Advanced General Aviation Transport Experiments

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

TORAY T700GC-12K-31E/#2510 Unidirectional Tape [US Units]

AGATE-WP3.3-033051-132

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1. INTRODUCTION

This material characterization program was performed to characterize the lamina properties of Toray Composites (America), T700GC-12K-31E/#2510, 150 g/m^2, unidirectional tape, herein designated P707AG-15. The P707AG-15 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 P707AG-15 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-UD06, 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 P707AG-15 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-UD06 "Torayca Unidirectional Carbon Fiber Preimpregnated with Epoxy Resin Prepreg Tape - 250°F Curing System Material and Process Specification," 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) & 90° (fill) Tensile Strength and Modulus
- 0° (warp) & 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.

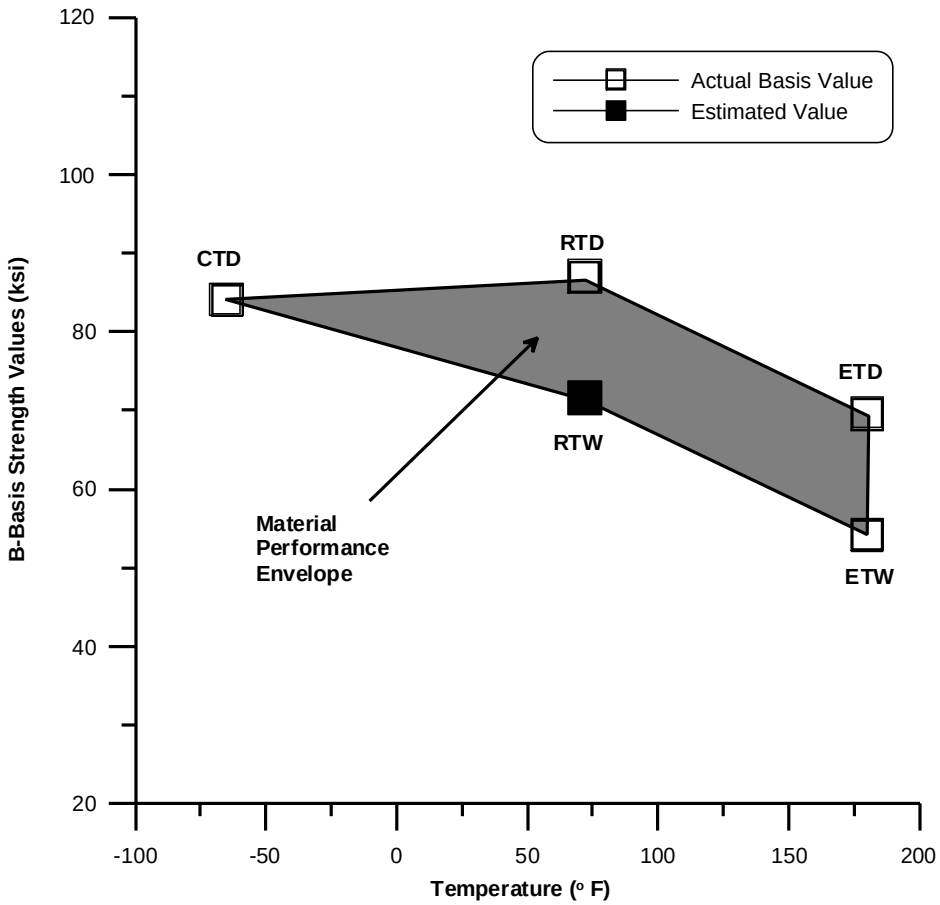


Figure 1.5.1 Material performance envelope.

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^{o} 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^{o} F become

ETD : B_{MOL} = 75.106 ksi

ETW : B_{MOL} = 59.746 ksi

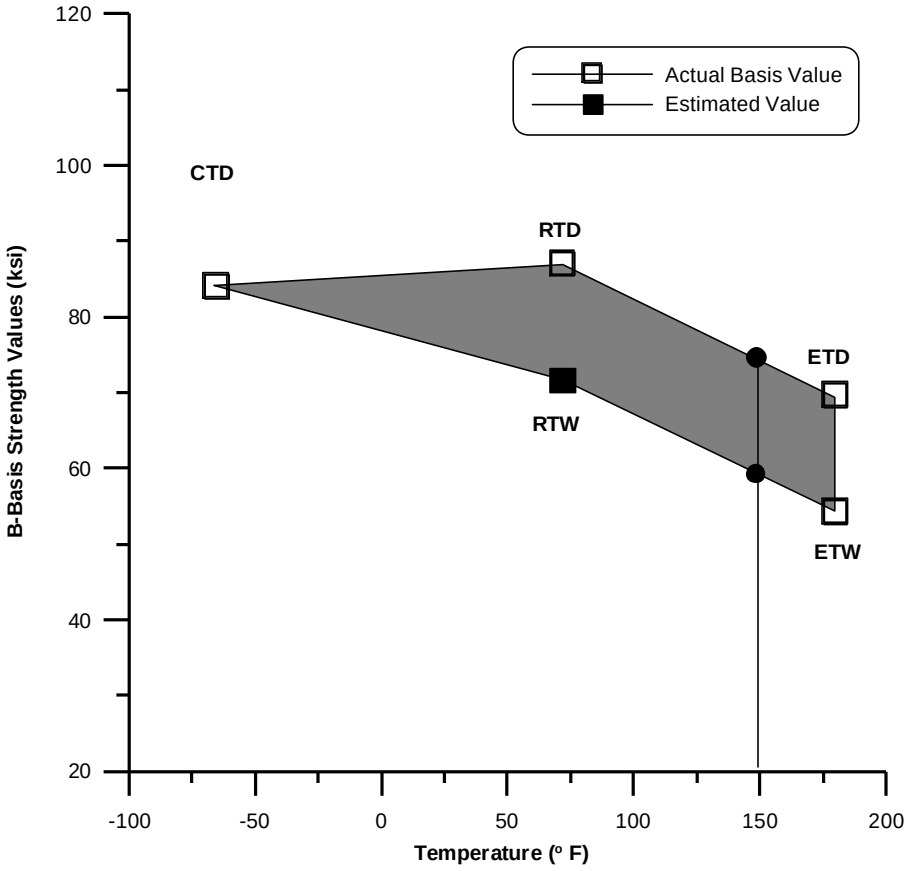


Figure 1.5.2 Example of 150^{o} F interpolation for B-basis values.

2. TORAY T700GC-12K-31E/#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)
National Institute for Aviation Research (NIAR), Wichita, KS	*-65°F (Dry) mechanical tests (0° Tension)* *180°F (Wet) mechanical tests (0° Comp. Strength)*
Rose Consultant, Half Moon Bay, CA	*cured laminate transition glass temperature, Tg*

2.1.1. Materials

The T700GC-12K-31E/#2510, P707AG-15, Unidirectional Tape prepreg batches were manufactured by the hot melt method of resin impregnation. Toray, Ehime of Japan and Carbon Fibers America in Decatur, Alabama manufactured the carbon fiber. 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 P707AG-15 prepreg material, namely; batches AB991033, AB991034 and AB991035. The prepreg batches were manufactured with two lots of carbon fibers and three batches of resin matrix. The P707AG-15 Unidirectional Tape batches were manufactured to nominal uncured resin content of 35 % (by weight) and a fiber areal weight (FAW) of 150 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 P707AG-15 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, “Material Qualification Methodology for Epoxy-Based Prepreg Composite Material System”, TCA Material Process Specification, TCSPF-T-UD06, Revision 1 dated February 4, 2000, and TCA work instructions, described in Figure 2-1.

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.

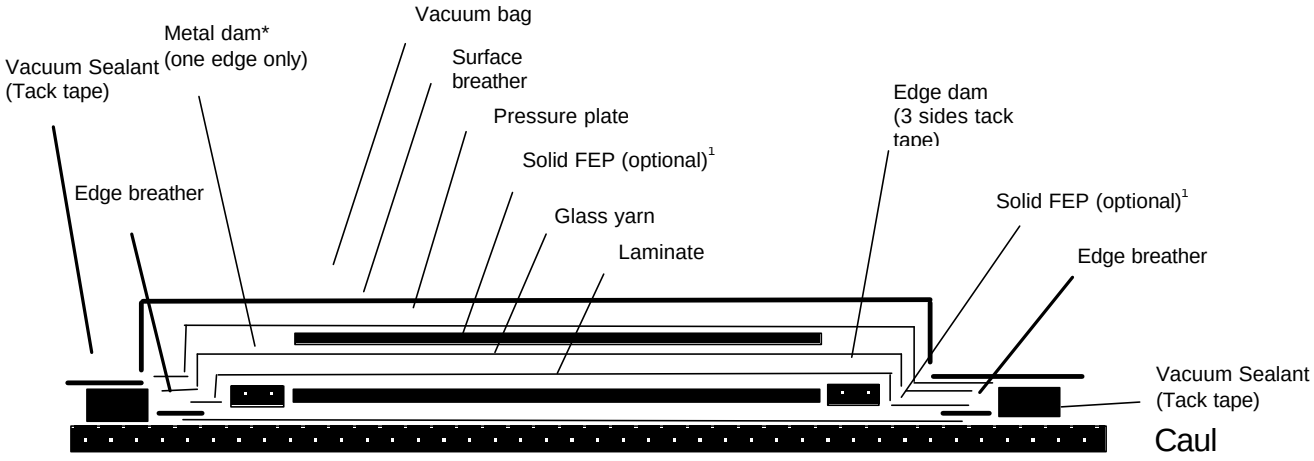
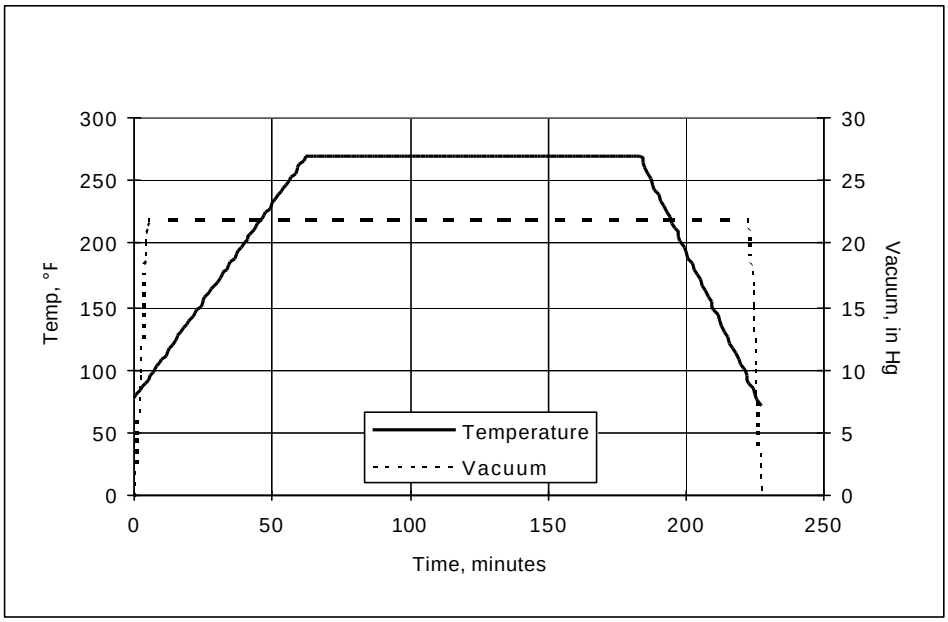


Figure 2-1. Vacuum Bagging Stack Sequence

[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.

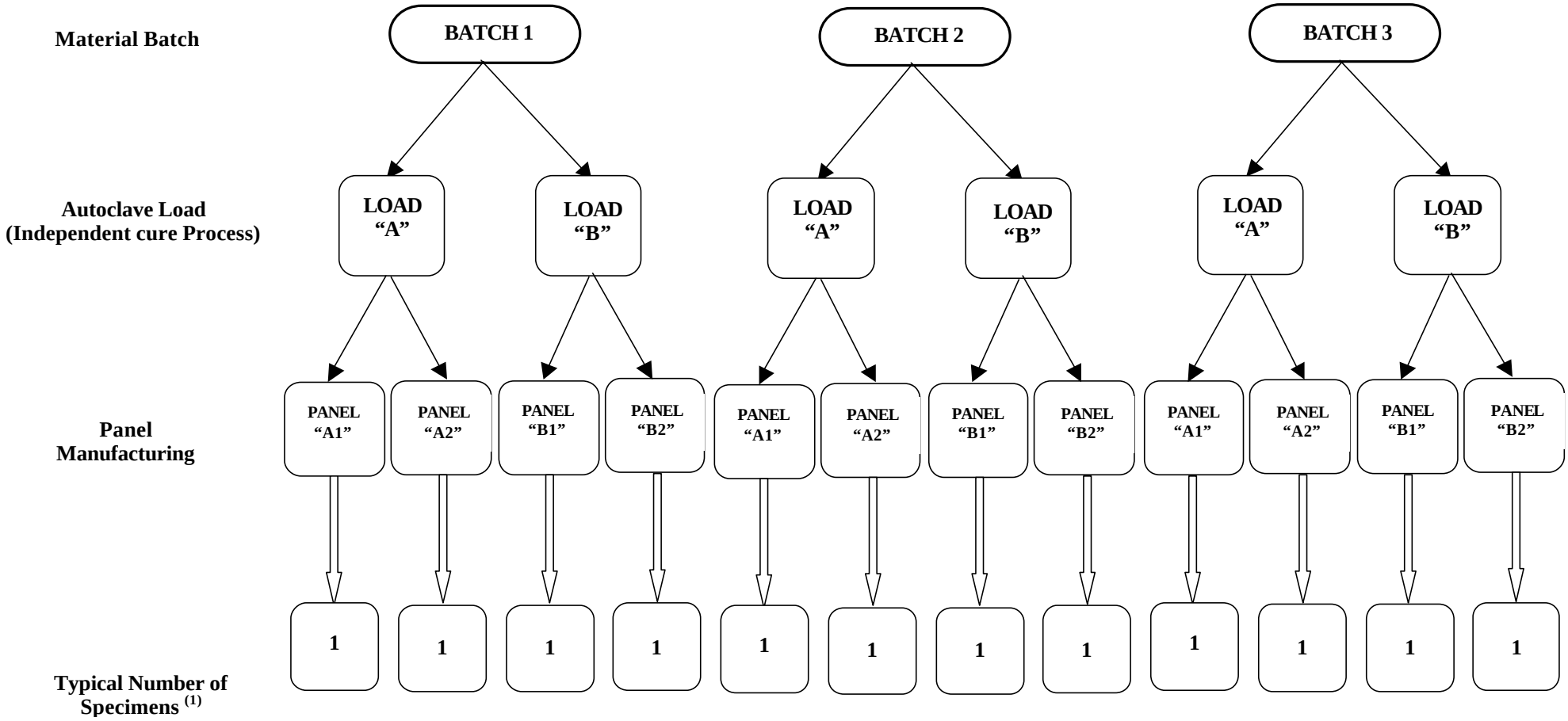
(4) Cool down the temperature to 170 °F or lower at a rate of 4.5 ± 0.5 °F per minute before removing the vacuum.

(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 panel and 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 October 27, 2000. However, additional test panels for compressive strength test were fabricated and conformed on November 15, 2000 and August 1, 2000 due to problems in the testing process, for example, tabbing and machining of specimens. The conformed compressive test panels were replacements for previously fabricated test panels. The conformity of all the test specimens was performed November 22, 1999. However, the additional test specimens for compressive strength were fabricated and conformed 4/14/2000, to replace the test specimens 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 P707AG-15** **Material Identification (weave, form, class, etc.): Carbon/Epoxy Unidirectional Tape** **Impregnation Method: Hot Melt**		
Prepreg Batch or Lot #	AB991033	AB991034	AB991035
Batch (Lot) ID as labeled on samples	**910-041**	**910-042**	**910-043**
Date of Manufacture	10/06/1999	10/06/1999	10/06/1999
Expiration Date	10/06/2001	10/06/2001	10/06/2001
Resin Content [%]	34.6%	35.0%	34.9%
Reinforcement Areal Weight & Test Method	148 g/m^2 SACMA SRM 23R-94	149 g/m^2 SACMA SRM 23R-94	149 g/m^2 SACMA SRM 23R-94
Resin Flow & Test Conditions	17.4% @ 250°F	17.5% @ 250°F	17.7% @ 250°F
Gel Time & Test Conditions	6.2 minutes @ 250°F	6.0 minutes @ 250°F	6.2 minutes @ 250°F
Volatile Content	0.17%	0.15%	0.14%
Reinforcement Documentation	**Fiber/Fabric Manufacturer & Product ID: Toray T700G-12K-31E** **Precursor Type: PAN** **Nominal Filament Count: 12K** **Finish/Sizing Type and %: 31E (0.5%)** **Nominal tow or yarn count/inch: n/a** **Twist: Never twisted**		
Fabric Batch or Lot #	099024	A909092	A909092
Date of Manufacture	02/1999	09/1999	09/1999
Average Fiber Density per Lot & Test Method	1.79 g/cc TY-030B-02	1.79 g/cc TY-030B-02	1.79 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 P707AG-15** **Material Identification (weave, form, class, etc.): Carbon/Epoxy Unidirectional Tape** **Impregnation Method: Hot Melt**			
Prepreg Batch or Lot #	AB010955	AB020234	AB020436	AB020552
Batch (Lot) ID as labeled on samples	A-1, B-2, A-3, B-4, A-5, B-6, A-7, B-8, A-9, B-10, A-11, B-12	A-13, B-14, A-15, B-16, A-17, B-18, A-19, B-20, A-21, B-22, A-23, B-24	A-25, B-26, A-27, B-28, A-29, B-30, A-31, B-32, A-33, B-34, A-35, B-36	A-37, B-38, A-39, B-40, A-41, B-42, A-43, B-44, A-45, B-46, A-47, B-48
Date of Manufacture	09/27/2001	02/28/2002	04/18/2002	05/02/2002
Expiration Date	09/27/2003	02/28/2004	04/18/2004	05/02/2004
Resin Content [%]	35.4%	36.0%	35.7%	-
Reinforcement Areal Weight & Test Method	150 g/m^2 SACMA SRM 23R-94	148 g/m^2 SACMA SRM 23R-94	152 g/m^2 SACMA SRM 23R-94	-
Resin Flow & Test Conditions	-	-	-	-
Gel Time & Test Conditions	12 minutes @ 250°F	12 minutes @ 250°F	9.7 minutes @ 250°F	-
Volatile Content	0.17%	0.17%	0.15%	-

Reinforcement Documentation	**Fiber/Fabric Manufacturer & Product ID: Toray T700G-12K-31E** **Precursor Type: PAN** **Nominal Filament Count: 12K** **Finish/Sizing Type and %: 31E (0.5%)** **Nominal tow or yarn count/inch: n/a** **Twist: Never twisted**			
Fiber Batch or Lot #	A111034	A111034	A111092	A111034
Date of Manufacture	03/2001	03/2001	09/2001	03/2001
Average Fiber Density per Lot & Test Method	1.80 g/cc TY-030B-02	1.80 g/cc TY-030B-02	1.80 g/cc TY-030B-02	1.80 g/cc TY-030B-02

Matrix Documentation	**Resin Manufacturer & Product ID: Toray Composites #2510**			
Matrix Batch or Lot #	3-GPT, 3-GPU	2-COV, 2-COW	1-CTC	2-CRJ
Date of Manufacture	9/23/2001, 9/24/2001	2/25/2002	4/10/2002	4/28/2002
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	T700GC-12K-31E/#2510 Unidirectional Tape
R	material class	Carbon/Epoxy
PREPREG ANALYSIS		
R	ply manufacturer	Toray Composites (America), Inc
R	date of manufacture	10/1999, 09/2001, 02/2002, 04/2002, 05/2002
R	material lot number	AB991033, AB991034, AB991035, AB010955, AB020234, AB020436, AB020552
R	commercial designation	P707AG-15
R	material form	Unidirectional Tape Prepreg
R	reinforcement areal weight	144 – 156 g/m^2
	reinforcement areal weight test method	Solvent Extraction
R	resin content	32 – 38 %
REINFORCEMENT ANALYSIS		
F	precursor type	PAN
R	commercial designation	T700GC-12K-31E
R	manufacturer	Torayca
R	date of manufacture	02/1999, 09/1999, 03/2001, 09/2001
R	lot number	099024, A909092, A111034, A111092
R	surface treatment (Y/N)	Y
R	surface finish (sizing) identification	31E
R	density (Average per lot)	1.79 g/cm^3
	density test method	JIS R 7601, TY-030B-02
R	nominal filament count	12000/tow
R	nominal tow or yarn count/inch	N/A
R	twist	No Twist
R	fiber areal weight (when applicable)	144 – 156 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, 09/2001, 02/2002, 04/2002
R	lot number (R – not prepregged, F – prepregged)	3-CCH, 3-CCG, 2-BFC, 3-GPT, 3-GPU, 2-COV, 2-COW, 1-CTC, 2-CRJ
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 – 7/2000
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	8 – axial tensile; 18 – trans tensile; 8 – axial & trans comp; 24 – IPS ; 18 – ILSS
R	lay-up code	$(0°)_8$ – axial tensile; $(90°)_{18}$ – trans tensile; $(0°)_8$ – axial comp; $(90°)_8$ – trans comp; $(0°/90°)_{6S}$ – IPS; $(0°)_{18}$ – ILSS
R	fiber volume	54.4% Average
F	void content	2.1% Average
	density	1.525 g/cc Average
R	glass transition temperature (wet, nominal)	262°F
R	glass transition temperature (dry, nominal)	297°F
R	glass transition temperature test method	DMA E'
SPECIMEN PREPARATION		
R	specimen orientation	0°, 90°, 0°/90
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: 11/1999 – 07/2000 additional QT: 05/2002 ~ 09/2002
R	specimen thickness for each specimen	nominal: 0.048"(0° Tens), 0.107"(90° Tens), 0.048"(Comp), 0.143" (IPS), 0.107" (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 (6 to 8 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 : 0.1 - 0.7 % Wet : 1.1 - 2.2%
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	0.0060 in.
	nominal fiber density	1.79 g/cm^3
	nominal fiber areal weight	150 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 T700GC-12K-31E/#2510 LAMINA PROPERTIES

3.1. Test Results

3.1.1. Summary

MATERIAL:	T700GC-12K-31E/#2510, 150 g/m2, unidirectional tape	**T700 UNI/#2510 Summary**
PREPREG:	Toray Composites P707AG-15	
FIBER:	Toray T700GC-12K-31E	**RESIN:** Toray Composites #2510
T_g (dry): 297 °F	**T_g (wet):** 262 °F	**T_g METHOD:** DMA (SRM 18-94)
PROCESSING:	Vacuum bag cure (minimum22 in-Hg): 270 ± 3 °F for 120 +10/-0 minutes	

Date of fiber manufacture	02/1999 – 09/2001	**Date of testing**	11/1999 – 09/2002
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= 0.0060 in)

	CTD		RTD		ETD		ETW	
	B-Basis	**Mean**	**B-Basis**	**Mean**	**B-Basis**	**Mean**	**B-Basis**	**Mean**
F_1^{tu} **(ksi)**	210.579 (216.021)	240.912 (243.955)	272.894 (277.268)	314.387 (315.086)	276.967 (281.634)	319.079 (320.048)	282.985 (288.420)	326.012 (327.759)
E_1^t **(Msi)**	---	18.422 (18.529)	---	18.104 (18.209)	---	17.710 (17.812)	---	17.636 (17.745)
n_{12}^{tu}	---	0.350	---	0.309	---	0.309	---	0.323
F_2^{tu} **(ksi)**	6.389	7.683	6.207	7.086	5.488	6.415	3.291	3.757
E_2^t **(Msi)**	---	1.313	---	1.219	---	1.083	---	0.920
F_1^{cu} **(ksi)**	174.601 (175.305)	202.546 (202.546)	184.914 (185.786)	209.999 (210.272)	179.882 (180.730)	204.285 (204.549)	156.723 (154.388)	177.255 (174.041)
E_1^c **(Msi)**	---	16.618 (16.512)	---	16.347 (16.284)	---	17.192 (17.188)	---	16.981 (16.916)
F_2^{cu} **(ksi)**	36.594	40.964	26.149	28.814	19.443	21.425	15.324	16.886
E_2^c **(Msi)**	---	2.043	---	1.471	---	1.231	---	1.153
F_{12}^{su} **(ksi)**	21.546	23.136	21.106	22.443	17.501	18.610	12.988	13.811
G_{12}^s **(Msi)**	---	0.757	---	0.613	---	0.509	---	0.453
F_{13}^{su**} **(ksi)**	---	---	11.142	12.489	---	---	---	---

** *Apparent* interlaminar shear strength

3.1.2. Individual Test Summaries

3.1.2.1. Tension, 1-axis

Tension, 1-axis
Gr/Ep
TCA T700G-12K-31E/#2510
Unidirectional Carbon
$[0]_8$

Material: Toray - TCA T700G-12K-31E/#2510 Unidirectional Carbon

Resin content: 32 - 38 wt%
Fiber volume: 53 - 60 %
Ply thickness: 0.0059 - 0.0072 in
Ply range: 8 plies

Comp. density: 1.51 - 1.57 g/cc
Void content: 0 - 3.4 %

Test method: D3039-95

Modulus calculation: linear fit from 1000 - 3000με

Normalized by: 0.0060 in. ply thickness

		CTD		RTD		ETD		ETW	
Test Temperature [°F]		-65		75		180		180	
Moisture Conditioning		dry		dry		dry		equilibrium	
Equilibrium at T, RH		as fabricated		as fabricated		as fabricated		145 F, 85%	
Source code									
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean	243.955	240.912	315.086	314.387	320.048	319.079	327.759	326.012
	Minimum	212.029	199.309	252.895	251.950	287.499	286.782	276.031	258.779
	Maximum	276.014	274.782	350.861	347.387	352.099	352.982	355.054	354.906
	C.V.(%)	7.626	8.568	7.634	7.558	5.504	5.791	6.838	8.228
F_1^{tu} (ksi)	**B-value**	216.021	210.579	277.268	272.894	281.634	276.967	288.420	282.985
	A-value	196.621	189.513	252.493	245.713	256.470	249.380	262.649	254.798
	No. Specimens	30		18		18		18	
	No. Prepreg Lots	3		3		3		3	
	Mean	18.529	18.422	18.209	18.104	17.812	17.710	17.745	17.636
	Minimum	18.002	18.133	17.786	17.651	17.415	17.253	17.065	17.130
	Maximum	18.900	18.775	18.804	18.572	18.330	18.223	18.106	18.119
E_1^t (Msi)	**C.V.(%)**	1.265	1.021	1.542	1.639	1.587	1.894	1.865	1.907
	No. Specimens	16		12		12		12	
	No. Prepreg Lots	3		3		3		3	
	Mean	0.350		0.309		0.309		0.323	
n_{12}^t	**No. Specimens**	16		12		12		12	
	No. Prepreg Lots	3		3		3		3	

3.1.2.2. Tension, 2-axis

Tension, 2-axis
Gr/Ep
TCA T700G-12K-31E/#2510
Unidirectional Carbon
$[0]_{18}$

Material:	Toray - TCA T700G-12K-31E/#2510 Unidirectional Carbon		
Resin content:	32 - 38 wt%	**Comp. density:**	1.48 - 1.52 g/cc
Fiber volume:	50 - 55 %	**Void content:**	2.0 - 4.0 %
Ply thickness:	0.0058 - 0.0062 in		
Ply range:	18 plies		
Test method:	D3039-95	**Modulus calculation:**	linear fit from 1000 - 3000με
Normalized by:	N/A		

		CTD		RTD		ETD		ETW	
Test Temperature [°F]		-65		75		180		180	
Moisture Conditioning		dry		dry		dry		equilibrium	
Equilibrium at T, RH		as fabricated		as fabricated		as fabricated		145 F, 85%	
Source code									
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean		7.683		7.086		6.415		3.757
	Minimum		5.772		5.546		4.814		2.831
	Maximum		9.190		8.656		7.370		4.683
	C.V.(%)		15.137		8.394		8.880		8.492
F_2^{tu}	**B-value**		6.389		6.207		5.488		3.291
(ksi)	**A-value**		5.689		5.541		4.900		2.938
	No. Specimens	6		146		18		146	
	No. Prepreg Lots	1		7		3		3	
	Mean		1.313		1.219		1.083		0.920
	Minimum		1.260		1.164		1.052		0.880
	Maximum		1.350		1.254		1.109		0.946
E_2^t	**C.V.(%)**		3.134		2.388		1.917		2.425
(Msi)									
	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 T700G-12K-31E/#2510
Unidirectional Carbon
$[0]_8$

Material: Toray - TCA T700G-12K-31E/#2510 Unidirectional Carbon

Resin content: 32 - 38 wt%
Fiber volume: 49 - 57 %
Ply thickness: 0.0057 - 0.0061
Ply range: 8 plies

Comp. density: 1.46 - 1.54 g/cc
Void content: 0.5 - 5.5 %

Test method: SRM 1-94

Modulus calculation: linear fit from 1000 - 3000με

Normalized by: 0.0060 in. ply thickness

		CTD		RTD		ETD		ETW	
Test Temperature [°F]		-65		75		180		180	
Moisture Conditioning		dry		dry		dry		equilibrium	
Equilibrium at T, RH		as fabricated		as fabricated		as fabricated		145 F, 85%	
Source code									
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean	202.546	202.546	210.272	209.999	204.549	204.285	174.041	177.255
	Minimum	189.803	189.803	190.936	189.006	174.311	174.420	134.781	135.486
	Maximum	213.689	213.689	234.916	236.592	222.711	224.300	192.097	197.022
	C.V.(%)	4.842	4.842	5.906	6.151	6.066	6.317	8.145	8.273
F_1^{cu}	**B-value**	175.305	174.601	185.786	184.914	180.730	179.882	154.388	156.723
(ksi)	**A-value**	160.113	159.017	169.607	168.338	164.991	163.757	140.888	142.618
	No. Specimens	6		18		18		25	
	No. Prepreg Lots	1		3		3		3	
	Mean	16.512	16.618	16.284	16.347	17.188	17.192	16.916	16.981
	Minimum	16.450	16.415	16.232	16.262	16.411	16.421	15.952	16.018
	Maximum	16.575	16.820	16.399	16.490	19.543	19.761	18.411	18.419
E_{1c}	**C.V.(%)**	0.536	1.722	0.372	0.638	6.840	7.443	5.391	4.924
(Msi)									
	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 T700G-12K-31E/#2510
Unidirectional Carbon
$[0]_8$

Material:	Toray - TCA T700G-12K-31E/#2510 Unidirectional Carbon				
Resin content:	32 - 38 wt%		**Comp. density:**	1.52 - 1.56 g/cc	
Fiber volume:	52 - 58 %		**Void content:**	0 - 2.5 %	
Ply thickness:	0.0059 - 0.0062 in				
Ply range:	8 plies				
Test method:	SRM 1-94		**Modulus calculation:**	linear fit from 1000 - 3000με	
Normalized by:	N/A				

		CTD		RTD		ETD		ETW	
Test Temperature [°F]		-65		75		180		180	
Moisture Conditioning		dry		dry		dry		equilibrium	
Equilibrium at T, RH		as fabricated		as fabricated		as fabricated		145 F, 85%	
Source code									
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean		40.964		28.814		21.425		16.886
	Minimum		35.123		26.641		19.042		15.233
	Maximum		43.986		31.121		23.472		18.490
	C.V.(%)		8.777		4.732		5.046		5.055
F_2^{cu} (ksi)	**B-value**		36.594		26.149		19.443		15.324
	A-value		34.147		24.380		18.128		14.287
	No. Specimens	6		18		18		18	
	No. Prepreg Lots	1		3		3		3	
	Mean		2.043		1.471		1.231		1.153
	Minimum		1.745		1.432		1.204		1.083
	Maximum		2.341		1.594		1.254		1.213
E_{2c} (Msi)	**C.V.(%)**		20.623		4.289		1.833		4.239
	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 T700G-12K-31E/#2510
Unidirectional Carbon
$[0/90]_{6s}$

Material:	Toray - TCA T700G-12K-31E/#2510 Unidirectional Carbon				
Resin content:	32 - 38 wt%		**Comp. density:**	1.51 - 1.54 g/cc	
Fiber volume:	54 - 59 %		**Void content:**	1.8 - 3.9 %	
Ply thickness:	0.0058 - 0.0060 in				
Ply range:	24 plies				
Test method:	D5379-93		**Modulus calculation:**	linear fit from 1000 - 6000με	
Normalized by:	N/A				

		CTD		RTD		ETD		ETW	
Test Temperature [°F]		-65		75		180		180	
Moisture Conditioning		dry		dry		dry		equilibrium	
Equilibrium at T, RH		as fabricated		as fabricated		as fabricated		145 F, 85%	
Source code									
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean		23.136		22.443		18.610		13.811
	Minimum		22.758		21.020		17.752		12.767
	Maximum		23.423		23.379		19.400		14.683
	C.V.(%)		1.151		2.819		2.938		4.313
$F1_2^{su}$	**B-value**		21.546		21.106		17.501		12.988
(ksi)	**A-value**		20.655		20.218		16.765		12.442
	No. Specimens	6		18		18		18	
	No. Prepreg Lots	1		3		3		3	
	Mean		0.757		0.613		0.509		0.453
	Minimum		0.743		0.526		0.486		0.426
	Maximum		0.775		0.665		0.543		0.505
$G1_{2s}$	**C.V.(%)**		1.812		5.774		3.298		4.374
(Msi)									
	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 T700G-12K-31E/#2510
Unidirectional Carbon
$[0]_{18}$

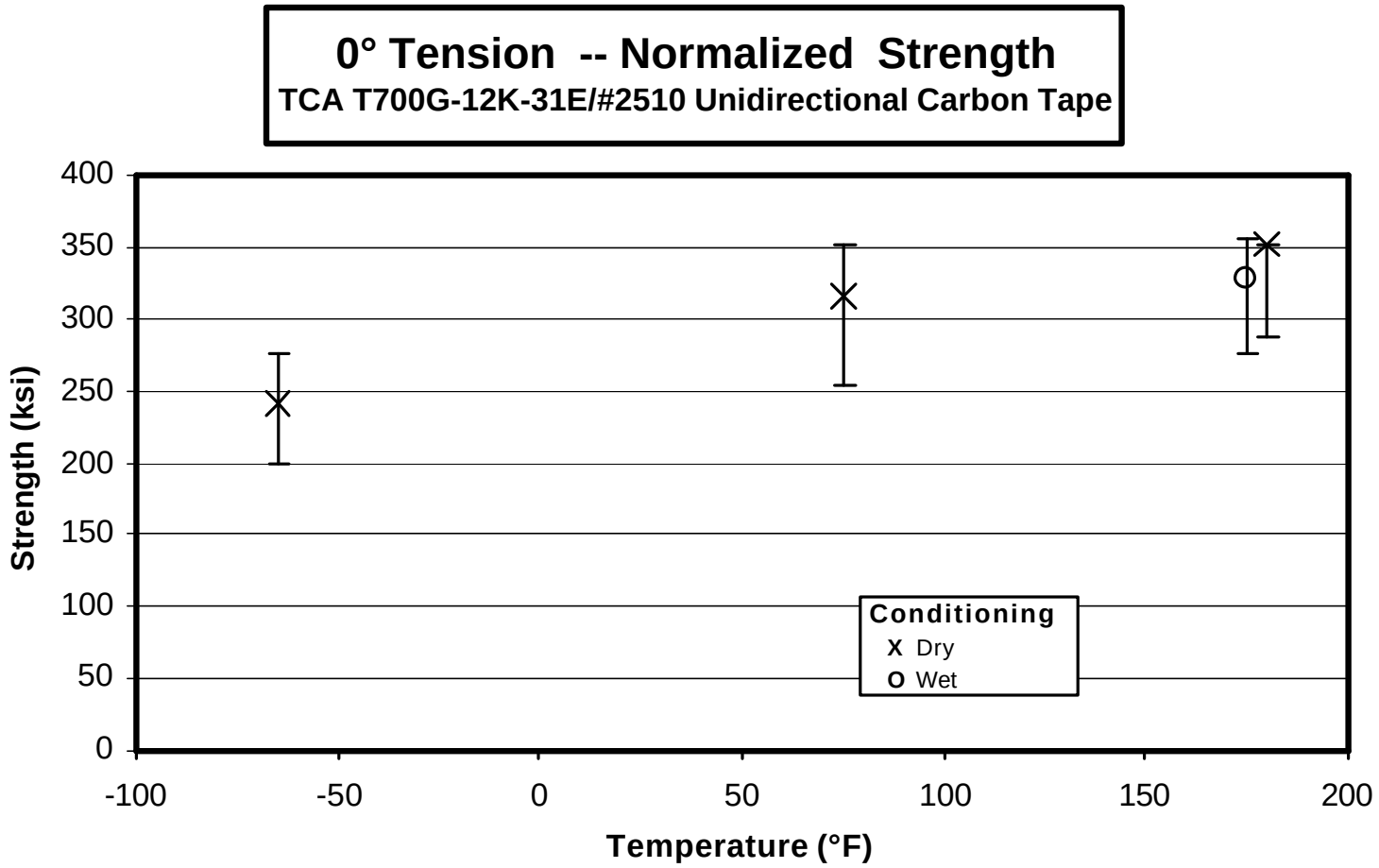
Material:	Toray - TCA T700G-12K-31E/#2510 Unidirectional Carbon		
Resin content:	32 - 38 wt%	**Comp. density:**	1.52 - 1.55 g/cc
Fiber volume:	54 - 58 %	**Void content:**	1.7 - 1.8 %
Ply thickness:	0.0058 - 0.0063 in		
Ply range:	18 plies		
Test method:	D2344-89	**Modulus calculation:**	linear fit from 1000 - 6000με
Normalized by:	N/A		

		CTD		RTD		ETD		ETW			
Test Temperature [°F]		-65		75		180		180			
Moisture Conditioning		dry		dry		dry		equilibrium			
Equilibrium at T, RH		as fabricated		as fabricated		as fabricated		145 F, 85%			
Source code											
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**		
	Mean				12.489						
	Minimum				10.226						
	Maximum				15.029						
	C.V.(%)				7.368						
$F1_3^{su}$	**B-value**				11.142						
(ksi)	**A-value**				10.103						
	No. Specimens			170							
	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.

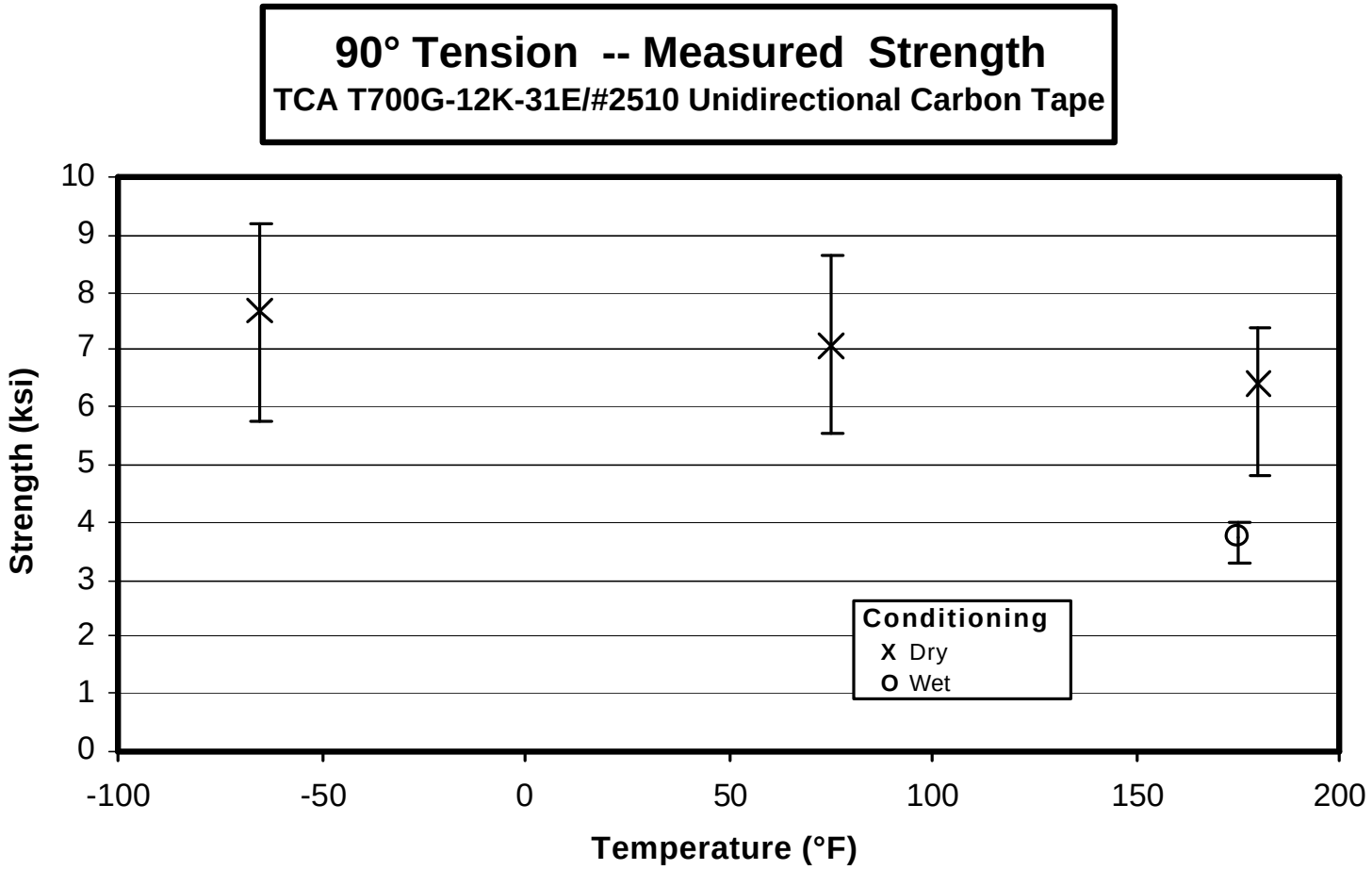
3.1.3. Individual Test Charts

3.1.3.1. Tension, 1-axis



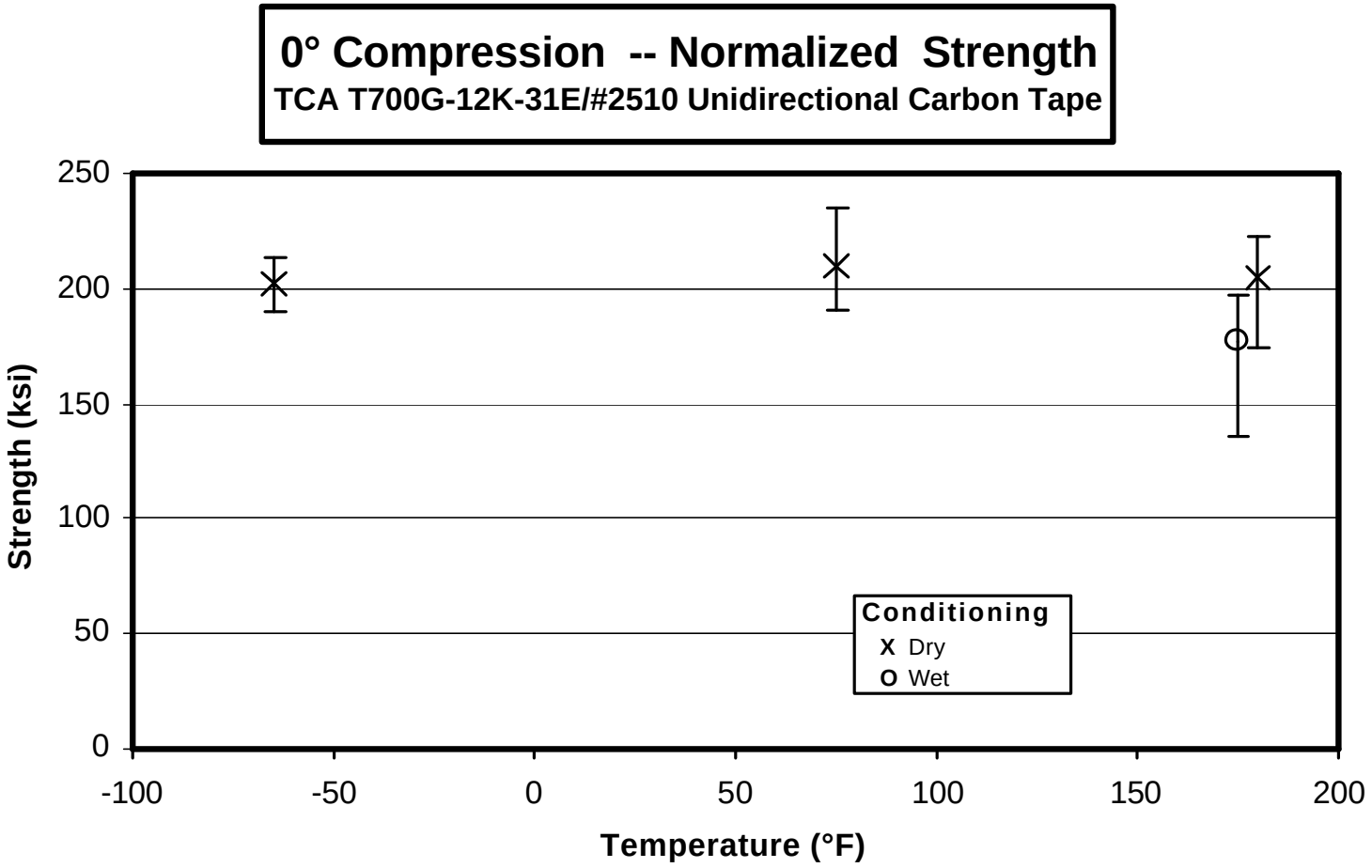
NOTE: The symbols represent the 'pooled' average of all tests, and the bars represent the upper and lower limit of the data. The 180° dry and wet data has been staggered for clarity

3.1.3.2. Tension, 2-axis



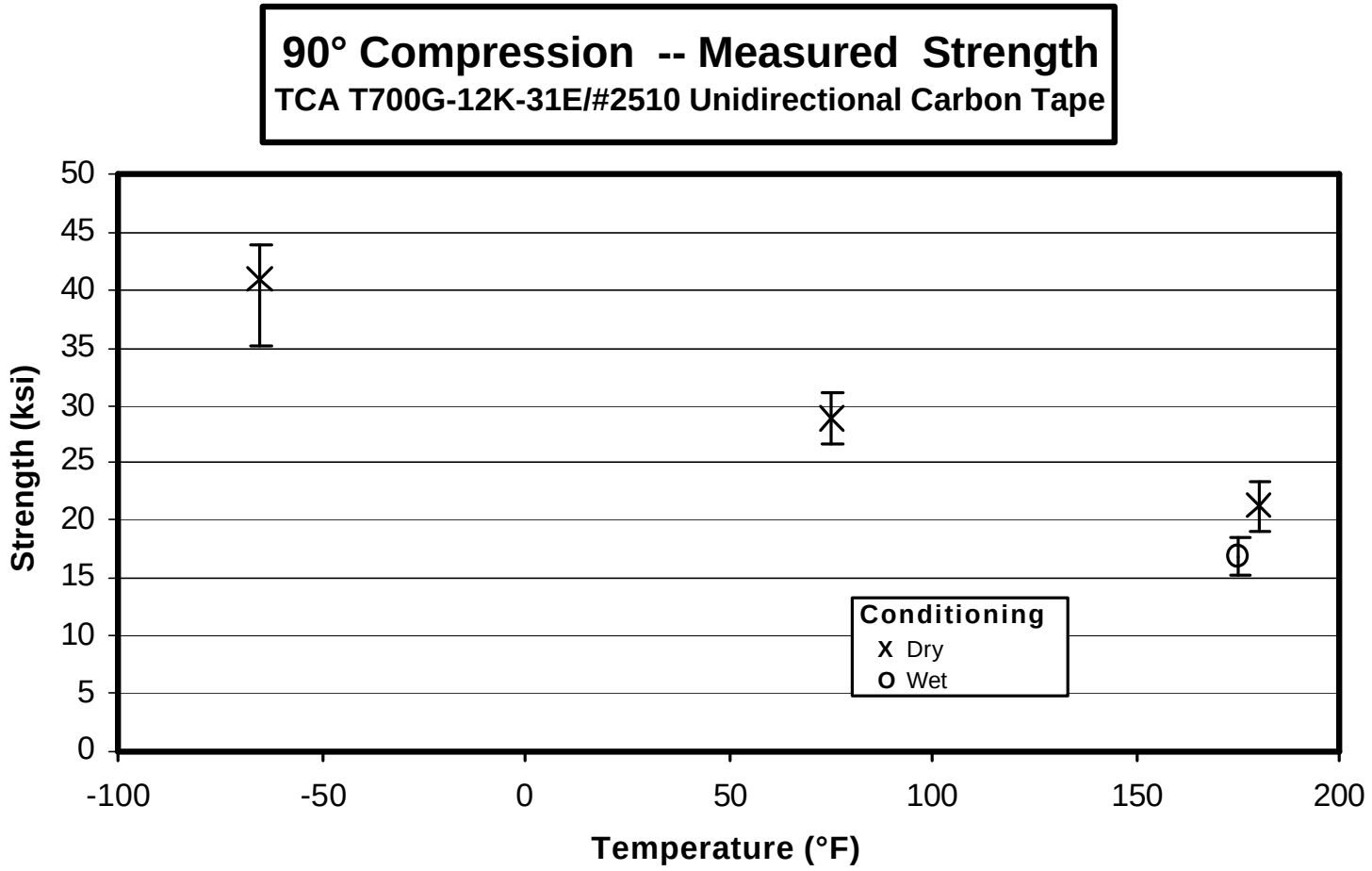
NOTE: The symbols represent the 'pooled' average of all tests, and the bars represent the upper and lower limit of the data. The 180° dry and wet data has been staggered for clarity.

3.1.3.3. Compression, 1-axis



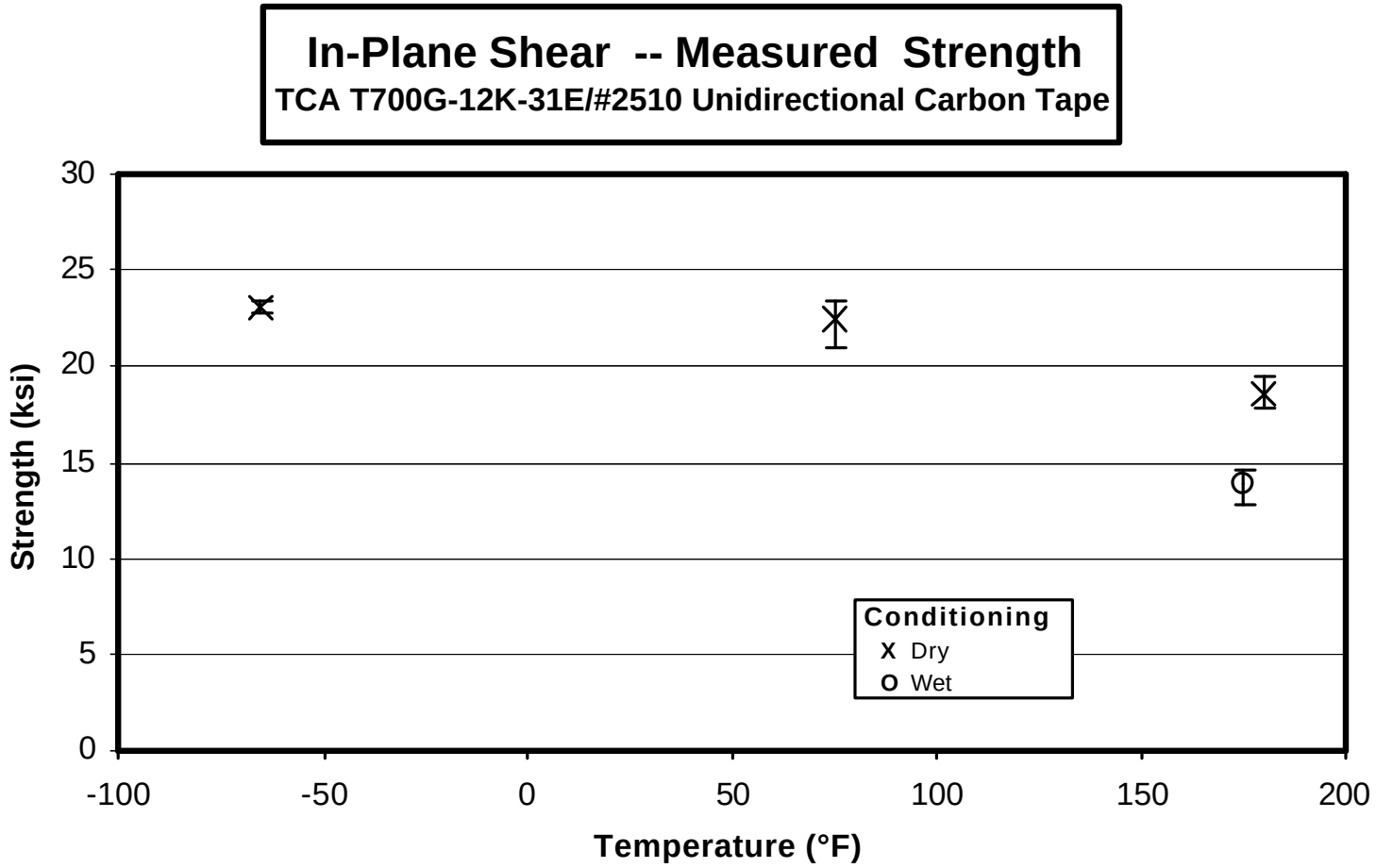
NOTE: The symbols represent the 'pooled' average of all tests, and the bars represent the upper and lower limit of the data. The 180° dry and wet data has been staggered for clarity.

3.1.3.4. Compression, 2-axis



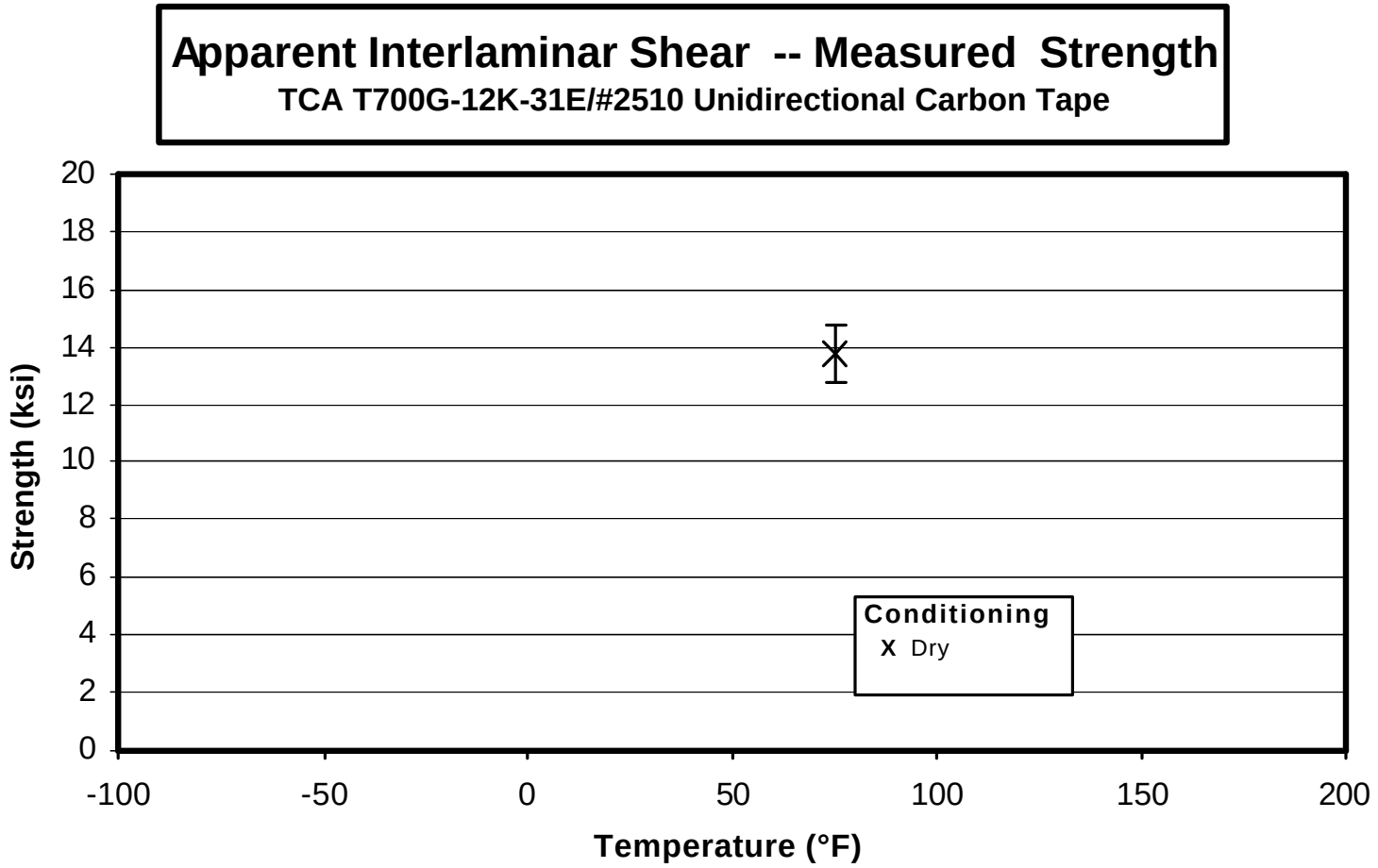
NOTE: The symbols represent the 'pooled' average of all tests, and the bars represent the upper and lower limit of the data. The 180° dry and wet data has been staggered for clarity.

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

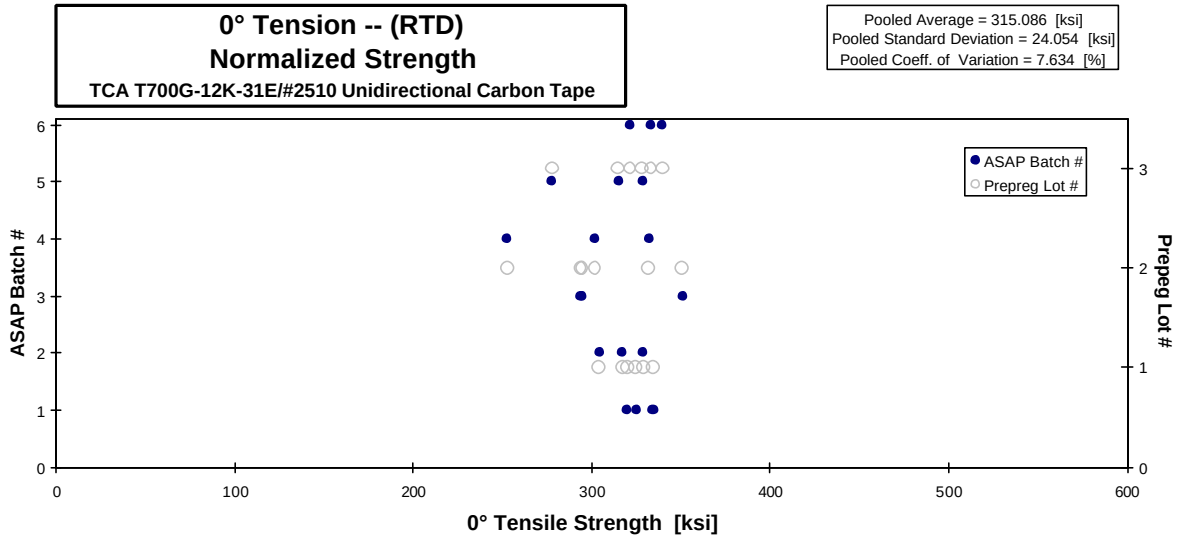
3.2.1. Raw Data Spreadsheets and Scatter Charts

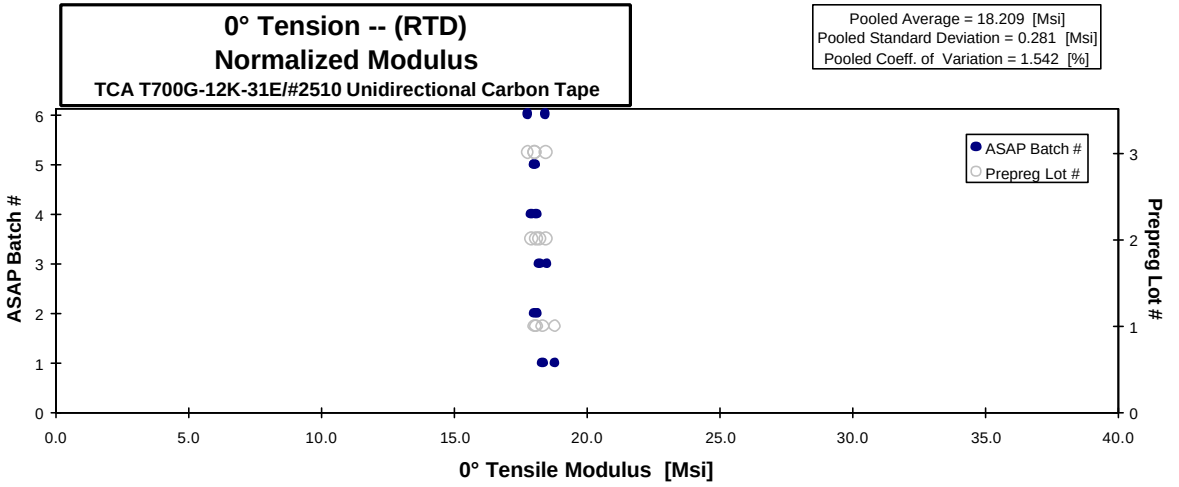
0° Tension -- (RTD)
Strength & Modulus
TCA T700G-12K-31E/#2510 Unidirectional Carbon Tape

normalizing t_{ply} [in]: 0.0060

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
A1-910-041-1-3	A	1	1	320.938	18.572	0.330	0.049	8	0.00608	324.950	18.804
A2-910-041-1-3	A	1	1	335.891	18.439	0.300	0.048	8	0.00598	334.491	18.362
A1-910-041-1-8	A	1	1	321.176			0.048	8	0.00598	320.038	
B1-910-041-1-3	B	1	2	320.317	18.304	0.305	0.048	8	0.00594	317.314	18.133
B2-910-041-1-3	B	1	2	303.504	18.025	0.305	0.048	8	0.00601	304.136	18.062
B1-910-041-2-2	B	1	2	328.201			0.048	8	0.00602	329.090	
A1-910-042-1-1	A	2	3	293.401	18.165	0.315	0.048	8	0.00602	294.501	18.233
A2-910-042-1-1	A	2	3	347.387	18.307	0.310	0.048	8	0.00606	350.861	18.490
A1-910-042-1-6	A	2	3	298.001			0.047	8	0.00592	293.780	
B1-910-042-1-1	B	2	4	251.950	17.869	0.305	0.048	8	0.00602	252.895	17.936
B2-910-042-1-1	B	2	4	300.751	18.046	0.305	0.048	8	0.00603	302.004	18.121
B1-910-042-1-6	B	2	4	332.368			0.048	8	0.00599	332.022	
A1-910-043-1-1	A	3	5	275.407	17.889	0.335	0.048	8	0.00605	277.817	18.045
A2-910-043-1-1	A	3	5	320.986	17.651	0.300	0.049	8	0.00614	328.342	18.055
A1-910-043-1-6	A	3	5	320.083			0.047	8	0.00591	315.082	
B1-910-043-1-1	B	3	6	318.659	18.312	0.305	0.048	8	0.00605	321.513	18.476
B2-910-043-1-1	B	3	6	330.703	17.664	0.290	0.048	8	0.00604	332.977	17.786
B1-910-043-1-6	B	3	6	339.244			0.048	8	0.00601	339.739	

Average	**314.387**	**18.104**	**0.309**	**$Average_{norm}$**	**0.00601**	**315.086**	**18.209**
Standard Dev.	**23.762**	**0.297**	**0.013**	**$Standard\ Dev._{norm}$**		**24.054**	**0.281**
Coeff. of Var. [%]	**7.558**	**1.639**	**4.093**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**7.634**	**1.542**
Min.	**251.950**	**17.651**	**0.290**	**Min.**	**0.0059**	**252.895**	**17.786**
Max.	**347.387**	**18.572**	**0.335**	**Max.**	**0.0061**	**350.861**	**18.804**
Number of Spec.	**18**	**12**	**12**	**Number of Spec.**		**18**	**12**



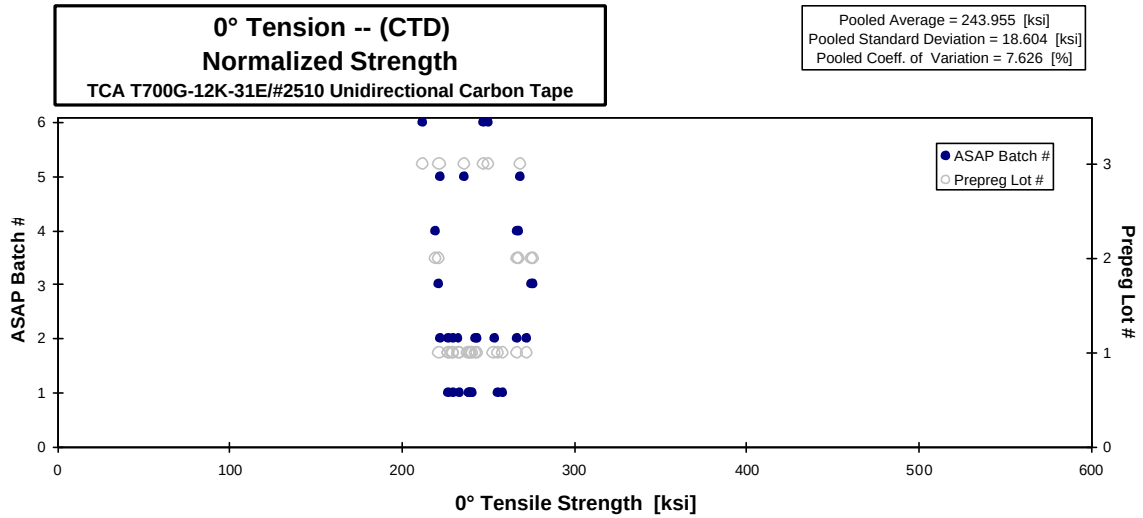


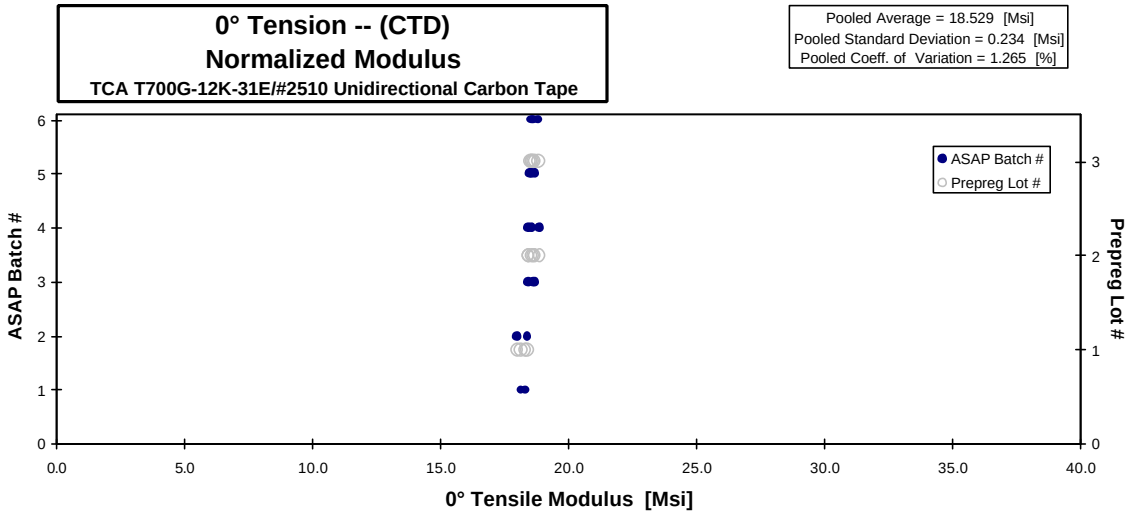
0° Tension -- (CTD)
Strength & Modulus
TCA T700G-12K-31E/#2510 Unidirectional Carbon Tape

normalizing t_{ply} [in]: 0.0060

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
A1-910-041-1-1	A	1	1	261.807	18.550	0.330	0.047	8	0.00593	258.534	18.318
A2-910-041-1-1	A	1	1	241.216	18.280	0.310	0.048	8	0.00596	239.709	18.166
A1-910-041-1-2	A	1	1	232.898			0.048	8	0.00601	233.383	
A1-910-041-1-10	A	1	1	245.723			0.050	8	0.00625	255.859	
A1-910-041-1-11	A	1	1	226.813			0.051	8	0.00632	238.720	
A1-910-041-1-12	A	1	1	214.697			0.051	8	0.00634	226.863	
A2-910-041-1-10	A	1	1	229.803			0.048	8	0.00600	229.707	
A2-910-041-1-11	A	1	1	199.309			0.058	8	0.00719	238.963	
A2-910-041-1-12	A	1	1	244.840			0.047	8	0.00591	241.167	
B1-910-041-1-1	B	1	2	230.072	18.230	0.310	0.047	8	0.00593	227.197	18.002
B2-910-041-1-1	B	1	2	243.892	18.410	0.320	0.048	8	0.00600	243.892	18.410
B1-910-041-1-2	B	1	2	235.368			0.048	8	0.00594	232.917	
B1-910-041-2-3	B	1	2	221.947			0.048	8	0.00600	221.947	
B1-910-041-2-4	B	1	2	254.174			0.048	8	0.00598	253.485	
B1-910-041-2-5	B	1	2	274.782			0.048	8	0.00594	272.206	
B2-910-041-2-3	B	1	2	242.153			0.048	8	0.00602	243.010	
B2-910-041-2-4	B	1	2	228.176			0.048	8	0.00603	229.364	
B2-910-041-2-5	B	1	2	265.373			0.048	8	0.00604	267.142	
A1-910-042-2-3	A	2	3	270.271	18.317	0.338	0.049	8	0.00613	276.014	18.706
A1-910-042-2-2	A	2	3	271.333	18.377	0.380	0.049	8	0.00609	275.177	18.637
A2-910-042-2-1	A	2	3	218.048	18.166	0.396	0.049	8	0.00610	221.545	18.457
B1-910-042-2-4	B	2	4	268.148	18.582	0.395	0.048	8	0.00599	267.869	18.563
B2-910-042-2-1	B	2	4	265.452	18.775	0.388	0.048	8	0.00604	267.222	18.900
B2-910-042-2-3	B	2	4	218.048	18.331	0.334	0.048	8	0.00603	219.184	18.426
A2-910-043-1-7	A	3	5	231.648	18.133	0.358	0.049	8	0.00613	236.523	18.515
A2-910-043-1-8	A	3	5	217.989	18.382	0.365	0.049	8	0.00611	221.985	18.719
A2-910-043-1-9	A	3	5	266.167	18.391	0.343	0.049	8	0.00606	268.995	18.586
B1-910-043-2-1	B	3	6	210.451	18.713	0.396	0.048	8	0.00605	212.029	18.853
B1-910-043-2-2	B	3	6	246.373	18.469	0.330	0.048	8	0.00603	247.656	18.565
B2-910-043-2-1	B	3	6	250.386	18.638	0.310	0.048	8	0.00600	250.386	18.638

Average	**240.912**	**18.422**	**0.350**	**$Average_{norm}$**	**0.00608**	**243.955**	**18.529**
Standard Dev.	**20.641**	**0.188**	**0.032**	**$Standard\ Dev._{norm}$**		**18.604**	**0.234**
Coeff. of Var. [%]	**8.568**	**1.021**	**9.279**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**7.626**	**1.265**
Min.	**199.309**	**18.133**	**0.310**	**Min.**	**0.0059**	**212.029**	**18.002**
Max.	**274.782**	**18.775**	**0.396**	**Max.**	**0.0072**	**276.014**	**18.900**
Number of Spec.	**30**	**16**	**16**	**Number of Spec.**		**30**	**16**



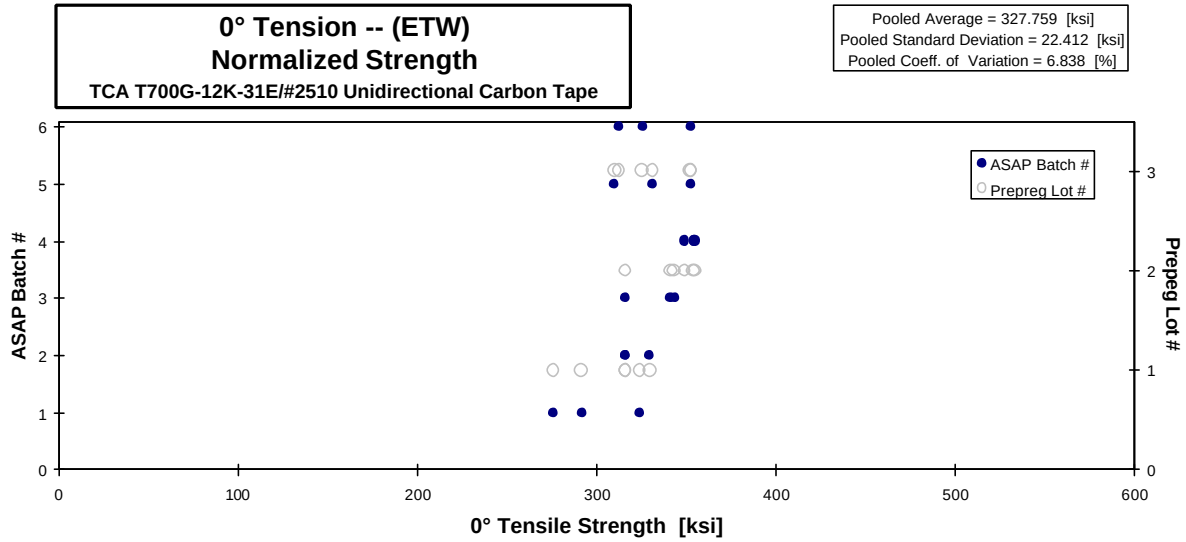


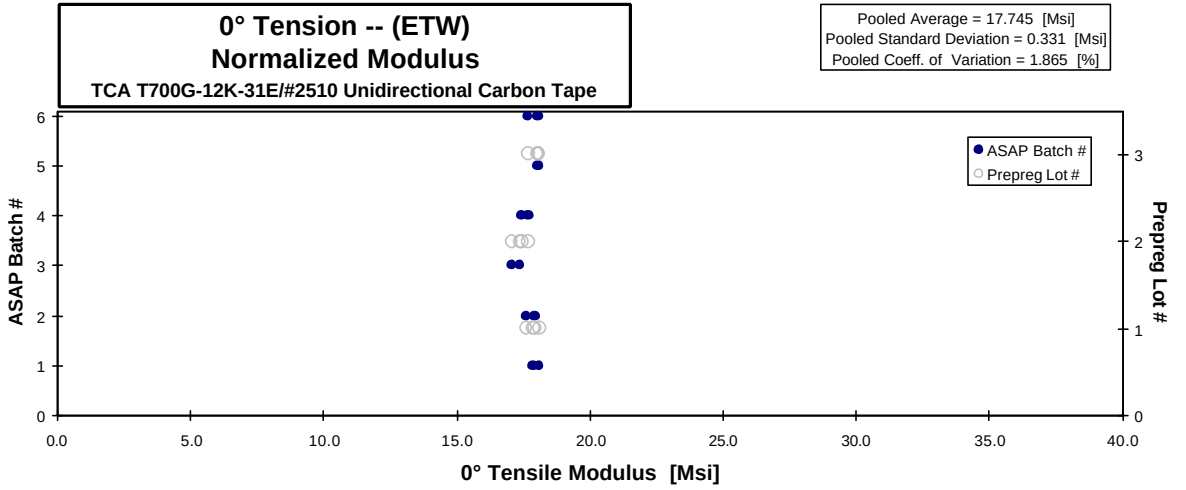
0° Tension -- (ETW)
Strength & Modulus
TCA T700G-12K-31E/#2510 Unidirectional Carbon Tape

normalizing t_{ply} [in]: 0.0060

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
A1-910-041-1-5	A	1	1	276.821	17.169	0.340	0.051	8	0.00633	291.931	18.106
A2-910-041-1-5	A	1	1	328.770	18.119	0.340	0.047	8	0.00592	324.318	17.874
A1-910-041-1-6	A	1	1	258.779			0.051	8	0.00640	276.031	
B1-910-041-1-5	B	1	2	317.673	17.687	0.320	0.048	8	0.00597	316.019	17.595
B2-910-041-1-5	B	1	2	315.286	17.883	0.275	0.048	8	0.00602	316.139	17.932
B1-910-041-1-6	B	1	2	333.209			0.048	8	0.00594	329.877	
A1-910-042-1-3	A	2	3	343.381	17.448	0.304	0.048	8	0.00597	341.736	17.365
A2-910-042-1-3	A	2	3	344.898	17.130	0.335	0.048	8	0.00598	343.605	17.065
A1-910-042-1-4	A	2	3	319.021			0.048	8	0.00595	316.230	
B1-910-042-1-3	B	2	4	354.906	17.693	0.331	0.048	8	0.00600	355.054	17.701
B2-910-042-1-3	B	2	4	346.624	17.313	0.321	0.048	8	0.00604	349.151	17.439
B1-910-042-1-4	B	2	4	353.010			0.048	8	0.00602	354.334	
A1-910-043-1-3	A	3	5	330.748	18.050	0.346	0.048	8	0.00601	331.437	18.088
A2-910-043-1-3	A	3	5	302.319	17.573	0.353	0.049	8	0.00616	310.192	18.031
A1-910-043-1-4	A	3	5	354.243			0.048	8	0.00598	352.989	
B1-910-043-1-3	B	3	6	322.992	17.544	0.312	0.048	8	0.00605	325.684	17.690
B2-910-043-1-3	B	3	6	311.882	18.017	0.298	0.048	8	0.00601	312.531	18.055
B1-910-043-1-4	B	3	6	353.655			0.048	8	0.00598	352.403	

Average	**326.012**	**17.636**	**0.323**	**$Average_{norm}$**	**0.00604**	**327.759**	**17.745**
Standard Dev.	**26.826**	**0.336**	**0.023**	**Standard Dev.$_{norm}$**		**22.412**	**0.331**
Coeff. of Var. [%]	**8.228**	**1.907**	**7.015**	**Coeff. of Var. [%]$_{norm}$**		**6.838**	**1.865**
Min.	**258.779**	**17.130**	**0.275**	**Min.**	**0.0059**	**276.031**	**17.065**
Max.	**354.906**	**18.119**	**0.353**	**Max.**	**0.0064**	**355.054**	**18.106**
Number of Spec.	**18**	**12**	**12**	**Number of Spec.**		**18**	**12**



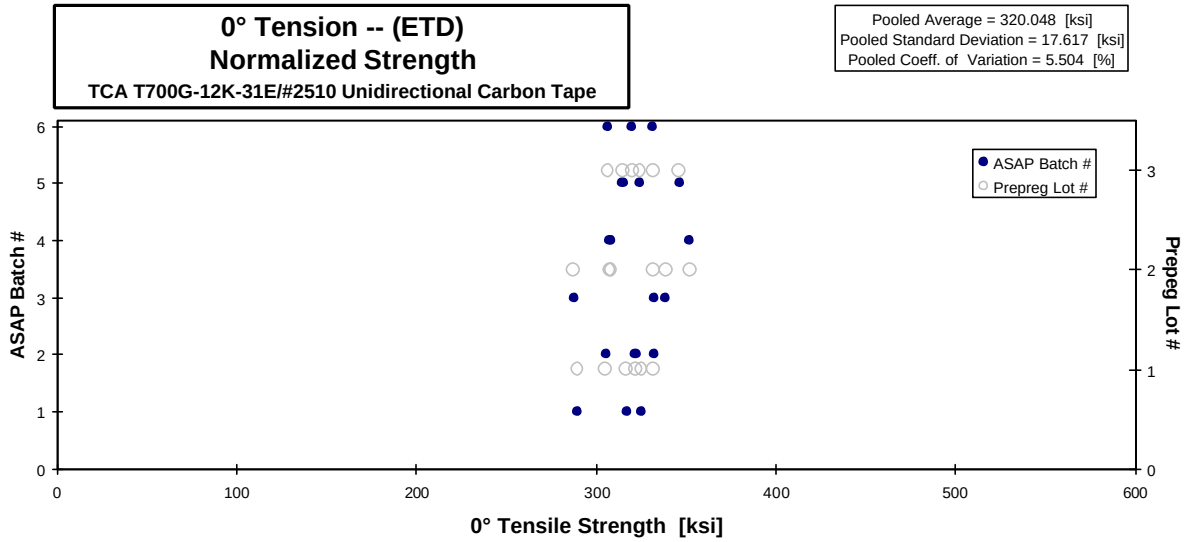


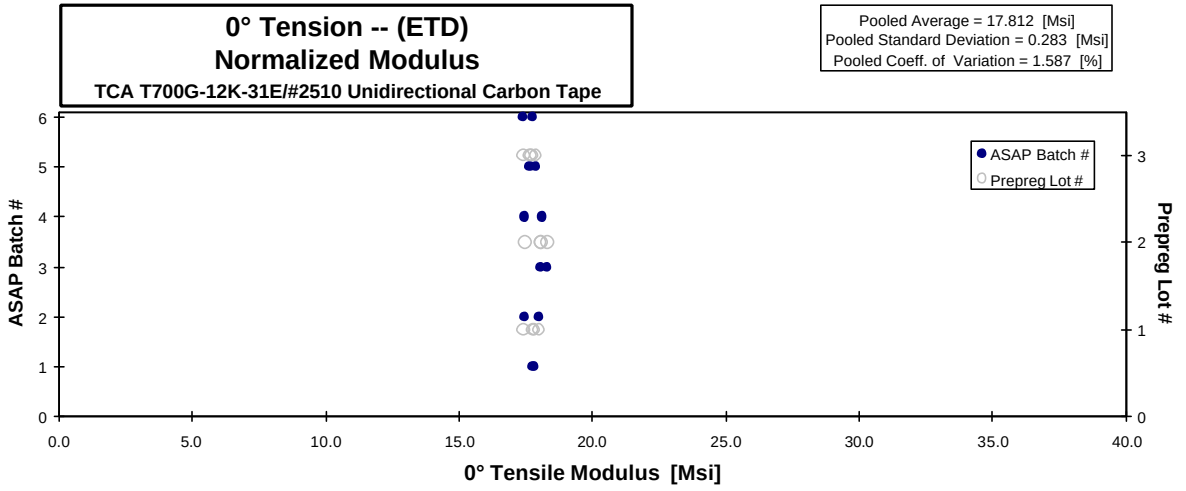
0° Tension -- (ETD)
Strength & Modulus
TCA T700G-12K-31E/#2510 Unidirectional Carbon Tape

normalizing t_{ply} [in]: 0.0060

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
A1-910-041-1-4	A	1	1	307.781	17.315	0.310	0.049	8	0.00618	316.886	17.827
A2-910-041-1-4	A	1	1	328.131	17.927	0.305	0.048	8	0.00595	325.260	17.770
A2-910-041-1-9	A	1	1	289.866			0.048	8	0.00599	289.383	
B1-910-041-1-4	B	1	2	307.698	17.588	0.295	0.048	8	0.00595	305.326	17.453
B2-910-041-1-4	B	1	2	331.673	17.973	0.315	0.048	8	0.00601	332.019	17.992
B2-910-041-2-2	B	1	2	322.023			0.048	8	0.00600	322.023	
A1-910-042-1-2	A	2	3	286.782	18.016	0.325	0.048	8	0.00602	287.499	18.061
A2-910-042-1-2	A	2	3	330.190	18.223	0.310	0.048	8	0.00604	332.116	18.330
A2-910-042-1-6	A	2	3	343.825			0.047	8	0.00591	338.811	
B1-910-042-1-2	B	2	4	352.982	18.153	0.330	0.048	8	0.00599	352.099	18.107
B2-910-042-1-2	B	2	4	305.839	17.379	0.305	0.048	8	0.00603	307.560	17.477
B2-910-042-1-6	B	2	4	309.174			0.048	8	0.00598	308.208	
A1-910-043-1-2	A	3	5	344.723	17.591	0.315	0.048	8	0.00603	346.375	17.675
A2-910-043-1-2	A	3	5	307.413	17.463	0.290	0.049	8	0.00615	314.906	17.889
A2-910-043-1-6	A	3	5	318.972			0.049	8	0.00610	324.288	
B1-910-043-1-2	B	3	6	317.114	17.253	0.325	0.048	8	0.00606	320.086	17.415
B2-910-043-1-2	B	3	6	304.698	17.644	0.285	0.048	8	0.00604	306.475	17.747
B2-910-043-1-6	B	3	6	334.545			0.048	8	0.00595	331.548	

Average	**319.079**	**17.710**	**0.309**	**$Average_{norm}$**	**0.00602**	**320.048**	**17.812**
Standard Dev.	**18.479**	**0.336**	**0.014**	**Standard Dev.$_{norm}$**		**17.617**	**0.283**
Coeff. of Var. [%]	**5.791**	**1.894**	**4.566**	**Coeff. of Var. [%]$_{norm}$**		**5.504**	**1.587**
Min.	**286.782**	**17.253**	**0.285**	**Min.**	**0.0059**	**287.499**	**17.415**
Max.	**352.982**	**18.223**	**0.330**	**Max.**	**0.0062**	**352.099**	**18.330**
Number of Spec.	**18**	**12**	**12**	**Number of Spec.**		**18**	**12**





90° Tension -- (RTD)
Strength & Modulus
TCA T700G-12K-31E/#2510 Unidirectional Carbon

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]
A1-910-041-1-3	A	1	1	8.082	1.215	0.107	18	0.00595
A2-910-041-1-3	A	1	1	6.418	1.184	0.108	18	0.00599
A1-910-041-1-8	A	1	1	7.120		0.108	18	0.00599
B1-910-041-1-3	B	1	2	6.978	1.183	0.107	18	0.00596
B2-910-041-1-3	B	1	2	7.229	1.164	0.109	18	0.00603
B1-910-041-1-8	B	1	2	7.306		0.107	18	0.00595
A1-910-042-1-1	A	2	3	8.448	1.205	0.106	18	0.00587
A2-910-042-1-1	A	2	3	7.493	1.226	0.106	18	0.00591
A1-910-042-1-8	A	2	3	6.940		0.108	18	0.00602
B1-910-042-1-1	B	2	4	8.409	1.239	0.105	18	0.00583
B2-910-042-1-1	B	2	4	8.656	1.252	0.105	18	0.00582
B1-910-042-1-8	B	2	4	5.887		0.109	18	0.00603
A1-910-043-1-1	A	3	5	6.655	1.233	0.105	18	0.00583
A2-910-043-1-1	A	3	5	7.202	1.241	0.105	18	0.00586
A1-910-043-1-6	A	3	5	6.332		0.108	18	0.00602
B1-910-043-1-1	B	3	6	8.180	1.234	0.106	18	0.00587
B2-910-043-1-1	B	3	6	7.464	1.254	0.106	18	0.00590
B1-910-043-1-6	B	3	6	6.765		0.108	18	0.00599
A-3-1	A	4	7	7.514		0.107	18	0.00595
A-3-3	A	4	7	6.490		0.110	18	0.00611
A-3-5	A	4	7	7.508		0.109	18	0.00608
A-3-7	A	4	7	7.591		0.108	18	0.00598
A-5-1	A	4	7	6.941		0.108	18	0.00599
A-5-3	A	4	7	6.999		0.108	18	0.00602
A-5-5	A	4	7	7.257		0.108	18	0.00601
A-5-7	A	4	7	7.406		0.108	18	0.00602
A-3-2	A	4	7	7.948		0.108	18	0.00601
A-3-4	A	4	7	6.532		0.110	18	0.00609
A-3-6	A	4	7	6.778		0.109	18	0.00604
A-3-8	A	4	7	8.404		0.107	18	0.00592
A-5-2	A	4	7	7.157		0.108	18	0.00603
A-5-4	A	4	7	6.705		0.108	18	0.00602
A-5-6	A	4	7	6.755		0.108	18	0.00603
A-5-8	A	4	7	7.821		0.107	18	0.00595

NOTE: This table is continued in next four pages.

90° Tension -- (RTD)
Strength & Modulus
TCA T700G-12K-31E/#2510 Unidirectional Carbon

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]
B-4-1	B	4	8	7.432		0.108	18	0.00602
B-4-3	B	4	8	7.176		0.109	18	0.00607
B-4-5	B	4	8	7.152		0.109	18	0.00607
B-4-7	B	4	8	7.224		0.109	18	0.00605
B-6-1	B	4	8	7.844		0.108	18	0.00597
B-6-3	B	4	8	6.908		0.109	18	0.00603
B-6-5	B	4	8	6.974		0.109	18	0.00604
B-6-7	B	4	8	6.444		0.108	18	0.00601
B-4-2	B	4	8	6.964		0.109	18	0.00607
B-4-4	B	4	8	7.398		0.109	18	0.00607
B-4-6	B	4	8	7.424		0.109	18	0.00606
B-4-8	B	4	8	8.509		0.108	18	0.00598
B-6-2	B	4	8	7.351		0.108	18	0.00601
B-6-4	B	4	8	6.575		0.109	18	0.00604
B-6-6	B	4	8	7.073		0.109	18	0.00604
B-6-8	B	4	8	7.158		0.107	18	0.00593
A-15-1	A	5	9	7.336		0.107	18	0.00597
A-15-3	A	5	9	6.063		0.109	18	0.00603
A-15-5	A	5	9	7.031		0.108	18	0.00597
A-15-7	A	5	9	6.206		0.108	18	0.00599
A-17-1	A	5	9	6.911		0.108	18	0.00598
A-17-3	A	5	9	7.374		0.108	18	0.00602
A-17-5	A	5	9	6.197		0.109	18	0.00603
A-17-7	A	5	9	6.854		0.108	18	0.00601
A-15-2	A	5	9	6.651		0.108	18	0.00601
A-15-4	A	5	9	6.552		0.108	18	0.00601
A-15-6	A	5	9	7.550		0.107	18	0.00597
A-15-8	A	5	9	8.055		0.106	18	0.00589
A-17-2	A	5	9	6.667		0.108	18	0.00601
A-17-4	A	5	9	6.592		0.109	18	0.00603
A-17-6	A	5	9	6.921		0.108	18	0.00602
A-17-8	A	5	9	7.612		0.107	18	0.00593

90° Tension -- (RTD)
Strength & Modulus
TCA T700G-12K-31E/#2510 Unidirectional Carbon

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]
B-16-1	B	5	10	7.442		0.108	18	0.00598
B-16-3	B	5	10	6.843		0.108	18	0.00602
B-16-5	B	5	10	7.141		0.108	18	0.00602
B-16-7	B	5	10	7.348		0.108	18	0.00600
B-18-1	B	5	10	6.619		0.107	18	0.00596
B-18-3	B	5	10	6.307		0.109	18	0.00603
B-18-5	B	5	10	6.877		0.108	18	0.00598
B-18-7	B	5	10	6.582		0.109	18	0.00604
B-16-2	B	5	10	6.827		0.108	18	0.00600
B-16-4	B	5	10	7.313		0.108	18	0.00602
B-16-6	B	5	10	6.641		0.108	18	0.00601
B-16-8	B	5	10	7.551		0.107	18	0.00594
B-18-2	B	5	10	6.968		0.108	18	0.00599
B-18-4	B	5	10	7.093		0.108	18	0.00602
B-18-6	B	5	10	6.915		0.108	18	0.00602
B-18-8	B	5	10	7.171		0.107	18	0.00597
A-27-1	A	6	11	7.578		0.110	18	0.00613
A-27-3	A	6	11	6.951		0.111	18	0.00619
A-27-5	A	6	11	6.842		0.112	18	0.00621
A-24-7	A	6	11	6.679		0.111	18	0.00617
A-29-1	A	6	11	7.728		0.110	18	0.00613
A-29-3	A	6	11	7.388		0.111	18	0.00619
A-29-5	A	6	11	7.257		0.112	18	0.00620
A-29-7	A	6	11	6.720		0.111	18	0.00617
A-27-2	A	6	11	7.690		0.111	18	0.00618
A-27-4	A	6	11	6.854		0.112	18	0.00621
A-27-6	A	6	11	6.907		0.112	18	0.00620
A-27-8	A	6	11	7.886		0.109	18	0.00604
A-29-2	A	6	11	7.513		0.111	18	0.00616
A-29-4	A	6	11	6.572		0.111	18	0.00619
A-29-6	A	6	11	7.074		0.111	18	0.00618
A-29-8	A	6	11	8.018		0.110	18	0.00609

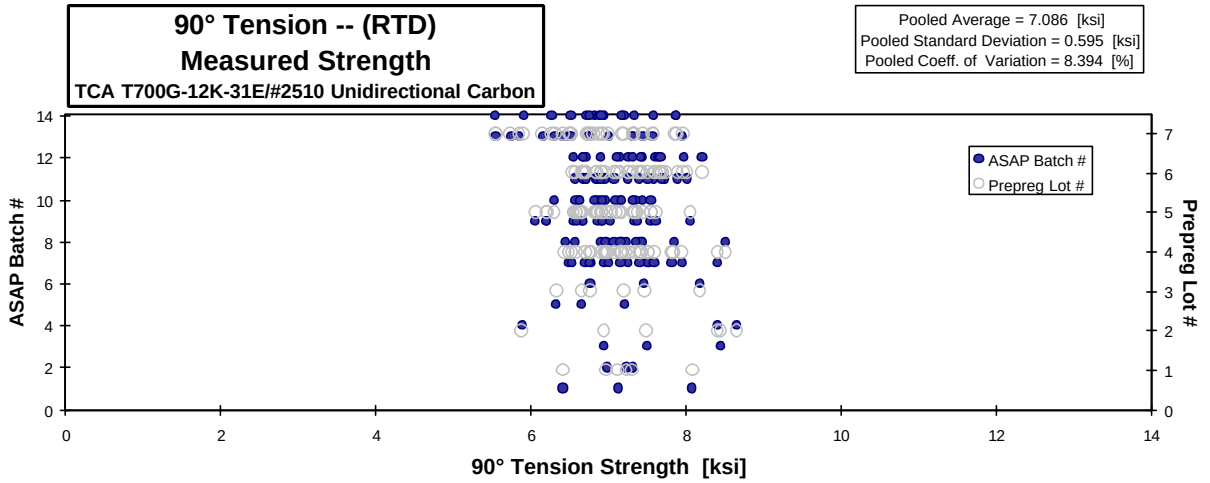
90° Tension -- (RTD)
Strength & Modulus
TCA T700G-12K-31E/#2510 Unidirectional Carbon

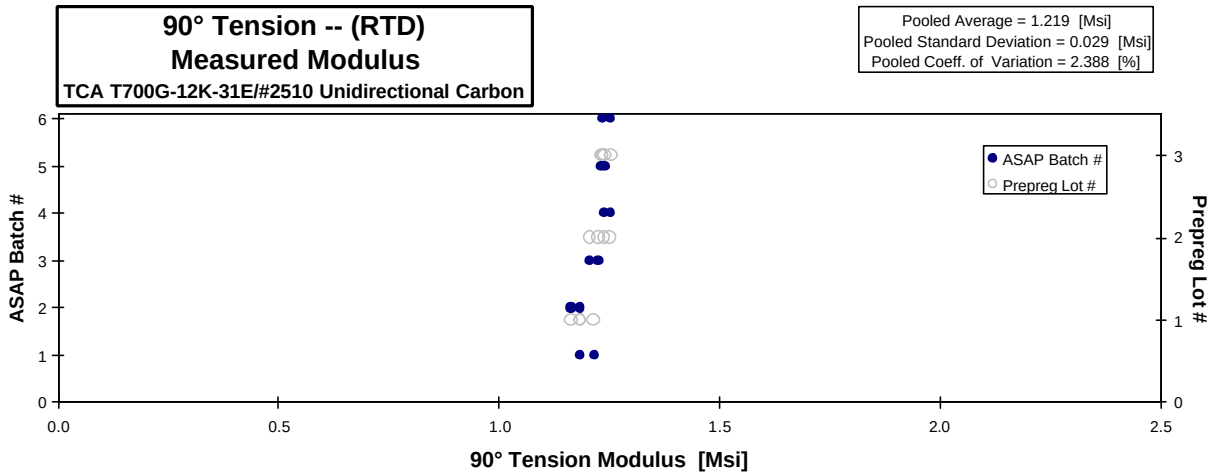
Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]
B-28-1	B	6	12	7.144		0.110	18	0.00614
B-28-3	B	6	12	6.713		0.111	18	0.00618
B-28-5	B	6	12	7.263		0.111	18	0.00619
B-28-7	B	6	12	7.113		0.111	18	0.00617
B-30-1	B	6	12	7.436		0.111	18	0.00615
B-30-3	B	6	12	6.907		0.112	18	0.00620
B-30-5	B	6	12	7.608		0.111	18	0.00618
B-30-7	B	6	12	7.419		0.111	18	0.00616
B-28-2	B	6	12	7.652		0.111	18	0.00615
B-28-4	B	6	12	6.670		0.111	18	0.00619
B-28-6	B	6	12	7.313		0.112	18	0.00620
B-28-8	B	6	12	7.966		0.109	18	0.00608
B-30-2	B	6	12	6.669		0.111	18	0.00618
B-30-4	B	6	12	7.673		0.111	18	0.00619
B-30-6	B	6	12	6.546		0.111	18	0.00618
B-30-8	B	6	12	8.211		0.110	18	0.00610
A-39-1	A	7	13	7.316		0.106	18	0.00592
A-39-3	A	7	13	6.762		0.108	18	0.00602
A-39-5	A	7	13	6.310		0.108	18	0.00602
A-39-7	A	7	13	5.552		0.108	18	0.00601
A-41-1	A	7	13	7.960		0.107	18	0.00594
A-41-3	A	7	13	6.417		0.109	18	0.00606
A-41-5	A	7	13	6.500		0.109	18	0.00604
A-41-7	A	7	13	7.574		0.108	18	0.00602
A-39-2	A	7	13	6.155		0.107	18	0.00597
A-39-4	A	7	13	5.744		0.108	18	0.00603
A-39-6	A	7	13	5.846		0.108	18	0.00601
A-39-8	A	7	13	6.519		0.105	18	0.00584
A-41-2	A	7	13	7.446		0.108	18	0.00602
A-41-4	A	7	13	6.998		0.109	18	0.00606
A-41-6	A	7	13	6.741		0.109	18	0.00603
A-41-8	A	7	13	7.313		0.105	18	0.00585

90° Tension -- (RTD)
Strength & Modulus
TCA T700G-12K-31E/#2510 Unidirectional Carbon

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]
B-40-1	B	7	14	7.583		0.107	18	0.00594
B-40-3	B	7	14	7.200		0.108	18	0.00600
B-40-5	B	7	14	6.815		0.108	18	0.00602
B-40-7	B	7	14	7.330		0.108	18	0.00600
B-42-1	B	7	14	6.939		0.108	18	0.00598
B-42-3	B	7	14	6.516		0.108	18	0.00601
B-42-5	B	7	14	5.546		0.108	18	0.00601
B-42-7	B	7	14	6.876		0.108	18	0.00599
B-40-2	B	7	14	6.716		0.108	18	0.00598
B-40-4	B	7	14	5.905		0.108	18	0.00602
B-40-6	B	7	14	6.274		0.108	18	0.00600
B-40-8	B	7	14	7.878		0.106	18	0.00592
B-42-2	B	7	14	6.751		0.108	18	0.00602
B-42-4	B	7	14	6.913		0.108	18	0.00602
B-42-6	B	7	14	7.173		0.108	18	0.00601
B-42-8	B	7	14	7.865		0.107	18	0.00595

Average	**7.086**	**1.219**	**Average**	**0.0060**
Standard Dev.	**0.595**	**0.029**		
Coeff. of Var. [%]	**8.394**	**2.388**		
Min.	**5.546**	**1.164**	**Min.**	**0.0058**
Max.	**8.656**	**1.254**	**Max.**	**0.0062**
Number of Spec.	**146**	**12**		

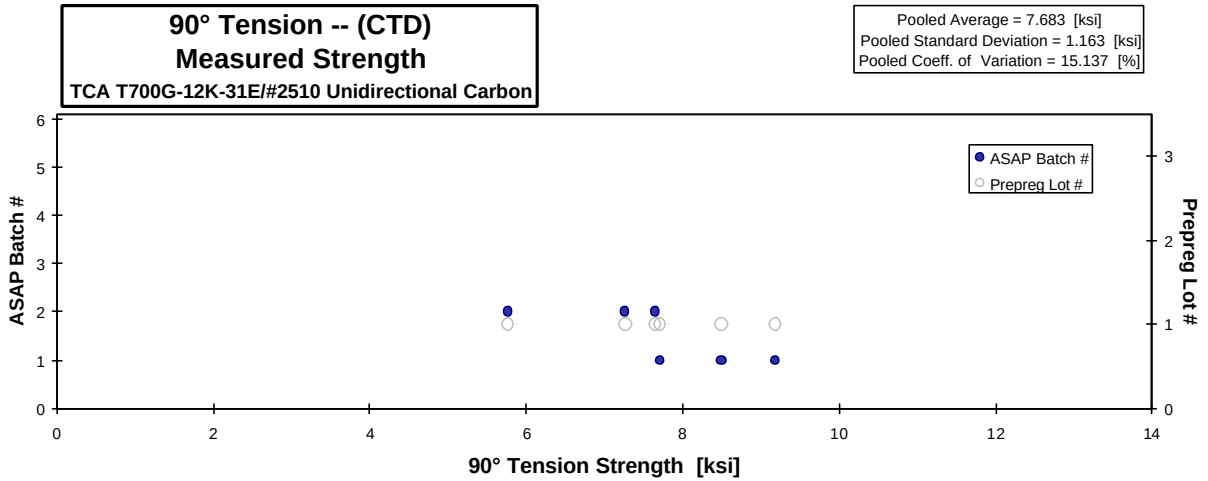


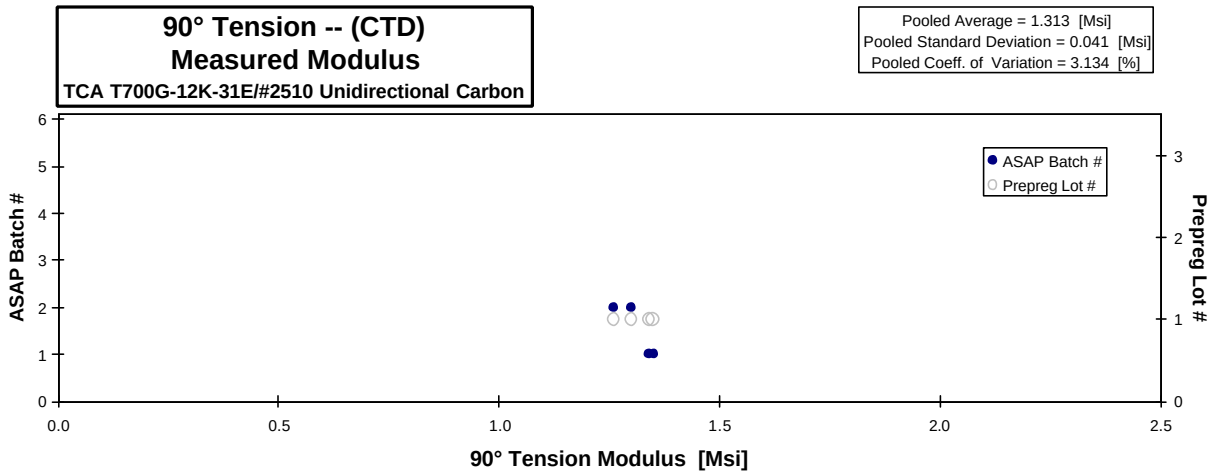


90° Tension -- (CTD)
Strength & Modulus
TCA T700G-12K-31E/#2510 Unidirectional Carbon

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]
A1-910-041-1-1	A	1	1	9.190	1.350	0.105	18	0.00583
A2-910-041-1-1	A	1	1	8.502	1.340	0.106	18	0.00590
A1-910-041-1-2	A	1	1	7.712		0.107	18	0.00592
B1-910-041-1-1	B	1	2	7.653	1.300	0.105	18	0.00582
B2-910-041-1-1	B	1	2	7.272	1.260	0.109	18	0.00603
B1-910-041-1-2	B	1	2	5.772		0.106	18	0.00590

Average	**7.683**	**1.313**	**Average**	**0.0059**
Standard Dev.	**1.163**	**0.041**		
Coeff. of Var. [%]	**15.137**	**3.134**		
Min.	**5.772**	**1.260**	**Min.**	**0.0058**
Max.	**9.190**	**1.350**	**Max.**	**0.0060**
Number of Spec.	**6**	**4**		





90° Tension -- (ETW)
Strength & Modulus
TCA T700G-12K-31E/#2510 Unidirectional Carbon

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]
A1-910-041-1-5	A	1	1	3.873	0.893	0.108	18	0.00600
A2-910-041-1-5	A	1	1	3.949	0.908	0.109	18	0.00605
A2-910-041-1-7	A	1	1	4.010		0.109	18	0.00604
B1-910-041-1-5	B	1	2	3.706	0.936	0.108	18	0.00600
B2-910-041-1-5	B	1	2	3.654	0.903	0.109	18	0.00605
B2-910-041-1-7	B	1	2	3.806		0.108	18	0.00600
A1-910-042-1-3	A	2	3	3.790	0.938	0.107	18	0.00596
A2-910-042-1-3	A	2	3	3.655	0.930	0.108	18	0.00598
A1-910-042-1-4	A	2	3	3.823		0.108	18	0.00600
B1-910-042-1-3	B	2	4	3.866	0.942	0.108	18	0.00600
B2-910-042-1-3	B	2	4	3.457	0.929	0.108	18	0.00599
B1-910-042-1-4	B	2	4	3.720		0.108	18	0.00603
A1-910-043-1-3	A	3	5	3.717	0.936	0.108	18	0.00598
A2-910-043-1-3	A	3	5	3.738	0.946	0.107	18	0.00594
A1-910-043-1-4	A	3	5	3.824		0.108	18	0.00599
B1-910-043-1-4	B	3	6	3.553	0.880	0.108	18	0.00598
B2-910-043-1-4	B	3	6	3.451	0.897	0.108	18	0.00598
B1-910-043-1-5	B	3	6	3.298		0.108	18	0.00598
A-7-3	A	4	7	3.464		0.110	18	0.00612
A-7-5	A	4	7	3.523		0.110	18	0.00608
A-7-7	A	4	7	3.637		0.110	18	0.00609
A-9-1	A	4	7	4.153		0.108	18	0.00601
A-9-3	A	4	7	3.963		0.109	18	0.00603
A-9-5	A	4	7	3.815		0.109	18	0.00604
A-9-7	A	4	7	4.079		0.108	18	0.00602
A-9-8	A	4	7	4.455		0.107	18	0.00595
A-11-2	A	4	7	3.439		0.109	18	0.00606
A-11-4	A	4	7	3.852		0.109	18	0.00607
A-11-6	A	4	7	3.818		0.109	18	0.00603
A-11-8	A	4	7	3.834		0.108	18	0.00598
A-11-3	A	4	7	3.562		0.110	18	0.00609
A-11-5	A	4	7	3.940		0.109	18	0.00606
A-11-7	A	4	7	3.680		0.109	18	0.00605

NOTE: This table is continued in next four pages.

90° Tension -- (ETW)
Strength & Modulus
TCA T700G-12K-31E/#2510 Unidirectional Carbon

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]
B-8-1	B	4	8	4.683		0.108	18	0.00599
B-8-3	B	4	8	4.286		0.108	18	0.00602
B-8-5	B	4	8	4.086		0.109	18	0.00604
B-8-7	B	4	8	4.013		0.109	18	0.00604
B-10-1	B	4	8	4.047		0.108	18	0.00598
B-10-3	B	4	8	3.529		0.109	18	0.00606
B-10-5	B	4	8	3.566		0.109	18	0.00607
B-10-7	B	4	8	3.669		0.109	18	0.00605
B-8-2	B	4	8	4.597		0.108	18	0.00600
B-8-4	B	4	8	4.122		0.108	18	0.00602
B-8-6	B	4	8	4.479		0.109	18	0.00606
B-8-8	B	4	8	4.462		0.107	18	0.00597
B-10-2	B	4	8	4.203		0.108	18	0.00602
B-10-4	B	4	8	3.554		0.109	18	0.00607
B-10-6	B	4	8	3.564		0.109	18	0.00607
B-10-8	B	4	8	3.777		0.106	18	0.00591
A-19-1	A	5	9	3.991		0.107	18	0.00592
A-19-3	A	5	9	3.357		0.109	18	0.00607
A-19-5	A	5	9	3.402		0.110	18	0.00610
A-19-7	A	5	9	3.990		0.107	18	0.00595
A-21-1	A	5	9	3.961		0.107	18	0.00597
A-21-3	A	5	9	3.243		0.108	18	0.00602
A-21-5	A	5	9	3.697		0.108	18	0.00602
A-21-7	A	5	9	3.679		0.108	18	0.00599
A-19-2	A	5	9	4.077		0.108	18	0.00600
A-19-4	A	5	9	3.572		0.110	18	0.00609
A-19-6	A	5	9	3.816		0.108	18	0.00603
A-19-8	A	5	9	4.095		0.106	18	0.00588
A-21-2	A	5	9	3.655		0.108	18	0.00599
A-21-4	A	5	9	3.647		0.108	18	0.00602
A-21-6	A	5	9	3.498		0.108	18	0.00602
A-21-8	A	5	9	3.690		0.107	18	0.00594

90° Tension -- (ETW)
Strength & Modulus
TCA T700G-12K-31E/#2510 Unidirectional Carbon

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]
B-19-1	B	5	10	4.055		0.107	18	0.00594
B-19-3	B	5	10	3.493		0.109	18	0.00607
B-19-5	B	5	10	3.428		0.109	18	0.00607
B-19-7	B	5	10	3.323		0.108	18	0.00601
B-21-1	B	5	10	3.545		0.107	18	0.00596
B-21-3	B	5	10	3.575		0.108	18	0.00600
B-21-5	B	5	10	3.425		0.108	18	0.00601
B-21-7	B	5	10	3.305		0.108	18	0.00599
B-19-2	B	5	10	3.505		0.109	18	0.00603
B-19-4	B	5	10	3.185		0.109	18	0.00608
B-19-6	B	5	10	3.371		0.109	18	0.00603
B-19-8	B	5	10	4.010		0.106	18	0.00589
B-21-2	B	5	10	3.705		0.108	18	0.00598
B-21-4	B	5	10	3.393		0.109	18	0.00603
B-21-6	B	5	10	3.497		0.108	18	0.00601
B-21-8	B	5	10	3.814		0.107	18	0.00592
A-31-1	A	6	11	3.910		0.111	18	0.00616
A-31-3	A	6	11	3.467		0.111	18	0.00619
A-31-5	A	6	11	3.630		0.111	18	0.00619
A-31-7	A	6	11	3.491		0.111	18	0.00617
A-33-1	A	6	11	4.111		0.112	18	0.00620
A-33-3	A	6	11	3.822		0.111	18	0.00618
A-33-5	A	6	11	3.713		0.111	18	0.00617
A-33-7	A	6	11	4.278		0.111	18	0.00617
A-31-2	A	6	11	3.698		0.111	18	0.00617
A-31-4	A	6	11	3.247		0.112	18	0.00620
A-31-6	A	6	11	3.906		0.111	18	0.00619
A-31-8	A	6	11	3.765		0.110	18	0.00611
A-33-2	A	6	11	3.850		0.112	18	0.00622
A-33-4	A	6	11	4.282		0.111	18	0.00617
A-33-6	A	6	11	4.079		0.111	18	0.00617
A-33-8	A	6	11	4.362		0.110	18	0.00612

90° Tension -- (ETW)
Strength & Modulus
TCA T700G-12K-31E/#2510 Unidirectional Carbon

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]
B-32-1	B	6	12	4.418		0.110	18	0.00609
B-32-3	B	6	12	3.603		0.112	18	0.00625
B-32-5	B	6	12	3.663		0.112	18	0.00622
B-32-7	B	6	12	3.938		0.110	18	0.00612
B-34-1	B	6	12	4.094		0.110	18	0.00610
B-34-3	B	6	12	3.835		0.111	18	0.00617
B-34-5	B	6	12	3.879		0.111	18	0.00618
B-34-7	B	6	12	3.998		0.111	18	0.00616
B-36-1	B	6	12	3.635		0.110	18	0.00612
B-36-3	B	6	12	3.763		0.111	18	0.00619
B-36-5	B	6	12	3.862		0.111	18	0.00615
B-36-7	B	6	12	3.839		0.111	18	0.00616
B-36-2	B	6	12	3.272		0.111	18	0.00617
B-36-4	B	6	12	3.802		0.111	18	0.00618
B-36-6	B	6	12	3.881		0.111	18	0.00614
B-36-8	B	6	12	4.350		0.109	18	0.00604
A-43-1	A	7	13	3.592		0.108	18	0.00597
A-43-3	A	7	13	3.201		0.107	18	0.00594
A-43-5	A	7	13	3.692		0.108	18	0.00599
A-43-7	A	7	13	3.084		0.109	18	0.00608
A-45-1	A	7	13	3.679		0.108	18	0.00598
A-45-3	A	7	13	3.348		0.108	18	0.00599
A-45-5	A	7	13	3.078		0.109	18	0.00606
A-45-7	A	7	13	3.433		0.108	18	0.00602
A-43-2	A	7	13	3.847		0.108	18	0.00598
A-43-4	A	7	13	3.859		0.107	18	0.00595
A-43-6	A	7	13	2.831		0.109	18	0.00606
A-43-8	A	7	13	3.534		0.107	18	0.00596
A-45-2	A	7	13	3.663		0.108	18	0.00598
A-45-4	A	7	13	3.545		0.108	18	0.00601
A-45-6	A	7	13	3.314		0.109	18	0.00605
A-45-8	A	7	13	3.990		0.107	18	0.00594
A-47-2	A	7	13	3.868		0.108	18	0.00602

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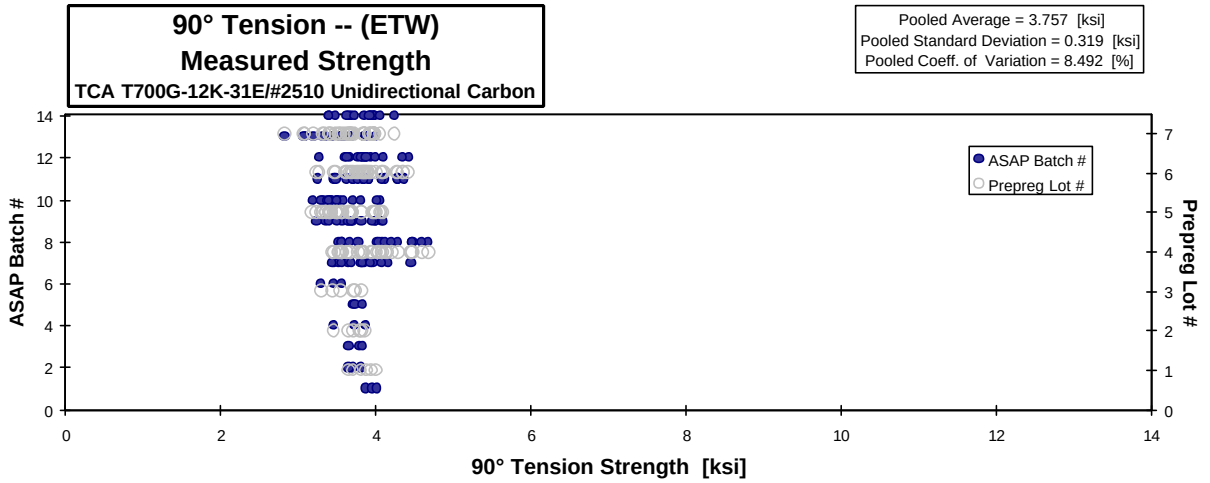
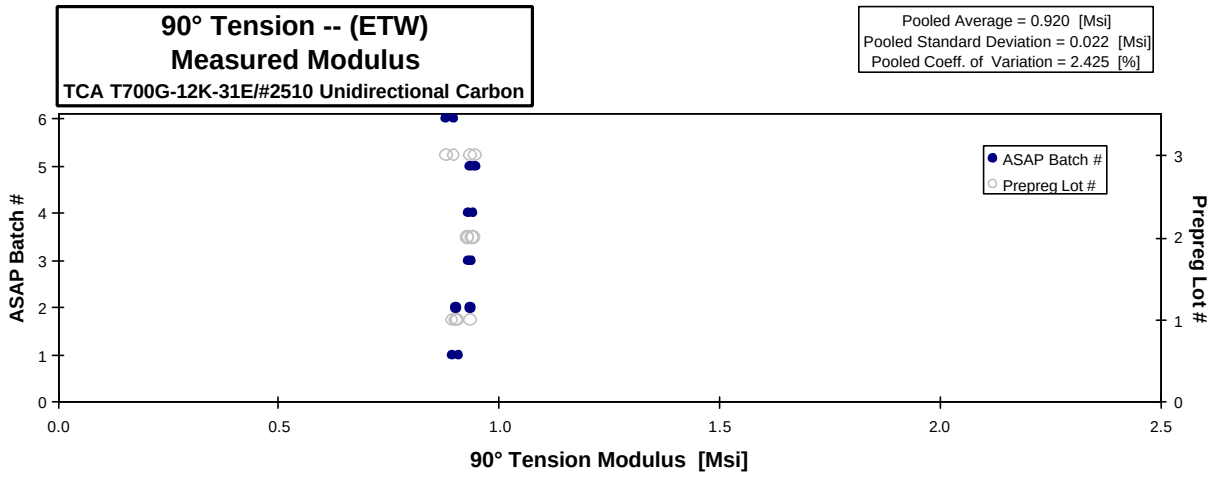
90° Tension -- (ETW)
Strength & Modulus
TCA T700G-12K-31E/#2510 Unidirectional Carbon

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]
A-44-1	A	7	14	3.850		0.107	18	0.00596
A-44-3	A	7	14	3.683		0.108	18	0.00600
A-44-5	A	7	14	3.398		0.108	18	0.00601
A-44-7	A	7	14	3.931		0.108	18	0.00599
A-48-1	A	7	14	3.982		0.108	18	0.00599
A-48-3	A	7	14	3.653		0.108	18	0.00602
A-48-5	A	7	14	3.971		0.108	18	0.00602
A-48-7	A	7	14	3.977		0.108	18	0.00601
A-44-2	A	7	14	3.483		0.108	18	0.00598
A-44-4	A	7	14	3.634		0.108	18	0.00601
A-44-6	A	7	14	3.400		0.108	18	0.00602
A-44-8	A	7	14	3.938		0.107	18	0.00593
A-48-2	A	7	14	4.052		0.108	18	0.00601
A-48-4	A	7	14	4.241		0.109	18	0.00603
A-48-6	A	7	14	3.919		0.108	18	0.00602
A-48-8	A	7	14	3.728		0.107	18	0.00597

Average	**3.757**	**0.920**	**Average**	**0.0060**
Standard Dev.	**0.319**	**0.022**		
Coeff. of Var. [%]	**8.492**	**2.425**		
Min.	**2.831**	**0.880**	**Min.**	**0.0059**
Max.	**4.683**	**0.946**	**Max.**	**0.0062**
Number of Spec.	**146**	**12**		

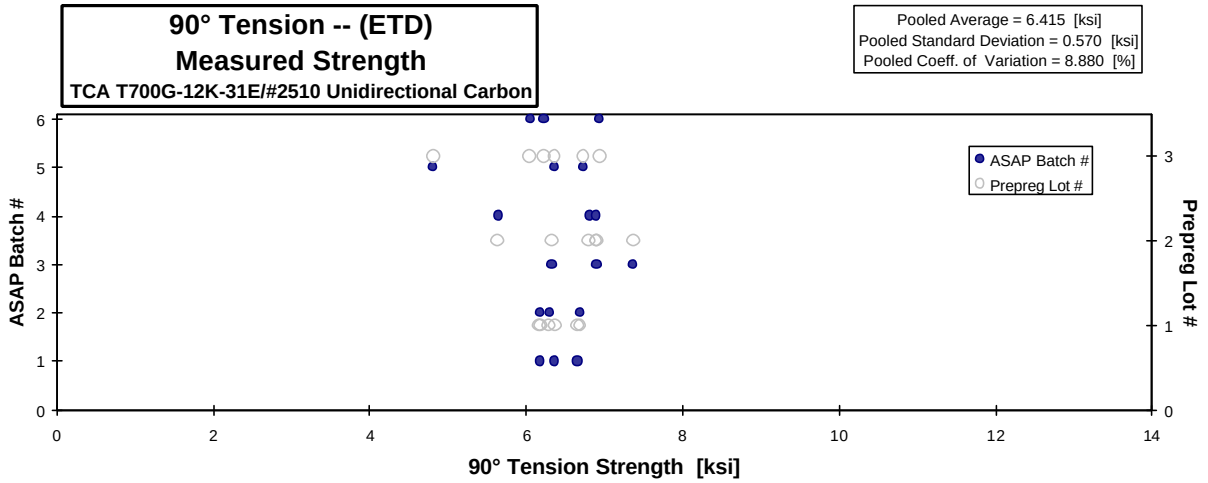


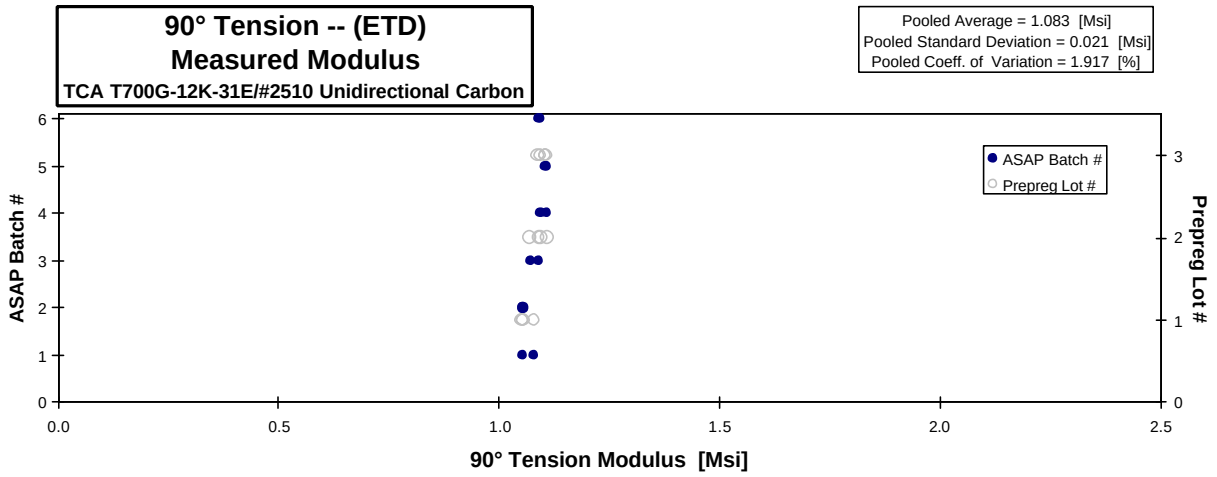


90° Tension -- (ETD)
Strength & Modulus
TCA T700G-12K-31E/#2510 Unidirectional Carbon

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]
A2-910-041-1-4	A	1	1	6.660	1.054	0.108	18	0.00601
A1-910-041-1-4	A	1	1	6.369	1.079	0.108	18	0.00600
A2-910-041-1-8	A	1	1	6.174		0.109	18	0.00603
B1-910-041-1-4	B	1	2	6.692	1.055	0.108	18	0.00600
B2-910-041-1-4	B	1	2	6.186	1.052	0.108	18	0.00602
B2-910-041-1-8	B	1	2	6.297		0.108	18	0.00599
A1-910-042-1-2	A	2	3	6.909	1.070	0.107	18	0.00593
A2-910-042-1-2	A	2	3	7.370	1.090	0.107	18	0.00595
A2-910-042-1-6	A	2	3	6.332		0.108	18	0.00600
B1-910-042-1-2	B	2	4	6.809	1.095	0.107	18	0.00592
B2-910-042-1-2	B	2	4	6.892	1.109	0.107	18	0.00592
B2-910-042-1-6	B	2	4	5.641		0.109	18	0.00608
A1-910-043-1-2	A	3	5	6.731	1.104	0.107	18	0.00594
A2-910-043-1-2	A	3	5	6.367	1.107	0.107	18	0.00593
A2-910-043-1-6	A	3	5	4.814		0.109	18	0.00607
B1-910-043-1-2	B	3	6	6.941	1.093	0.106	18	0.00590
B2-910-043-1-2	B	3	6	6.230	1.088	0.107	18	0.00597
B2-910-043-1-6	B	3	6	6.052		0.107	18	0.00597

Average	**6.415**	**1.083**	**Average**	**0.0060**
Standard Dev.	**0.570**	**0.021**		
Coeff. of Var. [%]	**8.880**	**1.917**		
Min.	**4.814**	**1.052**	**Min.**	**0.0059**
Max.	**7.370**	**1.109**	**Max.**	**0.0061**
Number of Spec.	**18**	**12**		



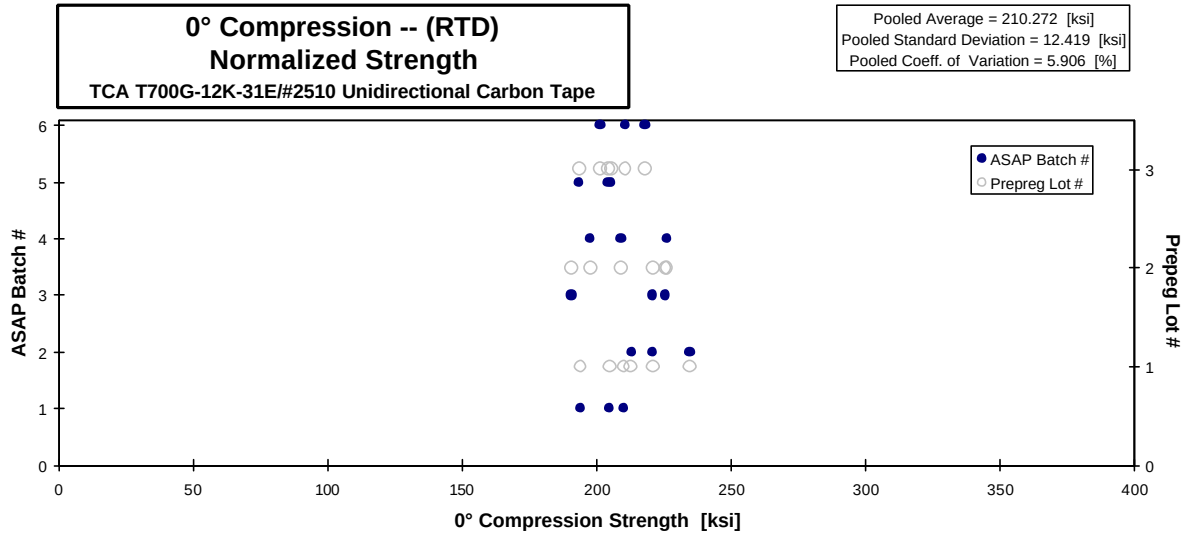


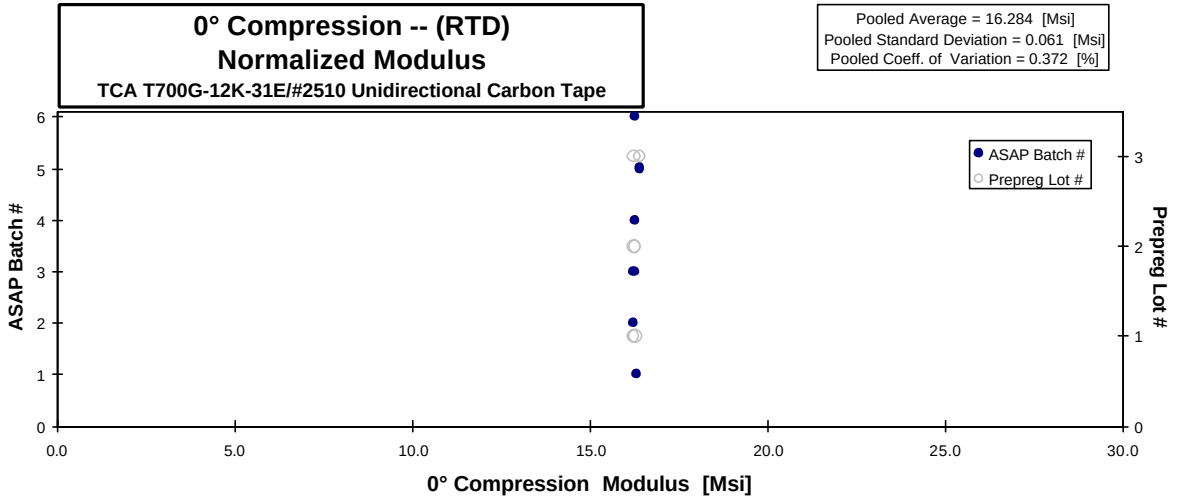
0° Compression -- (RTD)
Strength & Modulus
TCA T700G-12K-31E/#2510 Unidirectional Carbon Tape

normalizing t_{ply} [in]: 0.0060

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
A1-910-041-1-11	A	1	1	194.240		0.048	8	0.00600	194.160	
A2-910-041-1-9	A	1	1	205.157		0.048	8	0.00600	205.072	
A2-910-041-1-10	A	1	1	210.430		0.048	8	0.00600	210.342	
A1-910-041-1-2	A	1	1		16.270	0.048	8	0.00601		16.297
B1-910-041-1-11	B	1	2	214.506		0.048	8	0.00596	212.986	
B2-910-041-1-9	B	1	2	236.592		0.048	8	0.00596	234.916	
B2-910-041-1-10	B	1	2	222.740		0.048	8	0.00596	221.163	
B1-910-041-1-2	B	1	2		16.465	0.047	8	0.00592		16.232
A1-910-042-1-7	A	2	3	218.988		0.048	8	0.00606	221.223	
A2-910-042-1-7	A	2	3	189.006		0.048	8	0.00606	190.936	
A2-910-042-1-8	A	2	3	223.404		0.048	8	0.00606	225.684	
A1-911-042-1-1	A	2	3		16.265	0.048	8	0.00599		16.248
B1-910-042-1-7	B	2	4	209.509		0.048	8	0.00600	209.378	
B2-910-042-1-7	B	2	4	226.321		0.048	8	0.00600	226.180	
B2-910-042-1-8	B	2	4	198.093		0.048	8	0.00600	197.969	
B1-911-042-1-1	B	2	4		16.262	0.048	8	0.00600		16.273
A1-910-043-1-7	A	3	5	203.790		0.048	8	0.00606	205.786	
A2-910-043-1-7	A	3	5	202.602		0.048	8	0.00606	204.586	
A2-910-043-1-8	A	3	5	191.894		0.048	8	0.00606	193.773	
A1-910-043-1-1	A	3	5		16.331	0.048	8	0.00603		16.399
B1-910-043-1-7	B	3	6	202.233		0.048	8	0.00598	201.601	
B2-910-043-1-7	B	3	6	219.027		0.048	8	0.00598	218.342	
B2-910-043-1-8	B	3	6	211.458		0.048	8	0.00598	210.797	
B1-910-043-1-1	B	3	6		16.490	0.047	8	0.00592		16.256

Average	**209.999**	**16.347**		**Average$_{norm}$**	**0.00600**	**210.272**	**16.284**
Standard Dev.	**12.917**	**0.104**		**Standard Dev.$_{norm}$**		**12.419**	**0.061**
Coeff. of Var. [%]	**6.151**	**0.638**		**Coeff. of Var. [%]$_{norm}$**		**5.906**	**0.372**
Min.	**189.006**	**16.262**		**Min.**	**0.0059**	**190.936**	**16.232**
Max.	**236.592**	**16.490**		**Max.**	**0.0061**	**234.916**	**16.399**
Number of Spec.	**18**	**6**		**Number of Spec.**		**18**	**6**



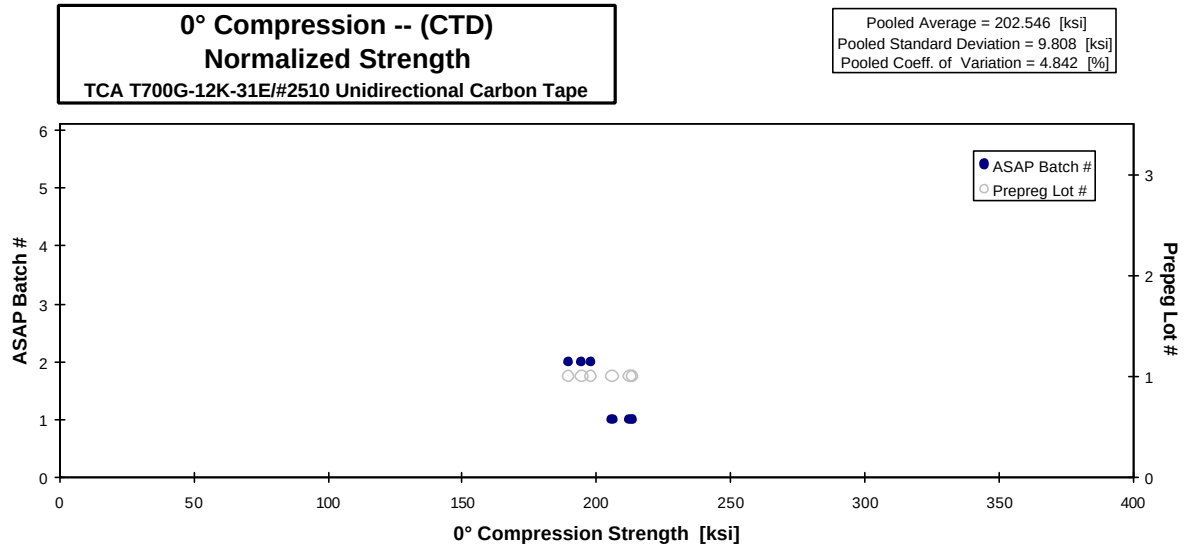


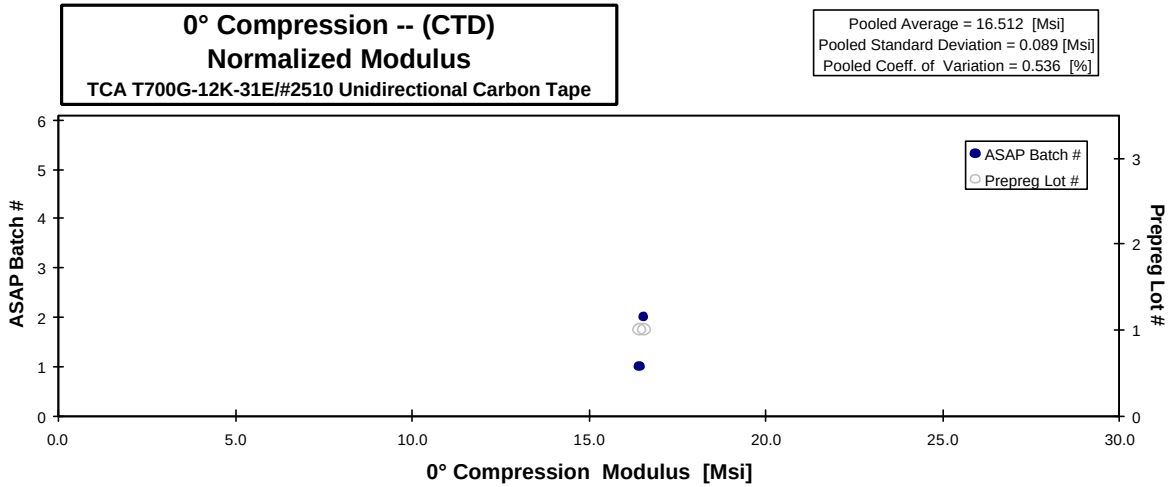
0° Compression -- (CTD)
Strength & Modulus
TCA T700G-12K-31E/#2510 Unidirectional Carbon Tape

normalizing t_{ply} [in]: 0.0060

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
A1-910-041-1-1	A	1	1	213.689		0.048	8	0.00600	213.689	
A1-910-041-1-2	A	1	1	212.689		0.048	8	0.00600	212.689	
A1-910-041-1-3	A	1	1	206.089		0.048	8	0.00600	206.089	
A1-910-041-1-1	A	1	1		16.415	0.048	8	0.00601		16.450
B1-910-041-1-3	B	1	2	189.803		0.048	8	0.00600	189.803	
B1-910-041-1-2	B	1	2	194.780		0.048	8	0.00600	194.780	
B1-910-041-1-4	B	1	2	198.225		0.048	8	0.00600	198.225	
B1-910-041-1-1	B	1	2		16.820	0.047	8	0.00591		16.575

			$Average_{norm}$			
Average	**202.546**	**16.618**		**0.00599**	**202.546**	**16.512**
Standard Dev.	**9.808**	**0.286**	**Standard Dev.$_{norm}$**		**9.808**	**0.089**
Coeff. of Var. [%]	**4.842**	**1.722**	**Coeff. of Var. [%]$_{norm}$**		**4.842**	**0.536**
Min.	**189.803**	**16.415**	**Min.**	**0.0059**	**189.803**	**16.450**
Max.	**213.689**	**16.820**	**Max.**	**0.0060**	**213.689**	**16.575**
Number of Spec.	**6**	**2**	**Number of Spec.**		**6**	**2**



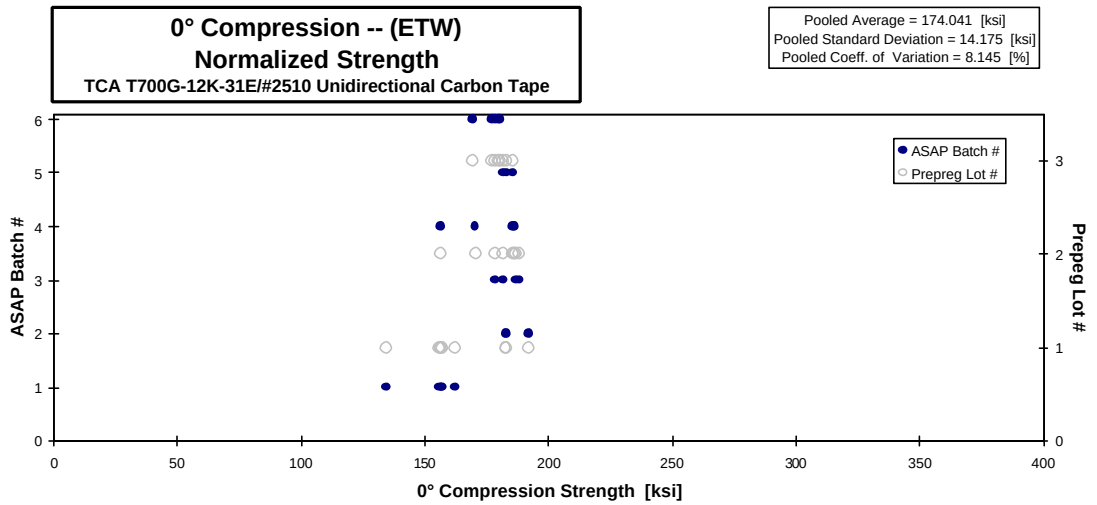


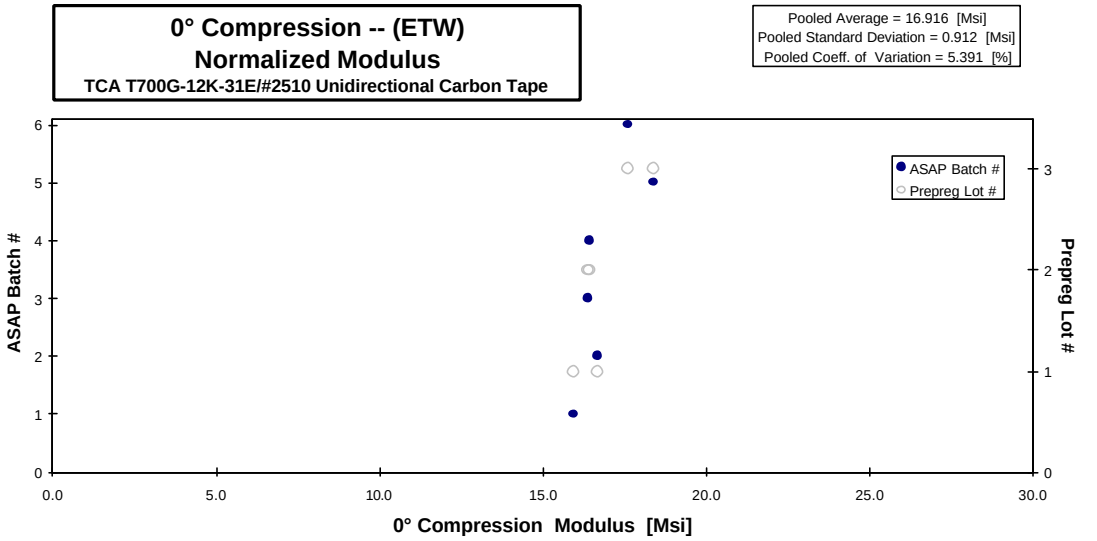
0° Compression -- (ETW)
Strength & Modulus
TCA T700G-12K-31E/#2510 Unidirectional Carbon Tape

normalizing t_{ply} [in]: 0.0060

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
A1-910-041-1-3	A	1	1	166.126		0.045	8	0.00566	156.782	
A1-910-041-1-4	A	1	1	165.717		0.047	8	0.00588	162.264	
A1-910-041-1-5	A	1	1	163.971		0.046	8	0.00575	157.139	
A6-910-041-1-8	A	1	1	135.486		0.048	8	0.00597	134.781	
A6-910-041-1-9	A	1	1	157.780		0.047	8	0.00593	155.808	
A6-910-041-1-11	A	1	1	158.226		0.048	8	0.00594	156.743	
A1-910-041-1-4	A	1	1		16.018	0.048	8	0.00598		15.952
B6-910-041-1-7	B	1	2	197.022		0.047	8	0.00585	192.097	
B6-910-041-1-8	B	1	2	186.760		0.047	8	0.00587	182.675	
B6-910-041-1-11	B	1	2	185.834		0.047	8	0.00592	183.318	
B1-910-041-1-4	B	1	2		16.730	0.048	8	0.00599		16.689
A1-910-042-1-1	A	2	3	183.135		0.047	8	0.00585	178.671	
A6-910-042-1-7	A	2	3	187.865		0.046	8	0.00581	181.799	
A6-910-042-1-10	A	2	3	194.633		0.046	8	0.00580	188.145	
A6-910-042-1-11	A	2	3	192.444		0.047	8	0.00583	186.831	
A1-910-042-1-3	A	2	3		16.813	0.047	8	0.00585		16.403
B1-910-042-1-3	B	2	4	183.548		0.049	8	0.00609	186.301	
B6-910-042-1-8	B	2	4	190.575		0.047	8	0.00584	185.414	
B6-910-042-1-9	B	2	4	173.790		0.047	8	0.00589	170.531	
B6-910-042-1-11	B	2	4	156.764		0.048	8	0.00599	156.437	
B1-910-042-1-3	B	2	4		16.500	0.048	8	0.00598		16.448
A6-910-043-1-7	A	3	5	185.209		0.048	8	0.00601	185.402	
A6-910-043-1-11	A	3	5	184.304		0.048	8	0.00596	182.960	
A6-910-043-1-12	A	3	5	183.242		0.048	8	0.00594	181.524	
A1-910-043-1-3	A	3	5		18.419	0.048	8	0.00600		18.411
B1-910-043-1-1	B	3	6	187.640		0.046	8	0.00571	178.531	
B1-910-043-1-2	B	3	6	179.306		0.048	8	0.00602	179.941	
B6-910-043-1-7	B	3	6	180.176		0.047	8	0.00590	177.173	
B6-910-043-1-8	B	3	6	182.419		0.048	8	0.00594	180.519	
B6-910-043-1-9	B	3	6	169.411		0.048	8	0.00599	169.234	
B1-910-043-1-3	B	3	6		17.405	0.049	8	0.00607		17.594

Average	**177.255**	**16.981**	**$Average_{norm}$**	**0.00591**	**174.041**	**16.916**
Standard Dev.	**14.664**	**0.836**	**$Standard\ Dev._{norm}$**		**14.175**	**0.912**
Coeff. of Var. [%]	**8.273**	**4.924**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**8.145**	**5.391**
Min.	**135.486**	**16.018**	**Min.**	**0.0057**	**134.781**	**15.952**
Max.	**197.022**	**18.419**	**Max.**	**0.0061**	**192.097**	**18.411**
Number of Spec.	**25**	**6**	**Number of Spec.**		**25**	**6**



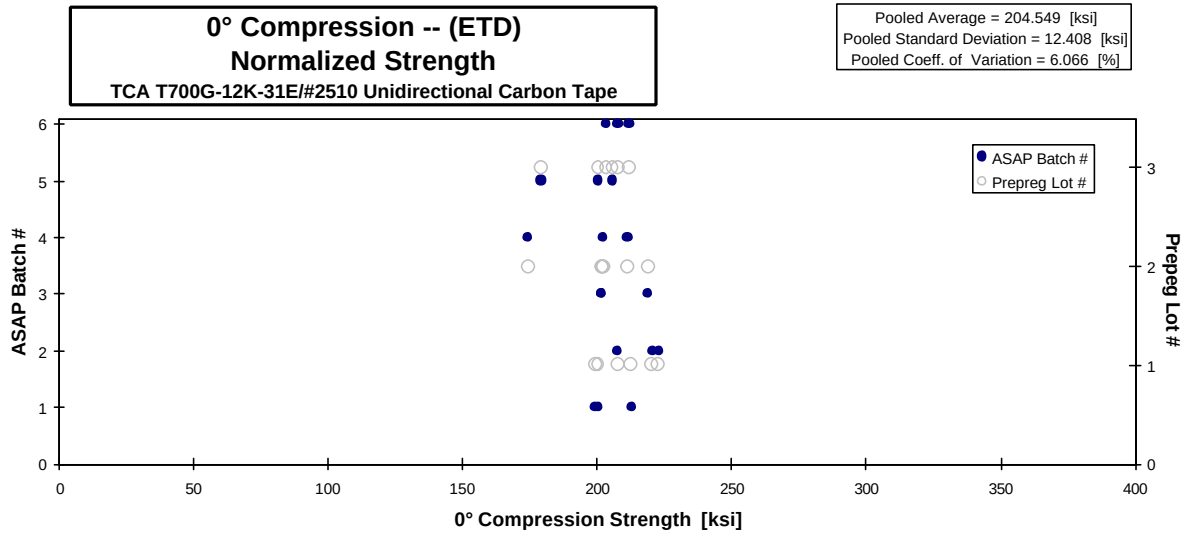


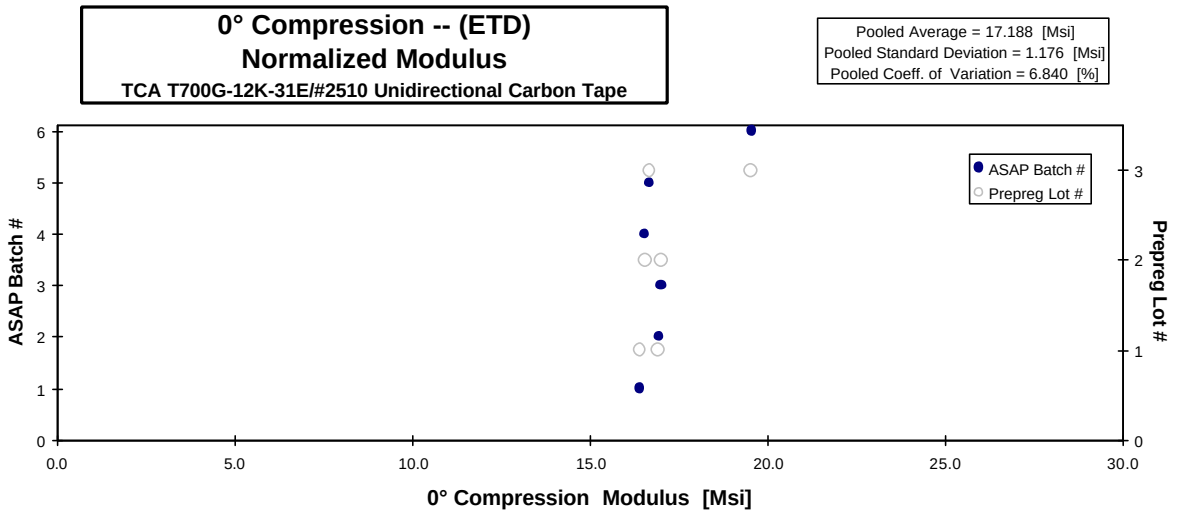
0° Compression -- (ETD)
Strength & Modulus
TCA T700G-12K-31E/#2510 Unidirectional Carbon Tape

normalizing t_{ply} [in]: 0.0060

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
A1-910-041-1-13	A	1	1	199.343		0.048	8	0.00600	199.260	
A1-910-041-1-14	A	1	1	200.422		0.048	8	0.00600	200.339	
A2-910-041-1-11	A	1	1	212.675		0.048	8	0.00600	212.587	
A1-910-041-1-3	A	1	1		16.421	0.048	8	0.00600		16.411
B1-910-041-1-13	B	1	2	221.975		0.048	8	0.00596	220.403	
B1-910-041-1-14	B	1	2	224.300		0.048	8	0.00596	222.711	
B2-910-041-1-11	B	1	2	209.123		0.048	8	0.00596	207.641	
B1-910-041-1-3	B	1	2		17.045	0.048	8	0.00596		16.931
A1-910-042-1-8	A	2	3	199.666		0.048	8	0.00606	201.704	
A1-910-042-1-9	A	2	3	216.765		0.048	8	0.00606	218.978	
A2-910-042-1-9	A	2	3	199.746		0.048	8	0.00606	201.785	
A1-910-042-1-2	A	2	3		16.840	0.049	8	0.00606		17.015
B1-910-042-1-8	B	2	4	174.420		0.048	8	0.00600	174.311	
B1-910-042-1-9	B	2	4	211.499		0.048	8	0.00600	211.367	
B2-910-042-1-9	B	2	4	202.470		0.048	8	0.00600	202.343	
B1-910-042-1-2	B	2	4		16.522	0.048	8	0.00601		16.556
A1-910-043-1-8	A	3	5	203.761		0.048	8	0.00606	205.756	
A1-910-043-1-9	A	3	5	198.465		0.048	8	0.00606	200.409	
A2-910-043-1-9	A	3	5	177.499		0.048	8	0.00606	179.237	
A1-910-043-1-2	A	3	5		16.562	0.048	8	0.00604		16.673
B1-910-043-1-8	B	3	6	203.923		0.048	8	0.00598	203.286	
B1-910-043-1-9	B	3	6	208.422		0.048	8	0.00598	207.771	
B2-910-043-1-9	B	3	6	212.660		0.048	8	0.00598	211.996	
B1-910-043-1-2	B	3	6		19.761	0.047	8	0.00593		19.543

Average	**204.285**	**17.192**	**$Average_{norm}$**	**0.00601**	**204.549**	**17.188**
Standard Dev.	**12.904**	**1.280**	**$Standard\ Dev._{norm}$**		**12.408**	**1.176**
Coeff. of Var. [%]	**6.317**	**7.443**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**6.066**	**6.840**
Min.	**174.420**	**16.421**	**Min.**	**0.0059**	**174.311**	**16.411**
Max.	**224.300**	**19.761**	**Max.**	**0.0061**	**222.711**	**19.543**
Number of Spec.	**18**	**6**	**Number of Spec.**		**18**	**6**

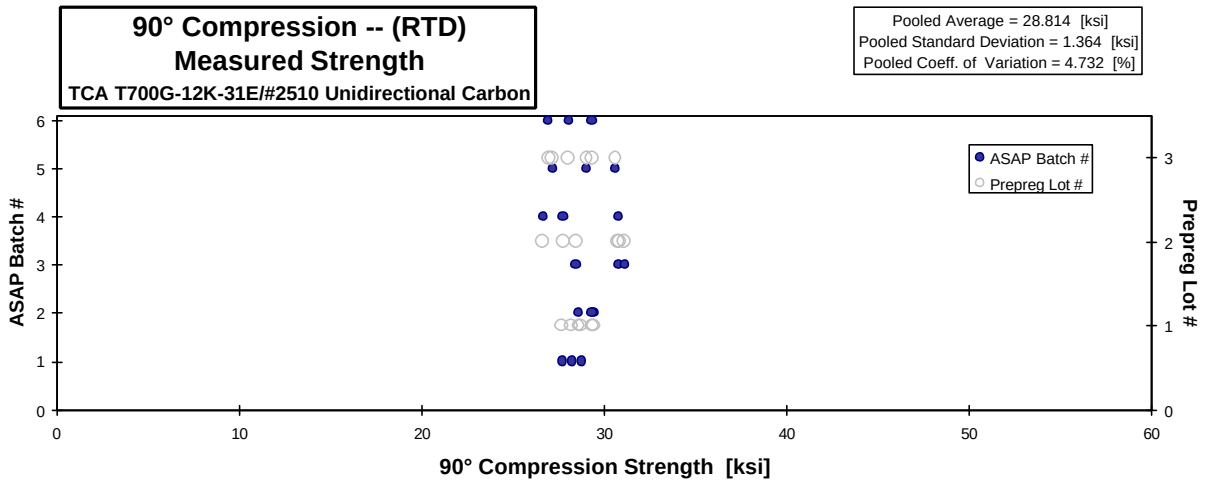


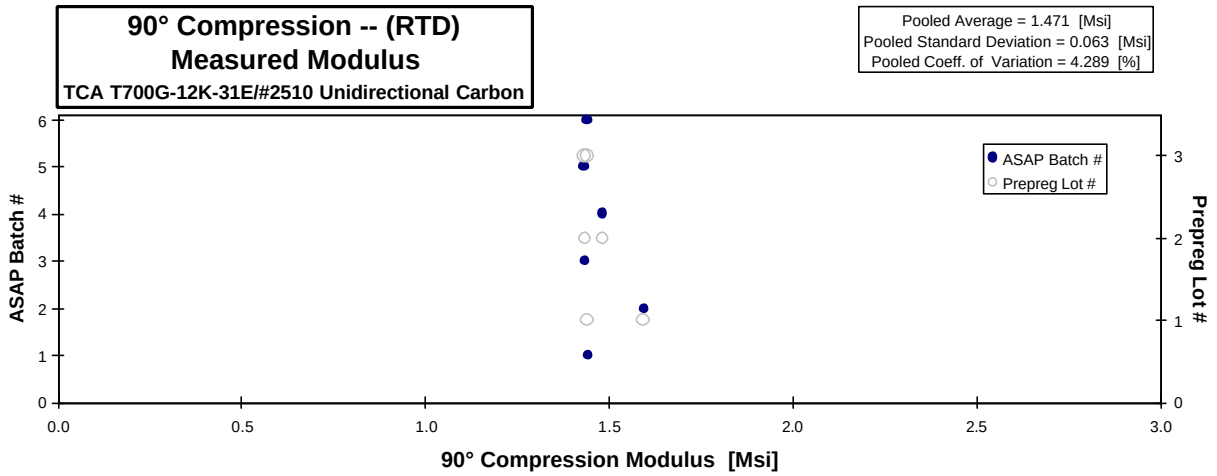


90° Compression -- (RTD)
Strength & Modulus
TCA T700G-12K-31E/#2510 Unidirectional Carbon

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]
A1-910-041-1-9	A	1	1	27.701		0.047	8	0.00594
A1-910-041-1-10	A	1	1	28.209		0.047	8	0.00594
A2-910-041-1-11	A	1	1	28.730		0.047	8	0.00594
A1-910-041-1-2	A	1	1		1.442	0.047	8	0.00593
B1-910-041-1-9	B	1	2	29.415		0.048	8	0.00600
B1-910-041-1-10	B	1	2	29.335		0.048	8	0.00600
B2-910-041-1-11	B	1	2	28.586		0.048	8	0.00600
B1-910-041-1-2	B	1	2		1.594	0.048	8	0.00600
A1-910-042-1-7	A	2	3	30.813		0.049	8	0.00617
A1-910-042-1-8	A	2	3	31.121		0.049	8	0.00617
A2-910-042-1-7	A	2	3	28.455		0.049	8	0.00617
A1-910-042-1-1	A	2	3		1.433	0.049	8	0.00607
B1-910-042-1-7	B	2	4	27.757		0.049	8	0.00609
B1-910-042-1-8	B	2	4	26.641		0.049	8	0.00609
B2-910-042-1-7	B	2	4	30.749		0.049	8	0.00609
B1-910-042-1-1	B	2	4		1.482	0.048	8	0.00603
A1-910-043-1-7	A	3	5	29.038		0.049	8	0.00610
A1-910-043-1-8	A	3	5	27.161		0.049	8	0.00610
A2-910-043-1-7	A	3	5	30.595		0.049	8	0.00610
A1-910-043-1-1	A	3	5		1.432	0.048	8	0.00598
B1-910-043-1-7	B	3	6	28.042		0.049	8	0.00610
B1-910-043-1-8	B	3	6	26.956		0.049	8	0.00610
B2-910-043-1-7	B	3	6	29.345		0.049	8	0.00610
B1-910-043-1-1	B	3	6		1.440	0.048	8	0.00604

Average	**28.814**	**1.471**	**Average**	**0.0061**
Standard Dev.	**1.364**	**0.063**		
Coeff. of Var. [%]	**4.732**	**4.289**		
Min.	**26.641**	**1.432**	**Min.**	**0.0059**
Max.	**31.121**	**1.594**	**Max.**	**0.0062**
Number of Spec.	**18**	**6**		

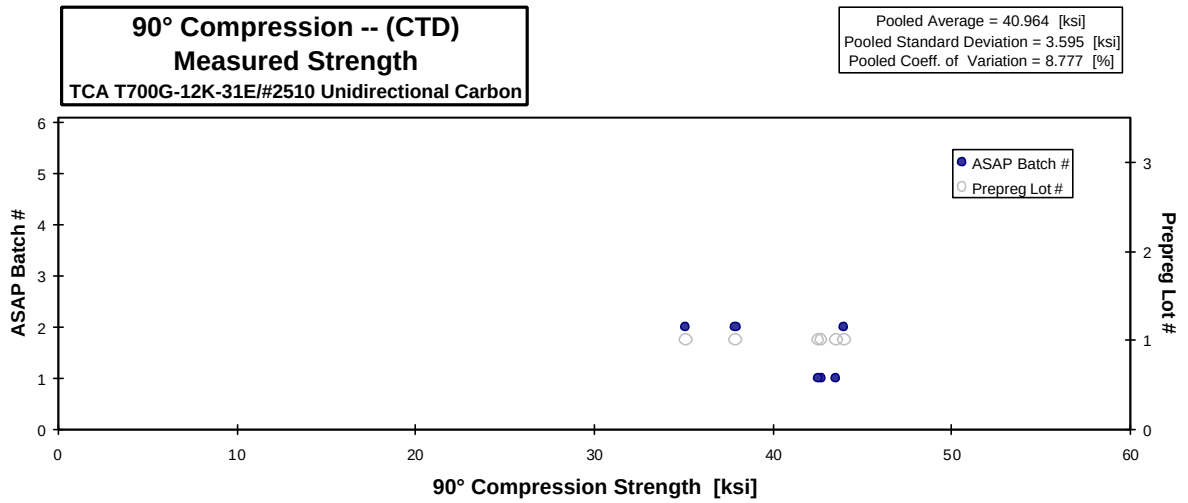


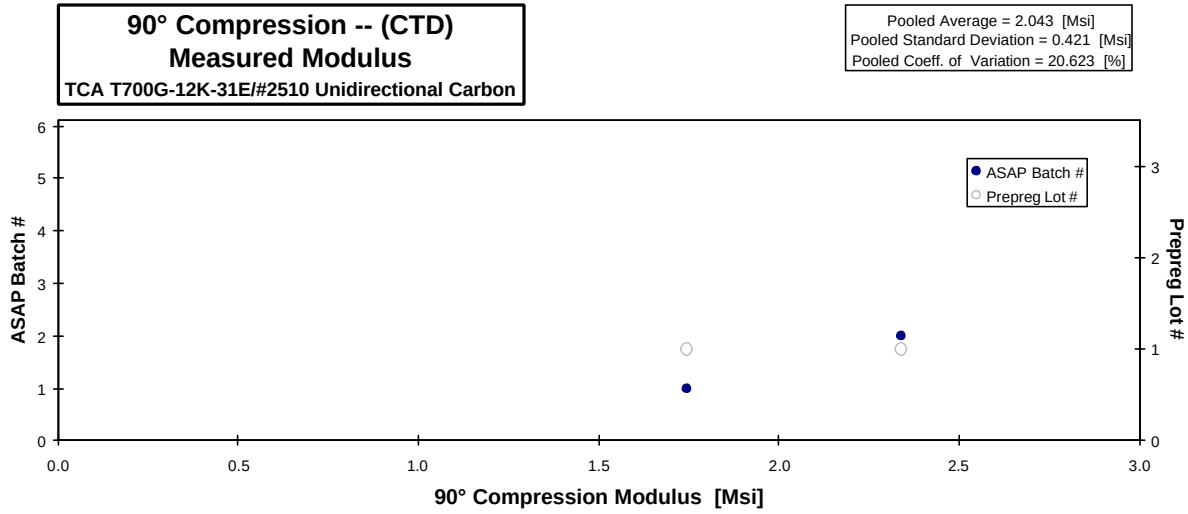


90° Compression -- (CTD)
Strength & Modulus
TCA T700G-12K-31E/#2510 Unidirectional Carbon

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]
A1-910-041-1-7	A	1	1	42.691		0.047	8	0.00594
A2-910-041-1-7	A	1	1	43.545		0.047	8	0.00594
A2-910-041-1-8	A	1	1	42.527		0.047	8	0.00594
A1-910-041-1-1	A	1	1		1.745	0.047	8	0.00591
B1-910-041-1-7	B	1	2	43.986		0.048	8	0.00600
B2-910-041-1-7	B	1	2	37.913		0.048	8	0.00600
B2-910-041-1-8	B	1	2	35.123		0.048	8	0.00600
B1-910-041-1-1	B	1	2		2.341	0.048	8	0.00596

Average	**40.964**	**2.043**	**Average**	**0.0060**
Standard Dev.	**3.595**	**0.421**		
Coeff. of Var. [%]	**8.777**	**20.623**		
Min.	**35.123**	**1.745**	**Min.**	**0.0059**
Max.	**43.986**	**2.341**	**Max.**	**0.0060**
Number of Spec.	**6**	**2**		

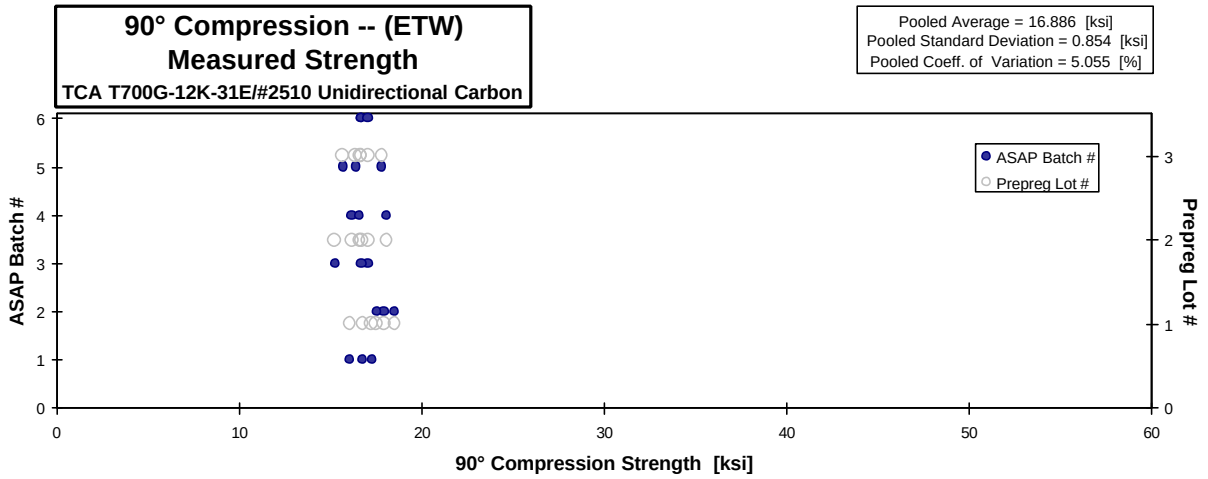


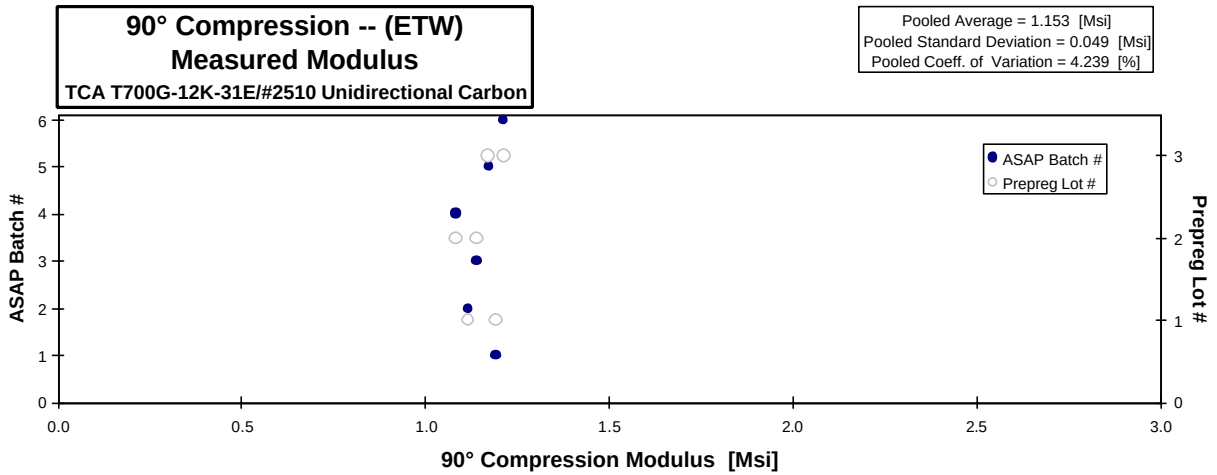


90° Compression -- (ETW)
Strength & Modulus
TCA T700G-12K-31E/#2510 Unidirectional Carbon

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]
A1-910-041-1-2	A	1	1	16.060		0.048	8	0.00600
A1-910-041-1-3	A	1	1	17.264		0.048	8	0.00600
A2-910-041-1-1	A	1	1	16.742		0.048	8	0.00600
A1-910-041-1-4	A	1	1		1.192	0.047	8	0.00593
B1-910-041-1-2	B	1	2	17.931		0.048	8	0.00600
B1-910-041-1-1	B	1	2	17.517		0.048	8	0.00600
B1-910-041-1-3	B	1	2	18.490		0.048	8	0.00600
B1-910-041-1-4	B	1	2		1.116	0.048	8	0.00603
A1-910-042-1-1	A	2	3	17.045		0.048	8	0.00600
A1-910-042-1-3	A	2	3	15.233		0.048	8	0.00600
A2-910-042-1-2	A	2	3	16.690		0.048	8	0.00600
A1-910-042-1-3	A	2	3		1.139	0.049	8	0.00617
B1-910-042-1-1	B	2	4	16.174		0.048	8	0.00600
B1-910-042-1-3	B	2	4	16.573		0.048	8	0.00600
B2-910-042-1-1	B	2	4	18.064		0.048	8	0.00600
B1-910-042-1-3	B	2	4		1.083	0.049	8	0.00609
A1-910-043-1-1	A	3	5	16.379		0.048	8	0.00600
A1-910-043-1-2	A	3	5	15.677		0.048	8	0.00600
A2-910-043-1-1	A	3	5	17.791		0.048	8	0.00594
A1-910-043-1-3	A	3	5		1.171	0.049	8	0.00613
B1-910-043-1-1	B	3	6	16.631		0.048	8	0.00600
B1-910-043-1-2	B	3	6	16.644		0.048	8	0.00600
B2-910-043-1-1	B	3	6	17.044		0.048	8	0.00600
B1-910-043-1-3	B	3	6		1.213	0.049	8	0.00609

Average	**16.886**	**1.153**	**Average**	**0.0060**
Standard Dev.	**0.854**	**0.049**		
Coeff. of Var. [%]	**5.055**	**4.239**		
Min.	**15.233**	**1.083**	**Min.**	**0.0059**
Max.	**18.490**	**1.213**	**Max.**	**0.0062**
Number of Spec.	**18**	**6**		

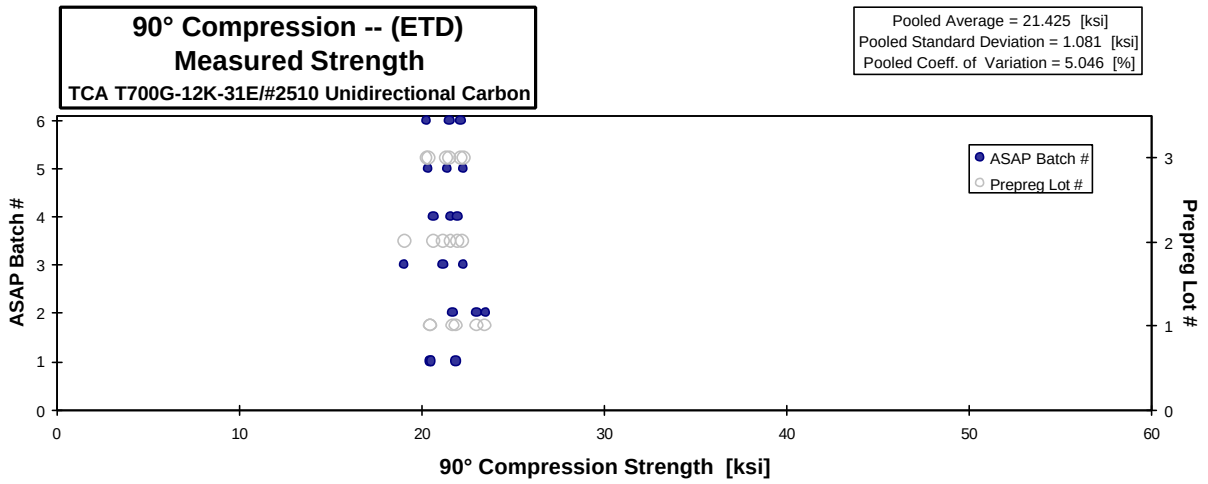


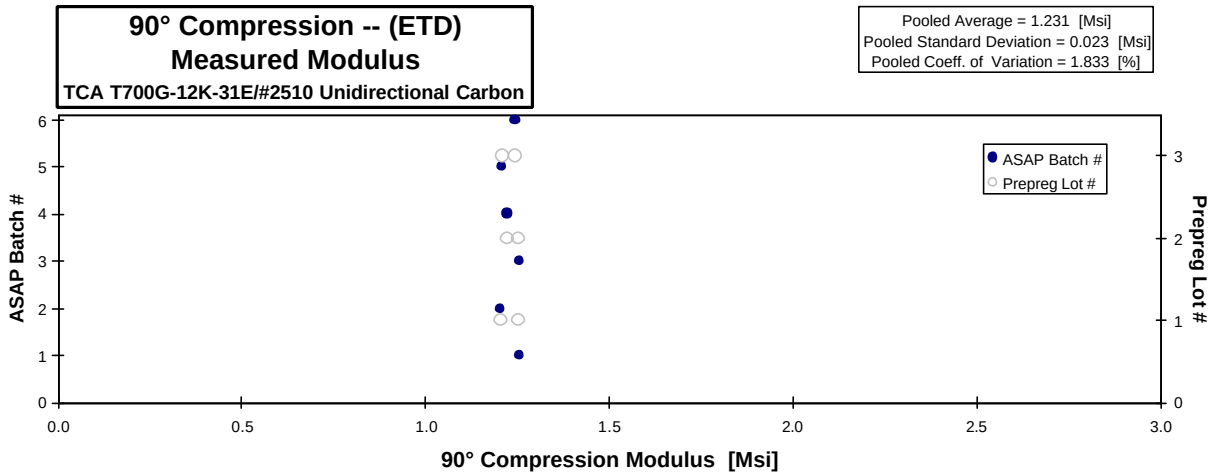


90° Compression -- (ETD)
Strength & Modulus
TCA T700G-12K-31E/#2510 Unidirectional Carbon

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]
A1-910-041-1-11	A	1	1	20.454		0.047	8	0.00594
A2-910-041-1-13	A	1	1	21.865		0.047	8	0.00594
A2-910-041-1-14	A	1	1	20.491		0.047	8	0.00594
A1-910-041-1-3	A	1	1		1.254	0.048	8	0.00604
B1-910-041-1-11	B	1	2	21.709		0.048	8	0.00600
B2-910-041-1-13	B	1	2	23.015		0.048	8	0.00600
B2-910-041-1-14	B	1	2	23.472		0.048	8	0.00600
B1-910-041-1-3	B	1	2		1.204	0.048	8	0.00595
A1-910-042-1-9	A	2	3	22.253		0.049	8	0.00617
A2-910-042-1-8	A	2	3	21.188		0.049	8	0.00617
A2-910-042-1-9	A	2	3	19.042		0.049	8	0.00617
A1-910-042-1-2	A	2	3		1.254	0.049	8	0.00611
B1-910-042-1-9	B	2	4	21.564		0.049	8	0.00609
B2-910-042-1-8	B	2	4	21.966		0.049	8	0.00609
B2-910-042-1-14	B	2	4	20.653		0.049	8	0.00609
B1-910-042-1-6	B	2	4		1.223	0.049	8	0.00609
A1-910-043-1-9	A	3	5	20.366		0.049	8	0.00610
A2-910-043-1-8	A	3	5	22.295		0.049	8	0.00610
A2-910-043-1-9	A	3	5	21.371		0.049	8	0.00610
A1-910-043-1-2	A	3	5		1.208	0.049	8	0.00608
B1-910-043-1-9	B	3	6	20.276		0.049	8	0.00610
B2-910-043-1-8	B	3	6	21.518		0.049	8	0.00610
B2-910-043-1-14	B	3	6	22.149		0.049	8	0.00610
B1-910-043-1-2	B	3	6		1.245	0.049	8	0.00608

Average	**21.425**	**1.231**	**Average**	**0.0061**
Standard Dev.	**1.081**	**0.023**		
Coeff. of Var. [%]	**5.046**	**1.833**		
Min.	**19.042**	**1.204**	**Min.**	**0.0059**
Max.	**23.472**	**1.254**	**Max.**	**0.0062**
Number of Spec.	**18**	**6**		

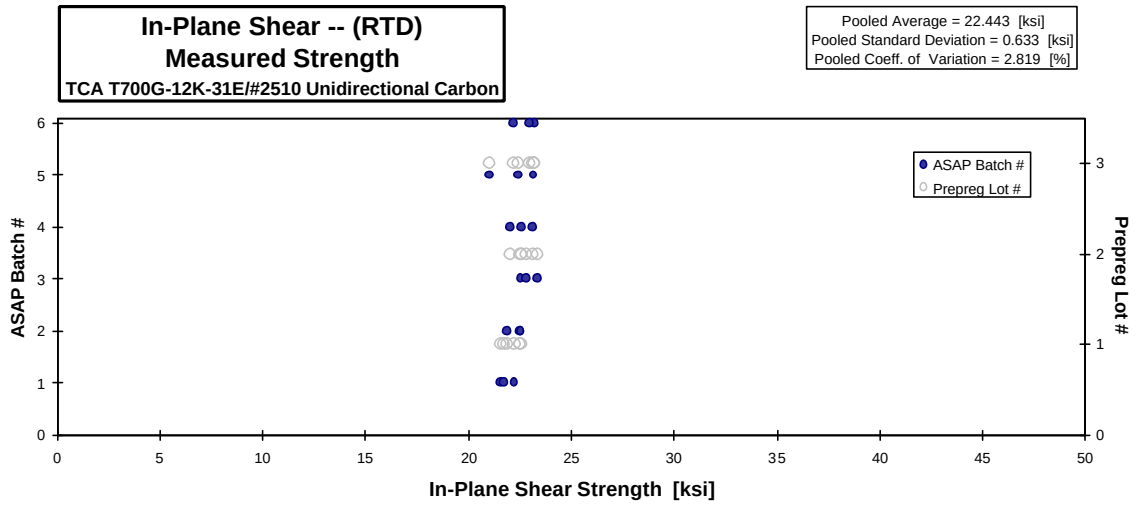


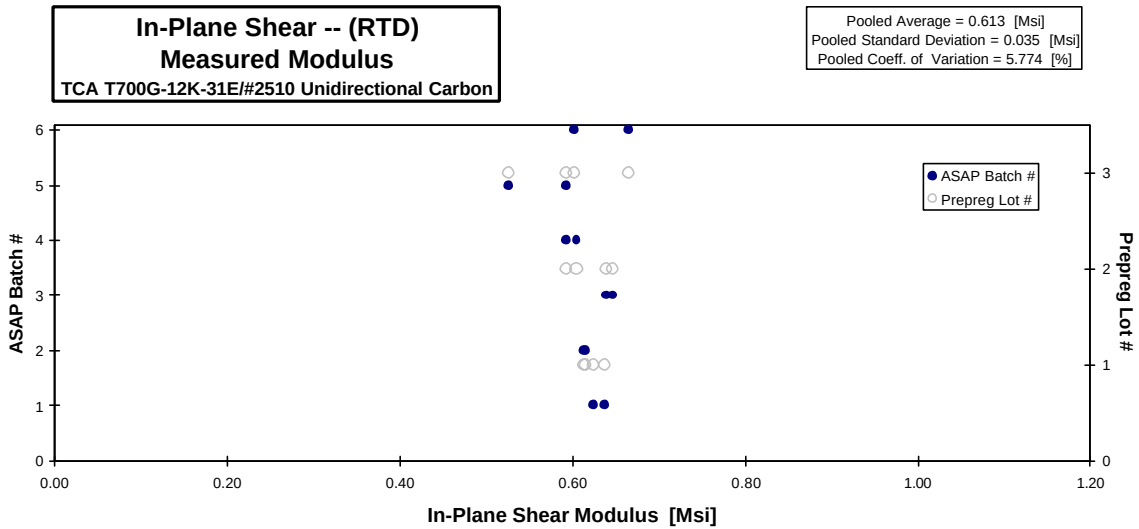


In-Plane Shear -- (RTD)
Strength & Modulus
TCA T700G-12K-31E/#2510 Unidirectional Carbon

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]
A1-910-041-1-32	A	1	1	21.586	0.625	0.143	24	0.00596
A1-910-041-1-33	A	1	1	22.240	0.638	0.143	24	0.00595
A1-910-041-1-5	A	1	1	21.721		0.144	24	0.00601
B1-910-041-1-32	B	1	2	21.903	0.613	0.143	24	0.00598
B1-910-041-1-33	B	1	2	22.484	0.615	0.143	24	0.00596
B1-910-041-1-5	B	1	2	22.550		0.142	24	0.00593
A1-910-042-1-11	A	2	3	22.542	0.646	0.144	24	0.00599
A1-910-042-1-12	A	2	3	22.856	0.639	0.141	24	0.00590
A1-910-042-1-1	A	2	3	23.379		0.141	24	0.00588
B1-910-042-1-11	B	2	4	22.012	0.605	0.144	24	0.00600
B1-910-042-1-12	B	2	4	23.141	0.593	0.141	24	0.00586
B1-910-042-1-1	B	2	4	22.563		0.140	24	0.00585
A1-910-043-1-11	A	3	5	22.460	0.593	0.144	24	0.00599
A1-910-043-1-12	A	3	5	21.020	0.526	0.144	24	0.00601
A1-910-043-1-1	A	3	5	23.164		0.143	24	0.00597
B1-910-043-1-11	B	3	6	22.191	0.602	0.144	24	0.00599
B1-910-043-1-12	B	3	6	23.214	0.665	0.142	24	0.00593
B1-910-043-1-1	B	3	6	22.952		0.140	24	0.00584

Average	**22.443**	**0.613**	**Average**	**0.0059**
Standard Dev.	**0.633**	**0.035**		
Coeff. of Var. [%]	**2.819**	**5.774**		
Min.	**21.020**	**0.526**	**Min.**	**0.0058**
Max.	**23.379**	**0.665**	**Max.**	**0.0060**
Number of Spec.	**18**	**12**		

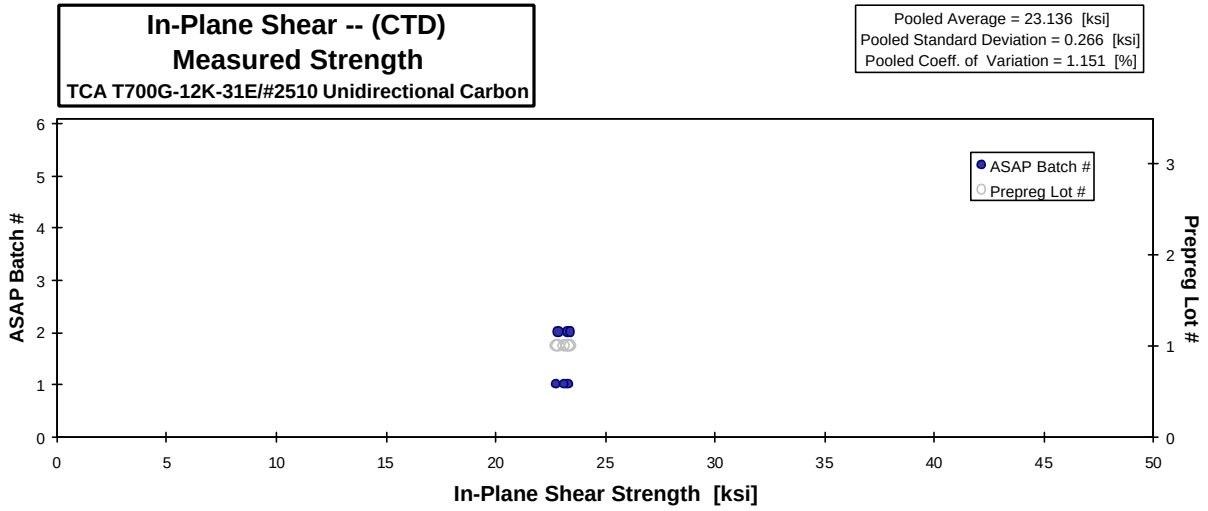


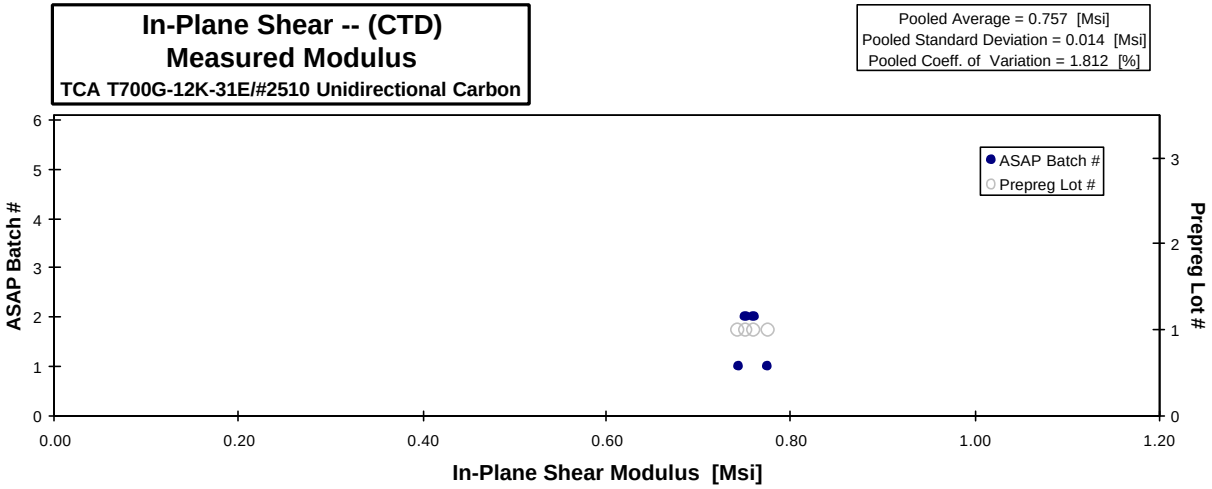


In-Plane Shear -- (CTD)
Strength & Modulus
TCA T700G-12K-31E/#2510 Unidirectional Carbon

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]
A1-910-041-1-1	A	1	1	23.318	0.775	0.142	24	0.00592
A1-910-041-1-2	A	1	1	22.758	0.743	0.143	24	0.00596
A1-910-041-1-3	A	1	1	23.134		0.144	24	0.00599
B1-910-041-1-1	B	1	2	22.877	0.760	0.142	24	0.00590
B1-910-041-1-2	B	1	2	23.305	0.751	0.142	24	0.00591
B1-910-041-1-3	B	1	2	23.423		0.142	24	0.00591

Average	**23.136**	**0.757**	**Average**	**0.0059**
Standard Dev.	**0.266**	**0.014**		
Coeff. of Var. [%]	**1.151**	**1.812**		
Min.	**22.758**	**0.743**	**Min.**	**0.0059**
Max.	**23.423**	**0.775**	**Max.**	**0.0060**
Number of Spec.	**6**	**4**		

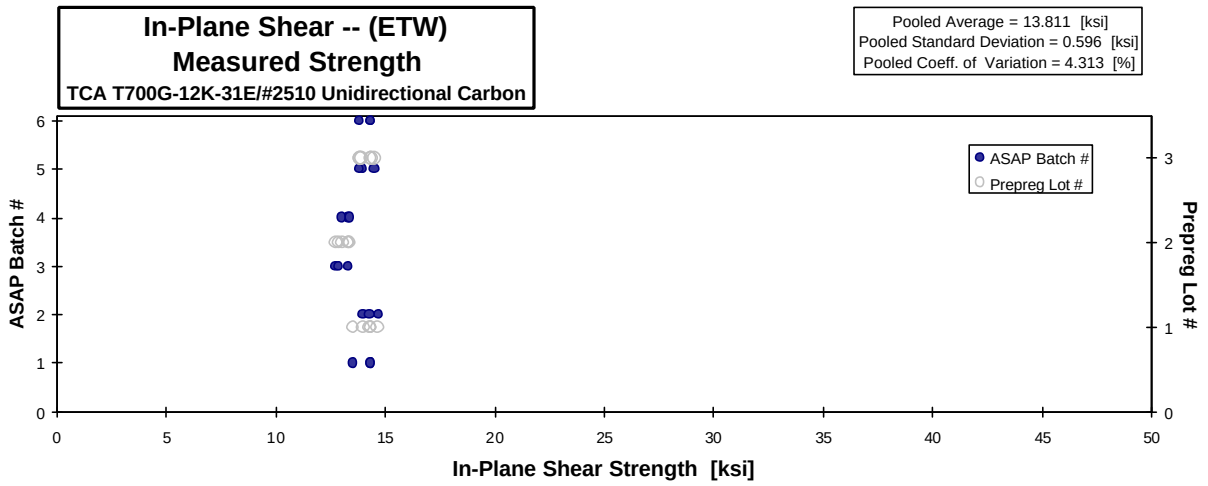


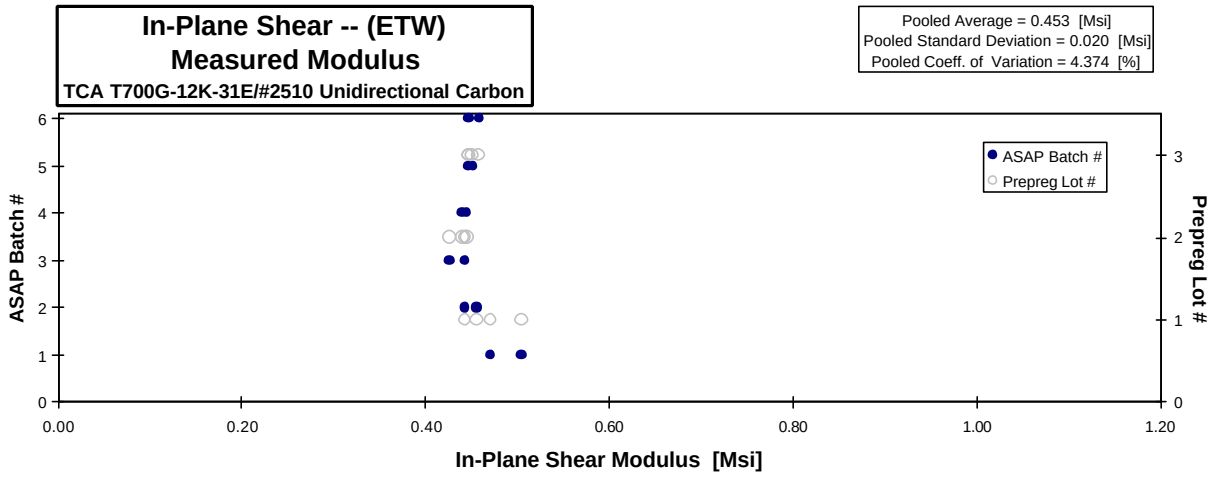


In-Plane Shear -- (ETW)
Strength & Modulus
TCA T700G-12K-31E/#2510 Unidirectional Carbon

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]
A1-910-041-1-13	A	1	1	14.337	0.505	0.143	24	0.00594
A1-910-041-1-12	A	1	1	14.339	0.471	0.142	24	0.00591
A1-910-041-1-11	A	1	1	13.522		0.144	24	0.00600
B1-910-041-1-10	B	1	2	14.683	0.456	0.143	24	0.00595
B1-910-041-1-12	B	1	2	14.005	0.443	0.142	24	0.00593
B1-910-041-1-11	B	1	2	14.289		0.142	24	0.00592
A1-910-042-1-5	A	2	3	13.309	0.443	0.143	24	0.00597
A1-910-042-1-6	A	2	3	12.767	0.426	0.143	24	0.00598
A1-910-042-1-7	A	2	3	12.865		0.144	24	0.00600
B1-910-042-1-5	B	2	4	13.298	0.440	0.144	24	0.00602
B1-910-042-1-6	B	2	4	13.026	0.445	0.145	24	0.00603
B1-910-042-1-7	B	2	4	13.381		0.144	24	0.00600
A1-910-056-1-8	A	3	5	13.942	0.451	0.144	24	0.00602
A1-910-056-1-9	A	3	5	13.822	0.446	0.145	24	0.00603
A1-910-056-1-7	A	3	5	14.504		0.144	24	0.00600
B1-910-043-1-5	B	3	6	14.335	0.458	0.144	24	0.00598
B1-910-043-1-6	B	3	6	13.825	0.447	0.144	24	0.00599
B1-910-056-1-7	B	3	6	14.351		0.144	24	0.00600

Average	**13.811**	**0.453**	**Average**	**0.0060**
Standard Dev.	**0.596**	**0.020**		
Coeff. of Var. [%]	**4.313**	**4.374**		
Min.	**12.767**	**0.426**	**Min.**	**0.0059**
Max.	**14.683**	**0.505**	**Max.**	**0.0060**
Number of Spec.	**18**	**12**		

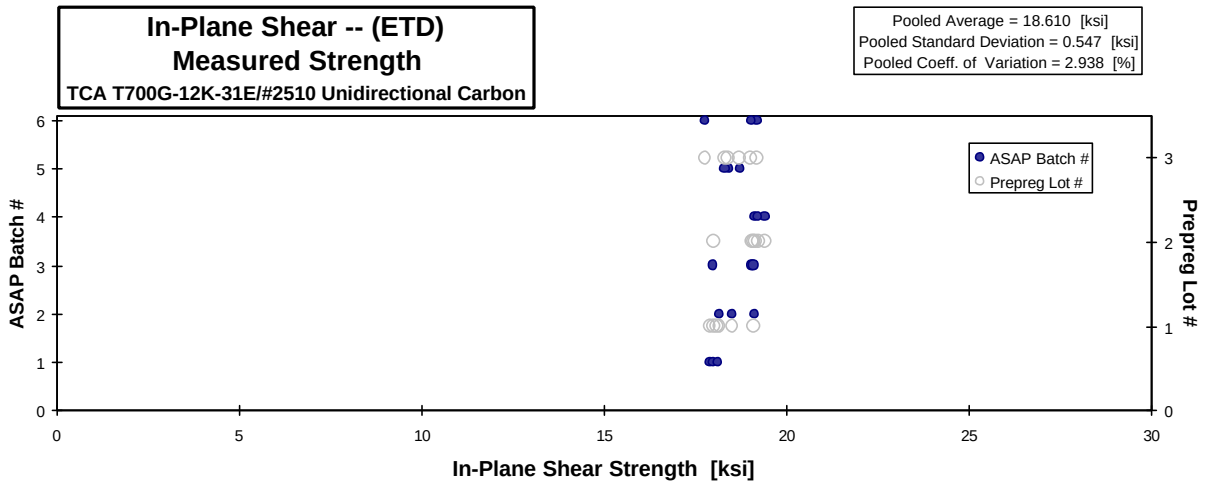


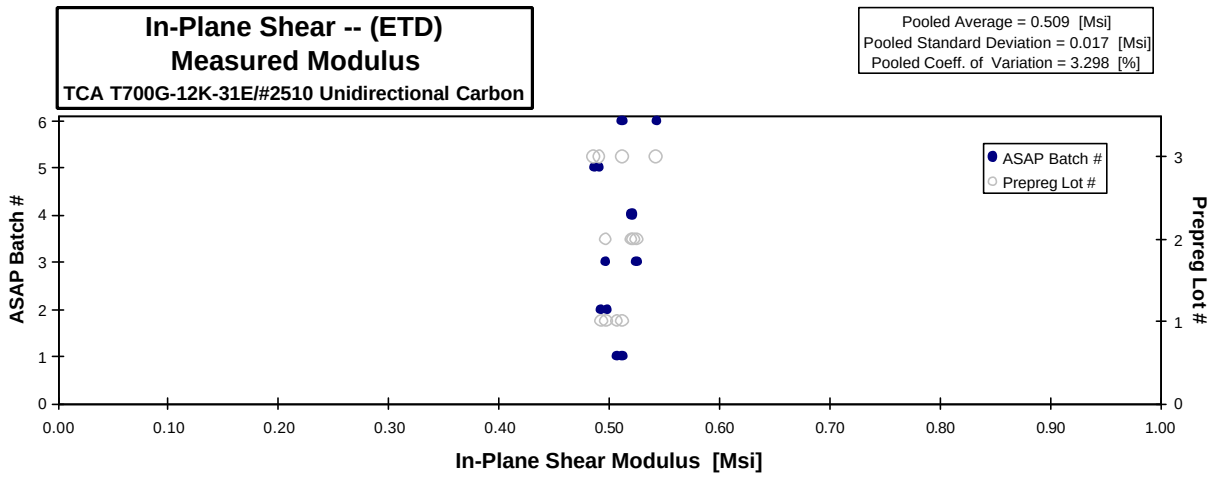


In-Plane Shear -- (ETD)
Strength & Modulus
TCA T700G-12K-31E/#2510 Unidirectional Carbon

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]
A1-910-041-1-29	A	1	1	17.885	0.512	0.143	24	0.00598
A1-910-041-1-30	A	1	1	17.992	0.507	0.144	24	0.00598
A1-910-041-1-7	A	1	1	18.094		0.144	24	0.00602
B1-910-041-1-29	B	1	2	18.157	0.493	0.143	24	0.00597
B1-910-041-1-30	B	1	2	18.503	0.498	0.144	24	0.00598
B1-910-041-1-7	B	1	2	19.104		0.143	24	0.00595
A1-910-042-1-13	A	2	3	19.052	0.525	0.142	24	0.00592
A1-910-042-1-15	A	2	3	17.989	0.497	0.143	24	0.00596
A1-910-042-1-3	A	2	3	19.096		0.142	24	0.00593
B1-910-042-1-13	B	2	4	19.122	0.520	0.141	24	0.00588
B1-910-042-1-14	B	2	4	19.400	0.522	0.142	24	0.00593
B1-910-042-1-3	B	2	4	19.217		0.142	24	0.00594
A1-910-043-1-13	A	3	5	18.404	0.486	0.144	24	0.00601
A1-910-043-1-14	A	3	5	18.305	0.491	0.145	24	0.00603
A1-910-043-1-3	A	3	5	18.713		0.145	24	0.00603
B1-910-043-1-13	B	3	6	17.752	0.512	0.140	24	0.00584
B1-910-043-1-14	B	3	6	19.178	0.543	0.141	24	0.00588
B1-910-043-1-3	B	3	6	19.022		0.142	24	0.00593

Average	**18.610**	**0.509**	**Average**	**0.0060**
Standard Dev.	**0.547**	**0.017**		
Coeff. of Var. [%]	**2.938**	**3.298**		
Min.	**17.752**	**0.486**	**Min.**	**0.0058**
Max.	**19.400**	**0.543**	**Max.**	**0.0060**
Number of Spec.	**18**	**12**		





Apparent Interlaminar Shear -- (RTD) Strength

TCA T700G-12K-31E/#2510 Unidirectional Carbon Tape

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]
A1-910-041-1-1	A	1	1	13.230	0.106	18	0.00591
A1-910-041-1-2	A	1	1	13.488	0.106	18	0.00588
A1-910-041-1-3	A	1	1	13.544	0.107	18	0.00593
A1-910-041-1-4	A	1	1	13.724	0.105	18	0.00584
A1-910-041-1-5	A	1	1	12.634	0.107	18	0.00592
A1-910-041-1-6	A	1	1	13.075	0.105	18	0.00585
B1-910-041-1-1	B	1	2	12.601	0.105	18	0.00584
B1-910-041-1-2	B	1	2	13.712	0.105	18	0.00585
B1-910-041-1-3	B	1	2	13.419	0.104	18	0.00579
B1-910-041-1-4	B	1	2	13.323	0.104	18	0.00580
B1-910-041-1-5	B	1	2	12.938	0.105	18	0.00584
B1-910-041-1-6	B	1	2	11.862	0.106	18	0.00588
A1-910-042-1-1	A	2	3	13.552	0.109	18	0.00606
A1-910-042-1-2	A	2	3	14.116	0.109	18	0.00604
A1-910-042-1-3	A	2	3	13.651	0.110	18	0.00609
A1-910-042-1-4	A	2	3	12.855	0.109	18	0.00607
A1-910-042-1-5	A	2	3	12.655	0.109	18	0.00608
A1-910-042-1-6	A	2	3	12.247	0.108	18	0.00602
B1-910-042-1-1	B	2	4	14.727	0.109	18	0.00603
B1-910-042-1-2	B	2	4	14.206	0.109	18	0.00604
B1-910-042-1-3	B	2	4	15.029	0.107	18	0.00594
B1-910-042-1-4	B	2	4	13.983	0.107	18	0.00593
B1-910-042-1-5	B	2	4	14.477	0.108	18	0.00599
B1-910-042-1-6	B	2	4	14.183	0.108	18	0.00598
A1-910-043-1-1	A	3	5	13.898	0.108	18	0.00601
A1-910-043-1-2	A	3	5	13.880	0.108	18	0.00599
A1-910-043-1-3	A	3	5	14.191	0.108	18	0.00603
A1-910-043-1-4	A	3	5	13.636	0.108	18	0.00600
A1-910-043-1-5	A	3	5	13.438	0.108	18	0.00600
A1-910-043-1-6	A	3	5	13.558	0.108	18	0.00603
B1-910-043-1-1	B	3	6	13.740	0.107	18	0.00593
B1-910-043-1-2	B	3	6	13.785	0.109	18	0.00603
B1-910-043-1-3	B	3	6	13.495	0.108	18	0.00600
B1-910-043-1-4	B	3	6	13.201	0.107	18	0.00592
B1-910-043-1-5	B	3	6	13.230	0.108	18	0.00602
B1-910-043-1-6	B	3	6	12.915	0.108	18	0.00598

NOTE: This table is continued in next four pages.

Apparent Interlaminar Shear -- (RTD) Strength

TCA T700G-12K-31E/#2510 Unidirectional Carbon Tape

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]
A-1-1-1	A	4	7	12.990	0.107	18	0.00595
A-1-1-3	A	4	7	12.129	0.108	18	0.00597
A-1-1-5	A	4	7	12.027	0.108	18	0.00602
A-1-4-7	A	4	7	13.428	0.108	18	0.00600
A-1-4-9	A	4	7	13.009	0.108	18	0.00598
A-1-4-11	A	4	7	12.130	0.109	18	0.00604
A-1-8-13	A	4	7	12.570	0.108	18	0.00598
A-1-8-15	A	4	7	13.160	0.109	18	0.00604
A-1-1-2	A	4	7	12.877	0.107	18	0.00593
A-1-1-4	A	4	7	11.984	0.108	18	0.00599
A-1-1-6	A	4	7	12.022	0.109	18	0.00603
A-1-4-8	A	4	7	13.144	0.107	18	0.00594
A-1-4-10	A	4	7	12.828	0.109	18	0.00603
A-1-4-12	A	4	7	11.704	0.109	18	0.00606
A-1-8-14	A	4	7	12.860	0.108	18	0.00599
A-1-8-16	A	4	7	12.134	0.108	18	0.00603
B-2-1-1	B	4	8	13.834	0.108	18	0.00600
B-2-1-3	B	4	8	13.279	0.109	18	0.00605
B-2-1-5	B	4	8	13.357	0.109	18	0.00607
B-2-4-7	B	4	8	13.728	0.108	18	0.00598
B-2-4-9	B	4	8	12.787	0.109	18	0.00603
B-2-4-11	B	4	8	13.153	0.109	18	0.00603
B-2-8-13	B	4	8	12.219	0.107	18	0.00597
B-2-8-15	B	4	8	11.170	0.108	18	0.00601
B-2-1-2	B	4	8	12.527	0.109	18	0.00603
B-2-1-4	B	4	8	12.102	0.109	18	0.00606
B-2-1-6	B	4	8	12.494	0.109	18	0.00603
B-2-4-8	B	4	8	12.524	0.108	18	0.00601
B-2-4-10	B	4	8	12.182	0.109	18	0.00603
B-2-4-12	B	4	8	13.335	0.109	18	0.00603
B-2-8-14	B	4	8	11.560	0.108	18	0.00599
B-2-8-16	B	4	8	11.171	0.108	18	0.00601
B-2-8-18	B	4	8	11.512	0.108	18	0.00601

Apparent Interlaminar Shear -- (RTD) Strength

TCA T700G-12K-31E/#2510 Unidirectional Carbon Tape

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]
A-13-2-1	A	5	9	11.857	0.108	18	0.00600
A-13-2-3	A	5	9	13.369	0.107	18	0.00592
A-13-2-5	A	5	9	12.084	0.108	18	0.00601
A-13-5-7	A	5	9	12.942	0.107	18	0.00596
A-13-5-9	A	5	9	13.518	0.107	18	0.00596
A-13-5-11	A	5	9	12.349	0.109	18	0.00603
A-13-7-13	A	5	9	13.508	0.107	18	0.00596
A-13-7-15	A	5	9	12.945	0.108	18	0.00600
A-13-2-2	A	5	9	12.173	0.107	18	0.00597
A-13-2-4	A	5	9	12.892	0.107	18	0.00596
A-13-2-6	A	5	9	12.472	0.109	18	0.00604
A-13-5-8	A	5	9	12.597	0.107	18	0.00593
A-13-5-10	A	5	9	11.676	0.108	18	0.00601
A-13-5-12	A	5	9	11.371	0.109	18	0.00606
A-13-7-14	A	5	9	12.364	0.107	18	0.00594
A-13-7-16	A	5	9	11.624	0.108	18	0.00599
A-13-7-18	A	5	9	10.835	0.109	18	0.00604
B-14-2-1	B	5	10	13.918	0.107	18	0.00593
B-14-2-3	B	5	10	13.165	0.107	18	0.00594
B-14-2-5	B	5	10	12.735	0.107	18	0.00595
B-14-5-7	B	5	10	12.741	0.107	18	0.00596
B-14-5-9	B	5	10	12.250	0.108	18	0.00599
B-14-5-11	B	5	10	12.836	0.107	18	0.00597
B-14-7-13	B	5	10	11.445	0.108	18	0.00601
B-14-7-15	B	5	10	11.948	0.108	18	0.00601
B-14-2-2	B	5	10	12.345	0.107	18	0.00595
B-14-2-4	B	5	10	12.737	0.107	18	0.00595
B-14-2-6	B	5	10	13.068	0.108	18	0.00597
B-14-5-8	B	5	10	12.676	0.107	18	0.00596
B-14-5-10	B	5	10	11.600	0.108	18	0.00600
B-14-5-12	B	5	10	12.042	0.108	18	0.00599
B-14-7-14	B	5	10	11.942	0.108	18	0.00599
B-14-7-16	B	5	10	11.910	0.108	18	0.00601

Apparent Interlaminar Shear -- (RTD) Strength

TCA T700G-12K-31E/#2510 Unidirectional Carbon Tape

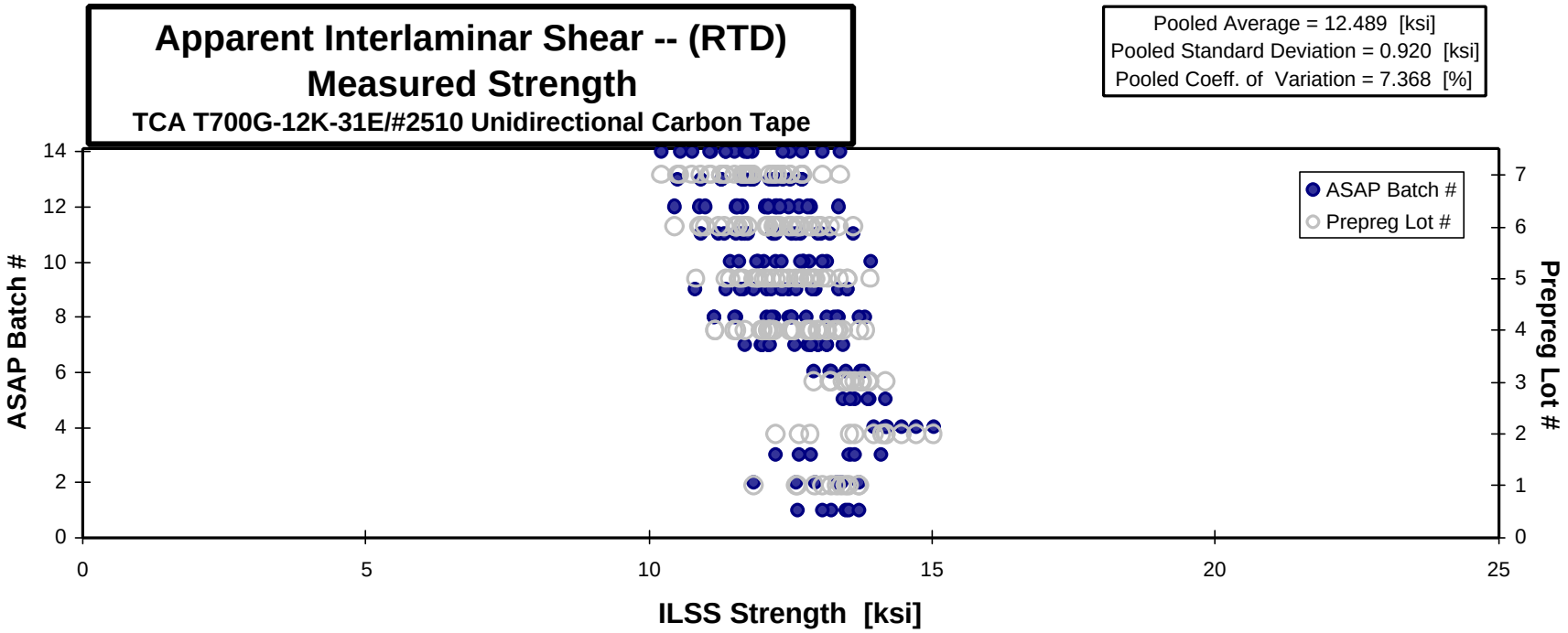
Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]
A-25-3-1	A	6	11	12.692	0.111	18	0.00617
A-25-3-3	A	6	11	13.627	0.110	18	0.00611
A-25-3-5	A	6	11	11.661	0.111	18	0.00619
A-25-6-7	A	6	11	13.055	0.111	18	0.00615
A-25-6-9	A	6	11	12.992	0.110	18	0.00613
A-25-6-11	A	6	11	12.210	0.111	18	0.00618
A-25-8-13	A	6	11	12.211	0.110	18	0.00613
A-25-8-15	A	6	11	12.532	0.110	18	0.00612
A-25-3-2	A	6	11	12.619	0.111	18	0.00614
A-25-3-4	A	6	11	13.211	0.111	18	0.00615
A-25-3-6	A	6	11	11.241	0.112	18	0.00620
A-25-6-8	A	6	11	11.691	0.110	18	0.00614
A-25-6-10	A	6	11	11.537	0.111	18	0.00619
A-25-6-12	A	6	11	12.261	0.111	18	0.00616
A-25-8-14	A	6	11	10.934	0.110	18	0.00613
A-25-8-16	A	6	11	11.351	0.110	18	0.00613
A-25-8-18	A	6	11	11.752	0.111	18	0.00615
B-26-3-1	B	6	12	13.360	0.111	18	0.00616
B-26-3-3	B	6	12	12.664	0.111	18	0.00615
B-26-3-5	B	6	12	12.876	0.112	18	0.00619
B-26-6-7	B	6	12	12.490	0.111	18	0.00617
B-26-6-9	B	6	12	12.825	0.111	18	0.00618
B-26-6-11	B	6	12	12.282	0.112	18	0.00620
B-26-8-13	B	6	12	12.075	0.112	18	0.00621
B-26-8-15	B	6	12	11.539	0.112	18	0.00621
B-26-3-2	B	6	12	12.111	0.111	18	0.00619
B-26-3-4	B	6	12	11.661	0.111	18	0.00616
B-26-3-6	B	6	12	11.575	0.111	18	0.00618
B-26-6-8	B	6	12	12.238	0.111	18	0.00619
B-26-6-10	B	6	12	12.325	0.111	18	0.00619
B-26-6-12	B	6	12	12.122	0.112	18	0.00623
B-26-8-14	B	6	12	10.901	0.112	18	0.00622
B-26-8-16	B	6	12	10.456	0.112	18	0.00624
B-26-8-18	B	6	12	11.010	0.113	18	0.00625

Apparent Interlaminar Shear -- (RTD) Strength

TCA T700G-12K-31E/#2510 Unidirectional Carbon Tape

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]
A-37-1-1	A	7	13	12.206	0.107	18	0.00596
A-37-1-3	A	7	13	12.710	0.107	18	0.00594
A-37-1-5	A	7	13	11.852	0.107	18	0.00593
A-37-3-7	A	7	13	12.385	0.107	18	0.00596
A-37-3-9	A	7	13	11.653	0.107	18	0.00593
A-37-3-11	A	7	13	12.512	0.107	18	0.00593
A-37-8-13	A	7	13	11.693	0.107	18	0.00595
A-37-8-15	A	7	13	11.297	0.107	18	0.00594
A-37-1-2	A	7	13	12.287	0.107	18	0.00593
A-37-1-4	A	7	13	12.218	0.107	18	0.00593
A-37-1-6	A	7	13	11.669	0.107	18	0.00596
A-37-3-8	A	7	13	12.719	0.107	18	0.00592
A-37-3-10	A	7	13	11.811	0.107	18	0.00594
A-37-3-12	A	7	13	12.139	0.107	18	0.00594
A-37-8-14	A	7	13	10.509	0.107	18	0.00595
A-37-8-16	A	7	13	11.289	0.107	18	0.00594
A-37-8-18	A	7	13	10.916	0.107	18	0.00596
B-38-1-1	B	7	14	12.500	0.108	18	0.00601
B-38-1-3	B	7	14	11.521	0.108	18	0.00600
B-38-1-5	B	7	14	11.115	0.109	18	0.00604
B-38-3-7	B	7	14	13.077	0.108	18	0.00599
B-38-3-9	B	7	14	13.392	0.108	18	0.00598
B-38-3-11	B	7	14	12.375	0.108	18	0.00602
B-38-8-13	B	7	14	11.367	0.107	18	0.00593
B-38-8-15	B	7	14	11.078	0.107	18	0.00595
B-38-1-2	B	7	14	11.709	0.108	18	0.00600
B-38-1-4	B	7	14	11.368	0.109	18	0.00605
B-38-1-6	B	7	14	11.839	0.109	18	0.00603
B-38-3-8	B	7	14	12.703	0.107	18	0.00597
B-38-3-10	B	7	14	11.767	0.108	18	0.00602
B-38-3-12	B	7	14	11.750	0.108	18	0.00602
B-38-8-14	B	7	14	10.226	0.107	18	0.00596
B-38-8-16	B	7	14	10.557	0.107	18	0.00595
B-38-8-18	B	7	14	10.763	0.108	18	0.00599

Average	**12.489**	**Average**	**0.0060**
Standard Dev.	**0.920**		
Coeff. of Var. [%]	**7.368**		
Min.	**10.226**	**Min.**	**0.0058**
Max.	**15.029**	**Max.**	**0.0063**
Number of Spec.	**170**		



3.2.2. Fluid Sensitivity Raw Data Spreadsheets and Scatter Charts

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

TCA T700G-12K-31E/#2510 Unidirectional Carbon

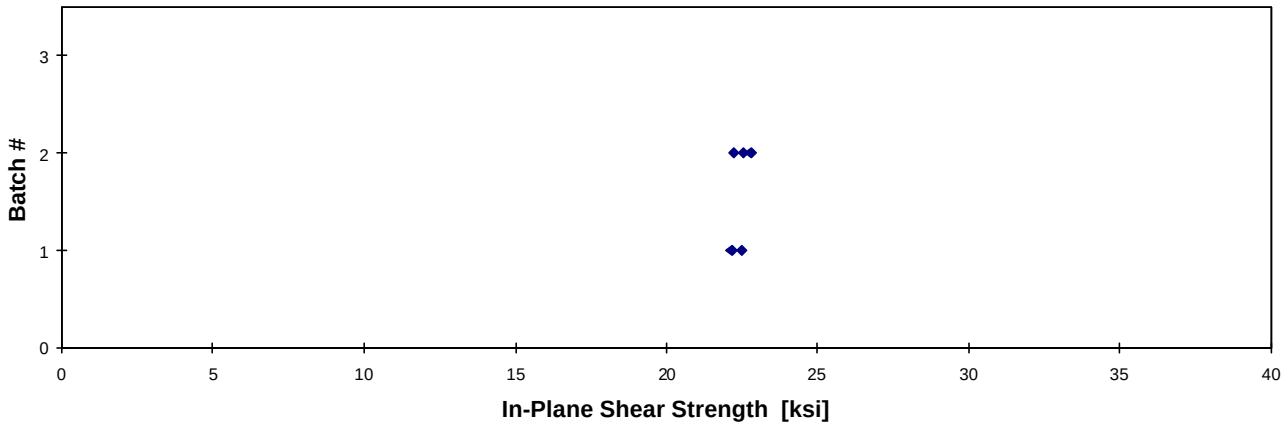
Specimen Number	Batch Number	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]
A1-910-041-1-23	1	22.492	0.140	24	0.00585
A1-910-041-1-24	1	22.173	0.141	24	0.00589
B1-910-041-1-23	2	22.531	0.142	24	0.00592
B1-910-041-1-24	2	22.805	0.142	24	0.00593
B1-910-041-1-25	2	22.262	0.142	24	0.00593

Average	**22.453**		**0.0059**
Standard Dev.	**0.248**		
Coeff. of Var. [%]	**1.106**		
Min.	**22.173**	**Min.**	**0.0058**
Max.	**22.805**	**Max.**	**0.0059**
Number of Spec.	**5**		

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

TCA T700G-12K-31E/#2510 Unidirectional Carbon

Pooled Average = 22.453 [ksi]
Pooled Standard Deviation = 0.248 [ksi]
Pooled Coeff. of Variation = 1.106 [%]



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

TCA T700G-12K-31E/#2510 Unidirectional Carbon

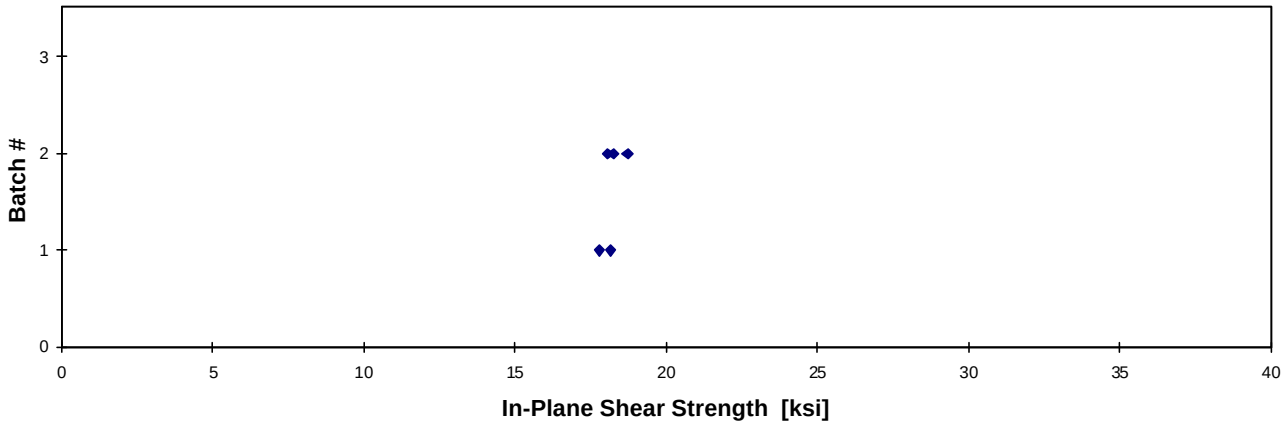
Specimen Number	Batch Number	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]
A1-910-041-1-15	1	18.184	0.144	24	0.00599
A1-910-041-1-16	1	17.774	0.144	24	0.00601
B1-910-041-1-15	2	18.070	0.143	24	0.00594
B1-910-041-1-16	2	18.256	0.143	24	0.00596
B1-910-041-1-17	2	18.698	0.143	24	0.00597

Average	**18.196**		**0.0060**
Standard Dev.	**0.335**		
Coeff. of Var. [%]	**1.843**		
Min.	**17.774**	**Min.**	**0.0059**
Max.	**18.698**	**Max.**	**0.0060**
Number of Spec.	**5**		

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

TCA T700G-12K-31E/#2510 Unidirectional Carbon

Pooled Average = 18.196 [ksi]
Pooled Standard Deviation = 0.335 [ksi]
Pooled Coeff. of Variation = 1.843[%]



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

TCA T700G-12K-31E/#2510 Unidirectional Carbon

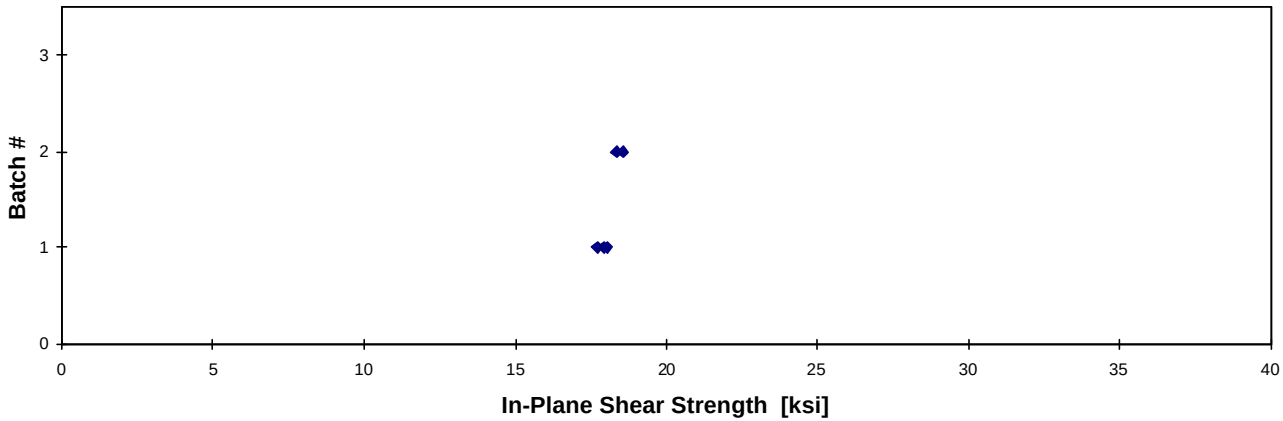
Specimen Number	Batch Number	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]
A1-910-041-1-19	1	17.692	0.145	24	0.00602
A1-910-041-1-20	1	17.936	0.145	24	0.00603
A1-910-041-1-21	1	18.042	0.144	24	0.00601
B1-910-041-1-19	2	18.359	0.144	24	0.00598
B1-910-041-1-20	2	18.559	0.144	24	0.00599

Average	**18.118**		**0.0060**
Standard Dev.	**0.344**		
Coeff. of Var. [%]	**1.898**		
Min.	**17.692**	**Min.**	**0.0060**
Max.	**18.559**	**Max.**	**0.0060**
Number of Spec.	**5**		

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

TCA T700G-12K-31E/#2510 Unidirectional Carbon

Pooled Average = 18.118 [ksi]
Pooled Standard Deviation = 0.344 [ksi]
Pooled Coeff. of Variation = 1.898 [%]



Fluid Sensitivity Comparison:

Average In-Plane Shear Strength with Fluid (ksi)	Same Environment In-Plane Shear Strength without Fluid (ksi)	Worst Case Environment In-Plane Shear Strength (ksi)
MEK (RTD)	(RTD)	(ETW)
22.453	22.443	13.811

The RTD average in-plane shear strength was not reduced after exposure to MEK. However, it remained 63% higher than water exposure in ETW condition.

Average In-Plane Shear Strength with Fluid (ksi)	Same Environment In-Plane Shear Strength without Fluid (ksi)	Worst Case Environment In-Plane Shear Strength (ksi)
JP-4 JET FUEL (ETD)	(ETD)	(ETW)
18.196	18.610	13.811

The ETD average in-plane shear strength was reduced 2% after exposure to JP-4 Jet Fuel. However it remained 32% higher than water exposure in ETW conditions.

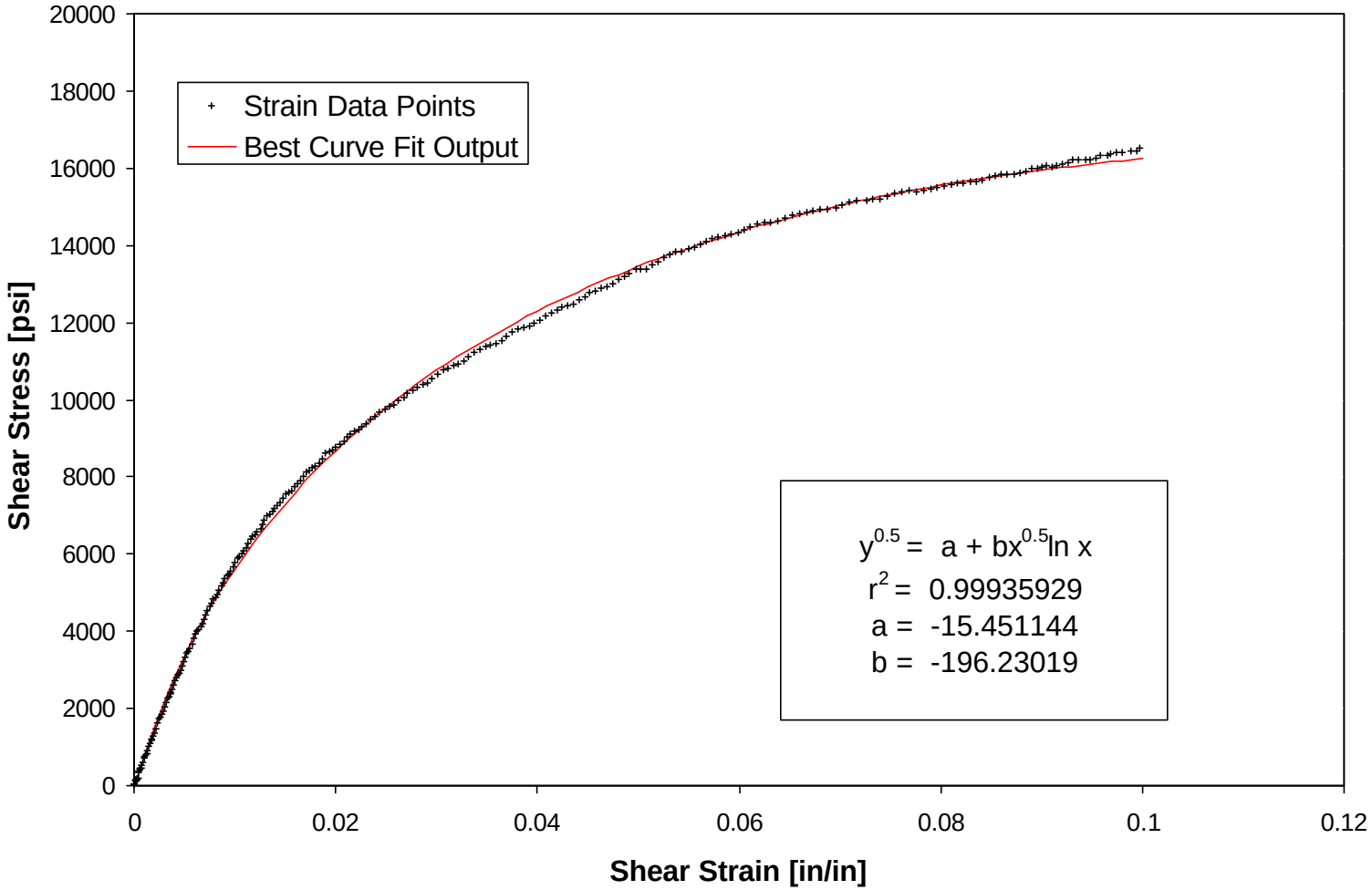
Average In-Plane Shear Strength with Fluid (ksi)	Same Environment In-Plane Shear Strength without Fluid (ksi)	Worst Case Environment In-Plane Shear Strength (ksi)
HYDRAULIC FLUID (ETD)	(ETD)	(ETW)
18.118	18.610	13.811

The ETD average in-plane shear strength was reduced 3% after exposure to hydraulic fluid. However it remained 31% higher than water exposure in ETW conditions.

3.2.3. Representative Shear Stress-Strain Curve

The following stress-strain curve is representative of the TORAY T700-12K-31E/#2510 Unidirectional Tape 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

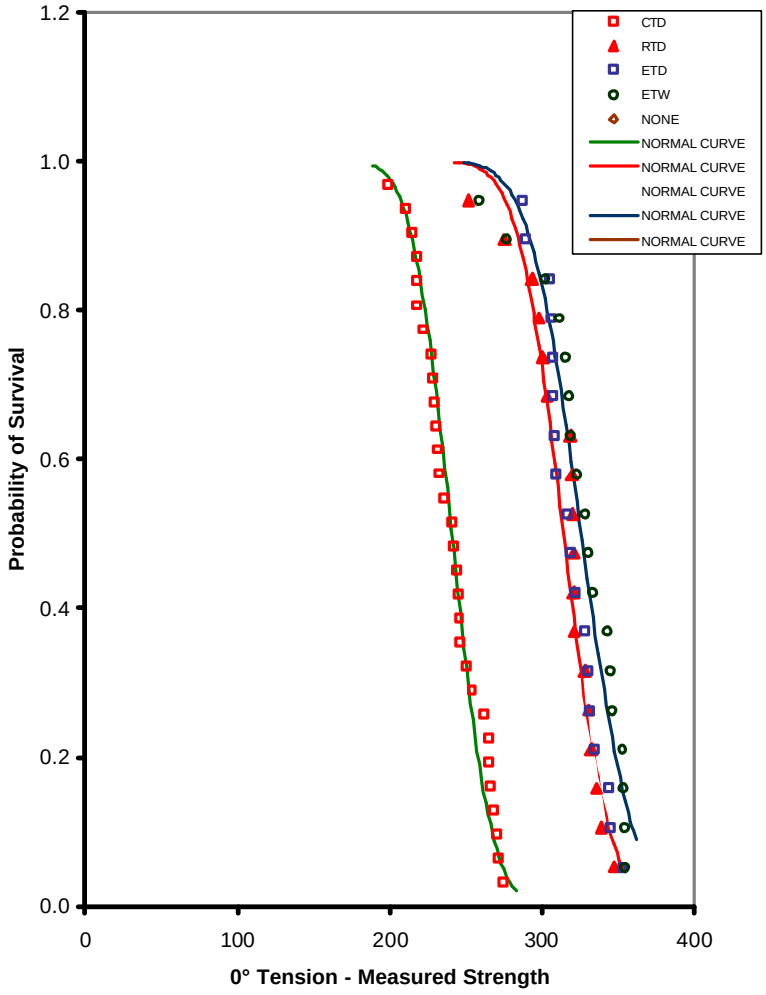
DISTRIBUTION OF DATA & NORMAL CURVES

Toray

TCA T700G-12K-31E/#2510 Unidirectional Carbon Tape

WICHITA STATE UNIVERSITY

DISTRIBUTION OF DATA AT INDIVIDUAL TEST CONDITIONS



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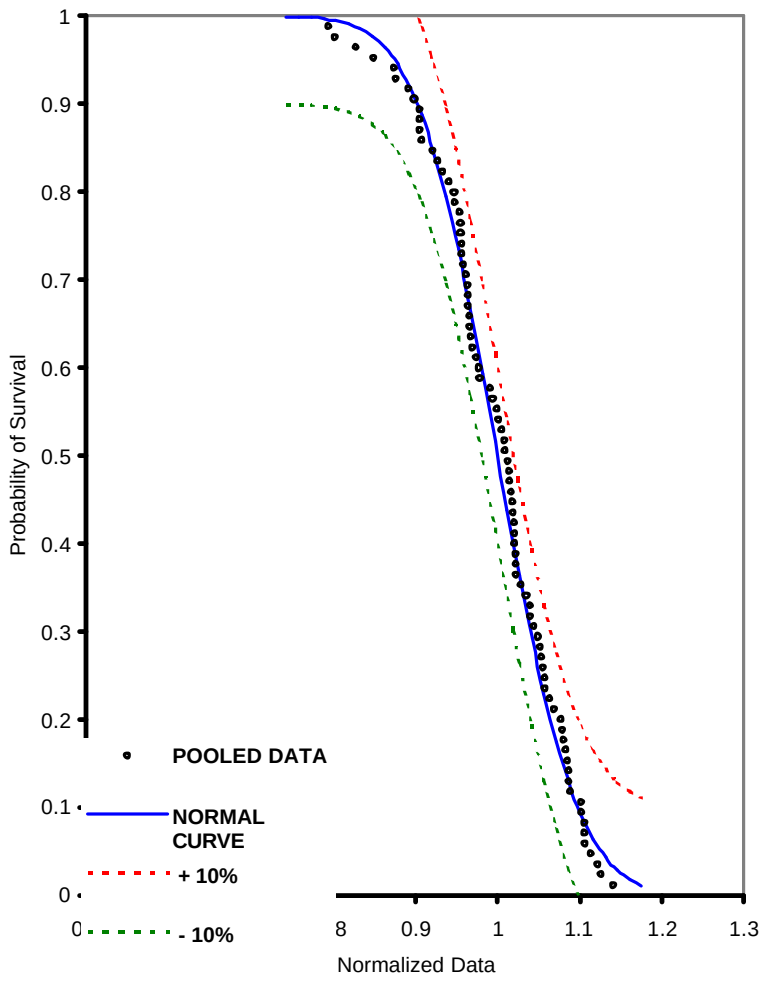

DISTRIBUTION OF DATA & NORMAL CURVES

Toray

TCA T700G-12K-31E/#2510 Unidirectional Carbon Tape

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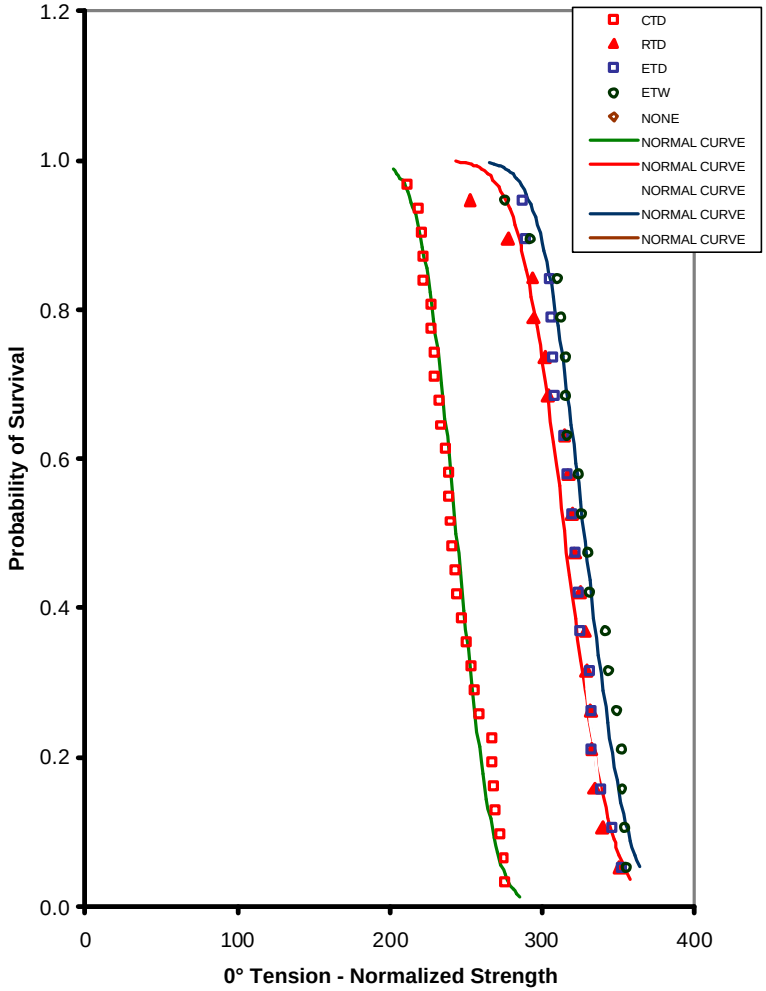
DISTRIBUTION OF DATA AT INDIVIDUAL TEST CONDITIONS



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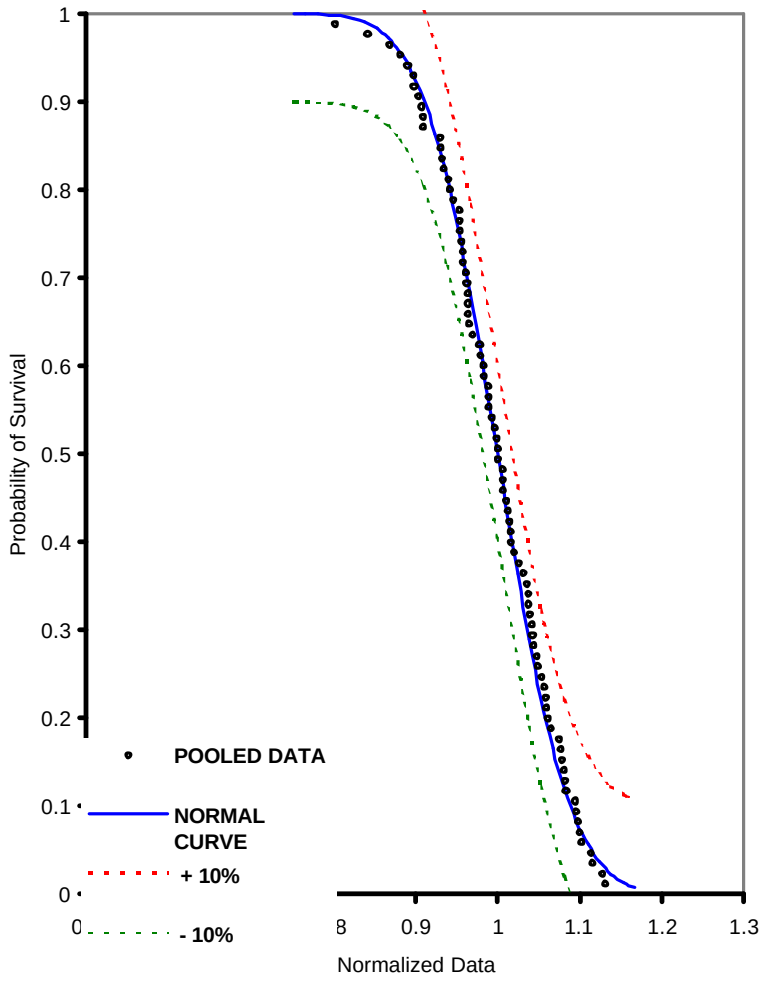


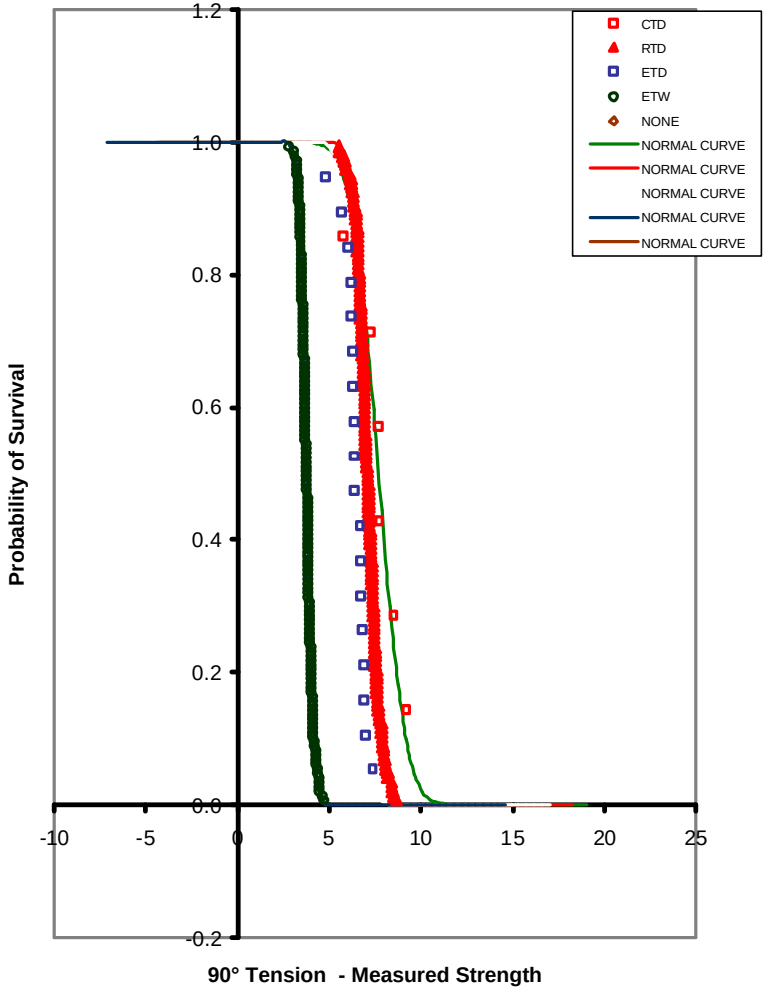
DISTRIBUTION OF DATA & NORMAL CURVES

Toray

TCA T700G-12K-31E/#2510 Unidirectional Carbon Tape

WICHITA STATE UNIVERSITY

DISTRIBUTION OF DATA AT INDIVIDUAL TEST CONDITIONS



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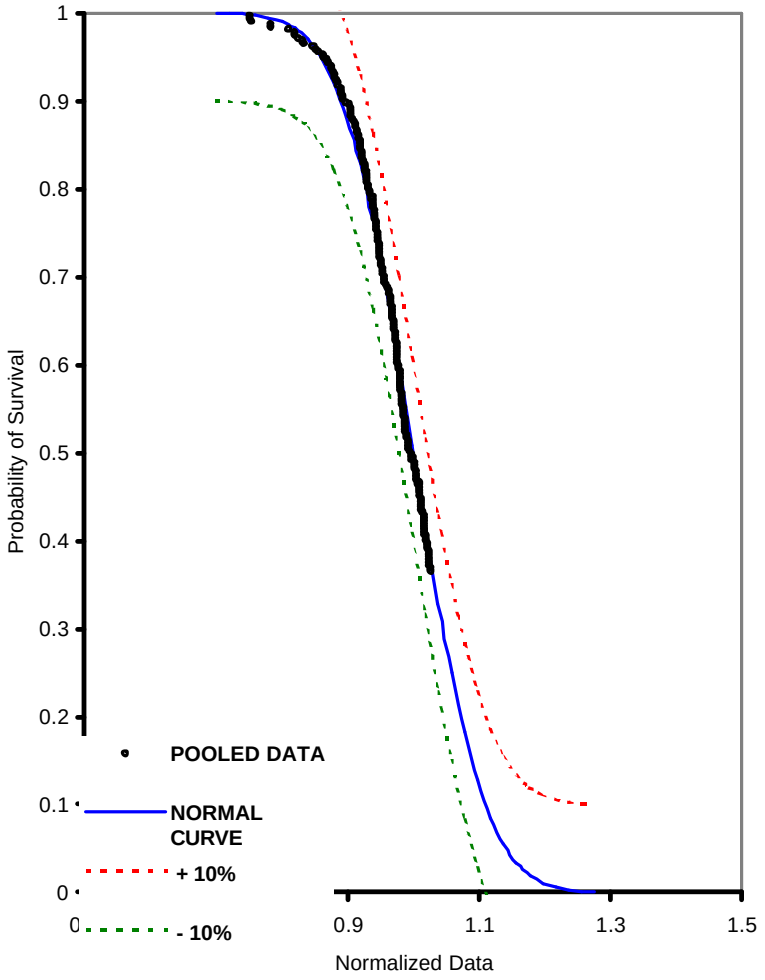


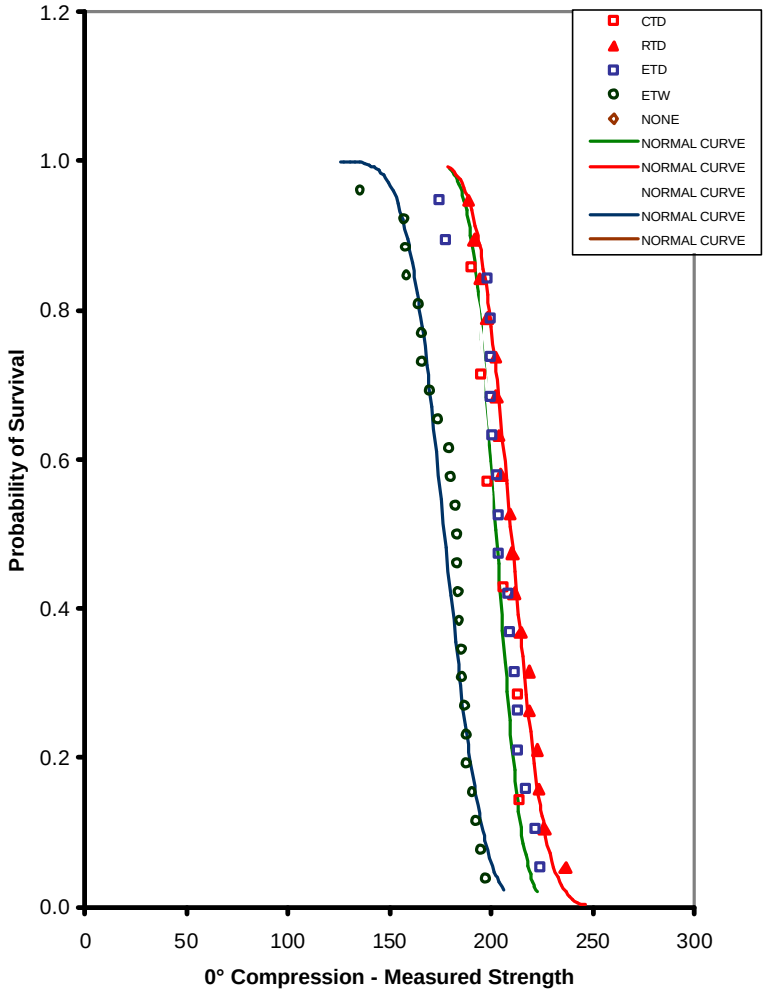
DISTRIBUTION OF DATA & NORMAL CURVES

Toray

TCA T700G-12K-31E/#2510 Unidirectional Carbon Tape

WICHITA STATE UNIVERSITY

DISTRIBUTION OF DATA AT INDIVIDUAL TEST CONDITIONS



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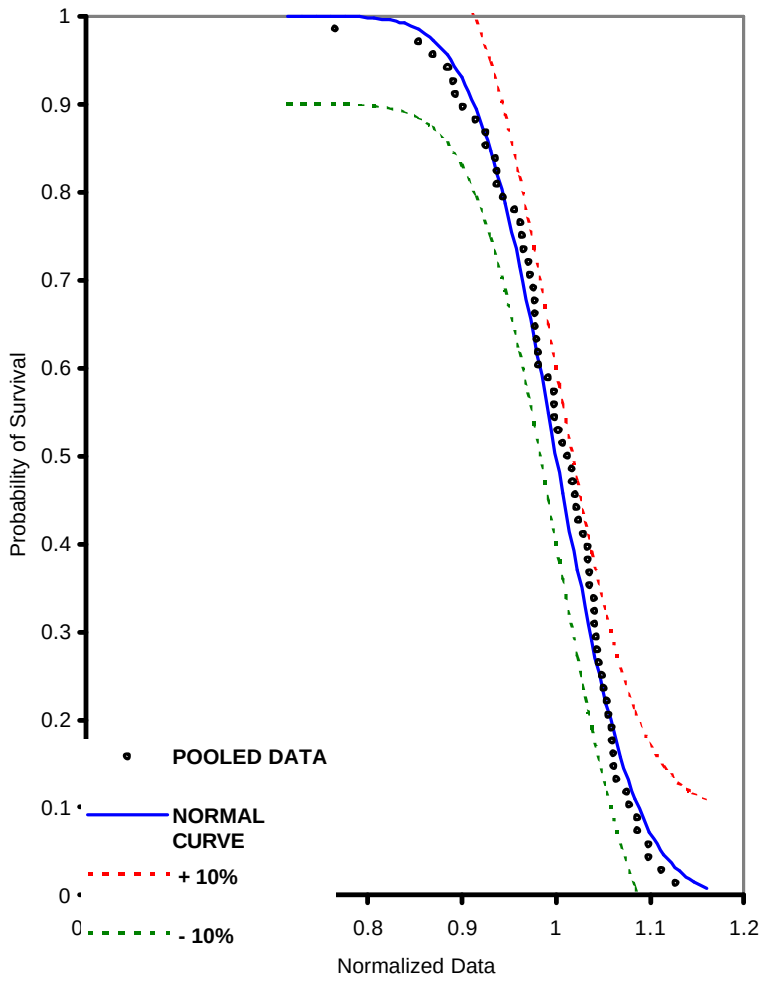

DISTRIBUTION OF DATA & NORMAL CURVES

Toray

TCA T700G-12K-31E/#2510 Unidirectional Carbon Tape

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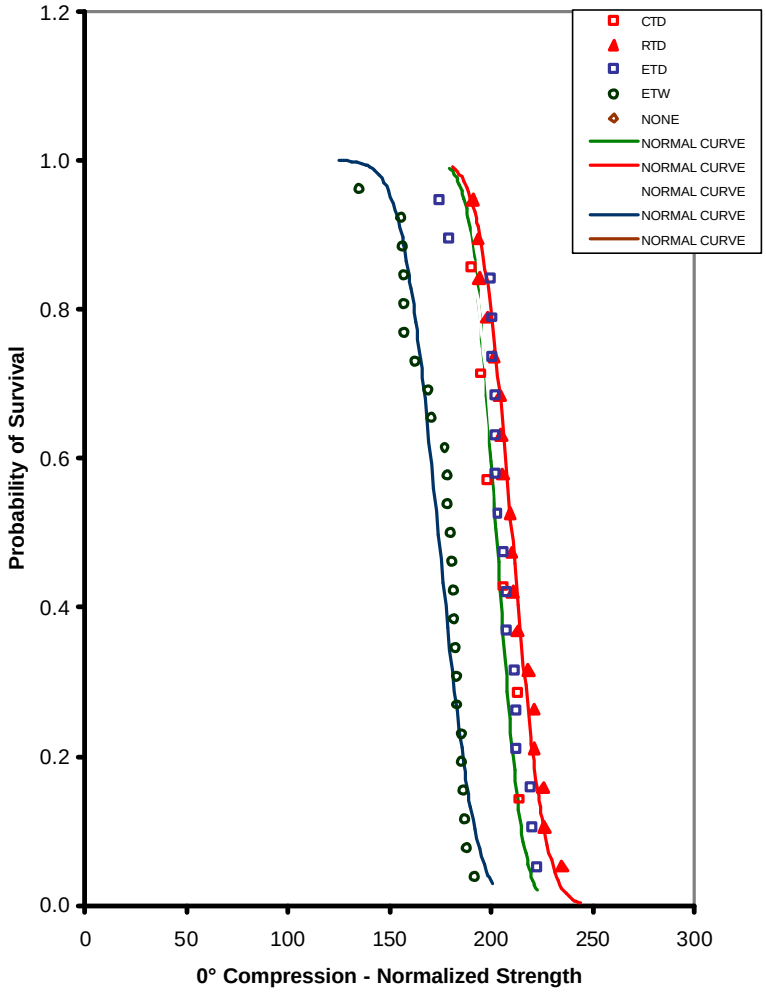
DISTRIBUTION OF DATA AT INDIVIDUAL TEST CONDITIONS



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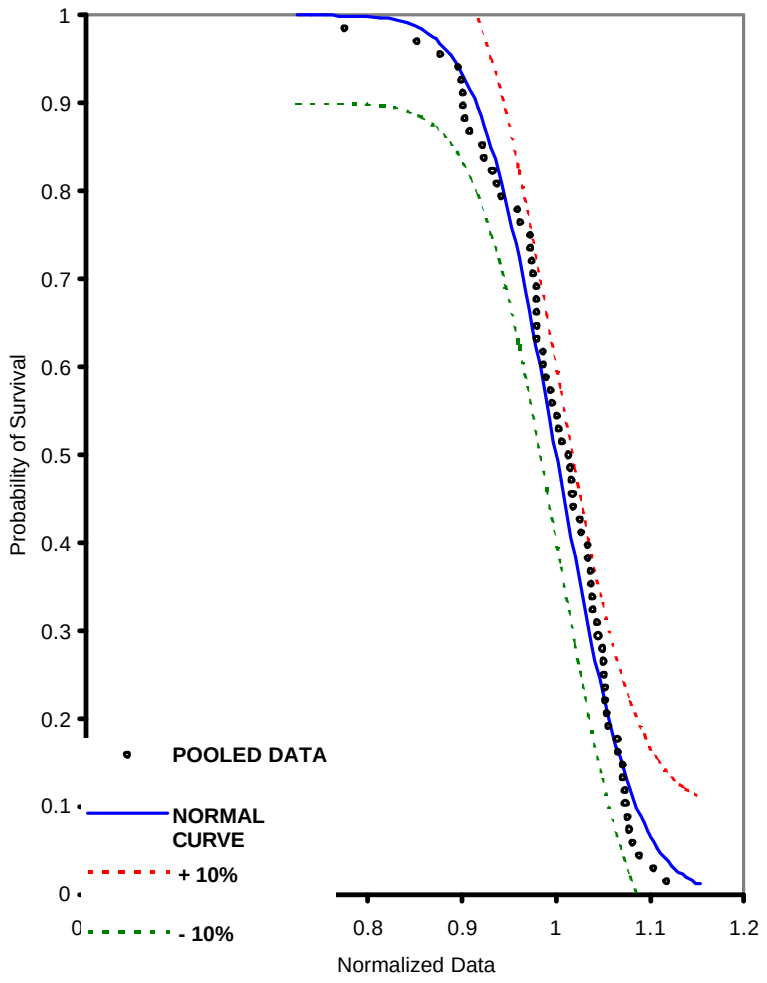

DISTRIBUTION OF DATA & NORMAL CURVES

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TCA T700G-12K-31E/#2510 Unidirectional Carbon Tape

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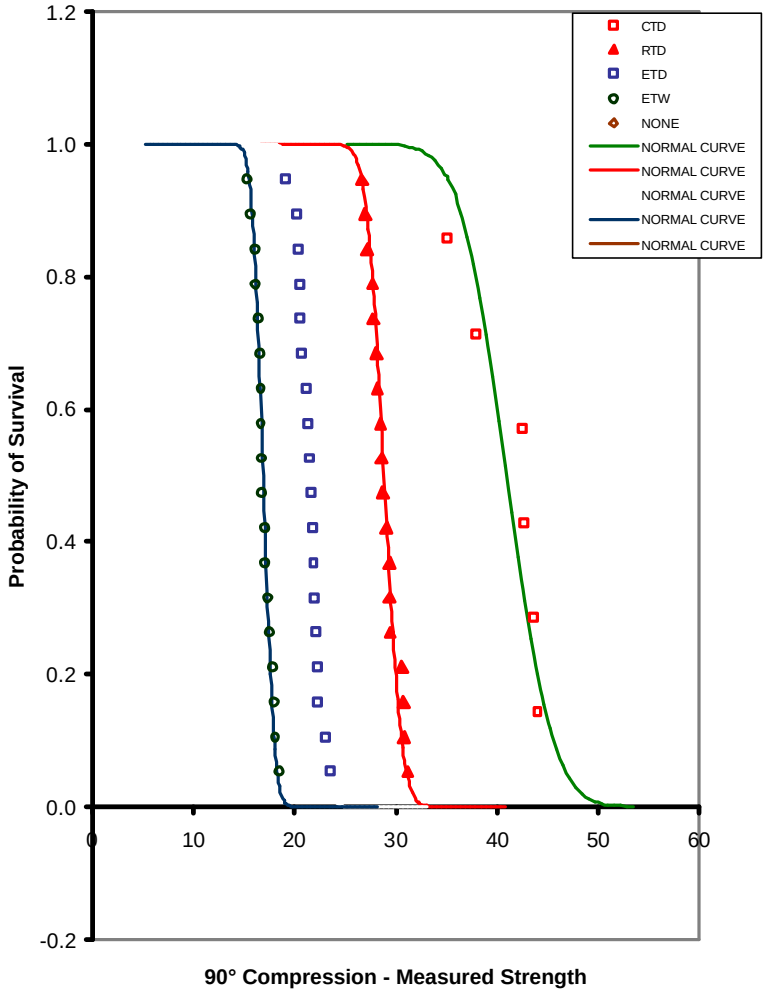
DISTRIBUTION OF DATA AT INDIVIDUAL TEST CONDITIONS



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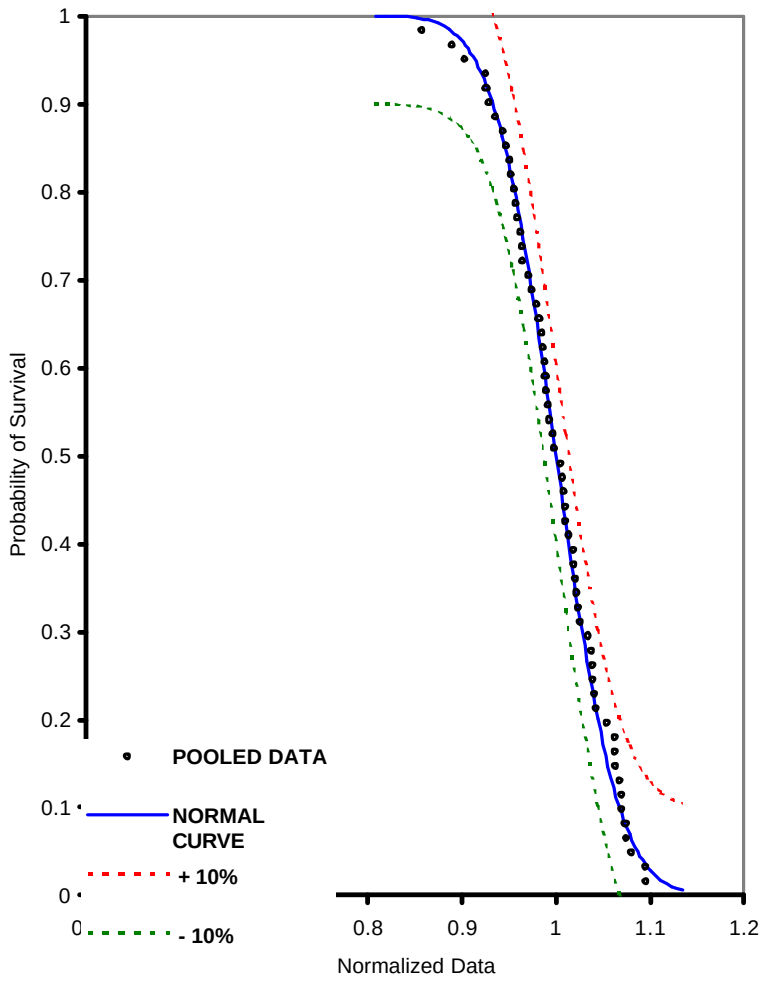

DISTRIBUTION OF DATA & NORMAL CURVES

Toray

TCA T700G-12K-31E/#2510 Unidirectional Carbon Tape

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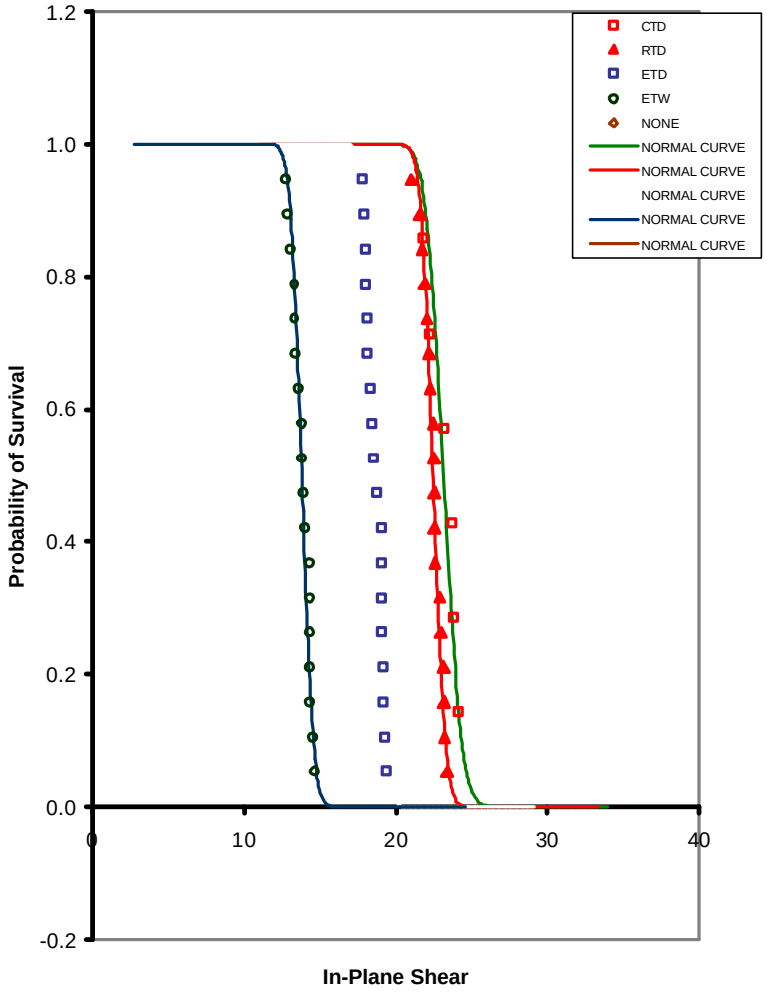
DISTRIBUTION OF DATA AT INDIVIDUAL TEST CONDITIONS



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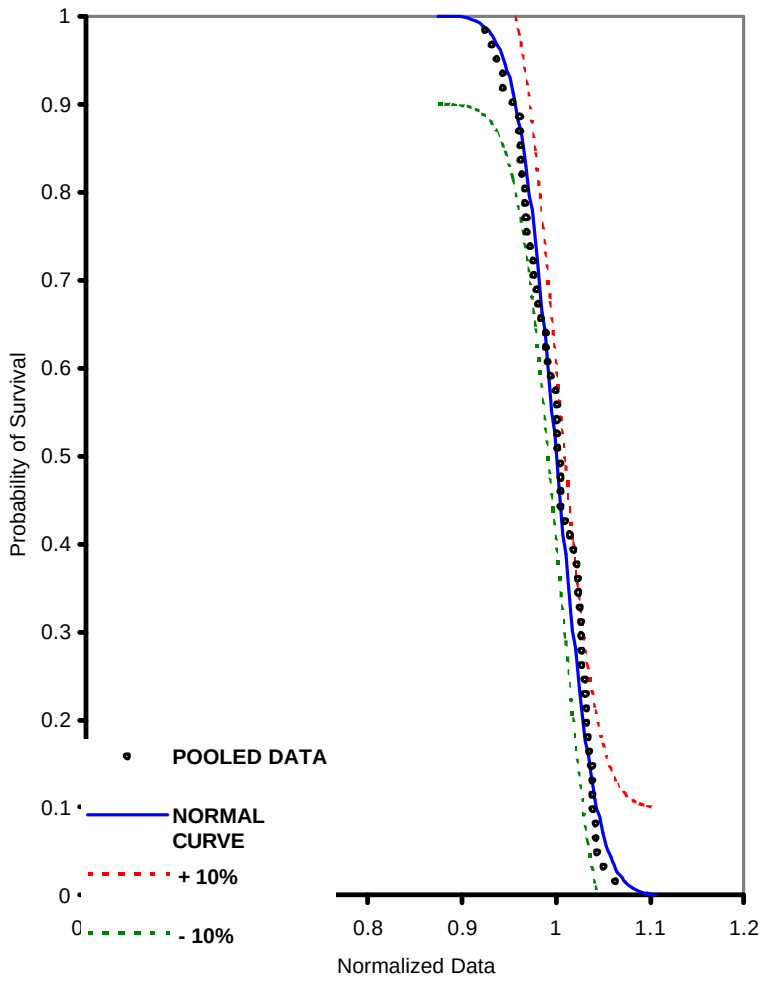

DISTRIBUTION OF DATA & NORMAL CURVES

Toray

TCA T700G-12K-31E/#2510 Unidirectional Carbon Tape

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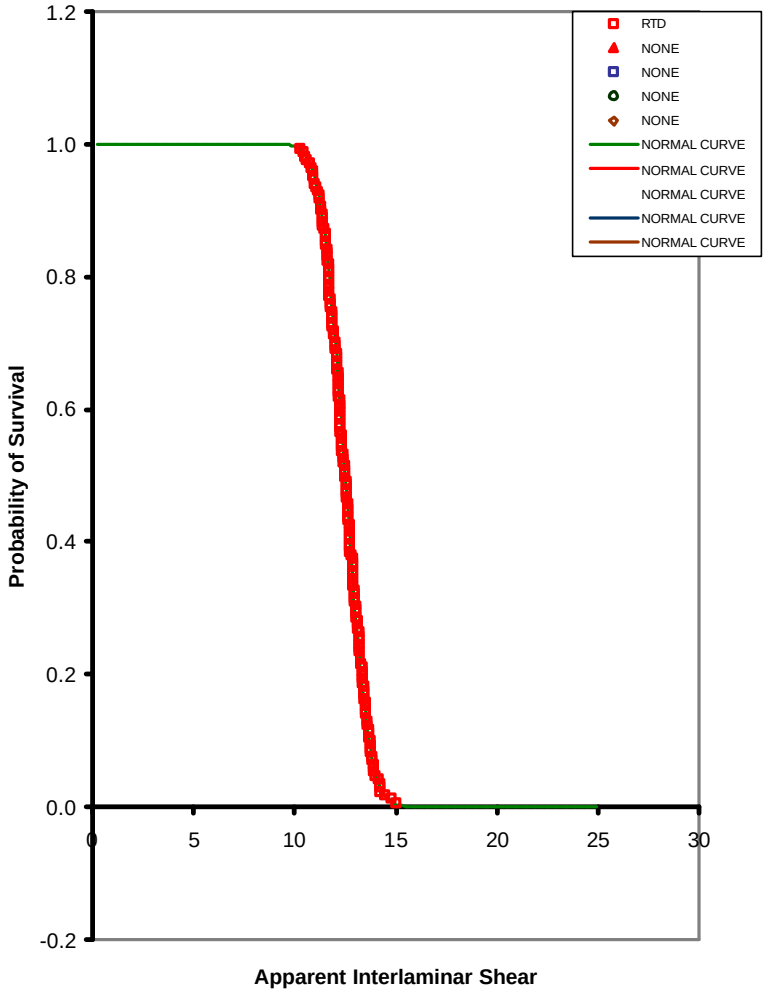
DISTRIBUTION OF DATA AT INDIVIDUAL TEST CONDITIONS



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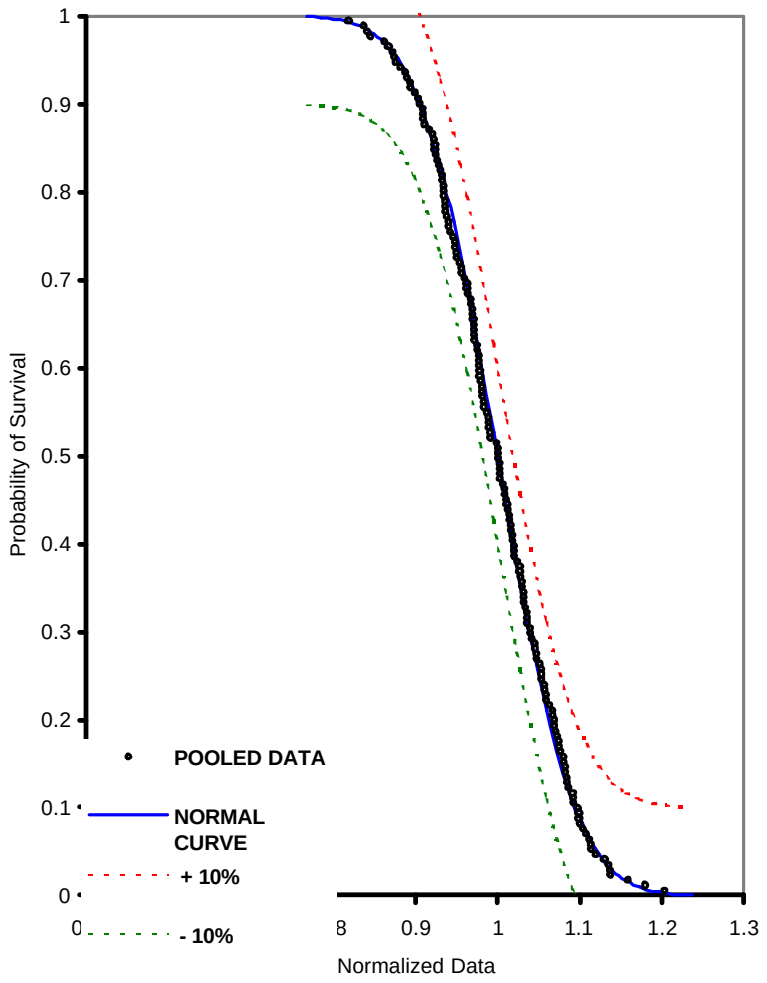


APPENDIX A. PHYSICAL AND MECHANICAL TEST PROCEDURES

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 = 1.79 for T700G

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 = 1.79 for T700G
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:

$$s_{ULT} = \frac{P}{b * d * \left(\frac{1{,}000\, psi}{ksi} \right)}$$

where: σ_{ULT} = the ultimate tensile stress (ksi)
P = the maximum load, (lb.)
b = the averaged measured width of the specimen (inch)
d = the averaged measured thickness of the specimen (inch)

A.2.1.1.2. Tensile Strength (Normalized)

The normalized tensile strength was calculated using the following equation:

$$s_{ULT} = \frac{P}{b * d * \left(\frac{1{,}000\,psi}{ksi}\right)} x \frac{CPT_{specimen}}{CPT_{batchaverage}}$$

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:

$$E_{11T} = \frac{P_{0.3\%} - P_{0.1\%}}{b * d * \left(e_{0.3\%} - e_{0.1\%}\right) * \left(\frac{1{,}000{,}000\,psi}{msi}\right)}$$

where: E_{11T} = the tensile modulus of elasticity (msi)
b = the averaged measured width of the specimen (inch)
d = the averaged measured thickness of the specimen (inch)
$P_{0.3\%}$ = the applied load at 3000 microstrain (kips)
$P_{0.1\%}$ = the applied load at 1000 microstrain (kips)
$\varepsilon_{0.3\%}$ = 0.3% measured longitudinal strain = 3000 microinches/inch (µin/in)
$\varepsilon_{0.1\%}$ = 0.1% measured longitudinal strain = 1000 microinches/inch (µin/in)

A.2.1.1.4. Tensile Modulus of Elasticity (Normalized)

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

$$E_{11T} = \frac{P_{0.3\%} - P_{0.1\%}}{b * d * \left(e_{0.3\%} - e_{0.1\%}\right) * \left(\frac{1{,}000{,}000\,psi}{msi}\right)} x \frac{CPT_{specimen}}{CPT_{batchaverage}}$$

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, inch/inch
ε_{Y2} = transverse strain at stress 2, inch/inch
0.002 = the longitudinal strain range (ε_{X2}-ε_{X1})=0.003–0.001 in/in

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 (ksi)
P = the ultimate compressive load (klb. or kips)
b = the averaged measured specimen width (inch)
t = the average thickness measured on untabbed compression panel

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:

$$E = \frac{P_{0.3\%} - P_{0.1\%}}{b * d * \left(e_{0.3\%} - e_{0.1\%}\right) * \left(\frac{1{,}000{,}000\, psi}{msi}\right)}$$

where:
- E = compressive modulus (msi)
- $P_{0.3\%}$ = applied load at 3000 microstrain, (lb.)
- $P_{0.1\%}$ = applied load at 1000 microstrain, (lb.)
- b = averaged measured specimen width, (inch)
- d = averaged measured specimen thickness, (inch)
- $\varepsilon_{0.3\%}$ = 0.3% measured strain = 3000 microinches/inch (µin/in)
- $\varepsilon_{0.1\%}$ = 0.1% measured strain = 1000 microinches/inch (µin/in)

A.4.1.1.2. Compressive Modulus Calculation (Normalized)

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

$$E = \frac{P_{0.3\%} - P_{0.1\%}}{b * d * (e_{0.3\%} - e_{0.1\%}) * \left(\frac{1{,}000{,}000\, psi}{msi} \right)} x \frac{CPT_{specimen}}{CPT_{batchaverage}}$$

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 ranges. 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

$$t_{Ult.} = \frac{P}{b * d * \left(\frac{1{,}000\, psi}{ksi} \right)}$$

where: $\tau_{Ult.}$ = the ultimate in-plane shear strength, ksi
P = the ultimate load, lbs.
b = the measured specimen width, in the symmetrical centrally located notch, inch
d = the average measured specimen thickness, inch

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

$$G_{12} = \frac{P_{0.65\%} - P_{0.25\%}}{b * d * (g_{0.65\%} - g_{0.25\%}) * \left(\frac{1{,}000{,}000\, psi}{msi} \right)}$$

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

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

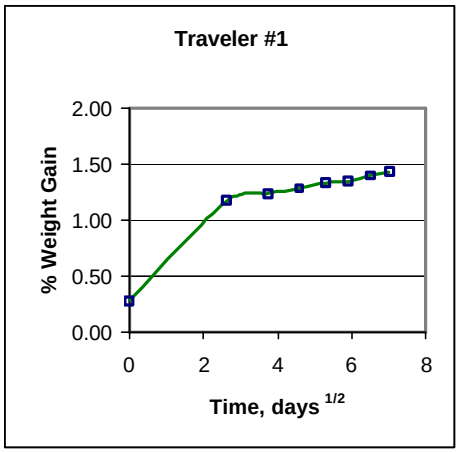
The short beam shear strengths were calculated by transferring the raw data recorded from the Instron 4505 computer into Microsoft Excel spreadsheet program, in accordance with the following equation:

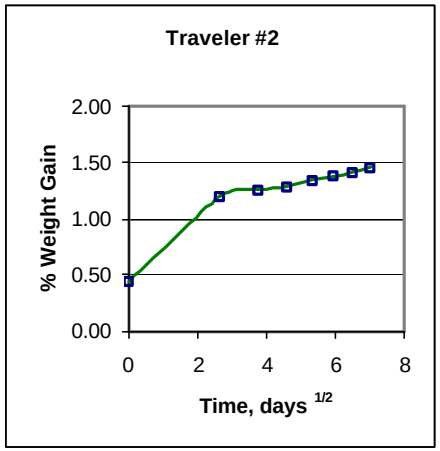
A.6.1.1. Short Beam Shear Strength Calculation

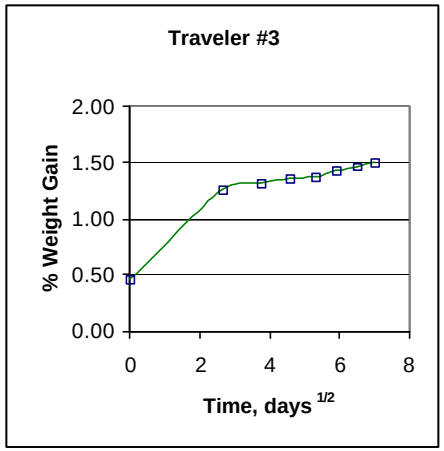
$$F = \frac{3 * P}{4 * b * t * \left(\frac{1{,}000\, psi}{ksi} \right)}$$

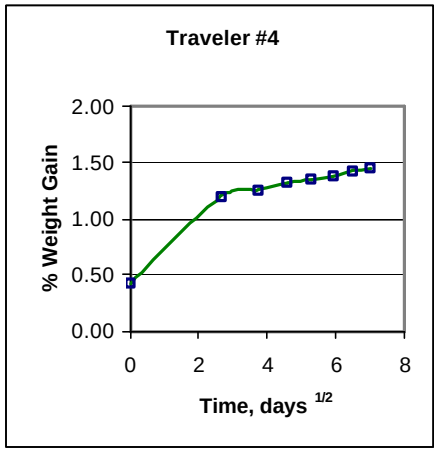
where: F = the short beam shear strength (ksi)
P = the ultimate load (lbs.)
b = the measured specimen width (inch)
t = the measured specimen thickness (inch)

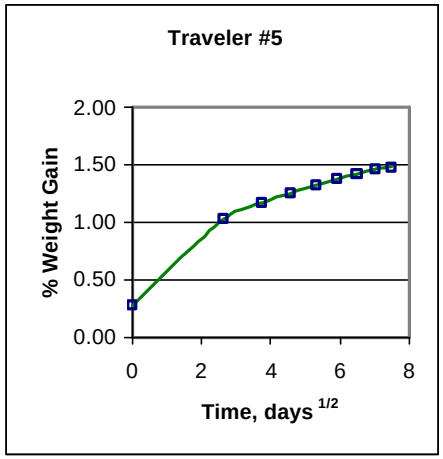
APPENDIX B. MOISTURE CONDITIONING HISTORY CHARTS

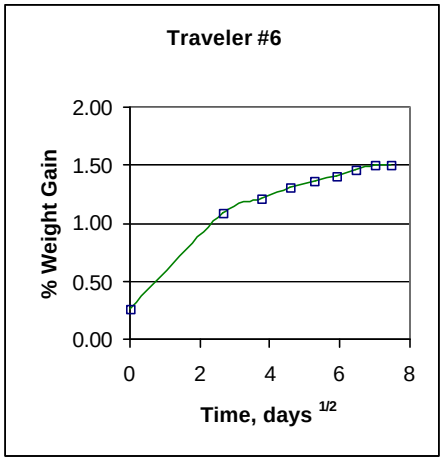


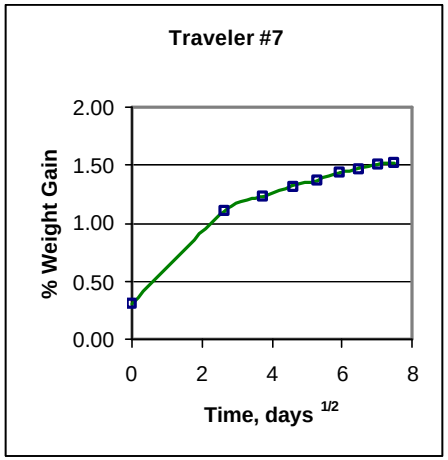


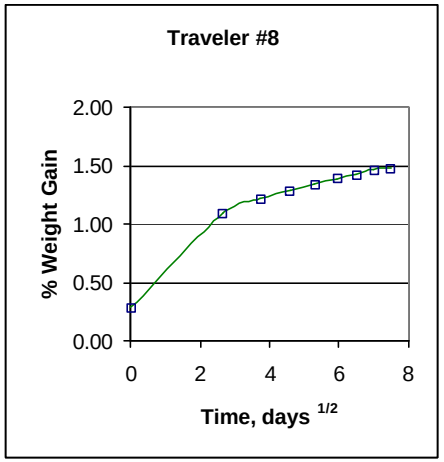


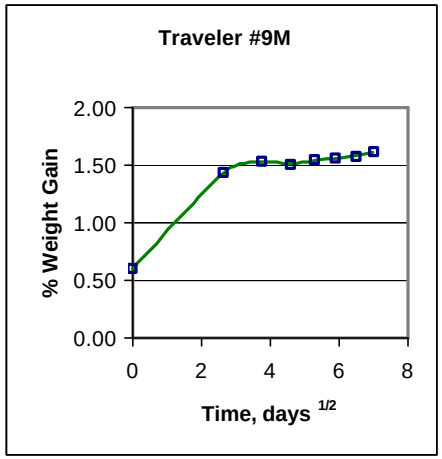


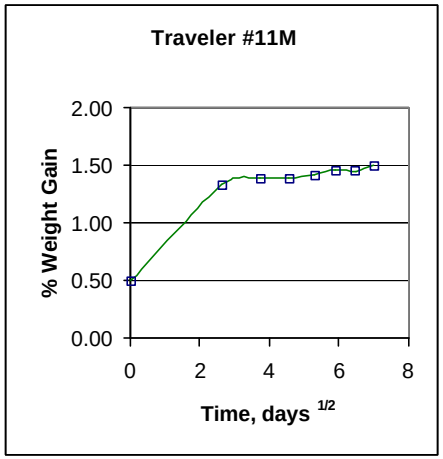


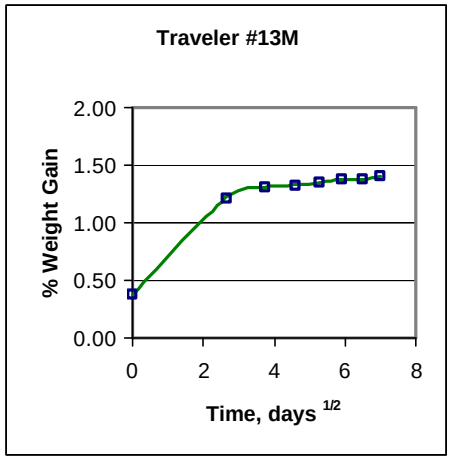


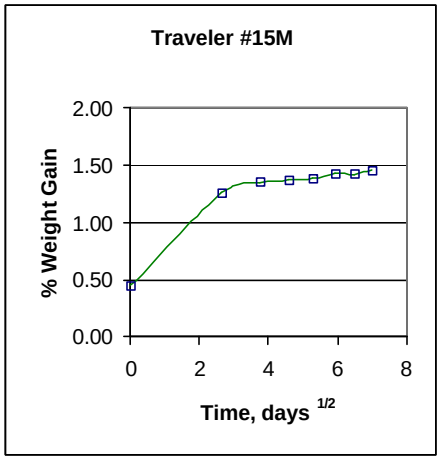


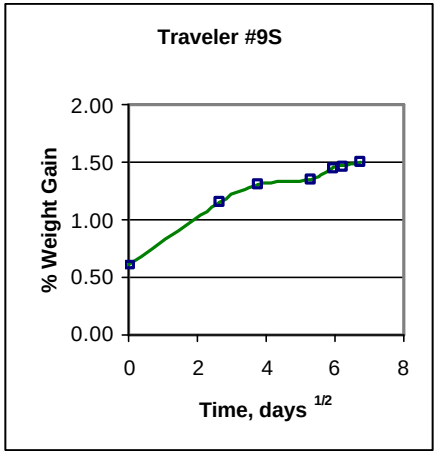


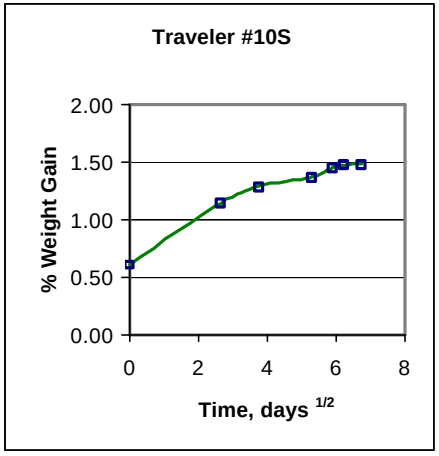


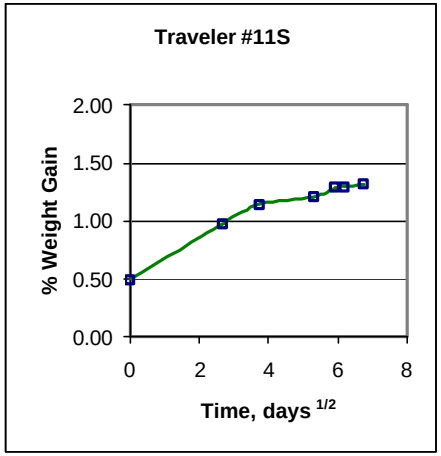


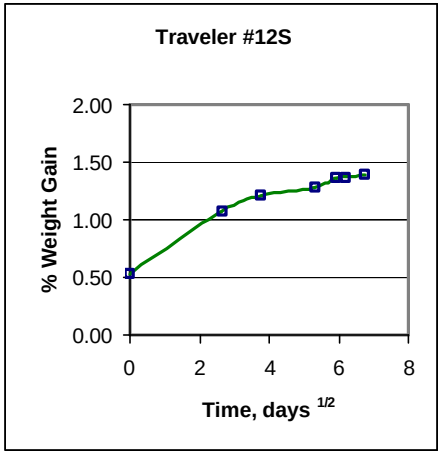


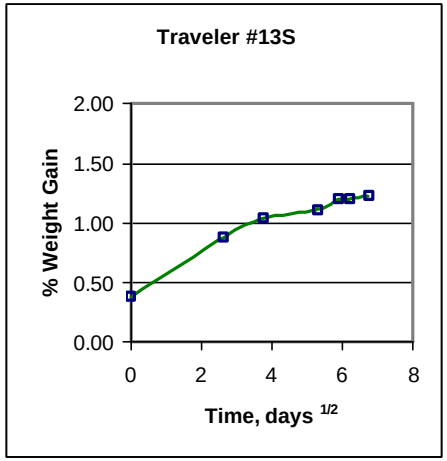


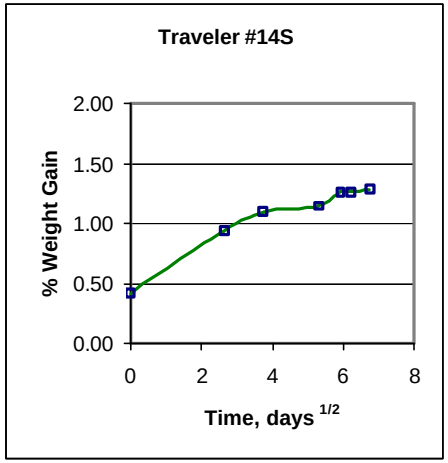


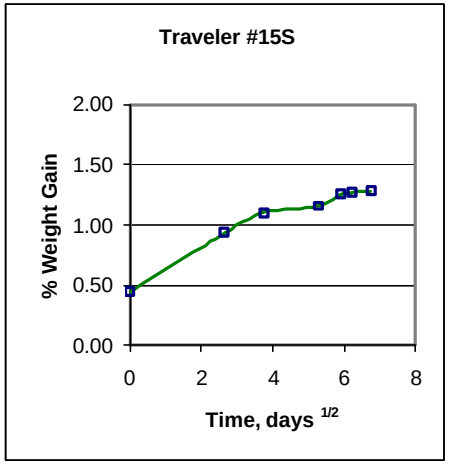


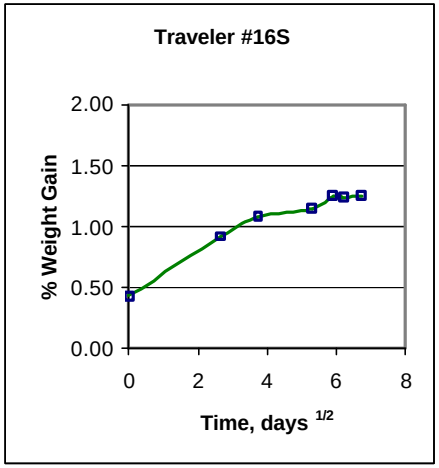


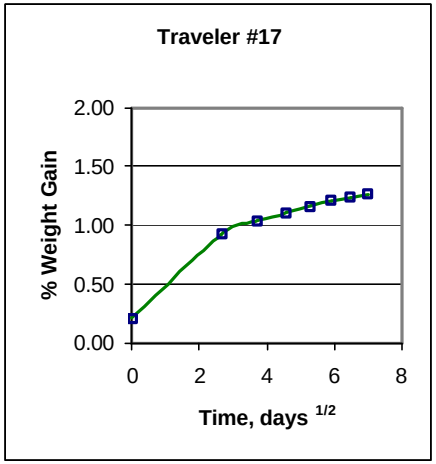


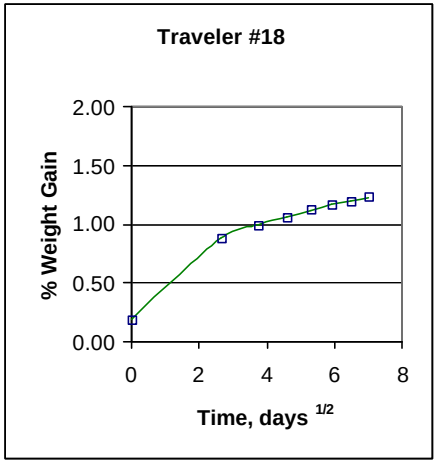


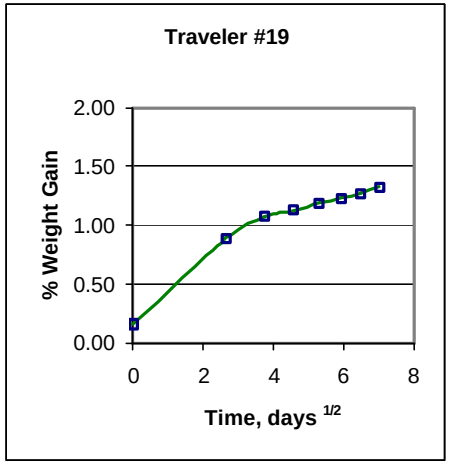


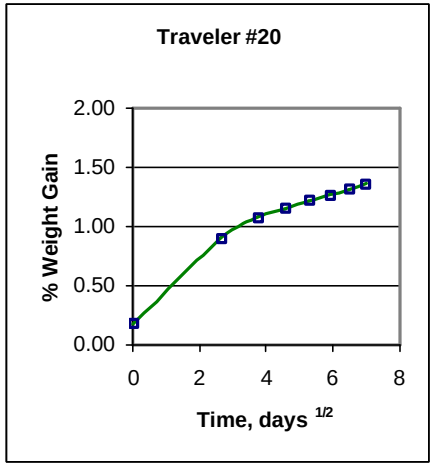


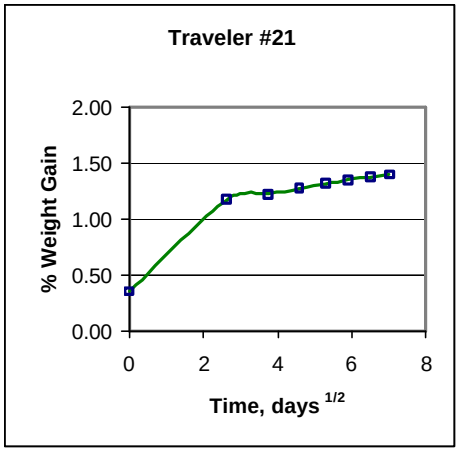


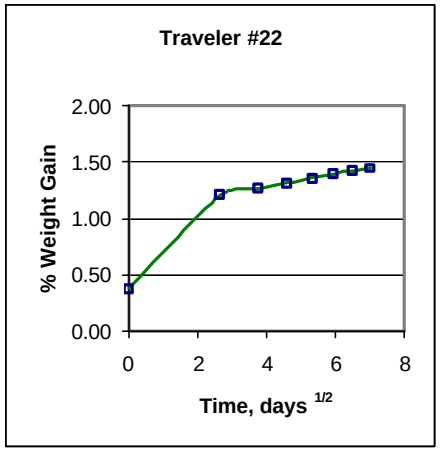


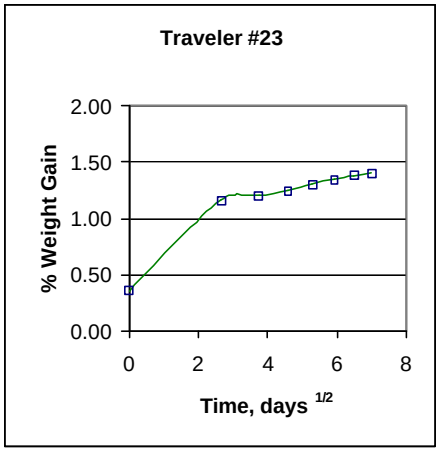


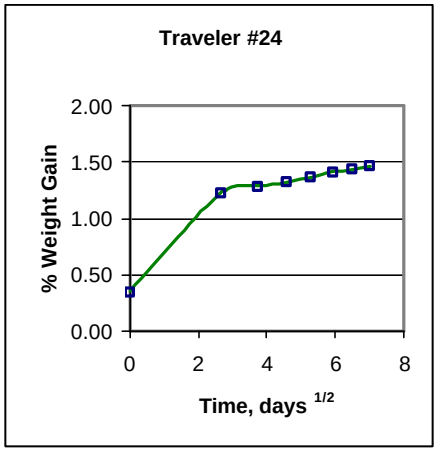


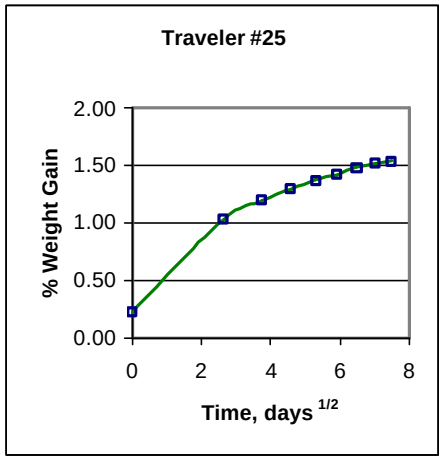


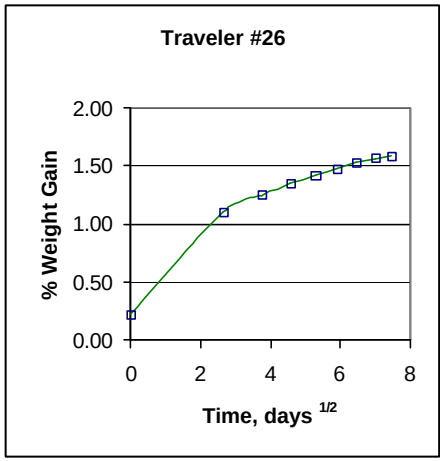


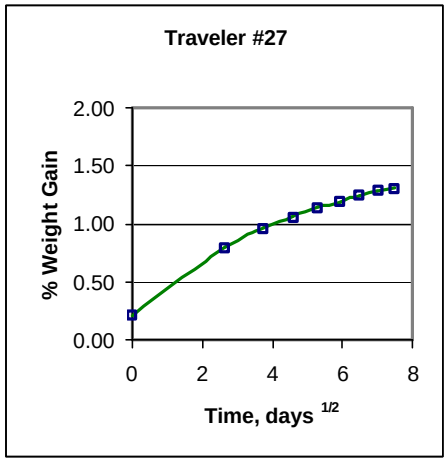


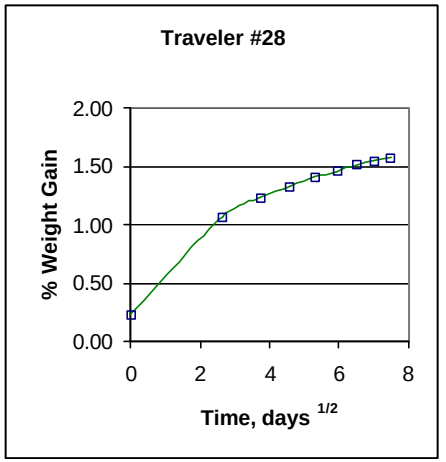


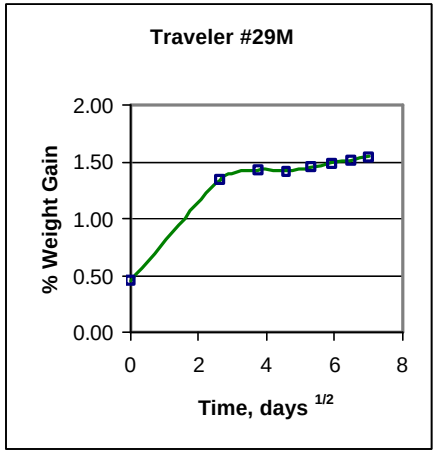


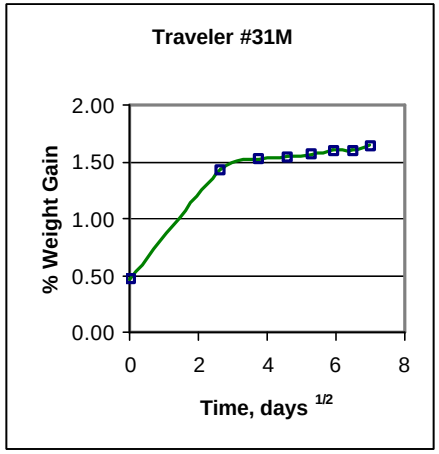


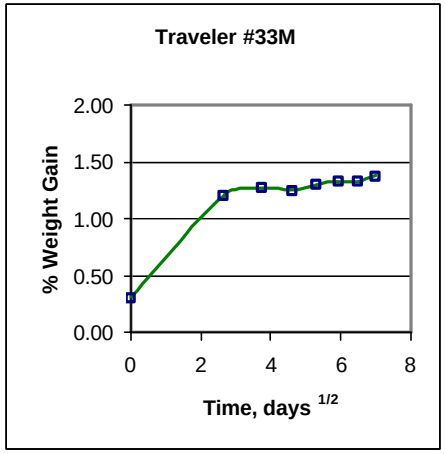


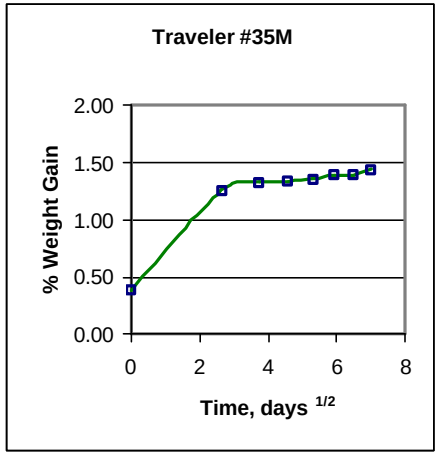


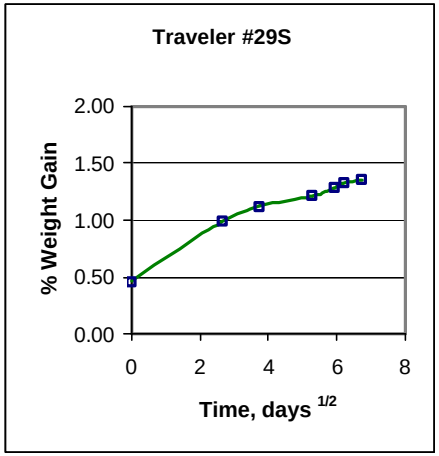


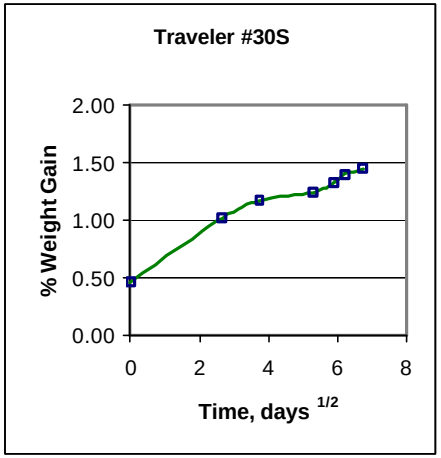


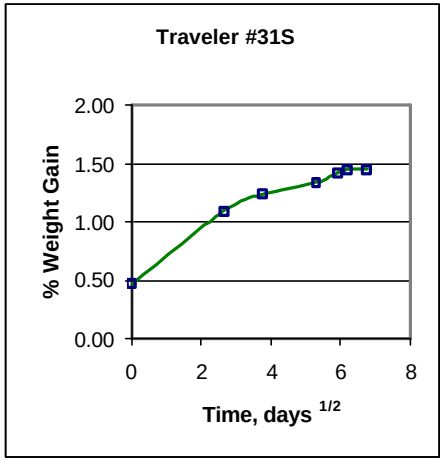


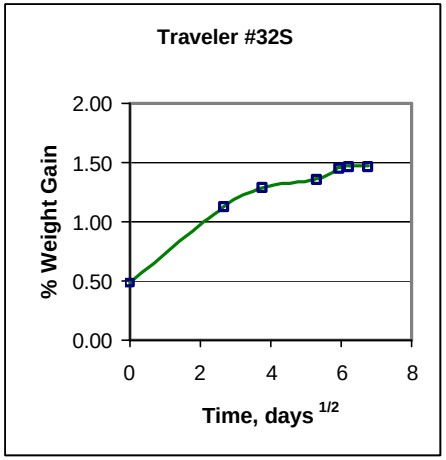


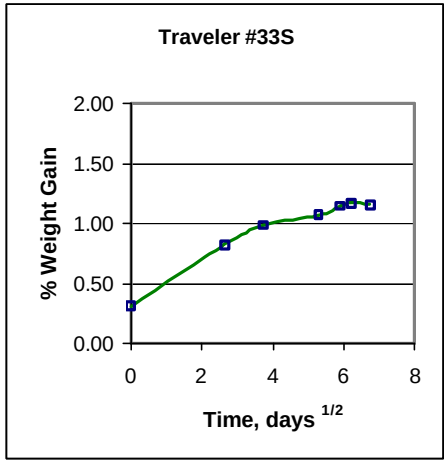


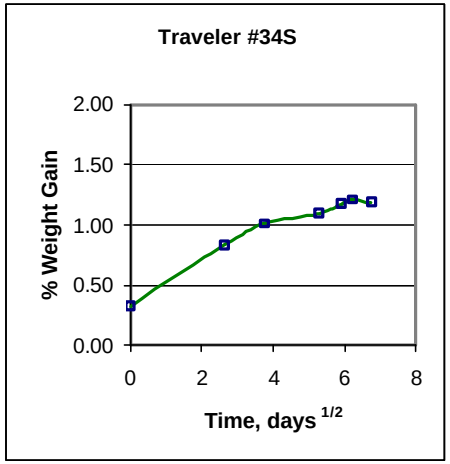


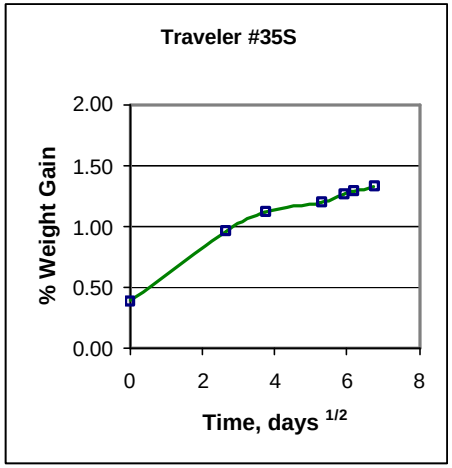


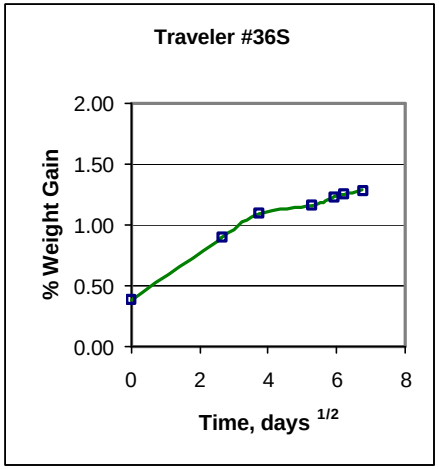


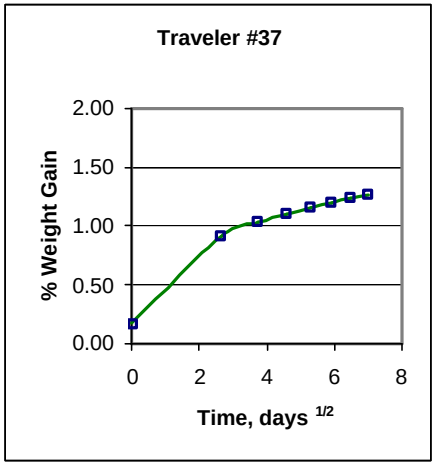


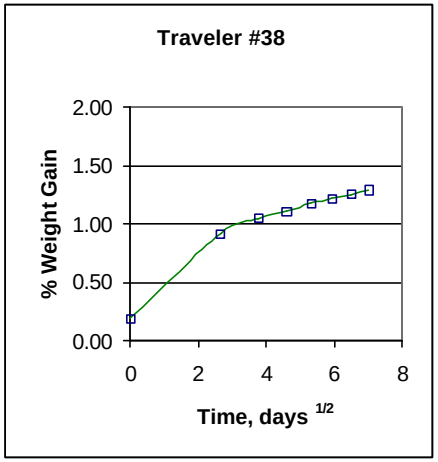


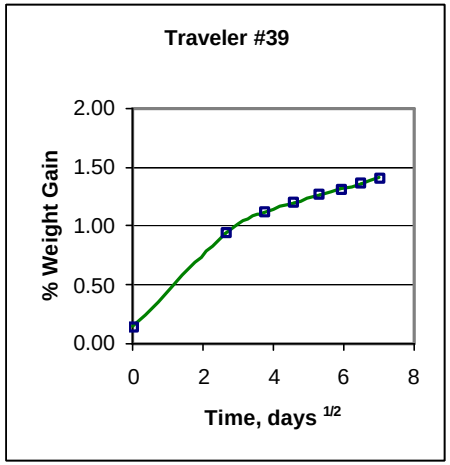


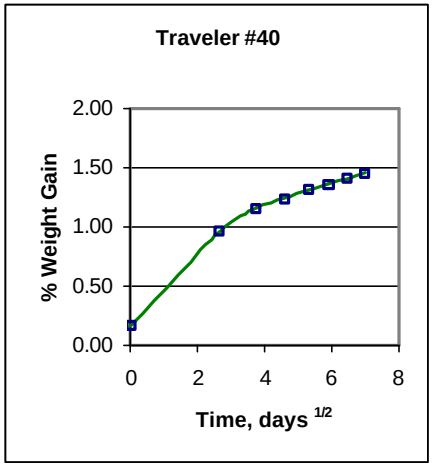


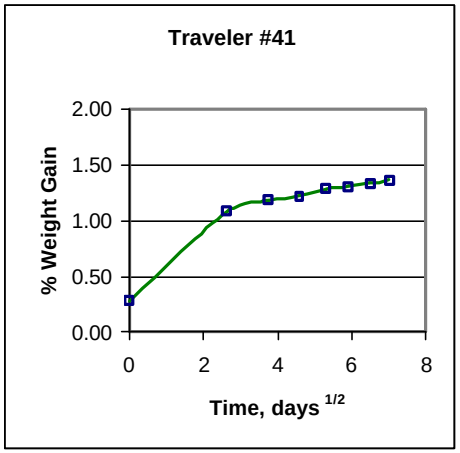


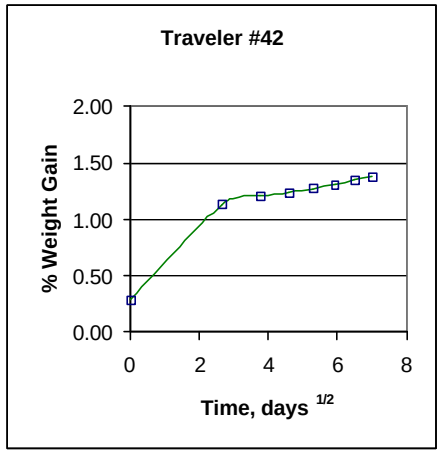


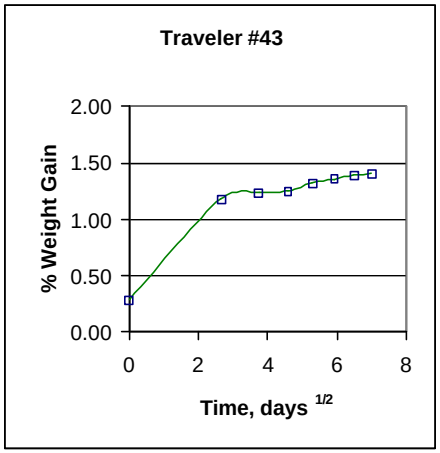


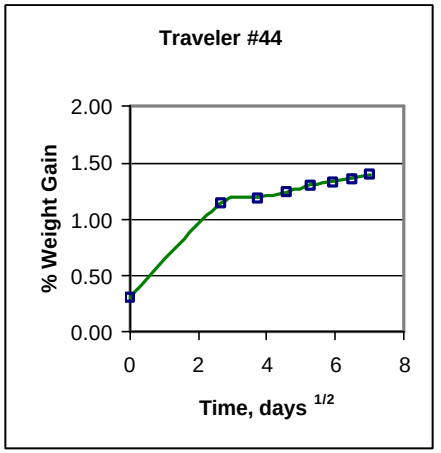


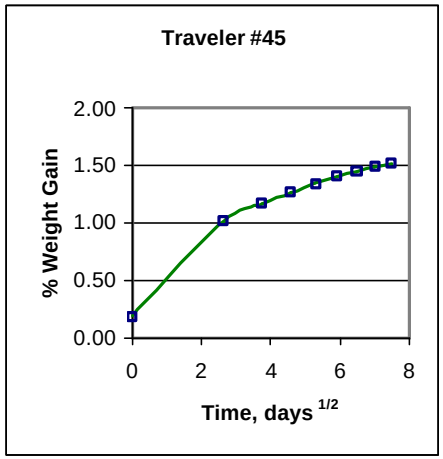


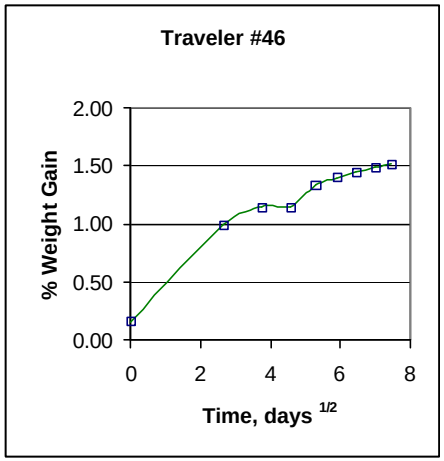


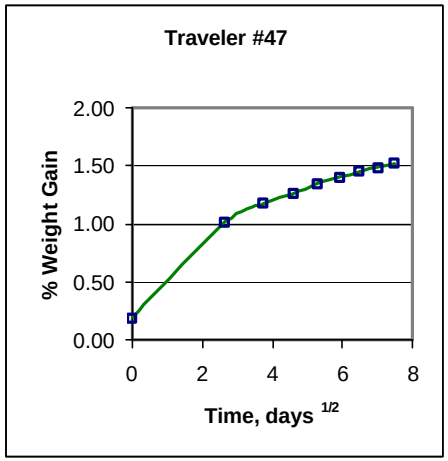


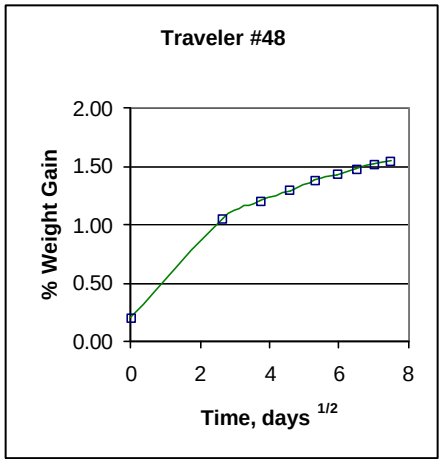


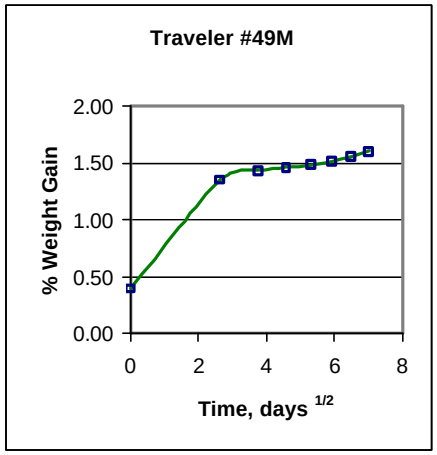


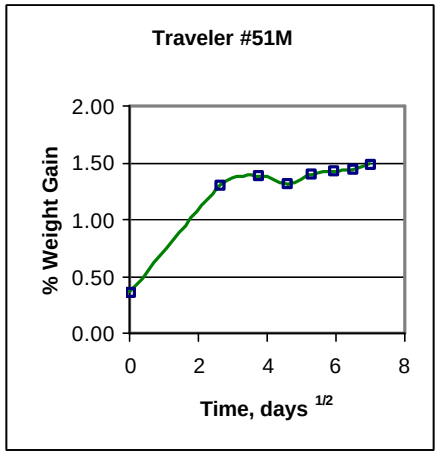


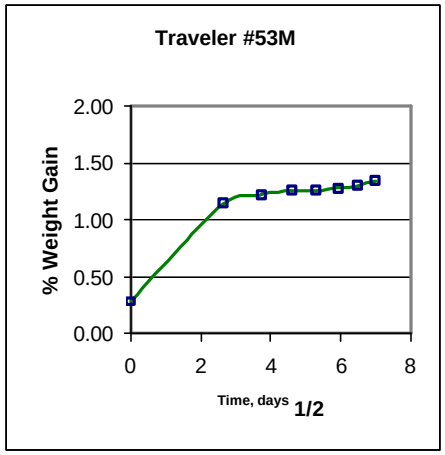


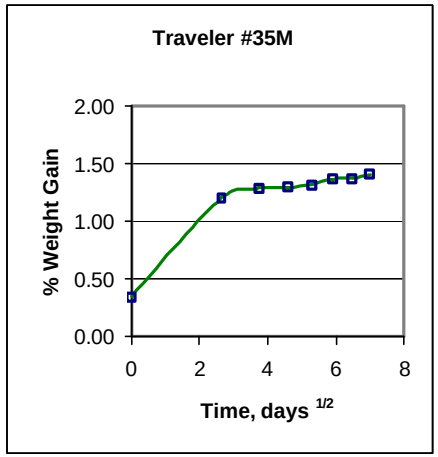


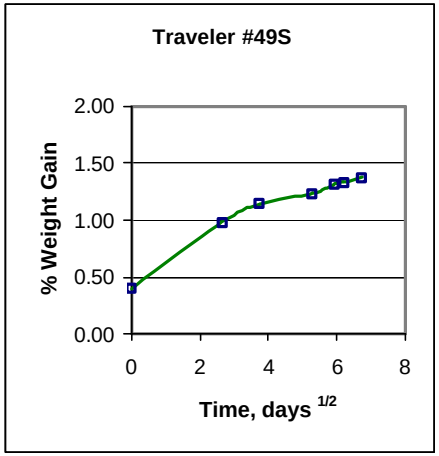


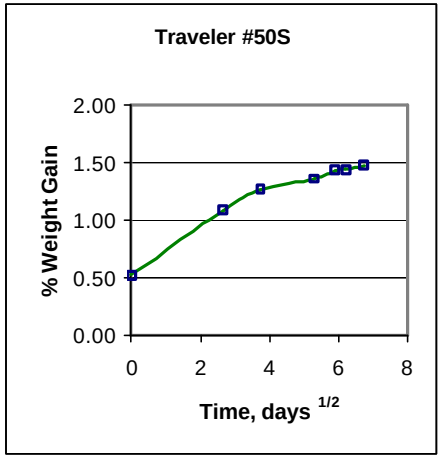


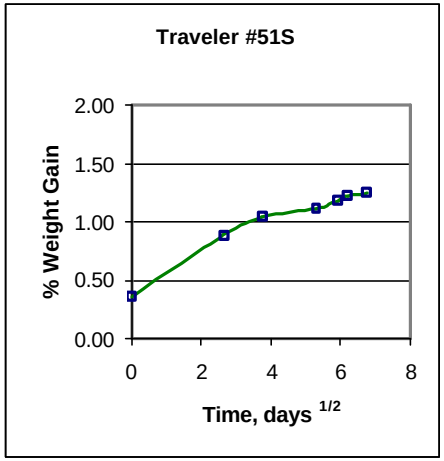


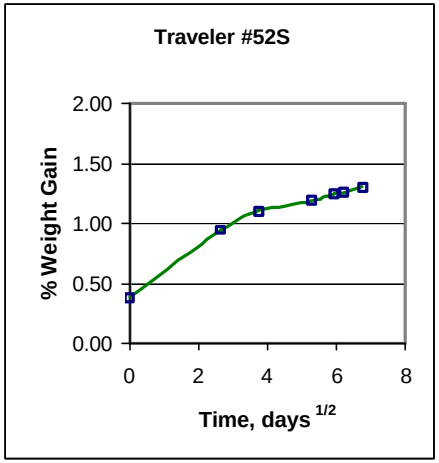


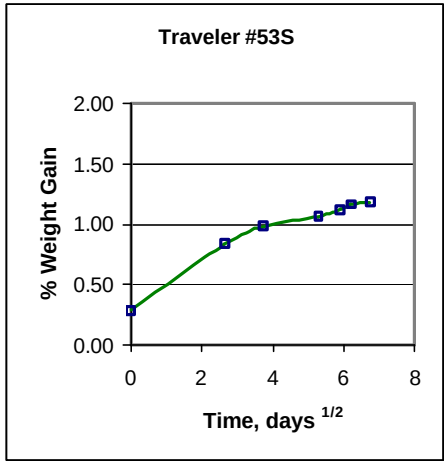


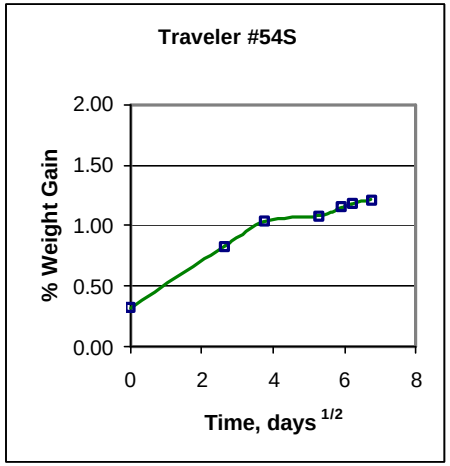


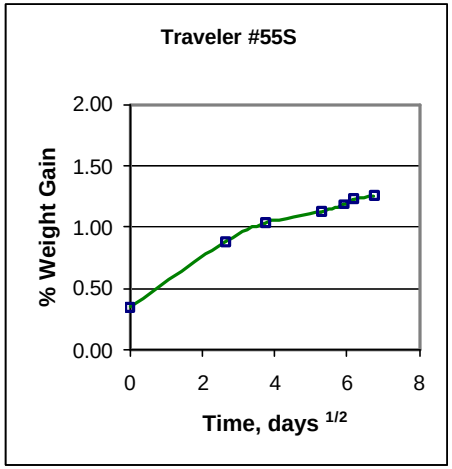


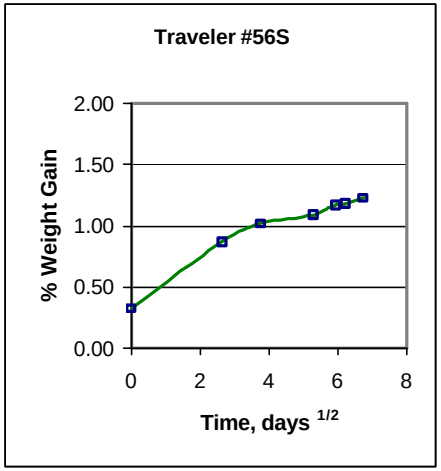


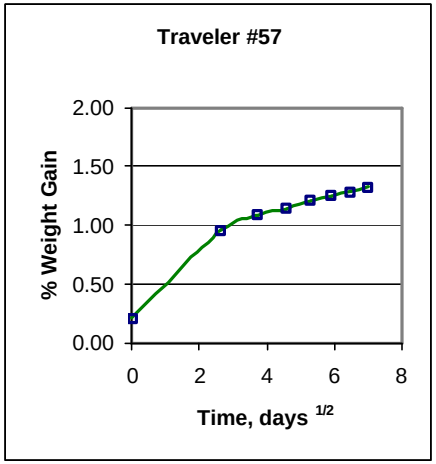


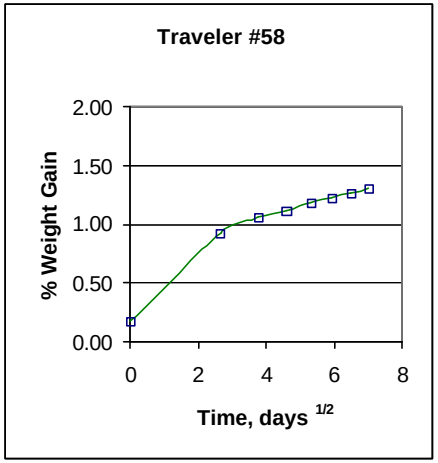


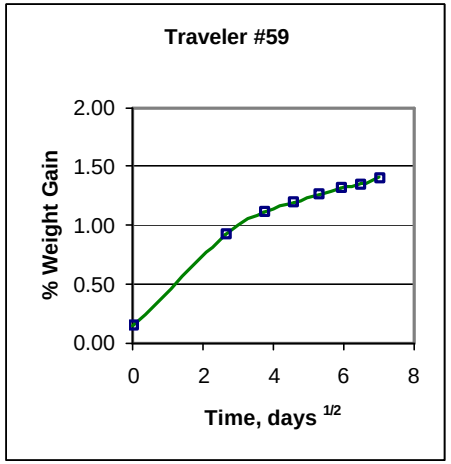


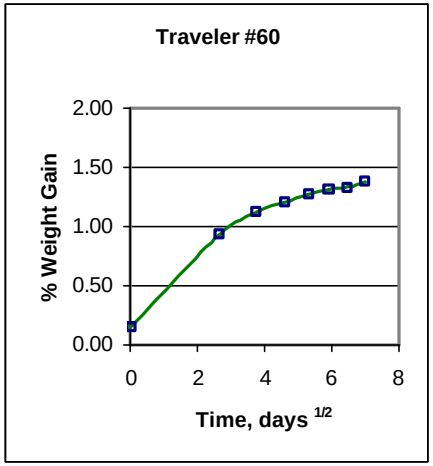












APPENDIX C. PHYSICAL TEST RESULTS

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
AB991033	34.6	148	0.17	6.2	17.4	scan	9.8	8.5	5.8	61.5	14.3	280	327
AB991034	35.0	149	0.15	6.0	17.5	on	9.9	8.6	5.8	61.6	14.2	281	327
AB991035	34.9	149	0.14	6.2	17.7	file	10.0	8.9	6.1	60.9	14.1	281	329
Grand Average	34.8	149	0.15	6.1	17.5		9.9	8.7	5.9	61.3	14.2	281	328
Requirement	35 ± 3	150 ± 6	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
AB991033	1.267	294	260
AB991034	1.267	300	265
AB991035	1.266	298	261
Grand Average	1.267	297	262
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 AB991033

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 -
AB991033							
A1-910-041	0° Tens	1.533	58.7	38.1	3.25	0.0061	99-631
A2-910-041	0° Tens	1.515	55.7	40.8	3.42	0.0060	99-558
B1-910-041	0° Tens	1.531	55.6	42.2	2.13	0.0060	99-559
B2-910-041	0° Tens	1.542	53.4	46.2	0.35	0.0060	99-559
A1-910-041	90° Tens	1.497	52.4	44.2	3.45	0.0060	99-560
A2-910-041	90° Tens	1.480	49.6	46.7	3.71	0.0060	99-560
B1-910-041	90° Tens	1.505	53.0	44.0	3.05	0.0060	99-559
B2-910-041	90° Tens	1.493	52.7	43.4	3.92	0.0060	99-559
A1-910-041	0° Comp	1.501	52.4	44.5	3.13	0.0060	99-564
A2-910-041	0°Comp	1.469	49.9	45.4	4.67	0.0060	99-569
B1-910-041	0°Comp	1.509	51.8	45.9	2.25	0.0060	99-563
B2-910-041	0°Comp	1.504	49.1	49.3	1.55	0.0060	99-568
A1-910-041	90°Comp	1.525	53.4	45.0	1.64	0.0059	99-564
A2-910-041	90°Comp	1.545	55.6	43.4	1.01	0.0059	99-564
B1-910-041	90°Comp	1.549	55.5	43.9	0.67	0.0060	99-563
B2-910-041	90°Comp	1.539	56.0	42.4	1.63	0.0060	99-572
A1-910-041	IPS	1.511	56.0	40.1	3.86	0.0060	99-560
B1-910-041	IPS	1.527	58.8	37.4	3.74	0.0059	99-563
A1-910-041	ILSS	1.537	58.4	38.8	2.78	0.0059	99-558
B1-910-041	ILSS	1.532	55.9	42.0	2.13	0.0058	99-559
Average		1.517	54.2	43.2	2.62	0.0060	-
Standard Deviation		0.022	2.9	3.0	1.20	0.0001	-
COV, %		1.47	5.34	7.03	45.82	0.98	-
Requirement		TBD	TBD	TBD	TBD	TBD	-

Summary of Chemical and Physical Tests - Cured Material Properties, Batch AB991034

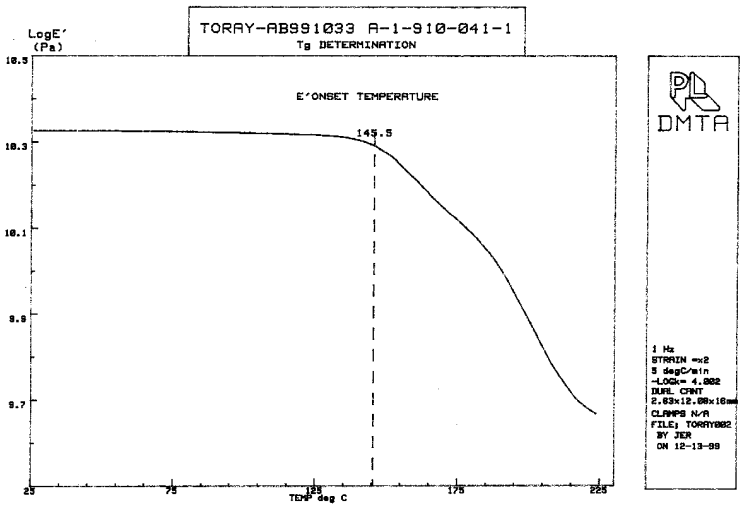
Batch No./ Panel ID	Test Type	Laminate Density (g/cc)	Fiber Volume (%vol)	Resin Volume (%vol)	Void Content (%vol)	Cured Ply Thickness (in.)	Autoclave Cure Run ID -
AB991034							
A1-910-042	0° Tens	1.557	57.5	41.7	0.82	0.0060	99-569
A2-910-042	0° Tens	1.571	60.3	38.8	0.88	0.0060	99-569
B1-910-042	0° Tens	1.563	57.6	42.0	0.39	0.0060	99-566
B2-910-042	0° Tens	1.541	56.4	41.9	1.67	0.0060	99-566
A1-910-042	90° Tens	1.504	51.2	46.3	2.47	0.0060	99-569
A2-910-042	90° Tens	1.509	51.9	45.8	2.32	0.0060	99-571
B1-910-042	90° Tens	1.510	53.5	43.5	2.93	0.0060	99-566
B2-910-042	90° Tens	1.519	55.4	41.6	3.00	0.0060	99-570
A1-910-042	0° Comp	1.461	49.4	45.6	5.07	0.0061	99-569
A2-910-042	0°Comp	1.475	53.2	41.2	5.55	0.0061	99-571
B1-910-042	0°Comp	1.499	50.1	47.5	2.38	0.0060	99-568
B2-910-042	0°Comp	1.512	48.7	50.5	0.78	0.0060	99-568
A1-910-042	90°Comp	1.552	57.0	41.9	1.05	0.0062	99-569
A2-910-042	90°Comp	1.536	51.6	48.3	0.09	0.0062	99-581
B1-910-042	90°Comp	1.557	53.9	46.7	0.00	0.0061	99-566
B2-910-042	90°Comp	1.552	53.8	46.5	0.00	0.0061	99-568
A1-910-042	IPS	1.516	55.1	41.7	3.13	0.0059	99-571
B1-910-042	IPS	1.537	56.0	42.2	1.80	0.0060	99-568
A1-910-042	ILSS	1.527	54.5	43.5	1.98	0.0061	99-571
B1-910-042	ILSS	1.536	55.6	42.7	1.73	0.0060	99-566
Average		1.527	54.1	44.0	1.90	0.0060	-
Standard Deviation		0.029	3.0	3.0	1.54	0.0001	-
COV, %		1.91	5.57	6.74	80.86	1.03	-
Requirement		TBD	TBD	TBD	TBD	TBD	-

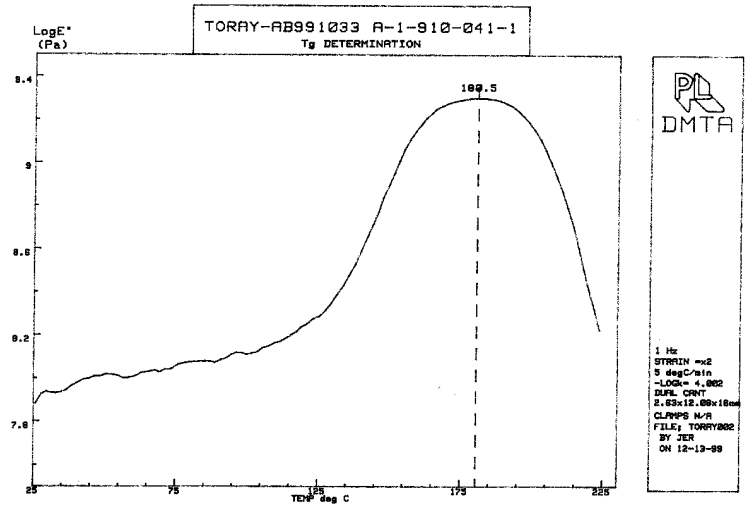
Summary of Chemical and Physical Tests - Cured Material Properties, Batch AB991035

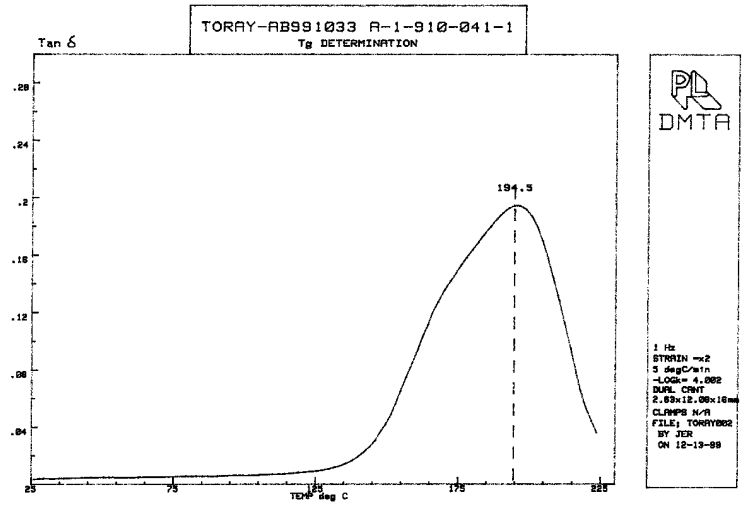
Batch No./ Panel ID	Test Type	Laminate Density (g/cc)	Fiber Volume (%vol)	Resin Volume (%vol)	Void Content (%vol)	Cured Ply Thickness (in.)	Autoclave Cure Run ID -
AB991035							
A1-910-043	0° Tens	1.563	60.0	38.6	1.41	0.0060	99-583
A2-910-043	0° Tens	1.551	55.5	44.0	0.51	0.0061	99-583
B1-910-043	0° Tens	1.543	52.7	47.4	0.00	0.0060	99-582
B2-910-043	0° Tens	1.529	53.4	45.2	1.35	0.0060	99-582
A1-910-043	90° Tens	1.512	53.0	44.4	2.57	0.0060	99-581
A2-910-043	90° Tens	1.517	52.8	45.2	2.04	0.0060	99-581
B1-910-043	90° Tens	1.505	52.6	44.4	2.98	0.0060	99-572
B2-910-043	90° Tens	1.504	53.2	43.6	3.27	0.0060	99-572
A1-910-043	0° Comp	1.514	52.7	45.1	2.25	0.0061	99-583
A2-910-043	0°Comp	1.530	51.7	47.8	0.54	0.0061	99-583
B1-910-043	0°Comp	1.541	56.9	41.3	1.86	0.0060	99-582
B2-910-043	0°Comp	1.512	53.4	43.8	2.76	0.0060	99-582
A1-910-043	90°Comp	1.547	54.3	45.3	0.35	0.0061	99-583
A2-910-043	90°Comp	1.527	55.8	41.7	2.51	0.0061	99-583
B1-910-043	90°Comp	1.555	56.4	43.0	0.53	0.0061	99-584
B2-910-043	90°Comp	1.559	58.3	40.7	1.04	0.0061	99-584
A1-910-043	IPS	1.532	57.1	40.2	2.65	0.0060	99-581
B1-910-043	IPS	1.517	54.0	43.3	2.61	0.0060	99-582
A1-910-043	ILSS	1.538	56.9	41.1	2.09	0.0060	99-581
B1-910-043	ILSS	1.542	56.6	41.7	1.69	0.0060	99-572
Average		1.532	54.9	43.4	1.75	0.0060	-
Standard Deviation		0.018	2.3	2.4	0.98	0.0001	-
COV, %		1.19	4.15	5.47	56.22	0.90	-
Requirement		TBD	TBD	TBD	TBD	TBD	-

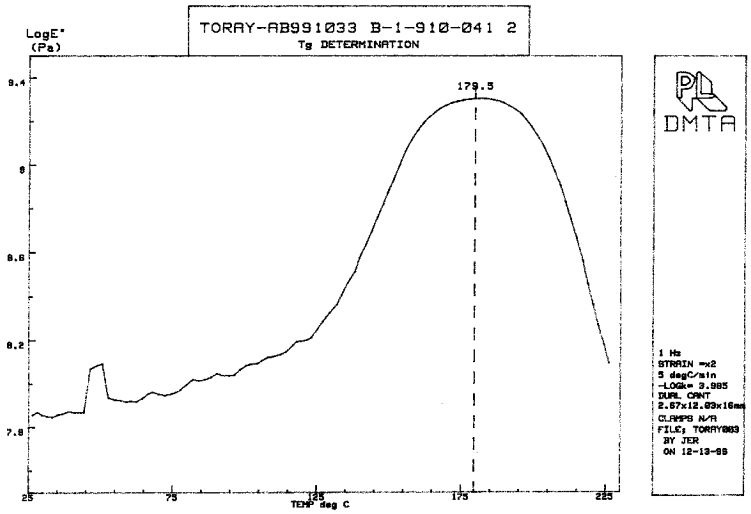
Dynamic Mechanical Analysis (DMA)
Graphs
in determination of
Dry Glass Transition Temperature, Tg (dry)
for

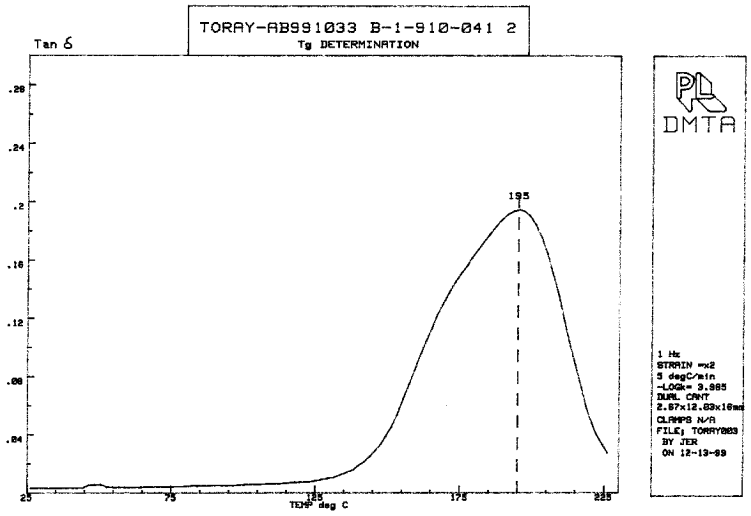
P707AG-15
T700G-12K/#2510
Unidirectional Tape Prepreg

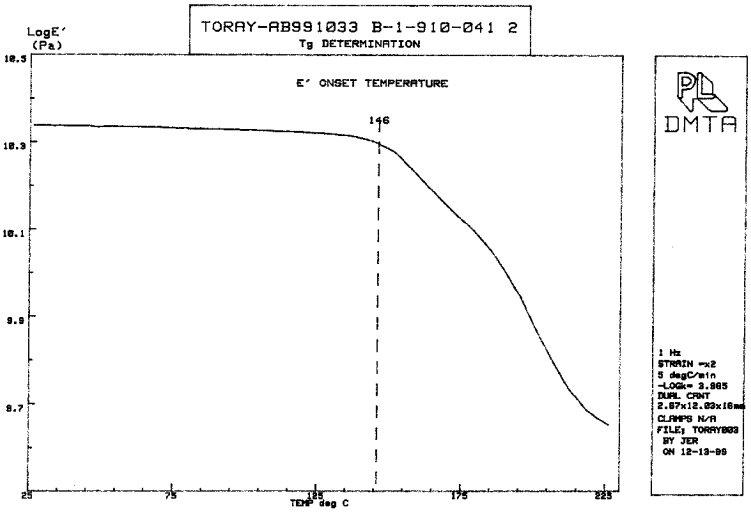


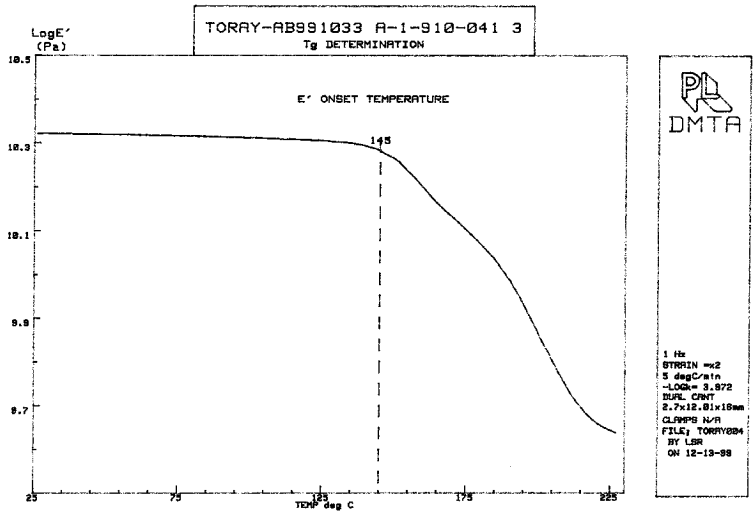


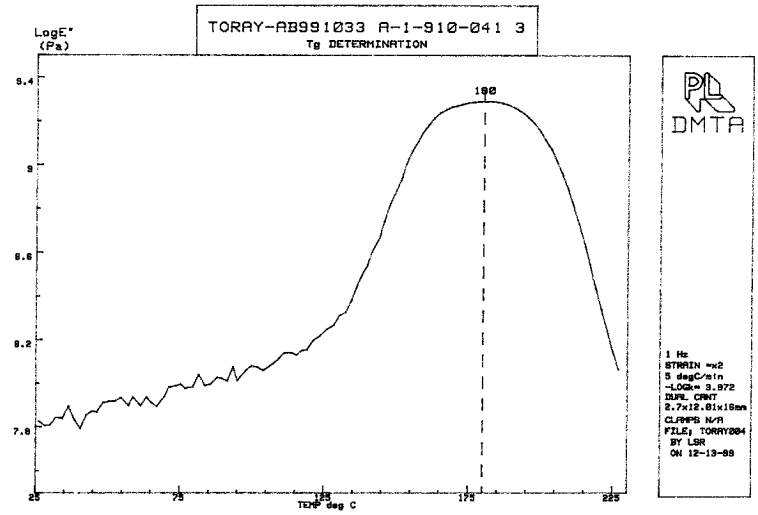


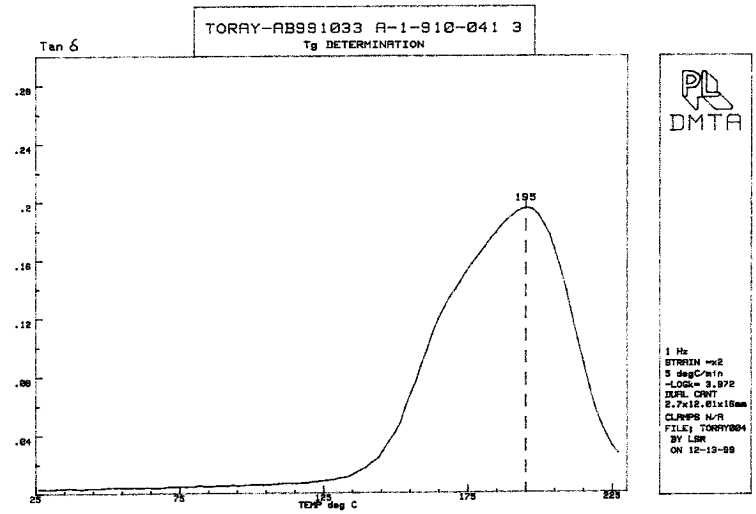


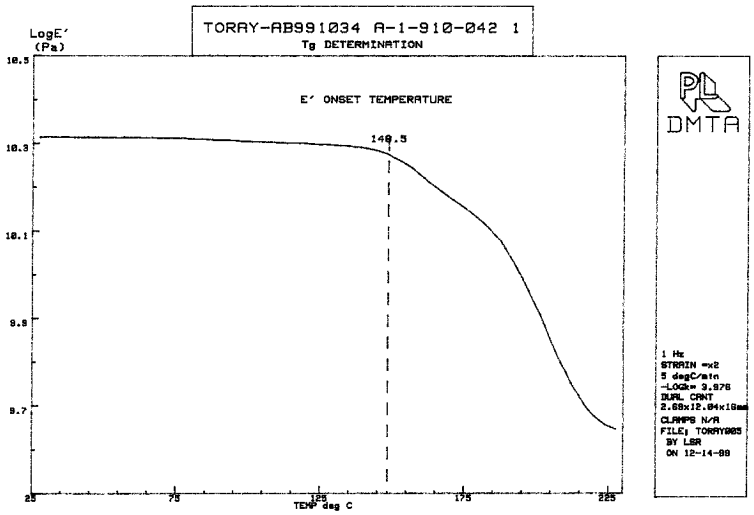


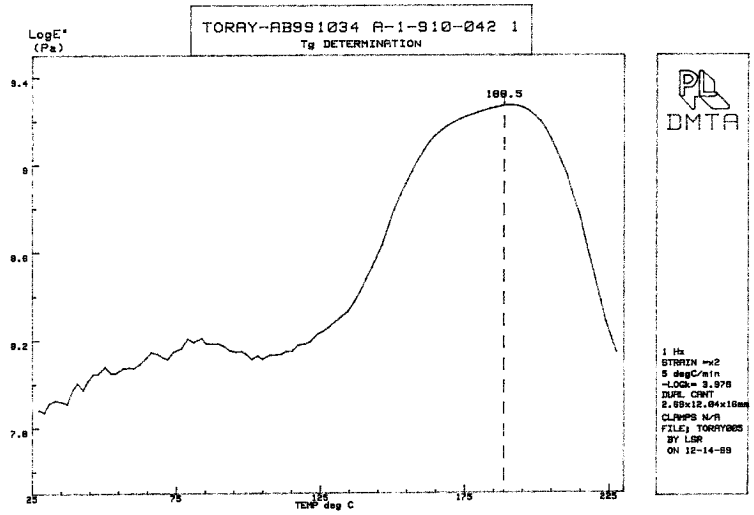


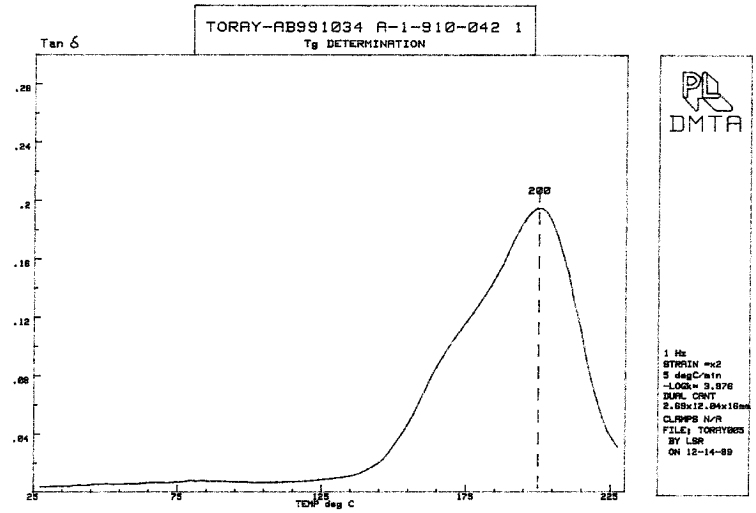


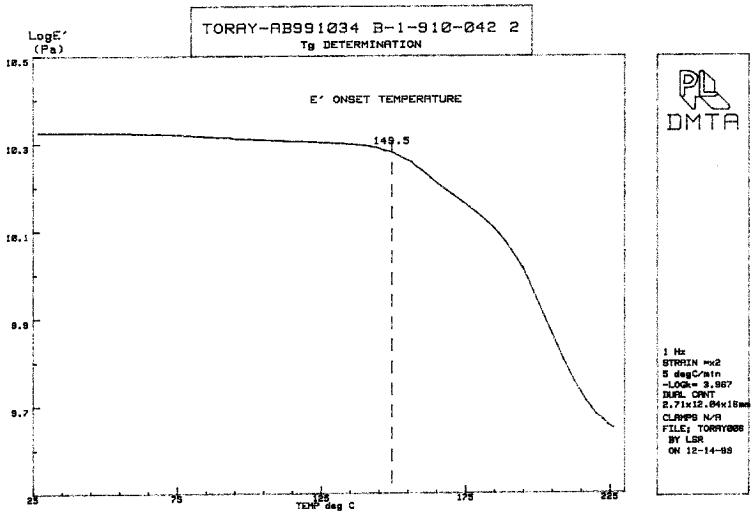


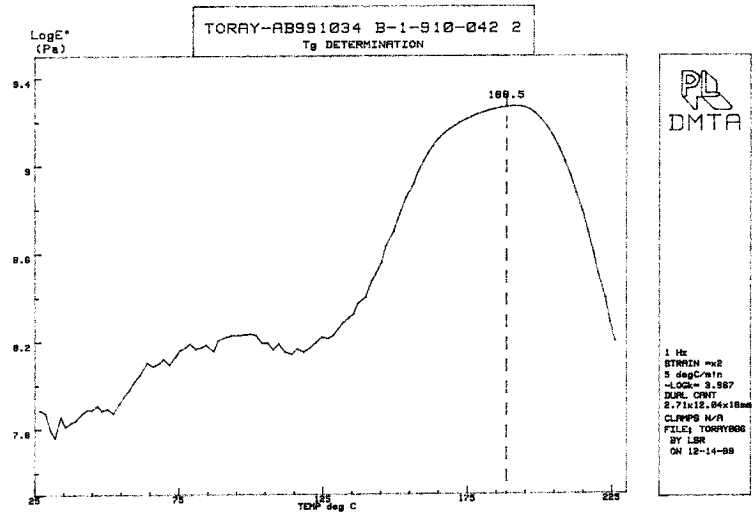


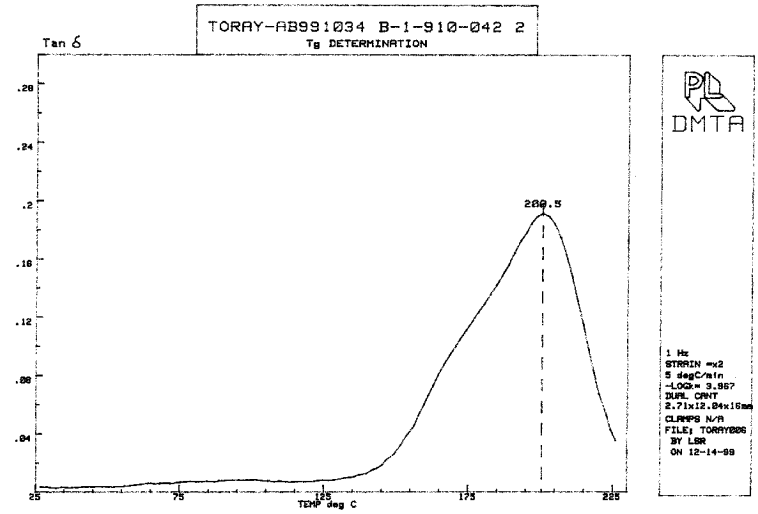


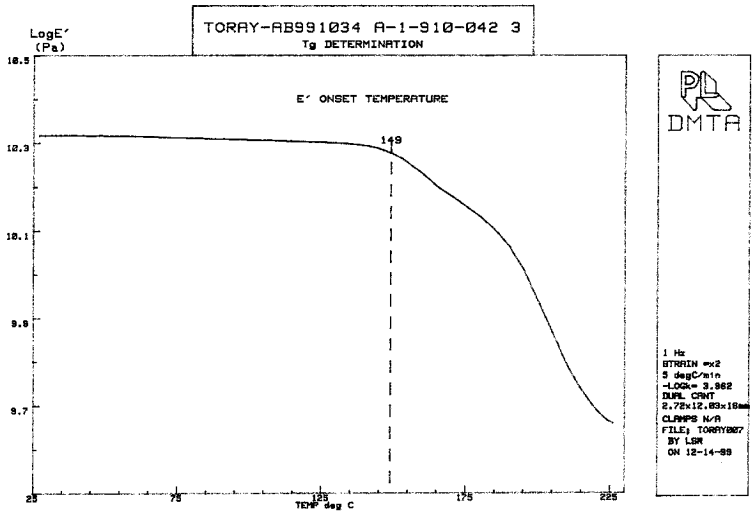


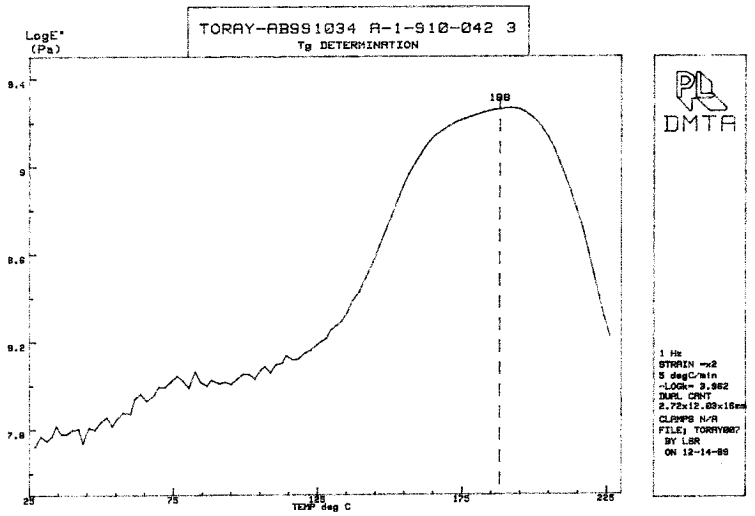


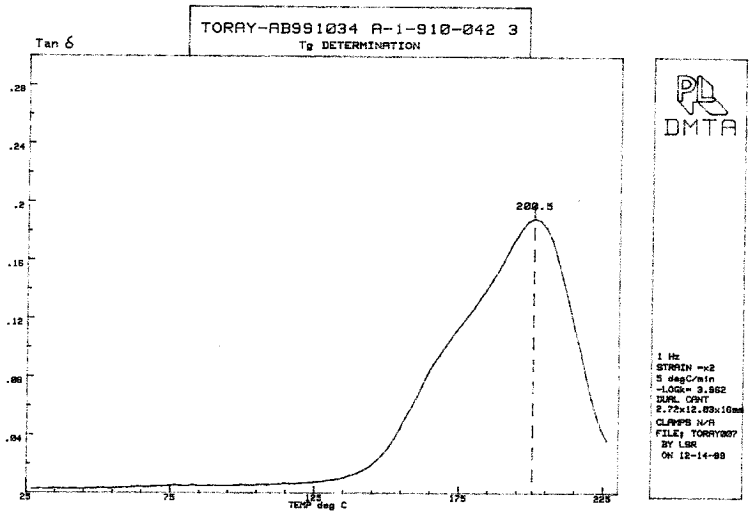


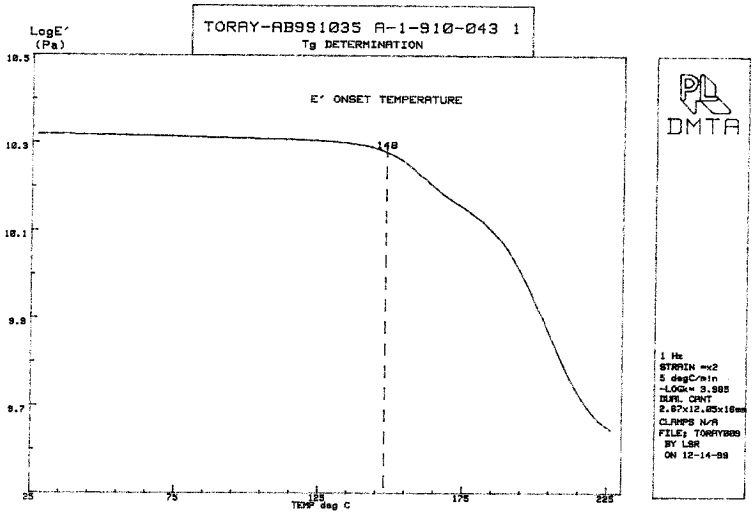


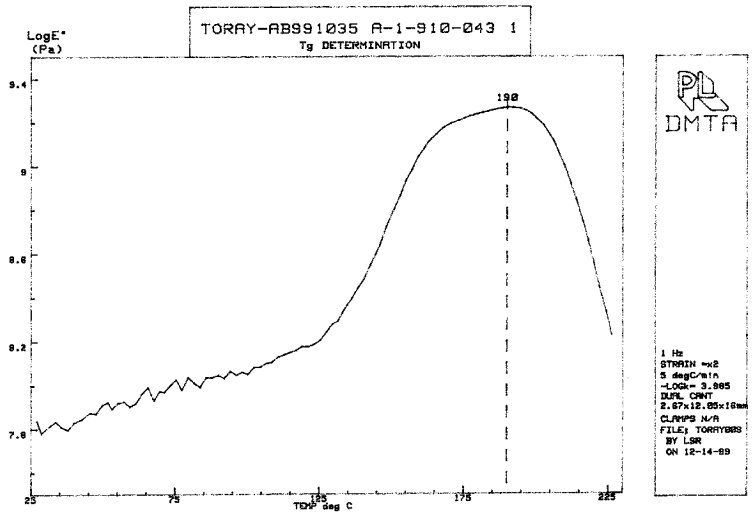


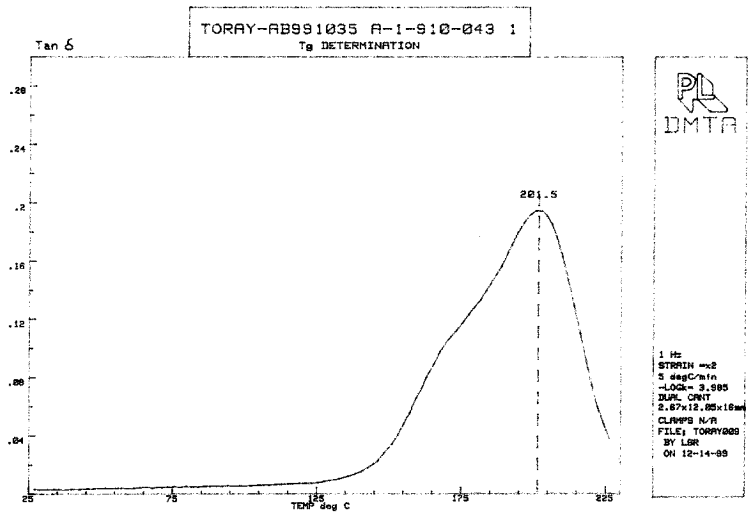


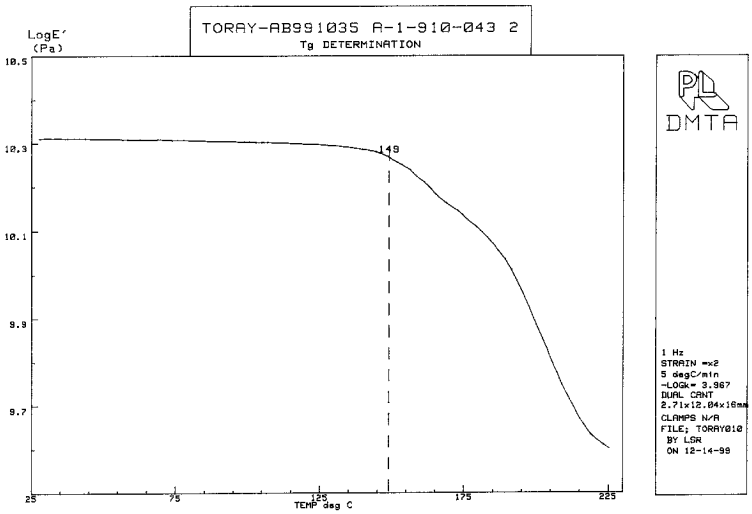


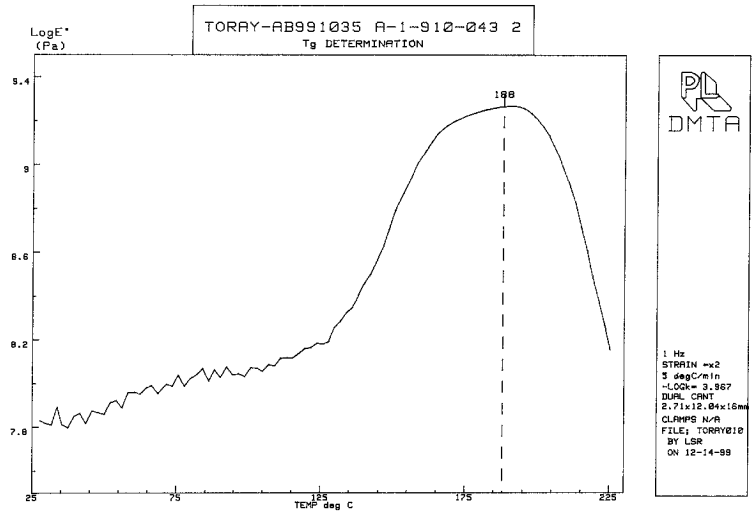


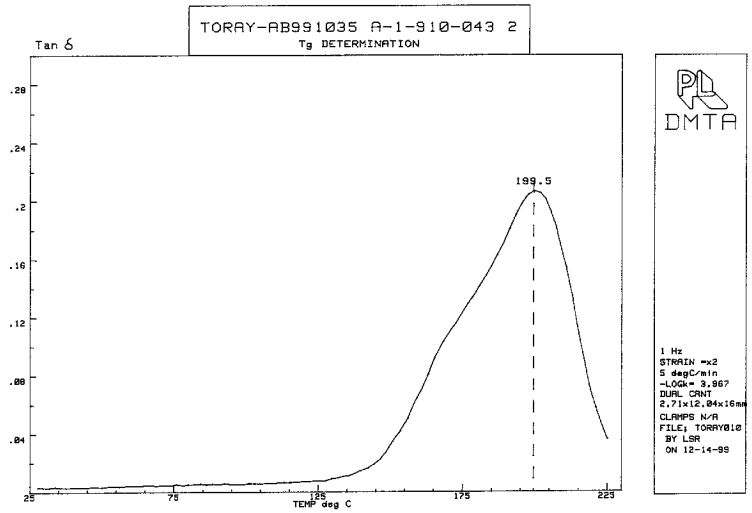


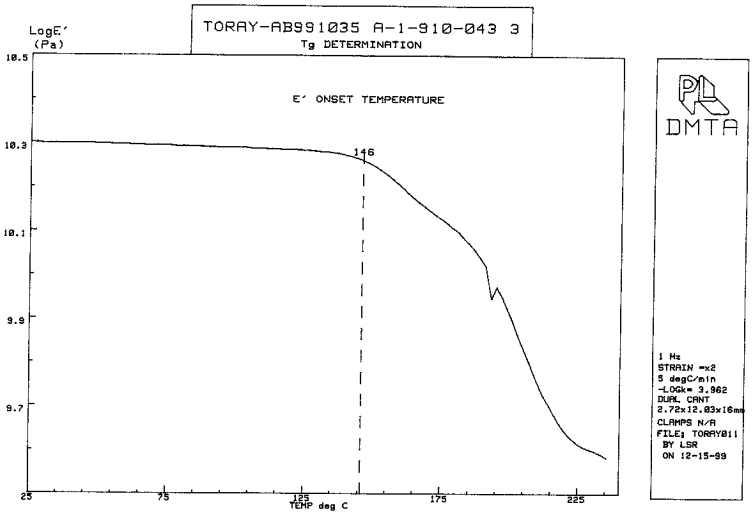


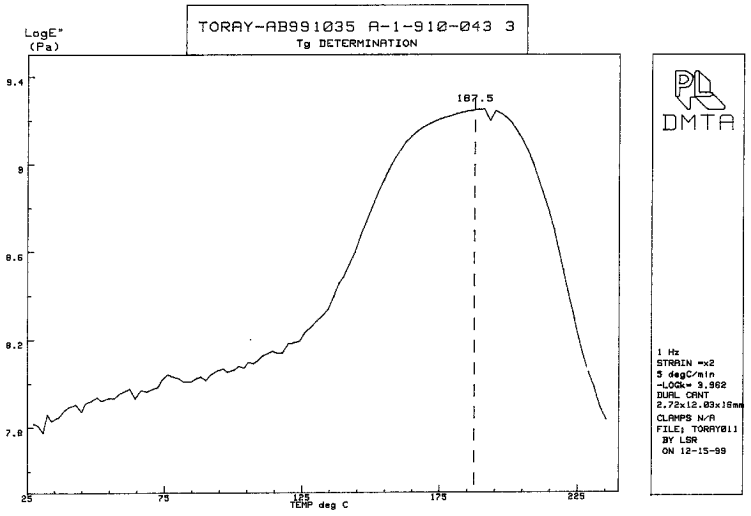


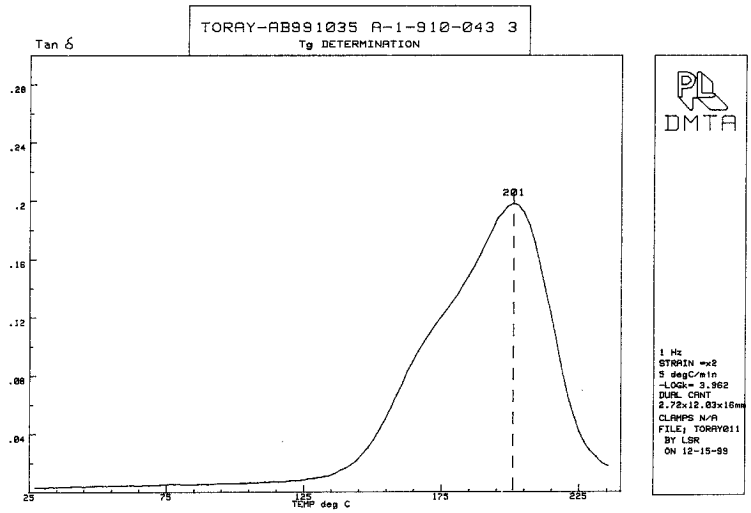






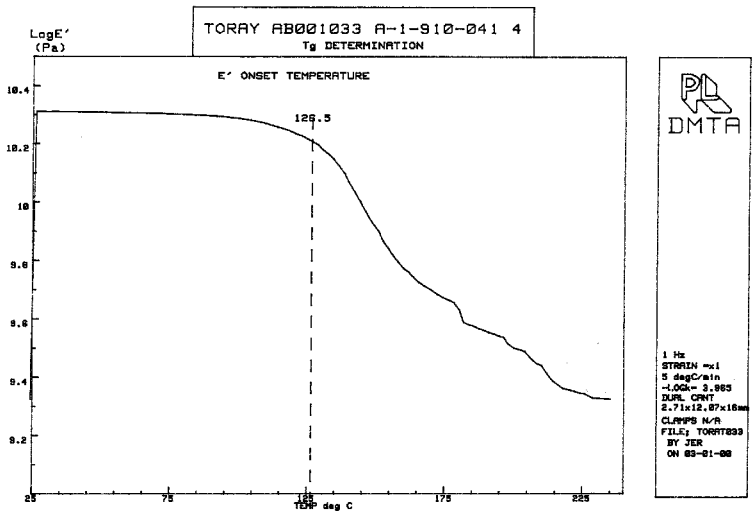


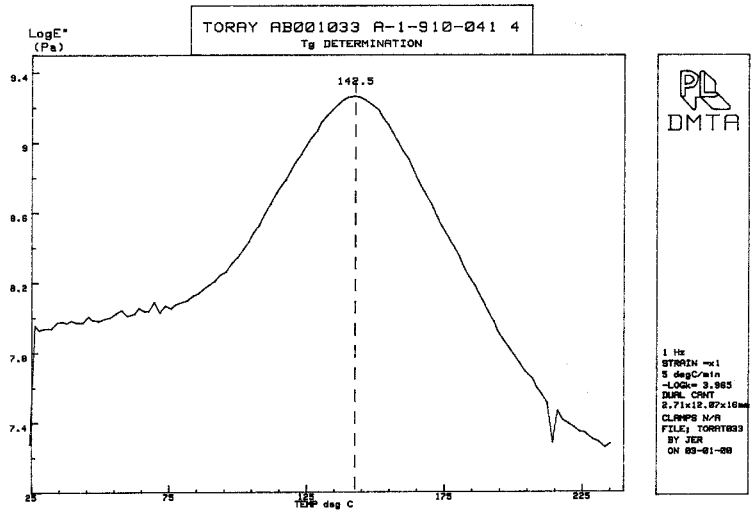


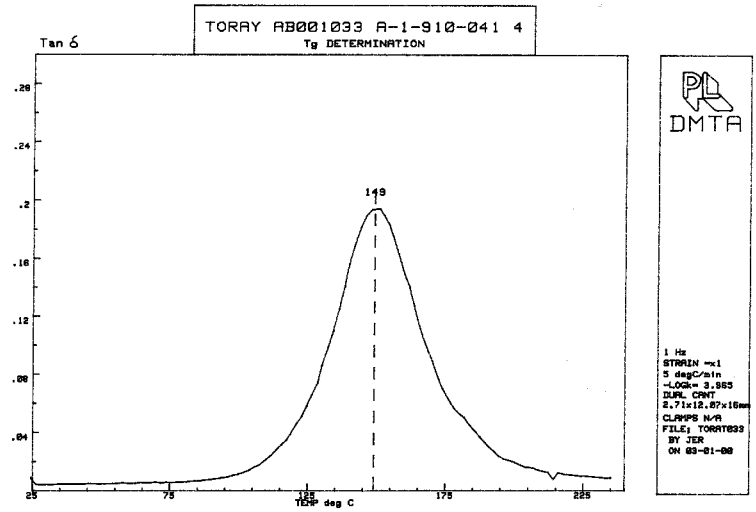


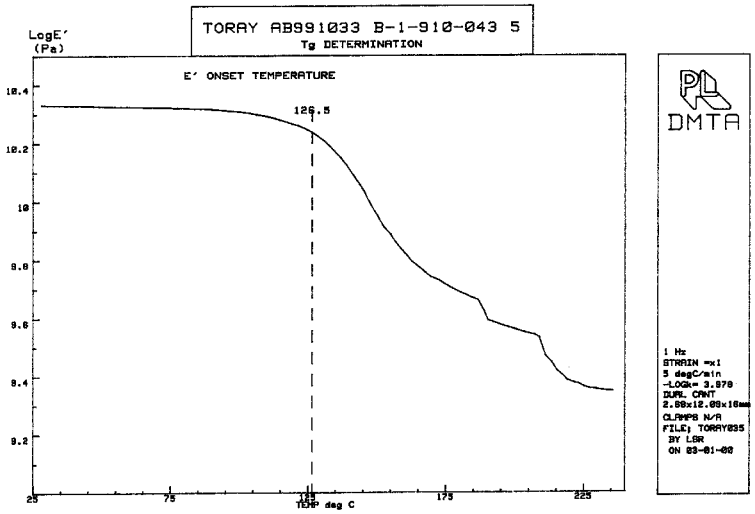
Dynamic Mechanical Analysis (DMA)
Graphs
in determination of
Wet Glass Transition Temperature, Tg (wet)
for

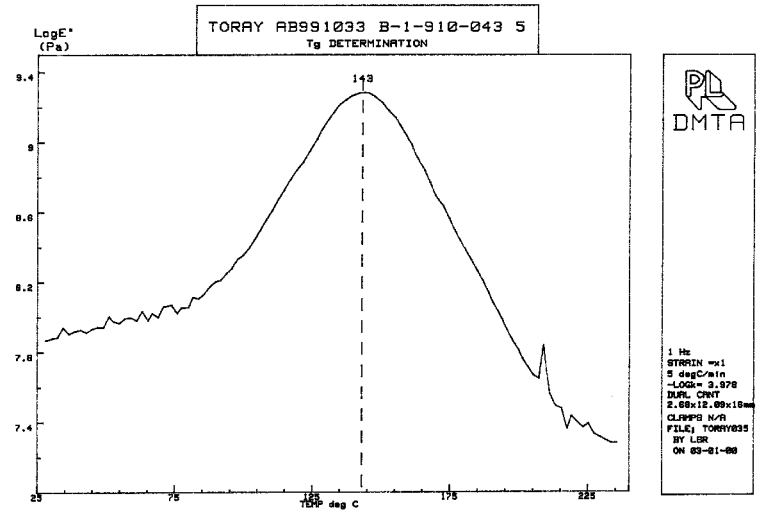
P707AG-15
T700G-12K/#2510
Unidirectional Tape Prepreg

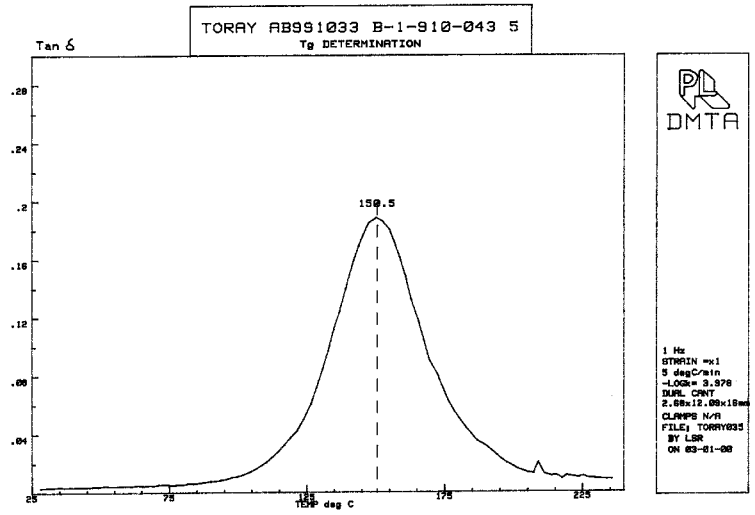


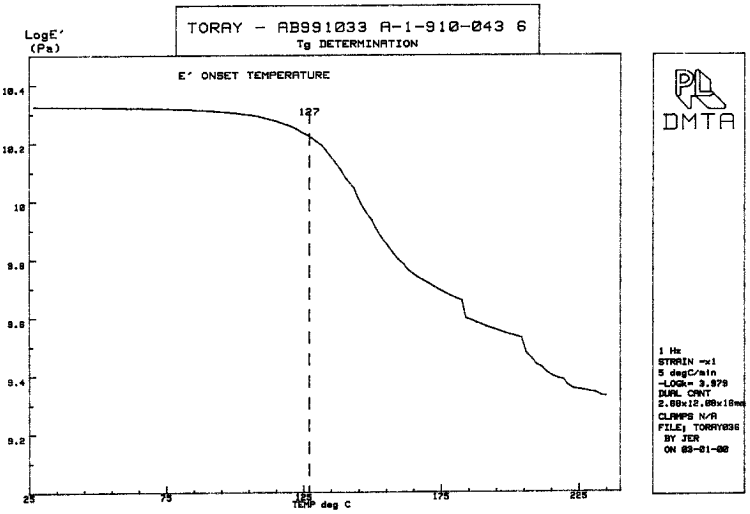


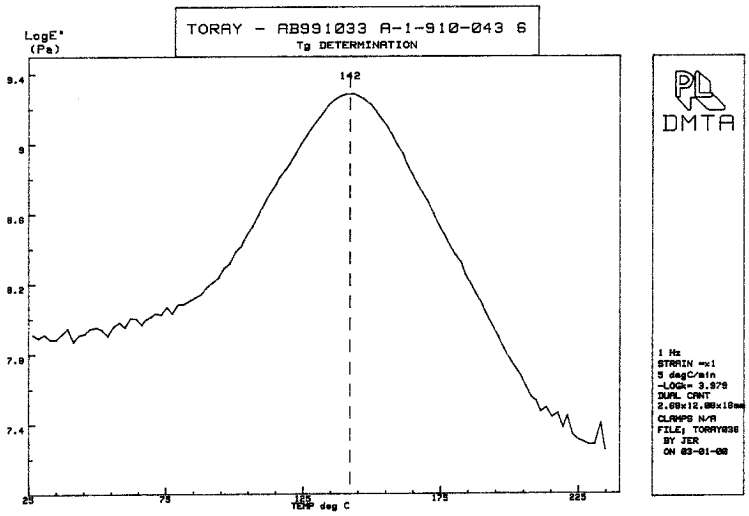


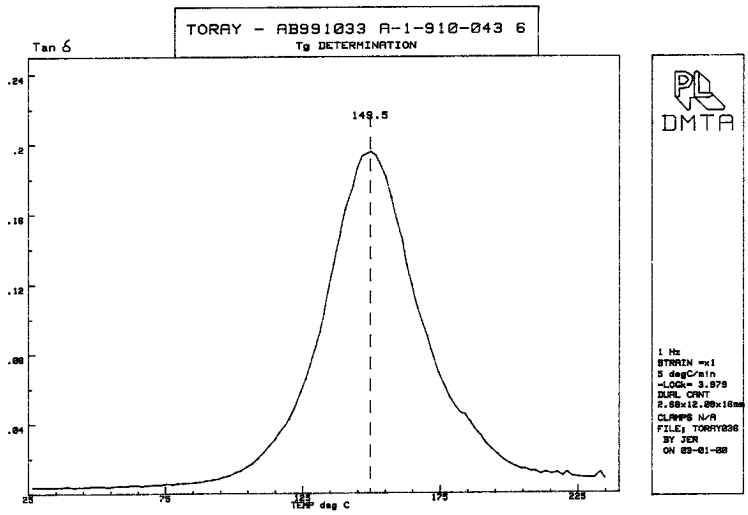


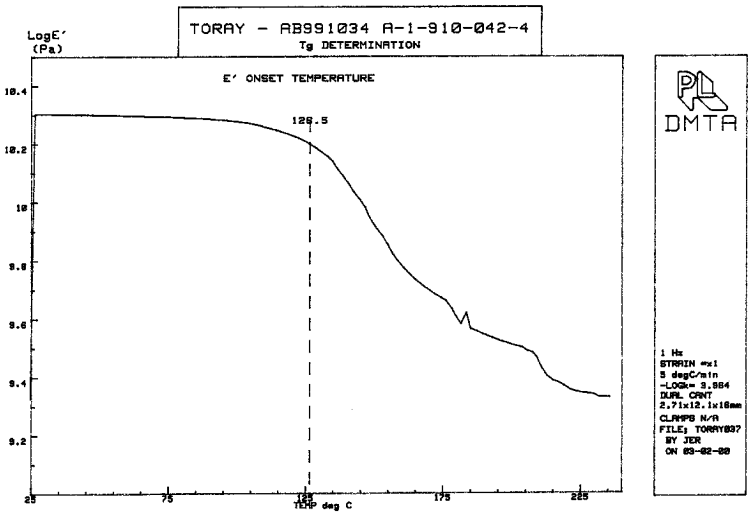


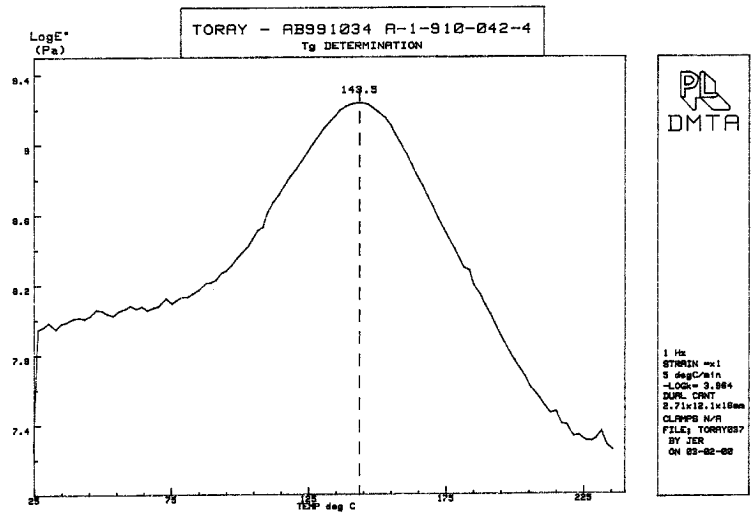


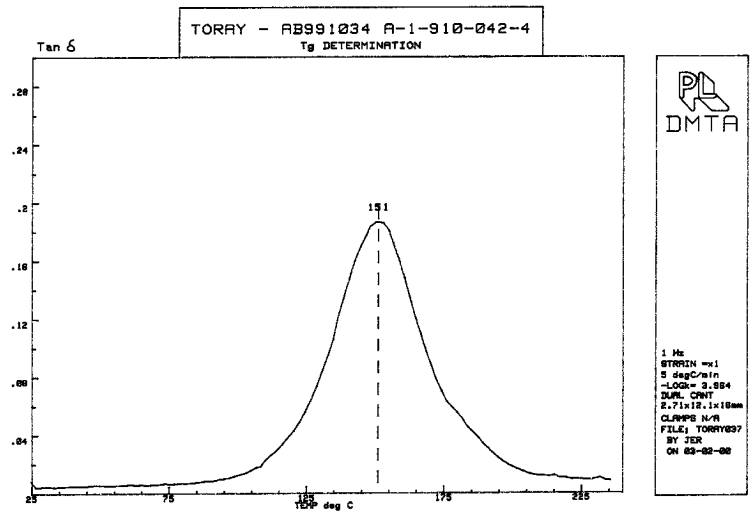


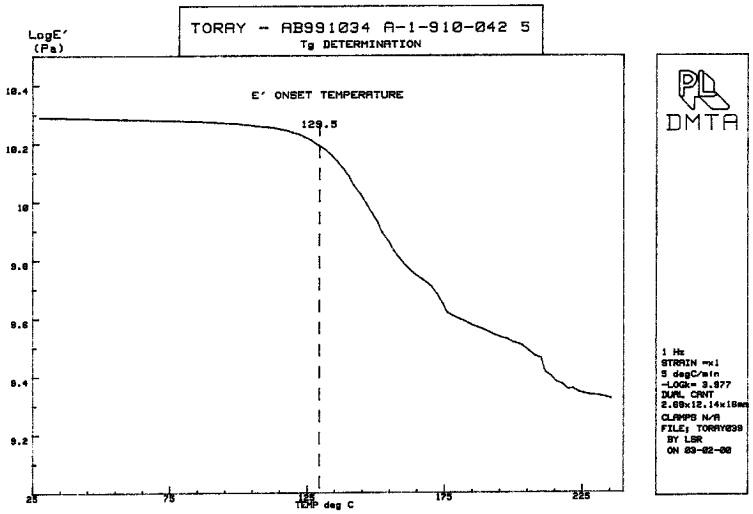


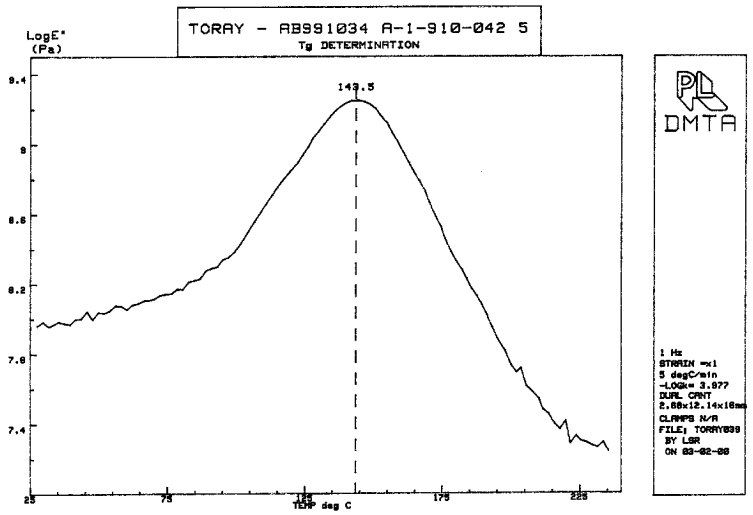


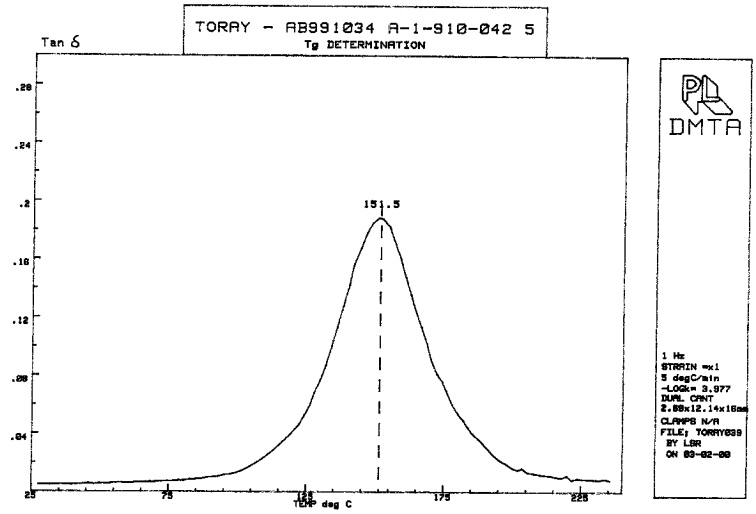


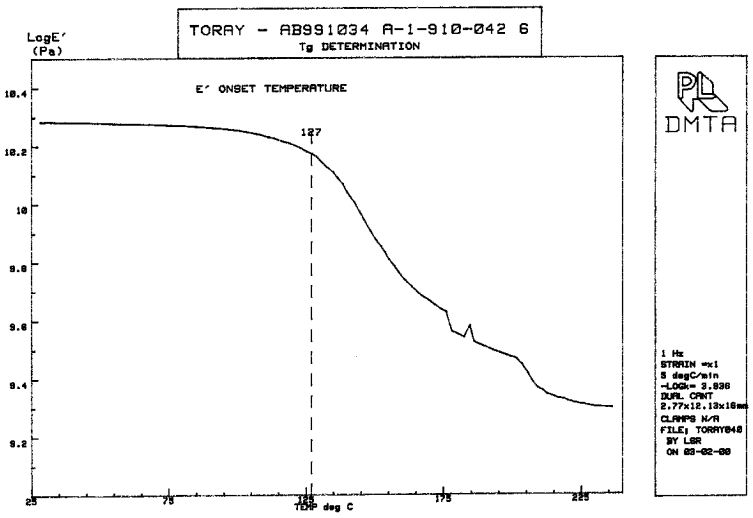


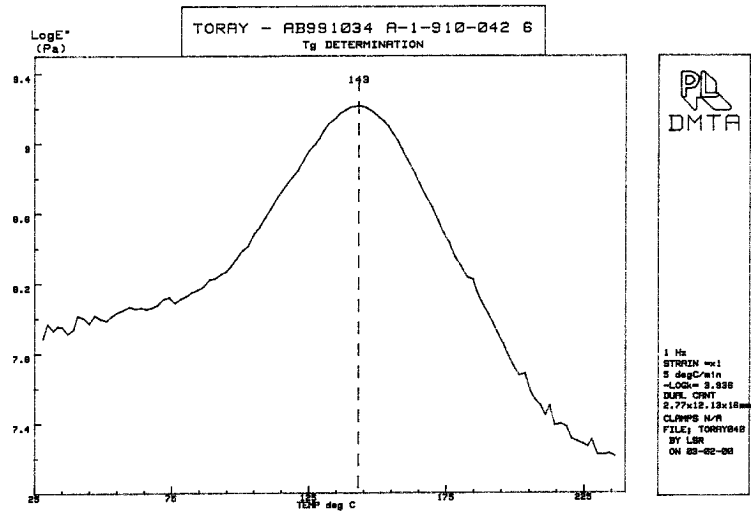


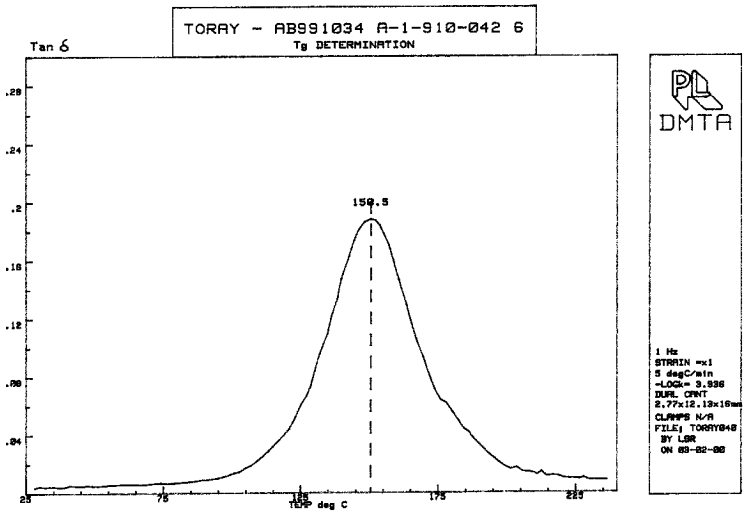


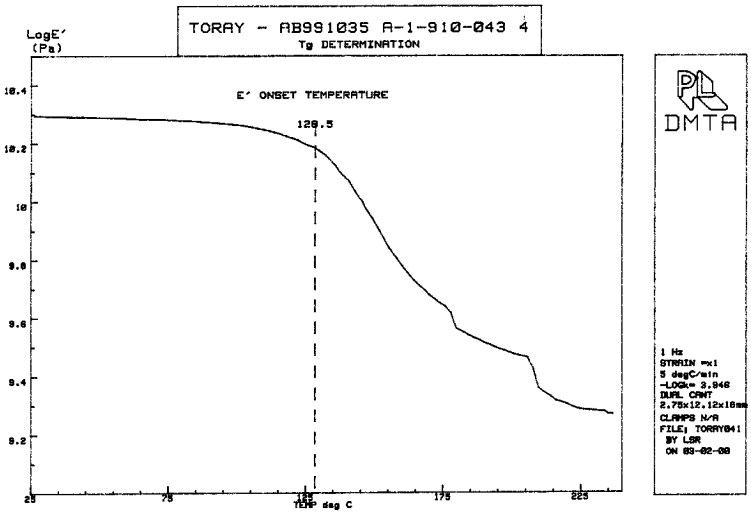


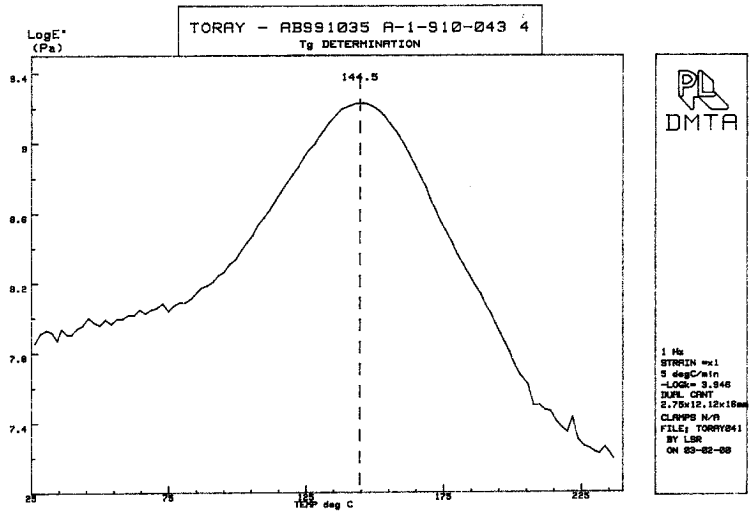


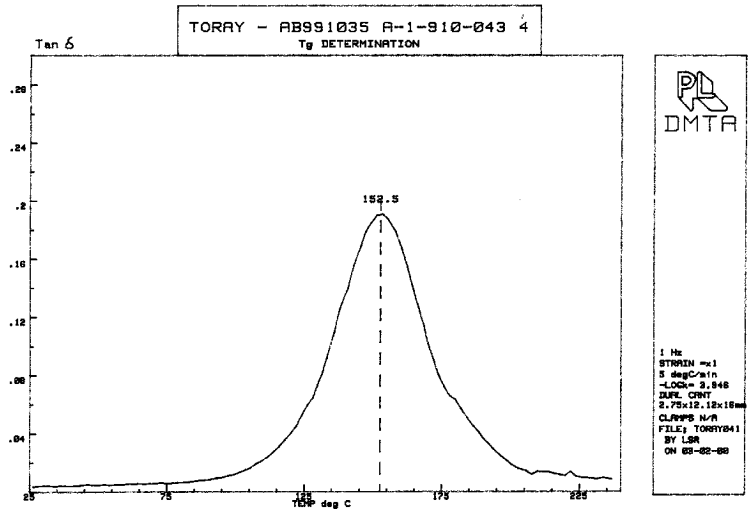


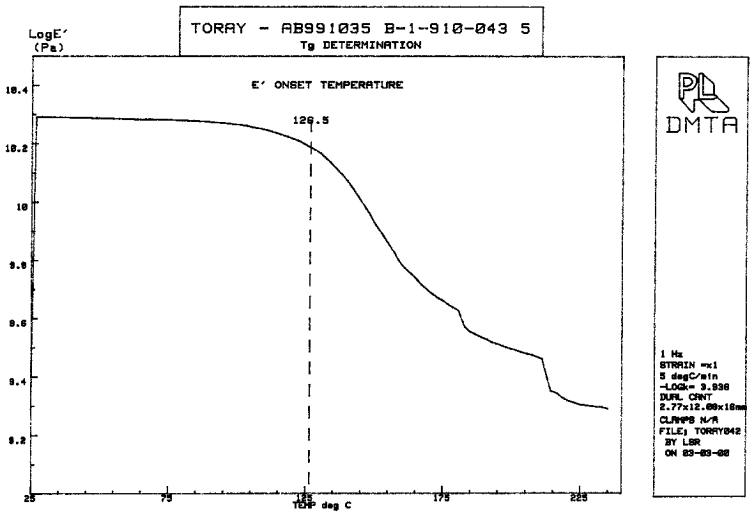


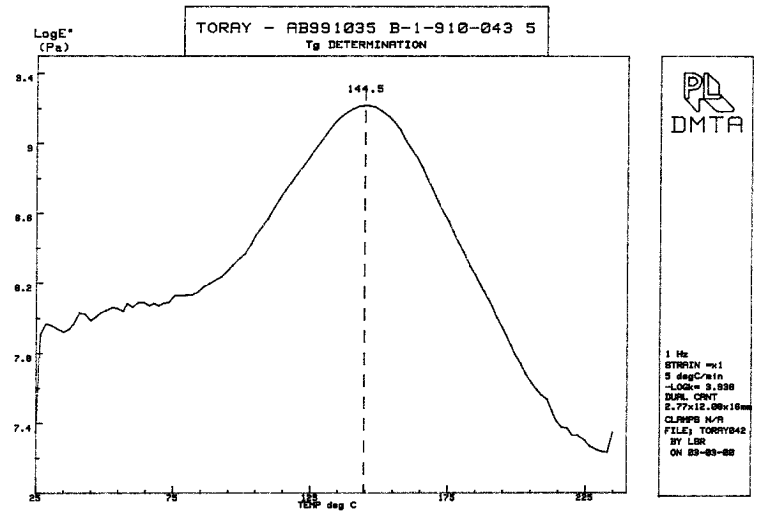


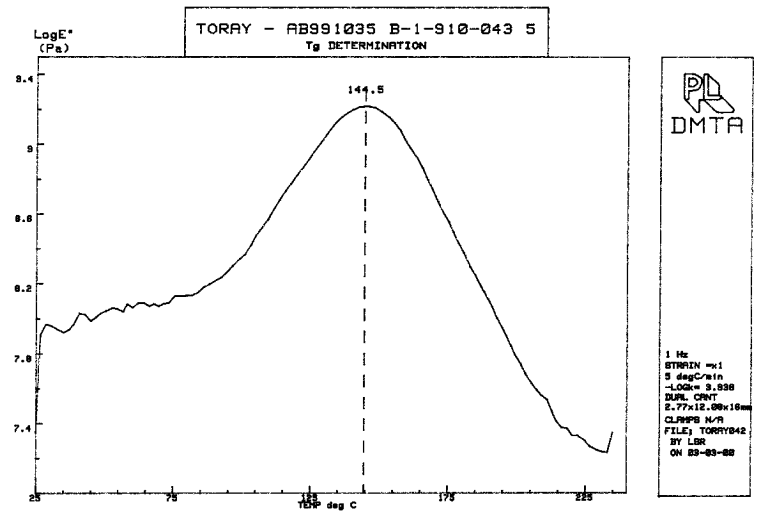


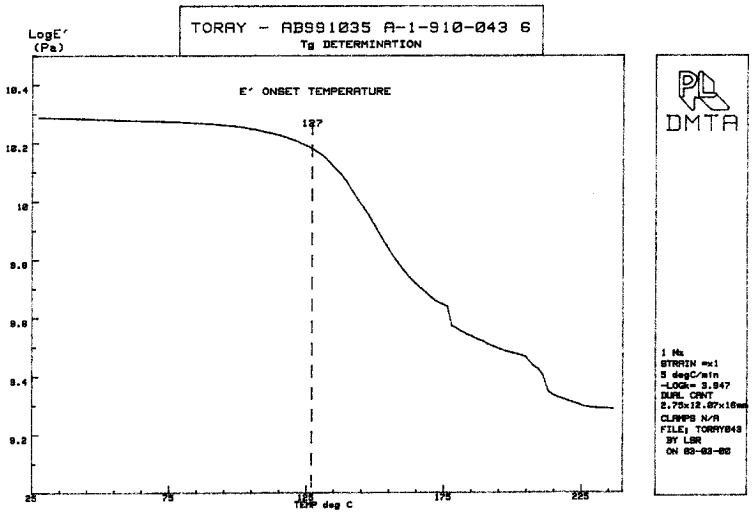


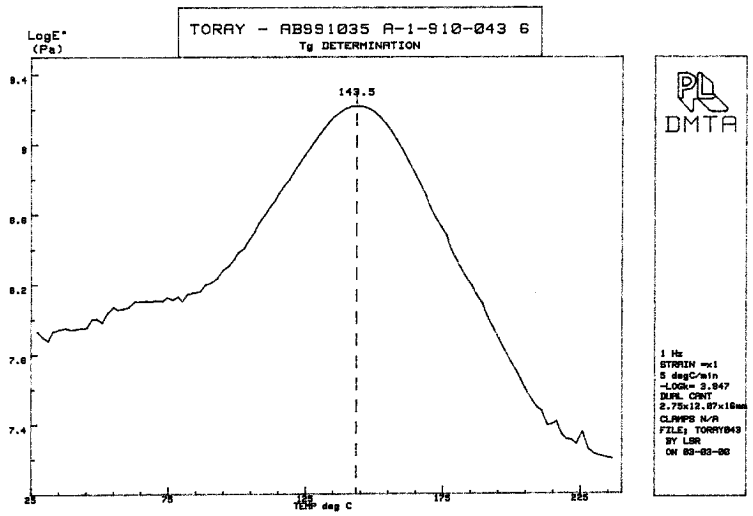


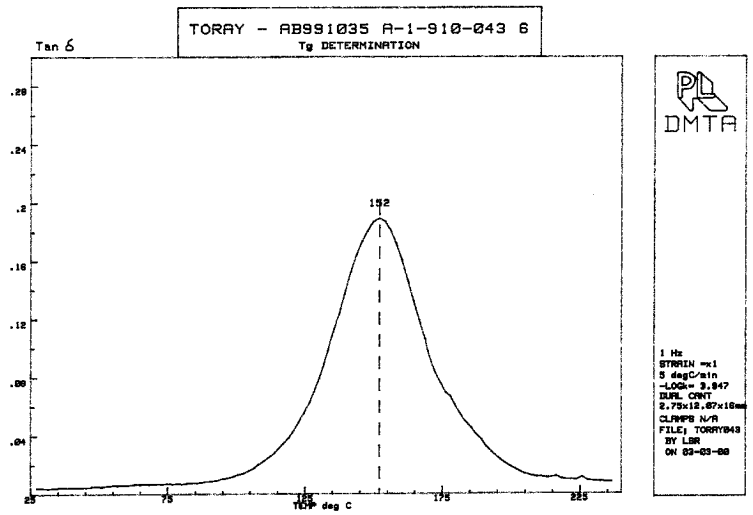












APPENDIX D. STATISTICAL ANALYSIS SUMMARY

COMPANY	Toray
MATERIAL	TCA T700G-12K-31E/#2510 Unidirectional Carbon Tape
PROPERTY	0° Tension - Measured Strength
COMMENTS	
DATE	December 24, 2002

DATA SUMMARY

STATISTIC	TEST CONDITION				
	CTD	**RTD**	**ETD**	**ETW**	
Sample Size	30	18	18	18	
No. of Batches	4	6	6	6	
Mean	240.912	314.387	319.079	326.012	
Std.dev	20.641	23.762	18.479	26.826	
% Co. Variation	8.568	7.558	5.791	8.228	
Minimum	199.309	251.950	286.782	258.779	
Maximum	274.782	347.387	352.982	354.906	
K_b	1.652	1.732	1.732	1.732	
K_a	2.799	2.866	2.866	2.866	
Equal C.V. Basis Values					
B-Basis Value	**210.579**	**272.894**	**276.967**	**282.985**	
A-Basis Value	**189.513**	**245.713**	**249.380**	**254.798**	

Anderson Darling Test for Normality

O.S.L	0.304	0.052	0.483	0.086	
Normality is	Acceptable	Acceptable	Acceptable	Acceptable	
O.S.L for pooled data is		**0.2329**	**Normality is**	**Acceptable**	

Check for Normality based on Normal Scores

r^2	0.988	0.943	0.987	0.945	
Normality is	Acceptable	Acceptable	Acceptable	Acceptable	
r^2 for pooled data is		**0.9891**	**Normality is**	**Acceptable**	

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

ADK	1.167	0.842	0.494	1.292	
ADC	1.764	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	1.20		
F CRITICAL	**2.879**	**3.447**	**4.203**

COMMENTS

WICHITA STATE UNIVERSITY

COMPANY	Toray
MATERIAL	TCA T700G-12K-31E/#2510 Unidirectional Carbon Tape
PROPERTY	0° Tension - Normalized Strength
COMMENTS	
DATE	December 24, 2002

DATA SUMMARY

STATISTIC	TEST CONDITION				
	CTD	**RTD**	**ETD**	**ETW**	
Sample Size	30	18	18	18	
No. of Batches	4	6	6	6	
Mean	243.955	315.086	320.048	327.759	
Std.dev	18.604	24.054	17.617	22.412	
% Co. Variation	7.626	7.634	5.504	6.838	
Minimum	212.029	252.895	287.499	276.031	
Maximum	276.014	350.861	352.099	355.054	
K_b	1.652	1.732	1.732	1.732	
K_a	2.799	2.866	2.866	2.866	
Equal C.V. Basis Values					
B-Basis Value	**216.021**	**277.268**	**281.634**	**288.420**	
A-Basis Value	**196.621**	**252.493**	**256.470**	**262.649**	

Anderson Darling Test for Normality

O.S.L	0.162	0.143	0.695	0.249	
Normality is	Acceptable	Acceptable	Acceptable	Acceptable	
O.S.L for pooled data is		**0.6438**	**Normality is**	**Acceptable**	

Check for Normality based on Normal Scores

r^2	0.983	0.955	0.990	0.967	
Normality is	Acceptable	Acceptable	Acceptable	Acceptable	
r^2 for pooled data is		**0.9948**	**Normality is**	**Acceptable**	

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

ADK	1.237	0.917	0.610	1.498	
ADC	1.764	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	0.78		
F CRITICAL	**2.879**	**3.447**	**4.203**

COMMENTS

WICHITA STATE UNIVERSITY

COMPANY	Toray
MATERIAL	TCA T700G-12K-31E/#2510 Unidirectional Carbon Tape
PROPERTY	90° Tension - Measured Strength
COMMENTS	
DATE	December 24, 2002

DATA SUMMARY

STATISTIC	TEST CONDITION				
	CTD	**RTD**	**ETD**	**ETW**	
Sample Size	6	146	18	146	
No. of Batches	2	14	6	14	
Mean	7.683	7.086	6.415	3.757	
Std.dev	1.163	0.595	0.570	0.319	
% Co. Variation	15.137	8.394	8.880	8.492	
Minimum	5.772	5.546	4.814	2.831	
Maximum	9.190	8.656	7.370	4.683	
K_b	1.965	1.447	1.684	1.447	
K_a	3.027	2.542	2.755	2.542	
Equal C.V. Basis Values					
B-Basis Value	**6.389**	**6.207**	**5.488**	**3.291**	
A-Basis Value	**5.689**	**5.541**	**4.900**	**2.938**	

Anderson Darling Test for Normality

O.S.L	0.640	0.455	0.109	0.435	
Normality is	Acceptable	Acceptable	Acceptable	Acceptable	
O.S.L for pooled data is		**0.1310**	**Normality is**	**Acceptable**	

Check for Normality based on Normal Scores

r^2	0.969	0.996	0.940	0.995	
Normality is	Acceptable	Acceptable	Acceptable	Acceptable	
r^2 **for pooled data is**		**0.9961**	**Normality is**	**Acceptable**	

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

ADK	2.484	1.436	0.802	2.068	
ADC	2.105	1.363	1.501	1.363	
SAME POPULATION	**NO**	**NO**	**YES**	**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	3.00		
F CRITICAL	**2.794**	**3.320**	**4.005**

COMMENTS

*** Equality of C.V.s not satisfied at a significance level of 0.05**
Pooling of data across test environments not permissible
Use Mil-Hdbk-17e method for generating allowables

WICHITA STATE UNIVERSITY

COMPANY	Toray
MATERIAL	TCA T700G-12K-31E/#2510 Unidirectional Carbon Tape
PROPERTY	0° Compression - Measured Strength
COMMENTS	
DATE	December 24, 2002

DATA SUMMARY

STATISTIC	TEST CONDITION				
	CTD	**RTD**	**ETD**	**ETW**	
Sample Size	6	18	18	25	
No. of Batches	2	6	6	6	
Mean	202.546	209.999	204.285	177.255	
Std.dev	9.808	12.917	12.904	14.664	
% Co. Variation	4.842	6.151	6.317	8.273	
Minimum	189.803	189.006	174.420	135.486	
Maximum	213.689	236.592	224.300	197.022	
K_b	2.019	1.748	1.748	1.695	
K_a	3.145	2.904	2.904	2.860	
Equal C.V. Basis Values					
B-Basis Value	**174.601**	**184.914**	**179.882**	**156.723**	
A-Basis Value	**159.017**	**168.338**	**163.757**	**142.618**	

Anderson Darling Test for Normality

O.S.L	0.603	0.751	0.068	0.016	
Normality is	Acceptable	Acceptable	Acceptable	Acceptable	
O.S.L for pooled data is		**0.0825**	**Normality is**	**Acceptable**	

Check for Normality based on Normal Scores

r^2	0.978	0.993	0.947	0.947	
Normality is	Acceptable	Acceptable	Acceptable	Acceptable	
r^2 **for pooled data is**		**0.9778**	**Normality is**	**Acceptable**	

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

ADK	2.484	1.011	1.266	2.264	
ADC	2.105	1.501	1.501	1.540	
SAME POPULATION	**NO**	**YES**	**YES**	**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	0.59		
F CRITICAL	**2.910**	**3.495**	**4.278**

COMMENTS

WICHITA STATE UNIVERSITY

COMPANY	Toray
MATERIAL	TCA T700G-12K-31E/#2510 Unidirectional Carbon Tape
PROPERTY	0° Compression - Normalized Strength
COMMENTS	
DATE	December 24, 2002

DATA SUMMARY

STATISTIC	TEST CONDITION				
	CTD	**RTD**	**ETD**	**ETW**	
Sample Size	6	18	18	25	
No. of Batches	2	6	6	6	
Mean	202.546	210.272	204.549	174.041	
Std.dev	9.808	12.419	12.408	14.175	
% Co. Variation	4.842	5.906	6.066	8.145	
Minimum	189.803	190.936	174.311	134.781	
Maximum	213.689	234.916	222.711	192.097	
K_b	2.019	1.748	1.748	1.695	
K_a	3.145	2.904	2.904	2.860	
Equal C.V. Basis Values					
B-Basis Value	**175.305**	**185.786**	**180.730**	**154.388**	
A-Basis Value	**160.113**	**169.607**	**164.991**	**140.888**	

Anderson Darling Test for Normality

O.S.L	0.603	0.654	0.038	0.001	
Normality is	Acceptable	Acceptable	Acceptable	Questionable	
O.S.L for pooled data is		**0.0213**	**Normality is**	**Acceptable**	

Check for Normality based on Normal Scores

r^2	0.978	0.991	0.938	0.929	
Normality is	Acceptable	Acceptable	Acceptable	Acceptable	
r^2 for pooled data is		**0.9736**	**Normality is**	**Acceptable**	

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

ADK	2.484	1.017	1.155	2.242	
ADC	2.105	1.501	1.501	1.540	
SAME POPULATION	**NO**	**YES**	**YES**	**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	0.71		
F CRITICAL	**2.910**	**3.495**	**4.278**

COMMENTS

WICHITA STATE UNIVERSITY

COMPANY	Toray
MATERIAL	TCA T700G-12K-31E/#2510 Unidirectional Carbon Tape
PROPERTY	90° Compression - Measured Strength
COMMENTS	
DATE	December 24, 2002

DATA SUMMARY

STATISTIC	TEST CONDITION				
	CTD	**RTD**	**ETD**	**ETW**	
Sample Size	6	18	18	18	
No. of Batches	2	6	6	6	
Mean	40.964	28.814	21.425	16.886	
Std.dev	3.595	1.364	1.081	0.854	
% Co. Variation	8.777	4.732	5.046	5.055	
Minimum	35.123	26.641	19.042	15.233	
Maximum	43.986	31.121	23.472	18.490	
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	**36.594**	**26.149**	**19.443**	**15.324**	
A-Basis Value	**34.147**	**24.380**	**18.128**	**14.287**	

Anderson Darling Test for Normality

O.S.L	0.176	0.462	0.576	0.690	
Normality is	Acceptable	Acceptable	Acceptable	Acceptable	
O.S.L for pooled data is		**0.6746**	**Normality is**	**Acceptable**	

Check for Normality based on Normal Scores

r^2	0.913	0.986	0.983	0.992	
Normality is	Acceptable	Acceptable	Acceptable	Acceptable	
r^2 **for pooled data is**		**0.9934**	**Normality is**	**Acceptable**	

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

ADK	1.018	0.983	0.916	1.067	
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	0.76		
F CRITICAL	**2.929**	**3.524**	**4.323**

COMMENTS

WICHITA STATE UNIVERSITY

COMPANY	Toray
MATERIAL	TCA T700G-12K-31E/#2510 Unidirectional Carbon Tape
PROPERTY	In-Plane Shear
COMMENTS	
DATE	December 26, 2002

DATA SUMMARY

STATISTIC	TEST CONDITION				
	CTD	RTD	ETD	ETW	
Sample Size	6	18	18	18	
No. of Batches	2	6	6	6	
Mean	23.136	22.443	18.610	13.811	
Std.dev	0.266	0.633	0.547	0.596	
% Co. Variation	1.151	2.819	2.938	4.313	
Minimum	22.758	21.020	17.752	12.767	
Maximum	23.423	23.379	19.400	14.683	
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	**21.634**	**21.180**	**17.563**	**13.034**	
A-Basis Value	**20.793**	**20.342**	**16.868**	**12.518**	

Anderson Darling Test for Normality

O.S.L	0.475	0.570	0.037	0.170	
Normality is	Acceptable	Acceptable	Acceptable	Acceptable	
O.S.L for pooled data is		**0.1907**	**Normality is**	**Acceptable**	

Check for Normality based on Normal Scores

r^2	0.963	0.984	0.964	0.976	
Normality is	Acceptable	Acceptable	Acceptable	Acceptable	
r^2 **for pooled data is**		**0.9897**	**Normality is**	**Acceptable**	

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

ADK	0.470	1.015	1.582	1.675	
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	4.98		
F CRITICAL	**2.929**	**3.524**	**4.323**

COMMENTS

*** Equality of C.V.s not satisfied at a significance level of 0.05**
Pooling of data across test environments not permissible
Use Mil-Hdbk-17e method for generating allowables

COV of CTD test samples will be modified to 4.00% using the method prescibed in Appendix E.

WICHITA STATE UNIVERSITY

COMPANY	Toray
MATERIAL	TCA T700G-12K-31E/#2510 Unidirectional Carbon Tape
PROPERTY	In-Plane Shear
COMMENTS	
DATE	December 26, 2002

DATA SUMMARY

STATISTIC	TEST CONDITION				
	CTD	RTD	ETD	ETW	
Sample Size	6	18	18	18	
No. of Batches	2	6	6	6	
Mean	23.136	22.443	18.610	13.811	
Std.dev	0.925	0.633	0.547	0.596	
% Co. Variation	4.000	2.819	2.938	4.313	
Minimum	21.823	21.020	17.752	12.767	
Maximum	24.135	23.379	19.400	14.683	
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	**21.546**	**21.106**	**17.501**	**12.988**	
A-Basis Value	**20.655**	**20.218**	**16.765**	**12.442**	

Anderson Darling Test for Normality

O.S.L	0.475	0.570	0.037	0.170	
Normality is	Acceptable	Acceptable	Acceptable	Acceptable	
O.S.L for pooled data is		**0.0239**	**Normality is**	**Acceptable**	

Check for Normality based on Normal Scores

r^2	0.963	0.984	0.964	0.976	
Normality is	Acceptable	Acceptable	Acceptable	Acceptable	
r^2 **for pooled data is**		**0.9840**	**Normality is**	**Acceptable**	

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

ADK	0.470	1.015	1.582	1.675	
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	2.14		
F CRITICAL	**2.929**	**3.524**	**4.323**

COMMENTS

COV of CTD test samples is modified to 4.00% using the method prescibed in Appendix E.

WICHITA STATE UNIVERSITY

COMPANY	Toray
MATERIAL	TCA T700G-12K-31E/#2510 Unidirectional Carbon Tape
PROPERTY	Apparent Interlaminar Shear
COMMENTS	
DATE	December 24, 2002

DATA SUMMARY

STATISTIC	TEST CONDITION				
	RTD				
Sample Size	170				
No. of Batches	14				
Mean	12.489				
Std.dev	0.920				
% Co. Variation	7.368				
Minimum	10.226				
Maximum	15.029				
K_b	1.464				
K_a	2.593				
Equal C.V. Basis Values					
B-Basis Value	**11.142**				
A-Basis Value	**10.103**				

Anderson Darling Test for Normality

O.S.L	0.751		
Normality is	Acceptable		
O.S.L for pooled data is	**0.7505**	**Normality is**	**Acceptable**

Check for Normality based on Normal Scores

r^2	0.999		
Normality is	Acceptable		
r^2 for pooled data is	**0.9989**	**Normality is**	**Acceptable**

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

ADK	3.963				
ADC	1.364				
SAME POPULATION	**NO**	**N/A**	**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**

Pooling of data a N/A*

Use Mil-Hdbk-17e method for generating allowables

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.***

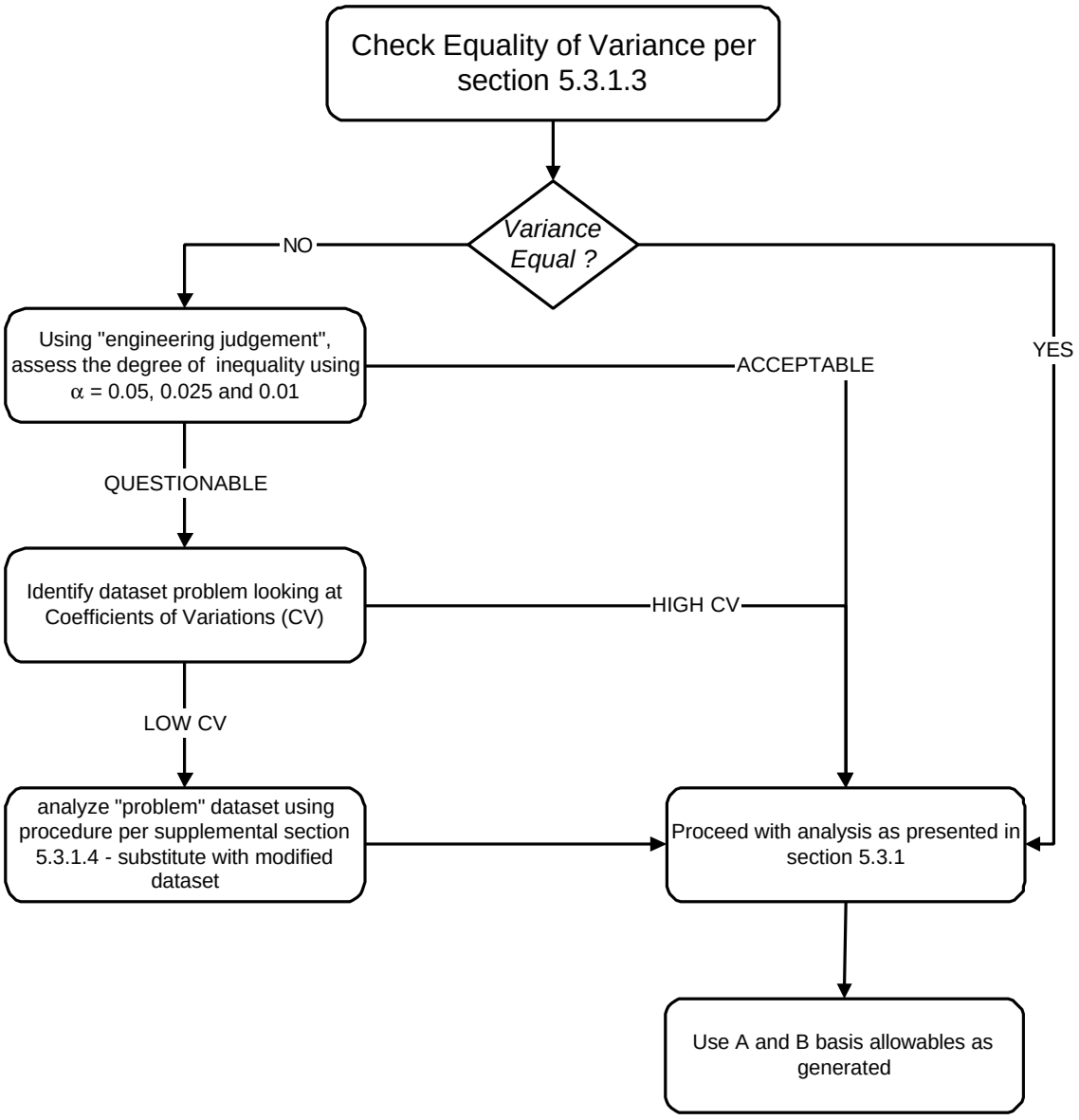


Figure E.1. Procedures to obtain design allowables in the case of variance inequality

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.

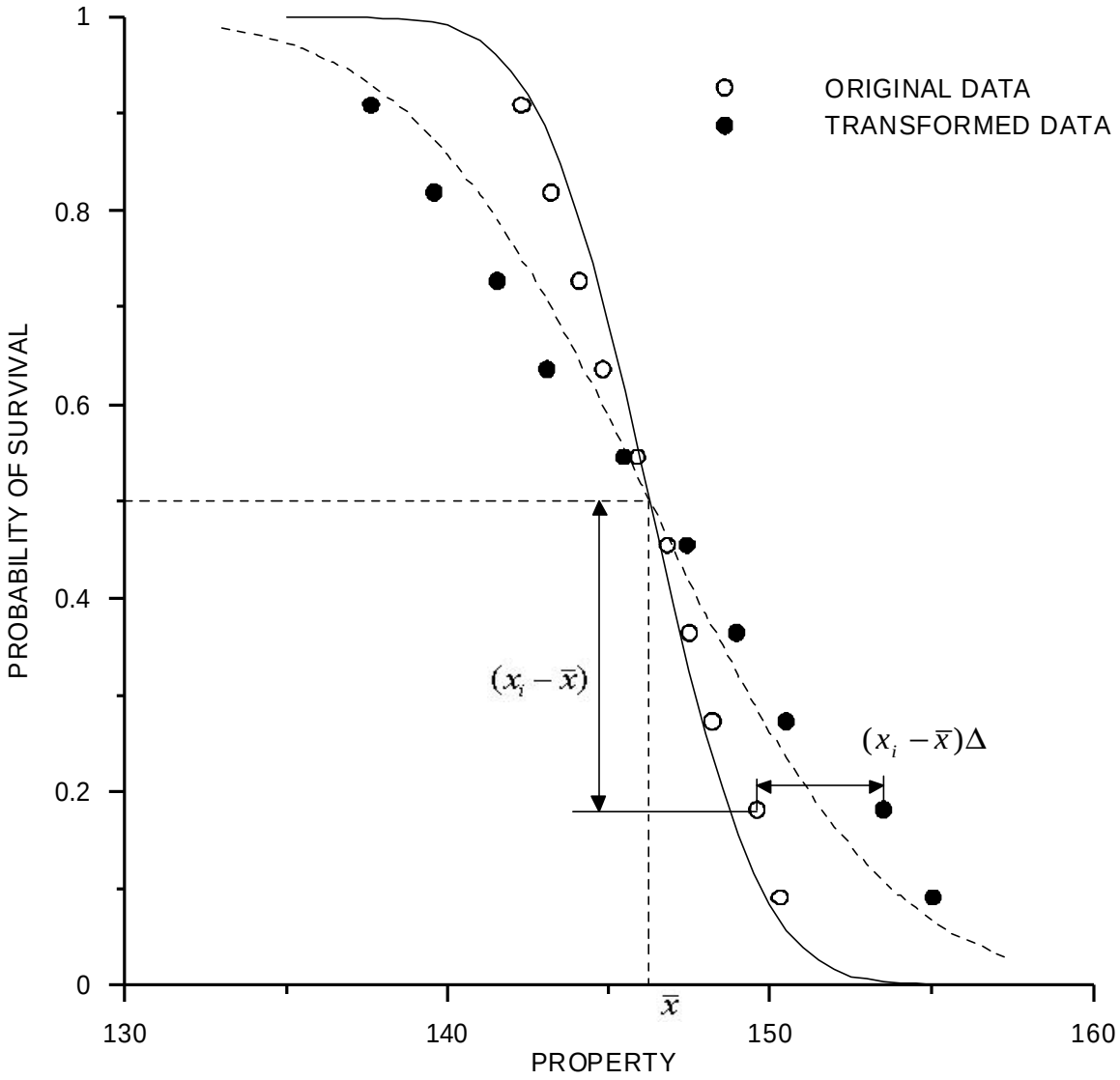


Figure E.2: Original and transformed data points

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

0° Tension Properties, -65°F (Dry)

Material Type: P707AG-15
Batch Number: AB991033
Test Method: ASTM D3039
Specimen Preconditioning: as machined
Test Conditions: -65°F/Dry
Ply Orientation: $(0)_8$
Testing Facility: Intec
Test Date: 12/17/1999, 2/23/00

Test Operator: Bryan Mines, Emmanuel Domingo
Test Frame: I
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: One biaxial gage (CEA-06-125UT-350)
Fiber Volume(normalizing): 55.1%
CPT (average): 0.0060 in.
Fiber Volume(batch average): 54.2%

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
A1-910-041-1-1	0.0474	0.4980	6180	262	259	418.1	1306	18.6	18.3	0.330	Explosive failure in gage
A2-910-041-1-1	0.0477	0.4980	5730	241	240	408.3	1277	18.3	18.2	0.310	Explosive failure in gage
B1-910-041-1-1	0.0474	0.4970	5420	230	227	446.8	1311	18.2	18.0	0.310	Explosive failure in gage
B2-910-041-1-1	0.0480	0.4980	5830	244	244	438.2	1320	18.4	18.4	0.320	Explosive failure in gage
A1-910-041-1-2	0.0481	0.4990	5590	233	233	-	-	-	-	-	Explosive failure in gage
B1-910-041-1-2	0.0475	0.5000	5590	235	233	-	-	-	-	-	Explosive failure in gage
Average	0.0477	0.4983	5723	241	239			18.4	18.2	0.318	
Std. Dev.	0.0003	0.0010	264	11.5	11.1			0.14	0.18	0.010	
COV, %	0.64	0.21	4.61	4.76	4.63			0.78	0.98	3.02	

Material Type: P707AG-15
Batch Number: AB991033
Test Method: ASTM D3039
Specimen Preconditioning: as machined
Test Conditions: -65°F/Dry
Ply Orientation: $(0)_8$
Testing Facility: Intec
Test Date: 5/24/2000

Test Operator: Kin Chu
Test Frame: I
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: N/A
Fiber Volume(normalizing): 55.1%
CPT (average): 0.0060 in.
Fiber Volume(batch average): 54.2%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ultimate Tensile Load (lbs.)	Ultimate Tensile Strength Actual (ksi)	Ultimate Tensile Strength Norm. (ksi)	Failure Location & Comments
A1-910-041-1-10	0.0500	0.5000	6140	246	256	Explosive failure in gage
A1-910-041-1-11	0.0505	0.5027	5760	227	239	Explosive failure in gage
A1-910-041-1-12	0.0507	0.4977	5420	215	227	Explosive failure in gage
A2-910-041-1-10	0.0480	0.4997	5510	230	230	Explosive failure in gage
A2-910-041-1-11	0.0576	0.5022	5760	199	239	Explosive failure in gage
A2-910-041-1-12	0.0473	0.4976	5760	245	241	Explosive failure in gage
B1-910-041-2-3	0.0480	0.4984	5310	222	222	Explosive failure in gage
B1-910-041-2-4	0.0479	0.4997	6080	254	253	Explosive failure in gage
B1-910-041-2-5	0.0476	0.5021	6560	275	272	Explosive failure in gage
B2-910-041-2-3	0.0482	0.4990	5820	242	243	Explosive failure in gage
B2-910-041-2-4	0.0483	0.4996	5500	228	229	Explosive failure in gage
B2-910-041-2-5	0.0483	0.5022	6440	265	267	Explosive failure in gage
Average	0.0493	0.5001	5838	237	243	
Std. Dev.	0.0028	0.0018	396	21.5	16.0	
COV, %	5.73	0.36	6.79	9.05	6.58	

Material Type: P707AG-15
Batch Number: AB991034
Test Method: ASTM D3039
Specimen Preconditioning: as machined
Test Conditions: -65°F/Dry
Ply Orientation: $(0)_8$
Testing Facility: NIAR Wichita State University
Test Date: 6/27/2000

Test Operator:
Test Frame:
Test Speed: 0.05 in/min
Control Mode: Stroke
Strain Gage: One biaxial gage (CEA-06-125UT-120)
Fiber Volume(normalizing): 55.1%
CPT (average): 0.0060 in.
Fiber Volume(batch average): 54.1%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ultimate Tensile Load (lbs.)	Ultimate Tensile Strength Actual (ksi)	Ultimate Tensile Strength Norm. (ksi)	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
A1-910-042-2-3	0.0490	0.4988	6608	270	276	18.3	18.7	0.338	Explosive failure in gage
B1-910-042-2-4	0.0480	0.4997	6425	268	268	18.6	18.6	0.395	Explosive failure in gage
B2-910-042-2-1	0.0483	0.4982	6390	265	267	18.8	18.9	0.388	Explosive failure in gage
A1-910-042-2-2	0.0487	0.4999	6603	271	275	18.4	18.6	0.380	Explosive failure in gage
A2-910-042-2-1	0.0488	0.4980	5296	218	222	18.2	18.5	0.396	Explosive failure in gage
B2-910-042-2-3	0.0483	0.4993	5253	218	219	18.3	18.4	0.334	Explosive failure in gage
Average	0.0485	0.4990	6096	252	255	18.4	18.7	0.372	
Std. Dev.	0.0004	0.0008	643	26.3	26.7	0.22	0.14	0.028	
COV, %	0.81	0.16	10.54	10.44	10.49	1.18	0.77	7.63	

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

Material Type: P707AG-15
Batch Number: AB991035
Test Method: ASTM D3039
Specimen Preconditioning: as machined
Test Conditions: -65°F/Dry
Ply Orientation: $(0)_8$
Testing Facility: NIAR Wichita State University
Test Date: 6/27/2000

Test Operator:
Test Frame:
Test Speed: 0.05 in/min
Control Mode: Stroke
Strain Gage: One biaxial gage (CEA-06-125UT-120)
Fiber Volume(normalizing): 55.1%
CPT (average): 0.0060 in.
Fiber Volume(batch average): 54.9%

Specimen Number	*Specimen Thickness*	*Specimen Width*	*Ultimate Tensile Load*	*Ultimate Tensile Strength*		*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)*	*Actual (msi)*	*Norm. (msi)*		
A2-910-043-1-7	0.0490	0.4988	5663	232	237	18.1	18.5	0.358	Explosive failure in gage
A2-910-043-1-8	0.0489	0.5012	5340	218	222	18.4	18.7	0.365	Explosive failure in gage
A2-910-043-1-9	0.0485	0.5000	6456	266	269	18.4	18.6	0.343	Explosive failure in gage
B1-910-043-2-1	0.0484	0.4990	5079	210	212	18.7	18.9	0.396	Explosive failure in gage
B1-910-043-2-2	0.0483	0.5003	5948	246	248	18.5	18.6	0.330	Explosive failure in gage
B2-910-043-2-1	0.0480	0.4987	5993	250	250	18.6	18.6	0.310	Explosive failure in gage
Average	0.0485	0.4997	5746	237	240	18.5	18.7	0.350	
Std. Dev.	0.0004	0.0010	495	21.0	20.6	0.21	0.15	0.030	
COV, %	0.79	0.20	8.61	8.87	8.60	1.12	0.80	8.52	

0° Tension Properties, 75°F (Dry)

Material Type: P707AG-15
Batch Number: AB991033
Test Method: ASTM D3039
Specimen Preconditioning: as machined
Test Conditions: RT/Dry
Ply Orientation: $(0)_8$
Testing Facility: Toray Composites (America)
Test Date: 11/28/1999, 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 (CEA-06-125UT-120)
Fiber Volume(normalizing): 55.1%
CPT (average): 0.0060 in.
Fiber Volume(batch average): 54.2%

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
A1-910-041-1-3	0.0486	0.4992	7786	321	325	425.9	1327	18.6	18.8	0.330	Explosive failure in gage
A2-910-041-1-3	0.0478	0.4988	8009	336	334	471.7	1351	18.4	18.4	0.300	Explosive failure in gage
B1-910-041-1-3	0.0476	0.4985	7593	320	317	453.2	1321	18.3	18.1	0.305	Explosive failure in gage
B2-910-041-1-3	0.0481	0.4987	7280	304	304	441.3	1306	18.0	18.1	0.305	Explosive failure in gage
A1-910-041-1-8	0.0478	0.4996	7674	321	320	-	-	-	-	-	Explosive failure in gage
B1-910-041-2-2	0.0481	0.4998	7895	328	329	-	-	-	-	-	Explosive failure in gage
Average	0.0480	0.4991	7706	322	322			18.3	18.3	0.310	
Std. Dev.	0.0004	0.0005	257	10.7	10.6			0.23	0.33	0.014	
COV, %	0.76	0.10	3.33	3.34	3.29			1.27	1.82	4.37	

Material Type: P707AG-15
Batch Number: AB991034
Test Method: ASTM D3039
Specimen Preconditioning: as machined
Test Conditions: RT/Dry
Ply Orientation: $(0)_8$
Testing Facility: Toray Composites (America)
Test Date: 11/28/1999, 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 (CEA-06-125UT-120)
Fiber Volume(normalizing): 55.1%
CPT (average): 0.0060 in.
Fiber Volume(batch average): 54.1%

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
B1-910-042-1-1	0.0482	0.4982	6048	252	253	434.1	1292	17.9	17.9	0.305	Explosive failure in gage
B2-910-042-1-1	0.0482	0.4982	7222	301	302	473.3	1340	18.0	18.1	0.305	Explosive failure in gage
A1-910-042-1-1	0.0482	0.4982	7043	293	295	446.9	1319	18.2	18.2	0.315	Explosive failure in gage
A2-910-042-1-1	0.0485	0.4981	8389	347	351	452.8	1337	18.3	18.5	0.310	Explosive failure in gage
A1-910-042-1-6	0.0473	0.4977	7018	298	294	-	-	-	-	-	Explosive failure in gage
B1-910-042-1-6	0.0480	0.4975	7929	332	332	-	-	-	-	-	Explosive failure in gage
Average	0.0481	0.4980	7275	304	304			18.1	18.2	0.309	
Std. Dev.	0.0004	0.0003	812	33.3	34.0			0.19	0.23	0.005	
COV, %	0.82	0.06	11.16	11.0	11.2			1.03	1.27	1.55	

Material Type: P707AG-15
Batch Number: AB991035
Test Method: ASTM D3039
Specimen Preconditioning: as machined
Test Conditions: RT/Dry
Ply Orientation: $(0)_8$
Testing Facility: Toray Composites (America)
Test Date: 11/28/1999, 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 (CEA-06-125UT-120)
Fiber Volume(normalizing): 55.1%
CPT (average): 0.0060 in.
Fiber Volume(batch average): 54.9%

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
A1-910-043-1-1	0.0484	0.4982	6644	275	278	458.9	1322	17.9	18.0	0.335	Explosive failure in gage
A2-910-043-1-1	0.0491	0.4978	7846	321	328	458.1	1321	17.7	18.1	0.300	Explosive failure in gage
B1-910-043-1-1	0.0484	0.4981	7687	319	322	474.5	1358	18.3	18.5	0.305	Explosive failure in gage
B2-910-043-1-1	0.0483	0.4975	7951	331	333	478.6	1328	17.7	17.8	0.290	Explosive failure in gage
A1-910-043-1-6	0.0473	0.4978	7529	320	315	-	-	-	-	-	Explosive failure in gage
B1-910-043-1-6	0.0481	0.4974	8111	339	340	-	-	-	-	-	Explosive failure in gage
Average	0.0483	0.4978	7628	318	319			17.9	18.1	0.308	
Std. Dev.	0.0006	0.0003	523	22.1	22.0			0.31	0.29	0.019	
COV, %	1.25	0.07	6.85	7.0	6.91			1.73	1.58	6.30	

0° Tension Properties, 180°F (Dry)

Material Type: P707AG-15
Batch Number: AB991033
Test Method: ASTM D3039
Specimen Preconditioning: as machined
Test Conditions: 180°F/Dry
Ply Orientation: $(0)_8$
Testing Facility: Toray Composites (America)
Test Date: 11/28/1999, 2/17/00

Test Operator: John Smith
Test Frame: Instron 4505
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: One biaxial gage (CEA-06-125UT-120)
Fiber Volume(normalizing): 55.1%
CPT (average): 0.0060 in.
Fiber Volume(batch average): 54.2%

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
A1-910-041-1-4	0.0494	0.5002	7608	308	318	460.0	1316	17.3	17.9	0.310	Explosive failure in gage
A2-910-041-1-4	0.0476	0.4996	7800	328	327	447.7	1300	17.9	17.9	0.305	Explosive failure in gage
B1-910-041-1-4	0.0476	0.4993	7318	308	307	445.4	1282	17.6	17.5	0.295	Explosive failure in gage
B2-910-041-1-4	0.0481	0.4995	7960	332	334	451.3	1314	18.0	18.1	0.315	Explosive failure in gage
A2-910-041-1-9	0.0479	0.4983	6922	290	291	-	-	-	-	-	Explosive failure in gage
B2-910-041-2-2	0.0480	0.4998	7725	322	324	-	-	-	-	-	Explosive failure in gage
Average	0.0481	0.4994	7556	315	317			17.7	17.8	0.306	
Std. Dev.	0.0007	0.0006	378	15.7	15.5			0.31	0.23	0.009	
COV, %	1.40	0.12	5.00	5.00	4.91			1.75	1.27	2.79	

Material Type: P707AG-15
Batch Number: AB991034
Test Method: ASTM D3039
Specimen Preconditioning: as machined
Test Conditions: 180°F/Dry
Ply Orientation: $(0)_8$
Testing Facility: Toray Composites (America)
Test Date: 11/28/1999, 2/17/00

Test Operator: John Smith
Test Frame: Instron 4505
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: One biaxial gage (CEA-06-125UT-120)
Fiber Volume(normalizing): 55.1%
CPT (average): 0.0060 in.
Fiber Volume(batch average): 54.1%

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
A1-910-042-1-2	0.0481	0.4999	6899	287	288	477.2	1344	18.0	18.1	0.325	Explosive failure in gage
A2-910-042-1-2	0.0483	0.4997	7966	330	333	475.7	1355	18.2	18.4	0.310	Explosive failure in gage
B1-910-042-1-2	0.0479	0.4998	8447	353	353	452.2	1321	18.2	18.1	0.330	Explosive failure in gage
B2-910-042-1-2	0.0483	0.4997	7377	306	308	464.6	1303	17.4	17.5	0.305	Explosive failure in gage
A2-910-042-1-6	0.0473	0.4975	8090	344	340	-	-	-	-	-	Explosive failure in gage
B2-910-042-1-6	0.0479	0.4975	7360	309	309	-	-	-	-	-	Explosive failure in gage
Average	0.0480	0.4990	7690	321	322			17.9	18.0	0.318	
Std. Dev.	0.0004	0.0012	573	25.2	24.0			0.39	0.36	0.012	
COV, %	0.77	0.24	7.45	7.83	7.47			2.15	2.02	3.75	

Material Type: P707AG-15
Batch Number: AB991035
Test Method: ASTM D3039
Specimen Preconditioning: as machined
Test Conditions: 180°F/Dry
Ply Orientation: $(0)_8$
Testing Facility: Toray Composites (America)
Test Date: 11/28/1999, 2/17/00

Test Operator: John Smith
Test Frame: Instron 4505
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: One biaxial gage (CEA-06-125UT-120)
Fiber Volume(normalizing): 55.1%
CPT (average): 0.0060 in.
Fiber Volume(batch average): 54.9%

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
A1-910-043-1-2	0.0482	0.5000	8313	345	346	448.6	1297	17.6	17.7	0.315	Explosive failure in gage
A2-910-043-1-2	0.0492	0.4996	7552	307	315	479.0	1337	17.5	17.9	0.290	Explosive failure in gage
B1-910-043-1-2	0.0485	0.4999	7681	317	320	478.2	1314	17.3	17.4	0.325	Explosive failure in gage
B2-910-043-1-2	0.0483	0.5021	7386	305	306	489.6	1345	17.6	17.7	0.285	Explosive failure in gage
A2-910-043-1-6	0.0488	0.4975	7744	319	324	-	-	-	-	-	Explosive failure in gage
B2-910-043-1-6	0.0476	0.4980	7925	335	332	-	-	-	-	-	Explosive failure in gage
Average	0.0484	0.4995	7767	321	324			17.5	17.7	0.304	
Std. Dev.	0.0005	0.0016	323	15.6	13.9			0.17	0.20	0.019	
COV, %	1.13	0.33	4.16	4.85	4.28			0.99	1.12	6.36	

0° Tension Properties, 180°F (Wet)

Material Type: P707AG-15
Batch Number: AB991033
Test Method: ASTM D3039
Specimen Preconditioning: per Section 3.2 of AGATE Methodology
Test Conditions: 180°F
Ply Orientation: $(0)_8$
Testing Facility: Toray Composites (America)
Test Date: 3/6/2000

Test Operator: John Smith
Test Frame: Instron 4505
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: One biaxial gage (CEA-06-125UT-120)
Fiber Volume(normalizing): 55.1%
CPT (average): 0.0060 in.
Fiber Volume(batch average): 54.2%

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
A1-910-041-1-5	0.0506	0.5028	7046	277	293	445.6	1320	17.2	18.2	0.340	Explosive failure in gage
A2-910-041-1-5	0.0474	0.5021	7816	329	326	455.4	1317	18.1	18.0	0.340	Explosive failure in gage
B1-910-041-1-5	0.0478	0.5018	7611	318	318	435.4	1283	17.7	17.7	0.320	Explosive failure in gage
B2-910-041-1-5	0.0481	0.5020	7618	315	318	463.7	1328	17.9	18.0	0.275	Explosive failure in gage
A1-910-041-1-6	0.0512	0.4978	6596	259	277	-	-	-	-	-	Explosive failure in gage
B1-910-041-1-6	0.0475	0.4979	7883	333	331	-	-	-	-	-	Explosive failure in gage
Average	0.0488	0.5007	7428	305	311			17.7	18.0	0.319	
Std. Dev.	0.0017	0.0023	503	30.2	20.8			0.40	0.21	0.031	
COV, %	3.47	0.45	6.77	9.90	6.71			2.28	1.19	9.59	

Material Type: P707AG-15
Batch Number: AB991034
Test Method: ASTM D3039
Specimen Preconditioning: per Section 3.2 of AGATE Methodology
Test Conditions: 180°F
Ply Orientation: $(0)_8$
Testing Facility: Toray Composites (America)
Test Date: 2/29/2000

Test Operator: John Smith
Test Frame: Instron 4505
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: One biaxial gage (CEA-06-125UT-120)
Fiber Volume(normalizing): 55.1%
CPT (average): 0.0060 in.
Fiber Volume(batch average): 54.1%

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
A1-910-042-1-3	0.0478	0.4987	8180	343	343	403.6	1235	17.4	17.4	0.304	Explosive failure in gage
A2-910-042-1-3	0.0478	0.4991	8232	345	344	428.4	1246	17.1	17.1	0.335	Explosive failure in gage
B1-910-042-1-3	0.0480	0.4988	8500	355	356	408.9	1256	17.7	17.7	0.331	Explosive failure in gage
B2-910-042-1-3	0.0484	0.4987	8357	347	350	435.2	1270	17.3	17.5	0.321	Explosive failure in gage
A1-910-042-1-4	0.0476	0.5002	7593	319	317	-	-	-	-	-	Explosive failure in gage
B1-910-042-1-4	0.0482	0.4995	8495	353	355	-	-	-	-	-	Explosive failure in gage
Average	0.0480	0.4992	8226	344	344			17.4	17.4	0.322	
Std. Dev.	0.0003	0.0006	337	12.9	14.4			0.24	0.26	0.014	
COV, %	0.59	0.12	4.10	3.75	4.18			1.36	1.50	4.29	

Material Type: P707AG-15
Batch Number: AB991035
Test Method: ASTM D3039
Specimen Preconditioning: per Section 3.2 of AGATE Methodology
Test Conditions: 180°F
Ply Orientation: $(0)_8$
Testing Facility: Toray Composites (America)
Test Date: 2/29/2000

Test Operator: John Smith
Test Frame: Instron 4505
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: One biaxial gage (CEA-06-125UT-120)
Fiber Volume(normalizing): 55.1%
CPT (average): 0.0060 in.
Fiber Volume(batch average): 54.9%

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
A1-910-043-1-3	0.0481	0.4989	7937	331	331	460.7	1327	18.1	18.1	0.346	Explosive failure in gage
A2-910-043-1-3	0.0493	0.4983	7419	302	310	456.8	1319	17.6	18.0	0.353	Explosive failure in gage
B1-910-043-1-3	0.0484	0.4993	7805	323	326	434.9	1283	17.5	17.7	0.312	Explosive failure in gage
B2-910-043-1-3	0.0481	0.4998	7497	312	313	478.7	1345	18.0	18.1	0.298	Explosive failure in gage
A1-910-043-1-4	0.0478	0.4998	8468	354	353	-	-	-	-	-	Explosive failure in gage
B1-910-043-1-4	0.0478	0.5000	8458	354	352	-	-	-	-	-	Explosive failure in gage
Average	0.0483	0.4993	7931	329	331			17.8	18.0	0.327	
Std. Dev.	0.0005	0.0007	454	21.4	18.7			0.27	0.19	0.027	
COV, %	1.10	0.13	5.73	6.50	5.64			1.54	1.03	8.14	

90° Tension Properties, -65°F (Dry)

Material Type: P707AG-15
Batch Number: AB991033
Test Method: ASTM D3039
Specimen Preconditioning: as machined
Test Conditions: -65°F/Dry
Ply Orientation: $(90)_{18}$
Testing Facility: Intec
Test Date: 12/17/1999, 2/23/00

Test Operator: Bryan Mines, Emmanuel Domingo
Test Frame: I
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: One axial gage (CEA-06-125UW-350)

CPT (average): 0.0060 in.
Fiber Volume(batch average): 54.2%

Specimen Number	*Specimen Thickness (in.)*	*Specimen Width (in.)*	*Ultimate Tensile Load (lbs.)*	*Ultimate Tensile Strength (ksi)*	*Load @ 0.1% Strain (lbs.)*	*Load @ 0.3% Strain (lbs.)*	*Tensile Modulus (0.1-0.3% strain) Actual (msi)*	*Failure Location & Comments*
A1-910-041-1-1	0.1049	1.0000	964	9.19	154.3	439.8	1.35	Failure in gage area
A2-910-041-1-1	0.1062	0.9990	902	8.50	143.2	426.8	1.34	Failure in gage area
B1-910-041-1-1	0.1048	1.0000	802	7.65	133.9	405.9	1.30	Failure in tab area
B2-910-041-1-1	0.1085	1.0000	789	7.27	145.6	419.8	1.26	Failure in gage area
A1-910-041-1-2	0.1065	1.0020	823	7.71	-	-	-	Failure in tab area
B1-910-041-1-2	0.1062	1.0000	613	5.77	-	-	-	Failure in gage area
Average	0.1062	1.0002	816	7.68			1.31	
Std. Dev.	0.0013	0.0010	120	1.16			0.04	
COV, %	1.27	0.10	14.66	15.14			3.13	

90° Tension Properties, 75°F (Dry)

Material Type: P707AG-15
Batch Number: AB991033
Test Method: ASTM D3039
Specimen Preconditioning: as machined
Test Conditions: RT/Dry
Ply Orientation: $(90)_{18}$
Testing Facility: Toray Composites (America)
Test Date: 12/4/1999, 2/14/00

Test Operator: John Smith
Test Frame: Instron 4505
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: One axial gage (C-960401-A)
CPT (average): 0.0060 in.
Fiber Volume(batch average): 54.2%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ultimate Tensile Load (lbs.)	Ultimate Tensile Strength (ksi)	Load @ 0.1% Strain (lbs.)	Load @ 0.3% Strain (lbs.)	Tensile Modulus (0.1-0.3% strain) Actual (msi)	Failure Location & Comments
A1-910-041-1-3	0.1072	1.0012	867	8.08	154.2	415.0	1.22	Failure in gage area
A2-910-041-1-3	0.1078	1.0000	692	6.42	153.5	408.8	1.18	Failure in gage area
B1-910-041-1-3	0.1073	1.0019	750	6.98	141.7	396.2	1.18	Failure in gage area
B2-910-041-1-3	0.1086	1.0014	786	7.23	149.8	402.9	1.16	Failure in gage area
A1-910-041-1-8	0.1078	0.9991	767	7.12	-	-	-	Failure in gage area
B1-910-041-1-8	0.1072	0.9995	782	7.31	-	-	-	Failure in gage area
Average	0.1076	1.0005	774	7.19			1.19	
Std. Dev.	0.0006	0.0011	57	0.54			0.02	
COV, %	0.51	0.11	7.38	7.51			1.79	

Material Type: P707AG-15
Batch Number: AB991034
Test Method: ASTM D3039
Specimen Preconditioning: as machined
Test Conditions: RT/Dry
Ply Orientation: $(90)_{18}$
Testing Facility: Toray Composites (America)
Test Date: 12/4/1999, 2/14/00

Test Operator: John Smith
Test Frame: Instron 4505
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: One axial gage (C-960401-A)
CPT (average): 0.0060 in.
Fiber Volume(batch average): 54.1%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ultimate Tensile Load (lbs.)	Ultimate Tensile Strength (ksi)	Load @ 0.1% Strain (lbs.)	Load @ 0.3% Strain (lbs.)	Tensile Modulus (0.1-0.3% strain) Actual (msi)	Failure Location & Comments
A1-910-042-1-1	0.1056	0.9997	892	8.45	145.3	399.9	1.21	Failure in gage area
A2-910-042-1-1	0.1064	0.9996	797	7.49	157.0	417.9	1.23	Failure in gage area
B1-910-042-1-1	0.1049	0.9999	882	8.41	148.8	408.7	1.24	Failure in gage area
B2-910-042-1-1	0.1048	0.9993	907	8.66	150.9	413.2	1.25	Failure in gage area
A1-910-042-1-8	0.1084	1.0012	753	6.94	-	-	-	Failure in gage area
B1-910-042-1-8	0.1086	1.0012	640	5.89	-	-	-	Failure in gage area
Average	0.1065	1.0002	812	7.64			1.23	
Std. Dev.	0.0017	0.0008	104	1.08			0.02	
COV, %	1.56	0.08	12.76	14.17			1.61	

Material Type: P707AG-15
Batch Number: AB991035
Test Method: ASTM D3039
Specimen Preconditioning: as machined
Test Conditions: RT/Dry
Ply Orientation: $(90)_{18}$
Testing Facility: Toray Composites (America)
Test Date: 12/4/1999, 2/14/00

Test Operator: John Smith
Test Frame: Instron 4505
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: One axial gage (C-960401-A)
CPT (average): 0.0060 in.
Fiber Volume(batch average): 54.9%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ultimate Tensile Load (lbs.)	Ultimate Tensile Strength (ksi)	Load @ 0.1% Strain (lbs.)	Load @ 0.3% Strain (lbs.)	Tensile Modulus (0.1-0.3% strain) Actual (msi)	Failure Location & Comments
A1-910-043-1-1	0.1050	0.9999	698	6.66	145.9	404.6	1.23	Failure in gage area
A2-910-043-1-1	0.1055	0.9969	757	7.20	147.4	408.3	1.24	Failure in gage area
B1-910-043-1-1	0.1057	0.9997	864	8.18	151.4	412.2	1.23	Failure in gage area
B2-910-043-1-1	0.1062	0.9999	793	7.46	149.3	415.5	1.25	Failure in gage area
A1-910-043-1-6	0.1084	1.0010	687	6.33	-	-	-	Failure in gage area
B1-910-043-1-6	0.1078	1.0010	730	6.77	-	-	-	Failure in gage area
Average	0.1064	0.9997	755	7.10			1.24	
Std. Dev.	0.0014	0.0015	66	0.66			0.01	
COV, %	1.30	0.15	8.75	9.36			0.77	

90° Tension Properties, 75°F (Dry) - continued

Material Type: P707AG-15 *Panel Fabrication:* TCA - vacuum bagged at 270°F *Specimen Preconditioning:* as machined
Batch Number: AB010955 *Ply Orientation:* $(90)_{18}$ *Loading Rate:* 0.05 in/min
Test Method: ASTM D3039 *Test Conditions:* RT/Dry *Control Mode:* Stroke

Specimen Panel	Specimen Coupon	Specimen Thickness (in.)	Specimen Width (in.)	Ultimate Load (lbs)	Tensile Strength (ksi)	Failure Location	Testing Facility	Test Conditions Temp (°F)	Test Conditions RH (%)	Test Operator	Test Frame	Test Date
A-3	1	0.10703	1.00053	804.6	**7.51**	Lateral, At grip/tab, Bottom	TCA	73	50	John S.	Inst 4505	6/10/2002
A-3	3	0.10998	1.00082	714.4	**6.49**	Lateral, Gage, Middle	TCA	73	50	John S.	Inst 4505	6/10/2002
A-3	5	0.10945	1.00060	822.2	**7.51**	Lateral, Gage, Middle	TCA	73	50	John S.	Inst 4505	6/10/2002
A-3	7	0.10757	1.00058	817.0	**7.59**	Lateral, <1W from grip/tab, Top	TCA	73	50	John S.	Inst 4505	6/10/2002
A-5	1	0.10788	1.00042	749.1	**6.94**	Lateral, Gage, Middle	TCA	73	50	Debra W.	Inst 4505	6/10/2002
A-5	3	0.10837	1.00155	759.7	**7.00**	Lateral, Gage, Middle	TCA	73	50	Debra W.	Inst 4505	6/10/2002
A-5	5	0.10822	1.00077	786.0	**7.26**	Lateral, Gage, Middle	TCA	73	50	Debra W.	Inst 4505	6/10/2002
A-5	7	0.10830	1.00072	802.6	**7.41**	Lateral, Gage, Middle	TCA	73	50	Debra W.	Inst 4505	6/10/2002
A-3	2	0.10822	1.00068	860.7	**7.95**	Lateral, <1W from grip/tab, Bottom	NIAR	74	68	Ken G.	MTS 318.2!	6/17/2002
A-3	4	0.10970	1.00057	717.0	**6.53**	Lateral, <1W from grip/tab, Top	NIAR	74	68	Ken G.	MTS 318.2!	6/17/2002
A-3	6	0.10878	1.00073	737.8	**6.78**	Lateral, At grip/tab, Top	NIAR	74	68	Ken G.	MTS 318.2!	6/17/2002
A-3	8	0.10653	1.00153	896.6	**8.40**	Lateral, Gage, Middle	NIAR	74	68	Ken G.	MTS 318.2!	6/17/2002
A-5	2	0.10845	1.00080	776.8	**7.16**	Lateral, Gage, Middle	NIAR	73	69	Ken G.	MTS 318.2!	6/17/2002
A-5	4	0.10830	1.00067	726.6	**6.70**	Lateral, Gage, Middle	NIAR	73	69	Ken G.	MTS 318.2!	6/17/2002
A-5	6	0.10845	1.00068	733.1	**6.76**	Lateral, <1W from grip/tab, Top & Bottom	NIAR	73	69	Ken G.	MTS 318.2!	6/17/2002
A-5	8	0.10707	1.00167	838.8	**7.82**	Lateral, Gage, Middle	NIAR	73	69	Ken G.	MTS 318.2!	6/17/2002
B-4	1	0.10843	1.00042	806.2	**7.43**	Lateral, At grip/tab, Bottom	TCA	73	50	Debra W.	Inst 4505	6/10/2002
B-4	3	0.10930	1.00135	785.4	**7.18**	Lateral, At grip/tab, Bottom	TCA	73	50	Debra W.	Inst 4505	6/10/2002
B-4	5	0.10925	0.99997	781.3	**7.15**	Lateral, < 1W from grip/tab, Top	TCA	73	50	Debra W.	Inst 4505	6/10/2002
B-4	7	0.10897	1.00012	787.3	**7.22**	Lateral, < 1W from grip/tab, Top	TCA	73	50	Debra W.	Inst 4505	6/10/2002
B-6	1	0.10750	1.00057	843.7	**7.84**	Lateral, Gage, Middle	TCA	73	50	John S.	Inst 4505	6/10/2002
B-6	3	0.10850	1.00110	750.3	**6.91**	Lateral, Gage, Middle	TCA	73	50	John S.	Inst 4505	6/10/2002
B-6	5	0.10880	1.00043	759.1	**6.97**	Lateral, Gage, Middle	TCA	73	50	John S.	Inst 4505	6/10/2002
B-6	7	0.10820	1.00042	697.5	**6.44**	Lateral, Gage, Middle	TCA	73	50	John S.	Inst 4505	6/10/2002
B-4	2	0.10927	1.00090	761.6	**6.96**	Lateral, Gage, Middle	NIAR	76	64	Shin	MTS 318.2!	6/17/2002
B-4	4	0.10922	1.00087	808.7	**7.40**	Lateral, < 1W from grip/tab, Top	NIAR	76	64	Shin	MTS 318.2!	6/17/2002
B-4	6	0.10910	1.00008	810.0	**7.42**	Lateral, Gage, Middle	NIAR	76	64	Shin	MTS 318.2!	6/17/2002
B-4	8	0.10767	1.00158	917.6	**8.51**	Lateral, Gage, Middle	NIAR	76	64	Shin	MTS 318.2!	6/17/2002
B-6	2	0.10810	1.00055	795.1	**7.35**	Lateral, At grip/tab, Top	NIAR	75	66	Shin	MTS 318.2!	6/17/2002
B-6	4	0.10877	1.00040	715.4	**6.57**	Lateral, Gage, Middle	NIAR	75	66	Shin	MTS 318.2!	6/17/2002
B-6	6	0.10865	1.00042	768.8	**7.07**	Lateral, <1W from grip/tab, Top & Gage, Middle	NIAR	75	66	Shin	MTS 318.2!	6/17/2002
B-6	8	0.10673	1.00117	764.9	**7.16**	Lateral, Gage, Middle	NIAR	75	66	Shin	MTS 318.2!	6/17/2002
	Average				**7.23**							
	Std, Dev.				**0.505**							
	COV, %				**6.98**							

Material Type: P707AG-15 *Panel Fabrication:* TCA - vacuum bagged at 270°F *Specimen Preconditioning:* as machined
Batch Number: AB020234 *Ply Orientation:* $(90)_{18}$ *Loading Rate:* 0.05 in/min
Test Method: ASTM D3039 *Test Conditions:* RT/Dry *Control Mode:* Stroke

Specimen Panel	Specimen Coupon	Specimen Thickness (in.)	Specimen Width (in.)	Ultimate Load (lbs)	Tensile Strength (ksi)	Failure Location	Testing Facility	Test Conditions Temp (°F)	Test Conditions RH (%)	Test Operator	Test Frame	Test Date
A-15	1	0.10743	0.99982	788.0	**7.34**	Lateral, <1W from grip/tab, Top	TCA	73	50	John S.	Inst 4505	6/10/2002
A-15	3	0.10850	0.99978	657.7	**6.06**	Lateral, <1W from grip/tab, Top	TCA	73	50	John S.	Inst 4505	6/10/2002
A-15	5	0.10752	0.99972	755.8	**7.03**	Lateral, <1W from grip/tab, Bottom	TCA	73	50	John S.	Inst 4505	6/10/2002
A-15	7	0.10785	0.99977	669.2	**6.21**	Lateral, Gage, Middle	TCA	73	50	John S.	Inst 4505	6/10/2002
A-17	1	0.10757	1.00025	743.6	**6.91**	Lateral, Gage, Middle	TCA	73	50	Debra W.	Inst 4505	6/10/2002
A-17	3	0.10833	1.00058	799.3	**7.37**	Lateral, <1W from grip/tab, Bottom	TCA	73	50	Debra W.	Inst 4505	6/10/2002
A-17	5	0.10852	1.00062	672.9	**6.20**	Lateral, Gage, Middle	TCA	73	50	Debra W.	Inst 4505	6/10/2002
A-17	7	0.10813	0.99977	740.9	**6.85**	Lateral, Gage, Middle	TCA	73	50	Debra W.	Inst 4505	6/10/2002
A-15	2	0.10815	0.99978	719.2	**6.65**	Lateral, Gage, Middle	NIAR	78	60	Shin	MTS 318.2!	6/17/2002
A-15	4	0.10810	0.99992	708.2	**6.55**	Lateral, <1W from grip/tab, Bottom	NIAR	78	60	Shin	MTS 318.2!	6/17/2002
A-15	6	0.10747	0.99972	811.2	**7.55**	Lateral, Gage, Middle	NIAR	78	60	Shin	MTS 318.2!	6/17/2002
A-15	8	0.10603	0.99960	853.7	**8.05**	Lateral, <1W from grip/tab, Bottom	NIAR	78	60	Shin	MTS 318.2!	6/17/2002
A-17	2	0.10815	1.00068	721.5	**6.67**	Lateral, Gage, Middle	NIAR	77	63	Shin	MTS 318.2!	6/17/2002
A-17	4	0.10855	1.00050	715.9	**6.59**	Lateral, Gage, Middle	NIAR	77	63	Shin	MTS 318.2!	6/17/2002
A-17	6	0.10843	0.99995	750.4	**6.92**	Lateral, Gage, Middle	NIAR	77	63	Shin	MTS 318.2!	6/17/2002
A-17	8	0.10670	1.00075	812.8	**7.61**	Lateral, Gage, Middle	NIAR	77	63	Shin	MTS 318.2!	6/17/2002
B-16	1	0.10758	1.00063	801.1	**7.44**	Lateral, At grip/tab, Bottom	TCA	73	50	Debra W.	Inst 4505	6/10/2002
B-16	3	0.10838	1.00042	742.0	**6.84**	Lateral, <1W from grip/tab, Top	TCA	73	50	Debra W.	Inst 4505	6/10/2002
B-16	5	0.10835	1.00093	774.5	**7.14**	Lateral, Gage, Middle	TCA	73	50	Debra W.	Inst 4505	6/10/2002
B-16	7	0.10805	1.00063	794.4	**7.35**	Lateral, Gage, Middle	TCA	73	50	Debra W.	Inst 4505	6/10/2002
B-18	1	0.10723	1.00027	710.0	**6.62**	Lateral, At grip/tab, Bottom	TCA	73	50	John S.	Inst 4505	6/10/2002
B-18	3	0.10862	1.00073	685.6	**6.31**	Lateral, Gage, Middle	TCA	73	50	John S.	Inst 4505	6/10/2002
B-18	5	0.10767	1.00060	740.9	**6.88**	Lateral, At grip/tab, Bottom	TCA	73	50	John S.	Inst 4505	6/10/2002
B-18	7	0.10872	0.99983	715.5	**6.58**	Lateral, Gage, Middle	TCA	73	50	John S.	Inst 4505	6/10/2002
B-16	2	0.10805	1.00097	738.4	**6.83**	Lateral, At grip/tab, Top	NIAR	76	66	Shin	MTS 318.2!	6/17/2002
B-16	4	0.10842	1.00055	793.3	**7.31**	Lateral, Gage, Middle	NIAR	76	66	Shin	MTS 318.2!	6/17/2002
B-16	6	0.10822	1.00067	719.2	**6.64**	Lateral, <1W from grip/tab, Bottom	NIAR	76	66	Shin	MTS 318.2!	6/17/2002
B-16	8	0.10683	1.00078	807.3	**7.55**	Lateral, Gage, Middle	NIAR	76	66	Shin	MTS 318.2!	6/17/2002
B-18	2	0.10785	1.00065	752.0	**6.97**	Lateral, Gage, Middle	NIAR	77	63	Shin	MTS 318.2!	6/17/2002
B-18	4	0.10838	1.00042	769.1	**7.09**	Lateral, Gage, Middle	NIAR	77	63	Shin	MTS 318.2!	6/17/2002
B-18	6	0.10838	1.00047	749.8	**6.92**	Lateral, Gage, Middle	NIAR	77	63	Shin	MTS 318.2!	6/17/2002
B-18	8	0.10738	1.00073	770.6	**7.17**	Lateral, At grip/tab, Top	NIAR	77	63	Shin	MTS 318.2!	6/17/2002
	Average				**6.94**							
	Std, Dev.				**0.458**							
	COV, %				**6.60**							

90° Tension Properties, 75°F (Dry) - continued

Material Type: P707AG-15 *Panel Fabrication:* TCA - vacuum bagged at 270°F *Specimen Preconditioning:* as machined
Batch Number: AB020436 *Ply Orientation:* $(90)_{18}$ *Loading Rate:* 0.05 in/min
Test Method: ASTM D3039 *Test Conditions:* RT/Dry *Control Mode:* Stroke

Specimen Panel	Specimen Coupon	Specimen Thickness (in.)	Specimen Width (in.)	Ultimate Load (lbs)	Tensile Strength (ksi)	Failure Location	Testing Facility	Test Conditions Temp (°F)	Test Conditions RH (%)	Test Operator	Test Frame	Test Date
A-27	1	0.11040	1.00055	837.1	**7.58**	Lateral, Gage, Middle	TCA	73	50	John S.	Inst 4505	6/10/2002
A-27	3	0.11142	1.00047	774.8	**6.95**	Lateral, Gage, Middle	TCA	73	50	John S.	Inst 4505	6/10/2002
A-27	5	0.11177	1.00053	765.1	**6.84**	Lateral, <1W from grip/tab, Top	TCA	73	50	John S.	Inst 4505	6/10/2002
A-27	7	0.11107	0.99945	741.4	**6.68**	Lateral, <1W from grip/tab, Bottom	TCA	73	50	John S.	Inst 4505	6/10/2002
A-29	1	0.11025	1.00030	852.3	**7.73**	Lateral, <1W from grip/tab, Bottom	TCA	73	50	Debra W.	Inst 4505	6/10/2002
A-29	3	0.11133	1.00017	822.7	**7.39**	Lateral, Gage, Middle	TCA	73	50	Debra W.	Inst 4505	6/10/2002
A-29	5	0.11152	1.00053	809.7	**7.26**	Lateral, Gage, Middle	TCA	73	50	Debra W.	Inst 4505	6/10/2002
A-29	7	0.11098	1.00035	746.0	**6.72**	Lateral, At grip/tab, Top	TCA	73	50	Debra W.	Inst 4505	6/10/2002
A-27	2	0.11123	1.00045	855.7	**7.69**	Lateral, Gage, Middle	NIAR	78	60	Shin	MTS 318.2!	6/17/2002
A-27	4	0.11173	1.00037	766.0	**6.85**	Lateral, <1W from grip/tab, Bottom	NIAR	78	60	Shin	MTS 318.2!	6/17/2002
A-27	6	0.11160	0.99857	769.7	**6.91**	Lateral, Gage, Middle	NIAR	78	60	Shin	MTS 318.2!	6/17/2002
A-27	8	0.10875	1.00033	857.9	**7.89**	Lateral, Gage, Middle	NIAR	78	60	Shin	MTS 318.2!	6/17/2002
A-29	2	0.11083	1.00090	833.4	**7.51**	Lateral, Gage, Middle	NIAR	72	55	Ken G.	MTS 318.2!	6/14/2002
A-29	4	0.11145	1.00040	732.7	**6.57**	Lateral, Gage, Middle	NIAR	72	55	Ken G.	MTS 318.2!	6/14/2002
A-29	6	0.11122	1.00048	787.2	**7.07**	Lateral, At grip/tab, Top	NIAR	72	55	Ken G.	MTS 318.2!	6/14/2002
A-29	8	0.10960	1.00060	879.3	**8.02**	Lateral, <1W from grip/tab, Top	NIAR	72	55	Ken G.	MTS 318.2!	6/14/2002
B-28	1	0.11047	1.00032	789.4	**7.14**	Lateral, Gage, Middle	TCA	73	50	Debra W.	Inst 4505	6/10/2002
B-28	3	0.11117	1.00208	747.8	**6.71**	Lateral, Gage, Middle	TCA	73	50	Debra W.	Inst 4505	6/10/2002
B-28	5	0.11147	1.00028	809.8	**7.26**	Lateral, Gage, Middle	TCA	73	50	Debra W.	Inst 4505	6/10/2002
B-28	7	0.11100	1.00007	789.6	**7.11**	Lateral, <1W from grip/tab, Top	TCA	73	50	Debra W.	Inst 4505	6/10/2002
B-30	1	0.11063	1.00043	823.0	**7.44**	Lateral, <1W from grip/tab, Bottom	TCA	73	50	John S.	Inst 4505	6/10/2002
B-30	3	0.11163	1.00030	771.3	**6.91**	Lateral, <1W from grip/tab, Top	TCA	73	50	John S.	Inst 4505	6/10/2002
B-30	5	0.11120	1.00030	846.3	**7.61**	Lateral, <1W from grip/tab, Top	TCA	73	50	John S.	Inst 4505	6/10/2002
B-30	7	0.11082	1.00037	822.5	**7.42**	Lateral, Gage, Middle	TCA	73	50	John S.	Inst 4505	6/10/2002
B-28	2	0.11073	1.00058	847.8	**7.65**	Lateral, Gage, Middle	NIAR	76	63	Shin	MTS 318.2!	6/17/2002
B-28	4	0.11137	0.99995	742.8	**6.67**	Lateral, At grip/tab, Bottom	NIAR	76	63	Shin	MTS 318.2!	6/17/2002
B-28	6	0.11152	0.99987	815.4	**7.31**	Lateral, Gage, Middle	NIAR	76	63	Shin	MTS 318.2!	6/17/2002
B-28	8	0.10935	1.00050	871.5	**7.97**	Lateral, <1W from grip/tab, Top	NIAR	76	63	Shin	MTS 318.2!	6/17/2002
B-30	2	0.11128	1.00063	742.6	**6.67**	Lateral, Gage, Middle	NIAR	78	61	Shin	MTS 318.2!	6/17/2002
B-30	4	0.11137	1.00035	854.8	**7.67**	Lateral, At grip/tab, Top	NIAR	78	61	Shin	MTS 318.2!	6/17/2002
B-30	6	0.11132	1.00023	728.9	**6.55**	Lateral, Gage, Middle	NIAR	78	61	Shin	MTS 318.2!	6/17/2002
B-30	8	0.10978	1.00053	901.9	**8.21**	Lateral, Gage, Middle	NIAR	78	61	Shin	MTS 318.2!	6/17/2002
	Average				**7.25**							
	Std, Dev.				**0.469**							
	COV, %				**6.47**							

Material Type: P707AG-15 *Panel Fabrication:* TCA - vacuum bagged at 270°F *Specimen Preconditioning:* as machined
Batch Number: AB020552 *Ply Orientation:* $(90)_{18}$ *Loading Rate:* 0.05 in/min
Test Method: ASTM D3039 *Test Conditions:* RT/Dry *Control Mode:* Stroke

Specimen Panel	Specimen Coupon	Specimen Thickness (in.)	Specimen Width (in.)	Ultimate Load (lbs)	Tensile Strength (ksi)	Failure Location	Testing Facility	Test Conditions Temp (°F)	Test Conditions RH (%)	Test Operator	Test Frame	Test Date
A-39	1	0.10647	1.00053	779.4	**7.32**	Lateral, At grip/tab, Bottom	TCA	73	50	John S.	Inst 4505	6/10/2002
A-39	3	0.10832	1.00077	733.0	**6.76**	Lateral, <1W from grip/tab, Top	TCA	73	50	John S.	Inst 4505	6/10/2002
A-39	5	0.10833	1.00047	683.9	**6.31**	Lateral, At grip/tab, Bottom	TCA	73	50	John S.	Inst 4505	6/10/2002
A-39	7	0.10815	0.99942	600.1	**5.55**	Lateral, At grip/tab, Bottom	TCA	73	50	John S.	Inst 4505	6/10/2002
A-41	1	0.10693	1.00062	851.7	**7.96**	Lateral, Gage, Middle	TCA	73	50	Debra W.	Inst 4505	6/10/2002
A-41	3	0.10903	1.00053	700.0	**6.42**	Lateral, Gage, Middle	TCA	73	50	Debra W.	Inst 4505	6/10/2002
A-41	5	0.10873	1.00052	707.1	**6.50**	Lateral, Gage, Middle	TCA	73	50	Debra W.	Inst 4505	6/10/2002
A-41	7	0.10835	0.99987	820.5	**7.57**	Lateral, Gage, Middle	TCA	73	50	Debra W.	Inst 4505	6/10/2002
A-39	2	0.10748	1.00075	662.0	**6.15**	Lateral, At grip/tab, Bottom	NIAR	78	60	Shin	MTS 318.2!	6/17/2002
A-39	4	0.10845	1.00055	623.3	**5.74**	Lateral, At grip/tab, Bottom	NIAR	78	60	Shin	MTS 318.2!	6/17/2002
A-39	6	0.10817	0.99998	632.3	**5.85**	Lateral, At grip/tab, Bottom	NIAR	78	60	Shin	MTS 318.2!	6/17/2002
A-39	8	0.10508	1.00088	685.6	**6.52**	Lateral, At grip/tab, Bottom	NIAR	78	60	Shin	MTS 318.2!	6/17/2002
A-41	2	0.10832	1.00095	807.3	**7.45**	Lateral, Gage, Middle	NIAR	77	62	Shin	MTS 318.2!	6/17/2002
A-41	4	0.10903	1.00043	763.3	**7.00**	Lateral, Gage, Middle	NIAR	77	62	Shin	MTS 318.2!	6/17/2002
A-41	6	0.10858	0.99982	731.8	**6.74**	Lateral, <1W from grip/tab, Bottom	NIAR	77	62	Shin	MTS 318.2!	6/17/2002
A-41	8	0.10532	1.00053	770.6	**7.31**	Lateral, Gage, Middle	NIAR	77	62	Shin	MTS 318.2!	6/17/2002
B-40	1	0.10698	1.00053	811.7	**7.58**	Lateral, Gage, Middle	TCA	73	50	Debra W.	Inst 4505	6/10/2002
B-40	3	0.10793	1.00093	777.8	**7.20**	Lateral, Gage, Middle	TCA	73	50	Debra W.	Inst 4505	6/10/2002
B-40	5	0.10832	1.00042	738.5	**6.81**	Lateral, Gage, Middle	TCA	73	50	Debra W.	Inst 4505	6/10/2002
B-40	7	0.10798	1.00022	791.7	**7.33**	Lateral, Gage, Middle	TCA	73	50	Debra W.	Inst 4505	6/10/2002
B-42	1	0.10758	1.00068	747.0	**6.94**	Lateral, <1W from grip/tab, Top	TCA	73	50	John S.	Inst 4505	6/10/2002
B-42	3	0.10822	1.00043	705.5	**6.52**	Lateral, <1W from grip/tab, Bottom	TCA	73	50	John S.	Inst 4505	6/10/2002
B-42	5	0.10818	1.00067	600.4	**5.55**	Lateral, <1W from grip/tab, Top	TCA	73	50	John S.	Inst 4505	6/10/2002
B-42	7	0.10782	1.00080	742.0	**6.88**	Lateral, At grip/tab, Top	TCA	73	50	John S.	Inst 4505	6/10/2002
B-40	2	0.10758	1.00047	722.9	**6.72**	Lateral, At grip/tab, Top	NIAR	77	63	Shin	MTS 318.2!	6/17/2002
B-40	4	0.10832	1.00037	639.9	**5.91**	Lateral, At grip/tab, Top	NIAR	77	63	Shin	MTS 318.2!	6/17/2002
B-40	6	0.10808	0.99955	677.8	**6.27**	Lateral, At grip/tab, Top	NIAR	77	63	Shin	MTS 318.2!	6/17/2002
B-40	8	0.10648	1.00057	839.3	**7.88**	Lateral, Gage, Middle	NIAR	77	63	Shin	MTS 318.2!	6/17/2002
B-42	2	0.10835	1.00070	732.0	**6.75**	Lateral, Gage, Middle	NIAR	77	61	Shin	MTS 318.2!	6/17/2002
B-42	4	0.10833	1.00063	749.4	**6.91**	Lateral, Gage, Middle	NIAR	77	61	Shin	MTS 318.2!	6/17/2002
B-42	6	0.10818	1.00067	776.5	**7.17**	Lateral, Gage, Middle	NIAR	77	61	Shin	MTS 318.2!	6/17/2002
B-42	8	0.10712	1.00055	843.0	**7.87**	Lateral, Gage, Middle	NIAR	77	61	Shin	MTS 318.2!	6/17/2002
	Average				**6.79**							
	Std, Dev.				**0.666**							
	COV, %				**9.80**							

90° Tension Properties, 180°F (Dry)

Material Type: P707AG-15
Batch Number: AB991033
Test Method: ASTM D3039
Specimen Preconditioning: as machined
Test Conditions: 180°F/Dry
Ply Orientation: $(90)_{18}$
Testing Facility: Toray Composites (America)
Test Date: 12/7/1999, 2/17/00

Test Operator: John Smith
Test Frame: Instron 4505
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: One axial gage (C-960401-A)
CPT (average): 0.0060 in.
Fiber Volume(batch average): 54.2%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ultimate Tensile Load (lbs.)	Ultimate Tensile Strength (ksi)	Load @ 0.1% Strain (lbs.)	Load @ 0.3% Strain (lbs.)	Tensile Modulus (0.1-0.3% strain) Actual (msi)	Failure Location & Comments
A2-910-041-1-4	0.1082	0.9988	720	6.66	139.9	367.6	1.05	Failure in gage area
A1-910-041-1-4	0.1079	0.9996	687	6.37	141.7	374.4	1.08	Failure in gage area
B1-910-041-1-4	0.1079	1.0014	723	6.69	141.3	369.4	1.06	Failure in gage area
B2-910-041-1-4	0.1083	1.0009	671	6.19	138.9	367.1	1.05	Failure in gage area
A2-910-041-1-8	0.1086	0.9994	670	6.17	-	-	-	Failure in gage area
B2-910-041-1-8	0.1077	0.9984	677	6.30	-	-	-	Failure in gage area
Average	0.1081	0.9998	691	6.40			1.06	
Std. Dev.	0.0003	0.0012	24	0.23			0.01	
COV, %	0.29	0.12	3.49	3.57			1.17	

Material Type: P707AG-15
Batch Number: AB991034
Test Method: ASTM D3039
Specimen Preconditioning: as machined
Test Conditions: 180°F/Dry
Ply Orientation: $(90)_{18}$
Testing Facility: Toray Composites (America)
Test Date: 12/7/1999, 2/17/00

Test Operator: John Smith
Test Frame: Instron 4505
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: One axial gage (C-960401-A)
CPT (average): 0.0060 in.
Fiber Volume(batch average): 54.1%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ultimate Tensile Load (lbs.)	Ultimate Tensile Strength (ksi)	Load @ 0.1% Strain (lbs.)	Load @ 0.3% Strain (lbs.)	Tensile Modulus (0.1-0.3% strain) Actual (msi)	Failure Location & Comments
A1-910-042-1-2	0.1067	1.0013	738	6.91	138.1	366.7	1.07	Failure in gage area
A2-910-042-1-2	0.1071	0.9993	789	7.37	143.3	376.5	1.09	Failure in gage area
B1-910-042-1-2	0.1066	0.9998	726	6.81	140.1	373.6	1.10	Failure in gage area
B2-910-042-1-2	0.1066	0.9987	734	6.89	144.5	380.5	1.11	Failure in gage area
A2-910-042-1-6	0.1080	1.0010	684	6.33	-	-	-	Failure in gage area
B2-910-042-1-6	0.1095	1.0004	618	5.64	-	-	-	Failure in gage area
Average	0.1074	1.0001	715	6.66			1.09	
Std. Dev.	0.0011	0.0010	58	0.60			0.02	
COV, %	1.07	0.10	8.11	8.98			1.47	

Material Type: P707AG-15
Batch Number: AB991035
Test Method: ASTM D3039
Specimen Preconditioning: as machined
Test Conditions: 180°F/Dry
Ply Orientation: $(90)_{18}$
Testing Facility: Toray Composites (America)
Test Date: 12/7/1999, 2/17/00

Test Operator: John Smith
Test Frame: Instron 4505
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: One axial gage (C-960401-A)
CPT (average): 0.0060 in.
Fiber Volume(batch average): 54.9%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ultimate Tensile Load (lbs.)	Ultimate Tensile Strength (ksi)	Load @ 0.1% Strain (lbs.)	Load @ 0.3% Strain (lbs.)	Tensile Modulus (0.1-0.3% strain) Actual (msi)	Failure Location & Comments
A1-910-043-1-2	0.1068	1.0013	720	6.73	147.1	383.3	1.10	Failure in gage area
A2-910-043-1-2	0.1067	0.9987	678	6.37	142.5	378.3	1.11	Failure in gage area
B1-910-043-1-2	0.1063	0.9993	737	6.94	142.2	374.3	1.09	Failure in gage area
B2-910-043-1-2	0.1075	0.9996	669	6.23	134.1	367.9	1.09	Failure in gage area
A2-910-043-1-6	0.1092	1.0005	526	4.81	-	-	-	Failure in gage area
B2-910-043-1-6	0.1075	1.0007	651	6.05	-	-	-	Failure in gage area
Average	0.1073	1.0000	664	6.19			1.10	
Std. Dev.	0.0010	0.0010	75	0.75			0.01	
COV, %	0.97	0.10	11.27	12.10			0.80	

90° Tension Properties, 180°F (Wet)

Material Type: P707AG-15
Batch Number: AB991033
Test Method: ASTM D3039
Specimen Preconditioning: per Section 3.2 of AGATE Methodology
Test Conditions: 180°F
Ply Orientation: $(90)_{18}$
Testing Facility: Toray Composites (America)
Test Date: 3/13/2000

Test Operator: John Smith
Test Frame: Instron 4505
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: One axial gage (C-960401-A)
CPT (average): 0.0060 in.
Fiber Volume(batch average): 54.2%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ultimate Tensile Load (lbs.)	Ultimate Tensile Strength (ksi)	Load @ 0.1% Strain (lbs.)	Load @ 0.3% Strain (lbs.)	Tensile Modulus (0.1-0.3% strain) Actual (msi)	Failure Location & Comments
A1-910-041-1-5	0.1080	0.9997	418	3.87	140.4	333.4	0.89	Failure in gage area
A2-910-041-1-5	0.1088	0.9988	429	3.95	123.8	321.1	0.91	Failure in gage area
B1-910-041-1-5	0.1081	0.9998	400	3.71	130.8	333.1	0.94	Failure in gage area
B2-910-041-1-5	0.1089	0.9995	398	3.65	116.9	313.2	0.90	Failure in gage area
A2-910-041-1-7	0.1088	1.0004	436	4.01	-	-	-	Failure in gage area
B2-910-041-1-7	0.1081	1.0009	412	3.81	-	-	-	Failure in gage area
Average	0.1084	0.9998	416	3.83			0.91	
Std. Dev.	0.0004	0.0007	16	0.14			0.02	
COV, %	0.38	0.07	3.73	3.61			2.02	

Material Type: P707AG-15
Batch Number: AB991034
Test Method: ASTM D3039
Specimen Preconditioning: per Section 3.2 of AGATE Methodology
Test Conditions: 180°F
Ply Orientation: $(90)_{18}$
Testing Facility: Toray Composites (America)
Test Date: 3/13/2000

Test Operator: John Smith
Test Frame: Instron 4505
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: One axial gage (C-960401-A)
CPT (average): 0.0060 in.
Fiber Volume(batch average): 54.1%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ultimate Tensile Load (lbs.)	Ultimate Tensile Strength (ksi)	Load @ 0.1% Strain (lbs.)	Load @ 0.3% Strain (lbs.)	Tensile Modulus (0.1-0.3% strain) Actual (msi)	Failure Location & Comments
A1-910-042-1-3	0.1072	1.0011	407	3.79	120.4	321.8	0.94	Failure in gage area
A2-910-042-1-3	0.1077	1.0010	394	3.66	120.2	320.6	0.93	Failure in gage area
B1-910-042-1-3	0.1080	1.0013	418	3.87	122.9	326.6	0.94	Failure in gage area
B2-910-042-1-3	0.1079	1.0002	373	3.46	124.1	324.4	0.93	Failure in gage area
A1-910-042-1-4	0.1079	0.9993	412	3.82	-	-	-	Failure in gage area
B1-910-042-1-4	0.1085	1.0012	404	3.72	-	-	-	Failure in gage area
Average	0.1078	1.0007	401	3.72			0.93	
Std. Dev.	0.0004	0.0008	16	0.15			0.01	
COV, %	0.38	0.08	4.01	3.99			0.70	

Material Type: P707AG-15
Batch Number: AB991035
Test Method: ASTM D3039
Specimen Preconditioning: per Section 3.2 of AGATE Methodology
Test Conditions: 180°F
Ply Orientation: $(90)_{18}$
Testing Facility: Toray Composites (America)
Test Date: 3/13/2000

Test Operator: John Smith
Test Frame: Instron 4505
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: One axial gage (C-960401-A)
CPT (average): 0.0060 in.
Fiber Volume(batch average): 54.9%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ultimate Tensile Load (lbs.)	Ultimate Tensile Strength (ksi)	Load @ 0.1% Strain (lbs.)	Load @ 0.3% Strain (lbs.)	Tensile Modulus (0.1-0.3% strain) Actual (msi)	Failure Location & Comments
A1-910-043-1-3	0.1077	1.0011	401	3.72	121.9	323.6	0.94	Failure in gage area
A2-910-043-1-3	0.1070	1.0003	400	3.74	123.6	326.1	0.95	Failure in gage area
B1-910-043-1-4	0.1077	1.0006	383	3.55	143.3	332.9	0.88	Failure in gage area
B2-910-043-1-4	0.1077	1.0009	372	3.45	122.0	315.4	0.90	Failure in gage area
A1-910-043-1-4	0.1079	0.9993	412	3.82	-	-	-	Failure in gage area
B1-910-043-1-5	0.1076	0.9994	355	3.30	-	-	-	Failure in gage area
Average	0.1076	1.0003	387	3.60			0.91	
Std. Dev.	0.0003	0.0008	21	0.20			0.03	
COV, %	0.30	0.08	5.53	5.54			3.43	

90° Tension - Strength
(180°F/Wet)

Toray Composites (America), Inc.

FAA Project No: TC1616SE-A-12
Test Plan Document: TCQAL-T-1018 Rev. A - Test Plan
Material Type: P707AG-15
Batch Number: AB010955
Test Method: ASTM D3039
Panel Fabrication: TCA - vacuum bagged at 270°F
Ply Orientation: $(90)_{18}$

TCA Process Specification: TCSPF-T-UD06 Rev. 3
TCA Material Specification: TCSPF-T-UD07 Rev. B
Test Conditions: 180°F
Specimen Preconditioning: moisture saturation per SACMA SRM SRM-11-94
Loading Rate: 0.05 in/min
Control Mode: Stroke

Specimen Panel	Specimen Coupon	Specimen Thickness (in.)	Specimen Width (in.)	Ultimate Load (lbs)	Tensile Strength (ksi)	Failure Location & Comments	Testing Facility	Test Temp (°F)	Test Operator	Test Frame	Test Date
A-7	3	0.11007	1.00113	381.7	3.46	Lateral, <1W from grip/tab, Top	TCA	180 ± 5°F	Debra W.	Inst 4505	8/26/2002
A-7	5	0.10952	1.00058	386.1	3.52	Lateral, <1W from grip/tab, Bottom	TCA	180 ± 5°F	Debra W.	Inst 4505	8/26/2002
A-7	7	0.10963	1.00000	398.7	3.64	Lateral, Gage, Middle	TCA	180 ± 5°F	Debra W.	Inst 4505	8/26/2002
A-9	1	0.10815	1.00025	449.3	4.15	Lateral, Gage, Middle	TCA	180 ± 5°F	John S.	Inst 4505	8/23/2002
A-9	3	0.10860	1.00125	430.9	3.96	Lateral, Gage, Middle	TCA	180 ± 5°F	John S.	Inst 4505	8/23/2002
A-9	5	0.10873	1.00083	415.2	3.82	Lateral, Gage, Middle	TCA	180 ± 5°F	John S.	Inst 4505	8/23/2002
A-9	7	0.10832	1.00012	441.9	4.08	Lateral, Gage, Middle	TCA	180 ± 5°F	John S.	Inst 4505	8/23/2002
A-9	8	0.10702	1.00163	477.6	4.46	Lateral, <1W from grip/tab, Bottom	NIAR	180 ± 5°F	Ken G.	MTS 318.10	8/28/2002
A-11	2	0.10907	1.00020	375.2	3.44	Lateral, Gage, Middle	NIAR	180 ± 5°F	Ken G.	MTS 318.10	9/16/2002
A-11	4	0.10928	1.00035	421.1	3.85	Lateral, <1W from grip/tab, Bottom	NIAR	180 ± 5°F	Ken G.	MTS 318.10	9/16/2002
A-11	6	0.10853	0.99972	414.3	3.82	Lateral, <1W from grip/tab, Bottom	NIAR	180 ± 5°F	Ken G.	MTS 318.10	9/16/2002
A-11	8	0.10768	1.00050	413.1	3.83	Lateral, <1W from grip/tab, Top	NIAR	180 ± 5°F	Ken G.	MTS 318.10	9/16/2002
A-11	3	0.10953	1.00052	390.3	3.56	Lateral, <1W from grip/tab, Top	NIAR	180 ± 5°F	Ken G.	MTS 318.10	9/16/2002
A-11	5	0.10908	1.00057	430.0	3.94	Lateral, Gage, Middle	NIAR	180 ± 5°F	Ken G.	MTS 318.10	9/16/2002
A-11	7	0.10892	0.99952	400.6	3.68	Lateral, <1W from grip/tab, Top	NIAR	180 ± 5°F	Ken G.	MTS 318.10	9/16/2002
"A" Panel	*Average*				3.81						
	Std, Dev.				0.280						
	COV, %				7.34						
B-8	1	0.10788	1.00067	505.5	4.68	Lateral, Gage, Middle	TCA	180 ± 5°F	John S.	Inst 4505	8/23/2002
B-8	3	0.10837	1.00153	465.2	4.29	Lateral, Gage, Middle	TCA	180 ± 5°F	John S.	Inst 4505	8/23/2002
B-8	5	0.10868	1.00075	444.4	4.09	Lateral, Gage, Middle	TCA	180 ± 5°F	John S.	Inst 4505	8/23/2002
B-8	7	0.10875	1.00013	436.5	4.01	Lateral, Gage, Middle	TCA	180 ± 5°F	John S.	Inst 4505	8/23/2002
B-10	1	0.10762	1.00035	435.7	4.05	Lateral, <1W from grip/tab, Top	TCA	180 ± 5°F	Debra W.	Inst 4505	9/9/2002
B-10	3	0.10903	1.00102	385.2	3.53	Lateral, Gage, Middle	TCA	180 ± 5°F	Debra W.	Inst 4505	9/9/2002
B-10	5	0.10933	1.00038	390.0	3.57	Lateral, Gage, Middle	TCA	180 ± 5°F	Debra W.	Inst 4505	9/9/2002
B-10	7	0.10893	1.00013	399.7	3.67	Lateral, Gage, Middle	TCA	180 ± 5°F	Debra W.	Inst 4505	9/9/2002
B-8	2	0.10800	1.00088	496.9	4.60	Lateral, <1W from grip/tab, Bottom	NIAR	180 ± 5°F	Ken G.	MTS 318.10	8/28/2002
B-8	4	0.10832	1.00065	446.8	4.12	Lateral, Gage, Middle	NIAR	180 ± 5°F	Ken G.	MTS 318.10	8/28/2002
B-8	6	0.10900	0.99988	488.1	4.48	Lateral, Gage, Middle	NIAR	180 ± 5°F	Ken G.	MTS 318.10	8/28/2002
B-8	8	0.10737	1.00153	479.8	4.46	Lateral, Gage, Middle	NIAR	180 ± 5°F	Ken G.	MTS 318.10	8/28/2002
B-10	2	0.10833	1.00075	455.6	4.20	Lateral, <1W from grip/tab, Top	NIAR	180 ± 5°F	Ken G.	MTS 318.10	9/16/2002
B-10	4	0.10925	1.00033	388.4	3.55	Lateral, Gage, Middle	NIAR	180 ± 5°F	Ken G.	MTS 318.10	9/16/2002
B-10	6	0.10918	1.00032	389.2	3.56	Lateral, Gage, Middle	NIAR	180 ± 5°F	Ken G.	MTS 318.10	9/16/2002
B-10	8	0.10645	1.00105	402.5	3.78	Lateral, Gage, Middle	NIAR	180 ± 5°F	Ken G.	MTS 318.10	9/16/2002
"B" Panel	*Average*				4.04						
	Std, Dev.				0.395						
	COV, %				9.79						

90° Tension - Strength
(180°F/Wet)

Toray Composites (America), Inc.

FAA Project No: TC1616SE-A-12
Test Plan Document: TCQAL-T-1018 Rev. A - Test Plan
Material Type: P707AG-15
Batch Number: AB020234
Test Method: ASTM D3039
Panel Fabrication: TCA - vacuum bagged at 270°F
Ply Orientation: $(90)_{18}$

TCA Process Specification: TCSPF-T-UD06 Rev. 3
TCA Material Specification: TCSPF-T-UD07 Rev. B
Test Conditions: 180°F
Specimen Preconditioning: moisture saturation per SACMA SRM SRM-11-94
Loading Rate: 0.05 in/min
Control Mode: Stroke

Specimen Panel	Specimen Coupon	Specimen Thickness (in.)	Specimen Width (in.)	Ultimate Load (lbs)	Tensile Strength (ksi)	Failure Location & Comments	Testing Facility	Test Temp (°F)	Test Operator	Test Frame	Test Date
A-19	1	0.10662	1.00043	425.7	3.99	Lateral, <1W from grip/tab, Bottom	TCA	180 ± 5°F	Debra W.	Inst 4505	8/26/2002
A-19	3	0.10923	1.00080	367.0	3.36	Lateral, <1W from grip/tab, Bottom	TCA	180 ± 5°F	Debra W.	Inst 4505	8/26/2002
A-19	5	0.10987	1.00043	373.9	3.40	Lateral, <1W from grip/tab, Top	TCA	180 ± 5°F	Debra W.	Inst 4505	8/26/2002
A-19	7	0.10703	0.99958	426.9	3.99	Lateral, Gage, Middle	TCA	180 ± 5°F	Debra W.	Inst 4505	8/26/2002
A-21	1	0.10745	1.00050	425.8	3.96	Lateral, <1W from grip/tab, Top	TCA	180 ± 5°F	John S.	Inst 4505	9/5/2002
A-21	3	0.10828	1.00053	351.3	3.24	Lateral, Gage, Middle	TCA	180 ± 5°F	John S.	Inst 4505	9/5/2002
A-21	5	0.10842	1.00050	401.0	3.70	Lateral, <1W from grip/tab, Top	TCA	180 ± 5°F	John S.	Inst 4505	9/5/2002
A-21	7	0.10787	1.00017	396.9	3.68	Lateral, <1W from grip/tab, Bottom	TCA	180 ± 5°F	John S.	Inst 4505	9/5/2002
A-19	2	0.10793	1.00057	440.3	4.08	Lateral, <1W from grip/tab, Bottom	NIAR	180 ± 5°F	Ken G.	MTS 318.10	8/28/2002
A-19	4	0.10970	1.00047	392.0	3.57	Lateral, <1W from grip/tab, Bottom	NIAR	180 ± 5°F	Ken G.	MTS 318.10	8/28/2002
A-19	6	0.10845	0.99990	413.8	3.82	Lateral, Gage, Middle	NIAR	180 ± 5°F	Ken G.	MTS 318.10	8/28/2002
A-19	8	0.10578	1.00085	433.5	4.09	Lateral, <1W from grip/tab, Bottom	NIAR	180 ± 5°F	Ken G.	MTS 318.10	8/28/2002
A-21	2	0.10782	1.00057	394.3	3.65	Lateral, Gage, Middle	NIAR	180 ± 5°F	Ken G.	MTS 318.10	9/16/2002
A-21	4	0.10842	1.00052	395.6	3.65	Lateral, Gage, Middle	NIAR	180 ± 5°F	Ken G.	MTS 318.10	9/16/2002
A-21	6	0.10827	1.00033	378.8	3.50	Lateral, Gage, Middle	NIAR	180 ± 5°F	Ken G.	MTS 318.10	9/16/2002
A-21	8	0.10695	1.00082	395.0	3.69	Lateral, <1W from grip/tab, Bottom	NIAR	180 ± 5°F	Ken G.	MTS 318.10	9/16/2002
"A" Panel	*Average*				3.71						
	Std, Dev.				0.261						
	COV, %				7.05						
B-20	1	0.10695	1.00048	433.9	4.06	Lateral, <1W from grip/tab, Top	TCA	180 ± 5°F	John S.	Inst 4505	9/5/2002
B-20	3	0.10917	1.00043	381.5	3.49	Lateral, Gage, Middle	TCA	180 ± 5°F	John S.	Inst 4505	9/5/2002
B-20	5	0.10932	1.00073	375.0	3.43	Lateral, <1W from grip/tab, Bottom	TCA	180 ± 5°F	John S.	Inst 4505	9/5/2002
B-20	7	0.10810	1.00062	359.4	3.32	Lateral, Gage, Middle	TCA	180 ± 5°F	John S.	Inst 4505	9/5/2002
B-22	1	0.10728	1.00047	380.5	3.55	Lateral, <1W from grip/tab, Top	TCA	180 ± 5°F	Debra W.	Inst 4505	9/9/2002
B-22	3	0.10798	1.00047	386.2	3.57	Lateral, Gage, Middle	TCA	180 ± 5°F	Debra W.	Inst 4505	9/9/2002
B-22	5	0.10823	1.00097	371.0	3.42	Lateral, <1W from grip/tab, Top	TCA	180 ± 5°F	Debra W.	Inst 4505	9/9/2002
B-22	7	0.10787	1.00053	356.7	3.31	Lateral, <1W from grip/tab, Top	TCA	180 ± 5°F	Debra W.	Inst 4505	9/9/2002
B-20	2	0.10860	1.00070	380.9	3.50	Lateral, <1W from grip/tab, Top	NIAR	180 ± 5°F	Ken G.	MTS 318.10	9/16/2002
B-20	4	0.10935	1.00073	348.5	3.18	Lateral, <1W from grip/tab, Bottom	NIAR	180 ± 5°F	Ken G.	MTS 318.10	9/16/2002
B-20	6	0.10852	1.00060	366.0	3.37	Lateral, <1W from grip/tab, Bottom	NIAR	180 ± 5°F	Ken G.	MTS 318.10	9/16/2002
B-20	8	0.10605	1.00090	425.6	4.01	Lateral, <1W from grip/tab, Bottom	NIAR	180 ± 5°F	Ken G.	MTS 318.10	9/16/2002
B-22	2	0.10770	1.00068	399.3	3.71	Lateral, Gage, Middle	NIAR	180 ± 5°F	Ken G.	MTS 318.10	9/16/2002
B-22	4	0.10855	1.00043	368.5	3.39	Lateral, Gage, Middle	NIAR	180 ± 5°F	Ken G.	MTS 318.10	9/16/2002
B-22	6	0.10823	1.00052	378.7	3.50	Lateral, <1W from grip/tab, Bottom	NIAR	180 ± 5°F	Ken G.	MTS 318.10	9/16/2002
B-22	8	0.10658	1.00093	406.9	3.81	Lateral, Gage, Middle	NIAR	180 ± 5°F	Ken G.	MTS 318.10	9/16/2002
"B" Panel	*Average*				3.54						
	Std, Dev.				0.245						
	COV, %				6.92						

90° Tension - Strength
(180°F/Wet)

Toray Composites (America), Inc.

FAA Project No: TC1616SE-A-12
Test Plan Document: TCQAL-T-1018 Rev. A - Test Plan
Material Type: P707AG-15
Batch Number: AB020436
Test Method: ASTM D3039
Panel Fabrication: TCA - vacuum bagged at 270°F
Ply Orientation: $(90)_{18}$

TCA Process Specification: TCSPF-T-UD06 Rev. 3
TCA Material Specification: TCSPF-T-UD07 Rev. B
Test Conditions: 180°F
Specimen Preconditioning: moisture saturation per SACMA SRM SRM-11-94
Loading Rate: 0.05 in/min
Control Mode: Stroke

Specimen Panel	Specimen Coupon	Specimen Thickness (in.)	Specimen Width (in.)	Ultimate Load (lbs)	Tensile Strength (ksi)	Failure Location & Comments	Testing Facility	Test Temp (°F)	Test Operator	Test Frame	Test Date
A-31	1	0.11080	1.00040	433.4	3.91	Lateral, Gage, Middle	TCA	180 ± 5°F	Debra W.	Inst 4505	9/9/2002
A-31	3	0.11133	1.00058	386.2	3.47	Lateral, Gage, Middle	TCA	180 ± 5°F	Debra W.	Inst 4505	9/9/2002
A-31	5	0.11145	1.00048	404.8	3.63	Lateral, <1W from grip/tab, Bottom	TCA	180 ± 5°F	Debra W.	Inst 4505	9/9/2002
A-31	7	0.11097	1.00013	387.5	3.49	Lateral, Gage, Middle	TCA	180 ± 5°F	Debra W.	Inst 4505	9/9/2002
A-33	1	0.11155	1.00037	458.8	4.11	Lateral, <1W from grip/tab, Bottom	TCA	180 ± 5°F	John S.	Inst 4505	8/23/2002
A-33	3	0.11130	1.00038	425.6	3.82	Lateral, Gage, Middle	TCA	180 ± 5°F	John S.	Inst 4505	8/23/2002
A-33	5	0.11097	1.00023	412.1	3.71	Lateral, Gage, Middle	TCA	180 ± 5°F	John S.	Inst 4505	8/23/2002
A-33	7	0.11112	0.99953	475.1	4.28	Lateral, Gage, Middle	TCA	180 ± 5°F	John S.	Inst 4505	8/23/2002
A-31	2	0.11108	1.00045	411.0	3.70	Lateral, Gage, Middle	NIAR	180 ± 5°F	Ken G.	MTS 318.10	9/16/2002
A-31	4	0.11153	1.00010	362.2	3.25	Lateral, <1W from grip/tab, Bottom	NIAR	180 ± 5°F	Ken G.	MTS 318.10	9/16/2002
A-31	6	0.11138	1.00035	435.2	3.91	Lateral, Gage, Middle	NIAR	180 ± 5°F	Ken G.	MTS 318.10	9/16/2002
A-31	8	0.10992	1.00040	414.0	3.76	Lateral, <1W from grip/tab, Top	NIAR	180 ± 5°F	Ken G.	MTS 318.10	9/16/2002
A-33	2	0.11193	1.00023	431.0	3.85	Lateral, Gage, Middle	NIAR	180 ± 5°F	Ken G.	MTS 318.10	8/28/2002
A-33	4	0.11102	1.00028	475.5	4.28	Lateral, Gage, Middle	NIAR	180 ± 5°F	Ken G.	MTS 318.10	8/28/2002
A-33	6	0.11098	1.00025	452.8	4.08	Lateral, Gage, Middle	NIAR	180 ± 5°F	Ken G.	MTS 318.10	8/28/2002
A-33	8	0.11022	1.00028	480.9	4.36	Lateral, Gage, Middle	NIAR	180 ± 5°F	Ken G.	MTS 318.10	8/28/2002
"A" Panel	*Average*				3.85						
	Std, Dev.				0.316						
	COV, %				8.20						
B-32	1	0.10963	1.00047	484.6	4.42	Lateral, <1W from grip/tab, Top	TCA	180 ± 5°F	John S.	Inst 4505	8/23/2002
B-32	3	0.11243	1.00055	405.3	3.60	Lateral, <1W from grip/tab, Top	TCA	180 ± 5°F	John S.	Inst 4505	8/23/2002
B-32	5	0.11203	0.99987	410.3	3.66	Lateral, Gage, Middle	TCA	180 ± 5°F	John S.	Inst 4505	8/23/2002
B-32	7	0.11018	0.99945	433.6	3.94	Lateral, Gage, Middle	TCA	180 ± 5°F	John S.	Inst 4505	8/23/2002
B-34	1	0.10988	1.00053	450.1	4.09	Lateral, Gage, Middle	TCA	180 ± 5°F	Debra W.	Inst 4505	8/26/2002
B-34	3	0.11098	1.00043	425.8	3.84	Lateral, Gage, Middle	TCA	180 ± 5°F	Debra W.	Inst 4505	8/26/2002
B-34	5	0.11128	1.00028	431.8	3.88	Lateral, Gage, Middle	TCA	180 ± 5°F	Debra W.	Inst 4505	8/26/2002
B-34	7	0.11093	1.00000	443.5	4.00	Lateral, Gage, Middle	TCA	180 ± 5°F	Debra W.	Inst 4505	8/26/2002
B-36	1	0.11010	1.00038	400.4	3.64	Lateral, Gage, Middle	NIAR	180 ± 5°F	Ken G.	MTS 318.10	9/16/2002
B-36	3	0.11147	0.99997	419.4	3.76	Lateral, <1W from grip/tab, Bottom	NIAR	180 ± 5°F	Ken G.	MTS 318.10	9/16/2002
B-36	5	0.11072	1.00048	427.8	3.86	Lateral, Gage, Middle	NIAR	180 ± 5°F	Ken G.	MTS 318.10	9/16/2002
B-36	7	0.11087	1.00005	425.7	3.84	Lateral, Gage, Middle	NIAR	180 ± 5°F	Ken G.	MTS 318.10	9/16/2002
B-36	2	0.11113	1.00057	363.8	3.27	Lateral, Gage, Middle	NIAR	180 ± 5°F	Ken G.	MTS 318.10	9/16/2002
B-36	4	0.11130	1.00030	423.3	3.80	Lateral, Gage, Middle	NIAR	180 ± 5°F	Ken G.	MTS 318.10	9/16/2002
B-36	6	0.11053	1.00043	429.2	3.88	Lateral, Gage, Middle	NIAR	180 ± 5°F	Ken G.	MTS 318.10	9/16/2002
B-36	8	0.10875	1.00023	473.2	4.35	Lateral, Gage, Middle	NIAR	180 ± 5°F	Ken G.	MTS 318.10	9/16/2002
"B" Panel	*Average*				3.86						
	Std, Dev.				0.277						
	COV, %				7.16						

90° Tension - Strength
(180°F/Wet)

Toray Composites (America), Inc.

FAA Project No: TC1616SE-A-12
Test Plan Document: TCQAL-T-1018 Rev. A - Test Plan
Material Type: P707AG-15
Batch Number: AB020552
Test Method: ASTM D3039
Panel Fabrication: TCA - vacuum bagged at 270°F
Ply Orientation: $(90)_{18}$

TCA Process Specification: TCSPF-T-UD06 Rev. 3
TCA Material Specification: TCSPF-T-UD07 Rev. B
Test Conditions: 180°F
Specimen Preconditioning: moisture saturation per SACMA SRM SRM-11-94
Loading Rate: 0.05 in/min
Control Mode: Stroke

Specimen Panel	Specimen Coupon	Specimen Thickness (in.)	Specimen Width (in.)	Ultimate Load (lbs)	Tensile Strength (ksi)	Failure Location & Comments	Testing Facility	Test Temp (°F)	Test Operator	Test Frame	Test Date
A-43	1	0.10752	0.99990	386.2	3.59	Lateral, Gage, Middle	TCA	180 ± 5°F	Debra W.	Inst 4505	9/9/2002
A-43	3	0.10697	0.99990	342.4	3.20	Lateral, <1W from grip/tab, Bottom	TCA	180 ± 5°F	Debra W.	Inst 4505	9/9/2002
A-43	5	0.10785	0.99953	398.0	3.69	Lateral, Gage, Middle	TCA	180 ± 5°F	Debra W.	Inst 4505	9/9/2002
A-43	7	0.10938	0.99967	337.2	3.08	Lateral, Gage, Middle	TCA	180 ± 5°F	Debra W.	Inst 4505	9/9/2002
A-45	1	0.10763	1.00048	396.2	3.68	Lateral, <1W from grip/tab, Top	TCA	180 ± 5°F	John S.	Inst 4505	9/5/2002
A-45	3	0.10777	1.00065	361.1	3.35	Lateral, <1W from grip/tab, Top	TCA	180 ± 5°F	John S.	Inst 4505	9/5/2002
A-45	5	0.10913	1.00095	336.2	3.08	Lateral, <1W from grip/tab, Top	TCA	180 ± 5°F	John S.	Inst 4505	9/5/2002
A-45	7	0.10842	1.00058	372.4	3.43	Lateral, <1W from grip/tab, Top	TCA	180 ± 5°F	John S.	Inst 4505	9/5/2002
A-43	2	0.10757	0.99975	413.7	3.85	Lateral, Gage, Middle	NIAR	180 ± 5°F	Ken G.	MTS 318.10	9/16/2002
A-43	4	0.10713	0.99993	413.4	3.86	Lateral, <1W from grip/tab, Top	NIAR	180 ± 5°F	Ken G.	MTS 318.10	9/16/2002
A-43	8	0.10723	0.99987	378.9	3.53	Lateral, Gage, Middle	NIAR	180 ± 5°F	Ken G.	MTS 318.10	9/16/2002
A-45	2	0.10758	1.00052	394.3	3.66	Lateral, Gage, Middle	NIAR	180 ± 5°F	Ken G.	MTS 318.10	9/16/2002
A-45	4	0.10825	1.00058	384.0	3.55	Lateral, Gage, Middle	NIAR	180 ± 5°F	Ken G.	MTS 318.10	9/16/2002
A-45	6	0.10892	1.00017	361.0	3.31	Lateral, <1W from grip/tab, Bottom	NIAR	180 ± 5°F	Ken G.	MTS 318.10	9/16/2002
A-45	8	0.10695	1.00100	427.2	3.99	Lateral, Gage, Middle	NIAR	180 ± 5°F	Ken G.	MTS 318.10	9/16/2002
A-47	2	0.10827	1.00040	419.0	3.87	Lateral, Gage, Middle	NIAR	180 ± 5°F	Ken G.	MTS 318.10	9/16/2002
"A" Panel	*Average*				3.55						
	Std, Dev.				0.283						
	COV, %				7.99						
B-44	1	0.10727	1.00072	413.3	3.85	Lateral, Gage, Middle	TCA	180 ± 5°F	John S.	Inst 4505	9/5/2002
B-44	3	0.10795	1.00055	397.8	3.68	Lateral, Gage, Middle	TCA	180 ± 5°F	John S.	Inst 4505	9/5/2002
B-44	5	0.10825	1.00077	368.1	3.40	Lateral, <1W from grip/tab, Bottom	TCA	180 ± 5°F	John S.	Inst 4505	9/5/2002
B-44	7	0.10775	1.00052	423.8	3.93	Lateral, <1W from grip/tab, Bottom	TCA	180 ± 5°F	John S.	Inst 4505	9/5/2002
B-48	1	0.10790	0.99998	429.6	3.98	Lateral, <1W from grip/tab, Bottom	TCA	180 ± 5°F	Debra W.	Inst 4505	8/26/2002
B-48	3	0.10833	1.00033	395.9	3.65	Lateral, <1W from grip/tab, Top	TCA	180 ± 5°F	Debra W.	Inst 4505	8/26/2002
B-48	5	0.10842	1.00057	430.8	3.97	Lateral, Gage, Middle	TCA	180 ± 5°F	Debra W.	Inst 4505	8/26/2002
B-48	7	0.10825	1.00027	430.6	3.98	Lateral, <1W from grip/tab, Top	TCA	180 ± 5°F	Debra W.	Inst 4505	8/26/2002
B-44	2	0.10760	1.00093	375.1	3.48	Lateral, Gage, Middle	NIAR	180 ± 5°F	Ken G.	MTS 318.10	9/16/2002
B-44	4	0.10823	1.00055	393.5	3.63	Lateral, <1W from grip/tab, Bottom	NIAR	180 ± 5°F	Ken G.	MTS 318.10	9/16/2002
B-44	6	0.10835	1.00063	368.6	3.40	Lateral, Gage, Middle	NIAR	180 ± 5°F	Ken G.	MTS 318.10	9/16/2002
B-44	8	0.10670	1.00092	420.6	3.94	Lateral, Gage, Middle	NIAR	180 ± 5°F	Ken G.	MTS 318.10	9/16/2002
B-48	2	0.10825	1.00083	439.0	4.05	Lateral, Gage, Middle	NIAR	180 ± 5°F	Ken G.	MTS 318.10	8/28/2002
B-48	4	0.10855	1.00018	460.4	4.24	Lateral, Gage, Middle	NIAR	180 ± 5°F	Ken G.	MTS 318.10	8/28/2002
B-48	6	0.10837	1.00035	424.9	3.92	Lateral, <1W from grip/tab, Top	NIAR	180 ± 5°F	Ken G.	MTS 318.10	8/28/2002
B-48	8	0.10738	1.00078	400.6	3.73	Lateral, <1W from grip/tab, Top	NIAR	180 ± 5°F	Ken G.	MTS 318.10	8/28/2002
"B" Panel	*Average*				3.80						
	Std, Dev.				0.244						
	COV, %				6.42						

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

Material Type: P707AG-15
Batch Number: AB991033
Test Method: SACMA SRM 1-94
Preconditioning: as machined
Test Conditions: -65°F/Dry
Ply Orientation: $(0)_8$
Testing Facility: TCA
Test Date: 3/23/2000

Test Operator: John Smith
Test Frame: Instron 4510
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: N/A
FV(normalizing): 55.0%
CPT (average): 0.0060 in.
FV(batch average): 54.2%

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
A1-910-041-1-1	0.0480	0.4991	5.12	213.69	213.69	Failure in gage
A1-910-041-1-2	0.0480	0.5013	5.12	212.69	212.69	Failure in gage
A1-910-041-1-3	0.0480	0.4986	4.93	206.09	206.09	Failure in gage
B1-910-041-1-3	0.0480	0.5046	4.60	189.80	189.80	Failure in gage
B1-910-041-1-2	0.0480	0.5000	4.68	194.78	194.78	Failure in gage
B1-910-041-1-4	0.0480	0.5012	4.77	198.22	198.22	Failure in gage
Average	0.0480	0.5008	4.87	202.55	202.55	
Std. Dev.	0.0000	0.0022	0.22	9.81	9.81	
COV, %	0.00	0.43	4.59	4.84	4.84	

Material Type: P707AG-15
Batch Number: AB991033
Test Method: SACMA SRM 1-94
Preconditioning: as machined
Test Conditions: -65°F/Dry
Ply Orientation: $(0)_8$
Testing Facility: Intec
Test Date: 12/17/1999

Test Operator: Joel Patterson
Test Frame: H
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: One axial gage (CEA-06-125UN-350)
FV(normalizing): 55.1%
CPT (average): 0.0060 in.
FV(batch average): 54.2%

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)
A1-910-041-1-1	0.0481	0.4990	624.8	1413	16.4	16.4
B1-910-041-1-1	0.0473	0.4990	641.5	1436	16.8	16.6
Average	0.0477	0.4990			16.6	16.5
Std. Dev.	0.0006	0.0000			0.29	0.09
COV, %	1.19	0.00			1.72	0.54

0° Compression Properties, 75°F (Dry)

Material Type: P707AG-15
Batch Number: AB991033
Test Method: SACMA SRM 1-94
Preconditioning: as machined
Test Conditions: RT/Dry
Ply Orientation: $(0)_8$
Testing Facility: TCA
Test Date: 12/1/1999

Test Operator: John Smith
Test Frame: Instron 4510
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: N/A
FV(normalizing): 55.1%
CPT (average): 0.0060 in.
FV(batch average): 54.2%

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
A1-910-041-1-11	0.0480	0.5031	4.69	194	194	Failure in gage
A2-910-041-1-9	0.0480	0.4995	4.92	205	205	Failure in gage
A2-910-041-1-10	0.0480	0.5010	5.06	210	210	Failure in gage
B1-910-041-1-11	0.0477	0.5024	5.14	215	213	Failure in gage
B2-910-041-1-9	0.0477	0.4995	5.63	237	235	Failure in gage
B2-910-041-1-10	0.0477	0.5005	5.31	223	221	Failure in gage
Average	0.0478	0.5010	5.12	214	213	
Std. Dev.	0.0002	0.0015	0.33	14.6	13.9	
COV, %	0.37	0.30	6.36	6.83	6.54	

Material Type: P707AG-15
Batch Number: AB991033
Test Method: SACMA SRM 1-94
Preconditioning: as machined
Test Conditions: RT/Dry
Ply Orientation: $(0)_8$
Testing Facility: TCA
Test Date: 11/30/1999

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): 55.1%
CPT (average): 0.0060 in.
FV(batch average): 54.2%

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)
A1-910-041-1-2	0.0481	0.5003	473.3	1256	16.3	16.3
B1-910-041-1-2	0.0473	0.4999	461.0	1240	16.5	16.2
Average	0.0477	0.5001			16.4	16.3
Std. Dev.	0.0005	0.0002			0.14	0.05
COV, %	1.13	0.05			0.84	0.29

Material Type: P707AG-15
Batch Number: AB991034
Test Method: SACMA SRM 1-94
Preconditioning: as machined
Test Conditions: RT/Dry
Ply Orientation: $(0)_8$
Testing Facility: TCA
Test Date: 12/8/1999

Test Operator: John Smith
Test Frame: Instron 4510
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: N/A
FV(normalizing): 55.1%
CPT (average): 0.0060 in.
FV(batch average): 54.1%

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
A1-910-042-1-7	0.0485	0.4989	5.30	219	221	Failure in gage
A2-910-042-1-7	0.0485	0.4988	4.57	189	191	Failure in gage
A2-910-042-1-8	0.0485	0.5031	5.45	223	226	Failure in gage
B1-910-042-1-7	0.0480	0.4987	5.01	210	209	Failure in gage
B2-910-042-1-7	0.0480	0.4991	5.42	226	226	Failure in gage
B2-910-042-1-8	0.0480	0.5005	4.76	198	198	Failure in gage
Average	0.0482	0.4998	5.08	211	212	
Std. Dev.	0.0003	0.0017	0.37	14.9	15.0	
COV, %	0.59	0.35	7.19	7.05	7.07	

Material Type: P707AG-15
Batch Number: AB991034
Test Method: SACMA SRM 1-94
Preconditioning: as machined
Test Conditions: RT/Dry
Ply Orientation: $(0)_8$
Testing Facility: TCA
Test Date: 11/30/1999

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): 55.1%
CPT (average): 0.0060 in.
FV(batch average): 54.1%

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)
A1-911-042-1-1	0.0480	0.4972	448.4	1224	16.3	16.2
B1-911-042-1-1	0.0480	0.4979	437.2	1215	16.3	16.3
Average	0.0480	0.4976			16.3	16.3
Std. Dev.	0.0001	0.0005			0.00	0.02
COV, %	0.12	0.10			0.01	0.11

Material Type: P707AG-15
Batch Number: AB991035
Test Method: SACMA SRM 1-94
Preconditioning: as machined
Test Conditions: RT/Dry
Ply Orientation: $(0)_8$
Testing Facility: TCA
Test Date: 12/8/1999

Test Operator: John Smith
Test Frame: Instron 4510
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: N/A
FV(normalizing): 55.1%
CPT (average): 0.0060 in.
FV(batch average): 54.9%

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
A1-910-043-1-7	0.0485	0.4988	4.93	204	206	Failure in gage
A2-910-043-1-7	0.0485	0.4987	4.90	203	205	Failure in gage
A2-910-043-1-8	0.0485	0.5030	4.68	192	194	Failure in gage
B1-910-043-1-7	0.0479	0.4991	4.83	202	202	Failure in gage
B2-910-043-1-7	0.0479	0.4989	5.23	219	218	Failure in gage
B2-910-043-1-8	0.0479	0.5006	5.07	211	211	Failure in gage
Average	0.0482	0.4998	4.94	205	206	
Std. Dev.	0.0003	0.0017	0.19	9.2	8.3	
COV, %	0.71	0.33	3.86	4.49	4.04	

Material Type: P707AG-15
Batch Number: AB991035
Test Method: SACMA SRM 1-94
Preconditioning: as machined
Test Conditions: RT/Dry
Ply Orientation: $(0)_8$
Testing Facility: TCA
Test Date: 11/30/1999

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): 55.1%
CPT (average): 0.0060 in.
FV(batch average): 54.9%

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)
A1-910-043-1-1	0.0482	0.4984	465.3	1250	16.3	16.4
B1-910-043-1-1	0.0473	0.4985	466.0	1244	16.5	16.3
Average	0.0478	0.4985			16.4	16.3
Std. Dev.	0.0006	0.0001			0.11	0.10
COV, %	1.30	0.01			0.68	0.62

0° Compression Properties, 180°F (Dry)

Material Type: P707AG-15
Batch Number: AB991033
Test Method: SACMA SRM 1-94
Preconditioning: as machined
Test Conditions: 180°F/Dry
Ply Orientation: $(0)_8$
Testing Facility: TCA
Test Date: 12/3/1999

Test Operator: John Smith
Test Frame: Instron 4510
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: N/A
FV(normalizing): 55.1%
CPT (average): 0.0060 in.
FV(batch average): 54.2%

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
A1-910-041-1-13	0.0480	0.4987	4.77	199	199	Failure in gage
A1-910-041-1-14	0.0480	0.5011	4.82	200	200	Failure in gage
A2-910-041-1-11	0.0480	0.5030	5.13	213	213	Failure in gage
B1-910-041-1-13	0.0477	0.4992	5.28	222	220	Failure in gage
B1-910-041-1-14	0.0477	0.5009	5.36	224	223	Failure in gage
B2-910-041-1-11	0.0477	0.5028	5.01	209	208	Failure in gage
Average	0.0478	0.5010	5.06	211	210	
Std. Dev.	0.0002	0.0018	0.24	10.5	9.9	
COV, %	0.37	0.35	4.72	4.97	4.70	

Material Type: P707AG-15
Batch Number: AB991033
Test Method: SACMA SRM 1-94
Preconditioning: as machined
Test Conditions: 180°F/Dry
Ply Orientation: $(0)_8$
Testing Facility: TCA
Test Date: 12/9/1999

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): 55.1%
CPT (average): 0.0060 in.
FV(batch average): 54.2%

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)
A1-910-041-1-3	0.0480	0.4990	434.9	1221	16.4	16.4
B1-910-041-1-3	0.0477	0.4990	443.0	1254	17.0	16.9
Average	0.0478	0.4990			16.7	16.7
Std. Dev.	0.0002	0.0000			0.44	0.37
COV, %	0.43	0.00			2.64	2.21

Material Type: P707AG-15
Batch Number: AB991034
Test Method: SACMA SRM 1-94
Preconditioning: as machined
Test Conditions: 180°F/Dry
Ply Orientation: $(0)_8$
Testing Facility: TCA
Test Date: 12/8/1999

Test Operator: John Smith
Test Frame: Instron 4510
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: N/A
FV(normalizing): 55.1%
CPT (average): 0.0060 in.
FV(batch average): 54.1%

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
A1-910-042-1-8	0.0485	0.5013	4.85	200	202	Failure in gage
A1-910-042-1-9	0.0485	0.4997	5.25	217	219	Failure in gage
A2-910-042-1-9	0.0485	0.5011	4.85	200	202	Failure in gage
B1-910-042-1-8	0.0480	0.5010	4.19	174	174	Failure in gage
B1-910-042-1-9	0.0480	0.4993	5.07	211	211	Failure in gage
B2-910-042-1-9	0.0480	0.4998	4.85	202	202	Failure in gage
Average	0.0482	0.5003	4.85	201	202	
Std. Dev.	0.0003	0.0008	0.36	14.6	15.1	
COV, %	0.59	0.17	7.39	7.29	7.49	

Material Type: P707AG-15
Batch Number: AB991034
Test Method: SACMA SRM 1-94
Preconditioning: as machined
Test Conditions: 180°F/Dry
Ply Orientation: $(0)_8$
Testing Facility: TCA
Test Date: 12/9/1999

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): 55.1%
CPT (average): 0.0060 in.
FV(batch average): 54.1%

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)
A1-910-042-1-2	0.0485	0.5023	459.6	1280	16.8	17.0
B1-910-042-1-2	0.0481	0.5021	454.0	1252	16.5	16.6
Average	0.0483	0.5022			16.7	16.8
Std. Dev.	0.0003	0.0001			0.22	0.32
COV, %	0.59	0.03			1.35	1.93

Material Type: P707AG-15
Batch Number: AB991035
Test Method: SACMA SRM 1-94
Preconditioning: as machined
Test Conditions: 180°F/Dry
Ply Orientation: $(0)_8$
Testing Facility: TCA
Test Date: 12/9/1999

Test Operator: John Smith
Test Frame: Instron 4510
Loading Rate: 0.05 in/min
Control Mode: 0.05 in/min
Strain Gage: N/A
FV(normalizing): 55.1%
CPT (average): 0.0060 in.
FV(batch average): 54.9%

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
A1-910-043-1-8	0.0485	0.5011	4.95	204	206	Failure in gage
A1-910-043-1-9	0.0485	0.4995	4.81	198	200	Failure in gage
A2-910-043-1-9	0.0485	0.5009	4.31	177	179	Failure in gage
B1-910-043-1-8	0.0479	0.5006	4.89	204	203	Failure in gage
B1-910-043-1-9	0.0479	0.4999	4.99	208	208	Failure in gage
B2-910-043-1-9	0.0479	0.4994	5.08	213	212	Failure in gage
Average	0.0482	0.5002	4.84	201	201	
Std. Dev.	0.0003	0.0007	0.27	12.4	11.6	
COV, %	0.71	0.15	5.68	6.16	5.74	

Material Type: P707AG-15
Batch Number: AB991035
Test Method: SACMA SRM 1-94
Preconditioning: as machined
Test Conditions: 180°F/Dry
Ply Orientation: $(0)_8$
Testing Facility: TCA
Test Date: 12/9/1999

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): 55.1%
CPT (average): 0.0060 in.
FV(batch average): 54.9%

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)
A1-910-043-1-2	0.0483	0.5003	459.2	1260	16.6	16.7
B1-910-043-1-2	0.0475	0.5000	473.9	1412	19.8	19.5
Average	0.0479	0.5002			18.2	18.1
Std. Dev.	0.0006	0.0002			2.26	2.03
COV, %	1.25	0.04			12.45	11.21

TORAY

Toray Composites (America), Inc.

0° Compression - Strength (180F/Wet)

FAA Project No: TC1616SE-A-12
Test Plan Document: TCQAL-T-1018 - Test Plan
Material Type: P707AG-15
Batch Number: AB991033
Test Method: SACMA SRM 1-94
Panel Fabrication: TCA - vacuum bagged at 270°F
Ply Orientation: $(0)_8$

TCA Process Specification: TCSPF-T-UD06 Rev. 3
TCA Material Specification: TCSPF-T-UD07
Test Conditions: 180 ± 5 °F
Specimen Preconditioning: 145°F ± 5°F, 85 ± 5%RH
moisture equilibrium per SACMA SRM 11-94
Loading Rate: 0.05 in/min
Control Mode: Stroke
CPT (average): 0.0060 in.
Fiber Volume (normalizing): 55.1 %

Specimen		Panel	Specimen	Specimen	Ultimate	Compression Strength		Failure	Testing	Test	Test	Test	Test
Panel	Coupon	Fiber Volume	Thickness	Width	Load	Actual	Normalized	Location & Comments	Facility	Temp	Operator	Frame	Date
		(%)	(in.)	(in.)	(lbs)	(ksi)	(ksi)			(°F)			
A1	910-041-1-3	54.2	0.04530	0.49865	3753	166	157	failure in gage	NIAR	180°F	Yap		6/27/2000
A1	910-041-1-4	54.2	0.04700	0.49938	3890	166	162	failure in gage	NIAR	180°F	Yap		6/27/2000
A1	910-041-1-5	54.2	0.04600	0.49928	3766	164	157	failure in gage	NIAR	180°F	Yap		6/27/2000
A6	910-041-1-8	51.3	0.04775	0.50035	3237	135	135	failure in gage	TCA	180°F	John S.	Inst 4510	6/29/2001
A6	910-041-1-9	51.3	0.04740	0.49928	3734	158	156	failure in gage	TCA	180°F	John S.	Inst 4510	6/29/2001
A6	910-041-1-11	51.3	0.04755	0.50308	3785	158	157	failure in gage	TCA	180°F	John S.	Inst 4510	6/29/2001
"A"	*Average*					158	154						
	Std, Dev.					11.6	9.7						
	COV, %					7.32	6.28						
B6	910-041-1-7	51.3	0.04680	0.49823	4594	197	192	failure in gage	TCA	180°F	John S.	Inst 4510	6/29/2001
B6	910-041-1-8	51.3	0.04695	0.50203	4402	187	183	failure in gage	TCA	180°F	John S.	Inst 4510	6/29/2001
B6	910-041-1-11	51.3	0.04735	0.50027	4402	186	183	failure in gage	TCA	180°F	John S.	Inst 4510	6/29/2001
"B"	*Average*					190	186						
	Std, Dev.					6.21	5.26						
	COV, %					3.27	2.83						

TORAY

Toray Composites (America), Inc.

0° Compression - Strength (180F/Wet)

FAA Project No: TC1616SE-A-12
Test Plan Document: TCQAL-T-1018 - Test Plan
Material Type: P707AG-15
Batch Number: AB991034
Test Method: SACMA SRM 1-94
Panel Fabrication: TCA - vacuum bagged at 270°F
Ply Orientation: $(0)_8$

TCA Process Specification: TCSPF-T-UD06 Rev. 3
TCA Material Specification: TCSPF-T-UD07
Test Conditions: 180 ± 5 °F
Specimen Preconditioning: 145°F ± 5°F, 85 ± 5%RH
moisture equilibrium per SACMA SRM 11-94
Loading Rate: 0.05 in/min
Control Mode: Stroke
CPT (average): 0.0060 in.
Fiber Volume (normalizing): 55.1 %

Specimen		Panel	Specimen	Specimen	Ultimate	Compression Strength		Failure	Testing	Test	Test	Test	Test
Panel	Coupon	Fiber Volume	Thickness	Width	Load	Actual	Normalized	Location & Comments	Facility	Temp	Operator	Frame	Date
		(%)	(in.)	(in.)	(lbs)	(ksi)	(ksi)			(°F)			
A1	910-042-1-1	54.1	0.04683	0.50195	4305	183	179	failure in gage	NIAR	180°F	Lamia		6/27/2000
A6	910-042-1-7	51.3	0.04645	0.49872	4352	188	182	failure in gage	TCA	180°F	John S.	Inst 4510	6/29/2001
A6	910-042-1-10	51.3	0.04640	0.49895	4506	195	188	failure in gage	TCA	180°F	John S.	Inst 4510	6/29/2001
A6	910-042-1-11	51.3	0.04660	0.50023	4486	192	187	failure in gage	TCA	180°F	John S.	Inst 4510	6/29/2001
"A"	*Average*					190	184						
	Std, Dev.					5.10	4.41						
	COV, %					2.69	2.40						
B1	910-042-1-3	54.1	0.04683	0.49952	4294	184	179	failure in gage	NIAR	180°F	Lamia		6/27/2000
B6	910-042-1-8	51.3	0.04670	0.50248	4472	191	185	failure in gage	TCA	180°F	John S.	Inst 4510	6/29/2001
B6	910-042-1-9	51.3	0.04710	0.50003	4093	174	171	failure in gage	TCA	180°F	John S.	Inst 4510	6/29/2001
B6	910-042-1-11	51.3	0.04790	0.50020	3756	157	156	failure in gage	TCA	180°F	John S.	Inst 4510	6/29/2001
"B"	*Average*					176	173						
	Std, Dev.					14.7	12.5						
	COV, %					8.32	7.25						

TORAY

Toray Composites (America), Inc.

0° Compression - Strength (180F/Wet)

FAA Project No:	TC1616SE-A-12	*TCA Process Specification:*	TCSPF-T-UD06 Rev. 3
Test Plan Document:	TCQAL-T-1018 - Test Plan	*TCA Material Specification:*	TCSPF-T-UD07
Material Type:	P707AG-15	*Test Conditions:*	180 ± 5 °F
Batch Number:	AB991035	*Specimen Preconditioning:*	145°F ± 5°F, 85 ± 5%RH
Test Method:	SACMA SRM 1-94		moisture equilibrium per SACMA SRM 11-94
Panel Fabrication:	TCA - vacuum bagged at 270°F	*Loading Rate:*	0.05 in/min
Ply Orientation:	$(0)_8$	*Control Mode:*	Stroke
		CPT (average):	0.0060 in.
		Fiber Volume (normalizing):	55.1 %

Specimen		*Panel*	*Specimen*	*Specimen*	*Ultimate*	*Compression Strength*		*Failure*	*Testing*	*Test*	*Test*	*Test*	*Test*
Panel	*Coupon*	*Fiber Volume*	*Thickness*	*Width*	*Load*	*Actual*	*Normalized*	*Location & Comments*	*Facility*	*Temp*	*Operator*	*Frame*	*Date*
		(%)	*(in.)*	*(in.)*	*(lbs)*	*(ksi)*	*(ksi)*			*(°F)*			
A6	910-043-1-11	51.3	0.04765	0.50250	4413	184	183	failure in gage	TCA	180°F	John S.	Inst 4510	6/29/2001
A6	910-043-1-12	51.3	0.04755	0.49890	4347	183	182	failure in gage	TCA	180°F	John S.	Inst 4510	6/29/2001
A6	910-043-1-7	51.3	0.04805	0.49813	4433	185	185	failure in gage	TCA	180°F	John S.	Inst 4510	6/29/2001
"A"	*Average*					184	183						
	Std, Dev.					0.98	1.96						
	COV, %					0.53	1.07						
B1	910-043-1-1	54.9	0.04567	0.49947	4280	188	179	failure in gage	NIAR	180°F	Lamia		6/27/2000
B1	910-043-1-2	54.9	0.04817	0.49952	4314	179	180	failure in gage	NIAR	180°F	Lamia		6/27/2000
B6	910-043-1-9	51.3	0.04795	0.49980	4060	169	169	failure in gage	TCA	180°F	John S.	Inst 4510	6/29/2001
B6	910-043-1-8	51.3	0.04750	0.50318	4360	182	181	failure in gage	TCA	180°F	John S.	Inst 4510	6/29/2001
B6	910-043-1-7	51.3	0.04720	0.49857	4240	180	177	failure in gage	TCA	180°F	John S.	Inst 4510	6/29/2001
"B"	*Average*					180	177						
	Std, Dev.					6.64	4.57						
	COV, %					3.69	2.58						

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

Material Type: P707AG-15 *Test Operator:* John Smith
Batch Number: AB991033 *Test Frame:* Instron 4510
Test Method: SACMA SRM 1-94 *Loading Rate:* 0.05 in/min
Preconditioning: as machined *Control Mode:* Stroke
Test Conditions: -65°F/Dry *Strain Gage:* N/A
Ply Orientation: $(90)_8$
Testing Facility: TCA *CPT (average):* 0.0060 in.
Test Date: 12/23/1999 *FV(batch average):* 54.2%

Specimen Number	*Specimen Thickness (in.)*	*Specimen Width (in.)*	*Ult. Comp. Load (kips)*	*Ult. Comp. Strength Actual (ksi)*	*Failure Location & Comments*
A1-910-041-1-7	0.0475	0.4988	1.01	42.7	Failure in gage
A2-910-041-1-7	0.0475	0.4987	1.03	43.5	Failure in gage
A2-910-041-1-8	0.0475	0.5007	1.01	42.5	Failure in gage
B1-910-041-1-7	0.0480	0.4989	1.05	44.0	Failure in gage
B2-910-041-1-7	0.0480	0.4990	0.909	37.9	Failure in gage
B2-910-041-1-8	0.0480	0.5005	0.844	35.1	Failure in gage
Average	0.0478	0.4994	0.977	41.0	
Std. Dev.	0.0003	0.0009	0.082	3.60	
COV, %	0.63	0.18	8.37	8.78	

Material Type: P707AG-15 *Test Operator:* Emmanuel Domingo
Batch Number: AB991033 *Test Frame:* I
Test Method: SACMA SRM 1-94 *Loading Rate:* 0.05 in/min
Preconditioning: as machined *Control Mode:* Stroke
Test Conditions: -65°F/Dry *Strain Gage:* One axial gage (CEA-06-125UN-350)
Ply Orientation: $(90)_8$
Testing Facility: Intec *CPT (average):* 0.0060 in.
Test Date: 12/17/1999 *FV(batch average):* 54.2%

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)*
A1-910-041-1-1	0.0473	0.4980	213.9	296	1.74
B1-910-041-1-1	0.0477	0.4980	218.9	330	2.34
Average	0.0475	0.4980			2.04
Std. Dev.	0.0003	0.0000			0.42
COV, %	0.60	0.00			20.62

90° Compression Properties, 75°F (Dry)

Material Type: P707AG-15 | *Test Operator:* John Smith
Batch Number: AB991033 | *Test Frame:* Instron 4510
Test Method: SACMA SRM 1-94 | *Loading Rate:* 0.05 in/min
Preconditioning: as machined | *Control Mode:* Stroke
Test Conditions: RT/Dry | *Strain Gage:* N/A
Ply Orientation: $(90)_8$
Testing Facility: TCA | *CPT (average):* 0.0060 in.
Test Date: 12/1/1999 | *FV(batch average):* 54.2%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ult. Comp. Load (kips)	Ult. Comp. Strength Actual (ksi)	Failure Location & Comments
A1-910-041-1-9	0.0475	0.4995	0.657	27.7	Failure in gage
A1-910-041-1-10	0.0475	0.5004	0.670	28.2	Failure in gage
A2-910-041-1-11	0.0475	0.5031	0.686	28.7	Failure in gage
B1-910-041-1-9	0.0480	0.4996	0.706	29.4	Failure in gage
B1-910-041-1-10	0.0480	0.5011	0.706	29.3	Failure in gage
B2-910-041-1-11	0.0480	0.5031	0.691	28.6	Failure in gage
Average	0.0478	0.5011	0.686	28.7	
Std. Dev.	0.0003	0.0016	0.020	0.66	
COV, %	0.63	0.33	2.85	2.29	

Material Type: P707AG-15 | *Test Operator:* John Smith
Batch Number: AB991033 | *Test Frame:* Instron 4505
Test Method: SACMA SRM 1-94 | *Loading Rate:* 0.05 in/min
Preconditioning: as machined | *Control Mode:* Stroke
Test Conditions: RT/Dry | *Strain Gage:* One axial gage (FAE-12S-AS-S6EL-2)
Ply Orientation: $(90)_8$
Testing Facility: TCA | *CPT (average):* 0.0060 in.
Test Date: 11/30/1999 | *FV(batch average):* 54.2%

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)
A1-910-041-1-2	0.0474	0.5004	127.2	196	1.44
B1-910-041-1-2	0.0480	0.5001	76.2	153	1.59
Average	0.0477	0.5003			1.52
Std. Dev.	0.0004	0.0002			0.11
COV, %	0.85	0.04			7.07

Material Type: P707AG-15 | *Test Operator:* John Smith
Batch Number: AB991034 | *Test Frame:* Instron 4510
Test Method: SACMA SRM 1-94 | *Loading Rate:* 0.05 in/min
Preconditioning: as machined | *Control Mode:* Stroke
Test Conditions: RT/Dry | *Strain Gage:* N/A
Ply Orientation: $(90)_8$
Testing Facility: TCA | *CPT (average):* 0.0060 in.
Test Date: 12/8/1999 | *FV(batch average):* 54.1%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ult. Comp. Load (kips)	Ult. Comp. Strength Actual (ksi)	Failure Location & Comments
A1-910-042-1-7	0.0494	0.4992	0.759	30.8	Failure in gage
A1-910-042-1-8	0.0494	0.5007	0.769	31.1	Failure in gage
A2-910-042-1-7	0.0494	0.4991	0.701	28.5	Failure in gage
B1-910-042-1-7	0.0487	0.4989	0.675	27.8	Failure in gage
B1-910-042-1-8	0.0487	0.5006	0.650	26.6	Failure in gage
B2-910-042-1-7	0.0487	0.4990	0.748	30.7	Failure in gage
Average	0.0490	0.4996	0.717	29.3	
Std. Dev.	0.0003	0.0008	0.049	1.89	
COV, %	0.70	0.17	6.83	6.46	

Material Type: P707AG-15 | *Test Operator:* John Smith
Batch Number: AB991034 | *Test Frame:* Instron 4505
Test Method: SACMA SRM 1-94 | *Loading Rate:* 0.05 in/min
Preconditioning: as machined | *Control Mode:* Stroke
Test Conditions: RT/Dry | *Strain Gage:* One axial gage (FAE-12S-AS-S6EL-2)
Ply Orientation: $(90)_8$
Testing Facility: TCA | *CPT (average):* 0.0060 in.
Test Date: 11/30/1999 | *FV(batch average):* 54.1%

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)
A1-910-042-1-1	0.0486	0.4982	72.4	142	1.43
B1-910-042-1-1	0.0483	0.4983	72.9	144	1.48
Average	0.0484	0.4983			1.46
Std. Dev.	0.0002	0.0001			0.03
COV, %	0.47	0.02			2.35

Material Type: P707AG-15 | *Test Operator:* John Smith
Batch Number: AB991035 | *Test Frame:* Instron 4510
Test Method: SACMA SRM 1-94 | *Loading Rate:* 0.05 in/min
Preconditioning: as machined | *Control Mode:* Stroke
Test Conditions: RT/Dry | *Strain Gage:* N/A
Ply Orientation: $(90)_8$
Testing Facility: TCA | *CPT (average):* 0.0060 in.
Test Date: 12/8/1999 | *FV(batch average):* 54.9%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ult. Comp. Load (kips)	Ult. Comp. Strength Actual (ksi)	Failure Location & Comments
A1-910-043-1-7	0.0488	0.4987	0.707	29.0	Failure in gage
A1-910-043-1-8	0.0488	0.5004	0.663	27.2	Failure in gage
A2-910-043-1-7	0.0488	0.4990	0.745	30.6	Failure in gage
B1-910-043-1-7	0.0488	0.4988	0.682	28.0	Failure in gage
B1-910-043-1-8	0.0488	0.5006	0.658	27.0	Failure in gage
B2-910-043-1-7	0.0488	0.4987	0.714	29.3	Failure in gage
Average	0.0488	0.4994	0.695	28.5	
Std. Dev.	0.0000	0.0009	0.033	1.40	
COV, %	0.03	0.18	4.79	4.90	

Material Type: P707AG-15 | *Test Operator:* John Smith
Batch Number: AB991035 | *Test Frame:* Instron 4505
Test Method: SACMA SRM 1-94 | *Loading Rate:* 0.05 in/min
Preconditioning: as machined | *Control Mode:* Stroke
Test Conditions: RT/Dry | *Strain Gage:* One axial gage (FAE-12S-AS-S6EL-2)
Ply Orientation: $(90)_8$
Testing Facility: TCA | *CPT (average):* 0.0060 in.
Test Date: 11/30/1999 | *FV(batch average):* 54.9%

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)
A1-910-043-1-1	0.0479	0.4983	83.1	151	1.43	
B1-910-043-1-1	0.0483	0.4983	72.0	141	1.44	
Average	0.0481	0.4983			1.44	
Std. Dev.	0.0003	0.0000			0.01	
COV, %	0.69	0.00			0.41	

90° Compression Properties, 180°F (Dry)

Material Type: P707AG-15 | *Test Operator:* John Smith
Batch Number: AB991033 | *Test Frame:* Instron 4510
Test Method: SACMA SRM 1-94 | *Loading Rate:* 0.05 in/min
Preconditioning: as machined | *Control Mode:* Stroke
Test Conditions: 180°F/Dry | *Strain Gage:* N/A
Ply Orientation: $(90)_8$
Testing Facility: TCA | *CPT (average):* 0.0060 in.
Test Date: 12/8/1999 | *FV(batch average):* 54.2%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ult. Comp. Load (kips)	Ult. Comp. Strength Actual (ksi)	Failure Location & Comments
A1-910-041-1-11	0.0475	0.5031	0.489	20.5	Failure in gage
A2-910-041-1-13	0.0475	0.4991	0.518	21.9	Failure in gage
A2-910-041-1-14	0.0475	0.5005	0.487	20.5	Failure in gage
B1-910-041-1-11	0.0480	0.5030	0.525	21.7	Failure in gage
B2-910-041-1-13	0.0480	0.4988	0.551	23.0	Failure in gage
B2-910-041-1-14	0.0480	0.5005	0.564	23.5	Failure in gage
Average	0.0478	0.5008	0.522	21.8	
Std. Dev.	0.0003	0.0019	0.032	1.25	
COV, %	0.63	0.37	6.06	5.72	

Material Type: P707AG-15 | *Test Operator:* John Smith
Batch Number: AB991033 | *Test Frame:* Instron 4505
Test Method: SACMA SRM 1-94 | *Loading Rate:* 0.05 in/min
Preconditioning: as machined | *Control Mode:* Stroke
Test Conditions: 180°F/Dry | *Strain Gage:* One axial gage (FAE-12S-AS-S6EL-2)
Ply Orientation: $(90)_8$
Testing Facility: TCA | *CPT (average):* 0.0060 in.
Test Date: 12/9/1999 | *FV(batch average):* 54.2%

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)
A1-910-041-1-3	0.0483	0.4991	57.2	118	1.25
B1-910-041-1-3	0.0476	0.4998	50.3	108	1.20
Average	0.0480	0.4994			1.23
Std. Dev.	0.0005	0.0004			0.04
COV, %	1.05	0.09			2.88

Material Type: P707AG-15 | *Test Operator:* John Smith
Batch Number: AB991034 | *Test Frame:* Instron 4510
Test Method: SACMA SRM 1-94 | *Loading Rate:* 0.05 in/min
Preconditioning: as machined | *Control Mode:* Stroke
Test Conditions: 180°F/Dry | *Strain Gage:* N/A
Ply Orientation: $(90)_8$
Testing Facility: TCA | *CPT (average):* 0.0060 in.
Test Date: 12/8/1999 | *FV(batch average):* 54.1%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ult. Comp. Load (kips)	Ult. Comp. Strength Actual (ksi)	Failure Location & Comments
A1-910-042-1-9	0.0494	0.4997	0.549	22.3	Failure in gage
A2-910-042-1-8	0.0494	0.5009	0.524	21.2	Failure in gage
A2-910-042-1-9	0.0494	0.4998	0.470	19.0	Failure in gage
B1-910-042-1-9	0.0487	0.4996	0.525	21.6	Failure in gage
B2-910-042-1-8	0.0487	0.5006	0.536	22.0	Failure in gage
B2-910-042-1-14	0.0487	0.4998	0.503	20.7	Failure in gage
Average	0.0490	0.5001	0.518	21.1	
Std. Dev.	0.0003	0.0005	0.028	1.16	
COV, %	0.70	0.10	5.40	5.50	

Material Type: P707AG-15 | *Test Operator:* John Smith
Batch Number: AB991034 | *Test Frame:* Instron 4505
Test Method: SACMA SRM 1-94 | *Loading Rate:* 0.05 in/min
Preconditioning: as machined | *Control Mode:* Stroke
Test Conditions: 180°F/Dry | *Strain Gage:* One axial gage (FAE-12S-AS-S6EL-2)
Ply Orientation: $(90)_8$
Testing Facility: TCA | *CPT (average):* 0.0060 in.
Test Date: 12/9/1999 | *FV(batch average):* 54.1%

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)
A1-910-042-1-2	0.0489	0.5004	62.2	124	1.25
B1-910-042-1-6	0.0487	0.4982	58.2	118	1.22
Average	0.0488	0.4993			1.24
Std. Dev.	0.0001	0.0015			0.02
COV, %	0.26	0.30			1.75

Material Type: P707AG-15 | *Test Operator:* John Smith
Batch Number: AB991035 | *Test Frame:* Instron 4510
Test Method: SACMA SRM 1-94 | *Loading Rate:* 0.05 in/min
Preconditioning: as machined | *Control Mode:* Stroke
Test Conditions: 180°F/Dry | *Strain Gage:* N/A
Ply Orientation: $(90)_8$
Testing Facility: TCA | *CPT (average):* 0.0060 in.
Test Date: 12/9/1999 | *FV(batch average):* 54.9%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ult. Comp. Load (kips)	Ult. Comp. Strength Actual (ksi)	Failure Location & Comments
A1-910-043-1-9	0.0488	0.4998	0.497	20.4	Failure in gage
A2-910-043-1-8	0.0488	0.5004	0.545	22.3	Failure in gage
A2-910-043-1-9	0.0488	0.4993	0.521	21.4	Failure in gage
B1-910-043-1-9	0.0488	0.4996	0.494	20.3	Failure in gage
B2-910-043-1-8	0.0488	0.5027	0.528	21.5	Failure in gage
B2-910-043-1-14	0.0488	0.5005	0.541	22.1	Failure in gage
Average	0.0488	0.5004	0.521	21.3	
Std. Dev.	0.0000	0.0012	0.021	0.86	
COV, %	0.03	0.25	4.11	4.02	

Material Type: P707AG-15 | *Test Operator:* John Smith
Batch Number: AB991035 | *Test Frame:* Instron 4505
Test Method: SACMA SRM 1-94 | *Loading Rate:* 0.05 in/min
Preconditioning: as machined | *Control Mode:* Stroke
Test Conditions: 180°F/Dry | *Strain Gage:* One axial gage (FAE-12S-AS-S6EL-2)
Ply Orientation: $(90)_8$
Testing Facility: TCA | *CPT (average):* 0.0060 in.
Test Date: 12/9/1999 | *FV(batch average):* 54.9%

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)	Norm. (msi)
A1-910-043-1-2	0.0486	0.5007	61.3	120	1.21	
B1-910-043-1-2	0.0486	0.5006	56.3	117	1.24	
Average	0.0486	0.5007			1.23	
Std. Dev.	0.0000	0.0001			0.03	
COV, %	0.00	0.01			2.10	

90° Compression Properties, 180°F (Wet)

Material Type: P707AG-15 *Test Operator:* John Smith
Batch Number: AB991033 *Test Frame:* Instron 4510
Test Method: SACMA SRM 1-94 *Loading Rate:* 0.05 in/min
Preconditioning: Section 3.2 of AGATE *Control Mode:* Stroke
Test Conditions: 180°F *Strain Gage:* N/A
Ply Orientation: $(90)_8$
Testing Facility: TCA *CPT (average):* 0.0060 in.
Test Date: 6/5/2000 *FV(batch average):* 54.2%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ult. Comp. Load (kips)	Ult. Comp. Strength Actual (ksi)	Failure Location & Comments
A1-910-041-1-2	0.0480	0.5004	0.386	16.1	Failure in gage
A1-910-041-1-3	0.0480	0.5006	0.415	17.3	Failure in gage
B1-910-041-1-2	0.0480	0.5024	0.432	17.9	Failure in gage
B1-910-041-1-1	0.0480	0.5023	0.422	17.5	Failure in gage
B1-910-041-1-3	0.0480	0.5021	0.446	18.5	Failure in gage
A2-910-041-1-1	0.0480	0.5014	0.403	16.7	Failure in gage
Average	0.0480	0.5015	0.417	17.3	
Std. Dev.	0.0000	0.0009	0.021	0.86	
COV, %	0.00	0.18	5.10	4.97	

Material Type: P707AG-15 *Test Operator:* John Smith
Batch Number: AB991033 *Test Frame:* Instron 4505
Test Method: SACMA SRM 1-94 *Loading Rate:* 0.05 in/min
Preconditioning: Section 3.2 of AGATE *Control Mode:* Stroke
Test Conditions: 180°F *Strain Gage:* One axial gage (FAE-12S-AS-S6EL-2)
Ply Orientation: $(90)_8$
Testing Facility: TCA *CPT (average):* 0.0060 in.
Test Date: 3/7/2000 *FV(batch average):* 54.2%

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)
A1-910-041-1-4	0.0475	0.5005	53.2	110	1.19
B1-910-041-1-4	0.0483	0.5003	62.0	116	1.12
Average	0.0479	0.5004			1.15
Std. Dev.	0.0006	0.0002			0.05
COV, %	1.21	0.03			4.69

Material Type: P707AG-15 *Test Operator:* John Smith
Batch Number: AB991034 *Test Frame:* Instron 4510
Test Method: SACMA SRM 1-94 *Loading Rate:* 0.05 in/min
Preconditioning: Section 3.2 of AGATE *Control Mode:* Stroke
Test Conditions: 180°F *Strain Gage:* N/A
Ply Orientation: $(90)_8$
Testing Facility: TCA *CPT (average):* 0.0060 in.
Test Date: 6/6/2000 *FV(batch average):* 54.1%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ult. Comp. Load (kips)	Ult. Comp. Strength Actual (ksi)	Failure Location & Comments
A1-910-042-1-1	0.0480	0.5033	0.412	17.0	Failure in gage
A1-910-042-1-3	0.0480	0.5036	0.368	15.2	Failure in gage
A2-910-042-1-2	0.0480	0.5009	0.401	16.7	Failure in gage
B1-910-042-1-1	0.0480	0.5006	0.389	16.2	Failure in gage
B1-910-042-1-3	0.0480	0.5008	0.398	16.6	Failure in gage
B2-910-042-1-1	0.0480	0.5002	0.434	18.1	Failure in gage
Average	0.0480	0.5016	0.400	16.6	
Std. Dev.	0.0000	0.0015	0.022	0.94	
COV, %	0.00	0.30	5.50	5.64	

Material Type: P707AG-15 *Test Operator:* John Smith
Batch Number: AB991034 *Test Frame:* Instron 4505
Test Method: SACMA SRM 1-94 *Loading Rate:* 0.05 in/min
Preconditioning: Section 3.2 of AGATE *Control Mode:* Stroke
Test Conditions: 180°F *Strain Gage:* One axial gage (FAE-12S-AS-S6EL-2)
Ply Orientation: $(90)_8$
Testing Facility: TCA *CPT (average):* 0.0060 in.
Test Date: 3/7/2000 *FV(batch average):* 54.1%

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)
A1-910-042-1-3	0.0494	0.4992	52.9	109	1.14
B1-910-042-1-3	0.0487	0.4992	47.7	100	1.08
Average	0.0490	0.4992			1.11
Std. Dev.	0.0004	0.0000			0.04
COV, %	0.91	0.01			3.56

Material Type: P707AG-15 *Test Operator:* John Smith
Batch Number: AB991035 *Test Frame:* Instron 4510
Test Method: SACMA SRM 1-94 *Loading Rate:* 0.05 in/min
Preconditioning: Section 3.2 of AGATE *Control Mode:* Stroke
Test Conditions: 180°F *Strain Gage:* N/A
Ply Orientation: $(90)_8$
Testing Facility: TCA *CPT (average):* 0.0060 in.
Test Date: 6/6/2000 *FV(batch average):* 54.9%

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ult. Comp. Load (kips)	Ult. Comp. Strength Actual (ksi)	Failure Location & Comments
A1-910-043-1-1	0.0480	0.4995	0.393	16.4	Failure in gage
A1-910-043-1-2	0.0480	0.4996	0.376	15.7	Failure in gage
A2-910-043-1-1	0.0475	0.5004	0.423	17.8	Failure in gage
B1-910-043-1-1	0.0480	0.4994	0.399	16.6	Failure in gage
B1-910-043-1-2	0.0480	0.4993	0.399	16.6	Failure in gage
B2-910-043-1-1	0.0480	0.5012	0.410	17.0	Failure in gage
Average	0.0479	0.4999	0.400	16.7	
Std. Dev.	0.0002	0.0007	0.016	0.70	
COV, %	0.43	0.15	3.97	4.21	

Material Type: P707AG-15 *Test Operator:* John Smith
Batch Number: AB991035 *Test Frame:* Instron 4505
Test Method: SACMA SRM 1-94 *Loading Rate:* 0.05 in/min
Preconditioning: Section 3.2 of AGATE *Control Mode:* Stroke
Test Conditions: 180°F *Strain Gage:* One axial gage (FAE-12S-AS-S6EL-2)
Ply Orientation: $(90)_8$
Testing Facility: TCA *CPT (average):* 0.0060 in.
Test Date: 3/3/2000 *FV(batch average):* 54.9%

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)	Norm. (msi)
A1-910-043-1-3	0.0491	0.4990	69.1	126	1.17	
B1-910-043-1-3	0.0487	0.4992	69.8	129	1.21	
Average	0.0489	0.4991			1.19	
Std. Dev.	0.0002	0.0001			0.03	
COV, %	0.46	0.03			2.48	

Iosipescu In-plane Shear Properties, -65°F (Dry)

Material Type: P707AG-15
Batch Number: AB991033
Test Method: ASTM D5379
Specimen Preconditioning: as machined
Test Conditions: -65°F/Dry
Ply Orientation: $(0/90)_{6S}$
Testing Facility: Intec
Test Date: 12/17/99, 2/23/00

Test Operator: Joel Patterson, Bryan Mines
Test Frame: H
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: One biaxial gage (EA-06-062TV-350)

CPT (average): 0.0060 in.
Fiber Volume(batch average): 54.2%

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*
A1-910-041-1-1	0.1421	0.4520	1498	23.3	0.775	Shear failure in gage
A2-910-041-1-2	0.1431	0.4520	1473	22.8	0.743	Shear failure in gage
B1-910-041-1-1	0.1415	0.4530	1468	22.9	0.760	Shear failure in gage
B2-910-041-1-2	0.1418	0.4540	1501	23.3	0.751	Shear failure in gage
A1-910-041-1-3	0.1438	0.4530	1510	23.2	-	Shear failure in gage
B1-910-041-1-3	0.1419	0.4530	1510	23.5	-	Shear failure in gage
Average	0.1424	0.4528	1493	23.2	0.757	
Std. Dev.	0.0009	0.0008	18	0.27	0.014	
COV, %	0.62	0.17	1.23	1.18	1.81	

[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

Iosipescu In-plane Shear Properties, 75°F (Dry)

Material Type: P707AG-15
Batch Number: AB991033
Test Method: ASTM D5379
Specimen Preconditioning: as machined
Test Conditions: RT/Dry
Ply Orientation: $(0/90)_{6S}$
Testing Facility: TCA
Test Date: 11/29/99, 1/27/00

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 (average): 0.0060 in.
Fiber Volume(batch average): 54.2%

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
A1-910-041-1-32	0.1430	0.4536	1400	21.6	0.625	Shear failure in gage
A1-910-041-1-33	0.1427	0.4449	1412	22.2	0.638	Shear failure in gage
B1-910-041-1-32	0.1434	0.4531	1423	21.9	0.613	Shear failure in gage
B1-910-041-1-33	0.1431	0.4530	1457	22.5	0.615	Shear failure in gage
A1-910-041-1-5	0.1443	0.4533	1421	21.7	-	Shear failure in gage
B1-910-041-1-5	0.1424	0.4527	1453	22.5	-	Shear failure in gage
Average	0.1431	0.4517	1428	22.1	0.623	
Std. Dev.	0.0007	0.0034	23	0.40	0.011	
COV, %	0.47	0.75	1.59	1.83	1.84	

Material Type: P707AG-15
Batch Number: AB991034
Test Method: ASTM D5379
Specimen Preconditioning: as machined
Test Conditions: RT/Dry
Ply Orientation: $(0/90)_{6S}$
Testing Facility: TCA
Test Date: 11/29/99, 1/27/00

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 (average): 0.0060 in.
Fiber Volume(batch average): 54.1%

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
A1-910-042-1-11	0.1438	0.4527	1467	22.5	0.646	Shear failure in gage
A1-910-042-1-12	0.1415	0.4549	1471	22.9	0.639	Shear failure in gage
B1-910-042-1-11	0.1439	0.4522	1432	22.0	0.605	Shear failure in gage
B1-910-042-1-12	0.1405	0.4548	1479	23.1	0.593	Shear failure in gage
A1-910-042-1-1	0.1411	0.4535	1496	23.4	-	Shear failure in gage
B1-910-042-1-1	0.1404	0.4544	1439	22.6	-	Shear failure in gage
Average	0.1419	0.4537	1464	22.7	0.621	
Std. Dev.	0.0016	0.0012	24	0.49	0.026	
COV, %	1.11	0.25	1.66	2.14	4.15	

Material Type: P707AG-15
Batch Number: AB991035
Test Method: ASTM D5379
Specimen Preconditioning: as machined
Test Conditions: RT/Dry
Ply Orientation: $(0/90)_{6S}$
Testing Facility: TCA
Test Date: 11/29/99, 1/27/00

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 (average): 0.0060 in.
Fiber Volume(batch average): 54.9%

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
A1-910-043-1-11	0.1437	0.4533	1463	22.5	0.593	Shear failure in gage
A1-910-043-1-12	0.1443	0.4527	1373	21.0	0.526	Shear failure in gage
B1-910-043-1-11	0.1437	0.4532	1445	22.2	0.602	Shear failure in gage
B1-910-043-1-12	0.1424	0.4528	1497	23.2	0.665	Shear failure in gage
A1-910-043-1-1	0.1433	0.4536	1506	23.2	-	Shear failure in gage
B1-910-043-1-1	0.1401	0.4555	1464	23.0	-	Shear failure in gage
Average	0.1429	0.4535	1458	22.5	0.597	
Std. Dev.	0.0015	0.0010	47	0.83	0.057	
COV, %	1.07	0.22	3.26	3.69	9.54	

[1] **IPS Modulus was calculated from only +45° strain channel due to inaccurate data collected on -45° channel. The +45° channel was multiplied by 2 to determine the shear strain. Modulus is then 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**

Iosipescu In-plane Shear Properties, 180°F (Dry)

Material Type: P707AG-15
Batch Number: AB991033
Test Method: ASTM D5379
Specimen Preconditioning: as machined
Test Conditions: 180°F/Dry
Ply Orientation: $(0/90)_{6S}$
Testing Facility: TCA
Test Date: 11/29/99, 1/28/00

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 (average): 0.0060 in.
Fiber Volume(batch average): 54.2%

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
A1-910-041-1-29	0.1435	0.4536	1164	17.9	0.512	Shear failure in gage
A1-910-041-1-30	0.1436	0.4541	1173	18.0	0.507	Shear failure in gage
B1-910-041-1-29	0.1434	0.4541	1182	18.2	0.493	Shear failure in gage
B1-910-041-1-30	0.1435	0.4550	1208	18.5	0.498	Shear failure in gage
A1-910-041-1-7	0.1444	0.4535	1185	18.1	-	Shear failure in gage
B1-910-041-1-7	0.1429	0.4528	1236	19.1	-	Shear failure in gage
Average	0.1435	0.4538	1191	18.3	0.503	
Std. Dev.	0.0005	0.0007	26	0.45	0.009	
COV, %	0.35	0.16	2.22	2.47	1.71	

Material Type: P707AG-15
Batch Number: AB991034
Test Method: ASTM D5379
Specimen Preconditioning: as machined
Test Conditions: 180°F/Dry
Ply Orientation: $(0/90)_{6S}$
Testing Facility: TCA
Test Date: 11/29/99, 1/28/00

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 (average): 0.0060 in.
Fiber Volume(batch average): 54.1%

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
A1-910-042-1-13	0.1422	0.4549	1232	19.1	0.525	Shear failure in gage
A1-910-042-1-15	0.1431	0.4549	1171	18.0	0.497	Shear failure in gage
B1-910-042-1-13	0.1411	0.4543	1226	19.1	0.520	Shear failure in gage
B1-910-042-1-14	0.1423	0.4543	1254	19.4	0.522	Shear failure in gage
A1-910-042-1-3	0.1424	0.4537	1234	19.1	-	Shear failure in gage
B1-910-042-1-3	0.1425	0.4548	1245	19.2	-	Shear failure in gage
Average	0.1423	0.4545	1227	19.0	0.516	
Std. Dev.	0.0006	0.0005	29	0.50	0.013	
COV, %	0.45	0.10	2.38	2.64	2.49	

Material Type: P707AG-15
Batch Number: AB991035
Test Method: ASTM D5379
Specimen Preconditioning: as machined
Test Conditions: 180°F/Dry
Ply Orientation: $(0/90)_{6S}$
Testing Facility: TCA
Test Date: 11/29/1999, 1/28/00

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 (average): 0.0060 in.
Fiber Volume(batch average): 54.9%

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
A1-910-043-1-13	0.1442	0.4540	1205	18.4	0.486	Shear failure in gage
A1-910-043-1-14	0.1447	0.4557	1207	18.3	0.491	Shear failure in gage
B1-910-043-1-13	0.1401	0.4544	1130	17.8	0.512	Shear failure in gage
B1-910-043-1-14	0.1411	0.4546	1230	19.2	0.543	Shear failure in gage
A1-910-043-1-3	0.1447	0.4536	1228	18.7	-	Shear failure in gage
B1-910-043-1-3	0.1422	0.4539	1228	19.0	-	Shear failure in gage
Average	0.1428	0.4544	1205	18.6	0.508	
Std. Dev.	0.0020	0.0007	38	0.52	0.026	
COV, %	1.39	0.16	3.17	2.81	5.10	

[1] **IPS Modulus was calculated from only +45° strain channel due to inaccurate data collected on -45° channel. The +45° channel was multiplied by 2 to determine the shear strain. Modulus is then 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**

Iosipescu In-plane Shear Properties, 180°F (Wet)

Material Type: P707AG-15
Batch Number: AB991033
Test Method: ASTM D5379
Specimen Preconditioning: per Section 3.2 of AGATE Methodology
Test Conditions: 180°F
Ply Orientation: $(0/90)_{6S}$
Testing Facility: TCA
Test Date: 3/9/2000

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 (average): 0.0060 in.
Fiber Volume(batch average): 54.2%

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
B1-910-041-1-10	0.1428	0.4536	951	14.7	0.471	Shear failure in gage
A1-910-041-1-13	0.1426	0.4533	927	14.3	0.505	Shear failure in gage
A1-910-041-1-12	0.1419	0.4526	921	14.3	0.456	Shear failure in gage
B1-910-041-1-12	0.1423	0.4522	901	14.0	0.443	Shear failure in gage
A1-910-041-1-11	0.1440	0.4525	881	13.5	-	Shear failure in gage
B1-910-041-1-11	0.1420	0.4522	917	14.3	-	Shear failure in gage
Average	0.1426	0.4527	916	14.2	0.469	
Std. Dev.	0.0008	0.0006	24	0.39	0.027	
COV, %	0.55	0.13	2.59	2.78	5.70	

Material Type: P707AG-15
Batch Number: AB991034
Test Method: ASTM D5379
Specimen Preconditioning: per Section 3.2 of AGATE Methodology
Test Conditions: 180°F
Ply Orientation: $(0/90)_{6S}$
Testing Facility: TCA
Test Date: 3/9/2000

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 (average): 0.0060 in.
Fiber Volume(batch average): 54.1%

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
A1-910-042-1-5	0.1432	0.4542	866	13.3	0.443	Shear failure in gage
A1-910-042-1-6	0.1434	0.4540	831	12.8	0.426	Shear failure in gage
B1-910-042-1-5	0.1444	0.4545	873	13.3	0.440	Shear failure in gage
B1-910-042-1-6	0.1447	0.4544	857	13.0	0.445	Shear failure in gage
A1-910-042-1-7	0.1440	0.4544	842	12.9	-	Shear failure in gage
B1-910-042-1-7	0.1440	0.4543	875	13.4	-	Shear failure in gage
Average	0.1440	0.4543	857	13.1	0.439	
Std. Dev.	0.0006	0.0002	18	0.26	0.009	
COV, %	0.40	0.04	2.05	1.97	1.96	

Material Type: P707AG-15
Batch Number: AB991035
Test Method: ASTM D5379
Specimen Preconditioning: per Section 3.2 of AGATE Methodology
Test Conditions: 180°F
Ply Orientation: $(0/90)_{6S}$
Testing Facility: TCA
Test Date: 2/29/2000

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 (average): 0.0060 in.
Fiber Volume(batch average): 54.9%

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
B1-910-043-1-5	0.1436	0.4540	935	14.3	0.451	Shear failure in gage
B1-910-043-1-6	0.1439	0.4542	903	13.8	0.446	Shear failure in gage
A1-910-056-1-8	0.1444	0.4540	914	13.9	0.458	Shear failure in gage
A1-910-056-1-9	0.1447	0.4536	907	13.8	0.447	Shear failure in gage
A1-910-056-1-7	0.1440	0.4540	948	14.5	-	Shear failure in gage
B1-910-056-1-7	0.1440	0.4537	938	14.4	-	Shear failure in gage
Average	0.1441	0.4539	924	14.1	0.451	
Std. Dev.	0.0004	0.0002	18	0.30	0.005	
COV, %	0.26	0.05	2.00	2.13	1.21	

[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

Iosipescu In-plane Shear Strength, Fluid Sensitivity

Fluid: Jet Fuel

Material Type: P707AG-15
Batch Number: AB991033
Test Method: ASTM D5379
Specimen Preconditioning: at RT for 500 hrs
Test Temperature: 180°F
Ply Orientation: $(0/90)_{6S}$
Testing Facility: TCA
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 (average): 0.0060 in.
Fiber Volume(batch average): 54.2%

Specimen Number	Specimen Thickness (in.)	Notch Width (in.)	Ultimate Load (lbs.)	In-plane Shear Strength Actual (ksi)	Failure Location & Comments
A1-910-041-1-15	0.1439	0.4534	1186	18.2	Shear failure in gage
A1-910-041-1-16	0.1444	0.4533	1163	17.8	Shear failure in gage
B1-910-041-1-15	0.1427	0.4535	1169	18.1	Shear failure in gage
B1-910-041-1-16	0.1431	0.4537	1185	18.3	Shear failure in gage
B1-910-041-1-17	0.1434	0.4533	1215	18.7	Shear failure in gage
Average	0.1435	0.4534	1184	18.2	
Std. Dev.	0.0007	0.0002	20	0.34	
COV, %	0.47	0.04	1.71	1.84	

Fluid: Hydraulic Fluid

Material Type: P707AG-15
Batch Number: AB991033
Test Method: ASTM D5379
Specimen Preconditioning: at RT for 60 - 90 minutes
Test Temperature: 180°F
Ply Orientation: $(0/90)_{6S}$
Testing Facility: TCA
Test Date: 12/7/1999
Test Operator: John Smith
Test Frame: Instron 4505
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: N/A
CPT (average): 0.0060 in.
Fiber Volume(batch average): 54.2%

Specimen Number	Specimen Thickness (in.)	Notch Width (in.)	Ultimate Load (lbs.)	In-plane Shear Strength Actual (ksi)	Failure Location & Comments
A1-910-041-1-19	0.1446	0.4531	1159	17.7	Shear failure in gage
A1-910-041-1-20	0.1447	0.4568	1185	17.9	Shear failure in gage
A1-910-041-1-21	0.1441	0.4531	1178	18.0	Shear failure in gage
B1-910-041-1-19	0.1436	0.4536	1196	18.4	Shear failure in gage
B1-910-041-1-20	0.1438	0.4543	1212	18.6	Shear failure in gage
Average	0.1441	0.4542	1186	18.1	
Std. Dev.	0.0005	0.0015	20	0.34	
COV, %	0.32	0.34	1.67	1.90	

Fluid: MEK Solvent

Material Type: P707AG-15
Batch Number: AB991033
Test Method: ASTM D5379
Specimen Preconditioning: at RT for 60 - 90 minutes
Test Temperature: RT
Ply Orientation: $(0/90)_{6S}$
Testing Facility: TCA
Test Date: 12/5/1999
Test Operator: John Smith
Test Frame: Instron 4505
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: N/A
CPT (average): 0.0060 in.
Fiber Volume(batch average): 54.2%

Specimen Number	Specimen Thickness (in.)	Notch Width (in.)	Ultimate Load (lbs.)	In-plane Shear Strength Actual (ksi)	Failure Location & Comments
A1-910-041-1-23	0.1404	0.4510	1424	22.5	Shear failure in gage
A1-910-041-1-24	0.1413	0.4538	1422	22.2	Shear failure in gage
B1-910-041-1-23	0.1420	0.4542	1453	22.5	Shear failure in gage
B1-910-041-1-24	0.1422	0.4539	1472	22.8	Shear failure in gage
B1-910-041-1-25	0.1424	0.4545	1441	22.3	Shear failure in gage
Average	0.1417	0.4535	1442	22.5	
Std. Dev.	0.0008	0.0014	21	0.25	
COV, %	0.59	0.31	1.45	1.11	

Apparent Interlaminar Shear Strength, 75°F (Dry)

Material Type: P707AG-15
Batch Number: AB991033
Test Method: ASTM D2344
Specimen Preconditioning: as machined
Test Conditions: RT/Dry
Ply Orientation: $(0)_{18}$
Testing Facility: TCA
Test Date: 12/5/1999, 4/3/02

Test Operator: John Smith
Test Frame: Instron 4510 & 4505
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: N/A

CPT (average): 0.0060 in.
Fiber Volume(batch average): 54.2%

Specimen Number	Specimen Depth (in.)	Specimen Width (in.)	Span: Thickness Ratio	Ultimate Load (kips)	Short Beam Shear Strength (ksi)	Failure Location & Comments
A1-910-041-1-1	0.10640	0.25010	4:1	469.4	13.2	Shear Failure
A1-910-041-1-2	0.10585	0.25005	4:1	476.0	13.5	Shear Failure
A1-910-041-1-3	0.10670	0.25015	4:1	482.0	13.5	Shear Failure
A1-910-041-1-4	0.10520	0.25050	4:1	482.2	13.7	Shear Failure
A1-910-041-1-5	0.10660	0.25010	4:1	449.1	12.6	Shear Failure
A1-910-041-1-6	0.10525	0.25060	4:1	459.8	13.1	Shear Failure
B1-910-041-1-1	0.10515	0.25025	4:1	442.1	12.6	Shear Failure
B1-910-041-1-2	0.10530	0.24965	4:1	480.6	13.7	Shear Failure
B1-910-041-1-3	0.10430	0.24870	4:1	464.1	13.4	Shear Failure
B1-910-041-1-4	0.10445	0.25045	4:1	464.7	13.3	Shear Failure
B1-910-041-1-5	0.10515	0.24985	4:1	453.2	12.9	Shear Failure
B1-910-041-1-6	0.10580	0.25015	4:1	418.6	11.9	Shear Failure
Average	0.10551	0.25005		461.8	13.1	
Std. Dev.	0.00078	0.00050		18.9	0.547	
COV, %	0.74	0.20		4.10	4.17	

Material Type: P707AG-15
Batch Number: AB991034
Test Method: ASTM D2344
Specimen Preconditioning: as machined
Test Conditions: RT/Dry
Ply Orientation: $(0)_{18}$
Testing Facility: TCA
Test Date: 12/5/1999, 4/3/02

Test Operator: John Smith
Test Frame: Instron 4510 & 4505
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: N/A

CPT (average): 0.0060 in.
Fiber Volume(batch average): 54.1%

Specimen Number	Specimen Depth (in.)	Specimen Width (in.)	Span: Thickness Ratio	Ultimate Load (kips)	Short Beam Shear Strength (ksi)	Failure Location & Comments
A1-910-042-1-1	0.10905	0.25040	4:1	493.4	13.6	Shear Failure
A1-910-042-1-2	0.10870	0.25050	4:1	512.5	14.1	Shear Failure
A1-910-042-1-3	0.10960	0.25045	4:1	499.6	13.7	Shear Failure
A1-910-042-1-4	0.10930	0.25045	4:1	469.2	12.9	Shear Failure
A1-910-042-1-5	0.10940	0.25045	4:1	462.3	12.7	Shear Failure
A1-910-042-1-6	0.10840	0.25050	4:1	443.4	12.2	Shear Failure
B1-910-042-1-1	0.10860	0.25000	4:1	533.1	14.7	Shear Failure
B1-910-042-1-2	0.10865	0.25020	4:1	514.9	14.2	Shear Failure
B1-910-042-1-3	0.10690	0.25035	4:1	536.3	15.0	Shear Failure
B1-910-042-1-4	0.10665	0.25050	4:1	498.1	14.0	Shear Failure
B1-910-042-1-5	0.10780	0.24980	4:1	519.8	14.5	Shear Failure
B1-910-042-1-6	0.10760	0.25020	4:1	509.1	14.2	Shear Failure
Average	0.10839	0.25032		499.3	13.8	
Std. Dev.	0.00096	0.00022		28.4	0.851	
COV, %	0.89	0.09		5.69	6.17	

Material Type: P707AG-15
Batch Number: AB991035
Test Method: ASTM D2344
Specimen Preconditioning: as machined
Test Conditions: RT/Dry
Ply Orientation: $(0)_{18}$
Testing Facility: TCA
Test Date: 12/5/1999, 4/3/02

Test Operator: John Smith
Test Frame: Instron 4510 & 4505
Loading Rate: 0.05 in/min
Control Mode: Stroke
Strain Gage: N/A

CPT (average): 0.0060 in.
Fiber Volume(batch average): 54.9%

Specimen Number	Specimen Depth (in.)	Specimen Width (in.)	Span: Thickness Ratio	Ultimate Load (kips)	Short Beam Shear Strength (ksi)	Failure Location & Comments
A1-910-043-1-1	0.10825	0.25035	4:1	502.2	13.9	Shear Failure
A1-910-043-1-2	0.10790	0.25170	4:1	502.6	13.9	Shear Failure
A1-910-043-1-3	0.10845	0.25025	4:1	513.5	14.2	Shear Failure
A1-910-043-1-4	0.10800	0.25025	4:1	491.4	13.6	Shear Failure
A1-910-043-1-5	0.10805	0.25015	4:1	484.3	13.4	Shear Failure
A1-910-043-1-6	0.10845	0.25080	4:1	491.7	13.6	Shear Failure
B1-910-043-1-1	0.10680	0.25065	4:1	490.4	13.7	Shear Failure
B1-910-043-1-2	0.10855	0.25020	4:1	499.2	13.8	Shear Failure
B1-910-043-1-3	0.10795	0.25010	4:1	485.8	13.5	Shear Failure
B1-910-043-1-4	0.10660	0.25065	4:1	470.3	13.2	Shear Failure
B1-910-043-1-5	0.10830	0.25000	4:1	477.6	13.2	Shear Failure
B1-910-043-1-6	0.10755	0.25010	4:1	463.2	12.9	Shear Failure
Average	0.10790	0.25043		489.4	13.6	
Std. Dev.	0.00063	0.00047		14.3	0.353	
COV, %	0.58	0.19		2.93	2.60	

Apparent Interlaminar Shear Strength, 75°F (Dry) - continued

Material Type: P707AG-15 | *Panel Fabrication:* TCA - vacuum bagged at 270°F | *Specimen Preconditioning:* as machined
Batch Number: AB010955 | *Ply Orientation:* $(0)_{18}$ | *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-1	1-1	0.10705	0.25075	0.432	464.9	0.0	464.9	**13.0**	Interlaminar Shear	TCA	73	50	John S.	Inst 4510	5/21/2002
A-1	1-3	0.10750	0.25050	0.432	435.5	0.0	435.5	**12.1**	Interlaminar Shear	TCA	73	50	John S.	Inst 4510	5/21/2002
A-1	1-5	0.10840	0.25025	0.432	435.0	0.0	435.0	**12.0**	Interlaminar Shear	TCA	73	50	John S.	Inst 4510	5/21/2002
A-1	4-7	0.10795	0.24950	0.432	482.2	0.0	482.2	**13.4**	Interlaminar Shear	TCA	73	50	John S.	Inst 4510	5/21/2002
A-1	4-9	0.10765	0.24935	0.432	465.6	0.0	465.6	**13.0**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4510	5/17/2002
A-1	4-11	0.10870	0.24925	0.432	438.2	0.0	438.2	**12.1**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4510	5/17/2002
A-1	8-13	0.10765	0.24980	0.432	450.7	0.0	450.7	**12.6**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4510	5/17/2002
A-1	8-15	0.10880	0.24960	0.432	476.5	0.0	476.5	**13.2**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4510	5/17/2002
A-1	1-2	0.10665	0.25075	0.432	454.0	5.2	459.2	**12.9**	Interlaminar Shear	NIAR	78	65	Ken G.	MTS 318.1	6/3/2002
A-1	1-4	0.10790	0.25030	0.432	426.4	5.2	431.6	**12.0**	Interlaminar Shear	NIAR	78	65	Ken G.	MTS 318.1	6/3/2002
A-1	1-6	0.10860	0.25020	0.432	430.4	5.2	435.6	**12.0**	Interlaminar Shear	NIAR	78	65	Ken G.	MTS 318.1	6/3/2002
A-1	4-8	0.10700	0.24960	0.432	462.9	5.2	468.1	**13.1**	Interlaminar Shear	NIAR	78	65	Ken G.	MTS 318.1	6/3/2002
A-1	4-10	0.10855	0.24930	0.432	457.7	5.2	462.9	**12.8**	Interlaminar Shear	NIAR	78	65	Ken G.	MTS 318.1	6/3/2002
A-1	4-12	0.10910	0.24925	0.432	419.2	5.2	424.4	**11.7**	Interlaminar Shear	NIAR	78	65	Ken G.	MTS 318.1	6/3/2002
A-1	8-14	0.10785	0.24970	0.432	456.6	5.2	461.8	**12.9**	Interlaminar Shear	NIAR	78	65	Ken G.	MTS 318.1	6/3/2002
A-1	8-16	0.10845	0.24950	0.432	432.6	5.2	437.8	**12.1**	Interlaminar Shear	NIAR	78	65	Ken G.	MTS 318.1	6/3/2002
B-2	1-1	0.10795	0.25070	0.432	499.2	0.0	499.2	**13.8**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4510	5/17/2002
B-2	1-3	0.10890	0.25015	0.432	482.3	0.0	482.3	**13.3**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4510	5/17/2002
B-2	1-5	0.10925	0.25015	0.432	486.7	0.0	486.7	**13.4**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4510	5/17/2002
B-2	4-7	0.10770	0.25080	0.432	494.4	0.0	494.4	**13.7**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4510	5/17/2002
B-2	4-9	0.10850	0.25035	0.432	463.1	0.0	463.1	**12.8**	Interlaminar Shear	TCA	73	50	John S.	Inst 4510	5/21/2002
B-2	4-11	0.10855	0.25005	0.432	476.0	0.0	476.0	**13.2**	Interlaminar Shear	TCA	73	50	John S.	Inst 4510	5/21/2002
B-2	8-13	0.10740	0.24975	0.432	437.0	0.0	437.0	**12.2**	Interlaminar Shear	TCA	73	50	John S.	Inst 4510	5/21/2002
B-2	8-15	0.10810	0.24975	0.432	402.1	0.0	402.1	**11.2**	Interlaminar Shear	TCA	73	50	John S.	Inst 4510	5/21/2002
B-2	1-2	0.10850	0.25060	0.432	449.0	5.2	454.2	**12.5**	Interlaminar Shear	NIAR	77	66	Ken G.	MTS 318.1	6/3/2002
B-2	1-4	0.10900	0.25030	0.432	435.1	5.2	440.3	**12.1**	Interlaminar Shear	NIAR	77	66	Ken G.	MTS 318.1	6/3/2002
B-2	1-6	0.10855	0.25010	0.432	447.1	5.2	452.3	**12.5**	Interlaminar Shear	NIAR	77	66	Ken G.	MTS 318.1	6/3/2002
B-2	4-8	0.10815	0.25075	0.432	447.7	5.2	452.9	**12.5**	Interlaminar Shear	NIAR	77	66	Ken G.	MTS 318.1	6/3/2002
B-2	4-10	0.10855	0.25050	0.432	436.5	5.2	441.7	**12.2**	Interlaminar Shear	NIAR	77	66	Ken G.	MTS 318.1	6/3/2002
B-2	4-12	0.10850	0.25040	0.432	477.9	5.2	483.1	**13.3**	Interlaminar Shear	NIAR	77	66	Ken G.	MTS 318.1	6/3/2002
B-2	8-14	0.10775	0.24985	0.432	409.8	5.2	415.0	**11.6**	Interlaminar Shear	NIAR	77	66	Ken G.	MTS 318.1	6/3/2002
B-2	8-16	0.10820	0.24960	0.432	397.1	5.2	402.3	**11.2**	Interlaminar Shear	NIAR	77	66	Ken G.	MTS 318.1	6/3/2002
B-2	8-18	0.10825	0.24950	0.432	409.4	5.2	414.6	**11.5**	Interlaminar Shear	NIAR	77	66	Ken G.	MTS 318.1	6/3/2002
	Average							**12.5**							
	Std, Dev.							**0.704**							
	COV, %							**5.61**							

Material Type: P707AG-15 | *Panel Fabrication:* TCA - vacuum bagged at 270°F | *Specimen Preconditioning:* as machined
Batch Number: AB020234 | *Ply Orientation:* $(0)_{18}$ | *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-13	2-1	0.10805	0.25055	0.432	428.0	0.0	428.0	**11.9**	Interlaminar Shear	TCA	73	50	John S.	Inst 4510	5/21/2002
A-13	2-3	0.10660	0.25035	0.432	475.7	0.0	475.7	**13.4**	Interlaminar Shear	TCA	73	50	John S.	Inst 4510	5/21/2002
A-13	2-5	0.10820	0.25015	0.432	436.1	0.0	436.1	**12.1**	Interlaminar Shear	TCA	73	50	John S.	Inst 4510	5/21/2002
A-13	5-7	0.10725	0.25040	0.432	463.4	0.0	463.4	**12.9**	Interlaminar Shear	TCA	73	50	John S.	Inst 4510	5/21/2002
A-13	5-9	0.10735	0.25040	0.432	484.5	0.0	484.5	**13.5**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4510	5/17/2002
A-13	5-11	0.10855	0.25020	0.432	447.2	0.0	447.2	**12.3**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4510	5/17/2002
A-13	7-13	0.10720	0.24960	0.432	481.9	0.0	481.9	**13.5**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4510	5/17/2002
A-13	7-15	0.10805	0.25035	0.432	466.9	0.0	466.9	**12.9**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4510	5/17/2002
A-13	2-2	0.10745	0.24945	0.432	429.9	5.2	435.1	**12.2**	Interlaminar Shear	NIAR	77	66	Ken G.	MTS 318.1	6/3/2002
A-13	2-4	0.10730	0.25030	0.432	456.5	5.2	461.7	**12.9**	Interlaminar Shear	NIAR	77	66	Ken G.	MTS 318.1	6/3/2002
A-13	2-6	0.10865	0.25020	0.432	446.9	5.2	452.1	**12.5**	Interlaminar Shear	NIAR	77	66	Ken G.	MTS 318.1	6/3/2002
A-13	5-8	0.10675	0.24990	0.432	442.9	5.2	448.1	**12.6**	Interlaminar Shear	NIAR	77	66	Ken G.	MTS 318.1	6/3/2002
A-13	5-10	0.10815	0.25020	0.432	416.1	5.2	421.3	**11.7**	Interlaminar Shear	NIAR	77	66	Ken G.	MTS 318.1	6/3/2002
A-13	5-12	0.10905	0.25020	0.432	408.5	5.2	413.7	**11.4**	Interlaminar Shear	NIAR	77	66	Ken G.	MTS 318.1	6/3/2002
A-13	7-14	0.10700	0.25020	0.432	436.2	5.2	441.4	**12.4**	Interlaminar Shear	NIAR	77	66	Ken G.	MTS 318.1	6/3/2002
A-13	7-16	0.10785	0.25010	0.432	412.9	5.2	418.1	**11.6**	Interlaminar Shear	NIAR	77	66	Ken G.	MTS 318.1	6/3/2002
A-13	7-18	0.10870	0.25010	0.432	387.6	5.2	392.8	**10.8**	Interlaminar Shear	NIAR	77	66	Ken G.	MTS 318.1	6/3/2002
B-14	2-1	0.10670	0.25030	0.432	495.6	0.0	495.6	**13.9**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4510	5/17/2002
B-14	2-3	0.10695	0.25040	0.432	470.1	0.0	470.1	**13.2**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4510	5/17/2002
B-14	2-5	0.10715	0.25030	0.432	455.4	0.0	455.4	**12.7**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4510	5/17/2002
B-14	5-7	0.10730	0.24955	0.432	454.9	0.0	454.9	**12.7**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4510	5/17/2002
B-14	5-9	0.10785	0.25035	0.432	441.0	0.0	441.0	**12.2**	Interlaminar Shear	TCA	73	50	John S.	Inst 4510	5/21/2002
B-14	5-11	0.10745	0.25035	0.432	460.4	0.0	460.4	**12.8**	Interlaminar Shear	TCA	73	50	John S.	Inst 4510	5/21/2002
B-14	7-13	0.10815	0.24995	0.432	412.5	0.0	412.5	**11.4**	Interlaminar Shear	TCA	73	50	John S.	Inst 4510	5/21/2002
B-14	7-15	0.10810	0.24970	0.432	430.0	0.0	430.0	**11.9**	Interlaminar Shear	TCA	73	50	John S.	Inst 4510	5/21/2002
B-14	2-2	0.10710	0.25035	0.432	436.2	5.2	441.4	**12.3**	Interlaminar Shear	NIAR	81	62	Ken G.	MTS 318.1	6/3/2002
B-14	2-4	0.10705	0.25035	0.432	450.0	5.2	455.2	**12.7**	Interlaminar Shear	NIAR	78	65	Ken G.	MTS 318.1	6/3/2002
B-14	2-6	0.10750	0.25025	0.432	463.6	5.2	468.8	**13.1**	Interlaminar Shear	NIAR	78	65	Ken G.	MTS 318.1	6/3/2002
B-14	5-8	0.10725	0.25060	0.432	449.1	5.2	454.3	**12.7**	Interlaminar Shear	NIAR	78	65	Ken G.	MTS 318.1	6/3/2002
B-14	5-10	0.10805	0.25045	0.432	413.4	5.2	418.6	**11.6**	Interlaminar Shear	NIAR	78	66	Ken G.	MTS 318.1	6/3/2002
B-14	5-12	0.10790	0.25020	0.432	428.3	5.2	433.5	**12.0**	Interlaminar Shear	NIAR	77	66	Ken G.	MTS 318.1	6/3/2002
B-14	7-14	0.10785	0.24950	0.432	423.3	5.2	428.5	**11.9**	Interlaminar Shear	NIAR	77	66	Ken G.	MTS 318.1	6/3/2002
B-14	7-16	0.10815	0.24935	0.432	423.1	5.2	428.3	**11.9**	Interlaminar Shear	NIAR	77	66	Ken G.	MTS 318.1	6/3/2002
	Average							**12.4**							
	Std, Dev.							**0.700**							
	COV, %							**5.63**							

Apparent Interlaminar Shear Strength, 75°F (Dry) - continued

Material Type: P707AG-15 *Panel Fabrication:* TCA - vacuum bagged at 270°F *Specimen Preconditioning:* as machined
Batch Number: AB020436 *Ply Orientation:* $(0)_{18}$ *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-25	3-1	0.11110	0.25095	0.432	471.8	0.0	471.8	**12.7**	Interlaminar Shear	TCA	73	50	John S.	Inst 4505	5/20/2002
A-25	3-3	0.10990	0.25095	0.432	501.1	0.0	501.1	**13.6**	Interlaminar Shear	TCA	73	50	John S.	Inst 4505	5/20/2002
A-25	3-5	0.11135	0.25080	0.432	434.2	0.0	434.2	**11.7**	Interlaminar Shear	TCA	73	50	John S.	Inst 4505	5/20/2002
A-25	6-7	0.11075	0.25090	0.432	483.7	0.0	483.7	**13.1**	Interlaminar Shear	TCA	73	50	John S.	Inst 4505	5/20/2002
A-25	6-9	0.11040	0.25020	0.432	478.5	0.0	478.5	**13.0**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4505	5/20/2002
A-25	6-11	0.11130	0.24995	0.432	452.9	0.0	452.9	**12.2**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4505	5/20/2002
A-25	8-13	0.11040	0.25025	0.432	449.8	0.0	449.8	**12.2**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4505	5/20/2002
A-25	8-15	0.11020	0.25015	0.432	460.6	0.0	460.6	**12.5**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4505	5/20/2002
A-25	3-2	0.11055	0.25125	0.432	462.2	5.2	467.4	**12.6**	Interlaminar Shear	NIAR	80	65	Ken G.	MTS 318.1	6/3/2002
A-25	3-4	0.11075	0.25090	0.432	484.3	5.2	489.5	**13.2**	Interlaminar Shear	NIAR	80	65	Ken G.	MTS 318.1	6/3/2002
A-25	3-6	0.11165	0.25090	0.432	414.7	5.2	419.9	**11.2**	Interlaminar Shear	NIAR	80	65	Ken G.	MTS 318.1	6/3/2002
A-25	6-8	0.11045	0.24990	0.432	425.1	5.2	430.3	**11.7**	Interlaminar Shear	NIAR	80	65	Ken G.	MTS 318.1	6/3/2002
A-25	6-10	0.11135	0.24985	0.432	422.8	5.2	428.0	**11.5**	Interlaminar Shear	NIAR	80	65	Ken G.	MTS 318.1	6/3/2002
A-25	6-12	0.11085	0.25000	0.432	447.9	5.2	453.1	**12.3**	Interlaminar Shear	NIAR	80	65	Ken G.	MTS 318.1	6/3/2002
A-25	8-14	0.11025	0.24995	0.432	396.6	5.2	401.8	**10.9**	Interlaminar Shear	NIAR	80	65	Ken G.	MTS 318.1	6/3/2002
A-25	8-16	0.11040	0.24985	0.432	412.3	5.2	417.5	**11.4**	Interlaminar Shear	NIAR	80	63	Ken G.	MTS 318.1	6/3/2002
A-25	8-18	0.11065	0.24970	0.432	427.8	5.2	433.0	**11.8**	Interlaminar Shear	NIAR	80	63	Ken G.	MTS 318.1	6/3/2002
B-26	3-1	0.11080	0.25105	0.446	495.5	0.0	495.5	**13.4**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4505	5/20/2002
B-26	3-3	0.11075	0.25080	0.446	469.0	0.0	469.0	**12.7**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4505	5/20/2002
B-26	3-5	0.11150	0.25075	0.446	480.0	0.0	480.0	**12.9**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4505	5/20/2002
B-26	6-7	0.11105	0.25030	0.446	462.9	0.0	462.9	**12.5**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4505	5/20/2002
B-26	6-9	0.11130	0.25000	0.446	475.8	0.0	475.8	**12.8**	Interlaminar Shear	TCA	73	50	John S.	Inst 4505	5/20/2002
B-26	6-11	0.11165	0.24995	0.446	457.0	0.0	457.0	**12.3**	Interlaminar Shear	TCA	73	50	John S.	Inst 4505	5/20/2002
B-26	8-13	0.11175	0.25040	0.446	450.5	0.0	450.5	**12.1**	Interlaminar Shear	TCA	73	50	John S.	Inst 4505	5/20/2002
B-26	8-15	0.11180	0.25010	0.446	430.2	0.0	430.2	**11.5**	Interlaminar Shear	TCA	73	50	John S.	Inst 4505	5/20/2002
B-26	3-2	0.11145	0.25080	0.446	446.2	5.2	451.4	**12.1**	Interlaminar Shear	NIAR	81	61	Ken G.	MTS 318.1	6/3/2002
B-26	3-4	0.11095	0.25080	0.446	427.5	5.2	432.7	**11.7**	Interlaminar Shear	NIAR	81	61	Ken G.	MTS 318.1	6/3/2002
B-26	3-6	0.11125	0.25065	0.446	425.2	5.2	430.4	**11.6**	Interlaminar Shear	NIAR	81	61	Ken G.	MTS 318.1	6/3/2002
B-26	6-8	0.11145	0.25000	0.446	449.5	5.2	454.7	**12.2**	Interlaminar Shear	NIAR	81	61	Ken G.	MTS 318.1	6/3/2002
B-26	6-10	0.11145	0.25010	0.446	452.9	5.2	458.1	**12.3**	Interlaminar Shear	NIAR	81	61	Ken G.	MTS 318.1	6/3/2002
B-26	6-12	0.11205	0.25000	0.446	447.6	5.2	452.8	**12.1**	Interlaminar Shear	NIAR	81	61	Ken G.	MTS 318.1	6/3/2002
B-26	8-14	0.11195	0.25010	0.446	401.8	5.2	407.0	**10.9**	Interlaminar Shear	NIAR	81	61	Ken G.	MTS 318.1	6/3/2002
B-26	8-16	0.11225	0.25020	0.446	386.4	5.2	391.6	**10.5**	Interlaminar Shear	NIAR	81	61	Ken G.	MTS 318.1	6/3/2002
B-26	8-18	0.11250	0.25010	0.446	407.9	5.2	413.1	**11.0**	Interlaminar Shear	NIAR	81	61	Ken G.	MTS 318.1	6/3/2002
	Average							**12.1**							
	Std, Dev.							**0.758**							
	COV, %							**6.26**							

Material Type: P707AG-15 *Panel Fabrication:* TCA - vacuum bagged at 270°F *Specimen Preconditioning:* as machined
Batch Number: AB020552 *Ply Orientation:* $(0)_{18}$ *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-37	1-1	0.10725	0.24980	0.432	436.0	0.0	436.0	**12.2**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4505	5/20/2002
A-37	1-3	0.10695	0.24945	0.432	452.1	0.0	452.1	**12.7**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4505	5/20/2002
A-37	1-5	0.10680	0.24950	0.432	421.1	0.0	421.1	**11.9**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4505	5/20/2002
A-37	3-7	0.10725	0.24990	0.432	442.6	0.0	442.6	**12.4**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4505	5/20/2002
A-37	3-9	0.10670	0.24955	0.432	413.7	0.0	413.7	**11.7**	Interlaminar Shear	TCA	73	50	John S.	Inst 4505	5/20/2002
A-37	3-11	0.10680	0.24960	0.432	444.7	0.0	444.7	**12.5**	Interlaminar Shear	TCA	73	50	John S.	Inst 4505	5/20/2002
A-37	8-13	0.10715	0.25040	0.432	418.3	0.0	418.3	**11.7**	Interlaminar Shear	TCA	73	50	John S.	Inst 4505	5/20/2002
A-37	8-15	0.10700	0.24905	0.432	401.4	0.0	401.4	**11.3**	Interlaminar Shear	TCA	73	50	John S.	Inst 4505	5/20/2002
A-37	1-2	0.10670	0.24980	0.432	431.5	5.2	436.7	**12.3**	Interlaminar Shear	NIAR	79	64	Ken G	MTS 318.1	6/3/2002
A-37	1-4	0.10680	0.24960	0.432	429.1	5.2	434.3	**12.2**	Interlaminar Shear	NIAR	79	64	Ken G	MTS 318.1	6/3/2002
A-37	1-6	0.10720	0.24945	0.432	410.9	5.2	416.1	**11.7**	Interlaminar Shear	NIAR	79	64	Ken G	MTS 318.1	6/3/2002
A-37	3-8	0.10655	0.24950	0.432	445.7	5.2	450.9	**12.7**	Interlaminar Shear	NIAR	79	64	Ken G	MTS 318.1	6/3/2002
A-37	3-10	0.10685	0.24970	0.432	415.0	5.2	420.2	**11.8**	Interlaminar Shear	NIAR	79	64	Ken G	MTS 318.1	6/3/2002
A-37	3-12	0.10691	0.24940	0.432	426.4	5.2	431.6	**12.1**	Interlaminar Shear	NIAR	79	64	Ken G	MTS 318.1	6/3/2002
A-37	8-14	0.10715	0.24980	0.432	369.9	5.2	375.1	**10.5**	Interlaminar Shear	NIAR	79	64	Ken G	MTS 318.1	6/3/2002
A-37	8-16	0.10700	0.24970	0.432	397.0	5.2	402.2	**11.3**	Interlaminar Shear	NIAR	79	64	Ken G	MTS 318.1	6/3/2002
A-37	8-18	0.10735	0.24995	0.432	385.4	5.2	390.6	**10.9**	Interlaminar Shear	NIAR	79	64	Ken G	MTS 318.1	6/3/2002
B-38	1-1	0.10825	0.25030	0.432	451.6	0.0	451.6	**12.5**	Interlaminar Shear	TCA	73	50	John S.	Inst 4505	5/20/2002
B-38	1-3	0.10800	0.25050	0.432	415.6	0.0	415.6	**11.5**	Interlaminar Shear	TCA	73	50	John S.	Inst 4505	5/20/2002
B-38	1-5	0.10870	0.25030	0.432	403.2	0.0	403.2	**11.1**	Interlaminar Shear	TCA	73	50	John S.	Inst 4505	5/20/2002
B-38	3-7	0.10780	0.25005	0.432	470.0	0.0	470.0	**13.1**	Interlaminar Shear	TCA	73	50	John S.	Inst 4505	5/20/2002
B-38	3-9	0.10755	0.24990	0.432	479.9	0.0	479.9	**13.4**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4505	5/20/2002
B-38	3-11	0.10840	0.24975	0.432	446.7	0.0	446.7	**12.4**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4505	5/20/2002
B-38	8-13	0.10675	0.25050	0.432	405.3	0.0	405.3	**11.4**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4505	5/20/2002
B-38	8-15	0.10715	0.25040	0.432	396.3	0.0	396.3	**11.1**	Interlaminar Shear	TCA	73	50	Debra W.	Inst 4505	5/20/2002
B-38	1-2	0.10800	0.25060	0.432	417.4	5.2	422.6	**11.7**	Interlaminar Shear	NIAR	79	66	Ken G	MTS 318.1	6/3/2002
B-38	1-4	0.10885	0.25030	0.432	407.8	5.2	413.0	**11.4**	Interlaminar Shear	NIAR	79	66	Ken G	MTS 318.1	6/3/2002
B-38	1-6	0.10850	0.25010	0.432	423.2	5.2	428.4	**11.8**	Interlaminar Shear	NIAR	79	66	Ken G	MTS 318.1	6/3/2002
B-38	3-8	0.10740	0.24945	0.432	448.6	5.2	453.8	**12.7**	Interlaminar Shear	NIAR	79	66	Ken G	MTS 318.1	6/3/2002
B-38	3-10	0.10835	0.24975	0.432	419.4	5.2	424.6	**11.8**	Interlaminar Shear	NIAR	79	66	Ken G	MTS 318.1	6/3/2002
B-38	3-12	0.10835	0.24970	0.432	418.7	5.2	423.9	**11.7**	Interlaminar Shear	NIAR	79	66	Ken G	MTS 318.1	6/3/2002
B-38	8-14	0.10720	0.24995	0.432	360.2	5.2	365.4	**10.2**	Interlaminar Shear	NIAR	79	66	Ken G	MTS 318.1	6/3/2002
B-38	8-16	0.10710	0.25030	0.432	372.2	5.2	377.4	**10.6**	Interlaminar Shear	NIAR	79	66	Ken G	MTS 318.1	6/3/2002
B-38	8-18	0.10785	0.25020	0.432	382.1	5.2	387.3	**10.8**	Interlaminar Shear	NIAR	79	66	Ken G	MTS 318.1	6/3/2002
	Average							**11.8**							
	Std, Dev.							**0.750**							
	COV, %							**6.36**							

APPENDIX G. DATES OF PANEL MANUFACTURE AND COPY OF FAA FORM 8130-3

FAA Form 8130-3
Airworthiness Approval Tag
for

P707AG-15
T700G-12K/#2510
Unidirectional Tape 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-1
4. Organization TORAY COMPOSITES AMERICA		5. Work Order, Contract, or Invoice Number: FAA PROJ NO. TC1616SE-A

6. Item	7. Description	8. Part Number	9. Eligibility *	10. Quantity	11. Serial/Batch Number	12. Status/Work
1.	TEST SAMPLES	P707AG-15		60 EA.		PROTO TYPE

13. Remarks

CONFORMS TO DOC. MATERIAL QUALIFICATIONS FOR EPOXY-BASED PREPREG COMPOSITE MATERIAL SYSTEMS. DTD. 2-1999
DOC. TCSPF-T-UD06, DTD. 9-20-99. REV. —

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	DARF351003N		
17. Name *(Typed or Printed)*:	**18. Date:**	**22. Name** *(Typed or Printed)*	**23. Date:**
WING C. CHIN	10-27-99		

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. P-2
4. Organization TORAY COMPOSITES AMERICA		5. Work Order, Contract, or Invoice Number: FAA PROJ. 002 TC 1616SE-A

6. Item	7. Description	8. Part Number	9. Eligibility *	10. Quantity	11. Serial/Batch Number	12. Status/Work
1.	TEST SAMPLES	F6373C-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	DAREX100XNM		
17. Name *(Typed or Printed)*: WING C. CHIN	**18. Date:** 11-15-99	**22. Name** *(Typed or Printed)*	**23. Date:**

* (Optional) Installer must cross check eligibility with applicable technical data.

P-6

1. UNITED STATES

2.

FAA FORM 8130-3

AIRWORTHINESS APPROVAL TAG

U.S. Department of Transportation
Federal Aviation Administration

4. Organization TORAY
19002 50TH AVE E.
TACOMA WA 98446

5. Work Order, Contract, or Invoice Number:
FAA PROJ NO
TC1606SE-A 10-26-99

6. Item	7. Description	8. Part Number	9. Eligibility *	10. Quantity	11. Serial/Batch Number	12. Status/Work
1.	TEST PANELS	B-3-910-041 A-3-910-041 A-3-910-042 B-3-910-042 A3-910-043		1 1 1 1 1	—	PROTO TYPE
13. Remarks		B-910-043 A-3911-082		1 1		

CONFORMS TO DOC. TCSPF-T-FG03 REV.—, 9-20-99
TCSPF-T-UD06 REV.—, 9-20-99

Limited life parts must be accompanied by maintenance history including total time/total cycles/time since new.

14. New ☒
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	DARF351003NM		
17. Name *(Typed or Printed)*: WING C. CHIN	**18. Date:**	**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. P-7 FAA Project No. TC1616E-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	Test Panels	A4-910-041		1	AB991033	Test Panel
2		A5-910-041		1	AB991033	Test Panel
3		B4-910-041		1	AB991033	Test Panel
4		B5-910-041		1	AB991033	Test Panel
5		A4-910-042		1	AB991034	Test Panel
6		A5-910-042		1	AB991034	Test Panel
7		B4-910-042		1	AB991034	Test Panel
8		B5-910-042		1	AB991034	Test Panel
9		A4-910-043		1	AB991035	Test Panel
10		A5-910-043		1	AB991035	Test Panel
11		B4-910-043		1	AB991035	Test Panel
12		B5-910-043		1	AB991035	Test Panel

13. Remarks
Conforms to Doc. TCSPF-T-UD06 Rev. 2 UD 8-9-00

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	DAR51003NM		
17. Name *(Typed or Printed):*	**18. Date**	**22. Name** *(Typed or Printed):*	**23. Date**
Wing C. Chin	12-15-2000		

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. # P-8 FAA Project No. TC1616E-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	Test Panels	A6-910-041		1	AB991033	Test Panel
2		A7-910-041		1	AB991033	Test Panel
3		B6-910-041		1	AB991033	Test Panel
4		B7-910-041		1	AB991033	Test Panel
5		A6-910-042		1	AB991034	Test Panel
6		A7-910-042		1	AB991034	Test Panel
7		B6-910-042		1	AB991034	Test Panel
8		B7-910-042		1	AB991034	Test Panel
9		A6-910-043		1	AB991035	Test Panel
10		A7-910-043		1	AB991035	Test Panel
11		B6-910-043		1	AB991035	Test Panel
12		B7-910-043		1	AB991035	Test Panel

13. Remarks
Conforms to Doc. TCSPF-T-UD06 Rev. 13, DATE 12/18/00

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):*	**18. Date**	**22. Name** *(Typed or Printed):*	**23. Date**
Wing C. Chin	1-4-2001		

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-1
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	90° Tension Test Panel	3, 4, 5, 6, 7, 8, 9, 10, 11, 12	N/A – Test Panels	10	AB010955	N/A – Test Panels
2	90° Tension Test Panel	15, 16, 17, 18, 19, 20, 21, 22, 23, 24	N/A – Test Panels	10	AB020234	N/A – Test Panels
3	90° Tension Test Panel	27, 28, 29, 30, 31, 32, 33, 34, 35, 36	N/A – Test Panels	10	AB020436	N/A – Test Panels
4	90° Tension Test Panel	39, 40, 41, 42, 43, 44, 45, 46, 47, 48	N/A – Test Panels	10	AB020552	N/A – Test Panels

13. Remarks
CONFORMITY
These test panels will be used to machine 90° Tensile 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-UD06, 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	5-8-2002		

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.

1. Approving National Aviation Authority/Country:	2.	3. System Tracking Ref. No. #P-2
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	1, 2	N/A – Test Panels	2	AB010955	N/A – Test Panels
2	SBS Test Panel	13, 14	N/A – Test Panels	2	AB020234	N/A – Test Panels
3	SBS Test Panel	25, 26	N/A – Test Panels	2	AB020436	N/A – Test Panels
4	SBS Test Panel	37, 38	N/A – Test Panels	2	AB020552	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-UD06, 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	DARF 351003NW		
17. Name (*Typed or Printed*):	**18. Date**	**22. Name (*Typed or Printed*):**	**23. Date**
WING 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
Airworthiness Approval Tag
for

P707AG-15
T700G-12K/#2510
Unidirectional Tape 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. # 1 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	12	AB991033 A1-910-041-1-1 to 1-12	Test Specimens
2	0° Tension, Oven A			12	AB991033 A2-910-041-1-1 to 1-12	Test Specimens
3	0° Tension, Oven B			12	AB991033 B1-910-041-1-1 to 2-6	Test Specimens
4	0° Tension, Oven B			12	AB991033 B2-910-041-1-1 to 2-6	Test Specimens

11/22/99

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	AB991033	0° Tension, Oven A	1	1	1	1	8	12
2	AB991033	0° Tension, Oven A	1	1	1	1	8	12
3	AB991033	0° Tension, Oven B	1	1	1	1	8	12
4	AB991033	0° Tension, Oven B	1	1	1	1	8	12

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:
WC Chin	DARF351003NM		
17. Name *(Typed or Printed)*: Wing C. Chin	18. Date 11-22-99	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	AB991033 A1-910-041-1-1 to 1-10	Test Specimens
2	90° Tension, Oven A			10	AB991033 A2-910-041-1-1 to 1-10	Test Specimens
3	90° Tension, Oven B			10	AB991033 B1-910-041-1-1 to 1-10	Test Specimens
4	90° Tension, Oven B			10	AB991033 B2-910-041-1-1 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	AB991033	90° Tension, Oven A	1	1	1	1	6	10
2	AB991033	90° Tension, Oven A	1	1	1	1	6	10
3	AB991033	90° Tension, Oven B	1	1	1	1	6	10
4	AB991033	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:
WC Chin	DARF391003N		
17. Name *(Typed or Printed)*: Wing C. Chin	18. Date 11-22-99	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. # 3 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	AB991033 A1-910-041-1-7 to 1-18	Test Specimens
2	0° Comp. Strength, Oven A			12	AB991033 A2-910-041-1-7 to 1-18	Test Specimens
3	0° Comp. Strength, Oven B			12	AB991033 B1-910-041-1-7 to 1-18	Test Specimens
4	0° Comp. Strength, Oven B			12	AB991033 B2-910-041-1-7 to 1-18	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	AB991033	0° Comp. Strength, Oven A	2	1	2	-	7	12
2	AB991033	0° Comp. Strength, Oven A	1	2	1	-	8	12
3	AB991033	0° Comp. Strength, Oven B	2	1	2	-	7	12
4	AB991033	0° Comp. Strength, Oven B	1	2	1	-	8	12

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:
WC Chin	DRF351003N80		
17. Name *(Typed or Printed):*	**18. Date**	**22. Name** *(Typed or Printed):*	**23. Date**
Wing C. Chin	11-22-99		

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. 3A 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	6	AB991033 A1-910-041-1-1 to 1-6	Test Specimens
2	0° Comp. Strength, Oven B			6	AB991033 B1-910-041-1-1 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	AB991033	0° Comp. Strength, Oven A	3	-	-	-	3	6
2	AB991033	0° Comp. Strength, Oven B	3	-	-	-	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	DAR E351003N		
17. Name *(Typed or Printed)*: Wing C. Chin	18. Date 3-1-00	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	6	AB991033 A1-910-041-1-1 to 1-6	Test Specimens
2	0° Comp. Strength, Oven A			5	AB991033 A2-910-041-2-1 to 2-5	Test Specimens
3	0° Comp. Strength, Oven B			6	AB991033 B1-910-041-1-1 to 1-6	Test Specimens
4	0° Comp. Strength, Oven B			6	AB991033 B2-910-041-2-1 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	AB991033	0° Comp. Strength, Oven A				2	4	6
2	AB991033	0° Comp. Strength, Oven A				1	4	5
3	AB991033	0° Comp. Strength, Oven B				2	4	6
4	AB991033	0° Comp. Strength, Oven B				1	5	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 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 B	AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composites Material Systems, Section 4.5.1, Table 4.3	Model LC40-550FG	14	AB991033 B1-910-041-1-1 to 1-14	Test Specimens

13. Remarks Conformity Inspection in support of FAA Project No. TC1416RC-R, dated 7/18/97

Item	Batch	Specimen Type	-65°F (Dry)	RT (Dry)	180°F (Dry)	180°F (Wet)	Spare	Total	
1	AB991033	0° Comp. Strength, Oven B	-	-	-	3	11	14	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	DAREB51003N		
17. Name *(Typed or Printed):*	**18. Date**	**22. Name** *(Typed or Printed):*	**23. Date**
Wing C. Chin	8-24-2000		

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. # 3D 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	AB991033 A1-910-041-1-1 to 1-14	Test Specimens

13. Remarks Conformity Inspection in support of FAA Project No. TC1416RC-R, dated 7/18/97

Item	Batch	Specimen Type	-65°F (Dry)	RT (Dry)	180°F (Dry)	180°F (Wet)	Spare	Total	
1	AB991033	0° Comp. Strength, Oven A	-	-	-	3	9	12	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-35100-WM		
17. Name *(Typed or Printed):*	**18. Date**	**22. Name** *(Typed or Printed):*	**23. Date**
Wing C. Chin	8-30-2000		

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. # 3E 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	A6-910-041 Quasi Tabs	-Model LC40-550FG	11	AB991033 A6-910-041-1-1 thru 1-11	Test Coupons
2	0° Comp. Strength, Oven A	A6-910-041 Uni Tabs		12	AB991033 A6-910-041-1-1 thru 1-12	Test Coupons
3	0° Comp. Strength, Oven B	B6-910-041 Quasi Tabs		12	AB991033 B6-910-041-1-1 thru 1-12	Test Coupons
4	0° Comp. Strength, Oven B	B6-910-041 Uni Tabs		12	AB991033 B6-910-041-1-1 thru 1-12	Test Coupons

13. Remarks Conformity Inspection in support of FAA Project No. TC1416RC-R, dated 7/18/97

Item	Batch	Coupon Type	-65°F (Dry)	RT (Dry)	180°F (Dry)	180°F (Wet)	Spare	Total
1	AB991033	0° Comp. Strength, A6-910-041 Quasi	-	-	-	3	8	11
2	AB991033	0° Comp. Strength, A6-910-041 Uni	-	-	-	3	9	12
3	AB991033	0° Comp. Strength, B6-910-041 Quasi	-	-	-	3	9	12
4	AB991033	0° Comp. Strength, B6-910-041 Uni	-	-	-	3	9	12

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 DARF3510031M			
17. Name *(Typed or Printed)*: Wing C. Chin	18. Date 2-28-2001	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. # 3F 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	A7-910-041 Quasi Tabs	-Model LC40-550FG	~~11~~ 12	AB991033 A7-910-041-1-1 thru 1-12	Test Coupons
2	0° Comp. Strength, Oven A	A7-910-041 Uni Tabs		12	AB991033 A7-910-041-1-1 thru 1-12	Test Coupons
3	0° Comp. Strength, Oven B	B7-910-041 Quasi Tabs		12	AB991033 B7-910-041-1-1 thru 1-12	Test Coupons
4	0° Comp. Strength, Oven B	B7-910-041 Uni Tabs		12	AB991033 B7-910-041-1-1 thru 1-12	Test Coupons

13. Remarks Conformity Inspection in support of FAA Project No. TC1416RC-R, dated 7/18/97

Item	Batch	Coupon Type	-65°F (Dry)	RT (Dry)	180°F (Dry)	180°F (Wet)	Spare	Total
1	AB991033	0° Comp. Strength, A7-910-041 Quasi	-	-	-	3	9	12
2	AB991033	0° Comp. Strength, A7-910-041 Uni	-	-	-	3	9	12
3	AB991033	0° Comp. Strength, B7-910-041 Quasi	-	-	-	3	9	12
4	AB991033	0° Comp. Strength, B7-910-041 Uni	-	-	-	3	9	12

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	DAOE356003NM		
17. Name (*Typed or Printed*): Wing C. Chin	18. Date 3-6-2001	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. # 4 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	AB991033 A1-910-041-1-7 to 1-18	Test Specimens
2	90° Comp. Strength, Oven A			12	AB991033 A2-910-041-1-7 to 1-18	Test Specimens
3	90° Comp. Strength, Oven B			12	AB991033 B1-910-041-1-7 to 1-18	Test Specimens
4	90° Comp. Strength, Oven B			12	AB991033 B2-910-041-1-7 to 1-18	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	AB991033	90° Comp. Strength, Oven A	1	2	1	-	8	12	Ref. Doc.: AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composite Material Systems, Section 4.5.1, Table 4.3
2	AB991033	90° Comp. Strength, Oven A	2	1	2	-	7	12	
3	AB991033	90° Comp. Strength, Oven B	1	2	1	-	8	12	
4	AB991033	90° Comp. Strength, Oven B	2	1	2	-	7	12	

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:
W C Chin	DAEF351003N00		
17. Name *(Typed or Printed)*: Wing C. Chin	18. Date 11-22-99	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. # 4A 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	6	AB991033 A1-910-041-1-1 to 1-6	Test Specimens
2	90° Comp. Strength, Oven A			6	AB991033 A2-910-041-2-1 to 2-6	Test Specimens
3	90° Comp. Strength, Oven B			6	AB991033 B1-910-041-1-1 to 1-6	Test Specimens
4	90° Comp. Strength, Oven B			5	AB991033 B2-910-041-2-1 to 2-5	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	AB991033	90° Comp. Strength, Oven A				2	4	6
2	AB991033	90° Comp. Strength, Oven A				1	5	6
3	AB991033	90° Comp. Strength, Oven B				2	4	6
4	AB991033	90° Comp. Strength, Oven B				1	4	5

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 F3S1003N M		
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. # 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	AB991033 A1-910-041-1-1 to 1-6	Test Specimens
2	0° Comp Modulus, Oven B			6	AB991033 B1-910-041-1-1 to 1-6	Test Specimens
3	90° Comp Modulus, Oven A			6	AB991033 A1-910-041-1-1 to 1-6	Test Specimens
4	90° Comp Modulus, Oven B			6	AB991033 B1-910-041-1-1 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	AB991033	Tension, Oven A	1	1	1	1	2	6
2	AB991033	Tension, Oven B	1	1	1	1	2	6
3	AB991033	Tension, Oven B	1	1	1	1	2	6
4	AB991033	Tension, 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:
WC Chin	DAR-35100-3NM		
17. Name *(Typed or Printed)*: Wing C. Chin	18. Date 11-22-99	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	AB991033 A1-910-041-1-1 to 1-33	Test Specimens
2	In-Plane Shear Strength, Oven B			33	AB991033 B1-910-041-1-1 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	AB991033	In-Plane Shear Strength, Oven A	2	2	2	2	8	17	33
2	AB991033	In-Plane Shear Strength, Oven B	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

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:
WC Chin	DARF351003N00		
17. Name *(Typed or Printed)*: Wing C. Chin	18. Date 11-22-99	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	AB991033 A1-910-041-1-1 to 1-6	Test Specimens
2	Short Beam Shear			6	AB991033 B1-910-041-1-1 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	AB991033	Short Beam Shear		3			3		Ref. Doc.: AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composite Material Systems, Section 4.5.1, Table 4.3
2	AB991033	Short Beam Shear		3			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:
WC Chin	DAVF351003NM		
17. Name (*Typed or Printed*): Wing C. Chin	18. Date 11-22-99	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	12	AB991034 A1-910-042-1-1 to 2-6	Test Specimens
2	0° Tension, Oven A			12	AB991034 A2-910-042-1-1 to 2-6	Test Specimens
3	0° Tension, Oven B			12	AB991024 B1-910-042-1-1 to 2-6	Test Specimens
4	0° Tension, Oven B			12	AB991034 B2-910-042-1-1 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	AB991034	0° Tension, Oven A	-	1	1	1	9	12	Ref. Doc.: AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composite Material Systems, Section 4.5.1, Table 4.3
2	AB991034	0° Tension, Oven A	-	1	1	1	9	12	
3	AB991034	0° Tension, Oven B	-	1	1	1	9	12	
4	AB991034	0° Tension, Oven B	-	1	1	1	9	12	

Limited life parts must be accompanied by maintenance histo-ry 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

WC Chin

16. FAA Authorization No.:

DAPF351003N10

17. Name *(Typed or Printed)*:

Wing C. Chin

18. Date

11-22-99

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. # 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	AB991034 A1-910-042-1-1 to 1-10	Test Specimens
2	90° Tension, Oven A			10	AB991034 A2-910-042-1-1 to 1-10	Test Specimens
3	90° Tension, Oven B			10	AB991034 B1-910-042-1-1 to 1-10	Test Specimens
4	90° Tension, Oven B			10	AB991034 B2-910-042-1-1 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	AB991034	90° Tension, Oven A	-	1	1	1	7	10
2	AB991034	90° Tension, Oven A	-	1	1	1	7	10
3	AB991034	90° Tension, Oven B	-	1	1	1	7	10
4	AB991034	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:
WC Chin	DAREF351003NM		
17. Name *(Typed or Printed)*: Wing C. Chin	18. Date 11-22-99	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. # 10 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	AB991034 A1-910-042-1-7 to 1-18	Test Specimens
2	0° Comp. Strength, Oven A			12	AB991034 A2-910-042-1-7 to 1-18	Test Specimens
3	0° Comp. Strength, Oven B			12	AB991034 B1-910-042-1-7 to 1-18	Test Specimens
4	0° Comp. Strength, Oven B			12	AB991034 B2-910-042-1-7 to 1-18	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	AB991034	0° Comp. Strength, Oven A	-	1	2	-	9	12
2	AB991034	0° Comp. Strength, Oven A	-	2	1	-	9	12
3	AB991034	0° Comp. Strength, Oven B	-	1	2	-	9	12
4	AB991034	0° Comp. Strength, Oven B	-	2	1	-	9	12

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:
WC Chin	DNPF351003NM		
17. Name (*Typed or Printed*): Wing C. Chin	18. Date 11-22-99	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. # 10A 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	6	AB991034 A1-910-042-1-1 to 1-6	Test Specimens
2	0° Comp. Strength, Oven A			6	AB991034 A2-910-042-2-1 to 2-6	Test Specimens
3	0° Comp. Strength, Oven B			6	AB991034 B1-910-042-1-1 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	AB991034	0° Comp. Strength, Oven A				2	4	6
2	AB991034	0° Comp. Strength, Oven A				1	5	6
3	AB991034	0° Comp. Strength, Oven B				3	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 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. # 10B

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	15	AB991034 A1-910-042-1-1 to 1-15	Test Specimens

13. Remarks Conformity Inspection in support of FAA Project No. TC1416RC-R, dated 7/18/97

Item	Batch	Specimen Type	-65°F (Dry)	RT (Dry)	180°F (Dry)	180°F (Wet)	Spare	Total	
1	AB991034	0° Comp. Strength, Oven A	-	-	-	3	12	15	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.

15. Signature Wing C. Chin

16. FAA Authorization No.: DAZB51003NM

17. Name *(Typed or Printed)*: Wing C. Chin

18. Date 8-24-2000

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.

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. # 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 B	AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composites Material Systems, Section 4.5.1, Table 4.3	Model LC40-550FG	14	AB991034 B1-910-042-1-1 to 1-14	Test Specimens

13. Remarks Conformity Inspection in support of FAA Project No. TC1416RC-R, dated 7/18/97

Item	Batch	Specimen Type	-65°F (Dry)	RT (Dry)	180°F (Dry)	180°F (Wet)	Spare	Total	
1	AB991034	0° Comp. Strength, Oven B	-	-	-	3	11	14	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):*	**18. Date**	**22. Name** *(Typed or Printed):*	**23. Date**
Wing C. Chin	8-30-2000		

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. # 10D 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	A6-910-042 Quasi Tabs	-Model LC40-550FG	12	AB991034 A6-910-042-1-1 thru 1-12	Test Coupons
2	0° Comp. Strength, Oven A	A6-910-042 Uni Tabs		12	AB991034 A6-910-042-1-1 thru 1-12	Test Coupons
3	0° Comp. Strength, Oven B	B6-910-042 Quasi Tabs		12	AB991034 B6-910-042-1-1 thru 1-12	Test Coupons
4	0° Comp. Strength, Oven B	B6-910-042 Uni Tabs		12	AB991034 B6-910-042-1-1 thru 1-12	Test Coupons

13. Remarks Conformity Inspection in support of FAA Project No. TC1416RC-R, dated 7/18/97

Item	Batch	Coupon Type	-65°F (Dry)	RT (Dry)	180°F (Dry)	180°F (Wet)	Spare	Total
1	AB991034	0° Comp. Strength, A6-910-042 Quasi	-	-	-	3	9	12
2	AB991034	0° Comp. Strength, A6-910-042 Uni	-	-	-	3	9	12
3	AB991034	0° Comp. Strength, B6-910-042 Quasi	-	-	-	3	9	12
4	AB991034	0° Comp. Strength, B6-910-042 Uni	-	-	-	3	9	12

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 2-28-2001	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. # 10E 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	A7-910-042 Quasi Tabs	-Model LC40-550FG	12	AB991034 A7-910-042-1-1 thru 1-12	Test Coupons
2	0° Comp. Strength, Oven A	A7-910-042 Uni Tabs		12	AB991034 A7-910-042-1-1 thru 1-12	Test Coupons
3	0° Comp. Strength, Oven B	B7-910-042 Quasi Tabs		12	AB991034 B7-910-042-1-1 thru 1-12	Test Coupons
4	0° Comp. Strength, Oven B	B7-910-042 Uni Tabs		12	AB991034 B7-910-042-1-1 thru 1-12	Test Coupons

13. Remarks Conformity Inspection in support of FAA Project No. TC1416RC-R, dated 7/18/97

Item	Batch	Coupon Type	-65°F (Dry)	RT (Dry)	180°F (Dry)	180°F (Wet)	Spare	Total
1	AB991034	0° Comp. Strength, A7-910-042 Quasi	-	-	-	3	9	12
2	AB991034	0° Comp. Strength, A7-910-042 Uni	-	-	-	3	9	12
3	AB991034	0° Comp. Strength, B7-910-042 Quasi	-	-	-	3	9	12
4	AB991034	0° Comp. Strength, B7-910-042 Uni	-	-	-	3	9	12

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	DARF35100310		
17. Name (*Typed or Printed*): Wing C. Chin	18. Date 3-6-2001	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. # 11 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	AB991034 A1-910-042-1-7 to 1-18	Test Specimens
2	90° Comp. Strength, Oven A			12	AB991034 A2-910-042-1-7 to 1-18	Test Specimens
3	90° Comp. Strength, Oven B			12	AB991034 B1-910-042-1-7 to 1-18	Test Specimens
4	90° Comp. Strength, Oven B			12	AB991034 B2-910-042-1-7 to 1-18	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	AB991034	90° Comp. Strength, Oven A	-	2	1	-	9	12
2	AB991034	90° Comp. Strength, Oven A	-	1	2	-	9	12
3	AB991034	90° Comp. Strength, Oven B	-	2	1	-	9	12
4	AB991034	90° Comp. Strength, Oven B	-	1	2	-	9	12

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:
WC Chin	DAREF351003NM		
17. Name (*Typed or Printed*): Wing C. Chin	18. Date 11-22-99	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. # 11A 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	6	AB991034 A1-910-042-1-1 to 1-6	Test Specimens
2	90° Comp. Strength, Oven A			6	AB991034 A2-910-042-2-1 to 2-6	Test Specimens
3	90° Comp. Strength, Oven B			6	AB991034 B1-910-042-1-6 to 1-6	Test Specimens
4	90° Comp. Strength, Oven B			5	AB991034 B2-910-042-2-1 to 2-5	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	AB991034	90° Comp. Strength, Oven A				2	4	6
2	AB991034	90° Comp. Strength, Oven A				1	5	6
3	AB991034	90° Comp. Strength, Oven B				2	4	6
4	AB991034	90° Comp. Strength, Oven B				1	4	5

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	DARF351003WM		
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. # 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	AB991034 A1-910-042-1-1 to 1-6	Test Specimens
2	0° Comp Modulus, Oven B			6	AB991034 B1-910-042-1-1 to 1-6	Test Specimens
3	90° Comp Modulus, Oven A			6	AB991034 A1-910-042-1-1 to 1-6	Test Specimens
4	90° Comp Modulus, Oven B			6	AB991034 B1-910-042-1-1 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	AB991034	0° Comp Modulus, Oven A	-	1	1	1	3	6
2	AB991034	0° Comp Modulus, Oven B	-	1	1	1	3	6
3	AB991034	90° Comp Modulus, Oven A	-	1	1	1	3	6
4	AB991034	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:
WC Chin	DAR F351003N1M		
17. Name *(Typed or Printed)*: Wing C. Chin	18. Date 11-22-99	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	AB991034 A1-910-042-1-1 to 1-33	Test Specimens
2	In-Plane Shear Strength, Oven B			33	AB991034 B1-910-042-1-1 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	AB991034	In-Plane Shear Strength, Oven A	-	2	2	2	8	19	33	Ref. Doc.: AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composite Material Systems, Section 4.5.1, Table 4.3
2	AB991034	In-Plane Shear Strength, Oven B	-	2	2	2	8	19	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:
WC Chin	DAR F351003N M		
17. Name *(Typed or Printed)*: Wing C. Chin	18. Date 11-22-99	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	AB991034 A1-910-041-1-1 to 1-6	Test Specimens
2	Short Beam Shear			6	AB991034 B1-910-041-1-1 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	AB991034	Short Beam Shear		3			3	6
2	AB991034	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

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)*:	18. Date	22. Name *(Typed or Printed)*:	23. Date
Wing C. Chin	11-22-99		

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. # 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	AB991035 A1-910-043-1-1 to 1-10	Test Specimens
2	0° Tension, Oven A			12	AB991035 A2-910-043-1-1 to 1-12	Test Specimens
3	0° Tension, Oven B			12	AB991035 B1-910-043-1-1 to 2-6	Test Specimens
4	0° Tension, Oven B			12	AB991035 B2-910-043-1-1 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	AB991035	0° Tension, Oven A	-	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
2	AB991035	0° Tension, Oven A	-	1	1	1	9	12	
3	AB991035	0° Tension, Oven B	-	1	1	1	9	12	
4	AB991035	0° Tension, Oven B	-	1	1	1	9	12	

Limited life parts must be accompanied by maintenance histo-ry 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:
WC Chin	DARF35100-3NM		
17. Name *(Typed or Printed)*: Wing C. Chin	18. Date 11-22-99	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	AB991035 A1-910-043-1-1 to 1-10	Test Specimens
2	90° Tension, Oven A			10	AB991035 A2-910-043-1-1 to 1-10	Test Specimens
3	90° Tension, Oven B			10	AB991035 B1-910-043-1-1 to 1-10	Test Specimens
4	90° Tension, Oven B			10	AB991035 B2-910-043-1-1 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	AB991035	90° Tension, Oven A	-	1	1	1	7	10
2	AB991035	90° Tension, Oven A	-	1	1	1	7	10
3	AB991035	90° Tension, Oven B	-	1	1	1	7	10
4	AB991035	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:
WC Chin	DRF 351003N10		
17. Name *(Typed or Printed)*: Wing C. Chin	18. Date 11-22-99	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. # 17 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	AB991034 A1-910-042-1-7 to 1-18	Test Specimens
2	0° Comp. Strength, Oven A			12	AB991034 A2-910-042-1-7 to 1-18	Test Specimens
3	0° Comp. Strength, Oven B			12	AB991034 B1-910-042-1-7 to 1-18	Test Specimens
4	0° Comp. Strength, Oven B			12	AB991034 B2-910-042-1-7 to 1-18	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	AB991034	0° Comp. Strength, Oven A	-	1	2	-	9	12
2	AB991034	0° Comp. Strength, Oven A	-	2	1	-	9	12
3	AB991034	0° Comp. Strength, Oven B	-	1	2	-	9	12
4	AB991034	0° Comp. Strength, Oven B	-	2	1	-	9	12

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:
WC Chin	DAFF351003W		
17. Name *(Typed or Printed)*: Wing C. Chin	18. Date 11-22-99	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. # 17A 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	6	AB991035 A1-910-043-1-1 to 1-6	Test Specimens
2	0° Comp. Strength, Oven A			6	AB991035 A2-910-043-2-1 to 2-6	Test Specimens
3	0° Comp. Strength, Oven B			5	AB991035 B1-910-043-1-1 to 1-5	Test Specimens
4	0° Comp. Strength, Oven B			6	AB991035 B2-910-043-2-1 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	AB991035	0° Comp. Strength, Oven A				2	4	6
2	AB991035	0° Comp. Strength, Oven A				1	5	6
3	AB991035	0° Comp. Strength, Oven B				1	4	5
4	AB991035	0° Comp. Strength, Oven B				2	4	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	DARF351003UM		
17. Name (*Typed or Printed*): Wing C. Chin	18. Date 9-14-2000	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 # 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	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	AB991035 A1-910-043-1-1 to 1-14	Test Specimens
2	0° Comp. Strength, Oven B			12	AB991035 B1-910-043-1-1, B1-910-043-1-3 to B1-910-043-1-13	Test Specimens

13. Remarks Conformity Inspection in support of FAA Project No. TC1416RC-R, dated 7/18/97

Item	Batch	Specimen Type	-65°F (Dry)	RT (Dry)	180°F (Dry)	180°F (Wet)	Spare	Total	
1	AB991035	0° Comp. Strength, Oven A	-	-	-	3	11	14	Ref. Doc.: AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composite Material Systems, Section 4.5.1, Table 4.3
2	AB991035	0° Comp. Strength, Oven B	-	-	-	3	9	12	

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	DAIF351003N		
17. Name (*Typed or Printed*): Wing C. Chin	18. Date 9-30-2000	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	A6-910-043 Quasi Tabs	-Model LC40-550FG	12	AB991035 A6-910-043-1-1 thru 1-12	Test Coupons
2	0° Comp. Strength, Oven A	A6-910-043 Uni Tabs		12	AB991035 A6-910-043-1-1 thru 1-12	Test Coupons
3	0° Comp. Strength, Oven B	B6-910-043 Quasi Tabs		12	AB991035 B6-910-043-1-1 thru 1-12	Test Coupons
4	0° Comp. Strength, Oven B	B6-910-043 Uni Tabs		12	AB991035 B6-910-043-1-1 thru 1-12	Test Coupons

13. Remarks Conformity Inspection in support of FAA Project No. TC1416RC-R, dated 7/18/97

Item	Batch	Coupon Type	-65°F (Dry)	RT (Dry)	180°F (Dry)	180°F (Wet)	Spare	Total
1	AB991035	0° Comp. Strength, A6-910-043 Quasi	-	-	-	3	9	12
2	AB991035	0° Comp. Strength, A6-910-043 Uni	-	-	-	3	9	12
3	AB991035	0° Comp. Strength, B6-910-043 Quasi	-	-	-	3	9	12
4	AB991035	0° Comp. Strength, B6-910-043 Uni	-	-	-	3	9	12

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	DARF3510003N		
17. Name *(Typed or Printed)*: Wing C. Chin	18. Date 2-28-2001	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. # 17D 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	A7-910-043 Quasi Tabs	-Model LC40-550FG	12	AB991035 A7-910-043-1-1 thru 1-12	Test Coupons
2	0° Comp. Strength, Oven A	A7-910-043 Uni Tabs		12	AB991035 A7-910-043-1-1 thru 1-12	Test Coupons
3	0° Comp. Strength, Oven B	B7-910-043 Quasi Tabs		12	AB991035 B7-910-043-1-1 thru 1-12	Test Coupons
4	0° Comp. Strength, Oven B	B7-910-043 Uni Tabs		12	AB991035 B7-910-043-1-1 thru 1-12	Test Coupons

13. Remarks: Conformity Inspection in support of FAA Project No. TC1416RC-R, dated 7/18/97

Item	Batch	Coupon Type	-65°F (Dry)	RT (Dry)	180°F (Dry)	180°F (Wet)	Spare	Total
1	AB991035	0° Comp. Strength, A7-910-043 Quasi	-	-	-	3	9	12
2	AB991035	0° Comp. Strength, A7-910-043 Uni	-	-	-	3	9	12
3	AB991035	0° Comp. Strength, B7-910-043 Quasi	-	-	-	3	9	12
4	AB991035	0° Comp. Strength, B7-910-043 Uni	-	-	-	3	9	12

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	DARF35100-3 Rev M		
17. Name (*Typed or Printed*): Wing C. Chin	18. Date 3-6-2001	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. # 18 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	AB991035 A1-910-043-1-7 to 1-18	Test Specimens
2	90° Comp. Strength, Oven A			12	AB991035 A2-910-043-1-7 to 1-18	Test Specimens
3	90° Comp. Strength, Oven B			12	AB991035 B1-910-043-1-7 to 1-18	Test Specimens
4	90° Comp. Strength, Oven B			12	AB991035 B2-910-043-1-7 to 1-18	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	AB991035	90° Comp. Strength, Oven A	-	2	1	-	9	12	Ref. Doc.: AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composite Material Systems, Section 4.5.1, Table 4.3
2	AB991035	90° Comp. Strength, Oven A	-	1	2	-	9	12	
3	AB991035	90° Comp. Strength, Oven B	-	2	1	-	9	12	
4	AB991035	90° Comp. Strength, Oven B	-	1	2	-	9	12	

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:
WC Chin	DRF361003NM		
17. Name *(Typed or Printed)*: Wing C. Chin	18. Date 11-22-99	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. # 18A 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	4	AB991035 A1-910-043-1-1 to 1-4	Test Specimens
2	90° Comp. Strength, Oven A			5	AB991035 A2-910-043-2-1 to 2-5	Test Specimens
3	90° Comp. Strength, Oven B			5	AB991035 B1-910-043-1-1 to 1-5	Test Specimens
4	90° Comp. Strength, Oven B			6	AB991035 B2-910-043-2-1 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	AB991035	90° Comp. Strength, Oven A				1	3	4
2	AB991035	90° Comp. Strength, Oven A				2	3	5
3	AB991035	90° Comp. Strength, Oven B				1	4	5
4	AB991035	90° Comp. Strength, Oven B				2	4	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	DA1RF351003NM		
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. # 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	AB991035 A1-910-043-1-1 to 1-6	Test Specimens
2	0° Comp Modulus, Oven B			6	AB991035 B1-910-043-1-1 to 1-6	Test Specimens
3	90° Comp Modulus, Oven A			6	AB991035 A1-910-043-1-1 to 1-6	Test Specimens
4	90° Comp Modulus, Oven B			6	AB991035 B1-910-043-1-1 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	AB991035	0° Comp Modulus, Oven A	-	1	1	1	3	6
2	AB991035	0° Comp Modulus, Oven B	-	1	1	1	3	6
3	AB991035	90° Comp Modulus, Oven A	-	1	1	1	3	6
4	AB991035	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:
WC Chin	DXPF351003N[illegible]		
17. Name *(Typed or Printed)*: Wing C. Chin	18. Date 11-22-99	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	AB991035 A1-910-043-1-1 to 1-33	Test Specimens
2	In-Plane Shear Strength, Oven B			33	AB991035 B1-910-043-1-1 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	AB991035	In-Plane Shear Strength, Oven A	-	2	2	2	8	19	33	Ref. Doc.: AGATE Material Qualification Methodology for Epoxy-Based Prepreg Composite Material Systems, Section 4.5.1, Table 4.3
2	AB991035	In-Plane Shear Strength, Oven B	-	2	2	2	8	19	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:
W.C. Chin	DAF351003NWD		
17. Name *(Typed or Printed)*: Wing C. Chin	18. Date 11-22-99	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. # 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	AB991035 A1-910-043-1-1 to 1-6	Test Specimens
2	Short Beam Shear			6	AB991035 B1-910-043-1-1 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	AB991035	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	AB991035	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	DALF351003N6		
17. Name *(Typed or Printed)*: Wing C. Chin	18. Date 11-22-99	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: UNITED STATES	2. **AUTHORIZED RELEASE CERTIFICATE** **FAA Form 8130-3, AIRWORTHINESS APPROVAL TAG**	3. System Tracking Ref. No. #S-1 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-1 1-1 thru 1-6	N/A – Test Coupons	6	AB010955	N/A – Test Coupons
2	SBS Test Specimens	A-1 4-7 thru 4-12	N/A – Test Coupons	6	AB010955	N/A – Test Coupons
3	SBS Test Specimens	A-1 8-13 thru 8-18	N/A – Test Coupons	6	AB010955	N/A – Test Coupons
4	SBS Test Specimens	B-2 1-1 thru 1-6	N/A – Test Coupons	6	AB010955	N/A – Test Coupons
5	SBS Test Specimens	B-2 4-7 thru 4-12	N/A – Test Coupons	6	AB010955	N/A – Test Coupons
6	SBS Test Specimens	B-2 8-13 thru 8-18	N/A – Test Coupons	6	AB010955	N/A – Test Coupons

13. Remarks
CONFORMITY
The coupons will be used to test 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-UD06, 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:
	DARF351003NM		
17. Name (*Typed or Printed*):	**18. Date**	**22. Name (*Typed or Printed*):**	**23. Date**
WINK 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: UNITED STATES	2. **AUTHORIZED RELEASE CERTIFICATE** **FAA Form 8130-3, AIRWORTHINESS APPROVAL TAG**	3. System Tracking Ref. No. #S-2 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-13 2-1 thru 2-6	N/A – Test Coupons	6	AB020234	N/A – Test Coupons
2	SBS Test Specimens	A-13 5-7 thru 5-12	N/A – Test Coupons	6	AB020234	N/A – Test Coupons
3	SBS Test Specimens	A-13 7-13 thru 7-18	N/A – Test Coupons	6	AB020234	N/A – Test Coupons
4	SBS Test Specimens	B-14 2-1 thru 2-6	N/A – Test Coupons	6	AB020234	N/A – Test Coupons
5	SBS Test Specimens	B-14 5-7 thru 5-12	N/A – Test Coupons	6	AB020234	N/A – Test Coupons
6	SBS Test Specimens	B-14 7-13 thru 7-18	N/A – Test Coupons	6	AB020234	N/A – Test Coupons

13. Remarks
CONFORMITY
The coupons will be used to test 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-UD06, 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	DARF351003NM		
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-3 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-25 3-1 thru 3-6	N/A – Test Coupons	6	AB020436	N/A – Test Coupons
2	SBS Test Specimens	A-25 6-7 thru 6-12	N/A – Test Coupons	6	AB020436	N/A – Test Coupons
3	SBS Test Specimens	A-25 8-13 thru 8-18	N/A – Test Coupons	6	AB020436	N/A – Test Coupons
4	SBS Test Specimens	B-26 3-1 thru 3-6	N/A – Test Coupons	6	AB020436	N/A – Test Coupons
5	SBS Test Specimens	B-26 6-7 thru 6-12	N/A – Test Coupons	6	AB020436	N/A – Test Coupons
6	SBS Test Specimens	B-26 8-13 thru 8-18	N/A – Test Coupons	6	AB020436	N/A – Test Coupons

13. Remarks
CONFORMITY
The coupons will be used to test 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-UD06, 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:
WINGO C. CHIN	DAQF351003N4P		
17. Name (*Typed or Printed*):	**18. Date**	**22. Name (*Typed or Printed*):**	**23. Date**
WINGO 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-4
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-37 1-1 thru 1-6	N/A – Test Coupons	6	AB020552	N/A – Test Coupons
2	SBS Test Specimens	A-37 3-7 thru 3-12	N/A – Test Coupons	6	AB020552	N/A – Test Coupons
3	SBS Test Specimens	A-37 8-13 thru 8-18	N/A – Test Coupons	6	AB020552	N/A – Test Coupons
4	SBS Test Specimens	B-38 1-1 thru 1-6	N/A – Test Coupons	6	AB020552	N/A – Test Coupons
5	SBS Test Specimens	B-38 3-7 thru 3-12	N/A – Test Coupons	6	AB020552	N/A – Test Coupons
6	SBS Test Specimens	B-38 8-13 thru 8-18	N/A – Test Coupons	6	AB020552	N/A – Test Coupons

13. Remarks
CONFORMITY
The coupons will be used to test 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-UD06, 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	DAOF351003NM		
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: UNITED STATES	2. **AUTHORIZED RELEASE CERTIFICATE** FAA Form 8130-3, AIRWORTHINESS APPROVAL TAG	3. System Tracking Ref. No. #S-9 FAA Project No. TD5195E-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	90° Tension Test Specimens	AB010955 A-3-1 thru A-3-8	N/A – Test Coupons	8	AB010955	N/A – Test Panels Coupons
2	90° Tension Test Specimens	AB010955 B-4-1 thru B-4-8	N/A – Test Coupons	8	AB010955	N/A – Test Panels Coupons
3	90° Tension Test Specimens	AB010955 A-5-1 thru A-5-8	N/A – Test Coupons	8	AB010955	N/A – Test Panels Coupons
4	90° Tension Test Specimens	AB010955 B-6-1 thru B-6-8	N/A – Test Coupons	8	AB010955	N/A – Test Panels Coupons
5	90° Tension Test Specimens	AB010955 A-7-1 thru A-7-8	N/A – Test Coupons	8	AB010955	N/A – Test Panels Coupons
6	90° Tension Test Specimens	AB010955 B-8-1 thru B-8-8	N/A – Test Coupons	8	AB010955	N/A – Test Panels Coupons
7	90° Tension Test Specimens	AB010955 A-9-1 thru A-9-8	N/A – Test Coupons	8	AB010955	N/A – Test Panels Coupons
8	90° Tension Test Specimens	AB010955 B-10-1 thru B-10-8	N/A – Test Coupons	8	AB010955	N/A – Test Panels Coupons
9	90° Tension Test Specimens	AB010955 A-11-1 thru A-11-8	N/A – Test Coupons	8	AB010955	N/A – Test Panels Coupons
10	90° Tension Test Specimens	AB010955 B-12-1 thru B-12-8	N/A – Test Coupons	8	AB010955	N/A – Test Panels Coupons

13. Remarks CONFORMITY

These test panels will be used to machine 90° Tensile specimens. This is in association with FAA Project Number TD5195E-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-UD06, 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	DARF351003N12		
17. Name (*Typed or Printed*):	**18. Date**	**22. Name (*Typed or Printed*):**	**23. Date**
WING C. CHIN	6-7-2002		

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: UNITED STATES	2. **AUTHORIZED RELEASE CERTIFICATE** FAA Form 8130-3, AIRWORTHINESS APPROVAL TAG	3. System Tracking Ref. No. #S-10 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	90° Tension Test Specimens	AB020234 A-15-1 thru A-15-8	N/A – Test Coupons	8	AB020234	N/A – Test Panels Coupons
2	90° Tension Test Specimens	AB020234 B-16-1 thru B-16-8	N/A – Test Coupons	8	AB020234	N/A – Test Panels Coupons
3	90° Tension Test Specimens	AB020234 A-17-1 thru A-17-8	N/A – Test Coupons	8	AB020234	N/A – Test Panels Coupons
4	90° Tension Test Specimens	AB020234 B-18-1 thru B-18-8	N/A – Test Coupons	8	AB020234	N/A – Test Panels Coupons
5	90° Tension Test Specimens	AB020234 A-19-1 thru A-19-8	N/A – Test Coupons	8	AB020234	N/A – Test Panels Coupons
6	90° Tension Test Specimens	AB020234 B-20-1 thru B-20-8	N/A – Test Coupons	8	AB020234	N/A – Test Panels Coupons
7	90° Tension Test Specimens	AB020234 A-21-1 thru A-21-8	N/A – Test Coupons	8	AB020234	N/A – Test Panels Coupons
8	90° Tension Test Specimens	AB020234 B-22-1 thru B-22-8	N/A – Test Coupons	8	AB020234	N/A – Test Panels Coupons
9	90° Tension Test Specimens	AB020234 A-23-1 thru A-23-8	N/A – Test Coupons	8	AB020234	N/A – Test Panels Coupons
10	90° Tension Test Specimens	AB020234 B-24-1 thru B-24-8	N/A – Test Coupons	8	AB020234	N/A – Test Panels Coupons

13. Remarks CONFORMITY

These test panels will be used to machine 90° Tensile 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-UD06, 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	6-7-2002		

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: UNITED STATES	2. **AUTHORIZED RELEASE CERTIFICATE** FAA Form 8130-3, AIRWORTHINESS APPROVAL TAG	3. System Tracking Ref. No. #S-11 FAA Project No. TD5198E-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	90° Tension Test Specimens	AB020436 A-27-1 thru A-27-8	N/A – Test Coupons	8	AB020436	N/A – Test Panels Coupons
2	90° Tension Test Specimens	AB020436 B-28-1 thru B-28-8	N/A – Test Coupons	8	AB020436	N/A – Test Panels Coupons
3	90° Tension Test Specimens	AB020436 A-29-1 thru A-29-8	N/A – Test Coupons	8	AB020436	N/A – Test Panels Coupons
4	90° Tension Test Specimens	AB020436 B-30-1 thru B-30-8	N/A – Test Coupons	8	AB020436	N/A – Test Panels Coupons
5	90° Tension Test Specimens	AB020436 A-31-1 thru A-31-8	N/A – Test Coupons	8	AB020436	N/A – Test Panels Coupons
6	90° Tension Test Specimens	AB020436 B-32-1 thru B-32-8	N/A – Test Coupons	8	AB020436	N/A – Test Panels Coupons
7	90° Tension Test Specimens	AB020436 A-33-1 thru A-33-8	N/A – Test Coupons	8	AB020436	N/A – Test Panels Coupons
8	90° Tension Test Specimens	AB020436 B-34-1 thru B-34-8	N/A – Test Coupons	8	AB020436	N/A – Test Panels Coupons
9	90° Tension Test Specimens	AB020436 A-35-1 thru A-35-8	N/A – Test Coupons	8	AB020436	N/A – Test Panels Coupons
10	90° Tension Test Specimens	AB020436 B-36-1 thru B-36-8	N/A – Test Coupons	8	AB020436	N/A – Test Panels Coupons

13. Remarks CONFORMITY

These test panels will be used to machine 90° Tensile specimens. This is in association with FAA Project Number TD5198E-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-UD06, 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:
WINC C CHIN	DARF351003DM		
17. Name (*Typed or Printed*):	**18. Date**	**22. Name (*Typed or Printed*):**	**23. Date**
WINC C CHIN	6-7-2002		

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-12 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	90° Tension Test Specimens	AB020552 A-39-1 thru A-39-8	N/A – Test Coupons	8	AB020552	N/A – Test Panels Coupons
2	90° Tension Test Specimens	AB020552 B-40-1 thru B-40-8	N/A – Test Coupons	8	AB020552	N/A – Test Panels Coupons
3	90° Tension Test Specimens	AB020552 A-41-1 thru A-41-8	N/A – Test Coupons	8	AB020552	N/A – Test Panels Coupons
4	90° Tension Test Specimens	AB020552 B-42-1 thru B-42-8	N/A – Test Coupons	8	AB020552	N/A – Test Panels Coupons
5	90° Tension Test Specimens	AB020552 A-43-1 thru A-43-8	N/A – Test Coupons	8	AB020552	N/A – Test Panels Coupons
6	90° Tension Test Specimens	AB020552 B-44-1 thru B-44-8	N/A – Test Coupons	8	AB020552	N/A – Test Panels Coupons
7	90° Tension Test Specimens	AB020552 A-45-1 thru A-45-8	N/A – Test Coupons	8	AB020552	N/A – Test Panels Coupons
8	90° Tension Test Specimens	AB020552 B-46-1 thru B-46-8	N/A – Test Coupons	8	AB020552	N/A – Test Panels Coupons
9	90° Tension Test Specimens	AB020552 A-47-1 thru A-47-8	N/A – Test Coupons	8	AB020552	N/A – Test Panels Coupons
10	90° Tension Test Specimens	AB020552 B-48-1 thru B-48-8	N/A – Test Coupons	8	AB020552	N/A – Test Panels Coupons

13. Remarks CONFORMITY

These test panels will be used to machine 90° Tensile 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-UD06, 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	DXEF351003NM		
17. Name ***(Typed or Printed):***	**18. Date**	**22. Name** ***(Typed or Printed):***	**23. Date**
WING C. CHIN	6-7-2002		

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 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

P707AG-15
T700G-12K/#2510
Unidirectional Tape Prepreg

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

STATEMENT OF COMPLIANCE WITH THE FEDERAL AVIATION REGULATIONS

DATE: JUL 27, 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-1012 New Release	AGATE MATERIAL QUALIFICATION OF T700G / #2510 150g/m2, Unidirectional Tape - TEST REPORT 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 Process Specification TCSPF-T-UD06 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
- [X] Approve these data

SIGNATURE(S) OF DESIGNATED ENGINEERING REPRESENTATIVE(S)	DESIGNATION NUMBERS(S)	CLASSIFICATION(S)
M. Ashizawa	NM-2249	STRUCTURES

FAA Form 8110-3 (11-70) SUPERSEDES PREVIOUS EDITION

GPO 901-613

Conformity Inspection Record	1. Project Number, TIA/Request Date: TC16160SE-A 10-26-99	2. SHEET 1 of Sheets 1
3. Applicant/Manufacturer: PACIFIC AVIATIONS	4. Beginning Date: 8-1-2000	5. Ending Date: 8-30-2000
6. Model: LANCAIR PART CONFORMITY	7. Inspected By: [signature] DAER35100 3 NIR	

8. Item No.	9. Nomenclature of Item Inspected	10. Drawing, Document, Specification, etc.	11. Revision and Date	12. No. of Items Determined SAT.	12. No. of Items Determined UNSAT.	13. Comments
1.	DOC. MQFEBPCMS	N/A	Rel.— 2-99	1		REPEAT TEST SEE FAA FORM 8130-3 FOR QTY. & BATCH NO'S. APPLICANT ADVISED FAA PROJECT ENGR OF THE RETESTING.
2.	DOC. TC.AMS.	TCSPF-T-UD06	Rel.— 9-20-99	1		
3.	DOC. TCADMS	TCSPF-T-FG03	Rel.— 9-20-99	1		

FAA Form 8100-1 [illegible] Supersedes Previous Edition

Conformity Inspection Record

1. Project Number, TIA/Request Date:	2. SHEET of Sheets
TC 1616SE-A 10-26-99	1 1

3. Applicant/Manufacturer:	4. Beginning Date:	5. Ending Date:
PACIFIC AVIATIONS	12-15-00	12-15-00

6. Model:	7. Inspected By:
TEST COUPONS	CRIM DARF35100-3N00

8. Item No.	9. Nomenclature of Item Inspected	10. Drawing, Document, Specification, etc.	11. Revision and Date	12. No. of Items Determined SAT.	12. No. of Items Determined UNSAT.	13. Comments
1.	DOC. MATERIALS	N/A	REV. — 2-99	1		REPEAT TEST SEE FAA 8130-3 FOR P/N'S & QTYS.
2.	DOC. TC AMS	TCSPF-T-UDXG	Rev.2 8-9-00	1		
			Rev.3 12-18-00	1		

FAA Form 8100-1 [illegible] Supersedes Previous Edition

FILE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

REQUEST FOR CONFORMITY

To: Manufacturing Inspection District Office
1601 Lind Ave. SW
Renton, WA 98055-4055

Attention: Jim Doyle

Request for Conformity Inspection

- [ ] Part Conformity
- [ ] Installation
- [x] Other Test Specimen

Project No.: TC1618SE-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) 227-2585

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

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: Laura A. Tourni	Title: 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. Fanni	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 Laura A. Tommi	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 TESPF-T-UD06 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 Jamison	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

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:

None

Signature of Certifier	Title
Laura A. Jimmie	TECHNICAL ENGINEER
Organization: TORAY COMPOSITES (AMERICA), INC.	Date: 4/16/2001

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*U.S.GPO:1994-568-012/56