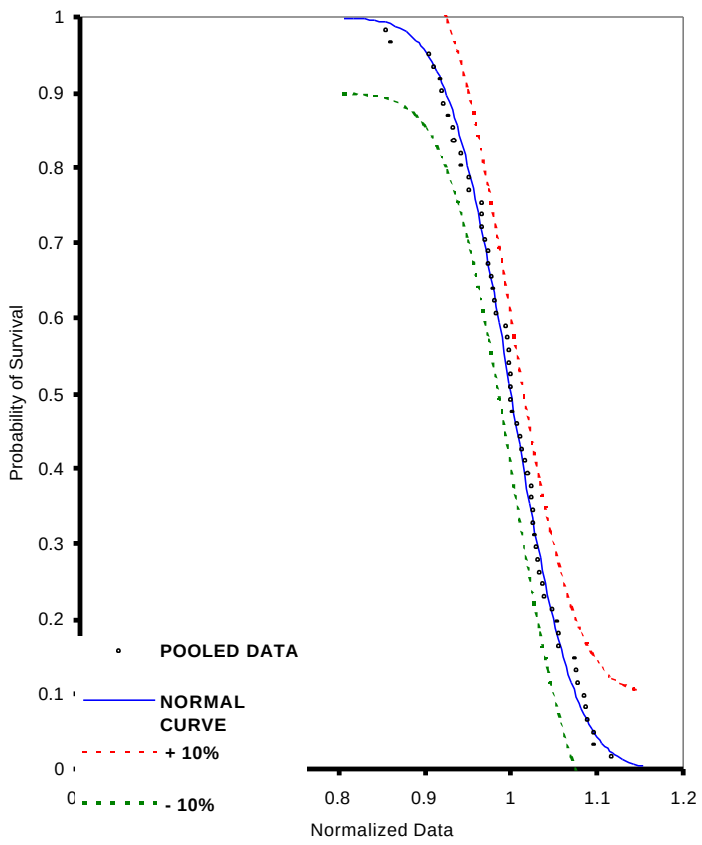

DISTRIBUTION OF DATA & NORMAL CURVES

Mil-17 eg

TCA T700S-12K-50C/#2510 Plain Weave Fabric

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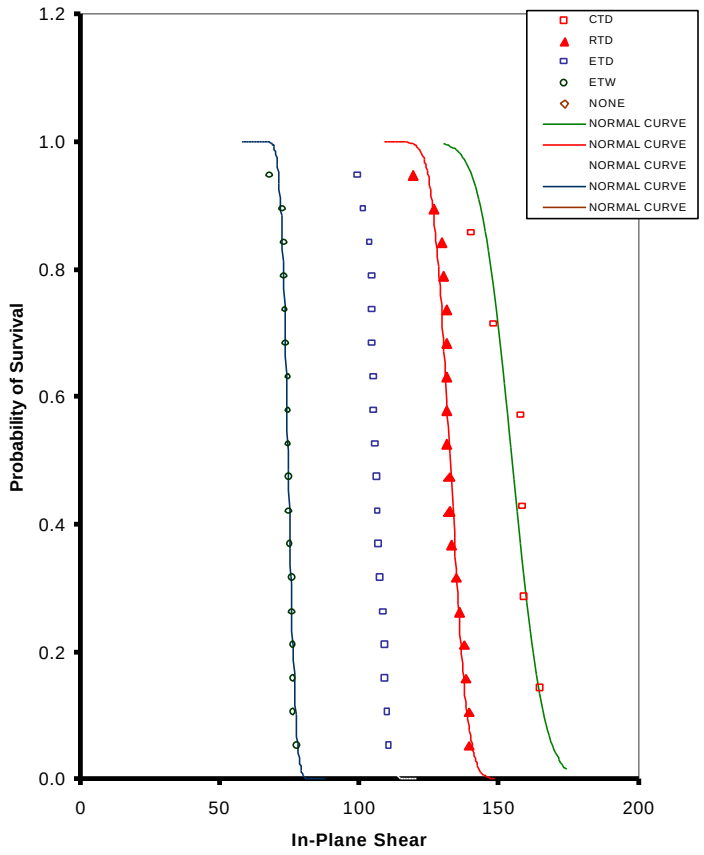
DISTRIBUTION OF DATA AT INDIVIDUAL TEST CONDITIONS



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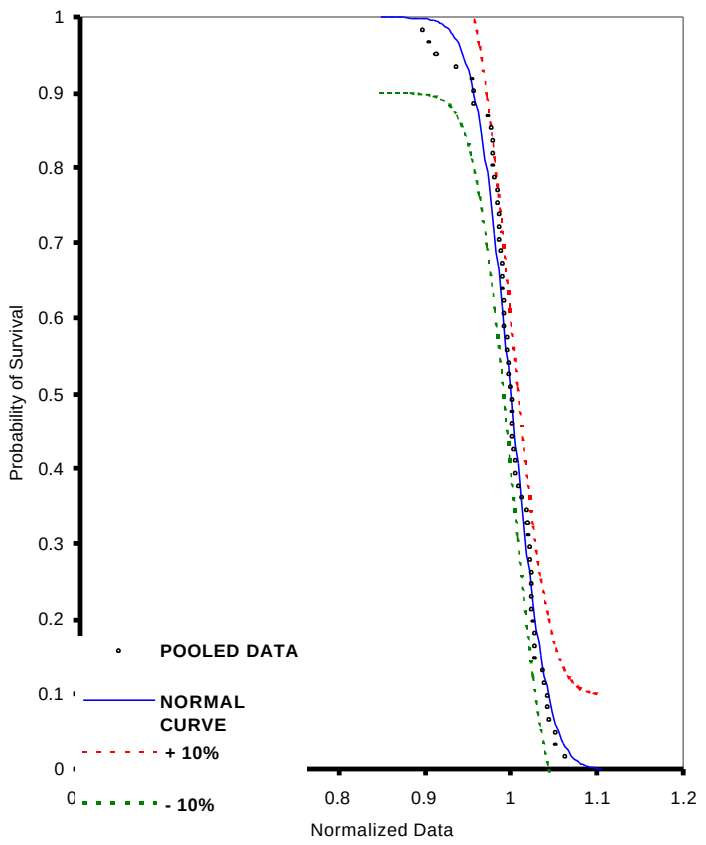

DISTRIBUTION OF DATA & NORMAL CURVES

Mil-17 eg

TCA T700S-12K-50C/#2510 Plain Weave Fabric

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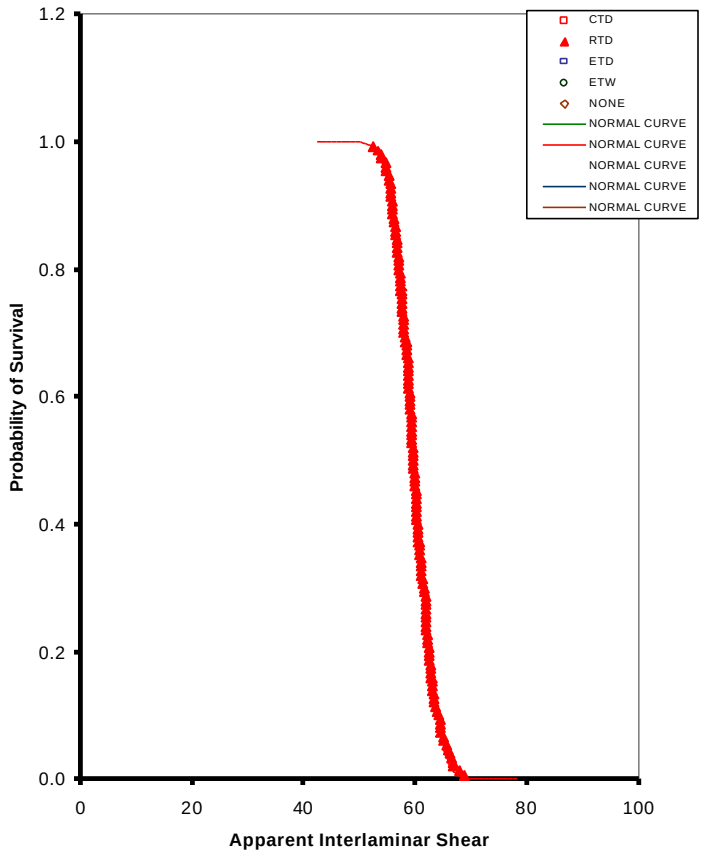
DISTRIBUTION OF DATA AT INDIVIDUAL TEST CONDITIONS



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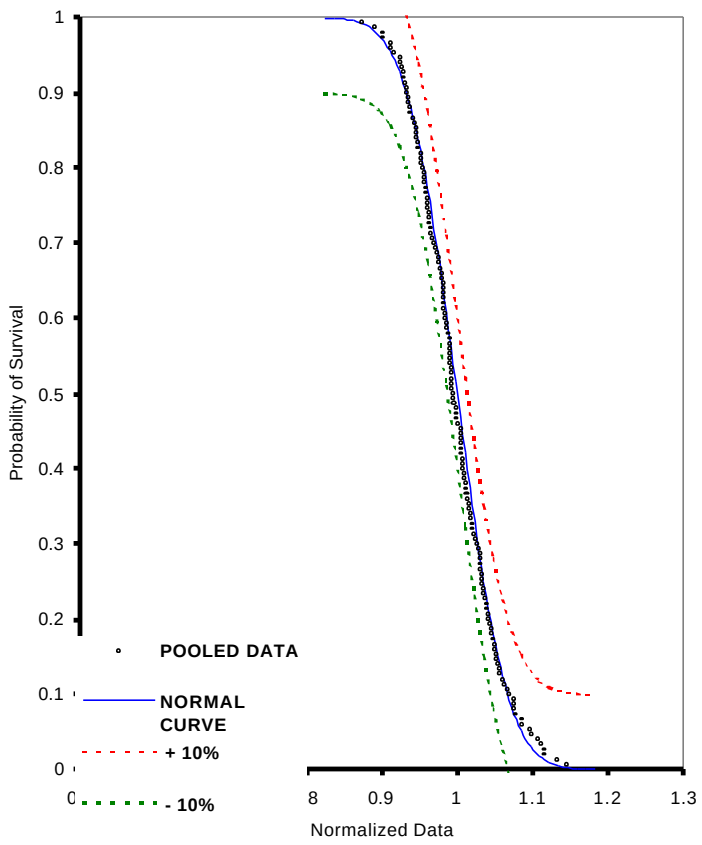


APPENDIX A. PHYSICAL AND MECHANICAL TEST PROCEDURES

A.1. Physical Properties

A.1.1. Uncured Resin Content

Three (100 mm X 100 mm) uncured samples were taken across the width of the prepreg ply sheet, from the start and end of the batch. These samples were tested for resin weight percentage in accordance with TCWIN-Q-P004, using N-Methyl Pyrrolidone (NMP) solvent to extract the resin matrix, and SACMA SRM 23-94, Method A.

A.1.2. Uncured Volatile Content

The volatile content weight fraction was determined in accordance with TCWIN-Q-P001 that meets the intent of ASTM D3530. Three (100 mm X 100 mm) uncured samples were taken across the width of the prepreg ply sheet, from the start and end of the batch.

A.1.3. Resin Gel Time

Three (6 mm X 6 mm) uncured samples were taken across the width of the prepreg ply sheet, from the start and end of the prepreg material batch. The gel time property was performed in accordance with ASTM D3532 and TCWIN-U-P007.

A.1.4. Resin Flow

The resin flow property was determined in accordance with SACMA SRM 22-94 and TCWIN-U-P008.

A.1.5. Uncured Fiber Areal Weight

The surface areas of resin content samples tested in accordance with 2.2.1 were precisely measured in accordance with TCWIN-Q-P004 and SACMA SRM 23R-94. The fiber areal weight (g/m^2) was calculated by dividing the mass of the resin free fibrous residue by the measured surface area.

A.1.6. Infrared Spectroscopy

The infrared spectroscopy signature tests were performed in accordance with TCWIN-U-C002 that meets the intent of ASTM D1252 and ASTM D168.

A.1.7. High Performance Liquid Chromatography (HPLC)

HPLC signature tests were performed in accordance with TCWIN-U-C004 and SACMA SRM 20R-94.

A.1.8. Differential Scanning Calorimetry (DSC)

DSC was performed to provide thermal property, specifically onset and peak temperature, data for prepreg material. The DSC tests were conducted in accordance with SACMA SRM 25R-94 and TCWIN-U-C003.

A.1.9. Cured Neat Resin Density

Testing the specimens in accordance with ASTM D792 Method A and TCWIN-U-M215 determined the cured neat resin density. The density was calculated as follows:

$$r_{\text{Resin}} = r_L \left(\frac{W_1}{W_1 - W_2} \right)$$

where: ρ_{Resin} = Resin density, g/cc
ρ_L = density of ethanol or water, g/cc
W_1 = weight of sample in air
W_2 = weight of sample in ethanol or water

A.1.10. Fiber Volume

The fiber volume of each mechanical test laminate was determined in accordance with ASTM D3171-90. The calculation was performed in accordance with the following equation;

$$V_F = r_C * \left(\frac{W_{CF}}{r_F} \right)$$

where: V_F = calculated fiber volume, %
ρ_C = laminate density, g/cc (same method as 2.2.9)
W_{CF} = weight of fibrous carbon fiber residue of acid digestion, g
ρ_F = nominal carbon fiber density, g/cc = 1.78 for T700S

A.1.11. Resin Volume

The resin volume of each mechanical test laminate was determined in accordance with ASTM D3171-90. The calculation was performed in accordance with the following equation;

$$V_F = r_C * \left(\frac{100 - W_{CF}}{r_R} \right)$$

where: V_F = calculated fiber volume, %(v)
ρ_C = laminate density, g/cc (same method as 2.2.9)
W_{CF} = weight of fibrous carbon fiber residue of acid digestion, g
ρ_R = nominal cured neat resin density, g/cc = 1.267

A.1.12. Void Content

The void content of each mechanical test laminate was determined in accordance with ASTM D2734-94. The calculation was performed in accordance with the following equation;

$$V_V = 100 - \left[r_C * \left(\frac{100 - W_{CF}}{r_R} + \frac{W_{CF}}{r_F} \right) \right]$$

where: V_V = Void content, %(v)
ρ_C = laminate density, g/cc (same method as 2.2.9)
W_{CF} = weight of fibrous carbon fiber residue of acid digestion, g
ρ_F = nominal carbon fiber density, g/cc = 1.78 for T700S
ρ_R = nominal cured neat resin density, g/cc = 1.267

A.1.13. Cured Laminate Tg by DMA

The dry and wet Tg by DMA was determined on three specimens per batch in accordance with SACMA SRM 18R-94. The wet Tg specimens were conditioned in accordance with method described in paragraph 2.1.7.1. The resultant wet Tg data reflected the plasticization of resin matrix due to moisture absorption that is anticipated for any operational environment.

A.2. TENSILE PROPERTIES

Note: The following descriptions below apply to both 0° (Warp) and 90° (Fill) Tensile specimens unless otherwise specified.

A.2.1. 0° (Warp) and 90° (Fill) Tensile Properties

The 0° (warp) and 90° (fill) tensile tests were conducted in accordance with ASTM D3039 and TCWIN-U-M201. Six test specimens, 4 for tensile strength & modulus and 2 for tensile strength only, were tested for each test condition. Test specimens

from one batch were tested at -65°F (Dry). Test specimens from three batches were tested at 75°F (Dry), 180°F (Dry) and 180°F (Wet).

Twelve plies were used to fabricate the initial test panels, for zero-degree $(warp)_{12}$ and ninety-degree $(fill)_{12}$ ply orientations. The panels were tabbed in accordance with para. 2.1.5. The zero-degree and ninety-degree test specimens were wet cut to 9.0 inches nominal length and 1.00 inch nominal width in accordance with TCWIN-Q-M101.

The widths of the test specimens were measured with digital ¼" diameter flat anvil and spindle micrometer. The thickness of the specimens were measured with digital ¼" diameter hemispherical anvil and spindle micrometer. The measurements were recorded onto TCFOR-Q-033. The width and thickness measurements were entered into the test frame computer along with the material type, batch number, test condition and specimen identification.

The 0° (warp) tensile test specimens were strain gauged with CEA-06-125UT-120 biaxial strain gage, except the –65 °F test specimens that were strain gauge with CEA-06-125UT-350 biaxial strain gage by Intec. The 90° (fill) tensile test specimens were strain gauged with C-960401-A axial strain gage, except the –65 °F test specimens that were strain gauge with CEA-06-125UW-350 axial strain gage by Intec. Instron 4505 load frame, operated in stroke control mode, was used to apply loading to the specimens at a crosshead rate of 0.05 inch/minute. For 0° (warp) tensile specimens, the loads, crosshead displacements, longitudinal strains and transverse strains were recorded throughout each test using a calibrated, computerized data assimilation system. For 90° (fill) tensile specimens, the loads, crosshead displacements and transverse strains only were recorded throughout each test using a calibrated, computerized data assimilation system.

A.2.1.1. Tensile Calculations

The ultimate tensile strengths, moduli and the poisson's ratio (zero-degree only) were calculated by transferring the raw data recorded, for example, ultimate loads, from the Instron computer into a Microsoft Excel spreadsheet program, in accordance with the following equations:

A.2.1.1.1. Tensile Strength (Un-normalized)

The un-normalized tensile strength was calculated using the following equation:

$$s_{ULT} = \frac{P}{b*d}$$

where: σ_{ULT} = the ultimate tensile stress (MPa)
P = the maximum load, (N)
b = the averaged measured width of the specimen (mm)
d = the averaged measured thickness of the specimen (mm)

A.2.1.1.2. Tensile Strength (Normalized)

The normalized tensile strength was calculated using the following equation:

$$s_{ULT} = \frac{P}{b*d} x \frac{CPT_{specimen}}{CPT_{batchaverage}}$$

A.2.1.1.3. Tensile Modulus of Elasticity (Un-normalized)

The un-normalized longitudinal tensile modulus of elasticity was calculated using the following equation:

$$E_{11T} = \frac{P_{0.3\%} - P_{0.1\%}}{b*d*(e_{0.3\%} - e_{0.1\%})}$$

where: E_{11T} = the tensile modulus of elasticity (GPa)
b = the averaged measured width of the specimen (mm)
d = the averaged measured thickness of the specimen (mm)
$P_{0.3\%}$ = the applied load at 3000 micron (N)
$P_{0.1\%}$ = the applied load at 1000 micron (N)
$\varepsilon_{0.3\%}$ = 0.3% measured longitudinal strain = 3000 micron (mm/m)
$\varepsilon_{0.1\%}$ = 0.1% measured longitudinal strain = 1000 micron (mm/m)

A.2.1.1.4. Tensile Modulus of Elasticity (Normalized)

The normalized longitudinal tensile modulus of elasticity was calculated using the following equation:

$$E_{11T} = \frac{P_{0.3\%} - P_{0.1\%}}{b*d*(e_{0.3\%} - e_{0.1\%})} x \frac{CPT_{specimen}}{CPT_{batchaverage}}$$

A.2.1.1.5. 0° (Warp) Tensile Poisson's Ratio

The poisson's ratio (ν_{12}) of 0° (warp) tensile specimen was calculated as follows:

$$\upsilon_{12} = \frac{e_{Y2} - e_{Y1}}{0.002}$$

where: υ_{12} = major Poisson's ratio
ε_{Y1} = transverse strain at stress 1, mm/mm
ε_{Y2} = transverse strain at stress 2, mm/mm
0.002 = the longitudinal strain range (ε_{X2}-ε_{X1})=0.003–0.001 mm/mm

A.3. COMPRESSIVE STRENGTH

Note: The following description apply to both 0° (Warp) and 90° (Fill) Compressive Strength specimens unless otherwise specified.

A.3.1. 0° (Warp) and 90° (Fill) Compressive Strength Properties

The 0° (warp) and 90° (fill) compressive strength tests were conducted in accordance with SACMA SRM 1R-94 and TCWIN-U-M204. Six compressive strength specimens were tested for each test condition. Test specimens from one batch were tested at -65°F (Dry). Test specimens from three batches were tested at 75°F (Dry), 180°F (Dry) and 180°F (Wet).

Twelve plies were used to fabricate the initial test panels, for zero-degree $(warp)_{12}$ and ninety-degree $(fill)_{12}$ ply orientations. The panels were tabbed in accordance with para. 2.1.5. The test specimens were wet cut, to nominal length of 3.18 inches and a nominal width of 0.50 inch. The test specimens were machined at NIAR, Wichita State University in accordance with SACMA SRM 1-94.

The widths of the specimens were measured with digital ¼" diameter flat anvil and spindle micrometer. The thickness of the specimens used in calculations was the average of measurements on untabbed test panel with digital ¼" diameter hemispherical anvil and spindle micrometer. The measurements were recorded onto TCFOR-Q-033. The width and thickness measurements were entered into the test frame computer along with the material type, batch number, test condition and specimen identification.

A modified ASTM D695 anti-buckling fixture was used to augment specimen stability during the compressive tests. Instron 4510 load frame, operated in stroke control mode, was used to apply loading to the specimens at 0.05 inch/minute crosshead rate. The loads and displacements were recorded throughout each test using a calibrated, computerized data assimilation system.

A.3.1.1. Compressive Strength Calculations

The ultimate compressive strengths were calculated by transferring the raw data recorded, for example, ultimate loads, from the Instron 4510 into a Microsoft Excel spreadsheet program, in accordance with the following equations:

A.3.1.1.1. Compressive Strength Calculation (Un-normalized)

The un-normalized 0° (warp) & 90° (fill) ultimate compressive strengths were calculated in accordance with the following formula:

$$F = \frac{P}{b * t}$$

where: F = the ultimate compressive strength (MPa)
P = the ultimate compressive load (N)
b = the averaged measured specimen width (mm)
t = the average thickness measured on untabbed compression panel (mm)

A.3.1.1.2. Compressive Strength Calculation (Normalized)

The 0° (warp) & 90° (fill) compressive strengths were normalized in accordance with the following formula:

$$F = \frac{P}{b * t} x \frac{CPT_{specimen}}{CPT_{batchaverage}}$$

A.4. COMPRESSIVE MODULUS

Note: The following description apply to both 0° (Warp) and 90° (Fill) Compressive Modulus specimens unless otherwise specified.

A.4.1. 0° (Warp) and 90° (Fill) Compression Modulus Properties

The 0° (warp) and 90° (fill) compressive modulus tests were conducted in accordance with SACMA SRM 1R-94 and TCWIN-U-M206. Two test specimens were tested for each test condition. Test specimens from one batch were tested at -65°F (Dry). Test specimens from three batches were tested at 75°F (Dry), 180°F (Dry) and 180°F (Wet).

Fourteen plies were used to fabricate the initial test panels, for zero-degree $(warp)_{14}$ and ninety-degree $(fill)_{14}$ ply orientations. The test specimens were wet cut, to nominal length of 3.18 inches and a nominal width of 0.50 inch, in accordance with TCWIN-Q-M103.

The widths of the test specimens were measured with digital ¼" diameter flat anvil and spindle micrometer. The thickness of the specimens were measured with digital ¼" diameter hemispherical anvil and spindle micrometer. The measurements were recorded onto TCFOR-Q-033. The width and thickness measurements were entered into the test frame computer along with the material type, batch number, test condition and specimen identification.

A modified ASTM D695 anti-buckling fixture was used to augment specimen stability during the compressive tests. Instron 4510 load frame, operated in stroke control mode, was used to apply the loads. The crosshead displacement rate for each test was 0.05 in/min (1.27 mm/min) and the strains were measured with a FAE-12S-12-S6EL-2 uni-axial strain gauge, except for the –65°F test specimens that were strain gauged with CEA-06-125UW-350 uni-axial strain gauge and tested by Intec. The loads and strains were recorded throughout each test using computerized data assimilation system.

A.4.1.1. Compression Modulus Calculations

The compression moduli were calculated by transferring the raw data recorded, for example, longitudinal strains, from the Instron 4510 into a Microsoft Excel spreadsheet program, in accordance with the following equations:

A.4.1.1.1. Compressive Modulus Calculation (Un-normalized)

The un-normalized 0° (warp) & 90° (fill) compressive modulus was calculated as follows:

$$E = \frac{P_{0.3\%} - P_{0.1\%}}{b * d * \left(e_{0.3\%} - e_{0.1\%}\right)}$$

where: E = compressive modulus (GPa)
$P_{0.3\%}$ = applied load at 3000 micron, (N)
$P_{0.1\%}$ = applied load at 1000 micron, (N)
b = averaged measured specimen width, (mm)
d = averaged measured specimen thickness, (mm)
$\varepsilon_{0.3\%}$ = 0.3% measured strain = 3000 micron (mm/m)
$\varepsilon_{0.1\%}$ = 0.1% measured strain = 1000 micron (mm/m)

A.4.1.1.2. Compressive Modulus Calculation (Normalized)

The 0° (warp) & 90° (fill) compressive modulus normalization was calculated as follows:

$$E = \frac{P_{0.3\%} - P_{0.1\%}}{b * d * \left(e_{0.3\%} - e_{0.1\%}\right)} x \frac{CPT_{specimen}}{CPT_{batchaverage}}$$

A.5. IN-PLANE (IOSIPESCU) SHEAR

The in-plane (iosipescu) shear tests were conducted in accordance with ASTM D5379-93 and D5379-98 for new calculation range. Six test specimens, 4 for shear strength & modulus and 2 for shear strength only, were tested for each test condition. Test specimens from one batch were tested at -65°F (Dry). Test specimens from three batches were tested at 75°F (Dry), 180°F (Dry) and 180°F (Wet).

Sixteen plies were used to fabricate the initial test panels, in the $(Warp/Fill)_{4S}$ ply stacking sequence. The test specimens were wet cut, to nominal length of 3.0 inches and to nominal width of 0.75 inch. The specimen width is further machined to symmetrical centrally located v-notched width of 0.45 inch, in accordance with ASTM D5379-93.

The symmetrical centrally notched widths of the test specimens were measured with digital needlepoint and spindle micrometer. The thickness of the specimens were measured with digital ¼" diameter hemispherical anvil and spindle micrometer. The measurements were recorded onto TCFOR-Q-033. The width and thickness measurements were entered into the test frame computer along with the material type, batch number, test condition and specimen identification.

The test specimens were inserted into the v-notched beam test fixture, with the notch located along the line-of-action of loading by means of an alignment tool that referenced the fixture. The notches influence the shear strain along the loading direction, as the two halves of the fixture were compressed by the load frame while monitoring load.

Instron 4505 load frame, operated in stroke control mode, was used to apply the loads. The crosshead displacement rate for each test was 0.05 in/min (1.27 mm/min). The strains were measured with a EA-06-125-TW-120 rosette strain gauge, except the -65°F test specimens that were strain gauged with EA-06-062TV-350 and tested by Intec. The loads and strains were recorded throughout each test using computerized data assimilation system.

A.5.1. In-plane (Iosipescu) Shear Strength Calculations

The strains were measured using the bonded strain gauge. The shear cord modulus was calculated in accordance with ASTM D5379-98, at 6500 microstrain and 2500 microstrain. The ultimate in-plane (iosipescu) shear strength and moduli were calculated by transferring the raw data recorded, for example, ultimate loads, measured strains, from the instron computer into a Microsoft Excel spreadsheet, in accordance with the following equations:

A.5.1.1. In-plane (Iosipescu) Shear, Ultimate Strength Calculation

$$t_{Ult.} = \frac{P}{b * d}$$

where: $\tau_{Ult.}$ = the ultimate in-plane shear strength (MPa)
P = the ultimate load (N)
b = the measured specimen width, in the symmetrical centrally located notch (mm)
d = the average measured specimen thickness (mm)

A.5.1.2. In-plane (Iosipescu) Shear, Modulus Calculation

$$G_{12} = \frac{P_{0.6\%} - P_{0.1\%}}{b * d * (g_{0.6\%} - g_{0.1\%})}$$

where: G_{12} = shear chord modulus of elasticity (GPa)
$P_{0.65\%}$ = applied load at 6500 micron (N)
$P_{0.25\%}$ = applied load at 2500 micron (N).
b = the measured specimen width, in the symmetrical centrally located notch (mm)
d = the average measured specimen thickness (mm)
$\gamma_{0.65\%} = |\varepsilon_{+45}| + |\varepsilon_{-45}|$ = shear strain at 6500 micron (mm/m)
$\gamma_{0.25\%} = |\varepsilon_{+45}| + |\varepsilon_{-45}|$ = shear strain at 2500 micron (mm/m)

A.6. SHORT BEAM SHEAR

The short beam shear tests were conducted in accordance with ASTM 2344-89. Six test specimens from three batches were tested at 75°F (Dry) only.

Twelve plies were used to fabricate the initial test panels, in the zero-degree ply stacking sequence, $(warp)_{12}$. The test specimens were wet cut, to nominal length of 6*average thickness, in inches and to nominal width of 0.25 inch.

Instron 4505 load frame, operated in stroke control mode, was used to apply the loads. The crosshead displacement rate for each test was 0.05 in/min (1.27 mm/min). The loads and displacements were recorded throughout each test using computerized data assimilation system.

A.6.1. Short Beam Shear Strength Calculations

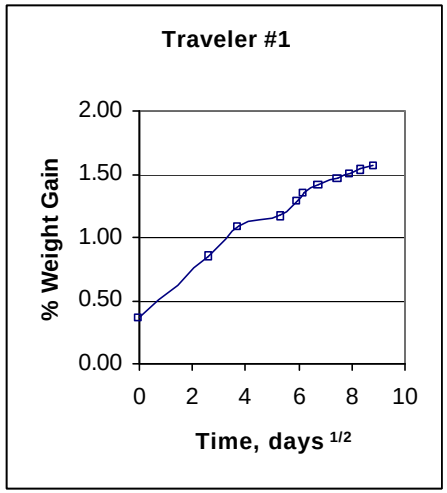
The short beam shear strengths were calculated by transferring the raw data recorded from the Instron 4505 computer into Microsoft Excel spreadsheet program, in accordance with the following equation:

A.6.1.1. Short Beam Shear Strength Calculation

$$F = \frac{3*P}{4*b*t}$$

where: F = the short beam shear strength (MPa)
P = the ultimate load (N)
b = the measured specimen width (mm)
t = the measured specimen thickness (mm)

APPENDIX B. MOISTURE CONDITIONING HISTORY CHARTS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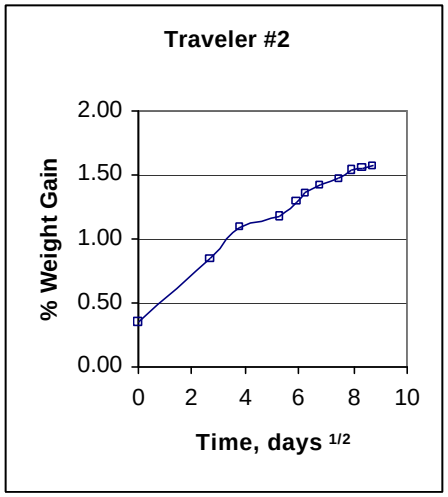
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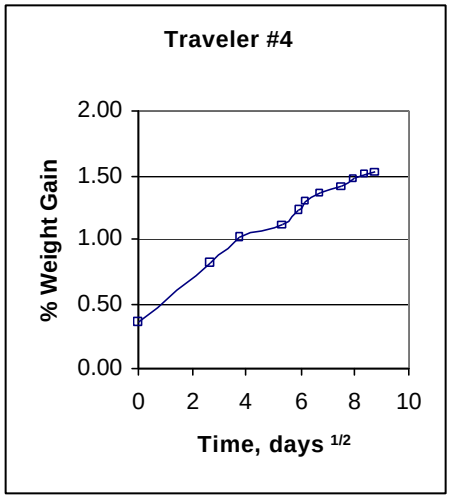
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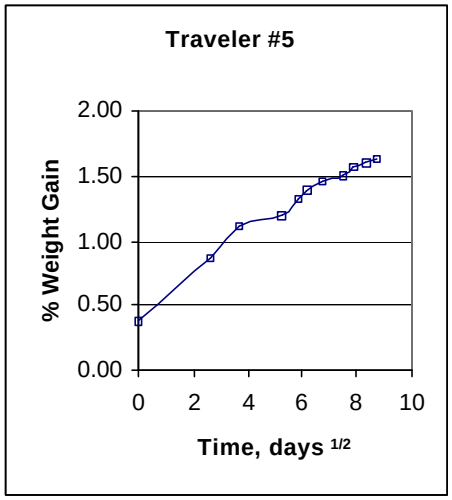
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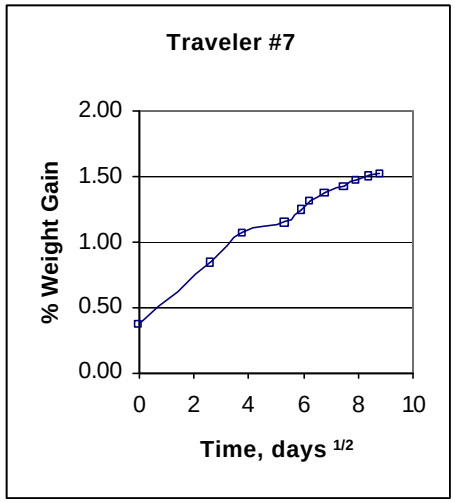
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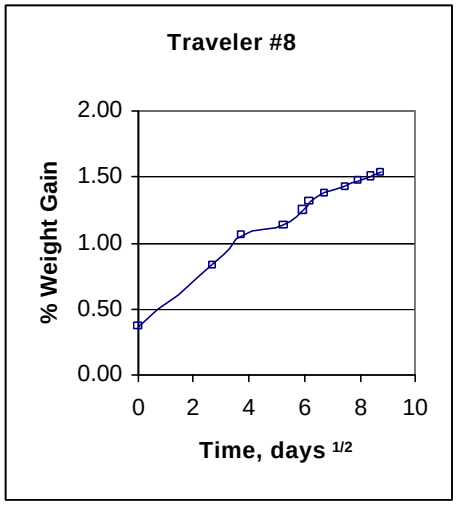
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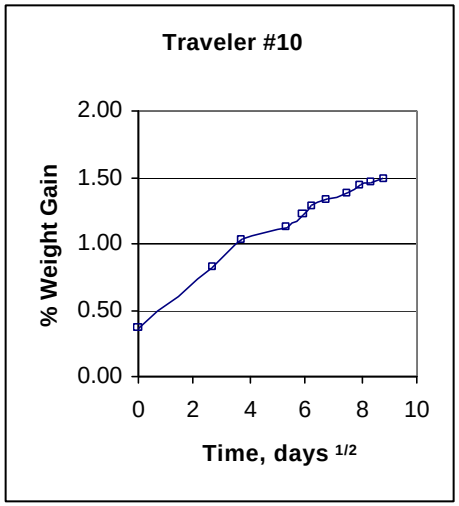
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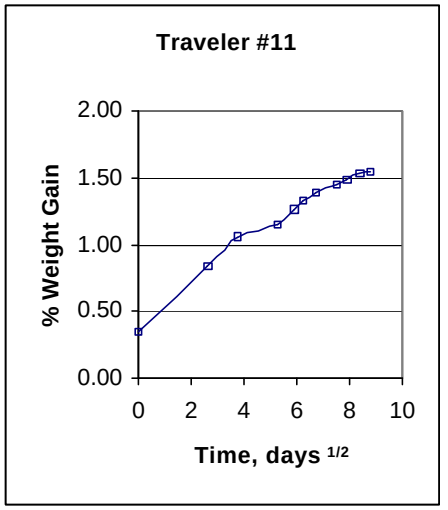
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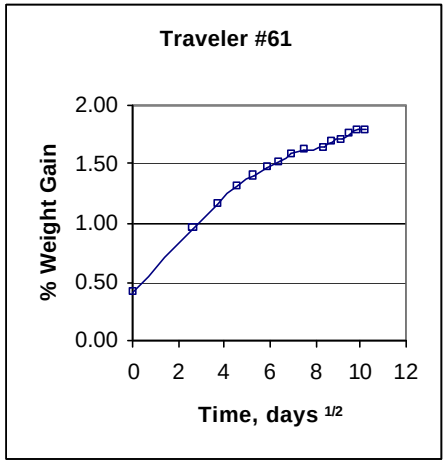
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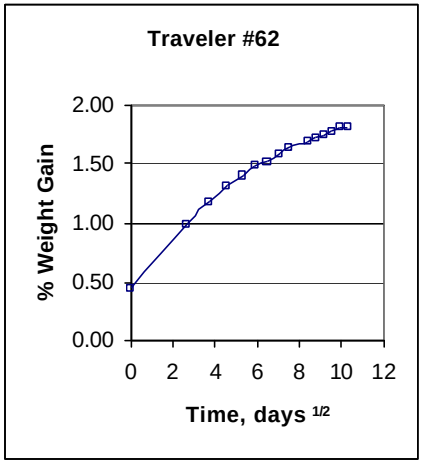
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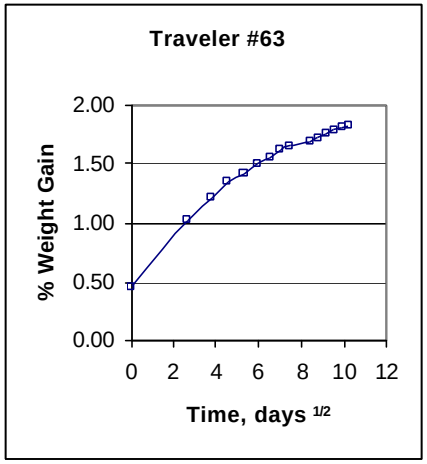
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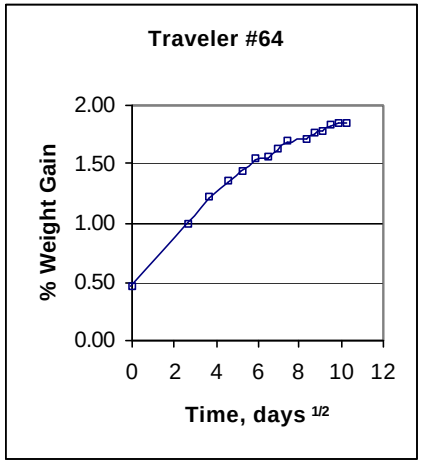
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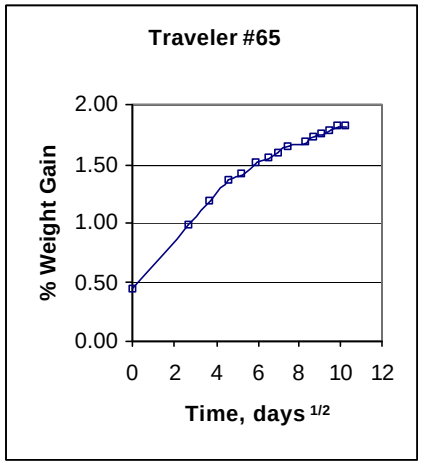
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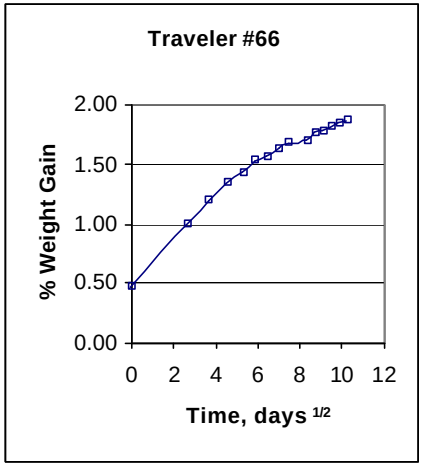
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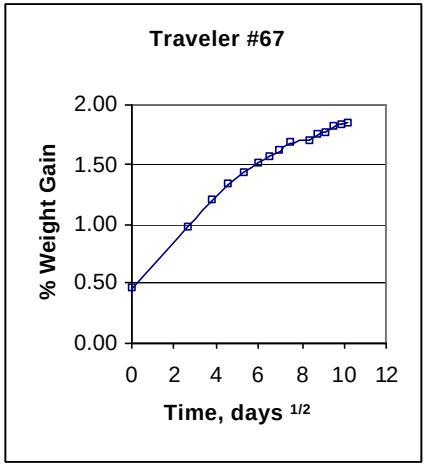
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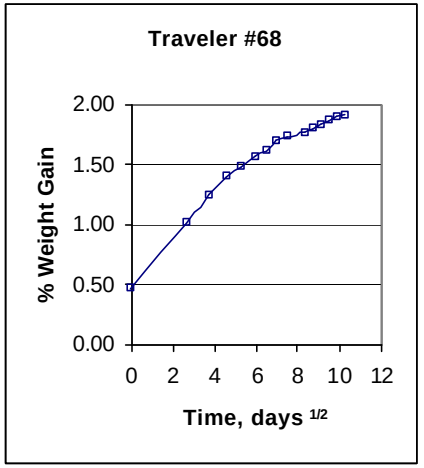
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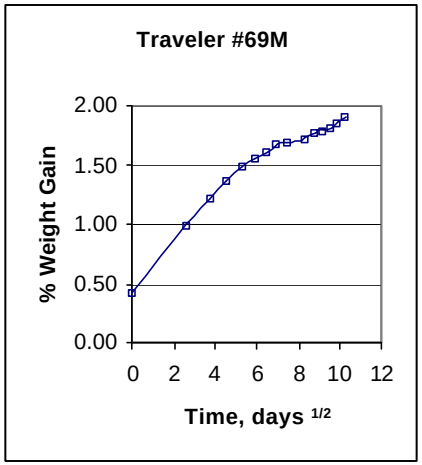
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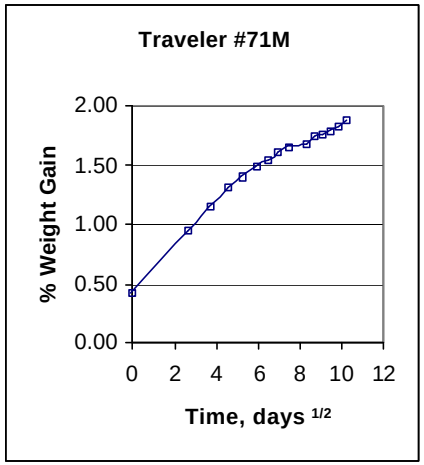
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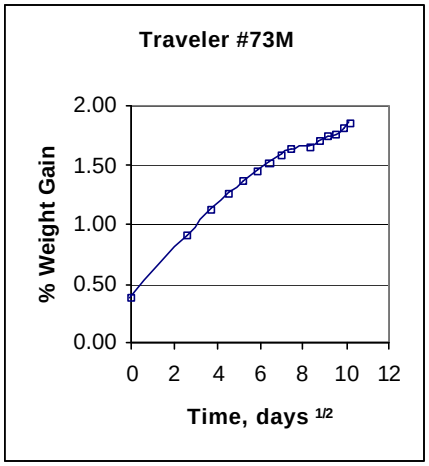
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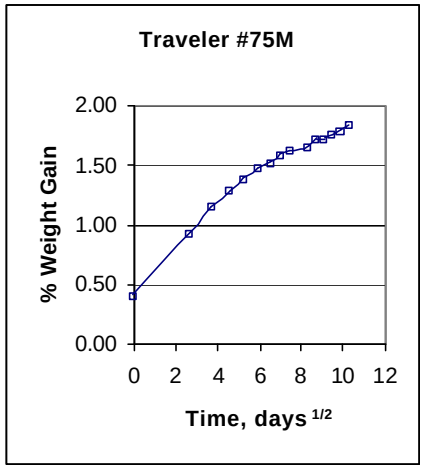
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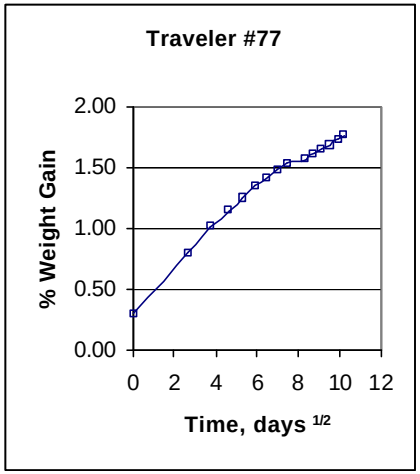
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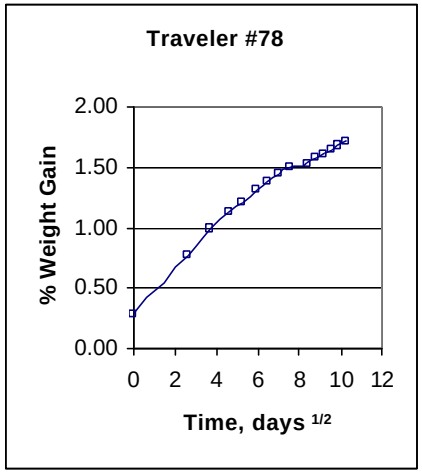
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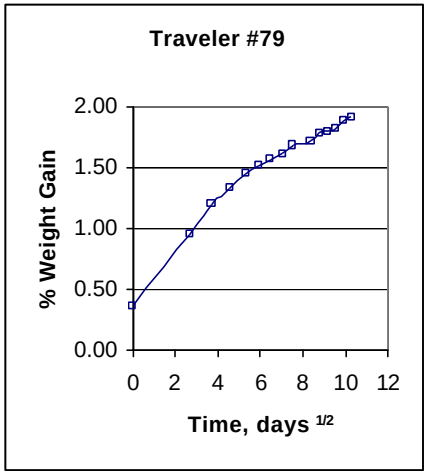
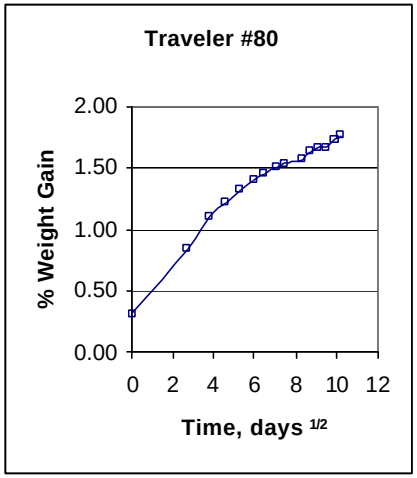
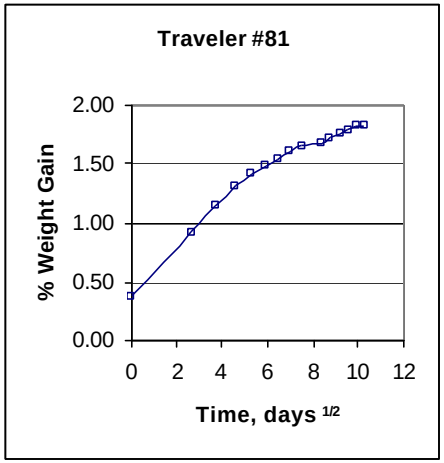
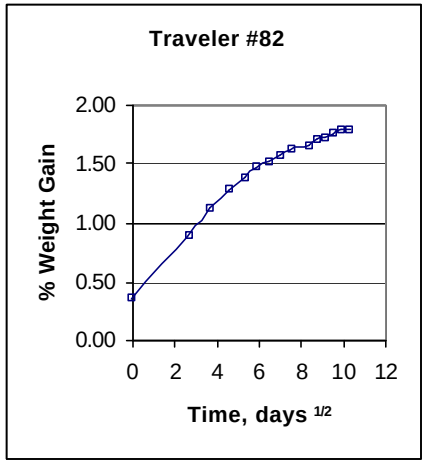
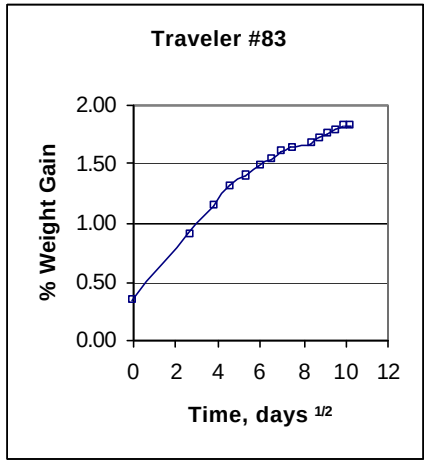
Time, days 1/2

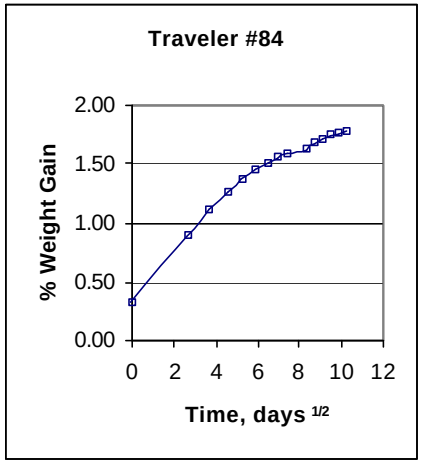

Traveler #79
% Weight Gain
2.00
1.50
1.00
0.50
0.00
0 2 4 6 8 10 12
Time, days 1/2

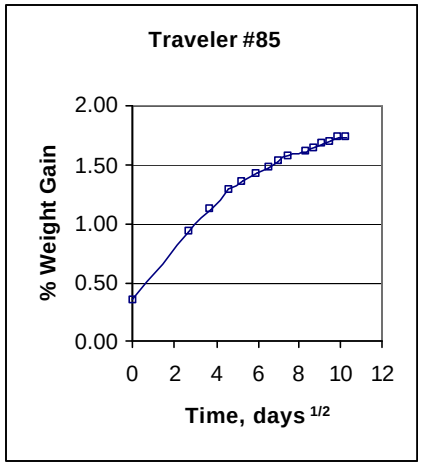

Traveler #80
% Weight Gain
2.00
1.50
1.00
0.50
0.00
0 2 4 6 8 10 12
Time, days 1/2

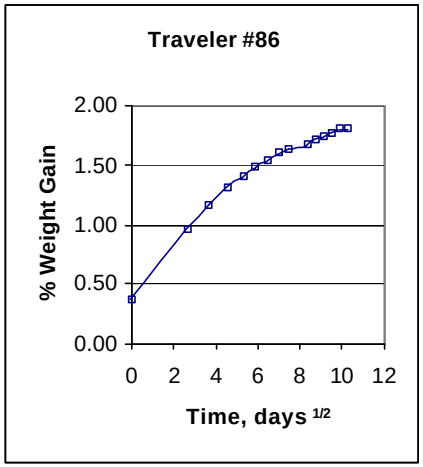

Traveler #81
% Weight Gain
2.00
1.50
1.00
0.50
0.00
0 2 4 6 8 10 12
Time, days 1/2

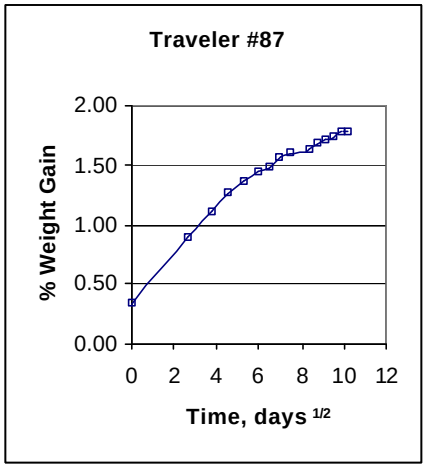

Traveler #82
% Weight Gain
2.00
1.50
1.00
0.50
0.00
0 2 4 6 8 10 12
Time, days 1/2

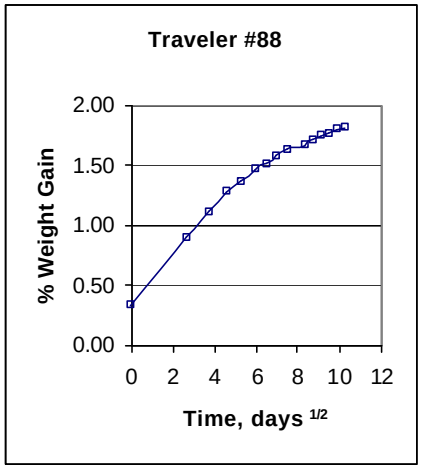

Traveler #83
% Weight Gain
2.00
1.50
1.00
0.50
0.00
0 2 4 6 8 10 12
Time, days 1/2

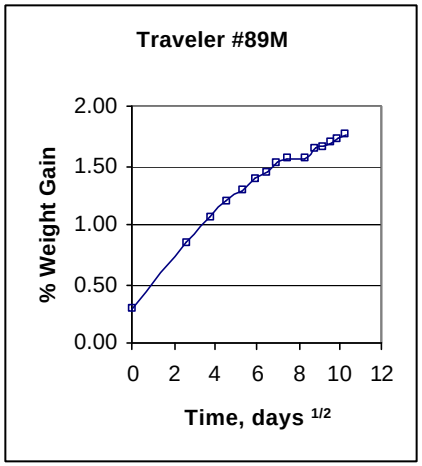

Traveler #84
% Weight Gain
2.00
1.50
1.00
0.50
0.00
0 2 4 6 8 10 12
Time, days 1/2

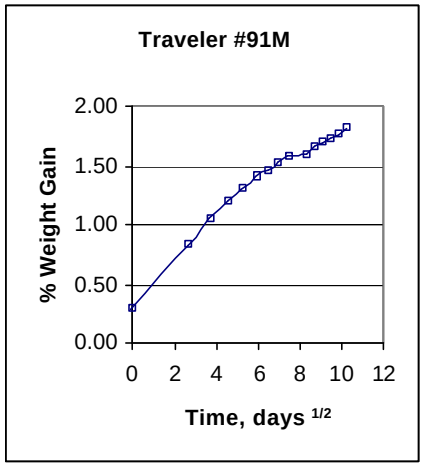

Traveler #85
% Weight Gain
2.00
1.50
1.00
0.50
0.00
0 2 4 6 8 10 12
Time, days 1/2

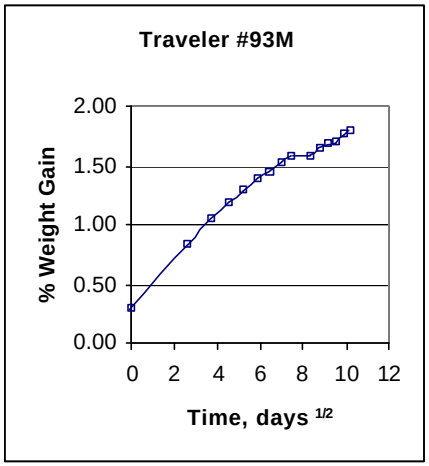

Traveler #86
% Weight Gain
2.00
1.50
1.00
0.50
0.00
0 2 4 6 8 10 12
Time, days 1/2

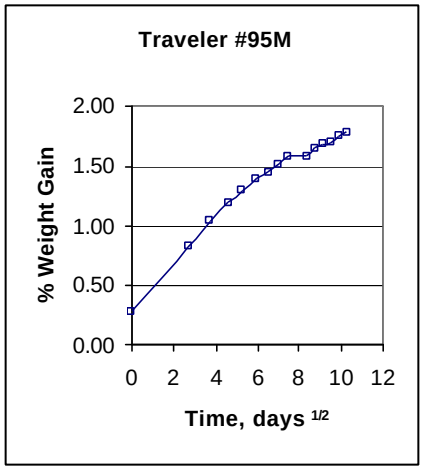

Traveler #87
% Weight Gain
2.00
1.50
1.00
0.50
0.00
0 2 4 6 8 10 12
Time, days 1/2

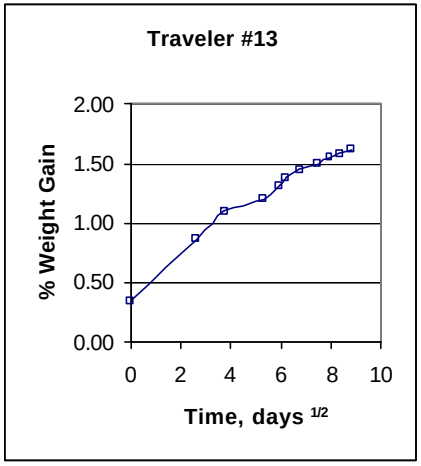

Traveler #88
% Weight Gain
2.00
1.50
1.00
0.50
0.00
0 2 4 6 8 10 12
Time, days 1/2

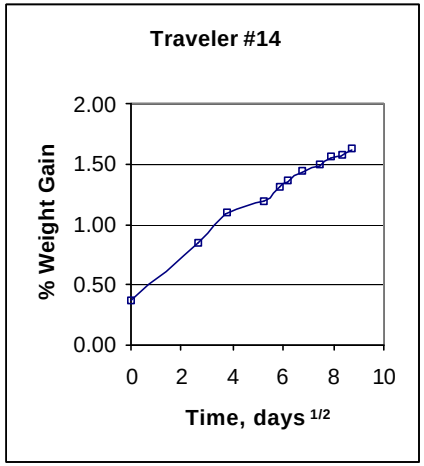

Traveler #89M
% Weight Gain
2.00
1.50
1.00
0.50
0.00
0 2 4 6 8 10 12
Time, days 1/2

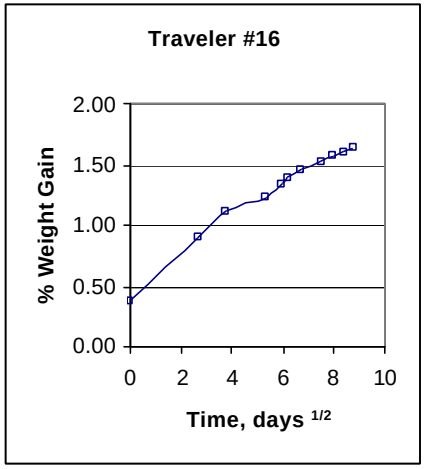

Traveler #91M
% Weight Gain
2.00
1.50
1.00
0.50
0.00
0 2 4 6 8 10 12
Time, days 1/2

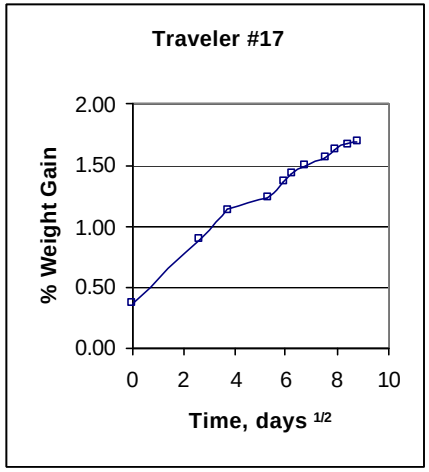

Traveler #93M
% Weight Gain
2.00
1.50
1.00
0.50
0.00
0 2 4 6 8 10 12
Time, days 1/2

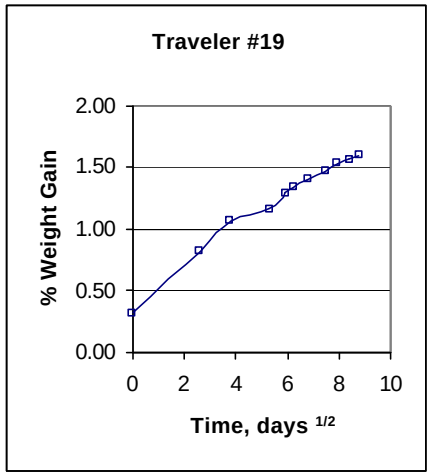

Traveler #95M
% Weight Gain
2.00
1.50
1.00
0.50
0.00
0 2 4 6 8 10 12
Time, days 1/2

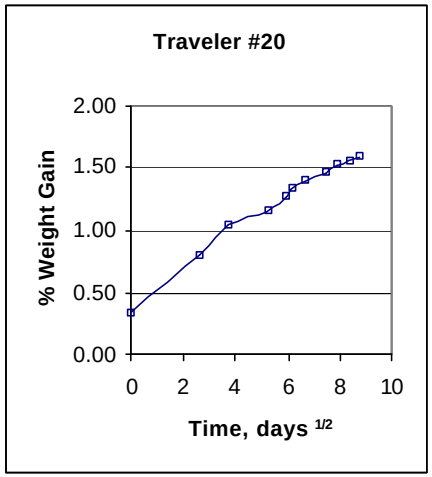

Traveler #13
% Weight Gain
2.00
1.50
1.00
0.50
0.00
0 2 4 6 8 10
Time, days 1/2

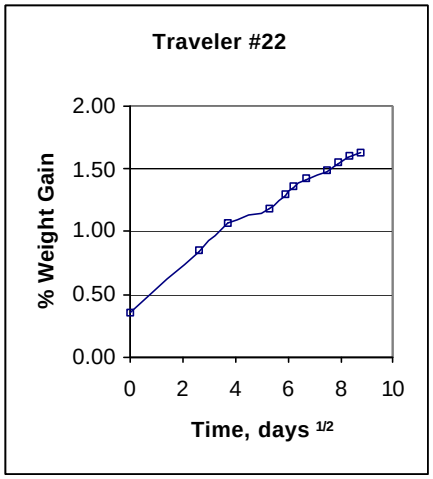

Traveler #14
% Weight Gain
2.00
1.50
1.00
0.50
0.00
0 2 4 6 8 10
Time, days 1/2

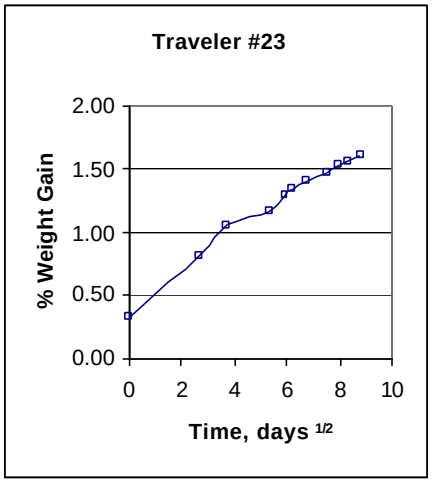

Traveler #16
% Weight Gain
2.00
1.50
1.00
0.50
0.00
0 2 4 6 8 10
Time, days 1/2

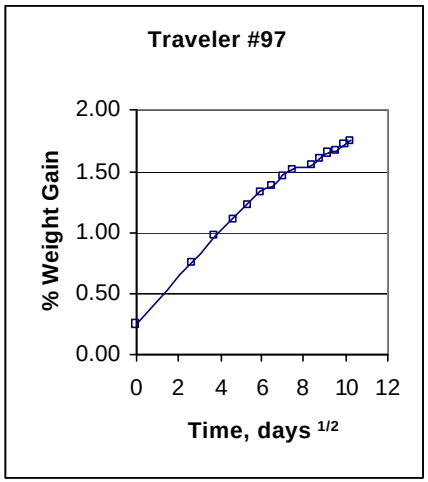

Traveler #17
% Weight Gain
2.00
1.50
1.00
0.50
0.00
0 2 4 6 8 10
Time, days 1/2

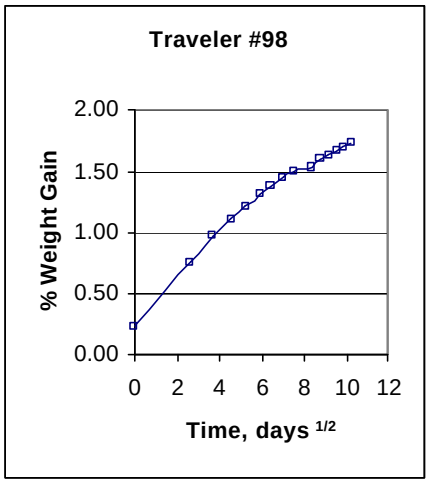

Traveler #19
% Weight Gain
2.00
1.50
1.00
0.50
0.00
0 2 4 6 8 10
Time, days 1/2

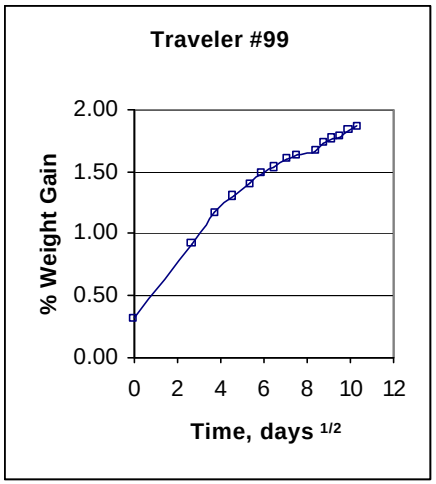

Traveler #20
% Weight Gain
2.00
1.50
1.00
0.50
0.00
0 2 4 6 8 10
Time, days 1/2

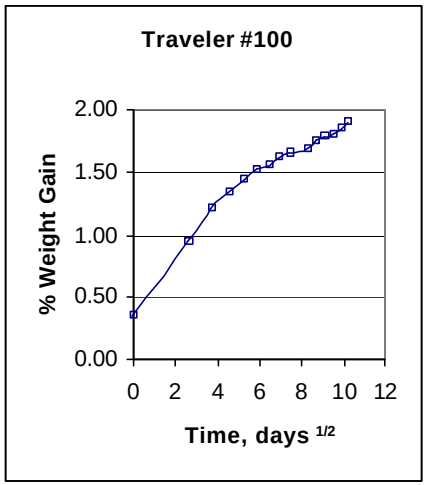

Traveler #22
% Weight Gain
2.00
1.50
1.00
0.50
0.00
0 2 4 6 8 10
Time, days 1/2

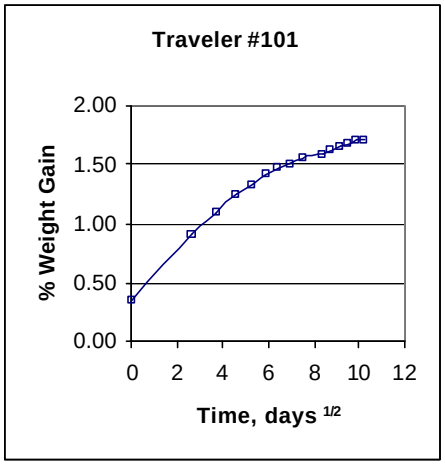

Traveler #23
% Weight Gain
2.00
1.50
1.00
0.50
0.00
0 2 4 6 8 10
Time, days 1/2

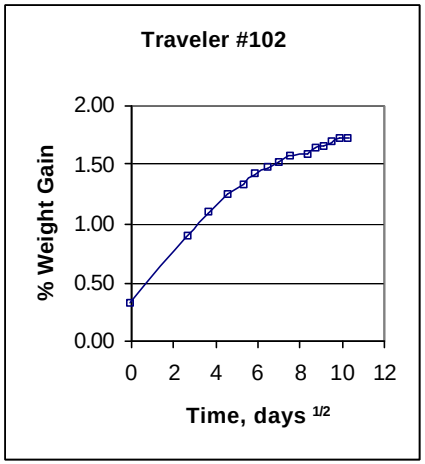

Traveler #97
% Weight Gain
2.00
1.50
1.00
0.50
0.00
0 2 4 6 8 10 12
Time, days 1/2

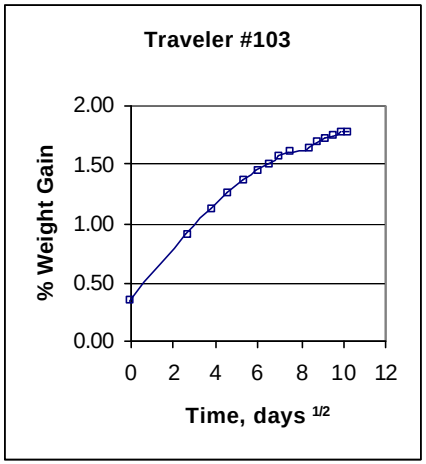

Traveler #98
% Weight Gain
2.00
1.50
1.00
0.50
0.00
0 2 4 6 8 10 12
Time, days 1/2

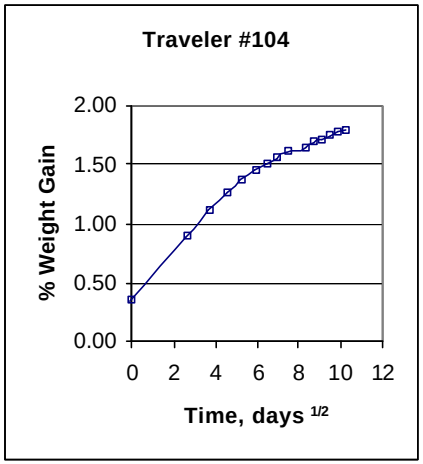

Traveler #99
% Weight Gain
2.00
1.50
1.00
0.50
0.00
0 2 4 6 8 10 12
Time, days 1/2

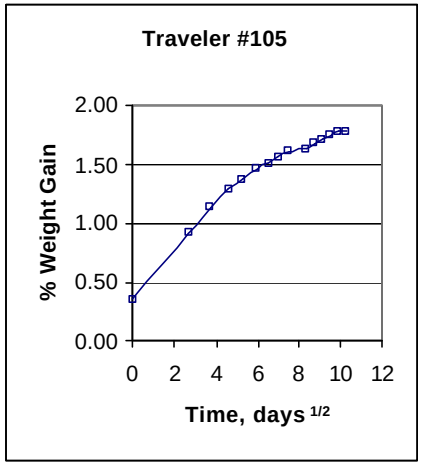

Traveler #100
% Weight Gain
2.00
1.50
1.00
0.50
0.00
0 2 4 6 8 10 12
Time, days 1/2

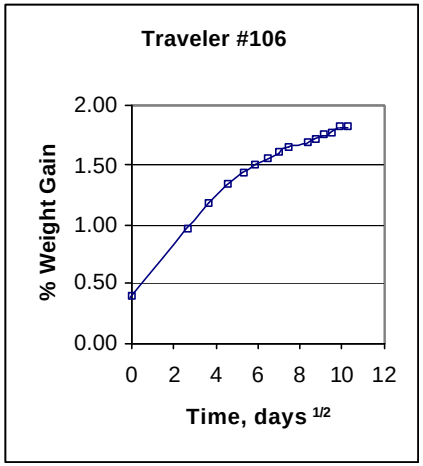

Traveler #101
% Weight Gain
2.00
1.50
1.00
0.50
0.00
0 2 4 6 8 10 12
Time, days 1/2

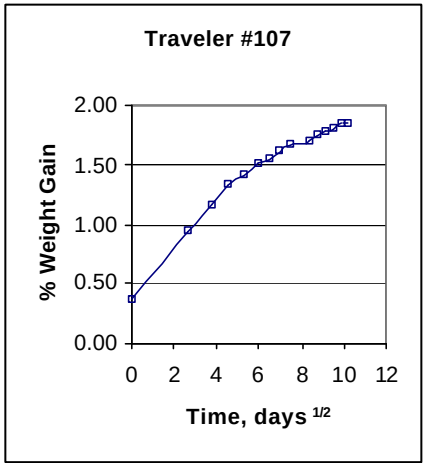

Traveler #102
% Weight Gain
2.00
1.50
1.00
0.50
0.00
0 2 4 6 8 10 12
Time, days 1/2

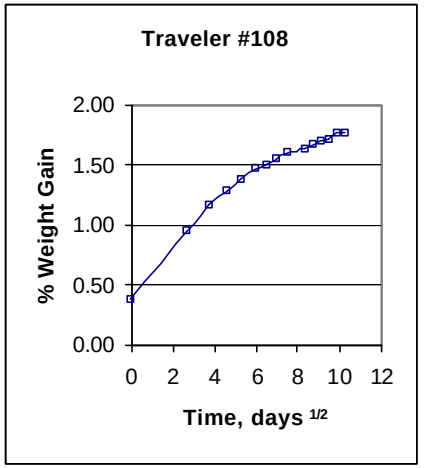

Traveler #103
% Weight Gain
2.00
1.50
1.00
0.50
0.00
0 2 4 6 8 10 12
Time, days 1/2

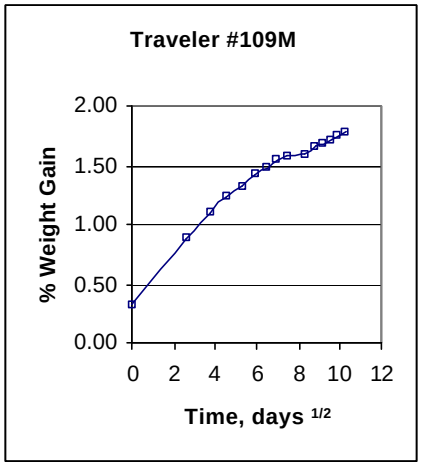

Traveler #104
% Weight Gain
2.00
1.50
1.00
0.50
0.00
0 2 4 6 8 10 12
Time, days 1/2

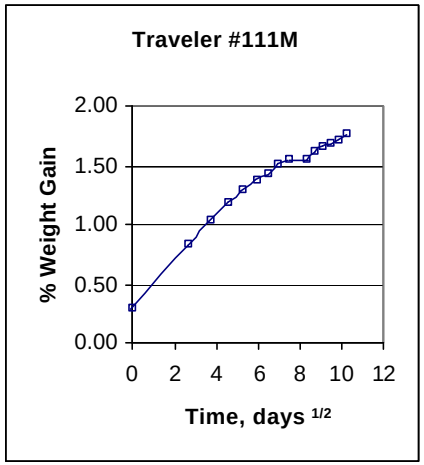

Traveler #105
% Weight Gain
2.00
1.50
1.00
0.50
0.00
0 2 4 6 8 10 12
Time, days 1/2

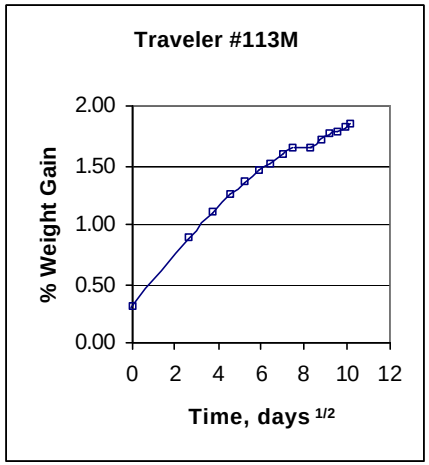

Traveler #106
% Weight Gain
2.00
1.50
1.00
0.50
0.00
0 2 4 6 8 10 12
Time, days 1/2

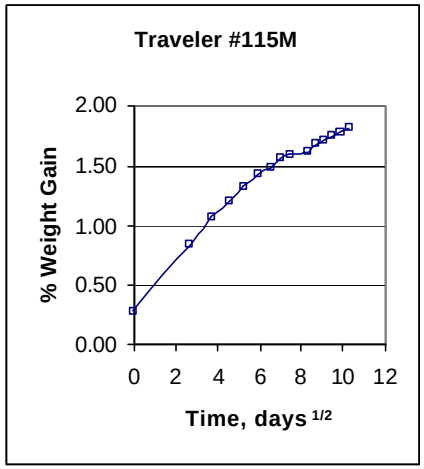

Traveler #107
% Weight Gain
2.00
1.50
1.00
0.50
0.00
0 2 4 6 8 10 12
Time, days 1/2

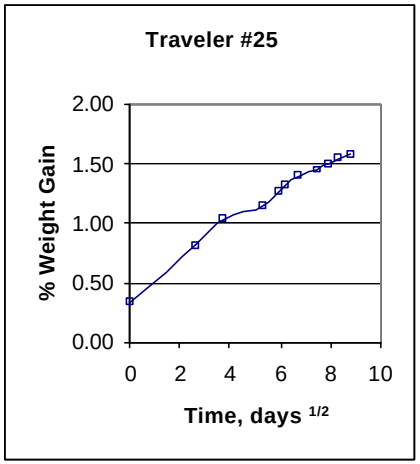

Traveler #108
% Weight Gain
2.00
1.50
1.00
0.50
0.00
0 2 4 6 8 10 12
Time, days 1/2

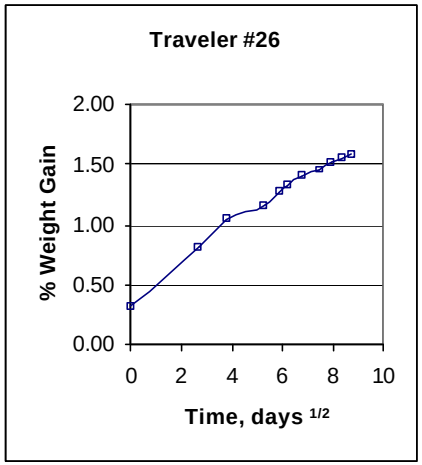

Traveler #109M
% Weight Gain
2.00
1.50
1.00
0.50
0.00
0 2 4 6 8 10 12
Time, days 1/2

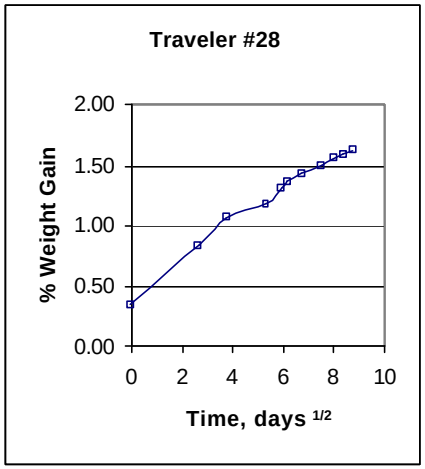

Traveler #111M
% Weight Gain
2.00
1.50
1.00
0.50
0.00
0 2 4 6 8 10 12
Time, days 1/2

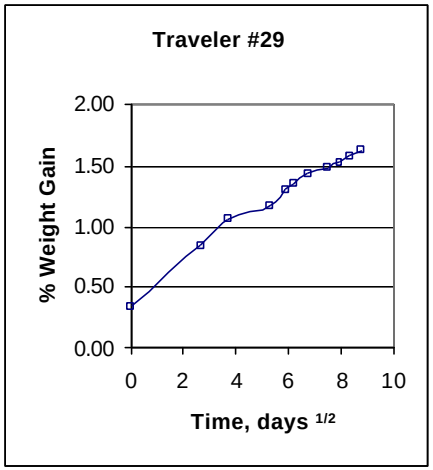

Traveler #113M
% Weight Gain
2.00
1.50
1.00
0.50
0.00
0 2 4 6 8 10 12
Time, days 1/2

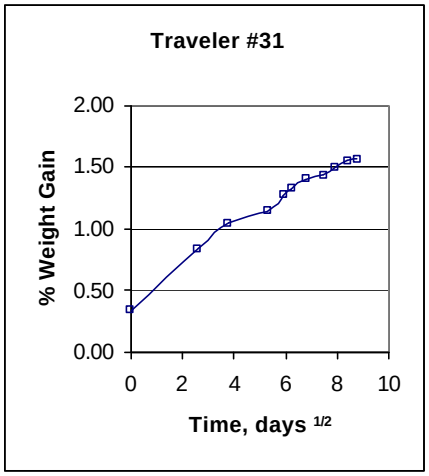

Traveler #115M
% Weight Gain
2.00
1.50
1.00
0.50
0.00
0 2 4 6 8 10 12
Time, days 1/2

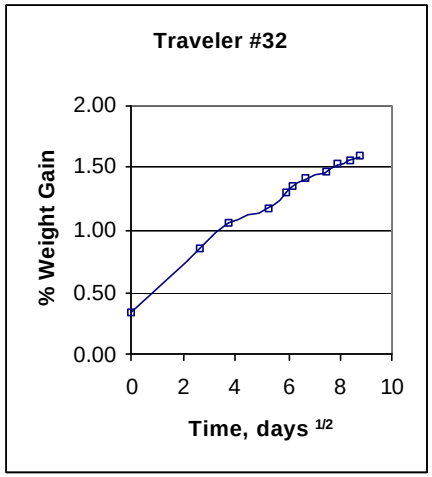

Traveler #25
% Weight Gain
2.00
1.50
1.00
0.50
0.00
0 2 4 6 8 10
Time, days 1/2

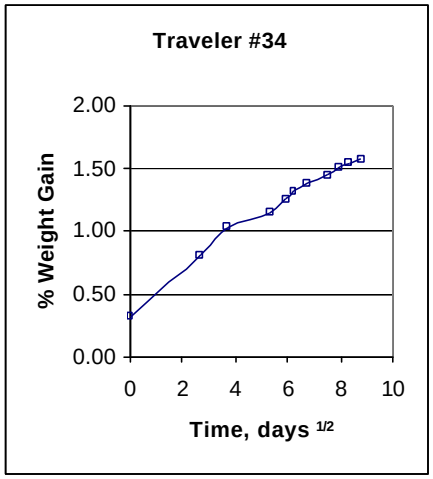

Traveler #26
% Weight Gain
2.00
1.50
1.00
0.50
0.00
0 2 4 6 8 10
Time, days 1/2

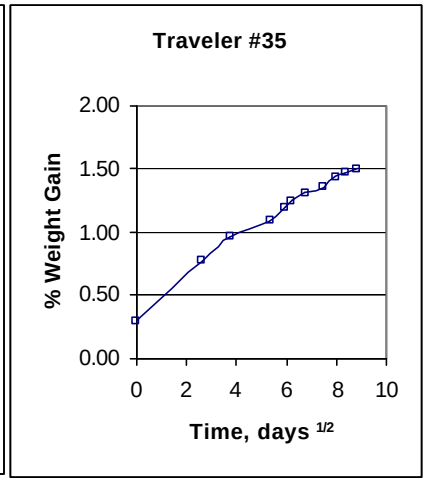

Traveler #28
% Weight Gain
2.00
1.50
1.00
0.50
0.00
0 2 4 6 8 10
Time, days 1/2


Traveler #29
% Weight Gain
2.00
1.50
1.00
0.50
0.00
0 2 4 6 8 10
Time, days 1/2


Traveler #31
% Weight Gain
2.00
1.50
1.00
0.50
0.00
0 2 4 6 8 10
Time, days 1/2


Traveler #32
% Weight Gain
2.00
1.50
1.00
0.50
0.00
0 2 4 6 8 10
Time, days 1/2


Traveler #34
% Weight Gain
2.00
1.50
1.00
0.50
0.00
0 2 4 6 8 10
Time, days 1/2


Traveler #35
% Weight Gain
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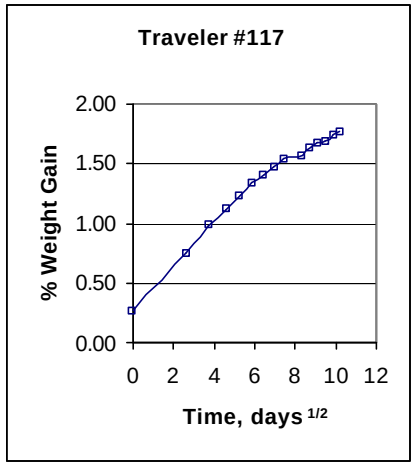
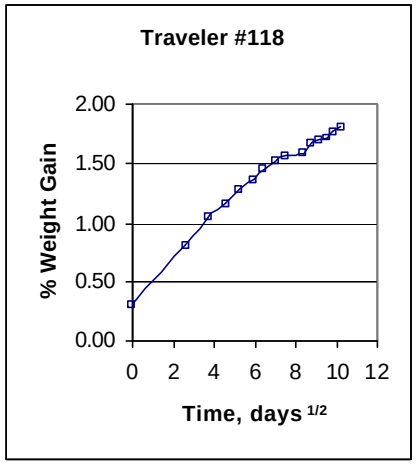
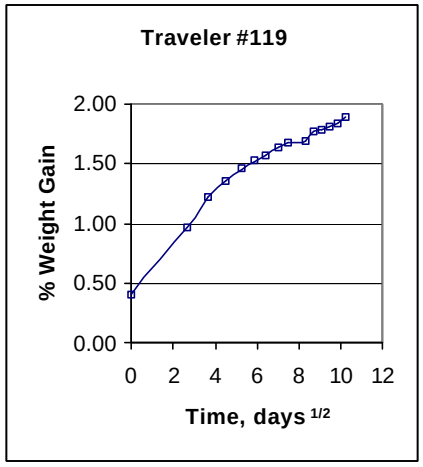
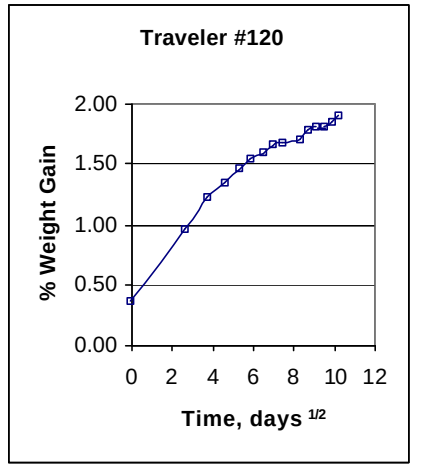
1.50
1.00
0.50
0.00
0 2 4 6 8 10
Time, days 1/2


Traveler #117
% Weight Gain
2.00
1.50
1.00
0.50
0.00
0 2 4 6 8 10 12
Time, days 1/2


Traveler #118
% Weight Gain
2.00
1.50
1.00
0.50
0.00
0 2 4 6 8 10 12
Time, days 1/2


Traveler #119
% Weight Gain
2.00
1.50
1.00
0.50
0.00
0 2 4 6 8 10 12
Time, days 1/2


Traveler #120
% Weight Gain
2.00
1.50
1.00
0.50
0.00
0 2 4 6 8 10 12
Time, days 1/2

APPENDIX C. PHYSICAL TEST RESULTS

Summary of Chemical and Physical Tests - Uncured Material Properties

Material Batch	Physical					Chemical								
	Uncured Resin Content (%)	Fiber Areal Weight (g/m^2)	Prepreg Volatile Content (%)	Gel Time (minutes)	Resin Flow (%)	IR	HPLC (% Area)					DSC (°F)	
							P_1	P_2	P_3	P_4	P_5	Onset	Peak
AF991009	41.5	194	0.13	8.0	23.5	scan	9.8	8.5	5.9	61.1	14.8	280	329
AF991010	41.7	190	0.21	7.9	23.5	on	10.1	8.8	6.4	59.7	14.9	279	330
AF991011	41.4	193	0.18	9.0	23.5	file	10.4	8.9	6.3	59.8	14.6	280	331
Grand Average	41.5	192	0.17	8.3	23.5		10.2	8.8	6.3	60.0	14.8	280	330
Requirement	42 ± 3	193 ± 8	2.0 max	5 - 25	10 min		TBD					TBD	TBD

Summary of Chemical and Physical Tests - Cured Material Properties

Material Batch	Resin Density (g/cc)	Glass Transition Temperature by DMA (°F)	
		Dry	Wet
AF991009	1.267	290	264
AF991010	1.267	296	266
AF991011	1.266	296	271
Grand Average	1.267	294	267
Requirement	1.26 ± 0.03	TBD	TBD *

* FAA Recommended Hot/Wet Tg: 230°F, Based on Maximum Operation Temperature of 180°F + 50°F

Summary of Chemical and Physical Tests - Cured Material Properties, Batch AF991009

Batch No./ Panel ID	Test Type	Laminate Density (g/cc)	Fiber Volume (%vol)	Resin Volume (%vol)	Void Content (%vol)	Cured Ply Thickness (in.)	Autoclave Cure Run ID -
AF991009							
A1-910-056	0° Tens	1.520	54.5	42.9	2.54	0.0086	99-595
A2-910-056	0° Tens	1.515	51.2	47.2	1.54	0.0085	99-595
B1-910-056	0° Tens	1.500	49.6	48.3	2.11	0.0087	99-596
B2-910-056	0° Tens	1.498	48.5	49.6	1.82	0.0085	99-596
A1-910-056	90° Tens	1.497	51.4	45.6	3.04	0.0086	99-595
A2-910-056	90° Tens	1.505	52.2	45.0	2.75	0.0086	99-595
B1-910-056	90° Tens	1.501	53.2	43.3	3.52	0.0086	99-596
B2-910-056	90° Tens	1.505	47.6	50.3	1.30	0.0086	99-598
A1-910-056	0° Comp	1.491	46.8	51.6	1.62	0.0086	99-595
A2-910-056	0°Comp	1.497	49.7	47.9	2.36	0.0086	99-595
B1-910-056	0°Comp	1.506	48.5	50.4	1.13	0.0086	99-598
B2-910-056	0°Comp	1.494	48.2	49.9	1.94	0.0086	99-598
A1-910-056	90°Comp	1.503	48.3	50.3	1.36	0.0086	99-597
A2-910-056	90°Comp	1.484	48.3	49.0	2.77	0.0086	99-597
B1-910-056	90°Comp	1.496	49.1	48.7	2.21	0.0086	99-598
B2-910-056	90°Comp	1.496	50.3	47.1	2.67	0.0087	99-598
A1-910-056	IPS	1.497	49.3	48.5	2.18	0.0087	99-597
B1-910-056	IPS	1.505	49.6	48.7	1.70	0.0086	99-596
A1-910-056	ILSS	1.489	47.3	50.4	2.34	0.0086	99-601
B1-910-056	ILSS	1.543	53.2	46.3	0.47	0.0082	99-600
Average		1.502	49.8	48.1	2.07	0.0086	-
Standard Deviation		0.013	2.1	2.4	0.73	0.0001	-
COV, %		0.85	4.30	5.02	35.09	1.08	-
Requirement		TBD	TBD	TBD	TBD	TBD	-

Summary of Chemical and Physical Tests - Cured Material Properties, Batch AF991010

Batch No./ Panel ID	Test Type	Laminate Density (g/cc)	Fiber Volume (%vol)	Resin Volume (%vol)	Void Content (%vol)	Cured Ply Thickness (in.)	Autoclave Cure Run ID -
AF991010							
A1-910-057	0° Tens	1.488	47.8	49.6	2.55	0.0085	99-626
A2-910-057	0° Tens	1.481	47.4	49.7	2.94	0.0086	99-626
B1-910-057	0° Tens	1.486	47.7	49.6	2.71	0.0086	99-627
B2-910-057	0° Tens	1.498	49.1	48.6	2.35	0.0086	99-627
A1-910-057	90° Tens	1.491	50.9	45.5	3.63	0.0086	99-629
A2-910-057	90° Tens	1.500	51.0	46.0	2.93	0.0086	99-629
B1-910-057	90° Tens	1.514	52.3	45.4	2.37	0.0085	99-627
B2-910-057	90° Tens	1.506	49.5	48.6	1.86	0.0085	99-627
A1-910-057	0° Comp	1.499	50.2	47.1	2.69	0.0085	99-624
A2-910-057	0°Comp	1.496	50.6	46.3	3.08	0.0086	99-624
B1-910-057	0°Comp	1.510	50.3	47.9	1.86	0.0085	99-625
B2-910-057	0°Comp	1.504	50.8	46.7	2.54	0.0085	99-625
A1-910-057	90°Comp	1.495	50.2	46.8	3.05	0.0085	99-624
A2-910-057	90°Comp	1.497	49.9	47.4	2.75	0.0086	99-624
B1-910-057	90°Comp	1.485	49.2	47.4	3.41	0.0085	99-625
B2-910-057	90°Comp	1.493	47.9	49.8	2.24	0.0085	99-625
A1-910-057	IPS	1.484	47.9	49.2	2.90	0.0086	99-629
B1-910-057	IPS	1.501	49.3	48.5	2.19	0.0086	99-628
A1-910-057	ILSS	1.494	48.0	49.8	2.21	0.0086	99-624
B1-910-057	ILSS	1.501	48.7	49.3	1.95	0.0087	99-625
Average		1.496	49.4	48.0	2.61	0.0086	-
Standard Deviation		0.009	1.4	1.5	0.49	0.0000	-
COV, %		0.59	2.76	3.14	18.84	0.54	-
Requirement		TBD	TBD	TBD	TBD	TBD	-

Summary of Chemical and Physical Tests - Cured Material Properties, Batch AF991011

Batch No./ Panel ID	Test Type	Laminate Density (g/cc)	Fiber Volume (%vol)	Resin Volume (%vol)	Void Content (%vol)	Cured Ply Thickness (in.)	Autoclave Cure Run ID -
AF991011							
A1-910-058	0° Tens	1.512	49.1	49.7	1.19	0.0086	99-633
A2-910-058	0° Tens	1.514	49.0	50.0	1.06	0.0085	99-633
B1-910-058	0° Tens	1.522	50.8	48.1	1.13	0.0085	99-637
B2-910-058	0° Tens	1.521	51.3	47.4	1.38	0.0085	99-637
A1-910-058	90° Tens	1.502	48.7	49.5	1.84	0.0085	99-633
A2-910-058	90° Tens	1.510	50.5	47.5	1.95	0.0085	99-633
B1-910-058	90° Tens	1.497	49.0	48.7	2.34	0.0085	99-630
B2-910-058	90° Tens	1.509	51.3	46.3	2.36	0.0086	99-630
A1-910-058	0° Comp	1.509	51.7	45.7	2.57	0.0085	99-631
A2-910-058	0°Comp	1.498	49.6	47.8	2.56	0.0085	99-631
B1-910-058	0°Comp	1.506	50.2	47.6	2.20	0.0087	99-630
B2-910-058	0°Comp	1.498	49.5	48.0	2.51	0.0087	99-630
A1-910-058	90°Comp	1.489	47.8	49.6	2.55	0.0086	99-631
A2-910-058	90°Comp	1.492	49.4	47.6	2.95	0.0086	99-631
B1-910-058	90°Comp	1.501	49.7	48.0	2.35	0.0086	99-630
B2-910-058	90°Comp	1.508	49.8	48.3	1.83	0.0085	99-630
A1-910-058	IPS	1.499	48.4	49.6	1.97	0.0085	99-636
B1-910-058	IPS	1.508	50.9	46.9	2.27	0.0085	99-637
A1-910-058	ILSS	1.500	50.9	46.2	2.91	0.0086	99-631
B1-910-058	ILSS	1.497	47.0	51.5	1.50	0.0087	99-639
Average		1.505	49.7	48.2	2.07	0.0086	-
Standard Deviation		0.009	1.2	1.4	0.58	0.0001	-
COV, %		0.59	2.49	3.01	27.81	0.76	-
Requirement		TBD	TBD	TBD	TBD	TBD	-

COMPANY : **Toray Composites**
MATERIAL SYSTEM : **TCA T700S-12K-50C/#2510 Plain Weave Fabric**

DMA Results -- Onset Storage Modulus

DRY

As Fabricated		
Sample #	**Tg [°C]**	**Tg [°F]**
A-1-910-056-1	142.5	288.5
A-1-910-056-2	144.0	291.2
A-1-910-056-3	143.5	290.3
A-1-910-057-1	148.0	298.4
A-1-910-057-2	146.5	295.7
A-1-910-057-3	146.0	294.8
A-1-910-058-1	144.0	291.2
A-1-910-058-2	148.0	298.4
A-1-910-058-3	147.5	297.5
Average [°F]		**294.00**
Standard Dev. [°F]		**3.78**
Coeff. Of Var. [%]		**1.28**

WET

Moisture Equilibrium at 85% RH		
Sample #	**Tg [°C]**	**Tg [°F]**
A-1-910-056-4	129.0	264.2
A-1-910-056-5	129.5	265.1
A-1-910-056-6	128.5	263.3
A-1-910-057-4	130.0	266.0
A-1-910-057-5	129.0	264.2
A-1-910-057-6	130.5	266.9
A-1-910-058-4	133.0	271.4
A-1-910-058-5	132.5	270.5
A-1-910-058-6	132.0	269.6
Average [°F]		**266.80**
Standard Dev. [°F]		**3.00**
Coeff. Of Var. [%]		**1.12**

DMA Results - Peak Tan Delta

DRY

As Fabricated		
Sample #	**Tg [°C]**	**Tg [°F]**
A-1-910-056-1	193.5	380.3
A-1-910-056-2	196.0	384.8
A-1-910-056-3	192.5	378.5
A-1-910-057-1	198.0	388.4
A-1-910-057-2	198.0	388.4
A-1-910-057-3	190.5	374.9
A-1-910-058-1	198.0	388.4
A-1-910-058-2	197.5	387.5
A-1-910-058-3	198.0	388.4
Average [°F]		**384.40**
Standard Dev. [°F]		**5.19**
Coeff. Of Var. [%]		**1.35**

WET

Moisture Equilibrium at 85% RH		
Sample #	**Tg [°C]**	**Tg [°F]**
A-1-910-056-4	151.0	303.8
A-1-910-056-5	151.0	303.8
A-1-910-056-6	149.0	300.2
A-1-910-057-4	152.0	305.6
A-1-910-057-5	151.5	304.7
A-1-910-057-6	152.5	306.5
A-1-910-058-4	154.0	309.2
A-1-910-058-5	150.5	302.9
A-1-910-058-6	153.5	308.3
Average [°F]		**305.00**
Standard Dev. [°F]		**2.77**
Coeff. Of Var. [%]		**0.91**

DMA Results -- Peak of Loss Modulus

DRY

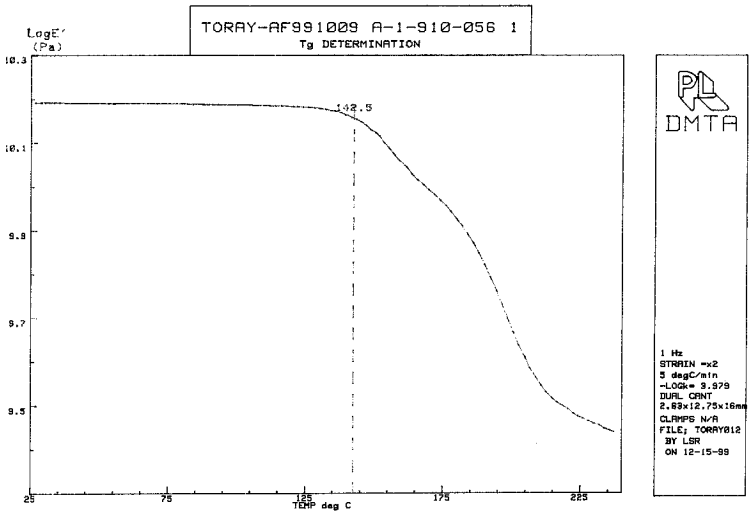
As Fabricated		
Sample #	**Tg [°C]**	**Tg [°F]**
A-1-910-056-1	178.0	352.4
A-1-910-056-2	186.5	367.7
A-1-910-056-3	177.5	351.5
A-1-910-057-1	185.5	365.9
A-1-910-057-2	186.0	366.8
A-1-910-057-3	185.5	365.9
A-1-910-058-1	185.5	365.9
A-1-910-058-2	188.5	371.3
A-1-910-058-3	186.0	366.8
Average [°F]		**363.80**
Standard Dev. [°F]		**6.93**
Coeff. Of Var. [%]		**1.90**

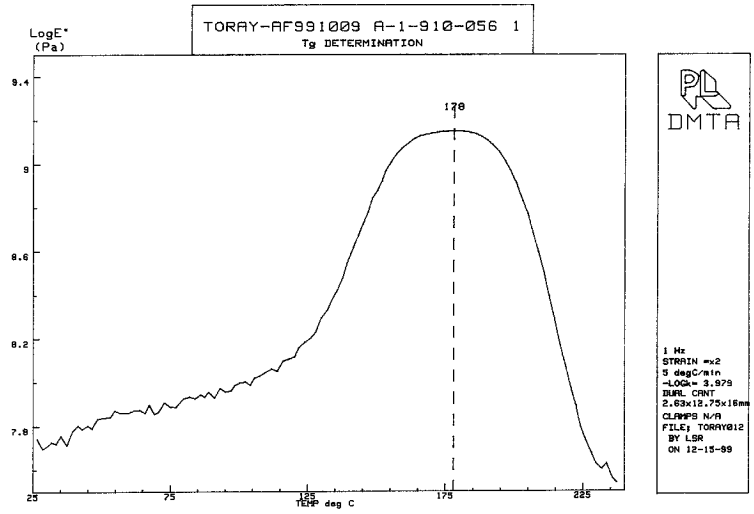
WET

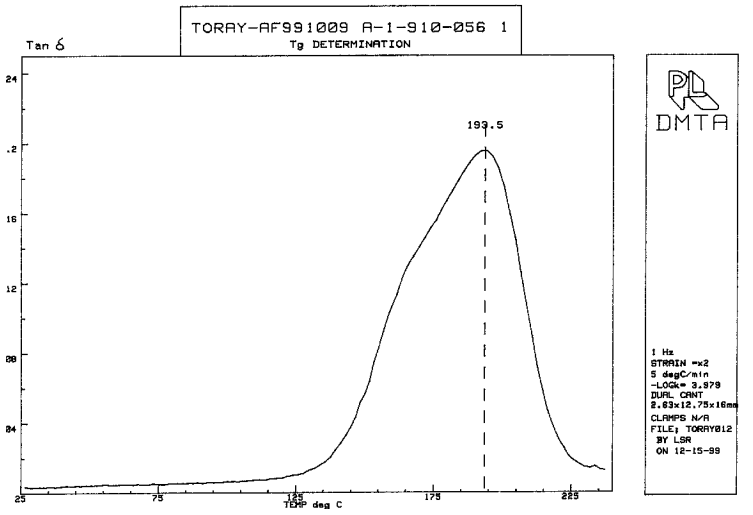
Moisture Equilibrium at 85% RH		
Sample #	**Tg [°C]**	**Tg [°F]**
A-1-910-056-4	143.0	289.4
A-1-910-056-5	143.5	290.3
A-1-910-056-6	141.0	285.8
A-1-910-057-4	144.5	292.1
A-1-910-057-5	144.0	291.2
A-1-910-057-6	145.0	293.0
A-1-910-058-4	145.5	293.9
A-1-910-058-5	142.5	288.5
A-1-910-058-6	145.0	293.0
Average [°F]		**290.80**
Standard Dev. [°F]		**2.59**
Coeff. Of Var. [%]		**0.89**

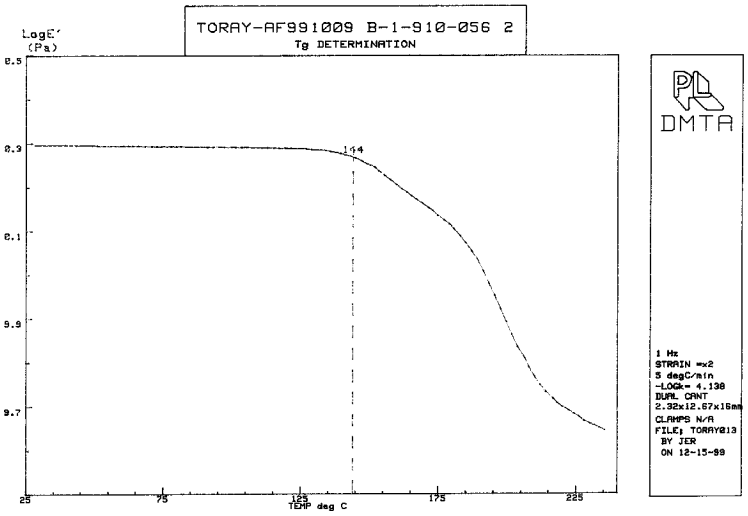
Dynamic Mechanical Analysis (DMA)
Graphs
in determination of
Dry Glass Transition Temperature, Tg (dry)
for

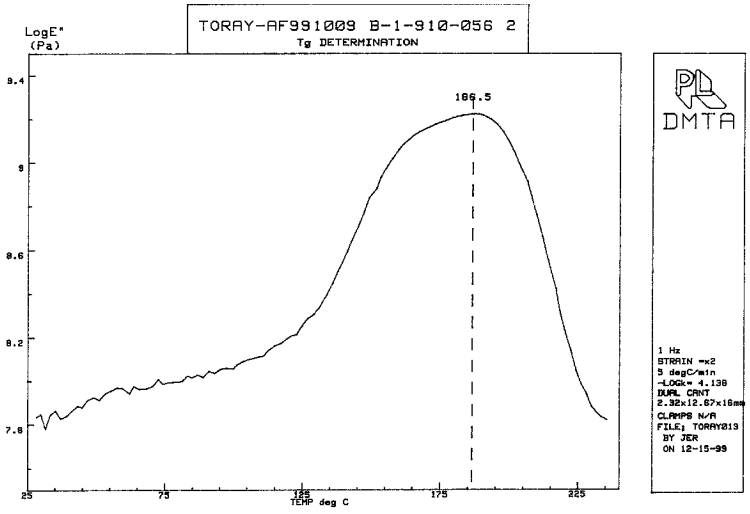
F6273C-07M
T700S-12K/#2510
Plain Weave Fabric Prepreg

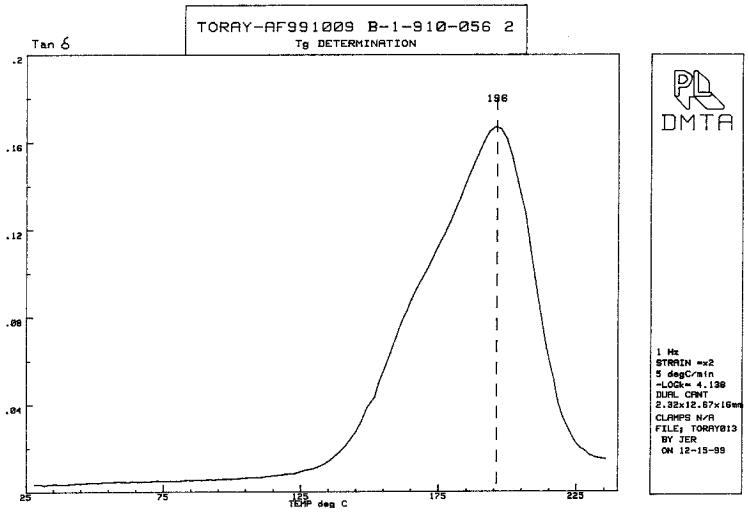

TORAY-AF991009 A-1-910-056 1
Tg DETERMINATION
LogE'
(Pa)
10.3
10.1
9.8
9.7
9.5
142.5
25
75
125
175
225
TEMP deg C
DMTA
1 Hz
STRAIN =x2
5 degC/min
-LOGk= 3.979
DUAL CANT
2.83x12.75x16mm
CLAMPS N/A
FILE; TORAY012
BY LSR
ON 12-15-99

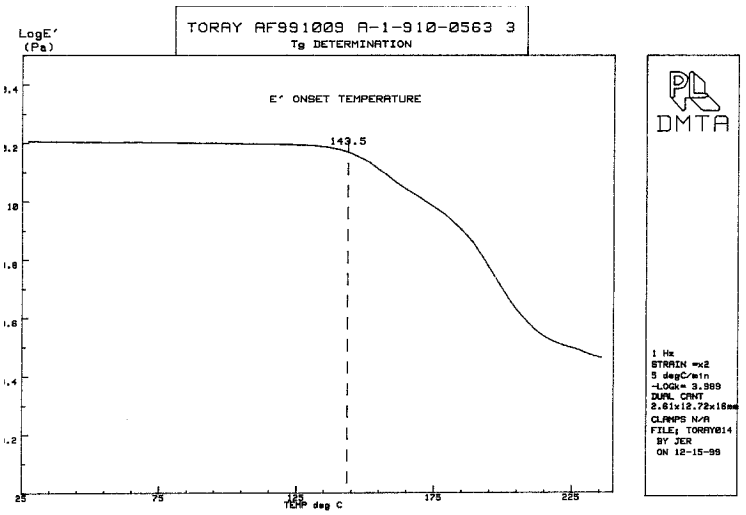

TORAY-AF991009 A-1-910-056 1
Tg DETERMINATION
LogE*
(Pa)
9.4
9
8.6
8.2
7.8
170
25
75
125
175
225
TEMP deg C
DMTA
1 Hz
STRAIN =x2
5 degC/min
-LOGk= 3.979
DUAL CANT
2.83x12.75x16mm
CLAMPS N/A
FILE; TORAY012
BY LSR
ON 12-15-99

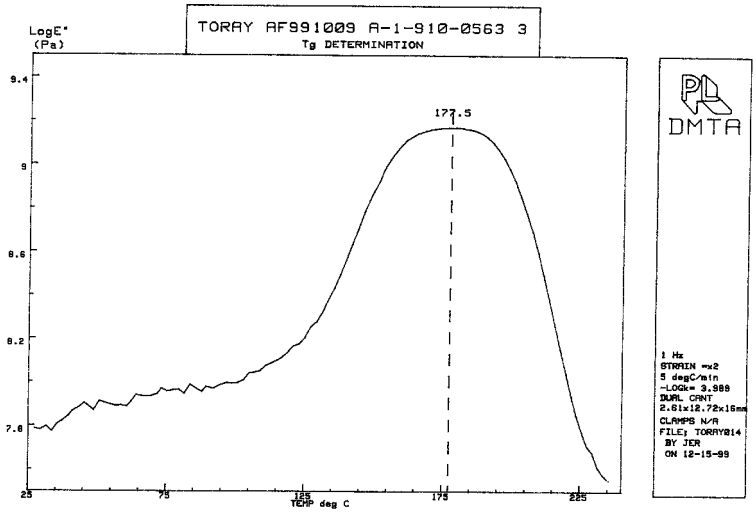

TORAY-AF991009 A-1-910-056 1
Tg DETERMINATION
Tan δ
24
.2
16
12
08
04
193.5
25
75
125
175
225
TEMP deg C
DMTA
1 Hz
STRAIN =x2
5 degC/min
-LOGk= 3.979
DUAL CANT
2.83x12.75x16mm
CLAMPS N/A
FILE; TORAY012
BY LSR
ON 12-15-99

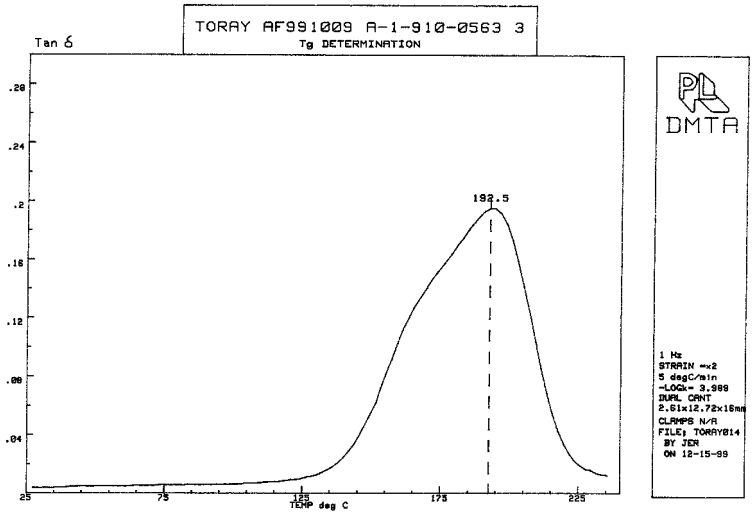

TORAY-AF991009 B-1-910-056 2
Tg DETERMINATION
LogE'
(Pa)
9.5
9.3
9.1
8.9
8.7
114
25
75
125
175
225
TEMP deg C
DMTA
1 Hz
STRAIN =x2
5 degC/min
-LOGk= 4.138
DUAL CANT
2.32x12.67x16mm
CLAMPS N/A
FILE; TORAY013
BY JER
ON 12-15-99

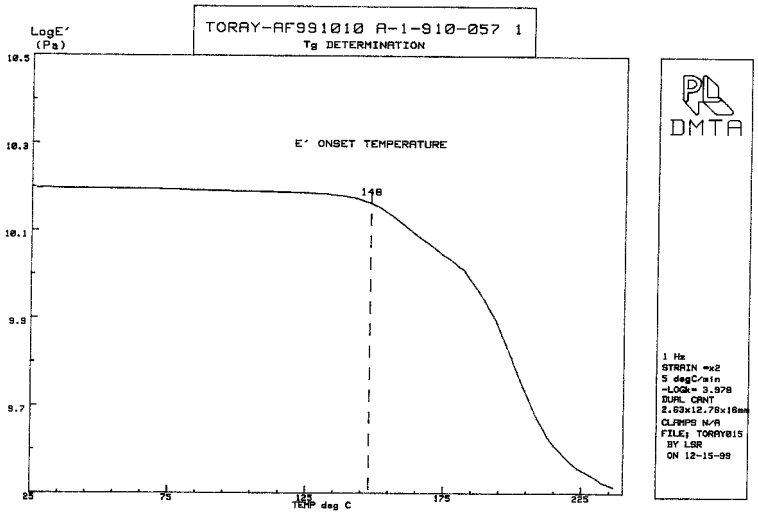

TORAY-AF991009 B-1-910-056 2
Tg DETERMINATION
LogE"
(Pa)
9.4
9
8.6
8.2
7.8
166.5
25
75
125
175
225
TEMP deg C
DMTA
1 Hz
STRAIN =x2
5 degC/min
-LOGk= 4.138
DUAL CANT
2.32x12.67x16mm
CLAMPS N/A
FILE; TORAY013
BY JER
ON 12-15-99

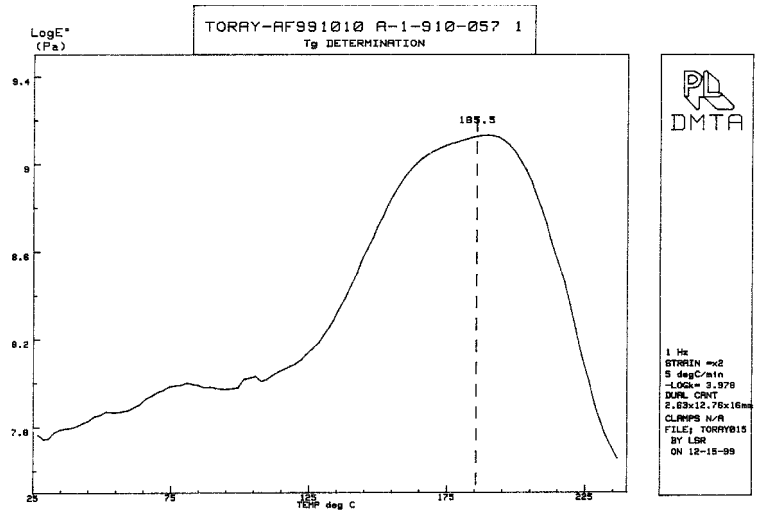

TORAY-AF991009 B-1-910-056 2
Tg DETERMINATION
Tan δ
.2
.16
.12
.08
.04
196
25
75
125
175
225
TEMP deg C
DMTA
1 Hz
STRAIN =x2
5 degC/min
-LOGk= 4.138
DUAL CANT
2.32x12.67x16mm
CLAMPS N/A
FILE; TORAY013
BY JER
ON 12-15-99

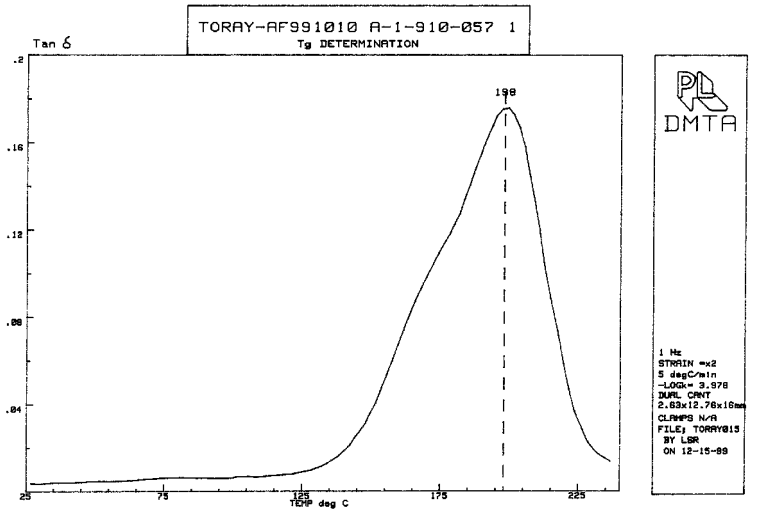

TORAY AF991009 A-1-910-0563 3
Tg DETERMINATION
LogE'
(Pa)
E' ONSET TEMPERATURE
143.5
TEMP deg C
DMTA
1 Hz
STRAIN =x2
5 degC/min
-LOGk= 3.989
DUAL CANT
2.61x12.72x16mm
CLAMPS N/A
FILE; TORAY014
BY JER
ON 12-15-99

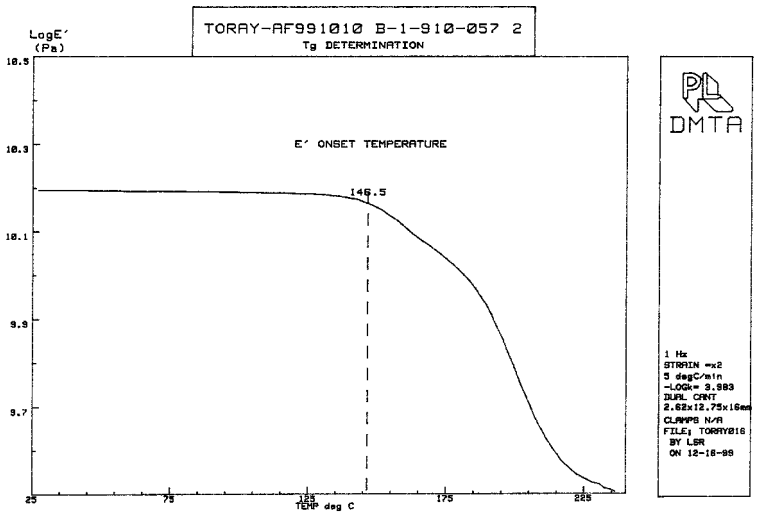

TORAY AF991009 A-1-910-0563 3
Tg DETERMINATION
LogE"
(Pa)
177.5
TEMP deg C
DMTA
1 Hz
STRAIN =x2
5 degC/min
-LOGk= 3.989
DUAL CANT
2.61x12.72x16mm
CLAMPS N/A
FILE; TORAY014
BY JER
ON 12-15-99

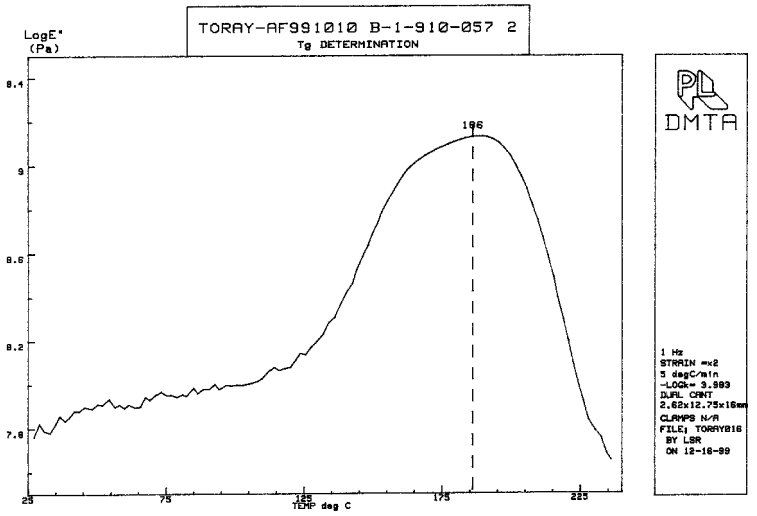

TORAY AF991009 A-1-910-0563 3
Tg DETERMINATION
Tan δ
192.5
TEMP deg C
DMTA
1 Hz
STRAIN =x2
5 degC/min
-LOGk= 3.989
DUAL CANT
2.61x12.72x16mm
CLAMPS N/A
FILE; TORAY014
BY JER
ON 12-15-99

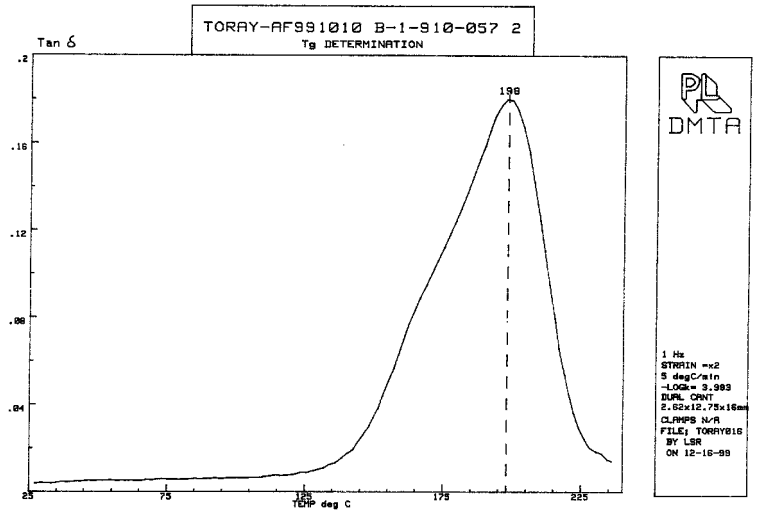

TORAY-AF991010 A-1-910-057 1
Tg DETERMINATION
LogE'
(Pa)
E' ONSET TEMPERATURE
148
TEMP deg C
DMTA
1 Hz
STRAIN =x2
5 degC/min
-LOGk= 3.978
DUAL CANT
2.63x12.76x16mm
CLAMPS N/A
FILE: TORAY015
BY LSR
ON 12-15-99

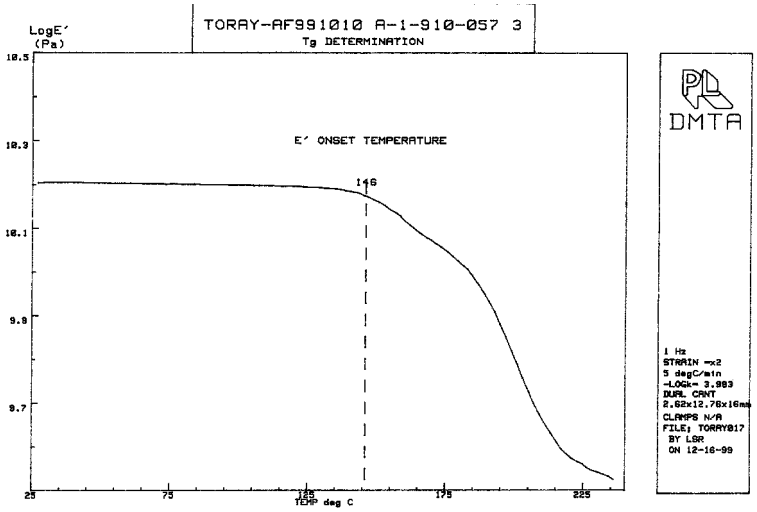

TORAY-AF991010 A-1-910-057 1
Tg DETERMINATION
LogE"
(Pa)
185.5
TEMP deg C
DMTA
1 Hz
STRAIN =x2
5 degC/min
-LOGk= 3.978
DUAL CANT
2.63x12.76x16mm
CLAMPS N/A
FILE: TORAY015
BY LSR
ON 12-15-99

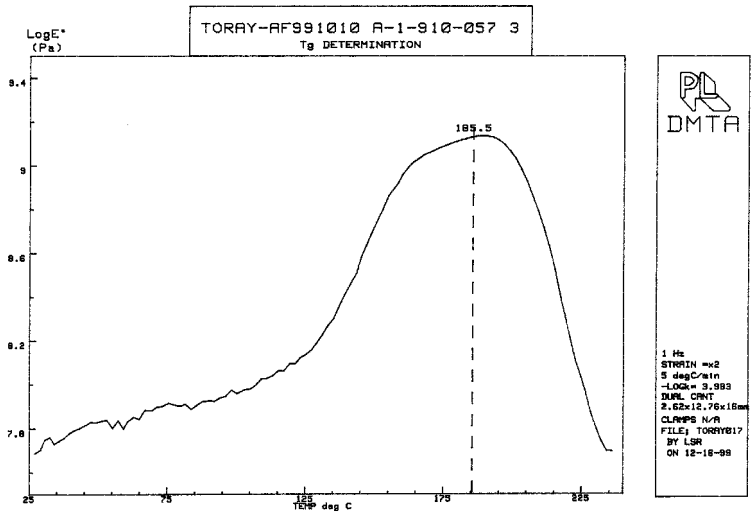

TORAY-AF991010 A-1-910-057 1
Tg DETERMINATION
Tan δ
198
TEMP deg C
DMTA
1 Hz
STRAIN =x2
5 degC/min
-LOGk= 3.978
DUAL CANT
2.63x12.76x16mm
CLAMPS N/A
FILE: TORAY015
BY LSR
ON 12-15-99

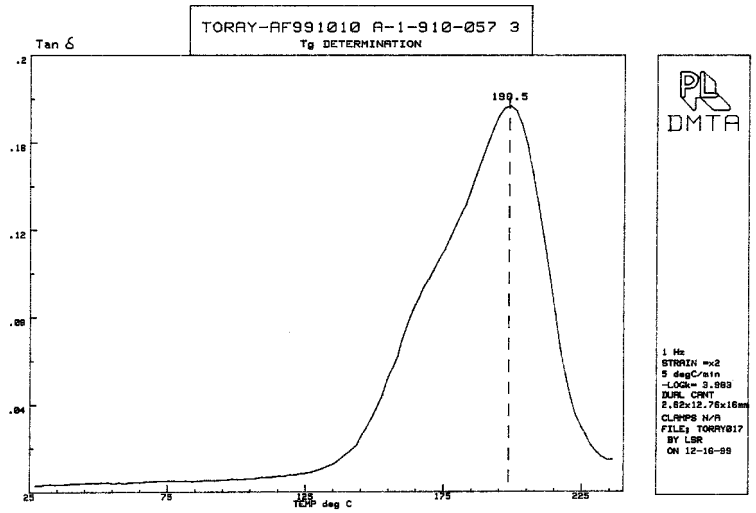

TORAY-AF991010 B-1-910-057 2
Tg DETERMINATION
LogE'
(Pa)
E' ONSET TEMPERATURE
146.5
TEMP deg C
DMTA
1 Hz
STRAIN =x2
5 degC/min
-LOGk= 3.983
DUAL CANT
2.62x12.75x16mm
CLAMPS N/A
FILE; TORAY816
BY LSR
ON 12-16-99

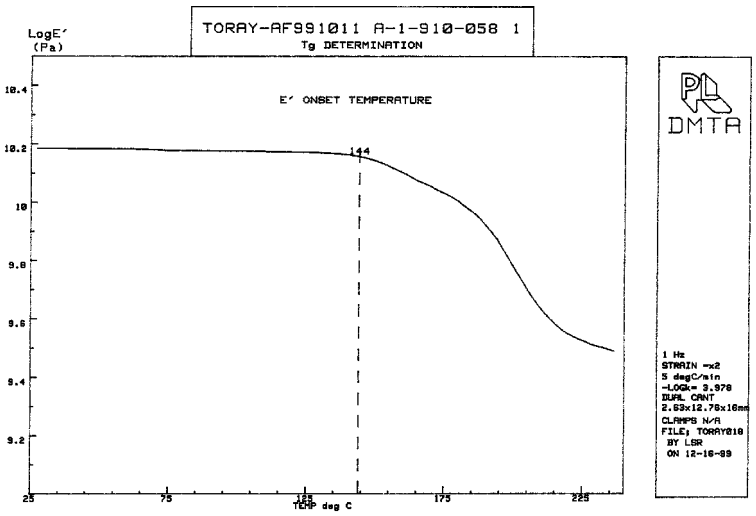

TORAY-AF991010 B-1-910-057 2
Tg DETERMINATION
LogE"
(Pa)
196
TEMP deg C
DMTA
1 Hz
STRAIN =x2
5 degC/min
-LOGk= 3.983
DUAL CANT
2.62x12.75x16mm
CLAMPS N/A
FILE; TORAY816
BY LSR
ON 12-16-99

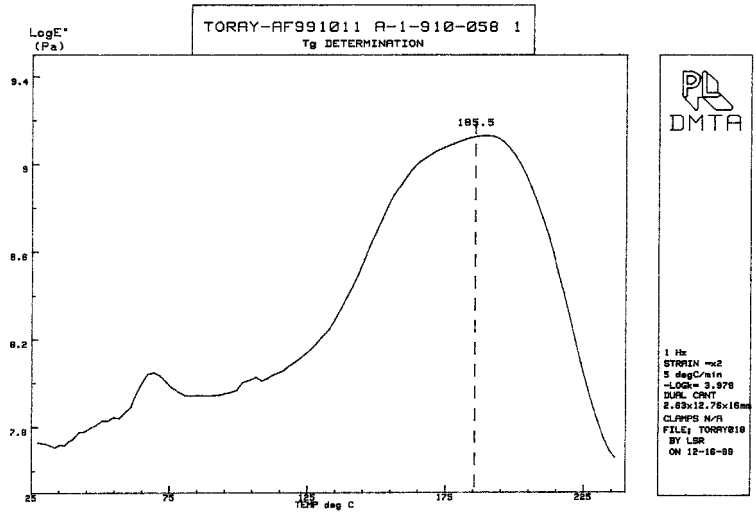

TORAY-AF991010 B-1-910-057 2
Tg DETERMINATION
Tan δ
198
TEMP deg C
DMTA
1 Hz
STRAIN =x2
5 degC/min
-LOGk= 3.983
DUAL CANT
2.62x12.75x16mm
CLAMPS N/A
FILE; TORAY816
BY LSR
ON 12-16-99

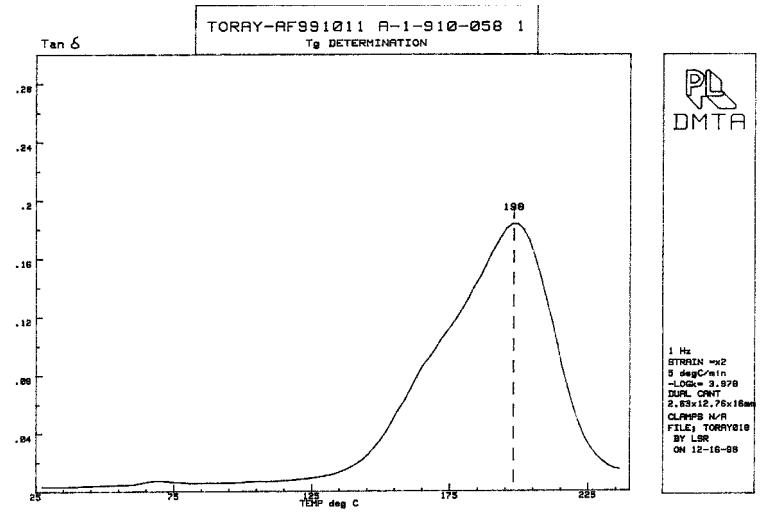

TORAY-AF991010 A-1-910-057 3
Tg DETERMINATION
LogE'
(Pa)
E' ONSET TEMPERATURE
146
TEMP deg C
DMTA
1 Hz
STRAIN =x2
5 degC/min
-LOG= 3.983
DUAL CANT
2.62x12.76x16mm
CLAMPS N/A
FILE: TORAY017
BY LSR
ON 12-16-99

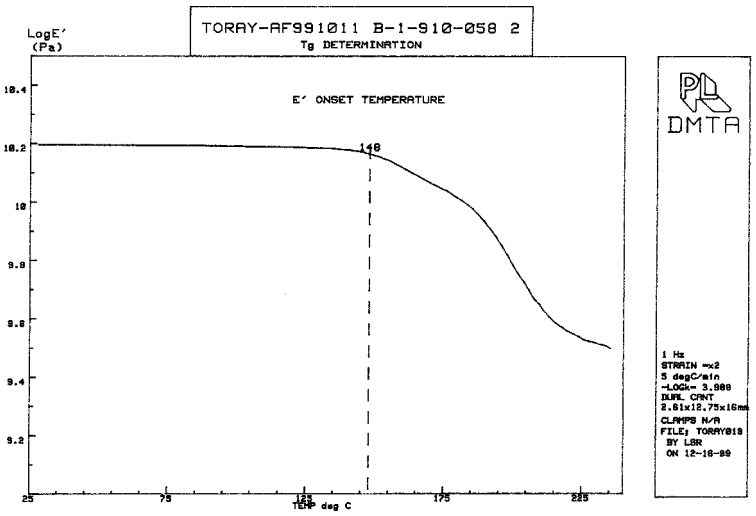

TORAY-AF991010 A-1-910-057 3
Tg DETERMINATION
LogE"
(Pa)
185.5
TEMP deg C
DMTA
1 Hz
STRAIN =x2
5 degC/min
-LOG= 3.983
DUAL CANT
2.62x12.76x16mm
CLAMPS N/A
FILE: TORAY017
BY LSR
ON 12-16-99

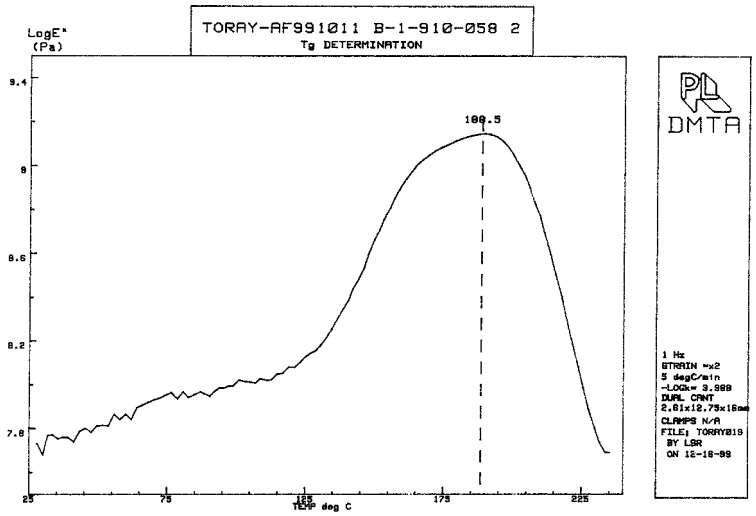

TORAY-AF991010 A-1-910-057 3
Tg DETERMINATION
Tan δ
189.5
TEMP deg C
DMTA
1 Hz
STRAIN =x2
5 degC/min
-LOG= 3.983
DUAL CANT
2.62x12.76x16mm
CLAMPS N/A
FILE: TORAY017
BY LSR
ON 12-16-99

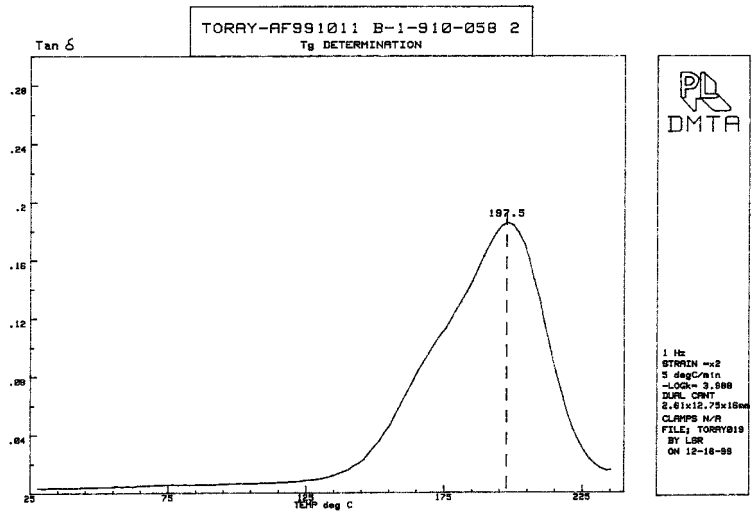

TORAY-AF991011 A-1-910-058 1
Tg DETERMINATION
LogE'
(Pa)
E' ONSET TEMPERATURE
144
10.4
10.2
10
9.8
9.6
9.4
9.2
25
75
125
175
225
TEMP deg C
DMTA
1 Hz
STRAIN =x2
5 degC/min
-LOGk= 3.978
DUAL CANT
2.63x12.76x16mm
CLAMPS N/A
FILE; TORAY010
BY LSR
ON 12-16-98

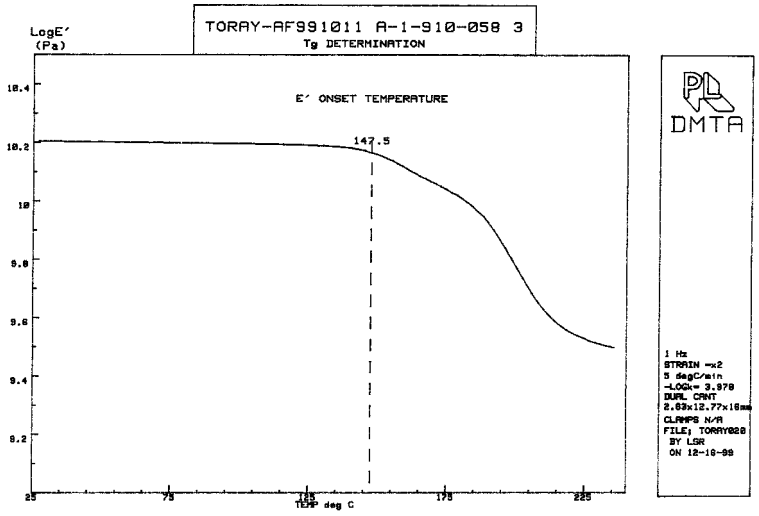

TORAY-AF991011 A-1-910-058 1
Tg DETERMINATION
LogE"
(Pa)
185.5
9.4
9
8.6
8.2
7.8
25
75
125
175
225
TEMP deg C
DMTA
1 Hz
STRAIN =x2
5 degC/min
-LOGk= 3.978
DUAL CANT
2.63x12.76x16mm
CLAMPS N/A
FILE; TORAY010
BY LSR
ON 12-16-98

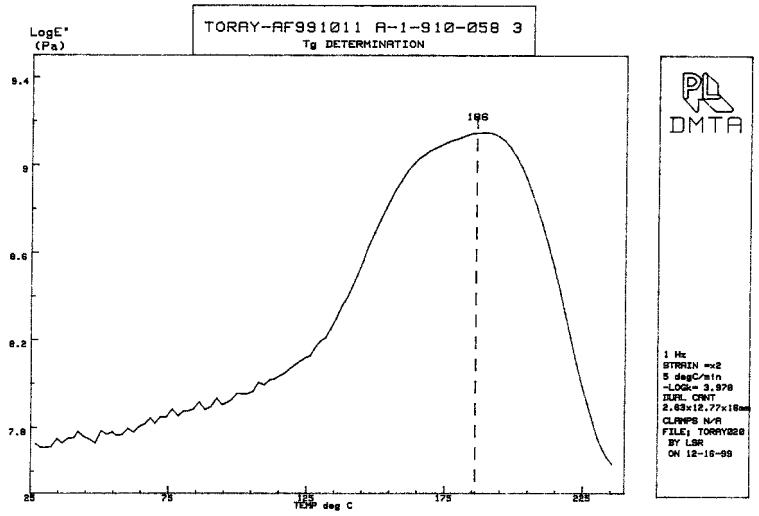

TORAY-AF991011 A-1-910-058 1
Tg DETERMINATION
Tan δ
198
.28
.24
.2
.16
.12
.08
.04
25
75
125
175
225
TEMP deg C
DMTA
1 Hz
STRAIN =x2
5 degC/min
-LOGk= 3.978
DUAL CANT
2.63x12.76x16mm
CLAMPS N/A
FILE; TORAY010
BY LSR
ON 12-16-98

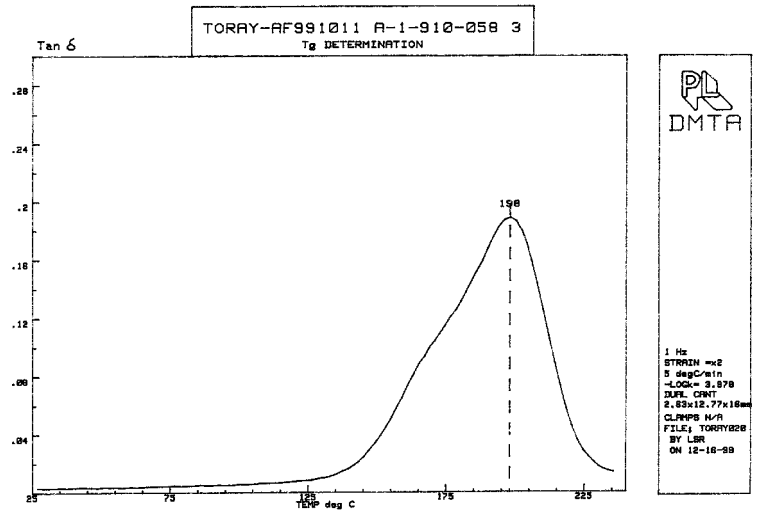

TORAY-AF991011 B-1-910-058 2
Tg DETERMINATION
LogE'
(Pa)
E' ONSET TEMPERATURE
148
TEMP deg C
DMTA
1 Hz
STRAIN =x2
5 degC/min
-LOG= 3.000
DUAL CANT
2.61x12.75x16mm
CLAMPS N/A
FILE: TORAY019
BY LSR
ON 12-16-99


TORAY-AF991011 B-1-910-058 2
Tg DETERMINATION
LogE"
(Pa)
188.5
TEMP deg C
DMTA
1 Hz
STRAIN =x2
5 degC/min
-LOG= 3.000
DUAL CANT
2.61x12.75x16mm
CLAMPS N/A
FILE: TORAY019
BY LSR
ON 12-16-99


TORAY-AF991011 B-1-910-058 2
Tg DETERMINATION
Tan δ
197.5
TEMP deg C
DMTA
1 Hz
STRAIN =x2
5 degC/min
-LOG= 3.000
DUAL CANT
2.61x12.75x16mm
CLAMPS N/A
FILE: TORAY019
BY LSR
ON 12-16-99

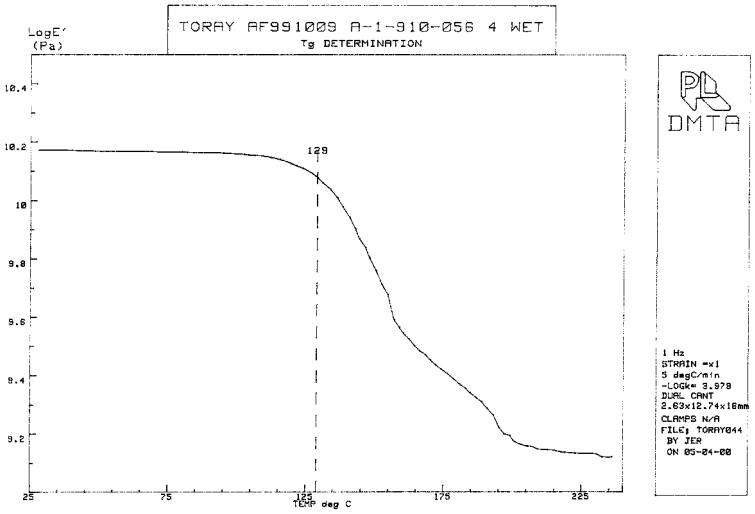

TORAY-AF991011 A-1-910-058 3
Tg DETERMINATION
LogE'
(Pa)
E' ONSET TEMPERATURE
147.5
TEMP deg C
DMTA
1 Hz
STRAIN =x2
5 degC/min
-LOGK= 3.978
DUAL CANT
2.63x12.77x18mm
CLAMPS N/A
FILE: TORAY028
BY LSR
ON 12-16-99

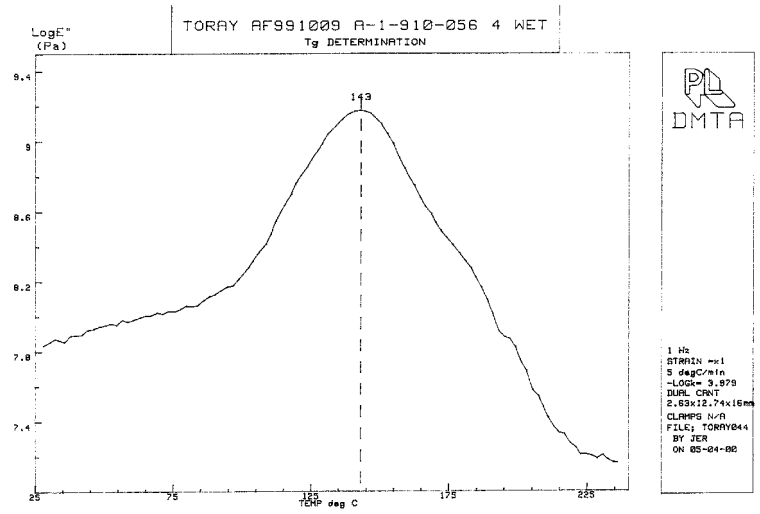

TORAY-AF991011 A-1-910-058 3
Tg DETERMINATION
LogE"
(Pa)
TEMP deg C
DMTA
1 Hz
STRAIN =x2
5 degC/min
-LOGK= 3.978
DUAL CANT
2.63x12.77x18mm
CLAMPS N/A
FILE: TORAY028
BY LSR
ON 12-16-99

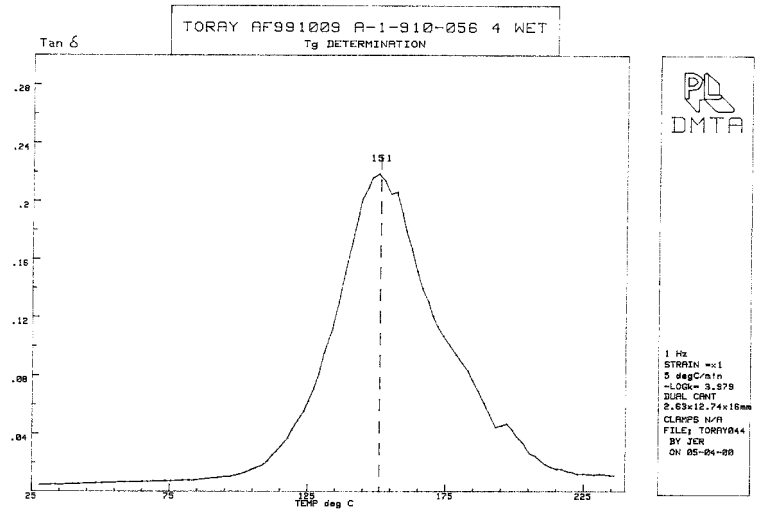

TORAY-AF991011 A-1-910-058 3
Tg DETERMINATION
Tan δ
198
TEMP deg C
DMTA
1 Hz
STRAIN =x2
5 degC/min
-LOGK= 3.978
DUAL CANT
2.63x12.77x18mm
CLAMPS N/A
FILE: TORAY028
BY LSR
ON 12-16-99

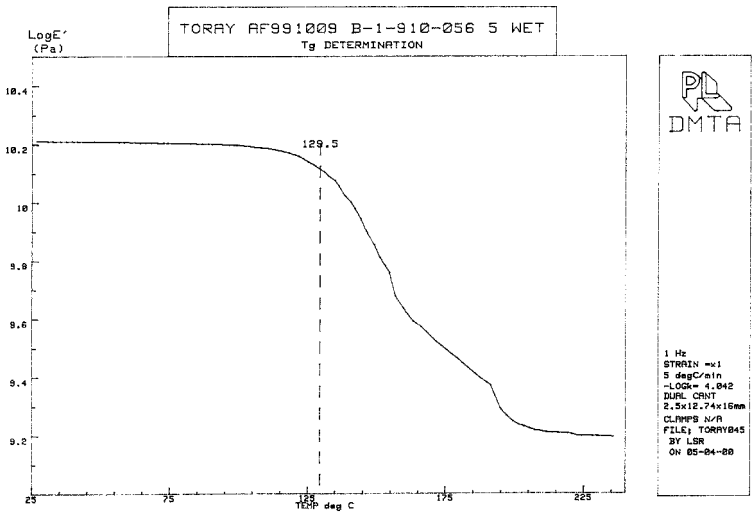
Dynamic Mechanical Analysis (DMA)
Graphs
in determination of
Wet Glass Transition Temperature, Tg (wet)
for

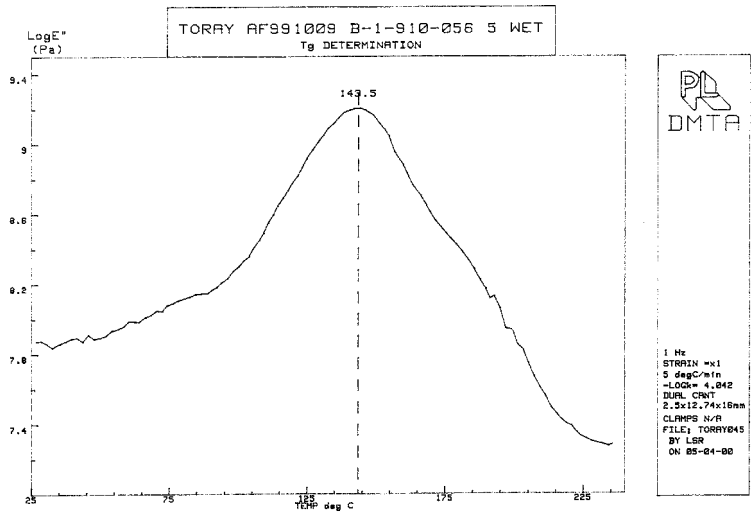
F6273C-07M
T700S-12K/#2510
Plain Weave Fabric Prepreg

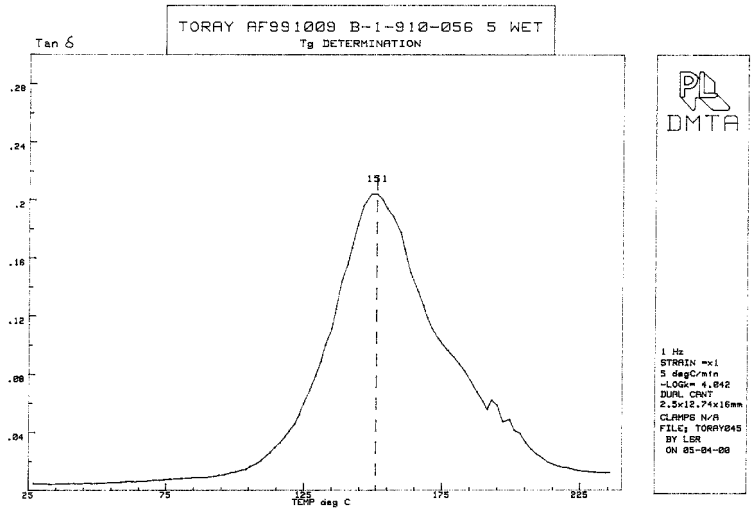

TORAY AF991009 A-1-910-056 4 WET
Tg DETERMINATION
LogE'
(Pa)
10.4
10.2
10
9.8
9.6
9.4
9.2
129
25
75
125
175
225
TEMP deg C
DMTA
1 Hz
STRAIN =x1
5 degC/min
-LOGK= 3.978
DUAL CANT
2.63x12.74x18mm
CLAMPS N/A
FILE; TORAY044
BY JER
ON 05-04-00

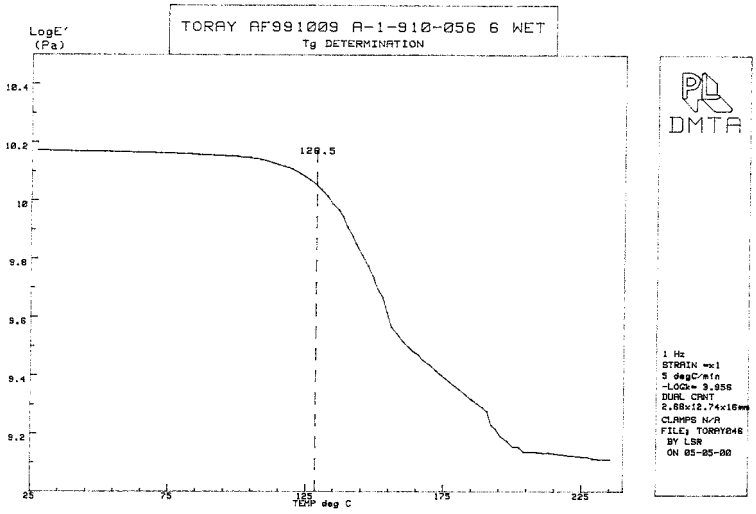

TORAY AF991009 A-1-910-056 4 WET
Tg DETERMINATION
LogE"
(Pa)
9.4
9
8.6
8.2
7.8
7.4
143
25
75
125
175
225
TEMP deg C
DMTA
1 Hz
STRAIN =x1
5 degC/min
-LOGK= 3.979
DUAL CANT
2.63x12.74x16mm
CLAMPS N/A
FILE; TORAY044
BY JER
ON 05-04-00

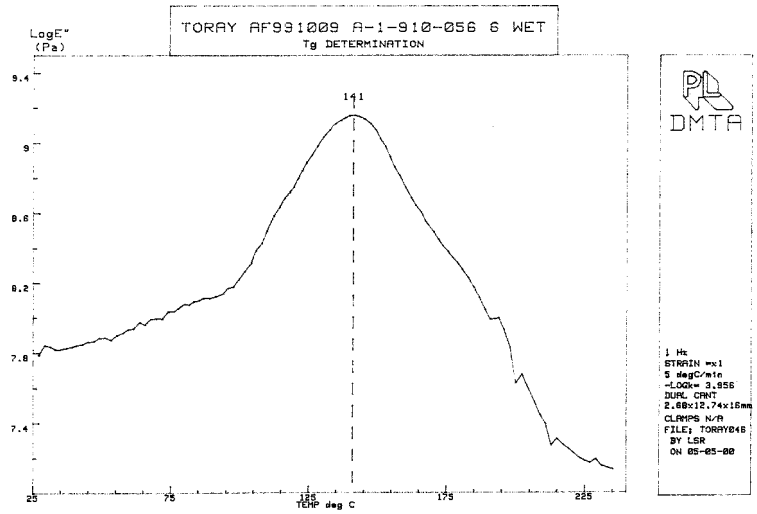

TORAY AF991009 A-1-910-056 4 WET
Tg DETERMINATION
Tan δ
.28
.24
.2
.16
.12
.08
.04
151
25
75
125
175
225
TEMP deg C
DMTA
1 Hz
STRAIN =x1
5 degC/min
-LOGK= 3.979
DUAL CANT
2.63x12.74x18mm
CLAMPS N/A
FILE; TORAY044
BY JER
ON 05-04-00

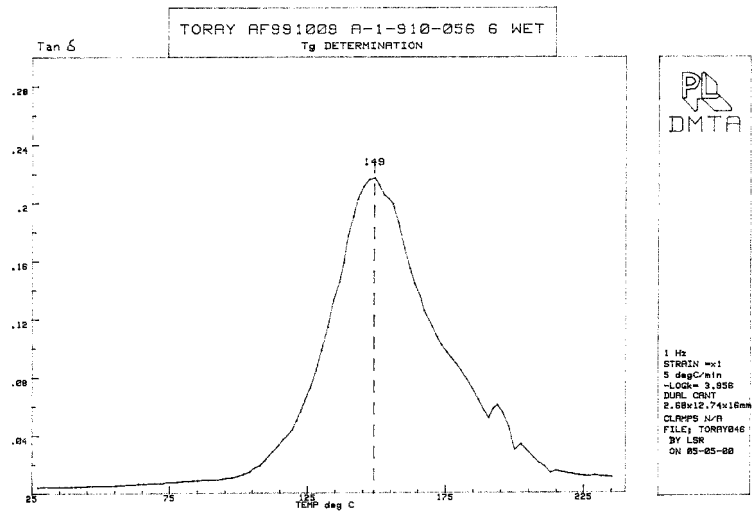

TORAY AF991009 B-1-910-056 5 WET
Tg DETERMINATION
LogE'
(Pa)
10.4
10.2
10
9.8
9.6
9.4
9.2
129.5
25
75
125
175
225
TEMP deg C
DMTA
1 Hz
STRAIN =x1
5 degC/min
-LOGK= 4.842
DUAL CANT
2.5x12.74x16mm
CLAMPS N/A
FILE: TORAY045
BY LSR
ON 05-04-00

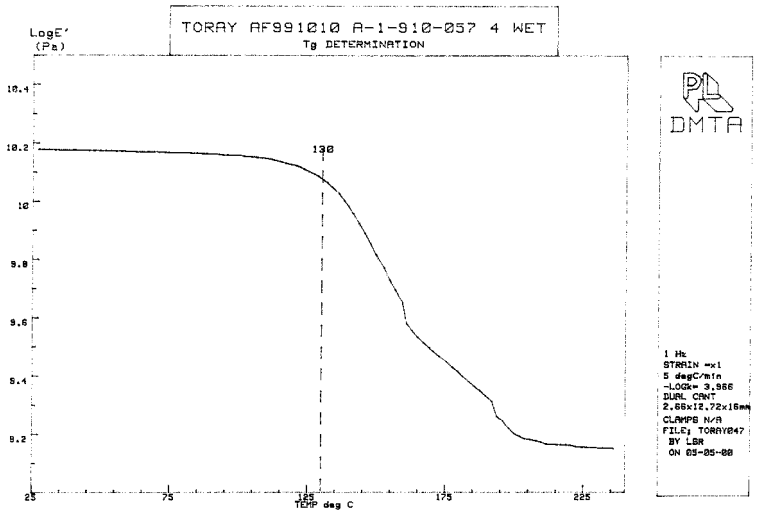

TORAY AF991009 B-1-910-056 5 WET
Tg DETERMINATION
LogE"
(Pa)
9.4
9
8.6
8.2
7.8
7.4
143.5
25
75
125
175
225
TEMP deg C
DMTA
1 Hz
STRAIN =x1
5 degC/min
-LOGK= 4.842
DUAL CANT
2.5x12.74x16mm
CLAMPS N/A
FILE: TORAY045
BY LSR
ON 05-04-00

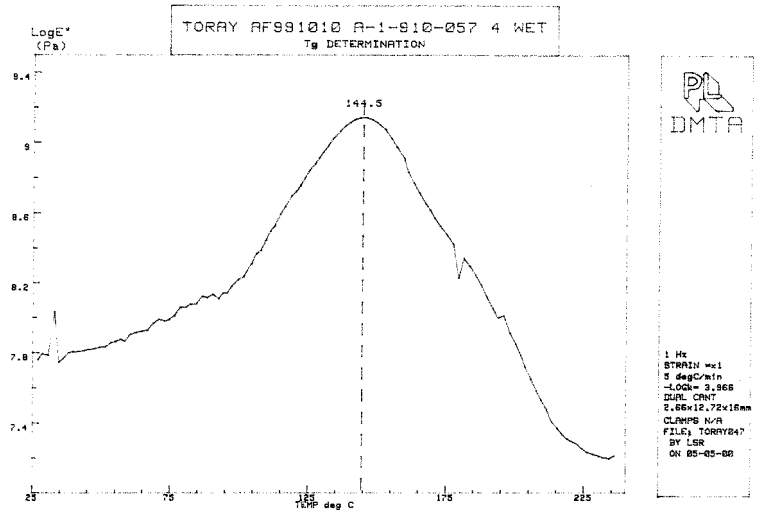

TORAY AF991009 B-1-910-056 5 WET
Tg DETERMINATION
Tan δ
.28
.24
.2
.16
.12
.08
.04
151
25
75
125
175
225
TEMP deg C
DMTA
1 Hz
STRAIN =x1
5 degC/min
-LOGK= 4.842
DUAL CANT
2.5x12.74x16mm
CLAMPS N/A
FILE: TORAY045
BY LSR
ON 05-04-00

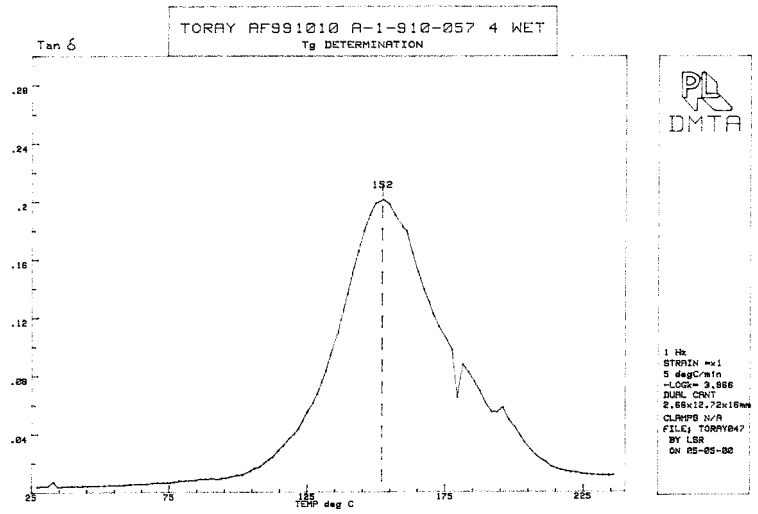

TORAY AF991009 A-1-910-056 6 WET
Tg DETERMINATION
LogE'
(Pa)
10.4
10.2
10
9.8
9.6
9.4
9.2
126.5
25
75
125
175
225
TEMP deg C
DMTA
1 Hz
STRAIN =x1
5 degC/min
-LOCK= 3.956
DUAL CANT
2.68x12.74x16mm
CLAMPS N/A
FILE; TORAY046
BY LSR
ON 05-05-00

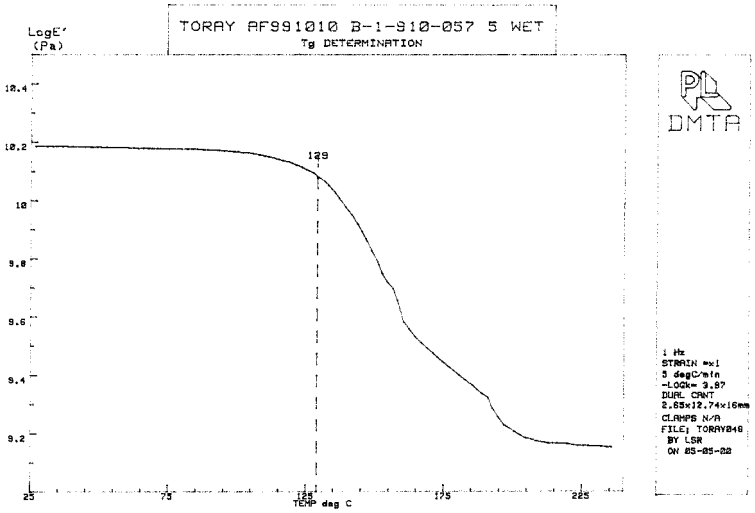

TORAY AF991009 A-1-910-056 6 WET
Tg DETERMINATION
LogE"
(Pa)
9.4
9
8.6
8.2
7.8
7.4
141
25
75
125
175
225
TEMP deg C
DMTA
1 Hz
STRAIN =x1
5 degC/min
-LOCK= 3.956
DUAL CANT
2.68x12.74x16mm
CLAMPS N/A
FILE; TORAY046
BY LSR
ON 05-05-00

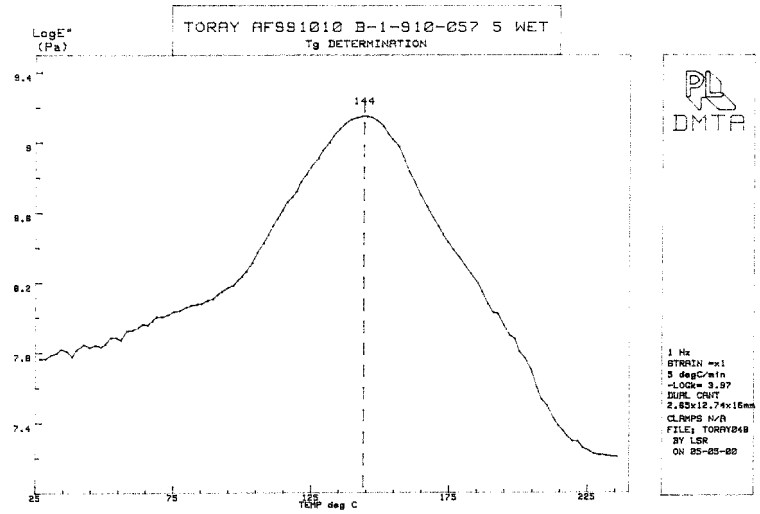

TORAY AF991009 A-1-910-056 6 WET
Tg DETERMINATION
Tan δ
.28
.24
.2
.16
.12
.08
.04
149
25
75
125
175
225
TEMP deg C
DMTA
1 Hz
STRAIN =x1
5 degC/min
-LOCK= 3.956
DUAL CANT
2.68x12.74x16mm
CLAMPS N/A
FILE; TORAY046
BY LSR
ON 05-05-00

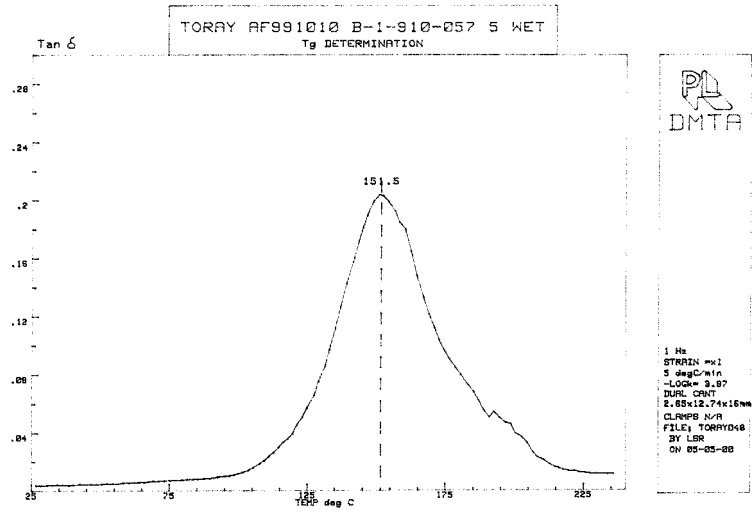

TORAY AF991010 A-1-910-057 4 WET
Tg DETERMINATION
LogE'
(Pa)
10.4
10.2
10
9.8
9.6
9.4
9.2
130
25
75
125
175
225
TEMP deg C
DMTA
1 Hz
STRAIN =x1
5 degC/min
-LOCK= 3.866
DUAL CANT
2.66x12.72x18mm
CLAMPS N/A
FILE: TORAY047
BY LSR
ON 05-05-00

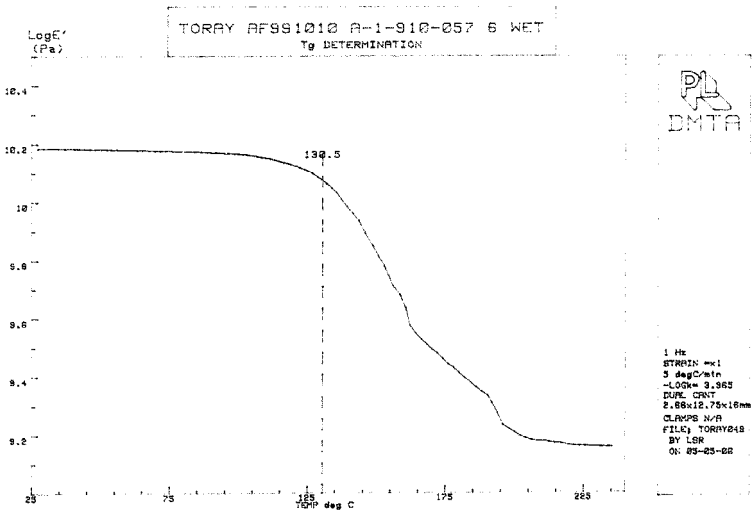

TORAY AF991010 A-1-910-057 4 WET
Tg DETERMINATION
LogE'
(Pa)
9.4
9
8.6
8.2
7.8
7.4
144.5
25
75
125
175
225
TEMP deg C
DMTA
1 Hz
STRAIN =x1
5 degC/min
-LOCK= 3.866
DUAL CANT
2.66x12.72x18mm
CLAMPS N/A
FILE: TORAY047
BY LSR
ON 05-05-00

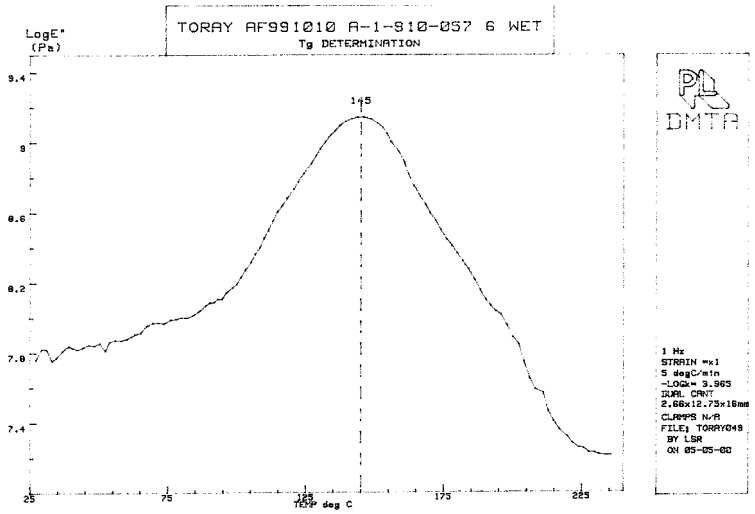

TORAY AF991010 A-1-910-057 4 WET
Tg DETERMINATION
Tan δ
.28
.24
.2
.16
.12
.08
.04
152
25
75
125
175
225
TEMP deg C
DMTA
1 Hz
STRAIN =x1
5 degC/min
-LOCK= 3.866
DUAL CANT
2.66x12.72x18mm
CLAMPS N/A
FILE: TORAY047
BY LSR
ON 05-05-00

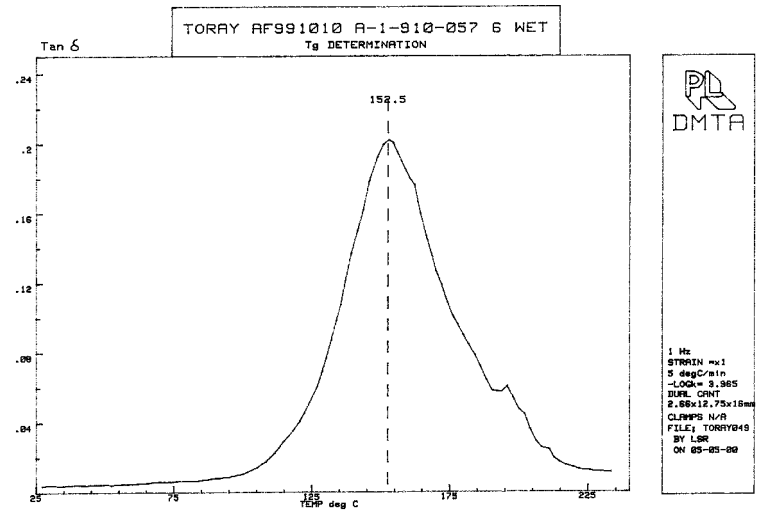

TORAY AF991010 B-1-910-057 5 WET
Tg DETERMINATION
LogE'
(Pa)
12.4
12.2
12
9.8
9.6
9.4
9.2
129
25
75
125
175
225
TEMP deg C
DMTA
1 Hz
STRAIN =x1
5 degC/min
-LOG= 3.87
DUAL CANT
2.65x12.74x16mm
CLAMPS N/A
FILE: TORAY048
BY LSR
ON 05-05-00

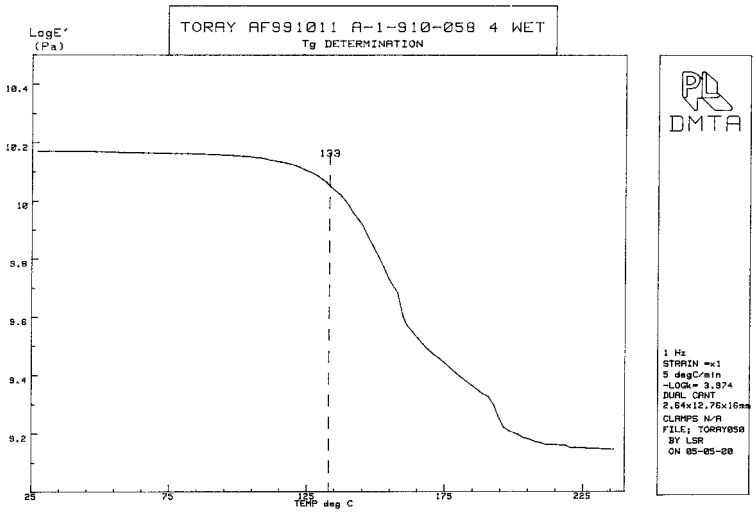

TORAY AF991010 B-1-910-057 5 WET
Tg DETERMINATION
LogE"
(Pa)
8.4
8
7.8
7.4
144
25
75
125
175
225
TEMP deg C
DMTA
1 Hz
STRAIN =x1
5 degC/min
-LOG= 3.87
DUAL CANT
2.65x12.74x16mm
CLAMPS N/A
FILE: TORAY048
BY LSR
ON 05-05-00

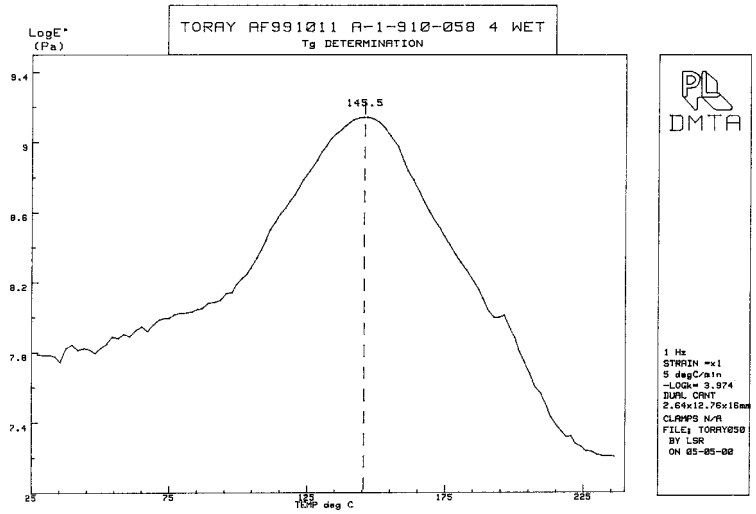

TORAY AF991010 B-1-910-057 5 WET
Tg DETERMINATION
Tan δ
.28
.24
.2
.16
.12
.08
.04
151.5
25
75
125
175
225
TEMP deg C
DMTA
1 Hz
STRAIN =x1
5 degC/min
-LOG= 3.87
DUAL CANT
2.65x12.74x16mm
CLAMPS N/A
FILE: TORAY048
BY LSR
ON 05-05-00

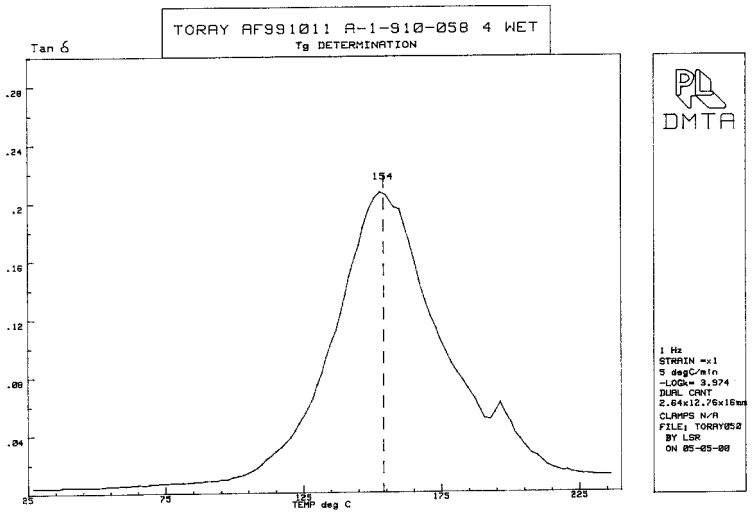

TORAY AF991010 A-1-910-057 6 WET
Tg DETERMINATION
LogE'
(Pa)
10.4
10.2
10
9.8
9.6
9.4
9.2
130.5
25
75
125
175
225
TEMP deg C
DMTA
1 Hz
STRAIN =x1
5 degC/min
-LOGk= 3.965
DUAL CANT
2.66x12.75x16mm
CLAMPS N/A
FILE: TORAY048
BY LSR
ON 05-05-00

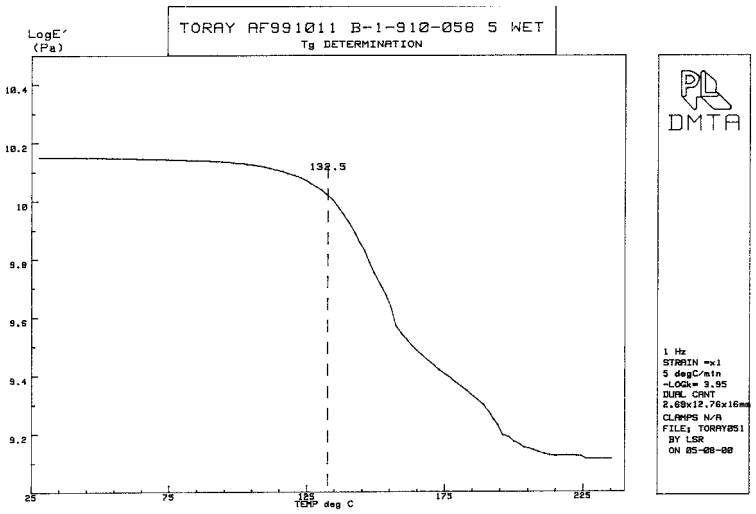

TORAY AF991010 A-1-910-057 6 WET
Tg DETERMINATION
LogE"
(Pa)
9.4
9
8.6
8.2
7.8
7.4
145
25
75
125
175
225
TEMP deg C
DMTA
1 Hz
STRAIN =x1
5 degC/min
-LOGk= 3.965
DUAL CANT
2.66x12.75x16mm
CLAMPS N/A
FILE: TORAY049
BY LSR
ON 05-05-00

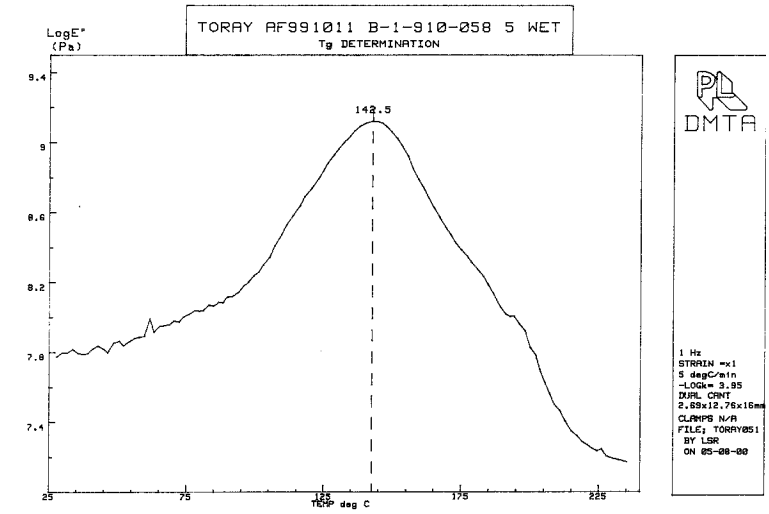

TORAY AF991010 A-1-910-057 6 WET
Tg DETERMINATION
Tan δ
.24
.2
.16
.12
.08
.04
152.5
25
75
125
175
225
TEMP deg C
DMTA
1 Hz
STRAIN =x1
5 degC/min
-LOGk= 3.965
DUAL CANT
2.66x12.75x16mm
CLAMPS N/A
FILE: TORAY049
BY LSR
ON 05-05-00

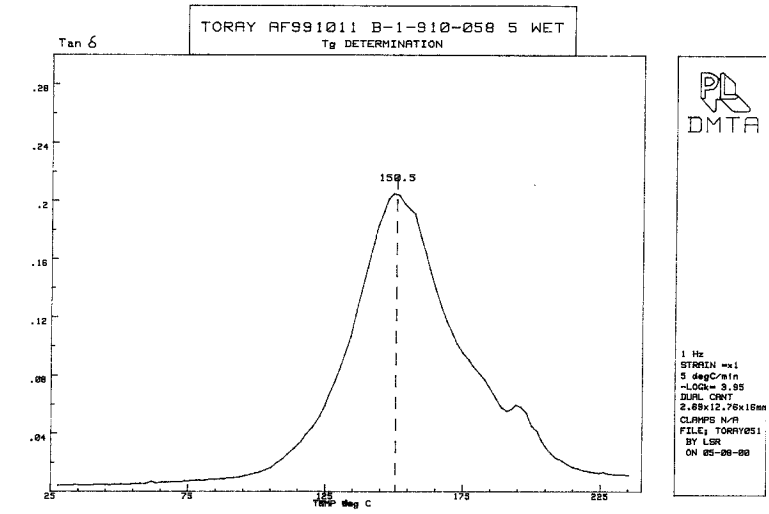

TORAY AF991011 A-1-910-058 4 WET
Tg DETERMINATION
LogE'
(Pa)
10.4
10.2
10
9.8
9.6
9.4
9.2
133
25
75
125
175
225
TEMP deg C
DMTA
1 Hz
STRAIN =x1
5 degC/min
-LOGK= 3.974
DUAL CANT
2.64x12.76x16mm
CLAMPS N/A
FILE; TORAY050
BY LSR
ON 05-05-00

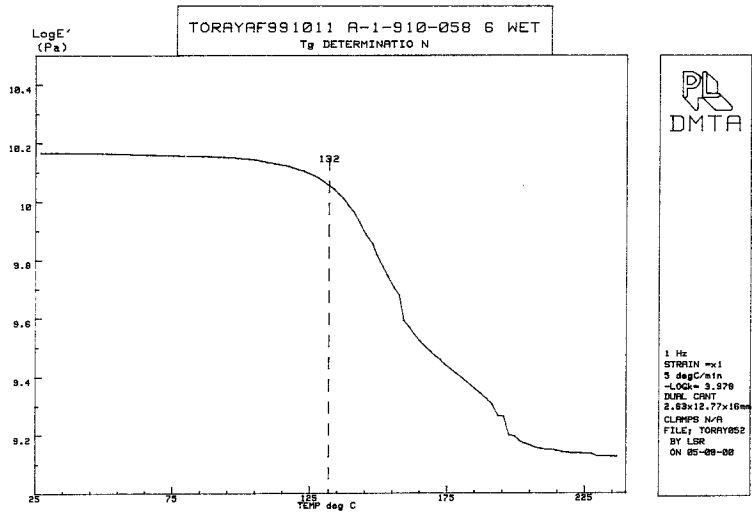

TORAY AF991011 A-1-910-058 4 WET
Tg DETERMINATION
LogE"
(Pa)
9.4
9
8.6
8.2
7.8
7.4
145.5
25
75
125
175
225
TEMP deg C
DMTA
1 Hz
STRAIN =x1
5 degC/min
-LOGK= 3.974
DUAL CANT
2.64x12.76x16mm
CLAMPS N/A
FILE; TORAY050
BY LSR
ON 05-05-00

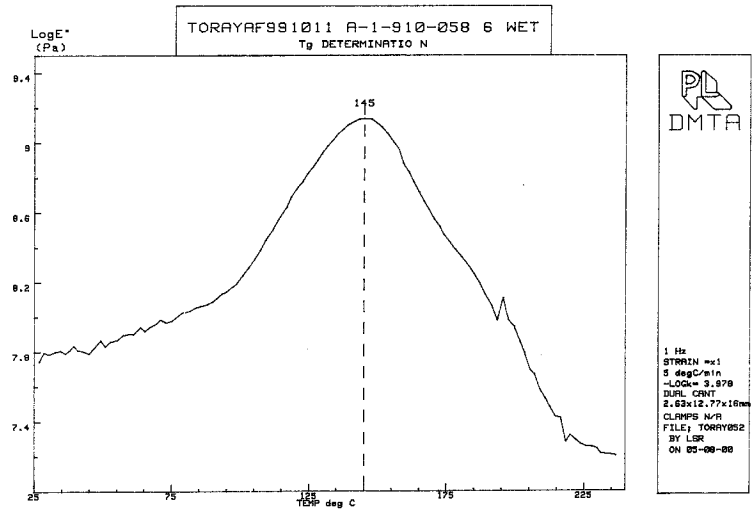

TORAY AF991011 A-1-910-058 4 WET
Tg DETERMINATION
Tan δ
.28
.24
.2
.16
.12
.08
.04
154
25
75
125
175
225
TEMP deg C
DMTA
1 Hz
STRAIN =x1
5 degC/min
-LOGK= 3.974
DUAL CANT
2.64x12.76x16mm
CLAMPS N/A
FILE; TORAY052
BY LSR
ON 05-05-00

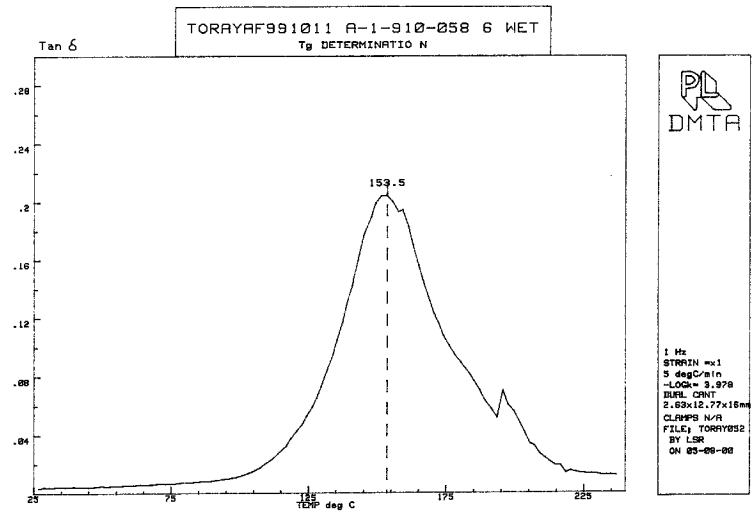

TORAY AF991011 B-1-910-058 5 WET
Tg DETERMINATION
LogE'
(Pa)
10.4
10.2
10
9.8
9.6
9.4
9.2
132.5
25
75
125
175
225
TEMP deg C
DMTA
1 Hz
STRAIN =x1
5 degC/min
-LOGk= 3.95
DUAL CANT
2.69x12.76x16mm
CLAMPS N/A
FILE: TORAY051
BY LSR
ON 05-08-00


TORAY AF991011 B-1-910-058 5 WET
Tg DETERMINATION
LogE"
(Pa)
9.4
9
8.6
8.2
7.8
7.4
142.5
25
75
125
175
225
TEMP deg C
DMTA
1 Hz
STRAIN =x1
5 degC/min
-LOGk= 3.95
DUAL CANT
2.69x12.76x16mm
CLAMPS N/A
FILE: TORAY051
BY LSR
ON 05-08-00


TORAY AF991011 B-1-910-058 5 WET
Tg DETERMINATION
Tan δ
.28
.24
.2
.16
.12
.08
.04
150.5
25
75
125
175
225
TEMP deg C
DMTA
1 Hz
STRAIN =x1
5 degC/min
-LOGk= 3.95
DUAL CANT
2.69x12.76x16mm
CLAMPS N/A
FILE: TORAY051
BY LSR
ON 05-08-00


TORAYAF991011 A-1-910-058 6 WET
Tg DETERMINATIO N
LogE'
(Pa)
10.4
10.2
10
9.8
9.6
9.4
9.2
132
25
75
125
175
225
TEMP deg C
DMTA
1 Hz
STRAIN =x1
5 degC/min
-LOCK= 3.970
DUAL CANT
2.63x12.77x16mm
CLAMPS N/A
FILE; TORAY052
BY LSR
ON 05-08-08


TORAYAF991011 A-1-910-058 6 WET
Tg DETERMINATIO N
LogE"
(Pa)
8.4
8
7.6
7.2
7.0
7.4
145
25
75
125
175
225
TEMP deg C
DMTA
1 Hz
STRAIN =x1
5 degC/min
-LOCK= 3.970
DUAL CANT
2.63x12.77x16mm
CLAMPS N/A
FILE; TORAY052
BY LSR
ON 05-08-08


TORAYAF991011 A-1-910-058 6 WET
Tg DETERMINATIO N
Tan δ
.28
.24
.2
.16
.12
.08
.04
153.5
25
75
125
175
225
TEMP deg C
DMTA
1 Hz
STRAIN =x1
5 degC/min
-LOCK= 3.970
DUAL CANT
2.63x12.77x16mm
CLAMPS N/A
FILE; TORAY052
BY LSR
ON 05-08-08

APPENDIX D. STATISTICAL ANALYSIS SUMMARY

COMPANY	Toray
MATERIAL	TCA T700S-12K-50C/#2510 Plain Weave Fabric
PROPERTY	0° Measured Compression Strength
COMMENTS	
DATE	December 23, 2002

DATA SUMMARY

STATISTIC	TEST CONDITION				
	CTD	**RTD**	**ETD**	**ETW**	
Sample Size	6	18	18	18	
No. of Batches	2	6	6	6	
Mean	747.203	708.869	668.465	472.915	
Std.dev	51.276	56.467	58.548	43.159	
% Co. Variation	6.862	7.966	8.759	9.126	
Minimum	701.885	593.713	580.651	394.658	
Maximum	844.971	782.660	774.079	531.983	
K_b	2.028	1.758	1.758	1.758	
K_a	3.163	2.925	2.925	2.925	
Equal C.V. Basis Values					
B-Basis Value	**621.925**	**605.822**	**571.291**	**404.168**	
A-Basis Value	**551.760**	**537.415**	**506.784**	**358.531**	

Anderson Darling Test for Normality

O.S.L	0.131	0.236	0.314	0.539	
Normality is	Acceptable	Acceptable	Acceptable	Acceptable	
O.S.L for pooled data is		**0.3941**	**Normality is Acceptable**		

Check for Normality based on Normal Scores

r^2	0.880	0.975	0.981	0.986	
Normality is	Questionable	Acceptable	Acceptable	Acceptable	
r^2 for pooled data is		**0.9930**	**Normality is Acceptable**		

k-sample Anderson Darling Test (ADK < ADC for batches from same population)

ADK	1.565	1.179	1.520	1.200	
ADC	2.105	1.501	1.501	1.501	
SAME POPULATION	**YES**	**YES**	**NO**	**YES**	**N/A**

Equality of Coeff. of Variations: Pooled Data ($F_{CALCULATED} < F_{CRITICAL}$ for equality)

a **LEVEL**	0.05	0.025	0.01
F CALCULATED	0.77		
F CRITICAL	**2.929**	**3.524**	**4.323**

COMMENTS

OUTLIERS EXIST! BASIS VALUES INVALID, Dispose Outliers & rerun Analysis

WICHITA STATE UNIVERSITY

COMPANY	Toray
MATERIAL	TCA T700S-12K-50C/#2510 Plain Weave Fabric
PROPERTY	0° Normalized Compression Strength
COMMENTS	
DATE	December 23, 2002

DATA SUMMARY

STATISTIC	TEST CONDITION				
	CTD	**RTD**	**ETD**	**ETW**	
Sample Size	6	18	18	18	
No. of Batches	2	6	6	6	
Mean	749.955	708.742	664.143	474.854	
Std.dev	51.465	57.768	58.129	45.123	
% Co. Variation	6.862	8.151	8.753	9.502	
Minimum	704.469	589.686	573.899	396.111	
Maximum	848.082	780.970	765.078	539.716	
K_b	2.028	1.758	1.758	1.758	
K_a	3.163	2.925	2.925	2.925	
Equal C.V. Basis Values					
B-Basis Value	**621.623**	**603.589**	**565.607**	**404.402**	
A-Basis Value	**549.748**	**533.785**	**500.195**	**357.633**	

Anderson Darling Test for Normality

O.S.L	0.131	0.164	0.371	0.543	
Normality is	Acceptable	Acceptable	Acceptable	Acceptable	
O.S.L for pooled data is		**0.3877**	**Normality is Acceptable**		

Check for Normality based on Normal Scores

r^2	0.880	0.970	0.984	0.988	
Normality is	Questionable	Acceptable	Acceptable	Acceptable	
r^2 for pooled data is		**0.9928**	**Normality is Acceptable**		

k-sample Anderson Darling Test (ADK < ADC for batches from same population)

ADK	1.565	1.142	1.489	1.200	
ADC	2.105	1.501	1.501	1.501	
SAME POPULATION	**YES**	**YES**	**YES**	**YES**	**N/A**

Equality of Coeff. of Variations: Pooled Data ($F_{CALCULATED} < F_{CRITICAL}$ for equality)

a **LEVEL**	0.05	0.025	0.01
F CALCULATED	0.96		
F CRITICAL	**2.929**	**3.524**	**4.323**

COMMENTS

OUTLIERS EXIST! BASIS VALUES INVALID, Dispose Outliers & rerun Analysis

WICHITA STATE UNIVERSITY

COMPANY	Toray
MATERIAL	TCA T700S-12K-50C/#2510 Plain Weave Fabric
PROPERTY	0° Measured Tension Strength
COMMENTS	
DATE	December 23, 2002

DATA SUMMARY

STATISTIC	TEST CONDITION				
	CTD	**RTD**	**ETD**	**ETW**	
Sample Size	6	18	18	18	
No. of Batches	2	6	6	6	
Mean	802.874	917.599	968.984	1051.949	
Std.dev	37.896	42.177	41.099	30.909	
% Co. Variation	4.720	4.596	4.241	2.938	
Minimum	752.490	842.606	880.860	1002.461	
Maximum	843.194	998.737	1015.816	1106.526	
K_b	2.028	1.758	1.758	1.758	
K_a	3.163	2.925	2.925	2.925	
Equal C.V. Basis Values					
B-Basis Value	**738.480**	**853.790**	**901.601**	**978.797**	
A-Basis Value	**702.415**	**811.431**	**856.870**	**930.236**	

Anderson Darling Test for Normality

O.S.L	0.531	0.560	0.026	0.429	
Normality is	Acceptable	Acceptable	Acceptable	Acceptable	
O.S.L for pooled data is		**0.1025**	**Normality is Acceptable**		

Check for Normality based on Normal Scores

r^2	0.968	0.989	0.951	0.982	
Normality is	Acceptable	Acceptable	Acceptable	Acceptable	
r^2 **for pooled data is**		**0.9896**	**Normality is Acceptable**		

k-sample Anderson Darling Test (ADK < ADC for batches from same population)

ADK	0.470	0.890	1.504	1.296	
ADC	2.105	1.501	1.501	1.501	
SAME POPULATION	**YES**	**YES**	**NO**	**YES**	**N/A**

Equality of Coeff. of Variations: Pooled Data ($F_{CALCULATED} < F_{CRITICAL}$ for equality)

α **LEVEL**	0.05	0.025	0.01
$F_{CALCULATED}$	1.19		
$F_{CRITICAL}$	**2.929**	**3.524**	**4.323**

COMMENTS

WICHITA STATE UNIVERSITY

COMPANY	Toray
MATERIAL	TCA T700S-12K-50C/#2510 Plain Weave Fabric
PROPERTY	0° Normalized Tension Strength
COMMENTS	
DATE	December 23, 2002

DATA SUMMARY

STATISTIC	TEST CONDITION				
	CTD	**RTD**	**ETD**	**ETW**	
Sample Size	6	18	18	18	
No. of Batches	2	6	6	6	
Mean	803.236	912.052	964.970	1049.137	
Std.dev	37.526	40.079	44.067	31.952	
% Co. Variation	4.672	4.394	4.567	3.046	
Minimum	756.865	846.883	864.643	1003.433	
Maximum	848.175	994.092	1014.012	1109.689	
K_b	2.028	1.758	1.758	1.758	
K_a	3.163	2.925	2.925	2.925	
Equal C.V. Basis Values					
B-Basis Value	**737.897**	**847.726**	**896.912**	**975.143**	
A-Basis Value	**701.302**	**805.025**	**851.733**	**926.023**	

Anderson Darling Test for Normality

O.S.L	0.626	0.614	0.033	0.469	
Normality is	Acceptable	Acceptable	Acceptable	Acceptable	
O.S.L for pooled data is		**0.2087**	**Normality is Acceptable**		

Check for Normality based on Normal Scores

r^2	0.980	0.989	0.948	0.984	
Normality is	Acceptable	Acceptable	Acceptable	Acceptable	
r^2 **for pooled data is**		**0.9901**	**Normality is Acceptable**		

k-sample Anderson Darling Test (ADK < ADC for batches from same population)

ADK	0.470	0.973	0.919	1.169	
ADC	2.105	1.501	1.501	1.501	
SAME POPULATION	**YES**	**YES**	**YES**	**YES**	**N/A**

Equality of Coeff. of Variations: Pooled Data ($F_{CALCULATED} < F_{CRITICAL}$ for equality)

α **LEVEL**	0.05	0.025	0.01
$F_{CALCULATED}$	1.11		
$F_{CRITICAL}$	**2.929**	**3.524**	**4.323**

COMMENTS

WICHITA STATE UNIVERSITY

COMPANY	Toray
MATERIAL	TCA T700S-12K-50C/#2510 Plain Weave Fabric
PROPERTY	90° Measured Compression Strength
COMMENTS	
DATE	December 23, 2002

DATA SUMMARY

STATISTIC	TEST CONDITION				
	CTD	**RTD**	**ETD**	**ETW**	
Sample Size	6	18	18	18	
No. of Batches	2	6	6	6	
Mean	744.535	702.974	649.439	479.913	
Std.dev	73.620	36.981	40.100	25.188	
% Co. Variation	9.888	5.261	6.175	5.249	
Minimum	636.880	638.979	556.310	435.238	
Maximum	831.167	774.590	707.857	523.323	
K_b	2.028	1.758	1.758	1.758	
K_a	3.163	2.925	2.925	2.925	
Equal C.V. Basis Values					
B-Basis Value	**654.992**	**629.671**	**581.719**	**429.870**	
A-Basis Value	**604.841**	**581.010**	**536.764**	**396.650**	

Anderson Darling Test for Normality

O.S.L	0.738	0.352	0.416	0.710	
Normality is	Acceptable	Acceptable	Acceptable	Acceptable	
O.S.L for pooled data is		**0.6440**	**Normality is Acceptable**		

Check for Normality based on Normal Scores

r^2	0.988	0.985	0.976	0.994	
Normality is	Acceptable	Acceptable	Acceptable	Acceptable	
r^2 **for pooled data is**		**0.9940**	**Normality is Acceptable**		

k-sample Anderson Darling Test (ADK < ADC for batches from same population)

ADK	1.565	1.317	1.227	1.362	
ADC	2.105	1.501	1.501	1.501	
SAME POPULATION	**YES**	**YES**	**YES**	**YES**	**N/A**

Equality of Coeff. of Variations: Pooled Data ($F_{CALCULATED} < F_{CRITICAL}$ for equality)

α **LEVEL**	0.05	0.025	0.01
$F_{CALCULATED}$	1.93		
$F_{CRITICAL}$	**2.929**	**3.524**	**4.323**

COMMENTS

WICHITA STATE UNIVERSITY

COMPANY	Toray
MATERIAL	TCA T700S-12K-50C/#2510 Plain Weave Fabric
PROPERTY	90° Normalized Compression Strength
COMMENTS	
DATE	December 23, 2002

DATA SUMMARY

STATISTIC	TEST CONDITION				
	CTD	**RTD**	**ETD**	**ETW**	
Sample Size	6	18	18	18	
No. of Batches	2	6	6	6	
Mean	741.866	698.158	645.694	478.702	
Std.dev	73.356	36.083	39.442	24.823	
% Co. Variation	9.888	5.168	6.108	5.185	
Minimum	634.596	640.837	555.232	433.678	
Maximum	828.187	765.583	703.056	519.773	
K_b	2.028	1.758	1.758	1.758	
K_a	3.163	2.925	2.925	2.925	
Equal C.V. Basis Values					
B-Basis Value	**653.537**	**626.087**	**579.039**	**429.285**	
A-Basis Value	**604.067**	**578.243**	**534.790**	**396.481**	

Anderson Darling Test for Normality

O.S.L	0.738	0.474	0.479	0.625	
Normality is	Acceptable	Acceptable	Acceptable	Acceptable	
O.S.L for pooled data is		**0.6505**	**Normality is Acceptable**		

Check for Normality based on Normal Scores

r^2	0.988	0.987	0.978	0.991	
Normality is	Acceptable	Acceptable	Acceptable	Acceptable	
r^2 **for pooled data is**		**0.9940**	**Normality is Acceptable**		

k-sample Anderson Darling Test (ADK < ADC for batches from same population)

ADK	1.565	1.287	1.227	1.294	
ADC	2.105	1.501	1.501	1.501	
SAME POPULATION	**YES**	**YES**	**YES**	**YES**	**N/A**

Equality of Coeff. of Variations: Pooled Data ($F_{CALCULATED} < F_{CRITICAL}$ for equality)

a **LEVEL**	0.05	0.025	0.01
F CALCULATED	2.04		
F CRITICAL	**2.929**	**3.524**	**4.323**

COMMENTS

WICHITA STATE UNIVERSITY

COMPANY	Toray
MATERIAL	TCA T700S-12K-50C/#2510 Plain Weave Fabric
PROPERTY	90° Measured Tension Strength
COMMENTS	
DATE	December 23, 2002

DATA SUMMARY

STATISTIC	TEST CONDITION				
	CTD	**RTD**	**ETD**	**ETW**	
Sample Size	6	18	18	18	
No. of Batches	2	6	6	6	
Mean	718.773	775.382	838.774	893.055	
Std.dev	19.586	58.245	65.356	68.559	
% Co. Variation	2.725	7.512	7.792	7.677	
Minimum	688.155	687.602	728.125	759.543	
Maximum	742.458	858.027	942.857	1004.365	
K_b	2.028	1.758	1.758	1.758	
K_a	3.163	2.925	2.925	2.925	
Equal C.V. Basis Values					
B-Basis Value	**614.325**	**677.690**	**733.095**	**780.537**	
A-Basis Value	**555.826**	**612.839**	**662.941**	**705.844**	

Anderson Darling Test for Normality

O.S.L	0.686	0.062	0.228	0.265	
Normality is	Acceptable	Acceptable	Acceptable	Acceptable	
O.S.L for pooled data is		**0.5273**	**Normality is Acceptable**		

Check for Normality based on Normal Scores

r^2	0.979	0.967	0.976	0.979	
Normality is	Acceptable	Acceptable	Acceptable	Acceptable	
r^2 for pooled data is		**0.9943**	**Normality is Acceptable**		

k-sample Anderson Darling Test (ADK < ADC for batches from same population)

ADK	1.565	1.467	1.916	1.967	
ADC	2.105	1.501	1.501	1.501	
SAME POPULATION	**YES**	**YES**	**NO**	**NO**	**N/A**

Equality of Coeff. of Variations: Pooled Data ($F_{CALCULATED} < F_{CRITICAL}$ for equality)

a **LEVEL**	0.05	0.025	0.01
$F_{CALCULATED}$	1.83		
$F_{CRITICAL}$	**2.929**	**3.524**	**4.323**

COMMENTS

WICHITA STATE UNIVERSITY

COMPANY	Toray
MATERIAL	TCA T700S-12K-50C/#2510 Plain Weave Fabric
PROPERTY	90° Normalized Tension Strength
COMMENTS	
DATE	December 23, 2002

DATA SUMMARY

STATISTIC	TEST CONDITION				
	CTD	**RTD**	**ETD**	**ETW**	
Sample Size	6	18	18	18	
No. of Batches	2	6	6	6	
Mean	722.602	771.977	833.734	892.276	
Std.dev	20.145	56.806	65.826	70.336	
% Co. Variation	2.788	7.359	7.895	7.883	
Minimum	696.157	688.601	722.975	752.772	
Maximum	746.775	852.207	943.274	1008.063	
K_b	2.028	1.758	1.758	1.758	
K_a	3.163	2.925	2.925	2.925	
Equal C.V. Basis Values					
B-Basis Value	**616.820**	**673.994**	**727.913**	**779.024**	
A-Basis Value	**557.575**	**608.950**	**657.665**	**703.844**	

Anderson Darling Test for Normality

O.S.L	0.622	0.092	0.359	0.268	
Normality is	Acceptable	Acceptable	Acceptable	Acceptable	
O.S.L for pooled data is		**0.5816**	**Normality is Acceptable**		

Check for Normality based on Normal Scores

r^2	0.978	0.970	0.983	0.978	
Normality is	Acceptable	Acceptable	Acceptable	Acceptable	
r^2 for pooled data is		**0.9953**	**Normality is Acceptable**		

k-sample Anderson Darling Test (ADK < ADC for batches from same population)

ADK	1.565	1.702	1.886	2.009	
ADC	2.105	1.501	1.501	1.501	
SAME POPULATION	**YES**	**NO**	**NO**	**NO**	**N/A**

Equality of Coeff. of Variations: Pooled Data ($F_{CALCULATED}$ < $F_{CRITICAL}$ for equality)

a **LEVEL**	0.05	0.025	0.01
F CALCULATED	1.64		
F CRITICAL	**2.929**	**3.524**	**4.323**

COMMENTS

WICHITA STATE UNIVERSITY

COMPANY	Toray
MATERIAL	TCA T700S-12K-50C/#2510 Plain Weave Fabric
PROPERTY	In-Plane Shear
COMMENTS	
DATE	December 23, 2002

DATA SUMMARY

STATISTIC	TEST CONDITION				
	CTD	**RTD**	**ETD**	**ETW**	
Sample Size	6	18	18	18	
No. of Batches	2	6	6	6	
Mean	154.888	132.570	106.206	74.569	
Std.dev	8.994	4.873	2.904	2.136	
% Co. Variation	5.806	3.676	2.735	2.865	
Minimum	140.140	119.133	99.529	68.150	
Maximum	164.811	139.524	110.741	77.954	
K_b	2.028	1.758	1.758	1.758	
K_a	3.163	2.925	2.925	2.925	
Equal C.V. Basis Values					
B-Basis Value	**144.345**	**124.746**	**99.938**	**70.168**	
A-Basis Value	**138.440**	**119.552**	**95.777**	**67.247**	

Anderson Darling Test for Normality

O.S.L	0.343	0.073	0.496	0.072	
Normality is	Acceptable	Acceptable	Acceptable	Acceptable	
O.S.L for pooled data is		**0.0108**	**Normality is Acceptable**		

Check for Normality based on Normal Scores

r^2	0.941	0.939	0.978	0.922	
Normality is	Acceptable	Acceptable	Acceptable	Acceptable	
r^2 for pooled data is		**0.9642**	**Normality is Acceptable**		

k-sample Anderson Darling Test (ADK < ADC for batches from same population)

ADK	0.470	0.764	0.668	1.165	
ADC	2.105	1.501	1.501	1.501	
SAME POPULATION	**YES**	**YES**	**YES**	**YES**	**N/A**

Equality of Coeff. of Variations: Pooled Data ($F_{CALCULATED}$ < $F_{CRITICAL}$ for equality)

a **LEVEL**	0.05	0.025	0.01
F CALCULATED	1.21		
F CRITICAL	**2.929**	**3.524**	**4.323**

COMMENTS

OUTLIERS EXIST! BASIS VALUES INVALID, Dispose Outliers & rerun Analysis

WICHITA STATE UNIVERSITY

COMPANY	Toray
MATERIAL	TCA T700S-12K-50C/#2510 Plain Weave Fabric
PROPERTY	Apparent Interlaminar Shear
COMMENTS	
DATE	December 23, 2002

DATA SUMMARY

STATISTIC	TEST CONDITION				
	CTD	RTD	ETD	ETW	
Sample Size		149			
No. of Batches		14			
Mean		59.935			
Std.dev		3.124			
% Co. Variation		5.213			
Minimum		52.403			
Maximum		68.707			
K_b		1.478			
K_a		2.613			
Equal C.V. Basis Values					
B-Basis Value		**55.317**			
A-Basis Value		**51.771**			

Anderson Darling Test for Normality

O.S.L	0.489		
Normality is	Acceptable		
O.S.L for pooled data is	**0.4893**	**Normality is Acceptable**	

Check for Normality based on Normal Scores

r^2	0.987		
Normality is	Acceptable		
r^2 for pooled data is	**0.9869**	**Normality is Acceptable**	

k-sample Anderson Darling Test (ADK < ADC for batches from same population)

ADK	2.110				
ADC	1.364				
SAME POPULATION	**N/A**	**NO**	**N/A**	**N/A**	**N/A**

Equality of Coeff. of Variations: Pooled Data ($F_{CALCULATED}$ < $F_{CRITICAL}$ for equality)

a **LEVEL**	0.05	0.025	0.01
F CALCULATED	N/A*		
F CRITICAL			

COMMENTS

***. Number of test conditions < 2, equality of c.v not applicable**

N/A*

WICHITA STATE UNIVERSITY

APPENDIX E. METHOD FOR TRANSFORMING VARIANCES OF TEST SAMPLES (SUPPLEMENT TO DOT/FAA/AR-47/00)

The following Appendix describes a procedure to supplement the process described in DOT/FAA/AR-47/00 for the case in which the variances are found to be unequal per section 5.3.1.3 of that document. A supplemental is given below which provides guidance in the situation of unequal variances and describes procedures to obtain a conservative design allowable. Note that these procedures must be combined with engineering judgment and that the failure modes must remain the same across environments.

The follow excerpt is taken from DOT/FAA/AR-47/00, section 5.3.1.3 and is used as the basis for this procedure:

> ***In general, a coefficient of variation between 4% and 10% is typical of composite materials. Experiences with large data sets have shown that this range is representative of most composite material systems. Lower coefficients of variation may be caused by the specimen fabrication and testing by a single laboratory while higher coefficients may point to lack of material and processing control. In cases where the coefficients of variation of the pooled data set are higher or lower than this range, the reason for the higher or lower coefficient of variation should be investigated before determining design allowable values from the pooled data set. For the coefficient of variation lower than 4%, an assigned value of 4% may be considered as an alternative engineering solution.***

Using this philosophy, the data in this report, which demonstrates unequal variances per section 5.3.1.3 of DOT/FAA/AR-47/00 will be modified by the supplemental procedure described in this appendix with the revised presented below. ***The coefficient of variation to be used in this case will be 4% as suggested by DOT/FAA/AR-47/00.***

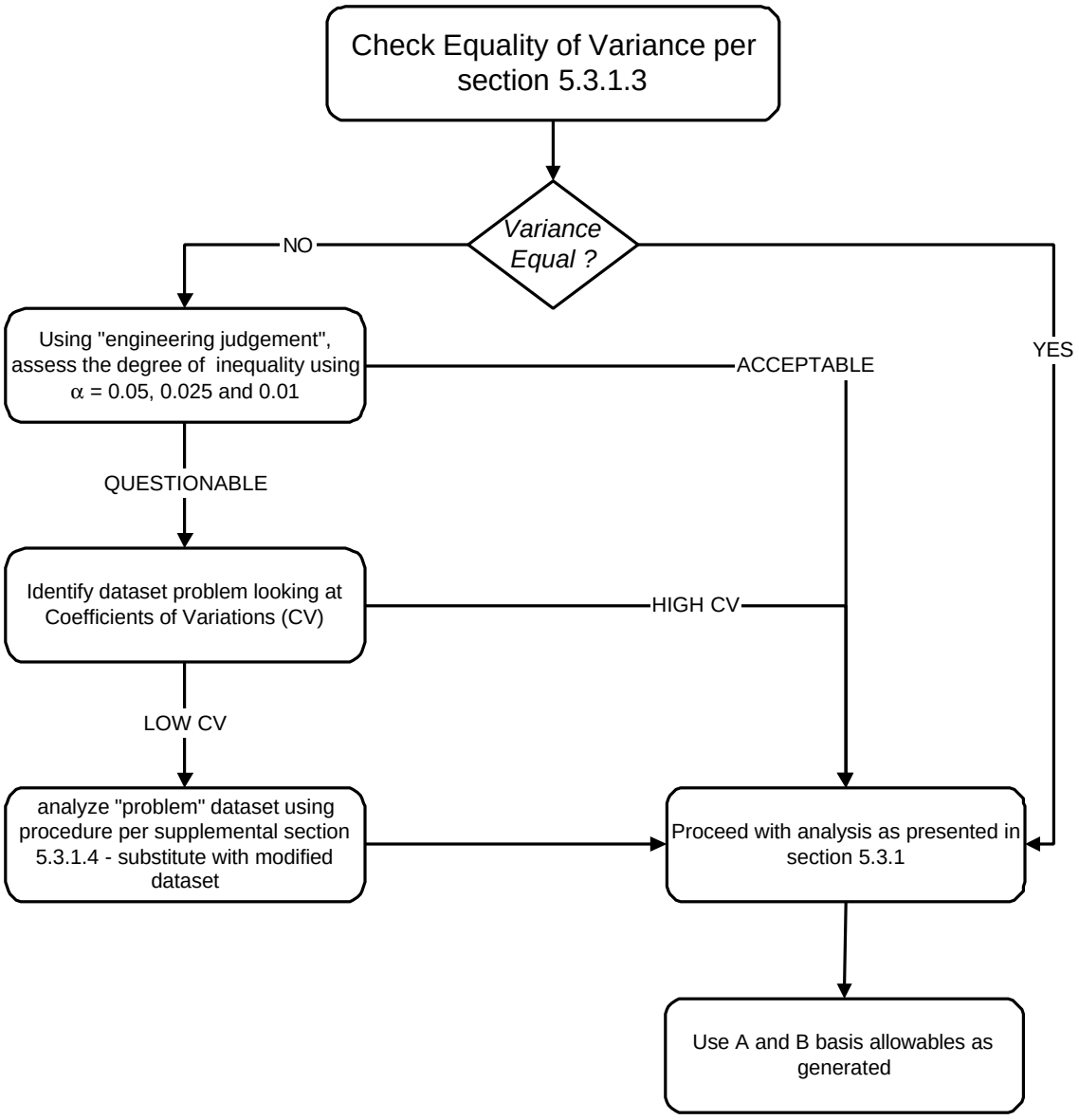


Figure E.1. Procedures to obtain design allowables in the case of variance inequality

A simple procedure for modifying the variance of a test sample to any desired value is presented. This procedure is useful in the case in which an environmental pooled dataset does not pass the equality of variance test per section 5.3.1.3 of DOT/FAA/AR-47/00. Consider a test sample x_i of n specimens with an average value of $\bar{x}$. Let the variance of this sample be CV which is given by

$$CV = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n-1}} \qquad \textbf{eq. 1}$$

Let the desired variance of the sample be CV^*. Consider a transformation of the form

$$x_i^* = x_i + a(x_i)\Delta \qquad \textbf{eq. 2}$$

where x_i^* is the transformed data, Δ is a constant and $a(x_i)$ is a weighting function. Let the weighting function be

$$a(x_i) = (x_i - \bar{x}) \qquad \textbf{eq. 3}$$

The new variance for the transformed data is then given by

$$CV^* = \sqrt{\frac{\sum_{i=1}^{n}(x_i^* - \bar{x}^*)^2}{n-1}} \qquad \textbf{eq. 4}$$

where $\bar{x}^*$ is the average value of the transformed sample. Substituting equations (2) and (3) into equation (4) we obtain

$$CV^* = \sqrt{\frac{\sum_{i=1}^{n}\left[\{x_i + (x_i - \bar{x})\Delta\} - \bar{x}^*\right]^2}{n-1}} \qquad \textbf{eq. 5}$$

If we further let $\bar{x}^* = \bar{x}$, equation (5) reduces to

$$CV^* = \sqrt{\frac{(1+\Delta)^2 \sum_{i=1}^{n} (x_i - \bar{x})^2}{n-1}} \qquad \textbf{eq. 6}$$

which gives

$$\Delta = \frac{CV^*}{CV} - 1 \qquad \textbf{eq. 7}$$

Thus, a sample with a known variance *CV* can be transformed using equation (2) to obtain the desired variance *CV**. The constant for transformation Δ, can be calculated using equation (7).

For example, consider a typical test sample of size n=10 with an average value of 146.27 and a corresponding CV of 0.0184 as shown in the table E.1. The sample is transformed as per the previous discussions to obtain a transformed sample with a CV* of 0.04 (desired value). The transformation is illustrated using a probability of survival plot shown in Figure E.2. It can be observed that the original normal curve has been rotated and stretched due to the transformation.

Table E.1: A typical data sample and transformed data.

i	x_i	$x_i - \bar{x}$	x_i^*	
1	142.3	-3.97	137.63	$\Delta = \frac{0.040}{0.0184} - 1 = 1.174$
2	143.2	-3.07	139.59	
3	144.1	-2.17	141.55	
4	144.8	-1.47	143.07	
5	145.9	-0.37	145.46	
6	146.8	0.53	147.42	
7	147.5	1.23	148.95	
8	148.2	1.93	150.47	
9	149.6	3.33	153.52	
10	150.3	4.03	155.04	
$\bar{x}$	146.27	$\bar{x}^*$	146.27	
CV	0.0184	CV*	0.040	

In order to further investigate the effects of the above transformation on the normality of the data, the Anderson- Darling test for normality was conducted for both the original and transformed data. The test indicated no change in the Observed Significance Level (O.S.L = 0.758) for both the samples. Thus, the

transformation not only maintains the average value of the sample but also retains the normality of the sample.

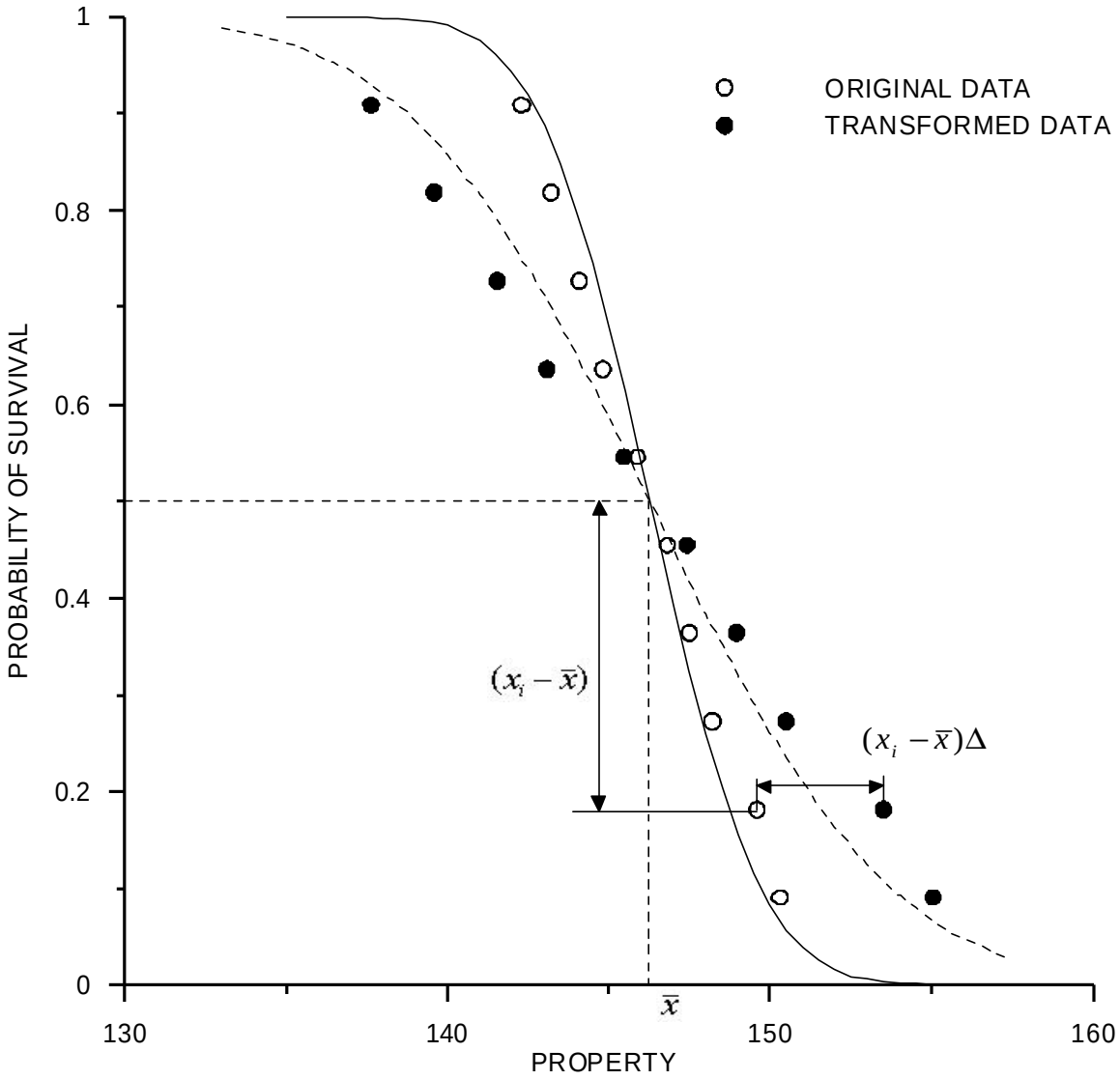


Figure E.2: Original and transformed data points

Once this sample has been transformed to the desired coefficient of variation, it may replaced and the data analyzed per the method described in section 5.3.1 of DOT/FAA/AR-47/00. It should be noted that this “replacement” is only for the calculation of basis values and the original data should be retained for all follow-on testing concerning material equivalence and acceptance.

APPENDIX F. RAW TESTING SUMMARIES

[Raw test sheets report data in US units only. Please refer to Section 3 for data in SI units]

0° (Warp) Tension Properties, -65°F (Dry)

Material Type: F6273C-07M
Batch Number: AF991009
Test Method: ASTM D3039
Specimen Preconditioning: as machined
Test Conditions: -65°F/Dry
Ply Orientation: $(warp)_{12}$
Testing Facility: Intec
Test Date: 12/29/99, 2/23/00

Test Operator: Bryan Mines
Test Frame: I
Test Speed: 0.05 in/min
Control Mode: Stroke
Strain Gage: One biaxial gage (CEA-06-125UT-350)

CPT (batch average): 0.0086 in.
Fiber Volume(batch average): 49.8%

Specimen Number	*Specimen Thickness*	*Specimen Width*	*Ultimate Tensile Load*	*Ultimate Tensile Strength*		*Load @ 0.1% Strain*	*Load @ 0.3% Strain*	*Tensile Modulus (0.1-0.3% strain)*		*Poisson's Ratio (0.1-0.3% strain)*	*Failure Location & Comments*
	(in.)	*(in.)*	*(lbs.)*	*Actual (ksi)*	*Norm. (ksi)*	*(lbs.)*	*(lbs.)*	*Actual (msi)*	*Norm. (msi)*		
A1-910-056-1-7	0.1026	1.0010	12560	122	122	839.2	2631	8.68	8.63	0.110	Lateral failure under tab
A2-910-056-1-7	0.1030	1.0020	11460	111	111	768.4	2423	8.02	8.00	0.070	Lateral failure at tab
B1-910-056-1-7	0.1035	1.0010	12180	118	118	845.3	2497	8.12	8.14	0.090	Lateral failure in gage
B2-910-056-1-7	0.1039	0.9980	12670	122	123	802.0	2537	8.31	8.37	0.070	Lateral failure under tab
A2-910-056-1-8	0.1027	1.0000	11960	116	116	-	-	-	-	-	Tensile failure inside/end of tab
B2-910-056-1-8	0.1038	1.0010	11340	109	110	-	-	-	-	-	Tensile failure inside/end of tab
Average	0.1033	1.0005	12028	116	116			8.28	8.29	0.085	
Std. Dev.	0.0006	0.0014	551	5.5	5.4			0.29	0.27	0.019	
COV, %	0.54	0.14	4.58	4.72	4.67			3.51	3.30	22.53	

0° (Warp) Tension Properties, 75°F (Dry)

Material Type: F6273C-07M
Batch Number: AF991009
Test Method: ASTM D3039
Specimen Preconditioning: as machined
Test Conditions: RT/Dry
Ply Orientation: $(warp)_{12}$
Testing Facility: Toray Composites (America)
Test Date: 1/1/2000, 2/14/00

Test Operator: John Smith
Test Frame: Instron 4505
Test Speed: 0.05 in/min
Control Mode: Stroke
Strain Gage: One biaxial gage (CEA-06-125UT-120)
CPT (batch average): 0.0086 in.
Fiber Volume(batch average): 49.8%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ultimate Tensile Load (lbs.)	Ultimate Tensile Strength Actual (ksi)	Ultimate Tensile Strength Norm. (ksi)	Load @ 0.1% Strain (lbs.)	Load @ 0.3% Strain (lbs.)	Tensile Modulus (0.1-0.3% strain) Actual (msi)	Tensile Modulus (0.1-0.3% strain) Norm. (msi)	Poisson's Ratio (0.1-0.3%) strain)	Failure Location & Comments
A1-910-056-1-1	0.1027	1.0010	13880	135	134	895.2	2523	7.92	7.88	0.025	Failure in gage area
A2-910-056-1-1	0.1023	1.0011	12690	124	123	807.7	2451	8.02	7.95	0.015	Failure in gage area
B1-910-056-1-1	0.1033	0.9997	13500	131	131	838.3	2461	7.86	7.86	0.020	Failure in gage area
B2-910-056-1-1	0.0999	0.9983	13460	135	131	825.8	2471	8.25	7.98	0.040	Failure in gage area
A1-910-056-1-6	0.1027	0.9980	14850	145	144	-	-	-	-	-	Failure in gage area
B1-910-056-1-6	0.1051	0.9971	12810	122	124	-	-	-	-	-	Failure in gage area
Average	0.1027	0.9992	13532	132	131			8.01	7.92	0.025	
Std. Dev.	0.0017	0.0017	787	8.3	7.7			0.17	0.06	0.011	
COV, %	1.66	0.17	5.81	6.31	5.84			2.17	0.73	43.20	

Material Type: F6273C-07M
Batch Number: AF991010
Test Method: ASTM D3039
Specimen Preconditioning: as machined
Test Conditions: RT/Dry
Ply Orientation: $(warp)_{12}$
Testing Facility: Toray Composites (America)
Test Date: 1/1/2000, 2/14/00

Test Operator: John Smith
Test Frame: Instron 4505
Test Speed: 0.05 in/min
Control Mode: Stroke
Strain Gage: One biaxial gage (CEA-06-125UT-120)
CPT (batch average): 0.0086 in.
Fiber Volume(batch average): 49.4%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ultimate Tensile Load (lbs.)	Ultimate Tensile Strength Actual (ksi)	Ultimate Tensile Strength Norm. (ksi)	Load @ 0.1% Strain (lbs.)	Load @ 0.3% Strain (lbs.)	Tensile Modulus (0.1-0.3% strain) Actual (msi)	Tensile Modulus (0.1-0.3% strain) Norm. (msi)	Poisson's Ratio (0.1-0.3%) strain)	Failure Location & Comments
A1-910-057-1-1	0.1025	1.0010	13770	134	133	882.0	2568	8.21	8.16	0.025	Failure in gage area
A2-910-057-1-1	0.1025	1.0013	14130	138	137	849.4	2523	8.15	8.10	0.040	Failure in gage area
B1-910-057-1-1	0.1026	1.0014	14060	137	136	920.2	2626	8.30	8.25	0.045	Failure in gage area
B2-910-057-1-1	0.1033	1.0014	13380	129	129	863.7	2542	8.12	8.12	0.025	Failure in gage area
A1-910-057-1-6	0.1029	1.0011	13550	132	131	-	-	-	-	-	Failure in gage area
B1-910-057-1-6	0.1025	1.0010	13120	128	127	-	-	-	-	-	Failure in gage area
Average	0.1027	1.0012	13668	133	132			8.20	8.16	0.034	
Std. Dev.	0.0003	0.0002	394	4.0	3.8			0.08	0.07	0.010	
COV, %	0.30	0.02	2.88	2.99	2.87			0.98	0.84	30.54	

Material Type: F6273C-07M
Batch Number: AF991011
Test Method: ASTM D3039
Specimen Preconditioning: as machined
Test Conditions: RT/Dry
Ply Orientation: $(warp)_{12}$
Testing Facility: Toray Composites (America)
Test Date: 1/1/2000, 2/14/00

Test Operator: John Smith
Test Frame: Instron 4505
Test Speed: 0.05 in/min
Control Mode: Stroke
Strain Gage: One biaxial gage (CEA-06-125UT-120)
CPT (batch average): 0.0086 in.
Fiber Volume(batch average): 49.7%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ultimate Tensile Load (lbs.)	Ultimate Tensile Strength Actual (ksi)	Ultimate Tensile Strength Norm. (ksi)	Load @ 0.1% Strain (lbs.)	Load @ 0.3% Strain (lbs.)	Tensile Modulus (0.1-0.3% strain) Actual (msi)	Tensile Modulus (0.1-0.3% strain) Norm. (msi)	Poisson's Ratio (0.1-0.3%) strain)	Failure Location & Comments
A1-910-058-1-7	0.1027	1.0009	14170	138	137	841.0	2451	7.83	7.79	0.050	Failure in gage area
A2-910-058-1-7	0.1024	1.0013	13980	136	135	916.6	2613	8.27	8.21	0.135	Failure in gage area
B1-910-058-1-7	0.1017	1.0013	14440	142	140	894.7	2539	8.07	7.96	0.045	Failure in gage area
B2-910-058-1-7	0.1016	1.0013	12820	126	124	992.5	2809	8.93	8.79	0.035	Failure in gage area
A1-910-058-1-6	0.1031	0.9981	14070	137	137	-	-	-	-	-	Failure in gage area
B1-910-058-1-6	0.1029	0.9972	13080	128	127	-	-	-	-	-	Failure in gage area
Average	0.1024	1.0000	13760	134	133			8.28	8.19	0.066	
Std. Dev.	0.0006	0.0019	651	6.2	6.2			0.47	0.44	0.046	
COV, %	0.60	0.19	4.73	4.61	4.69			5.70	5.33	69.82	

0° (Warp) Tension Properties, 180°F (Dry)

Material Type: F6273C-07M
Batch Number: AF991009
Test Method: ASTM D3039
Specimen Preconditioning: as machined
Test Conditions: 180°F/Dry
Ply Orientation: $(warp)_{12}$
Testing Facility: Toray Composites (America)
Test Date: 1/1/2000, 2/22/00

Test Operator: John Smith
Test Frame: Instron 4505
Test Speed: 0.05 in/min
Control Mode: Stroke
Strain Gage: One biaxial gage (CEA-06-125UT-120)
CPT (batch average): 0.0086 in.
Fiber Volume(batch average): 49.8%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ultimate Tensile Load (lbs.)	Ultimate Tensile Strength Actual (ksi)	Ultimate Tensile Strength Norm. (ksi)	Load @ 0.1% Strain (lbs.)	Load @ 0.3% Strain (lbs.)	Tensile Modulus (0.1-0.3% strain) Actual (msi)	Tensile Modulus (0.1-0.3% strain) Norm. (msi)	Poisson's Ratio (0.1-0.3%) strain)	Failure Location & Comments
A1-910-056-1-2	0.1030	1.0010	14490	141	140	849.8	2457	7.80	7.78	0.035	Failure in gage area
A2-910-056-1-2	0.1027	1.0016	14770	144	143	812.6	2461	8.01	7.97	0.065	Failure in gage area
B1-910-056-1-2	0.1040	1.0011	14140	136	137	870.4	2490	7.78	7.84	0.035	Failure in gage area
B2-910-056-1-2	0.1010	0.9987	13330	132	129	912.5	2569	8.21	8.04	0.020	Failure in gage area
A2-910-056-1-6	0.1053	0.9983	15020	143	146	-	-	-	-	-	Failure in gage area
B2-910-056-1-6	0.1041	0.9982	15150	146	147	-	-	-	-	-	Failure in gage area
Average	0.1033	0.9998	14483	140	140			7.95	7.91	0.039	
Std. Dev.	0.0015	0.0016	673	5.2	6.6			0.20	0.12	0.019	
COV, %	1.42	0.16	4.64	3.70	4.67			2.56	1.50	48.71	

Material Type: F6273C-07M
Batch Number: AF991010
Test Method: ASTM D3039
Specimen Preconditioning: as machined
Test Conditions: 180°F/Dry
Ply Orientation: $(warp)_{12}$
Testing Facility: Toray Composites (America)
Test Date: 1/1/2000, 2/22/00

Test Operator: John Smith
Test Frame: Instron 4505
Test Speed: 0.05 in/min
Control Mode: Stroke
Strain Gage: One biaxial gage (CEA-06-125UT-120)
CPT (batch average): 0.0086 in.
Fiber Volume(batch average): 49.4%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ultimate Tensile Load (lbs.)	Ultimate Tensile Strength Actual (ksi)	Ultimate Tensile Strength Norm. (ksi)	Load @ 0.1% Strain (lbs.)	Load @ 0.3% Strain (lbs.)	Tensile Modulus (0.1-0.3% strain) Actual (msi)	Tensile Modulus (0.1-0.3% strain) Norm. (msi)	Poisson's Ratio (0.1-0.3%) strain)	Failure Location & Comments
A1-910-057-1-2	0.1029	1.0012	13590	132	132	1035.0	2910	9.10	9.07	0.070	Failure in gage area
A2-910-057-1-2	0.1033	1.0006	13970	135	135	846.3	2527	8.13	8.14	0.025	Failure in gage area
B1-910-057-1-2	0.1033	1.0014	15030	145	145	896.8	2628	8.37	8.38	0.015	Failure in gage area
B2-910-057-1-2	0.1033	1.0015	14860	144	144	893.2	2581	8.16	8.17	0.025	Failure in gage area
A2-910-057-1-6	0.1035	0.9982	14940	145	145	-	-	-	-	-	Failure in gage area
B2-910-057-1-6	0.1032	1.0011	14080	136	136	-	-	-	-	-	Failure in gage area
Average	0.1032	1.0007	14412	139	140			8.44	8.44	0.034	
Std. Dev.	0.0002	0.0013	607	5.8	5.9			0.45	0.44	0.025	
COV, %	0.18	0.13	4.21	4.13	4.25			5.36	5.18	72.95	

Material Type: F6273C-07M
Batch Number: AF991011
Test Method: ASTM D3039
Specimen Preconditioning: as machined
Test Conditions: 180°F/Dry
Ply Orientation: $(warp)_{12}$
Testing Facility: Toray Composites (America)
Test Date: 1/1/2000, 2/22/00

Test Operator: John Smith
Test Frame: Instron 4505
Test Speed: 0.05 in/min
Control Mode: Stroke
Strain Gage: One biaxial gage (CEA-06-125UT-120)
CPT (batch average): 0.0086 in.
Fiber Volume(batch average): 49.7%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ultimate Tensile Load (lbs.)	Ultimate Tensile Strength Actual (ksi)	Ultimate Tensile Strength Norm. (ksi)	Load @ 0.1% Strain (lbs.)	Load @ 0.3% Strain (lbs.)	Tensile Modulus (0.1-0.3% strain) Actual (msi)	Tensile Modulus (0.1-0.3% strain) Norm. (msi)	Poisson's Ratio (0.1-0.3%) strain)	Failure Location & Comments
A1-910-058-1-8	0.1019	1.0029	14970	146	145	873.4	2554	8.22	8.12	0.045	Failure in gage area
A2-910-058-1-8	0.1023	1.0012	14950	146	145	853.1	2434	7.72	7.65	0.050	Failure in gage area
B1-910-058-1-8	0.1007	1.0009	14620	145	142	845.2	2489	8.15	7.96	0.050	Failure in gage area
B2-910-058-1-8	0.1013	1.0014	12960	128	125	914.4	2608	8.35	8.19	0.005	Failure in gage area
A2-910-058-1-6	0.1023	0.9981	15040	147	146	-	-	-	-	-	Failure in gage area
B2-910-058-1-6	0.1017	0.9988	14160	139	137	-	-	-	-	-	Failure in gage area
Average	0.1017	1.0006	14450	142	140			8.11	7.98	0.038	
Std. Dev.	0.0006	0.0018	800	7.5	7.8			0.27	0.24	0.022	
COV, %	0.60	0.18	5.54	5.30	5.55			3.36	3.02	58.12	

0° (Warp) Tension Properties, 180°F (Wet)

Material Type: F6273C-07M
Batch Number: AF991009
Test Method: ASTM D3039
Specimen Preconditioning: per Section 3.2 of AGATE Methodology
Test Conditions: 180°F
Ply Orientation: $(warp)_{12}$
Testing Facility: Toray Composites (America)
Test Date: 4/28/00, 4/27/00

Test Operator: John Smith
Test Frame: Instron 4505
Test Speed: 0.05 in/min
Control Mode: Stroke
Strain Gage: One biaxial gage (CEA-06-125UT-120)
CPT (batch average): 0.0086 in.
Fiber Volume(batch average): 49.8%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ultimate Tensile Load (lbs.)	Ultimate Tensile Strength Actual (ksi)	Ultimate Tensile Strength Norm. (ksi)	Load @ 0.1% Strain (lbs.)	Load @ 0.3% Strain (lbs.)	Tensile Modulus (0.1-0.3% strain) Actual (msi)	Tensile Modulus (0.1-0.3% strain) Norm. (msi)	Poisson's Ratio (0.1-0.3%) strain)	Failure Location & Comments
A1-910-056-1-3	0.1035	0.9984	15420	149	150	872.5	2494	7.85	7.87	0.029	Failure in gage area
A2-910-056-1-3	0.1025	0.9984	16420	160	159	873.1	2679	8.83	8.77	0.026	Failure in gage area
B1-910-056-1-3	0.1040	0.9979	16160	156	157	976.0	2866	9.11	9.18	0.035	Failure in gage area
B2-910-056-1-3	0.1007	1.0010	15070	150	146	825.6	2419	7.90	7.71	0.033	Failure in gage area
A1-910-056-1-4	0.1036	1.0006	16620	160	161	-	-	-	-	-	Failure in gage area
B1-910-056-1-4	0.1047	1.0007	16060	153	156	-	-	-	-	-	Failure in gage area
Average	0.1032	0.9995	15958	155	155			8.42	8.38	0.031	
Std. Dev.	0.0014	0.0014	597	5.0	5.8			0.64	0.71	0.004	
COV, %	1.37	0.14	3.74	3.22	3.76			7.62	8.42	12.60	

Material Type: F6273C-07M
Batch Number: AF991010
Test Method: ASTM D3039
Specimen Preconditioning: per Section 3.2 of AGATE Methodology
Test Conditions: 180°F
Ply Orientation: $(warp)_{12}$
Testing Facility: Toray Composites (America)
Test Date: 4/28/00, 4/27/00, 5/3/00

Test Operator: John Smith
Test Frame: Instron 4505
Test Speed: 0.05 in/min
Control Mode: Stroke
Strain Gage: One biaxial gage (CEA-06-125UT-120)
CPT (batch average): 0.0086 in.
Fiber Volume(batch average): 49.4%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ultimate Tensile Load (lbs.)	Ultimate Tensile Strength Actual (ksi)	Ultimate Tensile Strength Norm. (ksi)	Load @ 0.1% Strain (lbs.)	Load @ 0.3% Strain (lbs.)	Tensile Modulus (0.1-0.3% strain) Actual (msi)	Tensile Modulus (0.1-0.3% strain) Norm. (msi)	Poisson's Ratio (0.1-0.3%) strain)	Failure Location & Comments
A1-910-057-1-3	0.1025	1.0011	15990	156	155	874.2	2582	8.33	8.27	0.036	Failure in gage area
A2-910-047-1-3	0.1034	0.9986	15930	154	155	882.6	2573	8.19	8.20	0.029	Failure in gage area
B1-910-057-1-5	0.1033	1.0016	15050	145	146	921.5	2700	8.59	8.60	0.038	Failure in gage area
B2-910-057-1-3	0.1033	1.0014	15780	153	153	946.5	2672	8.34	8.35	0.017	Failure in gage area
A1-910-057-1-4	0.1018	1.0017	15740	154	152	-	-	-	-	-	Failure in gage area
B1-910-057-1-4	0.1032	1.0014	15100	146	146	-	-	-	-	-	Failure in gage area
Average	0.1029	1.0010	15598	151	151			8.36	8.36	0.030	
Std. Dev.	0.0006	0.0012	416	4.5	4.1			0.17	0.17	0.010	
COV, %	0.62	0.12	2.67	2.97	2.72			2.03	2.09	32.20	

Material Type: F6273C-07M
Batch Number: AF991011
Test Method: ASTM D3039
Specimen Preconditioning: per Section 3.2 of AGATE Methodology
Test Conditions: 180°F
Ply Orientation: $(warp)_{12}$
Testing Facility: Toray Composites (America)
Test Date: 4/28/00, 4/27/00

Test Operator: John Smith
Test Frame: Instron 4505
Test Speed: 0.05 in/min
Control Mode: Stroke
Strain Gage: One biaxial gage (CEA-06-125UT-120)
Fiber Volume(normalizing): 49.8%
CPT (batch average): 0.0086 in.
Fiber Volume(batch average): 49.7%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ultimate Tensile Load (lbs.)	Ultimate Tensile Strength Actual (ksi)	Ultimate Tensile Strength Norm. (ksi)	Load @ 0.1% Strain (lbs.)	Load @ 0.3% Strain (lbs.)	Tensile Modulus (0.1-0.3% strain) Actual (msi)	Tensile Modulus (0.1-0.3% strain) Norm. (msi)	Poisson's Ratio (0.1-0.3%) strain)	Failure Location & Comments
A1-910-058-1-3	0.1031	0.9981	15620	152	152	887.9	2593	8.29	8.28	0.028	Failure in gage area
A2-910-058-1-3	0.1023	0.9985	15640	153	152	972.1	2727	8.59	8.51	0.032	Failure in gage area
B1-910-058-1-3	0.1025	0.9987	16000	156	155	899.2	2658	8.59	8.53	0.041	Failure in gage area
B2-910-058-1-3	0.1018	0.9985	15600	154	151	974.5	2720	8.59	8.47	0.011	Failure in gage area
A1-910-058-1-4	0.1032	1.0011	15400	149	149	-	-	-	-	-	Failure in gage area
B1-910-058-1-4	0.1033	1.0014	15040	145	146	-	-	-	-	-	Failure in gage area
Average	0.1027	0.9994	15550	152	151			8.51	8.45	0.028	
Std. Dev.	0.0006	0.0014	316	3.8	3.2			0.15	0.12	0.013	
COV, %	0.59	0.14	2.03	2.52	2.15			1.79	1.40	45.50	

90° (Fill) Tension Properties, -65°F (Dry)

Material Type: F6273C-07M
Batch Number: AF991009
Test Method: ASTM D3039
Specimen Preconditioning: as machined
Test Conditions: -65°F/Dry
Ply Orientation: $(fill)_{12}$
Testing Facility: Intec
Test Date: 12/29/99, 2/23/00

Test Operator: Joel Patterson, Bryan Mines
Test Frame: I
Test Speed: 0.05 in/min
Control Mode: Stroke
Strain Gage: One axial gage (CEA-06-250UW-350)

CPT (batch average): 0.0086 in.
Fiber Volume(batch average): 49.8%

Specimen Number	***Specimen Thickness***	***Specimen Width***	***Ultimate Tensile Load***	***Ultimate Tensile Strength***		***Load @ 0.1% Strain***	***Load @ 0.3% Strain***	***Tensile Modulus (0.1-0.3% strain)***		***Failure Location & Comments***
				Actual	***Norm.***			***Actual***	***Norm.***	
	(in.)	***(in.)***	***(lbs.)***	***(ksi)***	***(ksi)***	***(lbs.)***	***(lbs.)***	***(msi)***	***(msi)***	
A1-910-056-1-7	0.1038	1.0020	11200	108	108	801	2507	8.23	8.28	Failure in gage area
A2-910-056-1-7	0.1044	1.0010	11160	107	108	756	2459	7.96	8.05	Failure in gage area
B1-910-056-1-7	0.1044	1.0000	10420	100	101	843	2578	8.18	8.28	Failure in gage area
B2-910-056-1-7	0.1038	1.0010	10840	104	105	773	2459	8.04	8.09	Failure in gage area
A1-910-056-1-8	0.1029	1.0010	10730	104	104	-	-	-	-	Failure in gage area
B1-910-056-1-8	0.1032	1.0000	10600	103	103	-	-	-	-	Failure in gage area
Average	0.1038	1.0008	10825	104	105			8.10	8.17	
Std. Dev.	0.0006	0.0008	309	2.84	2.92			0.12	0.12	
COV, %	0.59	0.08	2.85	2.72	2.79			1.54	1.47	

90° (Fill) Tension Properties, 75°F (Dry)

Material Type: F6273C-07M
Batch Number: AF991009
Test Method: ASTM D3039
Specimen Preconditioning: as machined
Test Conditions: RT/Dry
Ply Orientation: $(fill)_{12}$
Testing Facility: Toray Composites (America)
Test Date: 12/18/99, 2/14/00

Test Operator: John Smith
Test Frame: Instron 4505
Test Speed: 0.05 in/min
Control Mode: Stroke
Strain Gage: One axial gage (C-960401-A)
CPT (batch average): 0.0086 in.
Fiber Volume(batch average): 49.8%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ultimate Tensile Load (lbs.)	Ultimate Tensile Strength Actual (ksi)	Ultimate Tensile Strength Norm. (ksi)	Load @ 0.1% Strain (lbs.)	Load @ 0.3% Strain (lbs.)	Tensile Modulus (0.1-0.3% strain) Actual (msi)	Tensile Modulus (0.1-0.3% strain) Norm. (msi)	Failure Location & Comments
A1-910-056-1-6	0.1041	1.0014	11290	108	109	822	2429	7.71	7.77	Failure in gage area
A2-910-056-1-1	0.1007	1.0011	12440	123	120	861	2497	8.12	7.92	Failure in gage area
B1-910-056-1-1	0.1036	1.0015	12710	122	123	913	2583	8.05	8.08	Failure in gage area
B2-910-056-1-1	0.1031	0.9980	12710	124	123	854	2514	8.07	8.06	Failure in gage area
A1-910-056-1-9	0.1024	0.9998	11980	117	116	-	-	-	-	Failure in gage area
B1-910-056-1-9	0.1025	0.9996	12750	124	124	-	-	-	-	Failure in gage area
Average	0.1027	1.0002	12313	120	119			7.99	7.96	
Std. Dev.	0.0012	0.0014	580	6.25	5.68			0.19	0.14	
COV, %	1.16	0.14	4.71	5.21	4.76			2.34	1.77	

Material Type: F6273C-07M
Batch Number: AF991010
Test Method: ASTM D3039
Specimen Preconditioning: as machined
Test Conditions: RT/Dry
Ply Orientation: $(fill)_{12}$
Testing Facility: Toray Composites (America)
Test Date: 12/31/99, 2/14/00

Test Operator: John Smith
Test Frame: Instron 4505
Test Speed: 0.05 in/min
Control Mode: Stroke
Strain Gage: One axial gage (C-960401-A)
CPT (batch average): 0.0086 in.
Fiber Volume(batch average): 49.4%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ultimate Tensile Load (lbs.)	Ultimate Tensile Strength Actual (ksi)	Ultimate Tensile Strength Norm. (ksi)	Load @ 0.1% Strain (lbs.)	Load @ 0.3% Strain (lbs.)	Tensile Modulus (0.1-0.3% strain) Actual (msi)	Tensile Modulus (0.1-0.3% strain) Norm. (msi)	Failure Location & Comments
A1-910-057-1-1	0.1025	1.0006	12570	123	122	871	2477	7.83	7.78	Failure in gage area
A2-910-057-1-1	0.1023	0.9999	10700	105	104	877	2506	7.96	7.89	Failure in gage area
B1-910-057-1-1	0.1031	1.0011	11420	111	111	875	2522	7.98	7.97	Failure in gage area
B2-910-057-1-1	0.1020	1.0010	10900	107	106	843	2451	7.87	7.78	Failure in gage area
A1-910-057-1-6	0.1034	1.0013	10320	100	100	-	-	-	-	Failure in gage area
B1-910-057-1-6	0.1026	1.0007	10920	106	106	-	-	-	-	Failure in gage area
Average	0.1026	1.0008	11138	108	108			7.91	7.86	
Std. Dev.	0.0005	0.0005	787	7.78	7.62			0.07	0.10	
COV, %	0.50	0.05	7.06	7.17	7.07			0.89	1.21	

Material Type: F6273C-07M
Batch Number: AF991011
Test Method: ASTM D3039
Specimen Preconditioning: as machined
Test Conditions: RT/Dry
Ply Orientation: $(fill)_{12}$
Testing Facility: Toray Composites (America)
Test Date: 1/1/00, 2/14/00

Test Operator: John Smith
Test Frame: Instron 4505
Test Speed: 0.05 in/min
Control Mode: Stroke
Strain Gage: One axial gage (C-960401-A)
CPT (batch average): 0.0086 in.
Fiber Volume(batch average): 49.7%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ultimate Tensile Load (lbs.)	Ultimate Tensile Strength Actual (ksi)	Ultimate Tensile Strength Norm. (ksi)	Load @ 0.1% Strain (lbs.)	Load @ 0.3% Strain (lbs.)	Tensile Modulus (0.1-0.3% strain) Actual (msi)	Tensile Modulus (0.1-0.3% strain) Norm. (msi)	Failure Location & Comments
A1-910-058-1-7	0.1024	1.0005	10480	102	101	877	2534	8.09	8.03	Failure in gage area
A2-910-058-1-7	0.1017	0.9992	11590	114	112	849	2470	7.98	7.86	Failure in gage area
B1-910-058-1-7	0.1028	1.0015	11200	109	108	849	2502	8.03	8.00	Failure in gage area
B2-910-058-1-7	0.1033	1.0015	11100	107	107	873	2489	7.82	7.82	Failure in gage area
A1-910-058-1-6	0.1039	1.0004	10660	103	103	-	-	-	-	Failure in gage area
B1-910-058-1-6	0.1036	0.9995	12340	119	120	-	-	-	-	Failure in gage area
Average	0.1029	1.0004	11228	109	109			7.98	7.93	
Std. Dev.	0.0008	0.0010	673	6.60	6.58			0.12	0.10	
COV, %	0.78	0.10	6.00	6.06	6.05			1.47	1.27	

90° (Fill) Tension Properties, 180°F (Dry)

Material Type: F6273C-07M
Batch Number: AF991009
Test Method: ASTM D3039
Specimen Preconditioning: as machined
Test Conditions: 180°F/Dry
Ply Orientation: $(fill)_{12}$
Testing Facility: Toray Composites (America)
Test Date: 1/4/00, 2/22/00

Test Operator: John Smith
Test Frame: Instron 4505
Test Speed: 0.05 in/min
Control Mode: Stroke
Strain Gage: One axial gage (C-960401-A)
CPT (batch average): 0.0086 in.
Fiber Volume(batch average): 49.8%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ultimate Tensile Load (lbs.)	Ultimate Tensile Strength Actual (ksi)	Ultimate Tensile Strength Norm. (ksi)	Load @ 0.1% Strain (lbs.)	Load @ 0.3% Strain (lbs.)	Tensile Modulus (0.1-0.3% strain) Actual (msi)	Tensile Modulus (0.1-0.3% strain) Norm. (msi)	Failure Location & Comments
A1-910-056-1-2	0.1033	1.0015	14140	137	137	846	2463	7.82	7.82	Failure in gage area
A2-910-056-1-2	0.1014	1.0012	13850	136	134	831	2425	7.85	7.71	Failure in gage area
B1-910-056-1-2	0.1024	1.0012	12650	123	122	914	2563	8.04	7.98	Failure in gage area
B2-910-056-1-2	0.1020	1.0006	12400	122	120	897	2552	8.11	8.01	Failure in gage area
A1-910-056-1-9	0.1023	0.9993	13980	137	136	-	-	-	-	Failure in gage area
B1-910-056-1-9	0.1037	1.0009	13740	132	133	-	-	-	-	Failure in gage area
Average	0.1025	1.0008	13460	131	130			7.95	7.88	
Std. Dev.	0.0008	0.0008	741	7.00	7.18			0.14	0.14	
COV, %	0.81	0.08	5.50	5.33	5.51			1.80	1.78	

Material Type: F6273C-07M
Batch Number: AF991010
Test Method: ASTM D3039
Specimen Preconditioning: as machined
Test Conditions: 180°F/Dry
Ply Orientation: $(fill)_{12}$
Testing Facility: Toray Composites (America)
Test Date: 1/4/00, 2/22/00

Test Operator: John Smith
Test Frame: Instron 4505
Test Speed: 0.05 in/min
Control Mode: Stroke
Strain Gage: One axial gage (C-960401-A)
CPT (batch average): 0.0086 in.
Fiber Volume(batch average): 49.4%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ultimate Tensile Load (lbs.)	Ultimate Tensile Strength Actual (ksi)	Ultimate Tensile Strength Norm. (ksi)	Load @ 0.1% Strain (lbs.)	Load @ 0.3% Strain (lbs.)	Tensile Modulus (0.1-0.3% strain) Actual (msi)	Tensile Modulus (0.1-0.3% strain) Norm. (msi)	Failure Location & Comments
A1-910-057-1-2	0.1031	1.0008	11190	108	108	896	2564	8.08	8.07	Failure in gage area
A2-910-057-1-2	0.1025	0.9999	10820	106	105	802	2357	7.59	7.54	Failure in gage area
B1-910-057-1-2	0.1032	1.0011	12570	122	122	861	2473	7.80	7.80	Failure in gage area
B2-910-057-1-2	0.1024	1.0013	11700	114	113	840	2467	7.93	7.87	Failure in gage area
B2-910-057-1-6	0.1032	1.0011	12600	122	122	-	-	-	-	Failure in gage area
A2-910-057-1-6	0.1030	1.0001	12840	125	124	-	-	-	-	Failure in gage area
Average	0.1029	1.0007	11953	116	116			7.85	7.82	
Std. Dev.	0.0004	0.0006	839	7.89	8.11			0.21	0.22	
COV, %	0.35	0.06	7.02	6.80	7.00			2.66	2.84	

Material Type: F6273C-07M
Batch Number: AF991011
Test Method: ASTM D3039
Specimen Preconditioning: as machined
Test Conditions: 180°F/Dry
Ply Orientation: $(fill)_{12}$
Testing Facility: Toray Composites (America)
Test Date: 1/4/00, 2/22/00

Test Operator: John Smith
Test Frame: Instron 4505
Test Speed: 0.05 in/min
Control Mode: Stroke
Strain Gage: One axial gage (C-960401-A)
CPT (batch average): 0.0086 in.
Fiber Volume(batch average): 49.7%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ultimate Tensile Load (lbs.)	Ultimate Tensile Strength Actual (ksi)	Ultimate Tensile Strength Norm. (ksi)	Load @ 0.1% Strain (lbs.)	Load @ 0.3% Strain (lbs.)	Tensile Modulus (0.1-0.3% strain) Actual (msi)	Tensile Modulus (0.1-0.3% strain) Norm. (msi)	Failure Location & Comments
A1-910-058-1-8	0.1017	0.9975	11190	110	109	848	2449	7.89	7.78	Failure in gage area
A2-910-058-1-8	0.1027	1.0014	11550	112	112	909	2574	8.09	8.06	Failure in gage area
B1-910-058-1-8	0.1018	1.0016	12170	119	118	898	2582	8.26	8.15	Failure in gage area
B2-910-058-1-8	0.1028	0.9994	12540	122	122	840	2475	7.96	7.93	Failure in gage area
A2-910-058-1-6	0.1017	1.0012	12040	118	117	-	-	-	-	Failure in gage area
B2-910-058-1-6	0.1033	1.0012	12800	124	124	-	-	-	-	Failure in gage area
Average	0.1023	1.0004	12048	118	117			8.05	7.98	
Std. Dev.	0.0007	0.0016	601	5.34	5.74			0.16	0.16	
COV, %	0.69	0.16	4.99	4.54	4.92			2.03	2.03	

90° (Fill) Tension Properties, 180°F (Wet)

Material Type: F6273C-07M
Batch Number: AF991009
Test Method: ASTM D3039
Specimen Preconditioning: per Section 3.2 of AGATE Methodology
Test Conditions: 180°F
Ply Orientation: $(fill)_{12}$
Testing Facility: Toray Composites (America)
Test Date: 4/27/2000

Test Operator: John Smith
Test Frame: Instron 4505
Test Speed: 0.05 in/min
Control Mode: Stroke
Strain Gage: One axial gage (C-960401-A)
CPT (batch average): 0.0086 in.
Fiber Volume(batch average): 49.8%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ultimate Tensile Load (lbs.)	Ultimate Tensile Strength Actual (ksi)	Ultimate Tensile Strength Norm. (ksi)	Load @ 0.1% Strain (lbs.)	Load @ 0.3% Strain (lbs.)	Tensile Modulus (0.1-0.3% strain) Actual (msi)	Tensile Modulus (0.1-0.3% strain) Norm. (msi)	Failure Location & Comments
A1-910-056-1-3	0.1036	1.0014	15110	146	146	796	2415	7.81	7.84	Failure in gage area
A2-910-056-1-3	0.1031	1.0014	13630	132	132	883	2495	7.81	7.80	Failure in gage area
B1-910-056-1-3	0.1042	1.0012	13510	130	131	980	2710	8.29	8.37	Failure in gage area
B2-910-056-1-3	0.1020	1.0009	13910	136	135	864	2498	8.00	7.91	Failure in gage area
A1-910-056-1-4	0.1040	1.0012	14480	139	140	-	-	-	-	Failure in gage area
B1-910-056-1-4	0.1041	1.0007	13010	125	126	-	-	-	-	Failure in gage area
Average	0.1035	1.0011	13942	135	135			7.98	7.98	
Std. Dev.	0.0009	0.0003	749	7.39	7.23			0.23	0.27	
COV, %	0.82	0.03	5.37	5.49	5.36			2.87	3.34	

Material Type: F6273C-07M
Batch Number: AF991010
Test Method: ASTM D3039
Specimen Preconditioning: per Section 3.2 of AGATE Methodology
Test Conditions: 180°F
Ply Orientation: $(fill)_{12}$
Testing Facility: Toray Composites (America)
Test Date: 4/27/2000

Test Operator: John Smith
Test Frame: Instron 4505
Test Speed: 0.05 in/min
Control Mode: Stroke
Strain Gage: One axial gage (C-960401-A)
CPT (batch average): 0.0086 in.
Fiber Volume(batch average): 49.4%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ultimate Tensile Load (lbs.)	Ultimate Tensile Strength Actual (ksi)	Ultimate Tensile Strength Norm. (ksi)	Load @ 0.1% Strain (lbs.)	Load @ 0.3% Strain (lbs.)	Tensile Modulus (0.1-0.3% strain) Actual (msi)	Tensile Modulus (0.1-0.3% strain) Norm. (msi)	Failure Location & Comments
A1-910-057-1-3	0.1031	1.0010	13810	134	134	845	2432	7.69	7.68	Failure in gage area
A2-910-057-1-3	0.1028	1.0000	13810	134	134	837	2508	8.13	8.09	Failure in gage area
B1-910-057-1-3	0.1033	0.9996	14080	136	136	840	2468	7.88	7.89	Failure in gage area
B2-910-057-1-3	0.1028	1.0012	14276	139	138	874	2504	7.92	7.89	Failure in gage area
A1-910-057-1-4	0.1031	0.9983	14390	140	140	-	-	-	-	Failure in gage area
B1-910-057-1-4	0.1031	1.0007	13720	133	133	-	-	-	-	Failure in gage area
Average	0.1030	1.0001	14014	136	136			7.90	7.89	
Std. Dev.	0.0002	0.0011	277	2.77	2.76			0.18	0.17	
COV, %	0.20	0.11	1.98	2.03	2.03			2.30	2.14	

Material Type: F6273C-07M
Batch Number: AF991011
Test Method: ASTM D3039
Specimen Preconditioning: per Section 3.2 of AGATE Methodology
Test Conditions: 180°F
Ply Orientation: $(fill)_{12}$
Testing Facility: Toray Composites (America)
Test Date: 4/28/2000, 4/27/00

Test Operator: John Smith
Test Frame: Instron 4505
Test Speed: 0.05 in/min
Control Mode: Stroke
Strain Gage: One axial gage (C-960401-A)
CPT (batch average): 0.0086 in.
Fiber Volume(batch average): 49.7%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ultimate Tensile Load (lbs.)	Ultimate Tensile Strength Actual (ksi)	Ultimate Tensile Strength Norm. (ksi)	Load @ 0.1% Strain (lbs.)	Load @ 0.3% Strain (lbs.)	Tensile Modulus (0.1-0.3% strain) Actual (msi)	Tensile Modulus (0.1-0.3% strain) Norm. (msi)	Failure Location & Comments
A1-910-058-1-3	0.1023	1.0002	11270	110	109	940	2548	7.86	7.79	Failure in gage area
A2-910-058-1-3	0.1014	0.9994	11590	114	112	780	2303	7.52	7.38	Failure in gage area
B1-910-058-1-3	0.1033	0.9969	12940	126	126	820	2445	7.89	7.89	Failure in gage area
B2-910-058-1-3	0.1033	1.0016	12120	117	117	884	2510	7.85	7.86	Failure in gage area
A1-910-058-1-4	0.1036	1.0005	12130	117	117	-	-	-	-	Failure in gage area
B1-910-058-1-4	0.1028	1.0015	12720	124	123	-	-	-	-	Failure in gage area
Average	0.1028	1.0000	12128	118	118			7.78	7.73	
Std. Dev.	0.0008	0.0017	638	5.75	6.25			0.17	0.24	
COV, %	0.81	0.17	5.26	4.87	5.32			2.25	3.06	

0° (Warp) Compression Properties, -65°F (Dry)

Material Type: F6273C-07M
Batch Number: AF991009
Test Method: SACMA SRM 1-94
Preconditioning: as machined
Test Conditions: -65°F/Dry
Ply Orientation: $(warp)_{12}$
Testing Facility: TCA
Test Date: 4/25/2000

Test Operator: John Smith
Test Frame: Instron 4510
Test Speed: 0.05 in/min
Control Mode: Stroke
Strain Gage: N/A
FV(normalizing): 49.8%
CPT (batch average): 0.0086 in.
FV(batch average): 49.8%

Specimen Number	*Specimen Thickness (in.)*	*Specimen Width (in.)*	*Ult. Comp. Load (kips)*	*Ult. Comp. Strength Actual (ksi)*	*Ult. Comp. Strength Norm. (ksi)*	*Failure Location & Comments*
A1-910-056-1-4	0.1036	0.5000	5.43	105	105	Failure in gage
A1-910-056-1-5	0.1036	0.5002	5.27	102	102	Failure in gage
A2-910-056-1-4	0.1036	0.5002	5.50	106	107	Failure in gage
B1-910-056-1-4	0.1036	0.5000	6.35	123	123	Failure in gage
B2-910-056-1-4	0.1036	0.4997	5.69	110	111	Failure in gage
B2-910-056-1-5	0.1036	0.4998	5.43	105	105	Failure in gage
Average	0.1036	0.5000	5.61	108	109	
Std. Dev.	0.0000	0.0002	0.38	7.44	7.47	
COV, %	0.00	0.04	6.86	6.86	6.86	

Material Type: F6273C-07M
Batch Number: AF991009
Test Method: SACMA SRM 1-94
Preconditioning: as machined
Test Conditions: -65°F/Dry
Ply Orientation: $(warp)_{14}$
Testing Facility: Intec
Test Date: 12/29/1999

Test Operator: Joel Patterson
Test Frame: I
Test Speed: 0.05 in/min
Control Mode: Stroke
Strain Gage: One axial gage (CEA-06-125UW-350)
FV(normalizing): 49.8%
CPT (batch average): 0.0086 in.
FV(batch average): 49.8%

Specimen Number	*Specimen Thickness (in.)*	*Specimen Width (in.)*	*Load @ 0.1% Strain (lbs.)*	*Load @ 0.3% Strain (lbs.)*	*Comp. Mod. (0.1-0.3% strain) Actual (msi)*	*Comp. Mod. (0.1-0.3% strain) Norm. (msi)*
A2-910-056-1-6	0.1209	0.4980	686.0	1628	7.82	7.86
B2-910-056-1-6	0.1209	0.4990	684.7	1649	8.00	8.03
Average	0.1209	0.4985			7.91	7.94
Std. Dev.	0.0000	0.0007			0.12	0.12
COV, %	0.00	0.14			1.53	1.53

0° (Warp) Compression Properties, 75°F (Dry)

Material Type: F6273C-07M
Batch Number: AF991009
Test Method: SACMA SRM 1-94
Preconditioning: as machined
Test Conditions: RT/Dry
Ply Orientation: (warp)$_{12}$
Testing Facility: TCA
Test Date: 4/20/2000

Test Operator: John Smith
Test Frame: Instron 4510
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: N/A
FV(normalizing): 49.8%
CPT (batch average): 0.0086 in.
FV(batch average): 49.8%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ult. Comp. Load (kips)	Ult. Comp. Strength Actual (ksi)	Ult. Comp. Strength Norm. (ksi)	Failure Location & Comments
A1-910-056-1-8	0.1030	0.5001	5.06	98.2	98.0	Failure in gage
A2-910-056-1-5	0.1030	0.5001	4.95	96.1	95.9	Failure in gage
B1-910-056-1-5	0.1030	0.5000	5.78	112	112	Failure in gage
B2-910-056-1-7	0.1030	0.4996	5.41	105	105	Failure in gage
B2-910-056-1-8	0.1030	0.4999	5.29	103	102	Failure in gage
A1-910-056-1-10	0.1030	0.5002	4.78	92.9	92.7	Failure in gage
Average	0.1030	0.5000	5.21	101	101	
Std. Dev.	0.0000	0.0002	0.36	6.94	6.93	
COV, %	0.00	0.04	6.84	6.86	6.86	

Material Type: F6273C-07M
Batch Number: AF991009
Test Method: SACMA SRM 1-94
Preconditioning: as machined
Test Conditions: RT/Dry
Ply Orientation: (warp)$_{14}$
Testing Facility: TCA
Test Date: 12/27/1999

Test Operator: John Smith
Test Frame: Instron 4505
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: One axial gage (FAE-12S-AS-S6EL-2)
FV(normalizing): 49.8% in.
CPT (batch average): 0.0086
FV(batch average): 49.8%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Load @ 0.1% Strain (lbs.)	Load @ 0.3% Strain (lbs.)	Comp. Mod. (0.1-0.3% strain) Actual (msi)	Comp. Mod. (0.1-0.3% strain) Norm. (msi)
A2-910-056-1-1	0.1185	0.4991	545.8	1513	8.18	8.05
B2-910-056-1-1	0.1186	0.4989	545.2	1506	8.12	8.00
Average	0.1185	0.4990			8.15	8.02
Std. Dev.	0.0001	0.0001			0.04	0.04
COV, %	0.06	0.03			0.50	0.44

Material Type: F6273C-07M
Batch Number: AF991010
Test Method: SACMA SRM 1-94
Preconditioning: as machined
Test Conditions: RT/Dry
Ply Orientation: (warp)$_{12}$
Testing Facility: TCA
Test Date: 4/20/2000

Test Operator: John Smith
Test Frame: Instron 4510
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: N/A
FV(normalizing): 49.8%
CPT (batch average): 0.0086 in.
FV(batch average): 49.4%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ult. Comp. Load (kips)	Ult. Comp. Strength Actual (ksi)	Ult. Comp. Strength Norm. (ksi)	Failure Location & Comments
A1-910-057-1-5	0.1025	0.4991	4.89	95.6	95.0	Failure in gage
A2-910-057-1-7	0.1025	0.5019	5.68	110	110	Failure in gage
A2-910-057-1-8	0.1025	0.5016	5.66	110	109	Failure in gage
B1-910-057-1-5	0.1025	0.5000	5.82	114	113	Failure in gage
B2-910-057-1-7	0.1025	0.4998	4.58	89.4	88.8	Failure in gage
B2-910-057-1-8	0.1025	0.5000	4.41	86.1	85.5	Failure in gage
Average	0.1025	0.5004	5.17	101	100	
Std. Dev.	0.0000	0.0011	0.62	12.0	11.9	
COV, %	0.00	0.21	11.98	11.85	11.85	

Material Type: F6273C-07M
Batch Number: AF991010
Test Method: SACMA SRM 1-94
Preconditioning: as machined
Test Conditions: RT/Dry
Ply Orientation: (warp)$_{14}$
Testing Facility: TCA
Test Date: 12/27/1999

Test Operator: John Smith
Test Frame: Instron 4505
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: One axial gage (FAE-12S-AS-S6EL-2)
FV(normalizing): 49.8%
CPT (batch average): 0.0086 in.
FV(batch average): 49.4%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Load @ 0.1% Strain (lbs.)	Load @ 0.3% Strain (lbs.)	Comp. Mod. (0.1-0.3% strain) Actual (msi)	Comp. Mod. (0.1-0.3% strain) Norm. (msi)
A2-910-057-1-1	0.1189	0.4989	564.7	1525	8.10	7.99
B2-910-057-1-1	0.1175	0.4986	552.5	1520	8.26	8.06
Average	0.1182	0.4987			8.18	8.03
Std. Dev.	0.0009	0.0002			0.11	0.05
COV, %	0.80	0.05			1.38	0.57

Material Type: F6273C-07M
Batch Number: AF991011
Test Method: SACMA SRM 1-94
Preconditioning: as machined
Test Conditions: RT/Dry
Ply Orientation: (warp)$_{12}$
Testing Facility: TCA
Test Date: 4/20/2000

Test Operator: John Smith
Test Frame: Instron 4510
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: N/A
FV(normalizing): 49.8%
CPT (batch average): 0.0086 in.
FV(batch average): 49.7%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ult. Comp. Load (kips)	Ult. Comp. Strength Actual (ksi)	Ult. Comp. Strength Norm. (ksi)	Failure Location & Comments
A1-910-058-1-4	0.1040	0.5005	5.85	112	113	Failure in gage
A1-910-058-1-5	0.1040	0.5004	5.47	105	106	Failure in gage
A2-910-058-1-4	0.1040	0.5004	5.39	104	104	Failure in gage
B1-910-058-1-4	0.1040	0.5004	5.42	104	105	Failure in gage
B1-910-058-1-5	0.1040	0.5004	5.40	104	105	Failure in gage
B2-910-058-1-4	0.1040	0.4998	5.70	110	110	Failure in gage
Average	0.1040	0.5003	5.54	106	107	
Std. Dev.	0.0000	0.0003	0.19	3.69	3.72	
COV, %	0.00	0.05	3.45	3.46	3.46	

Material Type: F6273C-07M
Batch Number: AF991011
Test Method: SACMA SRM 1-94
Preconditioning: as machined
Test Conditions: RT/Dry
Ply Orientation: (warp)$_{14}$
Testing Facility: TCA
Test Date: 12/31/1999

Test Operator: John Smith
Test Frame: Instron 4505
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: One axial gage (FAE-12S-AS-S6EL-2)
FV(normalizing): 49.8%
CPT (batch average): 0.0086 in.
FV(batch average): 49.7%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Load @ 0.1% Strain (lbs.)	Load @ 0.3% Strain (lbs.)	Comp. Mod. (0.1-0.3% strain) Actual (msi)	Comp. Mod. (0.1-0.3% strain) Norm. (msi)
B2-910-058-1-1	0.1186	0.4986	532.4	1524	8.38	8.26
A2-910-058-1-1	0.1201	0.4988	527.7	1423	7.47	7.45
Average	0.1194	0.4987			7.93	7.86
Std. Dev.	0.0011	0.0001			0.64	0.57
COV, %	0.89	0.03			8.13	7.25

0° (Warp) Compression Properties, 180°F (Dry)

Material Type: F6273C-07M
Batch Number: AF991009
Test Method: SACMA SRM 1-94
Preconditioning: as machined
Test Conditions: 180°F/Dry
Ply Orientation: (warp)$_{12}$
Testing Facility: TCA
Test Date: 4/21/2000

Test Operator: John Smith
Test Frame: Instron 4510
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: N/A
FV(normalizing): 49.8%
CPT (batch average): 0.0086 in.
FV(batch average): 49.8%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ult. Comp. Load (kips)	Ult. Comp. Strength Actual (ksi)	Ult. Comp. Strength Norm. (ksi)	Failure Location & Comments
A1-910-056-1-9	0.1025	0.5002	4.40	85.8	85.3	Failure in gage
A2-910-056-1-8	0.1025	0.5006	4.41	85.9	85.3	Failure in gage
A2-910-056-1-9	0.1025	0.5004	4.37	85.1	84.6	Failure in gage
B1-910-056-1-8	0.1025	0.5000	4.91	95.8	95.2	Failure in gage
B1-910-056-1-9	0.1025	0.5000	4.92	95.9	95.3	Failure in gage
B2-910-056-1-9	0.1025	0.4995	4.98	97.2	96.5	Failure in gage
Average	0.1025	0.5001	4.66	91.0	90.4	
Std. Dev.	0.0000	0.0004	0.30	5.9	5.9	
COV, %	0.00	0.07	6.41	6.48	6.48	

Material Type: F6273C-07M
Batch Number: AF991009
Test Method: SACMA SRM 1-94
Preconditioning: as machined
Test Conditions: 180°F/Dry
Ply Orientation: (warp)$_{14}$
Testing Facility: TCA
Test Date: 1/4/2000

Test Operator: John Smith
Test Frame: Instron 4505
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: One axial gage (FAE-12S-AS-S6EL-2)
FV(normalizing): 49.8%
CPT (batch average): 0.0086 in.
FV(batch average): 49.8%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Load @ 0.1% Strain (lbs.)	Load @ 0.3% Strain (lbs.)	Comp. Mod. (0.1-0.3% strain) Actual (msi)	Comp. Mod. (0.1-0.3% strain) Norm. (msi)
A2-910-056-1-2	0.1188	0.5005	528.0	1479	8.00	7.89
B2-910-056-1-2	0.1192	0.5004	515.2	1451	7.84	7.77
Average	0.1190	0.5005			7.92	7.83
Std. Dev.	0.0003	0.0001			0.11	0.09
COV, %	0.26	0.02			1.38	1.12

Material Type: F6273C-07M
Batch Number: AF991010
Test Method: SACMA SRM 1-94
Preconditioning: as machined
Test Conditions: 180°F/Dry
Ply Orientation: (warp)$_{12}$
Testing Facility: TCA
Test Date: 4/21/2000

Test Operator: John Smith
Test Frame: Instron 4510
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: N/A
FV(normalizing): 49.8%
CPT (batch average): 0.0086 in.
FV(batch average): 49.4%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ult. Comp. Load (kips)	Ult. Comp. Strength Actual (ksi)	Ult. Comp. Strength Norm. (ksi)	Failure Location & Comments
A1-910-057-1-8	0.1020	0.4989	5.01	98.5	97.3	Failure in gage
A1-910-057-1-9	0.1020	0.4986	5.71	112	111	Failure in gage
A2-910-057-1-9	0.1020	0.5017	4.88	95.4	94.3	Failure in gage
B1-910-057-1-8	0.1020	0.4999	5.34	105	104	Failure in gage
B1-910-057-1-9	0.1020	0.5000	5.46	107	106	Failure in gage
B2-910-057-1-9	0.1020	0.4999	4.29	84.2	83.2	Failure in gage
Average	0.1020	0.4998	5.12	100	99	
Std. Dev.	0.0000	0.0011	0.50	10.0	9.8	
COV, %	0.00	0.22	9.83	9.91	9.91	

Material Type: F6273C-07M
Batch Number: AF991010
Test Method: SACMA SRM 1-94
Preconditioning: as machined
Test Conditions: 180°F/Dry
Ply Orientation: (warp)$_{14}$
Testing Facility: TCA
Test Date: 1/5/2000

Test Operator: John Smith
Test Frame: Instron 4505
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: One axial gage (FAE-12S-AS-S6EL-2)
FV(normalizing): 49.8%
CPT (batch average): 0.0086 in.
FV(batch average): 49.4%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Load @ 0.1% Strain (lbs.)	Load @ 0.3% Strain (lbs.)	Comp. Mod. (0.1-0.3% strain) Actual (msi)	Comp. Mod. (0.1-0.3% strain) Norm. (msi)
A2-910-057-1-2	0.1197	0.5003	548.5	1534	8.23	8.18
B2-910-057-1-2	0.1178	0.5000	565.5	1626	9.01	8.81
Average	0.1187	0.5001			8.62	8.49
Std. Dev.	0.0014	0.0002			0.55	0.44
COV, %	1.15	0.05			6.38	5.23

Material Type: F6273C-07M
Batch Number: AF991010
Test Method: SACMA SRM 1-94
Preconditioning: as machined
Test Conditions: 180°F/Dry
Ply Orientation: (warp)$_{12}$
Testing Facility: TCA
Test Date: 4/21/2000

Test Operator: John Smith
Test Frame: Instron 4510
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: N/A
FV(normalizing): 49.8%
CPT (batch average): 0.0086 in.
FV(batch average): 49.7%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ult. Comp. Load (kips)	Ult. Comp. Strength Actual (ksi)	Ult. Comp. Strength Norm. (ksi)	Failure Location & Comments
A1-910-058-1-9	0.1031	0.5004	4.94	95.7	95.6	Failure in gage
A2-910-058-1-5	0.1031	0.5000	5.09	98.7	98.6	Failure in gage
A2-910-058-1-9	0.1031	0.5002	4.58	88.7	88.6	Failure in gage
B1-910-058-1-9	0.1031	0.5005	5.25	102	102	Failure in gage
B2-910-058-1-5	0.1031	0.4998	5.36	104	104	Failure in gage
B2-910-058-1-9	0.1031	0.4995	5.57	108	108	Failure in gage
Average	0.1031	0.5001	5.13	100	99	
Std. Dev.	0.0000	0.0004	0.35	6.8	6.8	
COV, %	0.00	0.08	6.81	6.86	6.86	

Material Type: F6273C-07M
Batch Number: AF991011
Test Method: SACMA SRM 1-94
Preconditioning: as machined
Test Conditions: 180°F/Dry
Ply Orientation: (warp)$_{14}$
Testing Facility: TCA
Test Date: 1/5/2000

Test Operator: John Smith
Test Frame: Instron 4505
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: One axial gage (FAE-12S-AS-S6EL-2)
FV(normalizing): 49.8%
CPT (batch average): 0.0086 in.
FV(batch average): 49.7%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Load @ 0.1% Strain (lbs.)	Load @ 0.3% Strain (lbs.)	Comp. Mod. (0.1-0.3% strain) Actual (msi)	Comp. Mod. (0.1-0.3% strain) Norm. (msi)
A2-910-058-1-2	0.1198	0.5002	520.9	1479	8.00	7.95
B2-910-058-1-6	0.1214	0.4985	529.7	1477	7.83	7.89
Average	0.1206	0.4994			7.91	7.92
Std. Dev.	0.0012	0.0012			0.12	0.04
COV, %	0.96	0.25			1.51	0.55

0° (Warp) Compression Properties, 180°F (Wet)

Material Type: F6273C-07M
Batch Number: AF991009
Test Method: SACMA SRM 1-94
Preconditioning: Section 3.2 of AGATE
Test Conditions: 180°F
Ply Orientation: $(warp)_{12}$
Testing Facility: TCA
Test Date: 7/6/2000

Test Operator: John Smith
Test Frame: Instron 4510
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: N/A
CPT (batch average): 0.0086 in.
FV(batch average): 49.8%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ult. Comp. Load (kips)	Ult. Comp. Strength Actual (ksi)	Ult. Comp. Strength Norm. (ksi)	Failure Location & Comments
A1-910-056-1-1	0.1036	0.4999	3.43	66.3	66.5	Failure in gage
A1-910-056-1-2	0.1036	0.5000	3.56	68.7	68.9	Failure in gage
A2-910-056-1-1	0.1036	0.4999	2.96	57.2	57.5	Failure in gage
B1-910-056-1-2	0.1036	0.4999	3.15	60.8	61.1	Failure in gage
B1-910-056-1-1	0.1036	0.4999	3.01	58.1	58.3	Failure in gage
B2-910-056-1-1	0.1036	0.4995	3.99	77.1	77.4	Failure in gage
Average	0.1036	0.4999	3.35	64.7	64.9	
Std. Dev.	0.0000	0.0002	0.39	7.57	7.59	
COV, %	0.00	0.03	11.67	11.70	11.70	

Material Type: F6273C-07M
Batch Number: AF991009
Test Method: SACMA SRM 1-94
Preconditioning: Section 3.2 of AGATE
Test Conditions: 180°F
Ply Orientation: $(warp)_{14}$
Testing Facility: TCA
Test Date: 5/1/2000

Test Operator: John Smith
Test Frame: Instron 4505
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: One axial gage (FAE-12S-AS-S6EL-2)
CPT (batch average): 0.0086 in.
FV(batch average): 49.8%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Load @ 0.1% Strain (lbs.)	Load @ 0.3% Strain (lbs.)	Comp. Mod. (0.1-0.3% strain) Actual (msi)	Comp. Mod. (0.1-0.3% strain) Norm. (msi)
A2-910-056-1-3	0.1196	0.4997	540.4	1530	8.28	8.22
B2-910-056-1-3	0.1198	0.4996	497.0	1398	7.52	7.49
Average	0.1197	0.4997			7.90	7.85
Std. Dev.	0.0002	0.0001			0.53	0.52
COV, %	0.16	0.02			6.75	6.59

Material Type: F6273C-07M
Batch Number: AF991010
Test Method: SACMA SRM 1-94
Preconditioning: Section 3.2 of AGATE
Test Conditions: 180°F
Ply Orientation: $(warp)_{12}$
Testing Facility: TCA
Test Date: 7/6/2000

Test Operator: John Smith
Test Frame: Instron 4510
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: N/A
CPT (batch average): 0.0086 in.
FV(batch average): 49.4%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ult. Comp. Load (kips)	Ult. Comp. Strength Actual (ksi)	Ult. Comp. Strength Norm. (ksi)	Failure Location & Comments
A1-910-057-1-1	0.1025	0.4991	3.58	69.9	69.5	Failure in gage
A1-910-057-1-2	0.1025	0.4990	3.44	67.2	66.7	Failure in gage
A2-910-057-1-1	0.1025	0.5021	3.28	63.7	63.3	Failure in gage
B1-910-057-1-1	0.1025	0.4996	3.92	76.5	75.9	Failure in gage
B1-910-057-1-2	0.1025	0.5000	3.32	64.7	64.3	Failure in gage
B2-910-057-1-1	0.1025	0.5000	3.32	64.7	64.3	Failure in gage
Average	0.1025	0.5000	3.47	67.8	67.3	
Std. Dev.	0.0000	0.0011	0.24	4.81	4.77	
COV, %	0.00	0.23	6.98	7.09	7.09	

Material Type: F6273C-07M
Batch Number: AF991010
Test Method: SACMA SRM 1-94
Preconditioning: Section 3.2 of AGATE
Test Conditions: 180°F
Ply Orientation: $(warp)_{14}$
Testing Facility: TCA
Test Date: 5/1/2000

Test Operator: John Smith
Test Frame: Instron 4505
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: One axial gage (FAE-12S-AS-S6EL-2)
CPT (batch average): 0.0086 in.
FV(batch average): 49.4%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Load @ 0.1% Strain (lbs.)	Load @ 0.3% Strain (lbs.)	Comp. Mod. (0.1-0.3% strain) Actual (msi)	Comp. Mod. (0.1-0.3% strain) Norm. (msi)
A2-910-057-1-3	0.1201	0.4996	515.9	1406	7.42	7.40
B2-910-057-1-3	0.1186	0.4994	588.0	1665	9.10	8.96
Average	0.1193	0.4995			8.26	8.18
Std. Dev.	0.0011	0.0001			1.18	1.10
COV, %	0.89	0.03			14.34	13.46

Material Type: F6273C-07M
Batch Number: AF991011
Test Method: SACMA SRM 1-94
Preconditioning: Section 3.2 of AGATE
Test Conditions: 180°F
Ply Orientation: $(warp)_{12}$
Testing Facility: TCA
Test Date: 7/6/2000

Test Operator: John Smith
Test Frame: Instron 4510
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: N/A
CPT (batch average): 0.0086 in.
FV(batch average): 49.7%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ult. Comp. Load (kips)	Ult. Comp. Strength Actual (ksi)	Ult. Comp. Strength Norm. (ksi)	Failure Location & Comments
A1-910-058-1-1	0.1047	0.5005	3.98	76.0	77.1	Failure in gage
A2-910-058-1-1	0.1047	0.5000	3.83	73.2	74.3	Failure in gage
A2-910-058-1-2	0.1047	0.4999	3.71	70.9	71.9	Failure in gage
B1-910-058-1-1	0.1047	0.5005	4.04	77.2	78.3	Failure in gage
B2-910-058-1-1	0.1047	0.4997	3.71	70.8	71.9	Failure in gage
B2-910-058-1-2	0.1047	0.4997	3.75	71.6	72.6	Failure in gage
Average	0.1047	0.5000	3.84	73.3	74.4	
Std. Dev.	0.0000	0.0003	0.15	2.73	2.77	
COV, %	0.00	0.07	3.79	3.72	3.72	

Material Type: F6273C-07M
Batch Number: AF991011
Test Method: SACMA SRM 1-94
Preconditioning: Section 3.2 of AGATE
Test Conditions: 180°F
Ply Orientation: $(warp)_{14}$
Testing Facility: TCA
Test Date: 5/1/2000

Test Operator: John Smith
Test Frame: Instron 4505
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: One axial gage (FAE-12S-AS-S6EL-2)
CPT (batch average): 0.0086 in.
FV(batch average): 49.7%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Load @ 0.1% Strain (lbs.)	Load @ 0.3% Strain (lbs.)	Comp. Mod. (0.1-0.3% strain) Actual (msi)	Comp. Mod. (0.1-0.3% strain) Norm. (msi)
A2-910-058-1-3	0.1198	0.4994	527.5	1488	8.03	7.99
B2-910-058-1-3	0.1197	0.4993	514.7	1427	7.63	7.59
Average	0.1198	0.4994			7.83	7.79
Std. Dev.	0.0000	0.0001			0.28	0.28
COV, %	0.03	0.01			3.60	3.63

90° (Fill) Compression Properties, -65°F (Dry)

Material Type: F6273C-07M
Batch Number: AF991009
Test Method: SACMA SRM 1-94
Preconditioning: as machined
Test Conditions: -65°F/Dry
Ply Orientation: $(fill)_{12}$
Testing Facility: TCA
Test Date: 4/25/2000

Test Operator: John Smith
Test Frame: Instron 4510
Test Speed: 0.05 in/min
Control Mode: Stroke
Strain Gage: N/A
CPT (batch average): 0.0086 in.
FV(batch average): 49.8%

Specimen Number	*Specimen Thickness (in.)*	*Specimen Width (in.)*	*Ult. Comp. Load (kips)*	*Ult. Comp. Strength Actual (ksi)*	*Ult. Comp. Strength Norm. (ksi)*	*Failure Location & Comments*
A1-910-056-1-4	0.1028	0.4995	5.64	110	109	Failure in gage
A2-910-056-1-4	0.1028	0.5000	4.75	92.4	92.1	Failure in gage
A2-910-056-1-5	0.1028	0.5000	5.19	101	101	Failure in gage
B1-910-056-1-3	0.1028	0.4996	5.44	106	106	Failure in gage
B1-910-056-1-4	0.1028	0.4998	6.20	121	120	Failure in gage
B2-910-056-1-3	0.1028	0.4999	6.09	118	118	Failure in gage
Average	0.1028	0.4998	5.55	108	108	
Std. Dev.	0.0000	0.0002	0.55	10.7	10.7	
COV, %	0.00	0.04	9.88	9.89	9.89	

Material Type: F6273C-07M
Batch Number: AF991009
Test Method: SACMA SRM 1-94
Preconditioning: as machined
Test Conditions: -65°F/Dry
Ply Orientation: $(fill)_{14}$
Testing Facility: Intec
Test Date: 12/29/1999

Test Operator: Joel Patterson
Test Frame: Instron 4505
Test Speed: 0.05 in/min
Control Mode: Stroke
Strain Gage: One axial gage (CEA-06-125UW-350)
CPT (batch average): 0.0086 in.
FV(batch average): 49.8%

Specimen Number	*Specimen Thickness (in.)*	*Specimen Width (in.)*	*Load @ 0.1% Strain (lbs.)*	*Load @ 0.3% Strain (lbs.)*	*Comp. Mod. (0.1-0.3% strain) Actual (msi)*	*Comp. Mod. (0.1-0.3% strain) Norm. (msi)*
A2-910-056-1-6	0.1206	0.4980	659.4	1514	7.12	7.13
B2-910-056-1-6	0.1222	0.4980	650.9	1491	6.90	7.00
Average	0.1214	0.4980			7.01	7.07
Std. Dev.	0.0011	0.0000			0.15	0.09
COV, %	0.93	0.00			2.19	1.26

90° (Fill) Compression Properties, 75°F (Dry)

Material Type: F6273C-07M
Batch Number: AF991009
Test Method: SACMA SRM 1-94
Preconditioning: as machined
Test Conditions: RT/Dry
Ply Orientation: (fill)$_{12}$
Testing Facility: TCA
Test Date: 4/20/2000

Test Operator: John Smith
Test Frame: Instron 4510
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: N/A
CPT (batch average): 0.0086 in.
FV(batch average): 49.8%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ult. Comp. Load (kips)	Ult. Comp. Strength Actual (ksi)	Ult. Comp. Strength Norm. (ksi)	Failure Location & Comments
A1-910-056-1-5	0.1020	0.4998	4.98	97.6	96.5	Failure in gage
A2-910-056-1-8	0.1020	0.5003	4.88	95.6	94.5	Failure in gage
A2-910-056-1-9	0.1020	0.5003	4.81	94.2	93.1	Failure in gage
B1-910-056-1-5	0.1020	0.4994	4.93	96.7	95.6	Failure in gage
B1-910-056-1-8	0.1020	0.4997	5.35	105	103.7	Failure in gage
B2-910-056-1-4	0.1020	0.4996	5.73	112	111.0	Failure in gage
Average	0.1020	0.4999	5.11	100	99.1	
Std. Dev.	0.0000	0.0004	0.36	7.01	6.93	
COV, %	0.00	0.07	6.95	6.99	6.99	

Material Type: F6273C-07M
Batch Number: AF991009
Test Method: SACMA SRM 1-94
Preconditioning: as machined
Test Conditions: RT/Dry
Ply Orientation: (fill)$_{14}$
Testing Facility: TCA
Test Date: 12/27/1999

Test Operator: John Smith
Test Frame: Instron 4505
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: One axial gage (FAE-12S-AS-S6EL-2) in.
CPT (batch average): 0.0086
FV(batch average): 49.8%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Load @ 0.1% Strain (lbs.)	Load @ 0.3% Strain (lbs.)	Comp. Mod. (0.1-0.3% strain) Actual (msi)	Comp. Mod. (0.1-0.3% strain) Norm. (msi)
A2-910-056-1-1	0.1194	0.4988	546.6	1431	7.42	7.36
B2-910-056-1-1	0.1209	0.4988	525.1	1432	7.52	7.55
Average	0.1202	0.4988			7.47	7.46
Std. Dev.	0.0011	0.0000			0.07	0.13
COV, %	0.88	0.00			0.89	1.77

Material Type: F6273C-07M
Batch Number: AF991010
Test Method: SACMA SRM 1-94
Preconditioning: as machined
Test Conditions: RT/Dry
Ply Orientation: (fill)$_{12}$
Testing Facility: TCA
Test Date: 4/20/2000

Test Operator: John Smith
Test Frame: Instron 4510
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: N/A
CPT (batch average): 0.0086 in.
FV(batch average): 49.4%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ult. Comp. Load (kips)	Ult. Comp. Strength Actual (ksi)	Ult. Comp. Strength Norm. (ksi)	Failure Location & Comments
A1-910-057-1-8	0.1020	0.4988	5.28	104	103	Failure in gage
A2-910-057-1-4	0.1020	0.5006	5.37	105	104	Failure in gage
A2-910-057-1-5	0.1020	0.5009	5.22	102	101	Failure in gage
B1-910-057-1-7	0.1020	0.4995	5.39	106	105	Failure in gage
B2-910-057-1-4	0.1020	0.4994	5.51	108	107	Failure in gage
B2-910-057-1-5	0.1020	0.4997	5.38	106	104	Failure in gage
Average	0.1020	0.4998	5.36	105	104	
Std. Dev.	0.0000	0.0008	0.10	2.0	2.0	
COV, %	0.00	0.16	1.86	1.92	1.92	

Material Type: F6273C-07M
Batch Number: AF991010
Test Method: SACMA SRM 1-94
Preconditioning: as machined
Test Conditions: RT/Dry
Ply Orientation: (fill)$_{14}$
Testing Facility: TCA
Test Date: 12/27/1999

Test Operator: John Smith
Test Frame: Instron 4505
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: One axial gage (FAE-12S-AS-S6EL-2)
CPT (batch average): 0.0086 in.
FV(batch average): 49.4%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Load @ 0.1% Strain (lbs.)	Load @ 0.3% Strain (lbs.)	Comp. Mod. (0.1-0.3% strain) Actual (msi)	Comp. Mod. (0.1-0.3% strain) Norm. (msi)
A2-910-057-1-1	0.1206	0.4987	525.9	1464	7.80	7.81
B2-910-057-1-1	0.1193	0.4985	518.7	1430	7.66	7.59
Average	0.1199	0.4986			7.73	7.70
Std. Dev.	0.0010	0.0001			0.09	0.16
COV, %	0.80	0.03			1.23	2.02

Material Type: F6273C-07M
Batch Number: AF991011
Test Method: SACMA SRM 1-94
Preconditioning: as machined
Test Conditions: RT/Dry
Ply Orientation: (fill)$_{12}$
Testing Facility: TCA
Test Date: 4/20/2000

Test Operator: John Smith
Test Frame: Instron 4510
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: N/A
CPT (batch average): 0.0086 in.
FV(batch average): 49.7%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ult. Comp. Load (kips)	Ult. Comp. Strength Actual (ksi)	Ult. Comp. Strength Norm. (ksi)	Failure Location & Comments
A1-910-058-1-4	0.1035	0.4994	5.50	106	107	Failure in gage
A1-910-058-1-5	0.1035	0.4995	4.79	92.7	93	Failure in gage
A2-910-058-1-4	0.1035	0.5014	5.09	98.0	98	Failure in gage
B1-910-058-1-4	0.1035	0.5016	5.24	101	101	Failure in gage
B1-910-058-1-5	0.1035	0.5018	5.15	99.2	100	Failure in gage
B2-910-058-1-4	0.1035	0.4996	5.47	106	106	Failure in gage
Average	0.1035	0.5005	5.21	101	101	
Std. Dev.	0.0000	0.0012	0.26	5.17	5.19	
COV, %	0.00	0.23	5.09	5.15	5.15	

Material Type: F6273C-07M
Batch Number: AF991011
Test Method: SACMA SRM 1-94
Preconditioning: as machined
Test Conditions: RT/Dry
Ply Orientation: (fill)$_{14}$
Testing Facility: TCA
Test Date: 12/31/1999

Test Operator: John Smith
Test Frame: Instron 4505
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: One axial gage (FAE-12S-AS-S6EL-2)
CPT (batch average): 0.0086 in.
FV(batch average): 49.7%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Load @ 0.1% Strain (lbs.)	Load @ 0.3% Strain (lbs.)	Comp. Mod. (0.1-0.3% strain) Actual (msi)	Comp. Mod. (0.1-0.3% strain) Norm. (msi)
A2-910-058-1-1	0.1206	0.4984	542.0	1497	7.95	7.96
B2-910-058-1-1	0.1192	0.4987	554.5	1536	8.26	8.17
Average	0.1199	0.4986			8.10	8.06
Std. Dev.	0.0010	0.0002			0.22	0.15
COV, %	0.80	0.04			2.69	1.89

90° (Fill) Compression Properties, 180°F (Dry)

Material Type: F6273C-07M
Batch Number: AF991009
Test Method: SACMA SRM 1-94
Preconditioning: as machined
Test Conditions: 180°F/Dry
Ply Orientation: (fill)$_{12}$
Testing Facility: TCA
Test Date: 4/21/2000
Test Operator: John Smith
Test Frame: Instron 4510
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: N/A
CPT (batch average): 0.0086 in.
FV(batch average): 49.8%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ult. Comp. Load (kips)	Ult. Comp. Strength Actual (ksi)	Ult. Comp. Strength Norm. (ksi)	Failure Location & Comments
A1-910-056-1-7	0.1030	0.4999	4.88	94.8	94.6	Failure in gage
A1-910-056-1-8	0.1030	0.4997	4.15	80.7	80.5	Failure in gage
A2-910-056-1-10	0.1030	0.5003	4.41	85.5	85.3	Failure in gage
B1-910-056-1-9	0.1030	0.4998	4.48	87.0	86.9	Failure in gage
B2-910-056-1-5	0.1030	0.4998	5.10	99.1	98.9	Failure in gage
B2-910-056-1-9	0.1030	0.5000	5.26	102	102	Failure in gage
Average	0.1030	0.4999	4.71	91.5	91.4	
Std. Dev.	0.0000	0.0002	0.43	8.4	8.4	
COV, %	0.00	0.04	9.19	9.19	9.19	

Material Type: F6273C-07M
Batch Number: AF991009
Test Method: SACMA SRM 1-94
Preconditioning: as machined
Test Conditions: 180°F/Dry
Ply Orientation: (fill)$_{14}$
Testing Facility: TCA
Test Date: 1/4/2000
Test Operator: John Smith
Test Frame: Instron 4505
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: One axial gage (FAE-12S-AS-S6EL-2)
CPT (batch average): 0.0086 in.
FV(batch average): 49.8%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Load @ 0.1% Strain (lbs.)	Load @ 0.3% Strain (lbs.)	Comp. Mod. (0.1-0.3% strain) Actual (msi)	Comp. Mod. (0.1-0.3% strain) Norm. (msi)
A2-910-056-1-2	0.1197	0.5002	515.1	1420	7.56	7.51
B2-910-056-1-2	0.1211	0.5003	504.4	1436	7.69	7.73
Average	0.1204	0.5002			7.63	7.62
Std. Dev.	0.0010	0.0001			0.09	0.16
COV, %	0.81	0.02			1.22	2.03

Material Type: F6273C-07M
Batch Number: AF991010
Test Method: SACMA SRM 1-94
Preconditioning: as machined
Test Conditions: 180°F/Dry
Ply Orientation: (fill)$_{12}$
Testing Facility: TCA
Test Date: 4/21/2000
Test Operator: John Smith
Test Frame: Instron 4510
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: N/A
CPT (batch average): 0.0086 in.
FV(batch average): 49.4%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ult. Comp. Load (kips)	Ult. Comp. Strength Actual (ksi)	Ult. Comp. Strength Norm. (ksi)	Failure Location & Comments
A1-910-057-1-10	0.1025	0.4988	4.69	91.8	91.2	Failure in gage
A2-910-057-1-8	0.1025	0.5008	5.22	102	101	Failure in gage
A2-910-057-1-9	0.1025	0.5007	5.27	103	102	Failure in gage
B1-910-057-1-8	0.1025	0.4993	4.80	93.8	93.2	Failure in gage
B2-910-057-1-10	0.1025	0.4995	4.82	94.1	93.4	Failure in gage
B2-910-057-1-11	0.1025	0.4995	4.74	92.6	92.0	Failure in gage
Average	0.1025	0.4998	4.92	96.1	95.5	
Std. Dev.	0.0000	0.0008	0.25	4.8	4.8	
COV, %	0.00	0.16	5.16	5.00	5.00	

Material Type: F6273C-07M
Batch Number: AF991010
Test Method: SACMA SRM 1-94
Preconditioning: as machined
Test Conditions: 180°F/Dry
Ply Orientation: (fill)$_{14}$
Testing Facility: TCA
Test Date: 1/5/2000
Test Operator: John Smith
Test Frame: Instron 4505
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: One axial gage (FAE-12S-AS-S6EL-2)
CPT (batch average): 0.0086 in.
FV(batch average): 49.4%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Load @ 0.1% Strain (lbs.)	Load @ 0.3% Strain (lbs.)	Comp. Mod. (0.1-0.3% strain) Actual (msi)	Comp. Mod. (0.1-0.3% strain) Norm. (msi)
A2-910-057-1-2	0.1205	0.5003	491.4	1405	7.58	7.58
B2-910-057-1-2	0.1193	0.5000	526.2	1498	8.15	8.07
Average	0.1199	0.5001			7.86	7.83
Std. Dev.	0.0009	0.0002			0.40	0.34
COV, %	0.73	0.04			5.13	4.40

Material Type: F6273C-07M
Batch Number: AF991011
Test Method: SACMA SRM 1-94
Preconditioning: as machined
Test Conditions: 180°F/Dry
Ply Orientation: (fill)$_{12}$
Testing Facility: TCA
Test Date: 4/21/2000
Test Operator: John Smith
Test Frame: Instron 4510
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: N/A
CPT (batch average): 0.0086 in.
FV(batch average): 49.7%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ult. Comp. Load (kips)	Ult. Comp. Strength Actual (ksi)	Ult. Comp. Strength Norm. (ksi)	Failure Location & Comments
A1-910-058-1-9	0.1023	0.4994	4.99	97.6	96.8	Failure in gage
A2-910-058-1-8	0.1023	0.5016	4.85	94.4	93.6	Failure in gage
A2-910-058-1-9	0.1023	0.5017	4.62	90.0	89.2	Failure in gage
B1-910-058-1-9	0.1023	0.5021	4.85	94.4	93.6	Failure in gage
B2-910-058-1-8	0.1023	0.4994	4.92	96.3	95.5	Failure in gage
B2-910-058-1-9	0.1023	0.4992	4.95	96.8	96.0	Failure in gage
Average	0.1023	0.5006	4.86	94.9	94.1	
Std. Dev.	0.0000	0.0014	0.13	2.8	2.7	
COV, %	0.00	0.27	2.71	2.91	2.91	

Material Type: F6273C-07M
Batch Number: AF991011
Test Method: SACMA SRM 1-94
Preconditioning: as machined
Test Conditions: 180°F/Dry
Ply Orientation: (fill)$_{14}$
Testing Facility: TCA
Test Date: 1/5/2000
Test Operator: John Smith
Test Frame: Instron 4505
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: One axial gage (FAE-12S-AS-S6EL-2)
CPT (batch average): 0.0086 in.
FV(batch average): 49.7%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Load @ 0.1% Strain (lbs.)	Load @ 0.3% Strain (lbs.)	Comp. Mod. (0.1-0.3% strain) Actual (msi)	Comp. Mod. (0.1-0.3% strain) Norm. (msi)
B2-910-058-1-2	0.1194	0.5003	484.4	1384	7.53	7.47
A2-910-058-1-6	0.1202	0.4982	507.5	1432	7.72	7.71
Average	0.1198	0.4992			7.63	7.59
Std. Dev.	0.0005	0.0015			0.14	0.17
COV, %	0.44	0.30			1.79	2.23

90° (Fill) Compression Properties, 180°F (Wet)

Material Type: F6273C-07M
Batch Number: AF991009
Test Method: SACMA SRM 1-94
Preconditioning: Section 3.2 of AGATE
Test Conditions: 180°F
Ply Orientation: $(fill)_{12}$
Testing Facility: TCA
Test Date: 7/6/2000

Test Operator: John Smith
Test Frame: Instron 4510
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: N/A
FV(normalizing): 49.8%
CPT (batch average): 0.0086 in.
FV(batch average): 49.8%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ult. Comp. Load (kips)	Ult. Comp. Strength Actual (ksi)	Ult. Comp. Strength Norm. (ksi)	Failure Location & Comments
A1-910-056-1-1	0.1028	0.4993	3.30	64.3	64.0	Failure in gage
A2-910-056-1-1	0.1028	0.5001	3.59	69.8	69.5	Failure in gage
A2-910-056-1-2	0.1028	0.4998	3.38	65.7	65.5	Failure in gage
B1-910-056-1-1	0.1028	0.4998	3.24	63.1	62.9	Failure in gage
B2-910-056-1-1	0.1028	0.4998	3.67	71.4	71.1	Failure in gage
B2-910-056-1-2	0.1028	0.4994	3.57	69.6	69.3	Failure in gage
Average	0.1028	0.4997	3.46	67.3	67.1	
Std. Dev.	0.0000	0.0003	0.17	3.38	3.37	
COV, %	0.00	0.06	5.03	5.02	5.02	

Material Type: F6273C-07M
Batch Number: AF991009
Test Method: SACMA SRM 1-94
Preconditioning: Section 3.2 of AGATE
Test Conditions: 180°F
Ply Orientation: $(fill)_{14}$
Testing Facility: TCA
Test Date: 5/1/2000

Test Operator: John Smith
Test Frame: Instron 4505
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: One axial gage (FAE-12S-AS-S6EL-2)
FV(normalizing): 49.8%
CPT (batch average): 0.0086 in.
FV(batch average): 49.8%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Load @ 0.1% Strain (lbs.)	Load @ 0.3% Strain (lbs.)	Comp. Mod. (0.1-0.3% strain) Actual (msi)	Comp. Mod. (0.1-0.3% strain) Norm. (msi)
A2-910-056-1-3	0.1199	0.4995	516.1	1372	7.15	7.12
B2-910-056-1-3	0.1213	0.4996	526.9	1488	7.93	7.99
Average	0.1206	0.4995			7.54	7.55
Std. Dev.	0.0010	0.0000			0.55	0.61
COV, %	0.79	0.01			7.34	8.13

Material Type: F6273C-07M
Batch Number: AF991010
Test Method: SACMA SRM 1-94
Preconditioning: Section 3.2 of AGATE
Test Conditions: 180°F
Ply Orientation: $(fill)_{12}$
Testing Facility: TCA
Test Date: 7/6/2000

Test Operator: John Smith
Test Frame: Instron 4510
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: N/A
FV(normalizing): 49.8%
CPT (batch average): 0.0086 in.
FV(batch average): 49.4%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ult. Comp. Load (kips)	Ult. Comp. Strength Actual (ksi)	Ult. Comp. Strength Norm. (ksi)	Failure Location & Comments
A1-910-057-1-1	0.1025	0.4994	3.68	71.9	71.4	Failure in gage
A1-910-057-1-2	0.1025	0.4993	3.85	75.1	74.6	Failure in gage
A2-910-057-1-1	0.1025	0.5008	3.47	67.6	67.2	Failure in gage
B1-910-057-1-1	0.1025	0.4996	3.50	68.4	67.9	Failure in gage
B2-910-057-1-1	0.1025	0.4990	3.72	72.7	72.2	Failure in gage
B2-910-057-1-2	0.1025	0.4996	3.89	75.9	75.4	Failure in gage
Average	0.1025	0.4996	3.68	71.9	71.5	
Std. Dev.	0.0000	0.0006	0.17	3.40	3.38	
COV, %	0.00	0.13	4.66	4.73	4.73	

Material Type: F6273C-07M
Batch Number: AF991010
Test Method: SACMA SRM 1-94
Preconditioning: Section 3.2 of AGATE
Test Conditions: 180°F
Ply Orientation: $(fill)_{14}$
Testing Facility: TCA
Test Date: 5/1/2000

Test Operator: John Smith
Test Frame: Instron 4505
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: One axial gage (FAE-12S-AS-S6EL-2)
FV(normalizing): 49.8%
CPT (batch average): 0.0086 in.
FV(batch average): 49.4%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Load @ 0.1% Strain (lbs.)	Load @ 0.3% Strain (lbs.)	Comp. Mod. (0.1-0.3% strain) Actual (msi)	Comp. Mod. (0.1-0.3% strain) Norm. (msi)
A2-910-057-1-3	0.1241	0.4994	518.8	1482	7.77	8.01
B2-910-057-1-3	0.1192	0.4995	554.4	1573	8.56	8.47
Average	0.1216	0.4995			8.16	8.24
Std. Dev.	0.0035	0.0001			0.55	0.32
COV, %	2.87	0.02			6.77	3.90

Material Type: F6273C-07M
Batch Number: AF991011
Test Method: SACMA SRM 1-94
Preconditioning: Section 3.2 of AGATE
Test Conditions: 180°F
Ply Orientation: $(fill)_{12}$
Testing Facility: TCA
Test Date: 7/6/2000

Test Operator: John Smith
Test Frame: Instron 4510
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: N/A
FV(normalizing): 49.8%
CPT (batch average): 0.0086 in.
FV(batch average): 49.7%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ult. Comp. Load (kips)	Ult. Comp. Strength Actual (ksi)	Ult. Comp. Strength Norm. (ksi)	Failure Location & Comments
A1-910-058-1-1	0.1035	0.4994	3.85	74.4	74.7	Failure in gage
A2-910-058-1-1	0.1035	0.5014	3.62	69.8	70.0	Failure in gage
A2-910-058-1-2	0.1035	0.5014	3.73	71.9	72.1	Failure in gage
B1-910-058-1-1	0.1035	0.5020	3.51	67.5	67.7	Failure in gage
B2-910-058-1-1	0.1035	0.4996	3.46	67.0	67.2	Failure in gage
B2-910-058-1-2	0.1035	0.4996	3.46	66.9	67.1	Failure in gage
Average	0.1035	0.5006	3.60	69.6	69.8	
Std. Dev.	0.0000	0.0012	0.16	3.08	3.09	
COV, %	0.00	0.23	4.41	4.43	4.43	

Material Type: F6273C-07M
Batch Number: AF991011
Test Method: SACMA SRM 1-94
Preconditioning: per Section 3.2 of AGATE Met
Test Conditions: 180°F
Ply Orientation: $(fill)_{14}$
Testing Facility: TCA
Test Date: 5/1/2000

Test Operator: John Smith
Test Frame: Instron 4505
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: One axial gage (FAE-12S-AS-S6EL-2)
FV(normalizing): 49.8%
CPT (batch average): 0.0086 in.
FV(batch average): 49.7%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Load @ 0.1% Strain (lbs.)	Load @ 0.3% Strain (lbs.)	Comp. Mod. (0.1-0.3% strain) Actual (msi)	Comp. Mod. (0.1-0.3% strain) Norm. (msi)
A2-910-058-1-3	0.1205	0.4993	545.4	1518	8.08	8.09
B2-910-058-1-3	0.1195	0.4998	533.9	1486	7.97	7.91
Average	0.1200	0.4995			8.03	8.00
Std. Dev.	0.0007	0.0004			0.08	0.13
COV, %	0.60	0.08			0.98	1.57

In-plane Shear (Iosipescu) Properties, -65°F (Dry)

Material Type: F6273C-07M
Batch Number: AF991009
Test Method: ASTM D5379
Specimen Preconditioning: as machined
Test Conditions: -65°F/Dry
Ply Orientation: $(0/90)_{4S}$
Testing Facility: Intec
Test Date: 12/29/99, 2/23/00

Test Operator: Bryan Mines
Test Frame: H
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: One biaxial gage (EA-06-062TV-350)
CPT (batch average): 0.0086 in.
Fiber Volume(batch average): 49.8%

Specimen Number	***Specimen Thickness***	***Notch Width***	***Ultimate Load***	***In-plane Shear Strength Actual***	***IPS Modulus*** [1] ***(0.25-0.65%)*** [2]	***Failure Location & Comments***
	(in.)	***(in.)***	***(lbs.)***	***(ksi)***	***(msi)***	
A1-910-056-1-1	0.1388	0.4520	1499	23.9	0.665	Shear failure in gage
A2-910-056-1-2	0.1385	0.4500	1429	22.9	0.689	Shear failure in gage
B1-910-056-1-1	0.1388	0.4460	1430	23.1	0.573	Shear failure in gage
B2-910-056-1-2	0.1389	0.4480	1431	23.0	0.563	Shear failure in gage
A1-910-056-1-3	0.1387	0.4510	1270	20.3	-	Shear failure in gage
B1-910-056-1-3	0.1391	0.4480	1340	21.5	-	Shear failure in gage
Average	0.1388	0.4492	1400	22.5	0.623	
Std. Dev.	0.0002	0.0022	81	1.31	0.064	
COV, %	0.14	0.50	5.80	5.82	10.25	

[1] Modulus is determined to be the slope of the Stress-Shear Strain curve.
[2] 0.25 ~ 0.65% strain range per ASTM D5379-98, Section 12.3.1

In-plane Shear (Iosipescu) Properties, 75°F (Dry)

Material Type: F6273C-07M
Batch Number: AF991009
Test Method: ASTM D5379
Specimen Preconditioning: as machined
Test Conditions: RT/Dry
Ply Orientation: $(0/90)_{4S}$
Testing Facility: Toray Composites (America)
Test Date: 12/31/1999, 2/14/00

Test Operator: John Smith
Test Frame: Instron 4505
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: One biaxial gage (EA-06-125-TW-120)
CPT (batch average): 0.0086 in.
Fiber Volume(batch average): 49.8%

Specimen Number	Specimen Thickness (in.)	Notch Width (in.)	Ultimate Load (lbs.)	In-plane Shear Strength Actual (ksi)	IPS Modulus [1] (0.25-0.65%) [2] (msi)	Failure Location & Comments
A1-910-056-1-5	0.1390	0.4513	1209	19.3	0.619	Shear failure in gage
A1-910-056-1-6	0.1393	0.4526	1200	19.0	0.667	Shear failure in gage
B1-910-056-1-5	0.1390	0.4481	1219	19.6	0.598	Shear failure in gage
B1-910-056-1-6	0.1387	0.4477	1256	20.2	0.587	Shear failure in gage
A1-910-056-1-27	0.1387	0.4518	1083	17.3	-	Shear failure in gage
B1-910-056-1-27	0.1377	0.4493	1140	18.4	-	Shear failure in gage
Average	0.1387	0.4501	1185	19.0	0.618	
Std. Dev.	0.0005	0.0021	62	1.02	0.035	
COV, %	0.38	0.46	5.26	5.39	5.73	

Material Type: F6273C-07M
Batch Number: AF991010
Test Method: ASTM D5379
Specimen Preconditioning: as machined
Test Conditions: RT/Dry
Ply Orientation: $(0/90)_{4S}$
Testing Facility: Toray Composites (America)
Test Date: 12/31/1999, 2/14/00

Test Operator: John Smith
Test Frame: Instron 4505
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: One biaxial gage (EA-06-125-TW-120)
CPT (batch average): 0.0086 in.
Fiber Volume(batch average): 49.4%

Specimen Number	Specimen Thickness (in.)	Notch Width (in.)	Ultimate Load (lbs.)	In-plane Shear Strength Actual (ksi)	IPS Modulus [1] (0.25-0.65%) [2] (msi)	Failure Location & Comments
A1-910-057-1-1	0.1380	0.4498	1183	19.1	0.628	Shear failure in gage
A1-910-057-1-2	0.1377	0.4499	1223	19.7	0.596	Shear failure in gage
B1-910-057-1-1	0.1363	0.4522	1182	19.2	0.593	Shear failure in gage
B1-910-057-1-2	0.1376	0.4514	1191	19.2	0.601	Shear failure in gage
A1-910-057-1-11	0.1371	0.4501	1162	18.8	-	Shear failure in gage
B1-910-057-1-11	0.1362	0.4505	1171	19.1	-	Shear failure in gage
Average	0.1372	0.4506	1185	19.2	0.605	
Std. Dev.	0.0007	0.0009	21	0.30	0.016	
COV, %	0.55	0.21	1.78	1.58	2.65	

Material Type: F6273C-07M
Batch Number: AF991011
Test Method: ASTM D5379
Specimen Preconditioning: as machined
Test Conditions: RT/Dry
Ply Orientation: $(0/90)_{4S}$
Testing Facility: Toray Composites (America)
Test Date: 12/31/99, 2/14/00

Test Operator: John Smith
Test Frame: Instron 4505
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: One biaxial gage (EA-06-125-TW-120)
CPT (batch average): 0.0086 in.
Fiber Volume(batch average): 49.7%

Specimen Number	Specimen Thickness (in.)	Notch Width (in.)	Ultimate Load (lbs.)	In-plane Shear Strength Actual (ksi)	IPS Modulus [1] (0.25-0.65%) [2] (msi)	Failure Location & Comments
A1-910-058-1-1	0.1354	0.4484	1227	20.2	0.603	Shear failure in gage
A1-910-058-1-2	0.1359	0.4484	1221	20.0	0.575	Shear failure in gage
B1-910-058-1-1	0.1356	0.4566	1177	19.0	0.679	Shear failure in gage
B1-910-058-1-2	0.1361	0.4548	1182	19.1	0.588	Shear failure in gage
A1-910-058-1-11	0.1357	0.4488	1148	18.9	-	Shear failure in gage
B1-910-058-1-11	0.1356	0.4534	1228	20.0	-	Shear failure in gage
Average	0.1357	0.4517	1197	19.5	0.611	
Std. Dev.	0.0003	0.0037	33	0.61	0.047	
COV, %	0.20	0.81	2.76	3.11	7.62	

[1] Modulus is determined to be the slope of the Stress-Shear Strain curve.
[2] 0.25 ~ 0.65% strain range per ASTM D5379-98, Section 12.3.1

In-plane Shear (Iosipescu) Properties, 180°F (Dry)

Material Type: F6273C-07M
Batch Number: AF991009
Test Method: ASTM D5379
Specimen Preconditioning: as machined
Test Conditions: 180°F/Dry
Ply Orientation: $(0/90)_{4S}$
Testing Facility: Toray Composites (America)
Test Date: 1/5/2000, 2/14/00

Test Operator: John Smith
Test Frame: Instron 4505
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: One biaxial gage (EA-06-125-TW-120)
CPT (batch average): 0.0086 in.
Fiber Volume(batch average): 49.8%

Specimen Number	*Specimen Thickness* (in.)	*Notch Width* (in.)	*Ultimate Load* (lbs.)	*In-plane Shear Strength Actual* (ksi)	*IPS Modulus* [1] *(0.25-0.65%)* [2] (msi)	*Failure Location & Comments*
A1-910-056-1-7	0.1392	0.4511	980	15.6	0.524	Shear failure in gage
A1-910-056-1-8	0.1395	0.4514	971	15.4	0.507	Shear failure in gage
B1-910-056-1-7	0.1383	0.4492	983	15.8	0.498	Shear failure in gage
B1-910-056-1-8	0.1378	0.4543	1001	16.0	0.493	Shear failure in gage
A1-910-056-1-28	0.1387	0.4514	922	14.7	-	Shear failure in gage
B1-910-056-1-28	0.1380	0.4549	906	14.4	-	Shear failure in gage
Average	0.1386	0.4520	961	15.3	0.506	
Std. Dev.	0.0007	0.0022	38	0.62	0.014	
COV, %	0.48	0.48	3.91	4.06	2.70	

Material Type: F6273C-07M
Batch Number: AF991010
Test Method: ASTM D5379
Specimen Preconditioning: as machined
Test Conditions: 180°F/Dry
Ply Orientation: $(0/90)_{4S}$
Testing Facility: Toray Composites (America)
Test Date: 1/5/2000

Test Operator: John Smith
Test Frame: Instron 4505
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: One biaxial gage (EA-06-125-TW-120)
CPT (batch average): 0.0086 in.
Fiber Volume(batch average): 49.4%

Specimen Number	*Specimen Thickness* (in.)	*Notch Width* (in.)	*Ultimate Load* (lbs.)	*In-plane Shear Strength Actual* (ksi)	*IPS Modulus* [1] *(0.25-0.65%)* [2] (msi)	*Failure Location & Comments*
A1-910-057-1-3	0.1378	0.4501	961	15.5	0.513	Shear failure in gage
A1-910-057-1-4	0.1381	0.4491	978	15.8	0.537	Shear failure in gage
B1-910-057-1-3	0.1376	0.4510	953	15.4	0.491	Shear failure in gage
B1-910-057-1-4	0.1372	0.4501	938	15.2	0.521	Shear failure in gage
A1-910-057-1-12	0.1365	0.4498	934	15.2	-	Shear failure in gage
B1-910-057-1-12	0.1362	0.4504	937	15.3	-	Shear failure in gage
Average	0.1372	0.4501	950	15.4	0.516	
Std. Dev.	0.0007	0.0006	17	0.22	0.019	
COV, %	0.55	0.14	1.81	1.43	3.71	

Material Type: F6273C-07M
Batch Number: AF991011
Test Method: ASTM D5379
Specimen Preconditioning: as machined
Test Conditions: 180°F/Dry
Ply Orientation: $(0/90)_{4S}$
Testing Facility: Toray Composites (America)
Test Date: 1/5/2000

Test Operator: John Smith
Test Frame: Instron 4505
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: One biaxial gage (EA-06-125-TW-120)
CPT (batch average): 0.0086 in.
Fiber Volume(batch average): 49.7%

Specimen Number	*Specimen Thickness* (in.)	*Notch Width* (in.)	*Ultimate Load* (lbs.)	*In-plane Shear Strength Actual* (ksi)	*IPS Modulus* [1] *(0.25-0.65%)* [2] (msi)	*Failure Location & Comments*
A1-910-058-1-3	0.1361	0.4484	980	16.1	0.584	Shear failure in gage
A1-910-058-1-4	0.1365	0.4546	962	15.5	0.495	Shear failure in gage
B1-910-058-1-3	0.1365	0.4529	940	15.2	0.514	Shear failure in gage
B1-910-058-1-4	0.1366	0.4569	954	15.3	0.530	Shear failure in gage
A1-910-058-1-12	0.1358	0.4541	929	15.1	-	Shear failure in gage
B1-910-058-1-12	0.1350	0.4416	945	15.8	-	Shear failure in gage
Average	0.1361	0.4514	951	15.5	0.531	
Std. Dev.	0.0006	0.0056	18	0.39	0.038	
COV, %	0.46	1.23	1.90	2.52	7.21	

[1] Modulus is determined to be the slope of the Stress-Shear Strain curve.
[2] 0.25 ~ 0.65% strain range per ASTM D5379-98, Section 12.3.1

In-plane Shear (Iosipescu) Properties, 180°F (Wet)

Material Type: F6273C-07M
Batch Number: AF991009
Test Method: ASTM D5379
Specimen Preconditioning: per Section 3.2 of AGATE Methodology
Test Conditions: 180°F
Ply Orientation: $(0/90)_{4S}$
Testing Facility: Toray Composites (America)
Test Date: 5/2/2000

Test Operator: John Smith
Test Frame: Instron 4505
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: One biaxial gage (EA-06-125-TW-120)
CPT (batch average): 0.0086 in.
Fiber Volume(batch average): 49.8%

Specimen Number	*Specimen Thickness* (in.)	*Notch Width* (in.)	*Ultimate Load* (lbs.)	*In-plane Shear Strength Actual* (ksi)	*IPS Modulus* [1] *(0.25-0.65%)* [2] (msi)	*Failure Location & Comments*
A1-910-056-1-10	0.1391	0.4508	680	10.8	0.443	Shear failure in gage
B1-910-056-1-9	0.1371	0.4489	671	10.9	0.457	Shear failure in gage
B1-910-056-1-10	0.1363	0.4494	677	11.1	0.470	Shear failure in gage
A1-910-056-1-13	0.1363	0.4465	688	11.3	0.455	Shear failure in gage
A1-910-056-1-9	0.1393	0.4508	666	10.6	-	Shear failure in gage
B1-910-056-1-11	0.1353	0.4491	649	10.7	-	Shear failure in gage
Average	0.1372	0.4492	672	10.9	0.456	
Std. Dev.	0.0016	0.0016	14	0.26	0.011	
COV, %	1.20	0.35	2.03	2.36	2.42	

Material Type: F6273C-07M
Batch Number: AF991010
Test Method: ASTM D5379
Specimen Preconditioning: per Section 3.2 of AGATE Methodology
Test Conditions: 180°F
Ply Orientation: $(0/90)_{4S}$
Testing Facility: Toray Composites (America)
Test Date: 5/2/2000

Test Operator: John Smith
Test Frame: Instron 4505
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: One biaxial gage (EA-06-125-TW-120)
CPT (batch average): 0.0086 in.
Fiber Volume(batch average): 49.4%

Specimen Number	*Specimen Thickness* (in.)	*Notch Width* (in.)	*Ultimate Load* (lbs.)	*In-plane Shear Strength Actual* (ksi)	*IPS Modulus* [1] *(0.25-0.65%)* [2] (msi)	*Failure Location & Comments*
A1-910-057-1-5	0.1382	0.4511	690	11.1	0.489	Shear failure in gage
A1-910-057-1-6	0.1382	0.4999	683	9.88	0.436	Shear failure in gage
B1-910-057-1-5	0.1370	0.4508	668	10.8	0.481	Shear failure in gage
B1-910-057-1-6	0.1374	0.4517	671	10.8	0.420	Shear failure in gage
A1-910-057-1-7	0.1383	0.4492	660	10.6	-	Shear failure in gage
B1-910-057-1-7	0.1371	0.4505	670	10.8	-	Shear failure in gage
Average	0.1377	0.4589	674	10.7	0.457	
Std. Dev.	0.0006	0.0201	11	0.41	0.034	
COV, %	0.43	4.38	1.62	3.85	7.38	

Material Type: F6273C-07M
Batch Number: AF991011
Test Method: ASTM D5379
Specimen Preconditioning: per Section 3.2 of AGATE Methodology
Test Conditions: 180°F
Ply Orientation: $(0/90)_{4S}$
Testing Facility: Toray Composites (America)
Test Date: 5/2/2000

Test Operator: John Smith
Test Frame: Instron 4505
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: One biaxial gage (EA-06-125-TW-120)
CPT (batch average): 0.0086 in.
Fiber Volume(batch average): 49.7%

Specimen Number	*Specimen Thickness* (in.)	*Notch Width* (in.)	*Ultimate Load* (lbs.)	*In-plane Shear Strength Actual* (ksi)	*IPS Modulus* [1] *(0.25-0.65%)* [2] (msi)	*Failure Location & Comments*
A1-910-058-1-5	0.1368	0.4486	676	11.0	0.540	Shear failure in gage
A1-910-058-1-6	0.1367	0.4479	678	11.1	0.451	Shear failure in gage
B1-910-058-1-5	0.1369	0.4560	665	10.7	0.429	Shear failure in gage
B1-910-058-1-6	0.1374	0.4559	660	10.5	0.447	Shear failure in gage
A1-910-058-1-7	0.1366	0.4486	679	11.1	-	Shear failure in gage
B1-910-058-1-7	0.1373	0.4543	678	10.9	-	Shear failure in gage
Average	0.1369	0.4519	673	10.9	0.467	
Std. Dev.	0.0003	0.0039	8	0.23	0.050	
COV, %	0.25	0.86	1.20	2.14	10.66	

[1] **Modulus is determined to be the slope of the Stress-Shear Strain curve.**
[2] **0.25 ~ 0.65% strain range per ASTM D5379-98, Section 12.3.1**

In-plane Shear (Iosipescu) Strength, Fluid Sensitivity

Fluid: Jet Fuel

Material Type: F6273C-07M
Batch Number: AF991009
Test Method: ASTM D5379
Specimen Preconditioning: at RT for 500 hrs
Test Temperature: 180°F
Ply Orientation: $(0/90)_{4S}$
Testing Facility: Toray Composites (America)
Test Date: 1/5/2000

Test Operator: John Smith
Test Frame: Instron 4505
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: N/A
CPT (batch average): 0.0086 in.
Fiber Volume(batch average): 49.8%

Specimen Number	*Specimen Thickness (in.)*	*Notch Width (in.)*	*Ultimate Load (lbs.)*	*In-plane Shear Strength Actual (ksi)*	*Failure Location & Comments*
A1-910-056-1-15	0.1375	0.4502	883	14.3	Shear failure in gage
A1-910-056-1-16	0.1376	0.4510	878	14.1	Shear failure in gage
B1-910-056-1-16	0.1384	0.4487	889	14.3	Shear failure in gage
B1-910-056-1-17	0.1386	0.4559	931	14.7	Shear failure in gage
B1-910-056-1-18	0.1389	0.4496	906	14.5	Shear failure in gage
Average	0.1382	0.4511	897	14.4	
Std. Dev.	0.0006	0.0028	22	0.23	
COV, %	0.45	0.62	2.42	1.61	

Fluid: Hydraulic Fluid

Material Type: F6273C-07M
Batch Number: AF991009
Test Method: ASTM D5379
Specimen Preconditioning: at RT for 60 - 90 minutes
Test Temperature: 180°F
Ply Orientation: $(0/90)_{4S}$
Testing Facility: Toray Composites (America)
Test Date: 12/30/1999

Test Operator: John Smith
Test Frame: Instron 4505
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: N/A
CPT (batch average): 0.0086 in.
Fiber Volume(batch average): 49.8%

Specimen Number	*Specimen Thickness (in.)*	*Notch Width (in.)*	*Ultimate Load (lbs.)*	*In-plane Shear Strength Actual (ksi)*	*Failure Location & Comments*
A1-910-056-1-19	0.1382	0.4513	967	15.5	Shear failure in gage
A1-910-056-1-20	0.1384	0.4509	961	15.4	Shear failure in gage
A1-910-056-1-21	0.1384	0.4517	961	15.4	Shear failure in gage
B1-910-056-1-19	0.1390	0.4491	949	15.2	Shear failure in gage
B1-910-056-1-20	0.1390	0.4493	969	15.5	Shear failure in gage
Average	0.1386	0.4505	961	15.4	
Std. Dev.	0.0004	0.0012	8	0.13	
COV, %	0.28	0.26	0.83	0.85	

Fluid: MEK Solvent

Material Type: F6273C-07M
Batch Number: AF991009
Test Method: ASTM D5379
Specimen Preconditioning: at RT for 60 - 90 minutes
Test Temperature: RT
Ply Orientation: $(0/90)_{4S}$
Testing Facility: Toray Composites (America)
Test Date: 12/30/1999

Test Operator: John Smith
Test Frame: Instron 4505
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: N/A
CPT (batch average): 0.0086 in.
Fiber Volume(batch average): 49.8%

Specimen Number	*Specimen Thickness (in.)*	*Notch Width (in.)*	*Ultimate Load (lbs.)*	*In-plane Shear Strength Actual (ksi)*	*Failure Location & Comments*
A1-910-056-1-23	0.1374	0.4489	1174	19.0	Shear failure in gage
A1-910-056-1-24	0.1364	0.4490	1165	19.0	Shear failure in gage
B1-910-056-1-23	0.1380	0.4491	1151	18.6	Shear failure in gage
B1-910-056-1-24	0.1376	0.4490	1129	18.3	Shear failure in gage
B1-910-056-1-25	0.1366	0.4490	1130	18.4	Shear failure in gage
Average	0.1372	0.4490	1150	18.7	
Std. Dev.	0.0007	0.0001	20	0.35	
COV, %	0.52	0.02	1.76	1.86	

Apparent Interlaminar Shear Strength, 75°F (Dry)

Material Type: F6273C-07M
Batch Number: AF991009
Test Method: ASTM D2344
Specimen Preconditioning: as machined
Test Conditions: RT/Dry
Ply Orientation: $(warp)_{12}$
Testing Facility: Toray Composites (America)
Test Date: 12/27/1999

Test Operator: John Smith
Test Frame: Instron 4510
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: N/A
CPT (batch average): 0.0086 in.
Fiber Volume(batch average): 49.8%

Specimen Number	*Specimen Depth (in.)*	*Specimen Width (in.)*	*Span: Thickness Ratio*	*Ultimate Load (kips)*	*Short Beam Shear Strength (ksi)*	*Failure Location & Comments*
A1-910-056-1-1	0.1040	0.2523	4:1	294	8.40	Shear Failure
A1-910-056-1-2	0.1040	0.2523	4:1	297	8.49	Shear Failure
A1-910-056-1-3	0.1044	0.2527	4:1	295	8.38	Shear Failure
B1-910-056-1-1	0.0968	0.2516	4:1	284	8.75	Shear Failure
B1-910-056-1-2	0.0950	0.2514	4:1	281	8.81	Shear Failure
B1-910-056-1-3	0.0934	0.2514	4:1	265	8.47	Shear Failure
Average	0.0996	0.2519		286	8.55	
Std. Dev.	0.0051	0.0006		12	0.184	
COV, %	5.11	0.22		4.25	2.15	

Material Type: F6273C-07M
Batch Number: AF991010
Test Method: ASTM D2344
Specimen Preconditioning: as machined
Test Conditions: RT/Dry
Ply Orientation: $(warp)_{12}$
Testing Facility: Toray Composites (America)
Test Date: 12/31/1999

Test Operator: John Smith
Test Frame: Instron 4510
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: N/A
CPT (batch average): 0.0086 in.
Fiber Volume(batch average): 49.4%

Specimen Number	*Specimen Depth (in.)*	*Specimen Width (in.)*	*Span: Thickness Ratio*	*Ultimate Load (kips)*	*Short Beam Shear Strength (ksi)*	*Failure Location & Comments*
A1-910-057-1-1	0.1031	0.2519	4:1	304	8.79	Shear Failure
A1-910-057-1-2	0.1036	0.2522	4:1	300	8.61	Shear Failure
A1-910-057-1-3	0.1038	0.2523	4:1	313	8.95	Shear Failure
B1-910-057-1-1	0.1043	0.2512	4:1	306	8.76	Shear Failure
B1-910-057-1-2	0.1044	0.2507	4:1	277	7.93	Shear Failure
B1-910-057-1-3	0.1043	0.2512	4:1	290	8.32	Shear Failure
Average	0.1039	0.2516		298	8.56	
Std. Dev.	0.0005	0.0006		13	0.375	
COV, %	0.47	0.25		4.32	4.38	

Material Type: F6273C-07M
Batch Number: AF991011
Test Method: ASTM D2344
Specimen Preconditioning: as machined
Test Conditions: RT/Dry
Ply Orientation: $(warp)_{12}$
Testing Facility: Toray Composites (America)
Test Date: 12/31/1999

Test Operator: John Smith
Test Frame: Instron 4510
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: N/A
CPT (batch average): 0.0086 in.
Fiber Volume(batch average): 49.7%

Specimen Number	*Specimen Depth (in.)*	*Specimen Width (in.)*	*Span: Thickness Ratio*	*Ultimate Load (kips)*	*Short Beam Shear Strength (ksi)*	*Failure Location & Comments*
A1-910-058-1-1	0.1028	0.2519	4:1	298	8.63	Shear Failure
A1-910-058-1-2	0.1023	0.2528	4:1	299	8.68	Shear Failure
A1-910-058-1-3	0.1044	0.2526	4:1	301	8.57	Shear Failure
B1-910-058-1-1	0.1037	0.2515	4:1	288	8.28	Shear Failure
B1-910-058-1-2	0.1035	0.2514	4:1	300	8.64	Shear Failure
B1-910-058-1-3	0.1036	0.2516	4:1	279	8.04	Shear Failure
Average	0.1034	0.2520		294	8.47	
Std. Dev.	0.0008	0.0006		9	0.256	
COV, %	0.73	0.23		2.96	3.02	

Apparent Interlaminar Shear Strength, 75°F (Dry) - continued

Material Type: F6273C-07M
Batch Number: AF020224
Test Method: ASTM D2344-00

Panel Fabrication: TCA - vacuum bagged at 270°F
Ply Orientation: $(warp)_{12}$
Test Conditions: RT/Dry

Specimen Preconditioning: as machined
Loading Rate: 0.05 in/min
Control Mode: Stroke

Specimen Panel	Specimen Coupon	Specimen Depth (in.)	Specimen Width (in.)	Span (in.)	Ultimate Load (lbs)	Initial Load (lbs)	Total Load (lbs)	SBS Strength (ksi)	Failure Location	Testing Facility	Test Conditions Temp (°F)	Test Conditions RH (%)	Test Operator	Test Frame	Test Date
A-49	1-1	0.10070	0.25060	0.413	301.9	0.0	301.9	**8.97**	Interlaminar Shear	TCA	73	50	John S.	Inst 4510	5/21/2002
A-49	1-3	0.10035	0.25065	0.413	303.5	0.0	303.5	**9.05**	Interlaminar Shear	TCA	73	50	John S.	Inst 4510	5/21/2002
A-49	1-5	0.10055	0.25000	0.413	307.2	0.0	307.2	**9.17**	Interlaminar Shear	TCA	73	50	John S.	Inst 4510	5/21/2002
A-49	4-7	0.10190	0.25005	0.413	274.7	0.0	274.7	**8.09**	Interlaminar Shear	TCA	73	50	John S.	Inst 4510	5/21/2002
A-49	4-9	0.10220	0.25005	0.413	276.9	0.0	276.9	**8.13**	Interlaminar Shear	TCA	73	50	John S.	Inst 4510	5/21/2002
A-49	4-11	0.10180	0.24995	0.413	304.4	0.0	304.4	**8.97**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4510	5/17/2002
A-49	8-13	0.10380	0.24890	0.413	279.6	0.0	279.6	**8.12**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4510	5/17/2002
A-49	8-15	0.10370	0.24890	0.413	269.9	0.0	269.9	**7.84**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4510	5/17/2002
A-49	1-2	0.10055	0.25075	0.413	275.5	5.2	280.7	**8.35**	Interlaminar Shear	NIAR	81	62	Ken G.	MTS 318.1	6/3/2002
A-49	1-4	0.10045	0.25025	0.413	279.4	5.2	284.6	**8.49**	Interlaminar Shear	NIAR	81	62	Ken G.	MTS 318.1	6/3/2002
A-49	1-6	0.10165	0.25030	0.413	288.0	5.2	293.2	**8.64**	Interlaminar Shear	NIAR	81	62	Ken G.	MTS 318.1	6/3/2002
A-49	4-8	0.10175	0.25005	0.413	268.7	5.2	273.9	**8.07**	Interlaminar Shear	NIAR	81	62	Ken G.	MTS 318.1	6/3/2002
A-49	4-10	0.10160	0.25015	0.413	263.7	5.2	268.9	**7.93**	Interlaminar Shear	NIAR	81	62	Ken G.	MTS 318.1	6/3/2002
A-49	4-12	0.10205	0.25005	0.413	302.1	5.2	307.3	**9.03**	Interlaminar Shear	NIAR	81	62	Ken G.	MTS 318.1	6/3/2002
A-49	8-14	0.10350	0.24915	0.413	282.1	5.2	287.3	**8.35**	Interlaminar Shear	NIAR	81	62	Ken G.	MTS 318.1	6/3/2002
A-49	8-16	0.10380	0.24870	0.413	264.6	5.2	269.8	**7.84**	Interlaminar Shear	NIAR	81	62	Ken G.	MTS 318.1	6/3/2002
A-49	8-18	0.10405	0.24885	0.413	278.6	5.2	283.8	**8.22**	Interlaminar Shear	NIAR	81	62	Ken G.	MTS 318.1	6/3/2002
B-50	1-1	0.10120	0.25065	0.413	296.2	0.0	296.2	**8.76**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4510	5/17/2002
B-50	1-3	0.10130	0.25065	0.413	293.2	0.0	293.2	**8.66**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4510	5/17/2002
B-50	1-5	0.10165	0.25050	0.413	291.0	0.0	291.0	**8.57**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4510	5/17/2002
B-50	4-7	0.10005	0.24990	0.413	300.3	0.0	300.3	**9.01**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4510	5/17/2002
B-50	4-9	0.10055	0.24970	0.413	324.7	0.0	324.7	**9.70**	Interlaminar Shear	TCA	73	50	John S.	Inst 4510	5/21/2002
B-50	4-11	0.10030	0.24970	0.413	305.6	0.0	305.6	**9.15**	Interlaminar Shear	TCA	73	50	John S.	Inst 4510	5/21/2002
B-50	8-13	0.10025	0.24930	0.413	302.8	0.0	302.8	**9.09**	Interlaminar Shear	TCA	73	50	John S.	Inst 4510	5/21/2002
B-50	8-15	0.10035	0.24940	0.413	302.4	0.0	302.4	**9.06**	Interlaminar Shear	TCA	73	50	John S.	Inst 4510	5/21/2002
B-50	1-2	0.10130	0.25080	0.413	291.4	5.2	296.6	**8.75**	Interlaminar Shear	NIAR	81	61	Ken G.	MTS 318.1	6/3/2002
B-50	1-4	0.10140	0.25060	0.413	287.9	5.2	293.1	**8.65**	Interlaminar Shear	NIAR	81	61	Ken G.	MTS 318.1	6/3/2002
B-50	1-6	0.10095	0.25045	0.413	298.5	5.2	303.7	**9.01**	Interlaminar Shear	NIAR	81	61	Ken G.	MTS 318.1	6/3/2002
B-50	4-8	0.10020	0.24985	0.413	287.5	5.2	292.7	**8.77**	Interlaminar Shear	NIAR	81	61	Ken G.	MTS 318.1	6/3/2002
B-50	4-10	0.10030	0.24970	0.413	291.0	5.2	296.2	**8.87**	Interlaminar Shear	NIAR	81	61	Ken G.	MTS 318.1	6/3/2002
B-50	4-12	0.10030	0.24970	0.413	299.4	5.2	304.6	**9.12**	Interlaminar Shear	NIAR	81	61	Ken G.	MTS 318.1	6/3/2002
B-50	8-14	0.10035	0.24940	0.413	271.9	5.2	277.1	**8.30**	Interlaminar Shear	NIAR	81	61	Ken G.	MTS 318.1	6/3/2002
B-50	8-16	0.10025	0.24945	0.413	282.3	5.2	287.5	**8.62**	Interlaminar Shear	NIAR	81	61	Ken G.	MTS 318.1	6/3/2002
B-50	8-18	0.10045	0.24955	0.413	292.9	5.2	298.1	**8.92**	Interlaminar Shear	NIAR	81	61	Ken G.	MTS 318.1	6/3/2002
	Average							**8.65**							
	Std, Dev.							**0.450**							
	COV, %							**5.20**							

Apparent Interlaminar Shear Strength, 75°F (Dry) - continued

Material Type: F6273C-07M
Batch Number: AF020324
Test Method: ASTM D2344-00
Panel Fabrication: TCA - vacuum bagged at 270°F
Ply Orientation: $(warp)_{12}$
Test Conditions: RT/Dry
Specimen Preconditioning: as machined
Loading Rate: 0.05 in/min
Control Mode: Stroke

Specimen		Specimen	Specimen	Span	Ultimate	Initial	Total	SBS	Failure	Testing	Test Conditions		Test	Test	Test
Panel	Coupon	Depth (in.)	Width (in.)	(in.)	Load (lbs)	Load (lbs)	Load (lbs)	Strength (ksi)	Location	Facility	Temp (°F)	RH (%)	Operator	Frame	Date
A-51	2-1	0.10270	0.25030	0.413	291.2	0.0	291.2	**8.50**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4510	5/17/2002
A-51	2-3	0.10235	0.25065	0.413	277.9	0.0	277.9	**8.12**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4510	5/17/2002
A-51	2-5	0.10205	0.25025	0.413	263.5	0.0	263.5	**7.74**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4510	5/17/2002
A-51	5-7	0.10165	0.25060	0.413	295.2	0.0	295.2	**8.69**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4510	5/17/2002
A-51	5-9	0.10135	0.25030	0.413	288.3	0.0	288.3	**8.52**	Interlaminar Shear	TCA	73	50	John S.	Inst 4510	5/21/2002
A-51	5-11	0.10135	0.25030	0.413	278.2	0.0	278.2	**8.22**	Interlaminar Shear	TCA	73	50	John S.	Inst 4510	5/21/2002
A-51	8-13	0.10090	0.24980	0.413	290.2	0.0	290.2	**8.64**	Interlaminar Shear	TCA	73	50	John S.	Inst 4510	5/21/2002
A-51	8-15	0.10035	0.24955	0.413	278.0	0.0	278.0	**8.33**	Interlaminar Shear	TCA	73	50	John S.	Inst 4510	5/21/2002
A-51	2-2	0.10260	0.25085	0.413	275.7	5.2	280.9	**8.18**	Interlaminar Shear	NIAR	81	62	Ken G.	MTS 318.1	6/3/2002
A-51	2-4	0.10210	0.25045	0.413	270.8	5.2	276.0	**8.09**	Interlaminar Shear	NIAR	81	62	Ken G.	MTS 318.1	6/3/2002
A-51	2-6	0.10220	0.25030	0.413	288.5	5.2	293.7	**8.61**	Interlaminar Shear	NIAR	81	62	Ken G.	MTS 318.1	6/3/2002
A-51	5-8	0.10145	0.25025	0.413	286.4	5.2	291.6	**8.61**	Interlaminar Shear	NIAR	81	62	Ken G.	MTS 318.1	6/3/2002
A-51	5-10	0.10110	0.25005	0.413	272.4	5.2	277.6	**8.23**	Interlaminar Shear	NIAR	81	62	Ken G.	MTS 318.1	6/3/2002
A-51	5-12	0.10100	0.24990	0.413	287.5	5.2	292.7	**8.70**	Interlaminar Shear	NIAR	81	62	Ken G.	MTS 318.1	6/3/2002
A-51	8-14	0.10055	0.24965	0.413	291.0	5.2	296.2	**8.85**	Interlaminar Shear	NIAR	81	62	Ken G.	MTS 318.1	6/3/2002
A-51	8-16	0.10050	0.24965	0.413	271.7	5.2	276.9	**8.28**	Interlaminar Shear	NIAR	81	62	Ken G.	MTS 318.1	6/3/2002
B-52	2-1	0.10350	0.24955	0.413	293.9	0.0	293.9	**8.53**	Interlaminar Shear	TCA	73	50	John S.	Inst 4510	5/21/2002
B-52	2-3	0.10360	0.24955	0.413	312.9	0.0	312.9	**9.08**	Interlaminar Shear	TCA	73	50	John S.	Inst 4510	5/21/2002
B-52	2-5	0.10385	0.24945	0.413	295.5	0.0	295.5	**8.56**	Interlaminar Shear	TCA	73	50	John S.	Inst 4510	5/21/2002
B-52	5-7	0.10130	0.24950	0.413	287.5	0.0	287.5	**8.53**	Interlaminar Shear	TCA	73	50	John S.	Inst 4510	5/21/2002
B-52	5-9	0.10125	0.24945	0.413	311.6	0.0	311.6	**9.25**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4510	5/17/2002
B-52	5-11	0.10155	0.24945	0.413	305.2	0.0	305.2	**9.04**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4510	5/17/2002
B-52	8-13	0.09825	0.25000	0.413	287.7	0.0	287.7	**8.78**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4510	5/17/2002
B-52	8-15	0.09825	0.24980	0.413	270.8	0.0	270.8	**8.28**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4510	5/17/2002
B-52	2-2	0.10355	0.24905	0.413	272.2	5.2	277.4	**8.07**	Interlaminar Shear	NIAR	80	63	Ken G.	MTS 318.1	6/3/2002
B-52	2-4	0.10400	0.24965	0.413	276.8	5.2	282.0	**8.14**	Interlaminar Shear	NIAR	80	63	Ken G.	MTS 318.1	6/3/2002
B-52	2-6	0.10370	0.24950	0.413	276.3	5.2	281.5	**8.16**	Interlaminar Shear	NIAR	80	63	Ken G.	MTS 318.1	6/3/2002
B-52	5-8	0.10145	0.24960	0.413	283.5	5.2	288.7	**8.55**	Interlaminar Shear	NIAR	80	63	Ken G.	MTS 318.1	6/3/2002
B-52	5-10	0.10130	0.24930	0.413	282.7	5.2	287.9	**8.55**	Interlaminar Shear	NIAR	80	63	Ken G.	MTS 318.1	6/3/2002
B-52	5-12	0.10160	0.24940	0.413	276.7	5.2	281.9	**8.34**	Interlaminar Shear	NIAR	80	63	Ken G.	MTS 318.1	6/3/2002
B-52	8-14	0.09825	0.24985	0.413	284.0	5.2	289.2	**8.83**	Interlaminar Shear	NIAR	80	63	Ken G.	MTS 318.1	6/3/2002
B-52	8-16	0.09835	0.24975	0.413	276.8	5.2	282.0	**8.61**	Interlaminar Shear	NIAR	80	63	Ken G.	MTS 318.1	6/3/2002
	Average							**8.49**							
	Std, Dev.							**0.329**							
	COV, %							**3.88**							

Apparent Interlaminar Shear Strength, 75°F (Dry) - continued

Material Type: F6273C-07M | *Panel Fabrication:* TCA - vacuum bagged at 270°F | *Specimen Preconditioning:* as machined
Batch Number: AF020422 | *Ply Orientation:* $(warp)_{12}$ | *Loading Rate:* 0.05 in/min
Test Method: ASTM D2344-00 | *Test Conditions:* RT/Dry | *Control Mode:* Stroke

Specimen Panel	Specimen Coupon	Specimen Depth (in.)	Specimen Width (in.)	Span (in.)	Ultimate Load (lbs)	Initial Load (lbs)	Total Load (lbs)	SBS Strength (ksi)	Failure Location	Testing Facility	Test Conditions Temp (°F)	Test Conditions RH (%)	Test Operator	Test Frame	Test Date
A-53	1-1	0.10105	0.24840	0.413	266.7	0.0	266.7	**7.97**	Interlaminar Shear	TCA	73	50	John S.	Inst 4505	5/20/2002
A-53	1-3	0.10090	0.24850	0.413	310.3	0.0	310.3	**9.28**	Interlaminar Shear	TCA	73	50	John S.	Inst 4505	5/20/2002
A-53	1-5	0.10135	0.24905	0.413	289.7	0.0	289.7	**8.61**	Interlaminar Shear	TCA	73	50	John S.	Inst 4505	5/20/2002
A-53	6-7	0.10355	0.24910	0.413	314.2	0.0	314.2	**9.14**	Interlaminar Shear	TCA	73	50	John S.	Inst 4505	5/20/2002
A-53	6-9	0.10345	0.24955	0.413	332.8	0.0	332.8	**9.67**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4505	5/20/2002
A-53	6-11	0.10375	0.24940	0.413	308.2	0.0	308.2	**8.93**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4505	5/20/2002
A-53	7-13	0.10375	0.24905	0.413	301.0	0.0	301.0	**8.74**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4505	5/20/2002
A-53	7-15	0.10370	0.24900	0.413	294.9	0.0	294.9	**8.57**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4505	5/20/2002
A-53	1-2	0.10085	0.24825	0.413	288.3	5.2	293.5	**8.79**	Interlaminar Shear	NIAR	79	64	Ken G.	MTS 318.1	6/3/2002
A-53	1-4	0.10105	0.24880	0.413	280.7	5.2	285.9	**8.53**	Interlaminar Shear	NIAR	79	64	Ken G.	MTS 318.1	6/3/2002
A-53	1-6	0.10125	0.24920	0.413	298.1	5.2	303.3	**9.01**	Interlaminar Shear	NIAR	79	64	Ken G.	MTS 318.1	6/3/2002
A-53	6-8	0.10355	0.24920	0.413	317.5	5.2	322.7	**9.38**	Interlaminar Shear	NIAR	79	64	Ken G.	MTS 318.1	6/3/2002
A-53	6-10	0.10360	0.24960	0.413	304.7	5.2	309.9	**8.99**	Interlaminar Shear	NIAR	79	64	Ken G.	MTS 318.1	6/3/2002
A-53	6-12	0.10395	0.24935	0.413	311.3	5.2	316.5	**9.16**	Interlaminar Shear	NIAR	79	64	Ken G.	MTS 318.1	6/3/2002
A-53	7-14	0.10385	0.24900	0.413	284.2	5.2	289.4	**8.39**	Interlaminar Shear	NIAR	79	64	Ken G.	MTS 318.1	6/3/2002
A-53	7-16	0.10390	0.24915	0.413	282.1	5.2	287.3	**8.32**	Interlaminar Shear	NIAR	79	64	Ken G.	MTS 318.1	6/3/2002
B-54	1-1	0.10080	0.24695	0.413	279.6	0.0	279.6	**8.42**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4505	5/20/2002
B-54	1-3	0.10110	0.25020	0.413	296.9	0.0	296.9	**8.80**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4505	5/20/2002
B-54	1-5	0.10130	0.25050	0.413	316.5	0.0	316.5	**9.35**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4505	5/20/2002
B-54	6-7	0.10195	0.24985	0.413	324.5	0.0	324.5	**9.55**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4505	5/20/2002
B-54	6-9	0.10200	0.24955	0.413	301.7	0.0	301.7	**8.89**	Interlaminar Shear	TCA	73	50	John S.	Inst 4505	5/20/2002
B-54	6-11	0.10180	0.24945	0.413	312.1	0.0	312.1	**9.22**	Interlaminar Shear	TCA	73	50	John S.	Inst 4505	5/20/2002
B-54	7-13	0.10205	0.24940	0.413	300.5	0.0	300.5	**8.86**	Interlaminar Shear	TCA	73	50	John S.	Inst 4505	5/20/2002
B-54	7-15	0.10215	0.24955	0.413	280.3	0.0	280.3	**8.25**	Interlaminar Shear	TCA	73	50	John S.	Inst 4505	5/20/2002
B-54	1-2	0.10095	0.25000	0.413	276.7	5.2	281.9	**8.38**	Interlaminar Shear	NIAR	79	65	Ken G.	MTS 318.1	6/3/2002
B-54	1-4	0.10120	0.25040	0.413	283.1	5.2	288.3	**8.53**	Interlaminar Shear	NIAR	79	65	Ken G.	MTS 318.1	6/3/2002
B-54	1-6	0.10120	0.25030	0.413	305.1	5.2	310.3	**9.19**	Interlaminar Shear	NIAR	79	65	Ken G.	MTS 318.1	6/3/2002
B-54	6-8	0.10195	0.24955	0.413	310.5	5.2	315.7	**9.31**	Interlaminar Shear	NIAR	79	65	Ken G.	MTS 318.1	6/3/2002
B-54	6-10	0.10210	0.24945	0.413	300.2	5.2	305.4	**8.99**	Interlaminar Shear	NIAR	79	65	Ken G.	MTS 318.1	6/3/2002
B-54	6-12	0.10200	0.24920	0.413	295.6	5.2	300.8	**8.87**	Interlaminar Shear	NIAR	79	65	Ken G.	MTS 318.1	6/3/2002
B-54	7-14	0.10195	0.24950	0.413	278.4	5.2	283.6	**8.36**	Interlaminar Shear	NIAR	79	65	Ken G.	MTS 318.1	6/3/2002
B-54	7-16	0.10210	0.24965	0.413	278.3	5.2	283.5	**8.34**	Interlaminar Shear	NIAR	79	65	Ken G.	MTS 318.1	6/3/2002
	Average							**8.84**							
	Std, Dev.							**0.421**							
	COV, %							**4.76**							

Apparent Interlaminar Shear Strength, 75°F (Dry) - continued

Material Type: F6273C-07M
Batch Number: AF020522
Test Method: ASTM D2344-00
Panel Fabrication: TCA - vacuum bagged at 270°F
Ply Orientation: $(warp)_{12}$
Test Conditions: RT/Dry
Specimen Preconditioning: as machined
Loading Rate: 0.05 in/min
Control Mode: Stroke

Specimen		Specimen	Specimen	Span	Ultimate	Initial	Total	SBS	Failure	Testing	Test Conditions		Test	Test	Test
Panel	Coupon	Depth (in.)	Width (in.)	(in.)	Load (lbs)	Load (lbs)	Load (lbs)	Strength (ksi)	Location	Facility	Temp (°F)	RH (%)	Operator	Frame	Date
A-55	1-1	0.10115	0.25100	0.401	293.1	0.0	293.1	**8.66**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4505	5/20/2002
A-55	1-3	0.10020	0.25085	0.401	283.1	0.0	283.1	**8.45**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4505	5/20/2002
A-55	1-5	0.10145	0.25065	0.401	285.1	0.0	285.1	**8.41**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4505	5/20/2002
A-55	3-7	0.10095	0.25075	0.401	332.5	0.0	332.5	**9.85**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4505	5/20/2002
A-55	3-9	0.09955	0.25070	0.401	331.6	0.0	331.6	**9.97**	Interlaminar Shear	TCA	73	50	John S.	Inst 4505	5/20/2002
A-55	3-11	0.10075	0.25065	0.401	321.2	0.0	321.2	**9.54**	Interlaminar Shear	TCA	73	50	John S.	Inst 4505	5/20/2002
A-55	8-13	0.09870	0.24960	0.401	287.3	0.0	287.3	**8.75**	Interlaminar Shear	TCA	73	50	John S.	Inst 4505	5/20/2002
A-55	8-15	0.09870	0.24965	0.401	282.2	0.0	282.2	**8.59**	Interlaminar Shear	TCA	73	50	John S.	Inst 4505	5/20/2002
A-55	1-2	0.10045	0.25080	0.401	270.7	5.2	275.9	**8.21**	Interlaminar Shear	NIAR	81	62	Ken G.	MTS 318.1	6/3/2002
A-55	1-4	0.10075	0.25075	0.401	272.4	5.2	277.6	**8.24**	Interlaminar Shear	NIAR	81	62	Ken G.	MTS 318.1	6/3/2002
A-55	1-6	0.10160	0.25040	0.401	267.7	5.2	272.9	**8.04**	Interlaminar Shear	NIAR	81	62	Ken G.	MTS 318.1	6/3/2002
A-55	3-8	0.10000	0.25060	0.401	310.4	5.2	315.6	**9.44**	Interlaminar Shear	NIAR	81	62	Ken G.	MTS 318.1	6/3/2002
A-55	3-10	0.10020	0.25060	0.401	283.7	5.2	288.9	**8.63**	Interlaminar Shear	NIAR	81	62	Ken G.	MTS 318.1	6/3/2002
A-55	3-12	0.10125	0.25040	0.401	305.7	5.2	310.9	**9.20**	Interlaminar Shear	NIAR	81	62	Ken G.	MTS 318.1	6/3/2002
A-55	8-14	0.09850	0.24950	0.401	243.9	5.2	249.1	**7.60**	Interlaminar Shear	NIAR	81	62	Ken G.	MTS 318.1	6/3/2002
A-55	8-16	0.09895	0.24965	0.401	270.4	5.2	275.6	**8.37**	Interlaminar Shear	NIAR	81	62	Ken G.	MTS 318.1	6/3/2002
A-55	8-18	0.09980	0.24960	0.401	264.8	5.2	270.0	**8.13**	Interlaminar Shear	NIAR	81	62	Ken G.	MTS 318.1	6/3/2002
B-56	1-1	0.10070	0.24895	0.413	292.1	0.0	292.1	**8.74**	Interlaminar Shear	TCA	73	50	John S.	Inst 4505	5/20/2002
B-56	1-3	0.10095	0.25050	0.413	315.1	0.0	315.1	**9.35**	Interlaminar Shear	TCA	73	50	John S.	Inst 4505	5/20/2002
B-56	1-5	0.10075	0.25025	0.413	301.6	0.0	301.6	**8.97**	Interlaminar Shear	TCA	73	50	John S.	Inst 4505	5/20/2002
B-56	3-7	0.10135	0.25065	0.413	326.2	0.0	326.2	**9.63**	Interlaminar Shear	TCA	73	50	John S.	Inst 4505	5/20/2002
B-56	3-9	0.10165	0.25060	0.413	320.6	0.0	320.6	**9.44**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4505	5/20/2002
B-56	3-11	0.10125	0.25065	0.413	316.4	0.0	316.4	**9.35**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4505	5/20/2002
B-56	8-13	0.10370	0.24950	0.413	309.4	0.0	309.4	**8.97**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4505	5/20/2002
B-56	8-15	0.10400	0.24955	0.413	315.0	0.0	315.0	**9.10**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4505	5/20/2002
B-56	1-2	0.10080	0.25050	0.413	297.2	5.2	302.4	**8.98**	Interlaminar Shear	NIAR	78	65	Ken G.	MTS 318.1	6/3/2002
B-56	1-4	0.10095	0.25040	0.413	302.4	5.2	307.6	**9.13**	Interlaminar Shear	NIAR	79	66	Ken G.	MTS 318.1	6/3/2002
B-56	1-6	0.10025	0.25010	0.413	289.5	5.2	294.7	**8.81**	Interlaminar Shear	NIAR	79	66	Ken G.	MTS 318.1	6/3/2002
B-56	3-8	0.10145	0.25070	0.413	323.8	5.2	329.0	**9.70**	Interlaminar Shear	NIAR	79	66	Ken G.	MTS 318.1	6/3/2002
B-56	3-10	0.10150	0.25060	0.413	290.3	5.2	295.5	**8.71**	Interlaminar Shear	NIAR	79	66	Ken G.	MTS 318.1	6/3/2002
B-56	3-12	0.10075	0.25050	0.413	282.0	5.2	287.2	**8.53**	Interlaminar Shear	NIAR	79	66	Ken G.	MTS 318.1	6/3/2002
B-56	8-14	0.10375	0.24950	0.413	300.1	5.2	305.3	**8.84**	Interlaminar Shear	NIAR	79	66	Ken G.	MTS 318.1	6/3/2002
B-56	8-16	0.10405	0.24940	0.413	297.7	5.2	302.9	**8.75**	Interlaminar Shear	NIAR	79	66	Ken G.	MTS 318.1	6/3/2002
	Average							**8.88**							
	Std, Dev.							**0.557**							
	COV, %							**6.27**							

APPENDIX G. DATES OF PANEL MANUFACTURE AND COPY OF FAA FORM 8130-3

FAA Form 8130-3
Airworthiness Approval Tag
for

F6273C-07M
T700S-12K/#2510
Plain Weave Fabric Prepreg

Panels

1. UNITED STATES

2.

FAA FORM 8130-3

AIRWORTHINESS APPROVAL TAG

U.S. Department of Transportation
Federal Aviation Administration

3. System Tracking Ref. No. P-2

4. Organization TORAY COMPOSITES AMERICA

5. Work Order, Contract, or Invoice Number: FAA PROJ. NO TC 1616SE-A

6. Item	7. Description	8. Part Number	9. Eligibility *	10. Quantity	11. Serial/Batch Number	12. Status/Work
1.	TEST SAMPLES	F6J73C-07M P707AG-15		60 1	—	PROTOTYPE

13. Remarks

CONFORMS TO DOC. MATERIAL QUALIFICATION FOR EPOXY-BASED PREPREG COMPOSITES MATERIAL SYSTEMS, DTD 2, 1999.

Limited life parts must be accompanied by maintenance history including total time/total cycles/time since new.

14.
New [X]
Newly Overhauled [ ]

Certifies that the new or newly overhauled part(s) identified above, except as otherwise specified in block 13 was (were) manufactured in accordance with FAA approved design data and airworthiness.

NOTE: In case of parts to be exported, the special reqirements of the importing country have been met.

19.
Return to Service in Accordance with FAR 43.9

Certifies that the work specified in block 13 (or attached) above was carried out in accordance with FAA airworthiness regulations and in respect to the work performed the part(s) is (are) approved for return to service.

15. Signature	16. FAA Authorization No.:	20. Authorized Signature:	21. Certificate Number:
WING C. CHIN	DAREBSKOBNM		
17. Name *(Typed or Printed)*:	**18. Date:**	**22. Name** *(Typed or Printed)*	**23. Date:**
WING C. CHIN	11-15-99		

FAA Form 8130-3 (11-93)

* (Optional) Installer must cross check eligibility with applicable technical data.

1. Approving National Aviation Authority/Country:	2.	3. System Tracking Ref. No. #P-3
UNITED STATES	**AUTHORIZED RELEASE CERTIFICATE** **FAA Form 8130-3, AIRWORTHINESS APPROVAL TAG**	FAA Project No. TD519SE-A

4. Organization
TC Applicant: LANCAIR, 22550 Nelson Road, Bend, OR 97701
Testing Facility: TORAY COMPOSITES (AMERICA), INC., 19002 50TH AVE. NE, TACOMA, WA 98446

5. Work Order, Contract, or Invoice Number:

6. Item	7. Description	8. Part Number	9. Eligibilty*	10. Quantity	11. Serial/Batch Number	12. Status/Work
1	SBS Test Panel	49, 50	N/A – Test Panels	2	AF020224	N/A – Test Panels
2	SBS Test Panel	51, 52	N/A – Test Panels	2	AF020324	N/A – Test Panels
3	SBS Test Panel	53, 54	N/A – Test Panels	2	AF020422	N/A – Test Panels
4	SBS Test Panel	55, 56	N/A – Test Panels	2	AF020522	N/A – Test Panels

13. Remarks
CONFORMITY
These test panels will be used to machine SBS specimens. This is in association with FAA Project Number TD519SE-A.
Conform all processes associated with the following documents:
1. TCA AGATE Lamina Material Qualification Test Plan, TCQAL-T-1018 Rev. A., April 19, 2002
2. TCA Material Process Specification, TCSPF-T-FC05, Rev. 3, Dec. 18, 2000

14. Certifies the items identified above were manufactured in conformity to:

☐ Approved design data and are in condition for safe operation

☑ Non-approved design data specified in Block 13.

19. ☐ **14 CFR 43.9 Return to Service** ☐ **Other regulation specified in Block 13**

Certifies that unless otherwise specified in block 13, the work identified in Block 12 and described in Block 13 was accomplished in accordance with Title 14, Code of Federal Regulations, part 43 and in respect to that work, the items are approved for return to service.

15. Authorized Signature:	16. FAA Authorization No.:	20. Authorized Signature:	21. Approval/Certificate Number:
[signature]	DXRF351003NM		
17. Name (*Typed or Printed*):	**18. Date**	**22. Name (*Typed or Printed*):**	**23. Date**
WINCE C. CHIN	5-8-2002		

User/Installer Responsibilities

It is important to understand that the existence of this document alone does not automatically constitute authority to install the part/component/assembly.

Where the user/installer performs work in accordance with the national regulations of an airworthiness authority different than the airworthiness authority of the country specified in Block 1, it is essential that the user/installer ensures that his/her airworthiness accepts parts/components/assemblies from the airworthiness authority of the country specified in Block 1.

Statements in Blocks 14 and 19 do not constitute installation certification. In all cases, aircraft maintenance records must contain an installation certification issued in accordance with the national regulations by the user/installer before the aircraft may be flown.

FAA Form 8130-3 (6-01) Installer must cross check eligibility with applicable technical data. NSN: 0052-00-015-9005

P-4

1. UNITED ATES

2. **FAA FORM 8130-3**
AIRWORTHINESS APPROVAL TAG
U.S. Department of Transportation
Federal Aviation Administration

3. System Tracking Ref. No.

4. Organization: TORAY COMPOSITE
19000 50TH AVE E
TACOMA, WA. 98446

5. Work Order, Contract or Invoice Number:
FAA R&D. NO.
TCIGISE-15

6. Item	7. Description	8. Part Number	9. Eligibility *	10. Quantity	11. Serial/Batch Number	12. Status/Work
1.	0° comp	AF991009		2	—	PROTO TYPE
		AF991010		2		
		AF991011		2		
	90° comp	AF991009		2		
		AF991010		2		
		AF991011		2		

13. Remarks

CONFORMS TO: MQMTEBPCMS, DTD. 2-1999.

Limited life parts must be accompanied by maintenance history including total time/total cycles/time since new.

14.
New [X]
Newly Overhauled [ ]

Certifies that the new or newly overhauled part(s) identified above, except as otherwise specified in block 13 was (were) manufactured in accordance with FAA approved design data and airworthiness.

NOTE: In case of parts to be exported, the special reqirements of the importing country have been met.

19.
Return to Service in Accordance with FAR 43.9

Certifies that the work specified in block 13 (or attached) above was carried out in accordance with FAA airworthiness regulations and in respect to the work performed the part(s) is (are) approved for return to service.

15. Signature	16. FAA Authorization No.:	20. Authorized Signature:	21. Certificate Number:
Wing C. Chin	DARF350003L		
17. Name *(Typed or Printed)*:	**18. Date:**	**22. Name** *(Typed or Printed)*	**23. Date:**
WING C. CHIN	3-24-2000		

FAA Form 8130-3 (11-93)

* (Optional) Installer must cross check eligibility with applicable technical data.

FAA Form 8130-3
Airworthiness Approval Tag
for

F6273C-07M
T700S-12K/#2510
Plain Weave Fabric Prepreg

Specimens

1. UNITED STATES	2. **FAA FORM 8130-3** **AIRWORTHINESS APPROVAL TAG** U.S. Department of Transportation **Federal Aviation Administration**	3. System Tracking Ref. No. # / FAA Project No. TC1616SE-15 Dated: 10/1/99

4. Organization
Toray Composites (America), Inc.
19002 50th Ave. N.E.
Tacoma, WA 98446

5. Work Order, Contract, or Invoice Number:

6. Item	7. Description	8. Part Number	9. Eligibilty*	10. Quantity	11. Serial/Batch Number	12. Status/Work
1	0° Tension, Oven A	AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composites Material Systems, Section 4.5.1, Table 4.3	Model LC40-550FG	10	AF991009 A1-910-056-1-1 to 1-10	Test Specimens
2	0° Tension, Oven A			10	AF991009 A2-910-056-1-1 to 1-10	Test Specimens
3	0° Tension, Oven B			10	AF991009 B1-910-056-1-1 to 1-10	Test Specimens
4	0° Tension, Oven B			10	AF991009 B2-910-056-1-1 to 1-10	Test Specimens

13. Remarks Conformity Inspection in support of FAA Project No. TC1616SE-15, dated 10/1/99

Item	Batch	Specimen Type	-65°F (Dry)	RT (Dry)	180°F (Dry)	180°F (Wet)	Spare	Total
1	AF991009	0° Tension, Oven A	1	1	1	1	6	10
2	AF991009	0° Tension, Oven A	1	1	1	1	6	10
3	AF991009	0° Tension, Oven B	1	1	1	1	6	10
4	AF991009	0° Tension, Oven B	1	1	1	1	6	10

Ref. Doc.: AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composite Material Systems, Section 4.5.1, Table 4.3

Limited life parts must be accompanied by maintenance history including total time/total cycles/time since new.

14.
New ☒
New Overhauled ☐

Certifies that the new or newly overhauled part(s) identified above, except as otherwise specified in block 13 was (were) manufactured in accordance with FAA approved design data and airworthiness.

NOTE: In case of parts to be exported, the special requirements of the importing country have been met.

19.
Return to Service in Accordance with FAR 43.9

Certifies that the work specified in block 13 (or attached) above was carried out in accordance with FAA airworthiness regulations and in respect to the work performed the part(s) is (are) approved for return to service.

15. Signature	16. FAA Authorization No.:	20. Authorized Signature:	21. Certificate Number:
Wing C. Chin	DAREF361003NM		
17. Name *(Typed or Printed)*: Wing C. Chin	18. Date 12-13-99	22. Name *(Typed or Printed)*:	23. Date

FAA Form 8130-3 (11-93)

* (Optional) Installer must cross check eligibility with applicable technical data.

1. UNITED STATES	2. **FAA FORM 8130-3** **AIRWORTHINESS APPROVAL TAG** U.S. Department of Transportation **Federal Aviation Administration**	3. System Tracking Ref. No. # 2 FAA Project No. TC1616SE-15 Dated: 10/1/99

4. Organization
Toray Composites (America), Inc.
19002 50th Ave. N.E.
Tacoma, WA 98446

5. Work Order, Contract, or Invoice Number:

6. Item	7. Description	8. Part Number	9. Eligibilty*	10. Quantity	11. Serial/Batch Number	12. Status/Work
1	90° Tension, Oven A	AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composites Material Systems, Section 4.5.1, Table 4.3	Model LC40-550FG	10	AF991009 A1-910-056-1-1 to 1-10	Test Specimens
2	90° Tension, Oven A			10	AF991009 A2-910-056-1-1 to 1-10	Test Specimens
3	90° Tension, Oven B			10	AF991009 B1-910-056-1-1 to 1-10	Test Specimens
4	90° Tension, Oven B			10	AF991009 B2-910-056-1-1 to 1-10	Test Specimens

13. Remarks Conformity Inspection in support of FAA Project No. TC1616SE-15 dated 10/1/99

Item	Batch	Specimen Type	-65°F (Dry)	RT (Dry)	180°F (Dry)	180°F (Wet)	Spare	Total
1	AF991009	90° Tension, Oven A	1	1	1	1	6	10
2	AF991009	90° Tension, Oven A	1	1	1	1	6	10
3	AF991009	90° Tension, Oven B	1	1	1	1	6	10
4	AF991009	90° Tension, Oven B	1	1	1	1	6	10

Ref. Doc.: AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composite Material Systems, Section 4.5.1, Table 4.3

Limited life parts must be accompanied by maintenance history including total time/total cycles/time since new.

14.
New ☒
New Overhauled ☐

Certifies that the new or newly overhauled part(s) identified above, except as otherwise specified in block 13 was (were) manufactured in accordance with FAA approved design data and airworthiness.

NOTE: In case of parts to be exported, the special requirements of the importing country have been met.

19.
Return to Service in Accordance with FAR 43.9

Certifies that the work specified in block 13 (or attached) above was carried out in accordance with FAA airworthiness regulations and in respect to the work performed the part(s) is (are) approved for return to service.

15. Signature	16. FAA Authorization No.:	20. Authorized Signature:	21. Certificate Number:
Wing C. Chin	DAREF351003NM		
17. Name *(Typed or Printed)*: Wing C. Chin	18. Date 12-13-99	22. Name *(Typed or Printed)*:	23. Date

FAA Form 8130-3 (11-93)

* (Optional) Installer must cross check eligibility with applicable technical data.

1. UNITED STATES	2. **FAA FORM 8130-3** **AIRWORTHINESS APPROVAL TAG** U.S. Department of Transportation **Federal Aviation Administration**	3. System Tracking Ref. No. # 3B FAA Project No. TC1616SE-15 Dated: 10/1/99

4. Organization
Toray Composites (America), Inc.
19002 50th Ave. N.E.
Tacoma, WA 98446

5. Work Order, Contract, or Invoice Number:

6. Item	7. Description	8. Part Number	9. Eligibilty*	10. Quantity	11. Serial/Batch Number	12. Status/Work
1	0° Comp. Strength, Oven A	AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composites Material Systems, Section 4.5.1, Table 4.3	Model LC40-550FG	10	AF991009 A-1-910-056-2-1-1-1 to 1-10	Test Specimens
2	0° Comp. Strength, Oven A			9	AF991009 A-2-910-056-2-1-2-1 to 2-9	Test Specimens
3	0° Comp. Strength, Oven B			10	AF991009 B-1-910-056-2-1-1-1 to 1-10	Test Specimens
4	0° Comp. Strength, Oven B			10	AF991009 B-2-910-056-2-1-2-1 to 2-10	Test Specimens

13. Remarks Conformity Inspection in support of FAA Project No. TC1616SE-15, dated 10/1/99

Item	Batch	Specimen Type	-65°F (Dry)	RT (Dry)	180°F (Dry)	180°F (Wet)	Spare	Total
1	AF991009	0° Comp. Strength, Oven A				3	7	10
2	AF991009	0° Comp. Strength, Oven A				3	6	9
3	AF991009	0° Comp. Strength, Oven B				3	7	10
4	AF991009	0° Comp. Strength, Oven B				3	7	10

Ref. Doc.: AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composite Material Systems, Section 4.5.1, Table 4.3

Limited life parts must be accompanied by maintenance history including total time/total cycles/time since new.

14.
New ☒
New Overhauled ☐

Certifies that the new or newly overhauled part(s) identified above, except as otherwise specified in block 13 was (were) manufactured in accordance with FAA approved design data and airworthiness.

NOTE: In case of parts to be exported, the special requirements of the importing country have been met.

19.
Return to Service in Accordance with FAR 43.9

Certifies that the work specified in block 13 (or attached) above was carried out in accordance with FAA airworthiness regulations and in respect to the work performed the part(s) is (are) approved for return to service.

15. Signature	16. FAA Authorization No.:	20. Authorized Signature:	21. Certificate Number:
Wing C. Chin	DARF351003NM		
17. Name *(Typed or Printed)*: Wing C. Chin	18. Date 4-14-2000	22. Name *(Typed or Printed)*:	23. Date

FAA Form 8130-3 (11-93)

* (Optional) Installer must cross check eligibility with applicable technical data.

1. UNITED STATES	2. **FAA FORM 8130-3** **AIRWORTHINESS APPROVAL TAG** U.S. Department of Transportation **Federal Aviation Administration**	3. System Tracking Ref. No # 3C FAA Project No. TC1616SE-15 Dated: 10/1/99

4. Organization
Toray Composites (America), Inc.
19002 50th Ave. N.E.
Tacoma, WA 98446

5. Work Order, Contract, or Invoice Number:

6. Item	7. Description	8. Part Number	9. Eligibilty*	10. Quantity	11. Serial/Batch Number	12. Status/Work
1	0° Comp. Strength, Oven A	AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composites Material Systems, Section 4.5.1, Table 4.3	Model LC40-550FG AT 4/21/00	25 ~~10~~ 25	AF991009 A-1-910-056-2-1-1-1 to 1-25	Test Specimens
2	0° Comp. Strength, Oven B				AF991009 B-1-910-056-2-1-1-1 to 1-25	Test Specimens

13. Remarks Conformity Inspection in support of FAA Project No. TC1616SE-15, dated 10/1/99

Item	Batch	Specimen Type	-65°F (Dry)	RT (Dry)	180°F (Dry)	180°F (Wet)	Spare	Total	
1	AF991009	0° Comp. Strength, Oven A				-	25	25	Ref. Doc.: AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composite Material Systems, Section 4.5.1, Table 4.3
2	AF991009	0° Comp. Strength, Oven B				-	25	25	

Limited life parts must be accompanied by maintenance history including total time/total cycles/time since new.

14.
New ☒
New Overhauled ☐

Certifies that the new or newly overhauled part(s) identified above, except as otherwise specified in block 13 was (were) manufactured in accordance with FAA approved design data and airworthiness.

NOTE: In case of parts to be exported, the special requirements of the importing country have been met.

19.
Return to Service in Accordance with FAR 43.9

Certifies that the work specified in block 13 (or attached) above was carried out in accordance with FAA airworthiness regulations and in respect to the work performed the part(s) is (are) approved for return to service.

15. Signature	16. FAA Authorization No.:	20. Authorized Signature:	21. Certificate Number:
Wing C. Chin	DNRF351003WM		
17. Name *(Typed or Printed)*: Wing C. Chin	18. Date 4-21-2000	22. Name *(Typed or Printed)*:	23. Date

FAA Form 8130-3 (11-93)

* (Optional) Installer must cross check eligibility with applicable technical data.

1. UNITED STATES	2. **FAA FORM 8130-3** **AIRWORTHINESS APPROVAL TAG** U.S. Department of Transportation **Federal Aviation Administration**	3. System Tracking Ref. No. # 4B FAA Project No. TC1616SE-15 Dated: 10/1/99

4. Organization
Toray Composites (America), Inc.
19002 50th Ave. N.E.
Tacoma, WA 98446

5. Work Order, Contract, or Invoice Number:

6. Item	7. Description	8. Part Number	9. Eligibilty*	10. Quantity	11. Serial/Batch Number	12. Status/Work
1	90° Comp. Strength, Oven A	AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composites Material Systems, Section 4.5.1, Table 4.3	Model LC40-550FG	9	AF991009 A-1-910-056-2-1-1-1 to 1-9	Test Specimens
2	90° Comp. Strength, Oven A			10	AF991009 A-2-910-056-2-1-2-1 to 2-10	Test Specimens
3	90° Comp. Strength, Oven B			10	AF991009 B-1-910-056-2-1-1-1 to 1-10	Test Specimens
4	90° Comp. Strength, Oven B			10	AF991009 B-2-910-056-2-1-2-1 to 2-10	Test Specimens

13. Remarks Conformity Inspection in support of FAA Project No. TC1616SE-15, dated 10/1/99

Item	Batch	Specimen Type	-65°F (Dry)	RT (Dry)	180°F (Dry)	180°F (Wet)	Spare	Total
1	AF991009	90° Comp. Strength, Oven A				3	6	9
2	AF991009	90° Comp. Strength, Oven A				3	7	10
3	AF991009	90° Comp. Strength, Oven B				3	7	10
4	AF991009	90° Comp. Strength, Oven B				3	7	10

Ref. Doc.: AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composite Material Systems, Section 4.5.1, Table 4.3

Limited life parts must be accompanied by maintenance history including total time/total cycles/time since new.

14.
New ☒
New Overhauled ☐

Certifies that the new or newly overhauled part(s) identified above, except as otherwise specified in block 13 was (were) manufactured in accordance with FAA approved design data and airworthiness.

NOTE: In case of parts to be exported, the special requirements of the importing country have been met.

19.
Return to Service in Accordance with FAR 43.9

Certifies that the work specified in block 13 (or attached) above was carried out in accordance with FAA airworthiness regulations and in respect to the work performed the part(s) is (are) approved for return to service.

15. Signature	16. FAA Authorization No.:	20. Authorized Signature:	21. Certificate Number:
Wing C. Chin	DXR F351003XM		
17. Name *(Typed or Printed)*: Wing C. Chin	18. Date 4-14-2000	22. Name *(Typed or Printed)*:	23. Date

FAA Form 8130-3 (11-93)

* (Optional) Installer must cross check eligibility with applicable technical data.

1. UNITED STATES	2. **FAA FORM 8130-3** **AIRWORTHINESS APPROVAL TAG** U.S. Department of Transportation **Federal Aviation Administration**	3. System Tracking Ref. No # ~~3E~~ 4C FAA Project No. TC1616SE-15 Dated: 10/1/99

4. Organization
Toray Composites (America), Inc.
19002 50th Ave. N.E.
Tacoma, WA 98446

5. Work Order, Contract, or Invoice Number:

6. Item	7. Description	8. Part Number	9. Eligibilty*	10. Quantity	11. Serial/Batch Number	12. Status/Work
1	90° Comp. Strength, Oven A	AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composites Material Systems, Section 4.5.1, Table 4.3	Model LC40-550FG	20	AF991009 A-1-910-056-2-1-1-1 to 1-20	Test Specimens
2	90° Comp. Strength, Oven B			25	AF991009 B1-910-056-2-1-1-1 to 1-25	Test Specimens

13. Remarks Conformity Inspection in support of FAA Project No. TC1616SE-15, dated 10/1/99

Item	Batch	Specimen Type	-65°F (Dry)	RT (Dry)	180°F (Dry)	180°F (Wet)	Spare	Total	
1	AF991009	90° Comp. Strength, Oven A				-	20	25	Ref. Doc.: AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composite Material Systems, Section 4.5.1, Table 4.3
2	AF991009	90° Comp. Strength, Oven B				-	25	25	

Limited life parts must be accompanied by maintenance history including total time/total cycles/time since new.

14.
New ☒
New Overhauled ☐

Certifies that the new or newly overhauled part(s) identified above, except as otherwise specified in block 13 was (were) manufactured in accordance with FAA approved design data and airworthiness.

NOTE: In case of parts to be exported, the special requirements of the importing country have been met.

19.
Return to Service in Accordance with FAR 43.9

Certifies that the work specified in block 13 (or attached) above was carried out in accordance with FAA airworthiness regulations and in respect to the work performed the part(s) is (are) approved for return to service.

15. Signature	16. FAA Authorization No.:	20. Authorized Signature:	21. Certificate Number:
Wing C. Chin	DARF351002N		
17. Name *(Typed or Printed)*: Wing C. Chin	18. Date 4-21-2000	22. Name *(Typed or Printed)*:	23. Date

FAA Form 8130-3 (11-93)

* (Optional) Installer must cross check eligibility with applicable technical data.

1. UNITED STATES	2. **FAA FORM 8130-3** **AIRWORTHINESS APPROVAL TAG** U.S. Department of Transportation **Federal Aviation Administration**	3. System Tracking Ref. No. # 5 FAA Project No. TC1616SE-15 Dated: 10/1/99

4. Organization
Toray Composites (America), Inc.
19002 50th Ave. N.E.
Tacoma, WA 98446

5. Work Order, Contract, or Invoice Number:

6. Item	7. Description	8. Part Number	9. Eligibilty*	10. Quantity	11. Serial/Batch Number	12. Status/Work
1	0° Comp Modulus, Oven A	AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composites Material Systems, Section 4.5.1, Table 4.3	Model LC40-550FG	6	AF991009 A2-910-056-1-1 to 1-6	Test Specimens
2	0° Comp Modulus, Oven B			6	AF991009 B2-910-056-1-1 to 1-6	Test Specimens
3	90° Comp Modulus, Oven A			6	AF991009 A2-910-056-1-1 to 1-6	Test Specimens
4	90° Comp Modulus, Oven B			6	AF991009 B2-910-056-1-1 to 1-6	Test Specimens

13. Remarks Conformity Inspection in support of FAA Project No. TC1616Se-15, dated 10/1/99

Item	Batch	Specimen Type	-65°F (Dry)	RT (Dry)	180°F (Dry)	180°F (Wet)	Spare	Total
1	AF991009	0° Comp Modulus, Oven A	1	1	1	1	2	6
2	AF991009	0° Comp Modulus, Oven B	1	1	1	1	2	6
3	AF991009	90° Comp Modulus, Oven A	1	1	1	1	2	6
4	AF991009	90° Comp Modulus, Oven B	1	1	1	1	2	6

Ref. Doc.: AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composite Material Systems, Section 4.5.1, Table 4.3

Limited life parts must be accompanied by maintenance history including total time/total cycles/time since new.

14.
New ☒
New Overhauled ☐

Certifies that the new or newly overhauled part(s) identified above, except as otherwise specified in block 13 was (were) manufactured in accordance with FAA approved design data and airworthiness.

NOTE: In case of parts to be exported, the special requirements of the importing country have been met.

19.
Return to Service in Accordance with FAR 43.9

Certifies that the work specified in block 13 (or attached) above was carried out in accordance with FAA airworthiness regulations and in respect to the work performed the part(s) is (are) approved for return to service.

15. Signature	16. FAA Authorization No.:	20. Authorized Signature:	21. Certificate Number:
Wing C. Chin	DAR F 351003N90		
17. Name *(Typed or Printed)*: Wing C. Chin	18. Date 12-13-99	22. Name *(Typed or Printed)*:	23. Date

FAA Form 8130-3 (11-93)

* (Optional) Installer must cross check eligibility with applicable technical data.

1. UNITED STATES	2. **FAA FORM 8130-3** **AIRWORTHINESS APPROVAL TAG** U.S. Department of Transportation **Federal Aviation Administration**	3. System Tracking Ref. No. # 6 FAA Project No. TC1616SE-15 Dated: 10/1/99

4. Organization
Toray Composites (America), Inc.
19002 50th Ave. N.E.
Tacoma, WA 98446

5. Work Order, Contract, or Invoice Number:

6. Item	7. Description	8. Part Number	9. Eligibilty*	10. Quantity	11. Serial/Batch Number	12. Status/Work
1	In-Plane Shear Strength, Oven A	AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composites Material Systems, Section 4.5.1 and Section 4.5.3, Table 4.3 and Table 4.6, respectively	Model LC40-550FG	33	AF991009 A1-910-056-1-1 to 1-33	Test Specimens
2	In-Plane Shear Strength, Oven B			33	AF991009 B1-910-056-1-1 to 1-33	Test Specimens

13. Remarks Conformity Inspection in support of FAA Project No. TC1616SE-15, dated 10/1/99

Item	Batch	Specimen Type	-65°F (Dry)	RT (Dry)	180°F (Dry)	180°F (Wet)	Fluid Sensitivity	Spare	Total	
1	AF991009	In-Plane Shear Strength, Oven A	2	2	2	2	8	17	33	Ref. Doc.: AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composite Material Systems, Section 4.5.1, Table 4.3
2	AF991009	In-Plane Shear Strength, Oven B	2	2	2	2	8	17	33	

Limited life parts must be accompanied by maintenance history including total time/total cycles/time since new.

14.
New ☒
New Overhauled ☐

Certifies that the new or newly overhauled part(s) identified above, except as otherwise specified in block 13 was (were) manufactured in accordance with FAA approved design data and airworthiness.

NOTE: In case of parts to be exported, the special requirements of the importing country have been met.

19.
Return to Service in Accordance with FAR 43.9

Certifies that the work specified in block 13 (or attached) above was carried out in accordance with FAA airworthiness regulations and in respect to the work performed the part(s) is (are) approved for return to service.

15. Signature	16. FAA Authorization No.:	20. Authorized Signature:	21. Certificate Number:
Wing C. Chin	DARF 351003NM		
17. Name (*Typed or Printed*): Wing C. Chin	18. Date 12-21-99	22. Name (*Typed or Printed*):	23. Date

FAA Form 8130-3 (11-93)

* (Optional) Installer must cross check eligibility with applicable technical data.

1. UNITED STATES	2. **FAA FORM 8130-3** **AIRWORTHINESS APPROVAL TAG** U.S. Department of Transportation **Federal Aviation Administration**	3. System Tracking Ref. No. # 7 FAA Project No. TC1616SE-15 Dated: 10/1/99

4. Organization
Toray Composites (America), Inc.
19002 50th Ave. N.E.
Tacoma, WA 98446

5. Work Order, Contract, or Invoice Number:

6. Item	7. Description	8. Part Number	9. Eligibilty*	10. Quantity	11. Serial/Batch Number	12. Status/Work
1	Short Beam Shear	AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composites Material Systems, Section 4.5.1, Table 4.3	Model LC40-550FG	6	AF991009 A1-910-056-1-1 to 1-6	Test Specimens
2	Short Beam Shear			6	AF991009 B1-910-056-1-1 to 1-6	Test Specimens

13. Remarks Conformity Inspection in support of FAA Project No. TC1616SE-15, dated 10/1/99

Item	Batch	Specimen Type	-65°F (Dry)	RT (Dry)	180°F (Dry)	180°F (Wet)	Spare	Total	
1	AF991009	Short Beam Shear	-	3	-	-	3	6	Ref. Doc.: AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composite Material Systems, Section 4.5.1, Table 4.3
2	AF991009	Short Beam Shear	-	3	-	-	3	6	

Limited life parts must be accompanied by maintenance history including total time/total cycles/time since new.

14.
New ☒
New Overhauled ☐

Certifies that the new or newly overhauled part(s) identified above, except as otherwise specified in block 13 was (were) manufactured in accordance with FAA approved design data and airworthiness.

NOTE: In case of parts to be exported, the special requirements of the importing country have been met.

19.
Return to Service in Accordance with FAR 43.9

Certifies that the work specified in block 13 (or attached) above was carried out in accordance with FAA airworthiness regulations and in respect to the work performed the part(s) is (are) approved for return to service.

15. Signature	16. FAA Authorization No.:	20. Authorized Signature:	21. Certificate Number:
Wing C. Chin	DAEF35100-3NM		
17. Name *(Typed or Printed)*: Wing C. Chin	18. Date 12-13-99	22. Name *(Typed or Printed)*:	23. Date

FAA Form 8130-3 (11-93)

* (Optional) Installer must cross check eligibility with applicable technical data.

1. UNITED STATES	2. **FAA FORM 8130-3** **AIRWORTHINESS APPROVAL TAG** U.S. Department of Transportation **Federal Aviation Administration**	3. System Tracking Ref. No. # 8 FAA Project No. TC1616SE-15 Dated: 10/1/99

4. Organization
Toray Composites (America), Inc.
19002 50th Ave. N.E.
Tacoma, WA 98446

5. Work Order, Contract, or Invoice Number:

6. Item	7. Description	8. Part Number	9. Eligibilty*	10. Quantity	11. Serial/Batch Number	12. Status/Work
1	0° Tension, Oven A	AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composites Material Systems, Section 4.5.1, Table 4.3	Model LC40-550FG	10	AF991010 A1-910-057-1-1 to 1-10	Test Specimens
2	0° Tension, Oven A			10	AF991010 A2-910-057-1-1 to 1-10	Test Specimens
3	0° Tension, Oven B			10	AF991010 B1-910-057-1-1 to 1-10	Test Specimens
4	0° Tension, Oven B			10	AF991010 B2-910-057-1-1 to 1-10	Test Specimens

13. Remarks Conformity Inspection in support of FAA Project No. TC1616SE-15, dated 10/1/99

Item	Batch	Specimen Type	-65°F (Dry)	RT (Dry)	180°F (Dry)	180°F (Wet)	Spare	Total
1	AF991010	0° Tension, Oven A	-	1	1	1	7	10
2	AF991010	0° Tension, Oven A	-	1	1	1	7	10
3	AF991010	0° Tension, Oven B	-	1	1	1	7	10
4	AF991010	0° Tension, Oven B	-	1	1	1	7	10

Ref. Doc.: AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composite Material Systems, Section 4.5.1, Table 4.3

Limited life parts must be accompanied by maintenance history including total time/total cycles/time since new.

14.
New ☒
New Overhauled ☐

Certifies that the new or newly overhauled part(s) identified above, except as otherwise specified in block 13 was (were) manufactured in accordance with FAA approved design data and airworthiness.

NOTE: In case of parts to be exported, the special requirements of the importing country have been met.

19.
Return to Service in Accordance with FAR 43.9

Certifies that the work specified in block 13 (or attached) above was carried out in accordance with FAA airworthiness regulations and in respect to the work performed the part(s) is (are) approved for return to service.

15. Signature	16. FAA Authorization No.:	20. Authorized Signature:	21. Certificate Number:
Wing C. Chin	DRF351003NM		
17. Name *(Typed or Printed)*: Wing C. Chin	18. Date 12-13-99	22. Name *(Typed or Printed)*:	23. Date

FAA Form 8130-3 (11-93)

* (Optional) Installer must cross check eligibility with applicable technical data.

1. UNITED STATES	2. **FAA FORM 8130-3** **AIRWORTHINESS APPROVAL TAG** U.S. Department of Transportation **Federal Aviation Administration**	3. System Tracking Ref. No. # 9 FAA Project No. TC1616SE-15 Dated: 10/1/99

4. Organization
Toray Composites (America), Inc.
19002 50th Ave. N.E.
Tacoma, WA 98446

5. Work Order, Contract, or Invoice Number:

6. Item	7. Description	8. Part Number	9. Eligibilty*	10. Quantity	11. Serial/Batch Number	12. Status/Work
1	90° Tension, Oven A	AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composites Material Systems, Section 4.5.1, Table 4.3	Model LC40-550FG	10	AF991010 A1-910-057-1-1 to 1-10	Test Specimens
2	90° Tension, Oven A			10	AF991010 A2-910-057-1-1 to 1-10	Test Specimens
3	90° Tension, Oven B			10	AF991010 B1-910-057-1-1 to 1-10	Test Specimens
4	90° Tension, Oven B			10	AF991010 B2-910-057-1-1 to 1-10	Test Specimens

13. Remarks Conformity Inspection in support of FAA Project No. TC1616SE-15 dated 10/1/99

Item	Batch	Specimen Type	-65°F (Dry)	RT (Dry)	180°F (Dry)	180°F (Wet)	Spare	Total
1	AF991010	90° Tension, Oven A	-	1	1	1	7	10
2	AF991010	90° Tension, Oven A	-	1	1	1	7	10
3	AF991010	90° Tension, Oven B	-	1	1	1	7	10
4	AF991010	90° Tension, Oven B	-	1	1	1	7	10

Ref. Doc.: AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composite Material Systems, Section 4.5.1, Table 4.3

Limited life parts must be accompanied by maintenance history including total time/total cycles/time since new.

14.
New ☒
New Overhauled ☐

Certifies that the new or newly overhauled part(s) identified above, except as otherwise specified in block 13 was (were) manufactured in accordance with FAA approved design data and airworthiness.

NOTE: In case of parts to be exported, the special requirements of the importing country have been met.

19.
Return to Service in Accordance with FAR 43.9

Certifies that the work specified in block 13 (or attached) above was carried out in accordance with FAA airworthiness regulations and in respect to the work performed the part(s) is (are) approved for return to service.

15. Signature	16. FAA Authorization No.:	20. Authorized Signature:	21. Certificate Number:
Wing C. Chin	DAR F351003N		
17. Name *(Typed or Printed)*:	18. Date	22. Name *(Typed or Printed)*:	23. Date
Wing C. Chin	12-13-99		

FAA Form 8130-3 (11-93)

* (Optional) Installer must cross check eligibility with applicable technical data.

1. UNITED STATES	2. **FAA FORM 8130-3** **AIRWORTHINESS APPROVAL TAG** U.S. Department of Transportation **Federal Aviation Administration**	3. System Tracking Ref. No. # 108 FAA Project No. TC1616SE-15 Dated: 10/1/99

4. Organization
Toray Composites (America), Inc.
19002 50th Ave. N.E.
Tacoma, WA 98446

5. Work Order, Contract, or Invoice Number:

6. Item	7. Description	8. Part Number	9. Eligibilty*	10. Quantity	11. Serial/Batch Number	12. Status/Work
1	0° Comp. Strength, Oven A	AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composites Material Systems, Section 4.5.1, Table 4.3	Model LC40-550FG	10	AF991010 A-1-910-057-2-1-1-1 to 1-10	Test Specimens
2	0° Comp. Strength, Oven A			10~~-~~	AF991010 A-2-910-057-2-1-2-1 to 2-10	Test Specimens
3	0° Comp. Strength, Oven B			10	AF991010 B-1-910-057-2-1-1-1 to 1-10	Test Specimens
4	0° Comp. Strength, Oven B			~~10~~ 9	AF991010 B-2-910-057-2-1-2-1 to 2-6	Test Specimens

13. Remarks Conformity Inspection in support of FAA Project No. TC1616SE-15, dated 10/1/99

Item	Batch	Specimen Type	-65°F (Dry)	RT (Dry)	180°F (Dry)	180°F (Wet)	Spare	Total
1	AF991010	0° Comp. Strength, Oven A				3	7	10
2	AF991010	0° Comp. Strength, Oven A				3	7	10
3	AF991010	0° Comp. Strength, Oven B				3	7	10
4	AF991010	0° Comp. Strength, Oven B				3	7	10

Ref. Doc.: AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composite Material Systems, Section 4.5.1, Table 4.3

Limited life parts must be accompanied by maintenance history including total time/total cycles/time since new.

14.
New ☒
New Overhauled ☐

Certifies that the new or newly overhauled part(s) identified above, except as otherwise specified in block 13 was (were) manufactured in accordance with FAA approved design data and airworthiness.

NOTE: In case of parts to be exported, the special requirements of the importing country have been met.

19.
Return to Service in Accordance with FAR 43.9

Certifies that the work specified in block 13 (or attached) above was carried out in accordance with FAA airworthiness regulations and in respect to the work performed the part(s) is (are) approved for return to service.

15. Signature	16. FAA Authorization No.:	20. Authorized Signature:	21. Certificate Number:
Wing C. Chin	DARF351003N60		
17. Name *(Typed or Printed)*: Wing C. Chin	18. Date 4-14-2000	22. Name *(Typed or Printed)*:	23. Date

FAA Form 8130-3 (11-93)

* (Optional) Installer must cross check eligibility with applicable technical data.

1. UNITED STATES	2. **FAA FORM 8130-3** **AIRWORTHINESS APPROVAL TAG** U.S. Department of Transportation **Federal Aviation Administration**	3. System Tracking Ref. No # 10C FAA Project No. TC1616SE-15 Dated: 10/1/99

4. Organization
Toray Composites (America), Inc.
19002 50th Ave. N.E.
Tacoma, WA 98446

5. Work Order, Contract, or Invoice Number:

6. Item	7. Description	8. Part Number	9. Eligibilty*	10. Quantity	11. Serial/Batch Number	12. Status/Work
1	0° Comp. Strength, Oven A	AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composites Material Systems, Section 4.5.1, Table 4.3	Model LC40-550FG	14	AF991010 A-1-910-057-2-1-1-1 to 1-14	Test Specimens
2	0° Comp. Strength, Oven B			13	AF991010 B-1-910-057-2-1-1-1 to 1-13	Test Specimens

13. Remarks Conformity Inspection in support of FAA Project No. TC1616SE-15, dated 10/1/99

Item	Batch	Specimen Type	-65°F (Dry)	RT (Dry)	180°F (Dry)	180°F (Wet)	Spare	Total	
1	AF991010	0° Comp. Strength, Oven A				-	14	14	Ref. Doc.: AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composite Material Systems, Section 4.5.1, Table 4.3
2	AF991010	0° Comp. Strength, Oven B				-	13	13	

Limited life parts must be accompanied by maintenance history including total time/total cycles/time since new.

14.
New ☒
New Overhauled ☐

Certifies that the new or newly overhauled part(s) identified above, except as otherwise specified in block 13 was (were) manufactured in accordance with FAA approved design data and airworthiness.

NOTE: In case of parts to be exported, the special requirements of the importing country have been met.

19.
Return to Service in Accordance with FAR 43.9

Certifies that the work specified in block 13 (or attached) above was carried out in accordance with FAA airworthiness regulations and in respect to the work performed the part(s) is (are) approved for return to service.

15. Signature	16. FAA Authorization No.:	20. Authorized Signature:	21. Certificate Number:
Wing C. Chin	DAAF35K003MM		
17. Name *(Typed or Printed)*: Wing C. Chin	18. Date 4-21-2000	22. Name *(Typed or Printed)*:	23. Date

FAA Form 8130-3 (11-93)

* (Optional) Installer must cross check eligibility with applicable technical data.

1. UNITED STATES	2. **FAA FORM 8130-3** **AIRWORTHINESS APPROVAL TAG** U.S. Department of Transportation **Federal Aviation Administration**	3. System Tracking Ref. No. # 113 FAA Project No. TC1616SE-15 Dated: 10/1/99

4. Organization
Toray Composites (America), Inc.
19002 50th Ave. N.E.
Tacoma, WA 98446

5. Work Order, Contract, or Invoice Number:

6. Item	7. Description	8. Part Number	9. Eligibilty*	10. Quantity	11. Serial/Batch Number	12. Status/Work
1	0° Comp. Strength, Oven A	AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composites Material Systems, Section 4.5.1, Table 4.3	Model LC40-550FG	10	AF991011 A-1-910-058-2-1-1-1 to 1-10	Test Specimens
2	0° Comp. Strength, Oven A			10	AF991011 A-2-910-058-2-1-2-1 to 2-10	Test Specimens
3	0° Comp. Strength, Oven B			10	AF991011 B-1-910-058-2-1-1-1 to 1-10	Test Specimens
4	0° Comp. Strength, Oven B			10	AF991011 B-2-910-058-2-1-2-1 to 2-10	Test Specimens

13. Remarks Conformity Inspection in support of FAA Project No. TC1616SE-15, dated 10/1/99

Item	Batch	Specimen Type	-65°F (Dry)	RT (Dry)	180°F (Dry)	180°F (Wet)	Spare	Total
1	AF991011	0° Comp. Strength, Oven A				3	9	12
2	AF991011	0° Comp. Strength, Oven B				3	9	12
3								
4								

Ref. Doc.: AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composite Material Systems, Section 4.5.1, Table 4.3

Limited life parts must be accompanied by maintenance history including total time/total cycles/time since new.

14.
New ☒
New Overhauled ☐

Certifies that the new or newly overhauled part(s) identified above, except as otherwise specified in block 13 was (were) manufactured in accordance with FAA approved design data and airworthiness.

NOTE: In case of parts to be exported, the special requirements of the importing country have been met.

19.
Return to Service in Accordance with FAR 43.9

Certifies that the work specified in block 13 (or attached) above was carried out in accordance with FAA airworthiness regulations and in respect to the work performed the part(s) is (are) approved for return to service.

15. Signature	16. FAA Authorization No.:	20. Authorized Signature:	21. Certificate Number:
Wing C. Chin	DARF351003N00		
17. Name (*Typed or Printed*): Wing C. Chin	18. Date 4-14-2000	22. Name (*Typed or Printed*):	23. Date

FAA Form 8130-3 (11-93)

* (Optional) Installer must cross check eligibility with applicable technical data.

1. UNITED STATES	2. **FAA FORM 8130-3** **AIRWORTHINESS APPROVAL TAG** U.S. Department of Transportation **Federal Aviation Administration**	3. System Tracking Ref. No. # 11C FAA Project No. TC1616SE-15 Dated: 10/1/99

4. Organization	5. Work Order, Contract, or Invoice Number:
Toray Composites (America), Inc. 19002 50th Ave. N.E. Tacoma, WA 98446	

6. Item	7. Description	8. Part Number	9. Eligibilty*	10. Quantity	11. Serial/Batch Number	12. Status/Work
1	90° Comp. Strength, Oven A	AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composites Material Systems, Section 4.5.1, Table 4.3	Model LC40-550FG	13	AF991010 A-1-910-057-2-1-1-1 to 1-13	Test Specimens
2	90° Comp. Strength, Oven B			13	AF991010 B-1-910-057-2-1-1-1 to 1-13	Test Specimens

13. Remarks Conformity Inspection in support of FAA Project No. TC1616SE-15, dated 10/1/99

Item	Batch	Specimen Type	-65°F (Dry)	RT (Dry)	180°F (Dry)	180°F (Wet)	Spare	Total	
1	AF991010	90° Comp. Strength, Oven A				-	13	13	Ref. Doc.: AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composite Material Systems, Section 4.5.1, Table 4.3
2	AF991010	90° Comp. Strength, Oven B				-	13	13	

Limited life parts must be accompanied by maintenance history including total time/total cycles/time since new.

14.
New ☒
New Overhauled ☐

Certifies that the new or newly overhauled part(s) identified above, except as otherwise specified in block 13 was (were) manufactured in accordance with FAA approved design data and airworthiness.

NOTE: In case of parts to be exported, the special requirements of the importing country have been met.

19.
Return to Service in Accordance with FAR 43.9

Certifies that the work specified in block 13 (or attached) above was carried out in accordance with FAA airworthiness regulations and in respect to the work performed the part(s) is (are) approved for return to service.

15. Signature	16. FAA Authorization No.:	20. Authorized Signature:	21. Certificate Number:
Wing C. Chin	DAPF357003NM		
17. Name (*Typed or Printed*): Wing C. Chin	18. Date 4-21-2000	22. Name (*Typed or Printed*):	23. Date

FAA Form 8130-3 (11-93)

* (Optional) Installer must cross check eligibility with applicable technical data.

1. UNITED STATES	2. **FAA FORM 8130-3** **AIRWORTHINESS APPROVAL TAG** U.S. Department of Transportation **Federal Aviation Administration**	3. System Tracking Ref. No. # 12 FAA Project No. TC1616SE-15 Dated: 10/1/99

4. Organization
Toray Composites (America), Inc.
19002 50th Ave. N.E.
Tacoma, WA 98446

5. Work Order, Contract, or Invoice Number:

6. Item	7. Description	8. Part Number	9. Eligibilty*	10. Quantity	11. Serial/Batch Number	12. Status/Work
1	0° Comp Modulus, Oven A	AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composites Material Systems, Section 4.5.1, Table 4.3	Model LC40-550FG	6	AF991010 A2-910-057-1-1 to 1-6	Test Specimens
2	0° Comp Modulus, Oven B			6	AF991010 B2-910-057-1-1 to 1-6	Test Specimens
3	90° Comp Modulus, Oven A			6	AF991010 A2-910-057-1-1 to 1-6	Test Specimens
4	90° Comp Modulus, Oven B			6	AF991010 B2-910-057-1-1 to 1-6	Test Specimens

13. Remarks Conformity Inspection in support of FAA Project No. TC1616Se-15, dated 10/1/99

Item	Batch	Specimen Type	-65°F (Dry)	RT (Dry)	180°F (Dry)	180°F (Wet)	Spare	Total
1	AF991010	0° Comp Modulus, Oven A	-	1	1	1	3	6
2	AF991010	0° Comp Modulus, Oven B	-	1	1	1	3	6
3	AF991010	90° Comp Modulus, Oven A	-	1	1	1	3	6
4	AF991010	90° Comp Modulus, Oven B	-	1	1	1	3	6

Ref. Doc.: AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composite Material Systems, Section 4.5.1, Table 4.3

Limited life parts must be accompanied by maintenance history including total time/total cycles/time since new.

14.
New ☒
New Overhauled ☐

Certifies that the new or newly overhauled part(s) identified above, except as otherwise specified in block 13 was (were) manufactured in accordance with FAA approved design data and airworthiness.

NOTE: In case of parts to be exported, the special requirements of the importing country have been met.

19.
Return to Service in Accordance with FAR 43.9

Certifies that the work specified in block 13 (or attached) above was carried out in accordance with FAA airworthiness regulations and in respect to the work performed the part(s) is (are) approved for return to service.

15. Signature	16. FAA Authorization No.:	20. Authorized Signature:	21. Certificate Number:
Wing C. Chin	DAREF351003WM		
17. Name *(Typed or Printed)*: Wing C. Chin	18. Date 12-13-99	22. Name *(Typed or Printed)*:	23. Date

FAA Form 8130-3 (11-93)

* (Optional) Installer must cross check eligibility with applicable technical data.

1. UNITED STATES	2. **FAA FORM 8130-3** **AIRWORTHINESS APPROVAL TAG** U.S. Department of Transportation **Federal Aviation Administration**	3. System Tracking Ref. No. # 13 FAA Project No. TC1616SE-15 Dated: 10/1/99

4. Organization
Toray Composites (America), Inc.
19002 50th Ave. N.E.
Tacoma, WA 98446

5. Work Order, Contract, or Invoice Number:

6. Item	7. Description	8. Part Number	9. Eligibilty*	10. Quantity	11. Serial/Batch Number	12. Status/Work
1	In-Plane Shear Strength, Oven A	AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composites Material Systems, Section 4.5.1 and Section 4.5.3, Table 4.3 and Table 4.6, respectively	Model LC40-550FG	33	AF991010 A1-910-057-1-1 to 1-33	Test Specimens
2	In-Plane Shear Strength, Oven B			33	AF991010 B1-910-057-1-1 to 1-33	Test Specimens

13. Remarks Conformity Inspection in support of FAA Project No. TC1616SE-15, dated 10/1/99

Item	Batch	Specimen Type	-65°F (Dry)	RT (Dry)	180°F (Dry)	180°F (Wet)	Fluid Sensitivity	Spare	Total	
1	AF991010	In-Plane Shear Strength, Oven A	-	2	2	2	-	27	33	Ref. Doc.: AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composite Material Systems, Section 4.5.1, Table 4.3
2	AF991010	In-Plane Shear Strength, Oven B	-	2	2	2	-	27	33	

Limited life parts must be accompanied by maintenance history including total time/total cycles/time since new.

14.
New ☒
New Overhauled ☐

Certifies that the new or newly overhauled part(s) identified above, except as otherwise specified in block 13 was (were) manufactured in accordance with FAA approved design data and airworthiness.

NOTE: In case of parts to be exported, the special requirements of the importing country have been met.

19.
Return to Service in Accordance with FAR 43.9

Certifies that the work specified in block 13 (or attached) above was carried out in accordance with FAA airworthiness regulations and in respect to the work performed the part(s) is (are) approved for return to service.

15. Signature	16. FAA Authorization No.:	20. Authorized Signature:	21. Certificate Number:
Wing C. Chin	DAIF351003NM		
17. Name (*Typed or Printed*): Wing C. Chin	18. Date 12-21-99	22. Name (*Typed or Printed*):	23. Date

FAA Form 8130-3 (11-93)

* (Optional) Installer must cross check eligibility with applicable technical data.

1. UNITED STATES	2. **FAA FORM 8130-3** **AIRWORTHINESS APPROVAL TAG** U.S. Department of Transportation **Federal Aviation Administration**	3. System Tracking Ref. No. # 14 FAA Project No. TC1616SE-15 Dated: 10/1/99

4. Organization
Toray Composites (America), Inc.
19002 50th Ave. N.E.
Tacoma, WA 98446

5. Work Order, Contract, or Invoice Number:

6. Item	7. Description	8. Part Number	9. Eligibilty*	10. Quantity	11. Serial/Batch Number	12. Status/Work
1	Short Beam Shear	AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composites Material Systems, Section 4.5.1, Table 4.3	Model LC40-550FG	6	AF991010 A1-910-057-1-1 to 1-6	Test Specimens
2	Short Beam Shear			6	AF991010 B1-910-057-1-1 to 1-6	Test Specimens

13. Remarks Conformity Inspection in support of FAA Project No. TC1616SE-15, dated 10/1/99

Item	Batch	Specimen Type	-65°F (Dry)	RT (Dry)	180°F (Dry)	180°F (Wet)	Spare	Total	
1	AF991010	Short Beam Shear	-	3	-	-	3	6	Ref. Doc.: AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composite Material Systems, Section 4.5.1, Table 4.3
2	AF991010	Short Beam Shear	-	3	-	-	3	6	

Limited life parts must be accompanied by maintenance history including total time/total cycles/time since new.

14.
New ☒
New Overhauled ☐

Certifies that the new or newly overhauled part(s) identified above, except as otherwise specified in block 13 was (were) manufactured in accordance with FAA approved design data and airworthiness.

NOTE: In case of parts to be exported, the special requirements of the importing country have been met.

19.
Return to Service in Accordance with FAR 43.9

Certifies that the work specified in block 13 (or attached) above was carried out in accordance with FAA airworthiness regulations and in respect to the work performed the part(s) is (are) approved for return to service.

15. Signature	16. FAA Authorization No.:	20. Authorized Signature:	21. Certificate Number:
Wing C. Chin	DAE F351003NM		
17. Name (*Typed or Printed*): Wing C. Chin	18. Date 12-13-99	22. Name (*Typed or Printed*):	23. Date

FAA Form 8130-3 (11-93)

* (Optional) Installer must cross check eligibility with applicable technical data.

1. UNITED STATES	2. **FAA FORM 8130-3** **AIRWORTHINESS APPROVAL TAG** U.S. Department of Transportation **Federal Aviation Administration**	3. System Tracking Ref. No. # 15 FAA Project No. TC1616SE-15 Dated: 10/1/99

4. Organization
Toray Composites (America), Inc.
19002 50th Ave. N.E.
Tacoma, WA 98446

5. Work Order, Contract, or Invoice Number:

6. Item	7. Description	8. Part Number	9. Eligibilty*	10. Quantity	11. Serial/Batch Number	12. Status/Work
1	0° Tension, Oven A	AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composites Material Systems, Section 4.5.1, Table 4.3	Model LC40-550FG	10	AF991011 A1-910-058-1-1 to 1-10	Test Specimens
2	0° Tension, Oven A			10	AF991011 A2-910-058-1-1 to 1-10	Test Specimens
3	0° Tension, Oven B			10	AF991011 B1-910-058-1-1 to 1-10	Test Specimens
4	0° Tension, Oven B			10	AF991011 B2-910-058-1-1 to 1-10	Test Specimens

13. Remarks Conformity Inspection in support of FAA Project No. TC1616SE-15, dated 10/1/99

Item	Batch	Specimen Type	-65°F (Dry)	RT (Dry)	180°F (Dry)	180°F (Wet)	Spare	Total
1	AF991011	0° Tension, Oven A	-	1	1	1	7	10
2	AF991011	0° Tension, Oven A	-	1	1	1	7	10
3	AF991011	0° Tension, Oven B	-	1	1	1	7	10
4	AF991011	0° Tension, Oven B	-	1	1	1	7	10

Ref. Doc.: AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composite Material Systems, Section 4.5.1, Table 4.3

Limited life parts must be accompanied by maintenance history including total time/total cycles/time since new.

14.
New ☒
New Overhauled ☐

Certifies that the new or newly overhauled part(s) identified above, except as otherwise specified in block 13 was (were) manufactured in accordance with FAA approved design data and airworthiness.

NOTE: In case of parts to be exported, the special requirements of the importing country have been met.

19.
Return to Service in Accordance with FAR 43.9

Certifies that the work specified in block 13 (or attached) above was carried out in accordance with FAA airworthiness regulations and in respect to the work performed the part(s) is (are) approved for return to service.

15. Signature	16. FAA Authorization No.:	20. Authorized Signature:	21. Certificate Number:
Wing C. Chin	DAEF351003N		
17. Name *(Typed or Printed)*: Wing C. Chin	18. Date 12-13-99	22. Name *(Typed or Printed)*:	23. Date

FAA Form 8130-3 (11-93)

* (Optional) Installer must cross check eligibility with applicable technical data.

1. UNITED STATES	2. **FAA FORM 8130-3** **AIRWORTHINESS APPROVAL TAG** U.S. Department of Transportation **Federal Aviation Administration**	3. System Tracking Ref. No. # 16 FAA Project No. TC1616SE-15 Dated: 10/1/99

4. Organization
Toray Composites (America), Inc.
19002 50th Ave. N.E.
Tacoma, WA 98446

5. Work Order, Contract, or Invoice Number:

6. Item	7. Description	8. Part Number	9. Eligibilty*	10. Quantity	11. Serial/Batch Number	12. Status/Work
1	90° Tension, Oven A	AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composites Material Systems, Section 4.5.1, Table 4.3	Model LC40-550FG	10	AF991011 A1-910-058-1-1 to 1-10	Test Specimens
2	90° Tension, Oven A			10	AF991011 A2-910-058-1-1 to 1-10	Test Specimens
3	90° Tension, Oven B			10	AF991011 B1-910-058-1-1 to 1-10	Test Specimens
4	90° Tension, Oven B			10	AF991011 B2-910-058-1-1 to 1-10	Test Specimens

13. Remarks Conformity Inspection in support of FAA Project No. TC1616SE-15 dated 10/1/99

Item	Batch	Specimen Type	-65°F (Dry)	RT (Dry)	180°F (Dry)	180°F (Wet)	Spare	Total
1	AF991011	90° Tension, Oven A	-	1	1	1	7	10
2	AF991011	90° Tension, Oven A	-	1	1	1	7	10
3	AF991011	90° Tension, Oven B	-	1	1	1	7	10
4	AF991011	90° Tension, Oven B	-	1	1	1	7	10

Ref. Doc.: AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composite Material Systems, Section 4.5.1, Table 4.3

Limited life parts must be accompanied by maintenance history including total time/total cycles/time since new.

14.
New ☒
New Overhauled ☐

Certifies that the new or newly overhauled part(s) identified above, except as otherwise specified in block 13 was (were) manufactured in accordance with FAA approved design data and airworthiness.

NOTE: In case of parts to be exported, the special requirements of the importing country have been met.

19.
Return to Service in Accordance with FAR 43.9

Certifies that the work specified in block 13 (or attached) above was carried out in accordance with FAA airworthiness regulations and in respect to the work performed the part(s) is (are) approved for return to service.

15. Signature	16. FAA Authorization No.:	20. Authorized Signature:	21. Certificate Number:
Wing C. Chin	DAPF351003N		
17. Name *(Typed or Printed):*	**18. Date**	**22. Name** *(Typed or Printed):*	**23. Date**
Wing C. Chin	12-13-99		

FAA Form 8130-3 (11-93)

* (Optional) Installer must cross check eligibility with applicable technical data.

1. UNITED STATES	2. **FAA FORM 8130-3** **AIRWORTHINESS APPROVAL TAG** U.S. Department of Transportation **Federal Aviation Administration**	3. System Tracking Ref. No. # 17B FAA Project No. TC1616SE-15 Dated: 10/1/99

4. Organization
Toray Composites (America), Inc.
19002 50th Ave. N.E.
Tacoma, WA 98446

5. Work Order, Contract, or Invoice Number:

6. Item	7. Description	8. Part Number	9. Eligibilty*	10. Quantity	11. Serial/Batch Number	12. Status/Work
1	90° Comp. Strength, Oven A	AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composites Material Systems, Section 4.5.1, Table 4.3	Model LC40-550FG	10	AF991010 A-1-910-057-2-1-1-1 to 1-10	Test Specimens
2	90° Comp. Strength, Oven A			10	AF991010 A-2-910-057-2-1-2-1 to 2-10	Test Specimens
3	90° Comp. Strength, Oven B			9	AF991010 B-1-910-057-2-1-1-1 to 1-9	Test Specimens
4	90° Comp. Strength, Oven B			11	AF991010 B-2-910-057-2-1-2-1 to 2-11	Test Specimens

13. Remarks Conformity Inspection in support of FAA Project No. TC1616SE-15, dated 10/1/99

Item	Batch	Specimen Type	-65°F (Dry)	RT (Dry)	180°F (Dry)	180°F (Wet)	Spare	Total	
1	AF991010	90° Comp. Strength, Oven A				3	7	10	Ref. Doc.: AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composite Material Systems, Section 4.5.1, Table 4.3
2	AF991010	90° Comp. Strength, Oven A				3	7	10	
3	AF991010	90° Comp. Strength, Oven B				3	6	9	
4	AF991010	90° Comp. Strength, Oven B				3	8	11	

Limited life parts must be accompanied by maintenance history including total time/total cycles/time since new.

14.
New ☒
New Overhauled ☐

Certifies that the new or newly overhauled part(s) identified above, except as otherwise specified in block 13 was (were) manufactured in accordance with FAA approved design data and airworthiness.

NOTE: In case of parts to be exported, the special requirements of the importing country have been met.

19.
Return to Service in Accordance with FAR 43.9

Certifies that the work specified in block 13 (or attached) above was carried out in accordance with FAA airworthiness regulations and in respect to the work performed the part(s) is (are) approved for return to service.

15. Signature	16. FAA Authorization No.:	20. Authorized Signature:	21. Certificate Number:
Wing C. Chin	DARF351003N		
17. Name (*Typed or Printed*): Wing C. Chin	18. Date 4-14-2000	22. Name (*Typed or Printed*):	23. Date

FAA Form 8130-3 (11-93)

* (Optional) Installer must cross check eligibility with applicable technical data.

1. UNITED STATES

2.

FAA FORM 8130-3

AIRWORTHINESS APPROVAL TAG

U.S. Department of Transportation

Federal Aviation Administration

3. System Tracking Ref. No # 17C

FAA Project No.
TC1616SE-15
Dated: 10/1/99

4. Organization

Toray Composites (America), Inc.
19002 50th Ave. N.E.
Tacoma, WA 98446

5. Work Order, Contract, or Invoice Number:

6. Item	7. Description	8. Part Number	9. Eligibilty*	10. Quantity	11. Serial/Batch Number	12. Status/Work
1	0° Comp. Strength, Oven A	AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composites Material Systems, Section 4.5.1, Table 4.3	Model LC40-550FG	12	AF991011 A-1-910-058-2-1-1-1 to 1-12	Test Specimens
2	0° Comp. Strength, Oven B			13	AF991011B-1-910-058-2-1-1-1 to 1-13	Test Specimens

13. Remarks Conformity Inspection in support of FAA Project No. TC1616SE-15, dated 10/1/99

Item	Batch	Specimen Type	-65°F (Dry)	RT (Dry)	180°F (Dry)	180°F (Wet)	Spare	Total	
1	AF991011	0° Comp. Strength, Oven A				-	12	12	Ref. Doc.: AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composite Material Systems, Section 4.5.1, Table 4.3
2	AF991011	0° Comp. Strength, Oven B				-	13	13	

Limited life parts must be accompanied by maintenance history including total time/total cycles/time since new.

14.

New ☒

New Overhauled ☐

Certifies that the new or newly overhauled part(s) identified above, except as otherwise specified in block 13 was (were) manufactured in accordance with FAA approved design data and airworthiness.

NOTE: In case of parts to be exported, the special requirements of the importing country have been met.

19.

Return to Service in Accordance with FAR 43.9

Certifies that the work specified in block 13 (or attached) above was carried out in accordance with FAA airworthiness regulations and in respect to the work performed the part(s) is (are) approved for return to service.

15. Signature: Wing C Chin

16. FAA Authorization No.: DAR BS1003NM

17. Name *(Typed or Printed)*: Wing C. Chin

18. Date: 4-21-2000

20. Authorized Signature:

21. Certificate Number:

22. Name *(Typed or Printed)*:

23. Date

FAA Form 8130-3 (11-93)

* (Optional) Installer must cross check eligibility with applicable technical data.

1. UNITED STATES

2.

FAA FORM 8130-3

AIRWORTHINESS APPROVAL TAG

U.S. Department of Transportation

Federal Aviation Administration

3. System Tracking Ref. No. # 188

FAA Project No.
TC1616SE-15
Dated: 10/1/99

4. Organization

Toray Composites (America), Inc.
19002 50th Ave. N.E.
Tacoma, WA 98446

5. Work Order, Contract, or Invoice Number:

6. Item	7. Description	8. Part Number	9. Eligibilty*	10. Quantity	11. Serial/Batch Number	12. Status/Work
1	0° Comp. Strength, Oven A	AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composites Material Systems, Section 4.5.1, Table 4.3	Model LC40-550FG	10	AF991011 A-1-910-058-2-1-1-1 to 1-10	Test Specimens
2	0° Comp. Strength, Oven A			10	AF991011 A-2-910-058-2-1-2-1 to 2-10	Test Specimens
3	0° Comp. Strength, Oven B			10	AF991011 B-1-910-058-2-1-1-1 to 1-10	Test Specimens
4	0° Comp. Strength, Oven B			10	AF991011 B-2-910-058-2-1-2-1 to 2-10	Test Specimens

13. Remarks Conformity Inspection in support of FAA Project No. TC1616SE-15, dated 10/1/99

Item	Batch	Specimen Type	-65°F (Dry)	RT (Dry)	180°F (Dry)	180°F (Wet)	Spare	Total
1	AF991011	0° Comp. Strength, Oven A				3	7	10
2	AF991011	0° Comp. Strength, Oven A				3	7	10
3	AF991011	0° Comp. Strength, Oven B				3	7	10
4	AF991011	0° Comp. Strength, Oven B				3	7	10

Ref. Doc.: AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composite Material Systems, Section 4.5.1, Table 4.3

Limited life parts must be accompanied by maintenance history including total time/total cycles/time since new.

14.

New ☒

New Overhauled ☐

Certifies that the new or newly overhauled part(s) identified above, except as otherwise specified in block 13 was (were) manufactured in accordance with FAA approved design data and airworthiness.

NOTE: In case of parts to be exported, the special requirements of the importing country have been met.

19.

Return to Service in Accordance with FAR 43.9

Certifies that the work specified in block 13 (or attached) above was carried out in accordance with FAA airworthiness regulations and in respect to the work performed the part(s) is (are) approved for return to service.

15. Signature	16. FAA Authorization No.:	20. Authorized Signature:	21. Certificate Number:
Wing C. Chin	DAR F35003M		
17. Name *(Typed or Printed):*	**18. Date**	**22. Name** *(Typed or Printed):*	**23. Date**
Wing C. Chin	4-14-2000		

FAA Form 8130-3 (11-93)

* (Optional) Installer must cross check eligibility with applicable technical data.

1. UNITED STATES	2. **FAA FORM 8130-3** **AIRWORTHINESS APPROVAL TAG** U.S. Department of Transportation **Federal Aviation Administration**	3. System Tracking Ref. No # 18C FAA Project No. TC1616SE-15 Dated: 10/1/99

4. Organization
Toray Composites (America), Inc.
19002 50th Ave. N.E.
Tacoma, WA 98446

5. Work Order, Contract, or Invoice Number:

6. Item	7. Description	8. Part Number	9. Eligibilty*	10. Quantity	11. Serial/Batch Number	12. Status/Work
1	90° Comp. Strength, Oven A	AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composites Material Systems, Section 4.5.1, Table 4.3	Model LC40-550FG	12	AF991011 A-1-910-058-2-1-1-1 to 1-12	Test Specimens
2	90° Comp. Strength, Oven B			14	AF991011 B-1-910-058-2-1-1-1 to 1-14	Test Specimens

13. Remarks Conformity Inspection in support of FAA Project No. TC1616SE-15, dated 10/1/99

Item	Batch	Specimen Type	-65°F (Dry)	RT (Dry)	180°F (Dry)	180°F (Wet)	Spare	Total	
1	AF991011	90° Comp. Strength, Oven A				-	12	12	Ref. Doc.: AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composite Material Systems, Section 4.5.1, Table 4.3
2	AF991011	90° Comp. Strength, Oven B				-	14	14	

Limited life parts must be accompanied by maintenance history including total time/total cycles/time since new.

14.
New ☒
New Overhauled ☐

Certifies that the new or newly overhauled part(s) identified above, except as otherwise specified in block 13 was (were) manufactured in accordance with FAA approved design data and airworthiness.

NOTE: In case of parts to be exported, the special requirements of the importing country have been met.

19.
Return to Service in Accordance with FAR 43.9

Certifies that the work specified in block 13 (or attached) above was carried out in accordance with FAA airworthiness regulations and in respect to the work performed the part(s) is (are) approved for return to service.

15. Signature	16. FAA Authorization No.:	20. Authorized Signature:	21. Certificate Number:
Wing C. Chin	DARE35C003NM		
17. Name *(Typed or Printed)*: Wing C. Chin	18. Date 4-21-2000	22. Name *(Typed or Printed)*:	23. Date

FAA Form 8130-3 (11-93)

* (Optional) Installer must cross check eligibility with applicable technical data.

1. UNITED STATES	2. **FAA FORM 8130-3** **AIRWORTHINESS APPROVAL TAG** U.S. Department of Transportation **Federal Aviation Administration**	3. System Tracking Ref. No. # 19 FAA Project No. TC1616SE-15 Dated: 10/1/99

4. Organization
Toray Composites (America), Inc.
19002 50th Ave. N.E.
Tacoma, WA 98446

5. Work Order, Contract, or Invoice Number:

6. Item	7. Description	8. Part Number	9. Eligibilty*	10. Quantity	11. Serial/Batch Number	12. Status/Work
1	0° Comp Modulus, Oven A	AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composites Material Systems, Section 4.5.1, Table 4.3	Model LC40-550FG	6	AF991011 A2-910-058-1-1 to 1-6	Test Specimens
2	0° Comp Modulus, Oven B			6	AF991011 B2-910-058-1-1 to 1-6	Test Specimens
3	90° Comp Modulus, Oven A			6	AF991011 A2-910-058-1-1 to 1-6	Test Specimens
4	90° Comp Modulus, Oven B			6	AF991011 B2-910-058-1-1 to 1-6	Test Specimens

13. Remarks Conformity Inspection in support of FAA Project No. TC1616Se-15, dated 10/1/99

Item	Batch	Specimen Type	-65°F (Dry)	RT (Dry)	180°F (Dry)	180°F (Wet)	Spare	Total
1	AF991011	0° Comp Modulus, Oven A	-	1	1	1	3	6
2	AF991011	0° Comp Modulus, Oven B	-	1	1	1	3	6
3	AF991011	90° Comp Modulus, Oven A	-	1	1	1	3	6
4	AF991011	90° Comp Modulus, Oven B	-	1	1	1	3	6

Ref. Doc.: AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composite Material Systems, Section 4.5.1, Table 4.3

Limited life parts must be accompanied by maintenance history including total time/total cycles/time since new.

14.
New ☒
New Overhauled ☐

Certifies that the new or newly overhauled part(s) identified above, except as otherwise specified in block 13 was (were) manufactured in accordance with FAA approved design data and airworthiness.

NOTE: In case of parts to be exported, the special requirements of the importing country have been met.

19.
Return to Service in Accordance with FAR 43.9

Certifies that the work specified in block 13 (or attached) above was carried out in accordance with FAA airworthiness regulations and in respect to the work performed the part(s) is (are) approved for return to service.

15. Signature	16. FAA Authorization No.:	20. Authorized Signature:	21. Certificate Number:
Wing C. Chin	DARF351003N		
17. Name (*Typed or Printed*): Wing C. Chin	18. Date 12-13-99	22. Name (*Typed or Printed*):	23. Date

FAA Form 8130-3 (11-93)

* (Optional) Installer must cross check eligibility with applicable technical data.

1. UNITED STATES	2. **FAA FORM 8130-3** **AIRWORTHINESS APPROVAL TAG** U.S. Department of Transportation **Federal Aviation Administration**	3. System Tracking Ref. No. # 20 FAA Project No. TC1616SE-15 Dated: 10/1/99

4. Organization
Toray Composites (America), Inc.
19002 50th Ave. N.E.
Tacoma, WA 98446

5. Work Order, Contract, or Invoice Number:

6. Item	7. Description	8. Part Number	9. Eligibilty*	10. Quantity	11. Serial/Batch Number	12. Status/Work
1	In-Plane Shear Strength, Oven A	AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composites Material Systems, Section 4.5.1 and Section 4.5.3, Table 4.3 and Table 4.6, respectively	Model LC40-550FG	33	AF991011 A1-910-058-1-1 to 1-33	Test Specimens
2	In-Plane Shear Strength, Oven B			33	AF991011 B1-910-058-1-1 to 1-33	Test Specimens

13. Remarks Conformity Inspection in support of FAA Project No. TC1616SE-15, dated 10/1/99

Item	Batch	Specimen Type	-65°F (Dry)	RT (Dry)	180°F (Dry)	180°F (Wet)	Fluid Sensitivity	Spare	Total	
1	AF991011	In-Plane Shear Strength, Oven A	-	2	2	2	-	27	33	Ref. Doc.: AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composite Material Systems, Section 4.5.1, Table 4.3
2	AF991011	In-Plane Shear Strength, Oven B	-	2	2	2	-	27	33	

Limited life parts must be accompanied by maintenance history including total time/total cycles/time since new.

14.
New ☒
New Overhauled ☐

Certifies that the new or newly overhauled part(s) identified above, except as otherwise specified in block 13 was (were) manufactured in accordance with FAA approved design data and airworthiness.

NOTE: In case of parts to be exported, the special requirements of the importing country have been met.

19.
Return to Service in Accordance with FAR 43.9

Certifies that the work specified in block 13 (or attached) above was carried out in accordance with FAA airworthiness regulations and in respect to the work performed the part(s) is (are) approved for return to service.

15. Signature	16. FAA Authorization No.:	20. Authorized Signature:	21. Certificate Number:
Wing C. Chin	DARF351003L		
17. Name *(Typed or Printed):*	**18. Date**	**22. Name** *(Typed or Printed):*	**23. Date**
Wing C. Chin	12-21-99		

FAA Form 8130-3 (11-93)

* (Optional) Installer must cross check eligibility with applicable technical data.

1. UNITED STATES	2. **FAA FORM 8130-3** **AIRWORTHINESS APPROVAL TAG** U.S. Department of Transportation **Federal Aviation Administration**	3. System Tracking Ref. No. # 21 FAA Project No. TC1616SE-15 Dated: 10/1/99

4. Organization
Toray Composites (America), Inc.
19002 50th Ave. N.E.
Tacoma, WA 98446

5. Work Order, Contract, or Invoice Number:

6. Item	7. Description	8. Part Number	9. Eligibilty*	10. Quantity	11. Serial/Batch Number	12. Status/Work
1	Short Beam Shear	AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composites Material Systems, Section 4.5.1, Table 4.3	Model LC40-550FG	6	AF991011 A1-910-058-1-1 to 1-6	Test Specimens
2	Short Beam Shear			6	AF991011 B1-910-058-1-1 to 1-6	Test Specimens

13. Remarks Conformity Inspection in support of FAA Project No. TC1616SE-15, dated 10/1/99

Item	Batch	Specimen Type	-65°F (Dry)	RT (Dry)	180°F (Dry)	180°F (Wet)	Spare	Total	
1	AF991011	Short Beam Shear	-	3	-	-	3	6	Ref. Doc.: AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composite Material Systems, Section 4.5.1, Table 4.3
2	AF991011	Short Beam Shear	-	3	-	-	3	6	

Limited life parts must be accompanied by maintenance history including total time/total cycles/time since new.

14.
New ☒
New Overhauled ☐

Certifies that the new or newly overhauled part(s) identified above, except as otherwise specified in block 13 was (were) manufactured in accordance with FAA approved design data and airworthiness.

NOTE: In case of parts to be exported, the special requirements of the importing country have been met.

19.
Return to Service in Accordance with FAR 43.9

Certifies that the work specified in block 13 (or attached) above was carried out in accordance with FAA airworthiness regulations and in respect to the work performed the part(s) is (are) approved for return to service.

15. Signature	16. FAA Authorization No.:	20. Authorized Signature:	21. Certificate Number:
Wing C. Chin	DAEF351003NM		
17. Name *(Typed or Printed)*: Wing C. Chin	18. Date 12-13-99	22. Name *(Typed or Printed)*:	23. Date

FAA Form 8130-3 (11-93)

* (Optional) Installer must cross check eligibility with applicable technical data.

1. Approving National Aviation Authority/Country:	2.	3. System Tracking Ref. No. #S-5
UNITED STATES	**AUTHORIZED RELEASE CERTIFICATE** **FAA Form 8130-3, AIRWORTHINESS APPROVAL TAG**	FAA Project No. TD519SE-A

4. Organization
TC Applicant: LANCAIR, 22550 Nelson Road, Bend, OR 97701
Testing Facility: TORAY COMPOSITES (AMERICA), INC., 19002 50TH AVE. NE, TACOMA, WA 98446

5. Work Order, Contract, or Invoice Number:

6. Item	7. Description	8. Part Number	9. Eligibilty*	10. Quantity	11. Serial/Batch Number	12. Status/Work
1	SBS Test Specimens	A-49 1-1 thru 1-6	N/A – Test Coupons	6	AF020224	N/A – Test Coupons
2	SBS Test Specimens	A-49 4-7 thru 4-12	N/A – Test Coupons	6	AF020224	N/A – Test Coupons
3	SBS Test Specimens	A-49 8-13 thru 8-18	N/A – Test Coupons	6	AF020224	N/A – Test Coupons
4	SBS Test Specimens	B-49 1-1 thru 1-6	N/A – Test Coupons	6	AF020224	N/A – Test Coupons
5	SBS Test Specimens	B-49 4-7 thru 4-12	N/A – Test Coupons	6	AF020224	N/A – Test Coupons
6	SBS Test Specimens	B-49 8-13 thru 8-18	N/A – Test Coupons	6	AF020224	N/A – Test Coupons

13. Remarks
CONFORMITY
These test panels will be used to machine SBS specimens. This is in association with FAA Project Number TD519SE-A.
Conform all processes associated with the following documents:
1. TCA AGATE Lamina Material Qualification Test Plan, TCQAL-T-1018 Rev. A., April 19, 2002
2. TCA Material Process Specification, TCSPF-T-FC05, Rev. 3, Dec. 18, 2000

14. Certifies the items identified above were manufactured in conformity to:

☐ Approved design data and are in condition for safe operation

☑ Non-approved design data specified in Block 13.

19. ☐ **14 CFR 43.9 Return to Service** ☐ **Other regulation specified in Block 13**

Certifies that unless otherwise specified in block 13, the work identified in Block 12 and described in Block 13 was accomplished in accordance with Title 14, Code of Federal Regulations, part 43 and in respect to that work, the items are approved for return to service.

15. Authorized Signature:	16. FAA Authorization No.:	20. Authorized Signature:	21. Approval/Certificate Number:
Wing C. Chin	DREF351003WM		
17. Name (*Typed or Printed*):	**18. Date**	**22. Name (*Typed or Printed*):**	**23. Date**
WING C. CHIN	5-16-2002		

User/Installer Responsibilities

It is important to understand that the existence of this document alone does not automatically constitute authority to install the part/component/assembly.

Where the user/installer performs work in accordance with the national regulations of an airworthiness authority different than the airworthiness authority of the country specified in Block 1, it is essential that the user/installer ensures that his/her airworthiness accepts parts/components/assemblies from the airworthiness authority of the country specified in Block 1.

Statements in Blocks 14 and 19 do not constitute installation certification. In all cases, aircraft maintenance records must contain an installation certification issued in accordance with the national regulations by the user/installer before the aircraft may be flown.

FAA Form 8130-3 (6-01) Installer must cross check eligibility with applicable technical data. NSN: 0052-00-015-9005

1. Approving National Aviation Authority/Country:	2.	3. System Tracking Ref. No. #S-6
UNITED STATES	**AUTHORIZED RELEASE CERTIFICATE** **FAA Form 8130-3, AIRWORTHINESS APPROVAL TAG**	FAA Project No. TD519SE-A

4. Organization
TC Applicant: LANCAIR, 22550 Nelson Road, Bend, OR 97701
Testing Facility: TORAY COMPOSITES (AMERICA), INC., 19002 50TH AVE. NE, TACOMA, WA 98446

5. Work Order, Contract, or Invoice Number:

6. Item	7. Description	8. Part Number	9. Eligibilty*	10. Quantity	11. Serial/Batch Number	12. Status/Work
1	SBS Test Specimens	A-51 2-1 thru 2-6	N/A – Test Coupons	6	AF020324	N/A – Test Coupons
2	SBS Test Specimens	A-51 5-7 thru 5-12	N/A – Test Coupons	6	AF020324	N/A – Test Coupons
3	SBS Test Specimens	A-51 7-13 thru 7-18	N/A – Test Coupons	6	AF020324	N/A – Test Coupons
4	SBS Test Specimens	B-52 2-1 thru 2-6	N/A – Test Coupons	6	AF020324	N/A – Test Coupons
5	SBS Test Specimens	B-52 5-7 thru 5-12	N/A – Test Coupons	6	AF020324	N/A – Test Coupons
6	SBS Test Specimens	B-52 7-13 thru 7-18	N/A – Test Coupons	6	AF020324	N/A – Test Coupons

13. Remarks
CONFORMITY
These test panels will be used to machine SBS specimens. This is in association with FAA Project Number TD519SE-A.
Conform all processes associated with the following documents:
1. TCA AGATE Lamina Material Qualification Test Plan, TCQAL-T-1018 Rev. A., April 19, 2002
2. TCA Material Process Specification, TCSPF-T-FC05, Rev. 3, Dec. 18, 2000

14. Certifies the items identified above were manufactured in conformity to:

☐ Approved design data and are in condition for safe operation

☑ Non-approved design data specified in Block 13.

19. ☐ **14 CFR 43.9 Return to Service** ☐ **Other regulation specified in Block 13**

Certifies that unless otherwise specified in block 13, the work identified in Block 12 and described in Block 13 was accomplished in accordance with Title 14, Code of Federal Regulations, part 43 and in respect to that work, the items are approved for return to service.

15. Authorized Signature:	16. FAA Authorization No.:	20. Authorized Signature:	21. Approval/Certificate Number:
WINGC. CHIN	DAR F351003NM		
17. Name *(Typed or Printed):*	**18. Date**	**22. Name *(Typed or Printed):***	**23. Date**
WING C. CHIN	5-16-2002		

User/Installer Responsibilities

It is important to understand that the existence of this document alone does not automatically constitute authority to install the part/component/assembly.

Where the user/installer performs work in accordance with the national regulations of an airworthiness authority different than the airworthiness authority of the country specified in Block 1, it is essential that the user/installer ensures that his/her airworthiness accepts parts/components/assemblies from the airworthiness authority of the country specified in Block 1.

Statements in Blocks 14 and 19 do not constitute installation certification. In all cases, aircraft maintenance records must contain an installation certification issued in accordance with the national regulations by the user/installer before the aircraft may be flown.

1. Approving National Aviation Authority/Country: UNITED STATES	2. **AUTHORIZED RELEASE CERTIFICATE** **FAA Form 8130-3, AIRWORTHINESS APPROVAL TAG**	3. System Tracking Ref. No. #S-7 FAA Project No. TD519SE-A

4. Organization
TC Applicant: LANCAIR, 22550 Nelson Road, Bend, OR 97701
Testing Facility: TORAY COMPOSITES (AMERICA), INC., 19002 50TH AVE. NE, TACOMA, WA 98446

5. Work Order, Contract, or Invoice Number:

6. Item	7. Description	8. Part Number	9. Eligibilty*	10. Quantity	11. Serial/Batch Number	12. Status/Work
1	SBS Test Specimens	A-53 1-1 thru 1-6	N/A – Test Coupons	6	AF020422	N/A – Test Coupons
2	SBS Test Specimens	A-53 6-7 thru 6-12	N/A – Test Coupons	6	AF020422	N/A – Test Coupons
3	SBS Test Specimens	A-53 7-13 thru 7-18	N/A – Test Coupons	6	AF020422	N/A – Test Coupons
4	SBS Test Specimens	B-54 1-1 thru 1-6	N/A – Test Coupons	6	AF020422	N/A – Test Coupons
5	SBS Test Specimens	B-54 6-7 thru 6-12	N/A – Test Coupons	6	AF020422	N/A – Test Coupons
6	SBS Test Specimens	B-54 7-13 thru 7-18	N/A – Test Coupons	6	AF020422	N/A – Test Coupons

13. Remarks
CONFORMITY
These test panels will be used to machine SBS specimens. This is in association with FAA Project Number TD519SE-A.
Conform all processes associated with the following documents:
1. TCA AGATE Lamina Material Qualification Test Plan, TCQAL-T-1018 Rev. A., April 19, 2002
2. TCA Material Process Specification, TCSPF-T-FC05, Rev. 3, Dec. 18, 2000

14. Certifies the items identified above were manufactured in conformity to:

☐ Approved design data and are in condition for safe operation

☑ Non-approved design data specified in Block 13.

19. ☐ 14 CFR 43.9 Return to Service ☐ Other regulation specified in Block 13

Certifies that unless otherwise specified in block 13, the work identified in Block 12 and described in Block 13 was accomplished in accordance with Title 14, Code of Federal Regulations, part 43 and in respect to that work, the items are approved for return to service.

15. Authorized Signature:	16. FAA Authorization No.:	20. Authorized Signature:	21. Approval/Certificate Number:
17. Name (*Typed or Printed*):	18. Date	22. Name (*Typed or Printed*):	23. Date
WINDY C. CHIN	5-16-2002		

User/Installer Responsibilities

It is important to understand that the existence of this document alone does not automatically constitute authority to install the part/component/assembly.

Where the user/installer performs work in accordance with the national regulations of an airworthiness authority different than the airworthiness authority of the country specified in Block 1, it is essential that the user/installer ensures that his/her airworthiness accepts parts/components/assemblies from the airworthiness authority of the country specified in Block 1.

Statements in Blocks 14 and 19 do not constitute installation certification. In all cases, aircraft maintenance records must contain an installation certification issued in accordance with the national regulations by the user/installer before the aircraft may be flown.

1. Approving National Aviation Authority/Country:	2.	3. System Tracking Ref. No. #S-8
UNITED STATES	**AUTHORIZED RELEASE CERTIFICATE** **FAA Form 8130-3, AIRWORTHINESS APPROVAL TAG**	FAA Project No. TD519SE-A

4. Organization
TC Applicant: LANCAIR, 22550 Nelson Road, Bend, OR 97701
Testing Facility: TORAY COMPOSITES (AMERICA), INC., 19002 50TH AVE. NE, TACOMA, WA 98446

5. Work Order, Contract, or Invoice Number:

6. Item	7. Description	8. Part Number	9. Eligibilty*	10. Quantity	11. Serial/Batch Number	12. Status/Work
1	SBS Test Specimens	A-55 1-1 thru 1-6	N/A – Test Coupons	6	AF020522	N/A – Test Coupons
2	SBS Test Specimens	A-55 3-7 thru 3-12	N/A – Test Coupons	6	AF020522	N/A – Test Coupons
3	SBS Test Specimens	A-55 8-13 thru 8-18	N/A – Test Coupons	6	AF020522	N/A – Test Coupons
4	SBS Test Specimens	B-56 1-1 thru 1-6	N/A – Test Coupons	6	AF020522	N/A – Test Coupons
5	SBS Test Specimens	B-56 3-7 thru 3-12	N/A – Test Coupons	6	AF020522	N/A – Test Coupons
6	SBS Test Specimens	B-56 8-13 thru 8-18	N/A – Test Coupons	6	AF020522	N/A – Test Coupons

13. Remarks
CONFORMITY
These test panels will be used to machine SBS specimens. This is in association with FAA Project Number TD519SE-A.
Conform all processes associated with the following documents:
1. TCA AGATE Lamina Material Qualification Test Plan, TCQAL-T-1018 Rev. A., April 19, 2002
2. TCA Material Process Specification, TCSPF-T-FC05, Rev. 3, Dec. 18, 2000

14. Certifies the items identified above were manufactured in conformity to:

☐ Approved design data and are in condition for safe operation

☑ Non-approved design data specified in Block 13.

19. ☐ **14 CFR 43.9 Return to Service** ☐ **Other regulation specified in Block 13**

Certifies that unless otherwise specified in block 13, the work identified in Block 12 and described in Block 13 was accomplished in accordance with Title 14, Code of Federal Regulations, part 43 and in respect to that work, the items are approved for return to service.

15. Authorized Signature:	16. FAA Authorization No.:	20. Authorized Signature:	21. Approval/Certificate Number:
Wing C. Chin	DAEF351003NM		
17. Name (*Typed or Printed*):	**18. Date**	**22. Name (*Typed or Printed*):**	**23. Date**
Wing C. Chin	5-16-2002		

User/Installer Responsibilities

It is important to understand that the existence of this document alone does not automatically constitute authority to install the part/component/assembly.

Where the user/installer performs work in accordance with the national regulations of an airworthiness authority different than the airworthiness authority of the country specified in Block 1, it is essential that the user/installer ensures that his/her airworthiness accepts parts/components/assemblies from the airworthiness authority of the country specified in Block 1.

Statements in Blocks 14 and 19 do not constitute installation certification. In all cases, aircraft maintenance records must contain an installation certification issued in accordance with the national regulations by the user/installer before the aircraft may be flown.

FAA Form 8130-3 (6-01) Installer must cross check eligibility with applicable technical data. NSN: 0052-00-015-9005

FAA Form 8110-3
Statement of Compliance with
Federal Aviation Regulations

FAA Form 8100-1
Conformity Inspection Record

FAA Form 8120-10
Request for Conformity

FAA Form 8130-9
Statement of Conformity

for

F6273C-07M
T700S-12K/#2510
Plain Weave Fabric Prepreg

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

STATEMENT OF COMPLIANCE WITH THE FEDERAL AVIATION REGULATIONS

DATE: Aug. 9, 2000

AIRCRAFT OR AIRCRAFT COMPONENT IDENTIFICATION

MAKE	MODEL NO.	TYPE (Airplane, Radio, Helicopter, etc.)	NAME OF APPLICANT
PACUSA	LC40	AIRPLANE	Pacific Aviation Co. USA

LIST OF DATA

IDENTIFICATION	TITLE
TCQAL-T-1013 New Release	AGATE MATERIAL QUALIFICATION OF T700S / #2510 190 g/m2, Plain Weave Fabric Test Conducted Under FAA Project Number: TC1616SE-A This approval is for the Test Results obtained in accordance with AGATE test plan, "Material Qualification Methodology for Epoxy-Based Prepreg Composite Material System", dated February 1999. Toray Composite (America), Inc. Material Specification TCSPF-T-FC05 was used to fabricate specimens.

PURPOSE OF DATA: In support of LC40 Certification effort.

APPLICABLE REQUIREMENTS (List specific sections): FAR 23.603, FAR 23.605, FAR 23.613

CERTIFICATION - Under authority vested by direction of the Administrator and in accordance with conditions and limitations of appointment under Part 183 of the Federal Aviation Regulations, data listed above and on attached sheets numbered _____ have been examined in accordance with established procedures and found to comply with applicable requirements of the Federal Aviation Regulations.

I (We) Therefore ☐ Recommend approval of these data ☒ Approve these data

SIGNATURE(S) OF DESIGNATED ENGINEERING REPRESENTATIVE(S)	DESIGNATION NUMBER(S)	CLASSIFICATION(S)
M. Ashizawa	NM-2249	STRUCTURES

FAA Form 8110-3 (11-70) SUPERSEDES PREVIOUS EDITION GPO 901-613

MAR-27-2000 09:01 SEATTLE MIDO 425 227 1159 P.01/01

FILE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

REQUEST FOR CONFORMITY

To: Manufacturing Inspection District Office
1601 Lind Ave. SW
Renton, WA 98055-4056

Attention: Jim Doyle

Request for Conformity Inspection

- [ ] Part Conformity
- [ ] Installation
- [x] Other Test Specimen

Project No.: TC1616SE-A
Date: October 26, 1999

A conformity inspection pertaining to the subject is requested for the following:

Applicant Name: Pacific Aviation Composites USA, LLC

Company Name: same

Street: 22550 Nelson Road

City: Bend State: OR Zip: 97701

Time/Date Available: [x] Applicant will Contact FAA

Type Installation: Composite material test panels and specimens

Make/Model: Lancair LC40-550FG Quantity: See Test Plan

Requesting Document (P.O.) and Date:

Design Data: (with Revision/Date): Panels and specimens defined in Appendix B of "Material Qualification Methodology for Epoxy-Based Prepreg Composite Material Systems" dated February, 1999; manufactured in accordance with Documents Numbered 2-5 under PAC USA cover letter CA012382 dated October 1, 1999.

Special Instructions: Conformity must take place twice: once on panels and once on specimens.

Contact: Terry Merxbauer At: 541-318-1144 (Phone Number)

FAA Project Manager: Jeff Morfitt, ANM-190S Phone: (425) 227-2595

Remarks: The applicant requests that the conformity inspection be delegated to DAR Wing Chin, DAR No. F351003NM. Conformity of both the panels and specimens will take place at Toray Composites America in Tacoma, WA.

- [ ] T.I.A. Issued
- [x] FAA Form 8100-1 Required
- [ ] T.I.R. Required
- [x] FAA Form 8130-9 Required
- [x] 8130-3 Tags (As Required)

Note: Please return this request for conformity with the FAA conformity document to Modification Branch (ANM-190S -Jeff Morfitt) via the Seattle MIDO (ANM-108S)

FAA Form 8120-10 [illegible]

OMB: 2120-0018

STATEMENT OF CONFORMITY

Section I — Aircraft

1. Make	2. Model
3. Serial No.	4. Registration No.

Section II — Engine

1. Make	2. Model
3. Serial No.	

Section III — Propeller

1. Make	2. Hub Model
3. Blade Model	4. Hub Serial No.
5. Blade Serial Nos.	

Section IV — Certification

I hereby certify that:

☒ A. I have complied with Section 21.33(a.).

☐ B. The aircraft described above, produced under type certificate only (FAR 21 Subpart F), conforms to its type certificate, is in a condition for safe operation, and was flight checked on _____ *(Date)*

☐ C. The engine or propeller described above, presented herewith for type certification, conforms to the type design therefor.

☐ D. The engine or propeller described above produced under type certificate only (FAR 21 Subpart F), conforms to its type certificate and is in a condition for safe operation. The engine or, if applicable, the variable pitch propeller was subjected by the manufacturer to a final operation check on _____ *(Date)*

Deviations: NONE

FAA PROS NO. TC1616SE-A, DTD 10-26-00

Signature of Certifier	Title
Laura A. Tournier	TECHNICAL ENGINEER
Organization: TORAY COMPOSITES (AMERICA)	Date: 8/1/00

FAA Form 8130-9 (11-88) Use Previous Edition

*U.S.GPO:1994-568-012/56

OMB: 2120-0018

STATEMENT OF CONFORMITY

Section I — Aircraft

1. Make	2. Model
3. Serial No.	4. Registration No.

Section II — Engine

1. Make	2. Model
3. Serial No.	

Section III — Propeller

1. Make	2. Hub Model
3. Blade Model	4. Hub Serial No.
5. Blade Serial Nos.	

Section IV — Certification

I hereby certify that:

☐ A. I have complied with Section 21.33(a.).

☐ B. The aircraft described above, produced under type certificate only (FAR 21 Subpart F), conforms to its type certificate, is in a condition for safe operation, and was flight checked on _____ *(Date)*

☐ C. The engine or propeller described above, presented herewith for type certification, conforms to the type design therefor.

☐ D. The engine or propeller described above produced under type certificate only (FAR 21 Subpart F), conforms to its type certificate and is in a condition for safe operation. The engine or, if applicable, the variable pitch propeller was subjected by the manufacturer to a final operation check on _____ *(Date)*

Deviations:

Signature of Certifier: Laura A. Fanucci	Title: TECHNICAL ENGINEER
Organization: TORAY COMPOSITES (AMERICA)	Date: 8-24-00

FAA Form 8130-9 (11-88) Use Previous Edition

*U.S.GPO:1994-568-012/56

Not Subject to OMB Clearance

UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

STATEMENT OF CONFORMITY

SECTION I – AIRCRAFT

1. MAKE	2. MODEL N/A
3. SERIAL NO.	4. REGISTRATION NO.

SECTION II – ENGINE

1. MAKE	2. MODEL
3. SERIAL NO.	

SECTION III – PROPELLER

1. MAKE	2. HUB MODEL
3. BLADE MODEL	4. HUB SERIAL NO.
5. BLADE SERIAL NOS.	

SECTION IV – CERTIFICATION

I hereby certify that:

☑ A. I have complied with Section 21.33(a). CONFORMS TO TCSPF-T-UD06 Rev. 2, DTD 8-9-00

☐ B. The aircraft described above, produced under type certificate only (FAR 21 Subpart F), conforms to its type certificate, is in a condition for safe operation, and was flight checked on _____ (Date).

☐ C. The engine or propeller described above, presented herewith for type certification, conforms to the type design therefor.

☐ D. The engine or propeller described above produced under type certificate only (FAR 21 Subpart F), conforms to its type certificate and is in a condition for safe operation. The engine or, if applicable, the variable pitch propeller was subjected by the manufacturer to a final operational check on _____ (Date).

Deviations: NONE

SIGNATURE OF CERTIFIER Lane A. Jones	TITLE TECHNICAL ENGINEER
ORGANIZATION TORAY COMPOSITES (AMERICA), INC	DATE 12/15/00

FAA Form 8130-9 (9-78) USE PREVIOUS EDITION

OMB: 2120-0018

STATEMENT OF CONFORMITY

Section I — Aircraft

1. Make	2. Model N/A
3. Serial No.	4. Registration No.

Section II — Engine

1. Make	2. Model
3. Serial No.	

Section III — Propeller

1. Make	2. Hub Model
3. Blade Model	4. Hub Serial No.
5. Blade Serial Nos.	

Section IV — Certification

I hereby certify that:

☑ A. I have complied with Section 21.33(a.). CONFORMS TO TSSPF-T-0006 Rev. 3, DATE 12-18-00.

☐ B. The aircraft described above, produced under type certificate only (FAR 21 Subpart F), conforms to its type certificate, is in a condition for safe operation, and was flight checked on _____ *(Date)*

☐ C. The engine or propeller described above, presented herewith for type certification, conforms to the type design therefor.

☐ D. The engine or propeller described above produced under type certificate only (FAR 21 Subpart F), conforms to its type certificate and is in a condition for safe operation. The engine or, if applicable, the variable pitch propeller was subjected by the manufacturer to a final operation check on _____ *(Date)*

Deviations:

NONE

Signature of Certifier Laura A Jamnia	Title TECHNICAL ENGINEER
Organization TORAY COMPOSITES (AMERICA), INC.	Date 1-4-2001

FAA Form 8130-9 (11-88) Use Previous Edition

OMB: 2120-0018

STATEMENT OF CONFORMITY

Section I — Aircraft

1. Make	2. Model
3. Serial No.	4. Registration No.

Section II — Engine

1. Make	2. Model
3. Serial No.	

Section III — Propeller

1. Make	2. Hub Model
3. Blade Model	4. Hub Serial No.
5. Blade Serial Nos.	

Section IV — Certification

I hereby certify that:

☐ A. I have complied with Section 21.33(a.). TCSPF-T-UD06 Rev 3 12-18-00

☐ B. The aircraft described above, produced under type certificate only (FAR 21 Subpart F), conforms to its type certificate, is in a condition for safe operation, and was flight checked on _____ *(Date)*

☐ C. The engine or propeller described above, presented herewith for type certification, conforms to the type design therefor.

☐ D. The engine or propeller described above produced under type certificate only (FAR 21 Subpart F), conforms to its type certificate and is in a condition for safe operation. The engine or, if applicable, the variable pitch propeller was subjected by the manufacturer to a final operation check on _____ *(Date)*

Deviations:

None.

Signature of Certifier	Title
Laura A. Fournier	TECHNICAL ENGINEER
Organization: TORAY COMPOSITES (AMERICA), INC	Date: 2/28/2001

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*U.S.GPO:1994-568-012/56

OMB: 2120-0018

STATEMENT OF CONFORMITY

Section I — Aircraft

1. Make	2. Model
3. Serial No.	4. Registration No.

Section II — Engine

1. Make	2. Model
3. Serial No.	

Section III — Propeller

1. Make	2. Hub Model
3. Blade Model	4. Hub Serial No.
5. Blade Serial Nos.	

Section IV — Certification

I hereby certify that:

☒ A. I have complied with Section 21.33(a.).

☐ B. The aircraft described above, produced under type certificate only (FAR 21 Subpart F), conforms to its type certificate, is in a condition for safe operation, and was flight checked on _____ *(Date)*

☐ C. The engine or propeller described above, presented herewith for type certification, conforms to the type design therefor.

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Deviations: NONE

Signature of Certifier: Samuel T. Train	Title: Senior Technical Engineer
Organization: Toray Composites (America), Inc.	Date: 3/21/01

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Deviations:

None

Signature of Certifier	Title
Laura L. Fournier	TECHNICAL ENGINEER
Organization	**Date**
TORAY COMPOSITES (AMERICA), INC.	4/16/2001

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