



B – Basis Design Allowables for Epoxy – Based Prepreg

FiberCote Graphite Fabric T300 6K 5HS / E765

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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
$\mu\epsilon$	micro-strain
E_1^c	compressive modulus, longitudinal
E_1^t	tensile modulus, longitudinal
E_2^c	compressive modulus, transverse
E_2^t	tensile modulus, transverse
F_{12}^{su}	in – plane shear strength
F_{13}^{su}	apparent interlaminar shear strength
F_1^{cu}	compressive strength, longitudinal
F_1^{tu}	tensile strength, longitudinal
F_2^{cu}	compressive strength, transverse
F_2^{tu}	tensile strength, transverse
G_{12}^s	in – plane shear modulus

Superscripts

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

Subscripts

1	1 – axis; longitudinal (parallel to warp direction of reinforcement)
2	2 – axis; transverse (parallel to fill direction of reinforcement)
12	in – plane shear
13	interlaminar shear (apparent)

1.3 Acronyms and Definitions

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

1.4 References

ASTM Standards

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
D3171-99	Fiber Content of Resin – Matrix Composites by Matrix Digestion
D695-91	Compressive Properties of Rigid Plastics

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 E765QP1001, Material Qualification Plan: Fiberglass and Carbon Epoxy-Based Prepreg, 250° Curing, Rev. 0.

FiberCote Document Number E765 MS1000, Material Specification: Carbon Fiber Reinforced Epoxy Resin, Rev. 5.

FiberCote Document Number E-765 PS1001, Process Specification: Layup and Cure of Epoxy Prepreg Materials, 250 -280°F Curing Autoclave Process, Rev. 2.

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 6K 5HS 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	1x4
0° (warp) Tension Modulus, Strength and Poisson's Ratio	ASTM D3039-95	1x2	3x2	3x2	1x2
90° (fill) Tension Strength	ASTM D3039-95	1x4	3x4	3x4	1x4
90° (fill) Tension Modulus and Strength	ASTM D3039-95	1x2	3x2	3x2	1x2
0° (warp) Compression Strength	SACMA SRM 1-94	1x6	3x6	3x6	1x6
0° (warp) Compression Modulus	SACMA SRM 1-94	1x2	3x2	3x2	1x2
90° (fill) Compression Strength	SACMA SRM 1-94	1x6	3x6	3x6	1x6
90° (fill) Compression Modulus	SACMA SRM 1-94	1x2	3x2	3x2	1x2
In-Plane Shear Strength	ASTM D5379-93	1x4	3x4	3x4	1x4
In-Plane Shear Modulus and Strength	ASTM D5379-93	1x2	3x2	3x2	1x2
Short Beam Shear	ASTM D2344-89	---	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 = $-65 \pm 5^\circ \text{ F}$, moisture content = as fabricated, soak time at -65 was 5 min.)
- 2 RTD: Three prepreg batches of material tested (test temperature = $70 \pm 10^\circ \text{ F}$, moisture content = as fabricated)
- 3 ETW: Three prepreg batches of material tested (test temperature = $180 \pm 5^\circ \text{ F}$, moisture content = equilibrium per section 1.5.2, soak time at 180 was 2 min.)
- 4 ETD: One prepreg batches of material tested (test temperature = $180 \pm 5^\circ \text{ F}$, 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 that 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. (° 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:

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

where:

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

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.

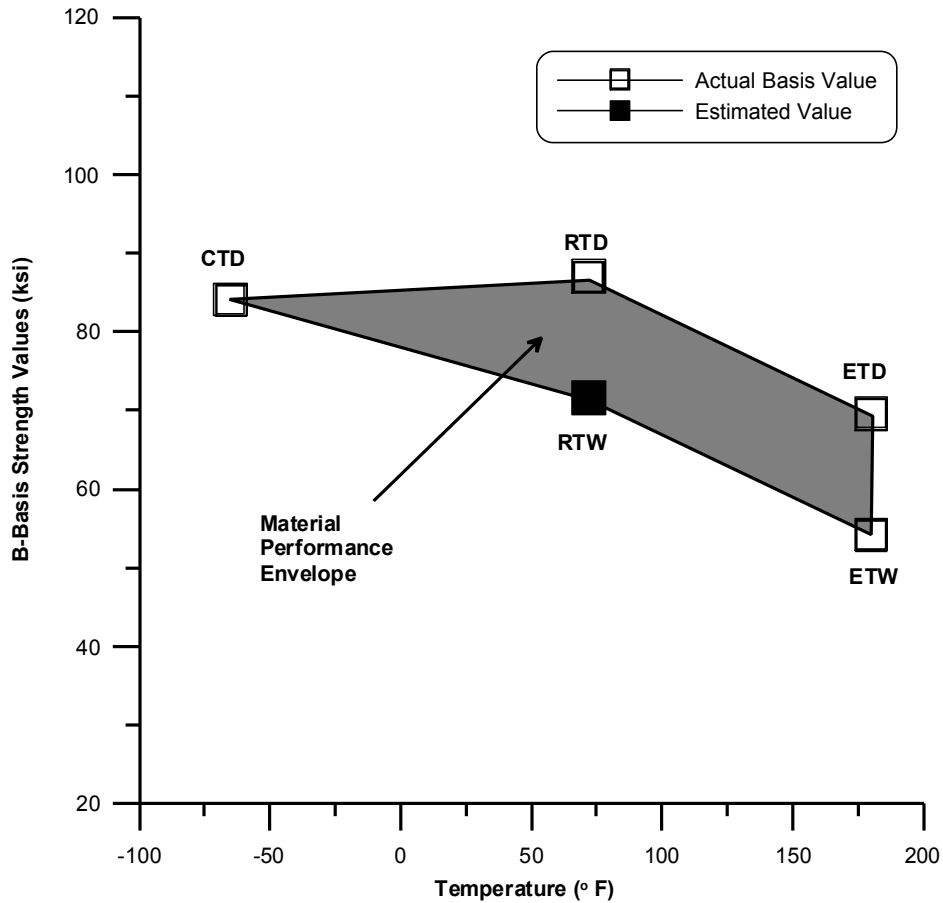


Figure 1.5.1 Material performance envelope.

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

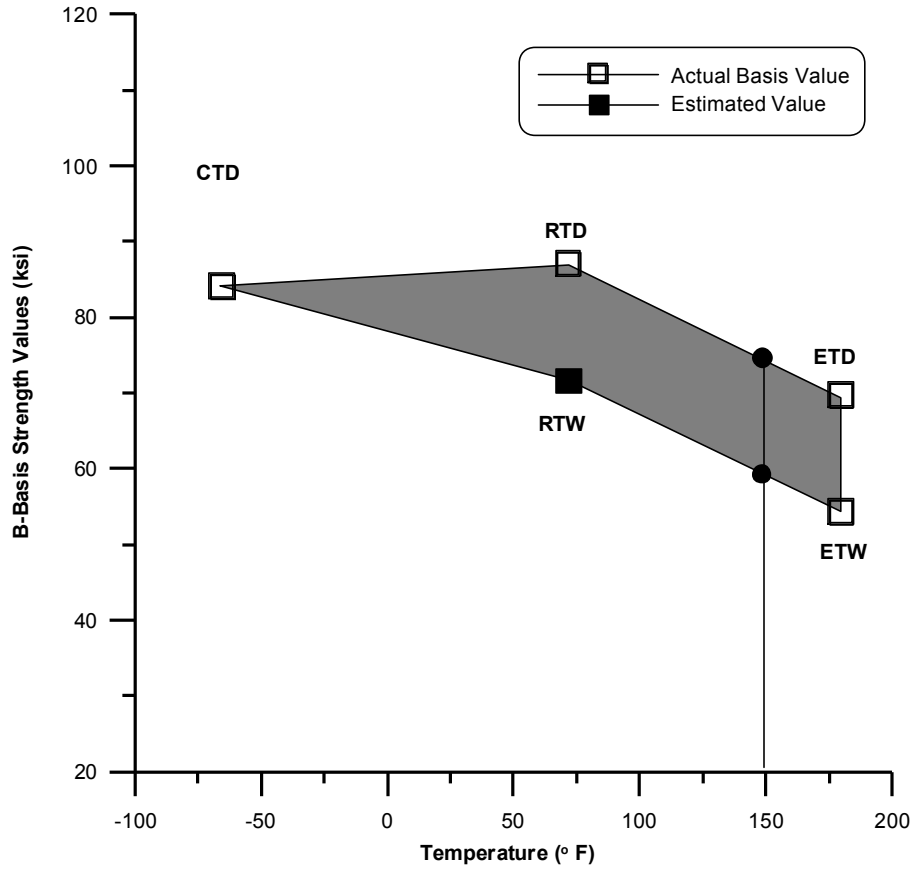


Figure 1.5.2 Example of 150° F interpolation for B-basis values.

2.0 FIBERCOTE T300 6K 5HS/E765 PREPREG PROPERTIES

2.1 Prepreg Documentation by Prepreg Batch

Prepreg Documentation	Prepreg Manufacturer & Product ID: FiberCote Industries, E-765/T300 6K 5 HS		
	Material Identification (weave, form, class, etc.): T300 6K 5HS		
	Impregnation Method: Solvent		
Prepreg Batch or Lot #	E-01243	E-10410	E-10411
Batch (Lot) ID as labeled on samples	1	2	3
Date of Manufacture	12-29-00	4-4-01	4-4-01
Expiration Date	6-29-01	10-4-01	10-4-01
Resin Content [%]	42.6%	41.8%	38.4%
Reinforcement Areal Weight (Wash Out)	368.72 gsm	374.57 gsm	392.62 gsm
Resin Flow & Test Conditions	15.2%, 8 min, 50 psi, 275°F	17.0%, 8 min, 50 psi, 275°F	19.4%, 8 min., 50 psi 275°F
Gel Time & Test Conditions	286 sec. 275°F	238 sec 275°F	248 sec 275°F
Volatile Content	0.7%, 8 min, 275°F	1.0%, 8 min, 275°F	1.0%, 8 min, 275°F
Reinforcement Documentation:			
Fiber/Fabric Manufacturer & Product ID	BP Amoco T300/BGF 94100	Toray T300B/BGF 94100	Toray T300B/BGF94100
Precursor Type:	PAN	PAN	PAN
Nominal Filament Count:	6K	6K	6K
Finish/Sizing Type:	309	Type "5"	Type "5"
Nominal Tow or Yarn Count/Inch:	12.0 x 12.2	12.0 x 12.0	12.0 x 12.0
Twist:	0	0	0
Fabric Batch or Lot #	00943852	00956260	00956259
Date of Manufacture	8-31-01	1-18-01	1-18-01
Average Fiber Volume per Lot	54.1%	53.3%	53.8%
Matrix Documentation	Resin Manufacturer & Product ID: FiberCote E-765		
Matrix Batch or Lot #	0M1252	1M0402	1M0404
Date of Manufacture	12-28-00	4-3-01	4-4-01
Average Neat Resin Density by Lot & Test Method	N/A	N/A	N/A

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 MS1000. (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

Quality Assurance maintained a record of all time and temperature for prepreg materials. 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	=	$N1 + 2 \times N2 + 6 \times N3$

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 prepreps. 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 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 were specified on the drawing and/or shop traveler.

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 (6) 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. The final debulk was for 30 minutes minimum.

2.2.6 Bagging

The shop traveler gave specific instructions regarding the use of peel plies, bleeder materials, breather materials and bagging materials.

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.

- c. Individual breather strings were laid along the edge of the laminate (in contact with the prepreg), extending out to the breather fabric to form a picture frame affect.
- d. One layer of 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 least 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 PS1001.

Table 2.2.1: Cure Cycles

Temperature Ramp rate	Cure Temperature	Pressure	Cooling Rate	Dwell Time At Cure
°F/Min.	°F (as defined by slowest heating part)	Psig	°F/Min.	Minutes
1 - 6	250 - 280	40-50	3 - 10	110 - 130

3.0 FIBERCOTE T300 6K 5HS/E765 LAMINA PROPERTIES

3.1 Test Results

3.1.1 Summary

MATERIAL:	FiberCote - E765/T300 6K 5HS Graphite Cloth	E765/T300 6K 5HS
PREPREG:	FiberCote E765/T300 6K 5HS	Summary
FIBER:	BP Amoco T300/BGF 94100 Toray T300B/BGF 94100	RESIN: FiberCote E765
T_g (dry): 265.93°F	T_g (wet): 204.19°F	T_g METHOD: DMA (SRM 18-94)
PROCESSING:	Autoclave cure (50 psi): 260°F for 120 min.	

Date of fiber manufacture	01/18/01 – 08/31/01	Date of testing	07/03/01 – 10/03/01
Date of resin manufacture	12/28/00 – 04/04/01	Date of data submittal	12/01
Date of prepreg manufacture	12/29/00 – 04-04-01	Date of analysis	07/03/01 – 10/25/01
Date of composite manufacture	04/06/01 – 04/11/01		

LAMINA MECHANICAL PROPERTY SUMMARY
 Data Reported as: Measured
 (Normalized by CPT= 0.0152 in)

	CTD		RTD		ETD		ETW	
	B-Basis	Mean	B-Basis	Mean	B-Basis	Mean	B-Basis	Mean
F₁^{tu} (ksi)	77.86 (77.07)	91.89 (89.24)	74.71 (75.98)	86.11 (86.17)	84.68 (84.76)	99.93 (98.13)	74.38 (75.10)	85.59 (85.05)
E₁^t (Msi)	---	9.85 (9.55)	---	9.34 (9.31)	---	9.17 (9.04)	---	8.93 (8.91)
ν₁₂^{tu}	---	0.065	---	0.047	---	0.057	---	0.043
F₂^{tu} (ksi)	64.30 (64.27)	75.40 (73.54)	71.87 (73.33)	82.62 (82.52)	75.87 (75.60)	89.34 (86.81)	63.76 (64.74)	72.99 (72.60)
E₂^t (Msi)	---	9.63 (9.45)	---	9.09 (9.08)	---	9.60 (9.33)	---	8.89 (8.79)
F₁^{cu} (ksi)	106.42 (110.28)	124.68 (127.59)	100.93 (101.14)	115.27 (114.32)	70.08 (72.41)	81.50 (83.22)	39.97 (40.03)	45.48 (45.09)
E₁^c (Msi)	---	10.14 (10.34)	---	8.94 (8.86)	---	8.77 (8.98)	---	8.47 (8.37)
F₂^{cu} (ksi)	95.18 (98.65)	112.21 (114.84)	87.77 (88.41)	100.82 (100.50)	69.68 (69.30)	81.51 (80.10)	37.66 (37.93)	43.09 (42.95)
E₂^c (Msi)	---	8.56 (8.86)	---	8.69 (8.71)	---	8.57 (8.72)	---	8.25 (8.17)
F₁₂^{su} (ksi)	18.55	20.72	16.49	18.08	13.35	14.91	9.48	10.39
G₁₂^s (Msi)	---	0.63	---	0.55	---	0.52	---	0.38
F₁₃^{su*} (ksi)	---	---	10.35	11.25	---	---	---	---

* *Apparent* interlaminar shear strength

3.1.2 Individual Test Summaries

3.1.2.1 Tension, 1-axis

Material: FiberCote - E765/T300 6K 5HS Graphite Cloth								Tension, 1-axis Gr/Ep FiberCote - E765/T300 6K 5HS Graphite Cloth [0]₆		
Resin content: 35 - 38 wt%				Comp. density: 1.51 - 1.53 g/cc						
Fiber volume: 54 - 56 vol%				Void content: 0.0 to 0.9 %						
Ply thickness: 0.0146 - 0.0157 in.				Modulus calculation: linear fit from 1000 - 3000 $\mu\epsilon$						
Ply range: 6 plies										
Test method: D3039-95										
Normalized by: 0.0152 in. ply thickness										
		CTD (B)		RTD (A)		ETD (G)		ETW (F)		
Test Temperature [°F]		-65		75		180		180		
Moisture Conditioning		dry		dry		dry		equilibrium		
Equilibrium at T, RH		as fabricated		as fabricated		as fabricated		145 F, 85%		
Source code		TFJXXXXB		TFJXXXXA		TFJXXXXG		TFJXXXXF		
		Normalized	Measured	Normalized	Measured	Normalized	Measured	Normalized	Measured	
F₁^{tu} (ksi)		Mean	89.24	91.89	86.17	86.11	98.13	99.93	85.05	85.59
		Minimum	76.20	79.22	69.85	67.50	92.85	95.29	79.67	79.64
		Maximum	101.62	105.06	101.99	104.24	103.10	105.30	89.47	91.80
		C.V.(%)	10.32	10.15	9.36	10.85	3.57	3.38	3.52	4.12
		B-value	77.07	77.86	75.98	74.71	84.76	84.68	75.10	74.38
		A-value	70.09	69.81	69.04	66.94	77.08	75.92	68.22	66.63
		No. Specimens	7		23		7		26	
No. Prepreg Lots	1		3		3		1			
E₁^t (Msi)		Mean	9.55	9.85	9.31	9.34	9.04	9.17	8.91	8.93
		Minimum	9.53	9.82	9.09	8.99	9.01	9.16	8.48	8.50
		Maximum	9.57	9.88	9.60	9.67	9.06	9.17	9.50	9.36
		C.V.(%)	0.32	0.40	1.71	2.32	0.38	0.04	3.51	3.27
		No. Specimens	2		7		2		10	
No. Prepreg Lots	1		3		1		1			
n₁₂^t		Mean	0.065		0.047		0.057		0.043	
		No. Specimens	2		7		2		6	
		No. Prepreg Lots	1		3		1		1	

3.1.2.2 Tension, 2-axis

Material: FiberCote - E765/T300 6K 5HS Graphite Cloth								Tension, 2-axis Gr/Ep FiberCote - E765/T300 6K 5HS Graphite Cloth [0]₆			
Resin content: 32 - 39 wt%				Comp. density: 1.50 - 1.52 g/cc							
Fiber volume: 53 - 59 vol%				Void content: 0.0 to 1.5 %							
Ply thickness: 0.0146 - 0.0157 in.				Modulus calculation: linear fit from 1000 - 3000µε							
Ply range: 6 plies											
Test method: D3039-95											
Normalized by: 0.0152 in. ply thickness											
		CTD (B)		RTD (A)		ETD (G)		ETW (F)			
Test Temperature [°F]		-65		75		180		180			
Moisture Conditioning		dry		dry		dry		equilibrium			
Equilibrium at T, RH		as fabricated		as fabricated		as fabricated		145 F, 85%			
Source code		TFUXXXXB		TFUXXXXA		TFUXXXXG		TFUXXXXF			
		Normalized	Measured	Normalized	Measured	Normalized	Measured	Normalized	Measured		
F₂^{tu} (ksi)		73.54	75.40	82.52	82.62	86.81	89.34	72.60	72.99		
		63.92	65.35	77.08	75.63	84.43	86.96	64.51	63.48		
		81.02	82.85	93.54	92.82	89.15	92.55	79.15	82.21		
		8.01	8.20	5.92	6.67	2.07	2.53	7.12	8.73		
		64.27	64.30	73.33	71.87	75.60	75.87	64.74	63.76		
		58.93	57.90	67.18	64.68	69.32	68.31	59.29	57.35		
		7		19		6		26			
No. Prepreg Lots		1		3		1		1			
E₂^t (Msi)		9.45	9.63	9.08	9.09	9.33	9.60	8.79	8.89		
		9.41	9.62	8.79	8.51	9.26	9.54	8.52	8.43		
		9.49	9.65	9.27	9.31	9.40	9.65	8.98	9.08		
		0.61	0.18	1.85	3.28	1.03	0.85	1.83	2.89		
		2		6		2		6			
		No. Prepreg Lots		1		3		1		1	

3.1.2.3 Compression, 1-axis

Compression, 1-axis										
Gr/Ep										
FiberCote - E765/T300 6K 5HS										
Graphite Cloth										
[0]₆										
Material:	FiberCote - E765/T300 6K 5HS Graphite Cloth									
Resin content:	35 - 38 wt%			Comp. density:	1.50 - 1.52 g/cc					
Fiber volume:	53 - 57 vol%			Void content:	0.0 to 0.9 %					
Ply thickness:	0.0146 - 0.0158 in.									
Ply range:	6 plies									
Test method:	SRM 1-94			Modulus calculation:	linear fit from 1000 - 3000 μ e					
Normalized by:	0.0152 in. ply thickness									
		CTD (B)		RTD (A)		ETD (G)		ETW (F)		
Test Temperature [°F]		-65		75		180		180		
Moisture Conditioning		dry		dry		dry		equilibrium		
Equilibrium at T, RH		as fabricated		as fabricated		as fabricated		145 F, 85%		
Source code		TFKXXXXB		TFKXXXXA		TFKXXXXG		TFKXXXXF		
		Normalized	Measured	Normalized	Measured	Normalized	Measured	Normalized	Measured	
F₁^{cu} (ksi)	Mean	127.59	124.68	114.32	115.27	83.22	81.50	45.09	45.48	
	Minimum	120.16	117.40	104.35	102.24	76.31	74.76	34.41	34.74	
	Maximum	136.00	134.97	123.13	126.89	88.13	86.24	52.67	53.70	
	C.V.(%)	4.37	5.14	5.05	6.25	5.04	5.34	8.56	8.83	
	B-value	110.28	106.42	101.14	100.93	72.41	70.08	40.03	39.97	
	A-value	100.62	96.24	92.21	91.22	66.07	63.38	36.48	36.11	
	No. Specimens	6		22		8		30		
No. Prepreg Lots	1		3		1		1			
E₁^c (Msi)	Mean	10.34	10.14	8.86	8.94	8.98	8.77	8.37	8.47	
	Minimum	9.39	9.23	8.63	8.65	8.96	8.72	7.99	7.79	
	Maximum	11.18	10.91	9.32	9.62	9.01	8.82	8.76	9.09	
	C.V.(%)	8.34	8.04	2.66	4.11	0.38	0.82	2.44	4.07	
	No. Specimens	5		6		2		13		
	No. Prepreg Lots	1		3		1		1		

3.1.2.4 Compression, 2-axis

Material: FiberCote - E765/T300 6K 5HS Graphite Cloth								Compression, 2-axis Gr/Ep FiberCote - E765/T300 6K 5HS Graphite Cloth [0]₆			
Resin content: 34 - 38 wt%		Comp. density: 1.50 - 1.52 g/cc		Void content: 0.0 to 1.3 %		Fiber volume: 53 - 58 vol%		Ply thickness: 0.0146 - 0.0159 in.		Ply range: 6 plies	
Test method: SRM 1-94				Modulus calculation: linear fit from 1000 - 3000 $\mu\epsilon$							
Normalized by: 0.0152 in. ply thickness											
		CTD (B)		RTD (A)		ETD (G)		ETW (F)			
Test Temperature [°F]		-65		75		180		180			
Moisture Conditioning		dry		dry		dry		equilibrium			
Equilibrium at T, RH		as fabricated		as fabricated		as fabricated		145 F, 85%			
Source code		TFWXXXXB		TFWXXXXA		TFWXXXXG		TFWXXXXF			
		Normalized	Measured	Normalized	Measured	Normalized	Measured	Normalized	Measured		
F₂^{cu} (ksi)		Mean	114.84	112.21	100.50	100.82	80.10	81.51	42.95	43.09	
		Minimum	104.61	102.59	88.23	87.58	72.34	73.59	37.08	36.27	
		Maximum	121.31	118.10	112.38	114.66	86.29	87.81	48.63	49.89	
		C.V.(%)	5.42	5.31	6.98	7.79	6.49	6.28	7.66	8.26	
		B-value	98.65	95.18	88.41	87.77	69.30	69.68	37.93	37.66	
		A-value	89.61	85.68	80.26	78.97	62.96	62.73	34.41	33.87	
		No. Specimens		6		21		8		29	
		No. Prepreg Lots		1		3		1		1	
E₂^c (Msi)		Mean	8.86	8.56	8.71	8.69	8.72	8.57	8.17	8.25	
		Minimum	8.83	8.53	8.45	8.42	8.67	8.52	7.17	7.22	
		Maximum	8.88	8.59	2.03	9.11	8.76	8.61	8.70	8.99	
		C.V.(%)	0.44	0.52	2.03	3.09	0.73	0.73	5.31	6.35	
		No. Specimens		2		7		2		13	
		No. Prepreg Lots		1		3		1		1	

3.1.2.5 Shear, 12 axis

Material: FiberCote - E765/T300 6K 5HS Graphite Cloth						Shear, 12-axis Gr/Ep FiberCote - E765/T300 6K 5HS Graphite Cloth [0/90]_{SS} [0]_{SS}					
Resin content: 35 - 40 wt%		Comp. density: 1.49 - 1.51 g/cc		Void content: 0.2 to 1.2 %							
Fiber volume: 51 - 56 vol%		Ply thickness: 0.0153 - 0.0164 in.		Ply range: 10 plies							
Test method: D5379-93		Modulus calculation: linear fit from 1000 - 6000psi									
Normalized by: N/A											
		CTD (B)		RTD (A)		ETD (G)		ETW (F)			
Test Temperature [°F]		-65		75		180		180			
Moisture Conditioning		dry		dry		dry		equilibrium			
Equilibrium at T, RH		as fabricated		as fabricated		as fabricated		145 F, 85%			
Source code		TFNXXXXB		TFNXXXXA		TFNXXXXG		TFNXXXXF			
		Normalized	Measured	Normalized	Measured	Normalized	Measured	Normalized	Measured		
F₁₂^{su} (ksi)		Mean		20.72		18.08		14.91		10.39	
		Minimum		19.59		16.55		14.67		8.82	
		Maximum		21.77		19.82		15.13		11.34	
		C.V.(%)		4.26		4.98		1.08		6.21	
		B-value		18.55		16.49		13.35		9.48	
		A-value		17.34		15.39		12.48		8.85	
		No. Specimens		6		24		6		25	
No. Prepreg Lots		1		3		1		1			
G₁₂^s (Msi)		Mean		0.63		0.55		0.52		0.38	
		Minimum		0.60		0.39		0.50		0.28	
		Maximum		0.66		0.72		0.54		0.47	
		C.V.(%)		6.70		19.74		5.50		16.35	
		No. Specimens		2		12		2		6	
		No. Prepreg Lots		1		3		1		1	

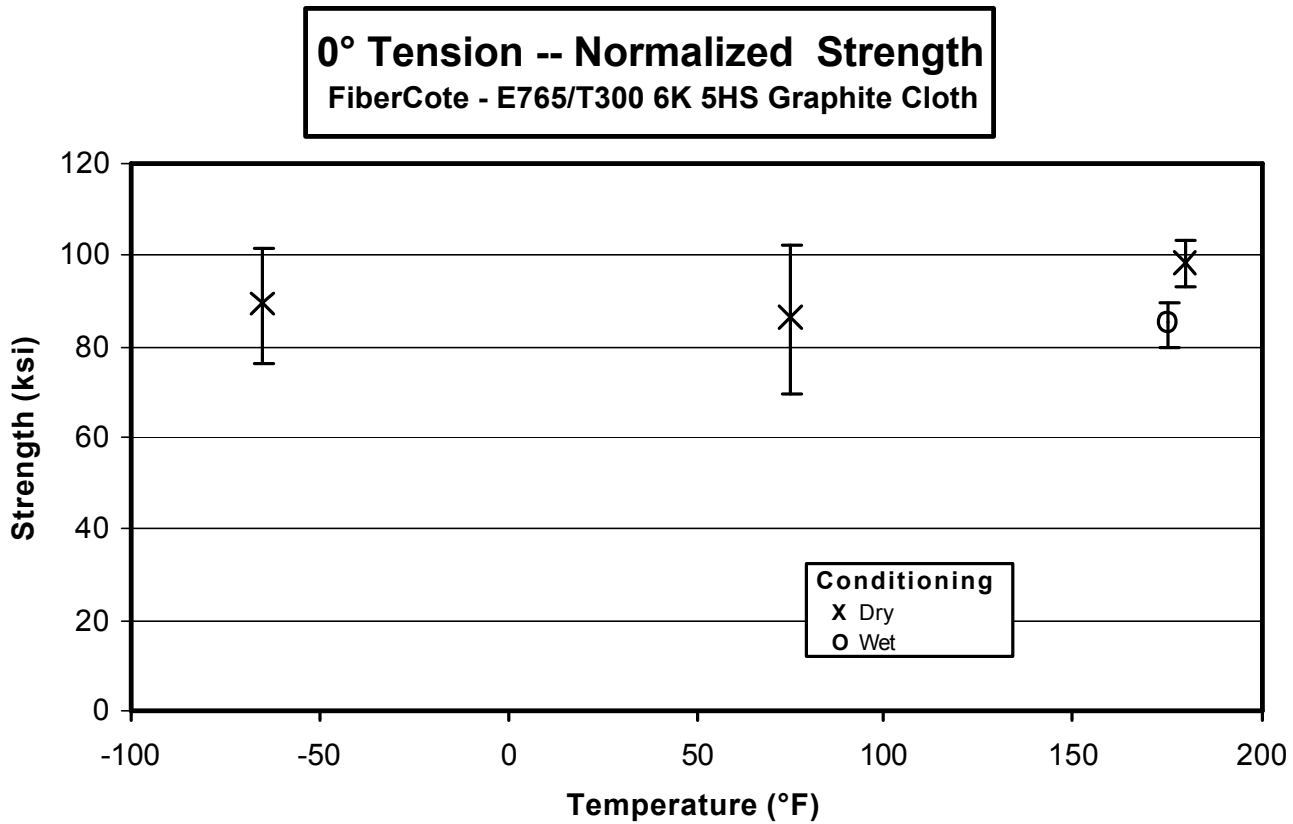
3.1.2.6 Shear, 13 axis

Material: FiberCote - E765/T300 6K 5HS Graphite Cloth						Shear, 13-axis Gr/Ep FiberCote - E765/T300 6K 5HS Graphite Cloth [0]₆			
Resin content: 35 - 37 wt%		Comp. density: 1.51 - 1.52 g/cc							
Fiber volume: 55 - 56 vol%		Void content: 0.0 to 0.6 %							
Ply thickness: 0.0145 - 0.0157 in.									
Ply range: 6 plies									
Test method: D2344-89				Modulus calculation: N/A					
Normalized by: N/A									
RTD (A)									
Test Temperature [°F]		75							
Moisture Conditioning		dry							
Equilibrium at T, RH		as fabricated							
Source code		TFQXXXXA							
		Normalized	Measured	Normalized	Measured	Normalized	Measured	Normalized	Measured
Mean				11.25					
Minimum				10.04					
Maximum				12.63					
C.V.(%)				4.79					
F₁₃^{SU}				10.35					
(ksi)				9.69					
A-value									
No. Specimens				47					
No. Prepreg Lots				3					

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

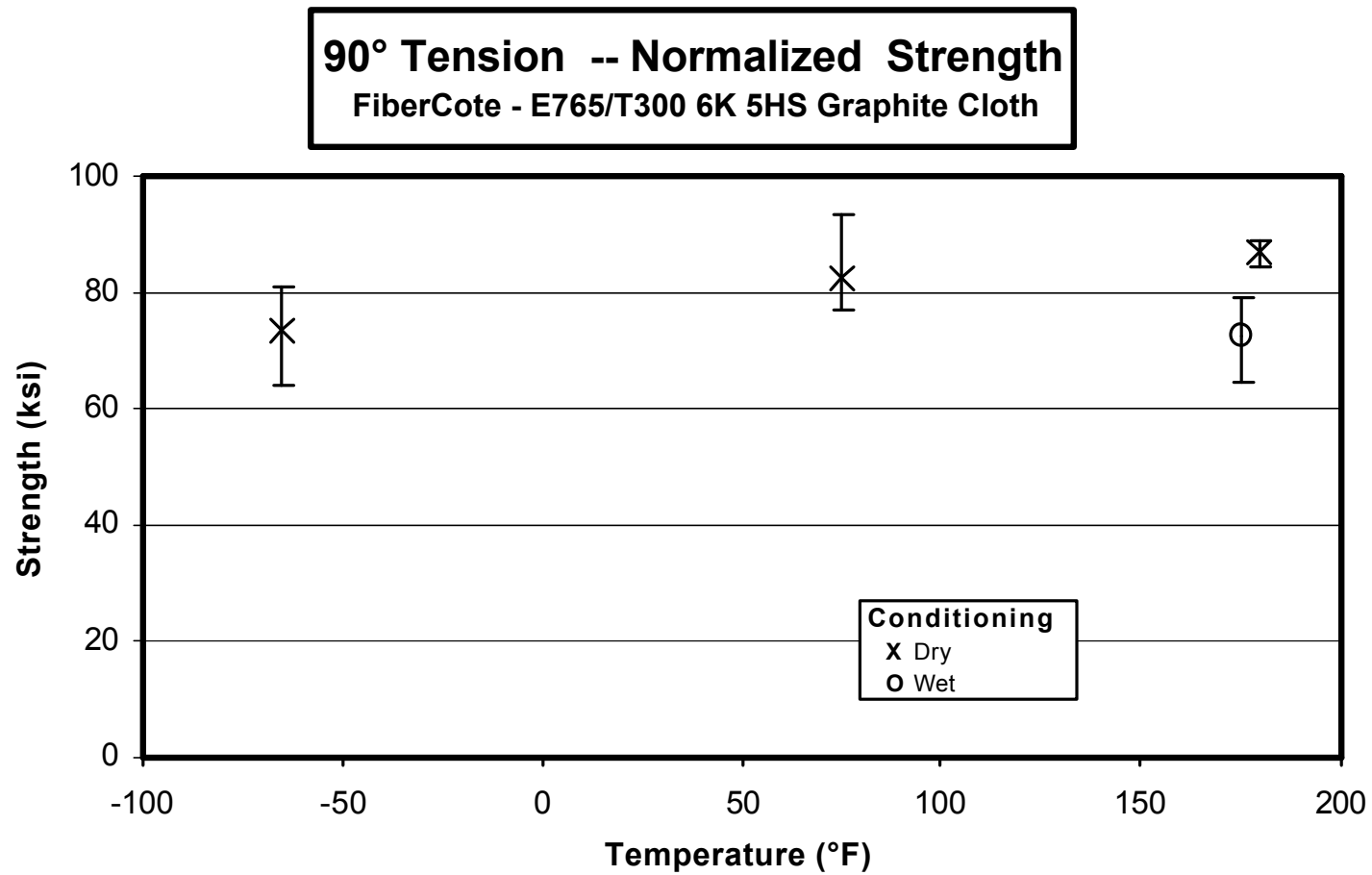
3.1.3 Individual Test Charts

3.1.3.1 Tension, 1-axis



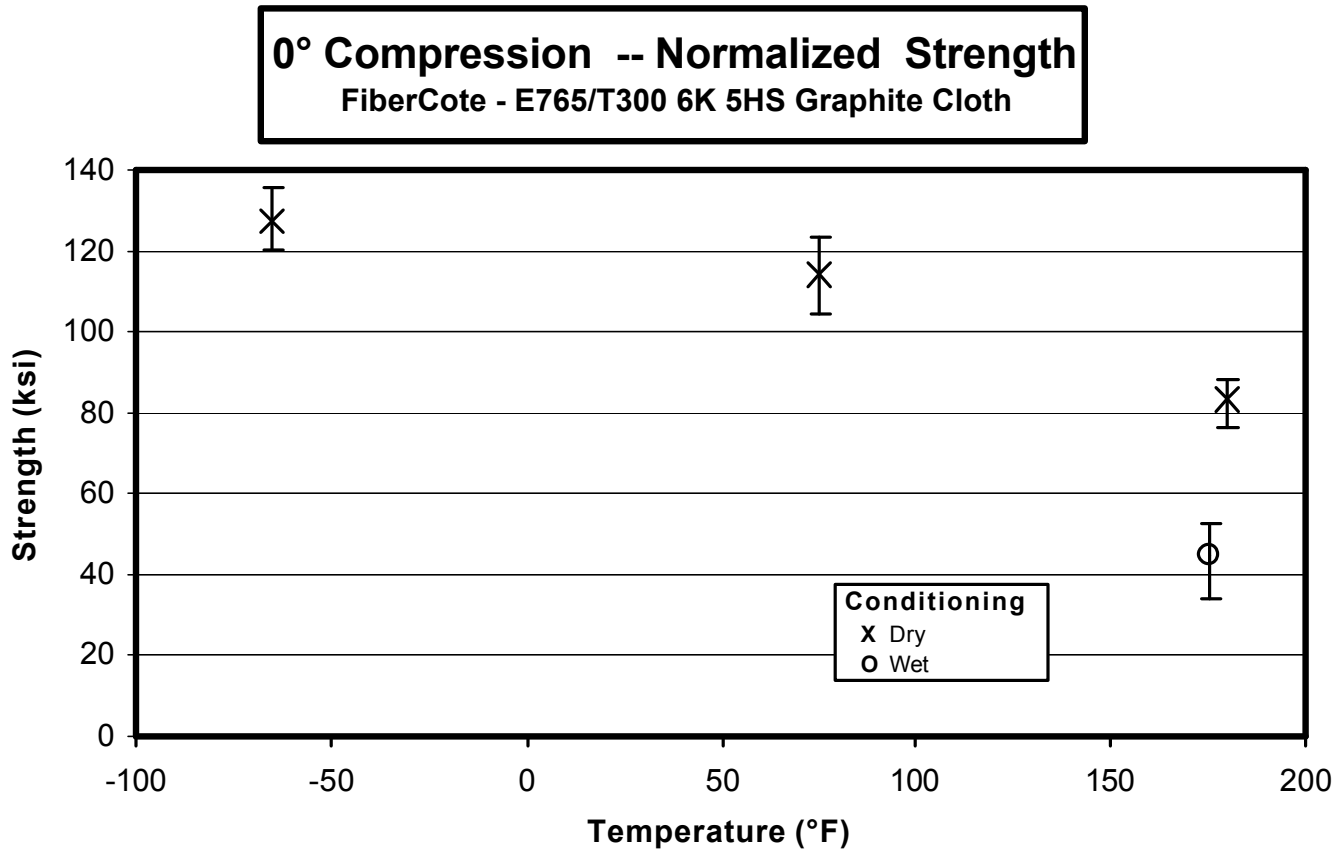
NOTE: The symbols represent the 'pooled' average of all tests, and the bars represent the upper and lower limit of the data. The 180° dry and wet data have been staggered for clarity.

3.1.3.2 Tension, 2-axis



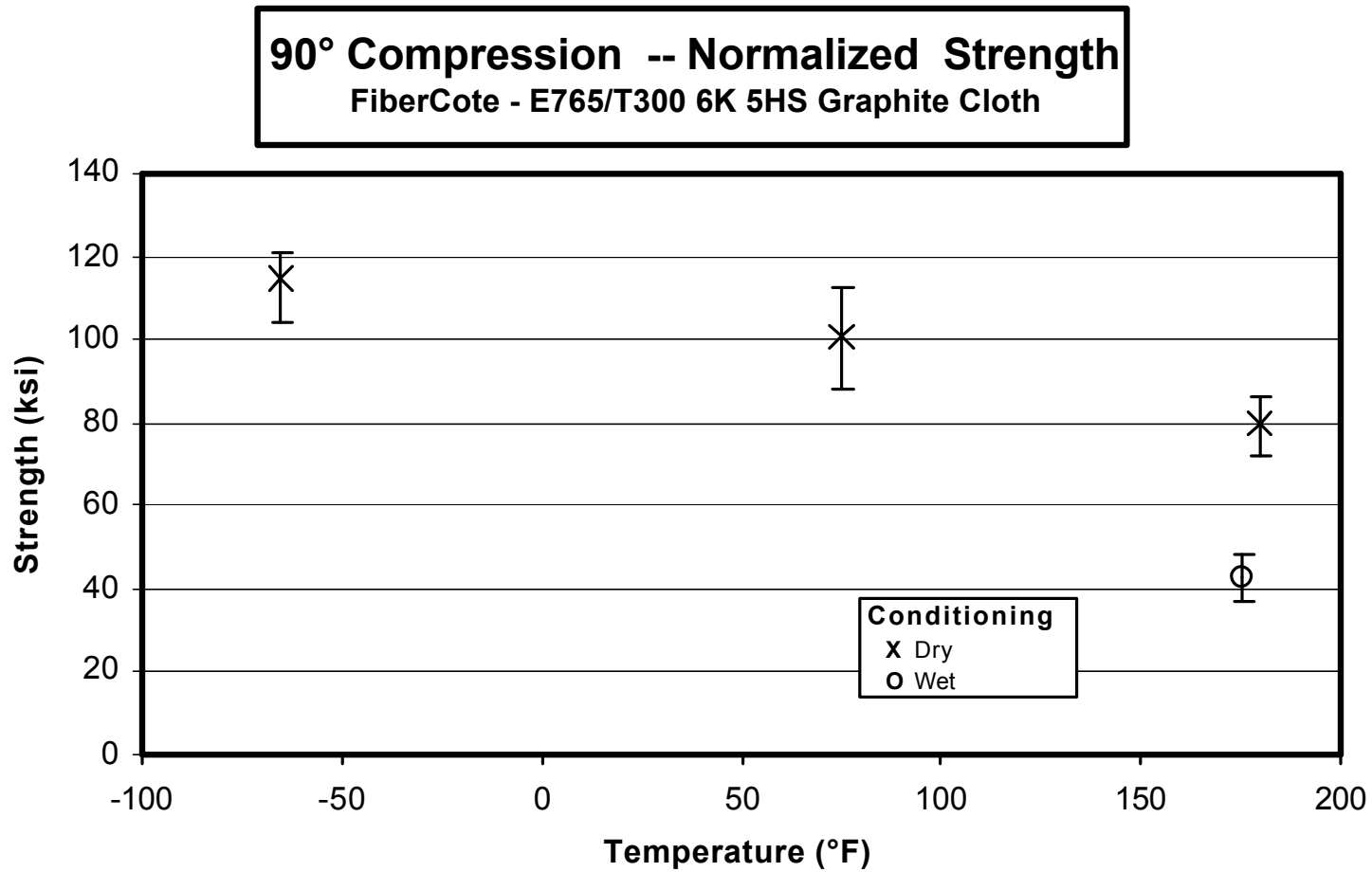
NOTE: The symbols represent the 'pooled' average of all tests, and the bars represent the upper and lower limit of the data. The 180° dry and wet data have been staggered for clarity.

3.1.3.3 Compression, 1-axis



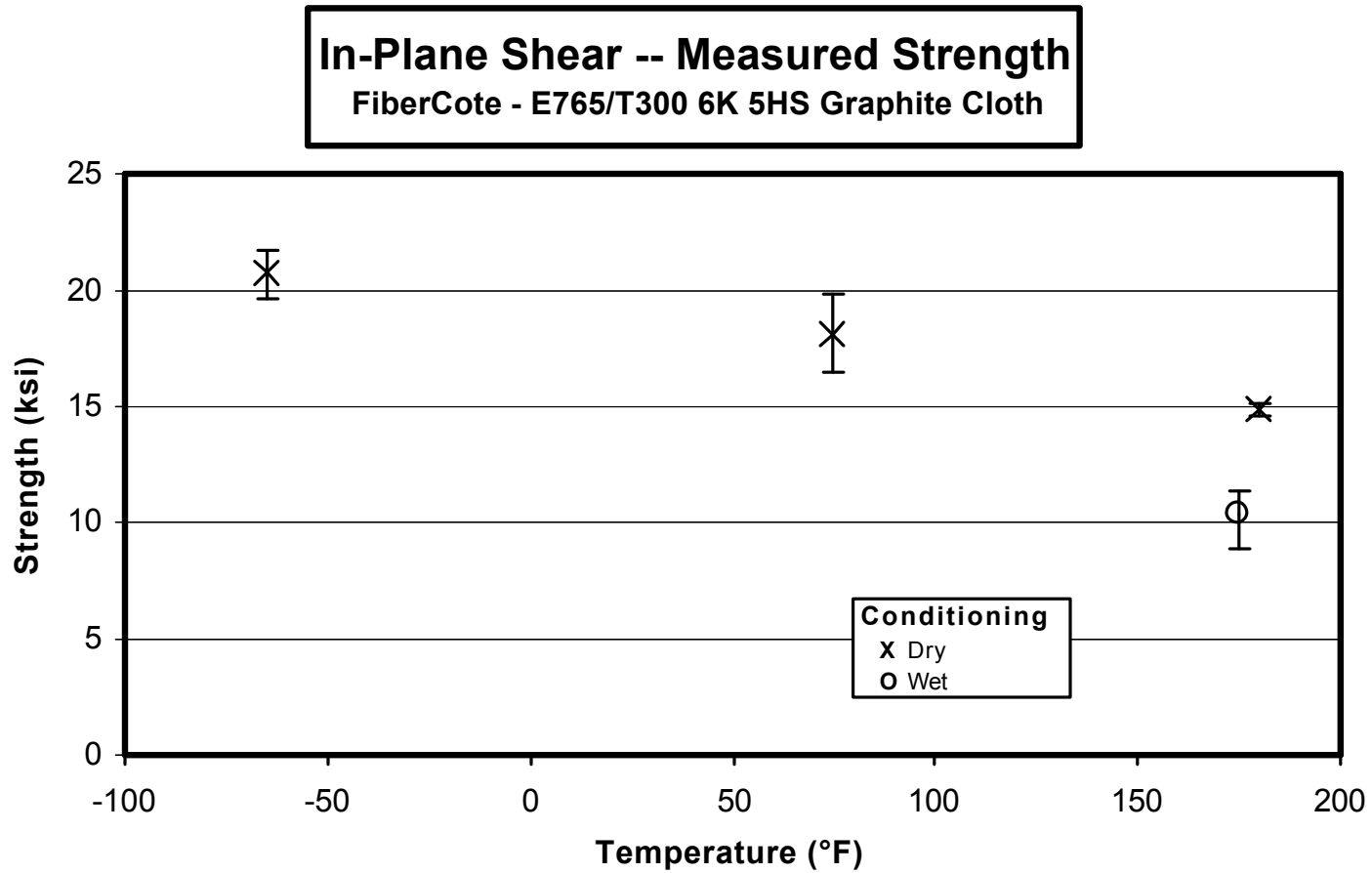
NOTE: The symbols represent the 'pooled' average of all tests, and the bars represent the upper and lower limit of the data. The 180° dry and wet data have been staggered for clarity.

3.1.3.4 Compression, 2-axis



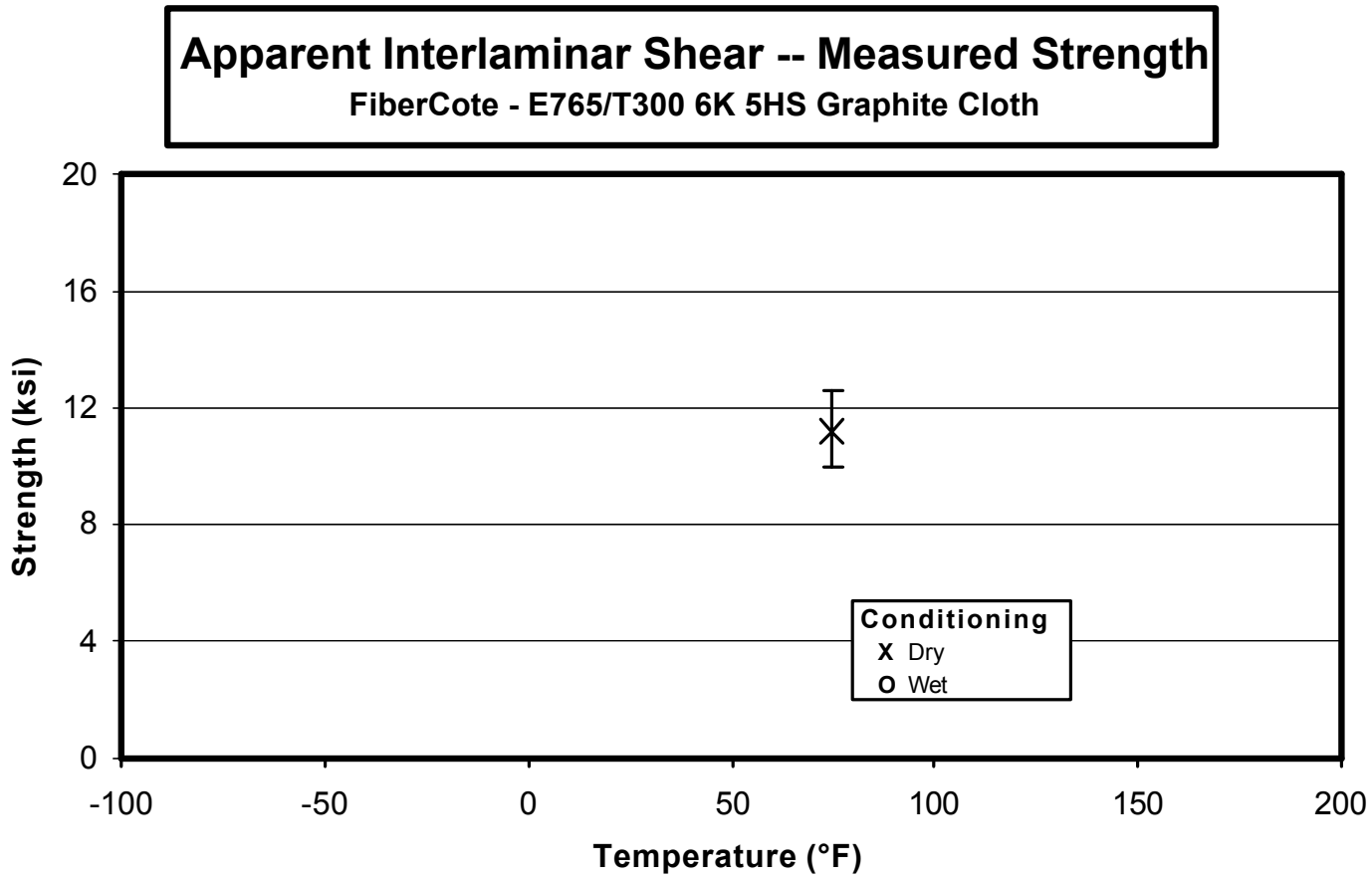
NOTE: The symbols represent the 'pooled' average of all tests, and the bars represent the upper and lower limit of the data. The 180° dry and wet data have been staggered for clarity.

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 F J 2 1 2 5 F

1st Character: Fabricator

'T' designates Fibercote

2nd Character: Material System

'F' designates T300 6K 5HS / 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 6K 5HS Graphite Cloth

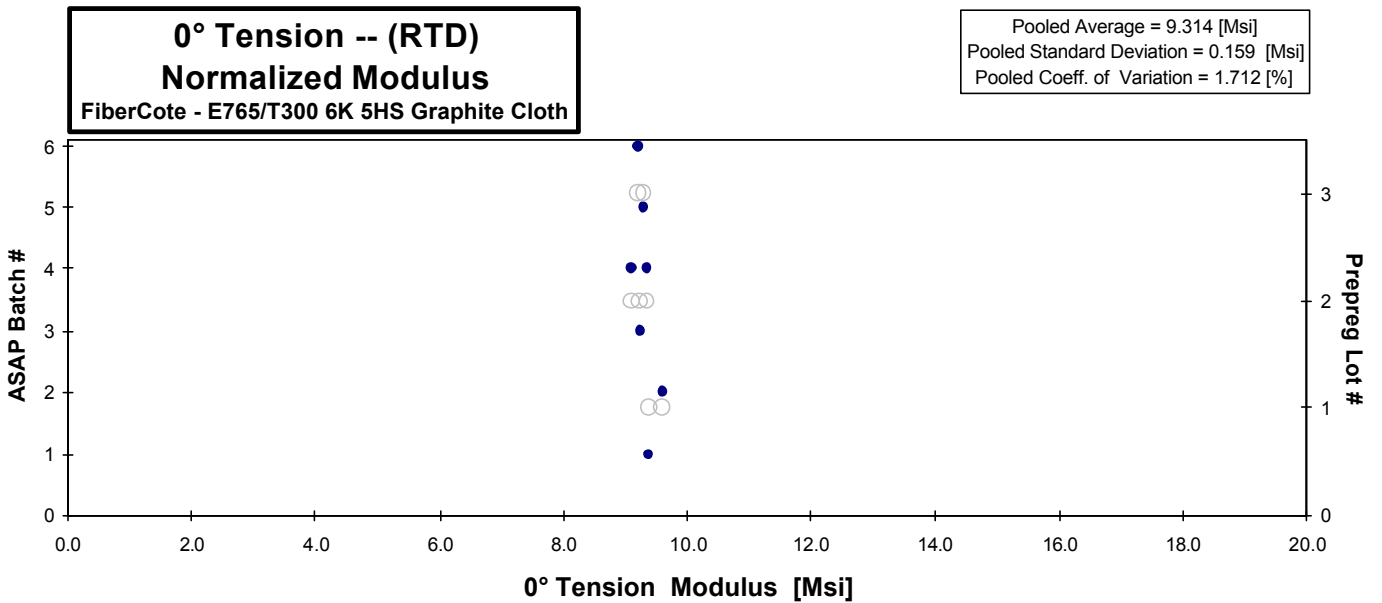
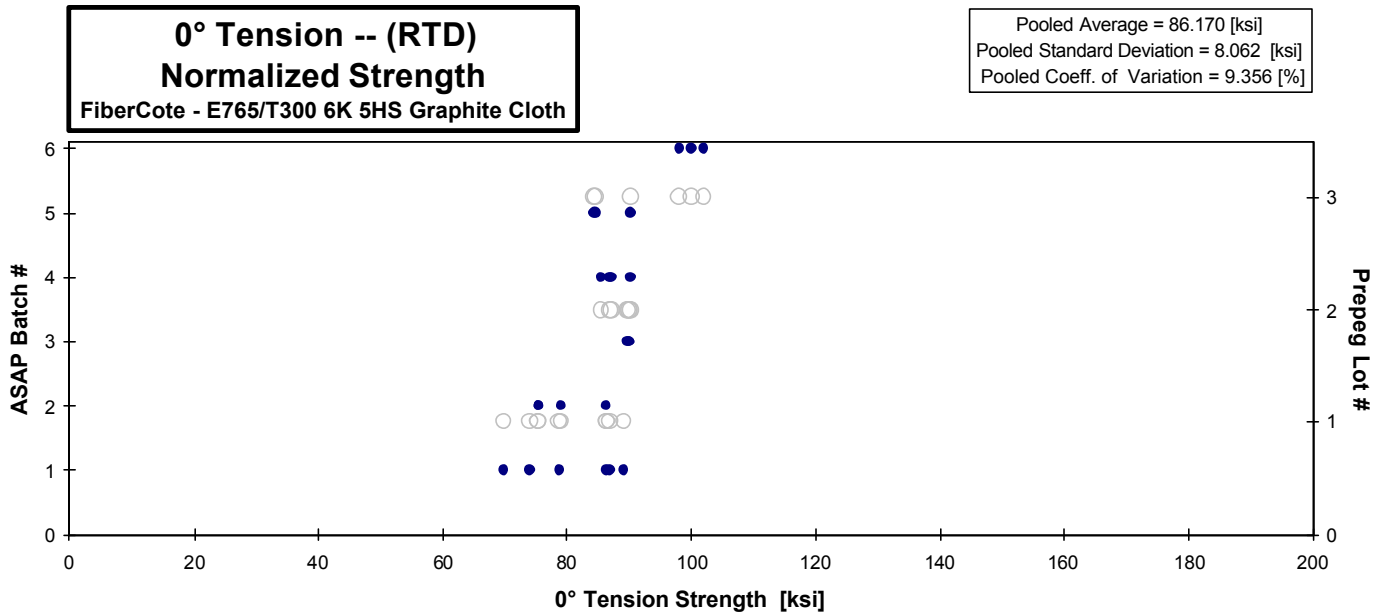
normalizing t_{ply}
 [in]
 0.0152

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thckn. [in]	# Plies in Laminate
TFJ1311A	1	1	1	88.669			0.092	6
TFJ1312A	1	1	1	72.458	9.185	0.049	0.093	6
TFJ1313A	1	1	1	67.498			0.094	6
TFJ1314A	1	1	1	84.343			0.093	6
TFJ1315A	1	1	1	77.025			0.093	6
TFJ131AA	1	1	1	84.979			0.093	6
TFJ1415A	2	1	2	73.634			0.093	6
TFJ1416A	2	1	2	77.339			0.093	6
TFJ1417A	2	1	2	84.123			0.093	6
TFJ1418A	2	1	2	74.206	9.447	0.042	0.092	6
TFJ2217A	1	2	3	90.450			0.090	6
TFJ2218A	1	2	3	90.087			0.091	6
TFJ2219A	1	2	3	90.389	9.282	0.045	0.091	6
TFJ2311A	2	2	4	90.914	9.404	0.034	0.090	6
TFJ2312A	2	2	4	86.678			0.090	6
TFJ2313A	2	2	4	87.289			0.091	6
TFJ2314A	2	2	4	85.933	8.992	0.057	0.092	6
TFJ3411A	1	3	5	87.919	9.674	0.056	0.087	6
TFJ3412A	1	3	5	92.482			0.089	6
TFJ3413A	1	3	5	87.167			0.088	6
TFJ3111A	2	3	6	104.236	9.416	0.047	0.089	6
TFJ3112A	2	3	6	101.474			0.090	6
TFJ3113A	2	3	6	101.179			0.088	6

Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
0.01526	89.290	
0.01550	74.081	9.391
0.01569	69.850	
0.01555	86.541	
0.01552	78.849	
0.01549	86.866	
0.01554	75.472	
0.01552	79.199	
0.01557	86.393	
0.01541	75.419	9.601
0.01508	89.956	
0.01511	89.793	
0.01511	90.078	9.250
0.01507	90.401	9.351
0.01499	85.697	
0.01514	87.196	
0.01533	86.912	9.095
0.01456	84.475	9.295
0.01481	90.350	
0.01474	84.759	
0.01483	101.986	9.212
0.01496	100.158	
0.01471	98.179	

Average **86.108** **9.343** **0.047**
 Standard Dev. **9.339** **0.216** **0.008**
 Coeff. of Var. [%] **10.846** **2.317** **17.002**
 Min. **67.498** **8.992** **0.034**
 Max. **104.236** **9.674** **0.057**
 Number of Spec. **23** **7** **7**

Average_{norm} **0.01519** **86.170** **9.314**
 Standard Dev._{norm} **0.01519** **8.062** **0.159**
 Coeff. of Var. [%]_{norm} **9.356** **1.712**
 Min. **0.0146** **69.850** **9.095**
 Max. **0.0157** **101.986** **9.601**
 Number of Spec. **23** **7**



**0° Tension -- (CTD)
 Strength & Modulus**
 FiberCote - E765/T300 6K 5HS Graphite Cloth

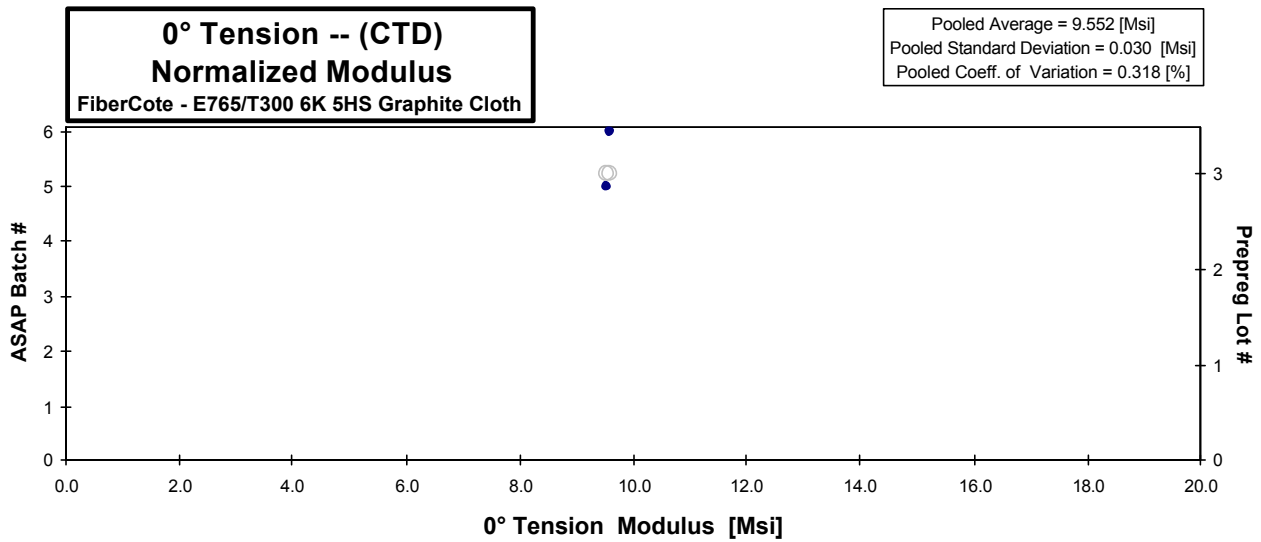
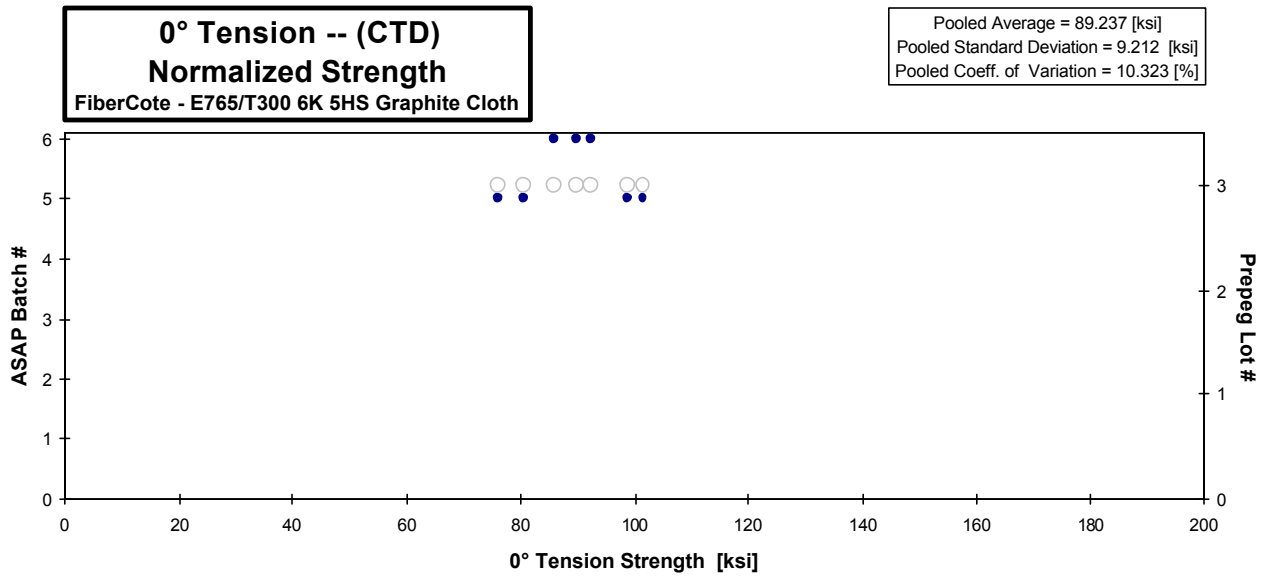
normalizing t_{ply}
 [in]
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Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate
TFJ3311B	2	3	5	83.374	9.876	0.068	0.088	6
TFJ3312B	2	3	5	105.061			0.088	6
TFJ3313B	2	3	5	79.224			0.088	6
TFJ3314B	2	3	5	101.682			0.088	6
TFJ3415B	1	3	6	88.036	9.820	0.063	0.089	6
TFJ3416B	1	3	6	94.095			0.089	6
TFJ3417B	1	3	6	91.735			0.089	6

Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
0.01467	80.464	9.531
0.01470	101.624	
0.01462	76.198	
0.01474	98.616	
0.01482	85.832	9.574
0.01490	92.238	
0.01486	89.690	

Average **91.887** **9.848** **0.065**
 Standard Dev. **9.328** **0.040** **0.004**
 Coeff. of Var. [%] **10.151** **0.402** **5.744**
 Min. **79.224** **9.820** **0.063**
 Max. **105.061** **9.876** **0.068**
 Number of Spec. **7** **2** **2**

Average_{norm} **0.01476** **89.237** **9.552**
 Standard Dev_{norm} **9.212** **0.030**
 Coeff. of Var. [%]_{norm} **10.323** **0.318**
 Min. **0.0146** **76.198** **9.531**
 Max. **0.0149** **101.624** **9.574**
 Number of Spec. **7** **2**



**0° Tension -- (ETW)
 Strength & Modulus**
 FiberCote - E765/T300 6K 5HS Graphite Cloth

normalizing t_{ply}

[in]

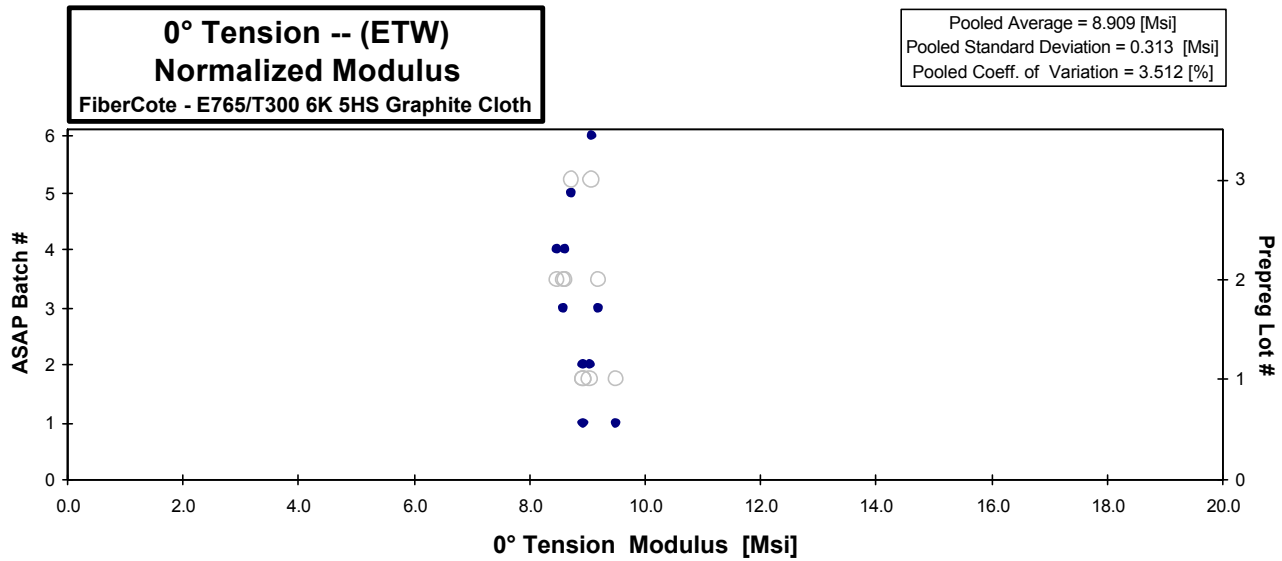
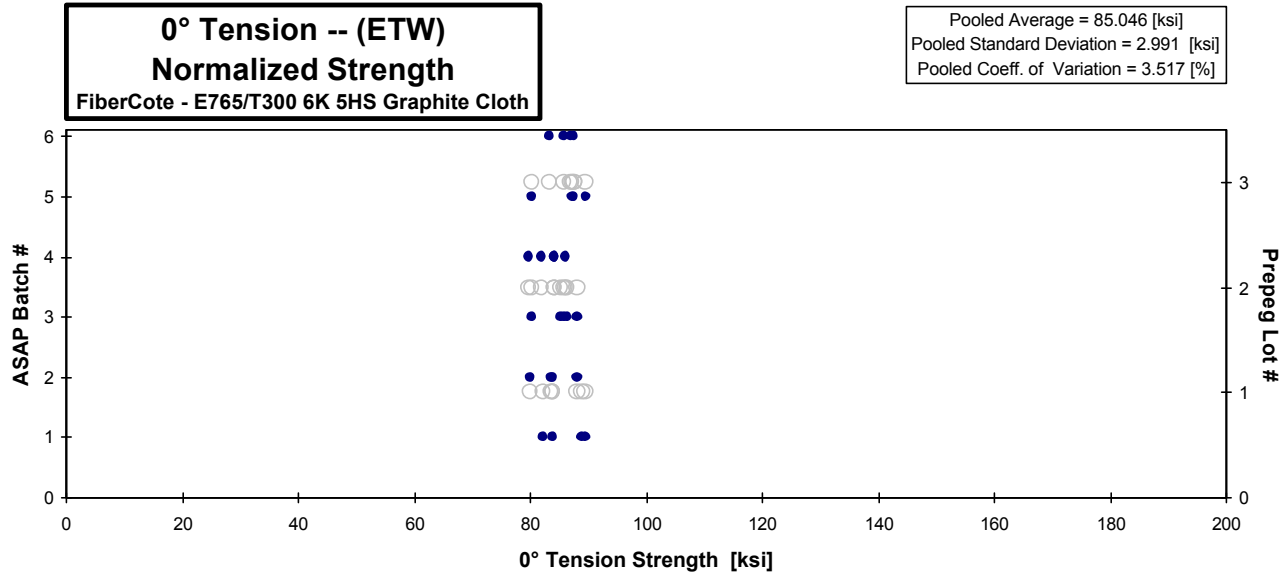
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Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thicken. [in]	# Plies in Laminate
TFJ1316F	1	1	1	80.070	8.692		0.094	6
TFJ1317F	1	1	1	87.072			0.093	6
TFJ1318F	1	1	1	88.047			0.093	6
TFJ1319F	1	1	1	81.723	9.246	0.040	0.094	6
TFJ1411F	2	1	2	83.618	8.940		0.091	6
TFJ1412F	2	1	2	79.641			0.092	6
TFJ1413F	2	1	2	82.118			0.093	6
TFJ1414F	2	1	2	87.112	8.922	0.045	0.092	6
TFJ2211F	1	2	3	89.527	9.329		0.090	6
TFJ2212F	1	2	3	86.887			0.091	6
TFJ2213F	1	2	3	85.938			0.091	6
TFJ2214F	1	2	3	80.823			0.091	6
TFJ2215F	1	2	3	86.664	8.683		0.090	6
TFJ2316F	2	2	4	83.515	8.783	0.037	0.089	6
TFJ2317F	2	2	4	80.940			0.090	6
TFJ2318F	2	2	4	84.995			0.090	6
TFJ2319F	2	2	4	83.860			0.092	6
TFJ231AF	2	2	4	86.344	8.503	0.035	0.091	6
TFJ3211F	1	3	5	81.811	8.888	0.049	0.090	6
TFJ3212F	1	3	5	90.297			0.089	6
TFJ3213F	1	3	5	89.375			0.089	6
TFJ3214F	1	3	5	91.799			0.089	6
TFJ3315F	2	3	6	88.589	9.364	0.052	0.088	6
TFJ3316F	2	3	6	85.165			0.089	6
TFJ3317F	2	3	6	88.993			0.089	6
TFJ3318F	2	3	6	90.345			0.088	6

Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
0.01560	82.177	8.920
0.01551	88.838	
0.01544	89.414	
0.01562	83.978	9.501
0.01521	83.649	8.943
0.01528	80.078	
0.01554	83.963	
0.01539	88.211	9.034
0.01498	88.218	9.192
0.01511	86.363	
0.01509	85.341	
0.01512	80.380	
0.01505	85.793	8.596
0.01491	81.897	8.613
0.01496	79.668	
0.01506	84.234	
0.01526	84.182	
0.01516	86.138	8.483
0.01492	80.286	8.723
0.01476	87.689	
0.01485	87.301	
0.01481	89.467	
0.01475	85.950	9.085
0.01490	83.484	
0.01484	86.895	
0.01474	87.588	

Average 85.587 8.935 0.043
 Standard Dev. 3.527 0.293 0.007
 Coeff. of Var. [%] 4.121 3.275 15.662
 Min. 79.641 8.503 0.035
 Max. 91.799 9.364 0.052
 Number of Spec. 26 10 6

Average_{norm} 0.01511 85.046 8.909
 Standard Dev._{norm} 2.991 0.313
 Coeff. of Var. [%]_{norm} 3.517 3.512
 Min. 0.0147 79.688 8.483
 Max. 0.0156 89.467 9.501
 Number of Spec. 26 10



**0° Tension -- (ETD)
 Strength & Modulus**
 FiberCote - E765/T300 6K 5HS Graphite Cloth

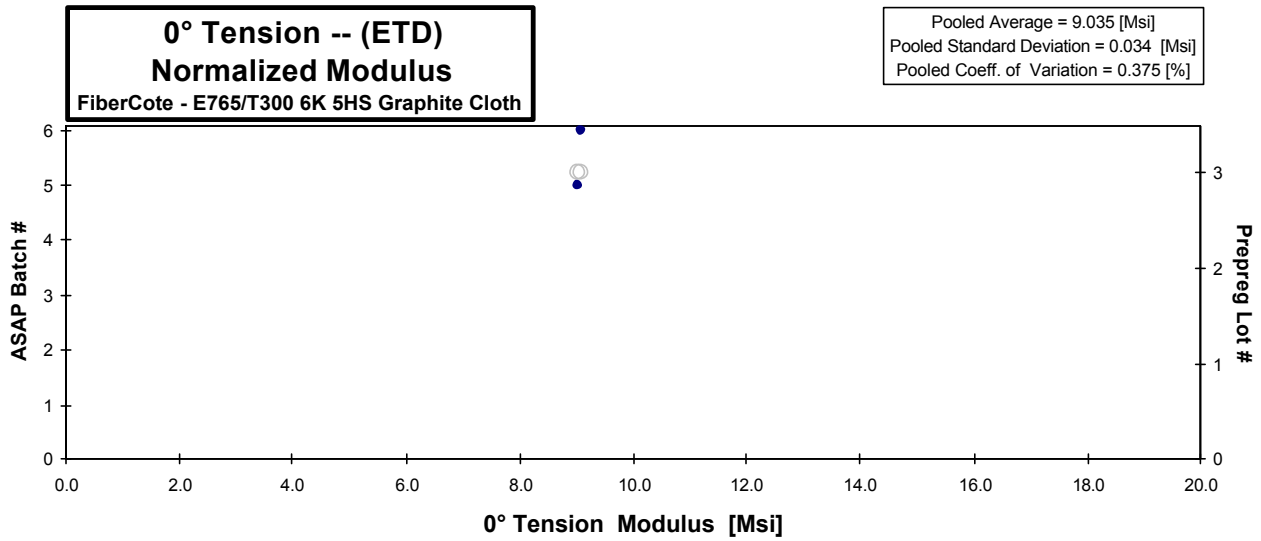
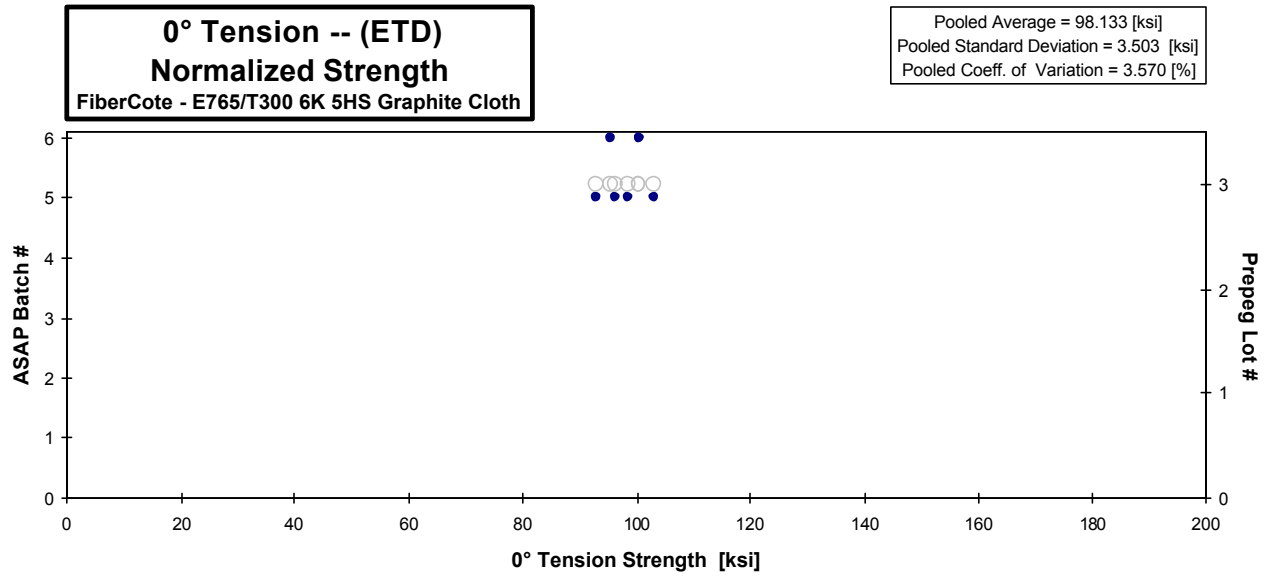
normalizing t_{ply}
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Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate
TFJ3116G	2	3	5	97.939	9.170	0.052	0.090	6
TFJ3117G	2	3	5	105.297			0.089	6
TFJ3118G	2	3	5	99.847			0.090	6
TFJ3119G	2	3	5	95.288			0.089	6
TFJ3216G	1	3	6	97.408			0.089	6
TFJ3217G	1	3	6	102.239			0.090	6
TFJ3219G	1	3	6	101.482	9.165	0.063	0.090	6

Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
0.01494	96.239	9.011
0.01488	103.103	
0.01499	98.497	
0.01481	92.850	
0.01490	95.467	
0.01494	100.464	
0.01503	100.313	9.059

Average 99.929 **9.167** **0.057**
Standard Dev. 3.377 **0.004** **0.008**
Coeff. of Var. [%] 3.379 **0.044** **14.179**
Min. 95.288 **9.165** **0.052**
Max. 105.297 **9.170** **0.063**
Number of Spec. 7 2 2

Average_{norm} 0.01493 **98.133** **9.035**
Standard Dev._{norm} **3.503** **0.034**
Coeff. of Var. [%]_{norm} **3.570** **0.375**
Min. 0.0148 **92.850** **9.011**
Max. 0.0150 **103.103** **9.059**
Number of Spec. 7 2



**90° Tension -- (RTD)
 Strength & Modulus**
 FiberCote - E765/T300 6K 5HS Graphite Cloth

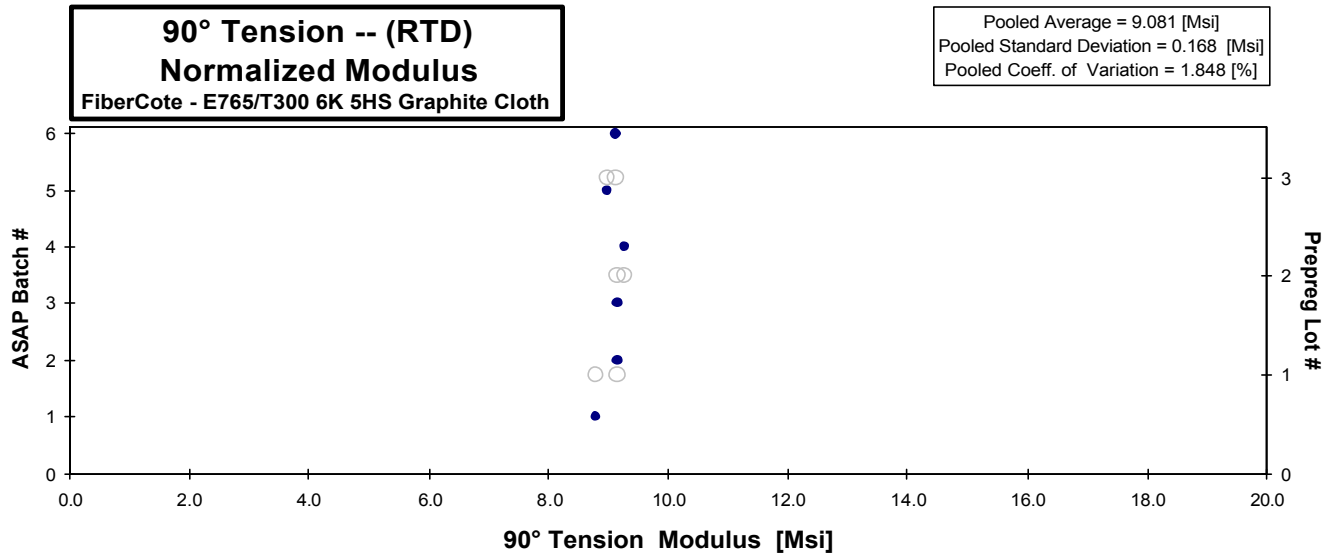
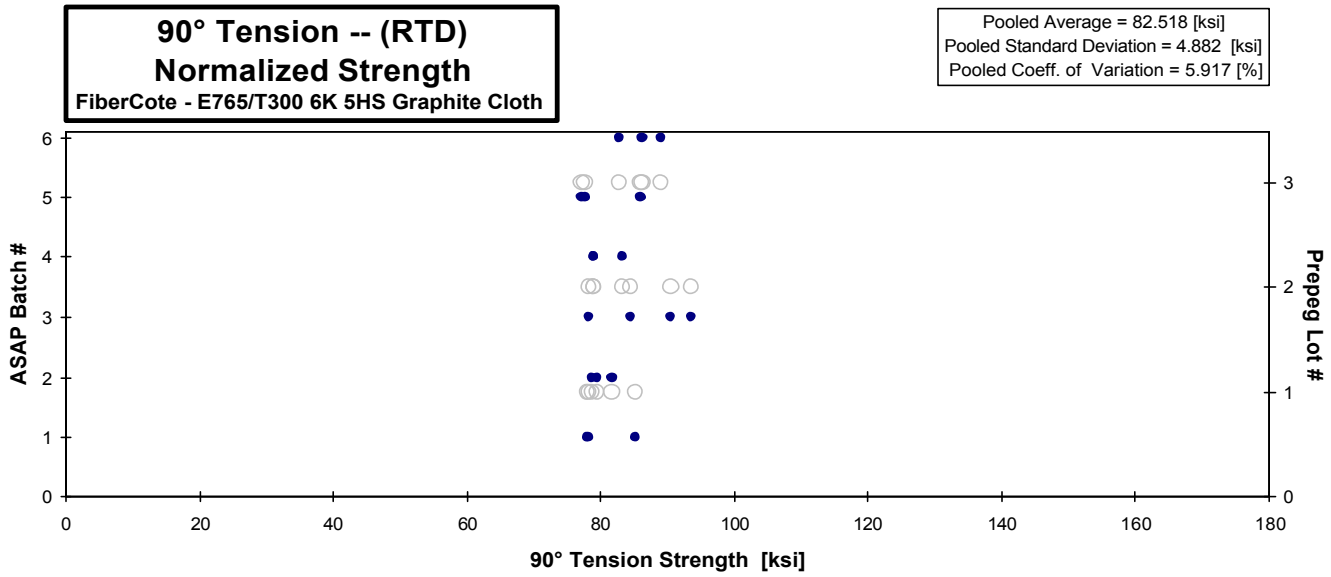
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Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate
TFU1112A	2	1	1	82.404	8.510	0.094	6
TFU1113A	2	1	1	75.628		0.094	6
TFU1114A	2	1	1	75.941		0.094	6
TFU1511A	1	1	2	78.225	9.106	0.092	6
TFU1512A	1	1	2	79.861		0.093	6
TFU1513A	1	1	2	77.948		0.093	6
TFU2311A	3	2	3	78.804	9.215	0.090	6
TFU2312A	3	2	3	92.819		0.092	6
TFU2313A	3	2	3	84.878		0.091	6
TFU2314A	3	2	3	91.851		0.090	6
TFU2416 A	2	2	4	79.175	9.292	0.091	6
TFU2417A	2	2	4	82.661		0.092	6
TFU2418A	2	2	4	79.509		0.090	6
TFU3212A	2	3	5	78.893	9.130	0.090	6
TFU3213A	2	3	5	78.535		0.089	6
TFU3214A	2	3	5	88.081		0.089	6
TFU3415A	4	3	6	90.939	9.313	0.089	6
TFU3416A	4	3	6	89.021		0.088	6
TFU3417A	4	3	6	84.591		0.089	6

Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
0.01566	85.140	8.793
0.01563	77.959	
0.01559	78.087	
0.01526	78.744	9.167
0.01552	81.781	
0.01545	79.451	
0.01505	78.258	9.151
0.01528	93.536	
0.01509	84.492	
0.01496	90.625	
0.01512	78.975	9.269
0.01526	83.224	
0.01504	78.886	
0.01492	77.653	8.987
0.01488	77.085	
0.01481	86.034	
0.01484	89.043	9.118
0.01469	86.268	
0.01480	82.594	

Average **82.619** **9.094**
 Standard Dev. **5.514** **0.298**
 Coeff. of Var. [%] **6.673** **3.277**
 Min. **75.628** **8.510**
 Max. **92.819** **9.313**
 Number of Spec. **19** **6**

Average_{norm} **0.01515** **82.518** **9.081**
 Standard Dev._{norm} **4.882** **0.168**
 Coeff. of Var. [%]_{norm} **5.917** **1.848**
 Min. **0.0147** **77.085** **8.793**
 Max. **0.0157** **93.536** **9.269**
 Number of Spec. **19** **6**



**90° Tension -- (CTD)
 Strength & Modulus**
 FiberCote - E765/T300 6K 5HS Graphite Cloth

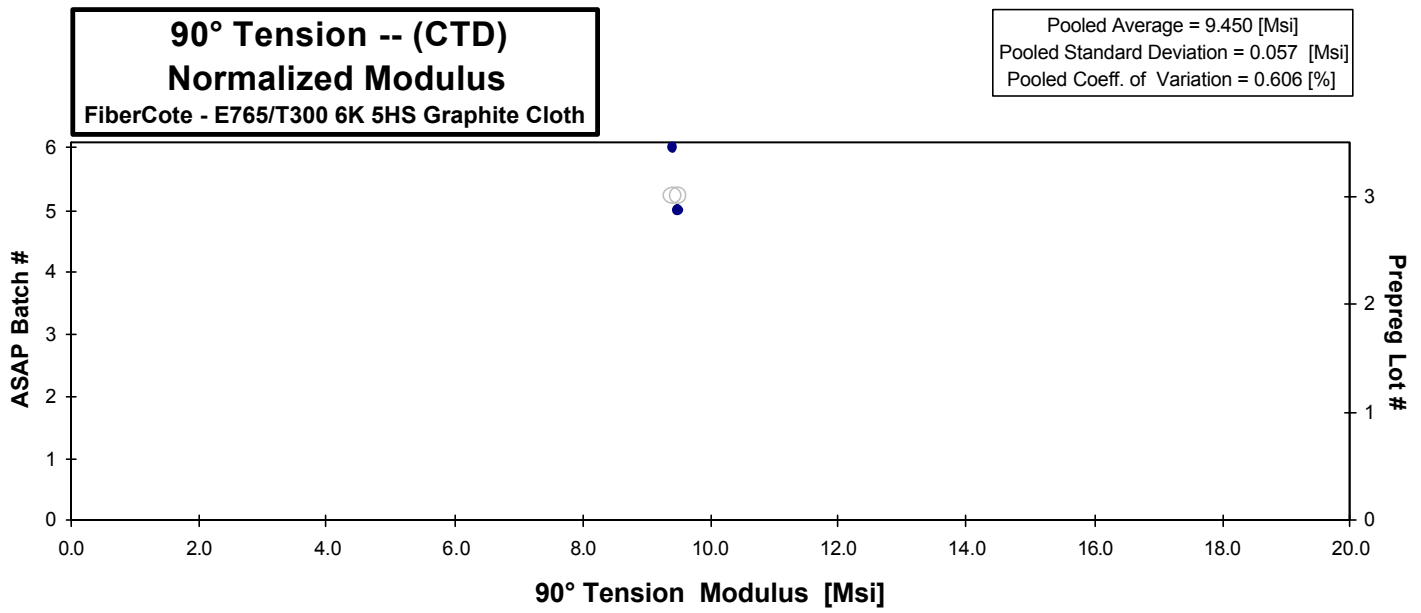
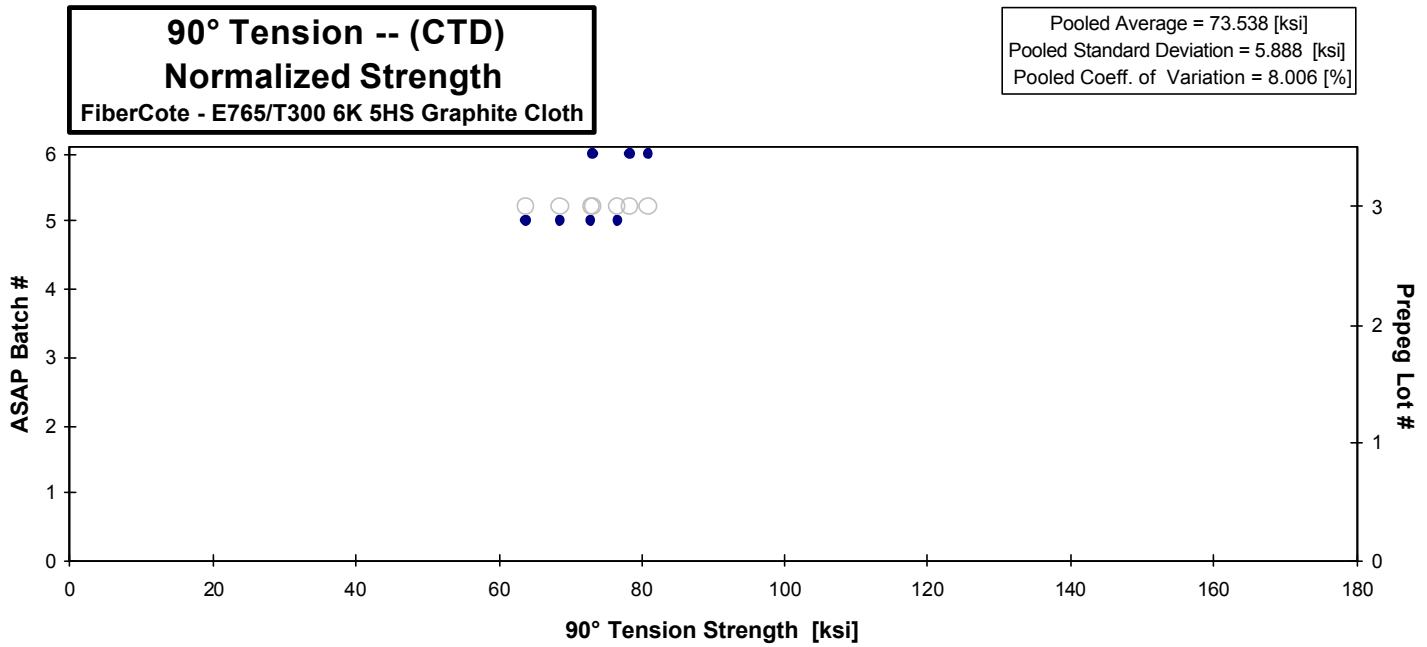
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Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate
TFU3216B	2	3	5	77.946	9.647	0.090	6
TFU3217B	2	3	5	74.860		0.089	6
TFU3218B	2	3	5	65.352		0.089	6
TFU3219B	2	3	5	69.706		0.090	6
TFU3317B	3	3	6	82.847	9.622	0.089	6
TFU3318B	3	3	6	81.187		0.088	6
TFU3319B	3	3	6	75.883		0.088	6

Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
0.01495	76.678	9.490
0.01482	72.986	
0.01487	63.918	
0.01494	68.534	
0.01486	81.015	9.409
0.01469	78.457	
0.01466	73.178	

Average 75.397 9.635
 Standard Dev. 6.183 0.018
 Coeff. of Var. [%] 8.200 0.184
 Min. 65.352 9.622
 Max. 82.847 9.647
 Number of Spec. 7 2

Average_{norm} 0.01483 73.538 9.450
 Standard Dev._{norm} 5.888 0.057
 Coeff. of Var. [%]_{norm} 8.006 0.606
 Min. 0.0147 63.918 9.409
 Max. 0.0150 81.015 9.490
 Number of Spec. 7 2



90° Tension -- (ETW)
Strength & Modulus
 FiberCote - E765/T300 6K 5HS Graphite Cloth

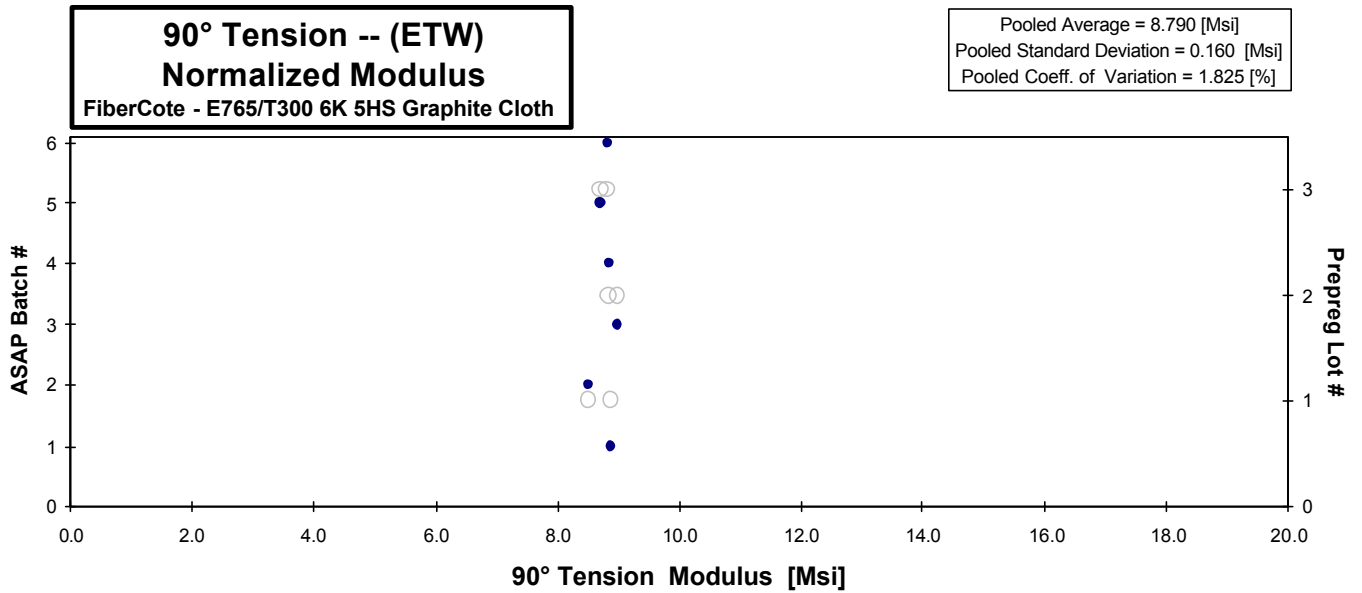
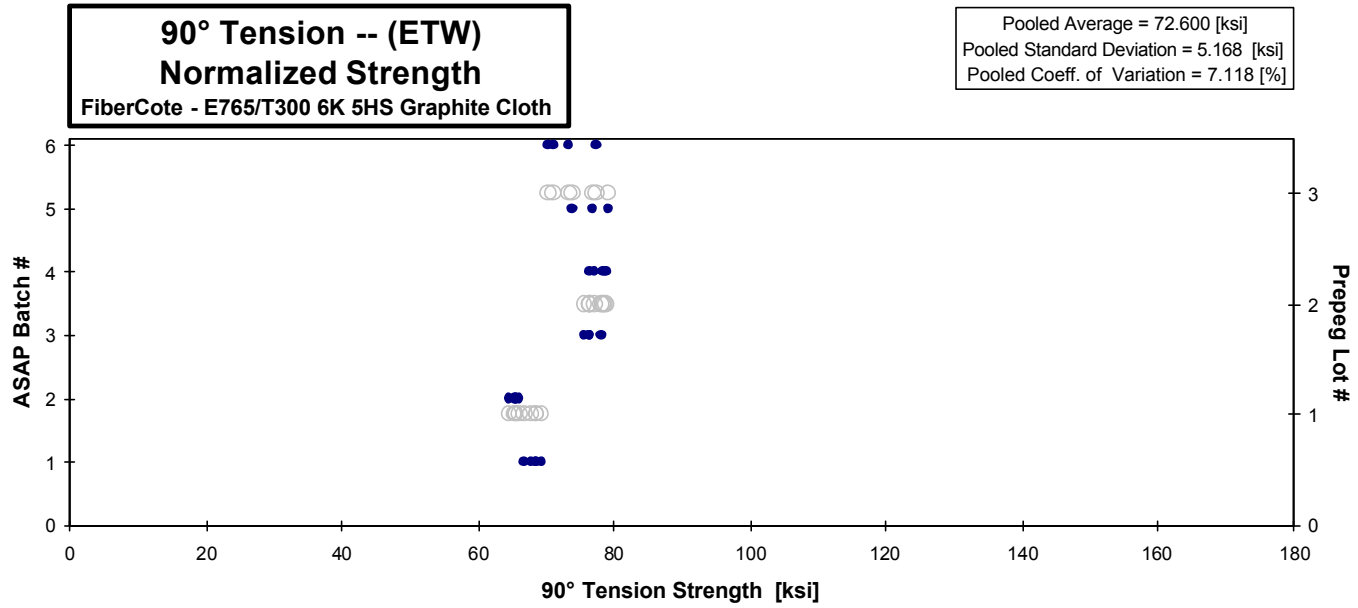
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Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate
TFU1311F	2	1	1	67.625	8.753	0.093	6
TFU1312F	2	1	1	68.136		0.093	6
TFU1313F	2	1	1	67.269		0.093	6
TFU1314F	2	1	1	66.435		0.093	6
TFU1315F	2	1	1	65.097		0.094	6
TFU1316F	2	1	2	63.477		0.094	6
TFU1515F	1	1	2	64.614	8.426	0.092	6
TFU1516F	1	1	2	63.498		0.093	6
TFU1517F	1	1	2	65.090		0.093	6
TFU1518F	1	1	2	64.713		0.093	6
TFU2316F	3	2	3	78.549	9.025	0.091	6
TFU2317F	3	2	3	76.074		0.091	6
TFU2318F	3	2	3	76.587		0.091	6
TFU2319F	3	2	3	76.875		0.091	6
TFU2411F	2	2	4	78.613	9.084	0.089	6
TFU2412F	2	2	4	79.762		0.090	6
TFU2413F	2	2	4	78.014		0.090	6
TFU2414F	2	2	4	80.310		0.089	6
TFU2415F	2	2	4	79.283		0.090	6
TFU3311F	3	3	5	82.213	9.035	0.088	6
TFU3312F	3	3	5	75.590		0.089	6
TFU3313F	3	3	5	79.393		0.088	6
TFU3411F	4	3	6	79.413	9.026	0.089	6
TFU3412F	4	3	6	72.716		0.088	6
TFU3413F	4	3	6	75.292		0.089	6
TFU3414F	4	3	6	73.184		0.089	6

Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
0.01542	68.601	8.879
0.01549	69.444	
0.01548	68.523	
0.01551	67.807	
0.01563	66.917	
0.01574	65.739	
0.01538	65.358	8.523
0.01544	64.507	
0.01544	66.113	
0.01544	65.718	
0.01513	78.190	8.984
0.01513	75.699	
0.01519	76.517	
0.01509	76.327	
0.01480	76.544	8.845
0.01506	79.018	
0.01504	77.215	
0.01491	78.798	
0.01504	78.428	
0.01463	79.148	8.698
0.01485	73.835	
0.01472	76.883	
0.01484	77.512	8.810
0.01471	70.364	
0.01480	73.324	
0.01476	71.058	

Average 72.993 8.891
 Standard Dev. 6.374 0.257
 Coeff. of Var. [%] 8.733 2.887
 Min. 63.477 8.426
 Max. 82.213 9.084
 Number of Spec. 26 6

Average_{norm} 0.01514 72.600 8.790
 Standard Dev._{norm} 5.168 0.160
 Coeff. of Var. [%]_{norm} 7.118 1.825
 Min. 0.0146 64.507 8.523
 Max. 0.0157 79.148 8.984
 Number of Spec. 26 6



**90° Tension -- (ETD)
 Strength & Modulus**
 FiberCote - E765/T300 6K 5HS Graphite Cloth

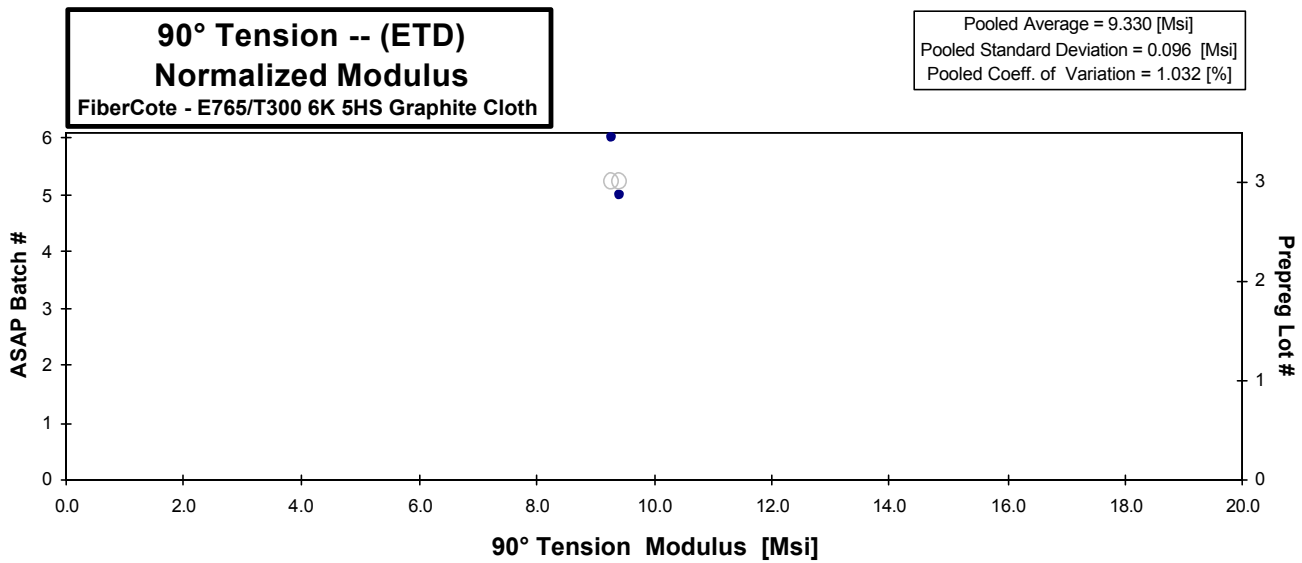
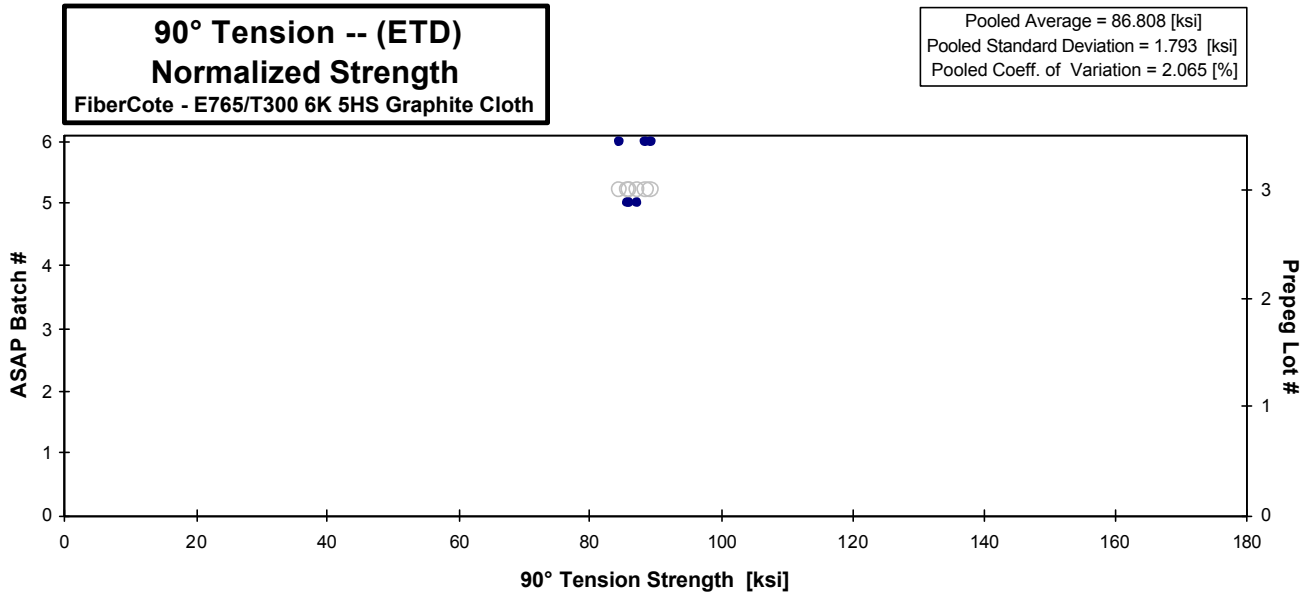
normalizing t_{ply}
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Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate
TFU3314G	3	3	5	88.263	9.654	0.089	6
TFU3315G	3	3	5	89.734		0.089	6
TFU3316G	3	3	5	87.241		0.090	6
TFU3418G	4	3	6	86.955	9.539	0.089	6
TFU3419G	4	3	6	92.546		0.088	6
TFU341AG	4	3	6	91.298		0.088	6

Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
0.01480	85.924	9.398
0.01479	87.291	
0.01492	85.646	
0.01476	84.428	9.262
0.01464	89.147	
0.01472	88.412	

Average **89.340** **9.596**
 Standard Dev. **2.259** **0.081**
 Coeff. of Var. [%] **2.529** **0.846**
 Min. **86.955** **9.539**
 Max. **92.546** **9.654**
 Number of Spec. **6** **2**

Average_{norm} **0.01477** **86.808** **9.330**
 Standard Dev._{norm} **1.793** **0.096**
 Coeff. of Var. [%]_{norm} **2.065** **1.032**
 Min. **0.0146** **84.428** **9.262**
 Max. **0.0149** **89.147** **9.398**
 Number of Spec. **6** **2**



**0° Compression -- (RTD)
 Strength & Modulus**
 FiberCote - E765/T300 6K 5HS Graphite Cloth

normalizing t_{ply}
 [in]

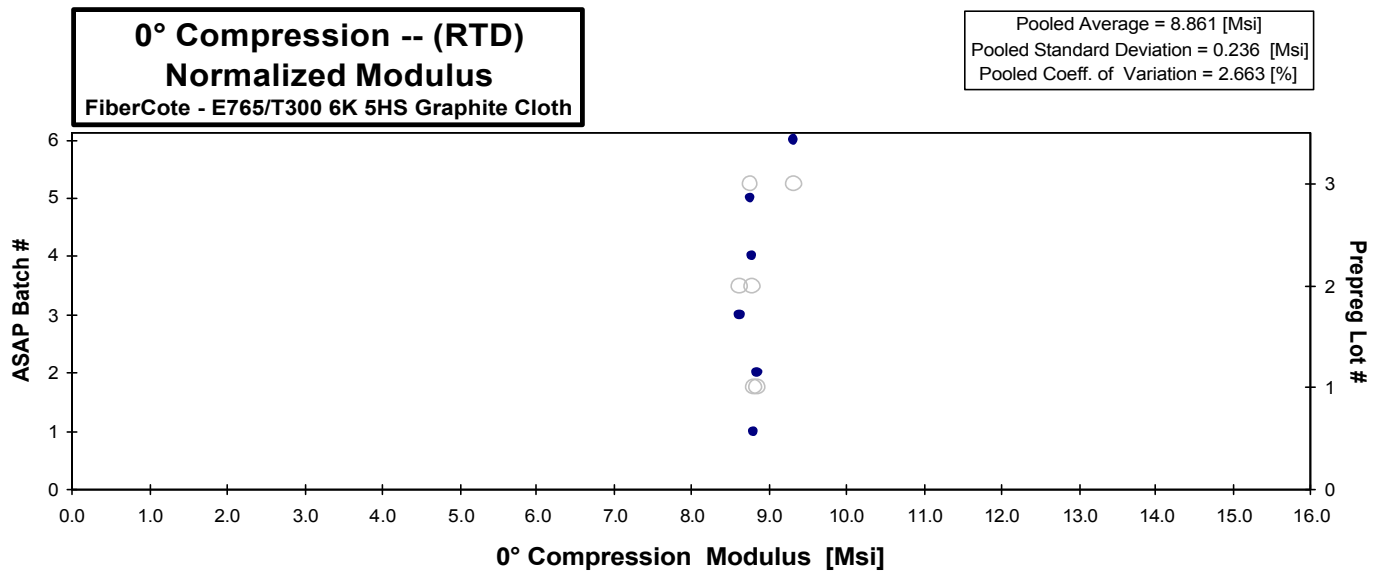
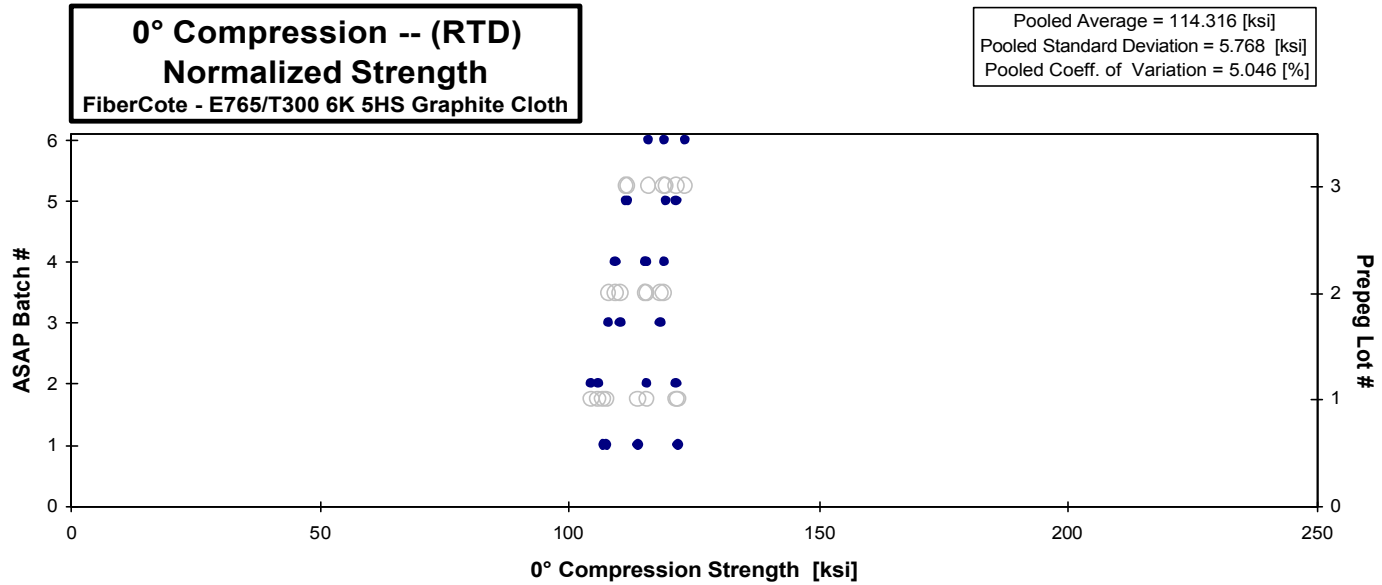
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Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate
TFK1121A	3	1	1	111.420		0.093	6
TFK1122A	3	1	1	105.612		0.092	6
TFK1123A	3	1	1	118.356		0.094	6
TFK1124A	3	1	1	104.681		0.094	6
TFL1111A	3	1	1		8.726	0.092	6
TFK1226A	4	1	2	113.423		0.093	6
TFK1227A	4	1	2	102.240		0.093	6
TFK1228A	4	1	2	119.413		0.092	6
TFK1229A	4	1	2	103.276		0.093	6
TFL123EA	4	1	2		8.666	0.093	6
TFK2111A	4	2	3	120.148		0.090	6
TFK2112A	4	2	3	112.191		0.089	6
TFK2113A	4	2	3	109.756		0.090	6
TFL2115A	4	2	3		8.651	0.091	6
TFK2211A	3	2	4	117.366		0.090	6
TFK2216A	3	2	4	111.083		0.089	6
TFK2217A	3	2	4	115.696		0.090	6
TFK2218A	3	2	4	121.305		0.089	6
TFL2225A	3	2	4		8.940	0.089	6
TFK3121A	3	3	5	124.273		0.087	6
TFK3122A	3	3	5	114.826		0.088	6
TFK3123A	3	3	5	125.671		0.088	6
TFK3124A	3	3	5	115.291		0.088	6
TFL3115A	3	3	5		9.004	0.089	6
TFK3211A	4	3	6	126.892		0.088	6
TFK3212A	4	3	6	122.497		0.088	6
TFK3213A	4	3	6	120.418		0.088	6
TFK3225A	4	3	6		9.624	0.088	6

Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
0.01550	113.905	
0.01533	106.836	
0.01561	121.907	
0.01559	107.649	
0.01530		8.806
0.01546	115.672	
0.01547	104.352	
0.01540	121.354	
0.01555	105.920	
0.01550		8.862
0.01492	118.237	
0.01490	110.252	
0.01492	108.010	
0.01513		8.632
0.01492	115.532	
0.01490	109.224	
0.01508	115.064	
0.01487	118.975	
0.01490		8.785
0.01458	119.495	
0.01473	111.610	
0.01466	121.530	
0.01463	111.302	
0.01475		8.764
0.01471	123.129	
0.01473	119.067	
0.01459	115.920	
0.01468		9.317

Average **115.265** **8.935**
 Standard Dev. **7.202** **0.368**
 Coeff. of Var. [%] **6.249** **4.114**
 Min. **102.240** **8.651**
 Max. **126.892** **9.624**
 Number of Spec. **22** **6**

Average_{norm} **0.01505** **114.316** **8.861**
 Standard Dev._{norm} **5.768** **0.236**
 Coeff. of Var. [%]_{norm} **5.046** **2.663**
 Min. **0.0146** **104.352** **8.632**
 Max. **0.0156** **123.129** **9.317**
 Number of Spec. **22** **6**



**0° Compression -- (CTD)
 Strength & Modulus**
 FiberCote - E765/T300 6K 5HS Graphite Cloth

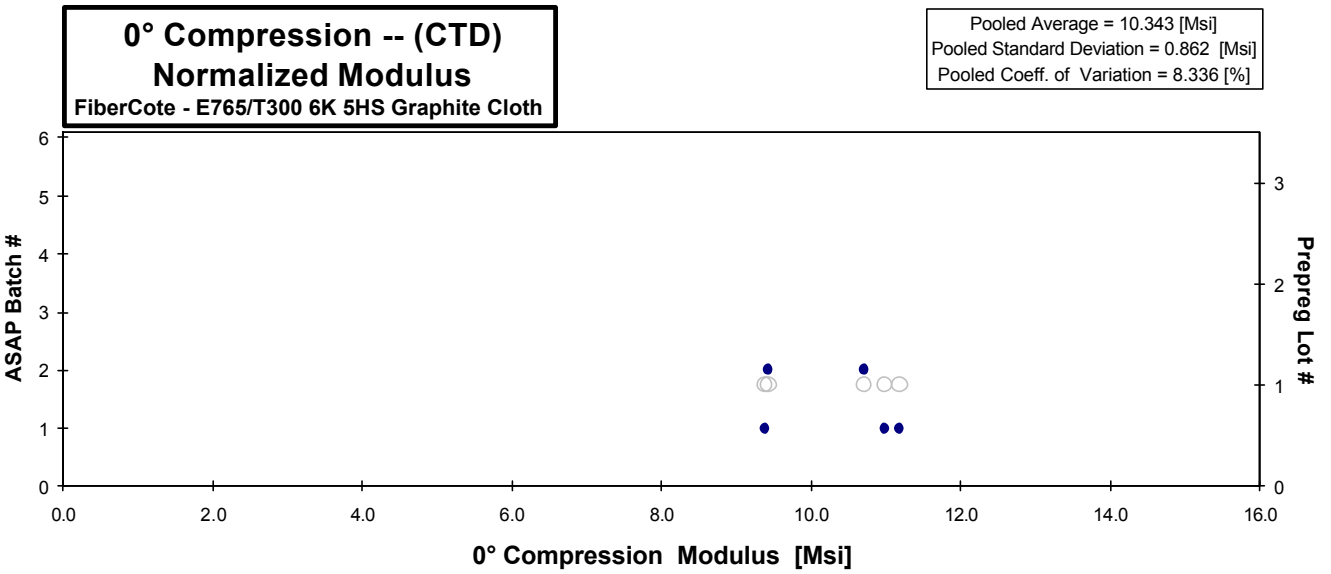
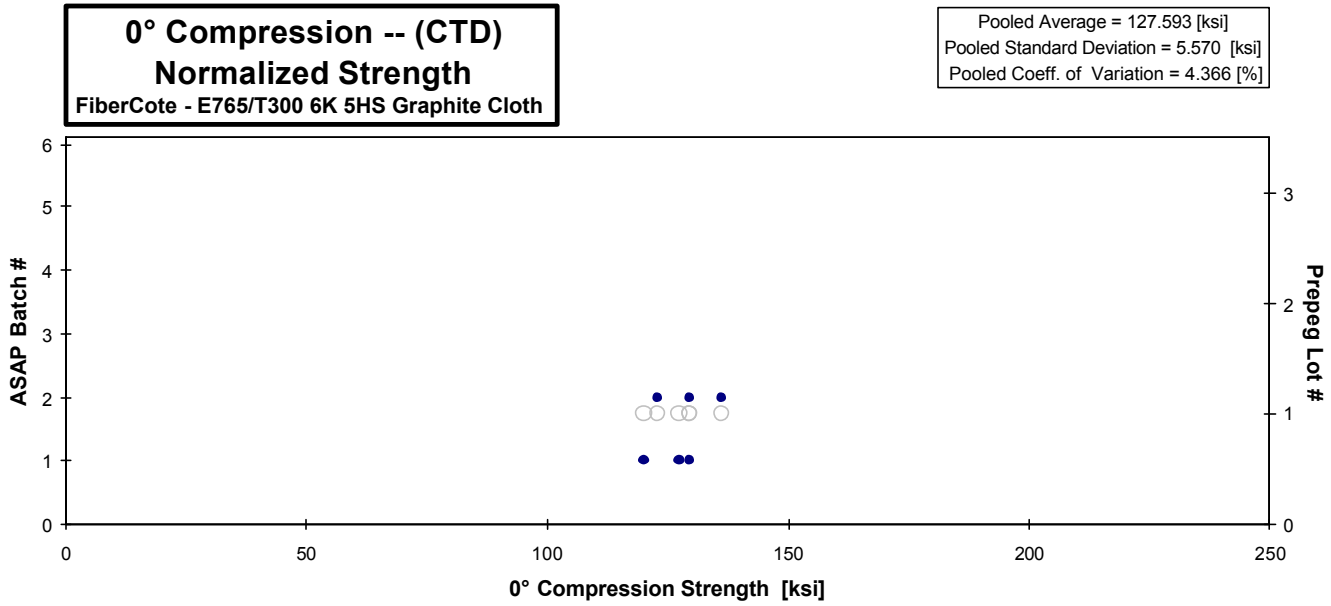
normalizing t_{ply}
 [in]
 0.0152

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate
TFK1111B	3	1	1	117.396		0.093	6
TFK1113B	3	1	1	124.909		0.095	6
TFK1114B	3	1	1	123.563		0.094	6
TFL1115B	3	1	1		10.821	0.093	6
TFL1117B	3	1	1		10.907	0.094	6
TFL1118B	3	1	1		9.232	0.093	6
TFK122BB	4	1	2	128.250		0.092	6
TFK122CB	4	1	2	134.967		0.092	6
TFK122DB	4	1	2	119.005		0.094	6
TFL1232B	4	1	2		10.452	0.093	6
TFL1233B	4	1	2		9.311	0.092	6

Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
0.01556	120.164	
0.01575	129.428	
0.01567	127.356	
0.01543		10.987
0.01558		11.182
0.01546		9.391
0.01537	129.656	
0.01532	136.003	
0.01570	122.952	
0.01558		10.713
0.01541		9.441

Average 124.681 10.145
Standard Dev. 6.405 0.815
Coeff. of Var. [%] 5.137 8.039
Min. 117.396 9.232
Max. 134.967 10.907
Number of Spec. 6 5

Average_{norm} 0.01553 127.593 10.343
Standard Dev_{norm} 5.570 0.862
Coeff. of Var. [%]_{norm} 4.366 8.336
Min. 0.0153 120.164 9.391
Max. 0.0158 136.003 11.182
Number of Spec. 6 5



**0° Compression -- (ETW)
 Strength & Modulus**
 FiberCote - E765/T300 6K 5HS Graphite Cloth

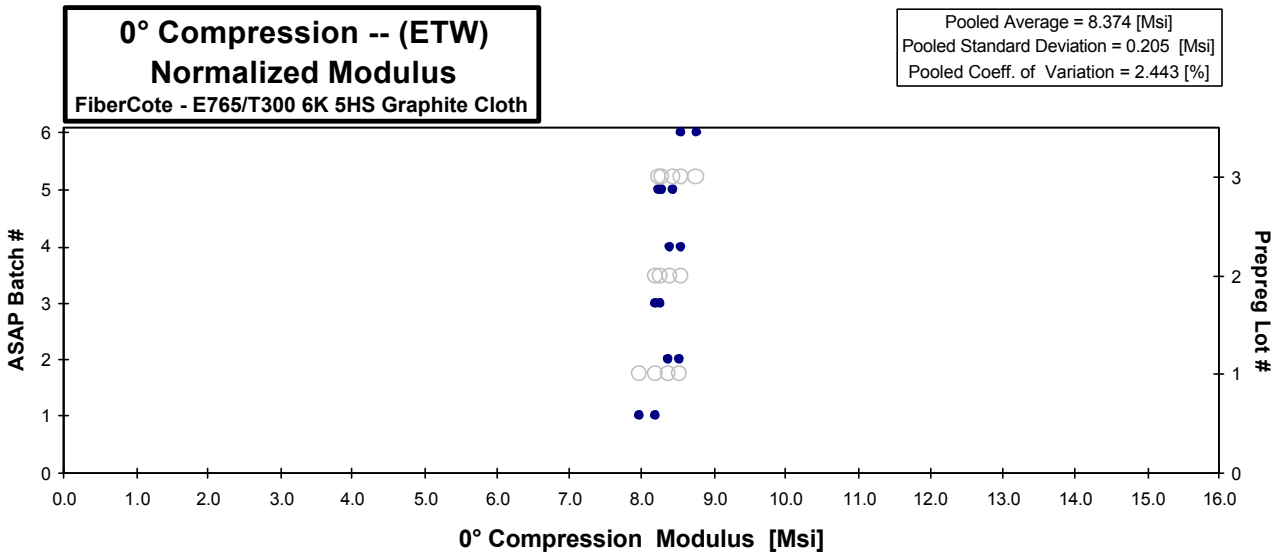
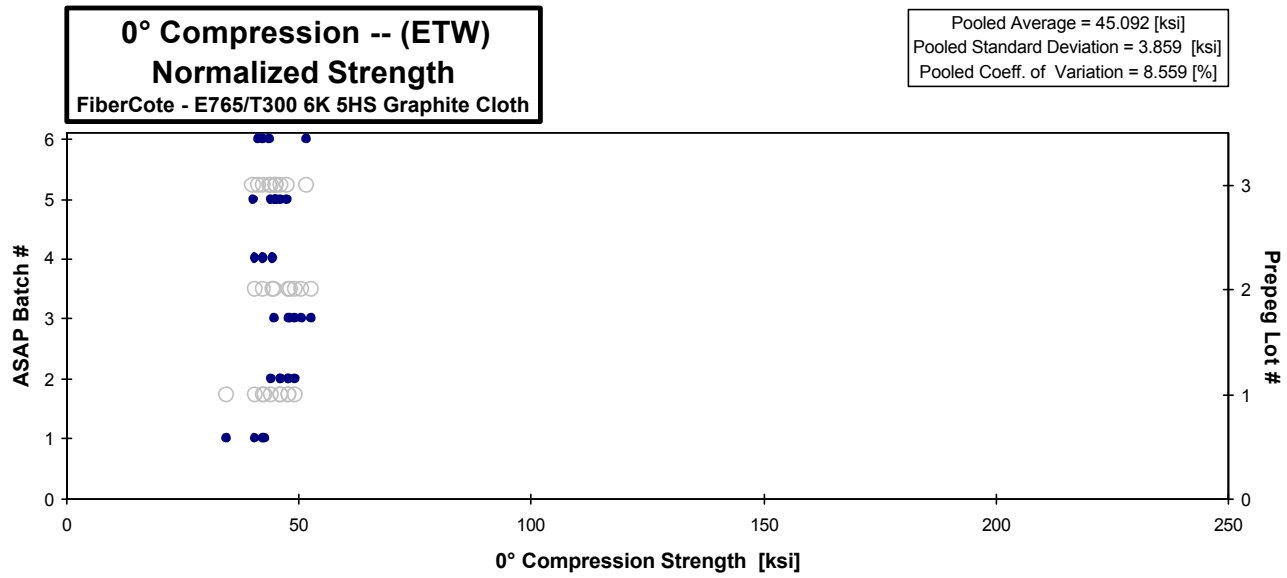
normalizing t_{ply}
 [in]
 0.0152

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksj]	Modulus [Msi]	Avg. Specimen Thicken. [in]	# Plies in Laminate
TFK1119F	3	1	1	34.738		0.090	6
TFK111AF	3	1	1	39.737		0.093	6
TFK111BF	3	1	1	41.469		0.093	6
TFK111CF	3	1	1	41.309		0.094	6
TFL1121F	3	1	1		8.028	0.093	6
TFL1122F	3	1	1		7.795	0.093	6
TFK1211F	4	1	2	45.667		0.092	6
TFK1212F	4	1	2	48.400		0.093	6
TFK1213F	4	1	2	46.825		0.093	6
TFK1214F	4	1	2	45.550		0.093	6
TFK1215F	4	1	2	43.009		0.093	6
TFK1216F	4	1	2	46.028		0.094	6
TFL1235F	4	1	2		8.216	0.093	6
TFL1236F	4	1	2		8.335	0.093	6
TFK2122F	4	2	3	48.744		0.090	6
TFK2123F	4	2	3	53.703		0.089	6
TFK2124F	4	2	3	45.241		0.090	6
TFK2125F	4	2	3	48.530		0.090	6
TFK2126F	4	2	3	51.465		0.090	6
TFK2127F	4	2	3	50.183		0.090	6
TFL2111F	4	2	3		8.278	0.090	6
TFL2112F	4	2	3		8.488	0.089	6
TFK2212F	3	2	4	41.085		0.090	6
TFK2213F	3	2	4	43.131		0.090	6
TFK2214F	3	2	4	44.768		0.090	6
TFL2221F	3	2	4		8.683	0.090	6
TFL2222F	3	2	4		8.592	0.089	6
TFK31211F	3	3	5	46.358		0.089	6
TFK31212F	3	3	5	45.729		0.088	6
TFK31213F	3	3	5	48.741		0.089	6
TFK31215F	3	3	5	46.225		0.089	6
TFK31216F	3	3	5	47.249		0.089	6
TFK31217F	3	3	5	41.217		0.089	6
TFK31218F	3	3	5	46.215		0.089	6
TFL3111F	3	3	5		8.751	0.088	6
TFL3112F	3	3	5		8.520	0.088	6
TFL3113F	3	3	5		8.519	0.089	6
TFK3216F	4	3	6	52.529		0.089	6
TFK3217F	4	3	6	43.717		0.088	6
TFK3218F	4	3	6	42.055		0.090	6
TFK3219F	4	3	6	44.908		0.088	6
TFL3221F	4	3	6		9.088	0.088	6
TFL3222F	4	3	6		8.826	0.089	6

Avg. t_{ply} [in]	Strength _{norm} [ksj]	Modulus _{norm} [Msi]
0.01506	34.414	
0.01549	40.499	
0.01555	42.412	
0.01564	42.498	
0.01555		8.213
0.01558		7.987
0.01537	46.181	
0.01543	49.143	
0.01555	47.891	
0.01543	46.225	
0.01557	44.047	
0.01575	47.681	
0.01552		8.389
0.01558		8.541
0.01505	48.249	
0.01491	52.672	
0.01498	44.584	
0.01493	47.679	
0.01496	50.647	
0.01494	49.330	
0.01505		8.199
0.01480		8.262
0.01503	40.635	
0.01493	42.350	
0.01504	44.302	
0.01498		8.557
0.01486		8.399
0.01478	45.087	
0.01463	44.024	
0.01477	47.365	
0.01483	45.097	
0.01481	46.044	
0.01487	40.325	
0.01480	44.999	
0.01468		8.453
0.01470		8.238
0.01479		8.290
0.01490	51.506	
0.01463	42.075	
0.01492	41.271	
0.01473	43.529	
0.01465		8.761
0.01476		8.572

Average 45.484 8.471
 Standard Dev. 4.018 0.344
 Coeff. of Var. [%] 8.835 4.066
 Min. 34.738 7.795
 Max. 53.703 9.088
 Number of Spec. 30 13

Average_{norm} 0.01506 45.092 8.374
 Standard Dev._{norm} 3.859 0.205
 Coeff. of Var. [%]_{norm} 8.559 2.443
 Min. 0.0146 34.414 7.987
 Max. 0.0157 52.672 8.761
 Number of Spec. 30 13



**0° Compression -- (ETD)
 Strength & Modulus**
 FiberCote - E765/T300 6K 5HS Graphite Cloth

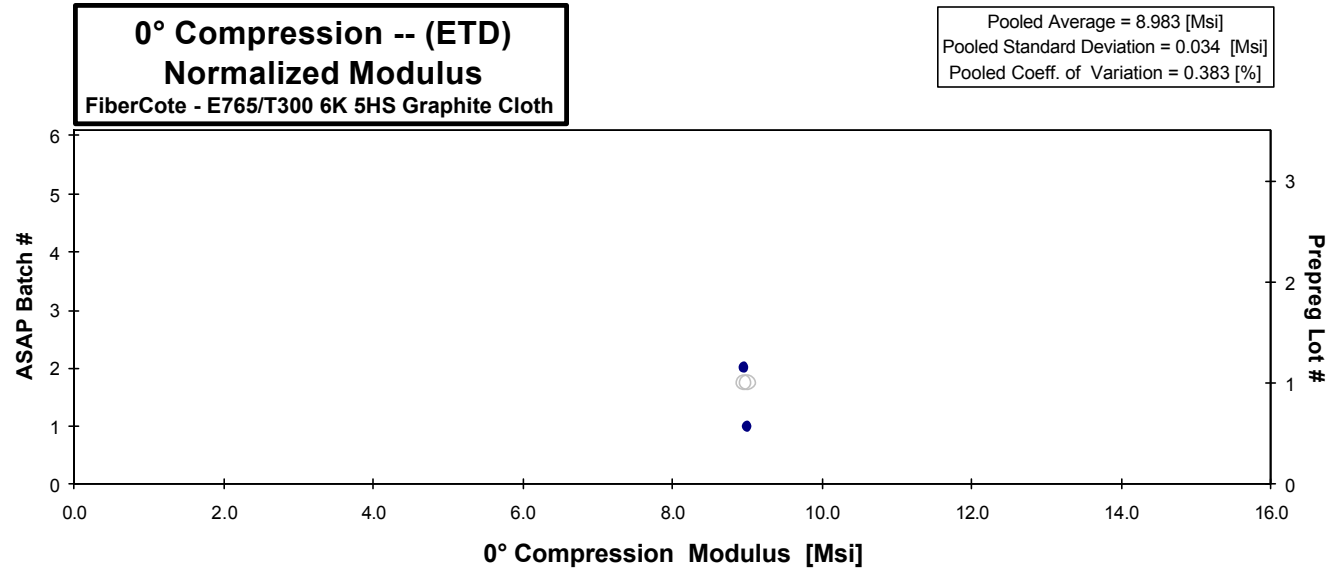
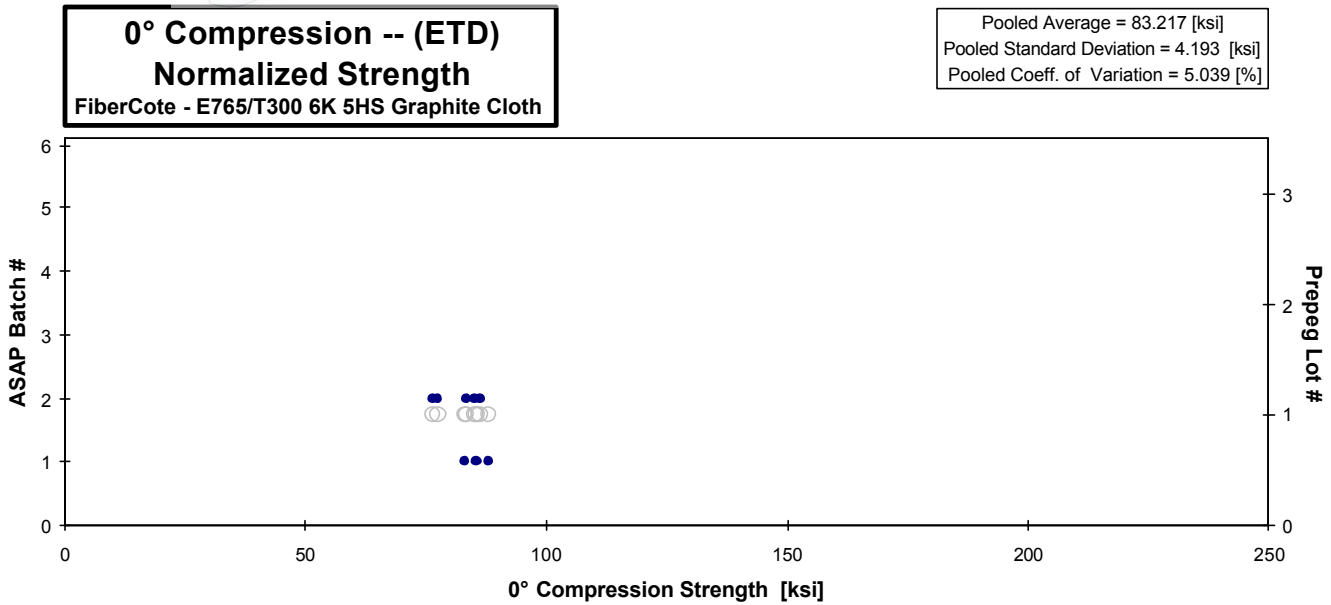
normalizing t_{ply}
 [in]
 0.0152

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate
TFK1129G	3	1	1	84.073		0.093	6
TFK112AG	3	1	1	86.241		0.093	6
TFK112BG	3	1	1	81.361		0.093	6
TFL1125G	3	1	1		8.818	0.093	6
TFK1221G	4	1	2	74.756		0.093	6
TFK1222G	4	1	2	84.928		0.093	6
TFK1223G	4	1	2	83.946		0.093	6
TFK1224G	4	1	2	81.491		0.093	6
TFK1225G	4	1	2	75.167		0.094	6
TFL1239G	4	1	2		8.717	0.094	6

Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
0.01550	85.709	
0.01553	88.133	
0.01553	83.146	
0.01553		9.007
0.01552	76.314	
0.01542	86.161	
0.01545	85.350	
0.01555	83.345	
0.01569	77.578	
0.01562		8.958

Average **81.495** **8.768**
 Standard Dev. **4.350** **0.072**
 Coeff. of Var. [%] **5.337** **0.818**
 Min. **74.756** **8.717**
 Max. **86.241** **8.818**
 Number of Spec. **8** **2**

Average_{norm} **0.01553** **83.217** **8.983**
 Standard Dev._{norm} **4.193** **0.034**
 Coeff. of Var. [%]_{norm} **5.039** **0.383**
 Min. **0.0154** **76.314** **8.958**
 Max. **0.0157** **88.133** **9.007**
 Number of Spec. **8** **2**



**90° Compression -- (RTD)
 Strength & Modulus**
 FiberCote - E765/T300 6K 5HS Graphite Cloth

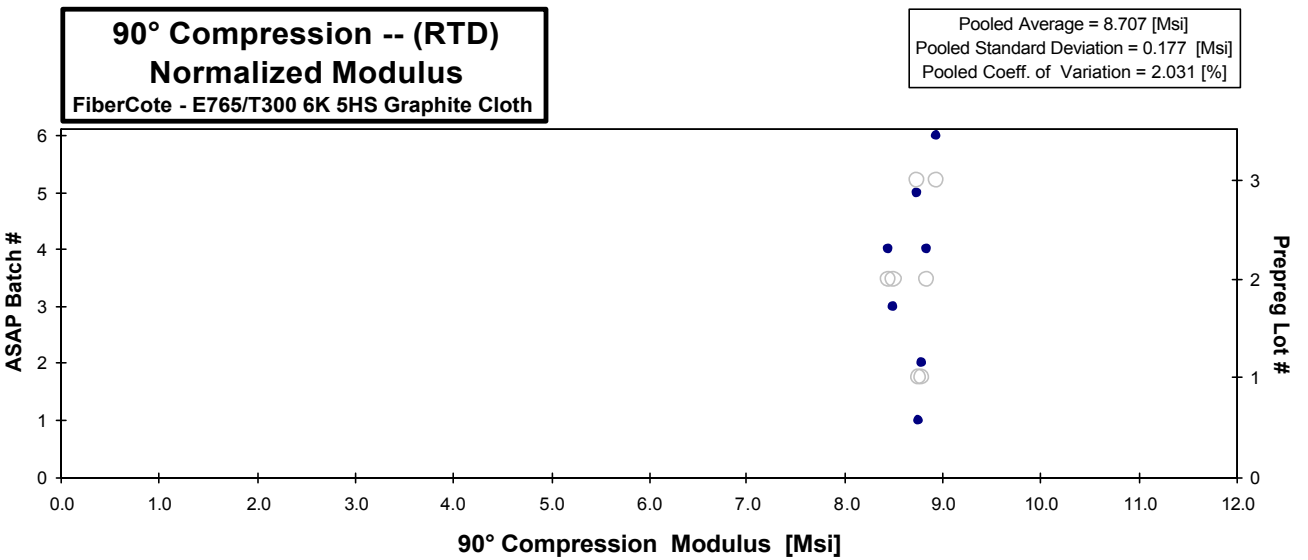
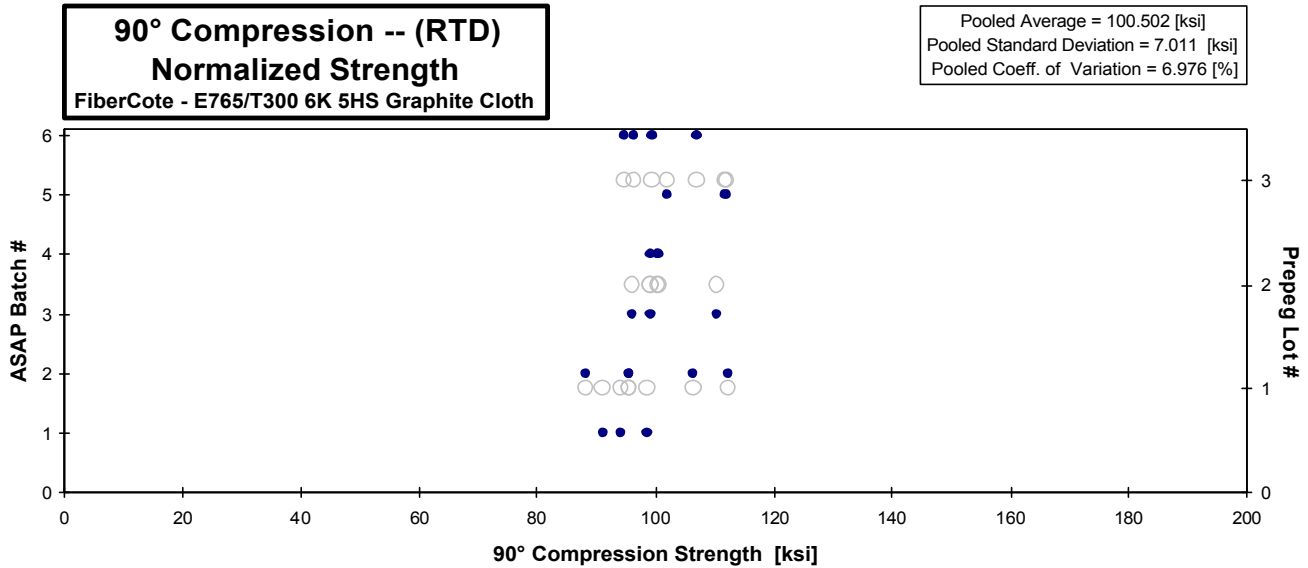
normalizing t_{ply}
 [in]
 0.0152

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksj]	Modulus [Msi]	Avg. Specimen Thicken. [in]	# Plies in Laminate
TFW1137A	4	1	1	91.404		0.094	6
TFW1138A	4	1	1	95.548		0.094	6
TFW1139A	4	1	1	89.141		0.093	6
TFZ1112A	4	1	1		8.464	0.094	6
TFW1231A	3	1	2	94.901		0.092	6
TFW1232A	3	1	2	87.580		0.092	6
TFW1233A	3	1	2	104.875		0.092	6
TFW1234A	3	1	2	109.838		0.093	6
TFW1235A	3	1	2	93.498		0.093	6
TFZ11K6A	3	1	2		8.522	0.094	6
TFW2111A	3	2	3	97.425		0.090	6
TFW2112A	3	2	3	99.796		0.090	6
TFW2113A	3	2	3	111.272		0.090	6
TFZ2118A	3	2	3		8.535	0.091	6
TFW2211A	4	2	4	102.063		0.090	6
TFW2212A	4	2	4	101.176		0.090	6
TFW2213A	4	2	4	98.560		0.092	6
TFZ2227A	4	2	4		8.425	0.091	6
TFZ2228A	4	2	4		8.926	0.090	6
TFW3113A	4	3	5	114.347		0.089	6
TFW3114A	4	3	5	114.665		0.089	6
TFW3117A	4	3	5	105.043		0.088	6
TFZ3117A	4	3	5		8.864	0.090	6
TFW3211A	3	3	6	109.609		0.089	6
TFW3212A	3	3	6	101.347		0.089	6
TFW3213A	3	3	6	98.376		0.089	6
TFW3214A	3	3	6	96.832		0.089	6
TFZ3226A	3	3	6		9.107	0.089	6

Avg. t_{ply} [in]	Strength _{norm} [ksj]	Modulus _{norm} [Msi]
0.01561	94.146	
0.01565	98.677	
0.01550	91.154	
0.01567		8.751
0.01528	95.661	
0.01527	88.234	
0.01540	106.522	
0.01551	112.378	
0.01547	95.404	
0.01560		8.773
0.01493	95.983	
0.01505	99.087	
0.01505	110.450	
0.01508		8.493
0.01493	100.496	
0.01502	100.262	
0.01527	99.295	
0.01520		8.446
0.01499		8.826
0.01483	111.900	
0.01477	111.737	
0.01471	101.929	
0.01492		8.726
0.01478	106.871	
0.01487	99.401	
0.01484	96.324	
0.01481	94.626	
0.01488		8.937

Average **100.824** **8.692**
 Standard Dev. **7.858** **0.269**
 Coeff. of Var. [%] **7.794** **3.092**
 Min. **87.580** **8.425**
 Max. **114.665** **9.107**
 Number of Spec. **21** **7**

Average_{norm} **0.01514** **100.502** **8.707**
 Standard Dev._{norm} **7.011** **0.177**
 Coeff. of Var. [%]_{norm} **6.976** **2.031**
 Min. **0.0147** **88.234** **8.446**
 Max. **0.0157** **112.378** **8.937**
 Number of Spec. **21** **7**



**90° Compression -- (CTD)
 Strength & Modulus**
 FiberCote - E765/T300 6K 5HS Graphite Cloth

normalizing t_{ply}
 [in]
 0.0152

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate
TFW1131B	4	1	1	107.963		0.094	6
TFW1132B	4	1	1	102.590		0.093	6
TFW1133B	4	1	1	117.562		0.093	6
TFZ1115B	4	1	1		8.527	0.095	6
TFW1239B	3	1	2	113.385		0.094	6
TFW123AB	3	1	2	113.647		0.093	6
TFW123BB	3	1	2	118.105		0.094	6
TFZ11K1B	3	1	2		8.589	0.094	6

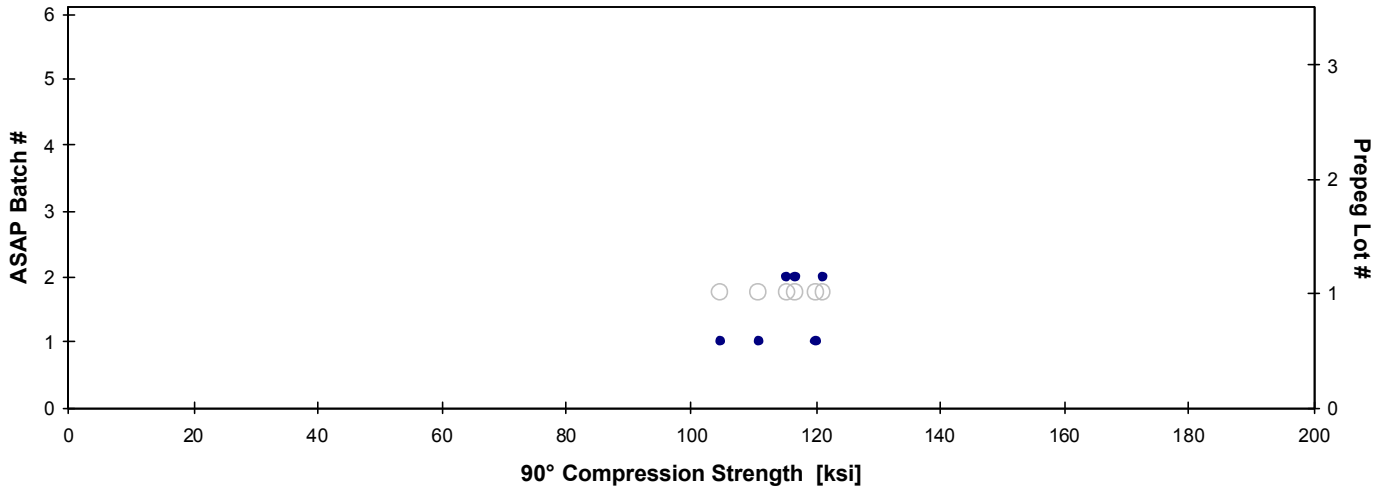
Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
0.01561	110.893	
0.01550	104.615	
0.01552	120.044	
0.01584		8.884
0.01567	116.866	
0.01542	115.299	
0.01561	121.310	
0.01563		8.829

Average **112.209** **8.558**
 Standard Dev. **5.957** **0.044**
 Coeff. of Var. [%] **5.309** **0.516**
 Min. **102.590** **8.527**
 Max. **118.105** **8.589**
 Number of Spec. **6** **2**

Average_{norm} **0.01560** **114.838** **8.857**
 Standard Dev._{norm} **6.219** **0.039**
 Coeff. of Var. [%]_{norm} **5.415** **0.439**
 Min. **0.0154** **104.615** **8.829**
 Max. **0.0158** **121.310** **8.884**
 Number of Spec. **6** **2**

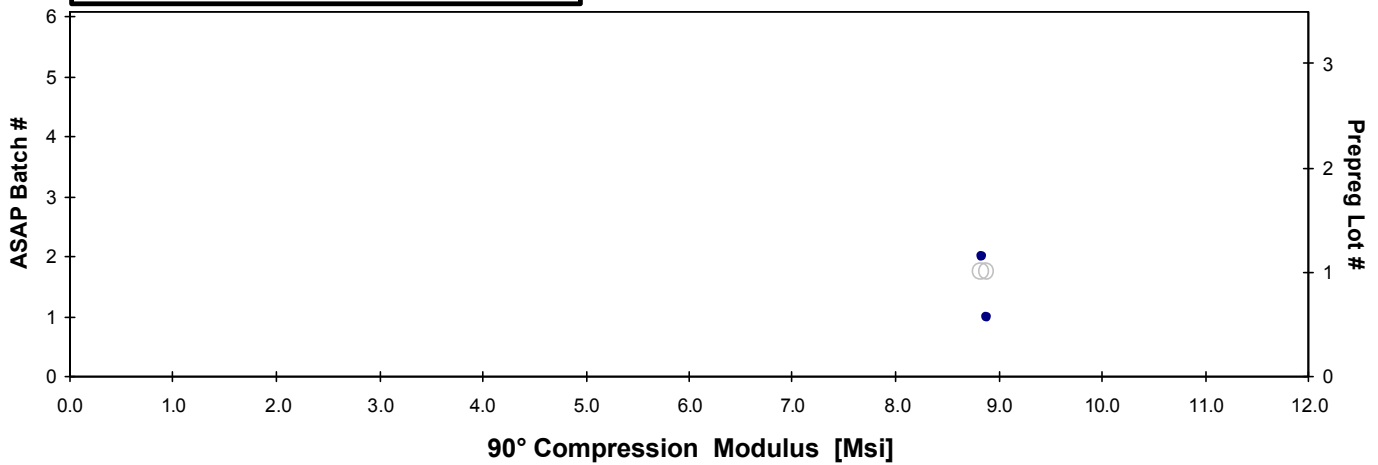
**90° Compression -- (CTD)
 Normalized Strength**
 FiberCote - E765/T300 6K 5HS Graphite Cloth

Pooled Average = 114.838 [ksi]
 Pooled Standard Deviation = 6.219 [ksi]
 Pooled Coeff. of Variation = 5.415 [%]



**90° Compression -- (CTD)
 Normalized Modulus**
 FiberCote - E765/T300 6K 5HS Graphite Cloth

Pooled Average = 8.857 [Msi]
 Pooled Standard Deviation = 0.039 [Msi]
 Pooled Coeff. of Variation = 0.439 [%]



**90° Compression -- (ETW)
 Strength & Modulus**
 FiberCote - E765/T300 6K 5HS Graphite Cloth

normalizing t_{ply}
 [in]
0.0152

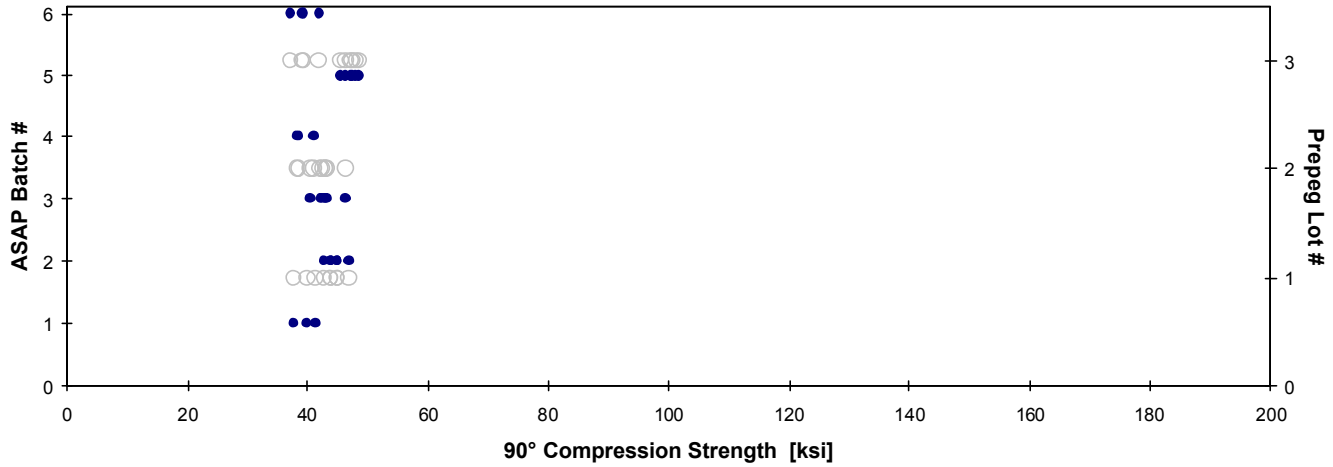
Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thicken. [in]	# Plies in Laminate
TFW113CF	4	1	1	39.604		0.095	6
TFW113DF	4	1	1	36.275		0.095	6
TFW113EF	4	1	1	38.833		0.094	6
TFZ1122F	4	1	1		8.298	0.091	6
TFZ1124F	4	1	1		8.548	0.093	6
TFW1211F	3	1	2	44.161		0.093	6
TFW1212F	3	1	2	42.035		0.093	6
TFW1213F	3	1	2	45.631		0.094	6
TFW1214F	3	1	2	44.088		0.093	6
TFW1215F	3	1	2	42.815		0.093	6
TFW1216F	3	1	2	42.883		0.093	6
TFZ11K7F	3	1	2		7.568	0.093	6
TFZ11K8F	3	1	2		7.844	0.093	6
TFW2131F	3	2	3	43.790		0.090	6
TFW2134F	3	2	3	42.893		0.092	6
TFW2135F	3	2	3	42.740		0.090	6
TFW2136F	3	2	3	46.647		0.090	6
TFW2138F	3	2	3	42.521		0.091	6
TFW2139F	3	2	3	40.891		0.090	6
TFW213AF	3	2	3	44.099		0.090	6
TFZ2111F	3	2	3		7.984	0.091	6
TFZ2112F	3	2	3		7.875	0.091	6
TFZ2113F	3	2	3		7.220	0.091	6
TFW221DF	4	2	4	38.556		0.091	6
TFW221EF	4	2	4	39.091		0.090	6
TFW221FF	4	2	4	41.671		0.090	6
TFZ2221F	4	2	4		8.395	0.091	6
TFZ2222F	4	2	4		8.367	0.090	6
TFW3121F	4	3	5	47.320		0.089	6
TFW3122F	4	3	5	49.891		0.089	6
TFW3123F	4	3	5	46.763		0.089	6
TFW3124F	4	3	5	47.933		0.090	6
TFW3125F	4	3	5	48.514		0.089	6
TFW3126F	4	3	5	49.034		0.089	6
TFZ3112F	4	3	5		8.755	0.089	6
TFZ3113F	4	3	5		8.986	0.088	6
TFW3219F	3	3	6	42.659		0.089	6
TFW321AF	3	3	6	40.435		0.089	6
TFW321BF	3	3	6	37.935		0.089	6
TFW321CF	3	3	6	39.828		0.090	6
TFZ3221F	3	3	6		8.876	0.088	6
TFZ3222F	3	3	6		8.531	0.088	6

Avg. t _{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
0.01586	41.330	
0.01584	37.806	
0.01568	40.057	
0.01523		8.316
0.01544		8.684
0.01544	44.864	
0.01546	42.750	
0.01560	46.844	
0.01552	45.019	
0.01553	43.731	
0.01550	43.718	
0.01548		7.707
0.01543		7.964
0.01492	42.986	
0.01525	43.034	
0.01501	42.201	
0.01508	46.263	
0.01520	42.521	
0.01503	40.442	
0.01493	43.313	
0.01520		7.982
0.01511		7.827
0.01510		7.173
0.01510	38.313	
0.01497	38.502	
0.01499	41.089	
0.01509		8.335
0.01503		8.273
0.01490	46.386	
0.01482	48.633	
0.01477	45.443	
0.01501	47.329	
0.01487	47.463	
0.01490	48.079	
0.01478		8.510
0.01471		8.695
0.01489	41.794	
0.01480	39.359	
0.01486	37.082	
0.01498	39.239	
0.01461		8.533
0.01470		8.251

Average	43.087	8.250	Average_{norm}	0.01513	42.951	8.173
Standard Dev.	3.560	0.524	Standard Dev. _{norm}		3.291	0.434
Coeff. of Var. [%]	8.262	6.353	Coeff. of Var. [%] _{norm}		7.663	5.307
Min.	36.275	7.220	Min.	0.0146	37.082	7.173
Max.	49.891	8.986	Max.	0.0159	48.633	8.695
Number of Spec.	29	13	Number of Spec.		29	13

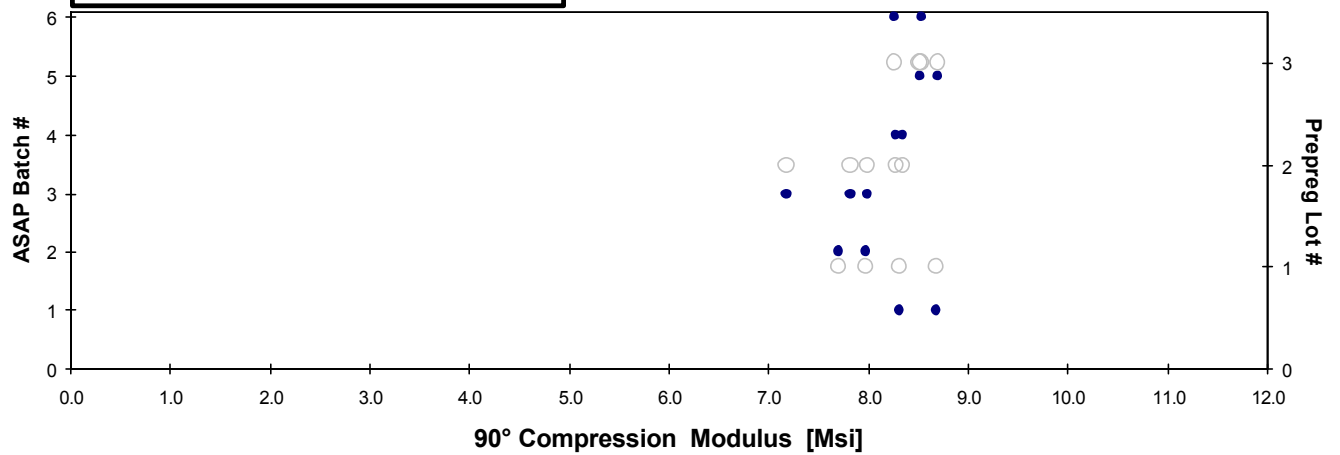
90° Compression -- (ETW)
Normalized Strength
 FiberCote - E765/T300 6K 5HS Graphite Cloth

Pooled Average = 42.951 [ksi]
 Pooled Standard Deviation = 3.291 [ksi]
 Pooled Coeff. of Variation = 7.663 [%]



90° Compression -- (ETW)
Normalized Modulus
 FiberCote - E765/T300 6K 5HS Graphite Cloth

Pooled Average = 8.173 [Msi]
 Pooled Standard Deviation = 0.434 [Msi]
 Pooled Coeff. of Variation = 5.307 [%]



90° Compression -- (ETD)
Strength & Modulus
 FiberCote - E765/T300 6K 5HS Graphite Cloth

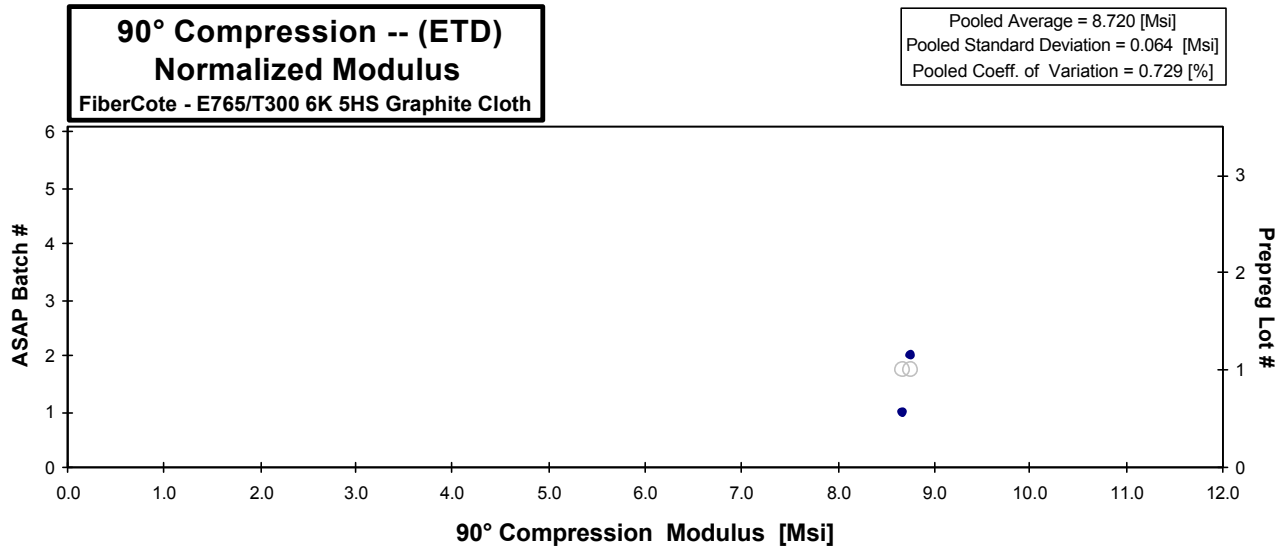
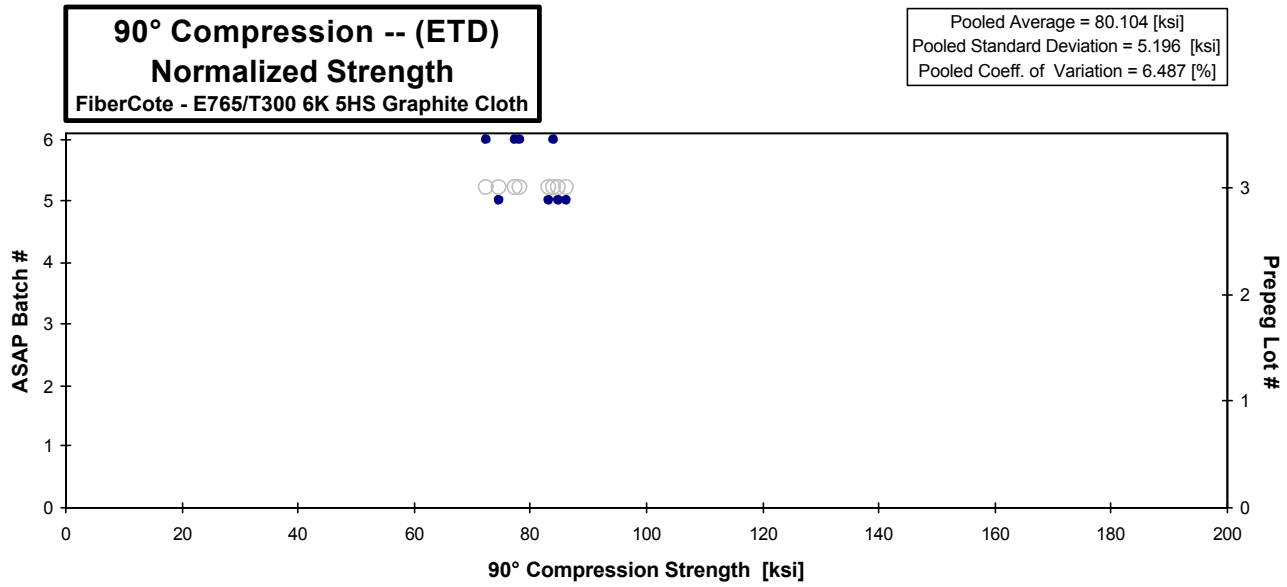
normalizing t_{ply}
 [in]
 0.0152

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate
TFW312AG	4	3	5	86.640		0.089	6
TFW312BG	4	3	5	84.014		0.090	6
TFW312CG	4	3	5	76.225		0.089	6
TFW312DG	4	3	5	87.806		0.090	6
TFZ1125G	4	1	1		8.523	0.093	6
TFW3215G	3	3	6	73.595		0.090	6
TFW3216G	3	3	6	84.984		0.090	6
TFW3217G	3	3	6	79.643		0.090	6
TFW3218G	3	3	6	79.208		0.089	6
TFZ11K3G	3	1	2		8.611	0.093	6

Avg. t_{ply} [in]	Strength _{norm} [ksi]	Modulus _{norm} [Msi]
0.01490	84.930	
0.01506	83.254	
0.01486	74.533	
0.01494	86.290	
0.01547		8.675
0.01494	72.344	
0.01502	83.959	
0.01493	78.224	
0.01483	77.297	
0.01547		8.765

Average **81.514** **8.567**
 Standard Dev. **5.122** **0.062**
 Coeff. of Var. [%] **6.284** **0.729**
 Min. **73.595** **8.523**
 Max. **87.806** **8.611**
 Number of Spec. **8** **2**

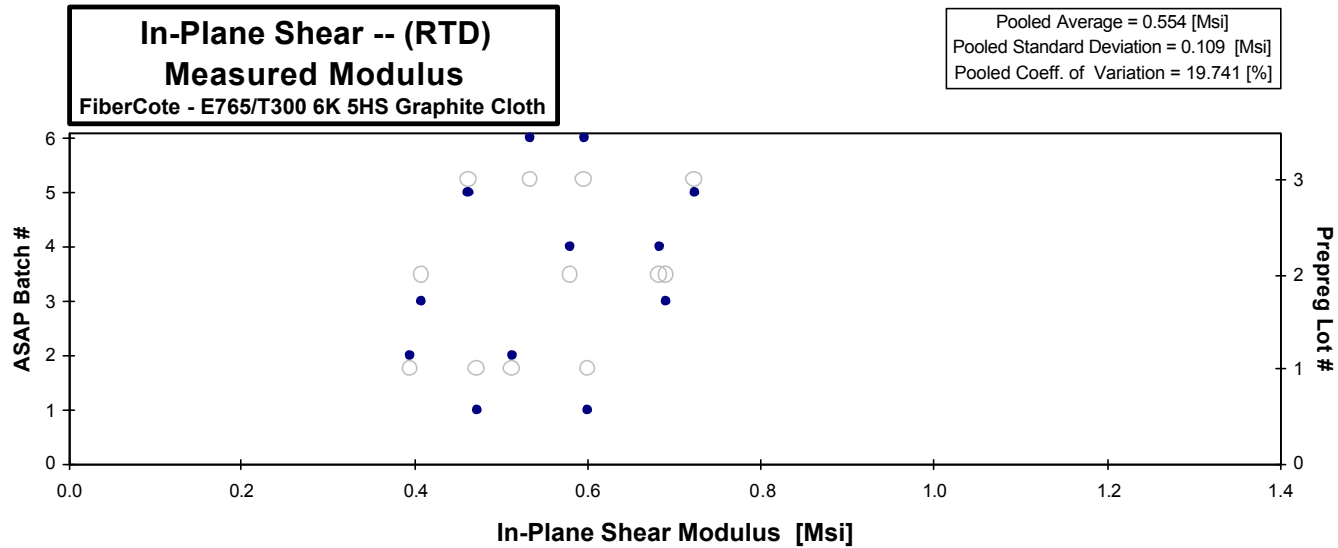
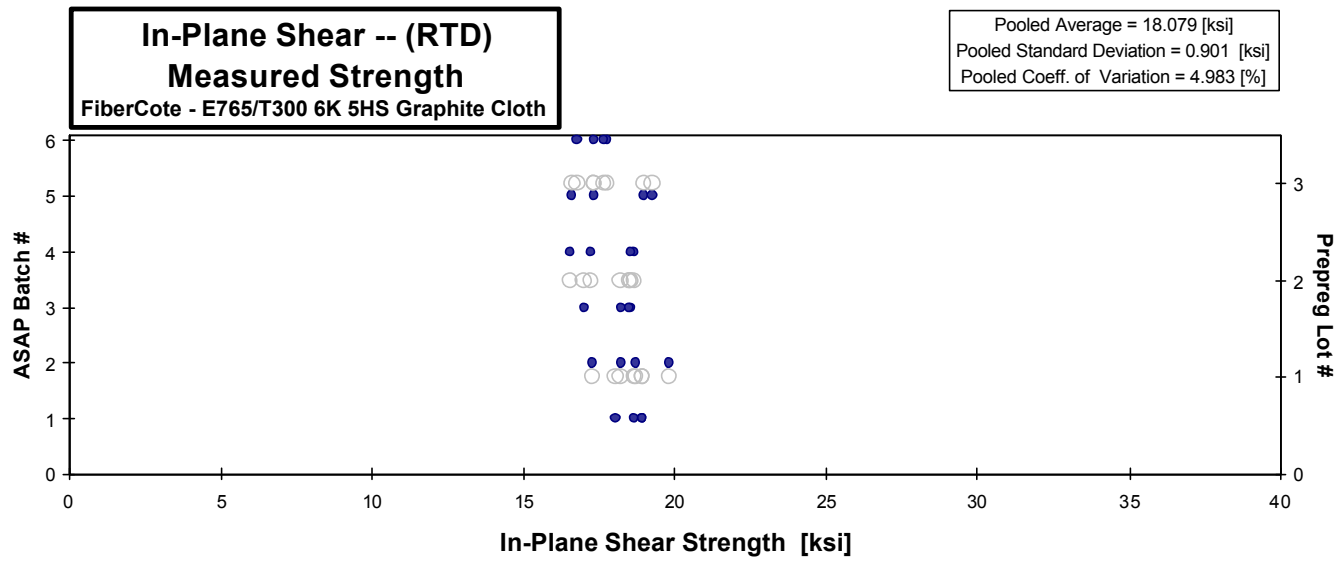
Average_{norm} **0.01504** **80.104** **8.720**
 Standard Dev._{norm} **5.196** **0.064**
 Coeff. of Var. [%]_{norm} **6.487** **0.729**
 Min. **0.0148** **72.344** **8.675**
 Max. **0.0155** **86.290** **8.765**
 Number of Spec. **8** **2**



In-Plane Shear -- (RTD) Strength & Modulus FiberCote - E765/T300 6K 5HS Graphite Cloth
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Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t _{ply} [in]
TFN1129A	5	1	1	18.047	0.599	0.164	10	0.01637
TFN112AA	5	1	1	18.949		0.163	10	0.01630
TFN112BA	5	1	1	18.975		0.163	10	0.01628
TFN1115A	5	1	1	18.690	0.473	0.163	10	0.01633
TFN1221A	4	1	2	18.755	0.513	0.162	10	0.01620
TFN1222A	4	1	2	18.235		0.163	10	0.01626
TFN1223A	4	1	2	17.273		0.163	10	0.01629
TFN1224A	4	1	2	19.821	0.394	0.163	10	0.01625
TFN2111A	5	2	3	16.998	0.690	0.158	10	0.01584
TFN2112A	5	2	3	18.574		0.158	10	0.01578
TFN2113A	5	2	3	18.222		0.159	10	0.01587
TFN2119A	5	2	3	18.481	0.408	0.158	10	0.01578
TFN2211A	4	2	4	16.553	0.682	0.159	10	0.01592
TFN2212A	4	2	4	18.651		0.157	10	0.01574
TFN2213A	4	2	4	18.566		0.159	10	0.01590
TFN2214A	4	2	4	17.257	0.579	0.157	10	0.01569
TFN3112A	5	3	5	17.321		0.154	10	0.01544
TFN3113A	5	3	5	16.630		0.155	10	0.01547
TFN3114A	5	3	5	19.307	0.462	0.154	10	0.01535
TFN3115A	5	3	5	18.994	0.722	0.154	10	0.01542
TFN3211A	6	3	6	17.767	0.534	0.156	10	0.01563
TFN3212A	6	3	6	17.348		0.155	10	0.01548
TFN3213A	6	3	6	16.818		0.154	10	0.01541
TFN3214A	6	3	6	17.674	0.596	0.155	10	0.01551

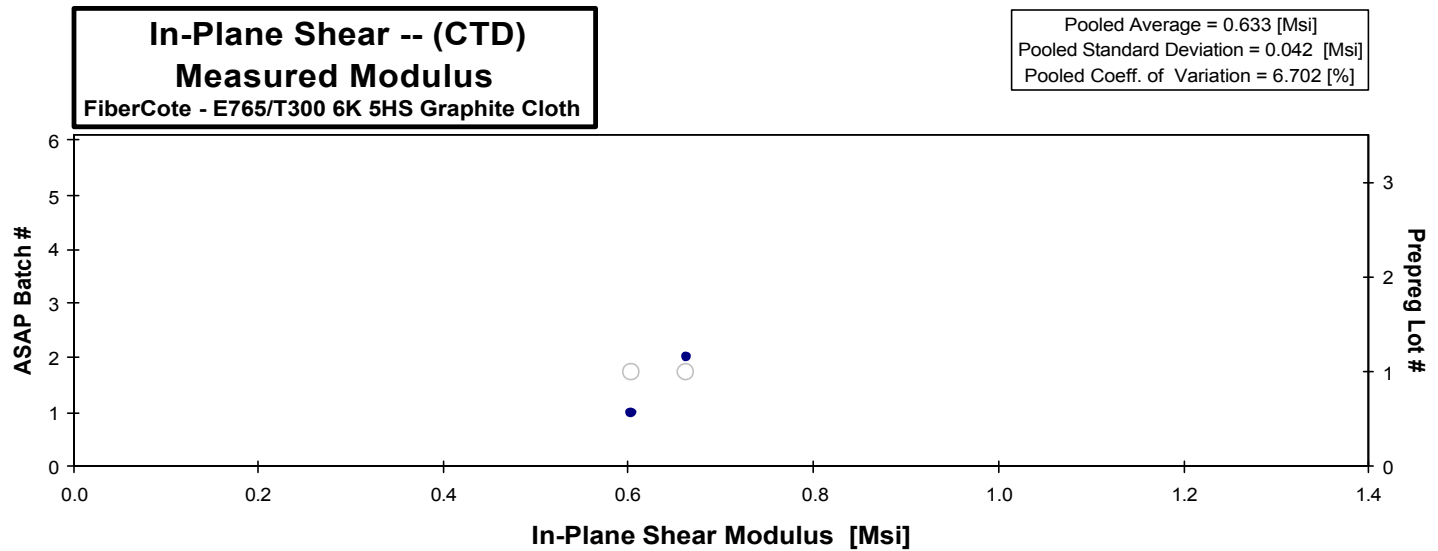
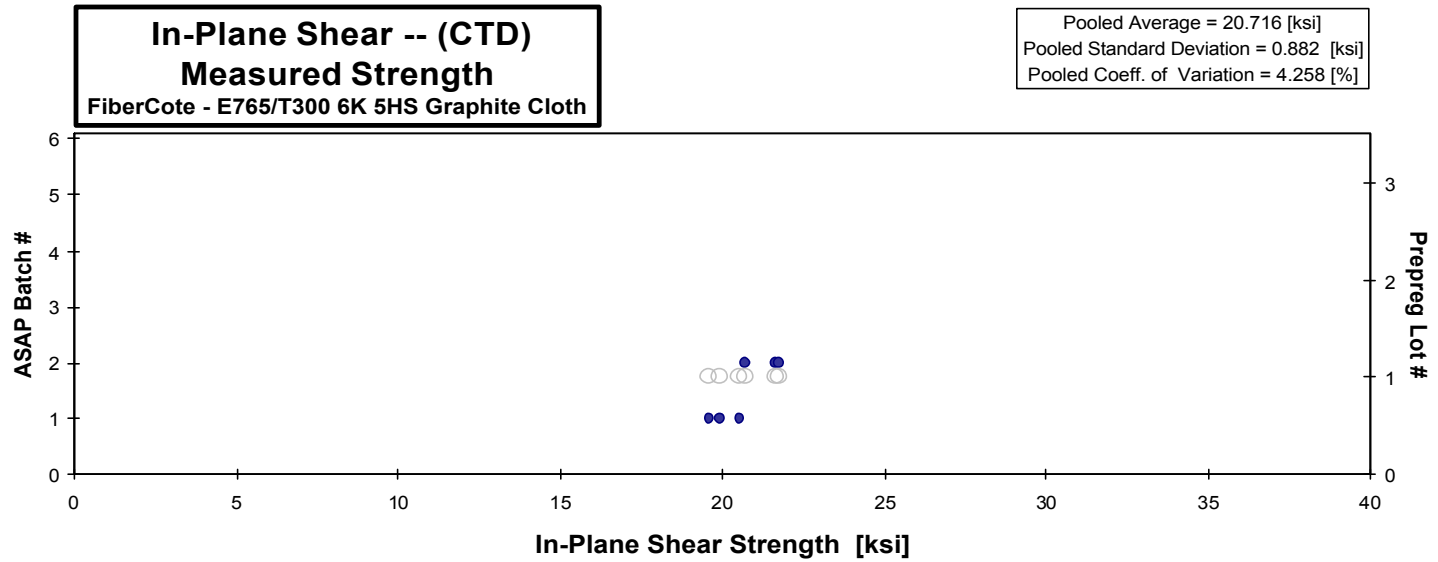
Average	18.079	0.554	Average	0.0159
Standard Dev.	0.901	0.109		
Coeff. of Var. [%]	4.983	19.741		
Min.	16.553	0.394	Min.	0.0154
Max.	19.821	0.722	Max.	0.0164
Number of Spec.	24	12		



**In-Plane Shear -- (CTD)
 Strength & Modulus**
 FiberCote - E765/T300 6K 5HS Graphite Cloth

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thckn. [in]	# Plies in Laminate	Avg. t _{ply} [in]
TFN1111B	5	1	1	19.586	0.603	0.161	10	0.01605
TFN1112B	5	1	1	20.568		0.161	10	0.01610
TFN1113B	5	1	1	19.966		0.163	10	0.01632
TFN121AB	4	1	2	20.732	0.663	0.162	10	0.01619
TFN121BB	4	1	2	21.672		0.162	10	0.01622
TFN121CB	4	1	2	21.772		0.162	10	0.01624

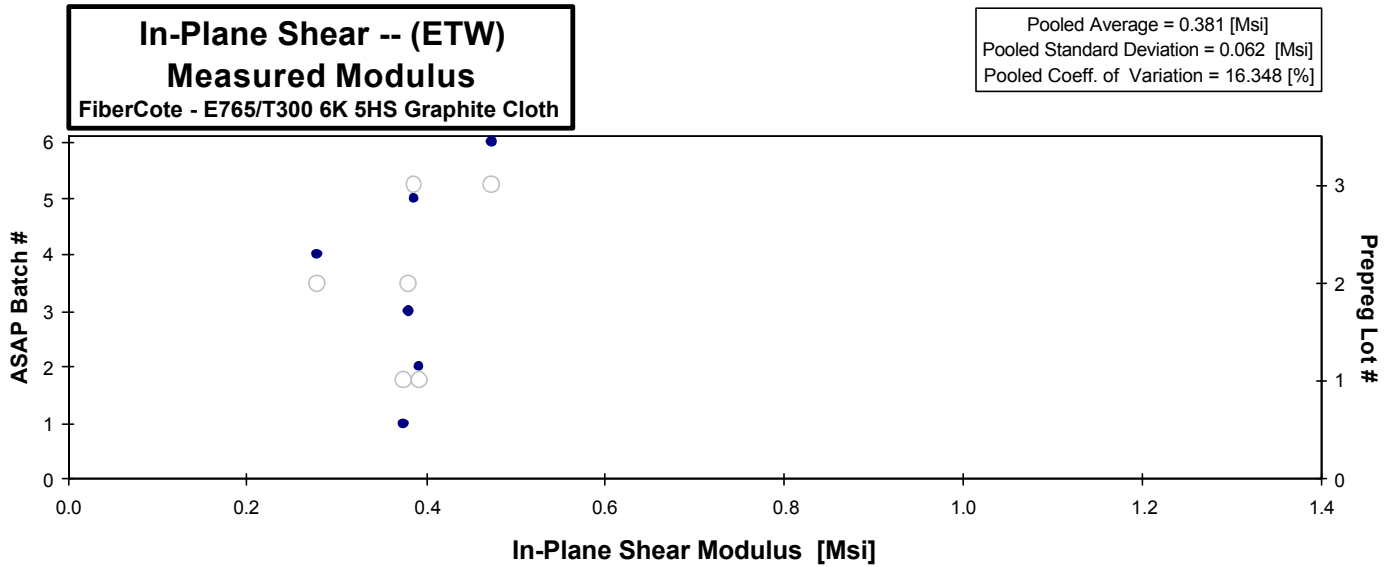
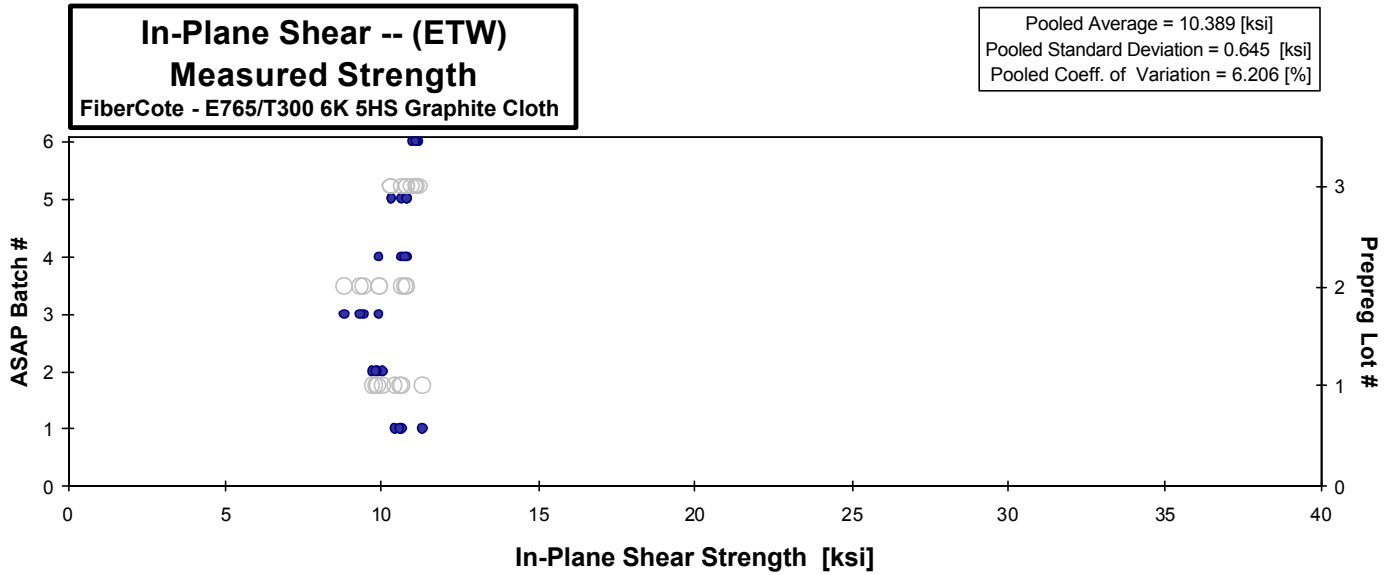
Average	20.716	0.633	Average	0.0162
Standard Dev.	0.882	0.042		
Coeff. of Var. [%]	4.258	6.702		
Min.	19.586	0.603	Min.	0.0161
Max.	21.772	0.663	Max.	0.0163
Number of Spec.	6	2		



In-Plane Shear -- (ETW) Strength & Modulus FiberCote - E765/T300 6K 5HS Graphite Cloth
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Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t _{ply} [in]
TFN1117F	5	1	1	11.345	0.375	0.163	10	0.01629
TFN1118F	5	1	1	10.671		0.162	10	0.01622
TFN1119F	5	1	1	10.417		0.162	10	0.01622
TFN111AF	5	1	1	10.629		0.162	10	0.01618
TFN1211F	4	1	2	9.750	0.392	0.160	10	0.01601
TFN1212F	4	1	2	10.080		0.162	10	0.01622
TFN1213F	4	1	2	9.885		0.163	10	0.01627
TFN1214F	4	1	2	9.844		0.162	10	0.01621
TFN2121F	5	2	3	8.821	0.380	0.158	10	0.01576
TFN2122F	5	2	3	9.443		0.159	10	0.01587
TFN2123F	5	2	3	9.946		0.158	10	0.01582
TFN2124F	5	2	3	9.326		0.158	10	0.01579
TFN2216F	4	2	4	9.920	0.278	0.158	10	0.01579
TFN2217F	4	2	4	10.646		0.158	10	0.01579
TFN2218F	4	2	4	10.826		0.157	10	0.01571
TFN2219F	4	2	4	10.770		0.158	10	0.01578
TFN3121F	5	3	5	10.332		0.153	10	0.01533
TFN3122F	5	3	5	10.819		0.153	10	0.01532
TFN3123F	5	3	5	10.647	0.387	0.154	10	0.01541
TFN3124F	5	3	5	10.808		0.154	10	0.01538
TFN3125F	5	3	5	10.346		0.154	10	0.01542
TFN3216F	6	3	6	10.974	0.474	0.155	10	0.01551
TFN3217F	6	3	6	11.215		0.154	10	0.01543
TFN3218F	6	3	6	11.157		0.156	10	0.01556
TFN3219F	6	3	6	11.113		0.154	10	0.01540

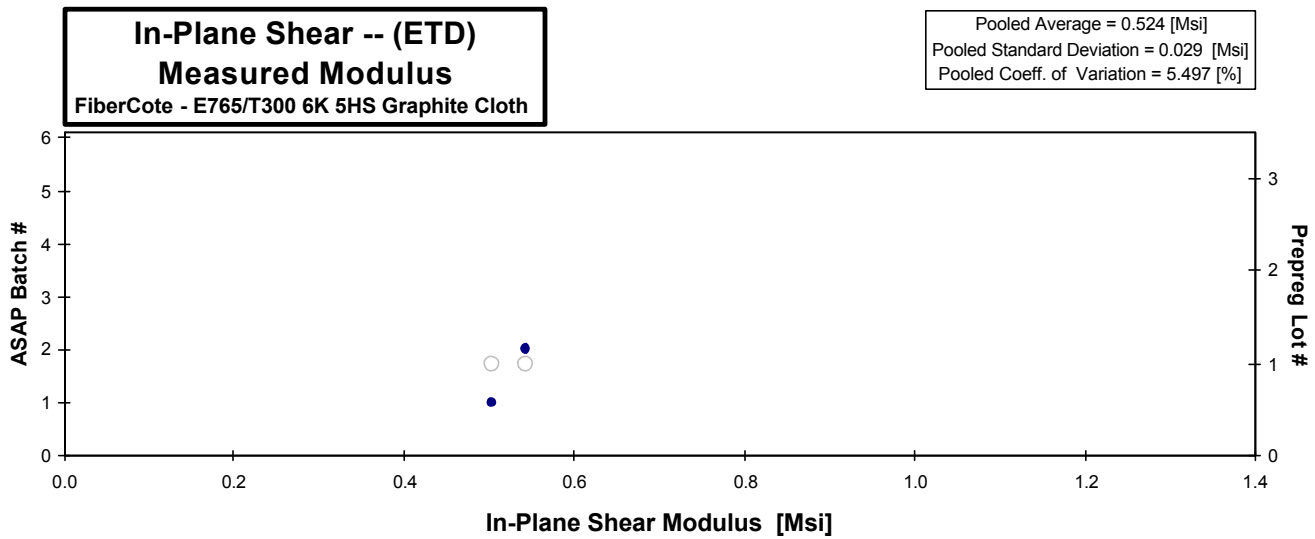
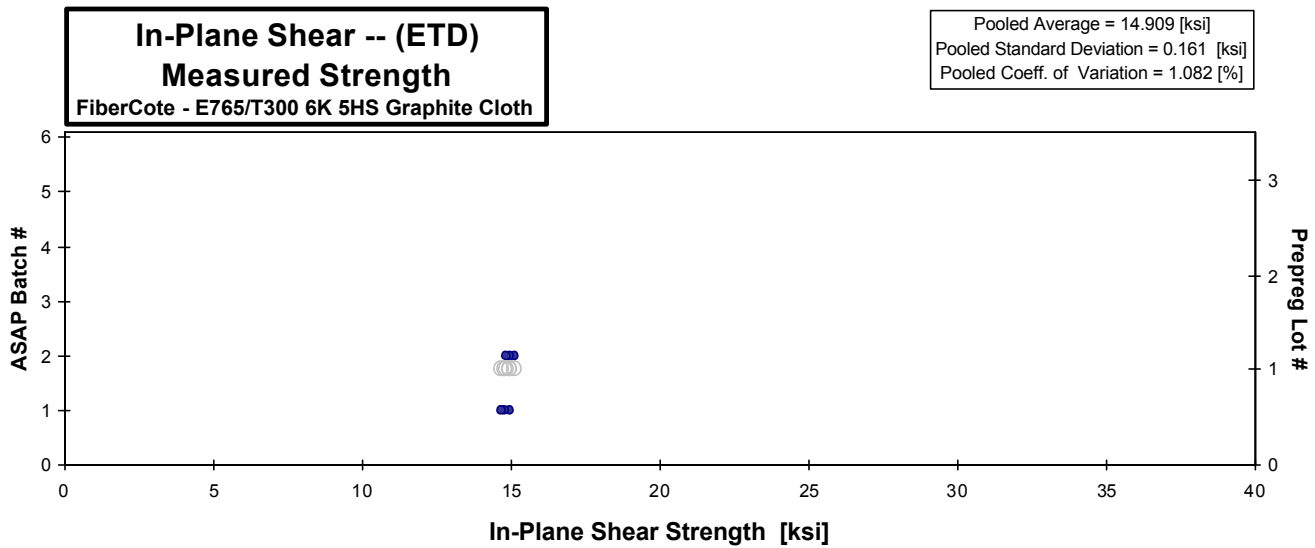
Average	10.389	0.381	Average	0.0158
Standard Dev.	0.645	0.062		
Coeff. of Var. [%]	6.206	16.348		
Min.	8.821	0.278	Min.	0.0153
Max.	11.345	0.474	Max.	0.0163
Number of Spec.	25	6		



In-Plane Shear -- (ETD) Strength & Modulus FiberCote - E765/T300 6K 5HS Graphite Cloth
--

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t _{ply} [in]
TFN1121G	5	1	1	14.995	0.503	0.160	10	0.01600
TFN1122G	5	1	1	14.832		0.162	10	0.01617
TFN1123G	5	1	1	14.672		0.162	10	0.01620
TFN1229G	4	1	2	15.129	0.544	0.163	10	0.01628
TFN122AG	4	1	2	14.991		0.163	10	0.01625
TFN122BG	4	1	2	14.835		0.163	10	0.01631

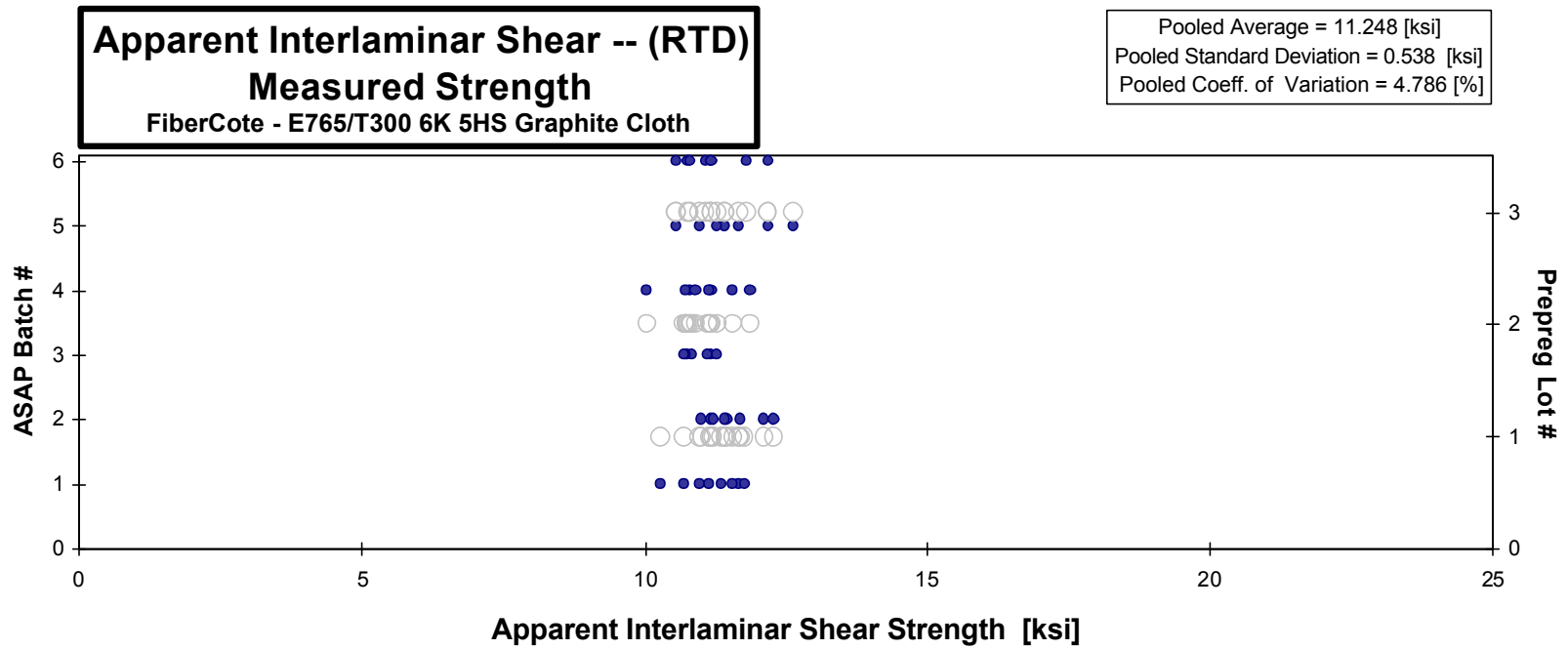
Average	14.909	0.524	Average	0.0162
Standard Dev.	0.161	0.029		
Coeff. of Var. [%]	1.082	5.497		
Min.	14.672	0.503	Min.	0.0160
Max.	15.129	0.544	Max.	0.0163
Number of Spec.	6	2		



**Apparent Interlaminar Shear -- (RTD)
 Strength**
 FiberCote - E765/T300 6K 5HS Graphite Cloth

Specimen Number	Cure Cycle	Prepreg Lot #	ASAP Batch #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]
TFQ1111A	5	1	1	11.657	0.092	6	0.01538
TFQ1112A	5	1	1	11.787	0.092	6	0.01528
TFQ1113A	5	1	1	11.369	0.092	6	0.01537
TFQ1114A	5	1	1	10.296	0.092	6	0.01533
TFQ1115A	5	1	1	11.142	0.091	6	0.01522
TFQ1116A	5	1	1	10.979	0.093	6	0.01549
TFQ1117A	5	1	1	10.712	0.091	6	0.01515
TFQ1118A	5	1	1	11.565	0.092	6	0.01535
TFQ11U1A	2	1	2	11.187	0.094	6	0.01565
TFQ11U2A	2	1	2	11.465	0.093	6	0.01553
TFQ11U3A	2	1	2	11.221	0.094	6	0.01566
TFQ11U4A	2	1	2	11.417	0.093	6	0.01544
TFQ11U5A	2	1	2	11.023	0.093	6	0.01557
TFQ11U6A	2	1	2	11.693	0.094	6	0.01569
TFQ11U7A	2	1	2	12.115	0.092	6	0.01538
TFQ11U8A	2	1	2	12.296	0.093	6	0.01549
TFQ2111A	6	2	3	10.769	0.091	6	0.01517
TFQ2112A	6	2	3	11.190	0.090	6	0.01505
TFQ2113A	6	2	3	11.281	0.089	6	0.01490
TFQ2114A	6	2	3	10.829	0.089	6	0.01490
TFQ2115A	6	2	3	11.135	0.090	6	0.01497
TFQ2117A	6	2	3	10.749	0.091	6	0.01519
TFQ2118A	6	2	3	10.702	0.090	6	0.01494
TFQ2311A	3	2	4	11.881	0.091	6	0.01510
TFQ2312A	3	2	4	10.817	0.090	6	0.01497
TFQ2313A	3	2	4	10.731	0.090	6	0.01497
TFQ2314A	3	2	4	11.563	0.091	6	0.01511
TFQ2315A	3	2	4	11.185	0.090	6	0.01498
TFQ2316A	3	2	4	10.036	0.090	6	0.01498
TFQ2317A	3	2	4	11.137	0.090	6	0.01493
TFQ2318A	3	2	4	10.904	0.089	6	0.01490
TFQ3111A	5	3	5	10.976	0.087	6	0.01449
TFQ3112A	5	3	5	11.445	0.089	6	0.01476
TFQ3113A	5	3	5	11.444	0.089	6	0.01478
TFQ3114A	5	3	5	12.184	0.087	6	0.01453
TFQ3115A	5	3	5	11.688	0.087	6	0.01455
TFQ3116A	5	3	5	12.635	0.087	6	0.01453
TFQ3117A	5	3	5	10.579	0.089	6	0.01482
TFQ3118A	5	3	5	11.295	0.088	6	0.01465
TFQ3411A	4	3	6	11.174	0.089	6	0.01488
TFQ3412A	4	3	6	11.077	0.088	6	0.01473
TFQ3413A	4	3	6	12.206	0.088	6	0.01469
TFQ3414A	4	3	6	10.763	0.088	6	0.01461
TFQ3415A	4	3	6	11.809	0.089	6	0.01475
TFQ3416A	4	3	6	11.182	0.089	6	0.01482
TFQ3417A	4	3	6	10.801	0.087	6	0.01455
TFQ3418A	4	3	6	10.558	0.088	6	0.01473

Average	11.248	Average	0.0150
Standard Dev.	0.538		
Coeff. of Var. [%]	4.786		
Min.	10.036	Min.	0.0145
Max.	12.635	Max.	0.0157
Number of Spec.	47		



3.2.2 Fluid Sensitivity Raw Data Spreadsheets and Scatter Charts

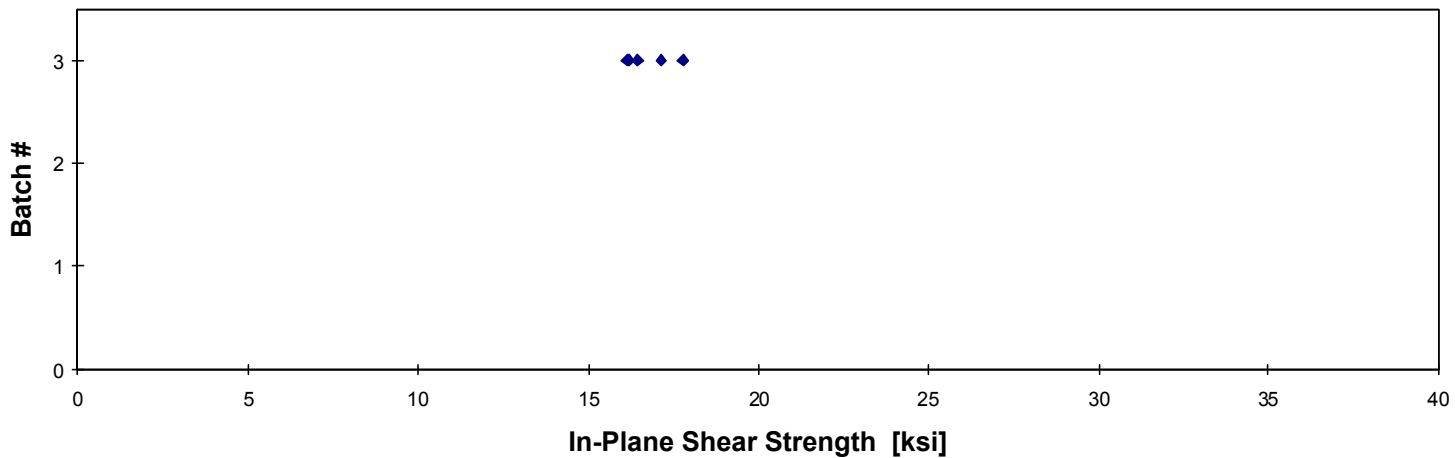
**In-Plane Shear -- (MEK - RTD)
 Strength**
 FiberCote - E765/T300 6K 5HS Graphite Cloth

Specimen Number	Batch Number	Strength [ksi]	Avg. Specimen Thicken. [in]	# Plies in Laminate	Avg. t_{ply} [in]
TFN3119T	3	16.444	0.154	10	0.01539
TFN311AT	3	16.128	0.154	10	0.01536
TFN311BT	3	16.189	0.154	10	0.01536
TFN312AT	3	17.141	0.156	10	0.01556
TFN312CT	3	17.788	0.155	10	0.01546

Average	16.738	0.0154
Standard Dev.	0.711	
Coeff. of Var. [%]	4.251	
Min.	16.128	Min. 0.0154
Max.	17.788	Max. 0.0156
Number of Spec.	5	

**In-Plane Shear -- (MEK - RTD)
 Measured Strength**
 FiberCote - E765/T300 6K 5HS Graphite Cloth

Pooled Average = 16.738 [ksi]
 Pooled Standard Deviation = 0.711 [ksi]
 Pooled Coeff. of Variation = 4.251 [%]



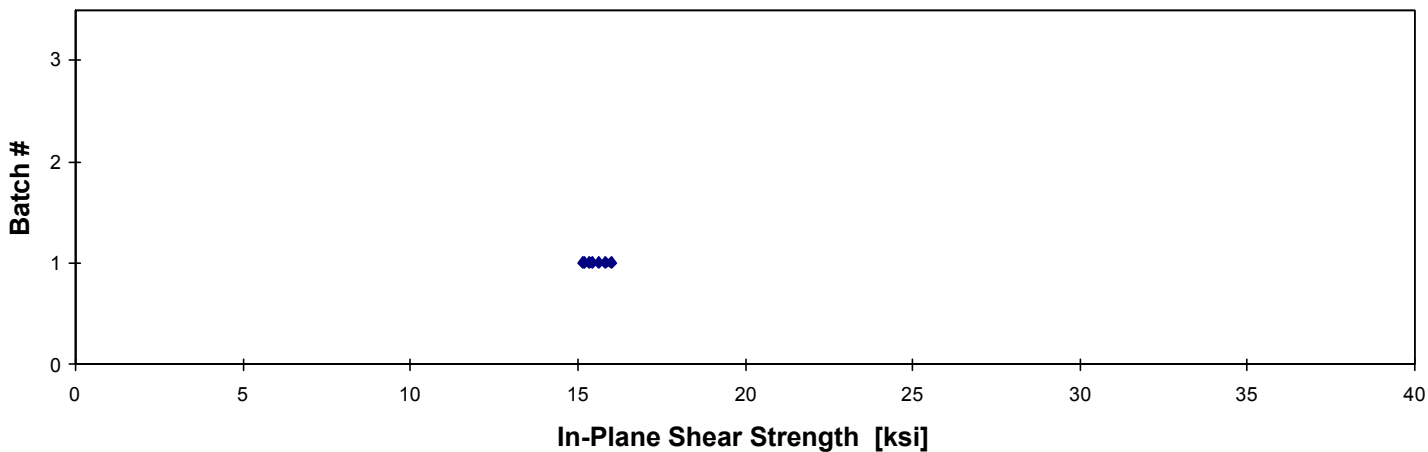
In-Plane Shear -- (JP-4 JET FUEL - ETD)
Strength
 FiberCote - E765/T300 6K 5HS Graphite Cloth

Specimen Number	Batch Number	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t _{ply} [in]
TFN1114R	1	15.882	0.163	10	0.01630
TFN1124R	1	15.405	0.162	10	0.01618
TFN1125R	1	16.038	0.161	10	0.01607
TFN1126R	1	15.191	0.162	10	0.01623
TFN1127R	1	15.408	0.162	10	0.01617
TFN112CR	1	15.220	0.163	10	0.01631
TFN112DR	1	15.656	0.163	10	0.01625

Average	15.543	0.0162
Standard Dev.	0.326	
Coeff. of Var. [%]	2.098	
Min.	15.191	Min. 0.0161
Max.	16.038	Max. 0.0163
Number of Spec.	7	

In-Plane Shear -- (JP-4 JET FUEL - ETD)
Measured Strength
 FiberCote - E765/T300 6K 5HS Graphite Cloth

Pooled Average = 15.543 [ksi]
 Pooled Standard Deviation = 0.326 [ksi]
 Pooled Coeff. of Variation = 2.098 [%]



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

FiberCote - E765/T300 6K 5HS Graphite Cloth

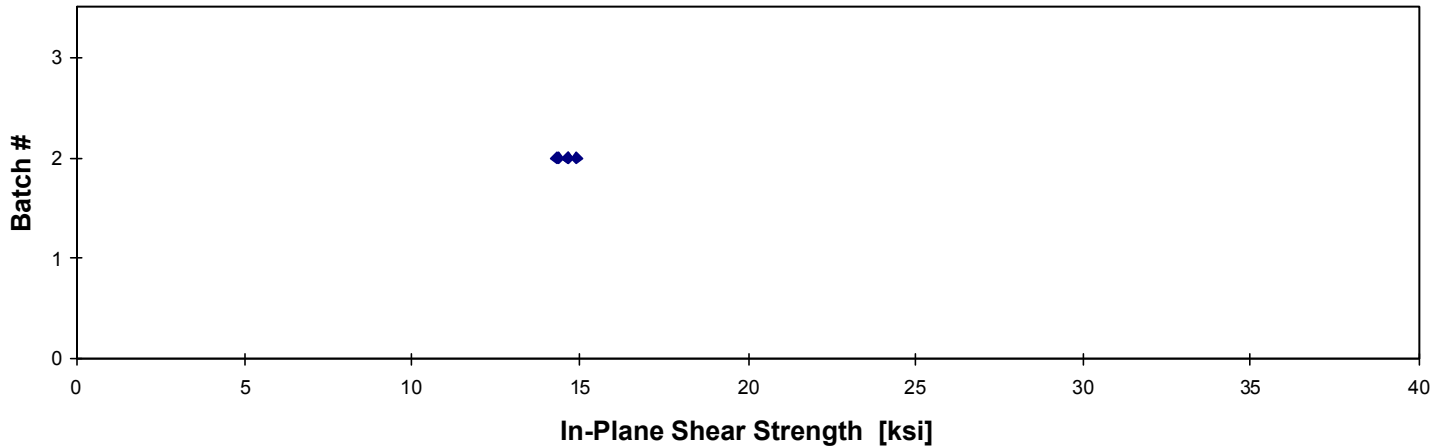
Specimen Number	Batch Number	Strength [ksi]	Avg. Specimen Thckn. [in]	# Plies in Laminate	Avg. t _{ply} [in]
TFN2114V	2	14.906	0.158	10	0.01578
TFN2115V	2	14.654	0.158	10	0.01581
TFN2116V	2	14.647	0.158	10	0.01580
TFN211AV	2	14.337	0.159	10	0.01587
TFN211BV	2	14.365	0.158	10	0.01575

Average	14.582	0.0158
Standard Dev.	0.235	
Coeff. of Var. [%]	1.614	
Min.	14.337	Min. 0.0158
Max.	14.906	Max. 0.0159
Number of Spec.	5	

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

FiberCote - E765/T300 6K 5HS Graphite Cloth

Pooled Average = 14.582 [ksi]
 Pooled Standard Deviation = 0.235 [ksi]
 Pooled Coeff. of Variation = 1.614 [%]



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) 16.74	(RTD) 18.08	(ETW) 10.39

The RTD average in-plane shear strength was reduced by 7% after exposure to MEK. However, it remained 61% 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) 15.54	(ETD) 14.91	(ETW) 10.39

The ETD average in-plane shear strength was not reduced after exposure to JP -4 Jet Fuel.

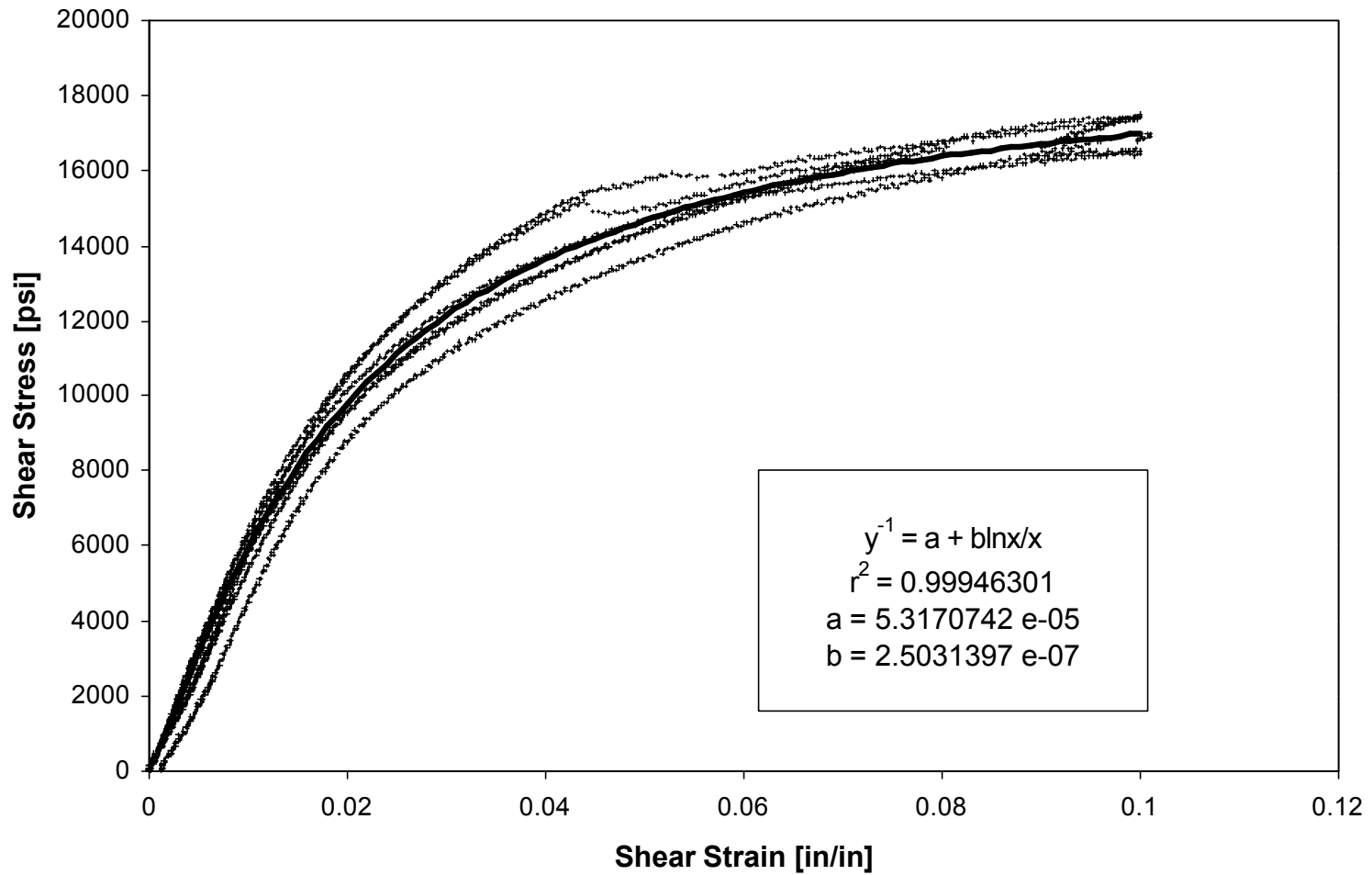
Average In-Plane Shear Strength with Fluid (ksi)	Same Environment In-Plane Shear Strength without Fluid (ksi)	Worst Case Environment In-Plane Shear Strength (ksi)
HYDRAULIC FLUID (ETD) 14.58	(ETD) 14.91	(ETW) 10.39

The ETD average in-plane shear strength was reduced by 2% after exposure to Hydraulic Fluid. However, it remained 40% 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 6K 5HS/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 are also presented on the chart to demonstrate material variability.

Shear Stress vs. Shear Strain, RTD

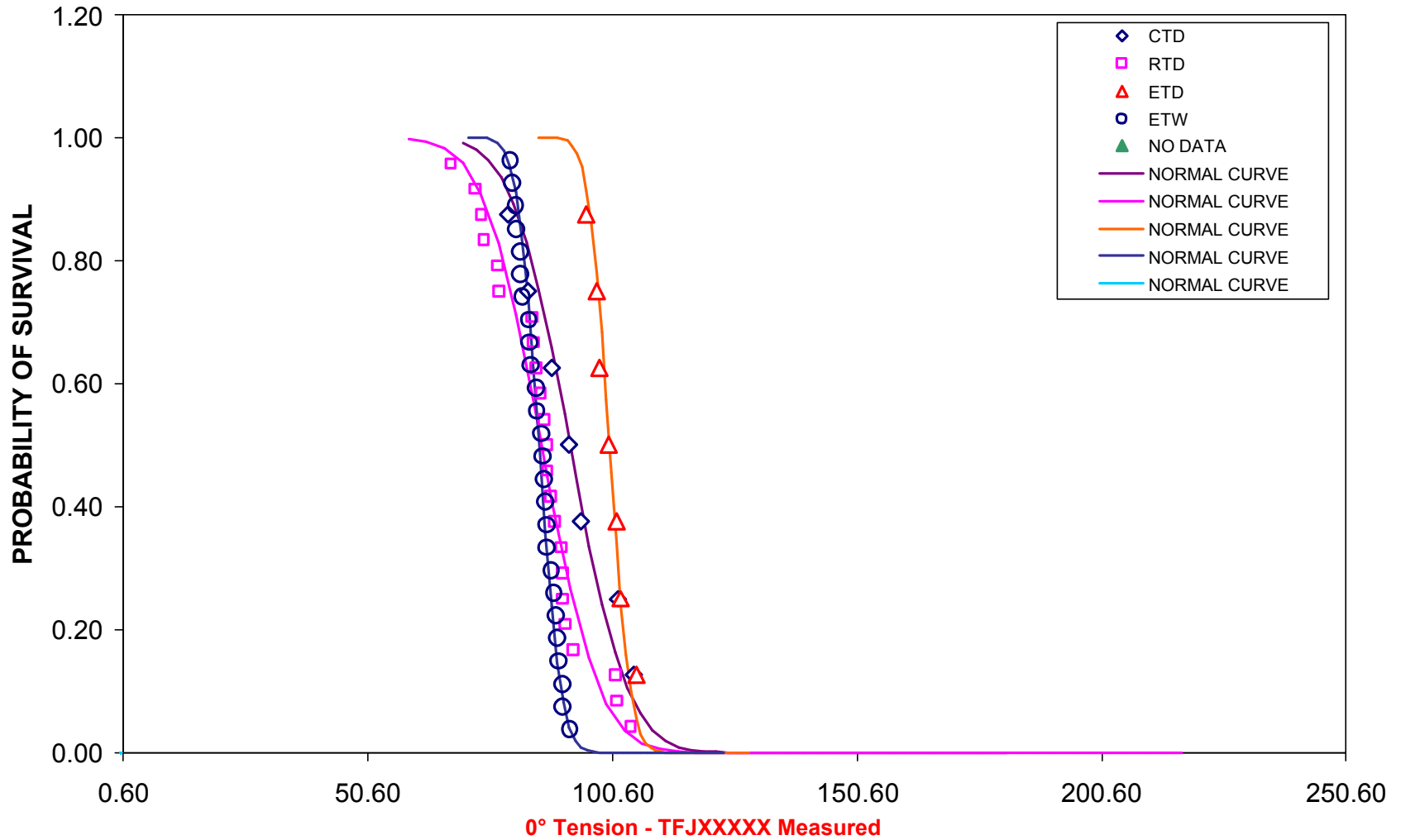


3.3 Statistical Results

3.3.1 Plot by Condition

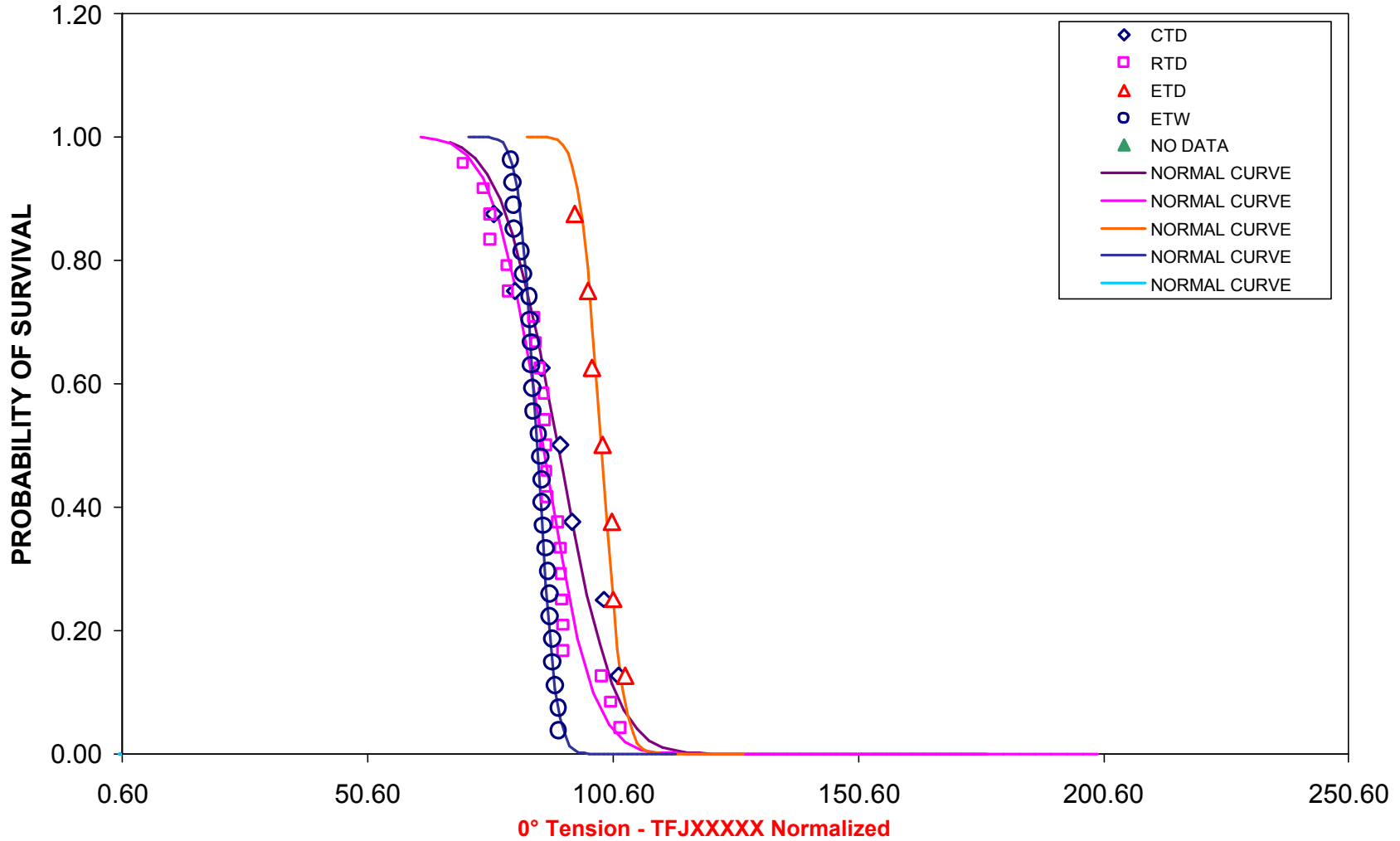
DISTRIBUTION OF GROUPED DATA FOR DIFFERENT TEST CONDITIONS

**E765/6K 5HS Graphite Cloth
FiberCote**



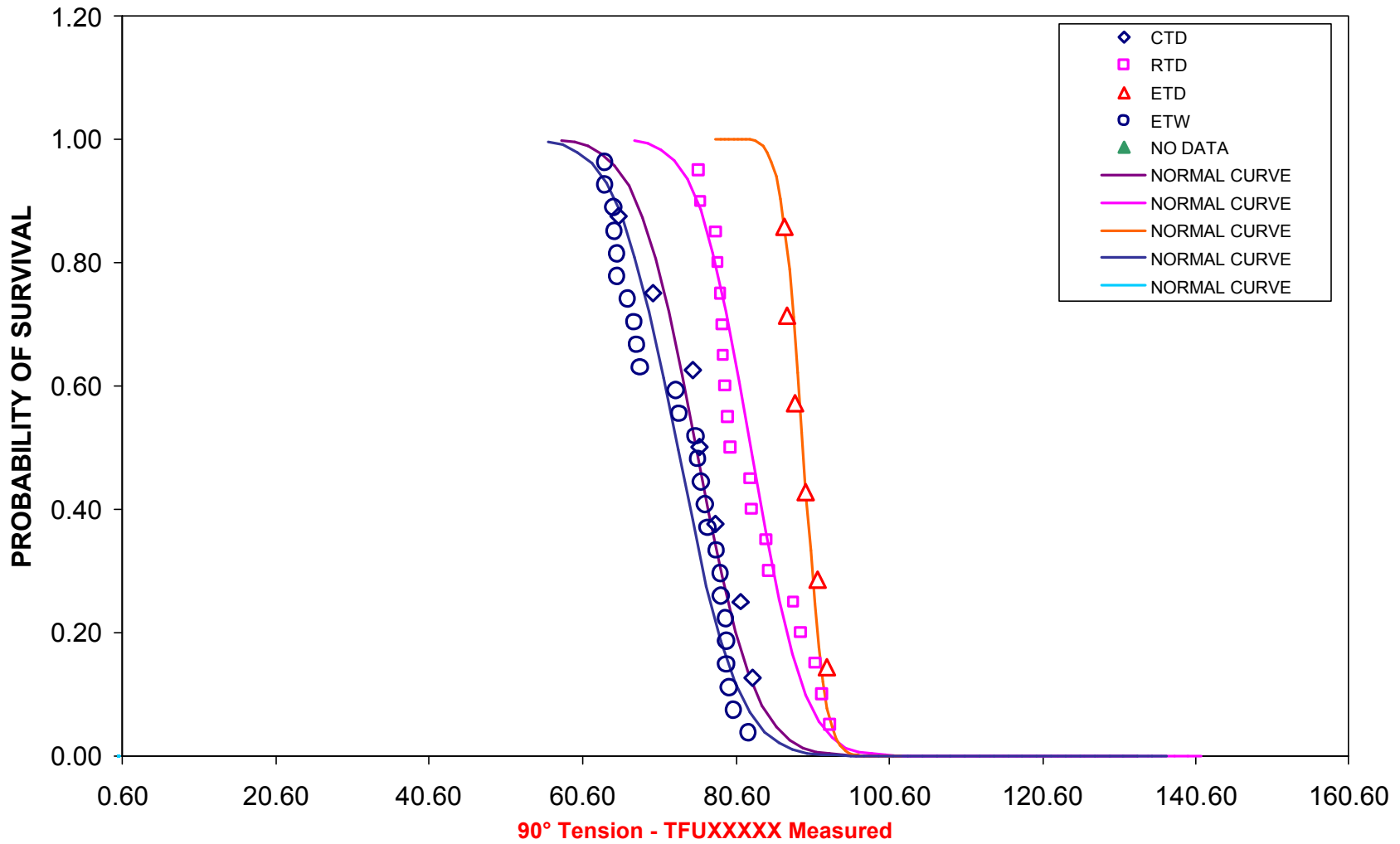
DISTRIBUTION OF GROUPED DATA FOR DIFFERENT TEST CONDITIONS

**E765/6K 5HS Graphite Cloth
FiberCote**



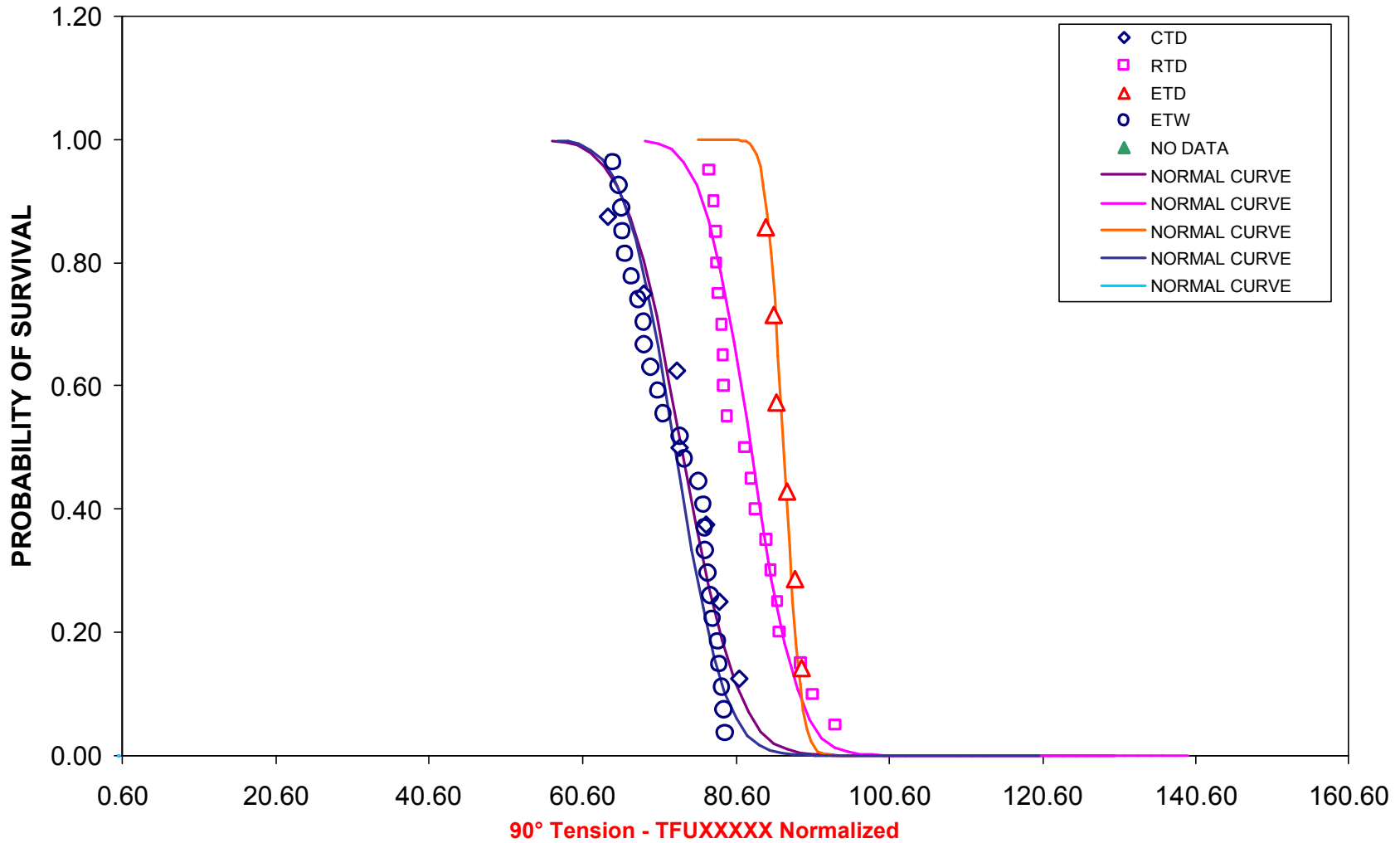
DISTRIBUTION OF GROUPED DATA FOR DIFFERENT TEST CONDITIONS

**E765/6K 5HS Graphite Cloth
 FiberCote**



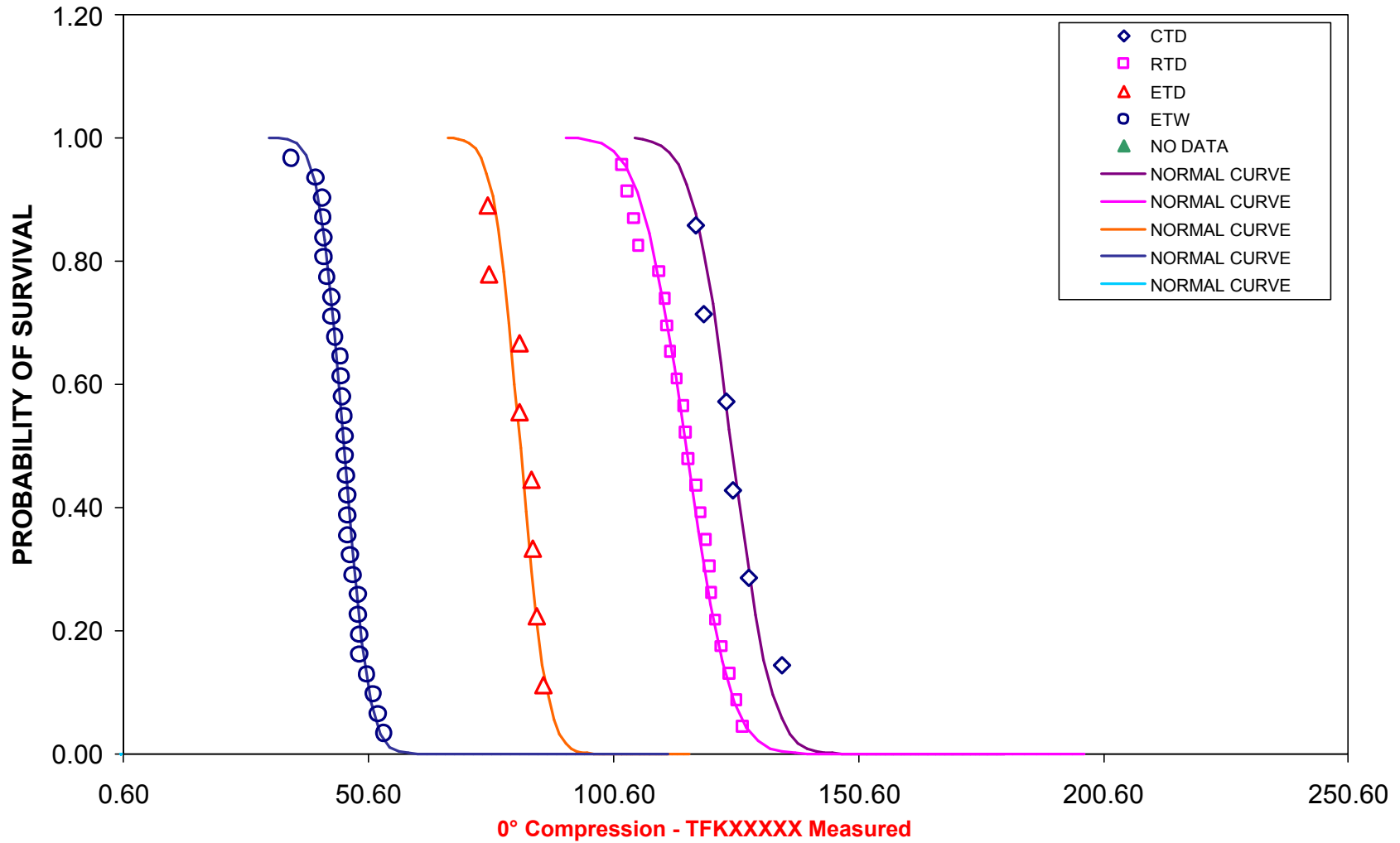
DISTRIBUTION OF GROUPED DATA FOR DIFFERENT TEST CONDITIONS

**E765/6K 5HS Graphite Cloth
FiberCote**



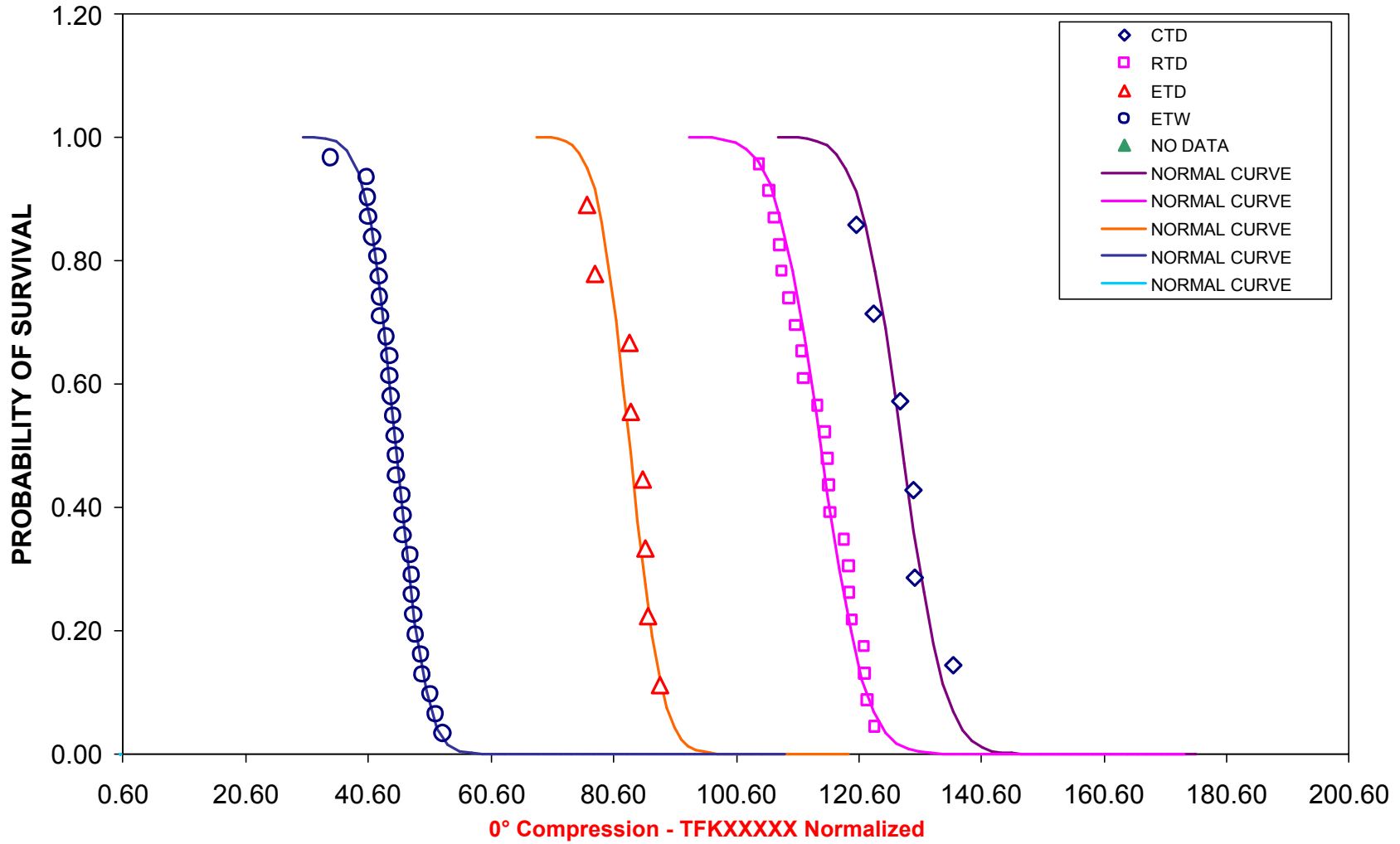
DISTRIBUTION OF GROUPED DATA FOR DIFFERENT TEST CONDITIONS

**E765/6K 5HS Graphite Cloth
 FiberCote**



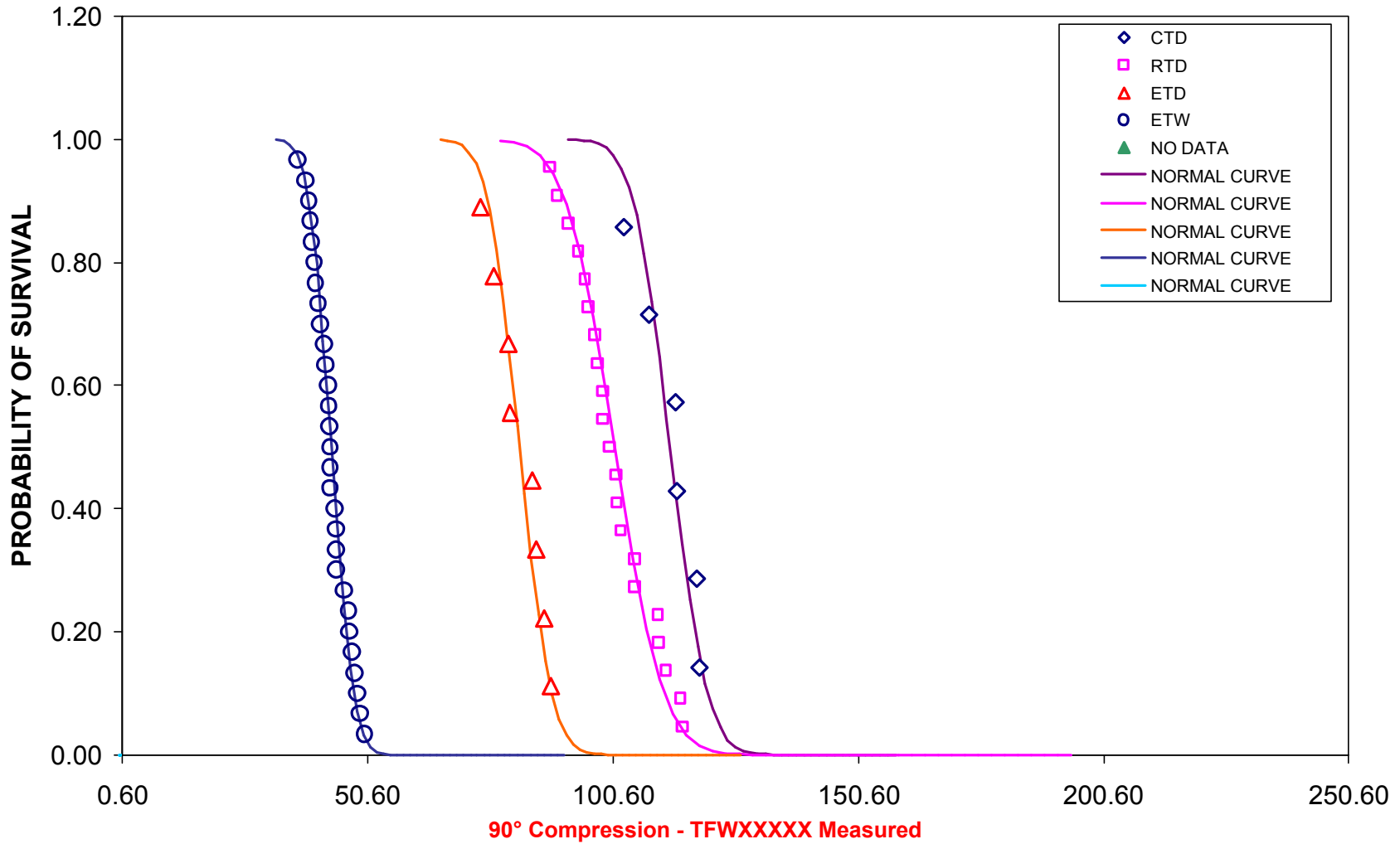
DISTRIBUTION OF GROUPED DATA FOR DIFFERENT TEST CONDITIONS

E765/6K 5HS Graphite Cloth
FiberCote



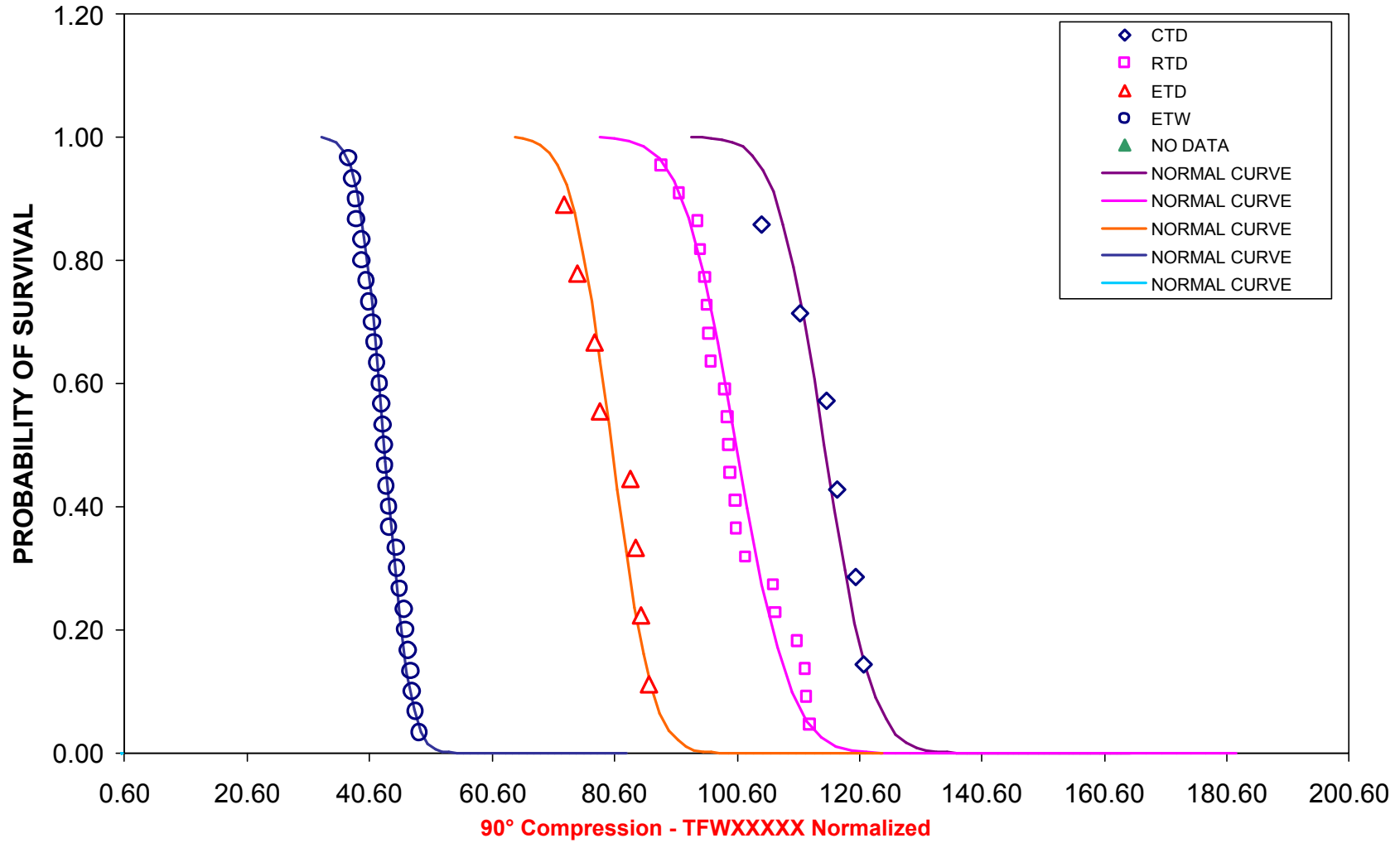
DISTRIBUTION OF GROUPED DATA FOR DIFFERENT TEST CONDITIONS

E765/6K 5HS Graphite Cloth
FiberCote



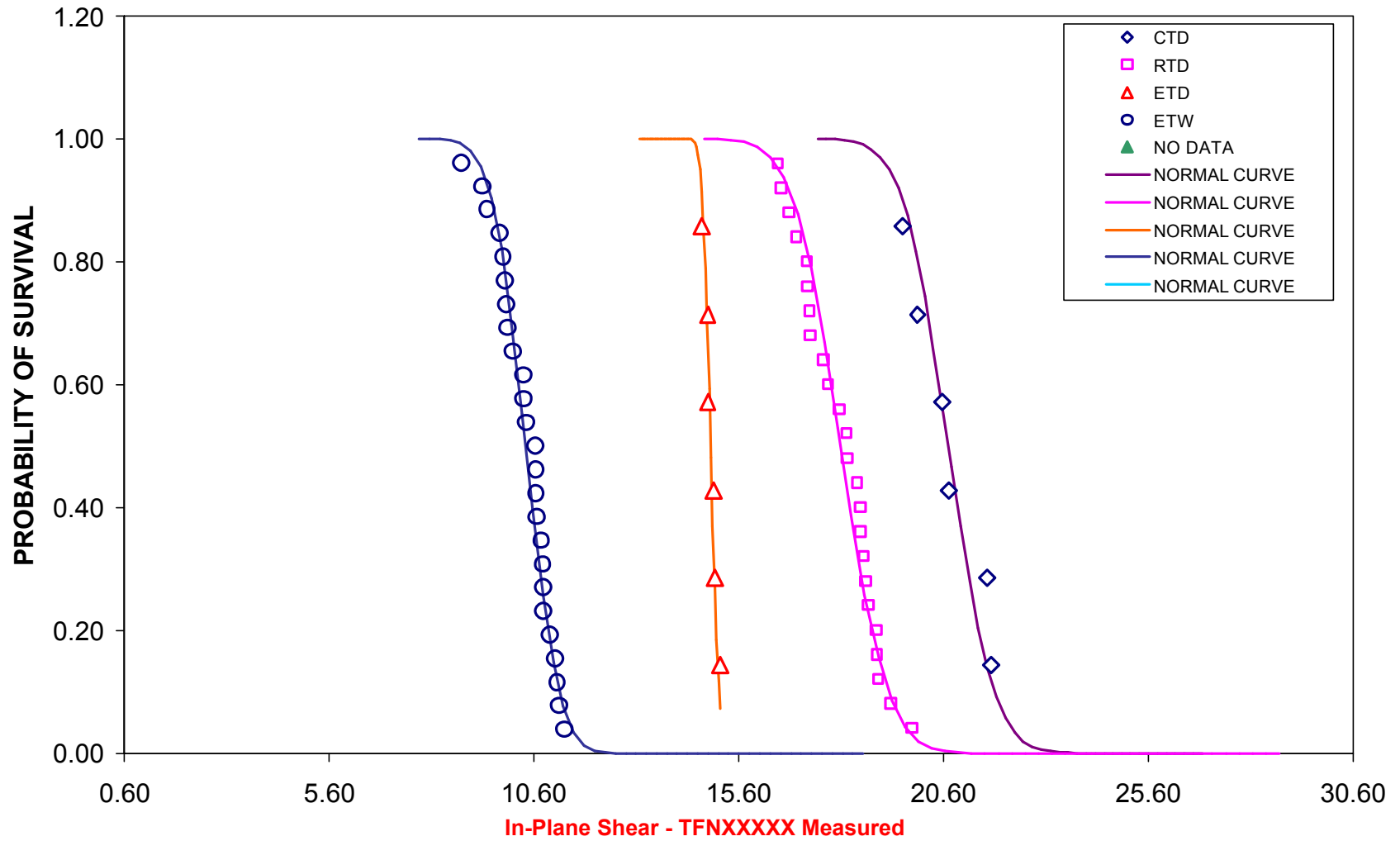
DISTRIBUTION OF GROUPED DATA FOR DIFFERENT TEST CONDITIONS

**E765/6K 5HS Graphite Cloth
 FiberCote**



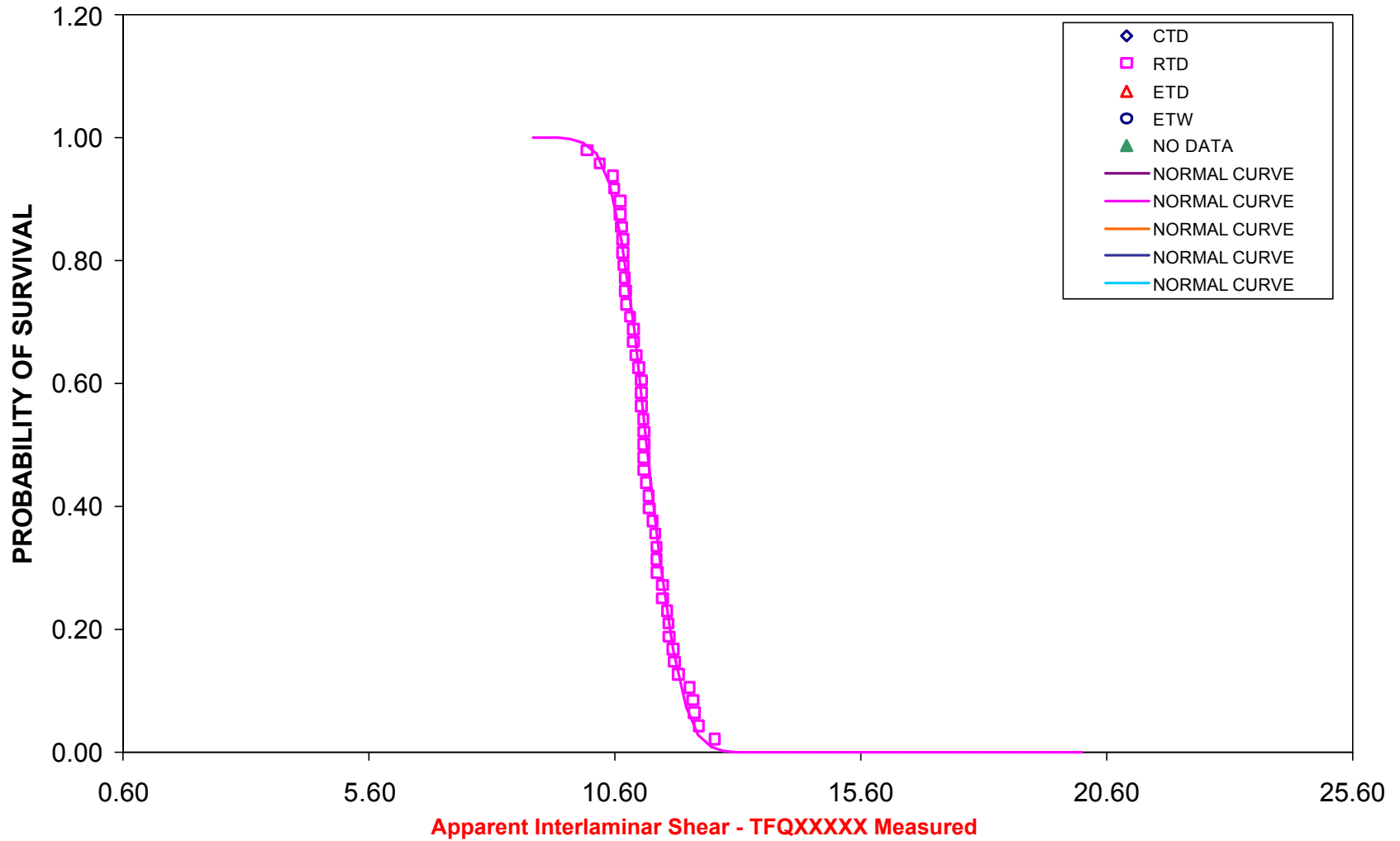
DISTRIBUTION OF GROUPED DATA FOR DIFFERENT TEST CONDITIONS

**E765/6K 5HS Graphite Cloth
 FiberCote**



DISTRIBUTION OF GROUPED DATA FOR DIFFERENT TEST CONDITIONS

**E765/6K 5HS Graphite Cloth
FiberCote**



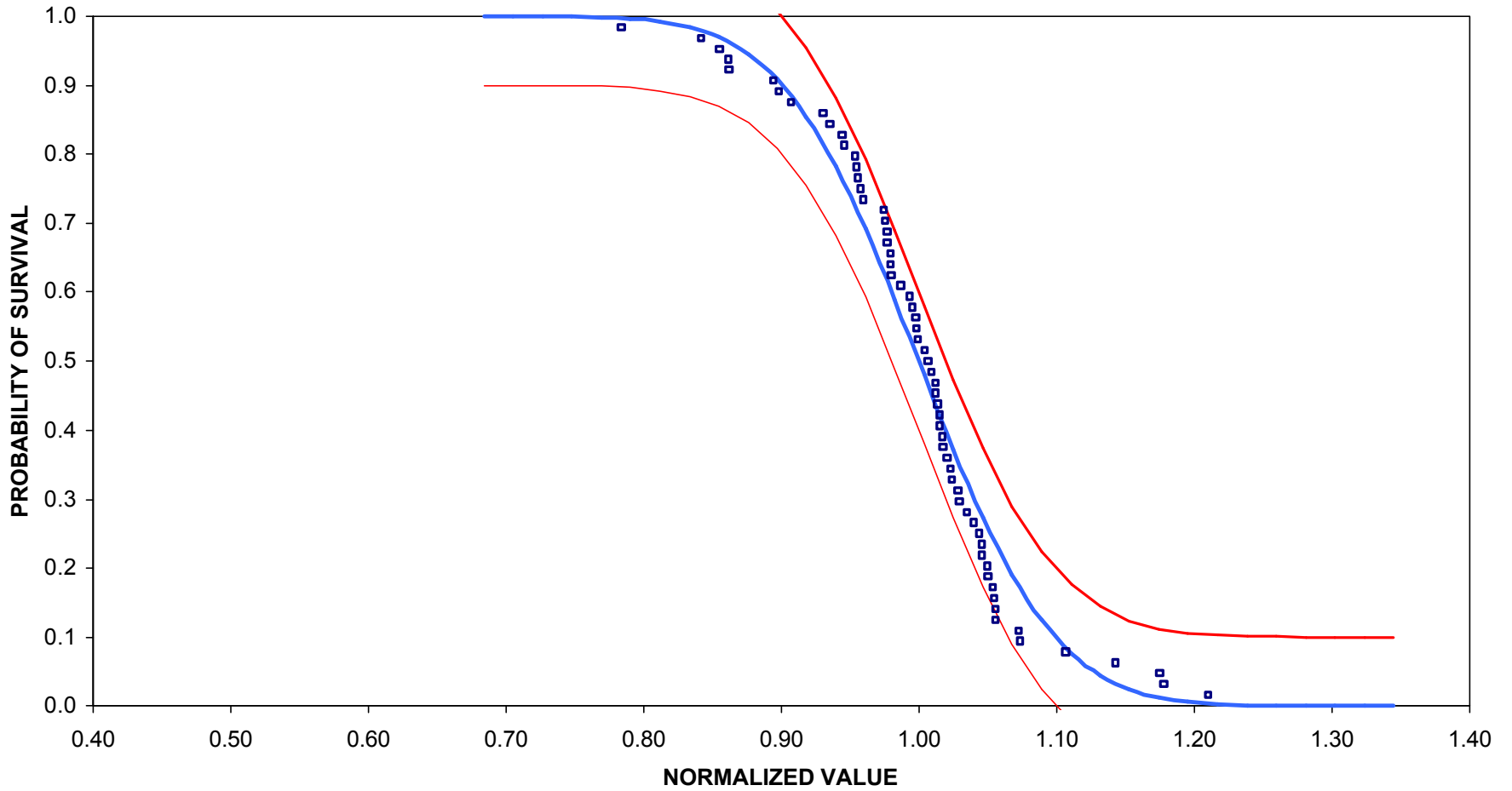
3.3.2 Plot of Pooled Data

DISTRIBUTION OF POOLED DATA

E765/6K 5HS Graphite Cloth

FiberCote

0° Tension - TFJXXXXX Measured

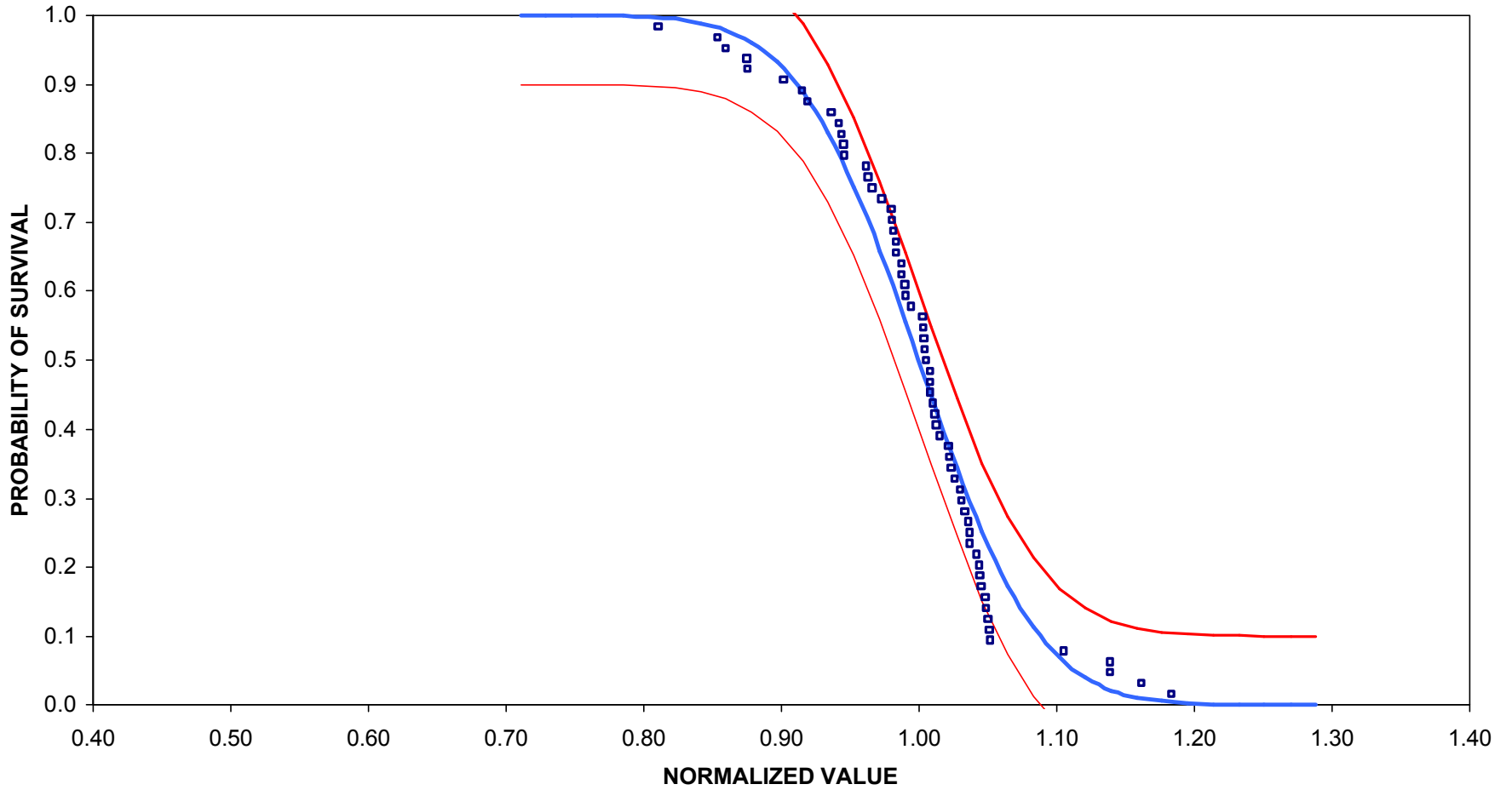


DISTRIBUTION OF POOLED DATA

E765/6K 5HS Graphite Cloth

FiberCote

0° Tension - TFJXXXXX Normalized

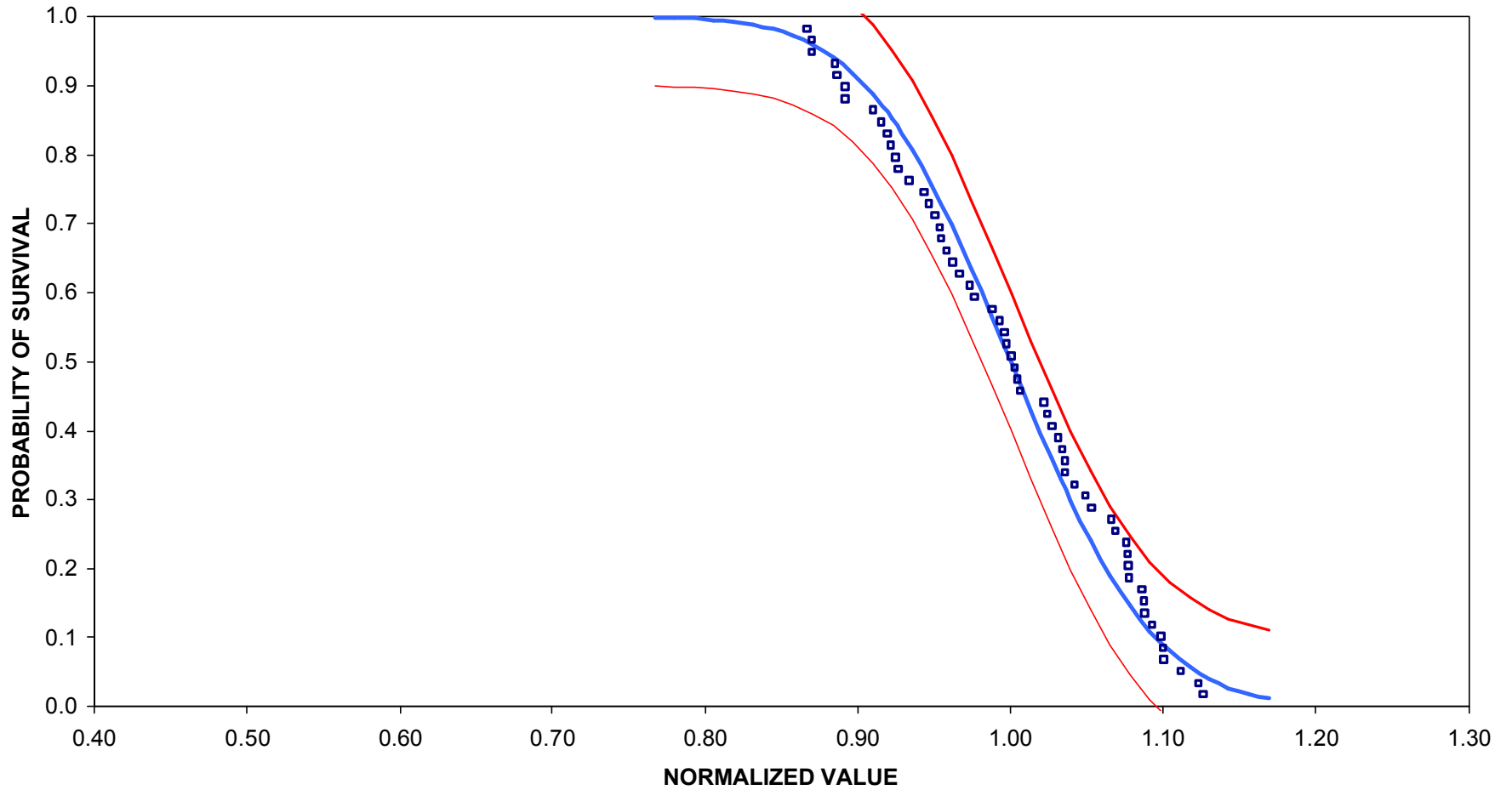


DISTRIBUTION OF POOLED DATA

E765/6K 5HS Graphite Cloth

FiberCote

90° Tension - TFUXXXX Measured

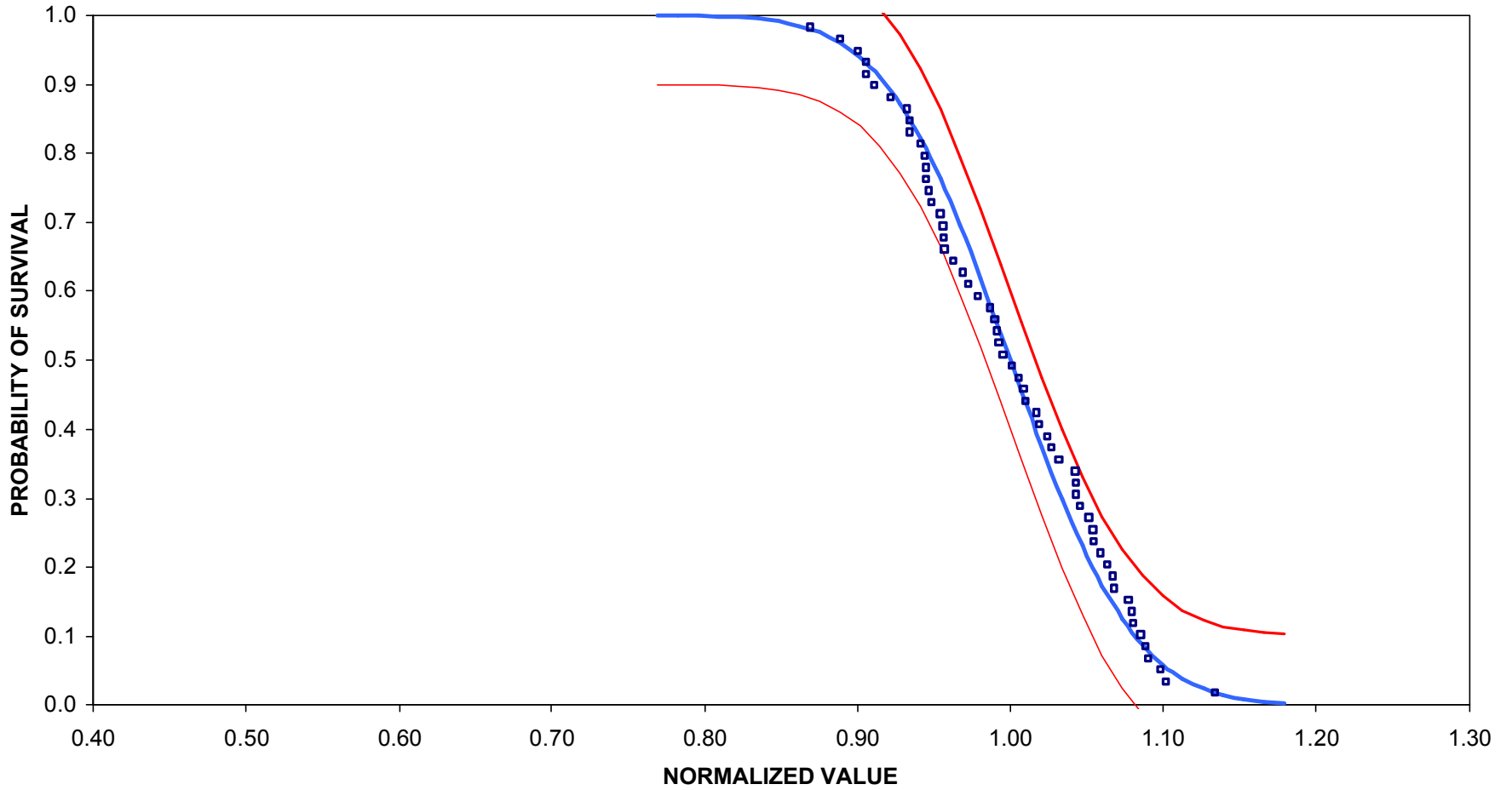


DISTRIBUTION OF POOLED DATA

E765/6K 5HS Graphite Cloth

FiberCote

90° Tension - TFUXXXXX Normalized

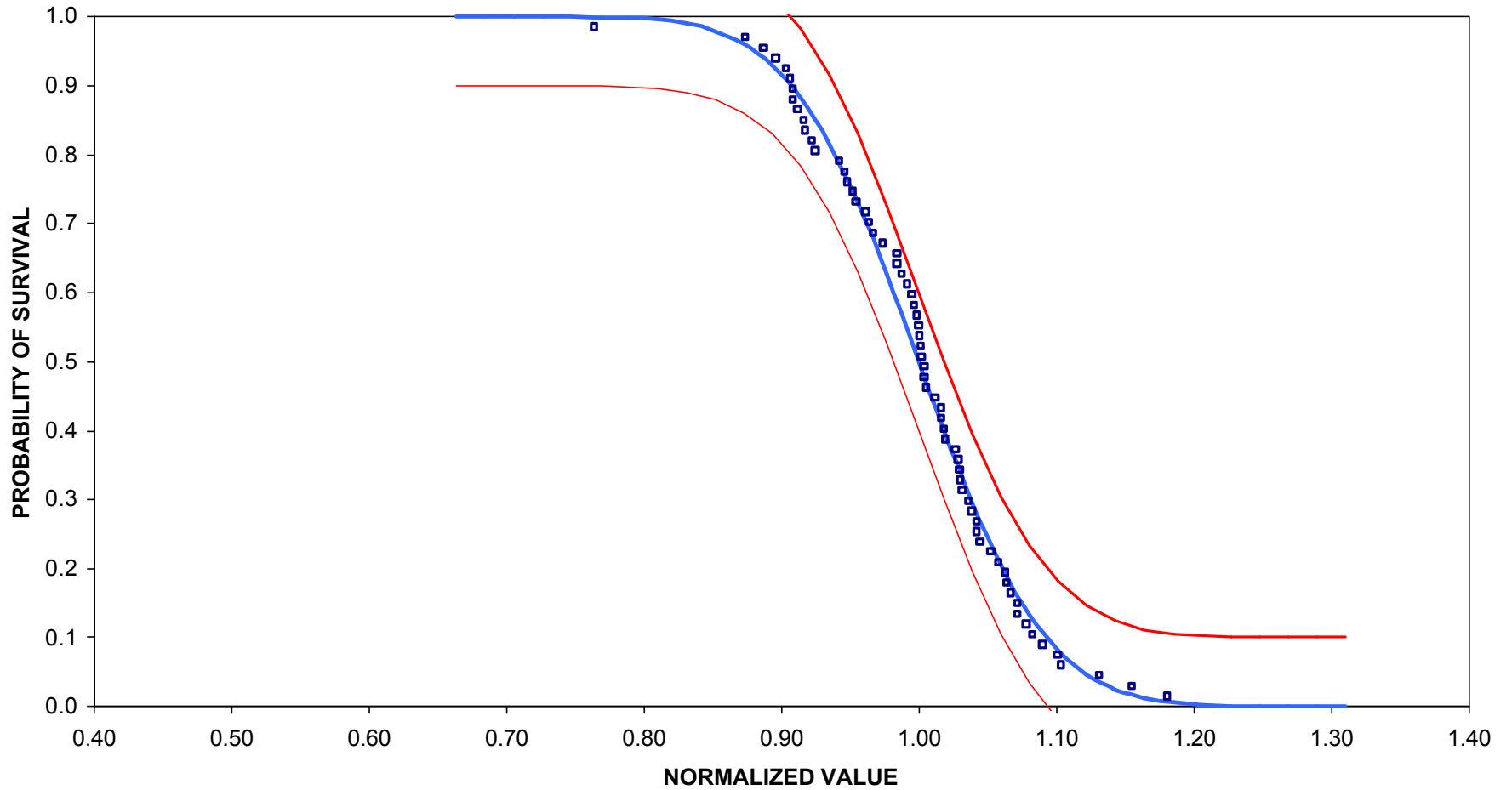


DISTRIBUTION OF POOLED DATA

E765/6K 5HS Graphite Cloth

FiberCote

0° Compression - TFKXXXXX Measured

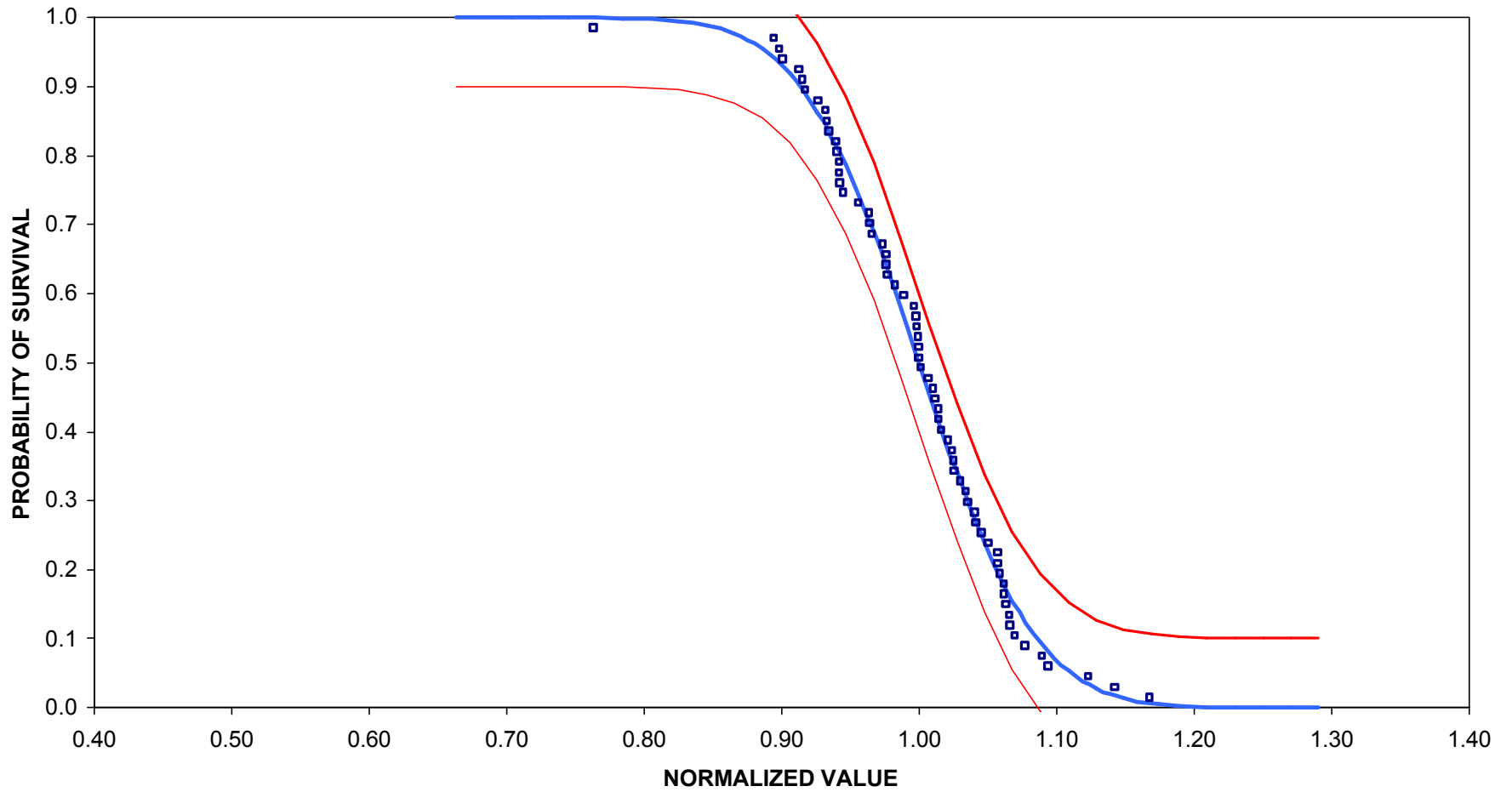


DISTRIBUTION OF POOLED DATA

E765/6K 5HS Graphite Cloth

FiberCote

0° Compression - TFKXXXXX Normalized

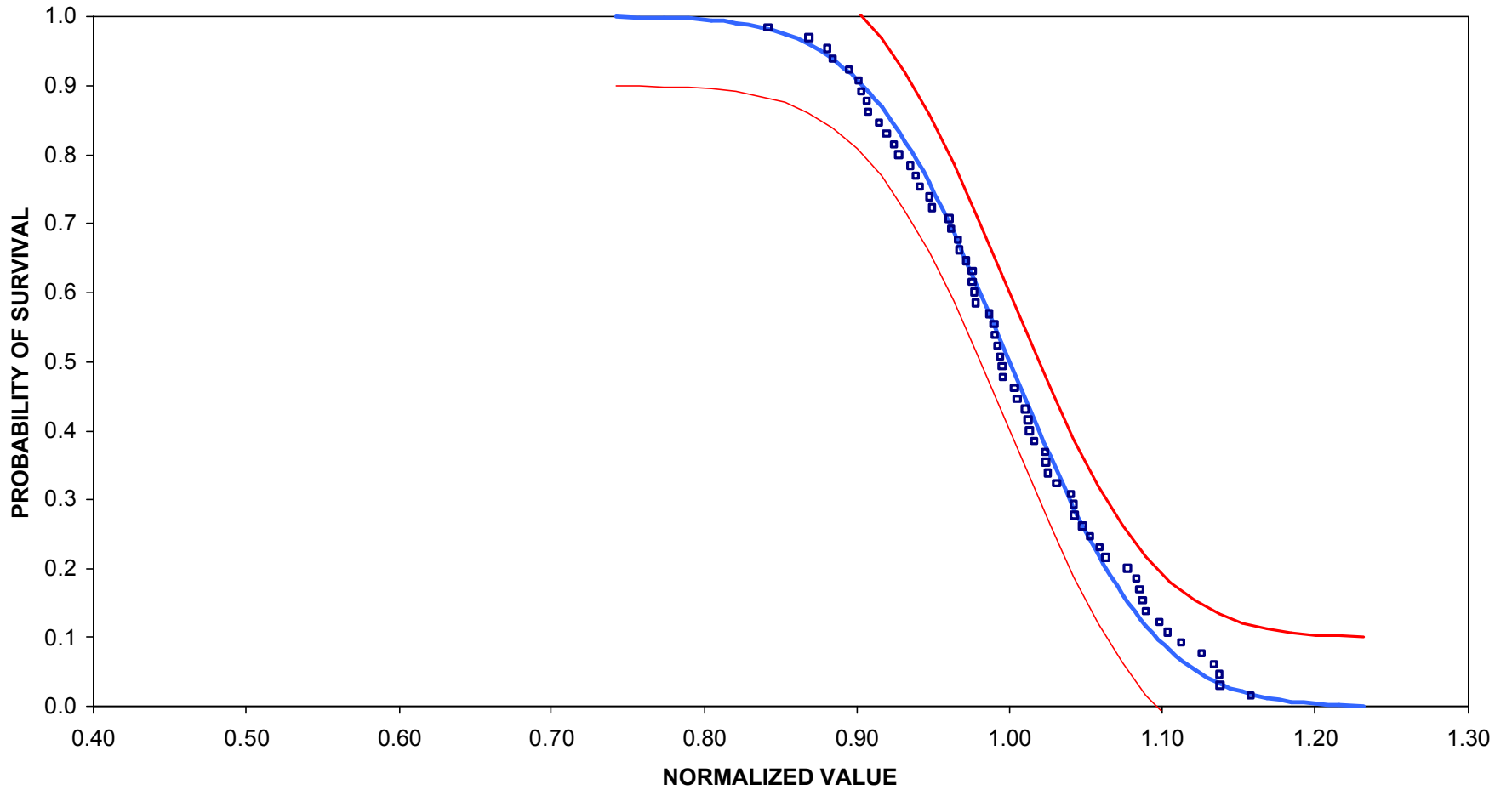


DISTRIBUTION OF POOLED DATA

E765/6K 5HS Graphite Cloth

FiberCote

90° Compression - TFWXXXXX Measured

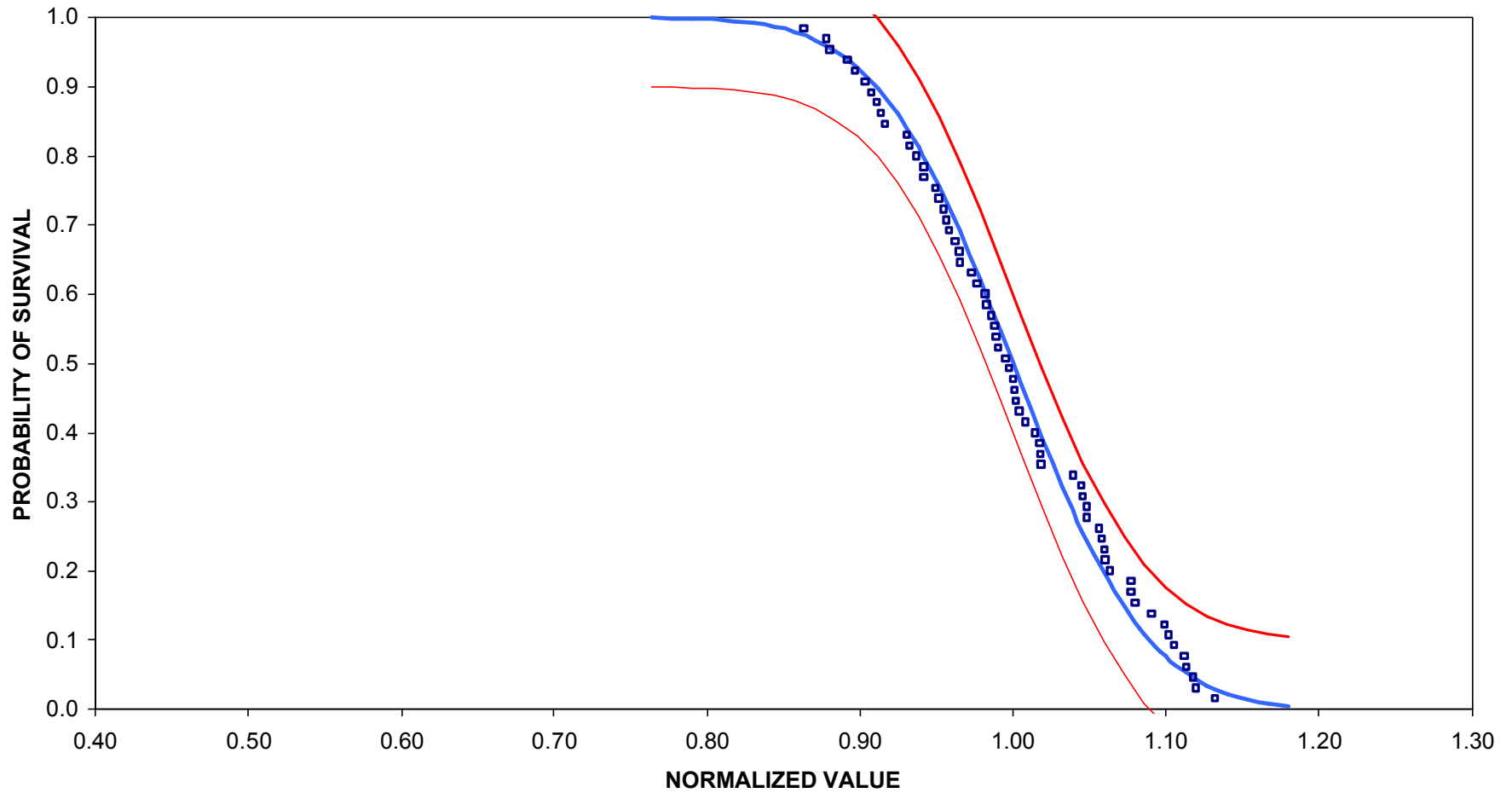


DISTRIBUTION OF POOLED DATA

E765/6K 5HS Graphite Cloth

FiberCote

90° Compression - TFWXXXXX Normalized

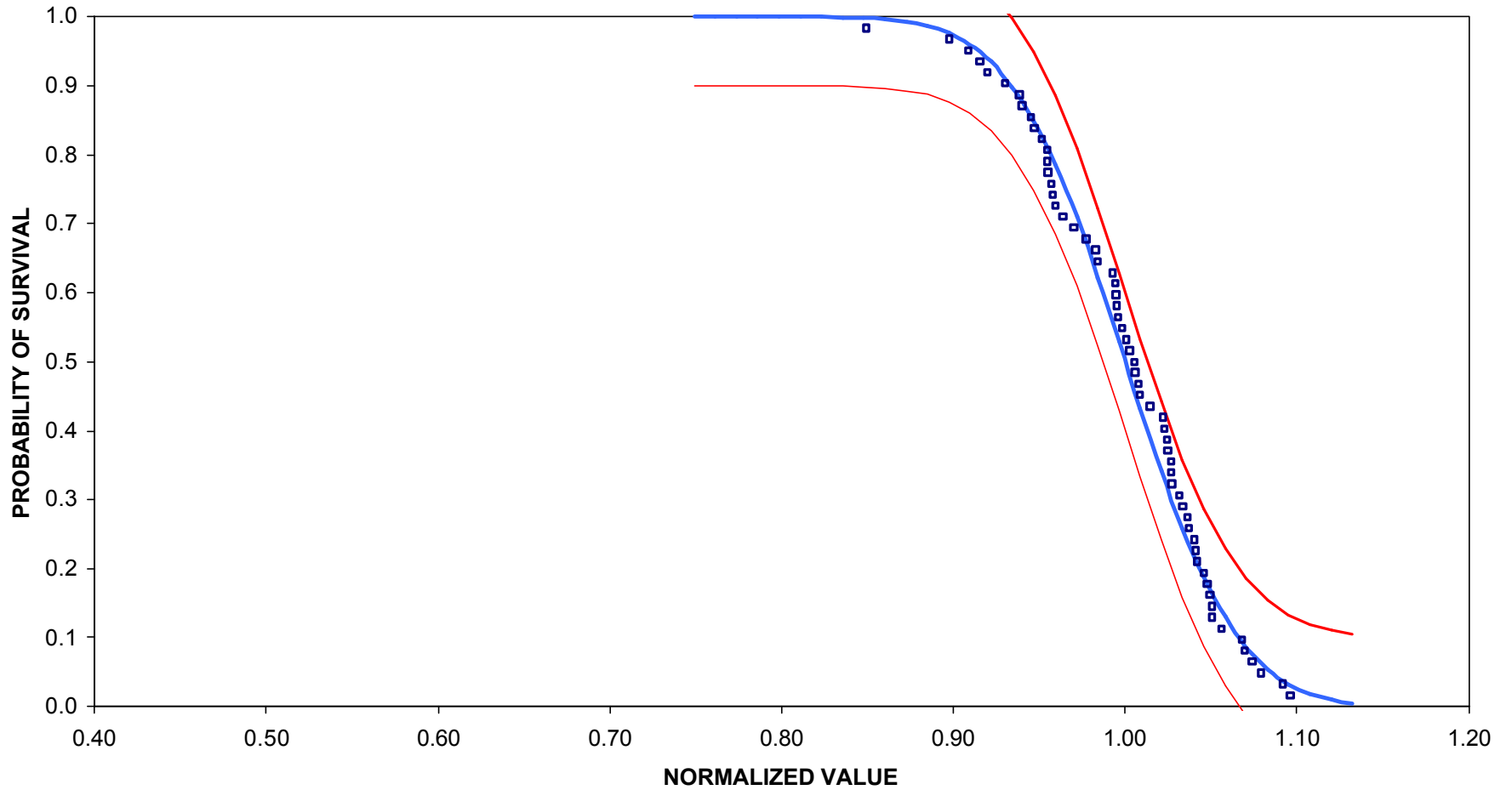


DISTRIBUTION OF POOLED DATA

E765/6K 5HS Graphite Cloth

FiberCote

In-Plane Shear - TFNXXXXX Measured

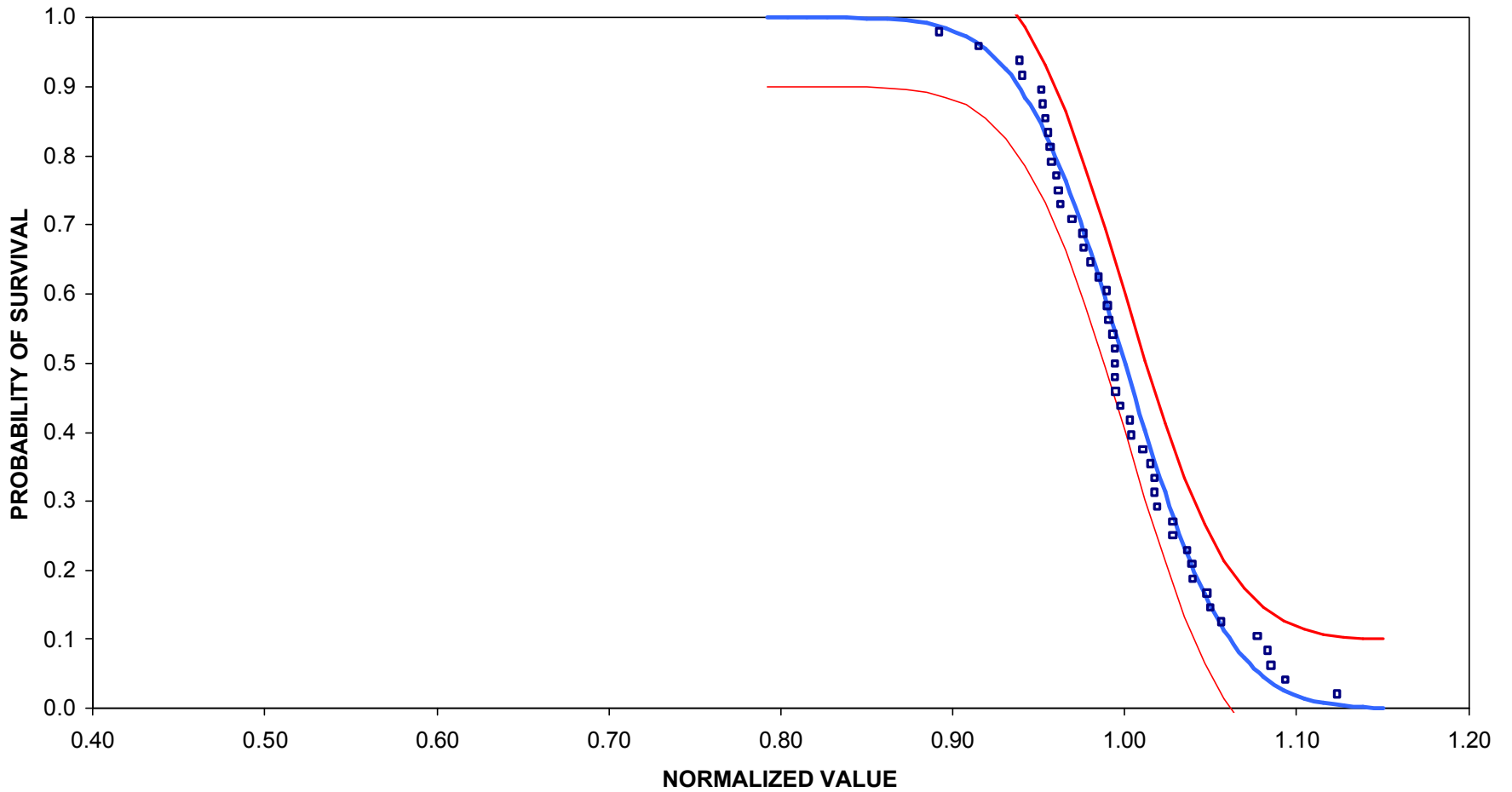


DISTRIBUTION OF POOLED DATA

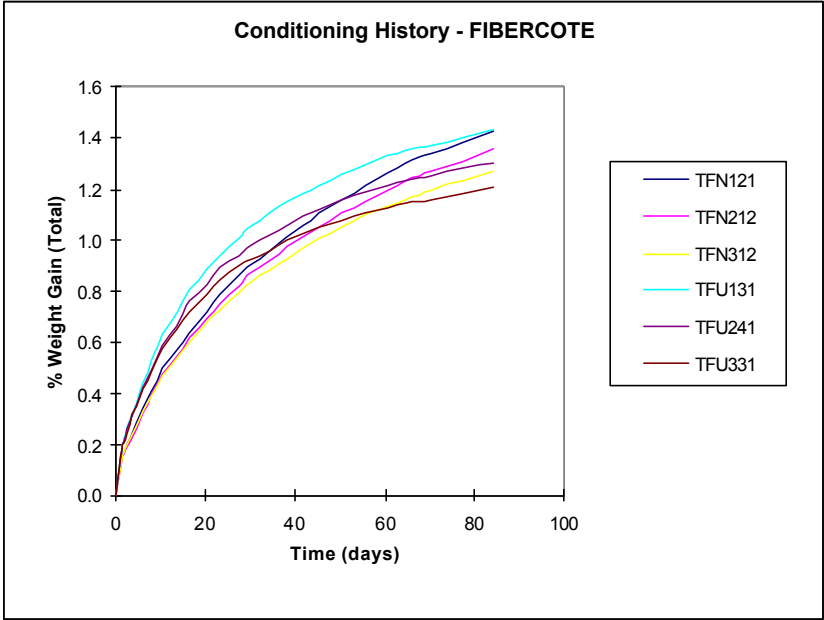
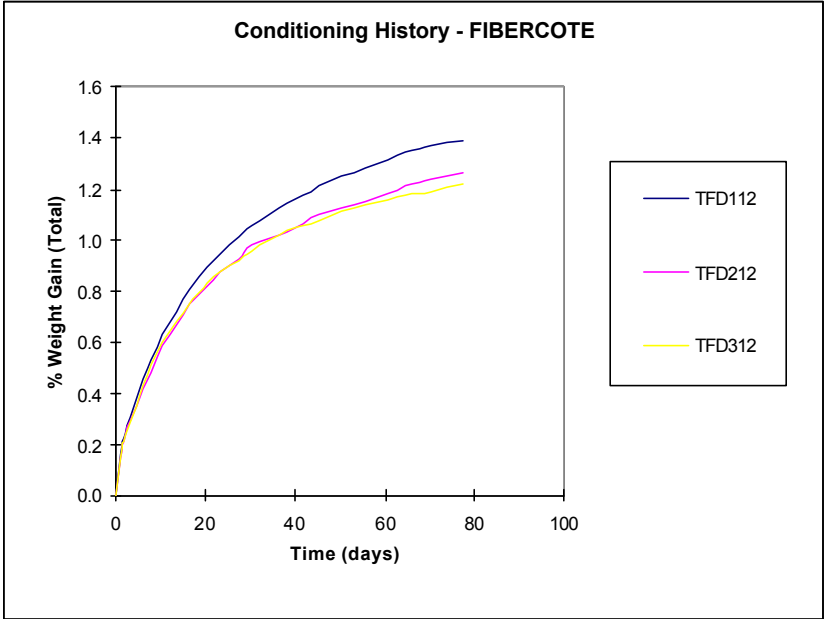
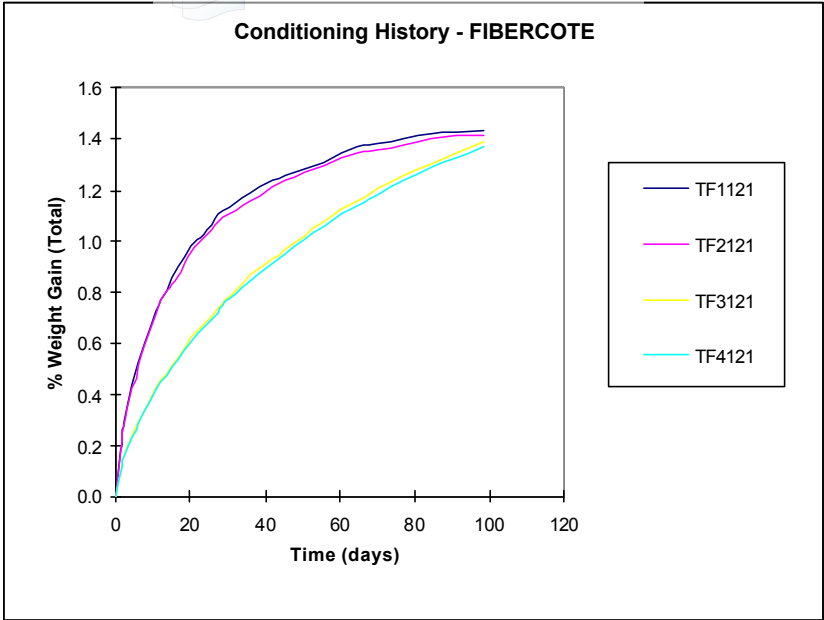
E765/6K 5HS Graphite Cloth

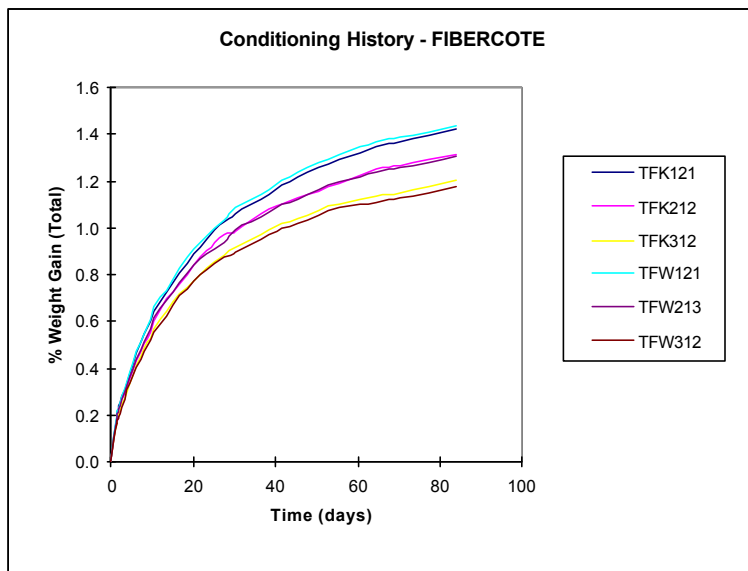
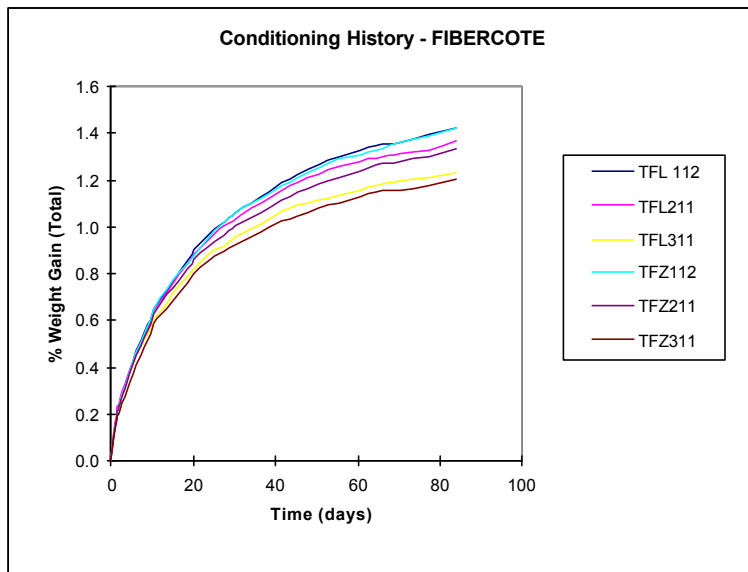
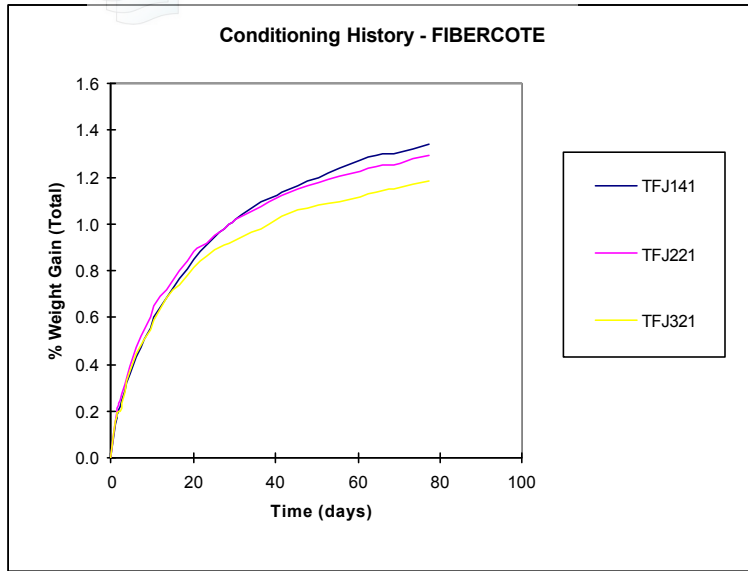
FiberCote

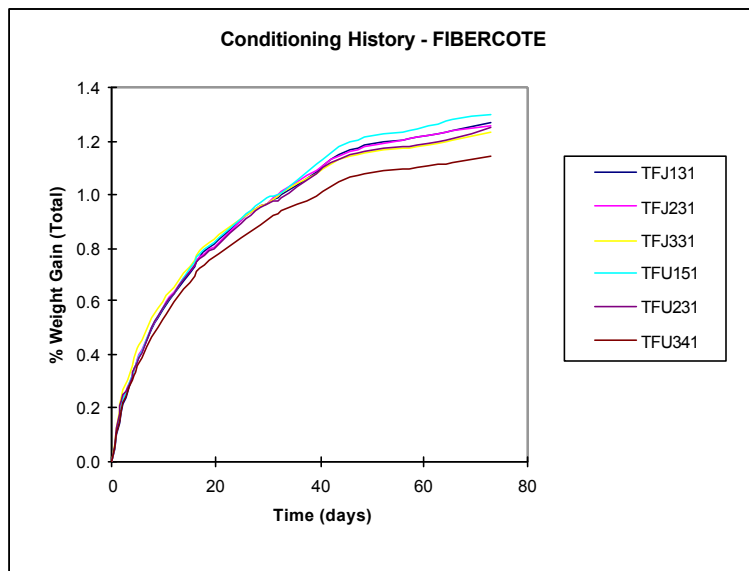
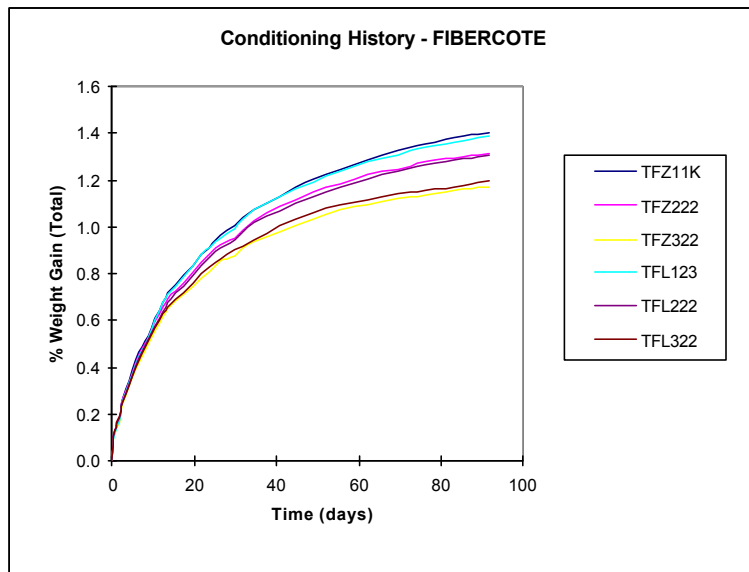
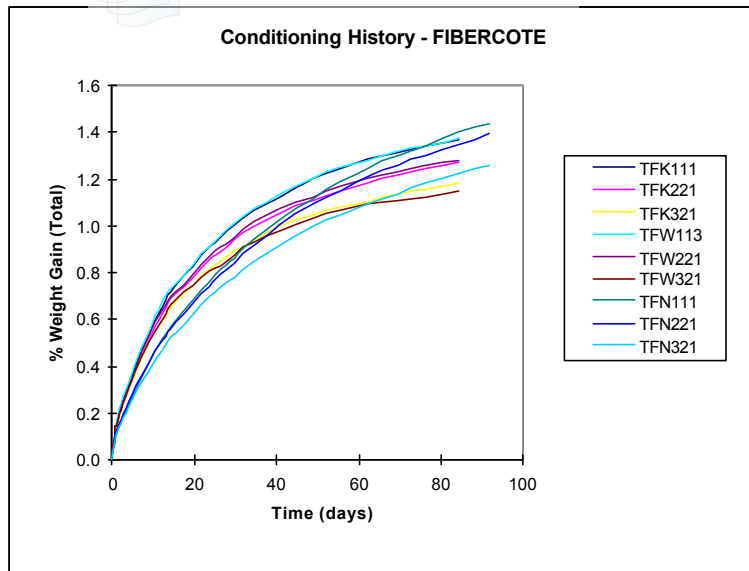
Apparent Interlaminar Shear - TFQXXXXX Measured



3.4 Moisture Conditioning History Charts







3.5 Physical Test Results

Physical Test Summary
FiberCote - E765/T300 6K 5HS Graphite Cloth

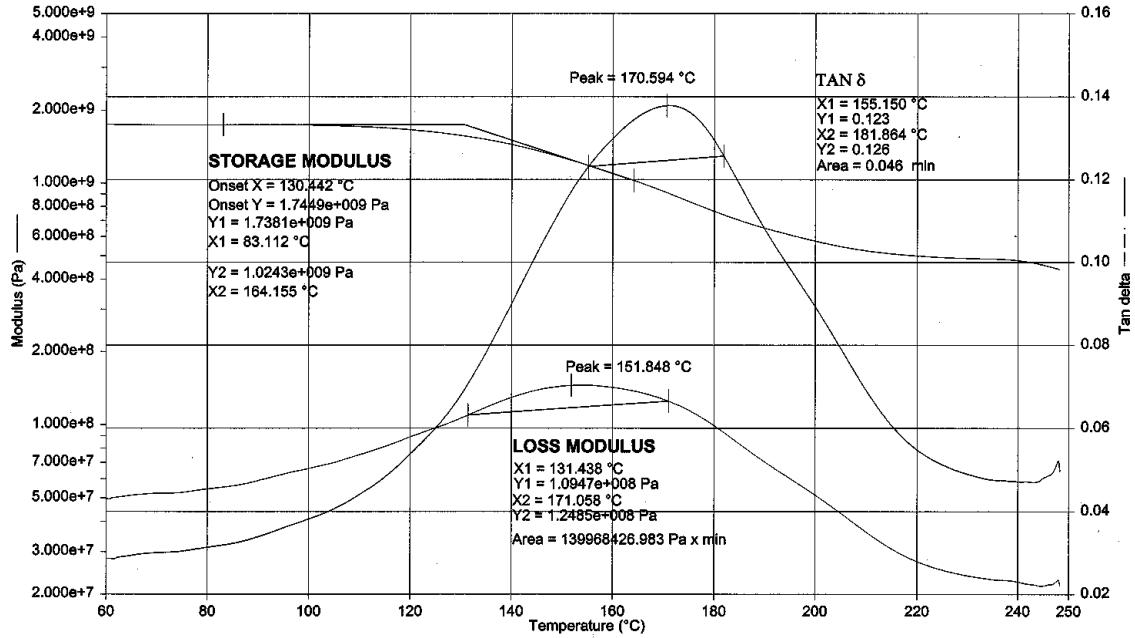
	Composite Density [g/cc]	Resin Content [wt%]	Fiber Volume [vol%]	Void Content [vol%]
0° Tension (TFJXXXXX)				
No. of Specimens	9	9	9	9
Mean	1.519	36.386	55.195	-0.146
Standard Deviation	0.009	0.870	0.675	0.684
90° Tension (TFUXXXXX)				
No. of Specimens	7	7	7	7
Mean	1.514	35.145	56.133	0.598
Standard Deviation	0.008	2.011	2.004	0.671
0° Compression (TFKXXXXX)				
No. of Specimens	9	9	9	9
Mean	1.513	36.363	55.028	0.239
Standard Deviation	0.009	1.042	1.103	0.488
90° Compression (TFWXXXXX)				
No. of Specimens	9	9	9	9
Mean	1.513	36.013	55.333	0.366
Standard Deviation	0.008	1.815	1.724	0.646
In-Plane Shear (TFNXXXXX)				
No. of Specimens	6	6	6	6
Mean	1.499	37.523	53.535	0.735
Standard Deviation	0.008	1.947	1.921	0.380
Interlaminar Shear (TFQXXXXX)				
No. of Specimens	3	3	3	3
Mean	1.518	36.211	55.317	0.004
Standard Deviation	0.004	0.901	0.627	0.592
Bearing (TF#XXXXX)				
No. of Specimens	8	8	8	8
Mean	1.504	38.337	52.709	0.399
Standard Deviation	0.006	0.471	0.419	0.472
Overall Summary				
Overall No. of Specimens	51	51	51	51
Overall Mean	1.512	36.575	54.741	0.312
Overall Std. Deviation	0.010	1.649	1.696	0.610

COMPANY : **FiberCote**
 MATERIAL SYSTEM : **E765/T300 6K 5HS Graphite Cloth**
 PROJECT : **010509S1**

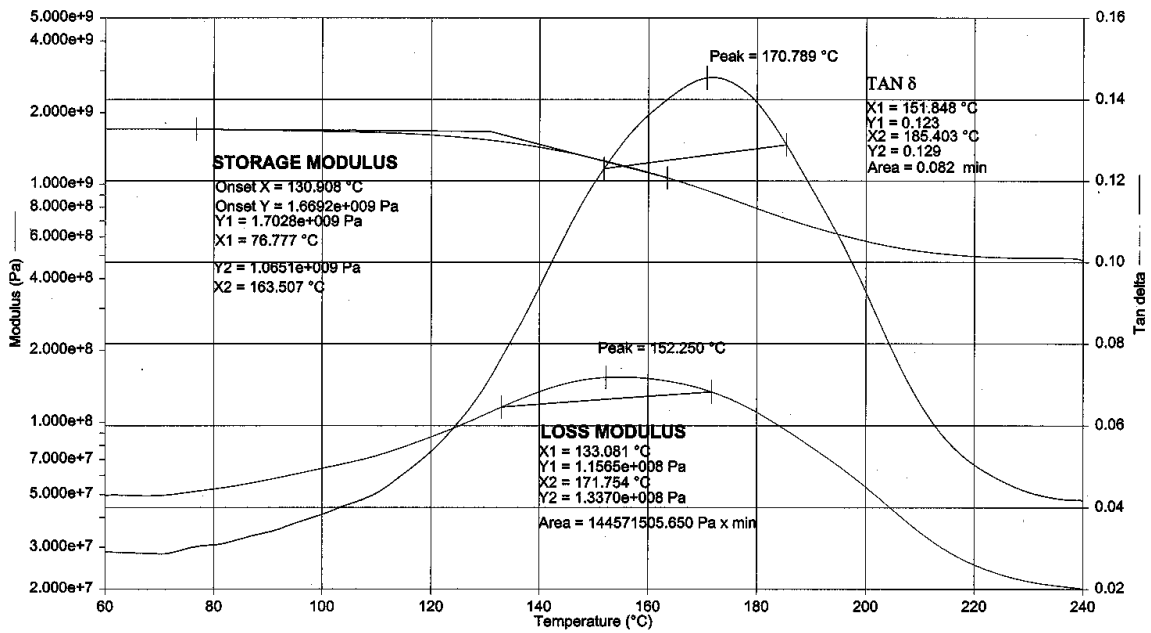
DMA Results -- Onset Storage Modulus					
DRY			WET		
Sample #	As Fabricated		Sample #	Moisture Equilibrium at 85% RH	
	Tg [°C]	Tg [°F]		Tg [°C]	Tg [°F]
TFD1127A	130.44	266.80	TFD1122F	100.63	213.14
TFD1128A	130.91	267.63	TFD1123F	98.14	208.66
TFD1129A	138.03	280.46	TFD1124F	93.46	200.22
TFD2127A	129.48	265.07	TFD1125F	91.42	196.55
TFD2128A	132.74	270.92	TFD2121F	91.53	196.75
TFD2129A	126.58	259.84	TFD2122F	97.48	207.46
TFD3127A	128.26	262.86	TFD2123F	96.78	206.21
TFD3128A	128.30	262.94	TFD3121F	90.05	194.08
TFD3129A	128.53	263.36	TFD3122F	94.02	201.24
			TFD3123F	95.11	203.19
Average [°F]		266.65	Average [°F]		202.75
Standard Dev. [°F]		6.10	Standard Dev. [°F]		6.10
Coeff. Of Var. [%]		2.29	Coeff. Of Var. [%]		3.01

DMA Results - Peak Tan Delta					
DRY			WET		
Sample #	As Fabricated		Sample #	Moisture Equilibrium at 85% RH	
	Tg [°C]	Tg [°F]		Tg [°C]	Tg [°F]
TFD1127A	170.59	339.07	TFD1122F	127.95	262.31
TFD1128A	170.79	339.42	TFD1123F	134.08	273.34
TFD1129A	171.19	340.14	TFD1124F	132.48	270.46
TFD2127A	167.41	333.34	TFD1125F	129.72	265.49
TFD2128A	166.66	331.98	TFD2121F	130.50	266.89
TFD2129A	167.20	332.96	TFD2122F	130.22	266.39
TFD3127A	164.13	327.43	TFD2123F	130.10	266.17
TFD3128A	162.49	324.48	TFD3121F	128.09	262.56
TFD3129A	164.59	328.27	TFD3122F	125.40	257.72
			TFD3123F	126.62	259.92
Average [°F]		333.01	Average [°F]		265.12
Standard Dev. [°F]		5.66	Standard Dev. [°F]		4.69
Coeff. Of Var. [%]		1.70	Coeff. Of Var. [%]		1.77

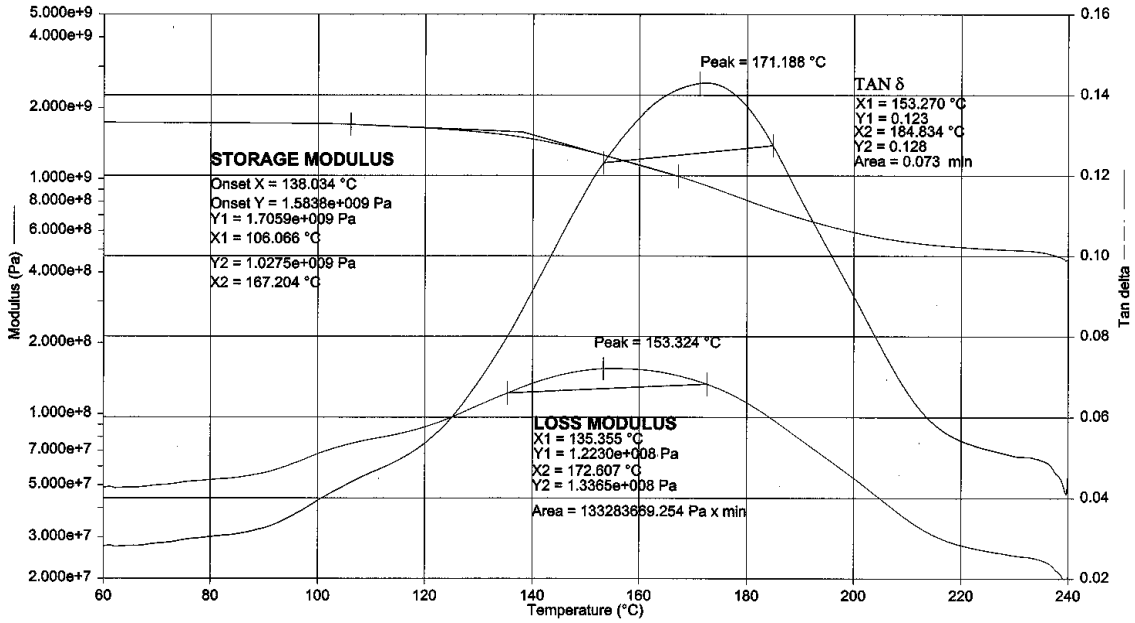
DMA Results -- Peak of Loss Modulus					
DRY			WET		
Sample #	As Fabricated		Sample #	Moisture Equilibrium at 85% RH	
	Tg [°C]	Tg [°F]		Tg [°C]	Tg [°F]
TFD1127A	151.85	305.33	TFD1122F	115.01	239.02
TFD1128A	152.25	306.05	TFD1123F	112.04	233.67
TFD1129A	153.32	307.98	TFD1124F	107.17	224.90
TFD2127A	149.02	300.23	TFD1125F	113.59	236.47
TFD2128A	150.01	302.03	TFD2121F	113.03	235.46
TFD2129A	148.24	298.83	TFD2122F	112.35	234.23
TFD3127A	148.81	299.86	TFD2123F	108.13	226.64
TFD3128A	147.70	297.86	TFD3121F	113.37	236.07
TFD3129A	125.69	258.24	TFD3122F	112.87	235.16
			TFD3123F	116.07	240.93
Average [°F]		297.38	Average [°F]		234.25
Standard Dev. [°F]		15.09	Standard Dev. [°F]		4.99
Coeff. Of Var. [%]		5.07	Coeff. Of Var. [%]		2.13



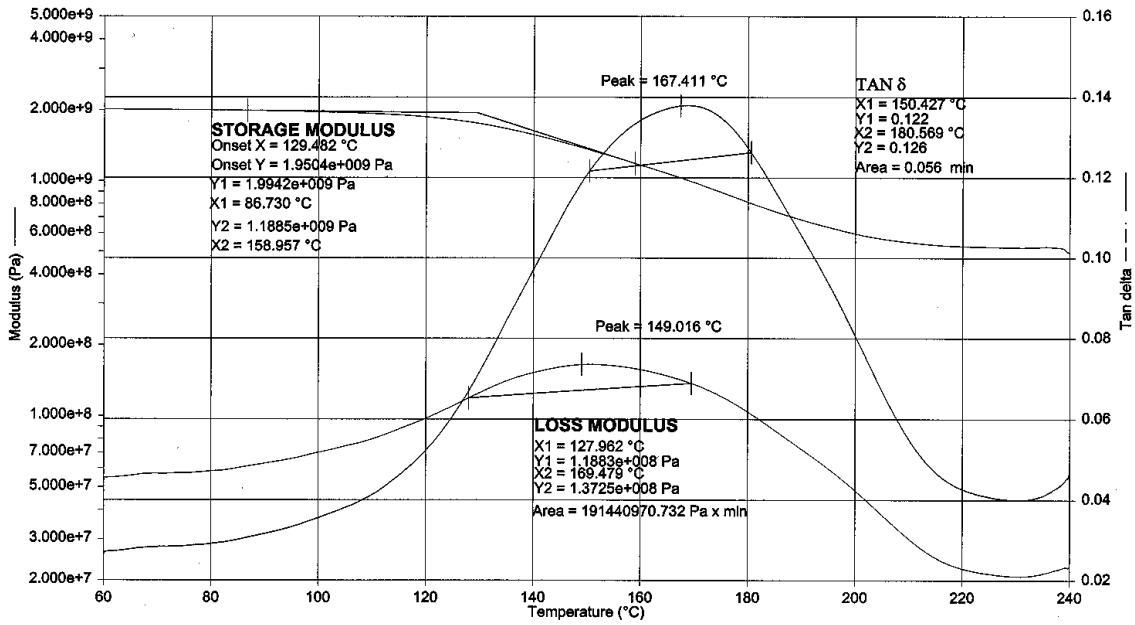
TFD 1127A



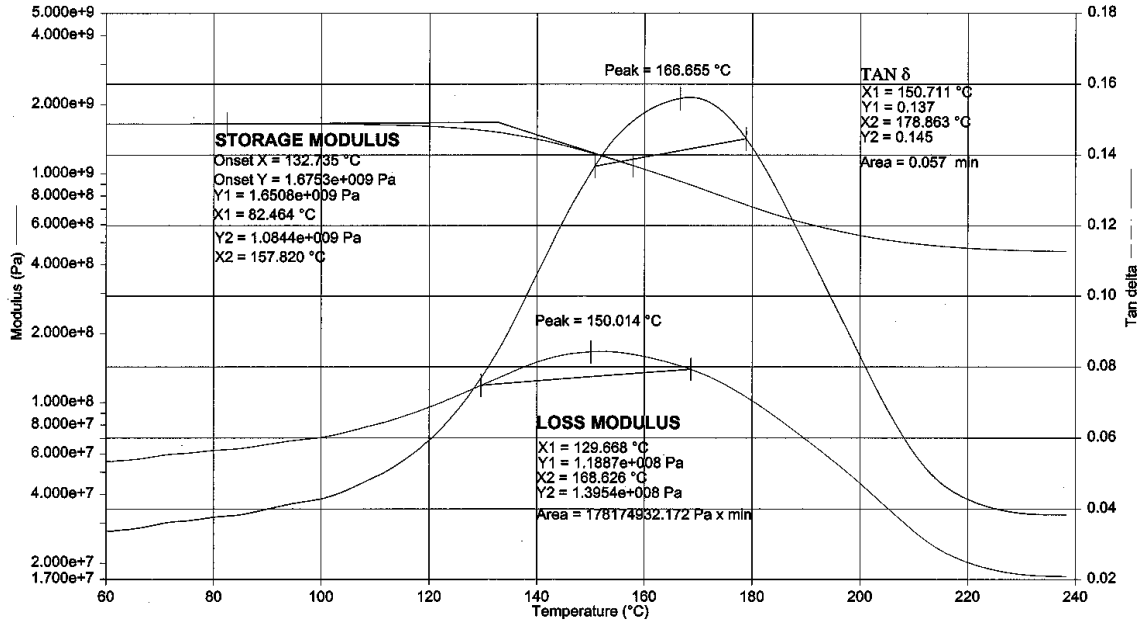
TFD 1128A



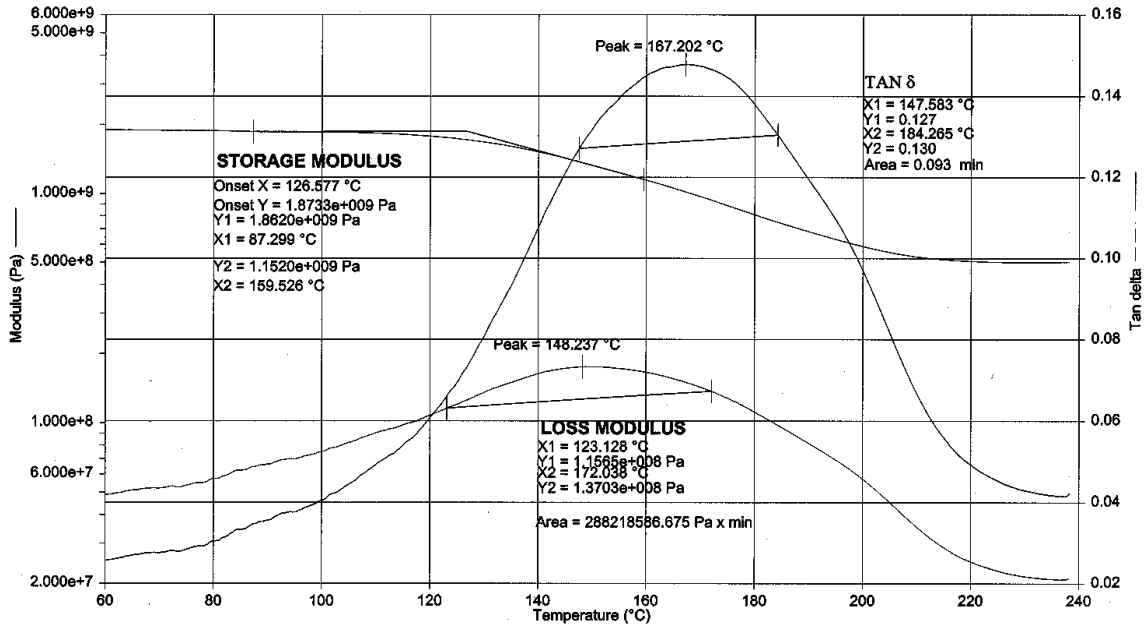
TFD 1129A



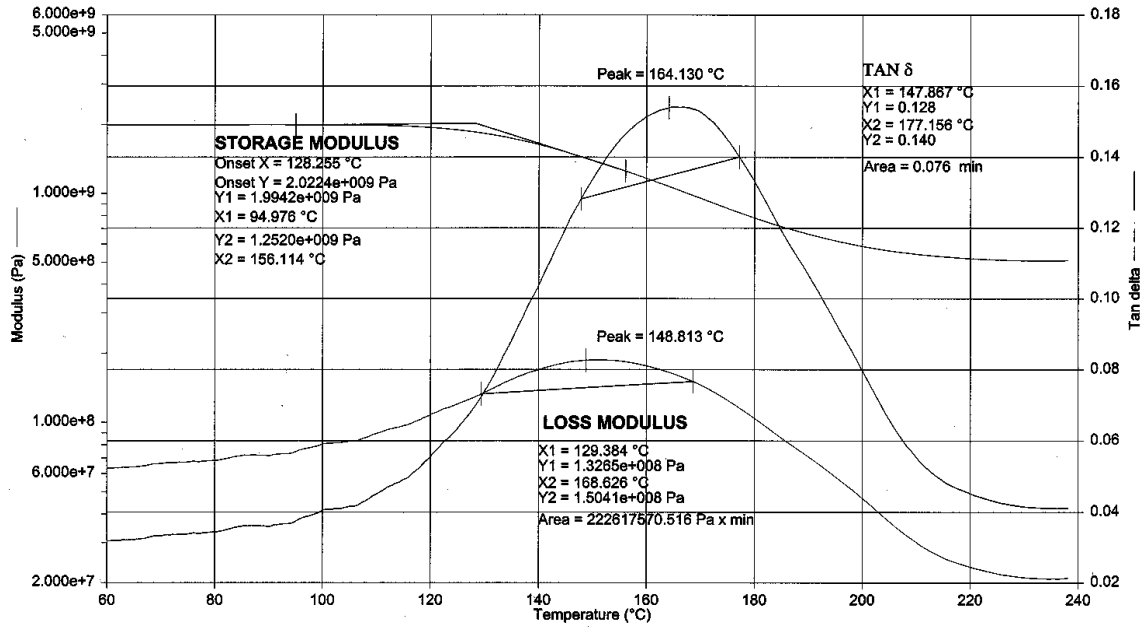
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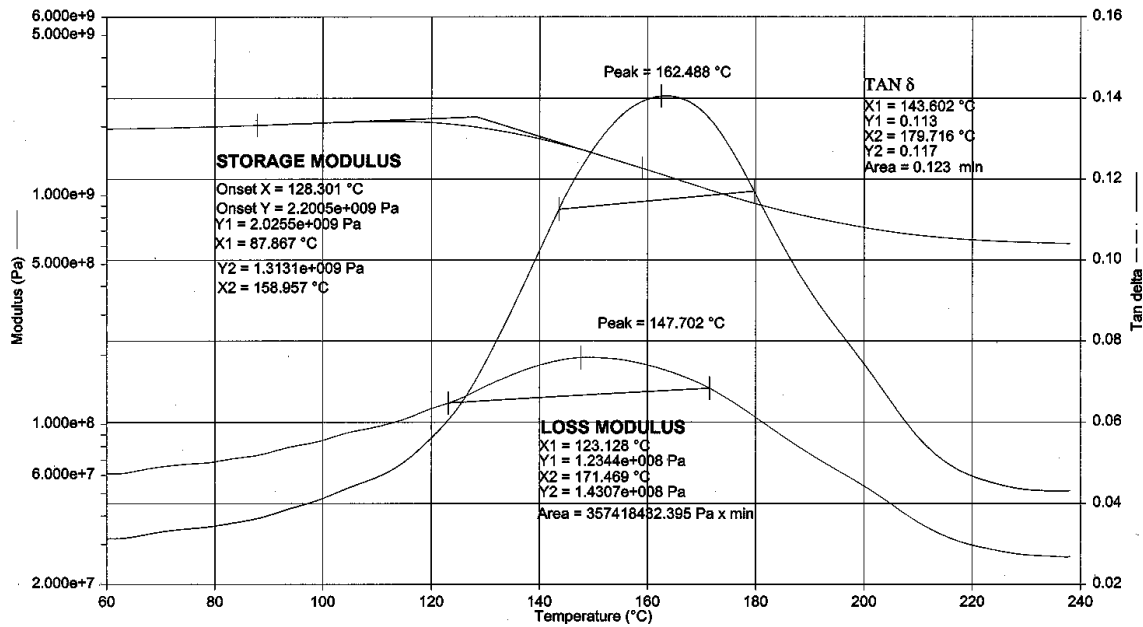
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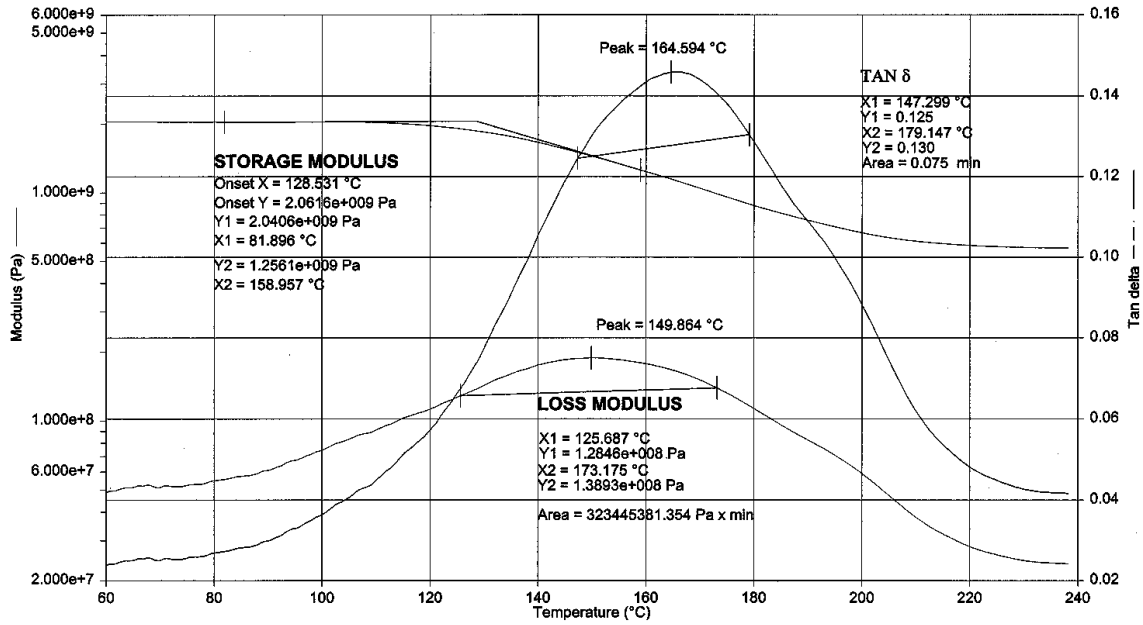
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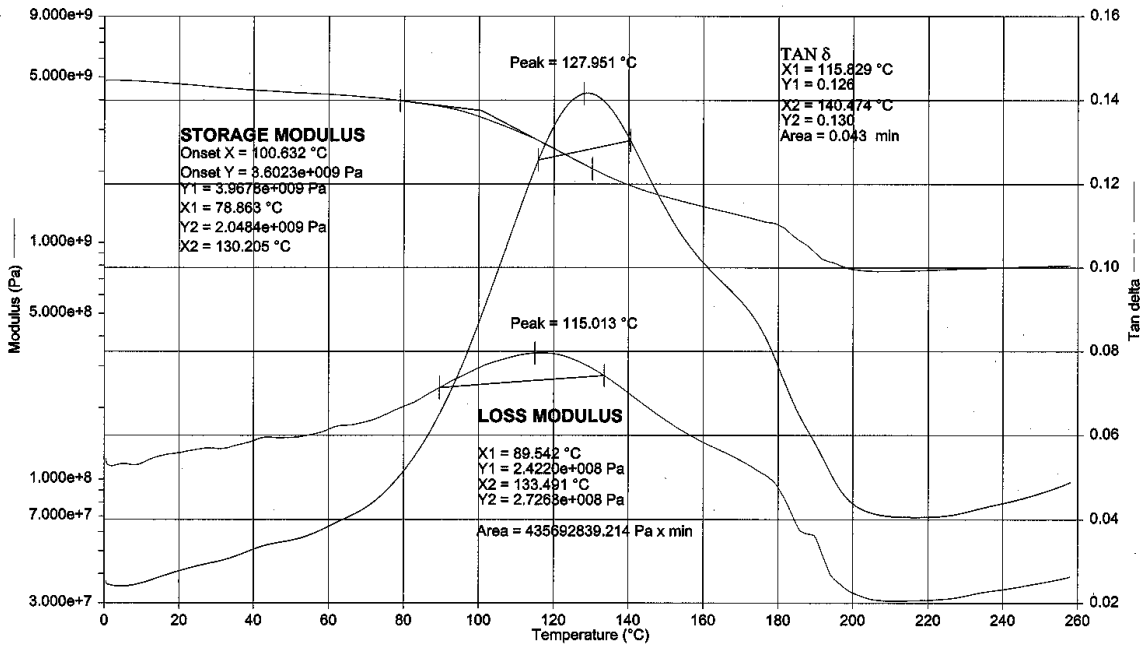
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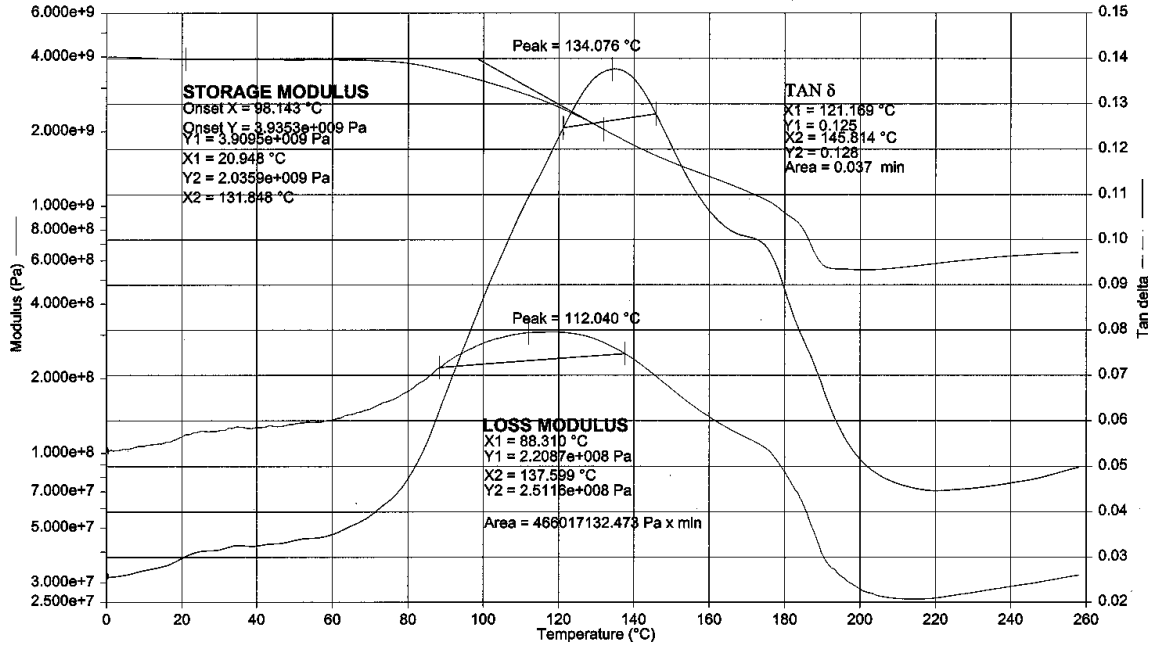
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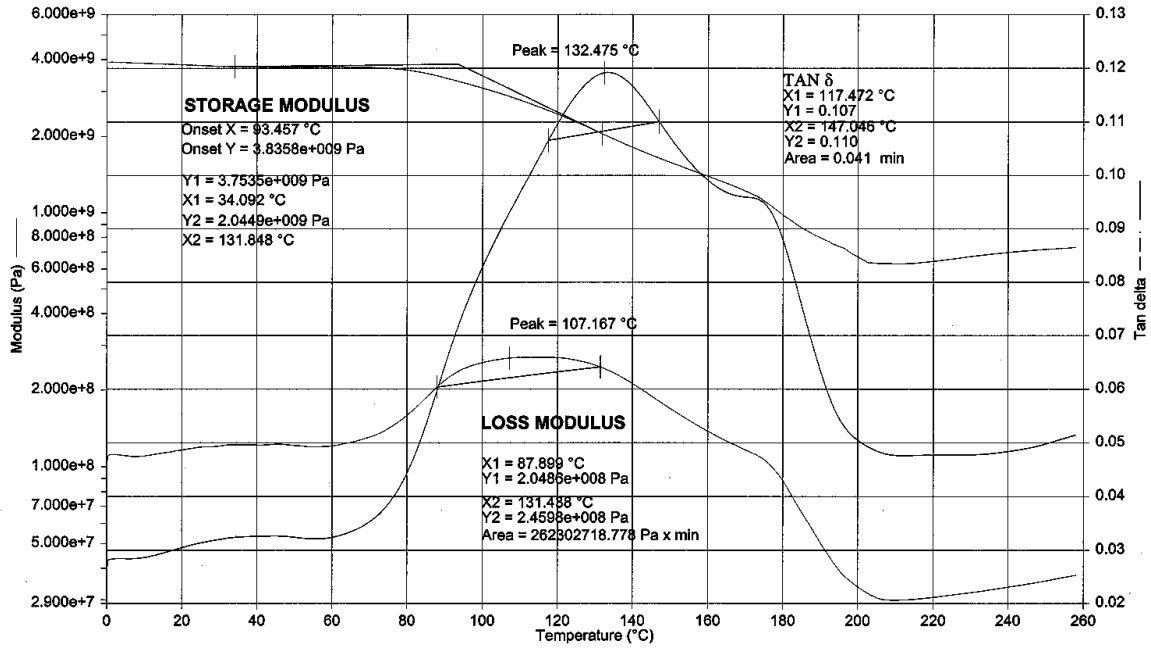
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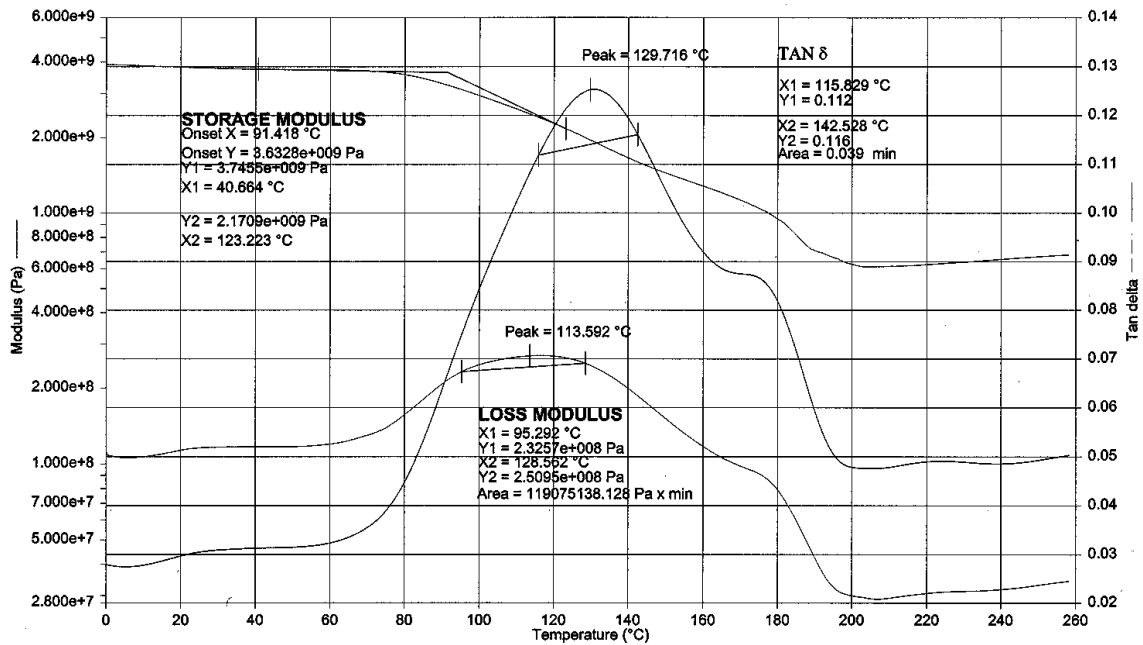
TFD 1122F



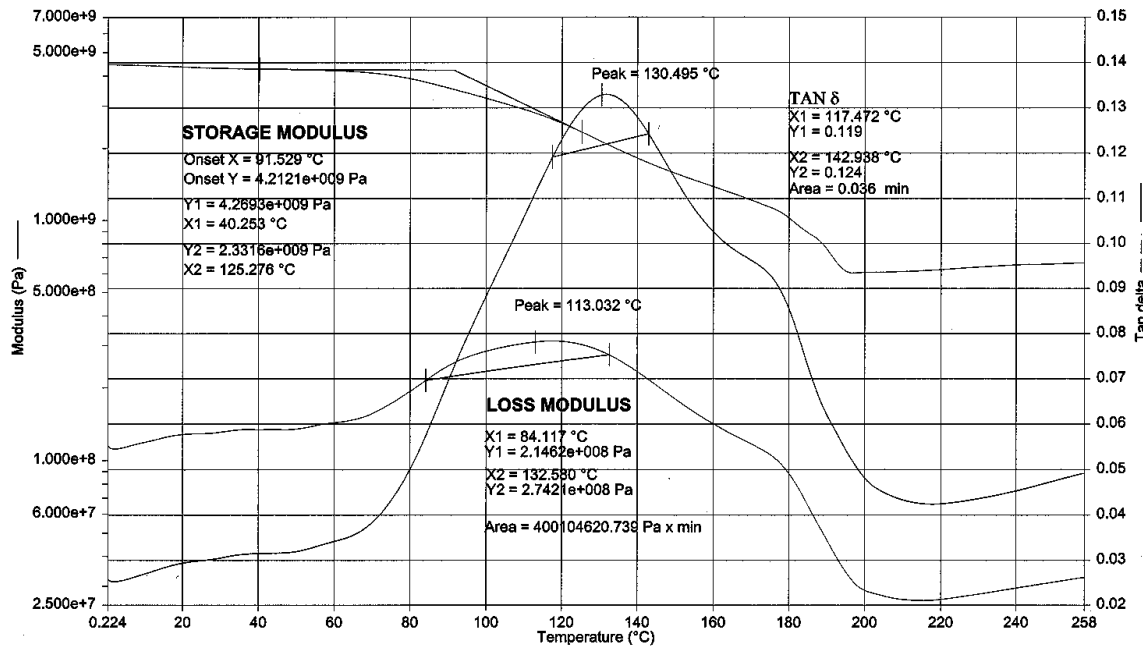
TFD 1123F



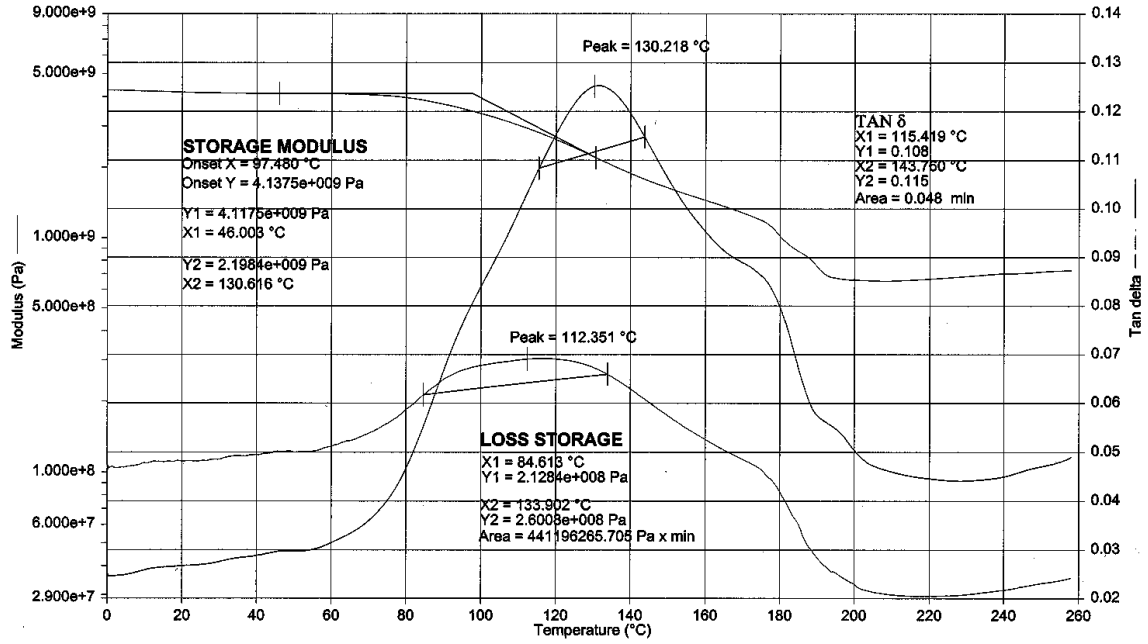
TFD 1124F



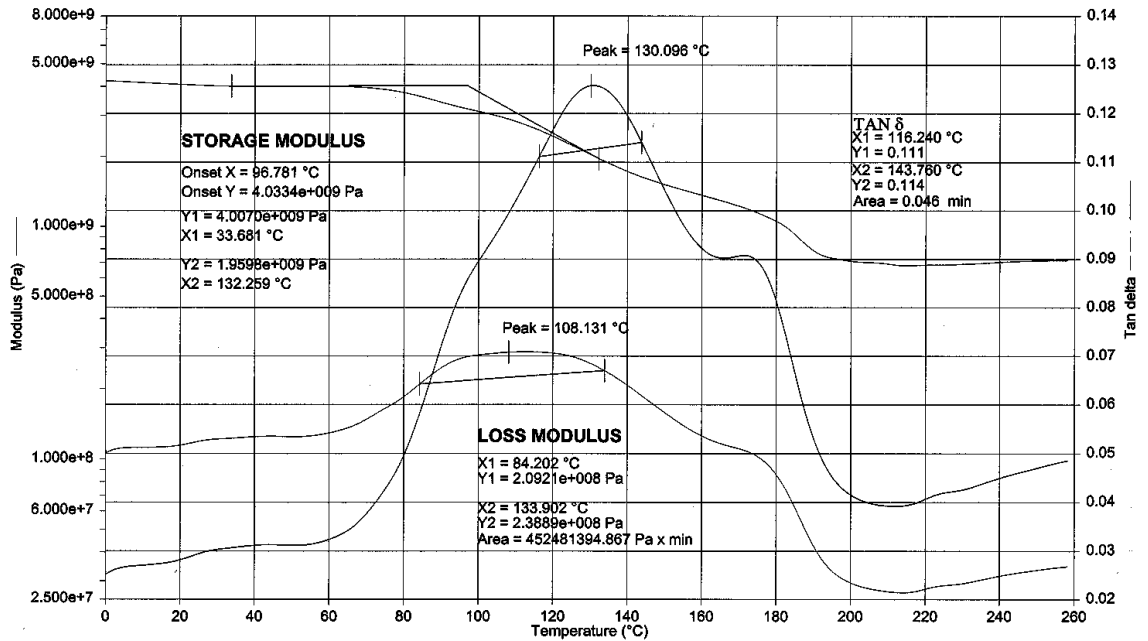
TFD 1125F



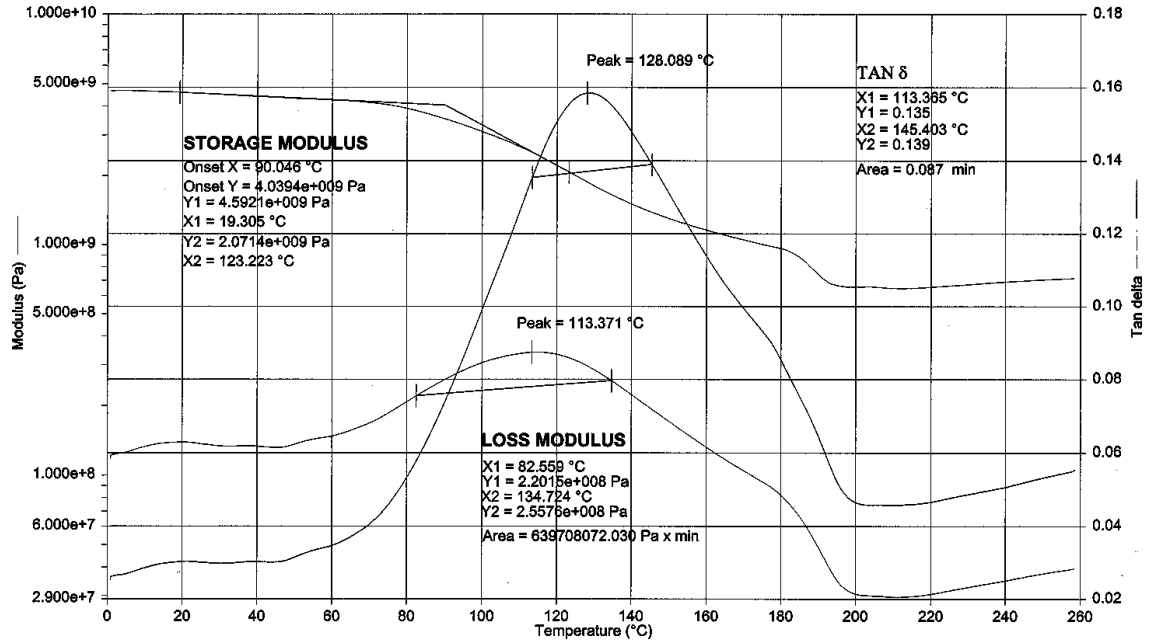
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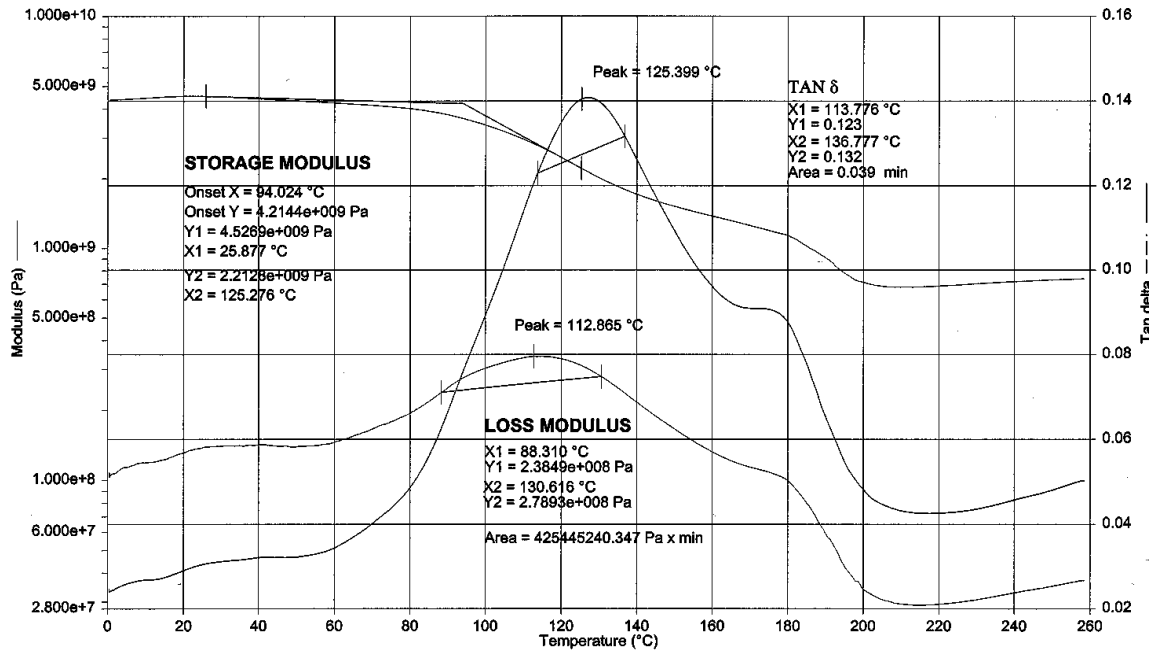
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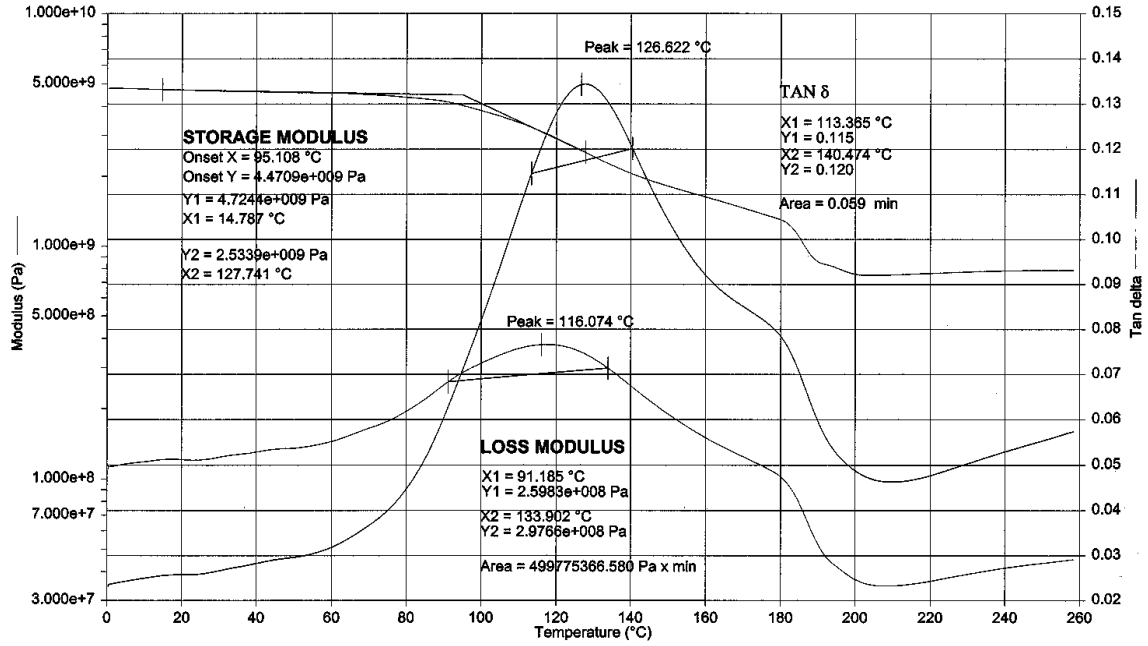
TFD 2123F



TFD 3121F



TFD 3122F



TFD 3123F

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

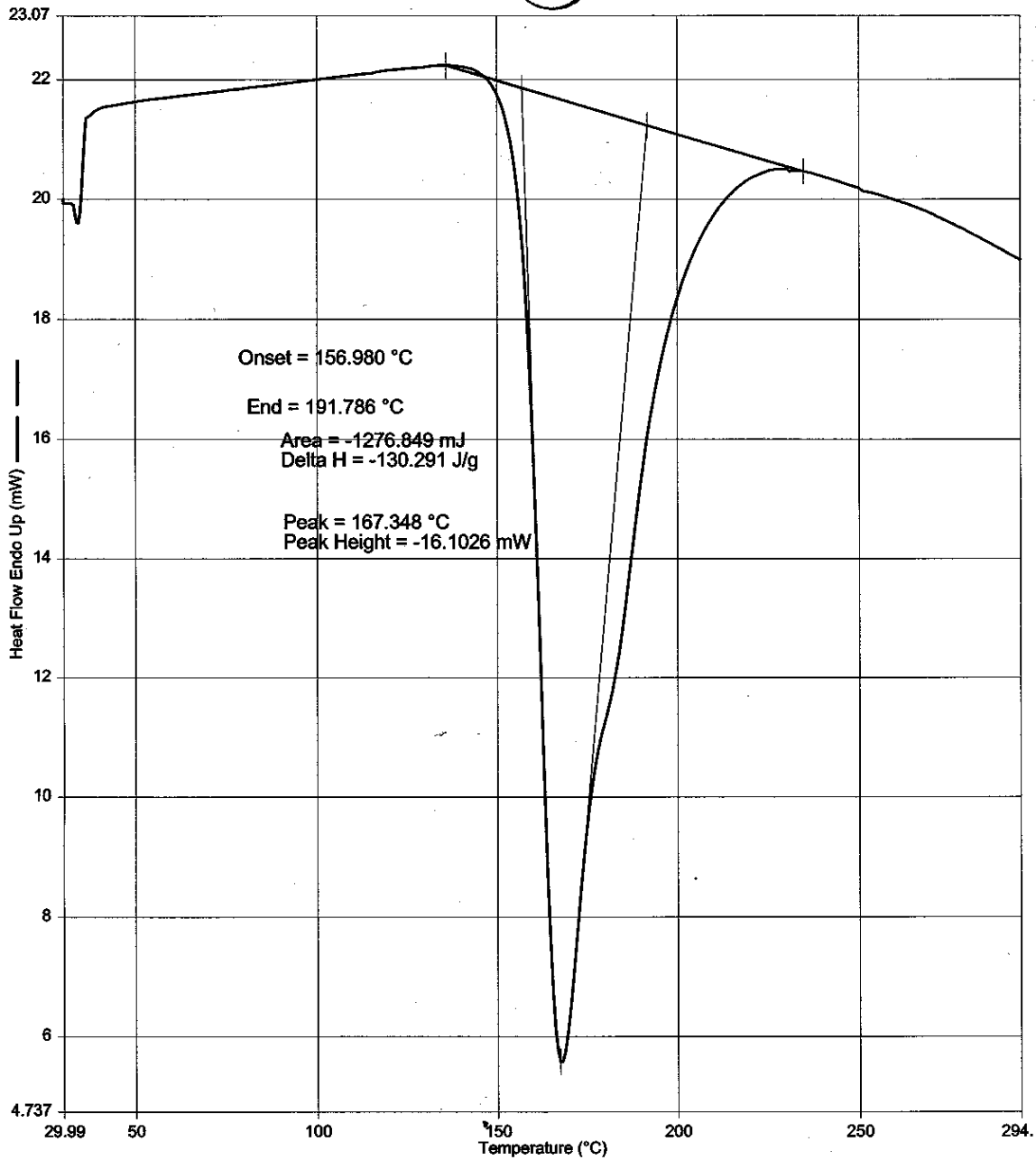
The identification of Components A, B, etc is proprietary to FiberCote. Details of the actual identifications are given in a letter from FiberCote to the FAA - Seattle, dated June 30, 1999 (ref. Project #TC1616SE-A).

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

Filename: C:\PE\PyrisData\E-765@010405124710.d6d
Operator ID: TARIQ
Sample ID: E-10411
Sample Weight: 9.800 mg
Comment: 6K

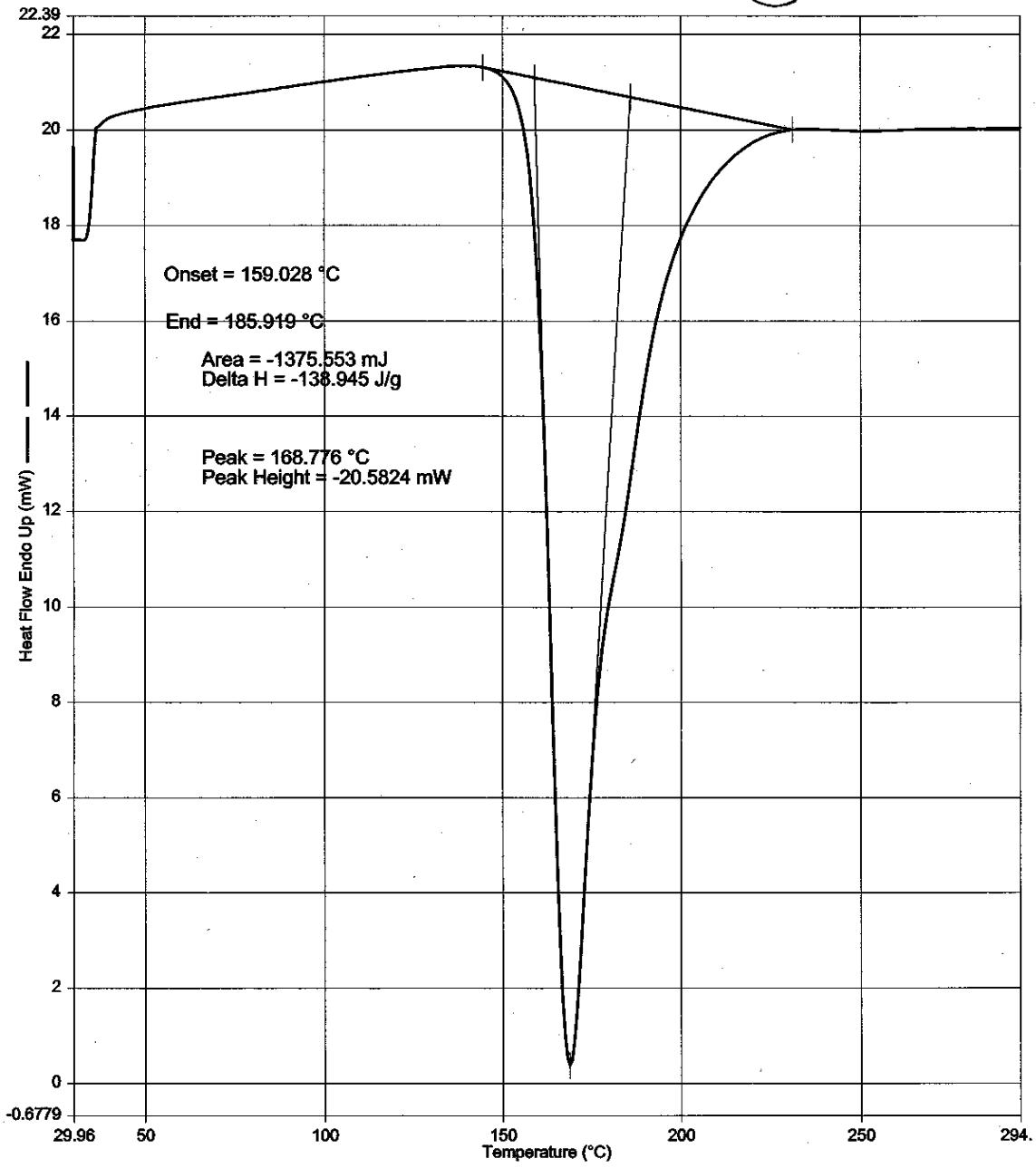
10
FCI
OK



2/13/02 11:19:02 AM

1) Hold for 1.0 min at 30.00°C 2) Heat from 30.00°C to 300.00°C at 20.00°C/min

Filename: C:\PEP\InstData\E-765@010103101416.d6d
Operator ID: TARIQ
Sample ID: lot 1243
Sample Weight: 9.900 mg
Comment: 6K

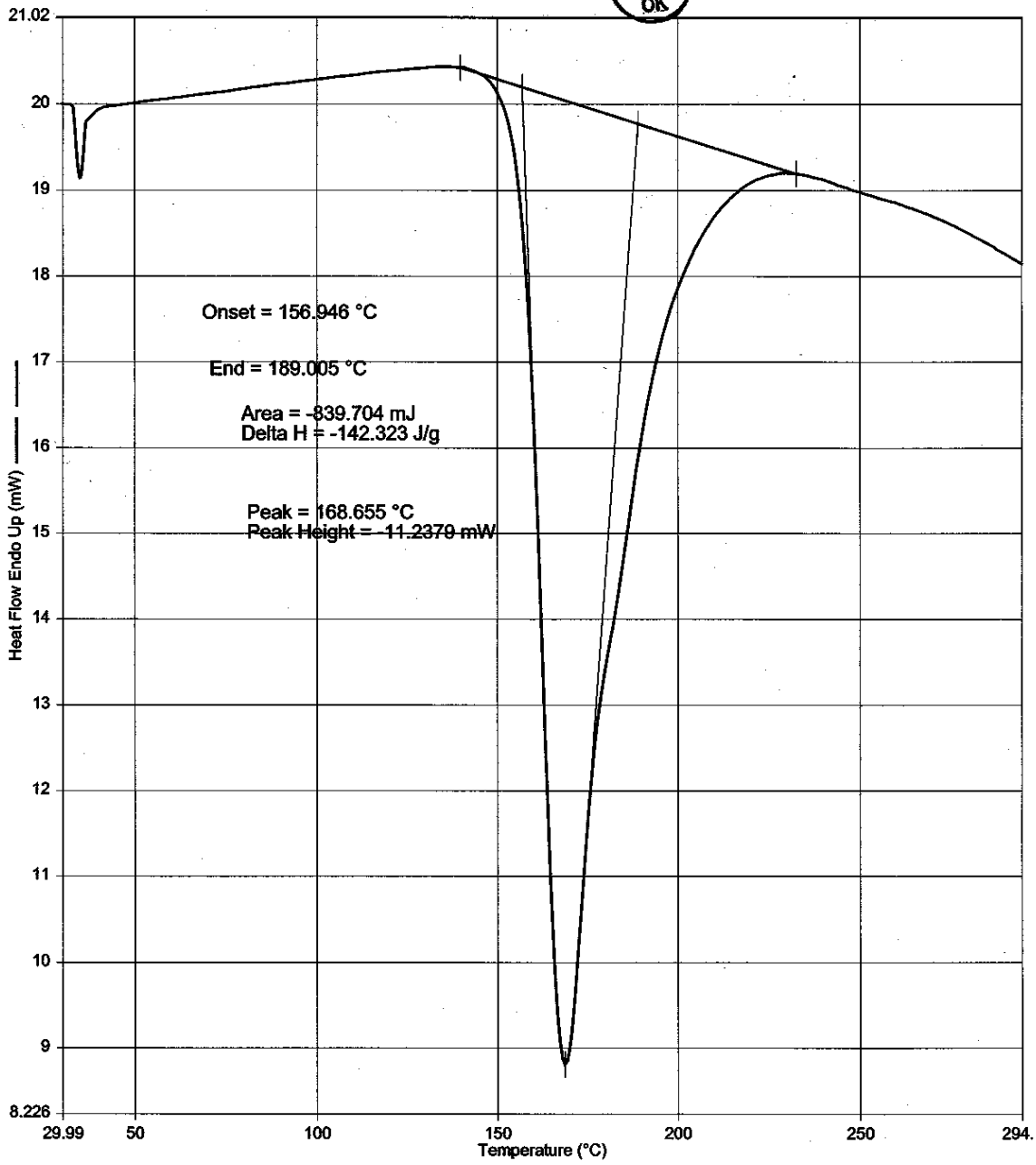


2/13/02 11:13:31 AM

1) Hold for 1.0 min at 30.00°C 2) Heat from 30.00°C to 300.00°C at 20.00°C/min

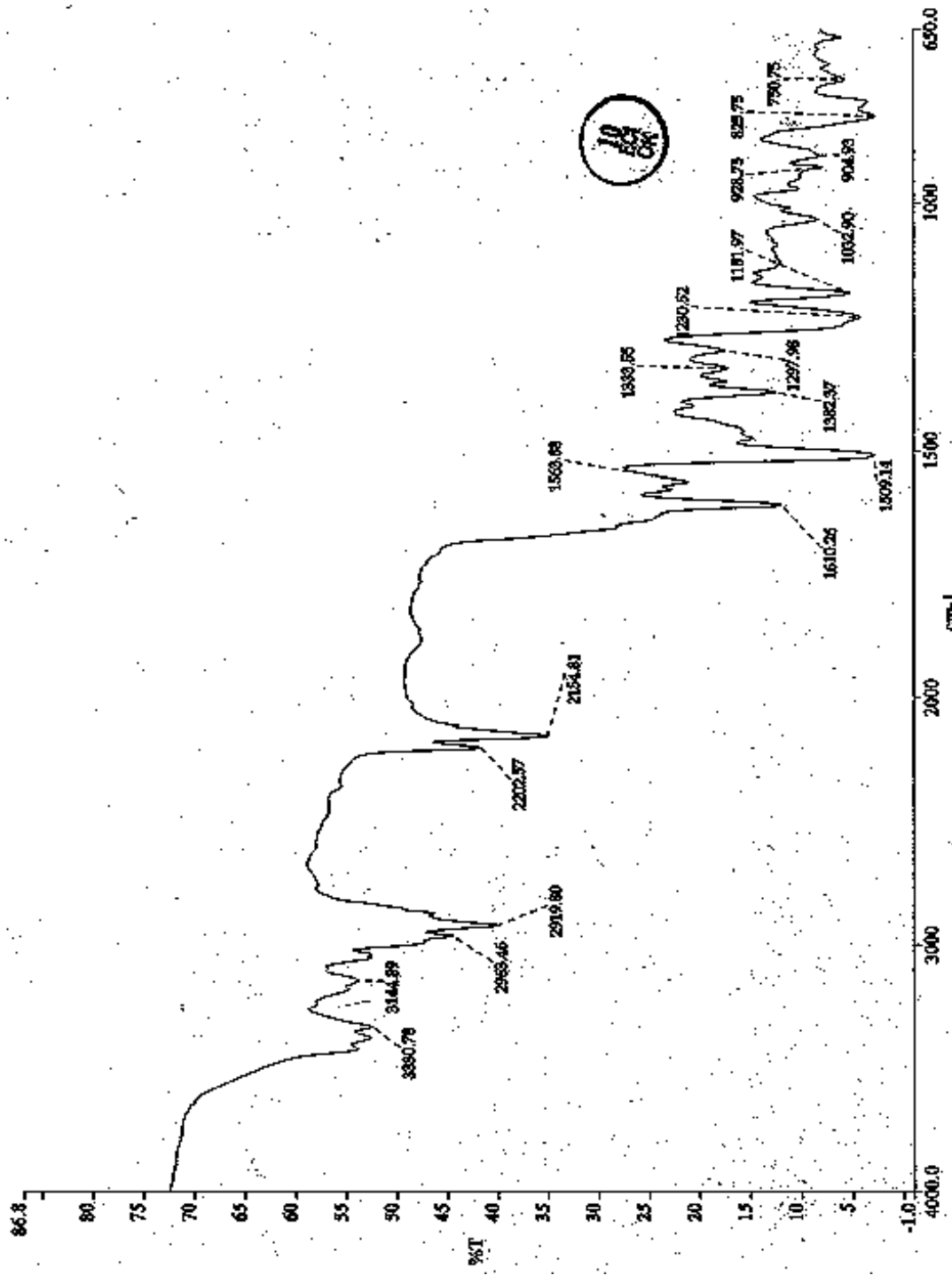
Filename: C:\PE\Pyris\Data\E-765@010405111333.d6d
Operator ID: TARIQ
Sample ID: E-10410
Sample Weight: 5.900 mg
Comment: 6K

10
FCI
OK

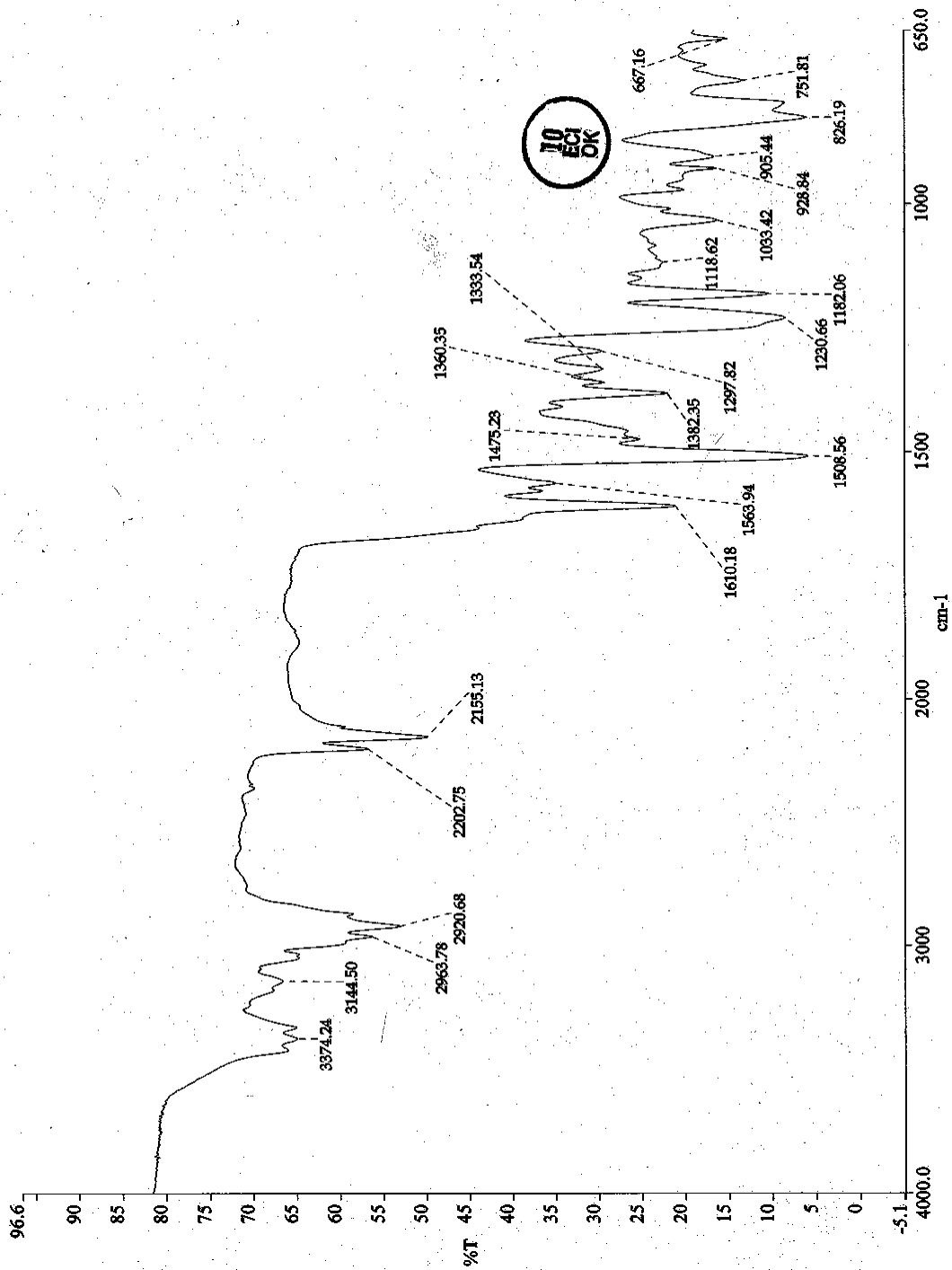


2/13/02 11:15:52 AM

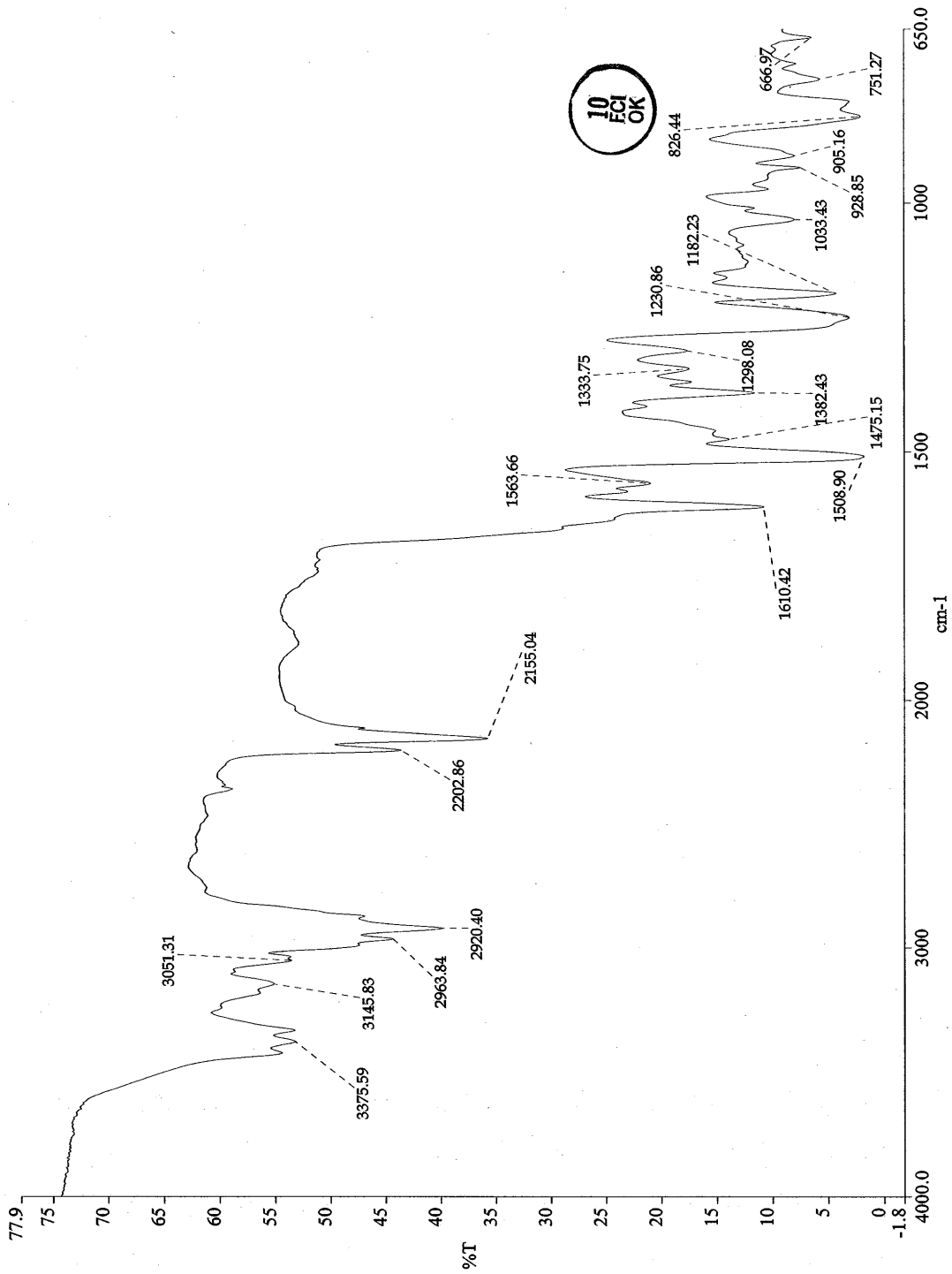
1) Hold for 1.0 min at 30.00°C 2) Heat from 30.00°C to 300.00°C at 20.00°C/min



cc:\del_data\spectra\le-786.sp - E- 01249



c:\pel_data\spectra\le-765.sp - E-10410



c:\pel_data\spectra\le-765.sp - E- 10411

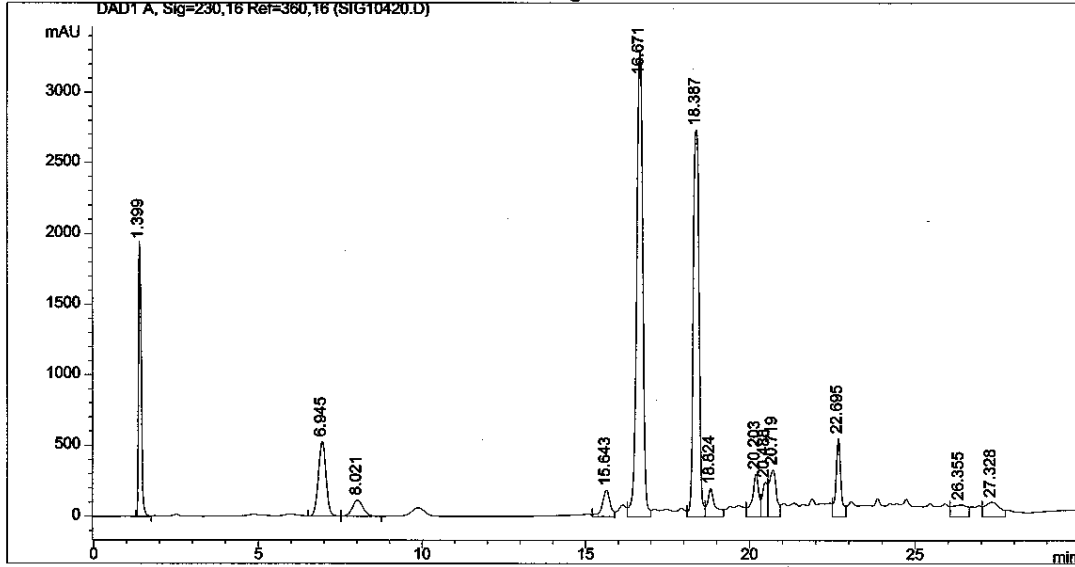
Data File C:\HPCHEM\1\DATA\SIG10420.D

Sample Name: E-10410

```

=====
Injection Date   : 2/20/02 8:39:27 AM
Sample Name     : E-10410
Acq. Operator   : TARIQ
Vial            : 21
Inj Volume      : 10 µl

Method          : C:\HPCHEM\1\METHODS\C18_ACN.M
Last changed    : 2/20/02 7:56:13 AM by TARIQ
                  (modified after loading)
    
```



=====
 Area Percent Report
 =====

```

Sorted By      : Signal
Multiplier     : 1.0000
Dilution       : 1.0000
    
```



Signal 1: DAD1 A, Sig=230,16 Ref=360,16

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	1.399	BV	0.0982	1.16213e4	1930.45728	8.9767
2	6.945	VV	0.2549	8611.33398	526.24414	6.6517
3	8.021	VB	0.3538	2622.84570	113.43019	2.0260
4	15.643	VV	0.2523	3118.60889	185.38477	2.4089
5	16.671	VV	0.2035	4.28827e4	3301.30005	33.1242
6	18.387	VV	0.1995	3.35989e4	2731.91187	25.9531
7	18.824	VV	0.2293	3195.72974	197.00275	2.4685
8	20.203	VV	0.1966	4151.36133	301.51965	3.2067
9	20.488	VV	0.1559	2580.26782	243.04858	1.9931
10	20.719	VV	0.2285	5137.42334	332.13873	3.9683
11	22.695	VV	0.1540	5795.07275	554.16718	4.4763
12	26.355	VV	0.4010	2771.21240	84.86569	2.1406

Series 1100 HPLC 2/20/02 9:09:01 AM TARIO

Page 1 of 2

Data File C:\HPCHEM\1\DATA\SIG10420.D

Sample Name: E-10410

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
13	27.328	VV	0.4541	3373.59937	104.08608	2.6059

Totals : 1.29460e5 1.06056e4

Results obtained with enhanced integrator!

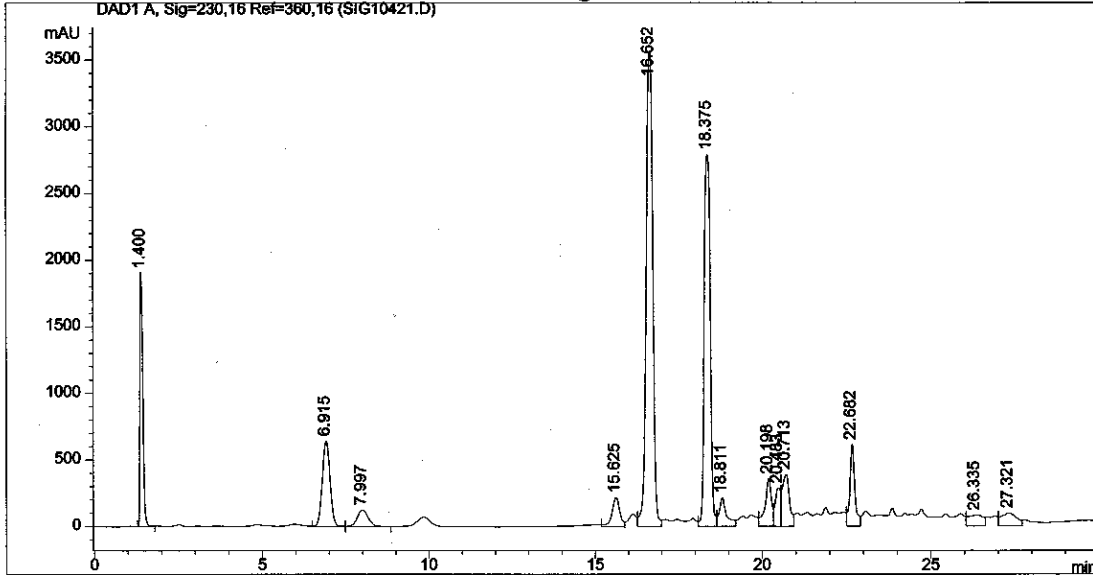
=====
*** End of Report ***

Data File C:\HPCHEM\1\DATA\SIG10421.D

Sample Name: E-10411

```

=====
Injection Date   : 2/20/02 9:25:25 AM
Sample Name     : E-10411
Acq. Operator  : TARIQ
Vial           : 21
Inj Volume     : 10 µl
Method         : C:\HPCHEM\1\METHODS\C18 ACN.M
Last changed   : 2/20/02 7:56:13 AM by TARIQ
                (modified after loading)
    
```



=====
 Area Percent Report
 =====

```

Sorted By      : Signal
Multiplier    : 1.0000
Dilution      : 1.0000
    
```



Signal 1: DAD1 A, Sig=230,16 Ref=360,16

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	1.400	PB	0.0986	1.15110e4	1901.49036	8.1040
2	6.915	VV	0.2539	1.04540e4	642.34491	7.3598
3	7.997	VV	0.3540	2903.04541	125.43497	2.0438
4	15.625	VV	0.2479	3605.91626	219.20116	2.5386
5	16.652	VV	0.2168	4.92018e4	3569.32690	34.6391
6	18.375	VV	0.2074	3.52426e4	2788.52588	24.8115
7	18.811	VV	0.2196	3385.38354	215.13733	2.3834
8	20.198	VV	0.1902	4743.15234	358.80740	3.3393
9	20.483	VV	0.1565	3071.25854	287.79361	2.1622
10	20.713	VV	0.2235	5894.28906	391.73380	4.1497
11	22.682	VV	0.1524	6320.53711	612.63593	4.4498
12	26.335	VV	0.3901	2601.20166	81.99092	1.8313

Series 1100 HPLC 2/20/02 9:54:57 AM TARIQ

Page 1 of 2

Data File C:\HPCHEM\1\DATA\SIG10421.D

Sample Name: E-10411

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
13	27.321	VV	0.4716	3107.22095	96.50289	2.1875

Totals : 1.42041e5 1.12909e4

Results obtained with enhanced integrator!

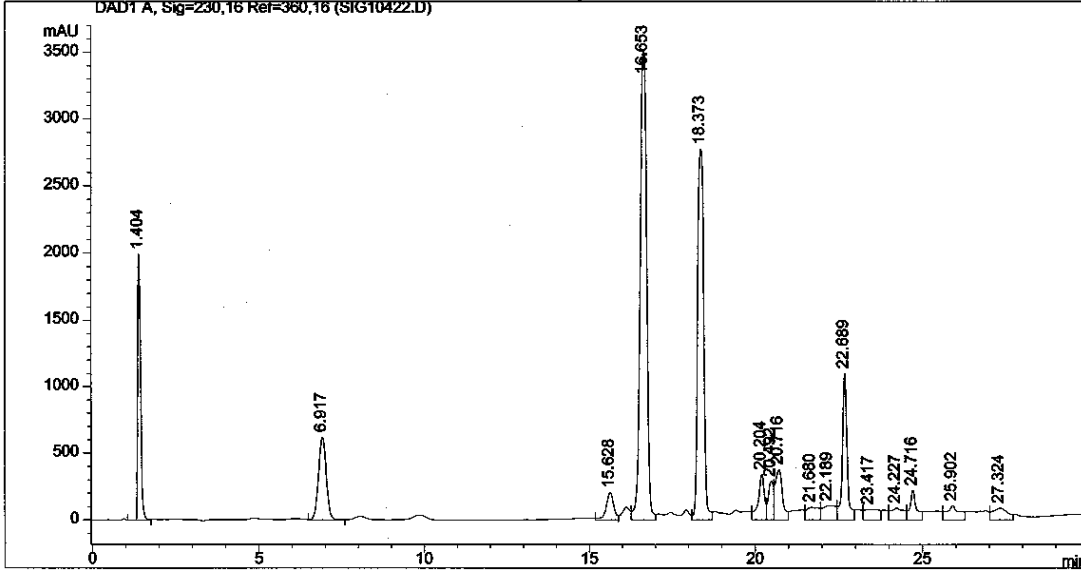
*** End of Report ***

Data File C:\HPCHEM\1\DATA\SIG10422.D

Sample Name: E-01243

```

=====
Injection Date   : 2/20/02 10:11:21 AM
Sample Name     : E-01243
Acq. Operator   : TARIQ
Method          : C:\HPCHEM\1\METHODS\C18_ACN.M
Last changed    : 2/20/02 7:56:13 AM by TARIQ
                  (modified after loading)
Inj Volume      : 10 µl
    
```



=====
 Area Percent Report
 =====

```

Sorted By      : Signal
Multiplier     : 1.0000
Dilution       : 1.0000
    
```

Signal 1: DAD1 A, Sig=230,16 Ref=360,16



Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	1.404	VV	0.1011	1.25007e4	1996.14905	8.1568
2	6.917	VV	0.2564	1.02649e4	622.29559	6.6980
3	15.628	VV	0.2486	3321.67822	205.46346	2.1674
4	16.653	VV	0.2192	4.81271e4	3526.14795	31.4033
5	18.373	VV	0.2085	3.53307e4	2774.77417	23.0536
6	20.204	VV	0.1869	4419.32910	341.74673	2.8837
7	20.492	VV	0.1600	3071.45020	289.02734	2.0041
8	20.716	VV	0.2311	5807.36084	378.34924	3.7894
9	21.680	VV	0.3476	2523.56274	96.98587	1.6466
10	22.189	VV	0.3651	3016.41479	108.25368	1.9682
11	22.689	VV	0.1520	1.09569e4	1101.82068	7.1495
12	23.417	VV	0.4139	2522.54053	81.31538	1.6460

Series 1100 HPLC 2/20/02 10:40:56 AM TARIQ

Page 1 of 2

Data File C:\HPCHEM\1\DATA\SIG10422.D

Sample Name: E-01243

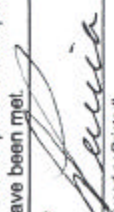
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
13	24.227	VV	0.3575	2533.98364	91.96789	1.6534
14	24.716	VV	0.1914	3039.32690	222.43542	1.9832
15	25.902	VV	0.3578	2977.49219	107.94757	1.9428
16	27.324	VV	0.4547	2841.22876	89.41663	1.8539

Totals : 1.53255e5 1.20341e4

Results obtained with enhanced integrator!

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*** End of Report ***

**APPENDIX B. DATES OF PANEL MANUFACTURE AND COPIES OF FAA
CONFORMITY PAPERWORK**


1. UNITED STATES		2. FAA FORM 8130-3 AIRWORTHINESS APPROVAL TAG U.S. Department of Transportation Federal Aviation Administration		3. System Tracking Ref. No. 041701001	
4. Organization Wichita State University, Kansas / Fibercote Industries, 172 East Aurora St. Waterbury, CT					
5. Work Order, Contract, or Invoice Number PURCHASE ORDER C11517					
6. Item	7. Description	8. Part Number	9. Eligibility *	10. Quantity	11. Serial/ Batch Number
1	Carbon fiber Test Panel Specimen	See attached document: Panel Identification - NIAR Composites 4/3/01	TBD	66	N/A
12. Status/Work PROTOTYPE					
13. Remarks FAA PROJECT # SP2626WI-Q-2962 CONFORMITY ONLY: 1. TEST SPECIMEN TO BE SHIPPED TO Wichita State University, FOR TESTING 2. FAA conformity inspection conducted to material qualification plan, E7850P1001, Rev. C, dated 1/7/00, and Curing Document# B-785 PS1001 Rev. 1 dated 10/18/00. 3. THIS TAG IS TO REMAIN WITH PARTS UNLESS REMOVED BY FAA.					
14. Limited life parts must be accompanied by maintenance history including total time/total cycles/time since new.					
14. New <input checked="" type="checkbox"/> Newly Overhauled <input type="checkbox"/>		19. Return to Service in Accordance with FAR 43.9 Certifies that the work specified in block 13 (or attached) above was carried out in accordance with FAA airworthiness regulations and in respect to the work performed the part(s) is (are) approved for return to service.			
15. Signature 		16. FAA Authorization No.: DARF-8008569NE		20. Authorized Signature: N/A	
17. Name (Typed or Printed): AL PEREIRA		18. Date: 04/18/01		21. Certificate Number	
				23. Date:	

* [Optional] installer must cross check eligibility with applicable technical data.

06/26/2001 TUE 10:13 FAX 316 946 4117

MFG INSP SPEC

001

 **US Department of Transportation
Federal Aviation Administration**

REQUEST FOR CONFORMITY

To: ICT MIDO Attention: BILL STOUAL
DARF 143025 CE

Request for Conformity Inspection Project No.: SP2626WI-Q-3338
 Part Conformity Date: 6/25/2001
 Installation
 Other Test specimens

A conformity inspection pertaining to the subject is requested for the following:
Applicant Name: WSU
Company Name: WSU
Street: 1845 Fairmount
City: Wichita State: KS Zip: 67260-0044
Time/Date Available: _____ Applicant will Contact FAA
Type Installation: _____
Make/Model: _____ Quantity: per qualification plan
Requesting Document (P.O.) and Date: _____
Design Data: (with Revision/Date): Material Qual Plan Doc. E765QP1001, Rev 0, Dated 01/07/00

Special Instructions: See attached instructions

Contact: Dr. John Tomblin at: (316) 978-5234
(Phone Number)
FAA Project Manager: David Ostrodka Phone: (316) 946-4129

Remarks: _____

T.I.A. Issued FAA Form 8100-1 Required
 T.I.R. Required FAA Form 8130-9 Required
 8130-3 Tags Required

Note: Please return this request for conformity with the FAA conformity document to MIS, DONNA BASGALL
316-946-4108

FAA Form 8120-10 (6-00)

SP2626W1-Q-3338

The Manufacturing Inspector is requested to accomplish the following:

1. Obtain a Statement of Conformity, FAA Form 8130-9, from applicant.
2. Conduct a conformity inspection of test specimens fabricated per FiberCote Material Qualification Plan: Fiberglass and Carbon Epoxy-Based Prepreg, 250° F Curing, Document Number E765QP1001, Revision 0, Dated 01/07/2000, or later FAA approved revision.
3. Conduct a conformity inspection of test setup. Verify that test machines, instruments, and environmental conditioning chambers are in calibration.
4. Conduct any other inspections deemed necessary.

OMB: 2120-0018

STATEMENT OF CONFORMITY	
Section I — Aircraft	
1. Make	2. Model
3. Serial No.	4. Registration No.
Section II — Engine	
1. Make	2. Model
3. Serial No.	
Section III — Propeller	
1. Make	2. Hub Model
3. Blade Model	4. Hub Serial No.
5. Blade Serial Nos.	
Section IV — Certification	
I hereby certify that:	
<input type="checkbox"/> A. I have complied with Section 21.33(a.). <input type="checkbox"/> B. The aircraft described above, produced under type certificate only (FAR 21 Subpart F), conforms to its type certificate, is in a condition for safe operation, and was flight checked on _____ (Date) <input type="checkbox"/> C. The engine or propeller described above, presented herewith for type certification, conforms to the type design therefor. <input type="checkbox"/> D. The engine or propeller described above produced under type certificate only (FAR 21 Subpart F), conforms to its type certificate and is in a condition for safe operation. The engine or, if applicable, the variable pitch propeller was subjected by the manufacturer to a final operation check on _____ (Date)	
Deviations:	
<p>FAA Project # SP2626WI-Q</p> <p>All test specimens for the E765/6K5HS 5-harness carbon material system have been manufactured for testing in accordance with DOT/FAA/AR-00/47, entitled "Material Qualification and Equivalency for Polymer Matrix Composite Material Systems" and FiberCote Industries Inc., Document # E765QP1001, entitled "Material Qualification Plan: Fiberglass and Carbon Epoxy-Based Prepreg, 250° F Curing," revision 0, dated 1/7/00. Shaded cells on the attached tracking forms indicate dimensional deviations from the test plan for each individual specimen.</p>	
Signature of Certifier <i>John Jowell</i>	Title PROFESSOR
Organization WSU/NAR	Date 6/28/01

Conformity Inspection Record		1. Project Number, TIAR/Request Date: SP2626 WI-Q-3338		2. SHEET 1 of 2 Sheets	
3. Applicant/Manufacturer: WSU (NAZIC)		4. Beginning Date: 6-28-01		5. Ending Date: 7-01-01	
6. Model: MATERIAL QUALIFICATION		7. Inspected By: William J. Stovall		8. Drawing, Document, Specification, etc. Doc E7659P1001	
9. Nomenclature of Item Inspected		11. Revision and Date		12. No. of Items Determined	
10. Drawing, Document, Specification, etc.		SAT.		UNSAT.	
13. Comments		SAT.		UNSAT.	
1	Statement of Conformity FAA Form 8130-9	6-28-01	1		Original Attached
2	ITEM 304 Request Instrument calib.		1		Measuring & Test Equip.
3	ITEM 304 Request TEST SET-UP		1		Inspected Test Fixtures
4	REF. Doc: DOT/FAA/AE-00/47	4/2001	1		NOTE: All UNSAT Due to Under size on Thickness
5	Bearing Strength Test Doc E7659P1001	REV 0 17/00	111		UNSAT UNDER THICKNESS
6	Tension Strength; Modulus ASTM D3039 Spec: new-0	Doc E7659P1001	REV 0 17/00	86	33
7	Compressive Test (ASTM D695 Mod)-0 Strength Spec: new	Doc E7659P1001	REV 0 17/00		106
8	Compressive Test (ASTM D695 Mod)-0 Modulus Spec: new	Doc E7659P1001	REV 0 17/00	50	106

Conformity Inspection Record		1. Project Number, Title/Request Date:	2. SHEET 2 of 2 Sheets
3. Applicant/Manufacturer:	4. Drawing, Document, Specification, etc.	4. Beginning Date:	5. Ending Date:
6. Model:	7. Inspected By:	12. No. of Items Determined	13. Comments
8. Item No.	9. Nomenclature of Item Inspected	11. Revision and Date	
		SAT.	UNSAT.
	W5U (NAIR)		
	Material Qualification Doc E7659A1001	William J. Stover	7-01-01
		6-28-01	7-01-01
			Stover 7/1/01
9.	IN-Plane Shear Strength Doc E7659A1001	Rev 0 1/10	105
	Modulo (ASTM D 5377)		NOTE: All UNSAT Due to under size on Thickness
10.	Short Beam Shear Strength (ASTM D 2344)	Doc E7659A1001	Rev 0 1/10
			54
11.	Tension Strength; Modulo (ASTM D 3039)	Doc E7659A1001	Rev 0 1/10
			103
12.	Compressive Test (ASTM D 695 Mod) -90° Strength	Doc E7659A1001	Rev 0 1/10
			56
13.	Compressive Test (ASTM D 695 Mod) -90° Modulus	Doc E7659A1001	Rev 0 1/10
			58
			UNSAT UNDER THICKNESS

FAA Form 8100-1 (5-92) Superseded Previous Edition (Electronic Form 1-02)

APR 30 '01 10:32AM FIBERCOTE IND

P.2/5

E-765 QP1001 QUALIFICATION PLAN
6K 5HS CARBON FABRIC

PANEL BUILD - E-765 PS1000

Page 1 of 4
 COMMENTS

PANEL #	KIT DATE	DATE LAYUP	CURE DATE/TIME	CURE CYCLE NO.	COMMENTS
TFJ11	4/5/01	4/6/01	4/6/01 10:45AM	1	
TFJ12	4/5/01	4/6/01	4/9/01 7:30AM	2	Freezer - in - 4/6/01 3:00AM out - 4/9/01 4:00AM
TFJ13	4/5/01	4/6/01	4/6/01 7:30AM	1	
TFJ14	4/5/01	4/6/01	4/9/01 10:45AM	2	Freezer - in - 4/6/01 3:00PM out - 4/9/01 4:00AM
TFJ15	4/5/01	4/6/01	4/6/01 7:30AM	1	
TFJ21	4/5/01	4/6/01	4/9/01 10:45AM	2	Freezer - in - 4/6/01 3:00PM out - 4/9/01 4:00AM
TFJ22	4/5/01	4/6/01	4/6/01 7:30AM	1	
TFJ23	4/5/01	4/6/01	4/9/01 10:45AM	2	Freezer - in - 4/6/01 3:00PM out - 4/9/01 4:00AM
TFJ24	4/5/01	4/6/01	4/6/01 7:30AM	1	
TFJ31	4/5/01	4/6/01	4/9/01 10:45AM	2	Freezer - in - 4/6/01 3:00PM out - 4/9/01 4:00AM
TFJ32	4/5/01	4/6/01	4/6/01 7:30AM	1	
TFJ33	4/5/01	4/6/01	4/9/01 10:45AM	2	Freezer - in - 4/6/01 3:00PM out - 4/9/01 4:00AM
TFJ34	4/5/01	4/6/01	4/6/01 7:30AM	1	
TFU11	4/5/01	4/6/01	4/9/01 10:45AM	2	Freezer - in - 4/6/01 3:00PM out - 4/9/01 4:00AM
TFU12	4/5/01	4/6/01	4/6/01 7:30AM	1	
TFU13	4/5/01	4/6/01	4/9/01 10:45AM	2	Freezer - in - 4/6/01 3:00PM out - 4/9/01 4:00AM
TFU14	4/5/01	4/6/01	4/6/01 7:30AM	1	
TFU15	4/5/01	4/6/01	4/9/01 10:45AM	2	Freezer - in - 4/6/01 3:00PM out - 4/9/01 4:00AM
TFU21	4/5/01	4/6/01	4/6/01 7:30AM	1	
TFU22	4/5/01	4/6/01	4/9/01 2:00PM	2	Freezer - in - 4/6/01 3:00PM out - 4/9/01 4:00AM
TFU23	4/5/01	4/6/01	4/9/01	3	Freezer - in - 4/6/01 3:00PM out - 4/9/01 7:00AM

G:/data/sue s/dfuse/QUFORM5hs

APR 30 '01 12:33AM FIBERCOTE IND

P.3/5

**E-765 OP1001 QUALIFICATION PLAN
 6K5 HS CARBON FABRIC**

PANEL BUILD - E-765 PS1000

Page 2 of 4

PANEL #	KIT DATE	DATE LAYUP	CURE DATE/TIME	CURE CYCLE NO.	COMMENTS
TFU24	4/5/01	4/6/01	4/9/01 7:30am 2:00pm	2	Freezer-in-4/6/01 3:00pm out-4/9/01 4:00am Freezer-in-4/6/01 3:00pm
TFU31	4/6/01	4/6/01	4/9/01 7:30am	3	out-4/9/01 7:00am Freezer-in-4/6/01 3:00pm
TFU32	4/6/01	4/6/01	4/9/01 2:00pm	2	out-4/9/01 4:00am Freezer-in-4/6/01 3:00pm
TFU33	4/6/01	4/6/01	4/9/01 7:30am	3	out-4/9/01 7:00am Freezer-in-4/6/01 3:00pm
TFU34	4/6/01	4/6/01	4/10/01 2:00pm	4	out-4-10-01 3:30am Freezer-in-4-6-01 3:00pm
TFK11	4/5/01	4/6/01	4/9/01 7:30am	3	out-4-9-01 7:00am Freezer-in-4-6-01 3:00pm
TFK12	4/5/01	4/6/01	4/10/01 2:00pm	4	out-4-10-01 3:30am Freezer-in-4-6-01 3:00pm
TFL11	4/5/01	4/6/01	4/9/01 7:30am	3	out-4-9-01 7:00am Freezer-in-4-6-01 3:00pm
TFK21	4/5/01	4/6/01	4/10/01 2:00pm	4	out-4-10-01 3:30am Freezer-in-4-6-01 3:00pm
TFK22	4/5/01	4/6/01	4/9/01 7:30am	3	out-4-9-01 7:00am Freezer-in-4-6-01 3:00pm
TFL21	4/5/01	4/6/01	4/10/01 2:00pm	4	out-4-10-01 3:30am Freezer-in-4-6-01 3:00pm
TFK31	4/5/01	4/6/01	4/9/01 7:30am	3	out-4-9-01 7:00am Freezer-in-4-6-01 3:00pm
TFK32	4/5/01	4/6/01	4/10/01 2:00pm	4	out-4-10-01 3:30am Freezer-in-4-6-01 3:00pm
TFL31	4/5/01	4/6/01	4/9/01 7:30am	3	out-4-9-01 7:00am Freezer-in-4-6-01 3:00pm
TFW11	4/5/01	4/6/01	4/10/01 2:00pm	4	out-4-10-01 3:30am Freezer-in-4-6-01 3:00pm
TFW12	4/5/01	4/6/01	4/9/01 7:30am	3	out-4-9-01 7:00am Freezer-in-4-6-01 3:00pm
TFZ11	4/5/01	4/6/01	4/10/01 2:00pm	4	out-4-10-01 3:30am Freezer-in-4-6-01 3:00pm
TFW21	4/5/01	4/6/01	4/9/01 7:30am	3	out-4-9-01 7:00am Freezer-in-4-6-01 3:00pm
TFW22	4/5/01	4/6/01	4/10/01 2:00pm	4	out-4-10-01 3:30am Freezer-in-4-6-01 3:00pm
TFZ21	4/5/01	4/6/01	4/9/01 7:30am	3	out-4-9-01 7:00am Freezer-in-4-6-01 3:00pm
TFW31	4/6/01	4/6/01	4/10/01	4	out-4-10-01 3:30am

G:/data/sue s/dfuse/QUFORM5hs

APR 30 '01 10:33AM FIBERCOTE IND

P.4/5

E-765 QP1001 QUALIFICATION PLAN
6K 5HS CARBON FABRIC

PANEL BUILD - E-765 PS1000

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PANEL #	KIT DATE	DATE LAYUP	CURE DATE/TIME	CURE CYCLE NO.	COMMENTS
TFW32	4/6/01	4/6/01	4/9/01 2:00pm	3	Freezer in - 4-6-01 3:00PM out - 4-9-01 7:00AM
TFZ31	4/6/01	4/6/01	4/10/01 7:30AM	4	Freezer in - 4-6-01 3:00PM out - 4-10-01 3:50AM
TFN11	4/6/01	4/6/01	4/10/01 1:45 PM	5	Freezer in - 4-6-01 3:00PM out - 4-10-01 8:00AM
TFN12	4/6/01	4/6/01	4/10/01 7:30AM	4	Freezer in - 4-6-01 3:00PM out - 4-10-01 3:50AM
TFN21	4/5/01	4/6/01	4/10/01 1:45 PM	5	Freezer in - 4-6-01 3:00PM out - 4-10-01 8:00AM
TFN22	4/5/01	4/6/01	4/10/01 7:30AM	4	Freezer in - 4-6-01 3:00PM out - 4-10-01 3:50AM
TFN31	4/6/01	4/6/01	4/10/01 1:45 PM	5	Freezer in - 4-6-01 3:00PM out - 4-10-01 8:00AM
TFN32	4/6/01	4/6/01	4/10/01 7:30AM	6	Freezer in - 4-6-01 3:00PM out - 4-10-01 6:00PM
TFQ11	4/6/01	4/6/01	4/10/01 1:45 PM	5	Freezer in - 4-6-01 3:00PM out - 4-10-01 8:00AM
TFQ21	4/6/01	4/6/01	4/11/01 7:30AM	6	Freezer in - 4-6-01 3:00PM out - 4-10-01 6:00PM
TFQ31	4/6/01	4/6/01	4/10/01 1:45 PM	5	Freezer in - 4-6-01 3:00PM out - 4-10-01 8:00AM
TF111	4/10/01	4/10/01	4/11/01 7:30AM	6	
TF112	4/10/01	4/10/01	4/10/01 1:45 PM	5	
TF113	4/10/01	4/10/01	4/10/01 7:30AM	6	
TF211	4/10/01	4/10/01	4/10/01 1:45 PM	5	
TF212	4/10/01	4/10/01	4/10/01 7:30AM	6	
TF213	4/10/01	4/10/01	4/10/01 1:45 PM	5	
TF311	4/10/01	4/10/01	4/11/01 7:30AM	6	
TF312	4/10/01	4/10/01	4/10/01 1:45 PM	5	
TF313	4/10/01	4/10/01	4/11/01 7:30AM	6	
TF411	4/10/01	4/10/01	4/10/01 1:45 PM	5	

G:/data/sue s/dfuse/QUFORM5hs

