Advanced General Aviation Transport Experiments

B – Basis Design Allowables for Epoxy – Based Prepreg

FiberCote Graphite Fabric T300 3KPW / E765

AGATE-WP3.3-033051-103

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1.0 INTRODUCTION

1.1 Scope

The test methods and results described in this document are intended to provide basic composite properties essential to most methods of analysis. These properties are considered to provide the initial base of the “building block” approach. Additional coupon level tests and subelement 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
F^{bu}	bearing strength
G_{12}^s	in – plane shear modulus

Superscripts

bu	bearing ultimate
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)
f	fabric

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

D3039-95	Tensile Properties of Polymer Matrix Composite Materials
D5379-93	Shear Properties of Composite Materials by the V-Notched Beam Method
D2344-89	Apparent Interlaminar Shear Strength of Parallel Fiber Composites by Short – Beam Method
D792-91	Density and Specific Gravity (Relative Density) of Plastics by Displacement
D2734-94	Void Content of Reinforced Plastics
D3171-90	Fiber Content of Resin – Matrix Composites by Matrix Digestion
D695-91	Compressive Properties of Rigid Plastics
D5961-96	Bearing Response of Polymer Matrix Composite Laminates

SACMA Standards

SRM 1-94	Compressive Properties of Oriented Fiber-Resin Composites
SRM 8-94	Short Beam Shear Strength of Oriented Fiber-Resin Composites
SRM 18-94	Glass Transition Temperature (T_g) Determination by DMA of Oriented Fiber-Resin Composites

Other Documents

FiberCote Document Number E765 MS100, Material Specification: Carbon Fiber Reinforced Epoxy Resin, Rev. N/A

FiberCote Document Number E765 PS1000, Process Specification: Layup and Cure of Epoxy Prepreg Materials, 270-280°F Curing, Rev. N/A

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 the AGATE report, *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 T300 3KPW graphite fabric 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: Test Matrix and Standards Used

TEST	METHOD	NO. OF REPLICATES PER TEST CONDITION			
		CTD[1]	RTD[2]	ETW[3]	ETD[4]
0° (warp) Tension Strength	ASTM D3039-95	1x4	3x4	3x4	3x4
0° (warp) Tension Modulus, Strength and Poisson's Ratio	ASTM D3039-95	1x2	3x2	3x2	3x2
90° (fill) Tension Strength	ASTM D3039-95	1x4	3x4	3x4	3x4
90° (fill) Tension Modulus and Strength	ASTM D3039-95	1x2	3x2	3x2	3x2
0° (warp) Compression Strength	SACMA SRM 1-94	1x6	3x6	3x6	3x6
0° (warp) Compression Modulus	SACMA SRM 1-94	1x2	3x2	3x2	3x2
90° (fill) Compression Strength	SACMA SRM 1-94	1x6	3x6	3x6	3x6
90° (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° F, moisture content = as fabricated, soak time at –65 was 3 min.)

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

3 ETW: Three prepreg batches of material tested (test temperature = 180 ± 5° 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° 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	Wipe On and Off

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 ± 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)Tensile Strength and Modulus
- 90° (fill) Tensile Strength and Modulus
- 0° (warp)Compression Strength and Modulus
- 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 three primary assumptions:

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

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

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

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

where:

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

1.5.5 Statistical Analysis

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

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

1.5.6 Material Performance Envelope and Interpolation

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

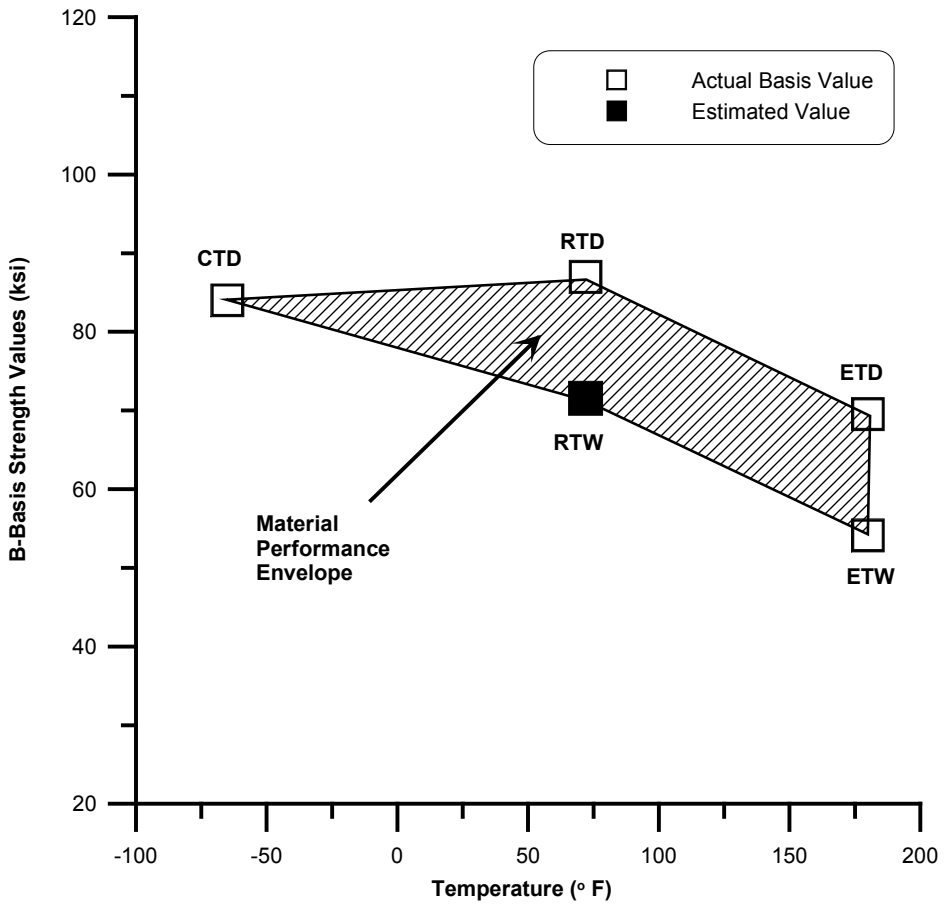


Figure 1.5.1 Material performance envelope.

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

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

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

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

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

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

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

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

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

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

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

1.5.6.1 Interpolation Example

This section provides an example of linear interpolations to a specific application environment less than the tested upper material limit used in qualification. Assuming a specific application environment of 150° F, Figure 1.5.2 depicts the linear interpolation of the B-basis design allowable to this environment. Using the above equations along

with the nominal testing temperatures (see Table 1.5.1), the interpolated basis values at 150° F become

ETD : B_{MOL} = 75.106 ksi

ETW : B_{MOL} = 59.746 ksi

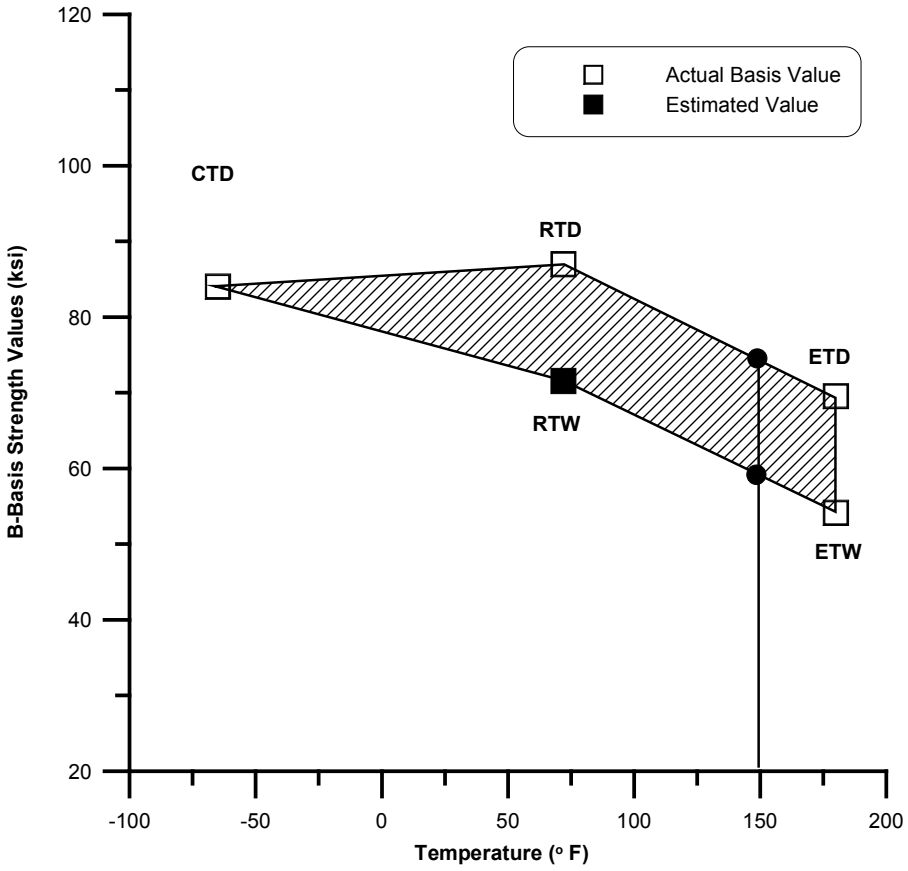


Figure 1.5.2 Example of 150° F interpolation for B-basis values.

2.0 FIBERCOTE T300 3KPW/E765 PREPREG PROPERTIES

2.1 Prepreg Documentation by Prepreg Batch

Prepreg Documentation	**Prepreg Manufacturer & Product ID: FiberCote E765 3K PW** **Material Identification (weave, form, class, etc.): 3K PW** **Impregnation Method: Solvent**		
Prepreg Batch #	712030	712031	712032
Batch ID as labeled on samples	**1**	**2**	**3**
Date of Manufacture	12/11/97	12/11/97	12/11/97
Expiration Date	12/11/98	12/11/98	12/11/98
Resin Content [%]	39.3	38.7	38.2
Reinforcement Areal Weight & Test Method	200.3 gsm	196.1 gsm	197.0 gsm
Resin Flow & Test Conditions	16.3%	16.5%	17.2%
Gel Time & Test Conditions	208 seconds	231 seconds	220 seconds
Volatile Content	0.4%	0.3%	0.4%
Reinforcement Documentation	**Fiber/Fabric Manufacturer & Product ID: Amoco T300 3K** **Precursor Type: PAN** **Nominal Filament Count: 3K** **Finish/Sizing Type and %: 309 - 1% nom.** **Nominal tow or yarn count/inch: 12x12** **Twist: 0**		
Fabric Batch or Lot#	598568	598569	598567
Date of Manufacture	11/10/97	11/08/97	11/08/97
Average Fiber Density per Lot & Test Method	1.759	1.760	1.759
Matrix Documentation	**Resin Manufacturer & Product ID: FiberCote E765**		
Matrix Batch or Lot #	7M1111	7M1112	7M1113
Date of Manufacture	11/11/97	11/11/97	11/11/97
Average Neat Resin Density by Lot & Test Method	1.23	1.23	1.23

Notes: (1)Test methods to determine resin content, reinforcement areal weight, resin flow, gel time, and volatile content are defined in FiberCote Material Specification E765 MS1001. (2) These information and test results were submitted to NIAR by FiberCote Industries Inc.

2.2 Process Specification

2.2.1 Storage

When not in use, all prepreg materials were stored at or below 0°F.

2.2.2 Out Times

Maximum cumulative out time units did not exceed 180 as defined by the following equations:

N	=	Cumulative Units
N1	=	Days at 0°F (180 max., N2 and N3 equal to zero)
N2	=	Days between 1°F and 59°F (90 max., N1 and N3 equal to zero)
N3	=	Days between 60°F and 85°F (28 max., N1 and N2 equal to zero)
N	=	N1 + 2 x N2 + 6 x N3

This time included shipping time, storage on-the-roll, out time for cutting, and any storage time as a kit of pre-cut plies.

2.2.3 Working Environment

All handling and lay-up of prepreg materials was conducted in a reasonably clean environment. No tool preparation, drilling, grinding, trimming, sanding, or other process creating particles was conducted in the same room as the lay-up of prepregs. There were no solvents, lubricants, mold release agents, or other potential contaminants used or stored in the same room with prepreg materials.

Unless otherwise validated for the material system in use, the area was temperature and humidity controlled such that the minimum temperature was 65°F with a corresponding relative humidity not greater than 63 percent. The maximum temperature was 75°F with a corresponding relative humidity not greater than 46 percent. The temperature and relative humidity values between the minimum and maximum acceptable values listed above formed a straight-line relationship. Procedures for Quality Control to verify and record temperature and humidity conditions were established to ensure environmental stability.

A continuous recording device was used.

Sensors and recording devices maintained calibrations traceable to NIST. Re-calibration frequency was in accordance with manufacturers' recommendations.

Quality Assurance will maintain a file of all continuous records for a minimum of three (3) years.

2.2.4 Mold Preparation

Each mold or lay-up surface was cleaned prior to lay-up, using non-contaminating cleaners, such as Acetone or alcohol. Mold preparation was performed outside the lay-up room.

After cleaning, each mold was treated with non-contaminating release agents in accordance with the supplier's instructions.

Thermocouple quantity and location have been specified on the shop traveler.

Witness panels, when required, were fabricated to specific instructions on the shop traveler and represented at least one zone of the part.

2.2.5 Cutting and Lay-up

The cutting and lay-up area was kept free of contaminants.

Prepreg laminations were pre-cut and grouped into kits for lay-up and cure, therefore, the poly-film backing provided by FiberCote was not be removed until each ply was ready to be placed in the lay-up mold. Kits were stored in sealed, moisture-proof containers until lay-up.

Before lay-up, the prepreg material was near ambient temperature. Upon removal from storage, the prepreg materials were allowed to warm to room temperature inside the sealed moisture-proof bag for 3 1/2 hours.

Any peel ply requirements are specified on the drawing and/or shop traveler.

Because of no other specifications on the drawing, splices were allowed. They overlaped by at least one inch and no two splices in a single ply were placed closer than 24 inches. Minimum distance between splices in adjacent plies was six inches. Butt splices were generally avoided. If butt splices were used, the maximum gap at any point was 0.030 inches. Butt splices had one additional ply of material, the same as the base laminate, which extended for at least one inch on either side of the splice joint. There were at least three plies of unspliced material between any two butt splices.

Splicing was not allowed on material qualification specimens.

White, lint-free cotton gloves were required for hand / personal protection. Talc-free latex or nitrile gloves were acceptable alternates.

No cutting of prepreg materials was permitted on the tool.

Debulking was performed in order to achieve appropriate compaction.

Debulking according to the following procedure was required no less frequently than every eight (8) plies of woven fabric.

a. One layer of porous release fabric was applied over the prepreg lay-up.

b. One layer of breather was applied on top of the porous release film. If the breather was not contaminated with resin or other foreign material, the breather was re-used.

c. Nylon bagging film was installed over the laminate or a silicone rubber bag and was form-fit and edge sealed to the tool with vacuum bag sealant; the vacuum connector was installed through the bag. Multiple vacuum connectors were used so that no point on the part was more than 60 inches from a vacuum source.

   Note: The vacuum connectors were installed on the tool surface outside the perimeter of the laminate wherever possible. Placing the connector in a bag pleat was an acceptable alternate.

d. Vacuum of at least 18 inches Hg was applied for at least 15 minutes at a rate that did not cause the prepreg to shift. When specified by the applicable shop traveler, the laminate was heated to 100°F maximum and held for 10-15 minutes during vacuum application but there were no more than six (6) debulks at 100°F on any lay-up.

Before lay-up, the prepreg material was equilibrated near ambient temperature. Upon removal from storage, the prepreg materials were allowed to warm to room temperature inside the sealed moisture-proof bag for 3 1/2 hours.

2.2.6 Bagging

The procedure was as follows:

a. One layer of porous release fabric was applied over the prepreg lay-up.

b. When specified on the shop traveler, bleeder cloth the same size as the laminate was applied over the release film. All wrinkles were smoothed out.

For laminates of six (6) plies or greater, such as qualification panels, two (2) or four (4) bleeder plies were added to aid in volatiles removal from the relatively tight weaves of E-765 6K 5HS and E-765 7781 materials.

Note: Porous release film and bleeder cloth were not used on Test Panels

c. Breather strings were applied from each corner of the part to contact the breather fabric.

d. One layer on non-porous release film was applied over the lay-up; extending at least 1/2 inch past each edge of the part.

e. One layer of breather fabric was applied over the lay-up ensuring that it formed a path to the breather.

f. Vacuum sources were not on the surface of the part. There were at lease two (2) sources for any part larger than four (4) square ft. For larger parts, at least one vacuum connection was provided for every 18 square ft. of laminate surface. Where possible, the maximum distance to any point on the laminate surface did not exceed 60 inches. Applying extra breather under the vacuum port protected against resin clogging.

g. Nylon bagging film was applied and edge sealed to the tool with vacuum bag sealant.

h. The bag was evacuated to at least 18 inches Hg and was adjusted to eliminate wrinkles and bridging.

i. A vacuum gauge was installed at the vacuum probe connector. The bagged assembly was allowed to stand for at least 15 minutes with an applied vacuum of at least 18 inches Hg. The vacuum source was removed and the bag vacuum monitored. Leakage did not exceed three (3) inches Hg in the first five (5) minutes after the vacuum source was removed.

2.2.7 Cure Cycle

All prepreg materials were cured according to tightly controlled time, temperature and vacuum requirements as shown in Table 2.2.1. Further details are clarified in FiberCote Process Specification E765 PSI1000.

Table 2.2.1: Cure Cycles

Temperature Ramp rate °F/Min.	**Cure Temperature** °F (as defined by slowest heating part)	**Pressure** In. Hg	**Cooling Rate** °F/Min.	**Dwell Time At Cure** Minutes
1 - 6	270 - 280	20 - 28	3 - 10	110 - 130

3.0 FIBERCOTE T300 3KPW/E765 LAMINA PROPERTIES

3.1 Test Results

3.1.1 Summary

MATERIAL:	FiberCote -- FiberCote E765/T300 3KPW Graphite Fabric	**E765/T300 3KPW**
PREPREG:	FiberCote E765 3K PW	**Summary**
FIBER:	Amoco T300 3K	**RESIN:** FiberCote E765
T_g (dry): 288.5°F	**T_g (wet): 227.0**°F	**T_g METHOD:** DMA (SRM 18-94)
PROCESSING:	Vacuum bag cure (20 - 28 in. Hg): 270-280°F for 110-130 min.	

Date of fiber manufacture	11/8/97 – 11/10/97	**Date of testing**	10/5/98 – 1/13/99
Date of resin manufacture	11/11/97	**Date of data submittal**	2/8/99
Date of prepreg manufacture	12/11/97	**Date of analysis**	10/6/98 – 1/13/99
Date of composite manufacture	6/9/98 – 6/19/98		

LAMINA MECHANICAL PROPERTY SUMMARY
Data Reported as: Measured
(Normalized by CPT= 0.0089 in)

	CTD		RTD		ETD		ETW	
	B-Basis	**Mean**	**B-Basis**	**Mean**	**B-Basis**	**Mean**	**B-Basis**	**Mean**
F_1^{tu} (ksi)	74.92 (73.94)	83.36 (82.55)	81.30 (79.71)	90.46 (88.99)	84.20 (82.81)	93.68 (92.45)	86.90 (86.24)	96.69 (96.29)
E_1^t (Msi)	---	8.55 (8.46)	---	8.20 (8.09)	---	7.94 (7.83)	---	8.02 (7.97)
ν_{12}^{tu}	---	0.065	---	0.059	---	0.045	---	0.043
F_2^{tu} (ksi)	63.31 (63.15)	74.39 (73.67)	66.23 (66.48)	77.82 (77.56)	70.09 (70.26)	82.35 (81.96)	69.97 (70.44)	82.22 (82.17)
E_2^t (Msi)	---	8.29 (8.25)	---	8.01 (7.98)	---	7.80 (7.78)	---	7.82 (7.83)
F_1^{cu} (ksi)	95.44 (92.25)	109.86 (107.01)	85.37 (86.47)	96.31 (98.19)	68.96 (69.39)	77.80 (78.79)	51.40 (52.07)	57.66 (58.76)
E_1^c (Msi)	---	7.78 (7.40)	---	7.27 (7.37)	---	7.52 (7.58)	---	7.46 (7.51)
F_2^{cu} (ksi)	82.38 (83.24)	98.04 (97.01)	75.42 (77.94)	87.52 (88.84)	60.83 (62.90)	70.59 (71.70)	47.12 (48.33)	54.28 (54.74)
E_2^c (Msi)	---	7.52 (7.38)	---	7.37 (7.37)	---	7.58 (7.64)	---	7.48 (7.55)
F_{12}^{su} (ksi)	20.02	22.07	17.41	18.86	13.18	14.33	11.23	12.19
G_{12}^s (Msi)	---	0.90	---	0.56	---	0.50	---	0.41
F_{13}^{su*} (ksi)	---	---	9.18	10.38	---	---	---	---

* *Apparent* interlaminar shear strength

3.1.2 Individual Test Summaries

3.1.2.1 Tension, 1-axis

Tension, 1-axis
Gr/Ep
FiberCote-E765/T300 3KPW Graphite Fabric
$[0]_{12}$

Material:	FiberCote-E765/T300 3KPW Graphite Fabric			
Resin content:	39 - 43 wt%	**Comp. density:**	1.46 - 1.48 g/cc	
Fiber volume:	48 - 51 vol%	**Void content:**	1.0 to 2.7 %	
Ply thickness:	0.0082 - 0.0090 in.			
Ply range:	12 plies			
Test method:	D3039-95	**Modulus calculation:**	linear fit from 1000 - 3000 με	
Normalized by:	0.0089 in ply thickness			

		CTD (B)		RTD (A)		ETD (G)		ETW(F)			
Test Temperature [°F]		-65		70		180		180			
Moisture Conditioning		dry		dry		dry		equilibrium			
Equilibrium at T, RH		as fabricated		as fabricated		as fabricated		145 F, 85 %			
Source code		TBJXXXXB		TBJXXXXA		TBJXXXXG		TBJXXXXF			
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
F_1^{tu} (ksi)	**Mean**	82.55	83.36	88.99	90.46	92.45	93.68	96.29	96.69		
	Minimum	74.36	76.65	75.17	77.52	79.50	81.83	87.89	88.02		
	Maximum	90.15	93.61	98.88	98.74	105.24	105.34	101.78	102.06		
	C.V.(%)	5.20	5.57	6.65	6.17	7.79	7.37	4.21	4.18		
	B-value	73.94	74.92	79.71	81.30	82.81	84.20	86.25	86.90		
	A-value	68.27	69.37	73.60	75.28	76.46	77.95	79.63	80.46		
	No. Specimens	18		18		18		18			
	No. Prepreg Lots	3		3		3		3			
E_1^t (Msi)	**Mean**	8.46	8.55	8.09	8.20	7.83	7.94	7.97	8.02		
	Minimum	8.01	8.13	7.86	8.00	7.63	7.78	7.86	7.89		
	Maximum	8.88	9.22	8.24	8.53	8.05	8.26	8.07	8.29		
	C.V.(%)	4.03	4.80	1.66	2.29	1.89	2.45	0.89	1.81		
	No. Specimens	6		6		6		6			
	No. Prepreg Lots	3		3		3		3			
ν_{12}^t	**Mean**		0.065		0.059		0.045		0.043		
	No. Specimens	6		6		6		6			
	No. Prepreg Lots	3		3		3		3			

3.1.2.2 Tension, 2-axis

Tension, 2-axis
Gr/Ep
FiberCote-E765/T300 3KPW Graphite Fabric
$[0]_{12}$

Material:	FiberCote-E765/T300 3KPW Graphite Fabric				
Resin content:	36 - 44 wt%		**Comp. density:**	1.47 - 1.48 g/cc	
Fiber volume:	47 - 54 vol%		**Void content:**	0.1 to 3.8 %	
Ply thickness:	0.0084 - 0.0092 in.				
Ply range:	12 plies				
Test method:	D3039-95		**Modulus calculation:**	linear fit from 1000 - 3000 με	
Normalized by:	0.0089 in. ply thickness				

		CTD (B)		RTD (A)		ETD (G)		ETW(F)			
Test Temperature [°F]		-65		70		180		180			
Moisture Conditioning		dry		dry		dry		equilibrium			
Equilibrium at T, RH		as fabricated		as fabricated		as fabricated		145 F, 85 %			
Source code		TBUXXXXB		TBUXXXXA		TBUXXXXG		TBUXXXXF			
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
F_2^{tu} (ksi)	**Mean**	73.67	74.39	77.56	77.82	81.96	82.35	82.17	82.22		
	Minimum	62.37	62.03	68.22	68.57	68.18	69.21	71.09	71.14		
	Maximum	86.20	86.27	88.05	88.66	98.32	97.75	96.40	98.82		
	C.V.(%)	8.88	9.57	6.54	7.15	8.45	7.90	9.33	10.00		
	B-value	63.15	63.31	66.49	66.23	70.26	70.09	70.44	69.97		
	A-value	56.22	56.01	59.20	58.60	62.55	62.01	62.72	61.91		
	No. Specimens	18		18		18		18			
	No. Prepreg Lots	3		3		3		3			
E_2^t (Msi)	**Mean**	8.25	8.29	7.98	8.01	7.78	7.80	7.83	7.82		
	Minimum	8.11	8.05	7.55	7.59	7.54	7.52	7.42	7.45		
	Maximum	8.48	8.66	8.42	8.58	8.19	8.31	8.15	8.33		
	C.V.(%)	1.89	2.90	4.13	5.06	3.76	4.69	3.15	4.09		
	No. Specimens	6		6		6		6			
	No. Prepreg Lots	3		3		3		3			

3.1.2.3 Compression, 1-axis

Compression, 1-axis
Gr/Ep
FiberCote-E765/T300 3KPW Graphite Fabric
$[0]_{14}$

Material:	FiberCote-E765/T300 3KPW Graphite Fabric		
Resin content:	35 - 45 wt%	**Comp. density:**	1.45 - 1.48 g/cc
Fiber volume:	45 - 54 vol%	**Void content:**	0.9 to 3.1 %
Ply thickness:	0.0083 - 0.0095 in.		
Ply range:	14 plies		
Test method:	SRM 1-94, D695-91 (mod)	**Modulus calculation:**	linear fit from 1000 - 3000 με
Normalized by:	0.0089 in. ply thickness		

		CTD (B)		RTD (A)		ETD (G)		ETW(F)			
Test Temperature [°F]		-65		70		180		180			
Moisture Conditioning		dry		dry		dry		equilibrium			
Equilibrium at T, RH		as fabricated		as fabricated		as fabricated		145 F, 85 %			
Source code		TBKXXXXB		TBKXXXXA		TBKXXXXG		TBKXXXXF			
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
F_1^{cu} (ksi)	**Mean**	107.01	109.86	98.19	96.31	78.79	77.80	58.76	57.66		
	Minimum	102.97	105.22	91.48	89.50	63.80	60.25	49.91	50.18		
	Maximum	111.59	115.46	104.48	105.13	91.89	87.29	67.79	64.86		
	C.V.(%)	3.74	3.97	3.95	5.18	8.56	8.68	7.76	6.43		
	B-value	92.25	95.44	86.47	85.38	69.39	68.96	52.07	51.40		
	A-value	84.04	87.42	78.76	78.17	63.20	63.15	47.39	47.04		
	No. Specimens	6		18		18		30			
	No. Prepreg Lots	1		3		3		3			
E_1^c (Msi)	**Mean**	7.40	7.78	7.37	7.27	7.58	7.52	7.51	7.46		
	Minimum	7.18	7.73	6.94	6.54	6.65	6.99	7.16	6.71		
	Maximum	7.62	7.83	7.75	7.87	8.07	7.98	7.97	8.03		
	C.V.(%)	4.21	0.92	4.73	6.87	7.53	5.30	4.08	6.19		
	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
FiberCote-E765/T300 3KPW Graphite Fabric
$[0]_{14}$

Material:	FiberCote-E765/T300 3KPW Graphite Fabric		
Resin content:	38 - 44 wt%	**Comp. density:**	1.46 - 1.50 g/cc
Fiber volume:	47 - 53 vol%	**Void content:**	0.8 to 1.6 %
Ply thickness:	0.0084 - 0.0098 in.		
Ply range:	14 plies		
Test method:	SRM 1-94, D695-91 (mod)	**Modulus calculation:**	linear fit from 1000 - 3000 με
Normalized by:	0.0089 in. ply thickness		

		CTD (B)		RTD (A)		ETD (G)		ETW(F)			
Test Temperature [°F]		-65		70		180		180			
Moisture Conditioning		dry		dry		dry		equilibrium			
Equilibrium at T, RH		as fabricated		as fabricated		as fabricated		145 F, 85 %			
Source code		TBWXXXXB		TBWXXXXA		TBWXXXXG		TBWXXXXF			
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
F_2^{cu} (ksi)	**Mean**	97.01	98.04	88.84	87.52	71.70	70.59	54.74	54.28		
	Minimum	90.88	93.30	74.29	73.90	61.97	58.46	46.25	43.58		
	Maximum	102.04	102.56	96.82	99.02	80.28	82.00	65.93	67.96		
	C.V.(%)	4.71	4.24	5.60	5.85	6.72	8.00	8.53	9.65		
	B-value	83.25	82.39	77.94	75.43	62.90	60.83	48.33	47.12		
	A-value	75.59	73.68	70.76	67.46	57.10	54.41	43.85	42.12		
	No. Specimens	6		18		18		30			
	No. Prepreg Lots	1		3		3		3			
E_2^c (Msi)	**Mean**	7.38	7.52	7.37	7.37	7.64	7.58	7.55	7.48		
	Minimum	7.10	7.25	7.01	6.64	7.00	6.98	7.08	6.70		
	Maximum	7.66	7.79	8.11	8.59	8.42	8.43	8.34	8.49		
	C.V.(%)	5.31	5.07	6.10	10.48	7.50	8.14	6.49	9.16		
	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
FiberCote-E765/T300 3KPW Graphite Fabric
$[0/90]_{4S}$

Material:	FiberCote-E765/T300 3KPW Graphite Fabric		
Resin content:	41 - 46 wt%	**Comp. density:**	1.45 - 1.48 g/cc
Fiber volume:	44 - 49 vol%	**Void content:**	0.9 to 1.2 %
Ply thickness:	0.0084 - 0.0095 in.		
Ply range:	16 plies		
Test method:	D5379-93	**Modulus calculation:**	linear fit from 1000 - 6000 με
Normalized by:	N/A		

		CTD (B)		RTD (A)		ETD (G)		ETW(F)			
Test Temperature [°F]		-65		70		180		180			
Moisture Conditioning		dry		dry		dry		equilibrium			
Equilibrium at T, RH		as fabricated		as fabricated		as fabricated		145 F, 85 %			
Source code		TBNXXXXB		TBNXXXXA		TBNXXXXG		TBNXXXXF			
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
F_{12}^{su} (ksi)	**Mean**		22.07		18.86		14.33		12.19		
	Minimum		21.04		16.96		12.23		10.62		
	Maximum		22.95		20.89		15.43		13.05		
	C.V.(%)		3.41		4.58		5.34		4.60		
	B-value		20.02		17.41		13.18		11.23		
	A-value		18.88		16.40		12.43		10.58		
	No. Specimens	6		29		19		22			
	No. Prepreg Lots	1		3		3		3			
G_{12}^{s} (Msi)	**Mean**		0.90		0.56		0.50		0.41		
	Minimum		0.87		0.50		0.40		0.33		
	Maximum		0.94		0.63		0.58		0.55		
	C.V.(%)		5.45		7.46		12.95		20.66		
	No. Specimens	2		6		7		5			
	No. Prepreg Lots	1		3		3		3			

3.1.2.6 Shear, 13 axis

Shear, 13-axis
Gr/Ep
FiberCote-E765/T300 3KPW Graphite Fabric
$[0]_{12}$

Material:	FiberCote-E765/T300 3KPW Graphite Fabric		
Resin content:	41 - 43 wt%	**Comp. density:**	1.47 - 1.49 g/cc
Fiber volume:	45 - 50 vol%	**Void content:**	0.2 to 0.4 %
Ply thickness:	0.0082 - 0.0090 in.		
Ply range:	12 plies		
Test method:	D2344-89	**Modulus calculation:**	N/A
Normalized by:	N/A		

			RTD (A)							
Test Temperature [°F]			70							
Moisture Conditioning			dry							
Equilibrium at T, RH			as fabricated							
Source code			TBQXXXXA							
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean				10.38						
	Minimum				10.01						
	Maximum				10.72						
	C.V.(%)				2.13						
F_{13}^{su}											
(ksi)	**B-value**				9.18*						
	A-value				8.33*						
	No. Specimens			21							
	No. Prepreg Lots			3							

*B and A-values are based on a 6% C.V. for conservatism

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.

3.1.2.7 Bearing Strength

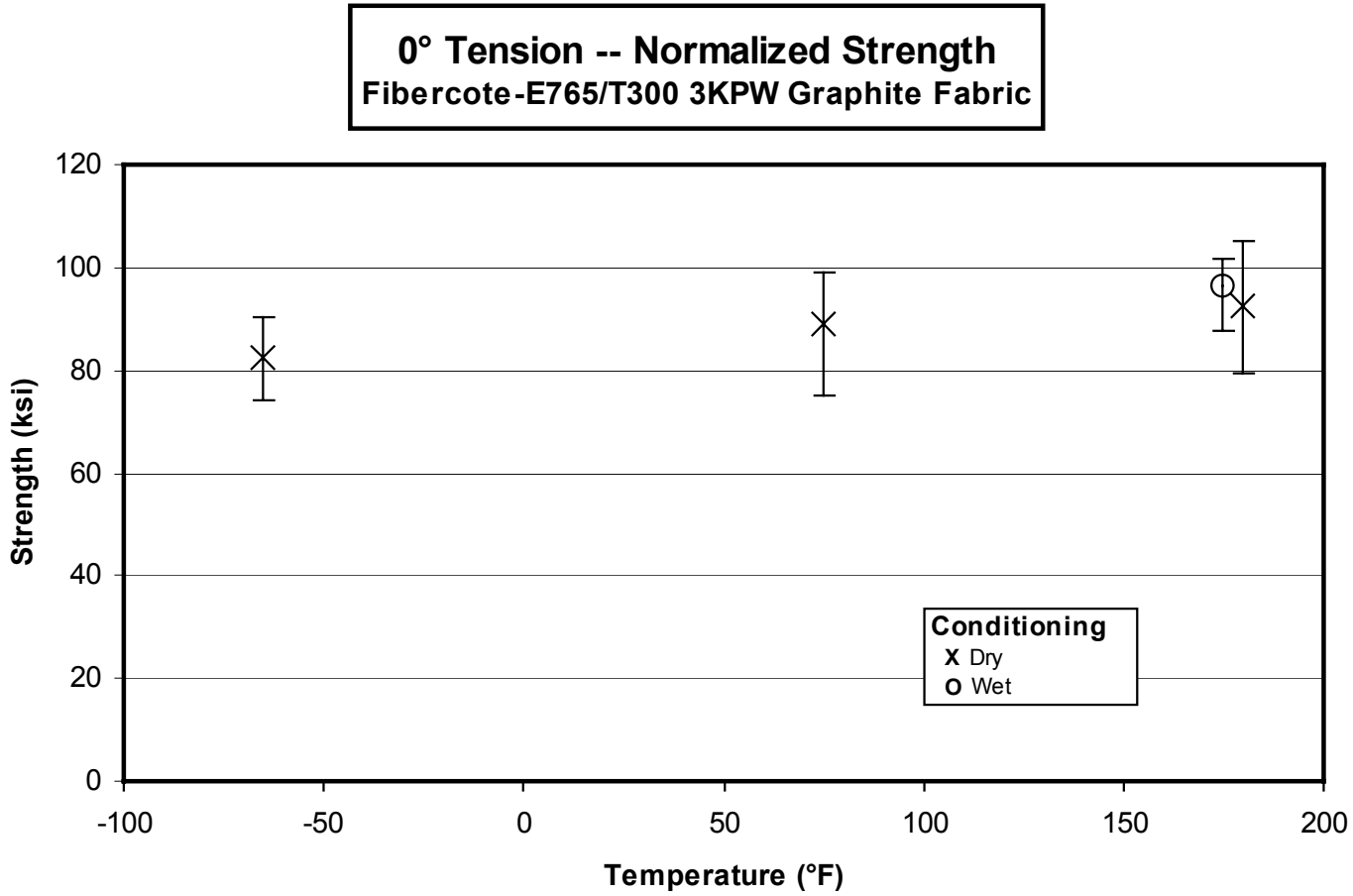
Bearing Strength
G/Ep
Fibercote-E765/T300 3KPW Graphite Fabric

Material:	Fibercote-E765/T300 3KPW Graphite Fabric		
Resin content:	39 - 43 wt%	**Comp. density:**	1.43 - 1.49 g/cc
Fiber volume:	46 - 52%	**Void content:**	1.1 to 3.9 %
Test method:	ASTM D953-95		
Type of bearing test:	Double Shear Pin Bearing		
Fastener Type:	Hardened Steel Pin		
Torque:	N/A		
Normalized by:	Not normalized		

		CTD			RTD			ETD			ETW		
Test Temperature [°F]		-65			70			180			180		
Moisture Conditioning		dry			dry			dry			equilibrium		
Equilibrium at T, RH		as fabricated			as fabricated			as fabricated			145F,85%		
Source code		TB#XXXXB			TB#XXXXA			TB#XXXXG			TB#XXXXF		
Diameter[in]		0.1875	0.250	0.375	0.1875	0.250	0.375	0.1875	0.250	0.375	0.1875	0.250	0.375
F^{bu} (ksi) $[45_f/0_f/45_f]_s$ (6 plies) t_{ply}: 0.0082 - 0.00876 in.	**Mean**	60.20	45.20		43.72	43.62		35.92	34.16		32.58	32.37	
	Minimum	55.72	32.15		33.25	40.32		34.58	29.95		30.62	29.13	
	Maximum	68.52	57.43		47.00	47.55		37.12	41.62		34.50	35.18	
	C.V.(%)	7.62	19.51		11.98	6.90		2.64	11.63		3.99	6.09	
	Failure Mode	Bearing	Bearing		Bearing	Bearing		Bearing	Bearing		Bearing	Bearing	
	No. Specimens	6	6		6	7		6	6		8	8	
	No. Prepreg Lots	1	1		1	1		1	1		1	1	
F^{bu} (ksi) $[(0_f/45_f)_s]_s$ (20 plies) t_{ply}: 0.00867 - 0.00936 in.	**Mean**		64.23	78.93		66.01	47.58		54.81	56.68		49.32	43.95
	Minimum		55.66	76.30		63.90	43.11		51.58	54.80		45.71	41.81
	Maximum		74.16	83.22		68.09	53.35		62.23	58.08		53.56	47.63
	C.V.(%)		10.25	2.93		2.88	9.62		7.02	2.29		4.86	4.48
	Failure Mode		Bearing	Lateral		Bearing	Bearing		Bearing	Bearing		Bearing	Bearing
	No. Specimens		6	8		6	6		6	6		9	8
	No. Prepreg Lots		1	1		1	1		1	1		1	1

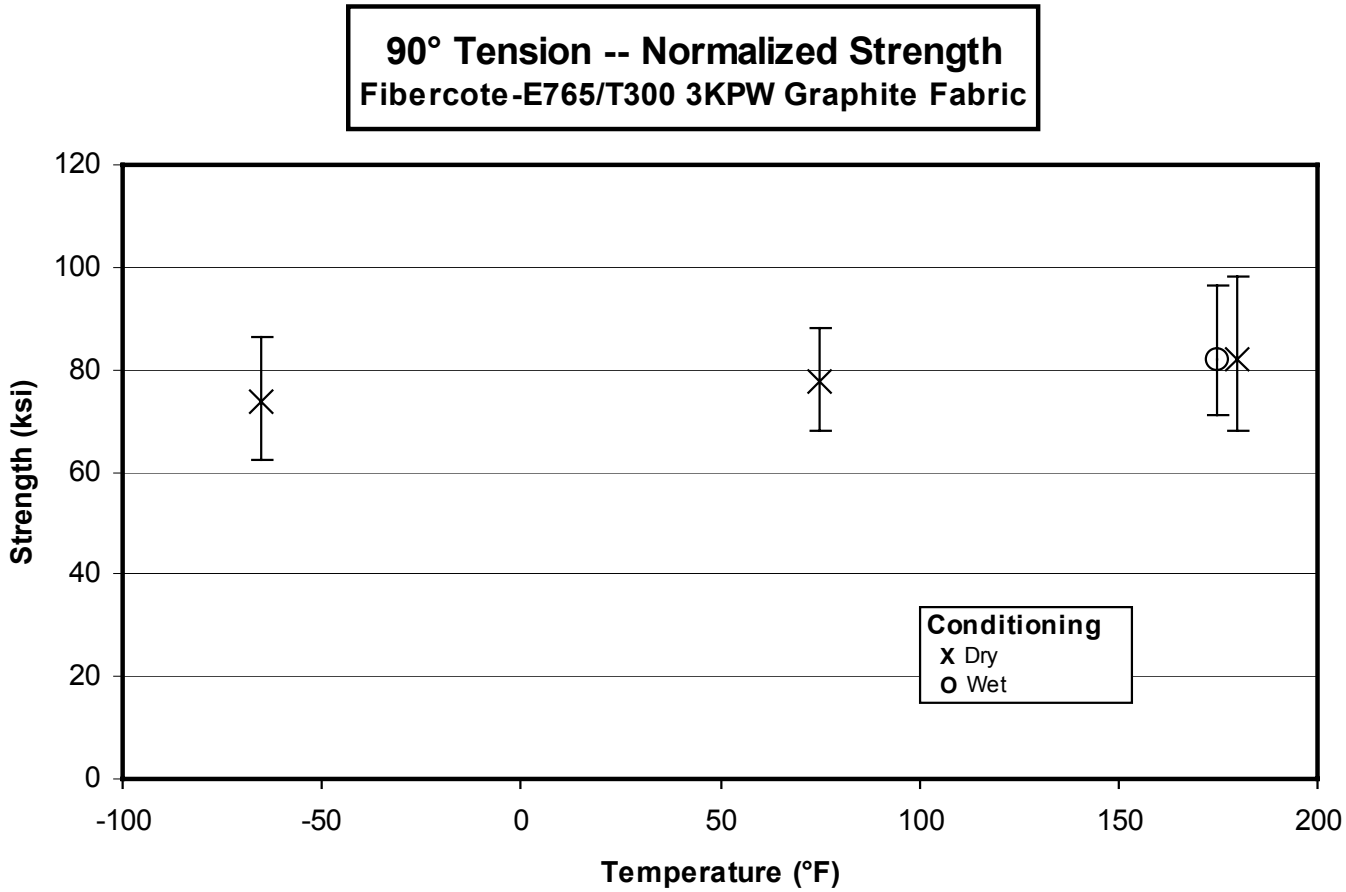
3.1.3 Individual Test Charts

3.1.3.1 Tension, 1-axis



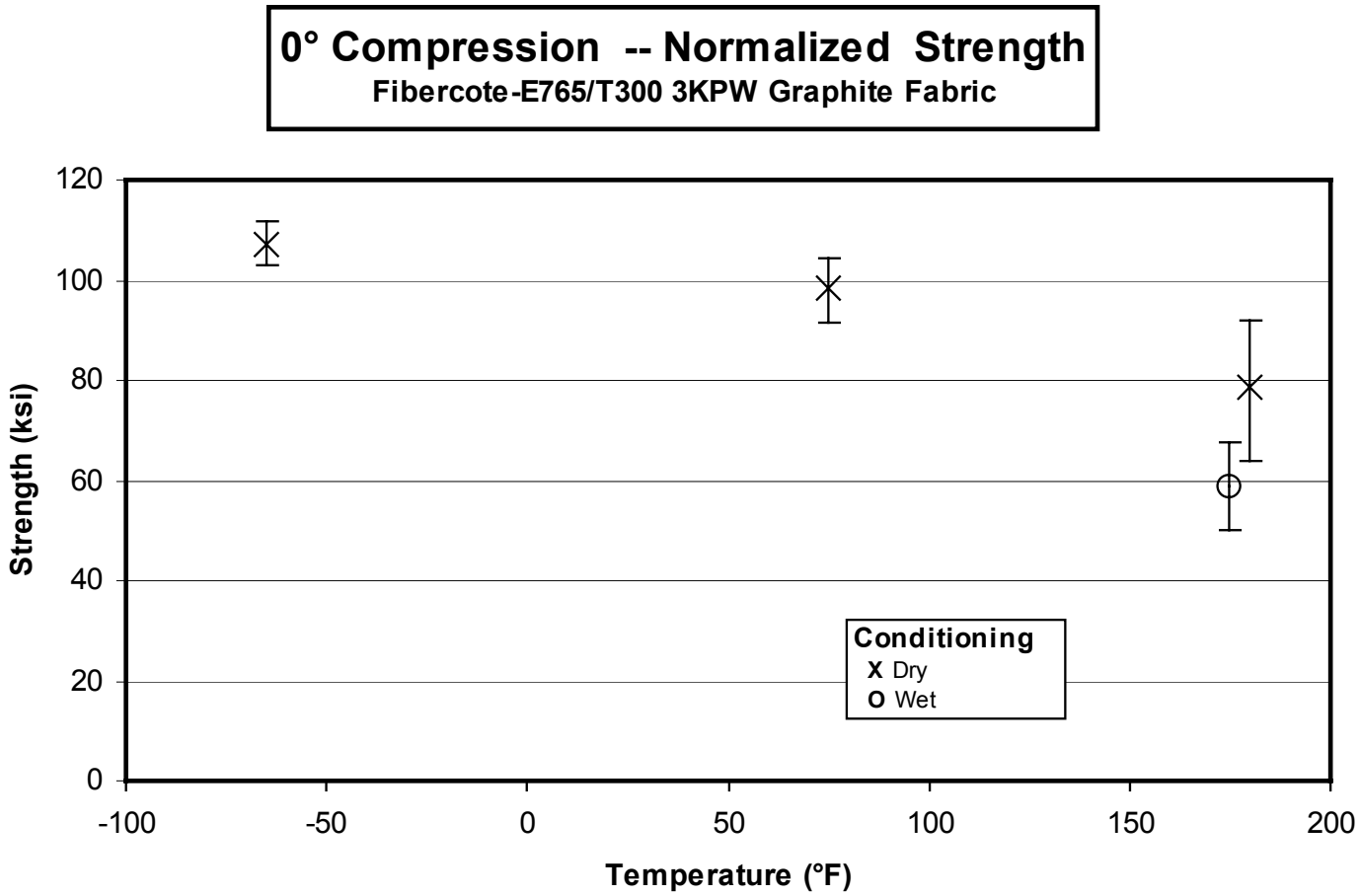
NOTE: The symbols represent the 'pooled' average of all tests, and the bars represent the upper and lower limit of the data. The 180° dry and wet data have been staggered for clarity.

3.1.3.2 Tension, 2-axis



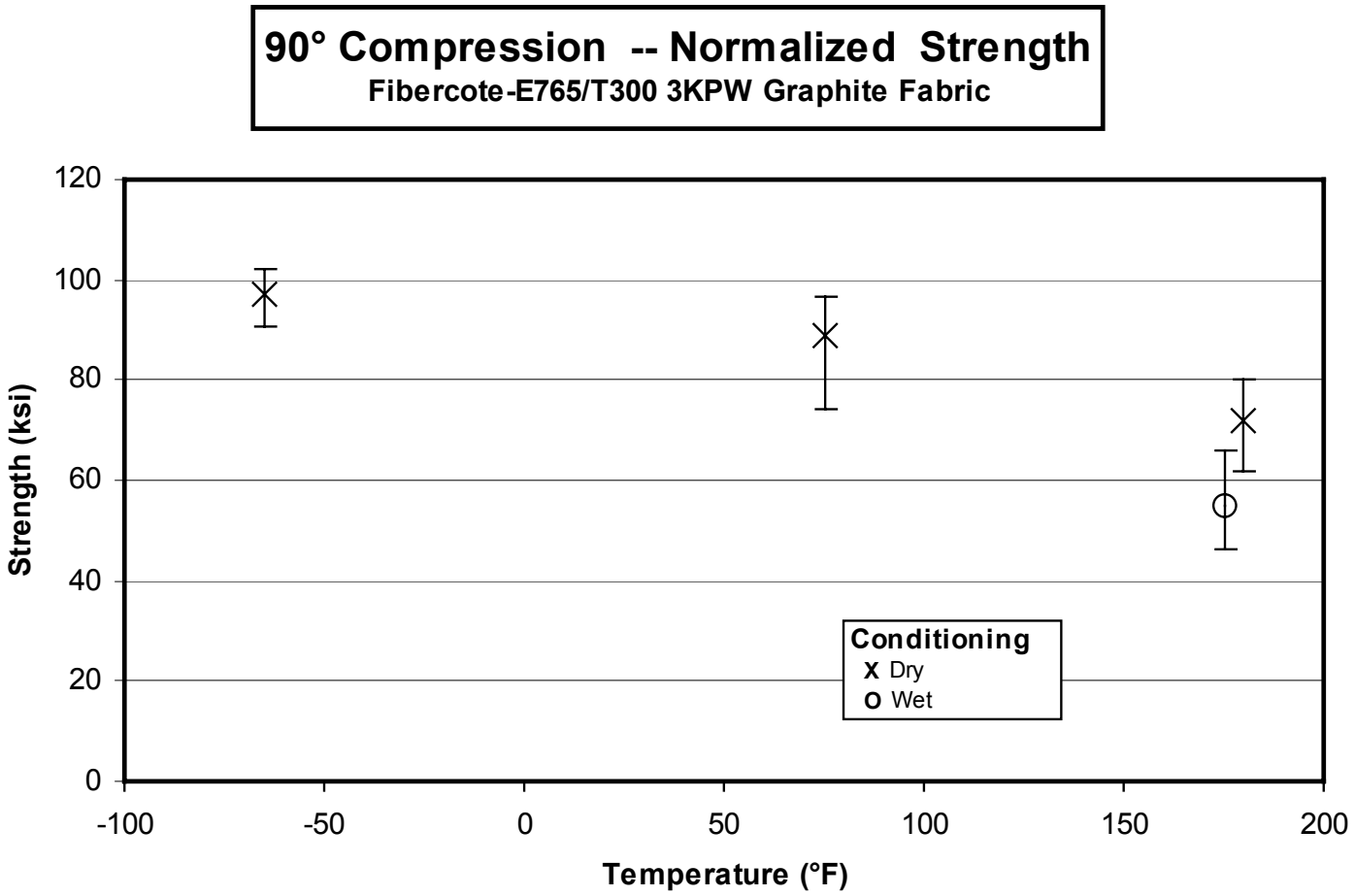
NOTE: The symbols represent the 'pooled' average of all tests, and the bars represent the upper and lower limit of the data. The 180° dry and wet data have been staggered for clarity.

3.1.3.3 Compression, 1-axis



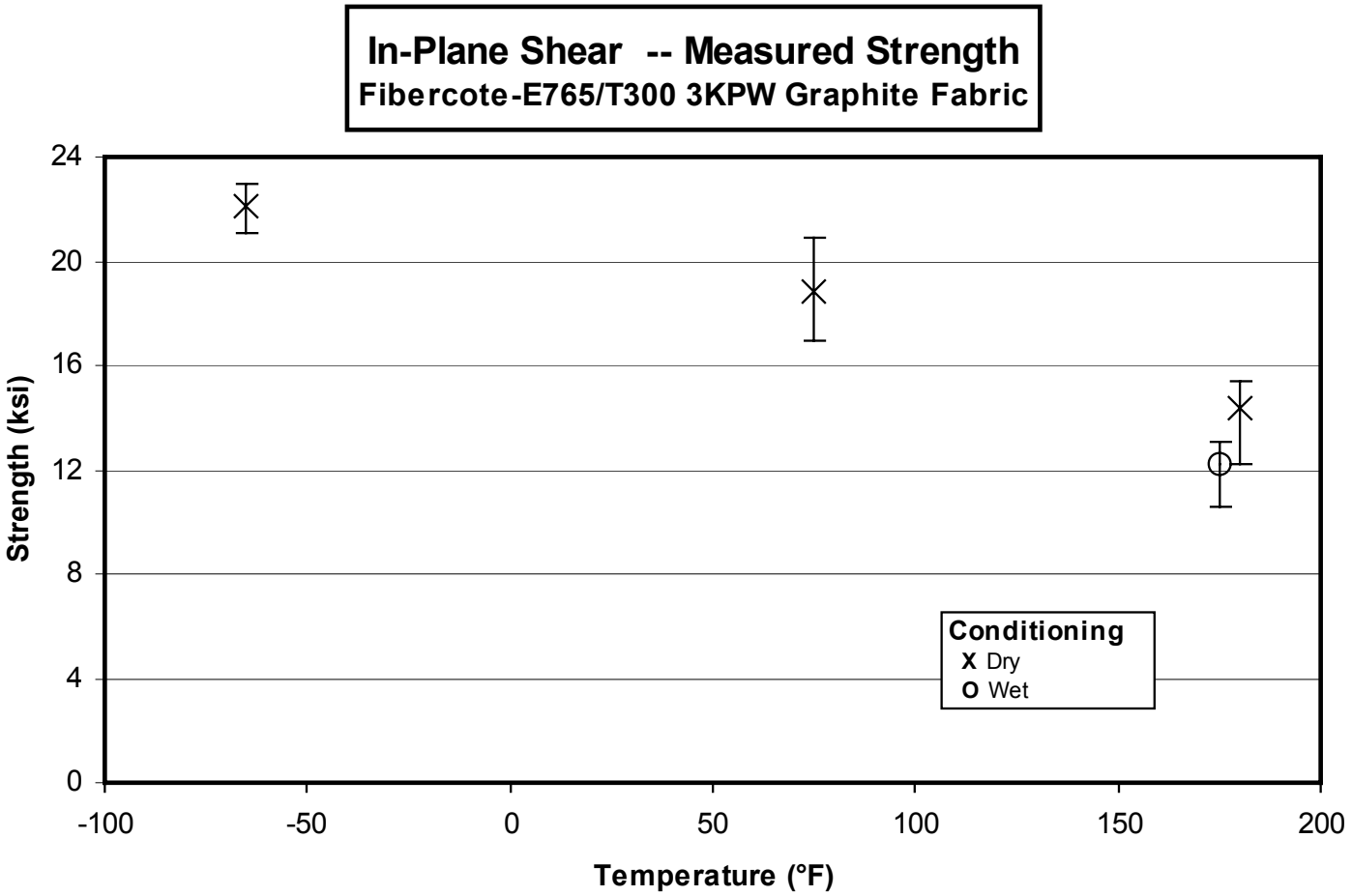
NOTE: The symbols represent the 'pooled' average of all tests, and the bars represent the upper and lower limit of the data. The 180° dry and wet data have been staggered for clarity.

3.1.3.4 Compression, 2-axis



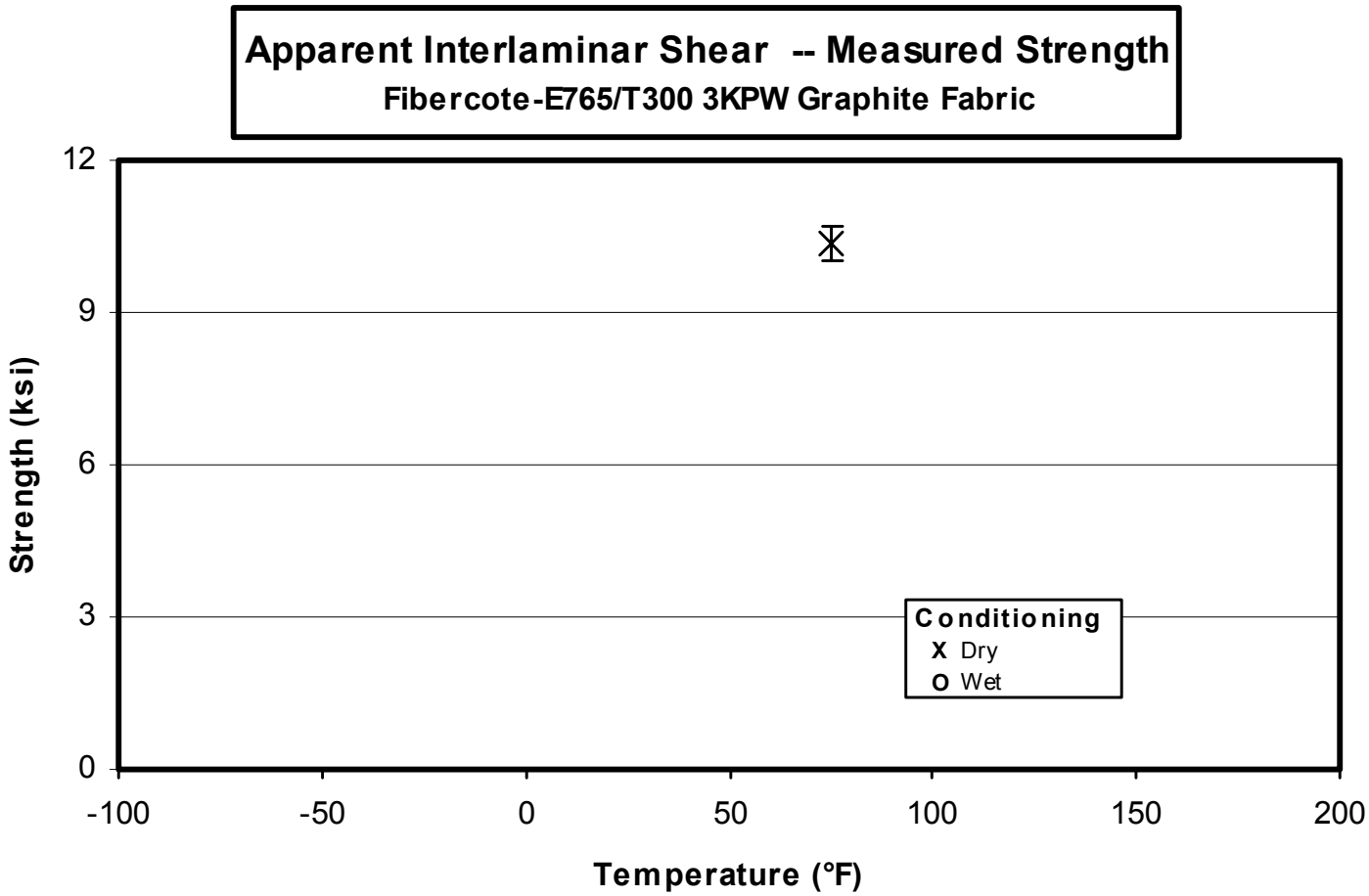
NOTE: The symbols represent the 'pooled' average of all tests, and the bars represent the upper and lower limit of the data. The 180° dry and wet data have been staggered for clarity.

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 have 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.

3.2 Raw Data

Specimen Naming Convention

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

T B J 2 1 2 5 F

1st Character: Fabricator
'T' designates Fibercote

2nd Character: Material System
'B' designates T300 3KPW / E765

3rd Character: Test Type
'J' designates 0° Tension Strength and Modulus, other test types will be clearly labeled at the top of each sheet

4th Character: Prepreg Batch ID
See Table 2.1 for FiberCote Batch ID / Sample Batch ID correlation.

5th Character: Panel Number
The panel(s) fabricated for a specific test method.

6th Character: Subpanel Number
The sub-panel(s) cut from each panel, with subpanel numbers labeled increasing from reference edge.

7th Character: Sample Number
The sample(s) cut from each subpanel, with sample numbers labeled increasing from reference edge.

8th Character: Test Condition
'A' --- RTD
'B' --- CTD
'F' --- ETW
'G' --- ETD
See Table 1.5.1 for condition parameters.

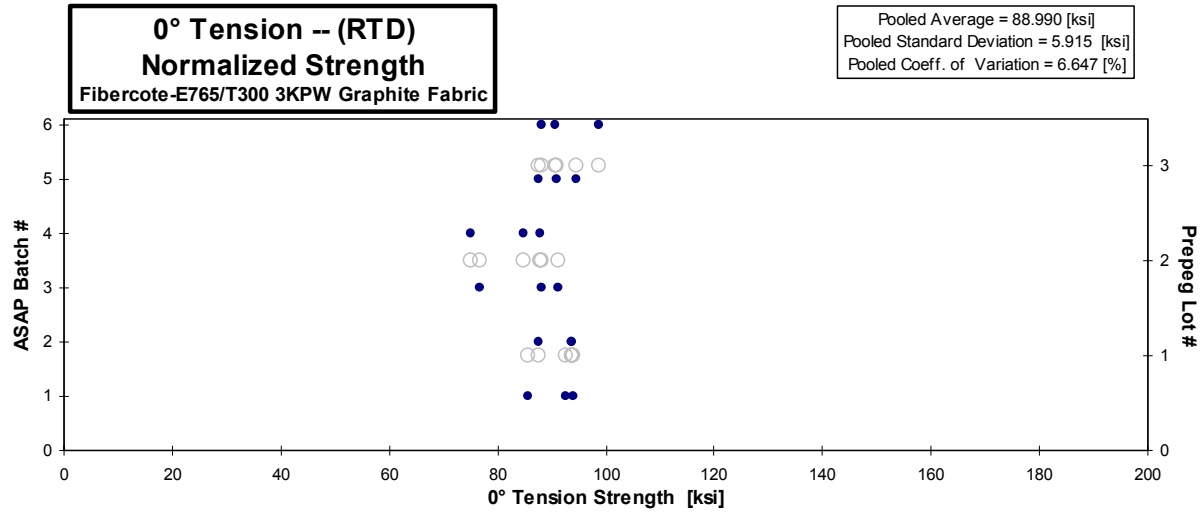
3.2.1 Raw Data Spreadsheets and Scatter Charts

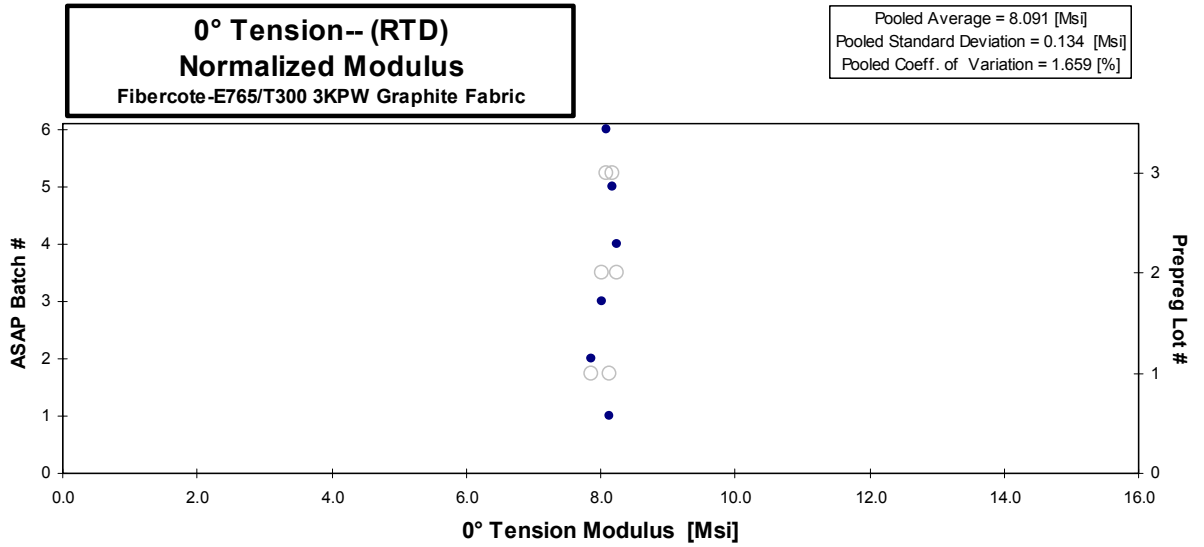
0° Tension-- (RTD)
Strength & Modulus
Fibercote-E765/T300 3KPW Graphite Fabric

normalizing t_{ply} [in]: 0.0089

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]
TBJ1311A	1	1	1	86.281	8.212	0.068	0.106	12	0.00882	85.540	8.141
TBJ1312A	1	1	1	96.055			0.104	12	0.00871	93.972	
TBJ1314A	1	1	1	92.623			0.107	12	0.00890	92.580	
TBJ1411A	2	1	2	95.242	8.000	0.058	0.105	12	0.00875	93.622	7.864
TBJ1412A	2	1	2	90.057			0.104	12	0.00867	87.682	
TBJ1413A	2	1	2	94.756			0.106	12	0.00880	93.647	
TBJ2411A	1	2	3	78.363	8.194	0.061	0.105	12	0.00871	76.724	8.023
TBJ2413A	1	2	3	90.707			0.104	12	0.00866	88.244	
TBJ2414A	1	2	3	94.097			0.103	12	0.00862	91.160	
TBJ2311A	2	2	4	91.058	8.533	0.046	0.103	12	0.00859	87.918	8.239
TBJ2312A	2	2	4	92.120			0.098	12	0.00821	84.932	
TBJ2313A	2	2	4	77.516			0.104	12	0.00863	75.169	
TBJ3411A	1	3	5	91.476	8.242	0.052	0.106	12	0.00884	90.877	8.188
TBJ3412A	1	3	5	94.300			0.107	12	0.00891	94.447	
TBJ3413A	1	3	5	87.400			0.107	12	0.00893	87.727	
TBJ3311A	2	3	6	90.058	8.045	0.066	0.107	12	0.00895	90.578	8.092
TBJ3312A	2	3	6	98.739			0.107	12	0.00891	98.878	
TBJ3313A	2	3	6	87.349			0.108	12	0.00898	88.126	

Average	**90.455**	**8.204**	**0.059**	**$Average_{norm}$**	**0.00876**	**88.990**	**8.091**
Standard Dev.	**5.577**	**0.188**	**0.008**	**$Standard\ Dev._{norm}$**		**5.915**	**0.134**
Coeff. of Var. [%]	**6.165**	**2.292**	**14.087**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**6.647**	**1.659**
Min.	**77.516**	**8.000**	**0.046**	**Min.**	**0.0082**	**75.169**	**7.864**
Max.	**98.739**	**8.533**	**0.068**	**Max.**	**0.0090**	**98.878**	**8.239**
Number of Spec.	**18**	**6**	**6**	**Number of Spec.**		**18**	**6**



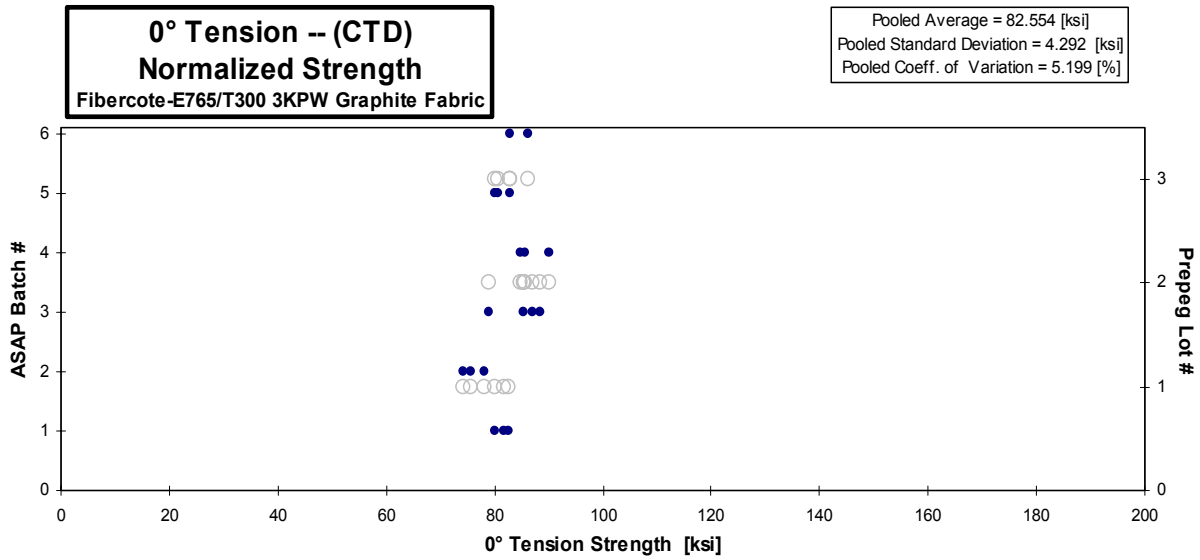


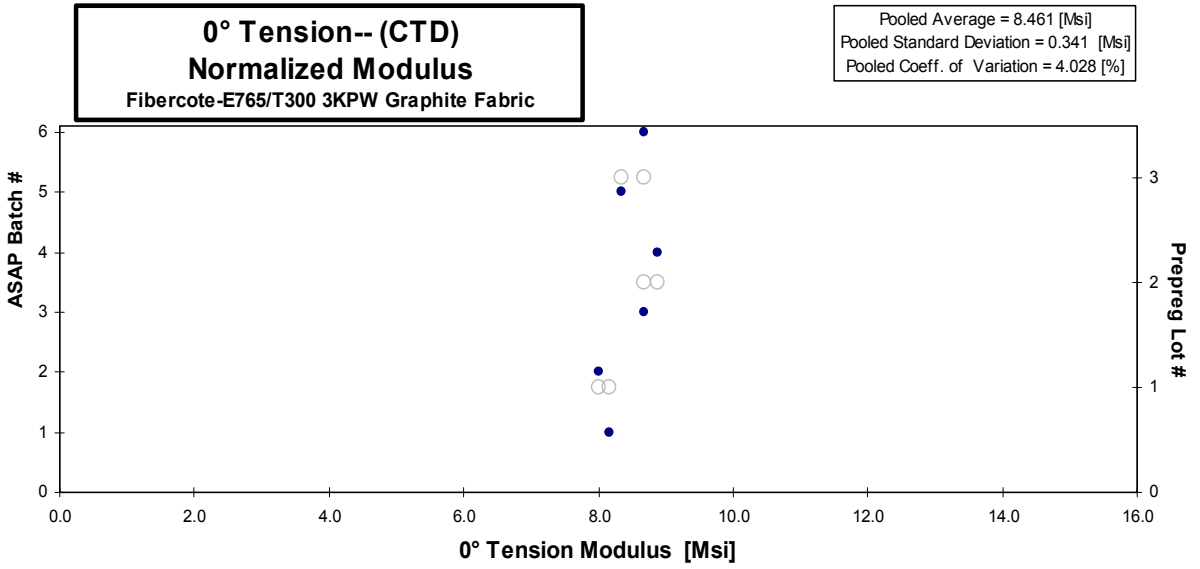
0° Tension-- (CTD)
Strength & Modulus
Fibercote-E765/T300 3KPW Graphite Fabric

normalizing t_{ply} [in]: 0.0089

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]
TBJ1316B	1	1	1	79.896	8.133	0.057	0.107	12	0.00894	80.232	8.167
TBJ1317B	1	1	1	81.853			0.108	12	0.00899	82.683	
TBJ1318B	1	1	1	81.608			0.107	12	0.00893	81.875	
TBJ1415B	2	1	2	76.956	8.287	0.073	0.103	12	0.00860	74.362	8.007
TBJ1416B	2	1	2	80.002			0.104	12	0.00870	78.179	
TBJ1417B	2	1	2	76.652			0.105	12	0.00879	75.671	
TBJ2215B	1	2	3	87.750	8.745	0.072	0.106	12	0.00883	87.024	8.672
TBJ2217B	1	2	3	88.605			0.107	12	0.00889	88.550	
TBJ2218B	1	2	3	85.410			0.107	12	0.00889	85.343	
TBJ2412B	1	2	3	80.948			0.104	12	0.00868	78.953	
TBJ2314B	2	2	4	93.612	9.223	0.082	0.103	12	0.00857	90.150	8.882
TBJ2318B	2	2	4	87.726			0.103	12	0.00859	84.715	
TBJ2319B	2	2	4	89.044			0.103	12	0.00858	85.792	
TBJ3215B	1	3	5	79.043	8.240	0.056	0.108	12	0.00901	80.042	8.344
TBJ3218B	1	3	5	79.580			0.108	12	0.00901	80.586	
TBJ3219B	1	3	5	83.710			0.106	12	0.00880	82.769	
TBJ3114B	2	3	6	82.510	8.665	0.051	0.107	12	0.00893	82.768	8.692
TBJ3115B	2	3	6	85.570			0.108	12	0.00897	86.278	

Average	**83.360**	**8.549**	**0.065**	**$Average_{norm}$**	**0.00882**	**82.554**	**8.461**
Standard Dev.	**4.644**	**0.411**	**0.012**	**$Standard\ Dev._{norm}$**		**4.292**	**0.341**
Coeff. of Var. [%]	**5.570**	**4.805**	**18.789**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**5.199**	**4.028**
Min.	**76.652**	**8.133**	**0.051**	**Min.**	**0.0086**	**74.362**	**8.007**
Max.	**93.612**	**9.223**	**0.082**	**Max.**	**0.0090**	**90.150**	**8.882**
Number of Spec.	**18**	**6**	**6**	**Number of Spec.**		**18**	**6**



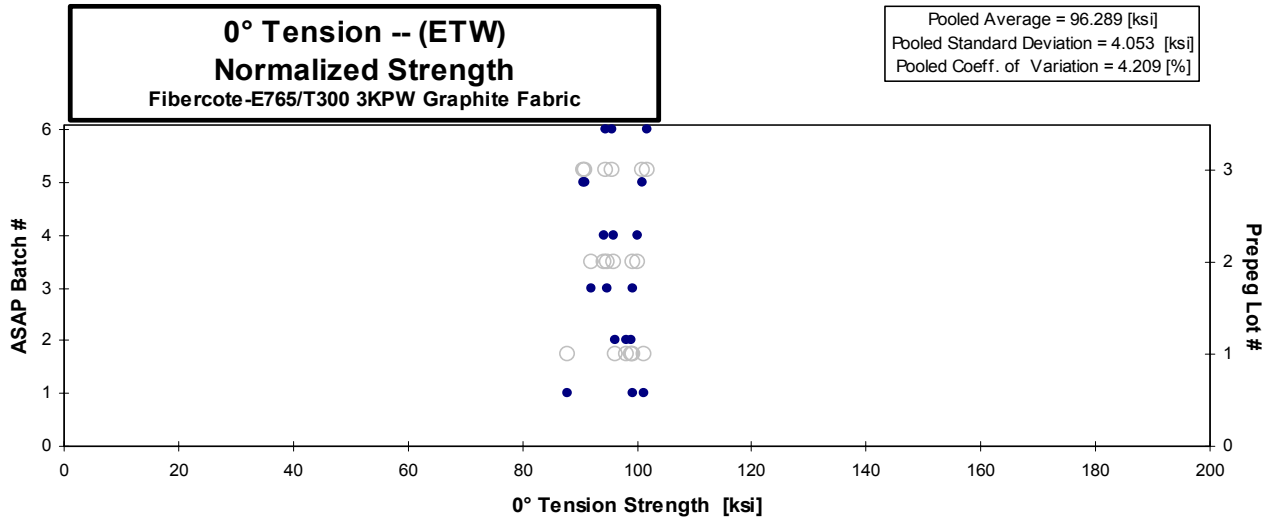


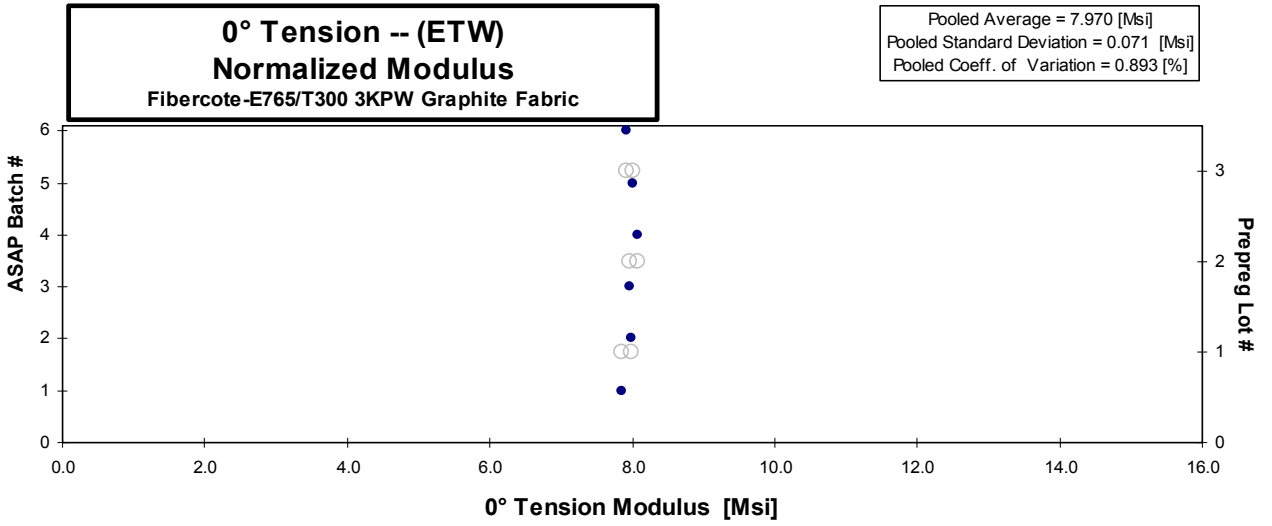
0° Tension -- (ETW)
Strength & Modulus
Fibercote-E765/T300 3KPW Graphite Fabric

normalizing t_{ply} [in]: 0.0089

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]
TBJ1112F	1	1	1	88.016			0.107	12	0.00889	87.892	
TBJ1113F	1	1	1	100.393			0.106	12	0.00880	99.296	
TBJ1114F	1	1	1	101.606	7.891	0.050	0.106	12	0.00887	101.210	7.860
TBJ1211F	2	1	2	96.032	7.975	0.043	0.107	12	0.00892	96.242	7.993
TBJ1212F	2	1	2	100.427			0.105	12	0.00877	99.001	
TBJ1213F	2	1	2	98.759			0.106	12	0.00885	98.219	
TBJ2212F	1	2	3	96.570			0.105	12	0.00875	94.928	
TBJ2213F	1	2	3	98.762			0.107	12	0.00895	99.348	
TBJ2214F	1	2	3	91.781	7.951	0.037	0.107	12	0.00892	91.981	7.969
TBJ2111F	2	2	4	100.540	8.098	0.046	0.106	12	0.00887	100.195	8.070
TBJ2112F	2	2	4	96.241			0.107	12	0.00888	96.075	
TBJ2113F	2	2	4	94.498			0.106	12	0.00887	94.189	
TBJ3212F	1	3	5	94.149	8.286	0.025	0.103	12	0.00859	90.916	8.002
TBJ3213F	1	3	5	99.763			0.108	12	0.00900	100.916	
TBJ3214F	1	3	5	89.602			0.108	12	0.00901	90.693	
TBJ3111F	2	3	6	95.928	7.945	0.057	0.107	12	0.00888	95.734	7.929
TBJ3113F	2	3	6	102.062			0.107	12	0.00888	101.776	
TBJ3116F	2	3	6	95.254			0.106	12	0.00884	94.585	

Average	**96.688**	**8.025**	**0.043**	**$Average_{norm}$**	**0.00886**	**96.289**	**7.970**
Standard Dev.	**4.042**	**0.146**	**0.011**	**$Standard\ Dev._{norm}$**		**4.053**	**0.071**
Coeff. of Var. [%]	**4.180**	**1.813**	**25.735**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**4.209**	**0.893**
Min.	**88.016**	**7.891**	**0.025**	**Min.**	**0.0086**	**87.892**	**7.860**
Max.	**102.062**	**8.286**	**0.057**	**Max.**	**0.0090**	**101.776**	**8.070**
Number of Spec.	**18**	**6**	**6**	**Number of Spec.**		**18**	**6**



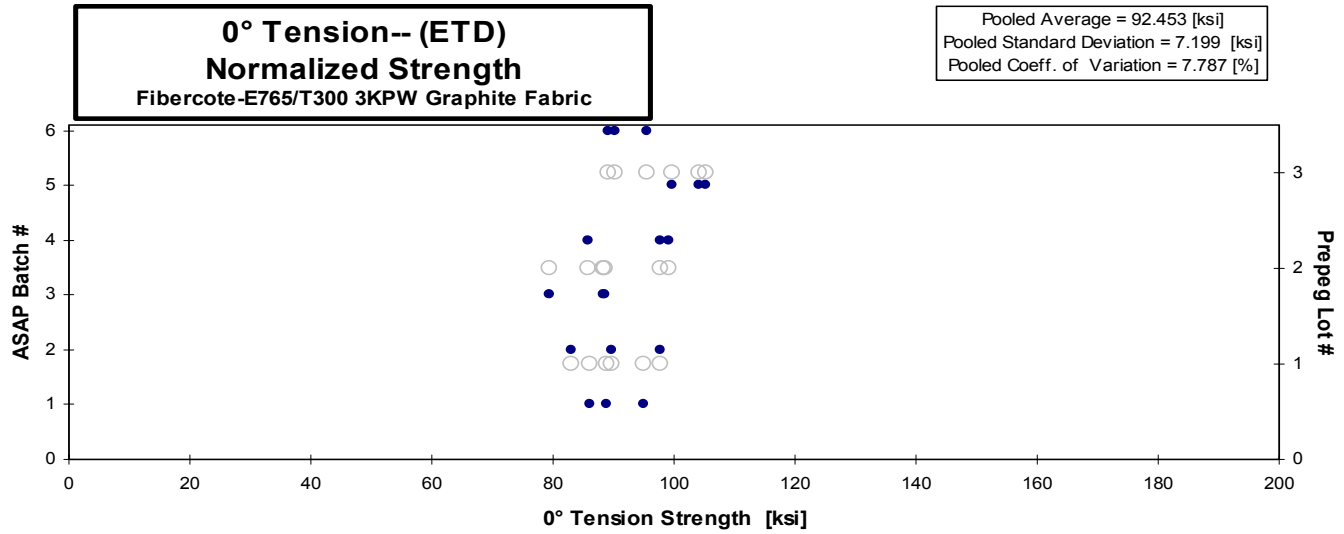


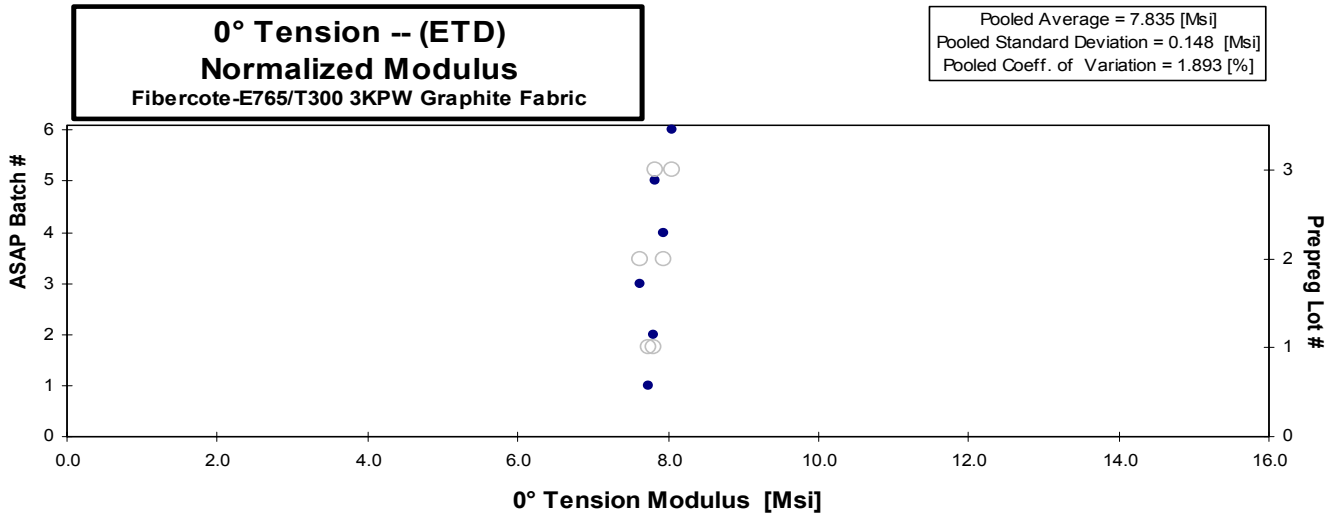
0° Tension -- (ETD)
Strength & Modulus
Fibercote-E765/T300 3KPW Graphite Fabric

normalizing t_{ply} [in]: 0.0089

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]
TBJ1116G	1	1	1	87.442	7.856	0.036	0.105	12	0.00877	86.118	7.737
TBJ1117G	1	1	1	90.168			0.105	12	0.00879	89.014	
TBJ1118G	1	1	1	94.702			0.107	12	0.00892	94.953	
TBJ1216G	2	1	2	97.559	7.793	0.043	0.107	12	0.00893	97.864	7.818
TBJ1217G	2	1	2	90.017			0.107	12	0.00888	89.834	
TBJ1218G	2	1	2	84.109			0.105	12	0.00878	82.941	
TBJ2415G	1	2	3	81.833	7.854	0.046	0.104	12	0.00865	79.496	7.630
TBJ2416G	1	2	3	91.664			0.103	12	0.00859	88.474	
TBJ2417G	1	2	3	91.573			0.103	12	0.00859	88.400	
TBJ2315G	2	2	4	103.396	8.261	0.070	0.103	12	0.00855	99.298	7.934
TBJ2316G	2	2	4	88.115			0.104	12	0.00867	85.832	
TBJ2317G	2	2	4	100.996			0.103	12	0.00861	97.686	
TBJ3415G	1	3	5	103.389	7.781	0.042	0.108	12	0.00896	104.131	7.837
TBJ3416G	1	3	5	99.577			0.107	12	0.00892	99.795	
TBJ3414G	1	3	5	105.344			0.107	12	0.00889	105.245	
TBJ3315G	2	3	6	89.754	8.100	0.035	0.106	12	0.00885	89.250	8.055
TBJ3316G	2	3	6	89.498			0.108	12	0.00898	90.308	
TBJ3112G	2	3	6	97.022			0.105	12	0.00876	95.507	

Average	**93.675**	**7.941**	**0.045**	**$Average_{norm}$**	**0.00878**	**92.453**	**7.835**
Standard Dev.	**6.900**	**0.195**	**0.013**	**$Standard\ Dev._{norm}$**		**7.199**	**0.148**
Coeff. of Var. [%]	**7.365**	**2.454**	**28.455**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**7.787**	**1.893**
Min.	**81.833**	**7.781**	**0.035**	**Min.**	**0.0085**	**79.496**	**7.630**
Max.	**105.344**	**8.261**	**0.070**	**Max.**	**0.0090**	**105.245**	**8.055**
Number of Spec.	**18**	**6**	**6**	**Number of Spec.**		**18**	**6**



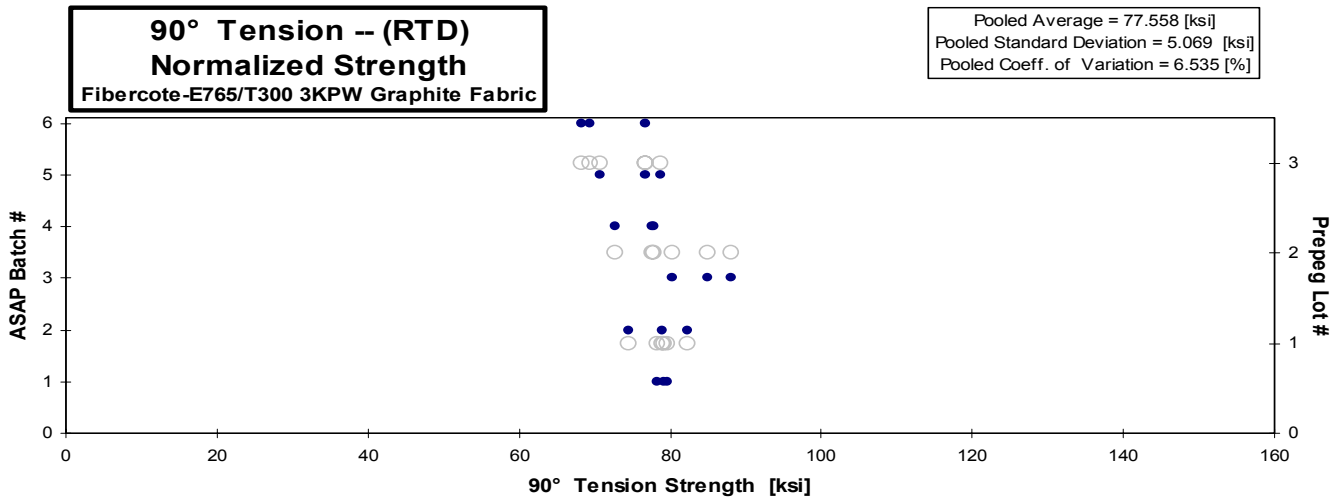


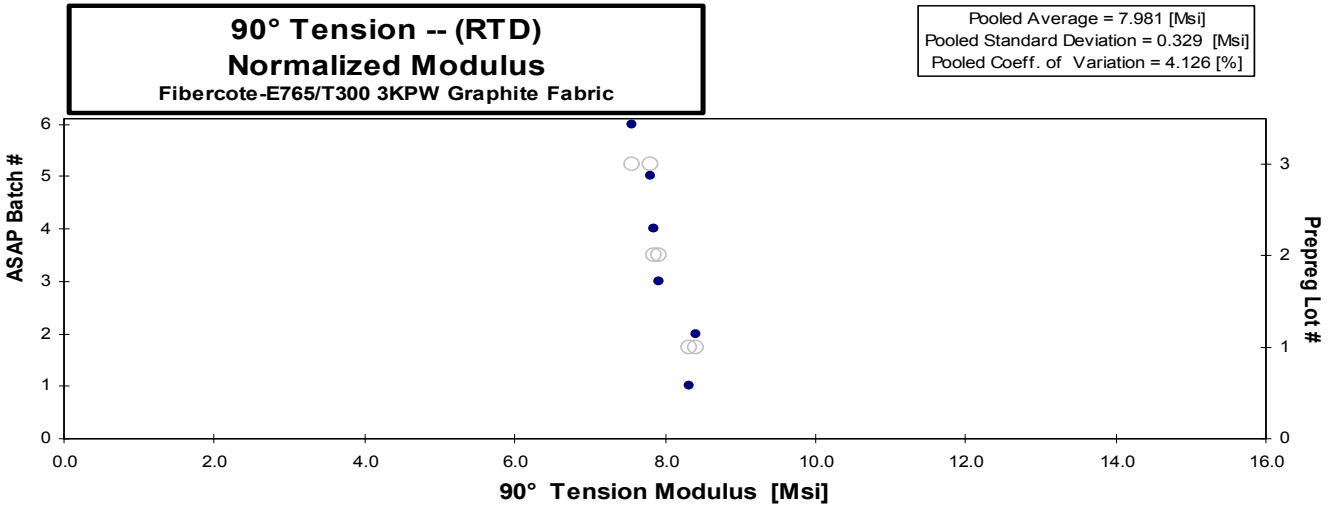
90° Tension-- (RTD)
Strength & Modulus
Fibercote-E765/T300 3KPW Graphite Fabric

normalizing t_{ply} [in]: 0.0089

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]
TBU1311A	1	1	1	79.996	8.403	0.106	12	0.00881	79.210	8.321
TBU1312A	1	1	1	79.292		0.106	12	0.00880	78.413	
TBU1313A	1	1	1	80.916		0.105	12	0.00877	79.691	
TBU1411A	2	1	2	83.780	8.582	0.105	12	0.00874	82.237	8.424
TBU1412A	2	1	2	80.568		0.105	12	0.00872	78.971	
TBU1413A	2	1	2	76.473		0.104	12	0.00869	74.647	
TBU2411A	1	2	3	88.658	7.970	0.106	12	0.00884	88.050	7.915
TBU2412A	1	2	3	82.016		0.105	12	0.00872	80.378	
TBU2414A	1	2	3	85.070		0.107	12	0.00889	84.964	
TBU2311A	2	2	4	78.244	7.893	0.106	12	0.00887	77.975	7.866
TBU2313A	2	2	4	77.273		0.107	12	0.00895	77.731	
TBU2314A	2	2	4	72.877		0.107	12	0.00888	72.718	
TBU3316A	2	3	5	69.169	7.621	0.109	12	0.00912	70.852	7.807
TBU3317A	2	3	5	76.408		0.110	12	0.00917	78.757	
TBU3318A	2	3	5	75.669		0.109	12	0.00904	76.873	
TBU3411A	5	3	6	68.569	7.593	0.106	12	0.00885	68.216	7.554
TBU3412A	5	3	6	68.582		0.108	12	0.00902	69.481	
TBU3414A	5	3	6	77.256		0.106	12	0.00886	76.871	

Average	**77.823**	**8.011**	**$Average_{norm}$**	**0.00887**	**77.558**	**7.981**
Standard Dev.	**5.566**	**0.406**	**$Standard\ Dev._{norm}$**		**5.069**	**0.329**
Coeff. of Var. [%]	**7.152**	**5.063**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**6.535**	**4.126**
Min.	**68.569**	**7.593**	**Min.**	**0.0087**	**68.216**	**7.554**
Max.	**88.658**	**8.582**	**Max.**	**0.0092**	**88.050**	**8.424**
Number of Spec.	**18**	**6**	**Number of Spec.**		**18**	**6**



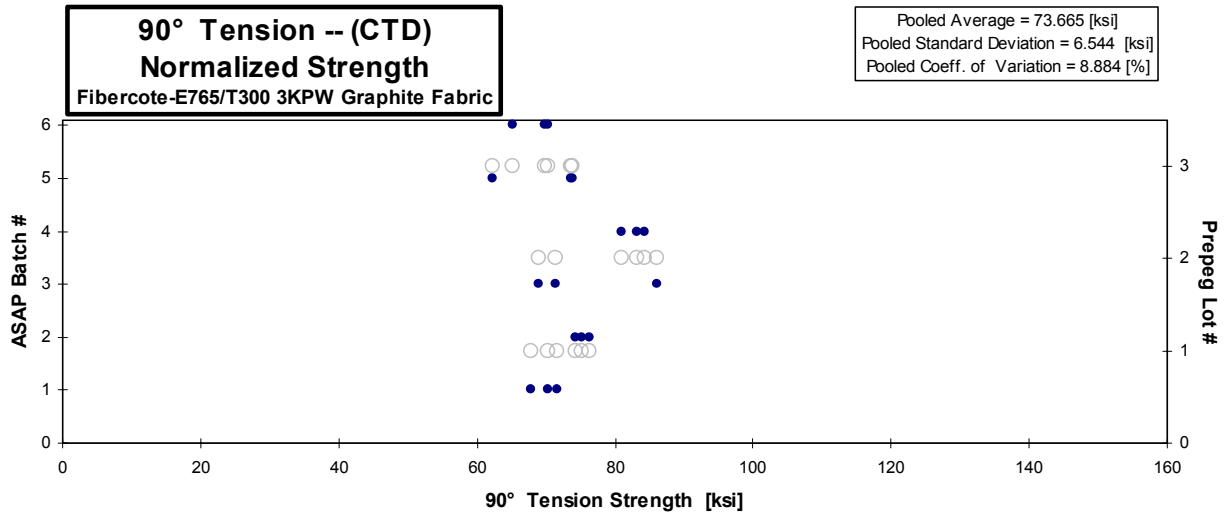


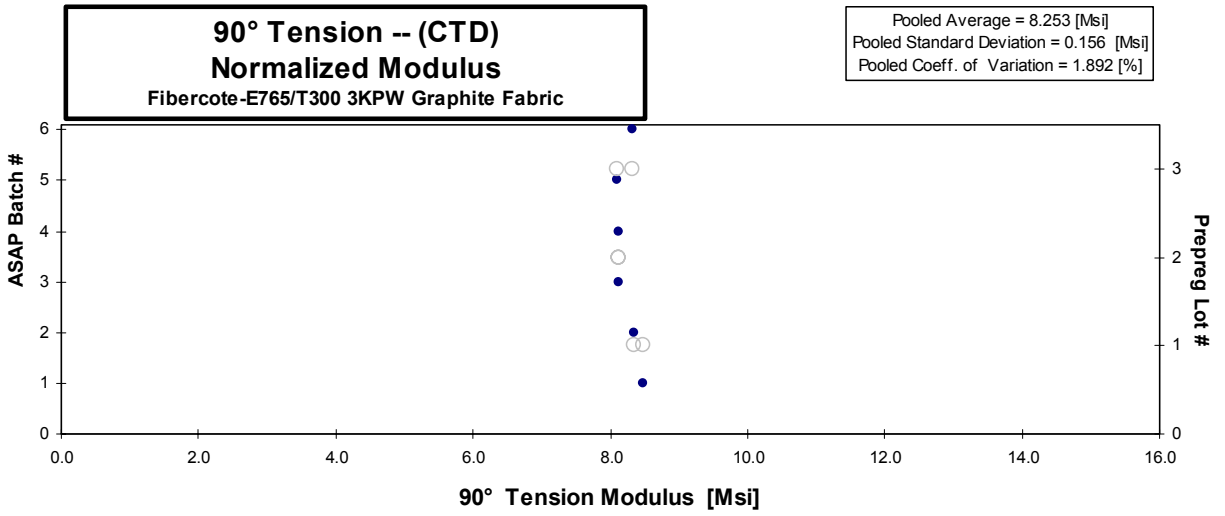
90° Tension-- (CTD)
Strength & Modulus
Fibercote-E765/T300 3KPW Graphite Fabric

normalizing t_{ply} [in]: 0.0089

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]
TBU1316B	1	1	1	68.146	8.517	0.106	12	0.00887	67.880	8.484
TBU1317B	1	1	1	71.469		0.105	12	0.00877	70.387	
TBU1318B	1	1	1	74.125		0.103	12	0.00859	71.557	
TBU1415B	2	1	2	78.107	8.660	0.103	12	0.00858	75.291	8.348
TBU1416B	2	1	2	78.192		0.104	12	0.00868	76.240	
TBU1418B	2	1	2	78.515		0.101	12	0.00843	74.374	
TBU2216B	1	2	3	71.489	8.135	0.107	12	0.00888	71.332	8.118
TBU2218B	1	2	3	68.618		0.107	12	0.00895	68.982	
TBU2416B	1	2	3	86.268		0.107	12	0.00889	86.201	
TBU2116B	2	2	4	84.810	8.173	0.106	12	0.00885	84.373	8.131
TBU2117B	2	2	4	83.419		0.104	12	0.00865	81.089	
TBU2118B	2	2	4	83.903		0.106	12	0.00882	83.143	
TBU3413B	5	3	5	73.027	8.049	0.108	12	0.00897	73.574	8.109
TBU3415B	5	3	5	62.035		0.107	12	0.00895	62.374	
TBU3419B	5	3	5	73.369		0.108	12	0.00897	73.908	
TBU3112B	2	3	6	64.339	8.216	0.108	12	0.00902	65.223	8.328
TBU3113B	2	3	6	68.844		0.108	12	0.00902	69.779	
TBU3117B	2	3	6	70.268		0.107	12	0.00890	70.268	

Average	**74.386**	**8.292**	**$Average_{norm}$**	**0.00882**	**73.665**	**8.253**
Standard Dev.	**7.115**	**0.241**	**Standard $Dev._{norm}$**		**6.544**	**0.156**
Coeff. of Var. [%]	**9.565**	**2.904**	**Coeff. of Var. $[\%]_{norm}$**		**8.884**	**1.892**
Min.	**62.035**	**8.049**	**Min.**	**0.0084**	**62.374**	**8.109**
Max.	**86.268**	**8.660**	**Max.**	**0.0090**	**86.201**	**8.484**
Number of Spec.	**18**	**6**	**Number of Spec.**		**18**	**6**



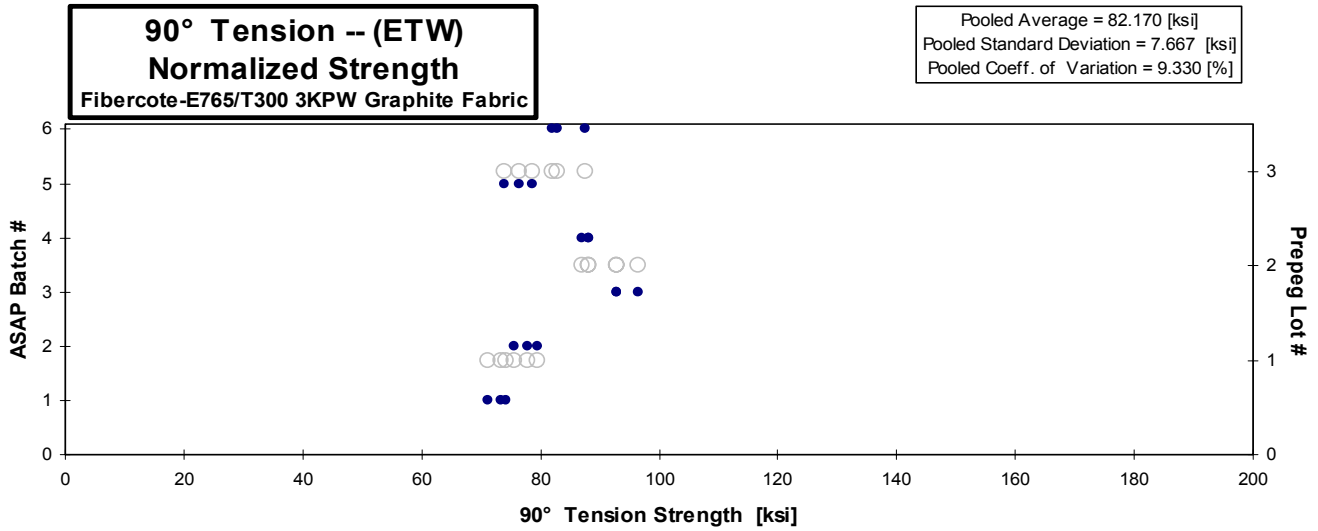


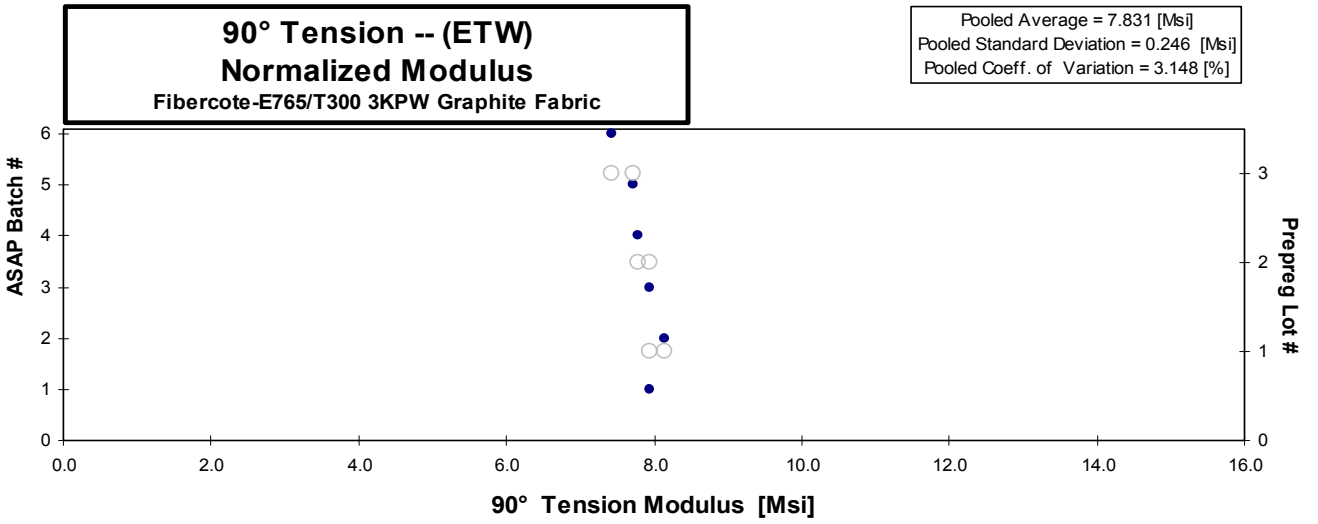
90° Tension-- (ETW)
Strength & Modulus
Fibercote-E765/T300 3KPW Graphite Fabric

normalizing t_{ply} [in]: 0.0089

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]
TBU1111F	1	1	1	71.137	7.946	0.107	12	0.00889	71.092	7.941
TBU1112F	1	1	1	73.990		0.107	12	0.00893	74.221	
TBU1113F	1	1	1	73.732		0.106	12	0.00886	73.433	
TBU1211F	2	1	2	77.256	8.330	0.105	12	0.00871	75.616	8.154
TBU1212F	2	1	2	78.991		0.105	12	0.00877	77.857	
TBU1213F	2	1	2	79.612		0.107	12	0.00891	79.662	
TBU2211F	1	2	3	92.167	7.883	0.108	12	0.00896	92.800	7.937
TBU2212F	1	2	3	94.606		0.105	12	0.00874	92.937	
TBU2213F	1	2	3	98.820		0.104	12	0.00868	96.399	
TBU2111F	2	2	4	88.241	7.808	0.107	12	0.00889	88.131	7.798
TBU2112F	2	2	4	88.573		0.106	12	0.00885	88.117	
TBU2113F	2	2	4	86.619		0.107	12	0.00894	87.052	
TBU3311F	2	3	5	74.471	7.515	0.110	12	0.00915	76.586	7.729
TBU3312F	2	3	5	76.264		0.110	12	0.00918	78.621	
TBU3313F	2	3	5	72.700		0.109	12	0.00905	73.936	
TBU3211F	5	3	6	88.028	7.449	0.106	12	0.00887	87.739	7.425
TBU3212F	5	3	6	82.224		0.107	12	0.00888	82.031	
TBU3213F	5	3	6	82.541		0.107	12	0.00893	82.825	

Average	**82.221**	**7.822**	**$Average_{norm}$**	**0.00890**	**82.170**	**7.831**
Standard Dev.	**8.219**	**0.320**	**$Standard\ Dev._{norm}$**		**7.667**	**0.246**
Coeff. of Var. [%]	**9.996**	**4.085**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**9.330**	**3.148**
Min.	**71.137**	**7.449**	**Min.**	**0.0087**	**71.092**	**7.425**
Max.	**98.820**	**8.330**	**Max.**	**0.0092**	**96.399**	**8.154**
Number of Spec.	**18**	**6**	**Number of Spec.**		**18**	**6**



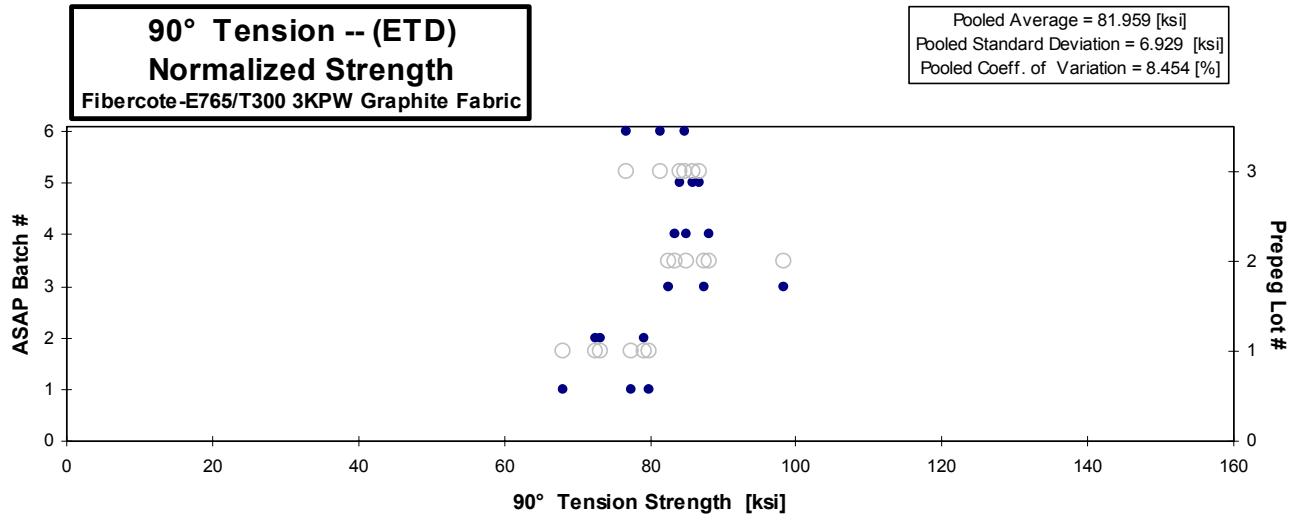


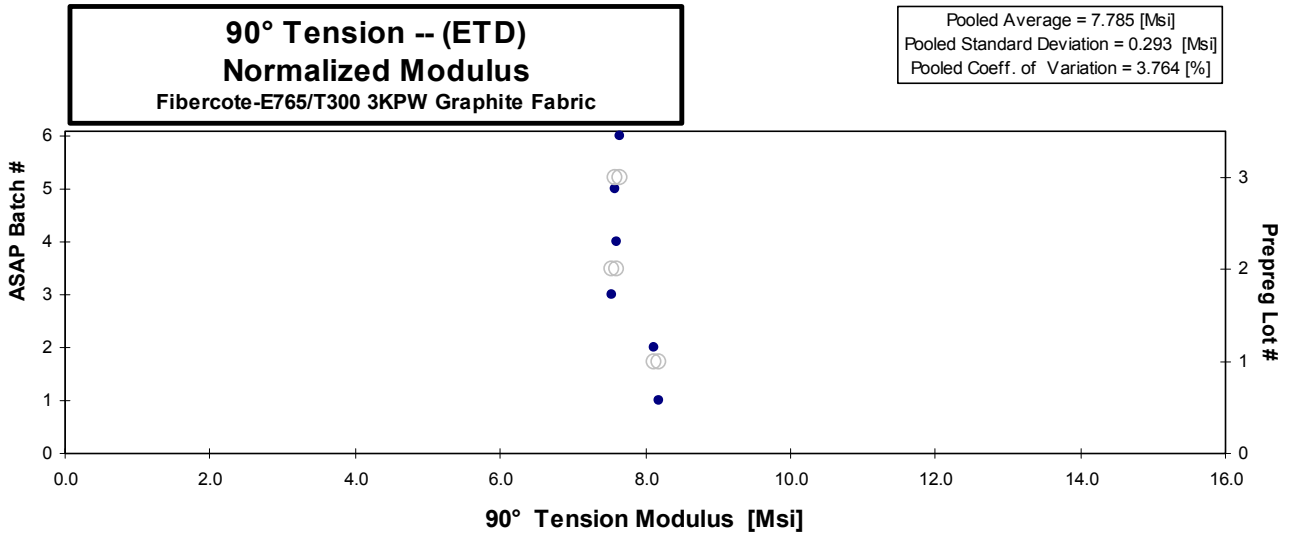
90° Tension-- (ETD)
Strength & Modulus
Fibercote-E765/T300 3KPW Graphite Fabric

normalizing t_{ply} [in]: 0.0089

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]
TBU1116G	1	1	1	69.211	8.312	0.105	12	0.00877	68.185	8.189
TBU1117G	1	1	1	78.099		0.106	12	0.00883	77.490	
TBU1119G	1	1	1	83.047		0.103	12	0.00856	79.885	
TBU1216G	2	1	2	74.035	8.220	0.106	12	0.00880	73.227	8.130
TBU1217G	2	1	2	80.197		0.106	12	0.00880	79.271	
TBU1218G	2	1	2	73.581		0.105	12	0.00877	72.490	
TBU2415G	1	2	3	82.473	7.536	0.107	12	0.00890	82.473	7.536
TBU2417G	1	2	3	87.893		0.106	12	0.00886	87.481	
TBU2418G	1	2	3	97.755		0.107	12	0.00895	98.319	
TBU2316G	2	2	4	84.407	7.565	0.108	12	0.00896	84.986	7.617
TBU2317G	2	2	4	90.244		0.104	12	0.00870	88.230	
TBU2318G	2	2	4	82.976		0.108	12	0.00896	83.520	
TBU3111G	2	3	5	85.027	7.516	0.108	12	0.00899	85.889	7.593
TBU3115G	2	3	5	82.044		0.110	12	0.00913	84.157	
TBU3118G	2	3	5	86.191		0.107	12	0.00896	86.729	
TBU3416G	5	3	6	81.332	7.639	0.107	12	0.00891	81.382	7.644
TBU3417G	5	3	6	78.819		0.104	12	0.00866	76.679	
TBU3418G	5	3	6	85.057		0.107	12	0.00888	84.871	

Average	**82.355**	**7.798**	**$Average_{norm}$**	**0.00885**	**81.959**	**7.785**
Standard Dev.	**6.506**	**0.366**	**$Standard\ Dev._{norm}$**		**6.929**	**0.293**
Coeff. of Var. [%]	**7.901**	**4.694**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**8.454**	**3.764**
Min.	**69.211**	**7.516**	**Min.**	**0.0086**	**68.185**	**7.536**
Max.	**97.755**	**8.312**	**Max.**	**0.0091**	**98.319**	**8.189**
Number of Spec.	**18**	**6**	**Number of Spec.**		**18**	**6**



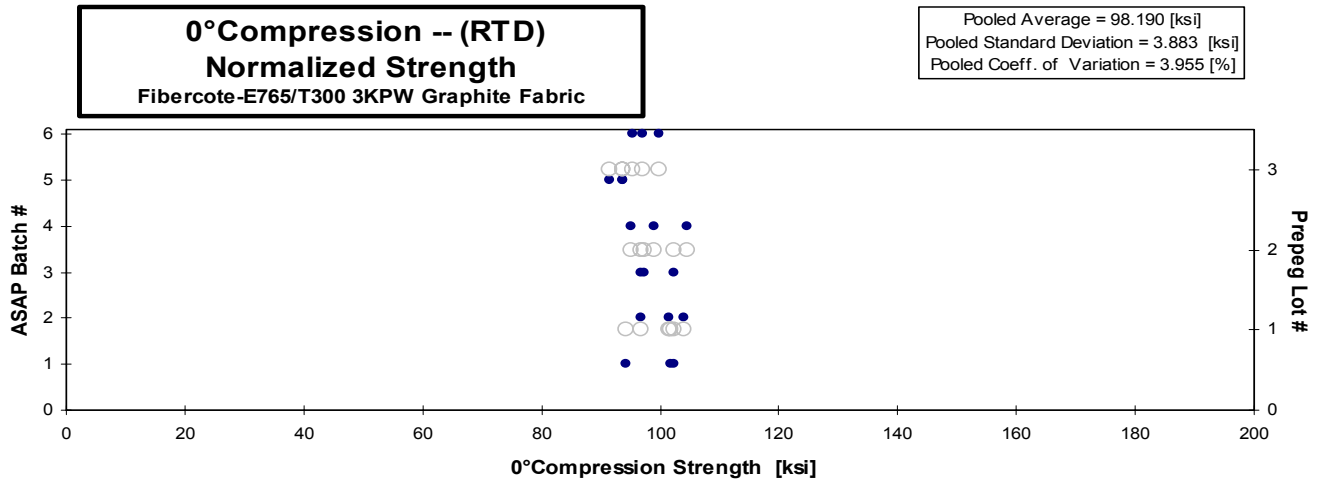


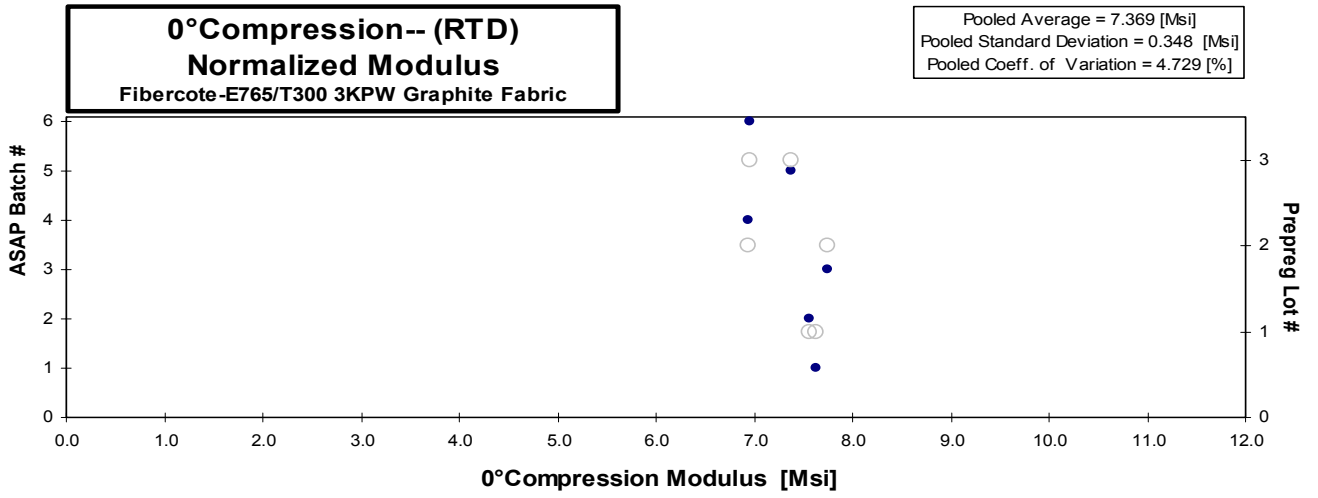
0°Compression -- (RTD)
Strength & Modulus
Fibercote-E765/T300 3KPW Graphite Fabric

normalizing t_{ply} [in]: 0.0089

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]
TBK1116A	3	1	1	98.095		0.120	14	0.00856	94.395	
TBK1117A	3	1	1	104.474		0.121	14	0.00868	101.854	
TBK1118A	3	1	1	103.589		0.123	14	0.00879	102.363	
TBL1111A	3	1	1		7.865	0.121	14	0.00863		7.624
TBK1216A	4	1	2	101.381		0.125	14	0.00891	101.442	
TBK1217A	4	1	2	97.607		0.123	14	0.00882	96.687	
TBK1218A	4	1	2	105.127		0.123	14	0.00881	104.115	
TBL1211A	4	1	2		7.746	0.122	14	0.00869		7.566
TBK2216A	3	2	3	96.094		0.133	14	0.00948	102.360	
TBK2217A	3	2	3	91.908		0.131	14	0.00936	96.684	
TBK221AA	3	2	3	92.217		0.132	14	0.00940	97.435	
TBL2211A	3	2	3		7.307	0.132	14	0.00944		7.750
TBK2116A	4	2	4	89.824		0.132	14	0.00944	95.267	
TBK2117A	4	2	4	99.133		0.131	14	0.00938	104.483	
TBK2118A	4	2	4	93.151		0.132	14	0.00945	98.908	
TBL2111A	4	2	4		6.545	0.132	14	0.00944		6.941
TBK3116A	3	3	5	91.456		0.128	14	0.00912	93.750	
TBK3117A	3	3	5	89.502		0.127	14	0.00910	91.478	
TBK3118A	3	3	5	91.725		0.128	14	0.00911	93.860	
TBL3111A	3	3	5		7.243	0.127	14	0.00907		7.379
TBK3216A	4	3	6	94.364		0.126	14	0.00901	95.519	
TBK3217A	4	3	6	95.626		0.127	14	0.00904	97.085	
TBK3218A	4	3	6	98.373		0.126	14	0.00902	99.735	
TBL3211A	4	3	6		6.898	0.126	14	0.00897		6.951

Average	**96.314**	**7.267**		**$Average_{norm}$**	**0.00907**	**98.190**	**7.369**
Standard Dev.	**4.992**	**0.500**		**Standard $Dev._{norm}$**		**3.883**	**0.348**
Coeff. of Var. [%]	**5.183**	**6.873**		**Coeff. of Var. $[\%]_{norm}$**		**3.955**	**4.729**
Min.	**89.502**	**6.545**		**Min.**	**0.0086**	**91.478**	**6.941**
Max.	**105.127**	**7.865**		**Max.**	**0.0095**	**104.483**	**7.750**
Number of Spec.	**18**	**6**		**Number of Spec.**		**18**	**6**



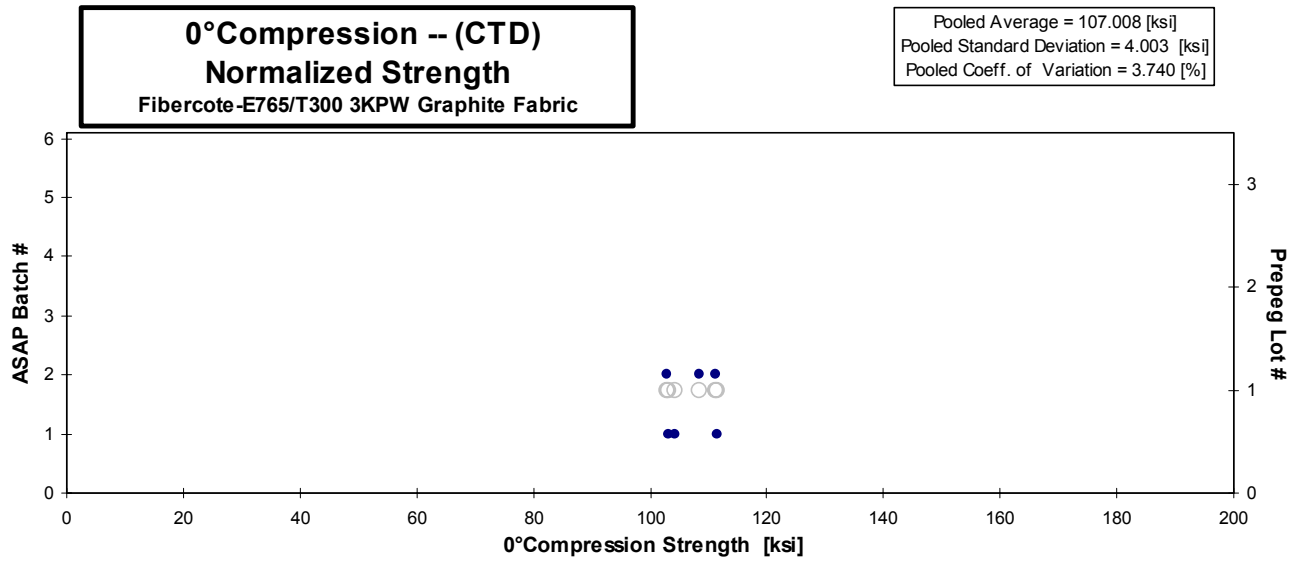


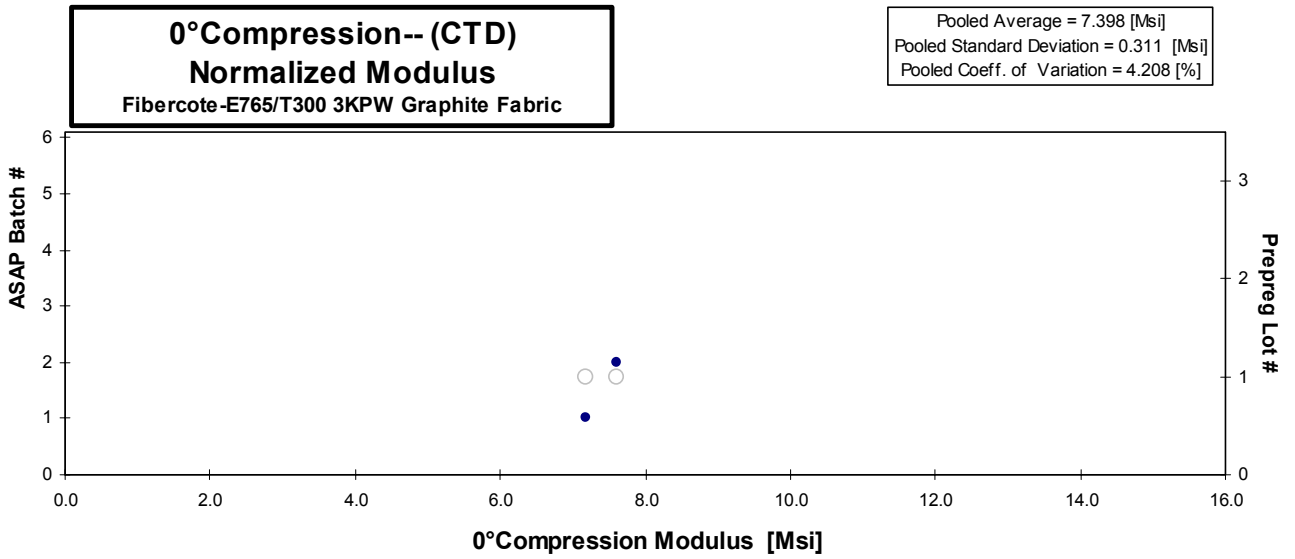
0°Compression -- (CTD)
Strength & Modulus
Fibercote-E765/T300 3KPW Graphite Fabric

normalizing t_{ply} [in]: 0.0089

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]
TBK1121B	3	1	1	105.223		0.122	14	0.00873	103.260	
TBK1122B	3	1	1	106.460		0.122	14	0.00872	104.281	
TBK1123B	3	1	1	113.873		0.122	14	0.00872	111.588	
TBL1114B	3	1	1		7.730	0.116	14	0.00826		7.178
TBK1223B	4	1	2	115.459		0.120	14	0.00858	111.336	
TBK1224B	4	1	2	106.471		0.121	14	0.00861	102.967	
TBK1225B	4	1	2	111.662		0.121	14	0.00866	108.615	
TBL1214B	4	1	2		7.832	0.121	14	0.00866		7.618

Average	**109.858**	**7.781**	**$Average_{norm}$**	**0.00862**	**107.008**	**7.398**
Standard Dev.	**4.365**	**0.072**	**Standard $Dev._{norm}$**		**4.003**	**0.311**
Coeff. of Var. [%]	**3.973**	**0.925**	**Coeff. of Var. $[\%]_{norm}$**		**3.740**	**4.208**
Min.	**105.223**	**7.730**	**Min.**	**0.0083**	**102.967**	**7.178**
Max.	**115.459**	**7.832**	**Max.**	**0.0087**	**111.588**	**7.618**
Number of Spec.	**6**	**2**	**Number of Spec.**		**6**	**2**



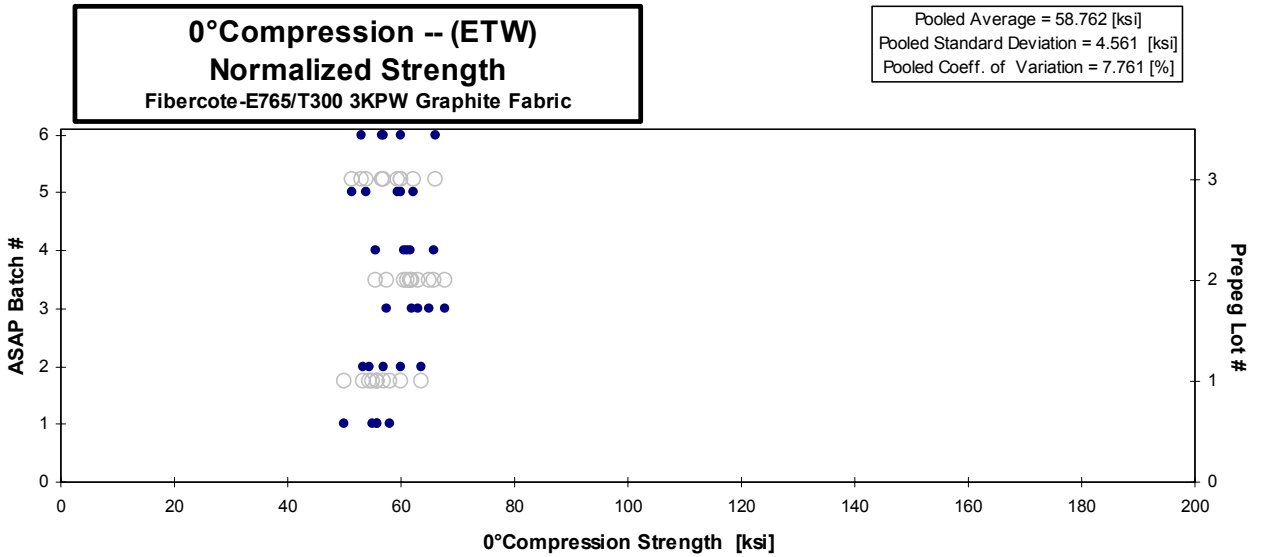


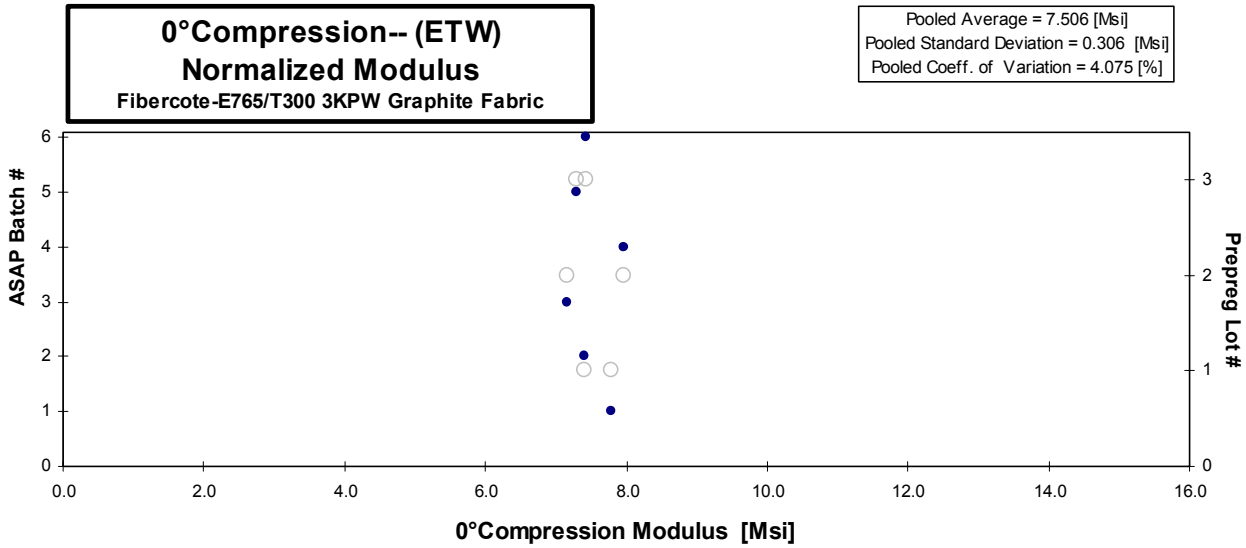
0°Compression -- (ETW)
Strength & Modulus
Fibercote-E765/T300 3KPW Graphite Fabric

normalizing t_{ply} [in]: 0.0089

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]
TBK1111F	3	1	1	57.163		0.122	14	0.00869	55.809	
TBK1112F	3	1	1	56.591		0.123	14	0.00878	55.853	
TBK1113F	3	1	1	59.745		0.121	14	0.00865	58.091	
TBK1114F	3	1	1	56.288		0.122	14	0.00869	54.956	
TBK1115F	3	1	1	51.341		0.121	14	0.00865	49.909	
TBL111AF	3	1	1		8.033	0.121	14	0.00862		7.780
TBK1211F	4	1	2	63.882		0.124	14	0.00886	63.587	
TBK1212F	4	1	2	61.230		0.122	14	0.00874	60.137	
TBK1213F	4	1	2	55.749		0.122	14	0.00871	54.529	
TBK1214F	4	1	2	53.932		0.123	14	0.00879	53.283	
TBK1215F	4	1	2	57.892		0.123	14	0.00876	56.951	
TBL1217F	4	1	2		7.625	0.121	14	0.00865		7.414
TBK2211F	3	2	3	53.863		0.133	14	0.00951	57.527	
TBK2212F	3	2	3	59.276		0.132	14	0.00946	62.986	
TBK2213F	3	2	3	59.744		0.129	14	0.00923	61.986	
TBK2214F	3	2	3	63.669		0.133	14	0.00948	67.795	
TBK2215F	3	2	3	61.093		0.132	14	0.00946	64.954	
TBL2217F	3	2	3		6.712	0.133	14	0.00949		7.157
TBK2111F	4	2	4	57.856		0.132	14	0.00940	61.094	
TBK2112F	4	2	4	57.139		0.132	14	0.00942	60.498	
TBK2113F	4	2	4	61.969		0.132	14	0.00944	65.736	
TBK2114F	4	2	4	58.461		0.132	14	0.00940	61.769	
TBK2115F	4	2	4	53.760		0.129	14	0.00919	55.497	
TBL2114F	4	2	4		7.772	0.128	14	0.00912		7.967
TBK3111F	3	3	5	60.913		0.127	14	0.00907	62.099	
TBK3112F	3	3	5	58.644		0.128	14	0.00912	60.080	
TBK3113F	3	3	5	50.177		0.128	14	0.00911	51.376	
TBK3114F	3	3	5	53.337		0.126	14	0.00899	53.904	
TBK3115F	3	3	5	58.370		0.127	14	0.00908	59.553	
TBL3117F	3	3	5		7.245	0.126	14	0.00897		7.298
TBK3211F	4	3	6	64.859		0.127	14	0.00908	66.199	
TBK3212F	4	3	6	56.042		0.127	14	0.00905	56.975	
TBK3213F	4	3	6	58.972		0.127	14	0.00906	60.037	
TBK3214F	4	3	6	52.123		0.127	14	0.00904	52.928	
TBK3215F	4	3	6	55.629		0.127	14	0.00908	56.768	
TBL3214F	4	3	6		7.368	0.126	14	0.00897		7.422

Average	**57.657**	**7.459**	**$Average_{norm}$**	**0.00905**	**58.762**	**7.506**
Standard Dev.	**3.706**	**0.462**	**$Standard\ Dev._{norm}$**		**4.561**	**0.306**
Coeff. of Var. [%]	**6.428**	**6.192**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**7.761**	**4.075**
Min.	**50.177**	**6.712**	**Min.**	**0.0086**	**49.909**	**7.157**
Max.	**64.859**	**8.033**	**Max.**	**0.0095**	**67.795**	**7.967**
Number of Spec.	**30**	**6**	**Number of Spec.**		**30**	**6**



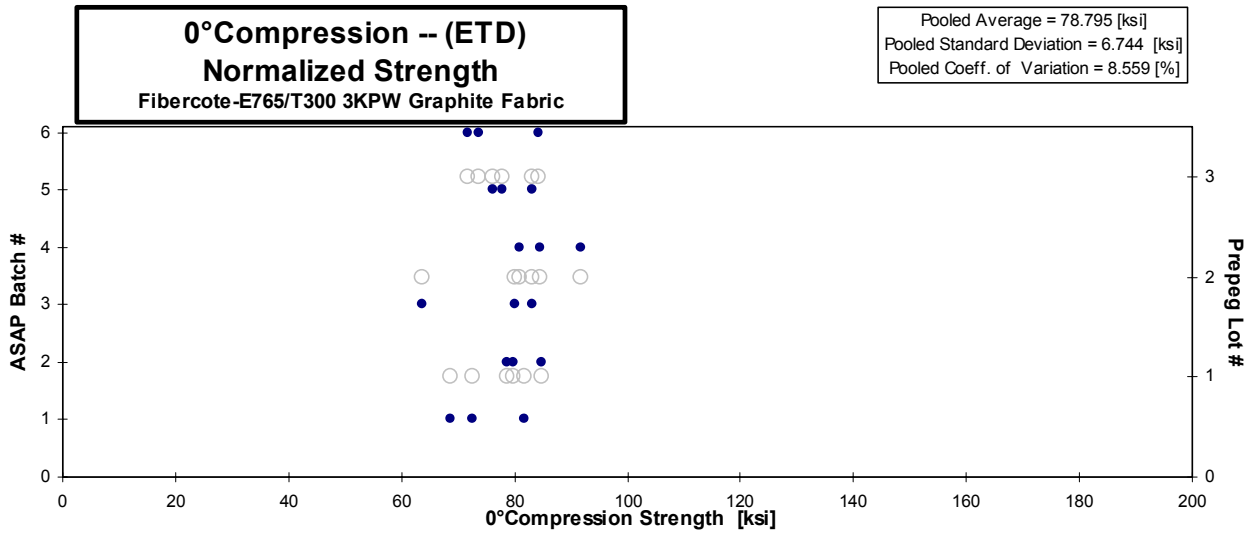


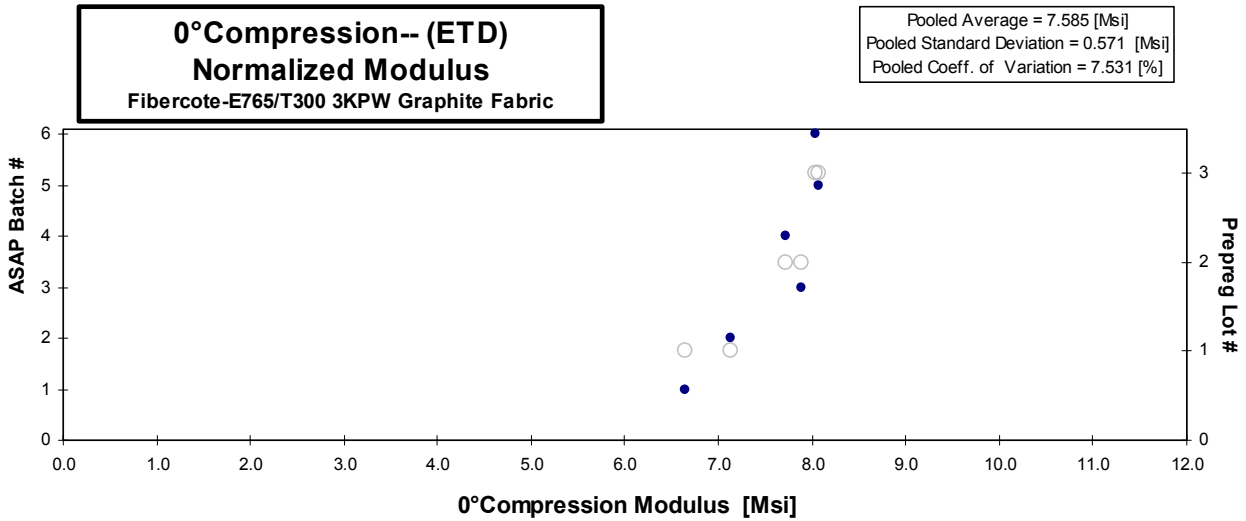
0°Compression -- (ETD)
Strength & Modulus
Fibercote-E765/T300 3KPW Graphite Fabric

normalizing t_{ply} [in]: 0.0089

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]
TBK1126G	3	1	1	75.108		0.121	14	0.00862	72.712	
TBK1127G	3	1	1	83.612		0.122	14	0.00872	81.884	
TBK1128G	3	1	1	70.260		0.122	14	0.00872	68.822	
TBL1118G	3	1	1		6.986	0.119	14	0.00847		6.650
TBK1226G	4	1	2	81.689		0.120	14	0.00858	78.771	
TBK1227G	4	1	2	87.290		0.121	14	0.00865	84.838	
TBK1228G	4	1	2	83.281		0.120	14	0.00854	79.906	
TBL121BG	4	1	2		7.388	0.120	14	0.00860		7.136
TBK2225G	3	2	3	60.249		0.132	14	0.00943	63.803	
TBK2226G	3	2	3	78.404		0.132	14	0.00943	83.108	
TBK2227G	3	2	3	75.841		0.132	14	0.00941	80.162	
TBL2214G	3	2	3		7.575	0.130	14	0.00928		7.896
TBK2121G	4	2	4	75.512		0.133	14	0.00953	80.815	
TBK2122G	4	2	4	82.215		0.128	14	0.00917	84.690	
TBK2123G	4	2	4	85.808		0.133	14	0.00953	91.886	
TBL2119G	4	2	4		7.238	0.133	14	0.00949		7.719
TBK3126G	3	3	5	74.848		0.127	14	0.00905	76.109	
TBK3127G	3	3	5	75.785		0.128	14	0.00914	77.838	
TBK3128G	3	3	5	82.789		0.125	14	0.00896	83.304	
TBL3114G	3	3	5		7.965	0.126	14	0.00901		8.066
TBK3221G	4	3	6	73.070		0.126	14	0.00898	73.745	
TBK3222G	4	3	6	83.642		0.125	14	0.00896	84.229	
TBK3223G	4	3	6	70.972		0.126	14	0.00899	71.684	
TBL3219G	4	3	6		7.980	0.126	14	0.00897		8.043

Average	**77.799**	**7.522**	**$Average_{norm}$**	**0.00901**	**78.795**	**7.585**
Standard Dev.	**6.752**	**0.399**	**Standard $Dev._{norm}$**		**6.744**	**0.571**
Coeff. of Var. [%]	**8.679**	**5.302**	**Coeff. of Var. $[\%]_{norm}$**		**8.559**	**7.531**
Min.	**60.249**	**6.986**	**Min.**	**0.0085**	**63.803**	**6.650**
Max.	**87.290**	**7.980**	**Max.**	**0.0095**	**91.886**	**8.066**
Number of Spec.	**18**	**6**	**Number of Spec.**		**18**	**6**



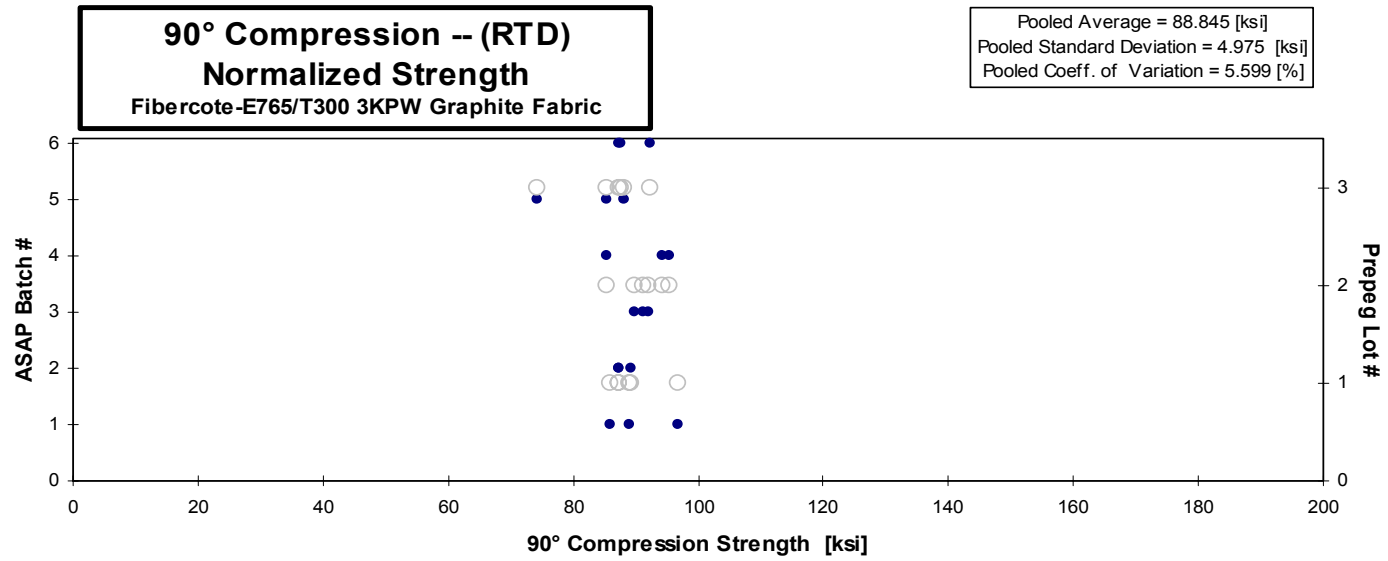


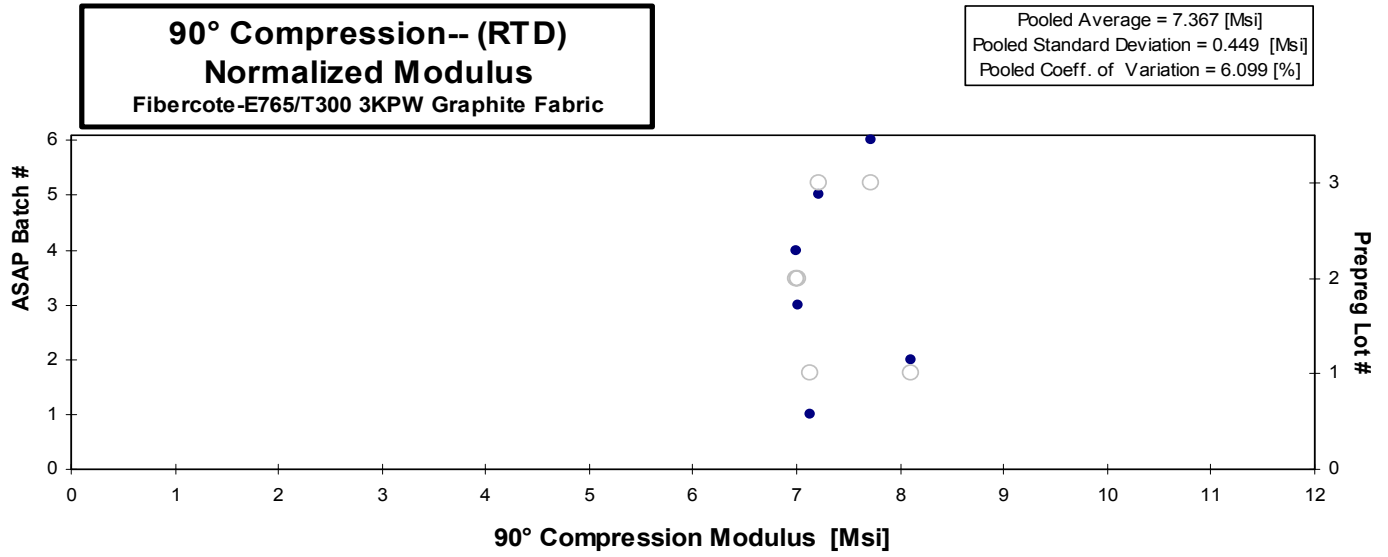
90° Compression -- (RTD)
Strength & Modulus
Fibercote-E765/T300 3KPW Graphite Fabric

normalizing t_{ply} [in]: 0.0089

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]
TBW1216A	3	1	1	90.371		0.123	14	0.00876	88.974	
TBW1217A	3	1	1	99.023		0.122	14	0.00870	96.817	
TBW1218A	3	1	1	87.102		0.123	14	0.00879	86.001	
TBZ1216A	3	1	1		7.205	0.123	14	0.00881		7.133
TBW1116A	4	1	2	88.399		0.123	14	0.00879	87.317	
TBW1117A	4	1	2	91.721		0.121	14	0.00866	89.292	
TBW1118A	4	1	2	89.830		0.121	14	0.00865	87.307	
TBZ1115A	4	1	2		8.588	0.118	14	0.00840		8.106
TBW2116A	3	2	3	85.716		0.133	14	0.00948	91.254	
TBW2117A	3	2	3	86.862		0.132	14	0.00943	92.056	
TBW2118A	3	2	3	84.209		0.133	14	0.00949	89.785	
TBZ2111A	3	2	3		6.643	0.132	14	0.00939		7.012
TBW2211A	4	2	4	88.620		0.133	14	0.00948	94.416	
TBW2212A	4	2	4	88.727		0.134	14	0.00957	95.403	
TBW2213A	4	2	4	80.276		0.133	14	0.00947	85.446	
TBZ2211A	4	2	4		6.675	0.131	14	0.00934		7.006
TBW3226A	3	3	5	85.096		0.125	14	0.00892	85.267	
TBW3227A	3	3	5	87.781		0.125	14	0.00895	88.274	
TBW3228A	3	3	5	73.900		0.125	14	0.00895	74.285	
TBW3211A	3	3	5		7.099	0.127	14	0.00905		7.216
TBW3116A	4	3	6	88.305		0.124	14	0.00884	87.685	
TBW3117A	4	3	6	91.869		0.125	14	0.00895	92.385	
TBW3118A	4	3	6	87.506		0.124	14	0.00887	87.242	
TBZ3115A	4	3	6		7.991	0.121	14	0.00861		7.728

Average	**87.517**	**7.367**	**$Average_{norm}$**	**0.00901**	**88.845**	**7.367**
Standard Dev.	**5.117**	**0.772**	**$Standard\ Dev._{norm}$**		**4.975**	**0.449**
Coeff. of Var. [%]	**5.847**	**10.481**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**5.599**	**6.099**
Min.	**73.900**	**6.643**	**Min.**	**0.0084**	**74.285**	**7.006**
Max.	**99.023**	**8.588**	**Max.**	**0.0096**	**96.817**	**8.106**
Number of Spec.	**18**	**6**	**Number of Spec.**		**18**	**6**



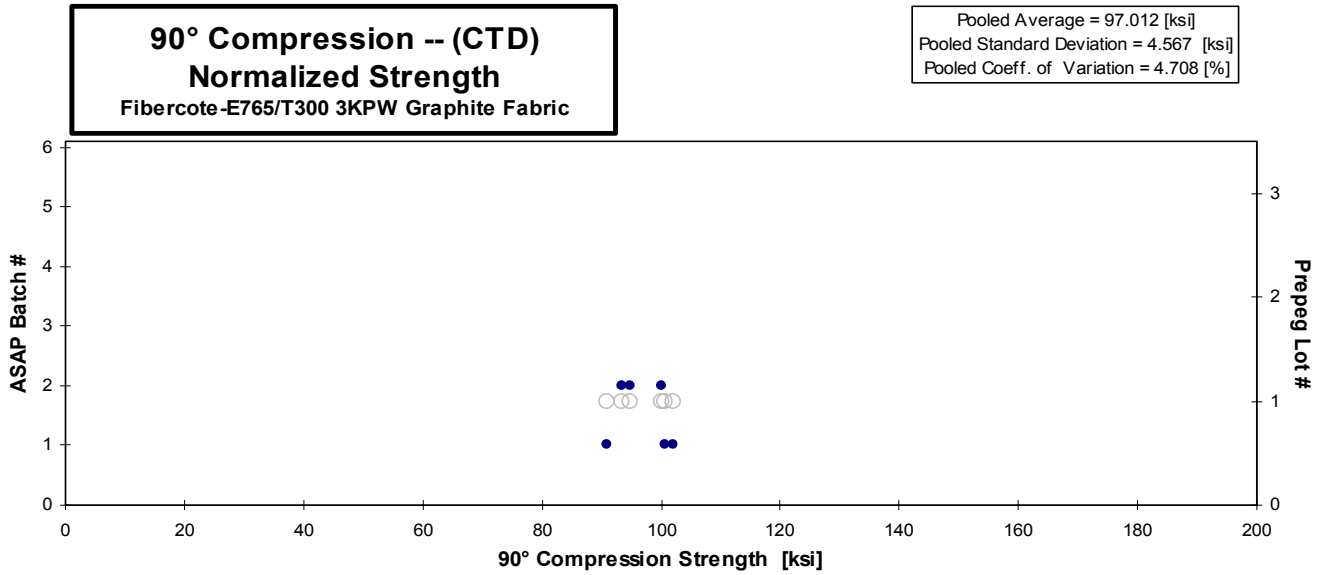


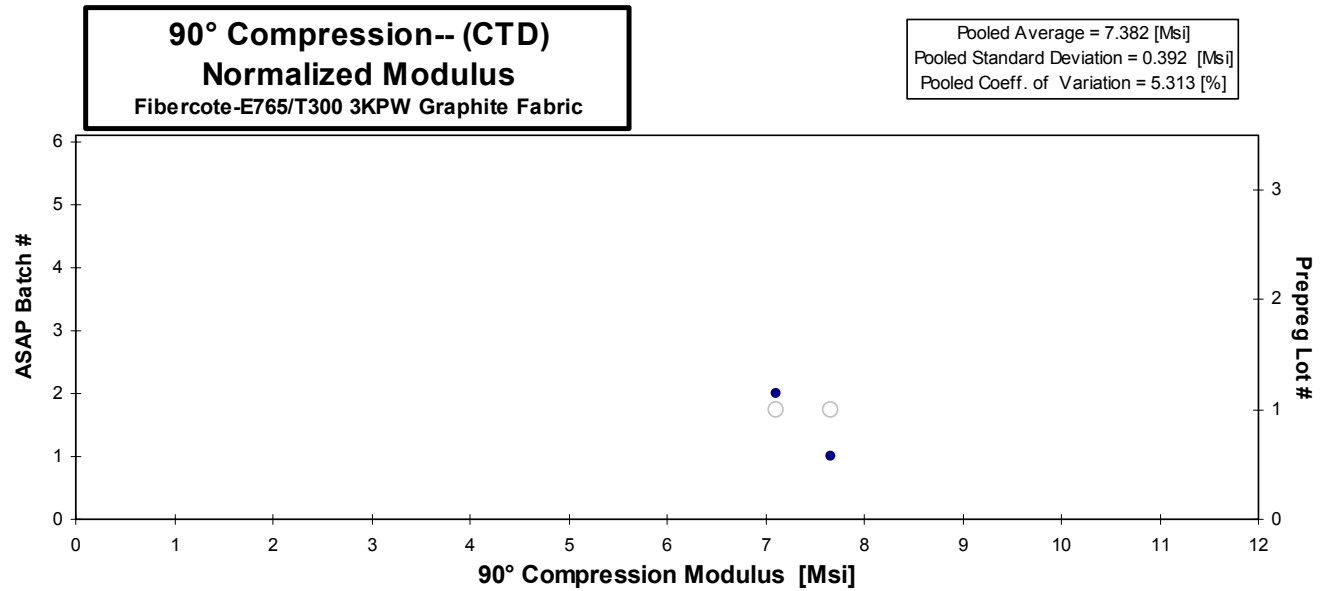
90° Compression -- (CTD)
Strength & Modulus
Fibercote-E765/T300 3KPW Graphite Fabric

normalizing t_{ply} [in]: 0.0089

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]
TBW1221B	3	1	1	102.187		0.123	14	0.00878	100.792	
TBW1222B	3	1	1	93.298		0.121	14	0.00867	90.884	
TBW1223B	3	1	1	102.557		0.124	14	0.00886	102.042	
TBZ121BB	3	1	1		7.791	0.123	14	0.00875		7.659
TBW1121B	4	1	2	94.198		0.123	14	0.00882	93.347	
TBW1122B	4	1	2	100.416		0.124	14	0.00887	100.073	
TBW1123B	4	1	2	95.604		0.124	14	0.00884	94.932	
TBZ1119B	4	1	2		7.252	0.122	14	0.00872		7.105

Average	**98.043**	**7.521**	**$Average_{norm}$**	**0.00879**	**97.012**	**7.382**
Standard Dev.	**4.157**	**0.381**	**Standard $Dev._{norm}$**		**4.567**	**0.392**
Coeff. of Var. [%]	**4.240**	**5.067**	**Coeff. of Var. $[\%]_{norm}$**		**4.708**	**5.313**
Min.	**93.298**	**7.252**	**Min.**	**0.0087**	**90.884**	**7.105**
Max.	**102.557**	**7.791**	**Max.**	**0.0089**	**102.042**	**7.659**
Number of Spec.	**6**	**2**	**Number of Spec.**		**6**	**2**



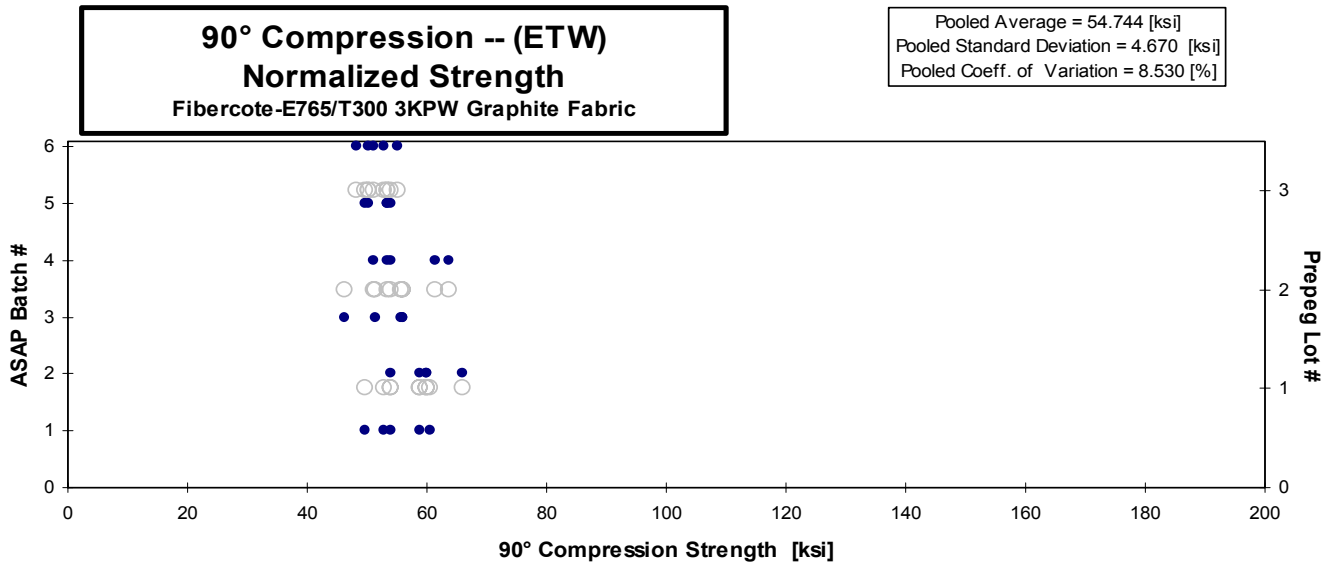


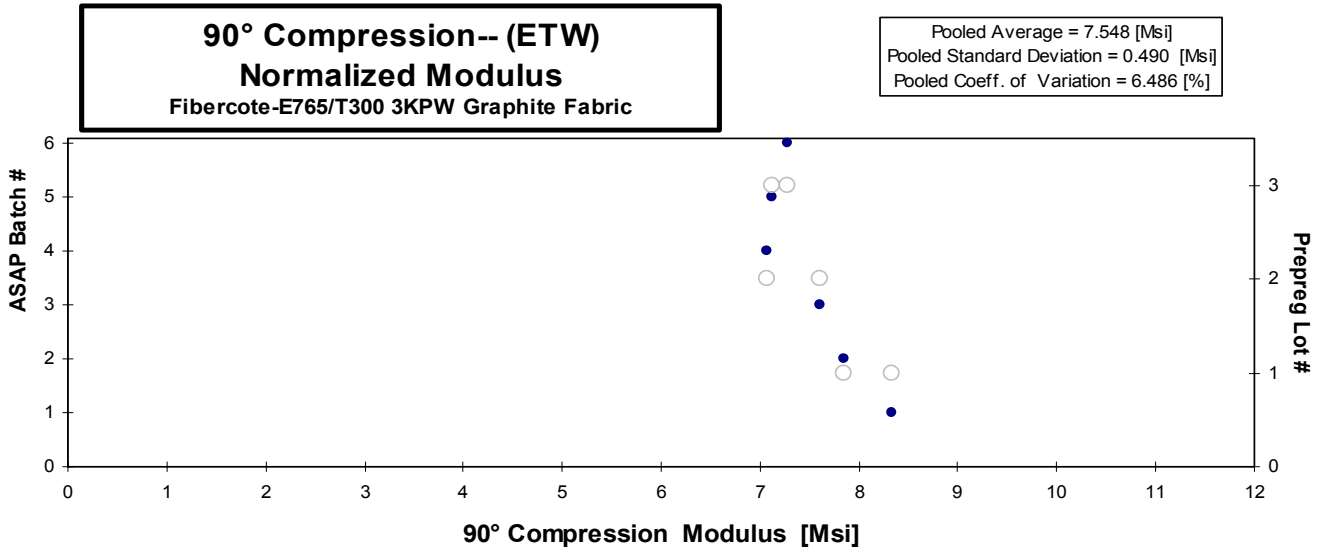
90° Compression -- (ETW)
Strength & Modulus
Fibercote-E765/T300 3KPW Graphite Fabric

normalizing t_{ply} [in]: 0.0089

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]
TBW1211F	3	1	1	55.162		0.122	14	0.00873	54.111	
TBW1212F	3	1	1	61.194		0.124	14	0.00882	60.653	
TBW1213F	3	1	1	51.359		0.120	14	0.00860	49.628	
TBW1214F	3	1	1	59.370		0.124	14	0.00884	58.953	
TBW1215F	3	1	1	54.965		0.120	14	0.00858	52.980	
TBZ1211F	3	1	1		8.487	0.122	14	0.00875		8.341
TBW1111F	4	1	2	60.485		0.121	14	0.00865	58.798	
TBW1112F	4	1	2	61.535		0.122	14	0.00869	60.103	
TBW1113F	4	1	2	63.964		0.117	14	0.00835	60.024	
TBW1114F	4	1	2	55.350		0.121	14	0.00867	53.917	
TBW1115F	4	1	2	67.965		0.121	14	0.00863	65.933	
TBZ1111F	4	1	2		8.138	0.120	14	0.00859		7.857
TBW2111F	3	2	3	48.073		0.133	14	0.00950	51.333	
TBW2112F	3	2	3	43.584		0.132	14	0.00944	46.251	
TBW2113F	3	2	3	52.574		0.133	14	0.00947	55.960	
TBW2114F	3	2	3	52.712		0.132	14	0.00944	55.906	
TBW2115F	3	2	3	53.307		0.130	14	0.00930	55.681	
TBZ2114F	3	2	3		7.236	0.131	14	0.00936		7.612
TBW2216F	4	2	4	59.848		0.132	14	0.00946	63.631	
TBW2217F	4	2	4	55.498		0.138	14	0.00984	61.366	
TBW2218F	4	2	4	48.663		0.131	14	0.00936	51.172	
TBW2219F	4	2	4	51.046		0.130	14	0.00931	53.422	
TBW221AF	4	2	4	51.004		0.132	14	0.00942	53.961	
TBZ2214F	4	2	4		6.702	0.132	14	0.00940		7.080
TBW3221F	3	3	5	52.634		0.126	14	0.00901	53.289	
TBW3222F	3	3	5	50.397		0.124	14	0.00888	50.296	
TBW3223F	3	3	5	53.572		0.124	14	0.00886	53.325	
TBW3224F	3	3	5	54.063		0.124	14	0.00888	53.943	
TBW3225F	3	3	5	49.891		0.124	14	0.00889	49.811	
TBZ3214F	3	3	5		7.071	0.126	14	0.00897		7.130
TBW3111F	4	3	6	52.637		0.125	14	0.00894	52.848	
TBW3112F	4	3	6	50.287		0.125	14	0.00892	50.378	
TBW3113F	4	3	6	48.272		0.125	14	0.00892	48.369	
TBW3114F	4	3	6	55.568		0.124	14	0.00884	55.189	
TBW3115F	4	3	6	53.375		0.119	14	0.00852	51.083	
TBZ3111F	4	3	6		7.227	0.125	14	0.00896		7.272

Average	**54.278**	**7.477**	**$Average_{norm}$**	**0.00899**	**54.744**	**7.548**
Standard Dev.	**5.239**	**0.685**	**Standard $Dev._{norm}$**		**4.670**	**0.490**
Coeff. of Var. [%]	**9.653**	**9.155**	**Coeff. of Var. $[\%]_{norm}$**		**8.530**	**6.486**
Min.	**43.584**	**6.702**	**Min.**	**0.0084**	**46.251**	**7.080**
Max.	**67.965**	**8.487**	**Max.**	**0.0098**	**65.933**	**8.341**
Number of Spec.	**30**	**6**	**Number of Spec.**		**30**	**6**



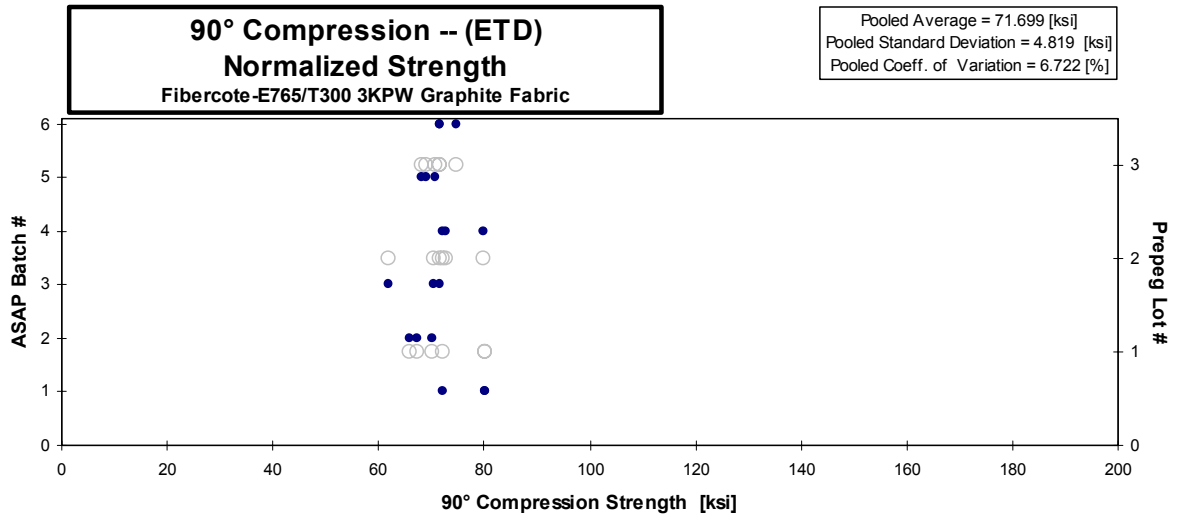


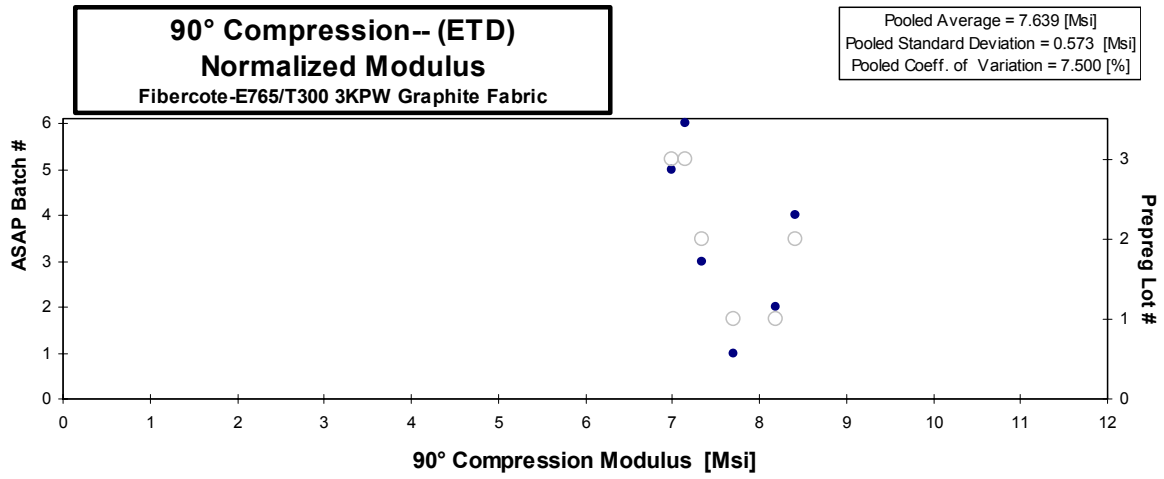
90° Compression -- (ETD)
Strength & Modulus
Fibercote-E765/T300 3KPW Graphite Fabric

normalizing t_{ply} [in]: 0.0089

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]
TBW1226G	3	1	1	73.667		0.122	14	0.00871	72.130	
TBW1227G	3	1	1	81.386		0.123	14	0.00878	80.276	
TBW1228G	3	1	1	82.004		0.122	14	0.00870	80.144	
TBZ1218G	3	1	1		7.911	0.121	14	0.00868		7.711
TBW1126G	4	1	2	67.809		0.121	14	0.00864	65.850	
TBW1127G	4	1	2	69.652		0.121	14	0.00862	67.430	
TBW1128G	4	1	2	71.779		0.122	14	0.00870	70.166	
TBZ111BG	4	1	2		8.425	0.121	14	0.00865		8.190
TBW21X5G	3	2	3	65.197		0.135	14	0.00962	70.495	
TBW21X6G	3	2	3	58.465		0.132	14	0.00943	61.972	
TBW21X7G	3	2	3	64.718		0.138	14	0.00983	71.483	
TBZ2118G	3	2	3		6.985	0.131	14	0.00937		7.350
TBW2221G	4	2	4	75.751		0.132	14	0.00939	79.961	
TBW2222G	4	2	4	70.064		0.129	14	0.00923	72.622	
TBW2223G	4	2	4	68.351		0.132	14	0.00939	72.150	
TBZ2218G	4	2	4		8.004	0.131	14	0.00936		8.422
TBW3215G	3	3	5	67.818		0.127	14	0.00906	69.070	
TBW3216G	3	3	5	67.294		0.126	14	0.00902	68.185	
TBW3217G	3	3	5	70.192		0.126	14	0.00897	70.741	
TBZ3218G	3	3	5		7.001	0.125	14	0.00890		7.004
TBW3121G	4	3	6	71.227		0.125	14	0.00893	71.498	
TBW3122G	4	3	6	70.835		0.126	14	0.00900	71.659	
TBW3123G	4	3	6	74.323		0.125	14	0.00895	74.755	
TBZ3118G	4	3	6		7.124	0.125	14	0.00894		7.156

Average	**70.585**	**7.575**		**$Average_{norm}$**	**0.00904**	**71.699**	**7.639**
Standard Dev.	**5.646**	**0.617**		**$Standard\ Dev._{norm}$**		**4.819**	**0.573**
Coeff. of Var. [%]	**7.999**	**8.143**		**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**6.722**	**7.500**
Min.	**58.465**	**6.985**		**Min.**	**0.0086**	**61.972**	**7.004**
Max.	**82.004**	**8.425**		**Max.**	**0.0098**	**80.276**	**8.422**
Number of Spec.	**18**	**6**		**Number of Spec.**		**18**	**6**

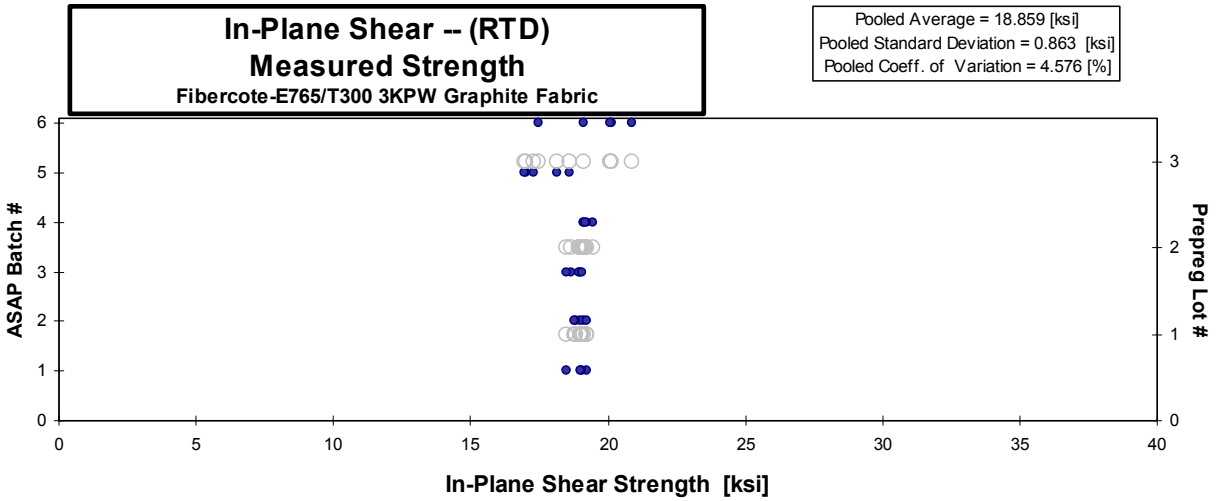


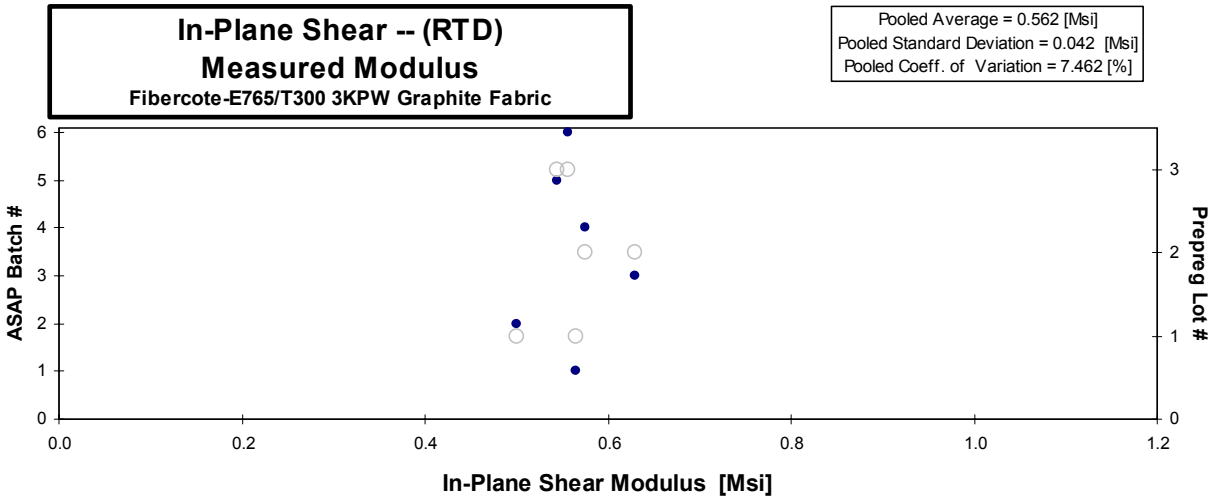


In-Plane Shear-- (RTD)
Strength & Modulus
Fibercote-E765/T300 3KPW Graphite Fabric

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]
TBN1121A	3	1	1	19.215	0.566	0.140	16	0.00876
TBN1122A	3	1	1	18.520		0.141	16	0.00878
TBN1138A	3	1	1	19.079		0.141	16	0.00880
TBN1139A	3	1	1	19.022		0.142	16	0.00885
TBN1216A	4	1	2	19.101	0.501	0.141	16	0.00879
TBN1217A	4	1	2	19.011		0.141	16	0.00879
TBN1218A	4	1	2	18.826		0.141	16	0.00878
TBN1219A	4	1	2	18.777		0.141	16	0.00880
TBN121AA	4	1	2	19.229		0.140	16	0.00873
TBN2116A	3	2	3	19.015	0.630	0.148	16	0.00928
TBN2117A	3	2	3	18.669		0.152	16	0.00950
TBN2118A	3	2	3	18.469		0.152	16	0.00952
TBN2119A	3	2	3	18.926		0.151	16	0.00947
TBN211AA	3	2	3	19.071		0.150	16	0.00937
TBN2221A	4	2	4	19.135		0.151	16	0.00945
TBN2222A	4	2	4	19.128	0.575	0.147	16	0.00919
TBN2223A	4	2	4	19.471		0.149	16	0.00929
TBN2224A	4	2	4	19.252		0.149	16	0.00933
TBN2225A	4	2	4	19.172		0.149	16	0.00929
TBN3136A	3	3	5	18.131	0.545	0.145	16	0.00906
TBN3137A	3	3	5	18.638		0.145	16	0.00903
TBN3138A	3	3	5	17.009		0.146	16	0.00913
TBN3139A	3	3	5	17.306		0.145	16	0.00905
TBN313AA	3	3	5	16.961		0.145	16	0.00908
TBN3216A	4	3	6	19.139	0.557	0.145	16	0.00903
TBN3217A	4	3	6	20.170		0.145	16	0.00905
TBN3218A	4	3	6	20.084		0.143	16	0.00892
TBN3219A	4	3	6	17.501		0.144	16	0.00903
TBN321AA	4	3	6	20.887		0.138	16	0.00865

Average	**18.859**	**0.562**		**0.0091**
Standard Dev.	**0.863**	**0.042**		
Coeff. of Var. [%]	**4.576**	**7.462**		
Min.	**16.961**	**0.501**	**Min.**	**0.0087**
Max.	**20.887**	**0.630**	**Max.**	**0.0095**
Number of Spec.	**29**	**6**		

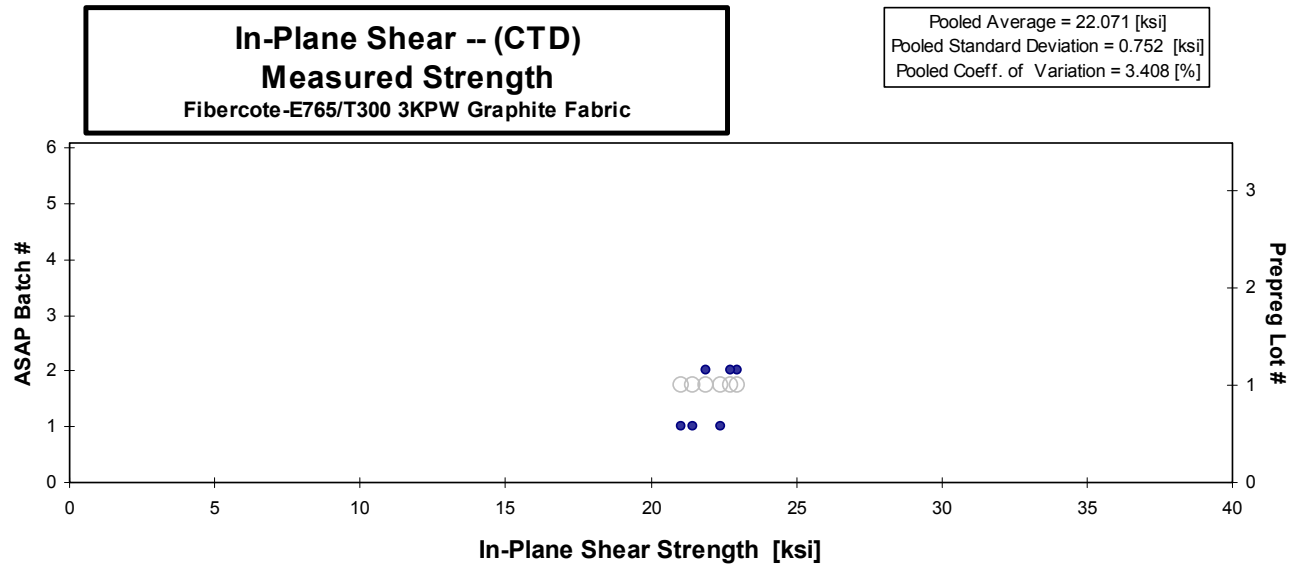


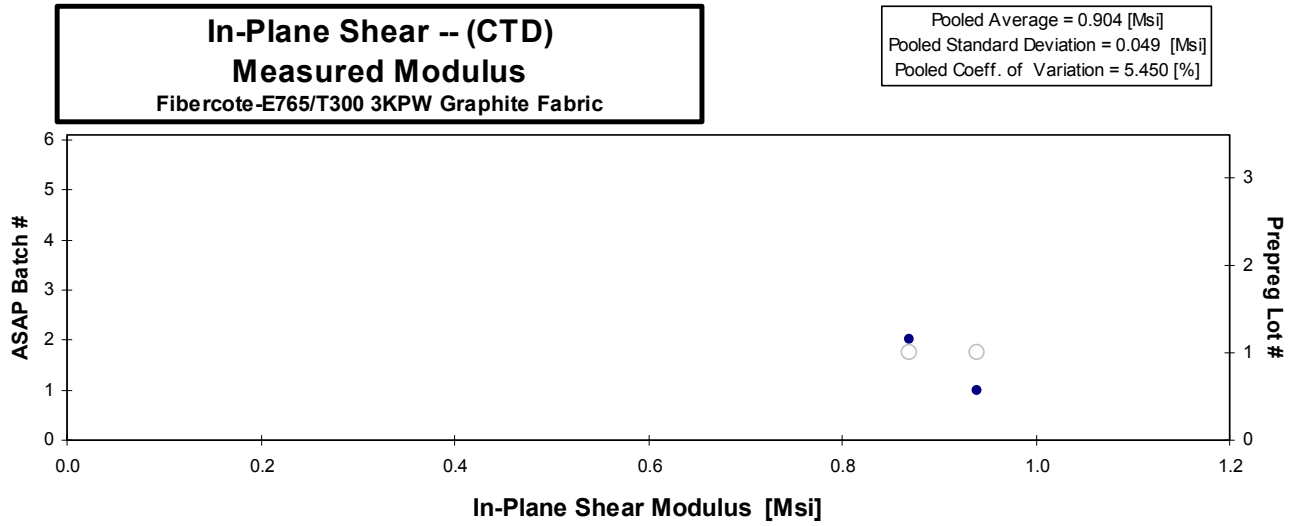


In-Plane Shear-- (CTD)
Strength & Modulus
Fibercote-E765/T300 3KPW Graphite Fabric

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]
TBN1123B	3	1	1	22.402	0.939	0.139	16	0.00869
TBN1124B	3	1	1	21.038		0.141	16	0.00883
TBN1125B	3	1	1	21.421		0.141	16	0.00878
TBN1226B	4	1	2	21.893	0.869	0.138	16	0.00865
TBN1227B	4	1	2	22.951		0.137	16	0.00857
TBN1228B	4	1	2	22.723		0.138	16	0.00864

Average	**22.071**	**0.904**		**0.0087**
Standard Dev.	**0.752**	**0.049**		
Coeff. of Var. [%]	**3.408**	**5.450**		
Min.	**21.038**	**0.869**	**Min.**	**0.0086**
Max.	**22.951**	**0.939**	**Max.**	**0.0088**
Number of Spec.	**6**	**2**		

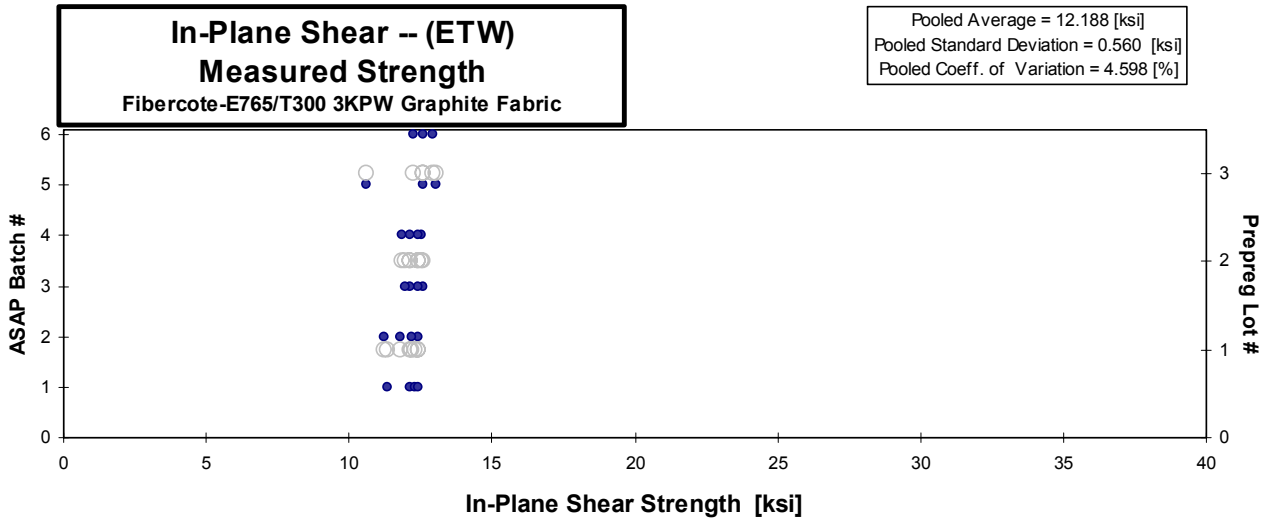


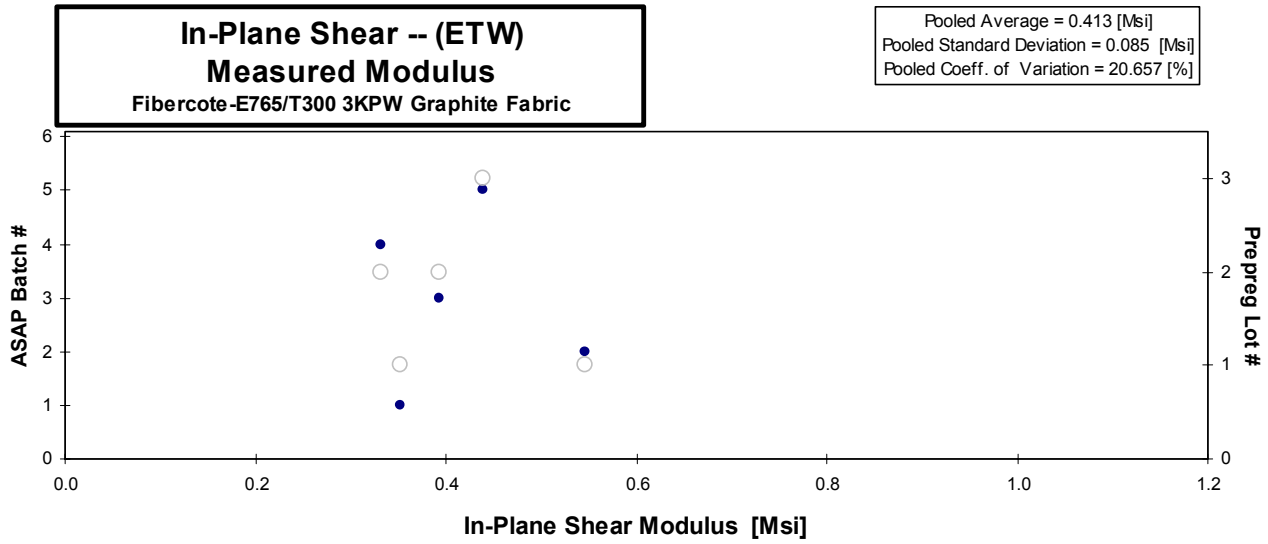


In-Plane Shear-- (ETW)
Strength & Modulus
Fibercote-E765/T300 3KPW Graphite Fabric

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]
TBN1131F	3	1	1	11.342	0.353	0.142	16	0.00890
TBN1132F	3	1	1	12.132		0.142	16	0.00886
TBN1133F	3	1	1	12.329		0.142	16	0.00888
TBN1134F	3	1	1	12.417		0.141	16	0.00884
TBN1211F	4	1	2	11.237	0.547	0.140	16	0.00874
TBN1212F	4	1	2	12.410		0.140	16	0.00874
TBN1213F	4	1	2	11.823		0.142	16	0.00886
TBN1214F	4	1	2	12.211		0.140	16	0.00876
TBN2111F	3	2	3	12.568	0.394	0.151	16	0.00946
TBN2112F	3	2	3	12.447		0.147	16	0.00921
TBN2113F	3	2	3	12.133		0.152	16	0.00949
TBN2114F	3	2	3	11.960		0.150	16	0.00937
TBN2231F	4	2	4	12.528	0.332	0.150	16	0.00935
TBN2232F	4	2	4	12.163		0.149	16	0.00929
TBN2233F	4	2	4	11.882		0.151	16	0.00943
TBN2234F	4	2	4	12.441		0.147	16	0.00921
TBN3131F	3	3	5	10.615	0.439	0.144	16	0.00901
TBN3132F	3	3	5	12.624		0.142	16	0.00889
TBN3133F	3	3	5	13.051		0.143	16	0.00894
TBN3212F	4	3	6	12.955		0.145	16	0.00905
TBN3213F	4	3	6	12.605		0.145	16	0.00906
TBN3214F	4	3	6	12.259		0.144	16	0.00903

Average	**12.188**	**0.413**		**0.0091**
Standard Dev.	**0.560**	**0.085**		
Coeff. of Var. [%]	**4.598**	**20.657**		
Min.	**10.615**	**0.332**	**Min.**	**0.0087**
Max.	**13.051**	**0.547**	**Max.**	**0.0095**
Number of Spec.	**22**	**5**		

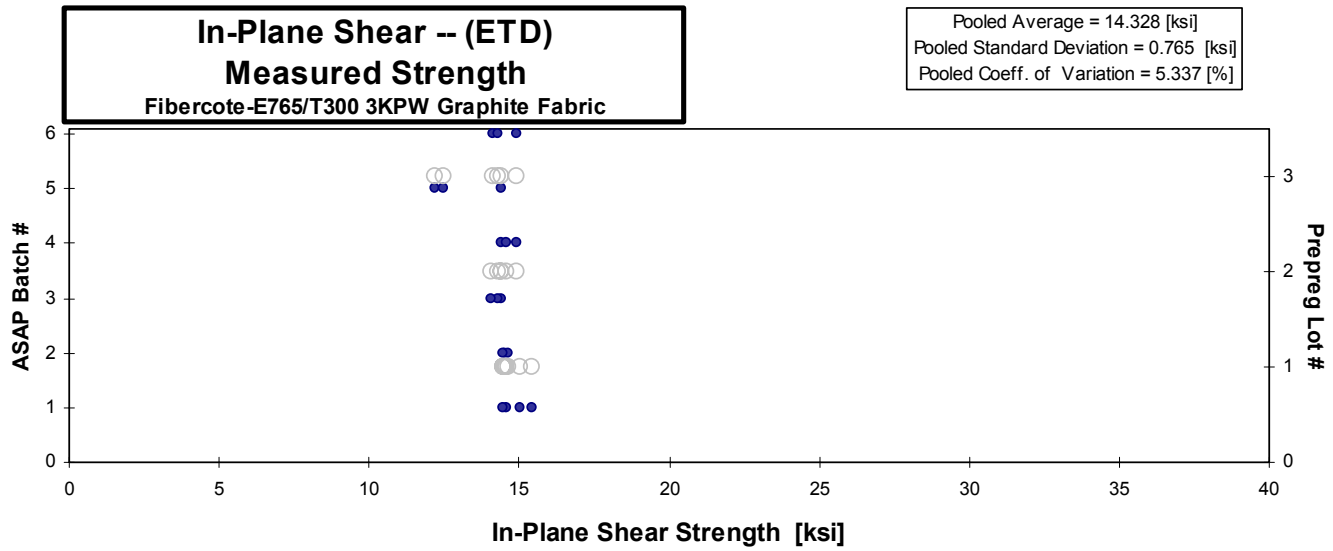


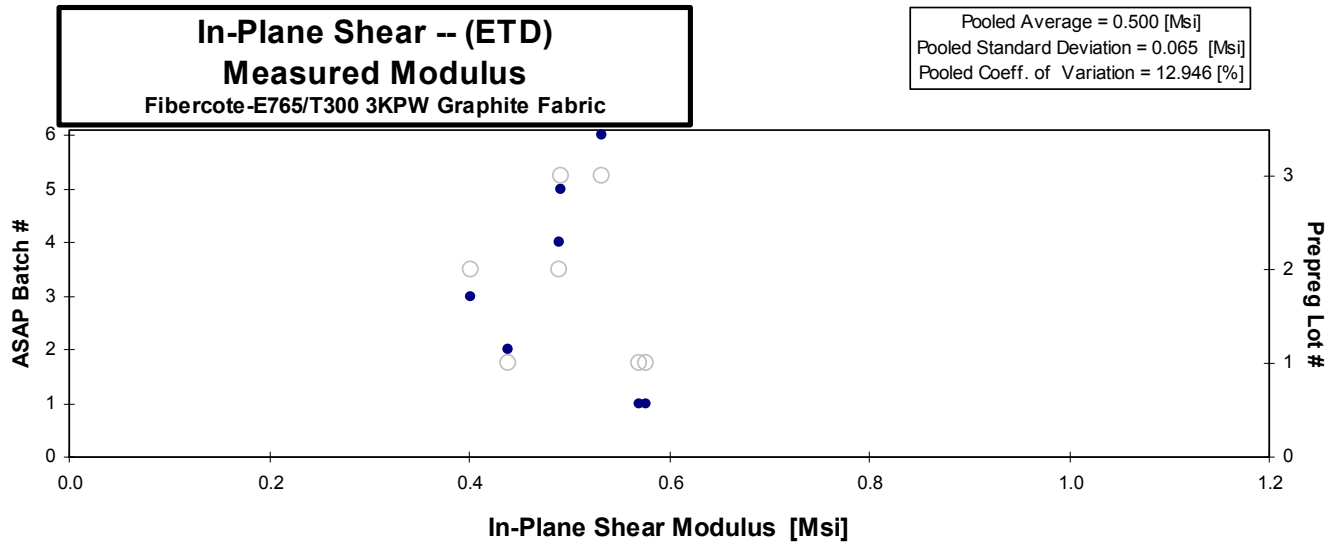


In-Plane Shear-- (ETD)
Strength & Modulus
Fibercote-E765/T300 3KPW Graphite Fabric

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]
TBN1127G	3	1	1	15.425	0.570	0.135	16	0.00845
TBN1128G	3	1	1	14.570		0.140	16	0.00874
TBN1129G	3	1	1	14.492		0.141	16	0.00882
TBN112AG	3	1	1	15.008	0.576	0.140	16	0.00877
TBN1221G	4	1	2	14.515	0.440	0.139	16	0.00870
TBN1222G	4	1	2	14.629		0.139	16	0.00870
TBN1223G	4	1	2	14.442		0.138	16	0.00864
TBN2121G	3	2	3	14.422	0.402	0.148	16	0.00926
TBN2122G	3	2	3	14.271		0.149	16	0.00932
TBN2123G	3	2	3	14.061		0.144	16	0.00900
TBN2226G	4	2	4	14.948	0.491	0.147	16	0.00920
TBN2227G	4	2	4	14.393		0.147	16	0.00920
TBN2228G	4	2	4	14.565		0.151	16	0.00941
TBN3122G	3	3	5	12.226		0.141	16	0.00883
TBN3123G	3	3	5	12.510		0.141	16	0.00881
TBN3124G	3	3	5	14.427	0.492	0.142	16	0.00886
TBN3221G	4	3	6	14.899	0.532	0.139	16	0.00870
TBN3222G	4	3	6	14.106		0.140	16	0.00876
TBN3223G	4	3	6	14.322		0.140	16	0.00875

Average	**14.328**	**0.500**		**0.0089**
Standard Dev.	**0.765**	**0.065**		
Coeff. of Var. [%]	**5.337**	**12.946**		
Min.	**12.226**	**0.402**	**Min.**	**0.0084**
Max.	**15.425**	**0.576**	**Max.**	**0.0094**
Number of Spec.	**19**	**7**		



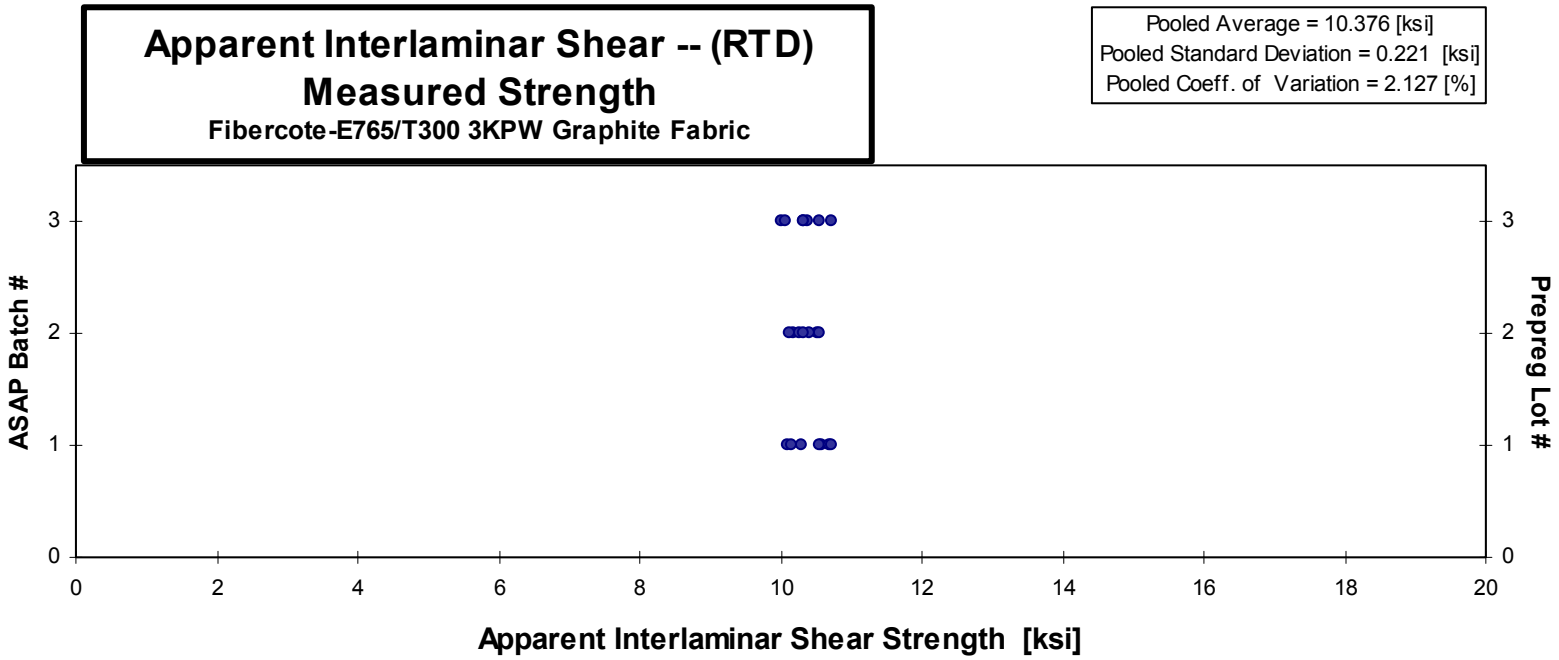


Apparent Interlaminar Shear -- (RTD) Strength

Fibercote-E765/T300 3KPW Graphite Fabric

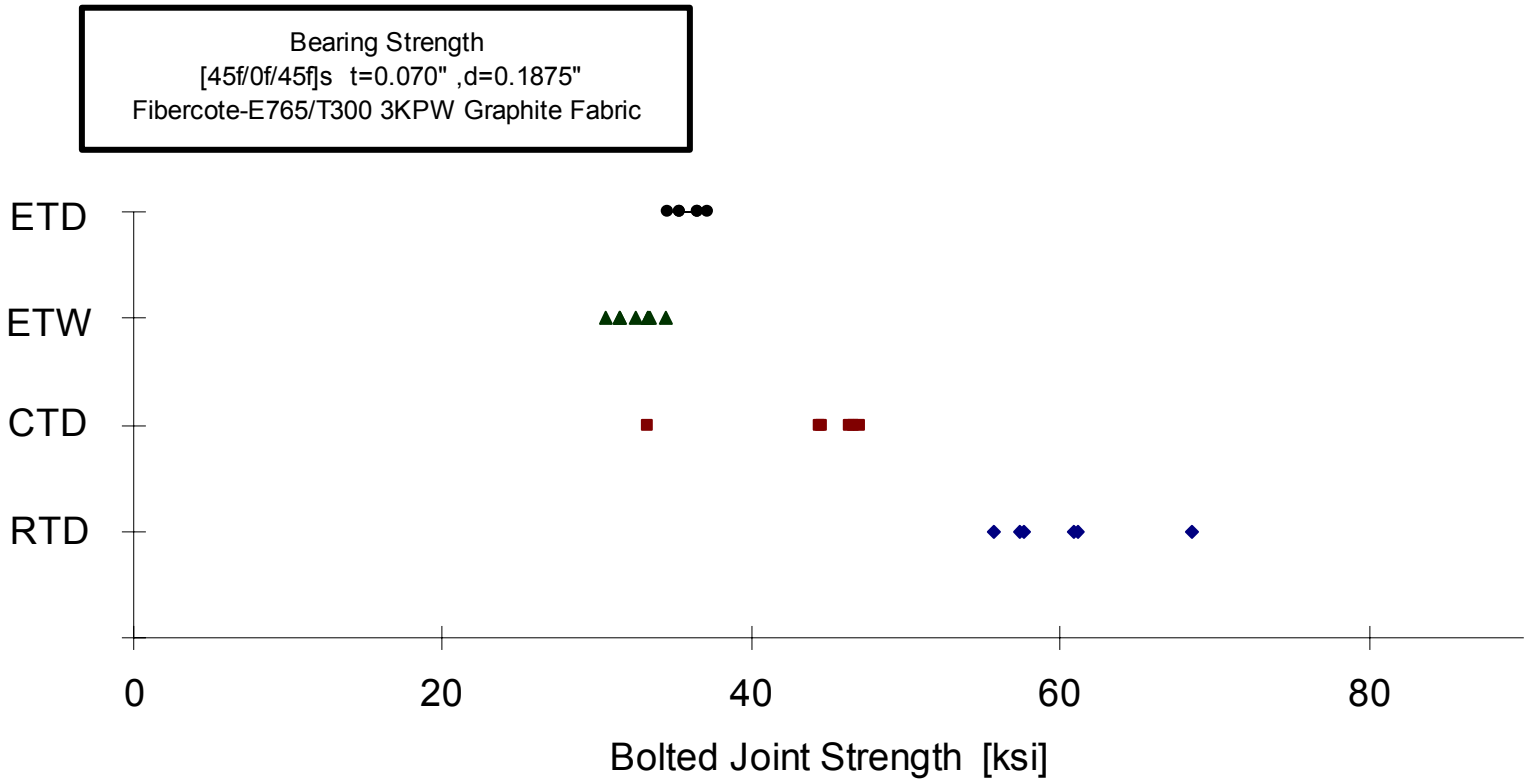
Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]
TBQ1116A	5	1	1	10.590	0.103	12	0.00861
TBQ1117A	5	1	1	10.091	0.099	12	0.00822
TBQ1118A	5	1	1	10.555	0.104	12	0.00866
TBQ1124A	5	1	1	10.707	0.103	12	0.00861
TBQ1125A	5	1	1	10.288	0.104	12	0.00866
TBQ1126A	5	1	1	10.724	0.103	12	0.00858
TBQ1127A	5	1	1	10.163	0.105	12	0.00872
TBQ2116A	5	2	2	10.191	0.108	12	0.00901
TBQ2117A	5	2	2	10.511	0.108	12	0.00904
TBQ2118A	5	2	2	10.141	0.108	12	0.00903
TBQ2121A	5	2	2	10.562	0.108	12	0.00898
TBQ2122A	5	2	2	10.404	0.106	12	0.00886
TBQ2123A	5	2	2	10.266	0.106	12	0.00887
TBQ2124A	5	2	2	10.329	0.106	12	0.00887
TBQ3116A	5	3	3	10.374	0.104	12	0.00868
TBQ3117A	5	3	3	10.337	0.104	12	0.00867
TBQ3118A	5	3	3	10.315	0.103	12	0.00861
TBQ3121A	5	3	3	10.007	0.104	12	0.00870
TBQ3122A	5	3	3	10.084	0.107	12	0.00894
TBQ3123A	5	3	3	10.723	0.106	12	0.00880
TBQ3124A	5	3	3	10.541	0.106	12	0.00881

Average	**10.376**		**0.0088**
Standard Dev.	**0.221**		
Coeff. of Var. [%]	**2.127**		
Min.	**10.007**	**Min.**	**0.0082**
Max.	**10.724**	**Max.**	**0.0090**
Number of Spec.	**21**		



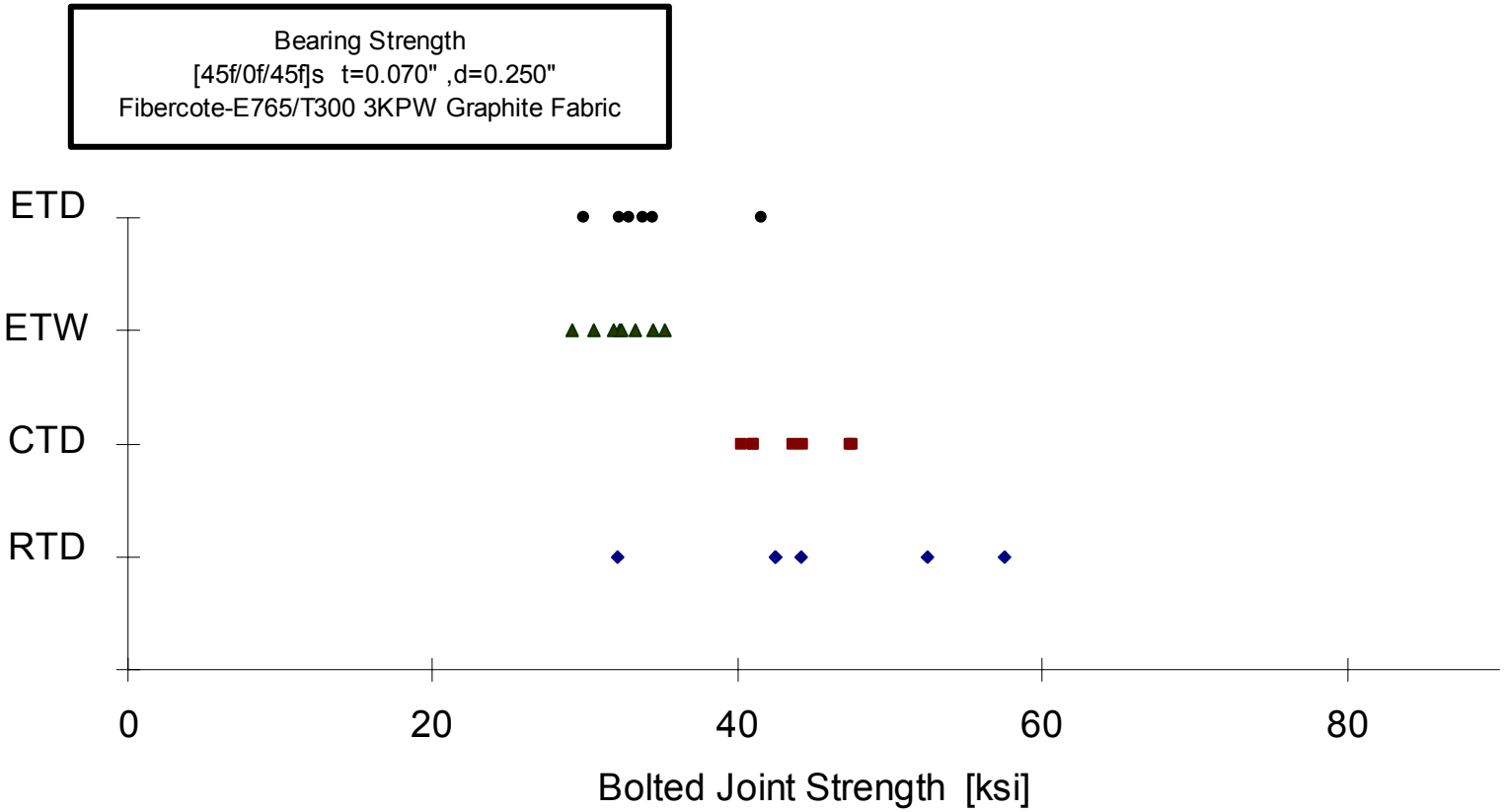
Bearing Strength
$[45_f/0_f/45_f]_s$ t=0.070" ,d=0.1875"
Fibercote-E765/T300 3KPW Graphite Fabric

Condition	Specimen Number	Prepreg Lot #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in laminate	Avg. tply [in]		
	TB11311B	1	60.865	0.050	6	0.00840	60.195	Average
	TB11312B	1	57.314	0.050	6	0.00835	4.589	Standard Dev.
CTD	TB11313B	1	61.087	0.050	6	0.00827	7.623	Coeff. of Var. [%]
	TB11314B	1	68.519	0.051	6	0.00849	55.719	Min.
	TB11315B	1	55.719	0.050	6	0.00841	68.519	Max.
	TB11316B	1	57.663	0.050	6	0.00841	6	Number of Spec.
	TB11221A	1	33.251	0.052	6	0.00863	43.720	Average
	TB11222A	1	44.457	0.051	6	0.00844	5.239	Standard Dev.
RTD	TB11223A	1	46.419	0.052	6	0.00860	11.982	Coeff. of Var. [%]
	TB11224A	1	44.595	0.052	6	0.00859	33.251	Min.
	TB11225A	1	46.599	0.050	6	0.00835	46.996	Max.
	TB11226A	1	46.996	0.051	6	0.00850	6	Number of Spec.
	TB11112F	1	33.420	0.053	6	0.00876		
	TB11113F	1	31.444	0.053	6	0.00875		
	TB11114F	1	31.483	0.052	6	0.00867	32.579	Average
ETW	TB11115F	1	32.493	0.052	6	0.00868	1.301	Standard Dev.
	TB11116F	1	33.329	0.052	6	0.00859	3.993	Coeff. of Var. [%]
	TB11121F	1	33.341	0.051	6	0.00846	30.624	Min.
	TB11122F	1	30.624	0.051	6	0.00850	34.496	Max.
	TB11123F	1	34.496	0.052	6	0.00860	8	Number of Spec.
	TB11211G	1	36.570	0.050	6	0.00841	35.922	Average
	TB11212G	1	37.121	0.051	6	0.00853	0.949	Standard Dev.
ETD	TB11213G	1	35.403	0.051	6	0.00853	2.643	Coeff. of Var. [%]
	TB11214G	1	36.465	0.050	6	0.00828	34.577	Min.
	TB11215G	1	34.577	0.051	6	0.00856	37.121	Max.
	TB11216G	1	35.397	0.051	6	0.00842	6	Number of Spec.



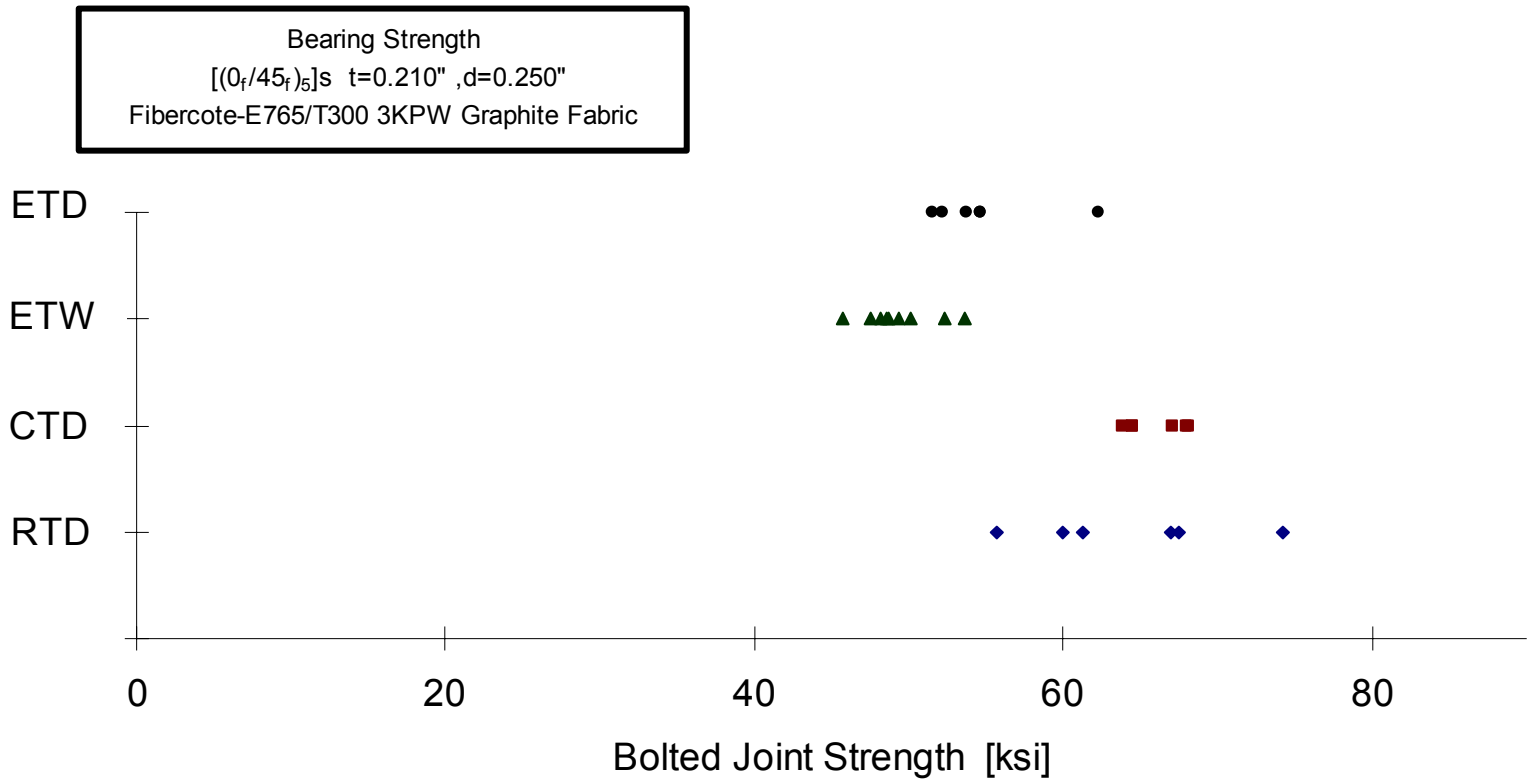
Bearing Strength
$[45_f/0_f/45_f]_s$ t=0.070" ,d=0.250"
Fibercote-E765/T300 3KPW Graphite Fabric

Condition	Specimen Number	Prepreg Lot #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in laminate	Avg. tply [in]		
	TB21115B	1	52.488	0.051	6	0.00851	45.204	Average
	TB21221B	1	57.433	0.051	6	0.00844	8.820	Standard Dev.
CTD	TB21222B	1	44.217	0.051	6	0.00856	19.511	Coeff. of Var. [%]
	TB21223B	1	42.513	0.050	6	0.00837	32.149	Min.
	TB21225B	1	42.427	0.050	6	0.00828	57.433	Max.
	TB21226B	1	32.149	0.051	6	0.00851	6	Number of Spec.
	TB21114A	1	41.022	0.051	6	0.00845		
	TB21211A	1	40.321	0.050	6	0.00835	43.622	Average
	TB21212A	1	41.060	0.050	6	0.00837	3.010	Standard Dev.
RTD	TB21213A	1	47.394	0.051	6	0.00853	6.901	Coeff. of Var. [%]
	TB21214A	1	43.667	0.050	6	0.00841	40.321	Min.
	TB21215A	1	47.548	0.049	6	0.00820	47.548	Max.
	TB21216A	1	44.341	0.050	6	0.00837	7	Number of Spec.
	TB21112F	1	35.179	0.051	6	0.00844		
	TB21113F	1	30.560	0.050	6	0.00839		
	TB21121F	1	33.225	0.051	6	0.00855	32.366	Average
ETW	TB21122F	1	32.200	0.052	6	0.00874	1.970	Standard Dev.
	TB21123F	1	31.828	0.051	6	0.00854	6.088	Coeff. of Var. [%]
	TB21124F	1	29.127	0.052	6	0.00864	29.127	Min.
	TB21125F	1	34.477	0.051	6	0.00850	35.179	Max.
	TB21126F	1	32.333	0.052	6	0.00860	8	Number of Spec.
	TB21116G	1	41.616	0.050	6	0.00841	34.159	Average
	TB21311G	1	32.213	0.050	6	0.00836	3.972	Standard Dev.
ETD	TB21312G	1	33.831	0.051	6	0.00848	11.628	Coeff. of Var. [%]
	TB21313G	1	34.456	0.050	6	0.00838	29.953	Min.
	TB21314G	1	29.953	0.051	6	0.00854	41.616	Max.
	TB21315G	1	32.888	0.051	6	0.00845	6	Number of Spec.



Bearing Strength
$[(0_f/45_f)_5]_s$ t=0.210" ,d=0.250"
Fibercote-E765/T300 3KPW Graphite Fabric

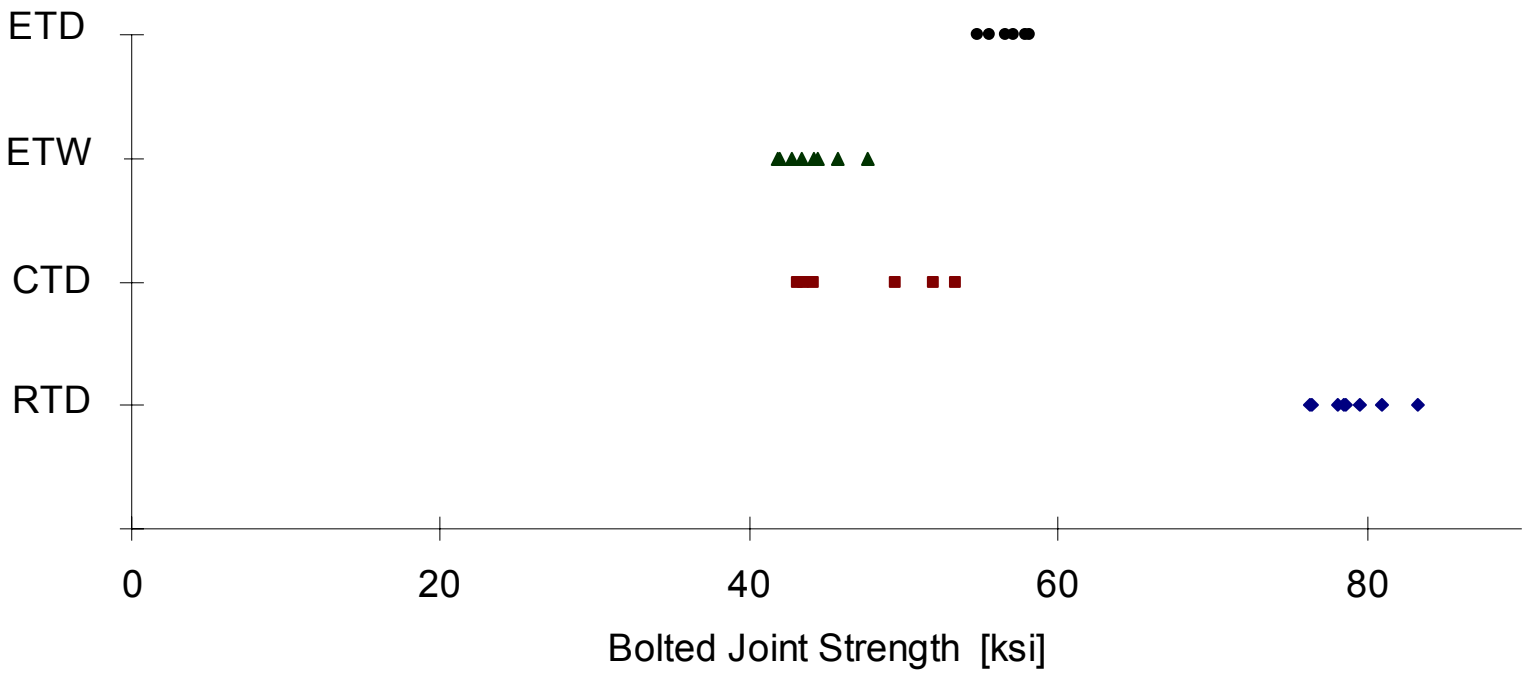
Condition	Specimen Number	Prepreg Lot #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in laminate	Avg. t_{ply} [in]		
	TB31311B	1	74.160	0.174	20	0.00870	64.229	Average
	TB31312B	1	66.901	0.176	20	0.00881	6.581	Standard Dev.
CTD	TB31313B	1	55.662	0.177	20	0.00883	10.247	Coeff. of Var. [%]
	TB31314B	1	61.197	0.175	20	0.00875	55.662	Min.
	TB31315B	1	67.450	0.176	20	0.00882	74.160	Max.
	TB31316B	1	60.005	0.176	20	0.00879	6	Number of Spec.
	TB31222A	1	64.552	0.183	20	0.00916	66.014	Average
	TB31223A	1	67.089	0.186	20	0.00930	1.900	Standard Dev.
RTD	TB31224A	1	64.511	0.186	20	0.00928	2.878	Coeff. of Var. [%]
	TB31225A	1	63.900	0.185	20	0.00927	63.900	Min.
	TB31226A	1	68.088	0.183	20	0.00916	68.088	Max.
	TB31116A	1	67.943	0.176	20	0.00878	6	Number of Spec.
	TB31111F	1	50.109	0.176	20	0.00882		
	TB31112F	1	48.589	0.179	20	0.00893		
	TB31113F	1	53.563	0.178	20	0.00889		
	TB31121F	1	52.263	0.173	20	0.00867	49.317	Average
ETW	TB31122F	1	49.301	0.179	20	0.00893	2.395	Standard Dev.
	TB31123F	1	48.657	0.178	20	0.00889	4.857	Coeff. of Var. [%]
	TB31124F	1	48.138	0.176	20	0.00882	45.714	Min.
	TB31125F	1	47.522	0.178	20	0.00892	53.563	Max.
	TB31126F	1	45.714	0.177	20	0.00883	9	Number of Spec.
	TB31211G	1	53.686	0.182	20	0.00912	54.810	Average
	TB31212G	1	52.128	0.185	20	0.00926	3.848	Standard Dev.
ETD	TB31213G	1	54.597	0.184	20	0.00920	7.020	Coeff. of Var. [%]
	TB31214G	1	54.647	0.183	20	0.00917	51.577	Min.
	TB31215G	1	51.577	0.184	20	0.00920	62.229	Max.
	TB31216G	1	62.229	0.185	20	0.00923	6	Number of Spec.



Bearing Strength
$[(0_f/45_f)_5]_s$ t=0.210" ,d=0.375"
Fibercote-E765/T300 3KPW Graphite Fabric

Condition	Specimen Number	Prepreg Lot #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in laminate	Avg. tply [in]		
CTD	TB41313B	1	76.295	0.182	20	0.00911		
	TB41314B	1	83.219	0.177	20	0.00886		
	TB41315B	1	76.383	0.182	20	0.00912	78.931	Average
	TB41316B	1	78.040	0.183	20	0.00913	2.309	Standard Dev.
	TB41113B	1	80.954	0.185	20	0.00925	2.925	Coeff. of Var. [%]
	TB41114B	1	79.476	0.186	20	0.00930	76.295	Min.
	TB41115B	1	78.605	0.187	20	0.00936	83.219	Max.
	TB41116B	1	78.475	0.182	20	0.00912	8	Number of Spec.
RTD	TB41221A	1	44.130	0.183	20	0.00917	47.583	Average
	TB41222A	1	43.114	0.187	20	0.00933	4.577	Standard Dev.
	TB41223A	1	43.472	0.186	20	0.00930	9.618	Coeff. of Var. [%]
	TB41224A	1	49.484	0.185	20	0.00925	43.114	Min.
	TB41225A	1	51.953	0.186	20	0.00932	53.347	Max.
	TB41226A	1	53.347	0.186	20	0.00932	6	Number of Spec.
ETW	TB41111F	1	47.628	0.182	20	0.00911		
	TB41112F	1	42.698	0.184	20	0.00918		
	TB41121F	1	41.963	0.185	20	0.00926	43.949	Average
	TB41122F	1	44.358	0.187	20	0.00934	1.969	Standard Dev.
	TB41123F	1	45.667	0.182	20	0.00912	4.481	Coeff. of Var. [%]
	TB41124F	1	43.332	0.186	20	0.00929	41.811	Min.
	TB41125F	1	41.811	0.183	20	0.00915	47.628	Max.
	TB41126F	1	44.133	0.183	20	0.00914	8	Number of Spec.
ETD	TB41211G	1	56.628	0.185	20	0.00926	56.682	Average
	TB41212G	1	58.080	0.185	20	0.00925	1.297	Standard Dev.
	TB41213G	1	57.086	0.184	20	0.00919	2.288	Coeff. of Var. [%]
	TB41214G	1	57.920	0.179	20	0.00897	54.804	Min.
	TB41215G	1	55.572	0.183	20	0.00915	58.080	Max.
	TB41216G	1	54.804	0.185	20	0.00923	6	Number of Spec.

Bearing Strength
$[(0_f/45_f)_5]s$ t=0.210" ,d=0.375"
Fibercote-E765/T300 3KPW Graphite Fabric



3.2.2 Fluid Sensitivity Raw Data Spreadsheets and Scatter Charts

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

Fibercote-E765/T300 3KPW Graphite Fabric

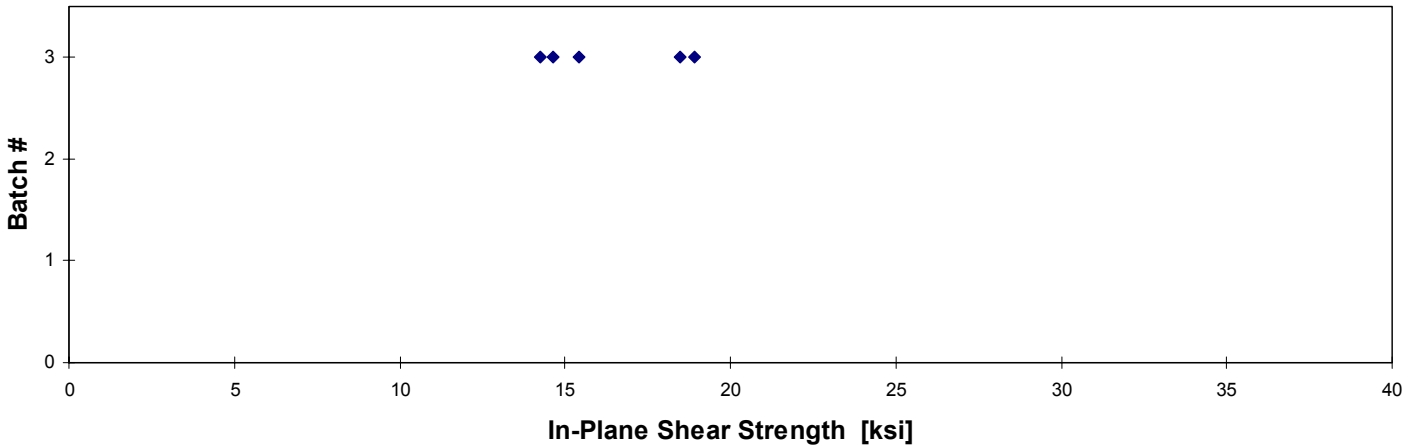
Specimen Number	Batch Number	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]
TBN3226A	3	15.426	0.139	16	0.00867
TBN3227A	3	14.643	0.136	16	0.00847
TBN3228A	3	14.261	0.133	16	0.00833
TBN3229A	3	18.924	0.138	16	0.00863
TBN322AA	3	18.468	0.140	16	0.00875

Average	**16.345**		**0.0086**
Standard Dev.	**2.193**		
Coeff. of Var. [%]	**13.418**		
Min.	**14.261**	**Min.**	**0.0083**
Max.	**18.924**	**Max.**	**0.0088**
Number of Spec.	**5**		

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

Fibercote-E765/T300 3KPW Graphite Fabric

Pooled Average = 16.345 [ksi]
Pooled Standard Deviation = 2.193 [ksi]
Pooled Coeff. of Variation = 13.418 [%]



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

Fibercote-E765/T300 3KPW Graphite Fabric

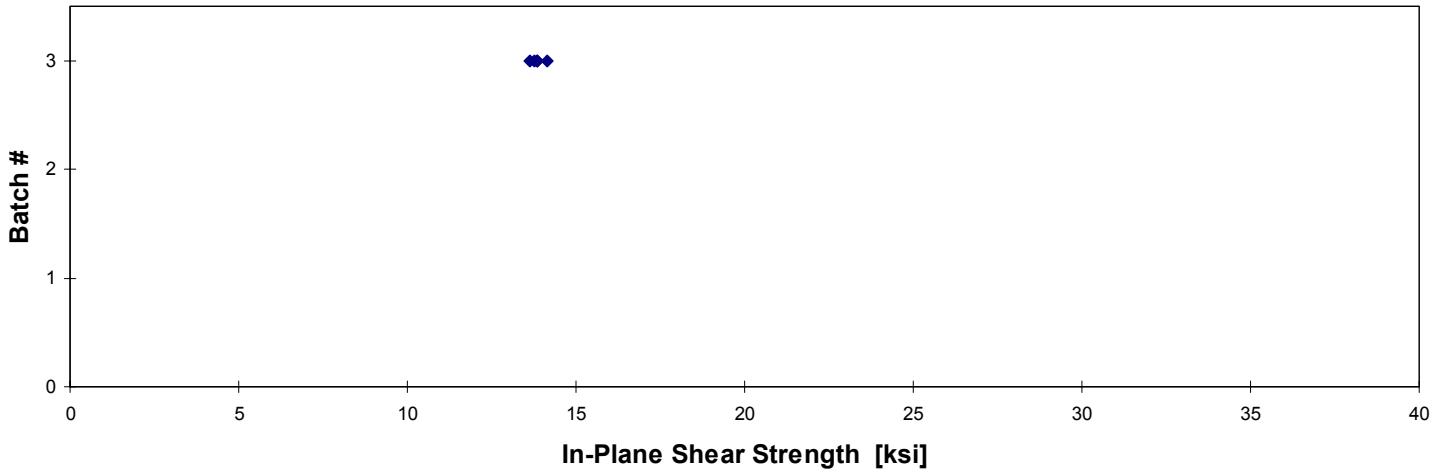
Specimen Number	Batch Number	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]
TBN3126G	3	13.634	0.143	16	0.00897
TBN3127G	3	14.124	0.144	16	0.00897
TBN3128G	3	13.857	0.144	16	0.00902
TBN3129G	3	13.846	0.145	16	0.00905
TBN312AG	3	13.748	0.140	16	0.00877

Average	**13.842**			**0.0090**
Standard Dev.	**0.182**			
Coeff. of Var. [%]	**1.313**			
Min.	**13.634**		**Min.**	**0.0088**
Max.	**14.124**		**Max.**	**0.0091**
Number of Spec.	**5**			

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

Fibercote-E765/T300 3KPW Graphite Fabric

Pooled Average = 13.842 [ksi]
Pooled Standard Deviation = 0.182 [ksi]
Pooled Coeff. of Variation = 1.313 [%]



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

Fibercote-E765/T300 3KPW Graphite Fabric

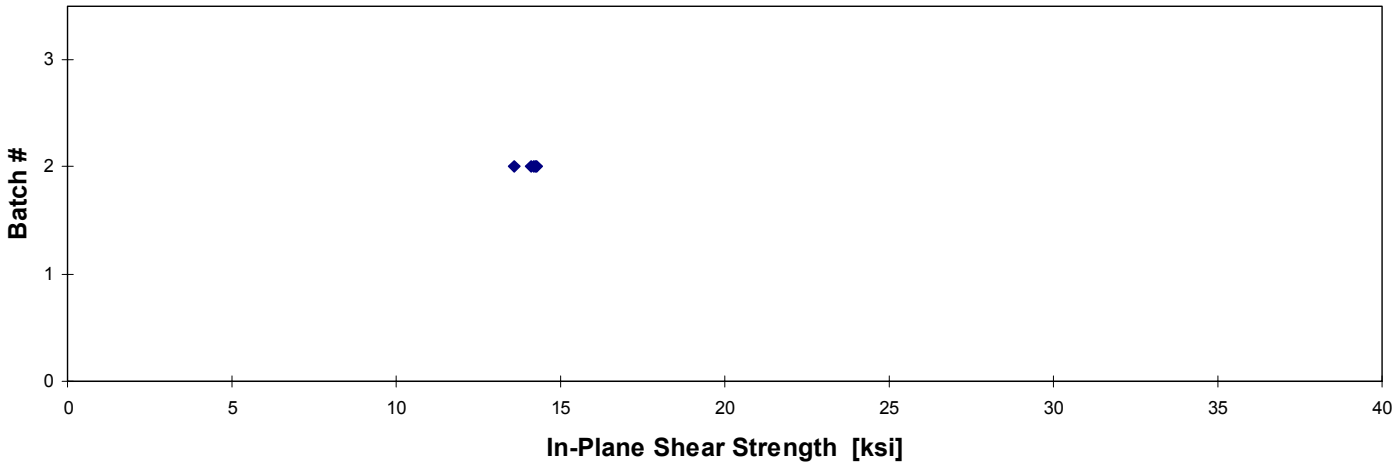
Specimen Number	Batch Number	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]
TBN2126G	2	14.218	0.149	16	0.00929
TBN2127G	2	14.286	0.149	16	0.00931
TBN2128G	2	13.596	0.149	16	0.00929
TBN2129G	2	14.178	0.147	16	0.00921
TBN212AG	2	14.106	0.146	16	0.00911

Average	**14.077**		**0.0092**
Standard Dev.	**0.276**		
Coeff. of Var. [%]	**1.964**		
Min.	**13.596**	**Min.**	**0.0091**
Max.	**14.286**	**Max.**	**0.0093**
Number of Spec.	**5**		

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

Fibercote-E765/T300 3KPW Graphite Fabric

Pooled Average = 14.077 [ksi]
Pooled Standard Deviation = 0.276 [ksi]
Pooled Coeff. of Variation = 1.964 [%]



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)
16.35	18.86	12.19

The RTD average in-plane shear strength was reduced by 13% after exposure to MEK. However, it remained 34% 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)**
JP-4 JET FUEL (ETD)	(ETD)	(ETW)
13.84	14.33	12.19

The ETD average in-plane shear strength was reduced by 3% after exposure to JP-4 Jet Fuel. However, it remained 14% higher than water exposure in ETW conditions.

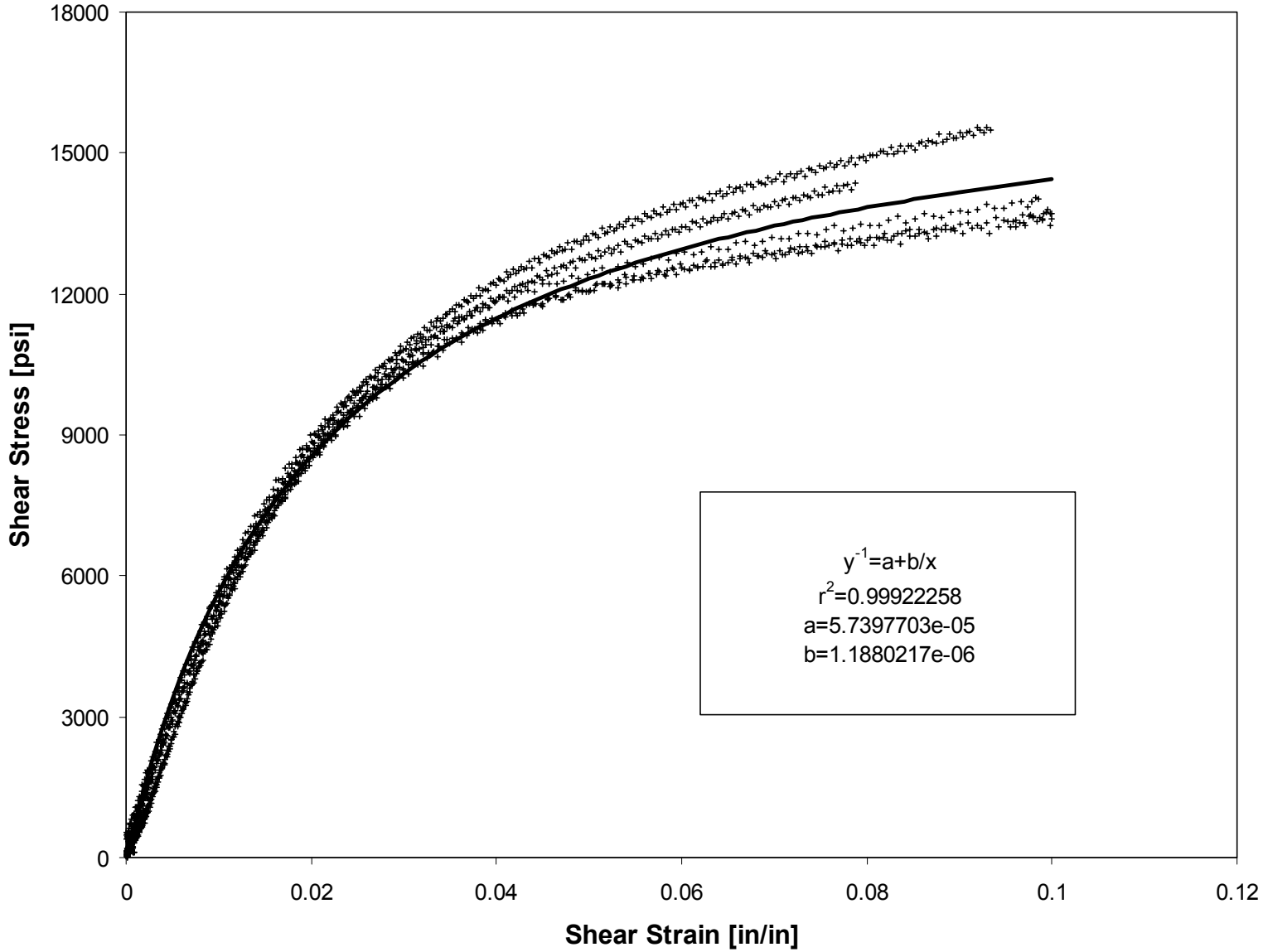
Average In-Plane Shear Strength with Fluid (ksi)	**Same Environment In-Plane Shear Strength without Fluid (ksi)**	**Worst Case Environment In-Plane Shear Strength (ksi)**
HYDRAULIC FLUID (ETD)	(ETD)	(ETW)
14.08	14.33	12.19

The ETD average in-plane shear strength was reduced by 2% after exposure to Hydraulic Fluid. However, it remained 16% higher than water exposure in ETW conditions.

3.2.3 Representative Shear Stress-Strain Curve

The following stress-strain curve is representative of the FiberCote T300 3KPW/E765 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 also presented on the chart to demonstrate material variability.

Shear Stress vs. Shear Strain, RTD

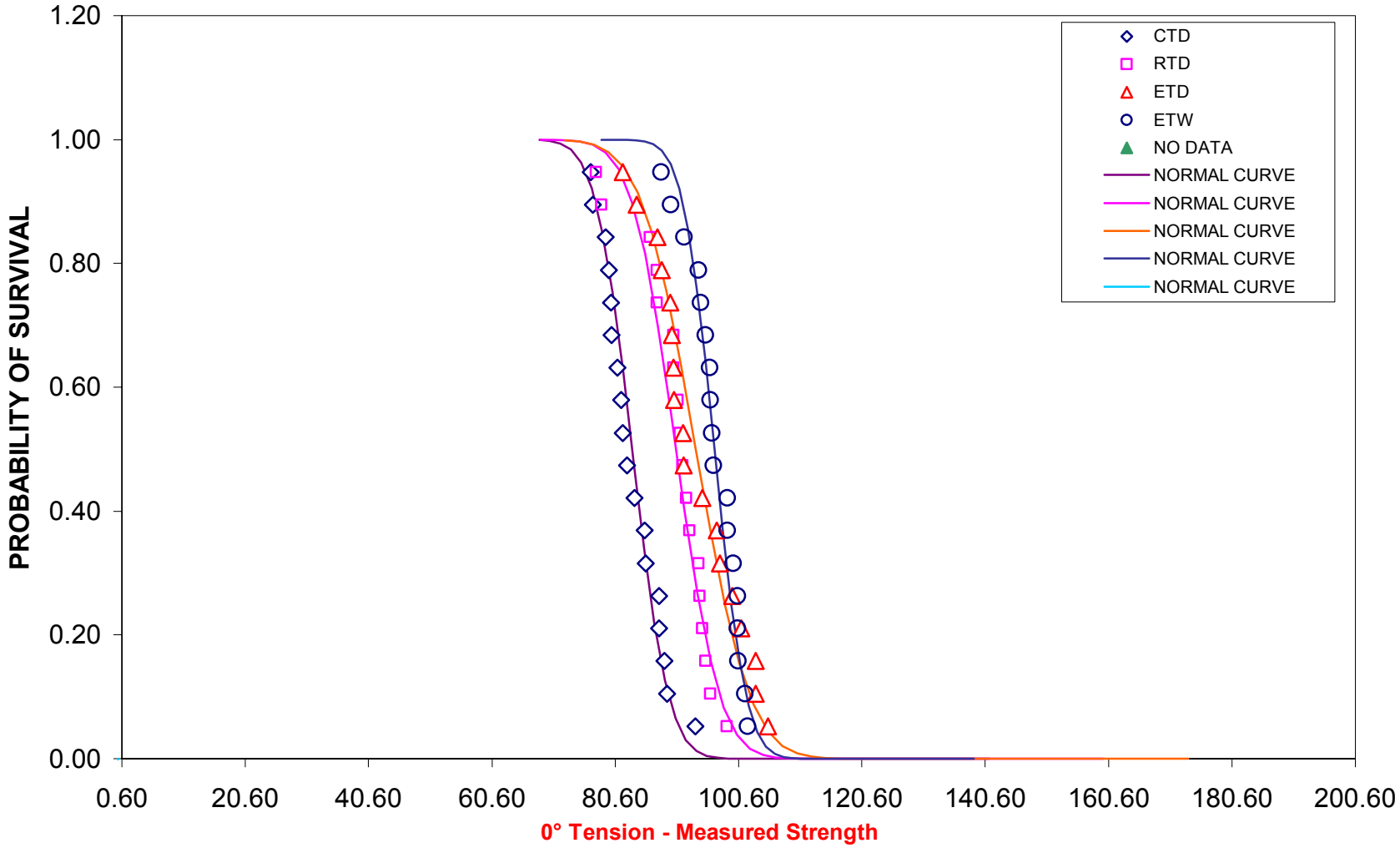


3.3 Statistical Results

3.3.1 Plot by Condition

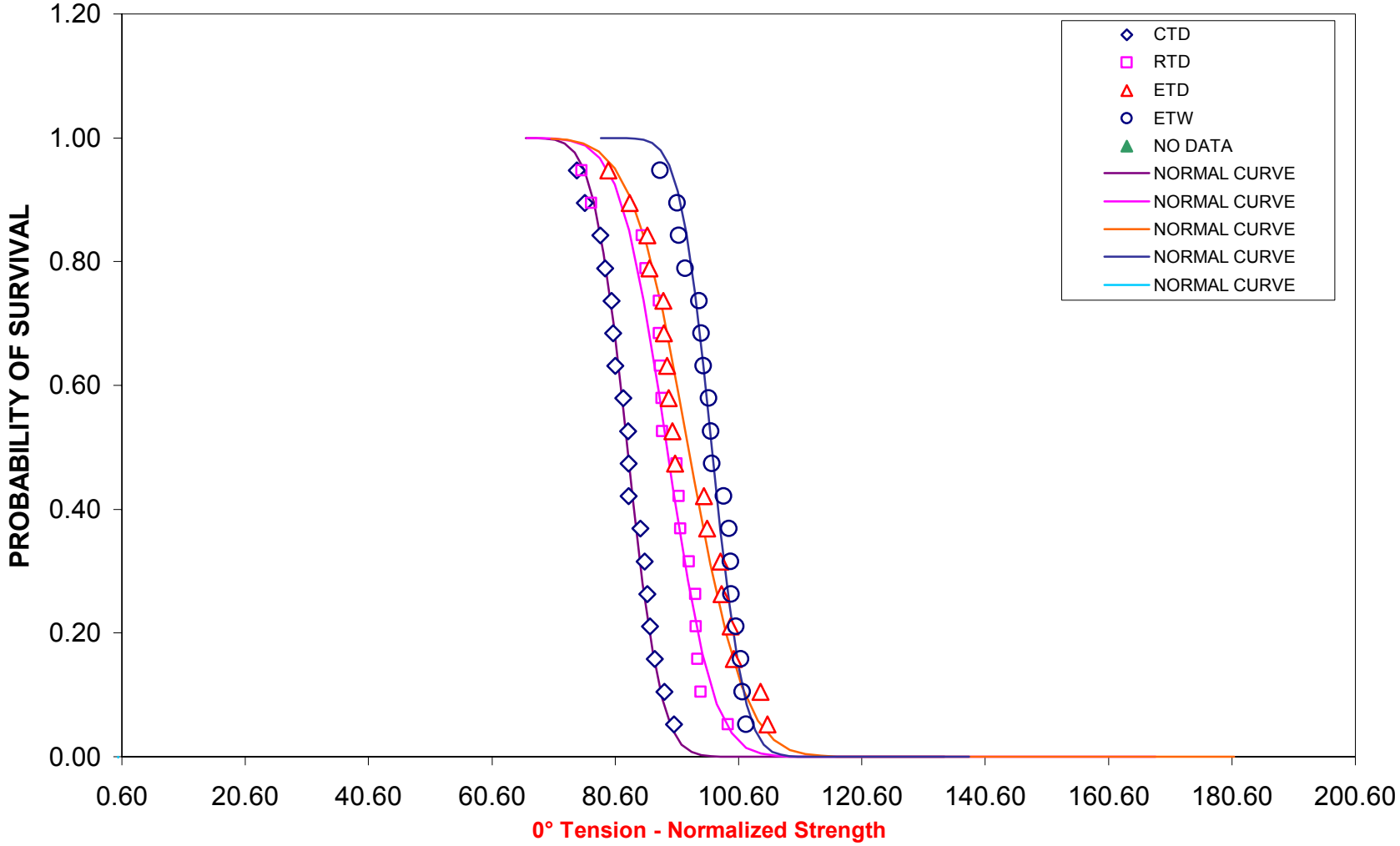
DISTRIBUTION OF GROUPED DATA FOR DIFFERENT TEST CONDITIONS

E765/T300 3KPW Graphite Fabric
FiberCote



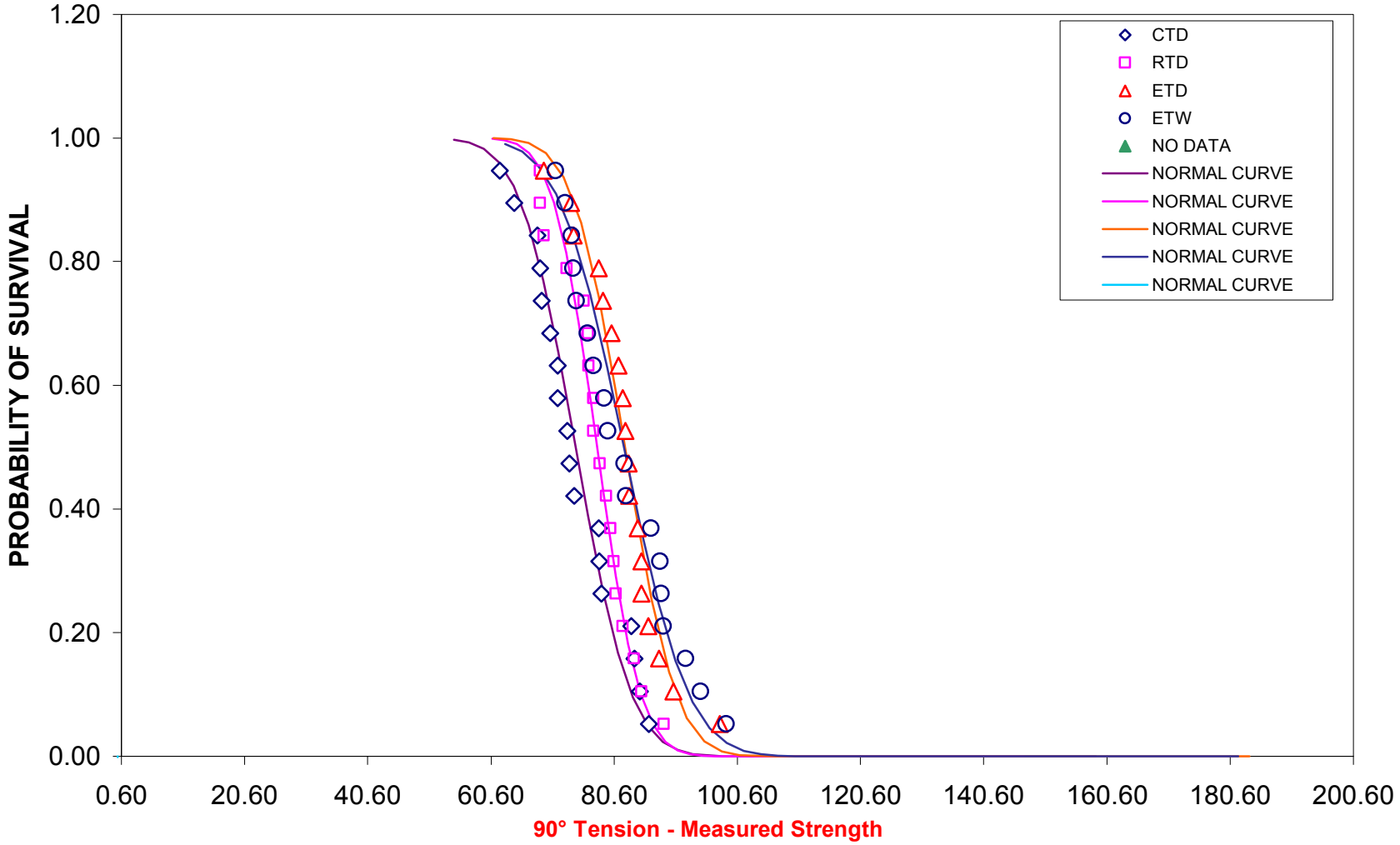
DISTRIBUTION OF GROUPED DATA FOR DIFFERENT TEST CONDITIONS

E765/T300 3KPW Graphite Fabric
FiberCote

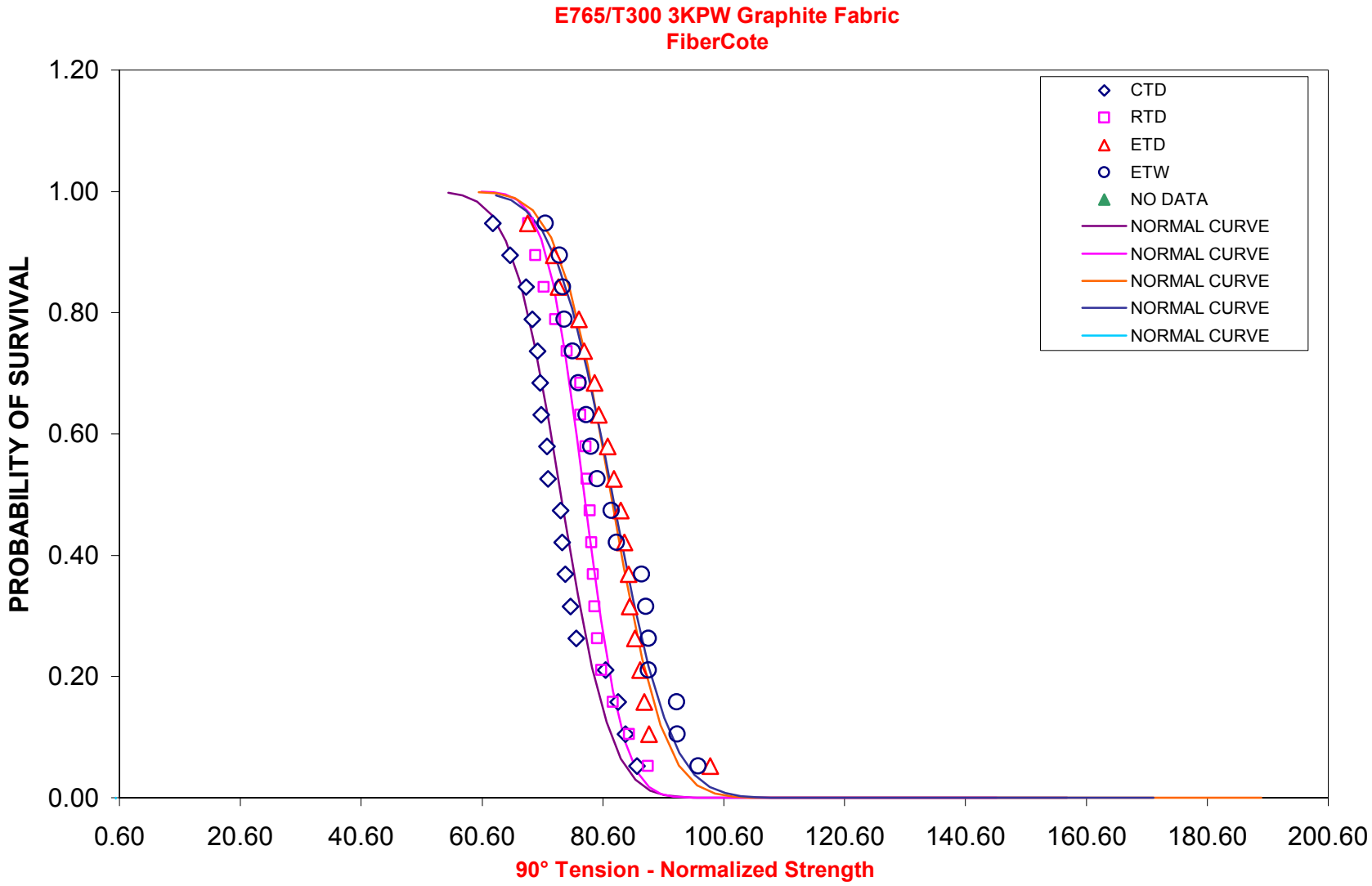


DISTRIBUTION OF GROUPED DATA FOR DIFFERENT TEST CONDITIONS

E765/T300 3KPW Graphite Fabric
FiberCote

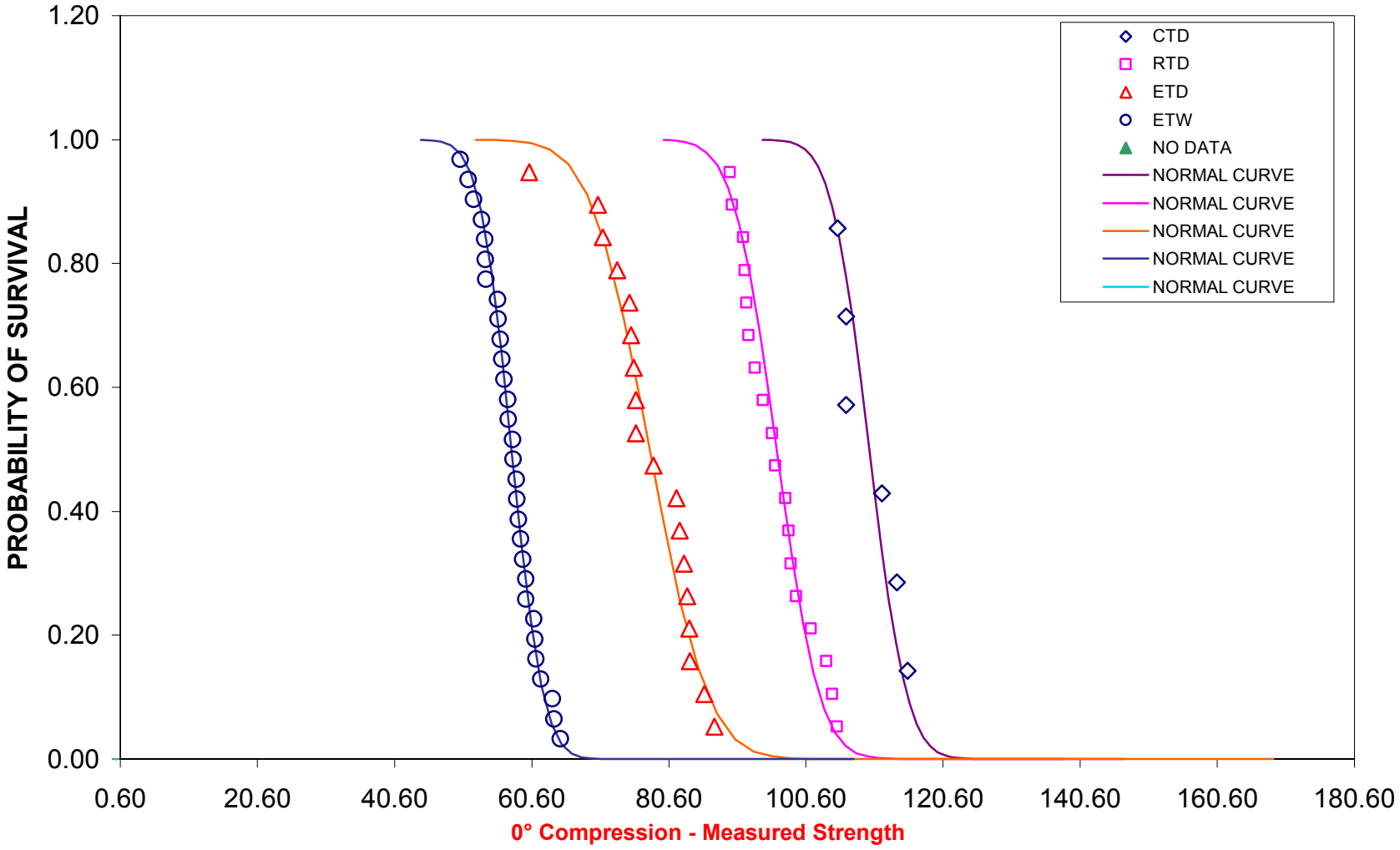


DISTRIBUTION OF GROUPED DATA FOR DIFFERENT TEST CONDITIONS

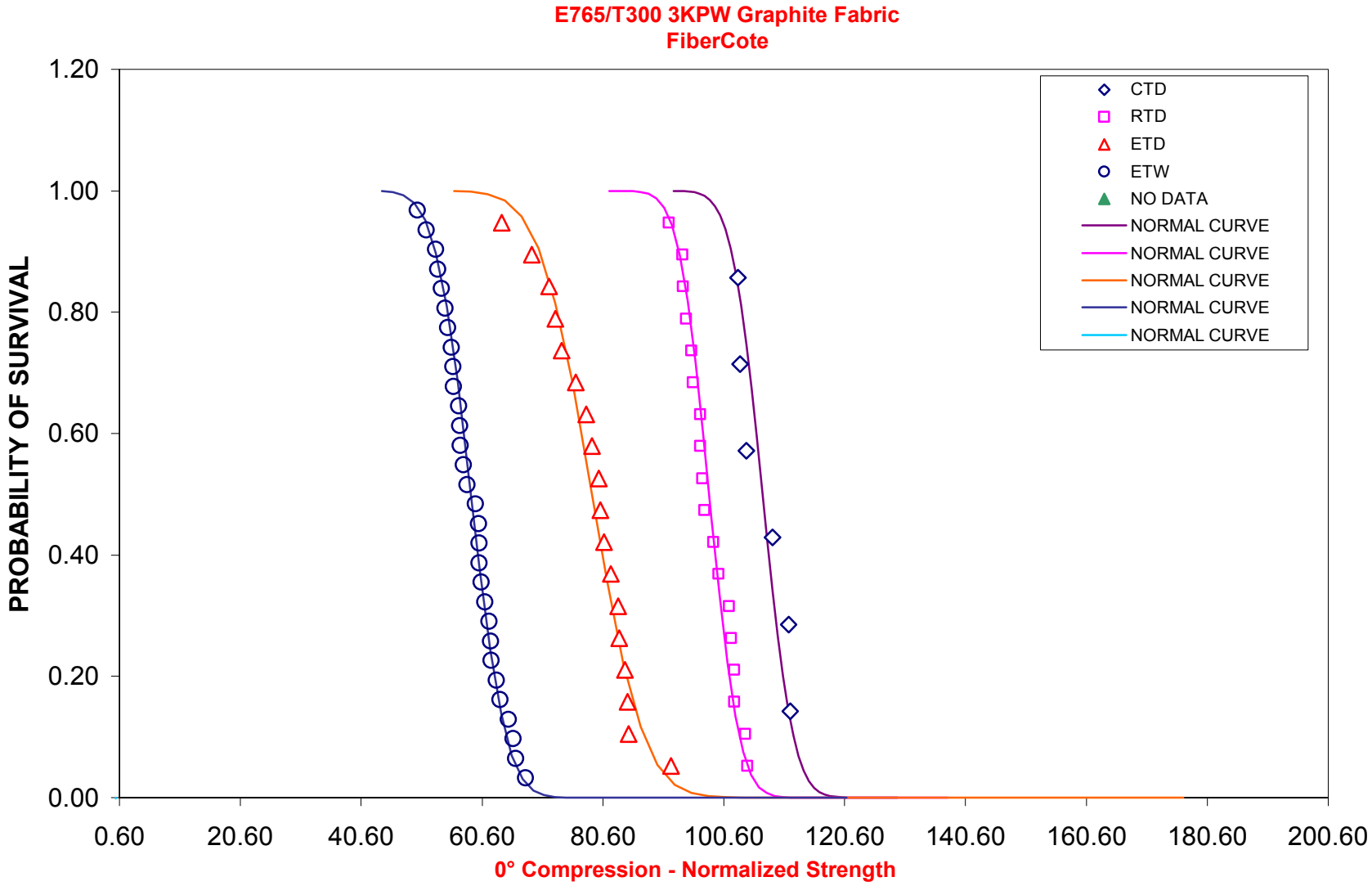


DISTRIBUTION OF GROUPED DATA FOR DIFFERENT TEST CONDITIONS

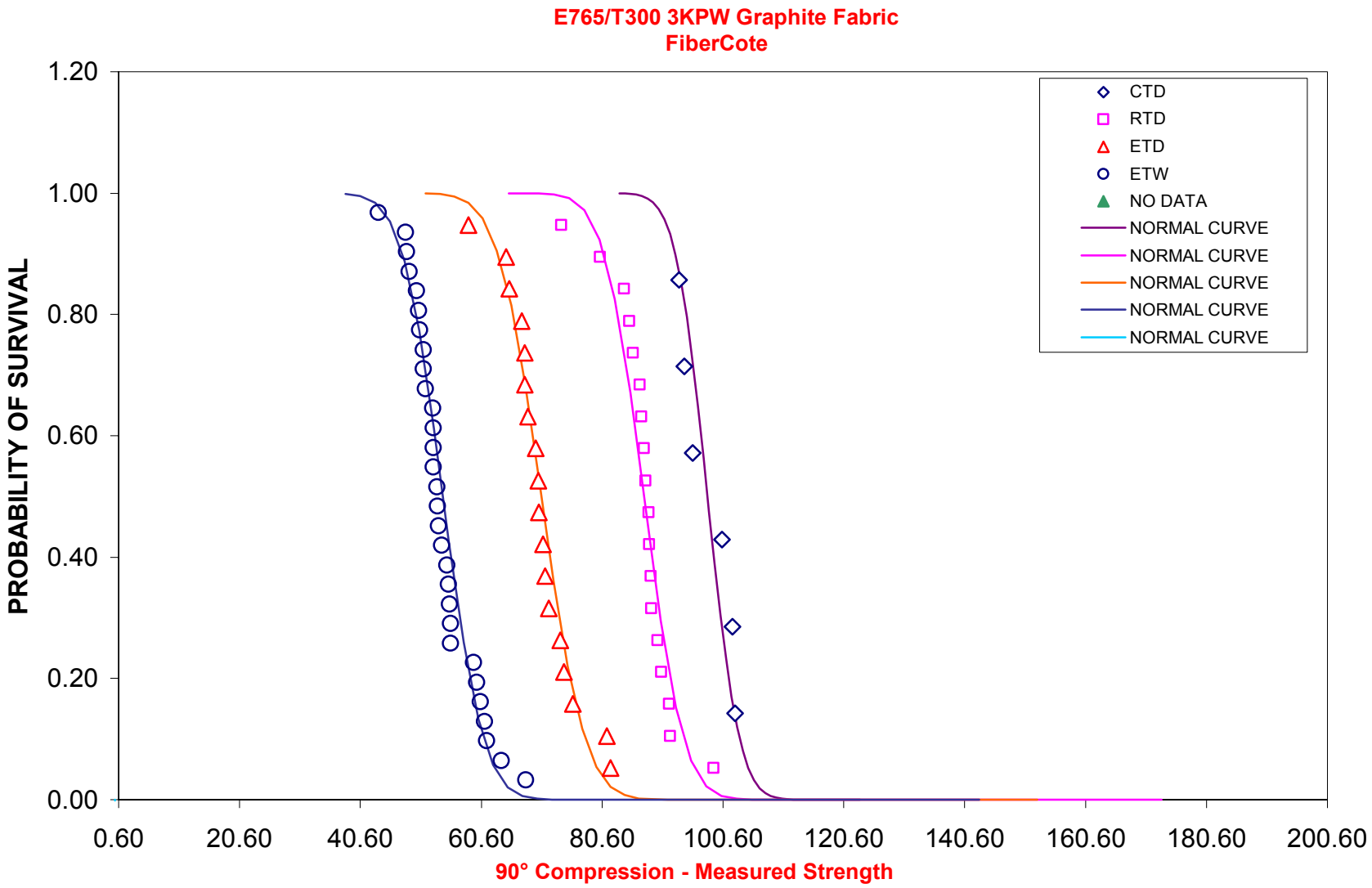
E765/T300 3KPW Graphite Fabric
FiberCote



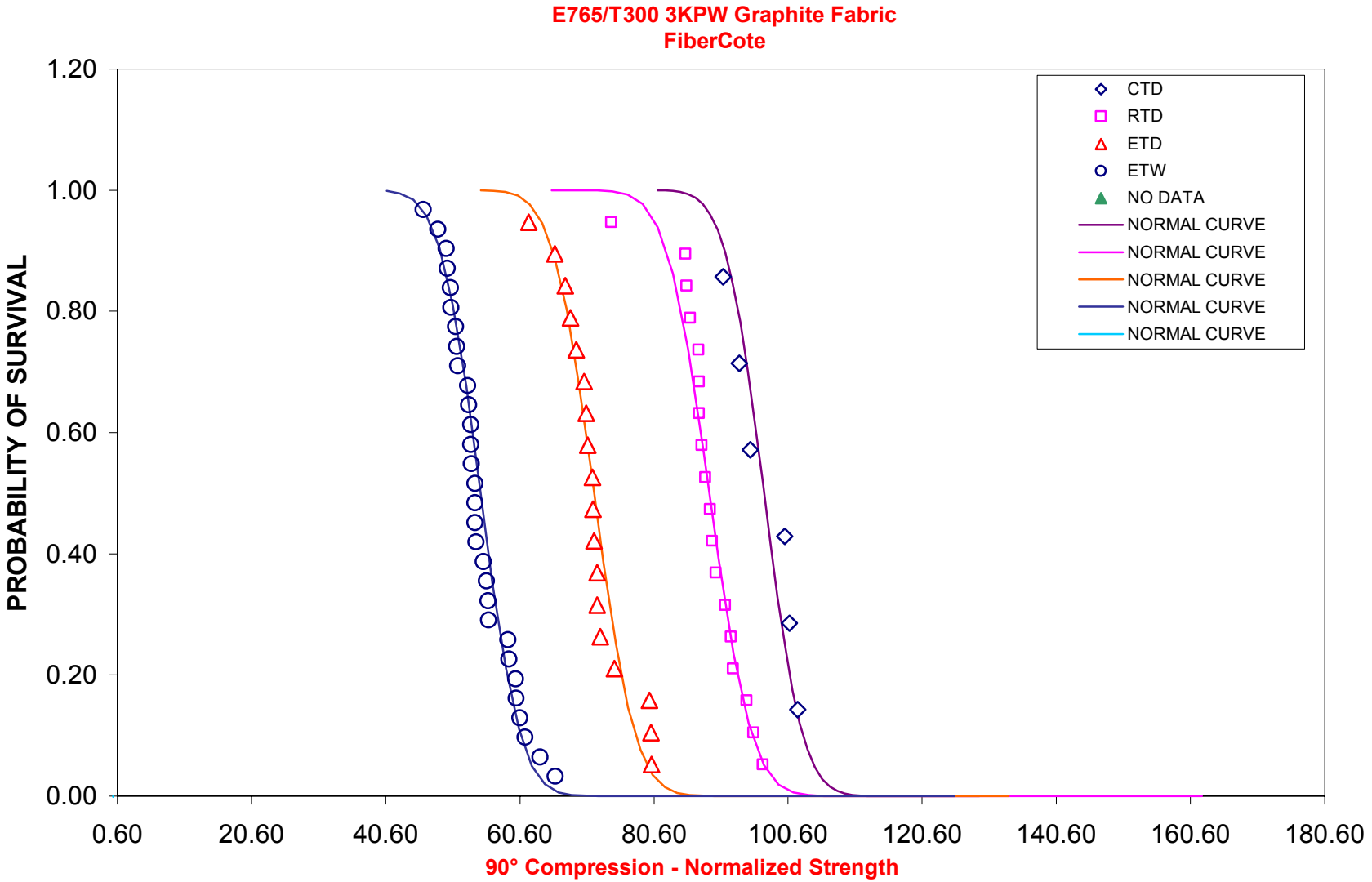
DISTRIBUTION OF GROUPED DATA FOR DIFFERENT TEST CONDITIONS



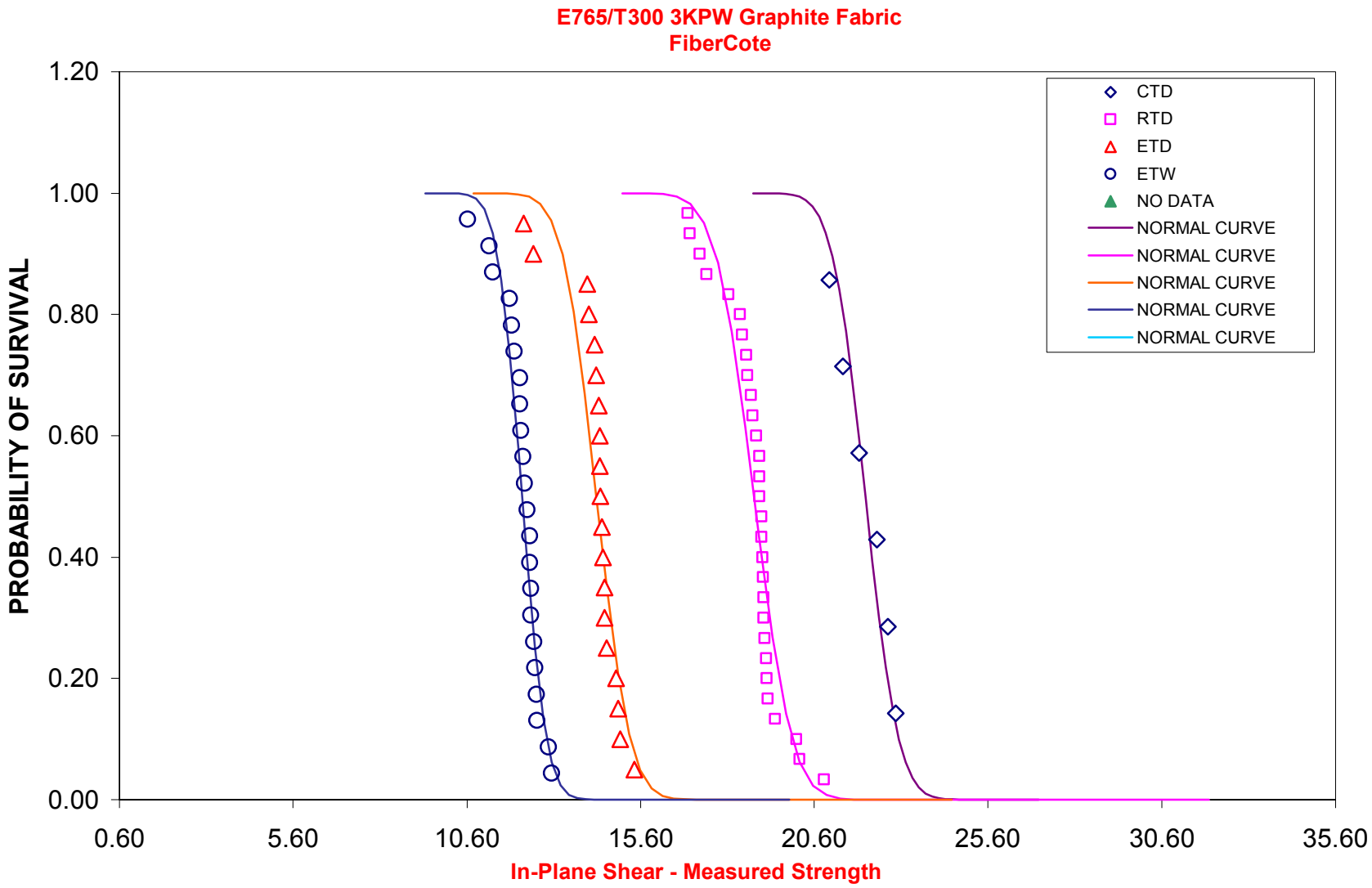
DISTRIBUTION OF GROUPED DATA FOR DIFFERENT TEST CONDITIONS



DISTRIBUTION OF GROUPED DATA FOR DIFFERENT TEST CONDITIONS

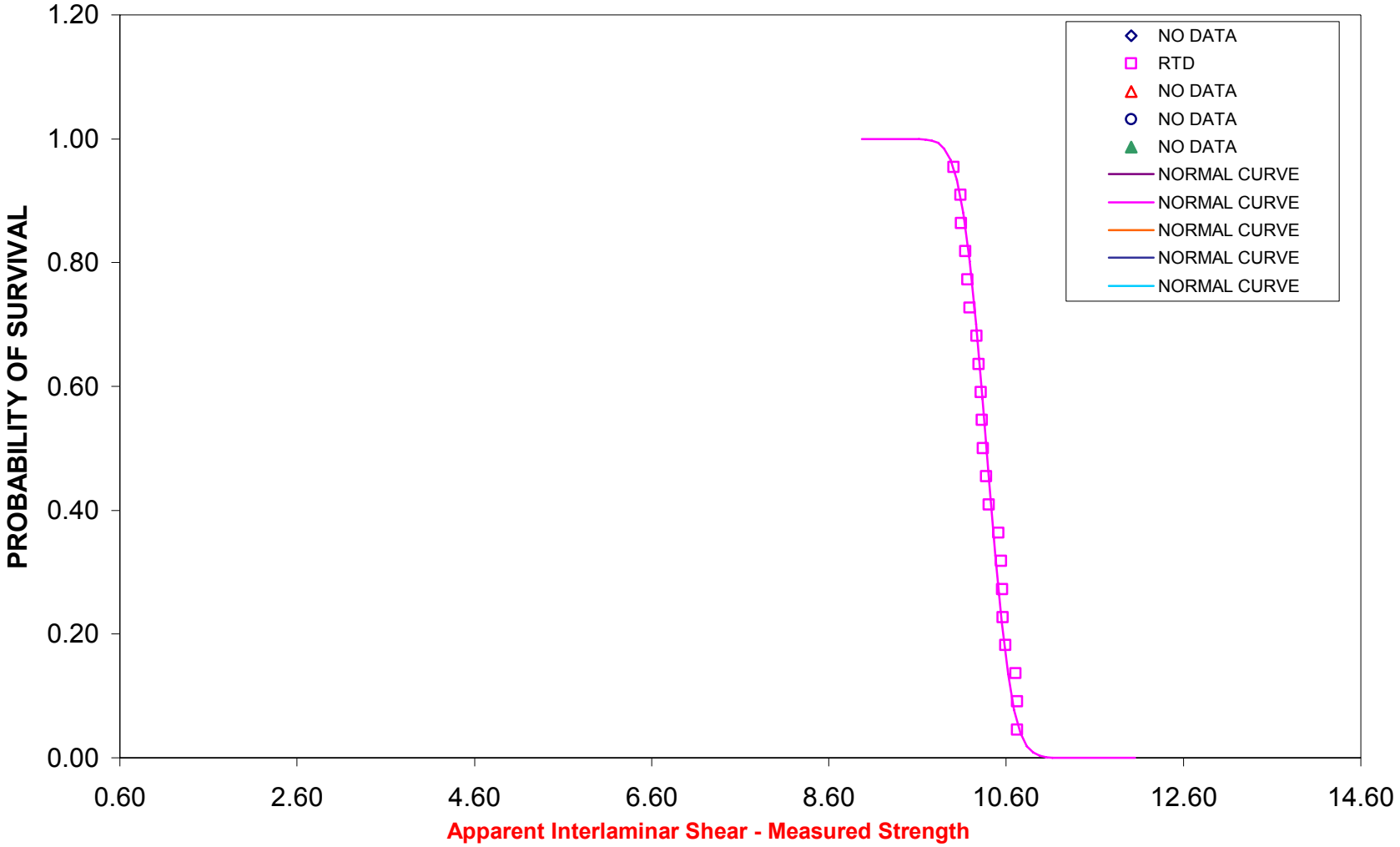


DISTRIBUTION OF GROUPED DATA FOR DIFFERENT TEST CONDITIONS



DISTRIBUTION OF GROUPED DATA FOR DIFFERENT TEST CONDITIONS

E765/T300 3KPW Graphite Fabric
FiberCote



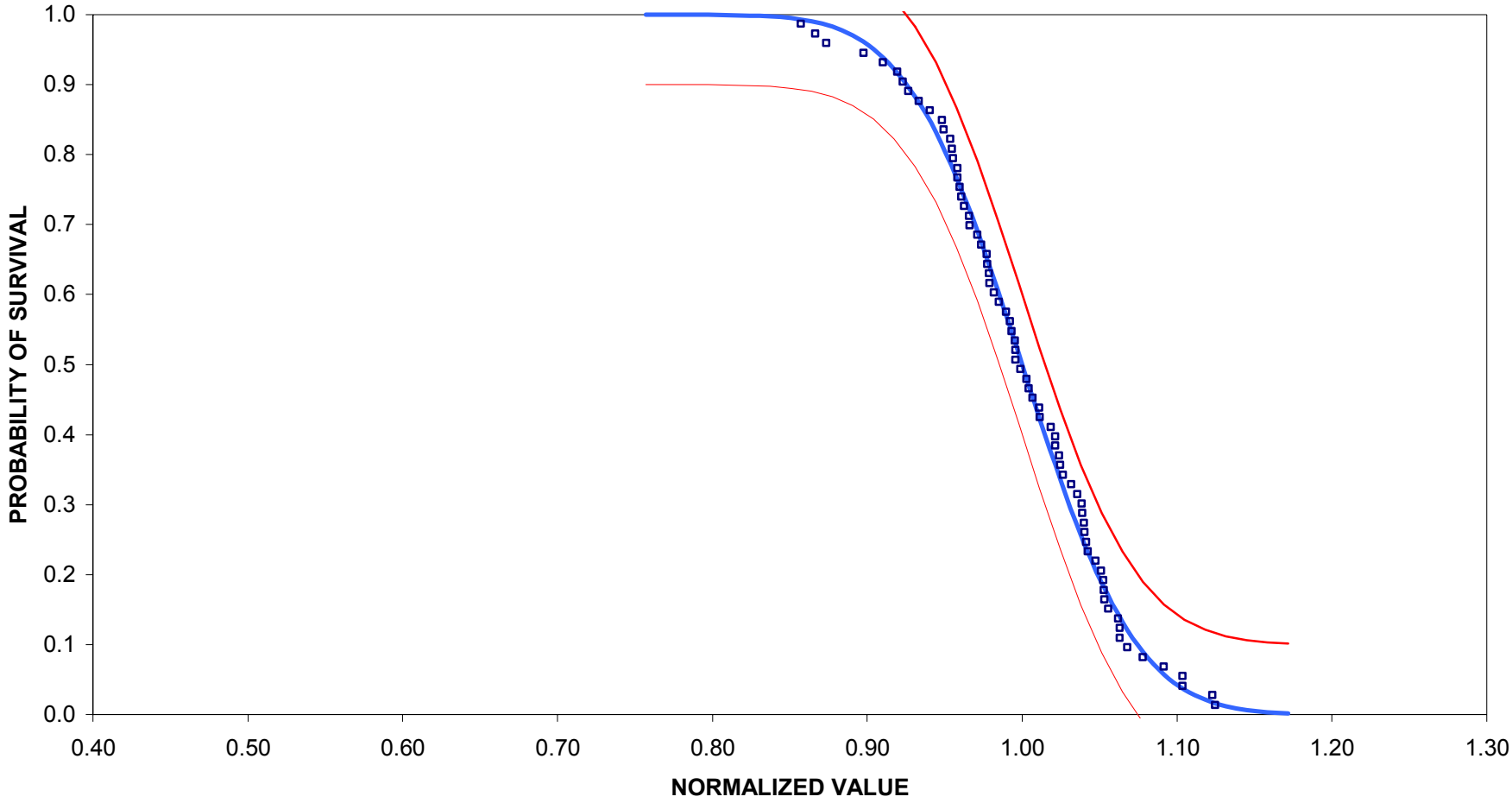
3.3.2 Plot of Pooled Data

DISTRIBUTION OF POOLED DATA

E765/T300 3KPW Graphite Fabric

FiberCote

0° Tension - Measured Strength

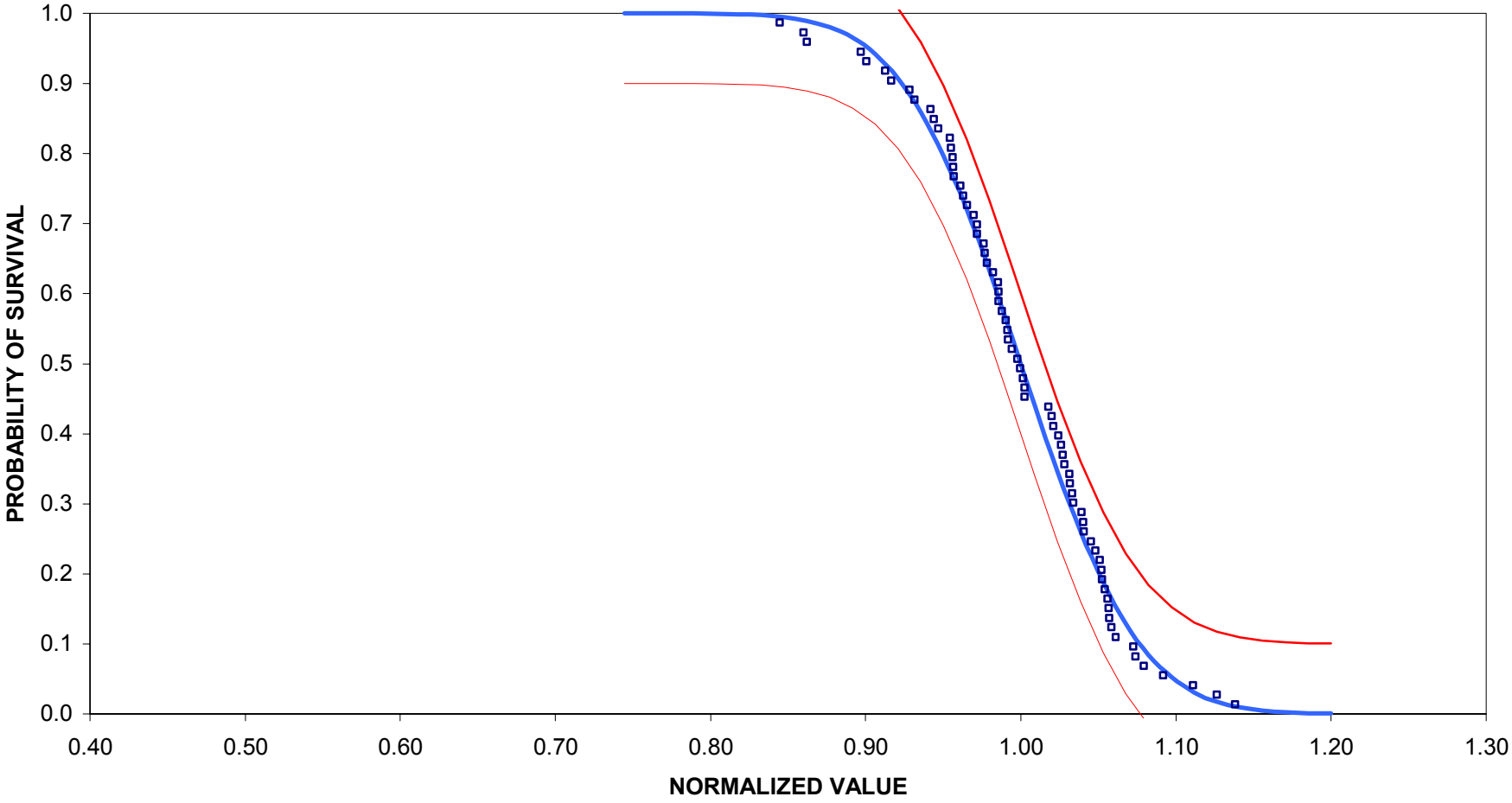


DISTRIBUTION OF POOLED DATA

E765/T300 3KPW Graphite Fabric

FiberCote

0° Tension - Normalized Strength

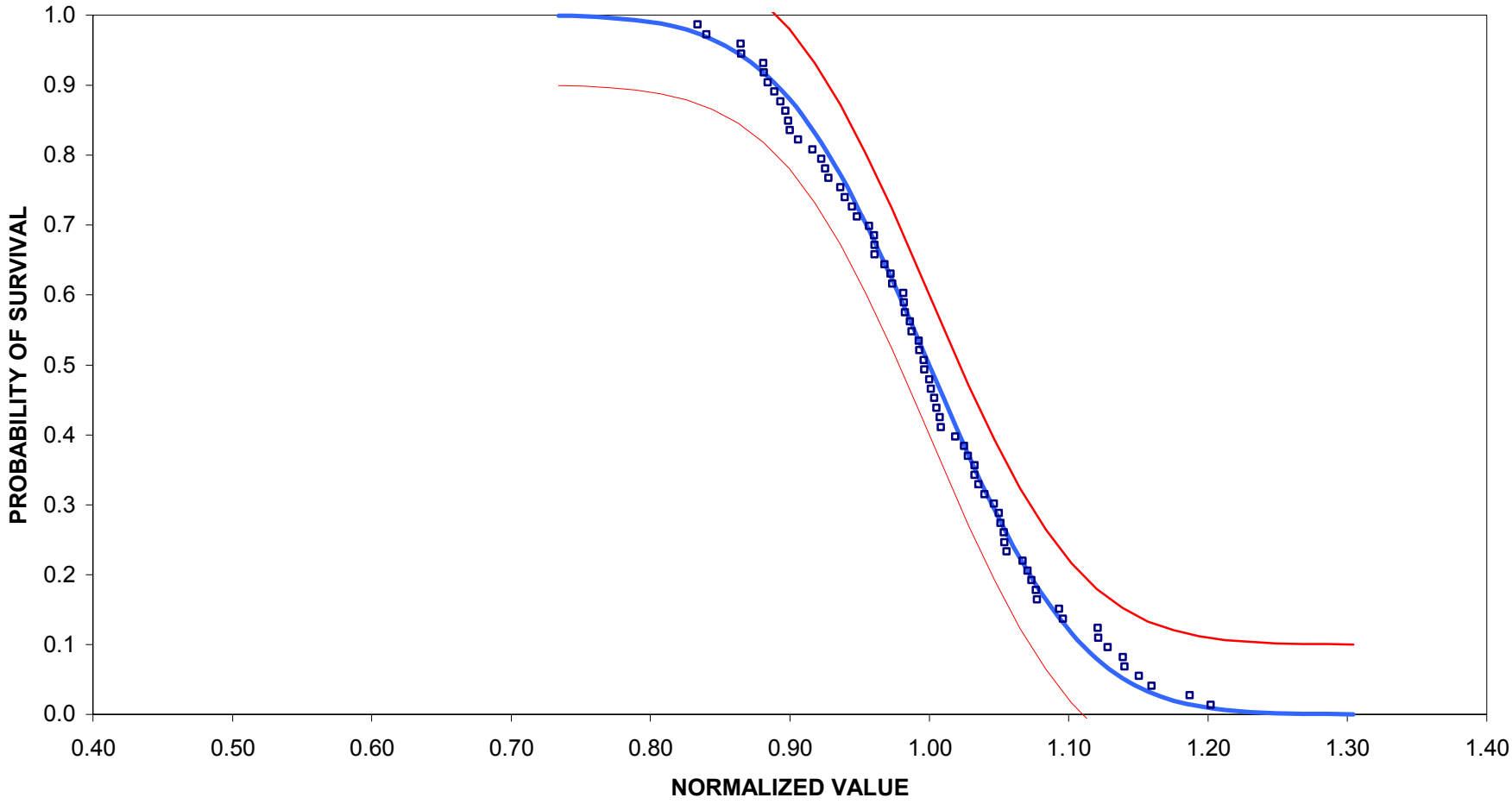


DISTRIBUTION OF POOLED DATA

E765/T300 3KPW Graphite Fabric

FiberCote

90° Tension - Measured Strength

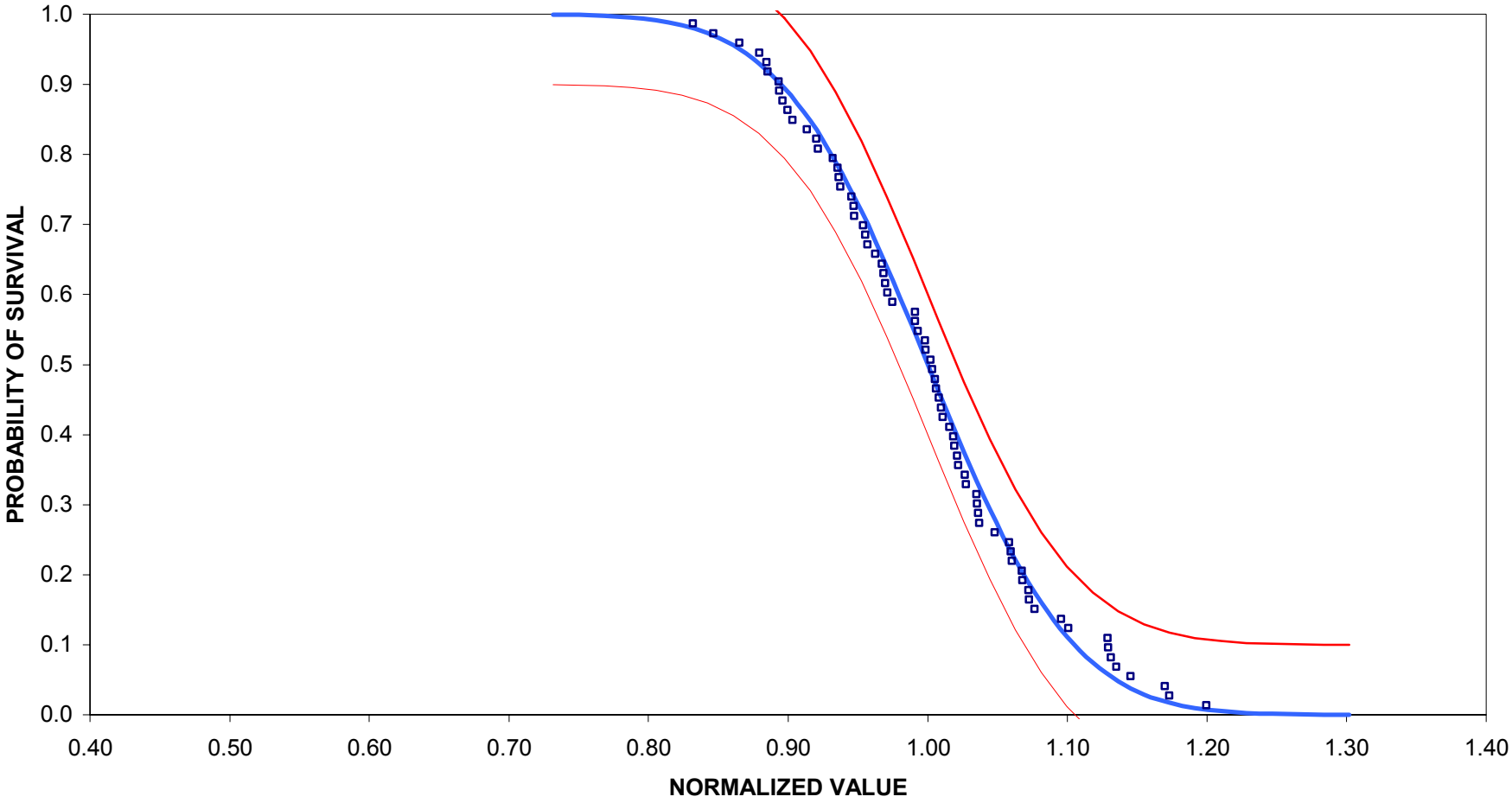


DISTRIBUTION OF POOLED DATA

E765/T300 3KPW Graphite Fabric

FiberCote

90° Tension - Normalized Strength

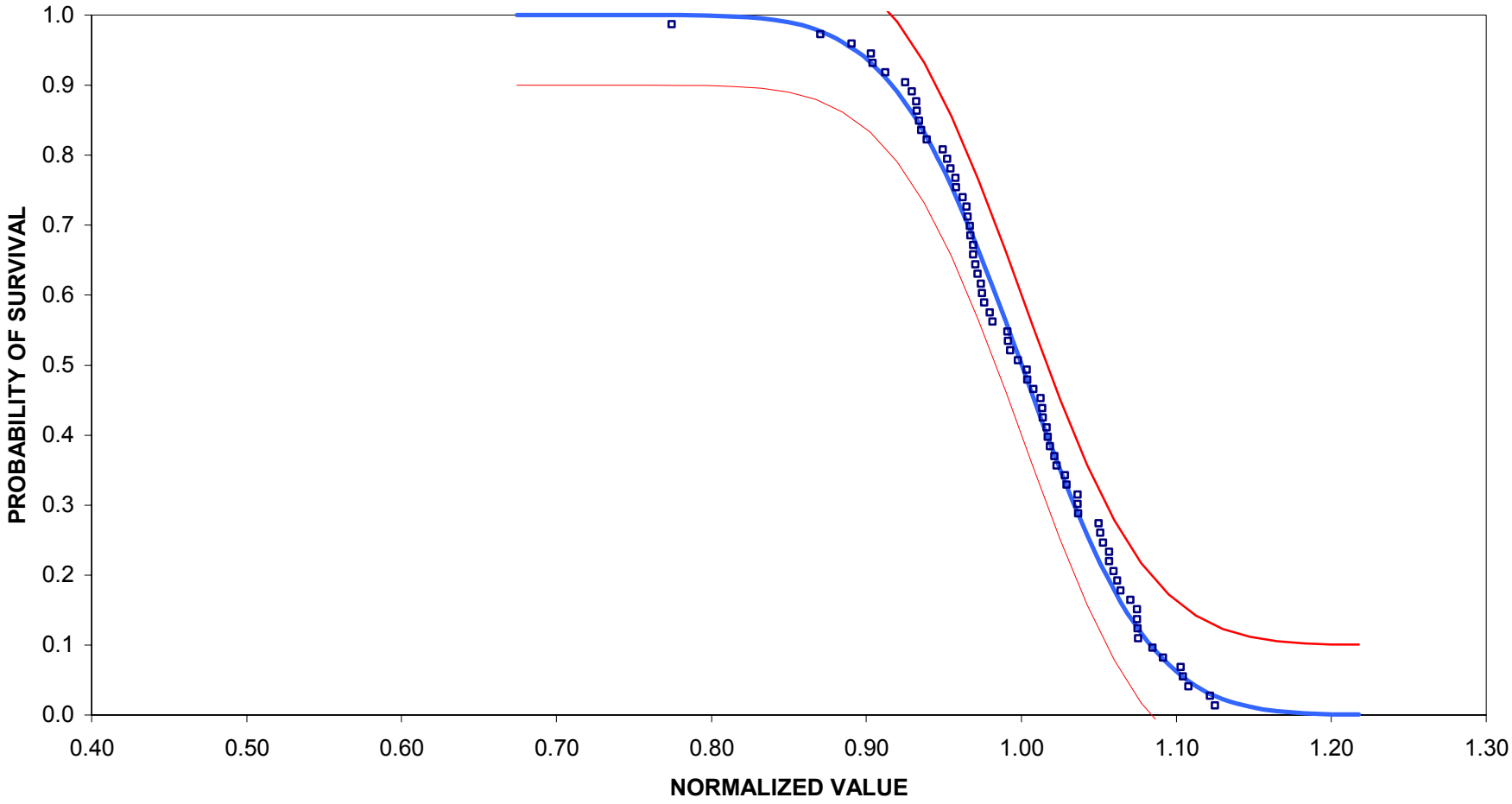


DISTRIBUTION OF POOLED DATA

E765/T300 3KPW Graphite Fabric

FiberCote

0° Compression - Measured Strength

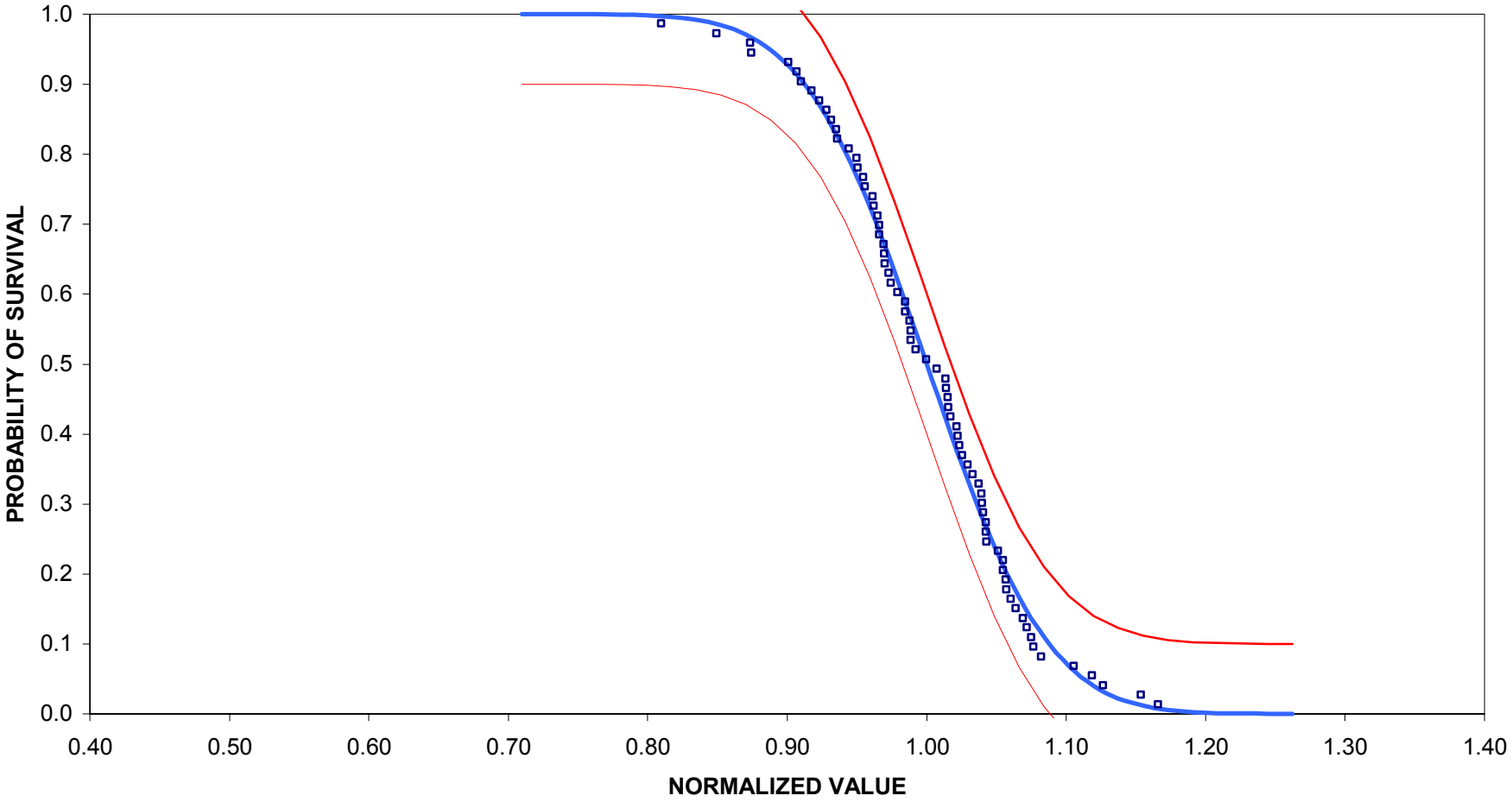


DISTRIBUTION OF POOLED DATA

E765/T300 3KPW Graphite Fabric

FiberCote

0° Compression - Normalized Strength

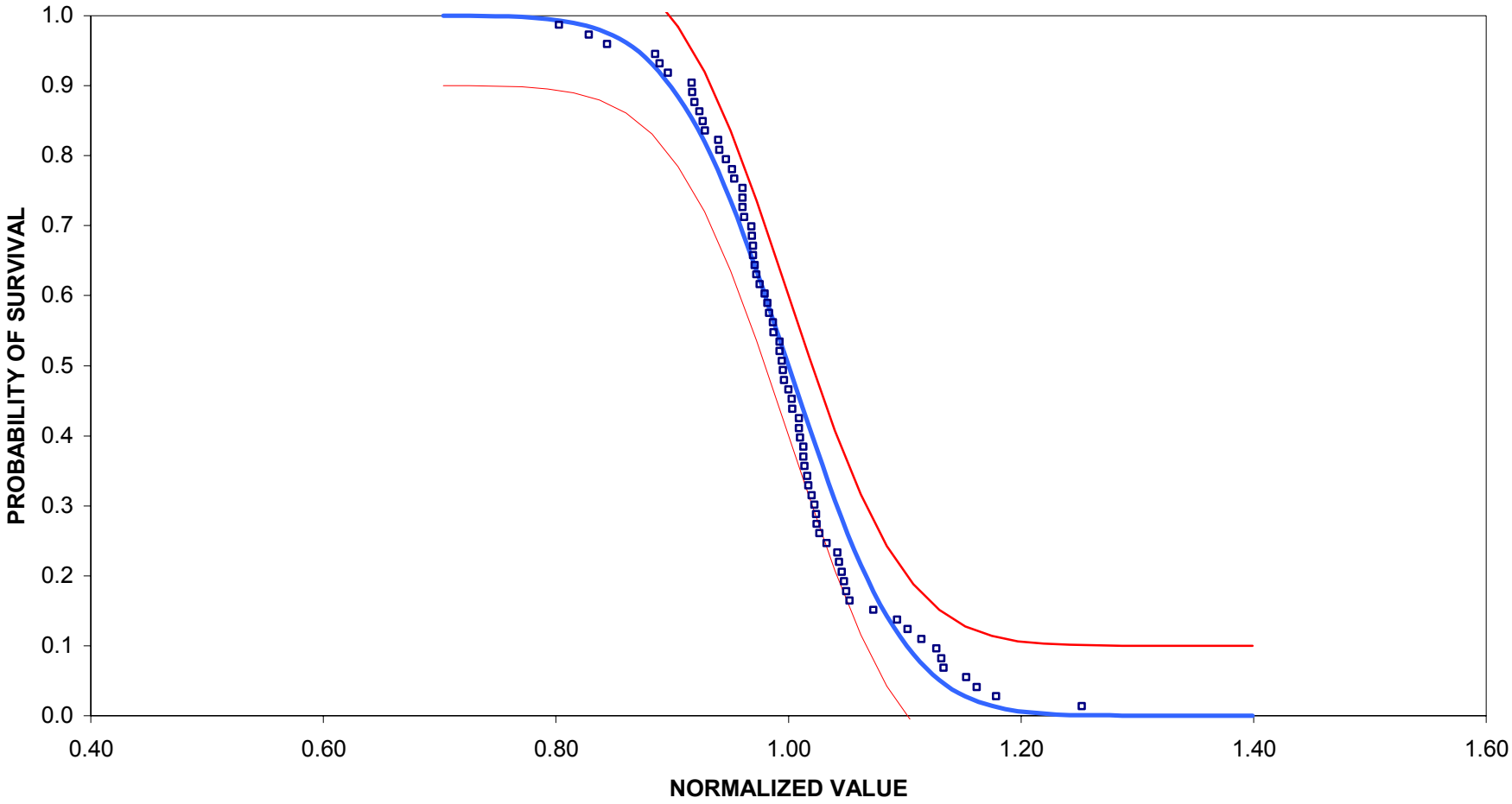


DISTRIBUTION OF POOLED DATA

E765/T300 3KPW Graphite Fabric

FiberCote

90° Compression - Measured Strength

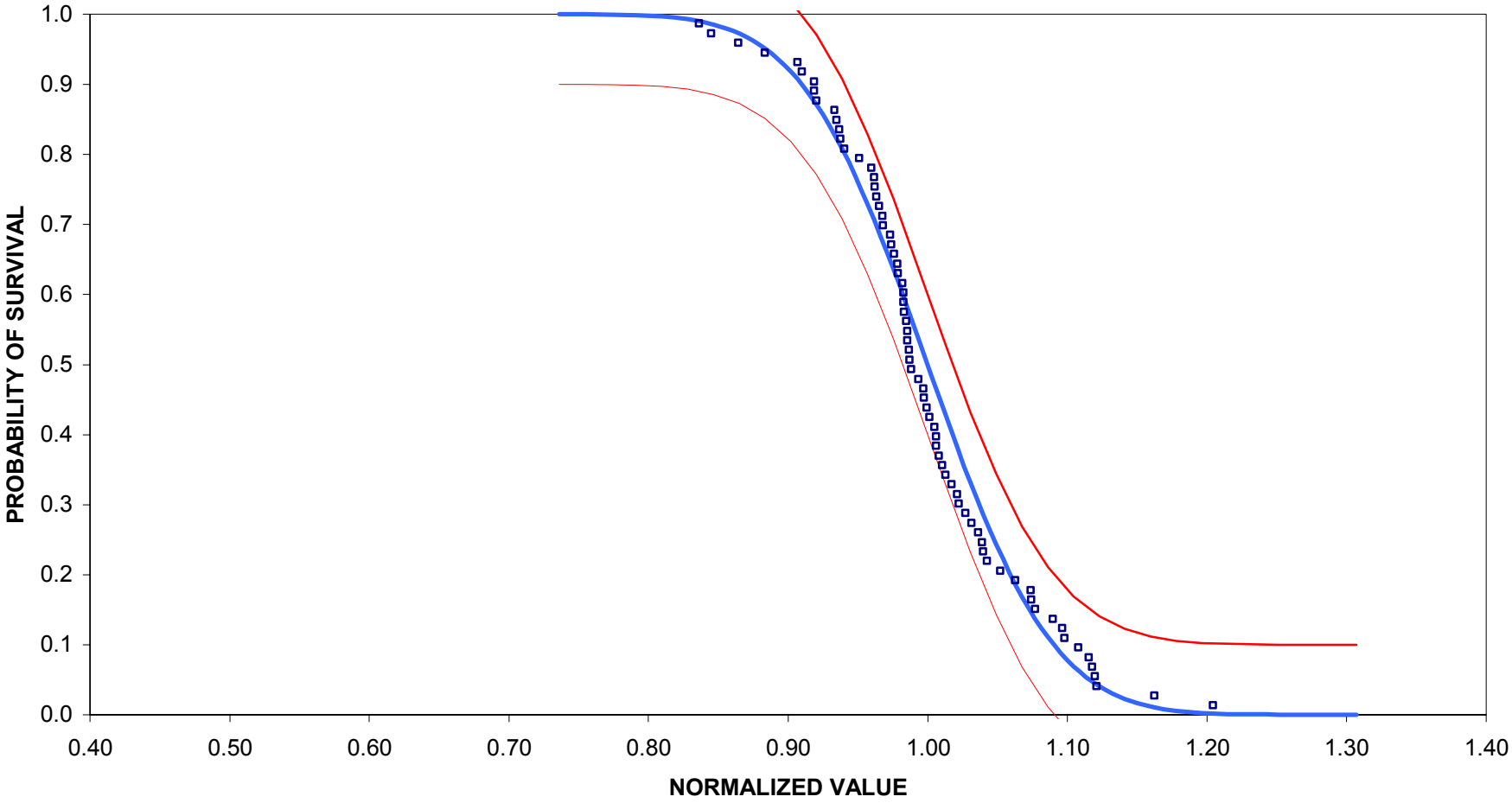


DISTRIBUTION OF POOLED DATA

E765/T300 3KPW Graphite Fabric

FiberCote

90° Compression - Normalized Strength

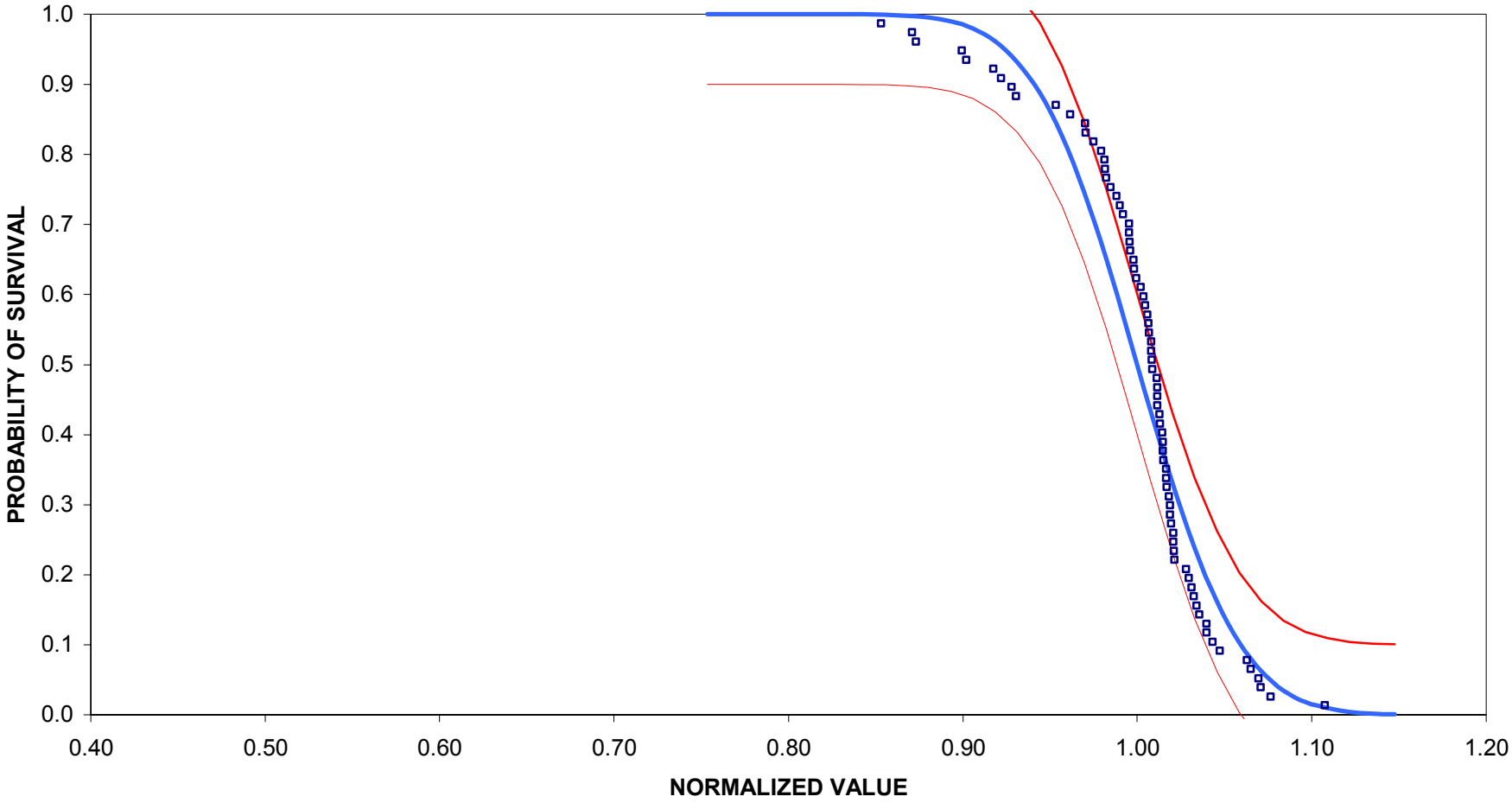


DISTRIBUTION OF POOLED DATA

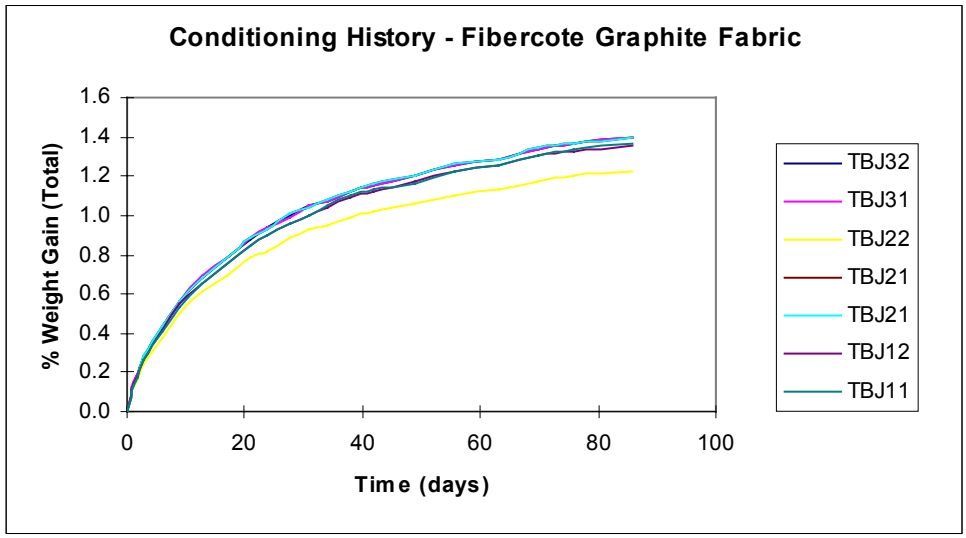
E765/T300 3KPW Graphite Fabric

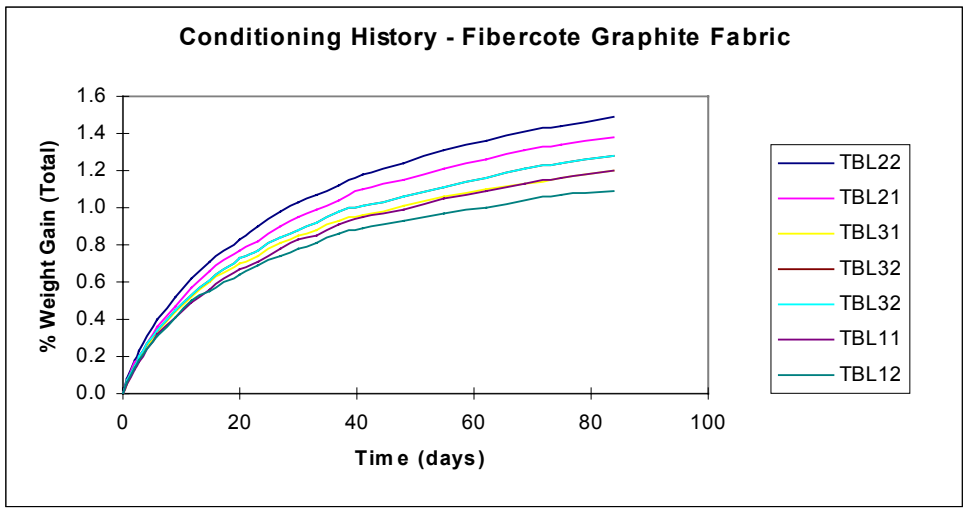
FiberCote

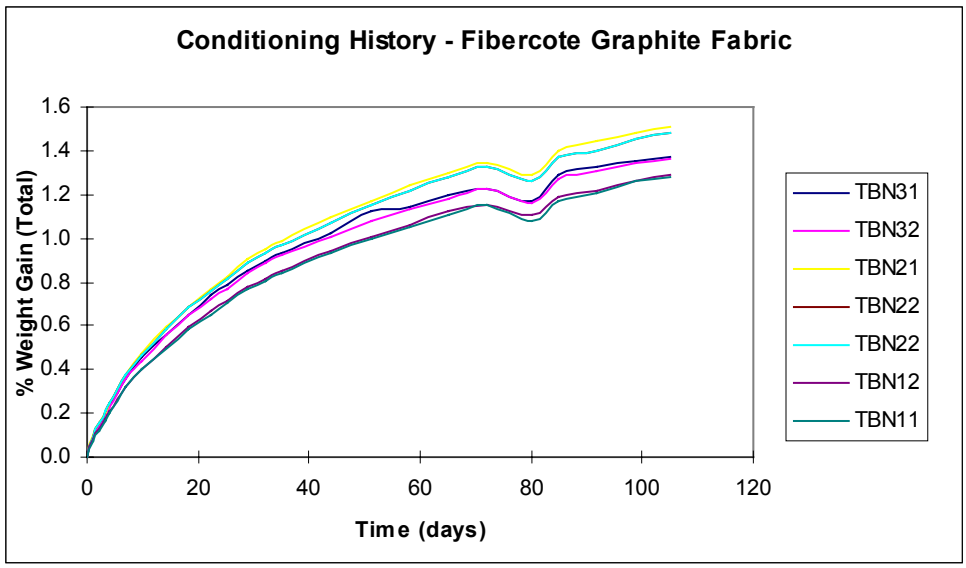
In-Plane Shear - Measured Strength

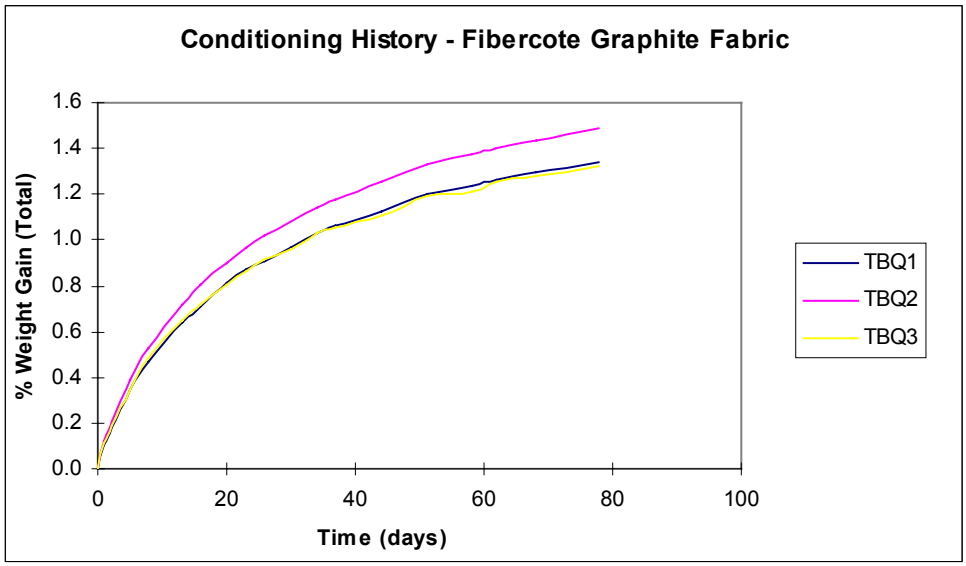


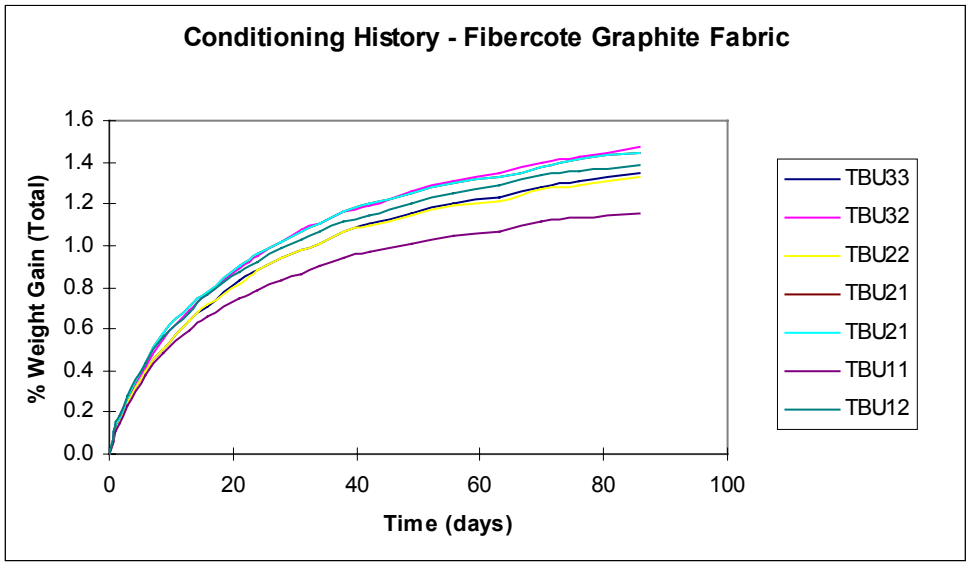
3.4 Moisture Conditioning History Charts

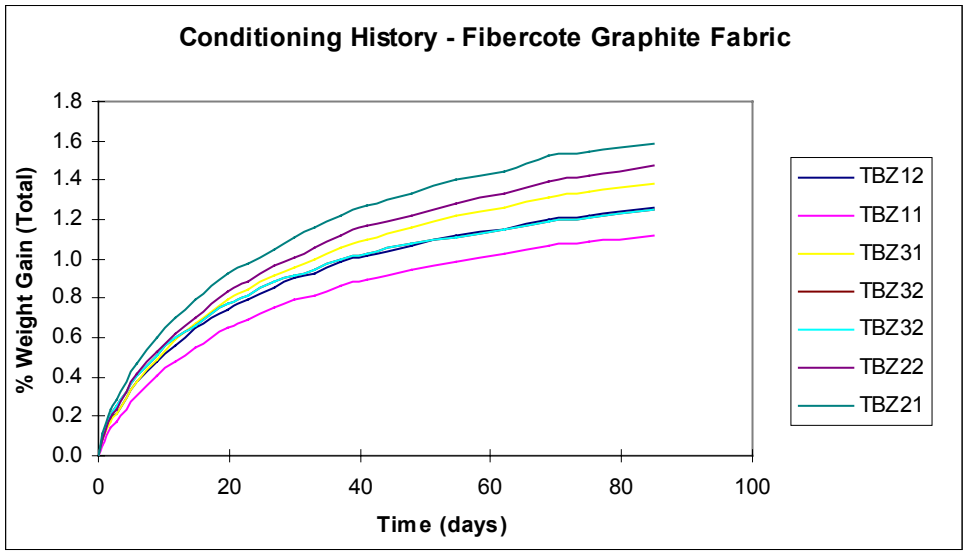


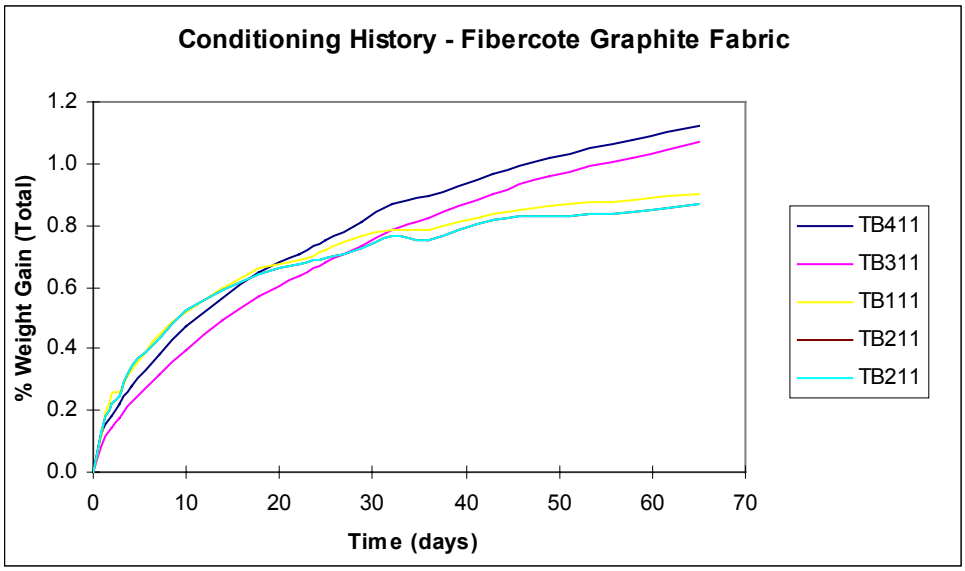












3.5 DMA Results

Physical Test Summary
Fibercote-E765/T300 3KPW Graphite Fabric

	Composite Density [g/cc]	Resin Content [wt%]	Fiber Volume [vol%]	Void Content [vol%]
0° Tension (TBJXXXXX)				
No. of Specimens	12	12	12	12
Mean	1.471	40.830	49.487	1.679
Standard Deviation	0.006	1.270	1.073	0.603
90° Tension (TBUXXXXX)				
No. of Specimens	12	12	12	12
Mean	1.472	41.460	48.994	1.376
Standard Deviation	0.005	2.631	2.150	1.093
0° Compression (TBKXXXXX)				
No. of Specimens	6	6	6	6
Mean	1.470	40.626	49.638	1.827
Standard Deviation	0.010	3.800	3.466	0.850
90° Compression (TBWXXXXX)				
No. of Specimens	7	7	7	7
Mean	1.481	40.306	50.278	1.219
Standard Deviation	0.015	2.689	2.755	0.273
In-Plane Shear (TBNXXXXX)				
No. of Specimens	6	6	6	6
Mean	1.467	43.481	47.147	1.010
Standard Deviation	0.010	2.085	2.067	0.118
Interlaminar Shear (TBQXXXXX)				
No. of Specimens	3	3	3	3
Mean	1.478	43.308	47.653	0.313
Standard Deviation	0.011	2.298	2.288	0.094
Bearing (TB#XXXXX)				
No. of Specimens	12	12	12	12
Mean	1.464	40.794	49.294	2.161
Standard Deviation	0.022	1.533	1.843	1.192
Overall No. of Specimens	**58**	**58**	**58**	**58**
Overall Mean	**1.471**	**41.271**	**49.119**	**1.536**
Overall Std. Deviation	**0.013**	**2.384**	**2.221**	**0.932**

DMA Results -- Onset Storage Modulus

DRY

As Fabricated		
Sample #	Tg [°C]	Tg [°F]
TBD111-1A	140.45	284.82
TBD111-2A	142.84	289.12
TBD111-3A	150.42	302.76
TBD211-1A	151.00	303.79
TBD211-2A	138.88	281.98
TBD211-3A	147.79	298.02
TBD311-1A	132.09	269.76
TBD311-2A	135.41	275.74
TBD311-3A	143.47	290.24
Average [°F]		288.47
Standard Dev. [°F]		11.73
Coeff. Of Var. [%]		4.07

HOT WET

85% RH		
Sample #	Tg [°C]	Tg [°F]
TBD111-1C	116.85	242.33
TBD111-2C	105.00	221.00
TBD111-3C	97.08	206.74
TBD211-1C	107.40	225.32
TBD211-2C	97.68	207.82
TBD211-3C	111.86	233.34
TBD311-1C	121.04	249.87
TBD311-2C	113.52	236.34
TCD311-3C	104.60	220.27
Average [°F]		227.00
Standard Dev. [°F]		14.78
Coeff. Of Var. [%]		6.51

DMA Results - Peak Tan Delta

DRY

As Fabricated		
Sample #	Tg [°C]	Tg [°F]
TBD111-1A	170.56	339.01
TBD111-2A	169.23	336.62
TBD111-3A	169.36	336.84
TBD211-1A	166.58	331.84
TBD211-2A	168.60	335.48
TBD211-3A	169.25	336.65
TBD311-1A	167.43	333.37
TBD311-2A	165.17	329.30
TBD311-3A	163.04	325.46
Average [°F]		333.84
Standard Dev. [°F]		4.32
Coeff. Of Var. [%]		1.29

HOT WET

85% RH		
Sample #	Tg [°C]	Tg [°F]
TBD111-1C	130.61	267.09
TBD111-2C	130.43	266.77
TBD111-3C	130.93	267.67
TBD211-1C	128.82	263.88
TBD211-2C	128.02	262.43
TBD211-3C	128.83	263.89
TBD311-1C	129.07	264.33
TBD311-2C	131.12	268.01
TCD311-3C	128.31	262.96
Average [°F]		265.23
Standard Dev. [°F]		2.15
Coeff. Of Var. [%]		0.81

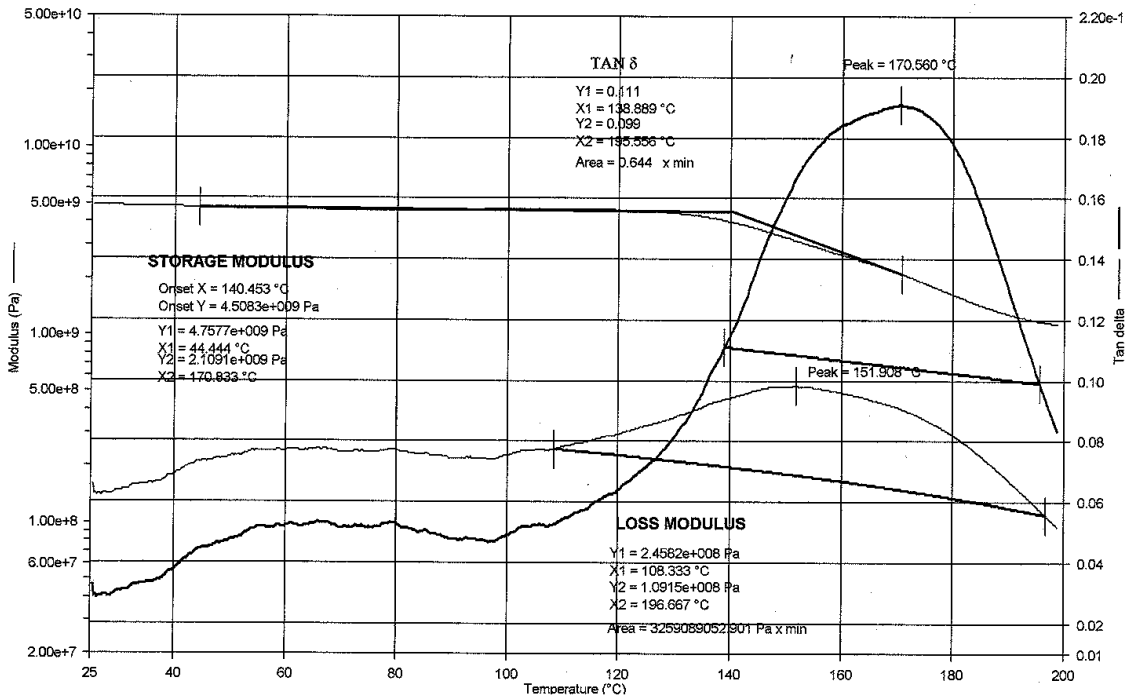
DMA Results - Peak Loss Modulus

DRY

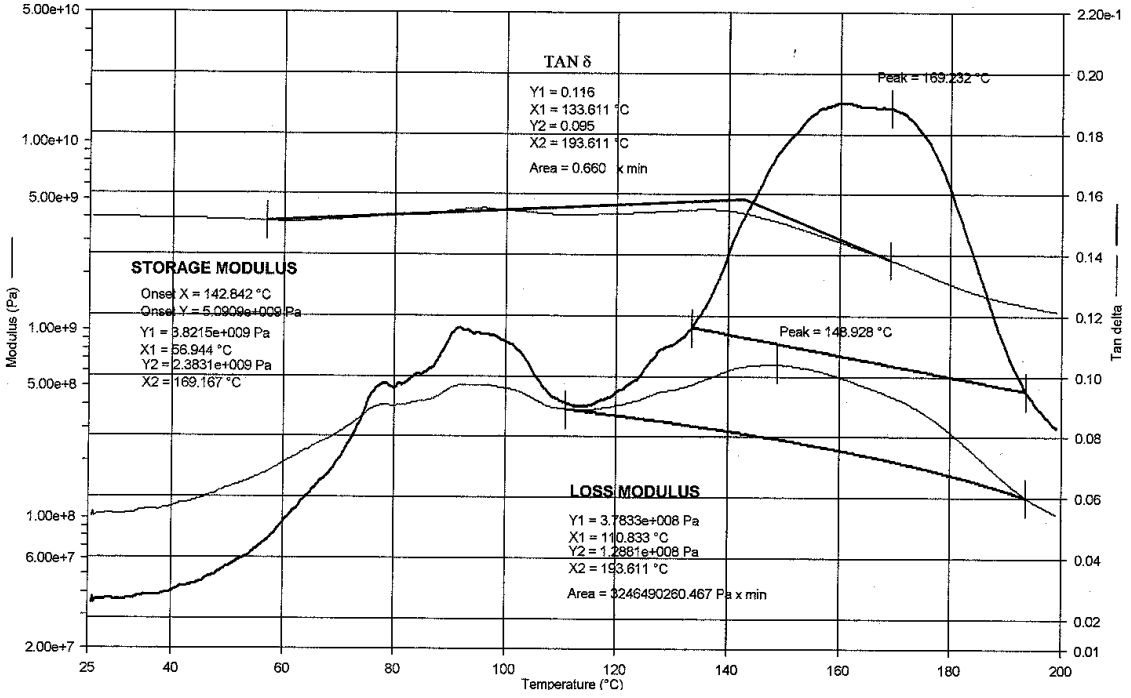
As Fabricated		
Sample #	Tg [°C]	Tg [°F]
TBD111-1A	151.91	305.43
TBD111-2A	148.93	300.07
TBD111-3A	131.36	268.44
TBD211-1A	150.41	302.74
TBD211-2A	150.88	303.59
TBD211-3A	152.78	307.01
TBD311-1A	153.02	307.44
TBD311-2A	148.87	299.96
TBD311-3A	147.27	297.08
Average [°F]		299.08
Standard Dev. [°F]		12.00
Coeff. Of Var. [%]		4.01

HOT WET

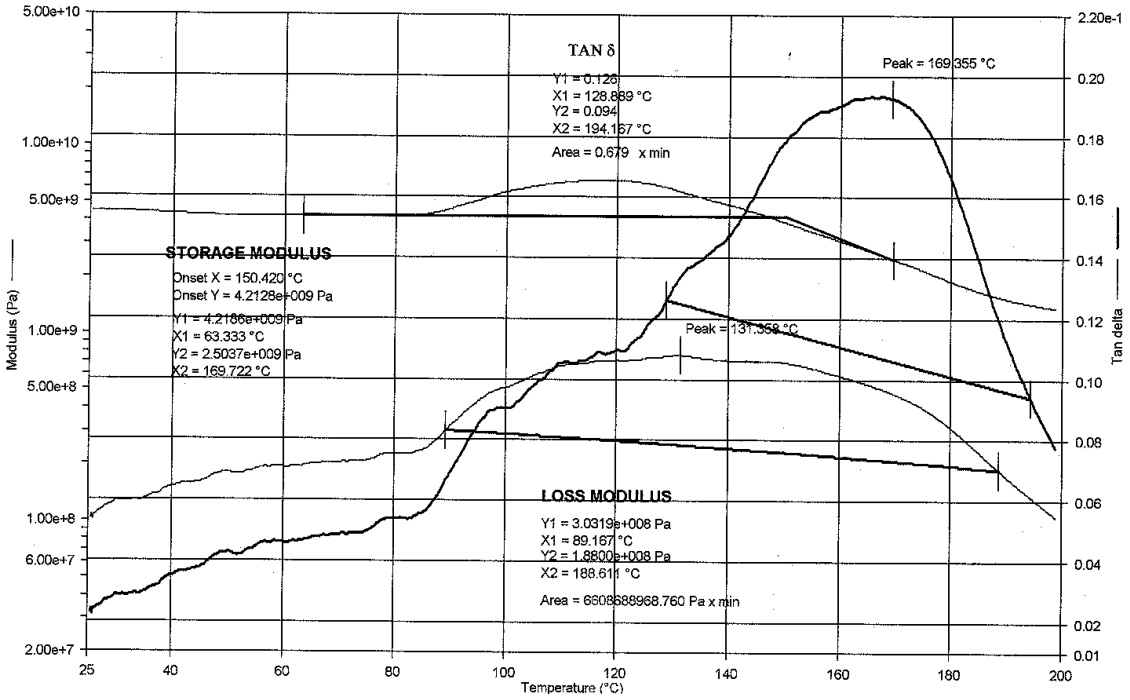
85% RH		
Sample #	Tg [°C]	Tg [°F]
TBD111-1C	123.93	255.08
TBD111-2C	123.69	254.63
TBD111-3C	124.10	255.37
TBD211-1C	105.81	222.46
TBD211-2C	108.40	227.13
TBD211-3C	119.86	247.76
TBD311-1C	119.57	247.22
TBD311-2C	123.70	254.66
TCD311-3C	120.04	248.07
Average [°F]		245.82
Standard Dev. [°F]		12.44
Coeff. Of Var. [%]		5.06



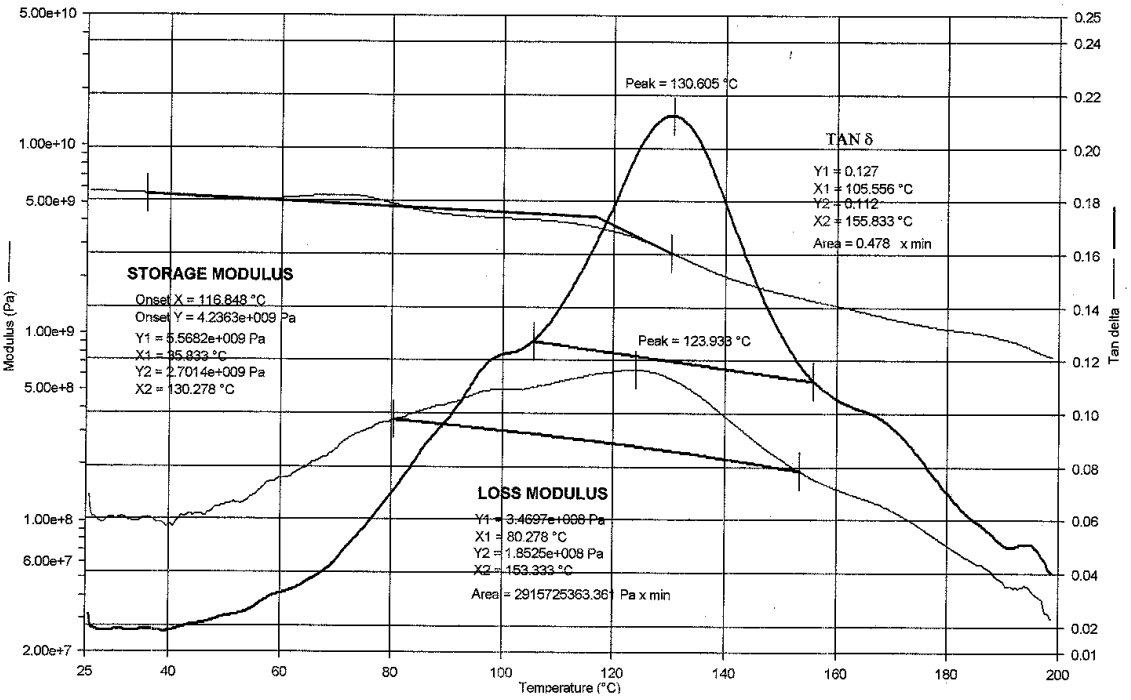
TBD111-1A



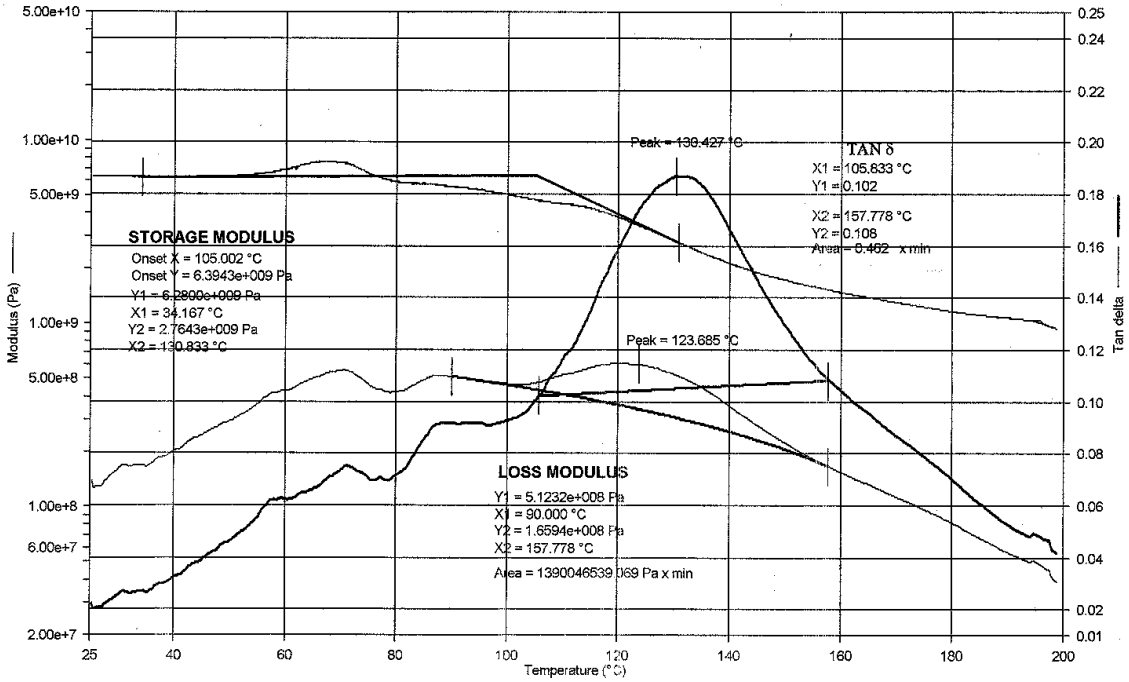
TBD111-2A



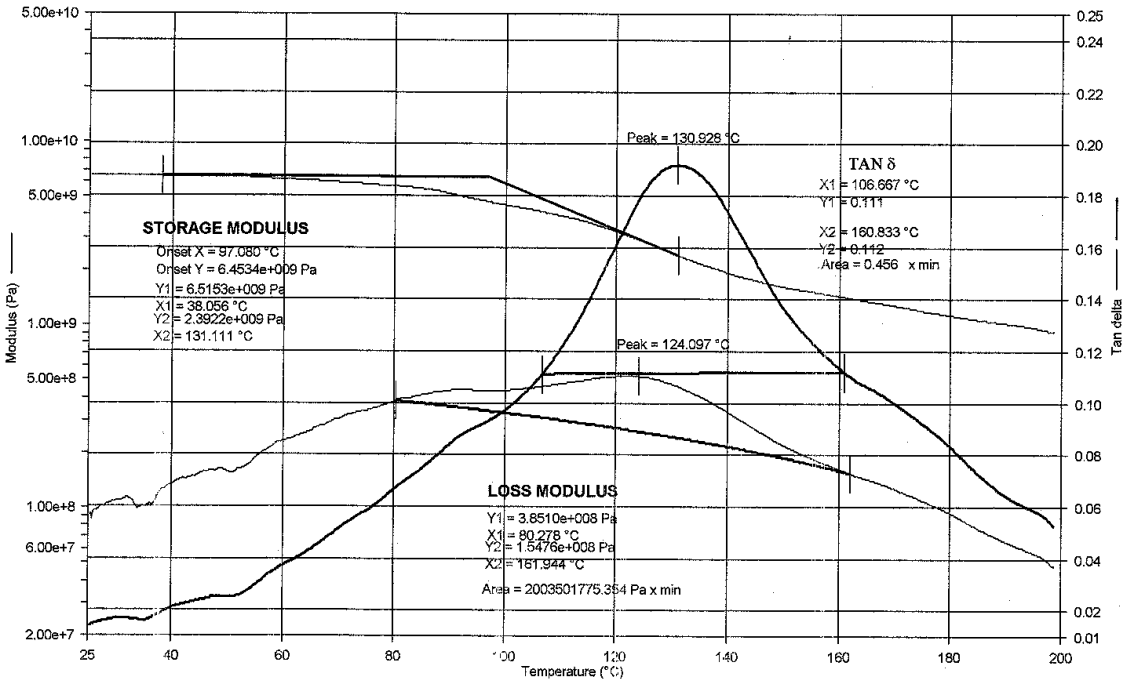
TBD111-3A



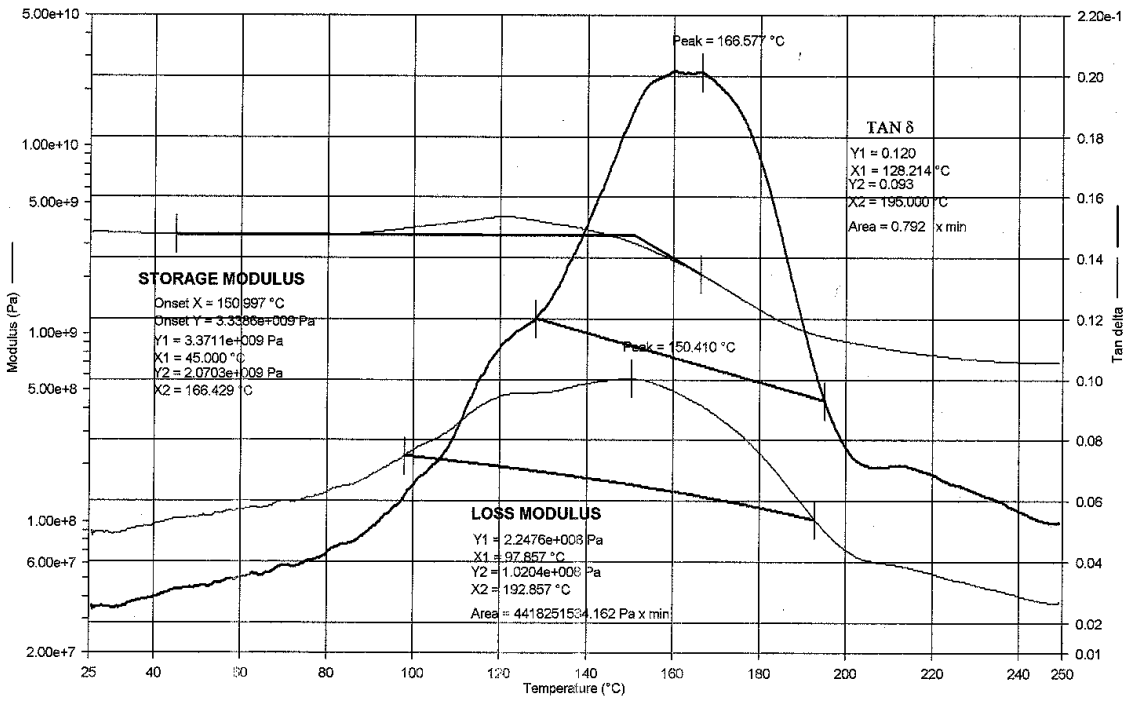
TBD111-1C



TBD111-2C



TBD111-3C



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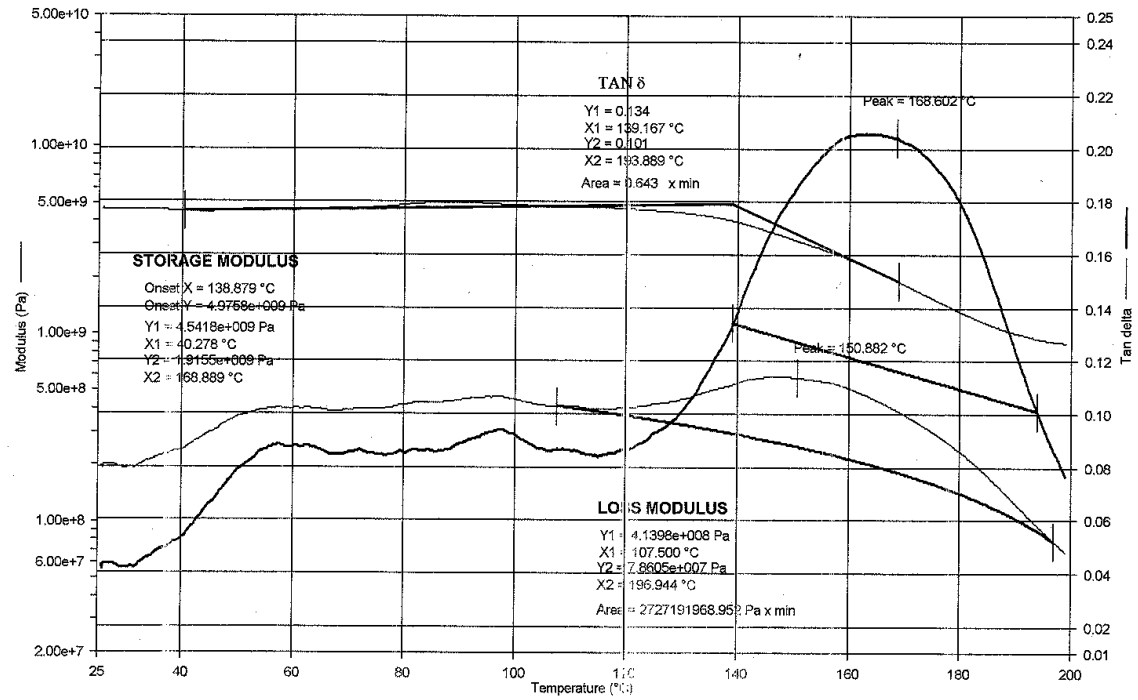
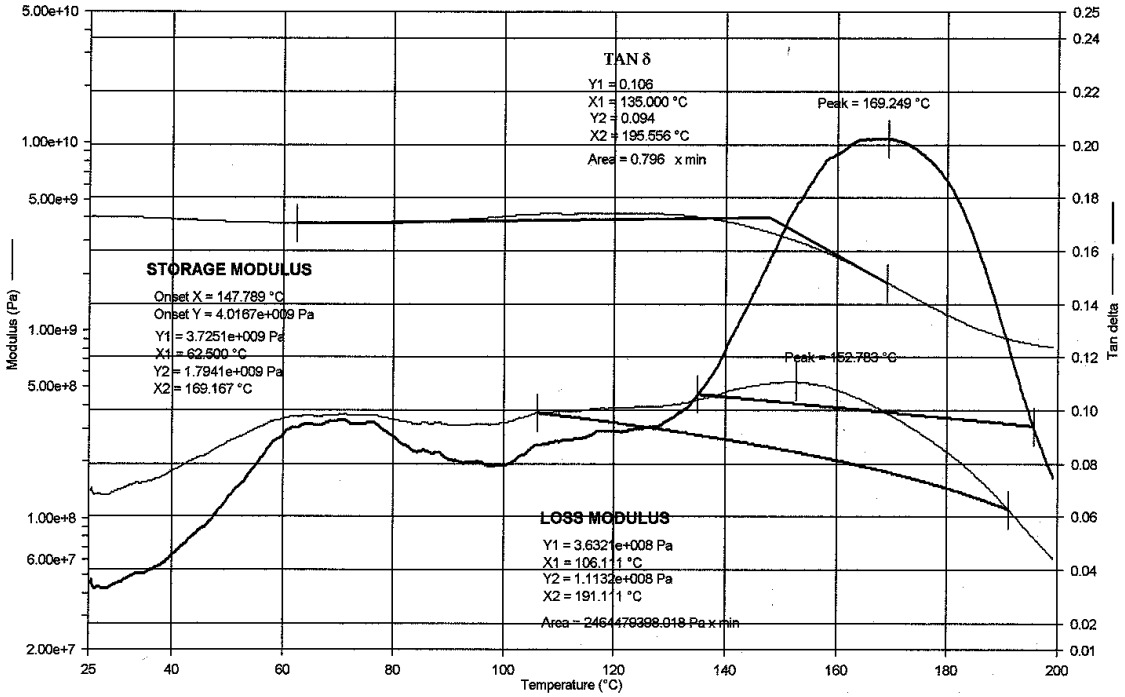
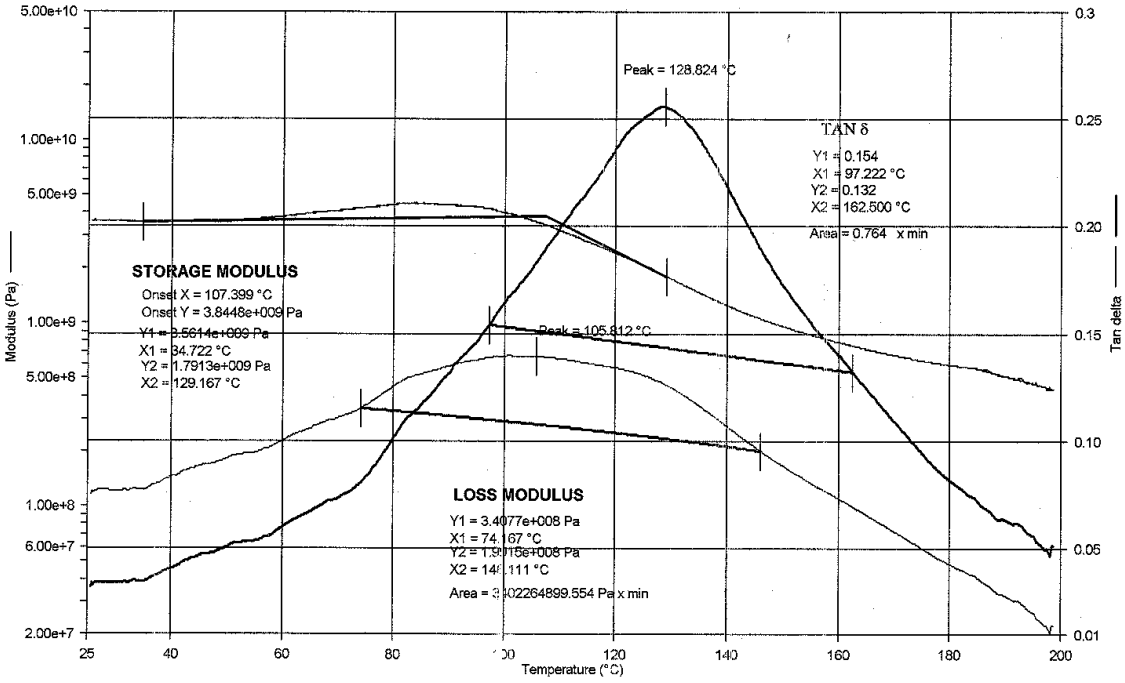


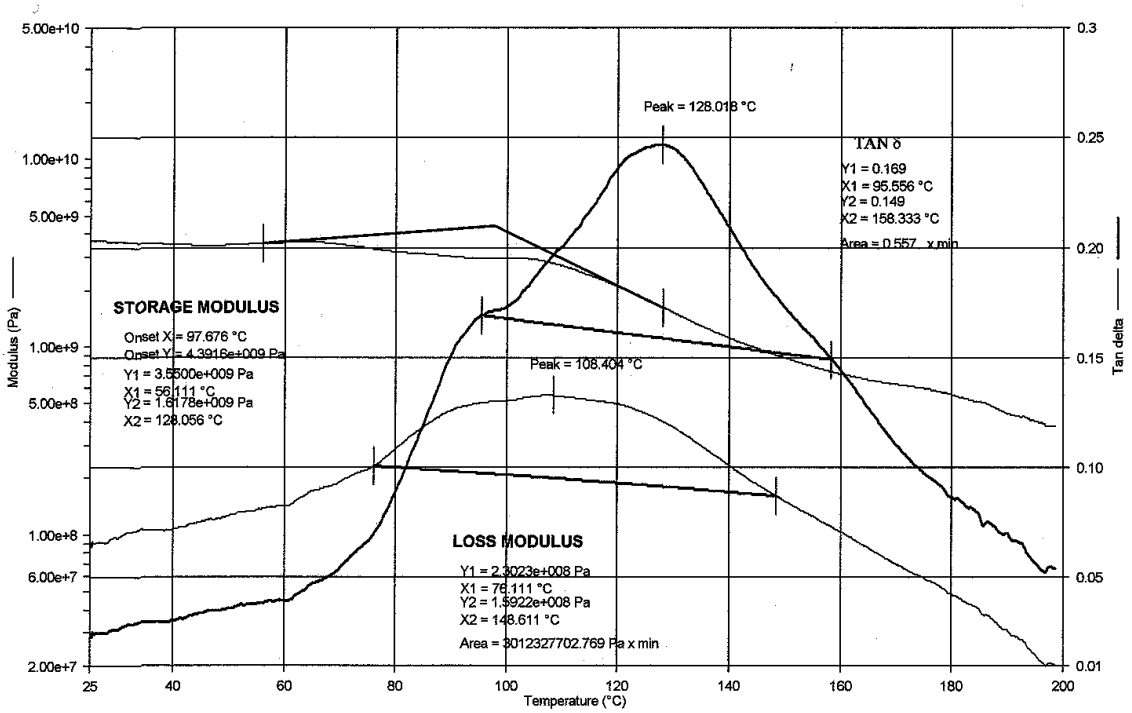
TBD211-2A



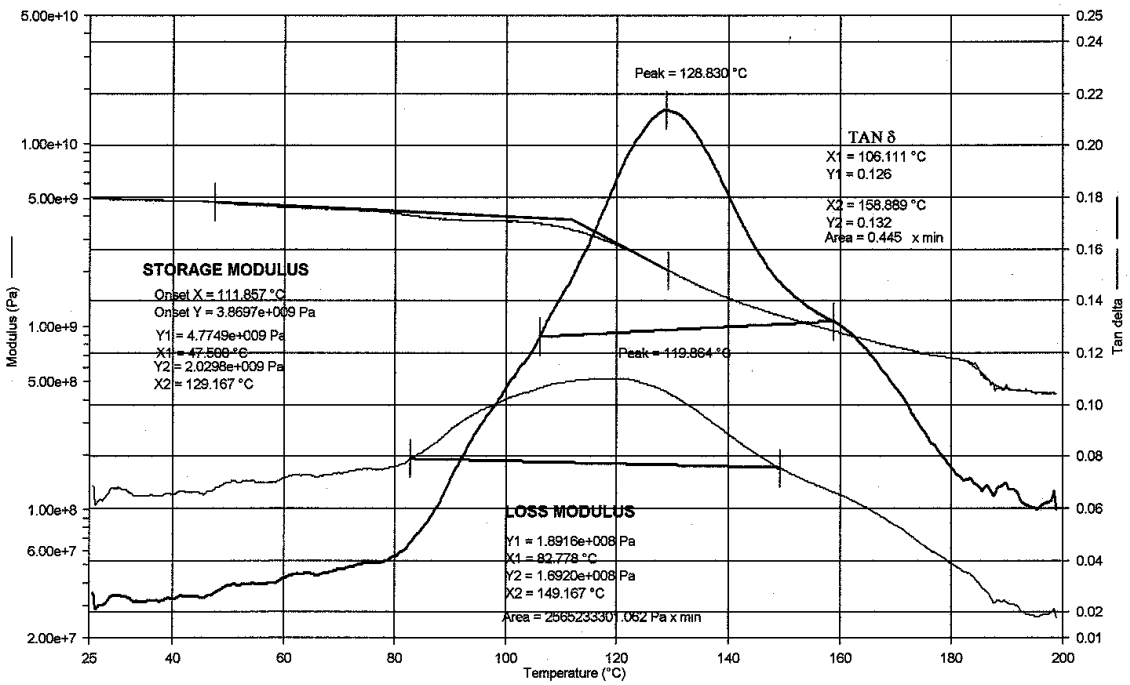
TBD211-3A



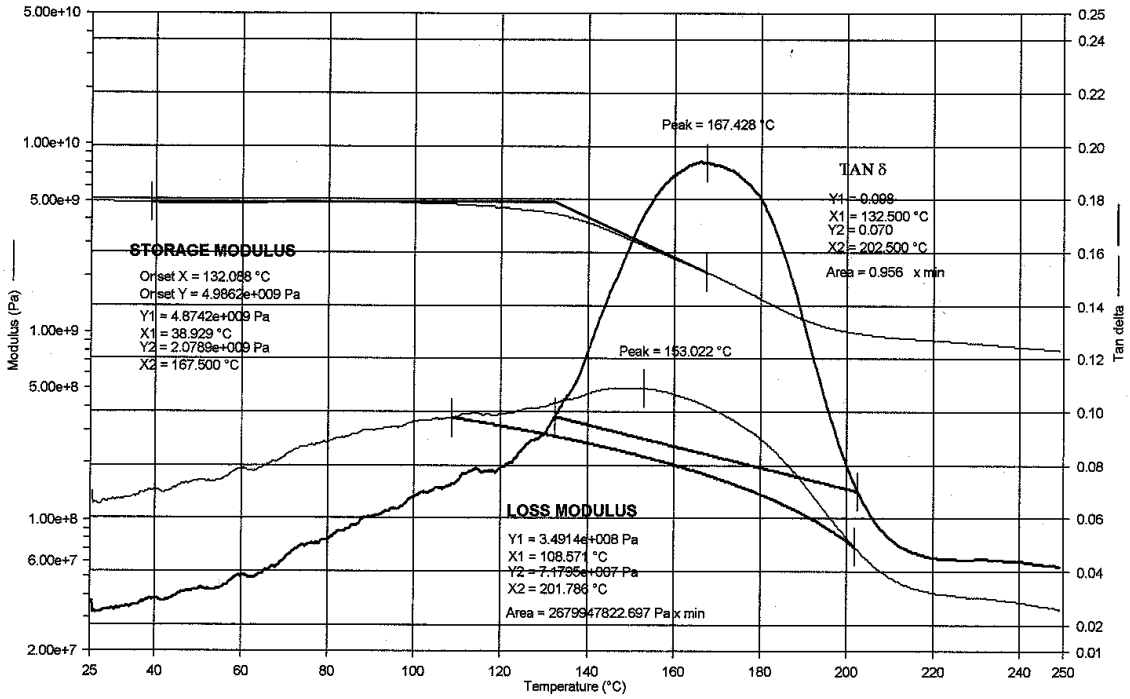
TBD211-1C



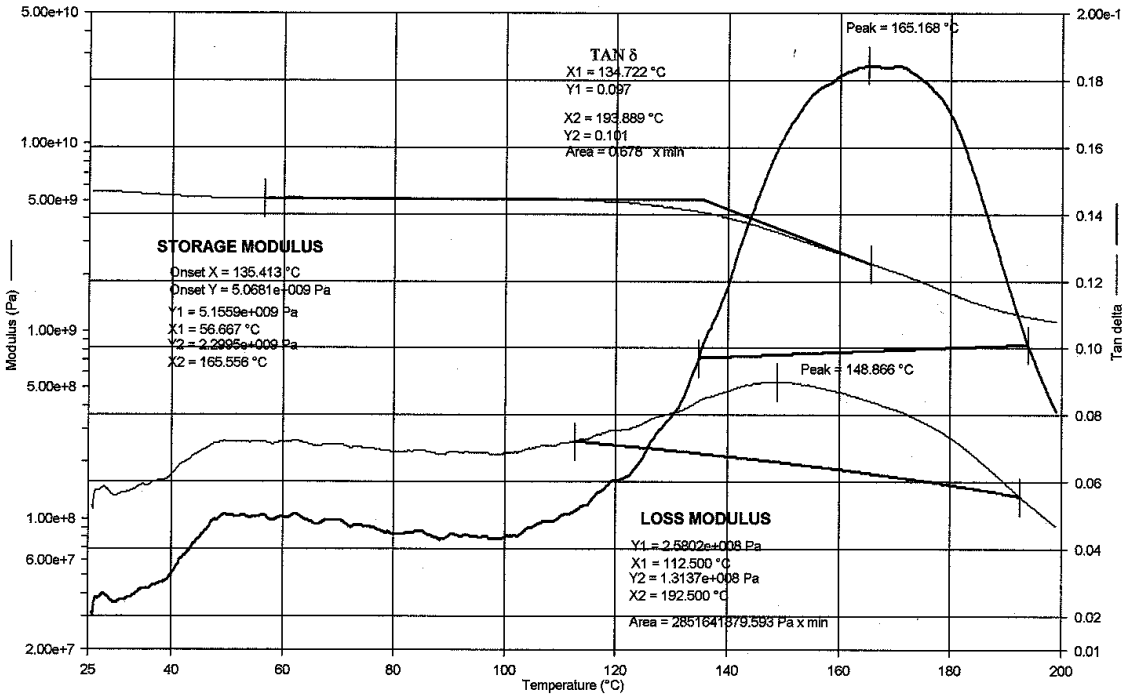
TBD211-2C



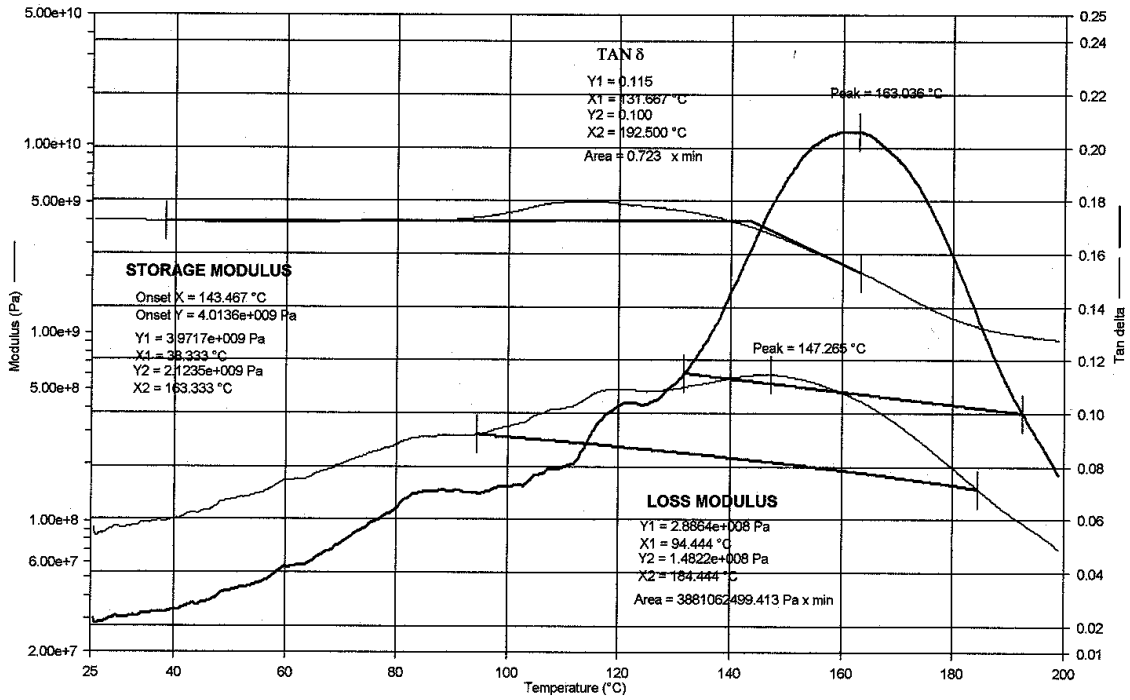
TBD211-3C



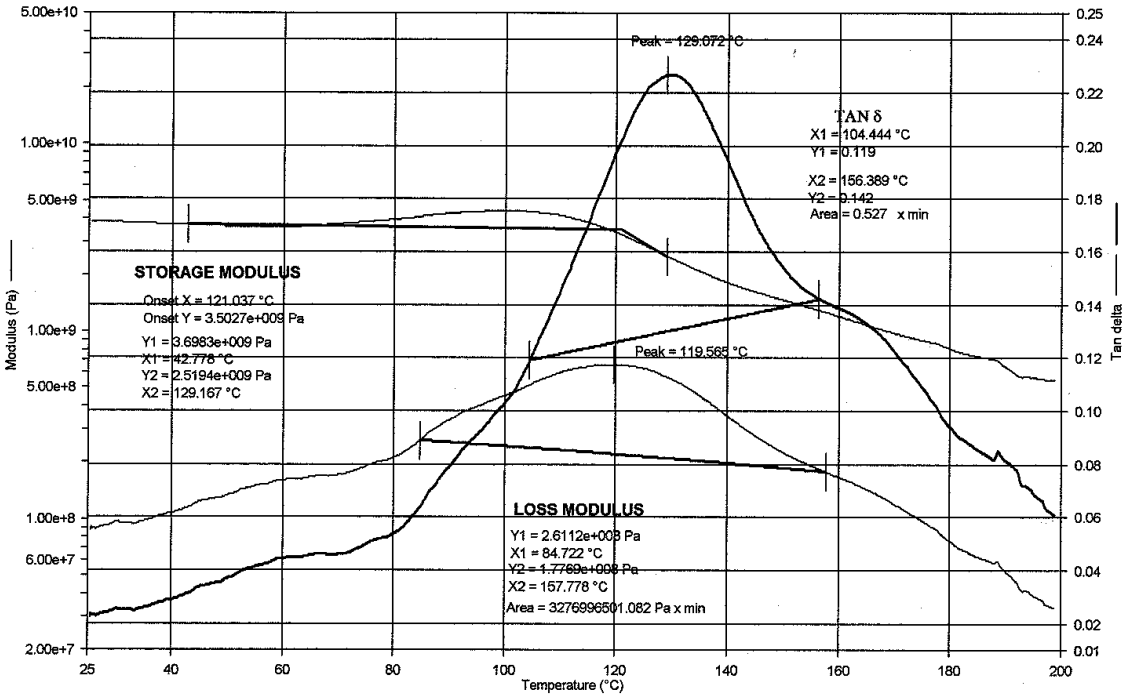
TBD311-1A



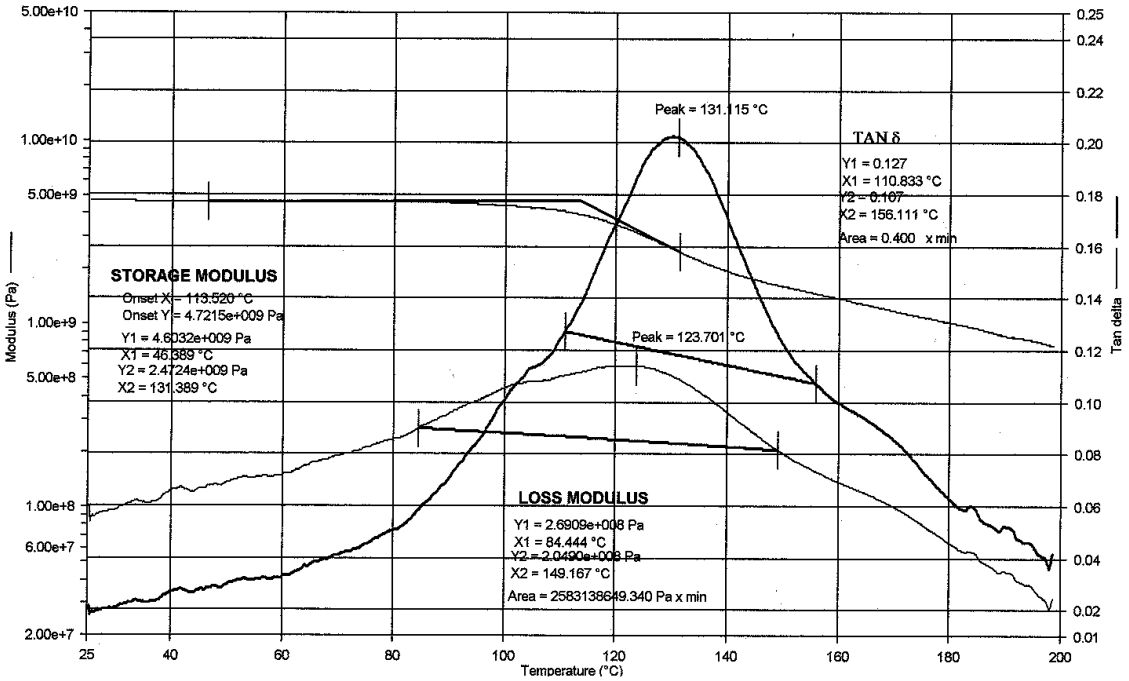
TBD311-2A



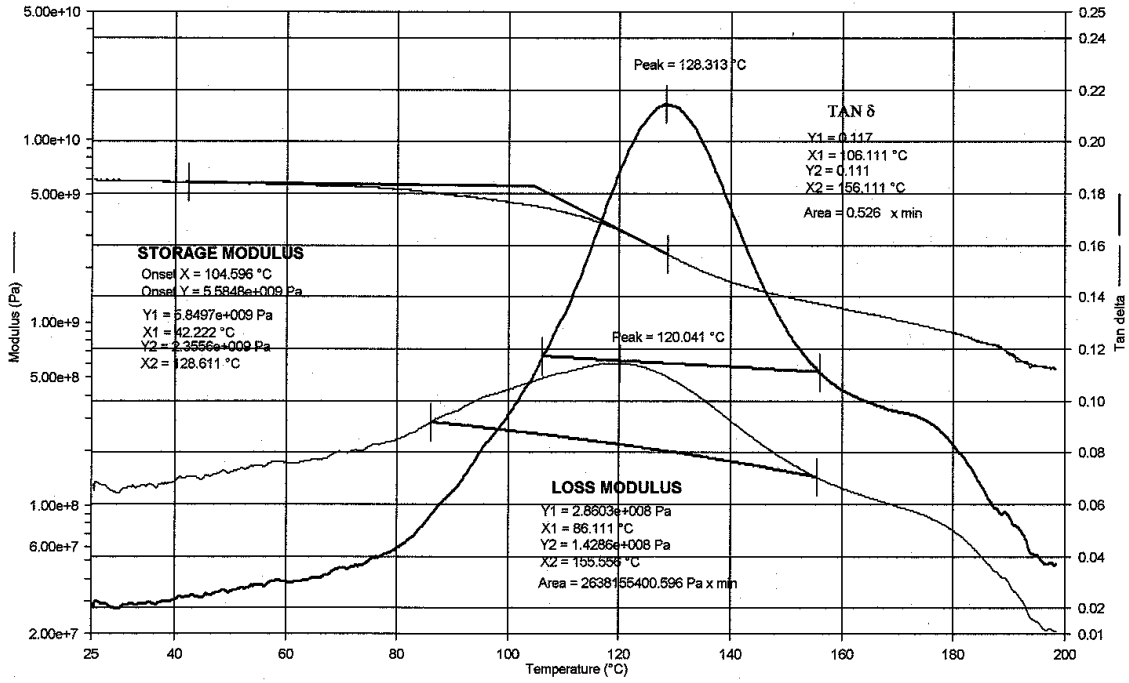
TBD311-3A



TBD311-1C



TBD311-2C



TBD311-3C

4.0 TESTING AND REPORTING COMMENTS

4.1 E765 Resin Components

The components used in the certification resin batches were:

Component A	Shell
Component B	Ciba
Component C	Phenoxy Associates
Component D	Air Products
Component E	SKW

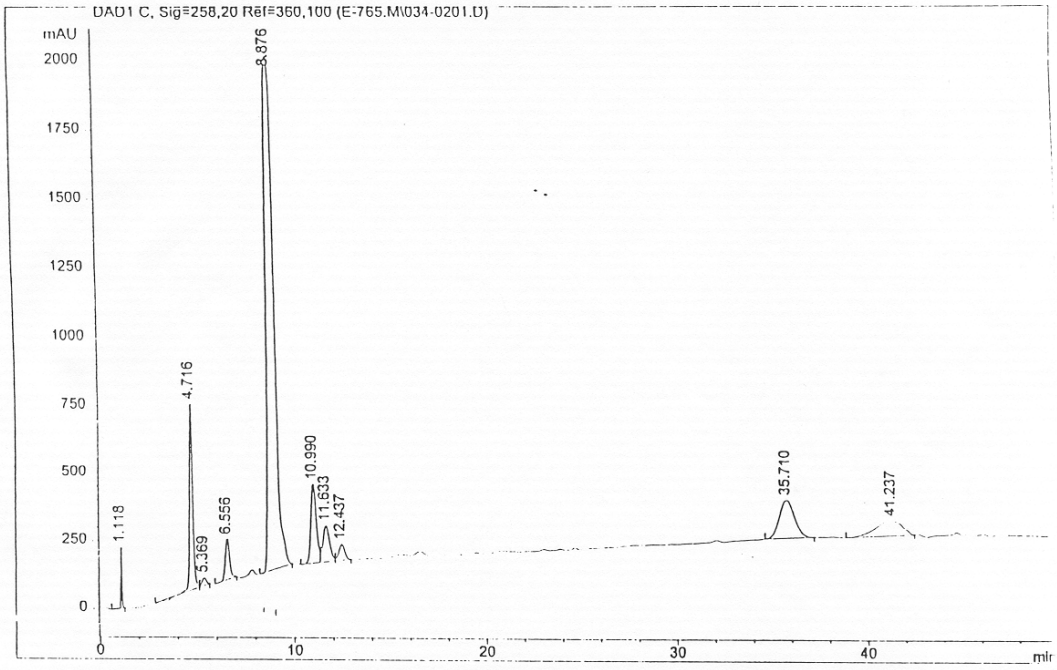
The identification of Components A, B, etc is proprietary to FiberCote. Details of the actual identifications are given in a letter from FiberCote to the FAA- Seaftle, dated June 30, 1999 (ref. Project #TC1616SE-A).
The identification will be made available to users of the material after the execution of a confidentiality agreement.

APPENDIX A. PHYSICAL TEST DATA SUPPLIED BY MATERIAL VENDOR

Data File C:\HPCHEM\1\DATA\E-765.M\034-0201.D Sample Name: 712032-1

Injection Date	: 6/2/98 2:06:28 PM	Seq. Line	: 2
Sample Name	: 712032-1	Vial	: 34
Acq. Operator	: tc	Inj	: 1
		Inj Volume	: 10 µl
Sequence File	: C:\HPCHEM\1\SEQUENCE\E-765.S		
Method	: C:\HPCHEM\1\METHODS\E-765.M		
Last changed	: 6/2/98 2:07:16 PM by tc (modified after loading)		

This is a fingerprint of E-765 on 3K carbon for FAA qualification. This method is for resin as well as prepreg samples.



Area Percent Report

Sorted By	:	Signal
Multiplier	:	1.0000
Dilution	:	1.0000

Data File C:\HPCHEM\1\DATA\E-765.M\034-0201.D Sample Name: 712032-1

Signal 1: DAD1 C, Sig=258,20 Ref=360,100
Results obtained with standard integrator!

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	1.118	BB S	0.0653	930.90991	225.10460	1.0694
2	4.716	BV	0.1743	7698.26221	688.19061	8.8432
3	5.369	VB	0.2195	422.22769	29.26329	0.4850
4	6.556	BB	0.2307	2249.37085	150.74992	2.5839
5	8.876	BV	0.4503	5.29515e4	1871.02576	60.8266
6	10.990	BV	0.2938	5493.70850	289.66150	6.3107
7	11.633	VV	0.3506	3094.89038	132.80751	3.5552
8	12.437	VB	0.3233	1235.42688	58.79188	1.4192
9	35.710	BB	0.8537	7630.52930	139.88950	8.7654
10	41.237	BV	1.2052	5346.43896	55.77269	6.1416
Totals :				8.70533e4	3641.25727	

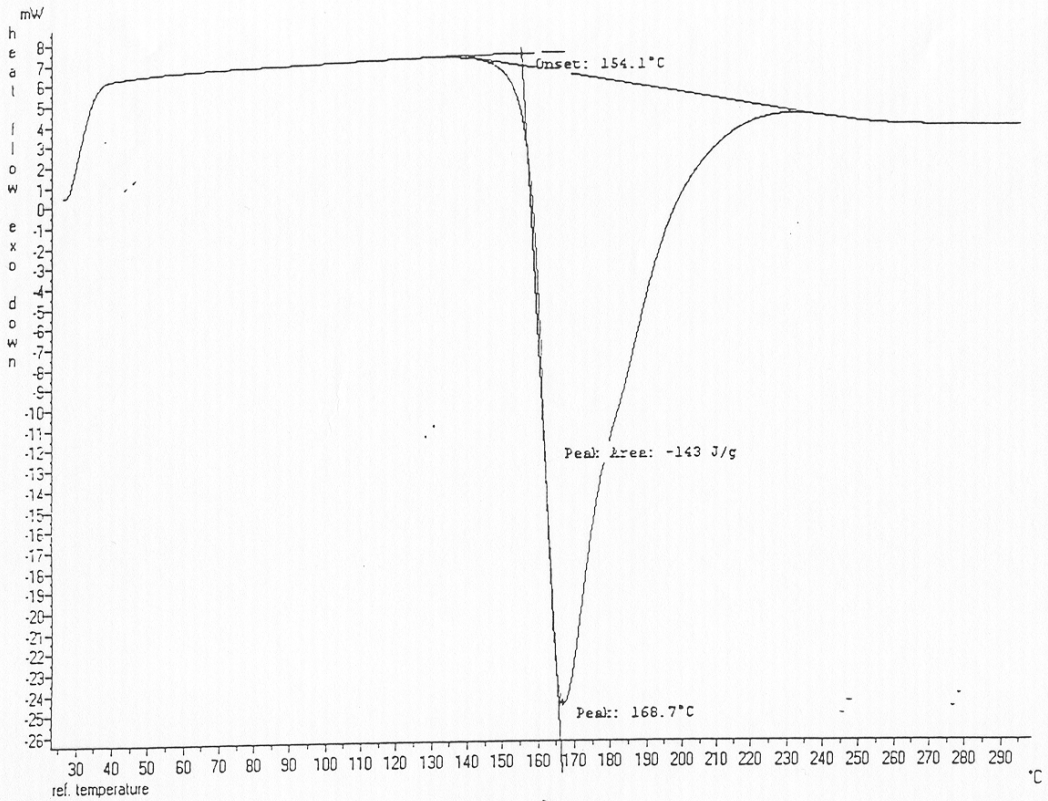
*** End of Report ***

Instrument 1 6/2/98 2:56:40 PM tc

PERKIN ELMER

Thermal Analysis DSC 6

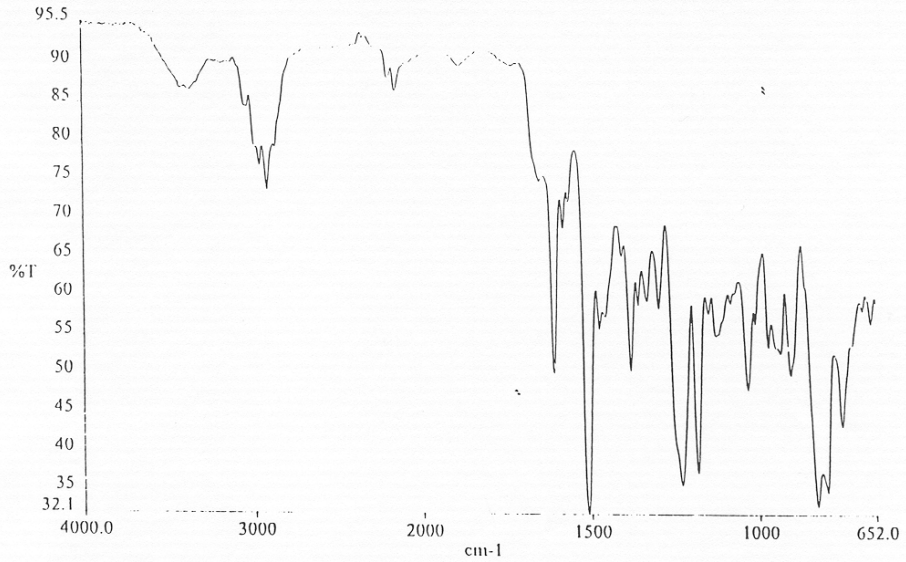
page: 1
date: 6/2/98 8:11:59 AM



File Name: 712032-1/E765Tg
Run Date: 6/2/98 7:50:54 AM
Sample ID: 712032-1
Sample Weight: 16.3 mg
Method Title: E765Tg
Method Information:
Comments:

Operator ID: RB
Date Created: 6-2-98
This method contains 1 step.
1: dyn. 30 - 300°C 20°C/min

Software Version: Report Builder, Rev. 1.60
Date: 6/2/98 Time: 10:23:44 AM



Spectrum Pathname: c:\pel_data\spectra\e7658.sp

Date Created: Tue Jun 02 10:12:21 1998

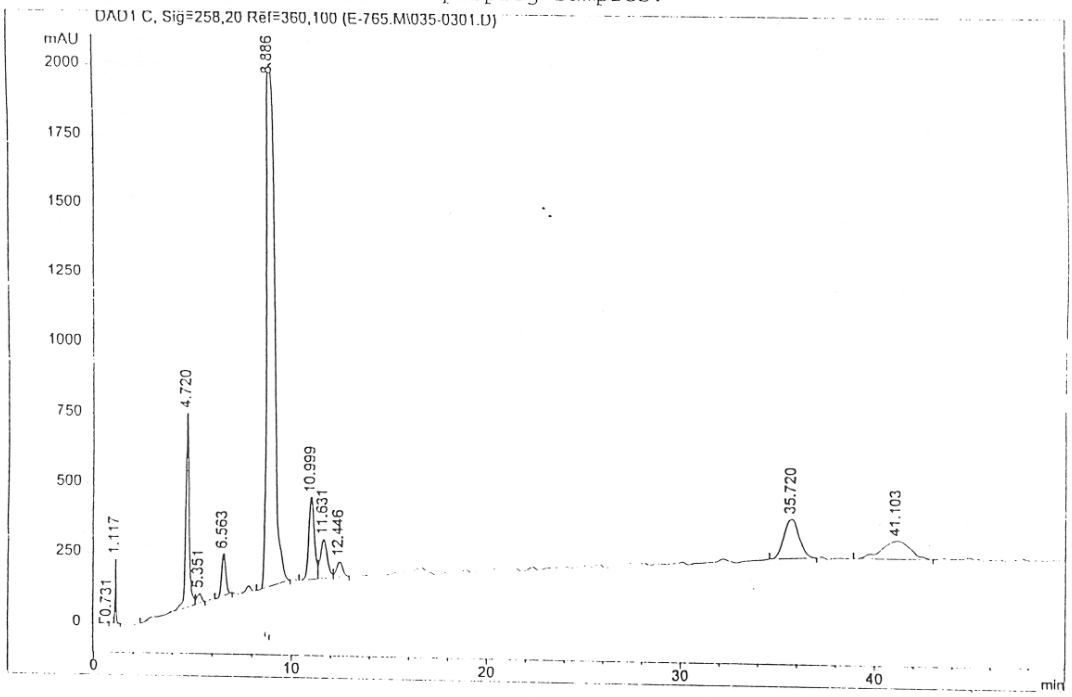
Analyst: (N)

Description: 712032-1 3K PW

Data File C:\HPCHEM\1\DATA\E-765.M\035-0301.D Sample Name: 712030-1

Injection Date	: 6/2/98 3:04:39 PM	Seq. Line	: 3
Sample Name	: 712030-1	Vial	: 35
Acq. Operator	: tc	Inj	: 1
		Inj Volume	: 10 µl
Sequence File	: C:\HPCHEM\1\SEQUENCE\E-765.S		
Method	: C:\HPCHEM\1\METHODS\E-765.M		
Last changed	: 6/2/98 3:03:30 PM by tc (modified after loading)		

This is a fingerprint of E-765 on 3K carbon for FAA qualification. This method is for resin as well as prepreg samples.



Area Percent Report

Sorted By	:	Signal
Multiplier	:	1.0000
Dilution	:	1.0000

Instrument 1 6/2/98 3:54:50 PM tc

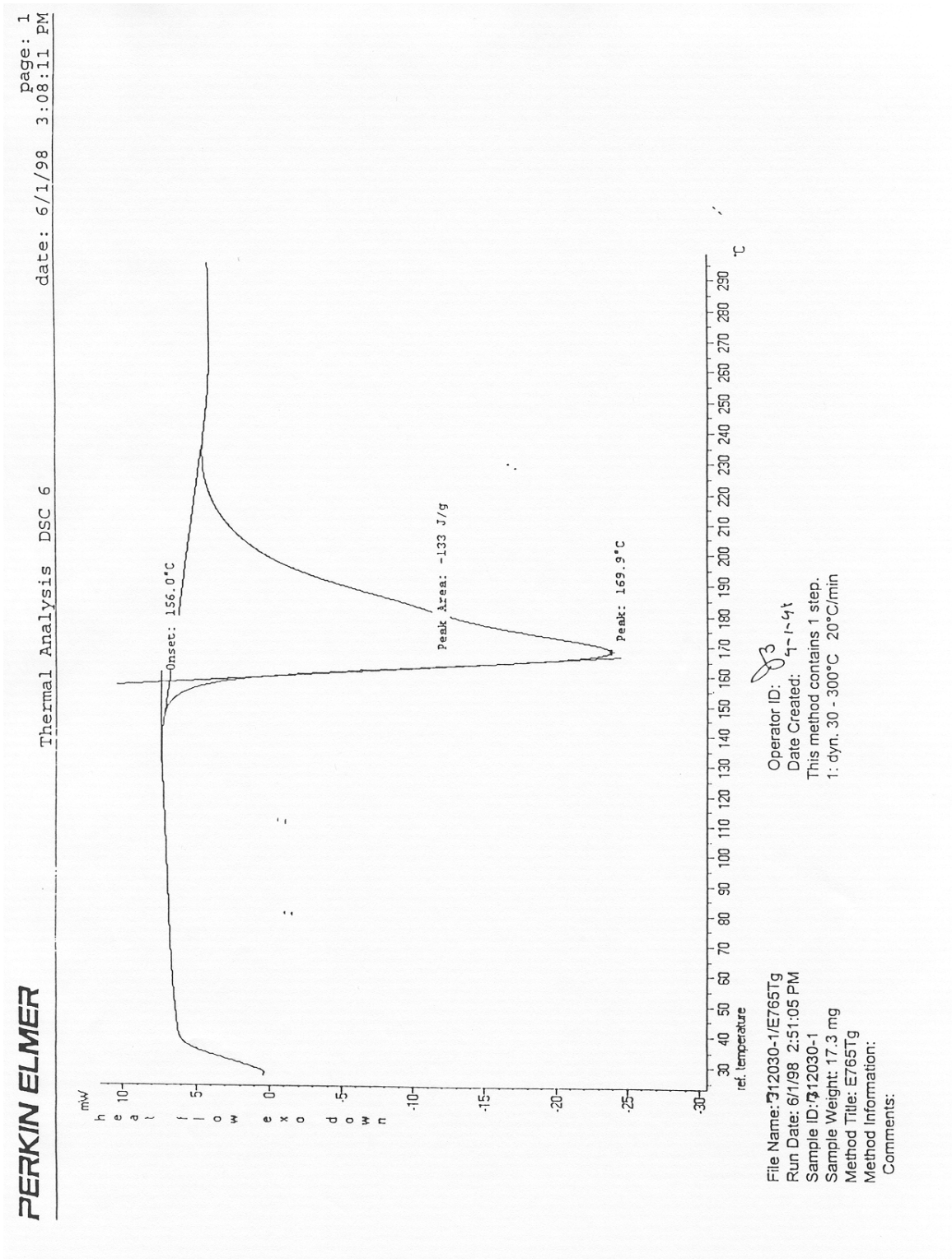
Data File C:\HPCHEM\1\DATA\E-765.M\035-0301.D Sample Name: 712030-1

Signal 1: DAD1 C, Sig=258,20 Ref=360,100
Results obtained with standard integrator!

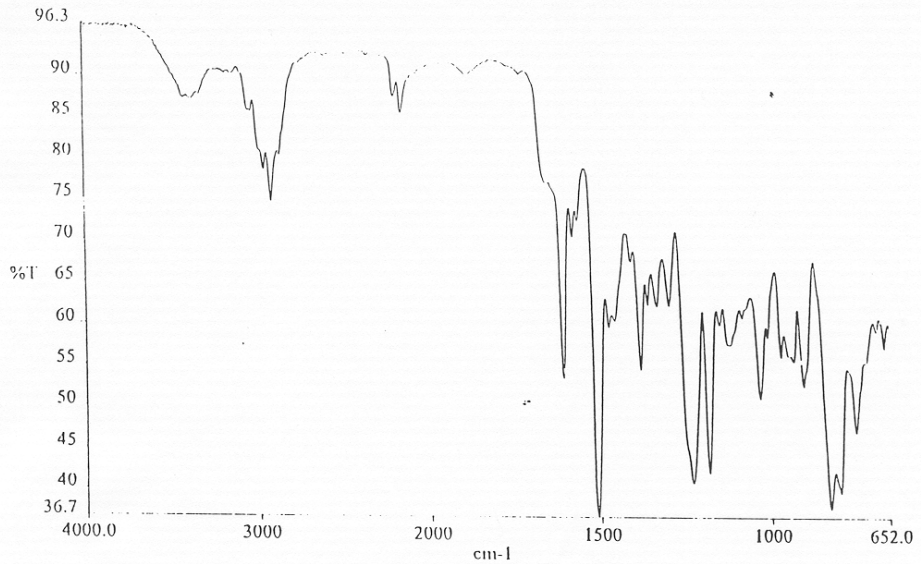
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	0.731	BB S	0.1668	32.96156	3.29267	0.0371
2	1.117	BB	0.1009	886.12744	227.82829	0.9980
3	4.720	BV	0.1902	8735.01660	694.91754	9.8374
4	5.351	VB	0.2401	551.26923	35.37943	0.6208
5	6.563	BB	0.2246	2111.31616	147.17906	2.3778
6	8.886	BB	0.4485	5.26227e4	1866.10596	59.2638
7	10.999	BV	0.2974	5612.02881	291.64368	6.3203
8	11.631	VV	0.3587	3204.38843	135.00543	3.6088
9	12.446	VB	0.3208	1112.66907	53.10600	1.2531
10	35.720	BB	0.7995	7435.01172	140.15533	8.3733
11	41.103	BB	1.4141	6490.48877	62.87906	7.3096
Totals :				8.87940e4	3657.49246	

*** End of Report ***

Instrument 1 6/2/98 3:54:50 PM tc



Software Version: Report Builder, Rev. 1.60
Date: 6/2/98 Time: 9:58:48 AM



Spectrum Pathname: c:\pel_data\spectra\e7657.sp

Date Created: Tue Jun 02 09:41:19 1998

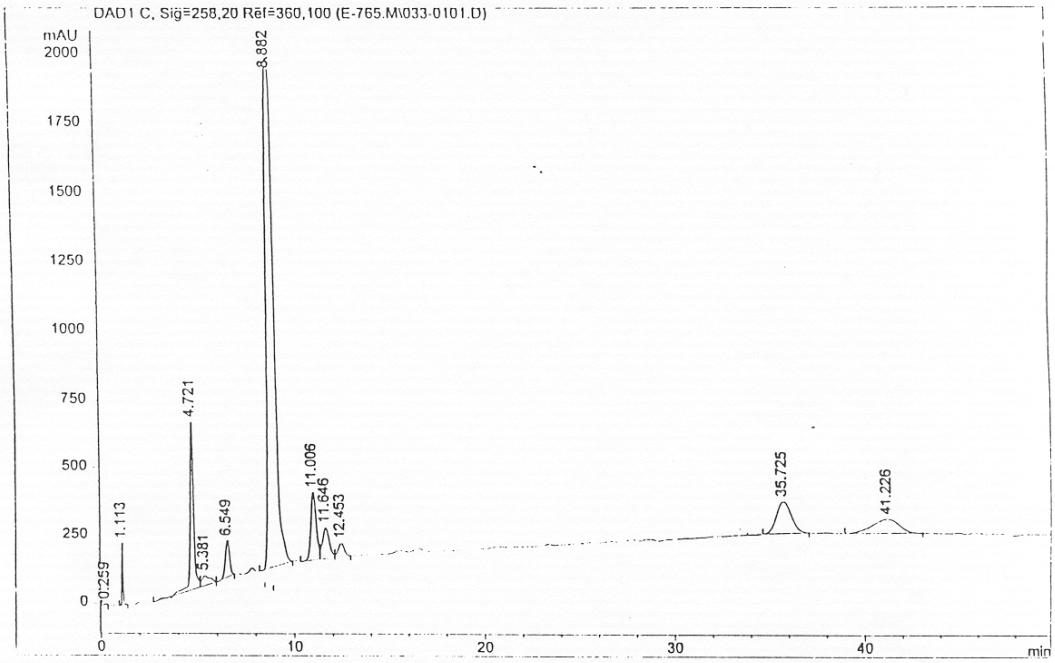
Analyst: (Z)

Description: 712030-1 3K PW

Data File C:\HPCHEM\1\DATA\E-765.M\033-0101.D Sample Name: 712031-2

Injection Date	: 6/2/98 1:08:23 PM	Seq. Line	: 1
Sample Name	: 712031-2	Vial	: 33
Acq. Operator	: tc	Inj	: 1
		Inj Volume	: 10 µl
Acq. Method	: C:\HPCHEM\1\METHODS\E-765.M		
Last changed	: 6/2/98 1:06:03 PM by tc		
Analysis Method	: C:\HPCHEM\1\METHODS\E-765.M		
Last changed	: 6/2/98 2:07:16 PM by tc (modified after loading)		

This is a fingerprint of E-765 on 3K carbon for FAA qualification. This method is for resin as well as prepreg samples.



Area Percent Report

Sorted By	:	Signal
Multiplier	:	1.0000
Dilution	:	1.0000

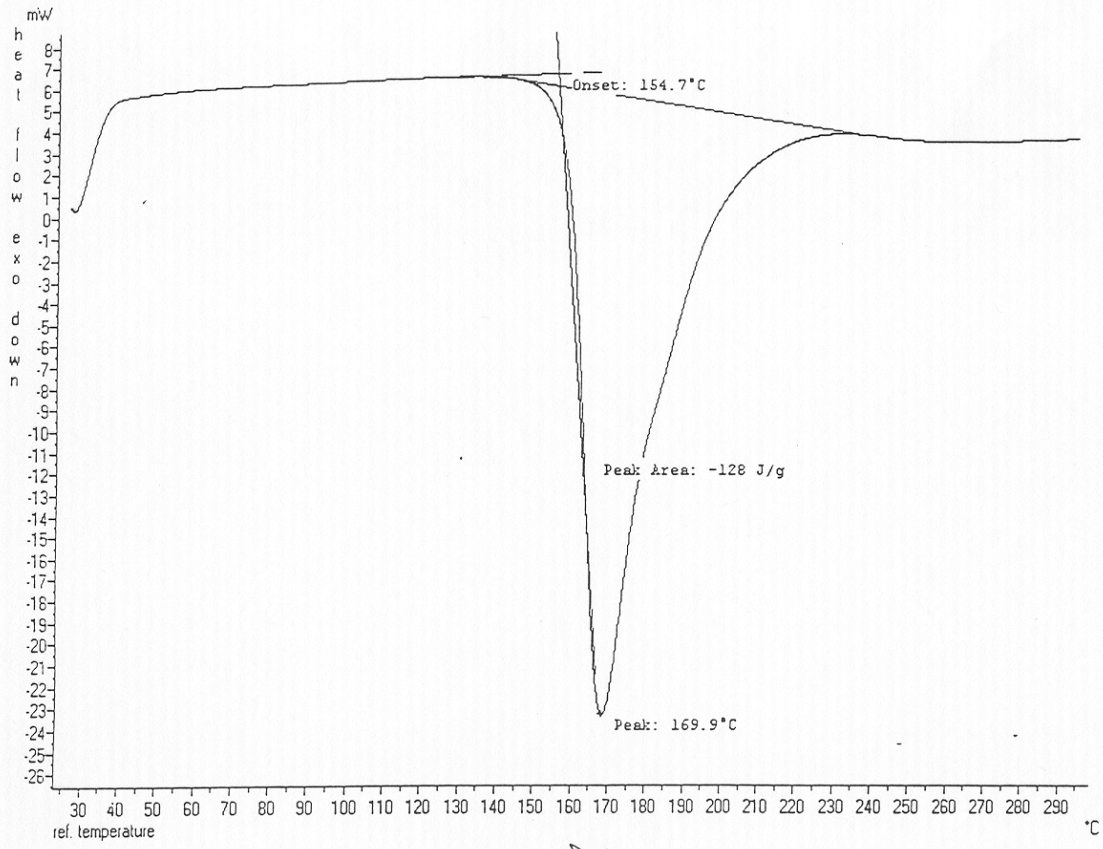
Data File C:\HPCHEM\1\DATA\E-765.M\033-0101.D Sample Name: 712031-2

Signal 1: DAD1 C, Sig=258,20 Ref=360,100
Results obtained with standard integrator!

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	0.259	BB S	0.1628	59.68731	5.81844	0.0724
2	1.113	BB	0.1029	959.20850	229.46078	1.1629
3	4.721	BV	0.1910	7871.83008	623.05042	9.5436
4	5.381	VB	0.4250	1054.68066	37.05930	1.2787
5	6.549	BB	0.2276	1973.81726	134.63699	2.3930
6	8.882	BB	0.4306	5.02476e4	1852.72021	60.9192
7	11.006	BV	0.2954	4776.62598	250.63020	5.7911
8	11.646	VV	0.3601	2749.56104	115.15546	3.3335
9	12.453	VB	0.3324	1100.90417	50.87504	1.3347
10	35.725	BB	0.8422	6449.83691	118.57471	7.8197
11	41.226	BB	1.2554	5238.67432	53.24024	6.3513
Totals :				8.24824e4	3471.22180	

*** End of Report ***

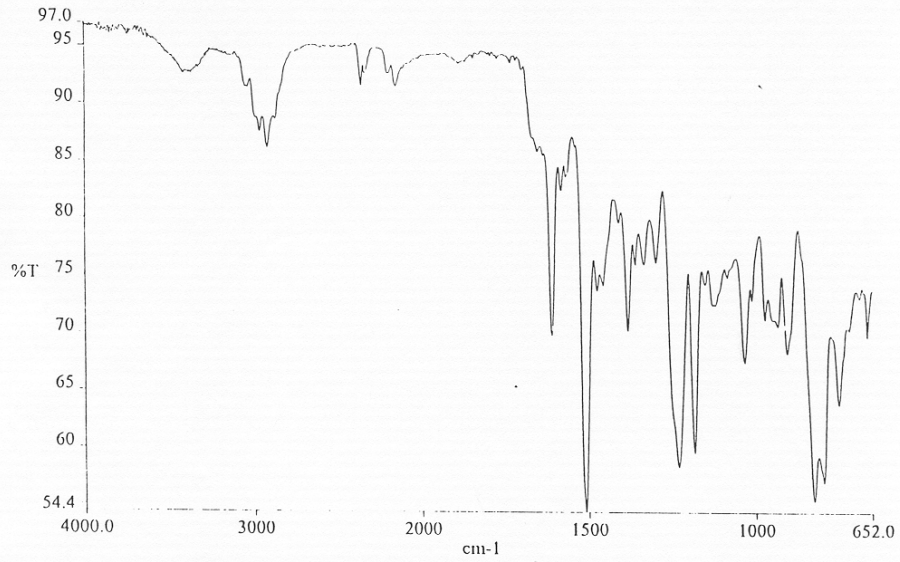
Instrument 1 6/2/98 2:07:29 PM tc



File Name: 712031-2/E765Tg
Run Date: 6/2/98 8:18:27 AM
Sample ID: 712031-2
Sample Weight: 16 mg
Method Title: E765Tg
Method Information:
Comments:

Operator ID: JB
Date Created: 9-2-98
This method contains 1 step.
1: dyn. 30 - 300°C 20°C/min

Software Version: Report Builder, Rev. 1.60
Date: 6/2/98 Time: 10:42:47 AM



Spectrum Pathname: c:\pel_data\spectra\e7659.sp

Date Created: Tue Jun 02 10:36:44 1998

Analyst: (2)

Description: 712031-2 3K PW

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

1. UNITED STATES

2.

FAA FORM 8130-3

AIRWORTHINESS APPROVAL TAG

U.S. Department of Transportation
Federal Aviation Administration

3. System Tracking Ref. No.: FC104

4. Organization: PAC USA / FiberCote, 172 East Aurora St., Waterbury, CT 06708-2024

5. Work Order, Contract, or Invoice Number: P.O. 11517

6. Item	7. Description	8. Part Number	9. Eligibility *	10. Quantity	11. Serial/Batch Number	12. Status/Work
1	Test Panels	See Remarks	Lancair LC-4D	34	N/A	Prototype

13. Remarks

CONFORMITY ONLY: Ship to Wichita State University

Part Numbers: TBJ21, TBJ22, TBJ23, TBJ24
TBU21, TBU22, TBU23, TBU24
TBK21, TBK22, TBL21
TBW21, TBW22, TBZ21
TBN21, TBN22, TBQ21
TBJ31, TBJ32, TBJ33, TBJ34
TBU31, TBU32, TBU33, TBU34
TBK31, TBK32, TBL31
TBW31, TBW32, TBZ31
TBN31, TBN32, TBQ31

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.

N/A

15. Signature	16. FAA Authorization No.:	20. Authorized Signature:	21. Certificate Number:
Al Pereira	DAR NE800856AC		
17. Name *(Typed or Printed):* Al Pereira	**18. Date:** 6-25-98	**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. FC103
4. Organization PAC USA / FiberCote, 172 East Aurora St., Waterbury, CT 06708-2024		5. Work Order, Contract, or Invoice Number: P.O. 11517

6. Item	7. Description	8. Part Number	9. Eligibility *	10. Quantity	11. Serial/Batch Number	12. Status/Work
1	Test Panels	See Remarks	Lancair LC-4D	32	N/A	Prototype

13. Remarks

CONFORMITY ONLY: Ship to Wichita State University

Part Numbers: TBJ11, TBJ12, TBJ13, TBJ14, TBJ15
TBU11, TBU12, TBU13, TBU14, TBU15
TBK11, TBK12, TBL11, TBW11, TBW12, TBZ11
TBN11, TBN12, TBQ11, TB111, TB112, TB113
TB211, TB212, TB213, TB311, TB312, TB313
TB411, TB412, TB413, TB414

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.

N/A

15. Signature	16. FAA Authorization No.: DAR NE800856AC	20. Authorized Signature:	21. Certificate Number:
17. Name *(Typed or Printed)*: Al Pereira	18. Date: 6-25-98	22. Name *(Typed or Printed)*	23. Date:

FAA Form 8130-3 (11-93)

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

E-765 QF1000 QUALIFICATION PLAN
GRAPHITE PW FABRIC

PANEL BUILD - E-765 PS1000

PANEL #	KIT DATE	DATE LAYUP	CURE DATE/TIME	CURE CYCLE NO.	COMMENTS Cure cyl.
TBJ11			6/9/98	1	13:45.
TBJ12			6/10/98	2	14:00.
TBJ13				1	
TBJ14				2	
TBJ15				1	
TBJ21				2	
TBJ22				1	
TBJ23				2	
TBJ24				1	
TBJ31				2	
TBJ32				1	
TBJ33				2	
TBJ34				1	
TBU11				1	
TBU12				2	
TBU13				1	
TBU14				2	
TBU15				1	
TBU21				2	
TBU22				1	
TBU23				2	

G:\DFUSE\QUFORM

E-765 QP1000 QUALIFICATION PLAN
GRAPHITE PW FABRIC

PANEL BUILD - E-765 PS1000

PANEL #	KIT DATE	DATE LAYUP	CURE DATE/TIME	CURE CYCLE NO.	COMMENTS
TBU24				1	
TBU31				2	
TBU32			6/16/98	5	15:15.
TBU33				2	
TBU34				5	
TBK11			6/11/98	3	14:15.
TBK12			6/12/98	4	13:45.
TBL11				3	
TBK21				4	
TBK22				3	
TBL21				4	
TBK31				3	
TBK32				4	
TBL31				3	
TBW11				4	
TBW12				3	
TBZ11				4	
TBW21				3	
TBW22				4	
TBZ21				3	
TBW31				4	

E-765 QP1000 QUALIFICATION PLAN
GRAPHITE PW FABRIC

PANEL BUILD - E-765 PS1000

PANEL #	KIT DATE	DATE LAYUP	CURE DATE/TIME	CURE CYCLE NO.	COMMENTS
TBW32				3	
TBZ31				4	
TBN11				3	
TBN12				4	
TBN21				3	
TBN22				4	
TBN31				3	
TBN32				4	
TBQ11				5	
TBQ21				5	
TBQ31				5	
TB111				5	
TB112			6/17/98	6	14:40.
TB113				5	
TB211				6	
TB212				5	
TB213				6	
TB311				5	
TB312				6	
TB313				5	
TB411				6	

E-765 QP1000 QUALIFICATION PLAN
GRAPHITE PW FABRIC

PANEL BUILD - E-765 PS1000

PANEL #	KIT DATE	DATE LAYUP	CURE DATE/TIME	CURE CYCLE NO.	COMMENTS
TB412			6/19/98	7	14:00.
TB413				6	
TB414				5	