



# Advanced General Aviation Transport Experiments

## Laminate Design Allowables for Epoxy – Based Prepreg

### FiberCote Graphite Fabric E765/T300 6K 5HS

*AGATE-WP3.3-033051-110*

**September 2002**

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## **1. INTRODUCTION**

### **1.1. Scope**

The test methods and results described in this document are intended to provide basic composite properties essential to most methods of analysis. 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

$E^{br}$	chord modulus
$E^c$	compressive modulus, longitudinal
$E^t$	tensile modulus, longitudinal
$F^{bu}$	bearing strength
$F^{cu}$	compressive strength, longitudinal
$F^{tu}$	tensile strength, longitudinal
$F^{2\%}$	bearing 2% offset strength
$\epsilon^{by}$	ultimate bypass strain
$\mu\epsilon$	micro-strain

### Superscripts

br	bearing (for cord modulus)
bu	bearing ultimate
by	bearing-bypass ultimate
c	compression
cu	compression ultimate
t	tension
tu	tension ultimate
2%	2% offset

### 1.3. Acronyms and Definitions

AGATE	Advanced General Aviation Transport Experiments
ASTM	American Society for Testing and Materials
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

D792-91	Density and Specific Gravity (Relative Density) of Plastics by Displacement
D2734-94	Void Content of Reinforced Plastics
D3171-90	Fiber Content of Resin – Matrix Composites by Matrix Digestion
D4065	Determining and Reporting Dynamic Mechanical Properties of Plastics
D5766-95	Open Hole Tensile Properties of Polymer Matrix Composite Laminates
D5961-01	Bearing Response of Polymer Matrix Composites Laminates
D6484-99	Open-Hole Compressive Strength of Polymer Matrix Composite Laminates

### SACMA Standards

SRM 3R-94	Open-Hole Compression Properties of Oriented Fiber-Resin Composites
SRM 18-94	Glass Transition Temperature ( $T_g$ ) Determination by DMA of Oriented Fiber-Resin Composites

### Other Documents

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

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

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 MIL-HDBK-17 Section 7 “Structural Element Characterization”. The test matrix for properties included in this document is listed on the next page.

The allowables used for design of composite laminate structures were developed from the testing summarized in Table 1. The data generated are physical properties and laminate mean strength and/or strain design allowables that include the effects of the critical environmental conditions. The specific design properties that were obtained from these laminate tests are the infinite plate gross strain design allowables for in-plane tension and compression as well as bearing strength/bypass strain allowables for bolted joints.

Table 1. Summary of Laminate Tests

Material Form	Test Description	Ref. Table Number
5HS Satin Weave	Physical Properties	2
Fabric	Mechanical Properties	3, 4, 5, and 6

Physical property testing is presented in Table 2. As the mechanical properties of fiber reinforced epoxy matrix laminates are dependent upon both the volume percentages of the resin/fiber as well as the extent of the resin reaction achieved during processing, physical testing was performed to verify these characteristics for representative test laminates.

Table 2. Cured Laminate Physical Properties Test Matrix

Test Description	Test Method	Test Sampling Scheme
Cured Laminate Specific Gravity	ASTM D792	3 per laminate configuration
Cured Resin Content	299-947-299 (Method 506.1)	3 per laminate configuration
Percent Total Cure (DSC)	ASTM D3417	3 per material batch
Glass Transition Temperature	Dry Wet	ASTM D4065 ASTM D4065
		3 per material batch 3 per material batch

The test matrix for laminate in-plane tension properties of 370 g/m<sup>2</sup> five harness satin weave carbon/epoxy is presented in Table 3. This testing was based upon the minimum recommended matrix for initial empirical assessment and determination of notched strength data for a range of

laminates as defined in section 7.2.6 of MIL-HDBK-17, with additional tests to account for variables that have been demonstrated to be critical in previous laminate design allowable test programs. The minimum recommended matrix has been modified in accordance with Table 3 as follows:

- No Hole Tension @ 75°F/Dry to verify classical laminate theory predictions of laminate stiffness, to determine stress-strain behavior up to ultimate load and to develop factors for notched vs. un-notched laminate tensile strength.
- Filled hole tension testing for all laminate configurations to define the pure bypass end-point of the tension bearing-bypass interaction curve for bolted joint allowables.
- Open hole tension testing for relatively “soft” laminates, since previous testing has demonstrated that for certain material systems, the open hole tension condition can be critical for soft laminate configurations.
- 180°F/Wet environment tension testing at the critical hole condition for relatively “soft” laminates, since previous testing has demonstrated that for certain material systems, the 180°F/Wet environment can be critical in tension for soft laminate configurations.
- All notched laminate testing for this program was performed with a 0.25-inch diameter hole at a W/D ratio of 6.

Table 3. Laminate Tension Tests for 370 g/m<sup>2</sup> Five Harness Satin Weave Fabric

Layup	Specimen Type	Material Batch	Environment			Total
			-65°F/Dry	75°F/Dry	180°F/Wet	
40/20/40	No Hole	1		3		3
	Filled Hole	1	5	5		10
25/50/25	No Hole	1		3		3
	Filled Hole	1	5	5		10
	Open Hole	1	5	5		10
	Critical Hole Condition	1			5	5
10/80/10	No Hole	1		3		3
	Filled Hole	1	5	5		10
	Open Hole	1	5	5		10
	Critical Hole Condition	1			5	5
					Total =	69

[1] No-hole specimens instrumented with back-to-back strain gages.

[2] Test methods are described in Table 7.

[3] Fasteners: Pin = NAS 6604 - (); Collar = MS 35650-3252 or equivalent.

The test matrix for laminate in-plane compression properties of 370 g/m<sup>2</sup> five harness satin weave fabric is presented in Table 4. This testing was based upon the minimum recommended matrix for initial empirical assessment and determination of notched strength data for a range of laminates as defined in section 7.2.6 of MIL-HDBK-17, with additional tests to account for

variables that have been demonstrated to be critical in previous laminate design allowable test programs. The minimum recommended matrix has been modified in accordance with Table 4 as follows:

- No Hole Compression @ 75°F/Dry to verify classical laminate theory predictions of laminate stiffness, to determine stress-strain behavior up to ultimate load and to develop factors for notched vs. un-notched laminate compression strength.
- 180°F/Wet Filled hole in addition to open hole compression testing, since previous testing has demonstrated that the 180°F/Wet condition is critical for compression loading and filled hole compression data at the critical condition is required to define the pure bypass end-point of the compression bearing-bypass interaction curve for mechanical joint allowables.

Table 4. Laminate Compression Tests for 370 g/m<sup>2</sup> Five Harness Satin Weave Fabric

Layup	Specimen Type	Material Batch	Environment		Total Specimens
			75°F/Dry	180°F/Wet	
40/20/40	No Hole	1	3		3
	Open Hole	1	5	5	10
	Filled Hole	1		5	5
25/50/25	No Hole	1	3		3
	Open Hole	1	5	5	10
	Filled Hole	1		5	5
10/80/10	No Hole	1	3		3
	Open Hole	1	5	5	10
	Filled Hole	1		5	5
				Total =	54

[1] No-hole specimens instrumented with back-to-back strain gages.

[2] Test methods are described in Table 7.

[3] Fasteners: Pin = NAS 6604 - (); Collar = MS 35650-3252 or equivalent

The test matrix for laminate bearing strength properties of 370 g/m<sup>2</sup> five harness satin weave fabric is presented in Table 5. This testing was based upon the minimum recommended matrix for initial empirical assessment and determination of bearing strength data for a range of laminates as defined in section 7.2.5 of MIL-HDBK-17, with modifications to account for variables that have been demonstrated to be critical in previous laminate design allowable test programs. The minimum recommended matrix has been modified in accordance with Table 5 as follows:

- Single shear and double shear joint configuration tests were performed to develop bearing strength allowables that account for mechanical joint stability. The acceptability of bearing design allowables based upon single bolt double shear and single shear stabilized joint configuration tests performed at the coupon level on previous programs have been

substantiated through element, full scale and flight test. These earlier programs demonstrated that the single shear stabilized and double shear specimen types best represent the bearing behavior observed for typical composite airframe bolted joints on full scale test articles.

- Bearing tests were performed under tension loading only, as previous testing has demonstrated that pure bearing strength is insensitive to whether the load is applied in tension or compression.
- Bearing tests were performed for one fastener diameter-to-thickness (D/t) ratio for this program.

Table 5. Laminate Bearing Tests for 370 g/m<sup>2</sup> Five Harness Satin Weave Fabric

Layup	Specimen Type	Material Batch	Environment		Total Specimens
			75°F/Dry	180°F/Wet	
40/20/40	Double Shear	1	5	5	10
	Single Shear Stabilized	1	5	5	10
25/50/25	Double Shear	1	5	5	10
	Single Shear Stabilized	1	5	5	10
				Total =	40

Notes:

- [1] Fasteners to be installed at 35 in-lb torque maximum (Low Clamp-up).
- [2] Test methods are described in Table 7.
- [3] Fasteners: Pin = NAS 6604 - (); Collar = MS 35650-3252 or equivalent; Washer = NAS1149V0432M or equivalent.

The test matrix for laminate bearing-bypass interaction properties of 370 g/m<sup>2</sup> five harness satin weave fabric is presented in Table 6. This testing was based upon the minimum recommended matrix for initial empirical assessment and determination of bearing-bypass properties for a range of laminates as defined in section 7.2.7 of MIL-HDBK-17 given the following assumptions:

- The double shear vs. single shear stabilized joint configuration relationship developed from the pure bearing tests can be applied as necessary to account for joint stabilization effects on bearing-bypass specimens that exhibit bearing dominated failure modes.
- The pure bypass (no bolt load) end point of the bearing-bypass interaction curve, represented by the critical environment filled hole test data, can be used to establish the environmental factor to be applied to the bypass dominated failure mode portion of the interaction curve.
- The pure bearing (100% load transfer) end point of the bearing-bypass interaction curve, represented by the critical environment bearing strength test data, can be used to establish the environmental factor to be applied to the bearing dominated failure mode portion of the interaction curve.

Table 6. Laminate Bearing Bypass tests for 370 g/m<sup>2</sup> five harness satin weave fabric

Layup	Bearing/Bypass Ratio	Specimen Type	Loading	Environment	No. of Specimens
40/20/40	0.50 (50% Load Transfer)	Single Shear	Tension [2]	RTD	5
			Compression [1]	RTD	5
	0.25 (25% Load Transfer)	Double Shear	Tension [2]	RTD	5
			Compression [1]	RTD	5
25/50/25	0.50 (50% Load Transfer)	Single Shear	Tension [2]	RTD	5
			Compression [1]	RTD	5
	0.25 (25% Load Transfer)	Double Shear	Tension [2]	RTD	5
			Compression [1]	RTD	5
10/80/10	0.50 (50% Load Transfer)	Single Shear	Tension [2]	RTD	5
			Compression [1]	RTD	5
	0.25 (25% Load Transfer)	Double Shear	Tension [2]	RTD	5
			Compression [1]	RTD	5
Total =					60

Notes:

[1] Fasteners to be installed at 70 ± 10 in-lb torque (High Clamp-up)

[2] Fasteners to be installed at 35 ± 5 in-lb torque (Low Clamp-up).

[3] Test methods are described in Table 7.

[4] Fasteners: Pin = NAS 6604 - (); Collar = MS 35650-3252 or equivalent; Washer = NAS1149V0432M or equivalent.

### 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  $85 \pm 5$  % relative humidity and  $145 \pm 5$  °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  $7 \pm 0.5$  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. Static Testing

Table 7. Static Test Specimen Configurations and Test Methods

Test Description	Test Method	Test Fixture Required
Tension, No Hole	SACMA SRM 5 (Modified) ASTM D5766 (Modified)	No
Tension, Open Hole	SACMA SRM 5 ASTM D5766	No
Tension, Filled Hole	SACMA SRM 5 (Modified) ASTM D5766 (Modified)	No
Compression, No Hole	SACMA SRM 3 (Modified) ASTM D6484 (Modified)	Yes
Compression, Open Hole	SACMA SRM 3 ASTM D6484	Yes
Compression, Filled Hole	SACMA SRM 3 (Modified) ASTM D6484 (Modified)	Yes
Bearing, Double Shear, Tension	ASTM D5961	No
Bearing, Single Shear Stabilized, Tension	ASTM D5961 (Modified)	No
50% Bearing-Bypass, Double-Shear, Tension	ASTM D5961 (Modified)	No
50% Bearing-Bypass, Double-Shear, Compression	ASTM D5961 (Modified)	Yes
25% Bearing-Bypass, Double-Shear, Tension	ASTM D5961 (Modified)	No
25% Bearing-Bypass, Double-Shear, Compression	ASTM D5961 (Modified)	Yes

Measurement of strain to failure was recorded for the unnotched tension and compression coupons tested at room temperature using strain gages mounted back-to-back to provide baseline modulus and stress-strain behavior verification of computed values up to ultimate load.

The Criteria for stopping static tests are: (1) Separation of the specimen into two pieces (major fracture across the specimen width or (2) Loss of load carrying capability. Load-displacement data shall be recorded during all testing. Load-strain data shall be recorded as required for instrumented specimens.

Test temperatures and corresponding soak times for mechanical testing is as follows;

- 1 CTD: One prepreg batch of material tested (test temperature =  $-65 \pm 5^{\circ}$  F, moisture content = as fabricated, soak time at  $-65$  was 3 min.)
- 2 RTD: One prepreg batches of material tested (test temperature =  $70 \pm 10^{\circ}$  F, moisture content = as fabricated)
- 3 ETW: One prepreg batches of material tested (test temperature =  $180 \pm 5^{\circ}$  F, moisture content = equilibrium per section 1.5.2, soak time at 180 was 2 min.)

## **2. FIBERCOTE T300 6K 5HS /E765 PREPREG PROPERTIES**

## 2.1. Prepreg Documentation by Prepreg Batch

<b>Prepreg Documentation</b>	<b>Prepreg Manufacturer: FiberCote Industries</b> <b>Product ID: MS1000, Rev. 3, Type 2, Grade C</b> <b>Material Identification (weave, form, class, etc.): 50" 6K 5HS Graphite/E-765</b> <b>Impregnation Method: Solution coat</b>		
Prepreg Batch #	003065-01	009103-01	009103-02
Batch ID as labeled on samples	<b>1</b>	<b>2</b>	<b>3</b>
Date of Manufacture	3/22/2000	10/2/2000	10/2/2000
Expiration Date	9/22/2000	4/2/2001	4/2/2001
Resin Content [%]	38.8	39.4	39.0
Reinforcement Areal Weight & Test Method	379.7	387.0	387.8
Resin Flow & Test Conditions	13.9 % (50 psi @ 275°F)	12.5 % (50 psi @ 275°F)	11.9 % (50 psi @ 275°F)
Gel Time & Test Conditions	296 min. (@ 275°F)	342 min. (@ 275°F)	340 min. (@ 275°F)
Volatile Content	0.7 (8 min @ 275°F)	1.2 (8 min @ 275°F)	1.2 (8 min @ 275°F)
<b>Reinforcement Documentation</b>	<b>Fiber/Fabric Manufacturer &amp; Product ID: Toray/BGF Industries and BP Amoco/BGF Industries (T300 Fiber)</b> <b>Precursor Type: PAN</b> <b>Nominal Filament Count: 6K</b> <b>Finish/Sizing Type and %:</b> <b>Nominal tow or yarn count/inch:</b> <b>Twist: untwisted</b>		
Fabric Batch or Lot#	269072	00943852/00010	00943852/00010
Date of Manufacture	12/9/1999	8/25/2000	8/25/2000
Average Fiber Density per Lot & Test Method	1.75 g/cm <sup>3</sup>	1.76 g/cm <sup>3</sup>	1.75 g/cm <sup>3</sup>
<b>Matrix Documentation</b>	<b>Resin Manufacturer &amp; Product ID:</b>		
Matrix Batch or Lot #	0M0335	0M0970	0M0970
Date of Manufacture	3/18/2000	9/29/2000	9/29/2000
Average Neat Resin Density by Lot & Test Method			

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

## 2.2. Process Specification

### 2.2.1. Storage

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

### 2.2.2. Out Times

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

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

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 prepregs. There were no solvents, lubricants, mold release agents, or other potential contaminants used or stored in the same room with prepreg materials.

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

A continuous recording device was used.

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

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

#### **2.2.4. Mold Preparation**

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

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

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

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

#### **2.2.5. Cutting and Lay-up**

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

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

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

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

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

Splicing was not allowed on material qualification specimens.

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

No cutting of prepreg materials was permitted on the tool.

Debulking was performed in order to achieve appropriate compaction.

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

- a. One layer of porous release fabric was applied over the prepreg lay-up.
- b. One layer of breather was applied on top of the porous release film. If the breather was not contaminated with resin or other foreign material, the breather was re-used.
- c. Nylon bagging film was installed over the laminate or a silicone rubber bag and was form-fit and edge sealed to the tool with vacuum bag sealant; the vacuum connector was installed through the bag. Multiple vacuum connectors were used so that no point on the part was more than 60 inches from a vacuum source.

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

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

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

### 2.2.6. Bagging

The procedure was as follows:

- a. One layer of porous release fabric was applied over the prepreg lay-up.
- b. When specified on the shop traveler, bleeder cloth the same size as the laminate was applied over the release film. All wrinkles were smoothed out.

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

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

- c. Breather strings were applied from each corner of the part to contact the breather fabric.
- d. One layer on non-porous release film was applied over the lay-up; extending at least 1/2 inch past each edge of the part.
- e. One layer of breather fabric was applied over the lay-up ensuring that it formed a path to the breather.
- f. Vacuum sources were not on the surface of the part. There were at 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 8. Further details are clarified in FiberCote Process Specification E765 PS1001.

Table 8. Cure Cycles

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

### **3. FIBERCOTE T300 6K 5HS /E765 LAMINA PROPERTIES**

### 3.1. Test Results

#### 3.1.1. Summary

<b>MATERIAL:</b> E765/T300 6K 5HS Graphite Fabric	<b>FiberCote E765/T300 6K 5HS Graphite Fabric Summary</b>
<b>PREPREG:</b> FiberCote E765/T300 6K 5HS Graphite Fabric	
<b>FIBER:</b> T300	<b>RESIN:</b> E 765
<b>T<sub>g</sub> (dry):</b> 271 °F	<b>T<sub>g</sub> (wet):</b> 218 °F
	<b>T<sub>g</sub> METHOD:</b> DMA (SRM 18-94)
<b>PROCESSING:</b> Autoclave cure (45- psi ) - 265 ±15°F for 120 ±10 min.	

**LAMINATE MECHANICAL PROPERTY SUMMARY**  
 Data Reported as: Measured

Layup 0°/±45°/90°	Test Method	Loading Condition	2% Offset Strength (ksi)		Ultimate Strength (ksi)			Modulus (Msi)	Ultimate Strain (Microstrain)	Chord Modulus (Msi)		2% Offset Bypass Strain (Microstrain)	Ultimate Bypass Strain (Microstrain)
			RTD	ETW	RTD	ETW	CTD			RTD	ETW		
40/20/40	No Hole	Tension			61.198			7.743					
		Compression			63.828			7.235					
	Open Hole	Tension											
		Compression			42.343	26.540							
	Filled Hole	Tension			39.472		37.306						
		Compression					36.734						
	50% bypass	Tension	78.399		64.320					1.687			845.120
		Compression	74.219		87.456					2.132			1390.932
	25% bypass	Tension			103.101								956.721
		Compression			130.254					6.267			3312.695
Single Shear Bearing	Tension	73.993	57.512	92.845	62.654				0.417	0.566			
Double Shear Bearing	Tension	69.363		70.986	42.854				0.666	1.971			
25/50/25	No Hole	Tension			66.390			6.163					
		Compression			68.035			5.679					
	Open Hole	Tension			34.304	33.683	32.013						
		Compression			38.755	22.504							
	Filled Hole	Tension			34.903		34.153						
		Compression					32.928						
	50% bypass	Tension	75.943		82.508					2.123			1456.815
		Compression	82.960		96.099					2.124			2136.106
	25% bypass	Tension			15.983								1135.929
		Compression			180.261					9.683			4378.407
Single Shear Bearing	Tension	89.995	68.861	109.294	72.476				0.690	0.621			
Double Shear Bearing	Tension	72.189		73.423	38.249				0.768	2.125			
10/80/10	No Hole	Tension			42.373			3.934					
		Compression			45.884			3.782					
	Open Hole	Tension			32.723	23.789	33.535						
		Compression			33.171	19.723							
	Filled Hole	Tension			34.241		36.018						
		Compression					22.479						
	50% bypass	Tension	65.067		77.432					1.460			2230.828
		Compression	70.272		85.842					1.982			2940.656
	25% bypass	Tension			21.231								991.785
		Compression			131.149					6.167			
Single Shear Bearing	Tension												
Double Shear Bearing	Tension												

### **3.1.2. Individual Test Summaries**

### 3.1.2.1. Laminate Tension

Material:		Bell - FiberCote E765/T300 6K 5HS Graphite Fabric						<b>Laminate Tension</b>	
Resin content:		37.74 - 42.04 wt%		Comp. density:		1.4941 - 1.5113 g/cc		<b>Gr/Ep</b>	
Fiber volume:		49.77 - 53.54 vol%		Void content:		0 to 0.598 %		<b>Bell - FiberCote E765/T300 6K 5HS Graphite Fabric</b>	
Test method:		Sacma SRM5, ASTM D5766 (Modified for no hole and filled hole)							
Type of bearing test:									
Fastener Type:		Pin = NAS 6604-2 or 3 w/ washer; Collar = MS 35650-3252							
Torque:		70±5 in-lbs							
Normalized by:		Not normalized							
		CTD		RTD			ETW		
Test Temperature [°F]		-65		75			180		
Moisture Conditioning		dry		dry			equilibrium		
Equilibrium at T, RH		as fabricated		as fabricated			145F,85%		
Source code		U(JKL)(HI)XXXXB		U(JKL)(JHI)XXXXA			U(JKL)HXXXXF		
		Open Hole	Filled Hole	No Hole	Open Hole	Filled Hole	Open Hole		
<b>F<sup>u</sup></b> (ksi)	Mean		37.31	61.20		39.47			
	Minimum		35.43	58.94		37.84			
	Maximum		41.02	62.41		40.45			
	C.V.(%)		5.85	3.20		2.76			
<b>E<sup>t</sup></b> (Msi)	Mean			7.74					
	Minimum			7.53					
	Maximum			7.87					
	C.V.(%)			1.54					
% 0°/45°/90° - 40/20/40 [0/90/45/90/0] <sub>s</sub> t <sub>ply</sub> : 0.01687 - 0.01736 in.		No. Specimens	5	3		5			
		No. Prepreg Lots	1	1		1			
<b>F<sup>u</sup></b> (ksi)	Mean	32.01	34.15	66.39	34.30	34.90	33.68		
	Minimum	30.82	33.34	62.38	31.85	33.46	32.75		
	Maximum	33.31	34.82	68.67	36.85	36.46	35.25		
	C.V.(%)	3.52	1.70	5.24	6.14	3.29	3.58		
<b>E<sup>t</sup></b> (Msi)	Mean			6.16					
	Minimum			5.97					
	Maximum			6.35					
	C.V.(%)			2.49					
% 0°/45°/90° - 25/50/25 [45/0/-45/90] <sub>s</sub> t <sub>ply</sub> : 0.01631 - 0.01744 in.		No. Specimens	5	3	5	5	5		
		No. Prepreg Lots	1	1	1	1	1		
<b>F<sup>u</sup></b> (ksi)	Mean	33.54	36.02	42.37	32.72	34.24	23.79		
	Minimum	32.69	34.96	40.91	32.14	34.05	22.82		
	Maximum	34.62	37.14	43.73	33.43	34.38	24.42		
	C.V.(%)	2.28	2.71	3.34	1.88	0.40	3.03		
<b>E<sup>t</sup></b> (Msi)	Mean			3.93					
	Minimum			3.86					
	Maximum			4.06					
	C.V.(%)			1.99					
% 0°/45°/90° - 10/80/10 [45/-45/0/45/-45] <sub>s</sub> t <sub>ply</sub> : 0.01616 - 0.01699 in.		No. Specimens	6	5	3	5	5		
		No. Prepreg Lots	1	1	1	1	1		

### 3.1.2.2. Laminate Compression

Material: Bell - FiberCote E765/T300 6K 5HS Graphite Fabric				<b>Laminate Compression Gr/Ep Bell - FiberCote E765/T300 6K 5HS Graphite Fabric</b>					
Resin content:		37.74 - 42.04 wt%	Comp. density:		1.4941 - 1.5113 g/cc				
Fiber volume:		49.77 - 53.54 vol%	Void content:		0 to 0.598 %				
Test method:				Sacma SRM3, ASTM D6484 (Modified for no hole and filled hole)					
Type of bearing test:				Pin = NAS 6604-2 or 3 w/ washer; Collar = MS 35650-3252					
Fastener Type:				35±5 in-lbs					
Torque:				Not normalized					
Normalized by:				Not normalized					
				CTD		RTD		ETW	
Test Temperature [°F]						75		180	
Moisture Conditioning						dry		equilibrium	
Equilibrium at T, RH						as fabricated		145F,85%	
Source code						U(JKL)(KL)XXXXA		U(JKL)(LM)XXXXF	
						No Hole		Open Hole	
						Open Hole		Filled Hole	
<b>F<sup>cu</sup></b> (ksi)	Mean			63.83	42.34		26.54	36.73	
	Minimum			63.16	40.66		25.74	35.01	
	Maximum			64.78	44.37		27.51	39.55	
	C.V.(%)			1.33	3.24		2.44	5.26	
<b>E<sup>c</sup></b> (Msi)	Mean			7.23					
	Minimum			7.08					
	Maximum			7.40					
	C.V.(%)			1.90					
% 0°/45°/90° - 40/20/40 [0/90/45/90/0] <sub>s</sub> t <sub>ply</sub> : 0.01645 - 0.01708 in.				No. Specimens			5	5	
				No. Prepreg Lots			1	1	
<b>F<sup>cu</sup></b> (ksi)	Mean			68.04	38.75		22.50	32.93	
	Minimum			65.89	37.89		21.90	31.97	
	Maximum			69.17	39.73		23.14	35.03	
	C.V.(%)			2.74	2.11		2.20	3.84	
<b>E<sup>c</sup></b> (Msi)	Mean			5.68					
	Minimum			5.52					
	Maximum			5.89					
	C.V.(%)			2.95					
% 0°/45°/90° - 25/50/25 [45/0/-45/90] <sub>s</sub> t <sub>ply</sub> : 0.01669 - 0.01713 in.				No. Specimens			5	5	
				No. Prepreg Lots			1	1	
<b>F<sup>cu</sup></b> (ksi)	Mean			45.88	33.17		19.72	22.48	
	Minimum			44.19	32.57		19.10	20.78	
	Maximum			46.86	34.71		20.31	24.20	
	C.V.(%)			3.20	2.65		2.36	5.76	
<b>E<sup>c</sup></b> (Msi)	Mean			3.78					
	Minimum			3.65					
	Maximum			3.93					
	C.V.(%)			3.03					
% 0°/45°/90° - 10/80/10 [45/-45/0/45/-45] <sub>s</sub> t <sub>ply</sub> : 0.01643 - 0.01708 in.				No. Specimens			5	5	
				No. Prepreg Lots			1	1	

### 3.1.2.3. Laminate Bearing

Material:		Bell - FiberCote E765/T300 6K 5HS Graphite Fabric				<b>Laminate Bearing Gr/Ep</b>	
Resin content:	38.75 - 41.09 wt%	Comp. density:	1.4947 - 1.5048 g/cc		Bell - FiberCote E765/T300 6K 5HS Graphite Fabric		
Fiber volume:	50.56 - 52.67 vol%	Void content:	0 to 0.194 %				
Test method:	ASTM D5961 (Modified for Single Shear Bearing)						
Type of bearing test:							
Fastener Type:	Pin = NAS 6604-8; Collar = MS 35650-3252						
Torque:	35±5 in-lbs						
Normalized by:	Not normalized						
		CTD		RTD		ETW	
Test Temperature [°F]		-65		75		180	
Moisture Conditioning		dry		dry		equilibrium	
Equilibrium at T, RH		as fabricated		as fabricated		145F,85%	
Source code		U(JKL)(12)XXXXB		U(JKL)(12)XXXXA		U(JKL)(12)XXXXF	
		Double Shear	Single Shear	Double Shear	Single Shear	Double Shear	Single Shear
<b>F<sup>bu</sup></b> (ksi)	Mean			70.99	92.84	42.85	62.65
	Minimum			69.88	75.77	40.99	61.81
	Maximum			72.53	99.59	45.36	64.74
	C.V.(%)			1.82	10.75	4.04	1.92
<b>F<sup>2%</sup></b> (ksi)	Mean			69.36	73.99		57.51
	Minimum			64.66	64.24		53.44
	Maximum			72.12	85.68		61.15
	C.V.(%)			4.34	11.65		5.51
<b>E<sup>br</sup></b> (Msi)	Mean			0.67	0.42	1.97	0.57
	Minimum			0.57	0.23	1.51	0.53
	Maximum			0.91	0.61	2.89	0.64
	C.V.(%)			20.65	34.49	27.60	8.18
% 0°/45°/90° - 40/20/40 [0/90/45/90/0] <sub>s</sub>							
t <sub>ply</sub> 0.01646 - 0.01715 in.							
		No. Specimens		5	5	5	5
		No. Prepreg Lots		1	1	1	1
<b>F<sup>bu</sup></b> (ksi)	Mean			73.42	109.29	38.25	72.48
	Minimum			71.10	104.29	36.85	68.86
	Maximum			75.91	115.37	40.15	75.89
	C.V.(%)			2.36	3.91	3.65	3.59
<b>F<sup>2%</sup></b> (ksi)	Mean			72.19	90.00		68.86
	Minimum			70.61	79.93		62.44
	Maximum			75.27	98.64		73.18
	C.V.(%)			2.65	9.20		6.19
<b>E<sup>br</sup></b> (Msi)	Mean			0.77	0.69	2.12	0.62
	Minimum			0.65	0.50	1.44	0.48
	Maximum			0.87	0.74	2.77	0.70
	C.V.(%)			12.40	15.06	23.58	16.06
% 0°/45°/90° - 25/50/25 [(45/0/-45/90) <sub>3</sub> ] <sub>s</sub>							
t <sub>ply</sub> 0.01673 - 0.01706 in.							
		No. Specimens		5	5	5	5
		No. Prepreg Lots		1	1	1	1
<b>F<sup>bu</sup></b> (ksi)	Mean						
	Minimum						
	Maximum						
	C.V.(%)						
<b>F<sup>2%</sup></b> (ksi)	Mean						
	Minimum						
	Maximum						
	C.V.(%)						
<b>E<sup>br</sup></b> (Msi)	Mean						
	Minimum						
	Maximum						
	C.V.(%)						
% 0°/45°/90° - 10/80/10 [45/-45/90/45/-45/45/-45/0/45/-45] <sub>s</sub>							
t <sub>ply</sub> x.xxxx - x.xxxx in.							
		No. Specimens					
		No. Prepreg Lots					

### 3.1.2.4. Laminate Bearing-Bypass Tension

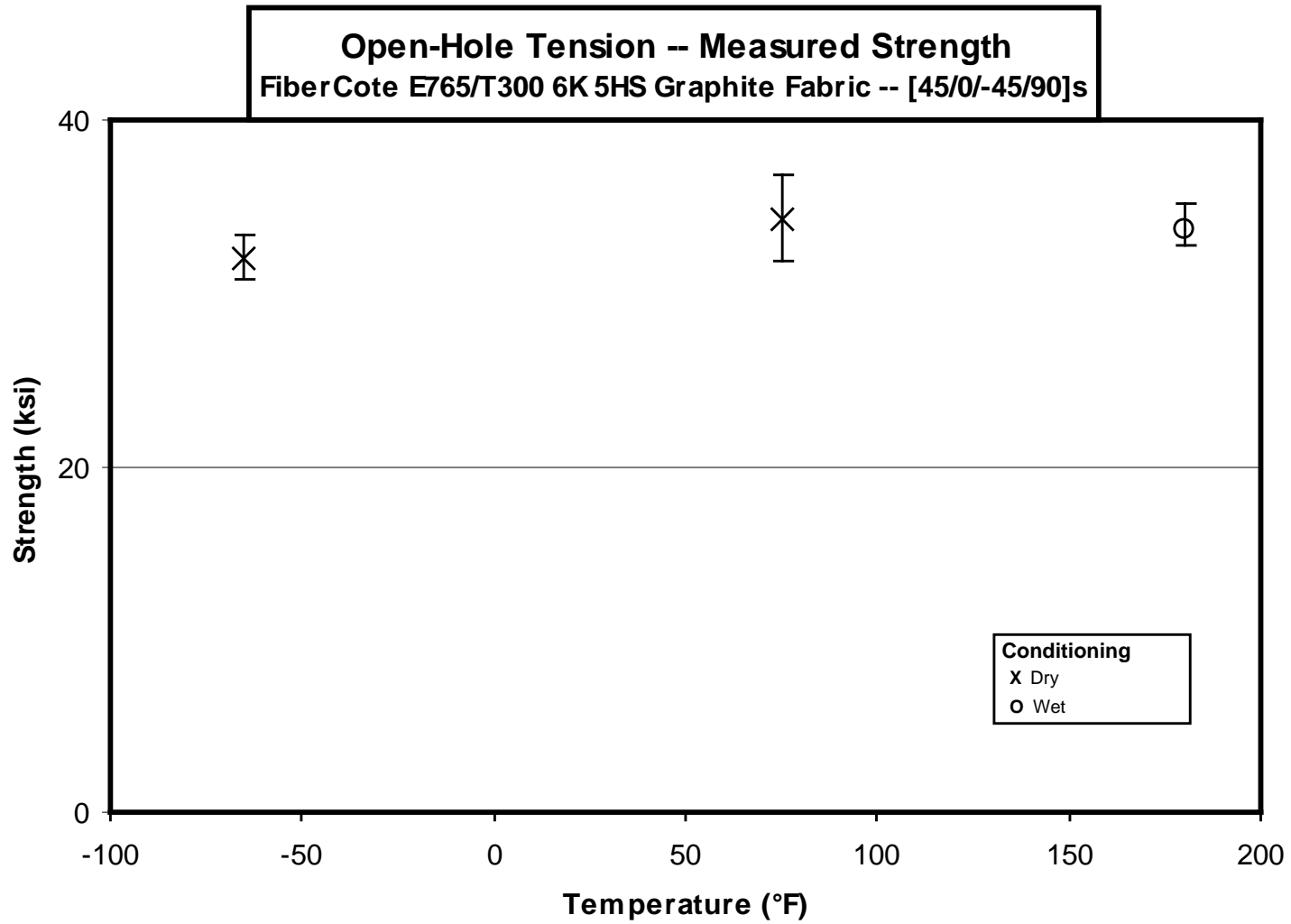
Material: Bell - FiberCote E765/T300 6K 5HS Graphite Fabric		<b>Laminate Bypass-Tension</b>					
		<b>Gr/Ep</b>					
Resin content: 38.30 - 41.63 wt%		Comp. density: 1.4876 - 1.5048 g/cc					
Fiber volume: 50.06 - 53.05 vol%		Void content: 0 to 0.489 %					
Test method: ASTM D5961 (Modified)							
Type of bearing test:							
Fastener Type: Pin = NAS 6604-3, 4, 5 or 6 w/ washer; Collar = MS 35650-3252							
Torque: 35±5 in-lbs							
Normalized by: Not normalized							
		CTD		RTD		ETW	
Test Temperature [°F]		-65		75		180	
Moisture Conditioning		dry		dry		equilibrium	
Equilibrium at T, RH		as fabricated		as fabricated		145F,85%	
Source code		U(JKL)(35)XXXXB		U(JKL)(35)XXXXA		U(JKL)(35)XXXXF	
		50% Bypass	25% Bypass	50% Bypass	25% Bypass	50% Bypass	25% Bypass
$F^{bu}$ (ksi)	Mean			64.32	103.10		
	Minimum			61.46	100.52		
	Maximum			66.91	108.03		
	C.V.(%)			3.73	2.81		
$F^{2\%}$ (ksi)	Mean			78.40			
	Minimum			74.20			
	Maximum			80.81			
	C.V.(%)			3.35			
$E^{br}$ (Msi)	Mean			1.69			
	Minimum			1.60			
	Maximum			1.80			
	C.V.(%)			5.29			
$\epsilon^{by}$ (microstrain)	Mean			845.12	956.72		
	Minimum			758.40	931.02		
	Maximum			931.84	982.42		
	C.V.(%)			14.51	3.80		
% 0°/45°/90° - 40/20/40 [0/90/45/90/0] <sub>z</sub> $t_{ply}$ : 0.01659 - 0.01709 in.		No. Specimens		5	5		
		No. Prepreg Lots		1	1		
$F^{bu}$ (ksi)	Mean			82.51	15.98		
	Minimum			78.45	15.58		
	Maximum			85.94	16.35		
	C.V.(%)			3.48	1.79		
$F^{2\%}$ (ksi)	Mean			75.94			
	Minimum			69.41			
	Maximum			80.68			
	C.V.(%)			5.72			
$E^{br}$ (Msi)	Mean			2.12			
	Minimum			1.82			
	Maximum			2.66			
	C.V.(%)			17.94			
$\epsilon^{by}$ (microstrain)	Mean			1456.81	1135.93		
	Minimum			1286.88	962.76		
	Maximum			1626.75	1309.10		
	C.V.(%)			16.50	21.56		
% 0°/45°/90° - 25/50/25 [(45/0/-45/90) <sub>z</sub> ] <sub>z</sub> $t_{ply}$ : 0.01599 - 0.01638 in.		No. Specimens		6	5		
		No. Prepreg Lots		1	1		
$F^{bu}$ (ksi)	Mean			77.43	21.23		
	Minimum			73.34	20.23		
	Maximum			79.55	21.76		
	C.V.(%)			3.23	2.93		
$F^{2\%}$ (ksi)	Mean			65.07			
	Minimum			61.12			
	Maximum			67.75			
	C.V.(%)			4.01			
$E^{br}$ (Msi)	Mean			1.46			
	Minimum			1.36			
	Maximum			1.62			
	C.V.(%)			6.53			
$\epsilon^{by}$ (microstrain)	Mean			2230.83	991.78		
	Minimum			2210.58	979.66		
	Maximum			2251.08	1003.91		
	C.V.(%)			1.28	1.73		
% 0°/45°/90° - 10/80/10 [45/-45/90/45/-45/45/-45/0/45/-45] <sub>z</sub> $t_{ply}$ : 0.01659 - 0.01708 in.		No. Specimens		5	5		
		No. Prepreg Lots		1	1		

### 3.1.2.5. Laminate Bearing-Bypass Compression

Material:		Bell - FiberCote E765/T300 6K 5HS Graphite Fabric					
Resin content:		38.30 - 41.63 wt%		Comp. density:		1.4876 - 1.5048 g/cc	
Fiber volume:		50.06 - 53.05 vol%		Void content:		0 to 0.489 %	
Test method:		ASTM D5961 (Modified)					
Type of bearing test:							
Fastener Type:		Pin = NAS 6604-3, 4, 5 or 6 w/ washer; Collar = MS 35650-3252					
Torque:		70±10 in-lbs					
Normalized by:		Not normalized					
		CTD		RTD		ETW	
Test Temperature [°F]		-65		75		180	
Moisture Conditioning		dry		dry		equilibrium	
Equilibrium at T, RH		as fabricated		as fabricated		145F,85%	
Source code		U(JKL)(46)XXXXB		U(JKL)(46)XXXXA		U(JKL)(46)XXXXF	
		50% Bypass	25% Bypass	50% Bypass	25% Bypass	50% Bypass	25% Bypass
<b>F<sup>bu</sup></b> (ksi)	Mean			87.46	130.25		
	Minimum			85.93	123.72		
	Maximum			89.74	135.64		
	C.V.(%)			1.81	4.03		
<b>F<sup>2%</sup></b> (ksi)	Mean			74.22			
	Minimum			68.90			
	Maximum			79.23			
	C.V.(%)			5.24			
<b>E<sup>br</sup></b> (Msi)	Mean			2.13	6.27		
	Minimum			2.00	6.06		
	Maximum			2.28	6.71		
	C.V.(%)			5.24	4.32		
<b>ε<sup>by</sup></b> (microstrain)	Mean			1390.93	3312.70		
	Minimum			907.98	2221.64		
	Maximum			1873.89	4403.75		
	C.V.(%)			49.10	46.58		
% 0°/45°/90° - 40/20/40 [0/90/45/90/0] <sub>s</sub>							
t <sub>ply</sub> 0.01673 - 0.01698 in.				5	5		
				1	1		
<b>F<sup>bu</sup></b> (ksi)	Mean			96.10	180.26		
	Minimum			89.13	168.38		
	Maximum			100.51	197.28		
	C.V.(%)			4.54	6.74		
<b>F<sup>2%</sup></b> (ksi)	Mean			82.96			
	Minimum			76.09			
	Maximum			86.87			
	C.V.(%)			5.56			
<b>E<sup>br</sup></b> (Msi)	Mean			2.12	9.68		
	Minimum			2.05	9.24		
	Maximum			2.24	10.24		
	C.V.(%)			3.76	4.60		
<b>ε<sup>by</sup></b> (microstrain)	Mean			2136.11	4378.41		
	Minimum			1893.46	4257.77		
	Maximum			2378.75	4499.04		
	C.V.(%)			16.06	3.90		
% 0°/45°/90° - 25/50/25 [(45/0/-45/90) <sub>s</sub> ] <sub>s</sub>							
t <sub>ply</sub> 0.01617 - 0.01646 in.				5	5		
				1	1		
<b>F<sup>bu</sup></b> (ksi)	Mean			85.84	131.15		
	Minimum			81.74	127.71		
	Maximum			88.06	134.79		
	C.V.(%)			2.93	2.32		
<b>F<sup>2%</sup></b> (ksi)	Mean			70.27			
	Minimum			68.64			
	Maximum			72.08			
	C.V.(%)			1.99			
<b>E<sup>br</sup></b> (Msi)	Mean			1.98	6.17		
	Minimum			1.68	6.04		
	Maximum			2.67	6.39		
	C.V.(%)			19.82	2.51		
<b>ε<sup>by</sup></b> (microstrain)	Mean			2940.66	4711.44		
	Minimum			2909.53	4585.58		
	Maximum			2971.78	4837.30		
	C.V.(%)			1.50	3.78		
% 0°/45°/90° - 10/80/10 [45/-45/90/45/-45/45/-45/0/45/-45] <sub>s</sub>							
t <sub>ply</sub> 0.01653 - 0.01685 in.				5	5		
				1	1		

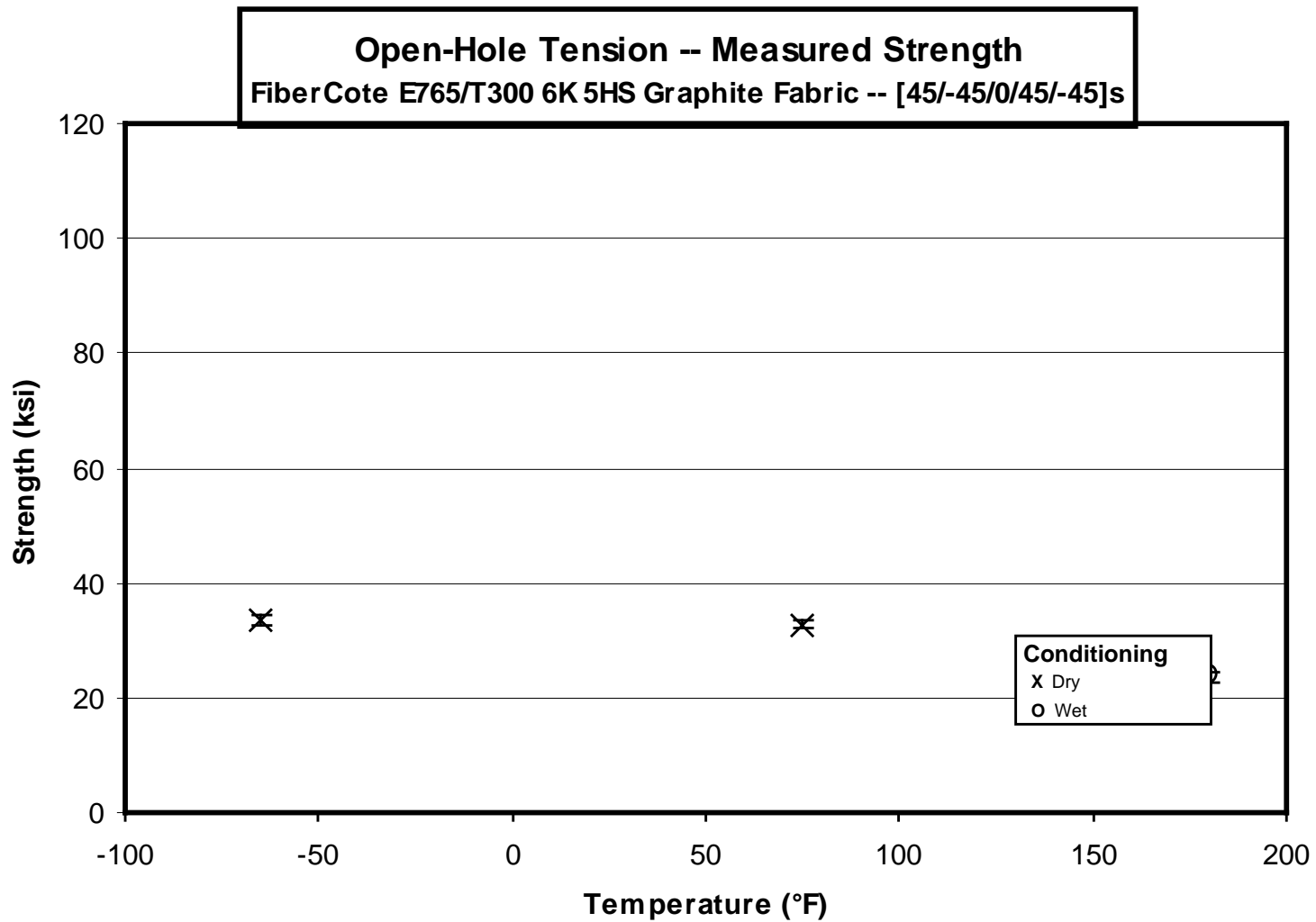
### **3.1.3. Individual Test Charts**

### 3.1.3.1. Open-Hole Tension [25/50/25]



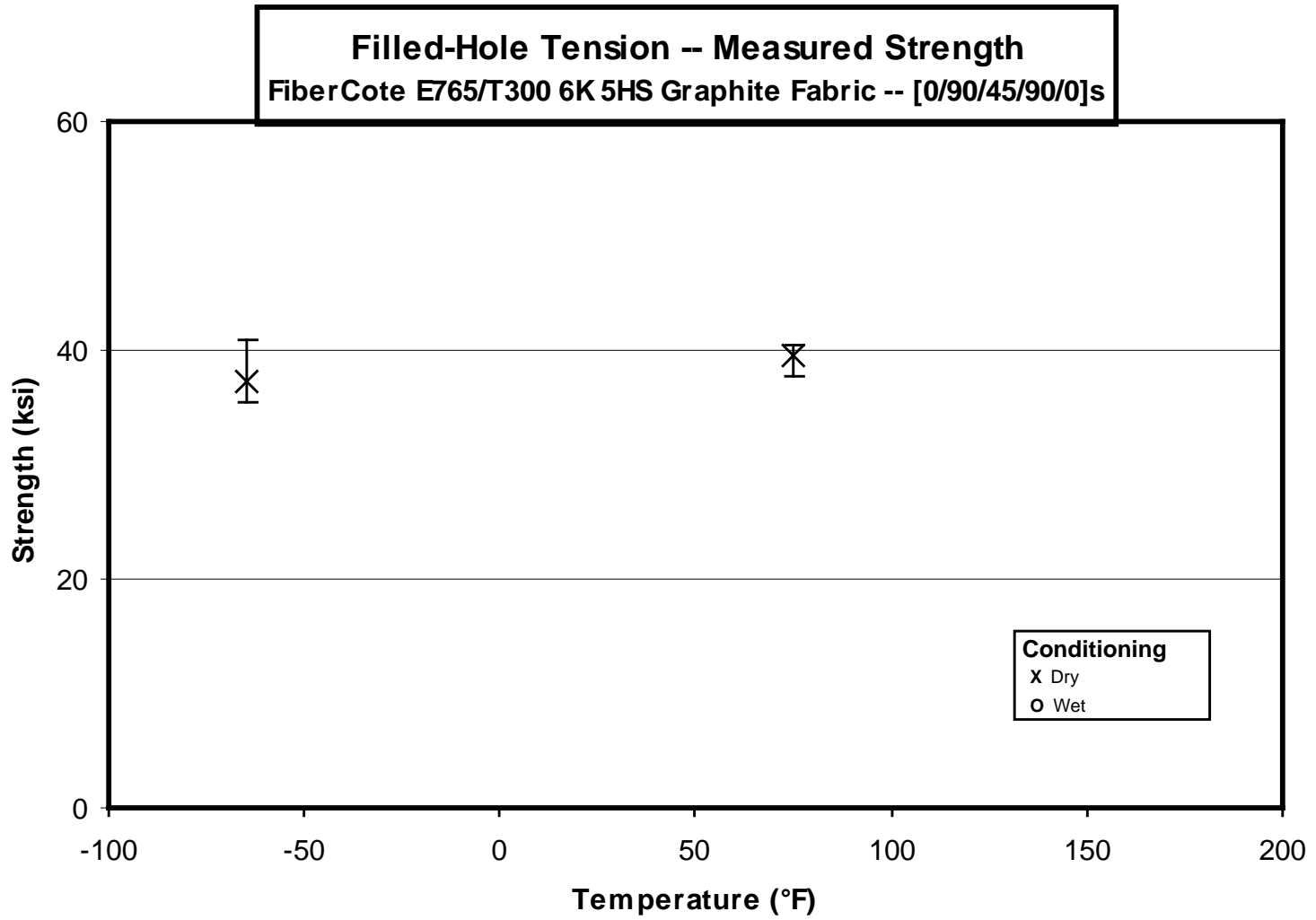
NOTE: The symbols represent the 'pooled' average of all tests, and the bars represent the upper and lower limit of the data.

### 3.1.3.2. Open-Hole Tension [10/80/10]

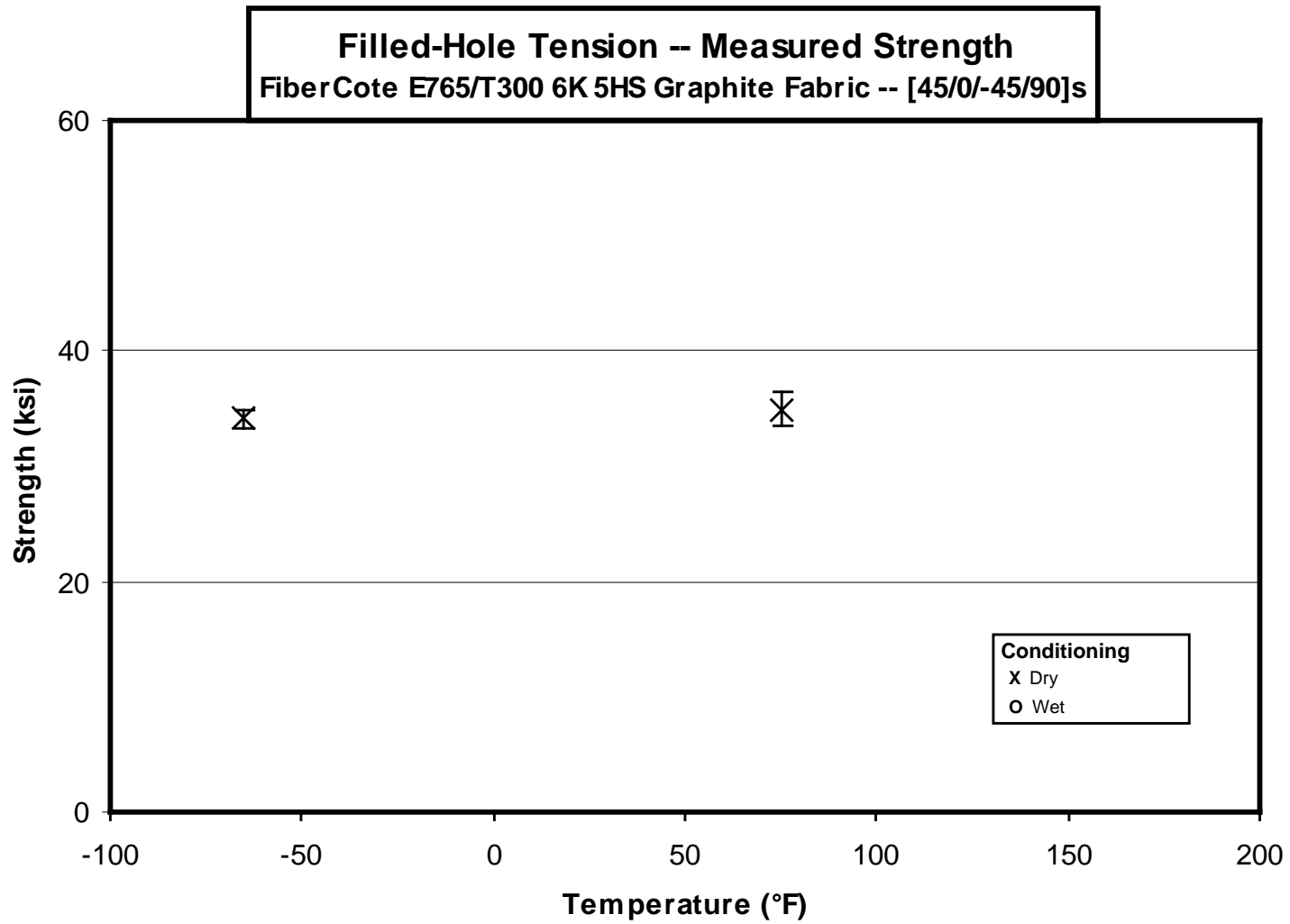


NOTE: The symbols represent the 'pooled' average of all tests, and the bars represent the upper and lower limit of the data.

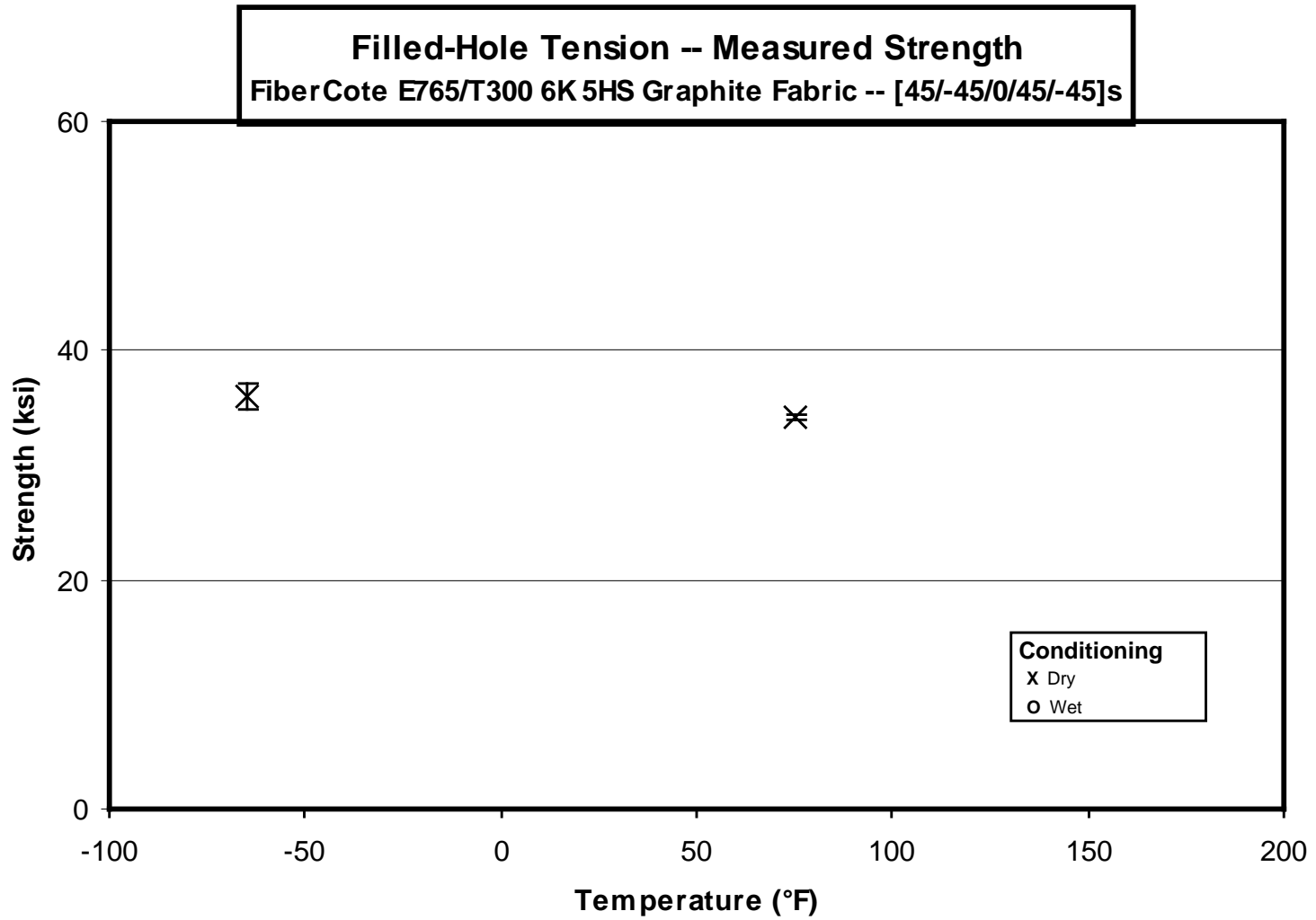
### 3.1.3.3. Filled-Hole Tension [40/20/40]



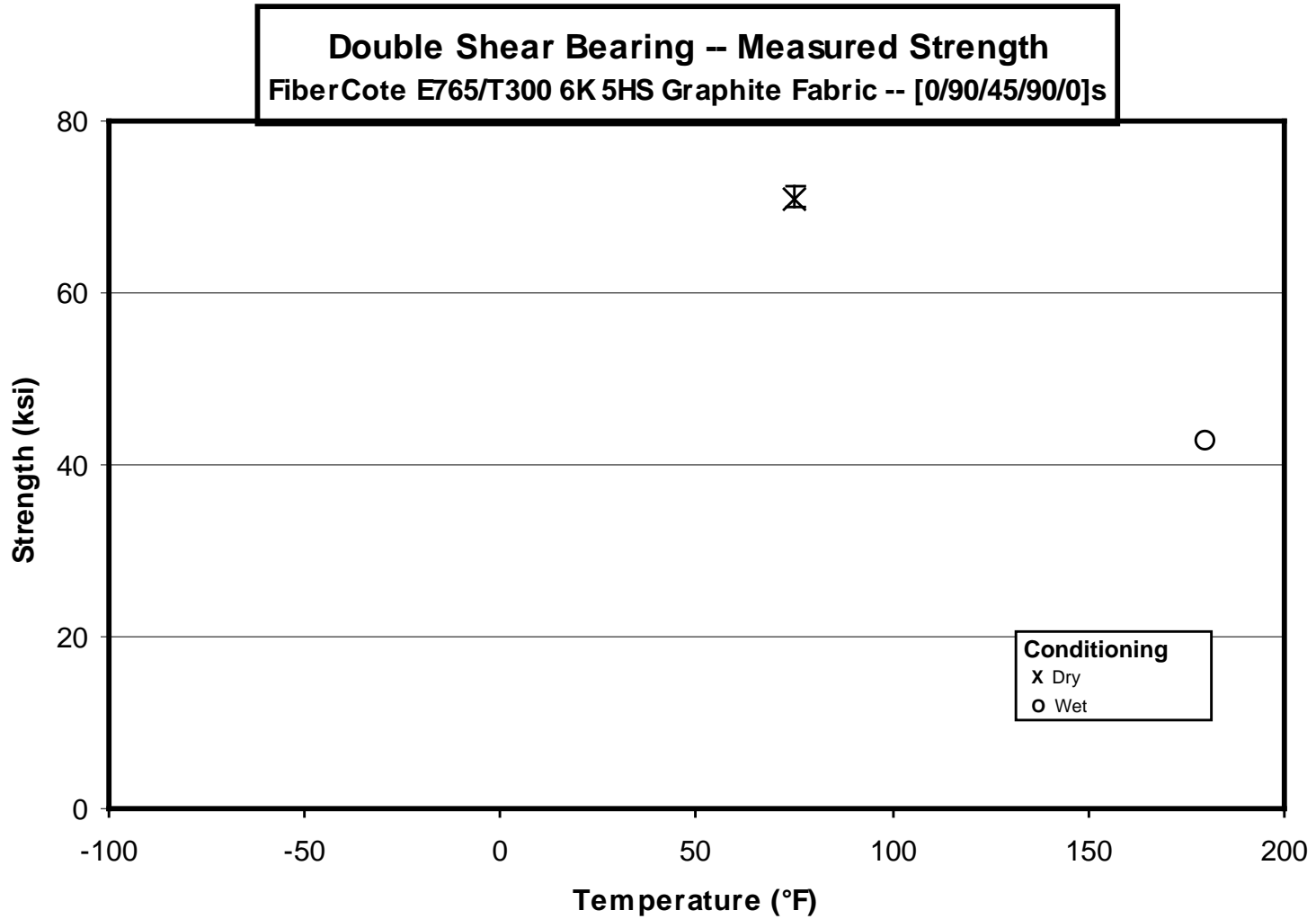
### 3.1.3.4. Filled-Hole Tension [25/50/25]



### 3.1.3.5. Filled-Hole Tension [10/80/10]

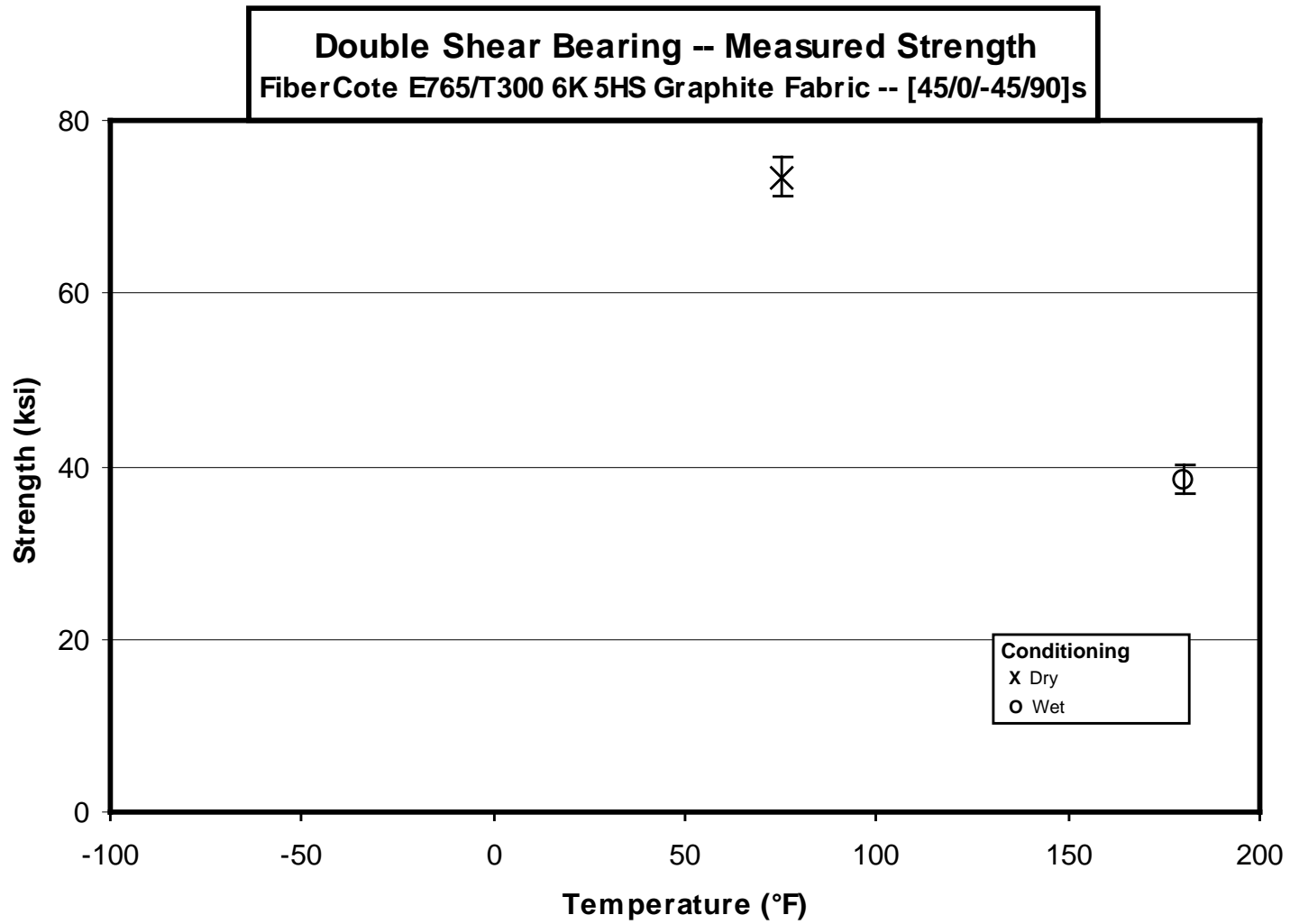


### 3.1.3.6. Double Shear Bearing [40/20/40]



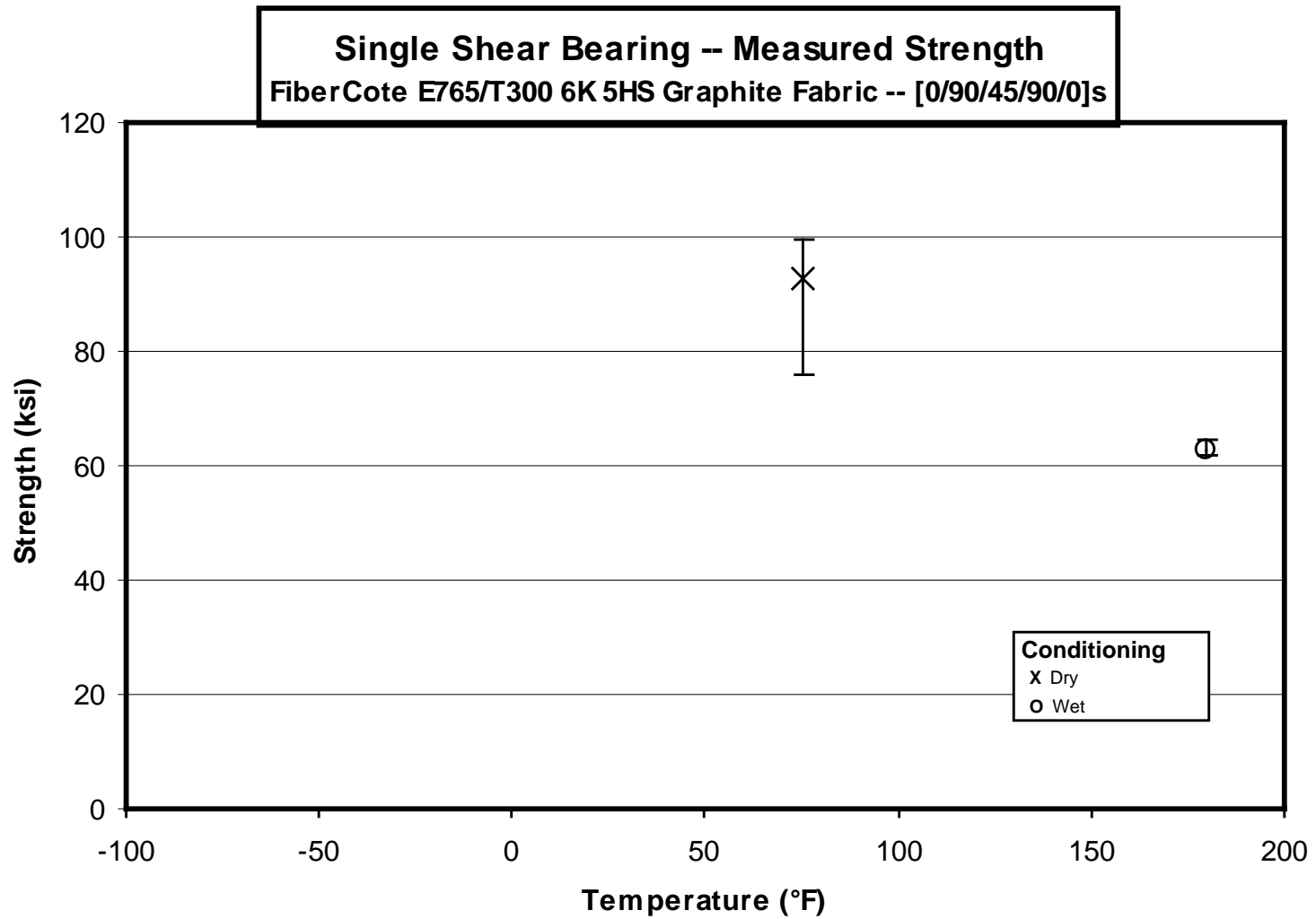
NOTE: The symbols represent the 'pooled' average of all tests, and the bars represent the upper and lower limit of the data.

### 3.1.3.7. Double Shear Bearing [25/50/25]



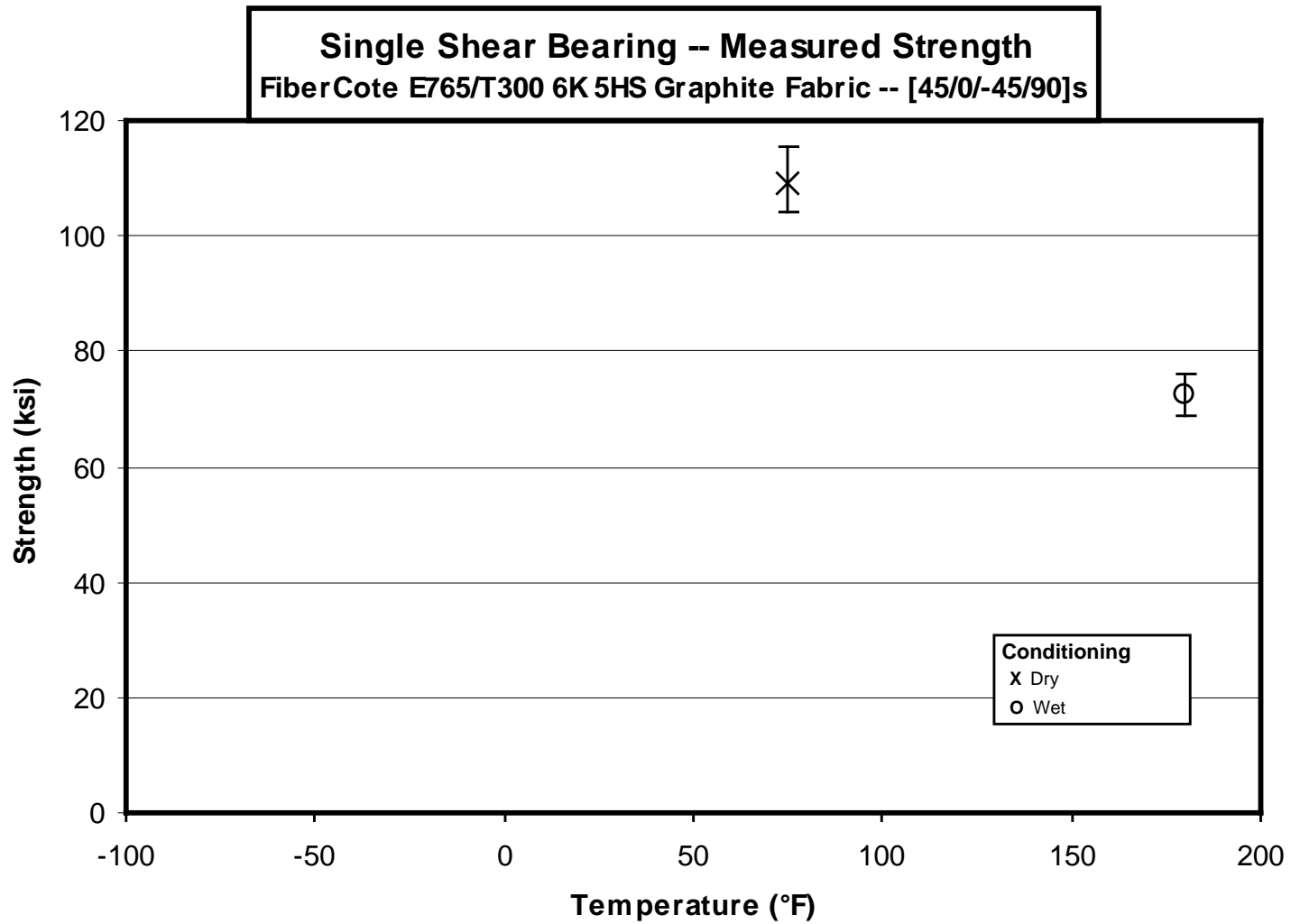
NOTE: The symbols represent the 'pooled' average of all tests, and the bars represent the upper and lower limit of the data.

### 3.1.3.8. Single Shear Bearing [40/20/40]



NOTE: The symbols represent the 'pooled' average of all tests, and the bars represent the upper and lower limit of the data.

### 3.1.3.9. Single Shear Bearing [25/50/25]



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.

**U E K 1 2 3 1 A**

#### 1<sup>st</sup> Character: Fabricator

'U' designates BELL Helicopter

#### 2<sup>nd</sup> Character: Material System & Layup Configuration

'J' designates T300 6K 5HS / E765 [40/20/40]

'K' designates T300 3KPW / E765 [25/50/25]

'L' designates T300 3KPW / E765 [10/80/10]

#### 3<sup>rd</sup> Character: Test Type

'J' designates 0° Tension  
Strength and Modulus, other  
test types will be clearly labeled  
at the top of each sheet

#### 4<sup>th</sup> Character: Prepreg Batch ID

See section 2.1 for FiberCote Batch ID /  
Sample Batch ID correlation.

#### 5<sup>th</sup> Character: Panel Number

The panel(s) fabricated for a specific test method.

#### 6<sup>th</sup> Character: Subpanel Number

The sub-panel(s) cut from each panel, with subpanel  
numbers labeled increasing from reference edge.

#### 7<sup>th</sup> Character: Sample Number

The sample(s) cut from each subpanel, with sample  
numbers labeled increasing from reference edge.

#### 8<sup>th</sup> Character: Test Condition

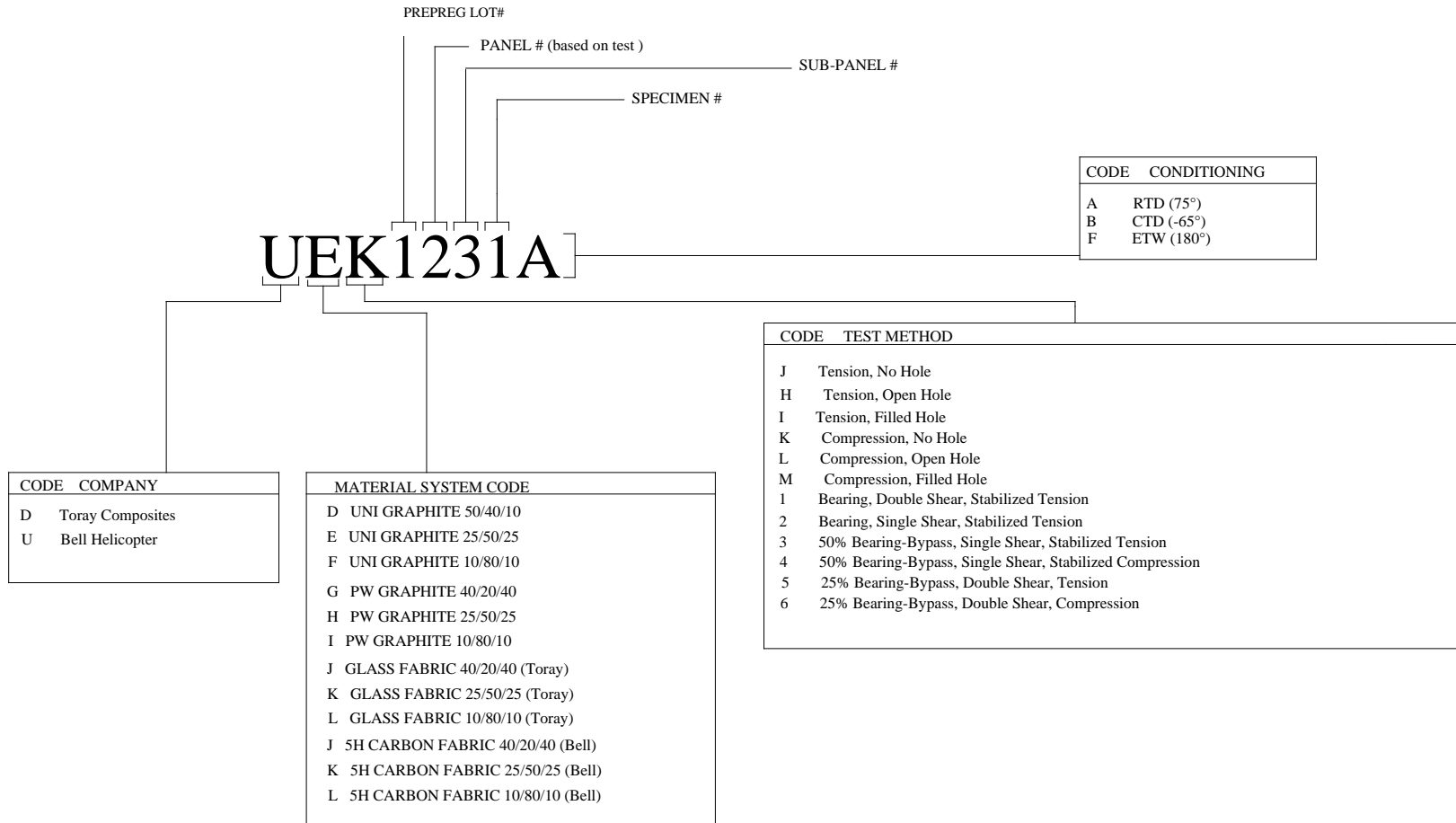
'A' --- RTD

'B' --- CTD

'F' --- ETW

See section 1.5.3 for condition parameters.

### 3.2.1. Nomenclature



### **3.3. Raw Data Spreadsheets and Scatter Charts**

**40/20/40 Laminate Tension -- (RTD)  
 Strength & Modulus**  
 Bell - FiberCote E765/T300 6K 5HS Graphite Fabric [0/90/45/90/0]<sub>s</sub>

Specimen Number	Panel #	Cure Cycle	Prepreg Lot #	No Hole Strength [ksi]	No Hole Modulus [Msi]		Filled Hole Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t <sub>ply</sub> [in]
					Front	Back				
UJJ1115A	C1-1	A	1	58.935	7.774	7.868		0.169	10	0.01694
UJJ1116A	C1-1	A	1	62.412	7.746	7.528		0.170	10	0.01698
UJJ1117A	C1-1	A	1	62.246	7.831	7.712		0.169	10	0.01693
UJI1111A	C1-4	B	1				40.453	0.170	10	0.01698
UJI1112A	C1-4	B	1				40.009	0.169	10	0.01689
UJI1113A	C1-4	B	1				38.888	0.171	10	0.01710
UJI1114A	C1-4	B	1				40.172	0.172	10	0.01719
UJI1115A	C1-4	B	1				37.837	0.174	10	0.01736

<b>Average</b>	<b>61.198</b>	<b>7.743</b>	<b>39.472</b>	<b>Average</b>	<b>0.0170</b>
<b>Standard Dev.</b>	<b>1.961</b>	<b>0.120</b>	<b>1.090</b>		
<b>Coeff. of Var. [%]</b>	<b>3.205</b>	<b>1.543</b>	<b>2.761</b>		
<b>Min.</b>	<b>58.935</b>	<b>7.528</b>	<b>37.837</b>	<b>Min.</b>	<b>0.0169</b>
<b>Max.</b>	<b>62.412</b>	<b>7.868</b>	<b>40.453</b>	<b>Max.</b>	<b>0.0174</b>
<b>Number of Spec.</b>	<b>3</b>	<b>3</b>	<b>5</b>		

**40/20/40 Laminate Tension -- (CTD)  
 Strength & Modulus**  
 Bell - FiberCote E765/T300 6K 5HS Graphite Fabric [0/90/45/90/0]<sub>s</sub>

Specimen Number	Panel #	Cure Cycle	Prepreg Lot #	Filled Hole Strength [ksi]	Avg. Specimen Thckn. [in]	# Plies in Laminate	Avg. t <sub>ply</sub> [in]
UJI1117B	C1-4	B	1	35.429	0.172	10	0.01720
UJI1118B	C1-4	B	1	36.640	0.169	10	0.01695
UJI1119B	C1-4	B	1	41.022	0.168	10	0.01676
UJI1227B	C1-5	B	1	36.185	0.170	10	0.01700
UJI1228B	C1-5	B	1	37.251	0.169	10	0.01687

<b>Average</b>	<b>37.306</b>	<b>Average</b>	<b>0.0170</b>
<b>Standard Dev.</b>	<b>2.182</b>		
<b>Coeff. of Var. [%]</b>	<b>5.848</b>		
<b>Min.</b>	<b>35.429</b>	<b>Min.</b>	<b>0.0168</b>
<b>Max.</b>	<b>41.022</b>	<b>Max.</b>	<b>0.0172</b>
<b>Number of Spec.</b>	<b>5</b>		

**40/20/40 Laminate Compression -- (RTD)  
 Strength & Modulus**  
 Bell - FiberCote E765/T300 6K 5HS Graphite Fabric [0/90/45/90/0]<sub>s</sub>

Specimen Number	Panel #	Cure Cycle	Prepreg Lot #	No Hole Strength [ksi]	No Hole Modulus [Msi]		Open Hole Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t <sub>ply</sub> [in]
					Front	Back				
UJK1111A	C1-1	A	1	63.544	7.259	7.391		0.164	10	0.01645
UJK1112A	C1-1	A	1	63.160	7.166	7.085		0.168	10	0.01678
UJK1113A	C1-1	A	1	64.781	7.398	7.109		0.167	10	0.01674
UJL1211A	C1-3	A	1				40.661	0.169	10	0.01687
UJL1212A	C1-3	A	1				41.630	0.170	10	0.01698
UJL1213A	C1-3	A	1				44.372	0.168	10	0.01683
UJL1214A	C1-3	A	1				42.565	0.171	10	0.01708
UJL1215A	C1-3	A	1				42.489	0.170	10	0.01700

<b>Average</b>	<b>63.828</b>	<b>7.235</b>	<b>42.343</b>	<b>Average</b>	<b>0.0168</b>
<b>Standard Dev.</b>	<b>0.847</b>	<b>0.138</b>	<b>1.371</b>		
<b>Coeff. of Var. [%]</b>	<b>1.327</b>	<b>1.901</b>	<b>3.239</b>		
<b>Min.</b>	<b>63.160</b>	<b>7.085</b>	<b>40.661</b>	<b>Min.</b>	<b>0.0164</b>
<b>Max.</b>	<b>64.781</b>	<b>7.398</b>	<b>44.372</b>	<b>Max.</b>	<b>0.0171</b>
<b>Number of Spec.</b>	<b>3</b>	<b>3</b>	<b>5</b>		

**40/20/40 Laminate Compression -- (ETW)  
 Strength & Modulus**  
 Bell - FiberCote E765/T300 6K 5HS Graphite Fabric [0/90/45/90/0]<sub>s</sub>

Specimen Number	Panel #	Cure Cycle	Prepreg Lot #	Open Hole Strength [ksi]	Filled Hole Strength [ksi]	Avg. Specimen Thckn. [in]	# Plies in Laminate	Avg. t <sub>ply</sub> [in]
UJL1111F	C1-3	A	1	25.741		0.165	10	0.01654
UJL1112F	C1-3	A	1	26.267		0.170	10	0.01704
UJL1113F	C1-3	A	1	27.514		0.168	10	0.01677
UJL1114F	C1-3	A	1	26.538		0.169	10	0.01694
UJL1115F	C1-3	A	1	26.640		0.170	10	0.01697
UJM1221F	C1-5	B	1		39.554	0.170	10	0.01698
UJM1222F	C1-5	B	1		37.857	0.169	10	0.01693
UJM1223F	C1-5	B	1		35.992	0.170	10	0.01695
UJM1224F	C1-5	B	1		35.011	0.170	10	0.01700
UJM1225F	C1-5	B	1		35.254	0.170	10	0.01702

<b>Average</b>	<b>26.540</b>	<b>36.734</b>	<b>Average</b>	<b>0.0169</b>
<b>Standard Dev.</b>	<b>0.646</b>	<b>1.932</b>		
<b>Coeff. of Var. [%]</b>	<b>2.436</b>	<b>5.259</b>		
<b>Min.</b>	<b>25.741</b>	<b>35.011</b>	<b>Min.</b>	<b>0.0165</b>
<b>Max.</b>	<b>27.514</b>	<b>39.554</b>	<b>Max.</b>	<b>0.0170</b>
<b>Number of Spec.</b>	<b>5</b>	<b>5</b>		

**40/20/40 Double Shear Bearing -- (RTD)**  
**Bearing Strength & Chord Modulus**  
 Bell - FiberCote E765/T300 6K 5HS Graphite Fabric [0/90/45/90/0]<sub>s</sub>

Specimen Number	Panel #	Cure Cycle	Prepreg Lot #	Ultimate Bearing Strength [ksi]	2% Offset Bearing Strength [ksi]	Chord Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t <sub>ply</sub> [in]
UJ11111A	C1-6	B	1	72.234	72.116	0.907	0.171	10	0.01708
UJ11112A	C1-6	B	1	72.528	71.885	0.634	0.171	10	0.01714
UJ11113A	C1-6	B	1	69.895	64.662	0.567	0.171	10	0.01710
UJ11114A	C1-6	B	1	69.879	68.918	0.624	0.171	10	0.01708
UJ11115A	C1-6	B	1	70.395	69.233	0.596	0.172	10	0.01715

<b>Average</b>	<b>70.986</b>	<b>69.363</b>	<b>0.666</b>	<b>Average</b>	<b>0.0171</b>
<b>Standard Dev.</b>	<b>1.294</b>	<b>3.010</b>	<b>0.137</b>		
<b>Coeff. of Var. [%]</b>	<b>1.824</b>	<b>4.340</b>	<b>20.648</b>		
<b>Min.</b>	<b>69.879</b>	<b>64.662</b>	<b>0.567</b>	<b>Min.</b>	<b>0.0171</b>
<b>Max.</b>	<b>72.528</b>	<b>72.116</b>	<b>0.907</b>	<b>Max.</b>	<b>0.0172</b>
<b>Number of Spec.</b>	<b>5</b>	<b>5</b>	<b>5</b>		

**40/20/40 Double Shear Bearing -- (ETW)**  
**Bearing Strength & Chord Modulus**  
 Bell - FiberCote E765/T300 6K 5HS Graphite Fabric [0/90/45/90/0]<sub>s</sub>

Specimen Number	Panel #	Cure Cycle	Prepreg Lot #	Ultimate Bearing Strength [ksi]	2% Offset Bearing Strength [ksi]	Chord Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t <sub>ply</sub> [in]
UJ11121F	C1-6	B	1	45.360	N/A	1.753	0.171	10	0.01707
UJ11122F	C1-6	B	1	43.525	N/A	2.011	0.170	10	0.01697
UJ11123F	C1-6	B	1	42.876	N/A	2.889	0.171	10	0.01706
UJ11124F	C1-6	B	1	41.523	N/A	1.694	0.170	10	0.01704
UJ11125F	C1-6	B	1	40.988	N/A	1.507	0.171	10	0.01708

<b>Average</b>	<b>42.854</b>	<b>1.971</b>	<b>Average</b>	<b>0.0170</b>
<b>Standard Dev.</b>	<b>1.731</b>	<b>0.544</b>		
<b>Coeff. of Var. [%]</b>	<b>4.039</b>	<b>27.605</b>		
<b>Min.</b>	<b>40.988</b>	<b>1.507</b>	<b>Min.</b>	<b>0.0170</b>
<b>Max.</b>	<b>45.360</b>	<b>2.889</b>	<b>Max.</b>	<b>0.0171</b>
<b>Number of Spec.</b>	<b>5</b>	<b>5</b>		

**40/20/40 Single Shear Bearing -- (RTD)**  
**Bearing Strength & Chord Modulus**  
 Bell - FiberCote E765/T300 6K 5HS Graphite Fabric [0/90/45/90/0]<sub>s</sub>

Specimen Number	Panel #	Cure Cycle	Prepreg Lot #	Ultimate Bearing Strength [ksi]	2% Offset Bearing Strength [ksi]	Chord Modulus [Msi]	Avg. Specimen Thicken. [in]	# Plies in Laminate	Avg. t <sub>ply</sub> [in]
UJ21111A & UJ21112A	C1-7	D	1	97.930	64.242	0.388	0.169	10	0.01685
UJ21113A & UJ21114A	C1-7	D	1	98.792	85.681	0.607	0.171	10	0.01709
UJ21121A & UJ21122A	C1-7	D	1	99.588	78.512	0.502	0.166	10	0.01655
UJ21123A & UJ21124A	C1-7	D	1	92.142	74.239	0.361	0.167	10	0.01667
UJ21125A & UJ21126A	C1-7	D	1	75.773	67.290	0.229	0.168	10	0.01676

<b>Average</b>	<b>92.845</b>	<b>73.993</b>	<b>0.417</b>	<b>Average</b>	<b>0.0168</b>
Standard Dev.	9.983	8.618	0.144		
Coeff. of Var. [%]	10.753	11.647	34.487		
Min.	75.773	64.242	0.229	Min.	0.0166
Max.	99.588	85.681	0.607	Max.	0.0171
Number of Spec.	5	5	5		

**40/20/40 Single Shear Bearing -- (ETW)**  
**Bearing Strength & Chord Modulus**  
 Bell - FiberCote E765/T300 6K 5HS Graphite Fabric [0/90/45/90/0]<sub>s</sub>

Specimen Number	Panel #	Cure Cycle	Prepreg Lot #	Ultimate Bearing Strength [ksi]	2% Offset Bearing Strength [ksi]	Chord Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t <sub>ply</sub> [in]
UJ21211F & UJ21212F	C1-8	D	1	61.875	53.437	0.548	0.167	10	0.01666
UJ21213F & UJ21214F	C1-8	D	1	62.522	59.592	0.636	0.171	10	0.01705
UJ21215F & UJ21216F	C1-8	D	1	62.328	55.172	0.589	0.171	10	0.01711
UJ21221F & UJ21222F	C1-8	D	1	64.738	61.147	0.532	0.165	10	0.01646
UJ21223F & UJ21224F	C1-8	D	1	61.809	58.212	0.525	0.169	10	0.01688

Average	62.654	57.512	0.566	Average	0.0168
Standard Dev.	1.203	3.167	0.046		
Coeff. of Var. [%]	1.920	5.506	8.184		
Min.	61.809	53.437	0.525	Min.	0.0165
Max.	64.738	61.147	0.636	Max.	0.0171
Number of Spec.	5	5	5		

**40/20/40 Bearing-Bypass 50%-Tension -- (RTD)**  
**Bearing Strength & Bypass Strain**  
 Bell - FiberCote E765/T300 6K 5HS Graphite Fabric [0/90/45/90/0]<sub>s</sub>

Specimen Number	Panel #	Cure Cycle	Prepreg Lot #	Ultimate Bearing Strength [ksi]	2% Offset Bearing Strength [ksi]	Chord Modulus [Msi]	Ultimate Bypass Strain (microstrain)	Avg. Specimen Thicken. [in]	# Plies in Laminate	Avg. $t_{ply}$ [in]
UJ31111A & UJ31112A	C1-11	D	1	62.718	80.805	1.756	758	0.166	10	0.01659
UJ31113A & UJ31114A	C1-11	D	1	66.913	74.202	1.804	932	0.167	10	0.01668
UJ31211A & UJ31212A	C1-12	F	1	63.867	78.157	1.663		0.169	10	0.01691
UJ31213A & UJ31214A	C1-12	F	1	66.639	80.442	1.616		0.169	10	0.01688
UJ31215A & UJ31216A	C1-12	F	1	61.463	78.389	1.599		0.170	10	0.01703

<b>Average</b>	<b>64.320</b>	<b>78.399</b>	<b>1.687</b>	<b>845</b>	<b>Average</b>	<b>0.0168</b>
<b>Standard Dev.</b>	<b>2.400</b>	<b>2.629</b>	<b>0.089</b>	<b>122.645</b>		
<b>Coeff. of Var. [%]</b>	<b>3.731</b>	<b>3.353</b>	<b>5.291</b>	<b>14.512</b>		
<b>Min.</b>	<b>61.463</b>	<b>74.202</b>	<b>1.599</b>	<b>758.397</b>	<b>Min.</b>	<b>0.0166</b>
<b>Max.</b>	<b>66.913</b>	<b>80.805</b>	<b>1.804</b>	<b>931.843</b>	<b>Max.</b>	<b>0.0170</b>
<b>Number of Spec.</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>2</b>		

**40/20/40 Bearing-Bypass 50%-Compression -- (RTD)**  
**Bearing Strength & Bypass Strain**  
 Bell - FiberCote E765/T300 6K 5HS Graphite Fabric [0/90/45/90/0]<sub>s</sub>

Specimen Number	Panel #	Cure Cycle	Prepreg Lot #	Ultimate Bearing Strength [ksi]	2% Offset Bearing Strength [ksi]	Chord Modulus [Msi]	Ultimate Bypass Strain (microstrain)	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t <sub>ply</sub> [in]
UJ41311A & UJ41312A	C1-13	F	1	88.293	74.801	2.282	908	0.168	10	0.01679
UJ41313A & UJ41314A	C1-13	F	1	87.141	79.228	1.999	1874	0.170	10	0.01698
UJ41315A & UJ41316A	C1-13	F	1	86.177	68.902	2.200		0.169	10	0.01690
UJ31115A & UJ31116A	C1-11	D	1	85.931	72.233	2.062		0.169	10	0.01694
UJ31118A & UJ41317A	C1-11	D	1	89.740	75.929	2.116		0.168	10	0.01685

<b>Average</b>	<b>87.456</b>	<b>74.219</b>	<b>2.132</b>	<b>1391</b>	<b>Average</b>	<b>0.0169</b>
<b>Standard Dev.</b>	<b>1.579</b>	<b>3.891</b>	<b>0.112</b>	<b>683.003</b>		
<b>Coeff. of Var. [%]</b>	<b>1.806</b>	<b>5.243</b>	<b>5.240</b>	<b>49.104</b>		
<b>Min.</b>	<b>85.931</b>	<b>68.902</b>	<b>1.999</b>	<b>907.976</b>	<b>Min.</b>	<b>0.0168</b>
<b>Max.</b>	<b>89.740</b>	<b>79.228</b>	<b>2.282</b>	<b>1873.888</b>	<b>Max.</b>	<b>0.0170</b>
<b>Number of Spec.</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>2</b>		

**40/20/40 Bearing-Bypass 25%-Tension -- (RTD)**  
**Bearing Strength & Bypass Strain**  
 Bell - FiberCote E765/T300 6K 5HS Graphite Fabric [0/90/45/90/0]<sub>S</sub>

Specimen Number	Panel #	Cure Cycle	Prepreg Lot #	Ultimate Bearing Strength [ksi]	2% Offset Bearing Strength [ksi]	Chord Modulus [Msi]	Ultimate Bypass Strain (microstrain)	Avg. Specimen Thicken. [in]	# Plies in Laminate	Avg. t <sub>ply</sub> [in]
UJ51111A	C1-14	F	1	108.034	N/A		982	0.169	10	0.01687
UJ51112A	C1-14	F	1	102.589	N/A		931	0.170	10	0.01697
UJ51113A	C1-14	F	1	100.523	N/A			0.170	10	0.01702
UJ51114A	C1-14	F	1	101.672	N/A			0.171	10	0.01709
UJ51115A	C1-14	F	1	102.685	N/A			0.170	10	0.01705

<b>Average</b>	<b>103.101</b>	<b>957</b>	<b>Average</b>	<b>0.0170</b>
<b>Standard Dev.</b>	<b>2.892</b>	<b>36.342</b>		
<b>Coeff. of Var. [%]</b>	<b>2.805</b>	<b>3.799</b>		
<b>Min.</b>	<b>100.523</b>	<b>931.023</b>	<b>Min.</b>	<b>0.0169</b>
<b>Max.</b>	<b>108.034</b>	<b>982.419</b>	<b>Max.</b>	<b>0.0171</b>
<b>Number of Spec.</b>	<b>5</b>	<b>2</b>		

**40/20/40 Bearing-Bypass 25%-Compression -- (RTD)**  
**Bearing Strength & Bypass Strain**  
 Bell - FiberCote E765/T300 6K 5HS Graphite Fabric [0/90/45/90/0]<sub>s</sub>

Specimen Number	Panel #	Cure Cycle	Prepreg Lot #	Ultimate Bearing Strength [ksi]	2% Offset Bearing Strength [ksi]	Chord Modulus [Msi]	Ultimate Bypass Strain (microstrain)	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t <sub>ply</sub> [in]
UJ61211A	C1-10	D	1	123.716	N/A	6.082	4404	0.167	10	0.01675
UJ61212A	C1-10	D	1	135.639	N/A	6.056	2222	0.168	10	0.01682
UJ61213A	C1-10	D	1	126.608	N/A	6.712		0.169	10	0.01687
UJ61214A	C1-10	D	1	130.036	N/A	6.157		0.168	10	0.01682
UJ61215A	C1-10	D	1	135.270	N/A	6.331		0.167	10	0.01673

Average	130.254	6.267	3313	Average	0.0168
Standard Dev.	5.250	0.271	1542.990		
Coeff. of Var. [%]	4.031	4.320	46.578		
Min.	123.716	6.056	2221.636	Min.	0.0167
Max.	135.639	6.712	4403.754	Max.	0.0169
Number of Spec.	5	5	2		

**25/50/25 Laminate Tension -- (RTD)**  
**Strength & Modulus**  
 Bell - FiberCote E765/T300 6K 5HS Graphite Fabric [45/0/-45/90]<sub>s</sub>

Specimen Number	Panel #	Cure Cycle	Prepreg Lot #	No Hole Strength [ksi]	No Hole Modulus [Msi] Front Back	Open Hole Strength [ksi]	Filled Hole Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t <sub>ply</sub> [in]
UKJ1111A	C2-1	C	1	68.665	6.304 6.349			0.131	8	0.01638
UKJ1112A	C2-1	C	1	68.124	6.193 6.155			0.133	8	0.01666
UKJ1113A	C2-1	C	1	62.382	6.005 5.970			0.139	8	0.01732
UKH1111A	C2-2	C	1			36.847		0.133	8	0.01658
UKH1112A	C2-2	C	1			35.975		0.133	8	0.01668
UKH1113A	C2-2	C	1			31.855		0.134	8	0.01674
UKH1114A	C2-2	C	1			32.745		0.134	8	0.01678
UKH1115A	C2-2	C	1			34.098		0.135	8	0.01685
UKI1111A	C2-5	C	1				35.267	0.132	8	0.01652
UKI1112A	C2-5	C	1				36.459	0.135	8	0.01693
UKI1113A	C2-5	C	1				34.146	0.136	8	0.01694
UKI1114A	C2-5	C	1				35.186	0.136	8	0.01704
UKI1115A	C2-5	C	1				33.460	0.137	8	0.01711

<b>Average</b>	<b>66.390</b>	<b>6.163</b>	<b>34.304</b>	<b>34.903</b>	<b>Average</b>	<b>0.0168</b>
<b>Standard Dev.</b>	<b>3.482</b>	<b>0.153</b>	<b>2.105</b>	<b>1.150</b>		
<b>Coeff. of Var. [%]</b>	<b>5.245</b>	<b>2.490</b>	<b>6.137</b>	<b>3.295</b>		
<b>Min.</b>	<b>62.382</b>	<b>5.970</b>	<b>31.855</b>	<b>33.460</b>	<b>Min.</b>	<b>0.0164</b>
<b>Max.</b>	<b>68.665</b>	<b>6.349</b>	<b>36.847</b>	<b>36.459</b>	<b>Max.</b>	<b>0.0173</b>
<b>Number of Spec.</b>	<b>3</b>	<b>3</b>	<b>5</b>	<b>5</b>		

**25/50/25 Laminate Tension -- (CTD)  
 Strength**  
 Bell - FiberCote E765/T300 6K 5HS Graphite Fabric [45/0/-45/90]<sub>s</sub>

Specimen Number	Panel #	Cure Cycle	Prepreg Lot #	Open Hole Strength [ksi]	Filled Hole Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t <sub>ply</sub> [in]
UKH1217B	C2-3	C	1	30.848		0.137	8	0.01716
UKH1218B	C2-3	C	1	33.312		0.133	8	0.01661
UKH1219B	C2-3	C	1	32.706		0.134	8	0.01673
UKH1317B	C2-3	C	1	30.823		0.135	8	0.01693
UKH1318B	C2-3	C	1	32.375		0.135	8	0.01684
UKI1116B	C2-5	C	1		33.988	0.137	8	0.01717
UKI1117B	C2-5	C	1		33.338	0.134	8	0.01679
UKI1118B	C2-5	C	1		34.816	0.134	8	0.01675
UKI1119B	C2-5	C	1		34.602	0.133	8	0.01666
UKI1227B	C2-6	C	1		34.019	0.134	8	0.01677

<b>Average</b>	<b>32.013</b>	<b>34.153</b>	<b>Average</b>	<b>0.0168</b>
<b>Standard Dev.</b>	<b>1.126</b>	<b>0.581</b>		
<b>Coeff. of Var. [%]</b>	<b>3.517</b>	<b>1.701</b>		
<b>Min.</b>	<b>30.823</b>	<b>33.338</b>	<b>Min.</b>	<b>0.0166</b>
<b>Max.</b>	<b>33.312</b>	<b>34.816</b>	<b>Max.</b>	<b>0.0172</b>
<b>Number of Spec.</b>	<b>5</b>	<b>5</b>		

**25/50/25 Laminate Tension -- (ETW)**  
**Strength & Modulus**  
 Bell - FiberCote E765/T300 6K 5HS Graphite Fabric [45/0/-45/90]<sub>s</sub>

Specimen Number	Panel #	Cure Cycle	Prepreg Lot #	Open Hole Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t <sub>ply</sub> [in]
UKH1111F	C2-7	D	1	34.730	0.131	8	0.01631
UKH1112F	C2-7	D	1	35.245	0.133	8	0.01663
UKH1113F	C2-7	D	1	32.755	0.134	8	0.01673
UKH1114F	C2-7	D	1	32.760	0.140	8	0.01744
UKH1115F	C2-7	D	1	32.926	0.135	8	0.01686

<b>Average</b>	<b>33.683</b>	<b>Average</b>	<b>0.0168</b>
<b>Standard Dev.</b>	<b>1.207</b>		
<b>Coeff. of Var. [%]</b>	<b>3.582</b>		
<b>Min.</b>	<b>32.755</b>	<b>Min.</b>	<b>0.0163</b>
<b>Max.</b>	<b>35.245</b>	<b>Max.</b>	<b>0.0174</b>
<b>Number of Spec.</b>	<b>5</b>		

**25/50/25 Laminate Compression -- (RTD)  
 Strength & Modulus**  
 Bell - FiberCote E765/T300 6K 5HS Graphite Fabric [45/0/-45/90]<sub>s</sub>

Specimen Number	Panel #	Cure Cycle	Prepreg Lot #	No Hole		Open Hole Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t <sub>ply</sub> [in]
				Strength [ksi]	Modulus [Msi]				
UKK1115A	C2-1	C	1	69.054	5.894	5.569	0.136	8	0.01694
UKK1116A	C2-1	C	1	69.167	5.856	5.527	0.136	8	0.01696
UKK1118A	C2-1	C	1	65.886	5.516	5.713	0.134	8	0.01669
UKL1211A	C2-4	C	1			38.288	0.134	8	0.01676
UKL1212A	C2-4	C	1			39.733	0.135	8	0.01685
UKL1213A	C2-4	C	1			38.336	0.135	8	0.01683
UKL1214A	C2-4	C	1			37.894	0.136	8	0.01697
UKL1215A	C2-4	C	1			39.522	0.136	8	0.01703

<b>Average</b>	<b>68.035</b>	<b>5.679</b>	<b>38.755</b>	<b>Average</b>	<b>0.0169</b>
<b>Standard Dev.</b>	<b>1.862</b>	<b>0.168</b>	<b>0.819</b>		
<b>Coeff. of Var. [%]</b>	<b>2.737</b>	<b>2.951</b>	<b>2.112</b>		
<b>Min.</b>	<b>65.886</b>	<b>5.516</b>	<b>37.894</b>	<b>Min.</b>	<b>0.0167</b>
<b>Max.</b>	<b>69.167</b>	<b>5.894</b>	<b>39.733</b>	<b>Max.</b>	<b>0.0170</b>
<b>Number of Spec.</b>	<b>3</b>	<b>3</b>	<b>5</b>		

**25/50/25 Laminate Compression -- (ETW)  
 Strength & Modulus**  
 Bell - FiberCote E765/T300 6K 5HS Graphite Fabric [45/0/-45/90]<sub>s</sub>

Specimen Number	Panel #	Cure Cycle	Prepreg Lot #	Open Hole Strength [ksi]	Filled Hole Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t <sub>ply</sub> [in]
UKL1311F	C2-4	C	1	23.142		0.134	8	0.01670
UKL1312F	C2-4	C	1	21.896		0.135	8	0.01684
UKL1313F	C2-4	C	1	22.420		0.137	8	0.01713
UKL1314F	C2-4	C	1	22.218		0.136	8	0.01699
UKL1315F	C2-4	C	1	22.844		0.137	8	0.01710
UKM1221F	C2-6	C	1		33.119	0.134	8	0.01677
UKM1222F	C2-6	C	1		31.971	0.135	8	0.01683
UKM1223F	C2-6	C	1		35.033	0.135	8	0.01686
UKM1224F	C2-6	C	1		32.502	0.135	8	0.01688
UKM1225F	C2-6	C	1		32.015	0.136	8	0.01696

<b>Average</b>	<b>22.504</b>	<b>32.928</b>	<b>Average</b>	<b>0.0169</b>
<b>Standard Dev.</b>	<b>0.495</b>	<b>1.265</b>		
<b>Coeff. of Var. [%]</b>	<b>2.200</b>	<b>3.840</b>		
<b>Min.</b>	<b>21.896</b>	<b>31.971</b>	<b>Min.</b>	<b>0.0167</b>
<b>Max.</b>	<b>23.142</b>	<b>35.033</b>	<b>Max.</b>	<b>0.0171</b>
<b>Number of Spec.</b>	<b>5</b>	<b>5</b>		

**25/50/25 Double Shear Bearing -- (RTD)  
 Bearing Strength & Chord Modulus**

Bell - FiberCote E765/T300 6K 5HS Graphite Fabric [45/0/-45/90]<sub>s</sub>

Specimen Number	Panel #	Cure Cycle	Prepreg Lot #	Ultimate Bearing Strength [ksi]	2% Offset Bearing Strength [ksi]	Chord Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. $t_{ply}$ [in]
UK11121A	C2-8	E	1	72.858	70.727	0.645	0.136	8	0.01698
UK11122A	C2-8	E	1	73.768	71.670	0.697	0.135	8	0.01688
UK11123A	C2-8	E	1	71.098	70.607	0.835	0.135	8	0.01685
UK11124A	C2-8	E	1	75.908	75.266	0.874	0.136	8	0.01696
UK11125A	C2-8	E	1	73.480	72.675	0.786	0.136	8	0.01698

<b>Average</b>	<b>73.423</b>	<b>72.189</b>	<b>0.768</b>	<b>Average</b>	<b>0.0169</b>
<b>Standard Dev.</b>	<b>1.734</b>	<b>1.911</b>	<b>0.095</b>		
<b>Coeff. of Var. [%]</b>	<b>2.361</b>	<b>2.648</b>	<b>12.396</b>		
<b>Min.</b>	<b>71.098</b>	<b>70.607</b>	<b>0.645</b>	<b>Min.</b>	<b>0.0169</b>
<b>Max.</b>	<b>75.908</b>	<b>75.266</b>	<b>0.874</b>	<b>Max.</b>	<b>0.0170</b>
<b>Number of Spec.</b>	<b>5</b>	<b>5</b>	<b>5</b>		

**25/50/25 Double Shear Bearing -- (ETW)**  
**Bearing Strength & Chord Modulus**  
 Bell - FiberCote E765/T300 6K 5HS Graphite Fabric [45/0/-45/90]<sub>s</sub>

Specimen Number	Panel #	Cure Cycle	Prepreg Lot #	Ultimate Bearing Strength [ksi]	2% Offset Bearing Strength [ksi]	Chord Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t <sub>ply</sub> [in]
UK11111F	C2-8	E	1	36.848	N/A	1.442	0.136	8	0.01705
UK11112F	C2-8	E	1	38.345	N/A	2.409	0.136	8	0.01696
UK11113F	C2-8	E	1	38.951	N/A	2.770	0.134	8	0.01679
UK11114F	C2-8	E	1	40.154	N/A	2.075	0.134	8	0.01674
UK11115F	C2-8	E	1	36.946	N/A	1.928	0.134	8	0.01673

<b>Average</b>	<b>38.249</b>	<b>2.125</b>	<b>Average</b>	<b>0.0169</b>
<b>Standard Dev.</b>	<b>1.396</b>	<b>0.501</b>		
<b>Coeff. of Var. [%]</b>	<b>3.649</b>	<b>23.583</b>		
<b>Min.</b>	<b>36.848</b>	<b>1.442</b>	<b>Min.</b>	<b>0.0167</b>
<b>Max.</b>	<b>40.154</b>	<b>2.770</b>	<b>Max.</b>	<b>0.0171</b>
<b>Number of Spec.</b>	<b>5</b>	<b>5</b>		

**25/50/25 Single Shear Bearing -- (RTD)**

**Bearing Strength & Chord Modulus**

Bell - FiberCote E765/T300 6K 5HS Graphite Fabric [45/0/-45/90]<sub>s</sub>

Specimen Number	Panel #	Cure Cycle	Prepreg Lot #	Ultimate Bearing Strength [ksi]	2% Offset Bearing Strength [ksi]	Chord Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t <sub>ply</sub> [in]
UK21111A & UK21112A	C2-9	E	1	110.136	98.637	0.732	0.133	8	0.01659
UK21113A & UK21114A	C2-9	E	1	115.372	98.126	0.505	0.134	8	0.01673
UK21115A & UK21116A	C2-9	E	1	106.257	84.486	0.737	0.134	8	0.01671
UK21121A & UK21122A	C2-9	E	1	110.413	88.802	0.734	0.132	8	0.01646
UK21123A & UK21124A	C2-9	E	1	104.290	79.925	0.745	0.137	8	0.01707

<b>Average</b>	<b>109.294</b>	<b>89.995</b>	<b>0.690</b>	<b>Average</b>	<b>0.0167</b>
<b>Standard Dev.</b>	<b>4.277</b>	<b>8.276</b>	<b>0.104</b>		
<b>Coeff. of Var. [%]</b>	<b>3.913</b>	<b>9.196</b>	<b>15.060</b>		
<b>Min.</b>	<b>104.290</b>	<b>79.925</b>	<b>0.505</b>	<b>Min.</b>	<b>0.0165</b>
<b>Max.</b>	<b>115.372</b>	<b>98.637</b>	<b>0.745</b>	<b>Max.</b>	<b>0.0171</b>
<b>Number of Spec.</b>	<b>5</b>	<b>5</b>	<b>5</b>		

**25/50/25 Single Shear Bearing -- (ETW)**  
**Bearing Strength & Chord Modulus**  
 Bell - FiberCote E765/T300 6K 5HS Graphite Fabric [45/0/-45/90]<sub>s</sub>

Specimen Number	Panel #	Cure Cycle	Prepreg Lot #	Ultimate Bearing Strength [ksi]	2% Offset Bearing Strength [ksi]	Chord Modulus [Msi]	Avg. Specimen Thicken. [in]	# Plies in Laminate	Avg. t <sub>ply</sub> [in]
UK21211F & UK21212F	C2-10	E	1	68.861	68.463	0.704	0.136	8	0.01700
UK21213F & UK21214F	C2-10	E	1	72.811	67.942	0.482	0.136	8	0.01699
UK21215F & UK21216F	C2-10	E	1	73.471	73.179	0.697	0.136	8	0.01706
UK21221F & UK21222F	C2-10	E	1	75.887	72.284	0.549	0.136	8	0.01694
UK21223F & UK21224F	C2-10	E	1	71.347	62.438	0.672	0.134	8	0.01681

<b>Average</b>	<b>72.476</b>	<b>68.861</b>	<b>0.621</b>	<b>Average</b>	<b>0.0170</b>
<b>Standard Dev.</b>	<b>2.602</b>	<b>4.261</b>	<b>0.100</b>		
<b>Coeff. of Var. [%]</b>	<b>3.590</b>	<b>6.188</b>	<b>16.062</b>		
<b>Min.</b>	<b>68.861</b>	<b>62.438</b>	<b>0.482</b>	<b>Min.</b>	<b>0.0168</b>
<b>Max.</b>	<b>75.887</b>	<b>73.179</b>	<b>0.704</b>	<b>Max.</b>	<b>0.0171</b>
<b>Number of Spec.</b>	<b>5</b>	<b>5</b>	<b>5</b>		

**25/50/25 Bearing-Bypass 50%-Tension -- (RTD)**  
**Bearing Strength & Bypass Strain**  
 Bell - FiberCote E765/T300 6K 5HS Graphite Fabric [45/0/-45/90]<sub>s</sub>

Specimen Number	Panel #	Cure Cycle	Prepreg Lot #	Ultimate Bearing Strength [ksi]	2% Offset Bearing Strength [ksi]	Chord Modulus [Msi]	Ultimate Bypass Strain (microstrain)	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. $t_{ply}$ [in]
UK31111A & UK31112A	C2-13	A	1	85.125	69.414	1.843	1287	0.128	8	0.01599
UK31113A & UK31114A	C2-13	A	1	82.264	80.684	2.540	1627	0.130	8	0.01630
UK31117A & UK31118A	C2-13	A	1	85.937	78.792	2.664		0.130	8	0.01626
UK31211A & UK31212A	C2-14	H	1	83.142	79.090	2.028		0.130	8	0.01622
UK31213A & UK31214A	C2-14	H	1	80.128	74.885	1.825		0.130	8	0.01625
UK31215A & UK31216A	C2-14	H	1	78.449	72.792	1.837		0.131	8	0.01638

<b>Average</b>	<b>82.508</b>	<b>75.943</b>	<b>2.123</b>	<b>1457</b>	<b>Average</b>	<b>0.0162</b>
Standard Dev.	2.871	4.340	0.381	240.321		
Coeff. of Var. [%]	3.480	5.715	17.937	16.496		
Min.	78.449	69.414	1.825	1286.882	Min.	0.0160
Max.	85.937	80.684	2.664	1626.747	Max.	0.0164
Number of Spec.	6	6	6	2		

**25/50/25 Bearing-Bypass 50%-Compression -- (RTD)**  
**Bearing Strength & Bypass Strain**  
 Bell - FiberCote E765/T300 6K 5HS Graphite Fabric [45/0/-45/90]<sub>s</sub>

Specimen Number	Panel #	Cure Cycle	Prepreg Lot #	Ultimate Bearing Strength [ksi]	2% Offset Bearing Strength [ksi]	Chord Modulus [Msi]	Ultimate Bypass Strain (microstrain)	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t <sub>ply</sub> [in]
UK41311A & UK41312A	C2-15	H	1	95.817	86.874	2.104	2379	0.132	8	0.01646
UK41313A & UK41314A	C2-15	H	1	100.512	86.302	2.162	1893	0.131	8	0.01638
UK41315A & UK41316A	C2-15	H	1	98.940	80.372	2.063		0.131	8	0.01636
UK41317A & UK41318A	C2-15	H	1	96.103	85.162	2.050		0.131	8	0.01642
UK31217A & UK31218A	C2-14	H	1	89.126	76.091	2.244		0.130	8	0.01629

Average	96.099	82.960	2.124	2136	Average	0.0164
Standard Dev.	4.366	4.615	0.080	343.153		
Coeff. of Var. [%]	4.543	5.563	3.761	16.064		
Min.	89.126	76.091	2.050	1893.460	Min.	0.0163
Max.	100.512	86.874	2.244	2378.751	Max.	0.0165
Number of Spec.	5	5	5	2		

**25/50/25 Bearing-Bypass 25%-Tension -- (RTD)**  
**Bearing Strength & Bypass Strain**  
 Bell - FiberCote E765/T300 6K 5HS Graphite Fabric [45/0/-45/90]<sub>s</sub>

Specimen Number	Panel #	Cure Cycle	Prepreg Lot #	Ultimate Bearing Strength [ksi]	2% Offset Bearing Strength [ksi]	Chord Modulus [Msi]	Ultimate Bypass Strain (microstrain)	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. $t_{ply}$ [in]
UK51111A	C2-11	A	1	15.929	N/A		963	0.129	8	0.01614
UK51112A	C2-11	A	1	15.907	N/A		1309	0.130	8	0.01622
UK51113A	C2-11	A	1	16.149	N/A			0.130	8	0.01621
UK51114A	C2-11	A	1	16.346	N/A			0.131	8	0.01635
UK51115A	C2-11	A	1	15.584	N/A			0.130	8	0.01623

<b>Average</b>	<b>15.983</b>	<b>1136</b>	<b>Average</b>	<b>0.0162</b>
<b>Standard Dev.</b>	<b>0.286</b>	<b>244.900</b>		
<b>Coeff. of Var. [%]</b>	<b>1.791</b>	<b>21.559</b>		
<b>Min.</b>	<b>15.584</b>	<b>962.759</b>	<b>Min.</b>	<b>0.0161</b>
<b>Max.</b>	<b>16.346</b>	<b>1309.100</b>	<b>Max.</b>	<b>0.0163</b>
<b>Number of Spec.</b>	<b>5</b>	<b>2</b>		

**25/50/25 Bearing-Bypass 25%-Compression -- (RTD)**  
**Bearing Strength & Bypass Strain**  
 Bell - FiberCote E765/T300 6K 5HS Graphite Fabric [45/0/-45/90]<sub>s</sub>

Specimen Number	Panel #	Cure Cycle	Prepreg Lot #	Ultimate Bearing Strength [ksi]	2% Offset Bearing Strength [ksi]	Chord Modulus [Msi]	Ultimate Bypass Strain (microstrain)	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t <sub>ply</sub> [in]
UK61211A	C2-12	A	1	188.431	N/A	10.081	4499	0.129	8	0.01617
UK61212A	C2-12	A	1	197.284	N/A	9.418	4258	0.130	8	0.01631
UK61213A	C2-12	A	1	168.383	N/A	10.238		0.130	8	0.01630
UK61214A	C2-12	A	1	175.163	N/A	9.238		0.130	8	0.01628
UK61215A	C2-12	A	1	172.044	N/A	9.438		0.131	8	0.01632

<b>Average</b>	<b>180.261</b>			<b>9.683</b>		<b>4378</b>		<b>Average</b>	<b>0.0163</b>
<b>Standard Dev.</b>	<b>12.157</b>			<b>0.446</b>		<b>170.606</b>			
<b>Coeff. of Var. [%]</b>	<b>6.744</b>			<b>4.604</b>		<b>3.897</b>			
<b>Min.</b>	<b>168.383</b>			<b>9.238</b>		<b>4257.770</b>		<b>Min.</b>	<b>0.0162</b>
<b>Max.</b>	<b>197.284</b>			<b>10.238</b>		<b>4499.043</b>		<b>Max.</b>	<b>0.0163</b>
<b>Number of Spec.</b>	<b>5</b>			<b>5</b>		<b>2</b>			

**10/80/10 Laminate Tension -- (RTD)  
 Strength & Modulus**  
 Bell - FiberCote E765/T300 6K 5HS Graphite Fabric [45/-45/0/45/-45]<sub>s</sub>

Specimen Number	Panel #	Cure Cycle	Prepreg Lot #	No Hole Strength [ksi]	No Hole Modulus [Msi]		Open Hole Strength [ksi]	Filled Hole Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t <sub>ply</sub> [in]
					Front	Back					
ULJ1112A	C3-1	B	1	43.729	3.988	3.890			0.166	10	0.01656
ULJ1113A	C3-1	B	1	40.908	4.063	3.929			0.167	10	0.01675
ULJ1114A	C3-1	B	1	42.483	3.873	3.861			0.168	10	0.01685
ULH1111A	C3-2	B	1				33.337		0.165	10	0.01651
ULH1112A	C3-2	B	1				32.238		0.166	10	0.01664
ULH1113A	C3-2	B	1				32.141		0.168	10	0.01677
ULH1114A	C3-2	B	1				32.473		0.168	10	0.01676
ULH1115A	C3-2	B	1				33.427		0.168	10	0.01676
ULI1111A	C3-5	E	1					34.194	0.167	10	0.01674
ULI1112A	C3-5	E	1					34.372	0.168	10	0.01682
ULI1113A	C3-5	E	1					34.381	0.169	10	0.01690
ULI1114A	C3-5	E	1					34.210	0.169	10	0.01686
ULI1115A	C3-5	E	1					34.051	0.169	10	0.01695

<b>Average</b>	<b>42.373</b>	<b>3.934</b>	<b>32.723</b>	<b>34.241</b>	<b>Average</b>	<b>0.0168</b>
<b>Standard Dev.</b>	<b>1.414</b>	<b>0.078</b>	<b>0.614</b>	<b>0.138</b>		
<b>Coeff. of Var. [%]</b>	<b>3.336</b>	<b>1.990</b>	<b>1.877</b>	<b>0.403</b>		
<b>Min.</b>	<b>40.908</b>	<b>3.861</b>	<b>32.141</b>	<b>34.051</b>	<b>Min.</b>	<b>0.0165</b>
<b>Max.</b>	<b>43.729</b>	<b>4.063</b>	<b>33.427</b>	<b>34.381</b>	<b>Max.</b>	<b>0.0169</b>
<b>Number of Spec.</b>	<b>3</b>	<b>3</b>	<b>5</b>	<b>5</b>		

**10/80/10 Laminate Tension -- (CTD)  
 Strength**  
 Bell - FiberCote E765/T300 6K 5HS Graphite Fabric [45/-45/0/45/-45]<sub>s</sub>

Specimen Number	Panel #	Cure Cycle	Prepreg Lot #	Open Hole Strength [ksi]	Filled Hole Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t <sub>ply</sub> [in]
ULH1211B	C3-3	B	1	34.624		0.165	10	0.01649
ULH1212B	C3-3	B	1	34.224		0.165	10	0.01652
ULH1213B	C3-3	B	1	32.692		0.166	10	0.01657
ULH1214B	C3-3	B	1	33.187		0.168	10	0.01681
ULH1215B	C3-3	B	1	33.602		0.169	10	0.01693
ULH1216B	C3-3	B	1	32.882		0.169	10	0.01688
ULI1117B	C3-5	E	1		35.051	0.169	10	0.01685
ULI1118B	C3-5	E	1		34.959	0.168	10	0.01683
ULI1119B	C3-5	E	1		36.245	0.165	10	0.01647
ULI1227B	C3-6	E	1		36.700	0.170	10	0.01699
ULI1228B	C3-6	E	1		37.137	0.166	10	0.01661

<b>Average</b>	<b>33.535</b>	<b>36.018</b>	<b>Average</b>	<b>0.0167</b>
<b>Standard Dev.</b>	<b>0.765</b>	<b>0.978</b>		
<b>Coeff. of Var. [%]</b>	<b>2.281</b>	<b>2.715</b>		
<b>Min.</b>	<b>32.692</b>	<b>34.959</b>	<b>Min.</b>	<b>0.0165</b>
<b>Max.</b>	<b>34.624</b>	<b>37.137</b>	<b>Max.</b>	<b>0.0170</b>
<b>Number of Spec.</b>	<b>6</b>	<b>5</b>		

**10/80/10 Laminate Tension -- (ETW)**  
**Strength & Modulus**  
 Bell - FiberCote E765/T300 6K 5HS Graphite Fabric [45/-45/0/45/-45]<sub>s</sub>

Specimen Number	Panel #	Cure Cycle	Prepreg Lot #	Open Hole Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t <sub>ply</sub> [in]
ULH1111F	C3-7	H	1	24.421	0.162	10	0.01616
ULH1112F	C3-7	H	1	24.273	0.164	10	0.01637
ULH1113F	C3-7	H	1	24.211	0.165	10	0.01649
ULH1114F	C3-7	H	1	23.221	0.165	10	0.01654
ULH1115F	C3-7	H	1	22.816	0.166	10	0.01659

<b>Average</b>	<b>23.789</b>	<b>Average</b>	<b>0.0164</b>
<b>Standard Dev.</b>	<b>0.721</b>		
<b>Coeff. of Var. [%]</b>	<b>3.032</b>		
<b>Min.</b>	<b>22.816</b>	<b>Min.</b>	<b>0.0162</b>
<b>Max.</b>	<b>24.421</b>	<b>Max.</b>	<b>0.0166</b>
<b>Number of Spec.</b>	<b>5</b>		

**10/80/10 Laminate Compression -- (RTD)  
 Strength & Modulus**  
 Bell - FiberCote E765/T300 6K 5HS Graphite Fabric [45/-45/0/45/-45]<sub>s</sub>

Specimen Number	Panel #	Cure Cycle	Prepreg Lot #	No Hole Strength [ksi]	No Hole Modulus [Msi] Front	Back	Open Hole Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t <sub>ply</sub> [in]
ULK1116A	C3-1	B	1	46.601	3.671	3.837		0.170	10	0.01699
ULK1117A	C3-1	B	1	46.858	3.652	3.927		0.168	10	0.01683
ULK1118A	C3-1	B	1	44.193	3.724	3.879		0.168	10	0.01683
ULL1321A	C3-4	E	1				34.706	0.167	10	0.01666
ULL1322A	C3-4	E	1				33.045	0.167	10	0.01670
ULL1323A	C3-4	E	1				32.914	0.166	10	0.01661
ULL1324A	C3-4	E	1				32.571	0.166	10	0.01664
ULL1325A	C3-4	E	1				32.619	0.168	10	0.01681

<b>Average</b>	<b>45.884</b>	<b>3.782</b>	<b>33.171</b>	<b>Average</b>	<b>0.0168</b>
<b>Standard Dev.</b>	<b>1.470</b>	<b>0.115</b>	<b>0.880</b>		
<b>Coeff. of Var. [%]</b>	<b>3.203</b>	<b>3.034</b>	<b>2.654</b>		
<b>Min.</b>	<b>44.193</b>	<b>3.652</b>	<b>32.571</b>	<b>Min.</b>	<b>0.0166</b>
<b>Max.</b>	<b>46.858</b>	<b>3.927</b>	<b>34.706</b>	<b>Max.</b>	<b>0.0170</b>
<b>Number of Spec.</b>	<b>3</b>	<b>3</b>	<b>5</b>		

**10/80/10 Laminate Compression -- (ETW)  
 Strength & Modulus**  
 Bell - FiberCote E765/T300 6K 5HS Graphite Fabric [45/-45/0/45/-45]<sub>s</sub>

Specimen Number	Panel #	Cure Cycle	Prepreg Lot #	Open Hole Strength [ksi]	Filled Hole Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t <sub>ply</sub> [in]
ULL1327F	C3-4	E	1	19.972		0.165	10	0.01652
ULL1328F	C3-4	E	1	19.460		0.166	10	0.01662
ULL1329F	C3-4	E	1	20.311		0.164	10	0.01643
ULL1217F	C3-4	E	1	19.099		0.171	10	0.01708
ULL1218F	C3-4	E	1	19.772		0.169	10	0.01695
ULM1221F	C3-6	E	1		23.007	0.165	10	0.01651
ULM1222F	C3-6	E	1		24.198	0.167	10	0.01668
ULM1223F	C3-6	E	1		22.668	0.169	10	0.01688
ULM1224F	C3-6	E	1		21.745	0.169	10	0.01694
ULM1225F	C3-6	E	1		20.778	0.171	10	0.01707

<b>Average</b>	<b>19.723</b>	<b>22.479</b>	<b>Average</b>	<b>0.0168</b>
<b>Standard Dev.</b>	<b>0.466</b>	<b>1.295</b>		
<b>Coeff. of Var. [%]</b>	<b>2.362</b>	<b>5.759</b>		
<b>Min.</b>	<b>19.099</b>	<b>20.778</b>	<b>Min.</b>	<b>0.0164</b>
<b>Max.</b>	<b>20.311</b>	<b>24.198</b>	<b>Max.</b>	<b>0.0171</b>
<b>Number of Spec.</b>	<b>5</b>	<b>5</b>		

**10/80/10 Bearing-Bypass 50%-Tension -- (RTD)**  
**Bearing Strength & Bypass Strain**  
 Bell - FiberCote E765/T300 6K 5HS Graphite Fabric [45/-45/0/45/-45]<sub>s</sub>

Specimen Number	Panel #	Cure Cycle	Prepreg Lot #	Ultimate Bearing Strength [ksi]	2% Offset Bearing Strength [ksi]	Chord Modulus [Msi]	Ultimate Bypass Strain (microstrain)	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t <sub>ply</sub> [in]
UL31111A & UL31112A	C3-10	I	1	79.213	63.973	1.432	2251	0.169	10	0.01685
UL31113A & UL31114A	C3-10	I	1	73.340	61.116	1.363	2211	0.168	10	0.01682
UL31115A & UL31116A	C3-10	I	1	77.005	66.749	1.465		0.168	10	0.01680
UL31211A & UL31212A	C3-11	I	1	79.547	67.746	1.617		0.166	10	0.01659
UL31213A & UL31214A	C3-11	I	1	78.056	65.751	1.422		0.167	10	0.01667

<b>Average</b>	<b>77.432</b>	<b>65.067</b>	<b>1.460</b>	<b>2231</b>	<b>Average</b>	<b>0.0167</b>
Standard Dev.	2.498	2.611	0.095	28.642		
Coeff. of Var. [%]	3.226	4.013	6.530	1.284		
Min.	73.340	61.116	1.363	2210.576	Min.	0.0166
Max.	79.547	67.746	1.617	2251.081	Max.	0.0169
Number of Spec.	5	5	5	2		

**10/80/10 Bearing-Bypass 50%-Compression -- (RTD)**  
**Bearing Strength & Bypass Strain**  
 Bell - FiberCote E765/T300 6K 5HS Graphite Fabric [45/-45/0/45/-45]<sub>s</sub>

Specimen Number	Panel #	Cure Cycle	Prepreg Lot #	Ultimate Bearing Strength [ksi]	2% Offset Bearing Strength [ksi]	Chord Modulus [Msi]	Ultimate Bypass Strain (microstrain)	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t <sub>ply</sub> [in]
UL41311A & UL41312A	C3-12	I	1	81.742	68.638	1.680	2910	0.167	10	0.01671
UL41313A & UL41314A	C3-12	I	1	87.547	71.115	2.671	2972	0.168	10	0.01679
UL41315A & UL41316A	C3-12	I	1	86.509	72.085	1.895		0.167	10	0.01668
UL41317A & UL41318A	C3-12	I	1	88.064	69.200	1.825		0.168	10	0.01679
UL31117A & UL31118A	C3-10	I	1	85.345	70.323	1.841		0.168	10	0.01679

<b>Average</b>	<b>85.842</b>	<b>70.272</b>	<b>1.982</b>	<b>2941</b>	<b>Average</b>	<b>0.0168</b>
Standard Dev.	2.517	1.398	0.393	44.022		
Coeff. of Var. [%]	2.933	1.990	19.821	1.497		
Min.	81.742	68.638	1.680	2909.527	Min.	0.0167
Max.	88.064	72.085	2.671	2971.784	Max.	0.0168
Number of Spec.	5	5	5	2		

**10/80/10 Bearing-Bypass 25%-Tension -- (RTD)**  
**Bearing Strength & Bypass Strain**  
 Bell - FiberCote E765/T300 6K 5HS Graphite Fabric [45/-45/0/45/-45]<sub>s</sub>

Specimen Number	Panel #	Cure Cycle	Prepreg Lot #	Ultimate Bearing Strength [ksi]	2% Offset Bearing Strength [ksi]	Chord Modulus [Msi]	Ultimate Bypass Strain (microstrain)	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. $t_{ply}$ [in]
UL51111A	C3-8	I	1	21.706	N/A			0.170	10	0.01702
UL51112A	C3-8	I	1	20.232	N/A			0.170	10	0.01697
UL51113A	C3-8	I	1	21.084	N/A		980	0.170	10	0.01699
UL51114A	C3-8	I	1	21.375	N/A		1004	0.171	10	0.01705
UL51115A	C3-8	I	1	21.760	N/A			0.171	10	0.01708

<b>Average</b>	<b>21.231</b>	<b>992</b>	<b>Average</b>	<b>0.0170</b>
<b>Standard Dev.</b>	<b>0.622</b>	<b>17.147</b>		
<b>Coeff. of Var. [%]</b>	<b>2.928</b>	<b>1.729</b>		
<b>Min.</b>	<b>20.232</b>	<b>979.660</b>	<b>Min.</b>	<b>0.0170</b>
<b>Max.</b>	<b>21.760</b>	<b>1003.910</b>	<b>Max.</b>	<b>0.0171</b>
<b>Number of Spec.</b>	<b>5</b>	<b>2</b>		

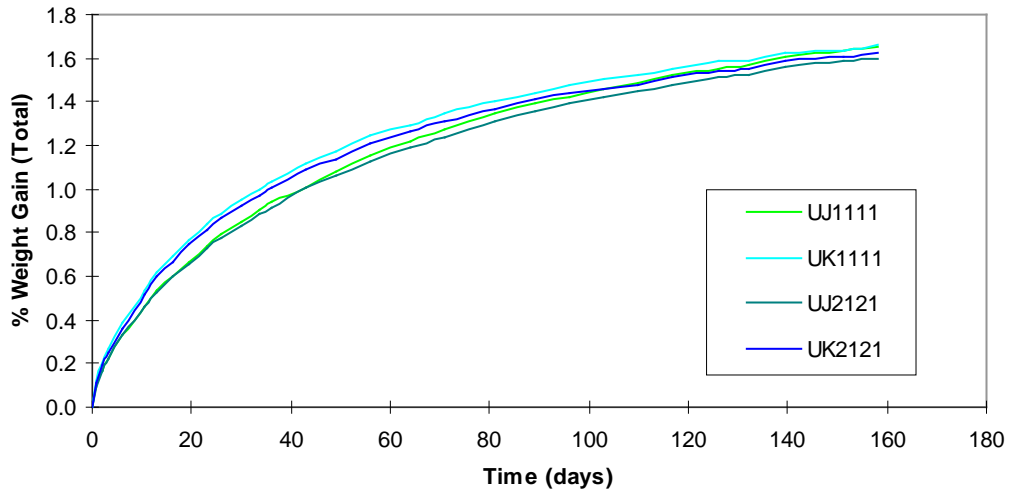
**10/80/10 Bearing-Bypass 25%-Compression -- (RTD)**  
**Bearing Strength & Bypass Strain**  
 Bell - FiberCote E765/T300 6K 5HS Graphite Fabric [45/-45/0/45/-45]<sub>s</sub>

Specimen Number	Panel #	Cure Cycle	Prepreg Lot #	Ultimate Bearing Strength [ksi]	2% Offset Bearing Strength [ksi]	Chord Modulus [Msi]	Ultimate Bypass Strain (microstrain)	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. $t_{ply}$ [in]
UL61211A	C3-9	I	1	134.793	N/A	6.392	4586	0.165	10	0.01653
UL61212A	C3-9	I	1	131.120	N/A	6.264	4837	0.167	10	0.01674
UL61213A	C3-9	I	1	133.488	N/A	6.087		0.167	10	0.01673
UL61214A	C3-9	I	1	128.630	N/A	6.049		0.169	10	0.01685
UL61215A	C3-9	I	1	127.712	N/A	6.043		0.167	10	0.01672

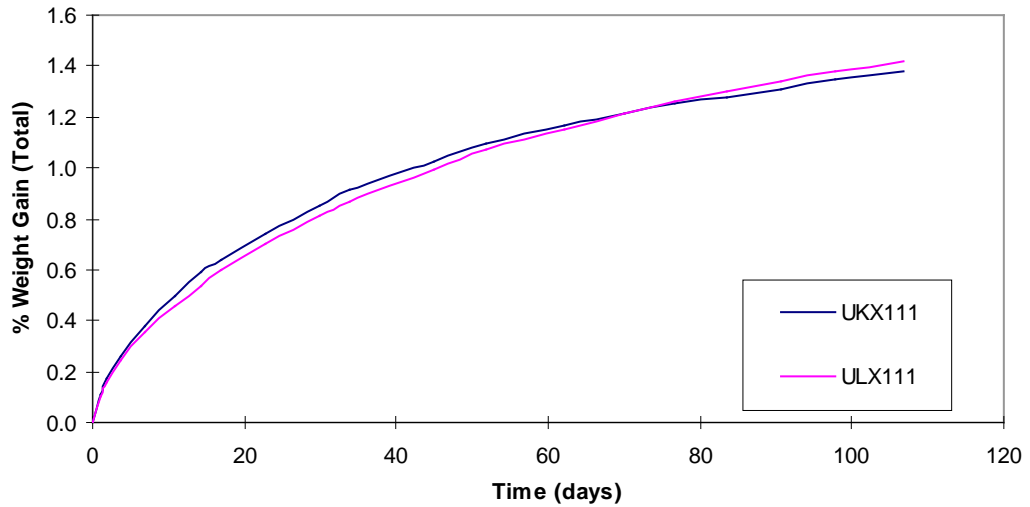
<b>Average</b>	<b>131.149</b>	<b>6.167</b>	<b>4711</b>	<b>Average</b>	<b>0.0167</b>
<b>Standard Dev.</b>	<b>3.038</b>	<b>0.155</b>	<b>177.994</b>		
<b>Coeff. of Var. [%]</b>	<b>2.316</b>	<b>2.508</b>	<b>3.778</b>		
<b>Min.</b>	<b>127.712</b>	<b>6.043</b>	<b>4585.582</b>	<b>Min.</b>	<b>0.0165</b>
<b>Max.</b>	<b>134.793</b>	<b>6.392</b>	<b>4837.303</b>	<b>Max.</b>	<b>0.0169</b>
<b>Number of Spec.</b>	<b>5</b>	<b>5</b>	<b>2</b>		

### **3.4. Moisture Conditioning History Charts**

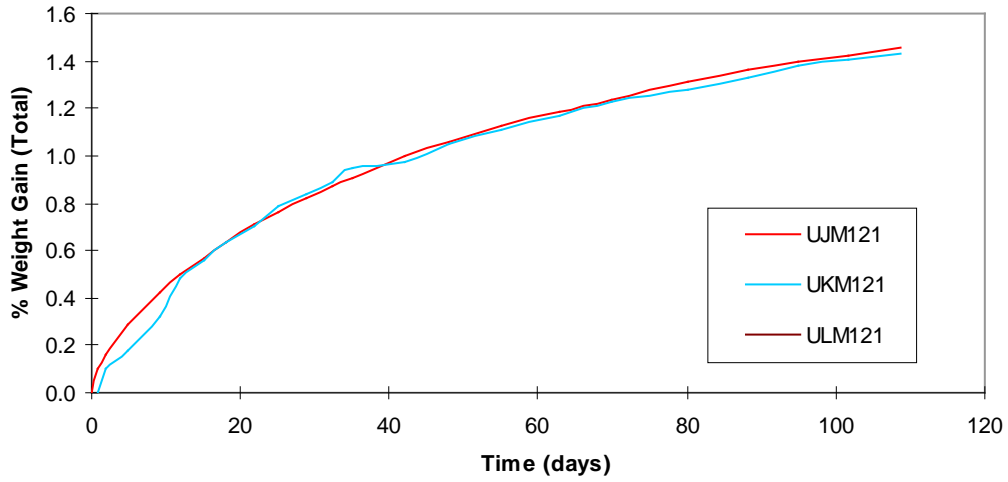
### Conditioning History - BELL HELICOPTER



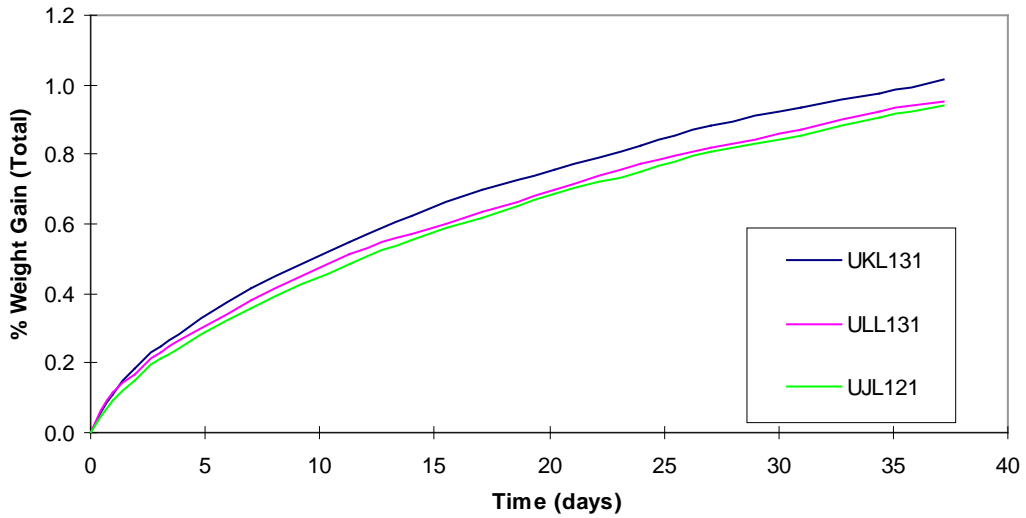
### Conditioning History - BELL HELICOPTER



### Conditioning History - BELL HELICOPTER



### Conditioning History - BELL HELICOPTER



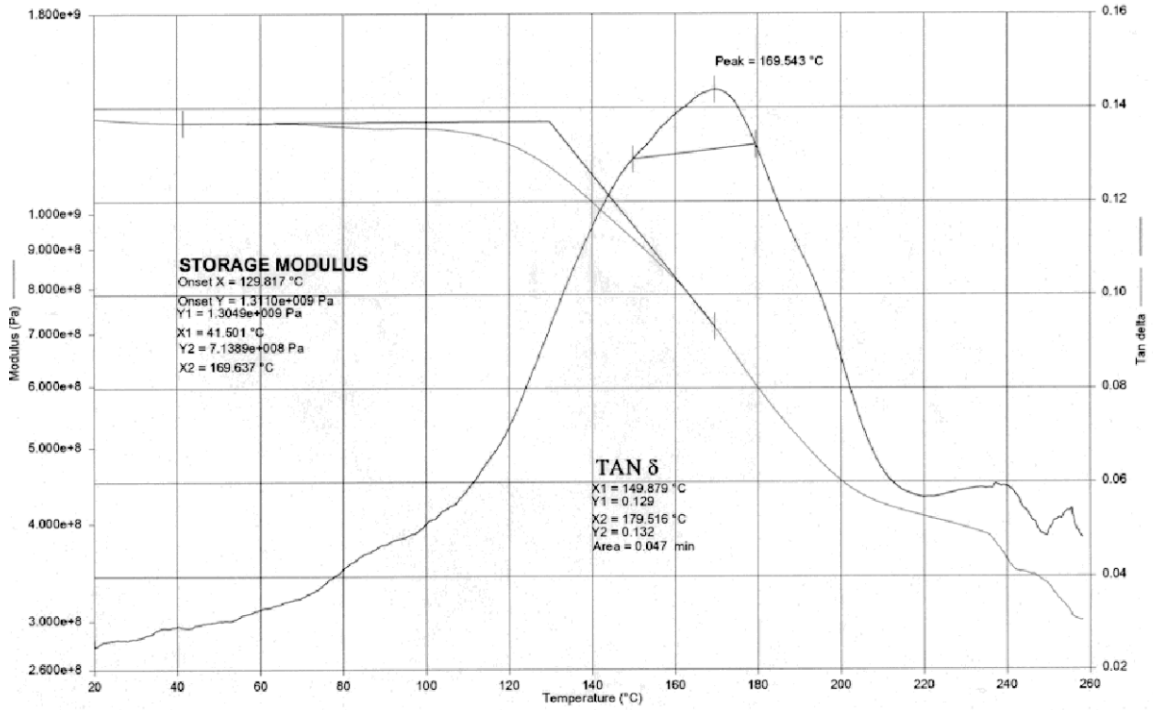
### **3.5. Physical Test Results**

### 3.5.1. DMA Results and Graphs

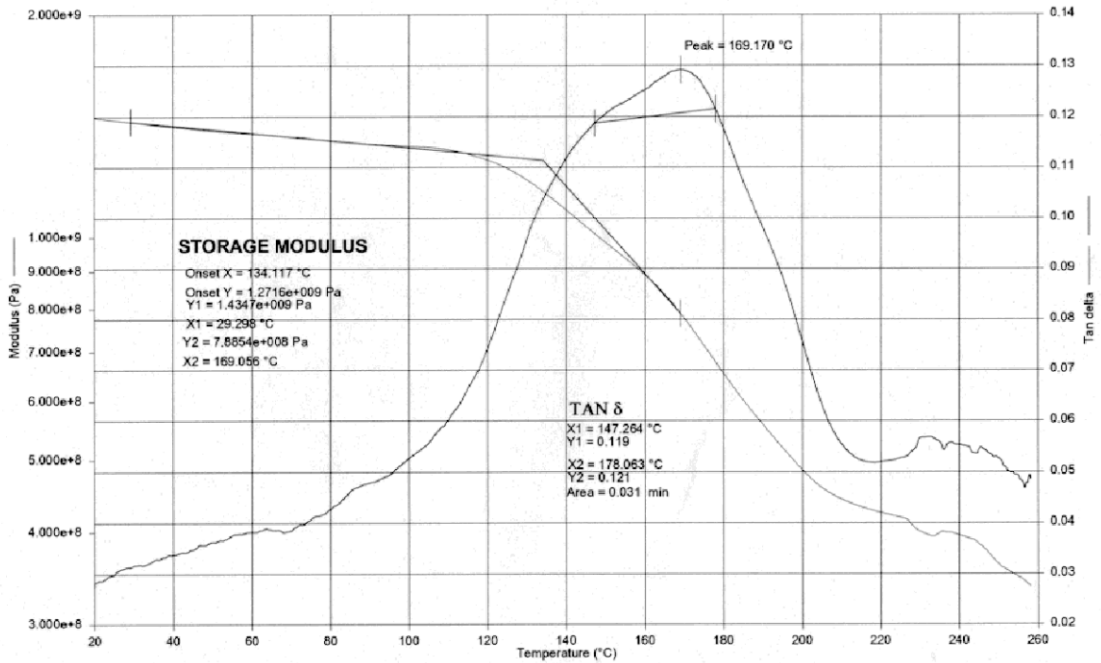
COMPANY : **Bell Helicopter**  
 MATERIAL SYSTEM : **FiberCoteE765/6K 5HS Graphite Cloth**  
 PROJECT : **000714c1**

<b>DMA Results -- Onset Storage Modulus</b>					
DRY			WET		
As Fabricated			Moisture Equilibrium at 85% RH		
Sample #	Tg [°C]	Tg [°F]	Sample #	Tg [°C]	Tg [°F]
UKD1111A	129.82	265.67	UKD1111F	104.44	219.98
UKD1112A	134.12	273.41	UKD1112F	107.49	225.48
UKD1114A	134.72	274.50	UKD1113F	97.90	208.23
			UKD1114F	103.72	218.69
		<b>Average [°F]</b>			<b>271.19</b>
		<b>Standard Dev. [°F]</b>			<b>4.82</b>
		<b>Coeff. Of Var. [%]</b>			<b>1.78</b>
					<b>Average [°F]</b>
					<b>218.10</b>
					<b>Standard Dev. [°F]</b>
					<b>7.21</b>
					<b>Coeff. Of Var. [%]</b>
					<b>3.31</b>

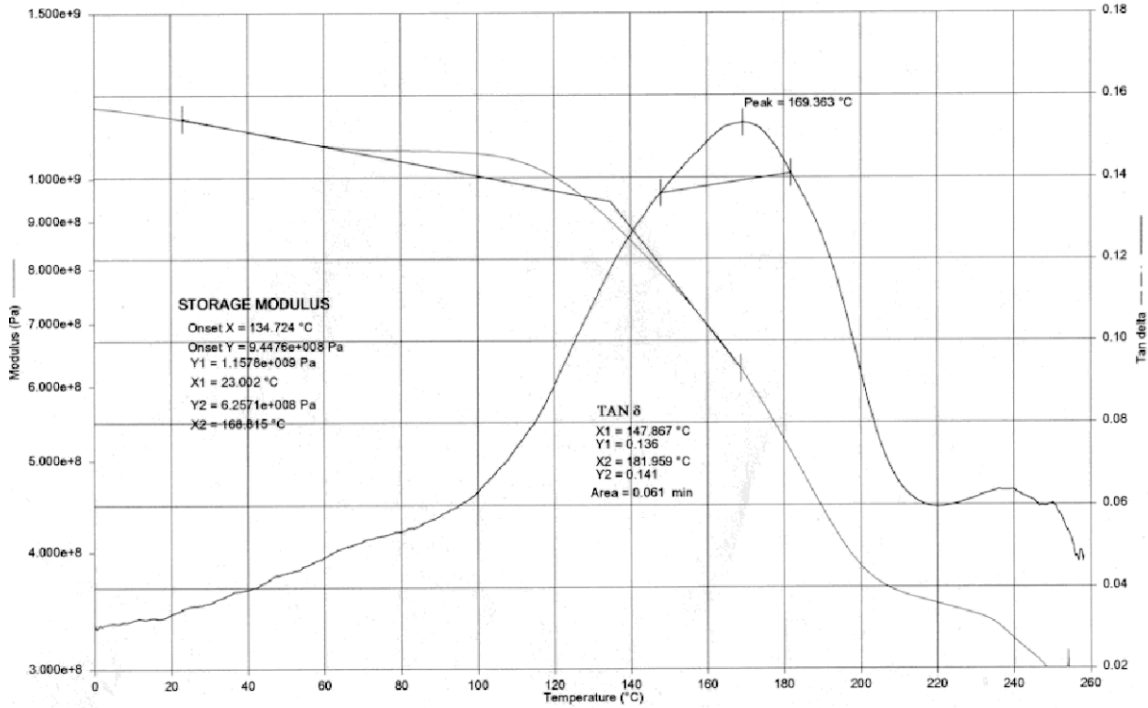
<b>DMA Results - Peak Tan Delta</b>					
DRY			WET		
As Fabricated			Moisture Equilibrium at 85% RH		
Sample #	Tg [°C]	Tg [°F]	Sample #	Tg [°C]	Tg [°F]
UKD1111A	169.54	337.18	UKD1111F	129.98	265.97
UKD1112A	169.17	336.51	UKD1112F	129.12	264.41
UKD1114A	169.36	336.85	UKD1113F	127.75	261.95
			UKD1114F	129.73	265.51
		<b>Average [°F]</b>			<b>336.85</b>
		<b>Standard Dev. [°F]</b>			<b>0.34</b>
		<b>Coeff. Of Var. [%]</b>			<b>0.10</b>
					<b>Average [°F]</b>
					<b>264.46</b>
					<b>Standard Dev. [°F]</b>
					<b>1.80</b>
					<b>Coeff. Of Var. [%]</b>
					<b>0.68</b>



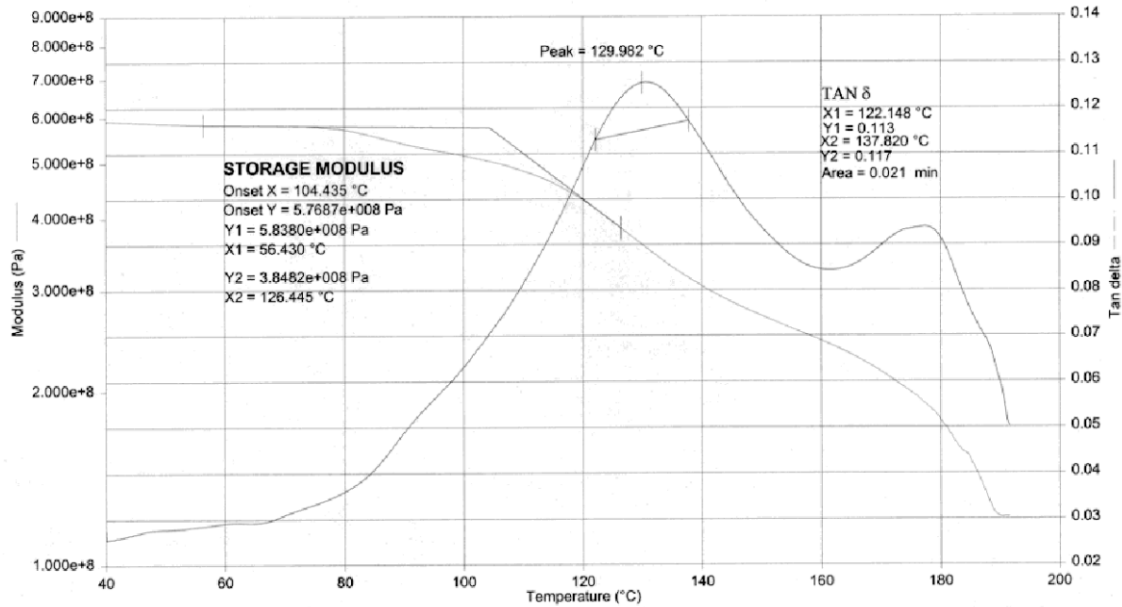
UKD 1111A



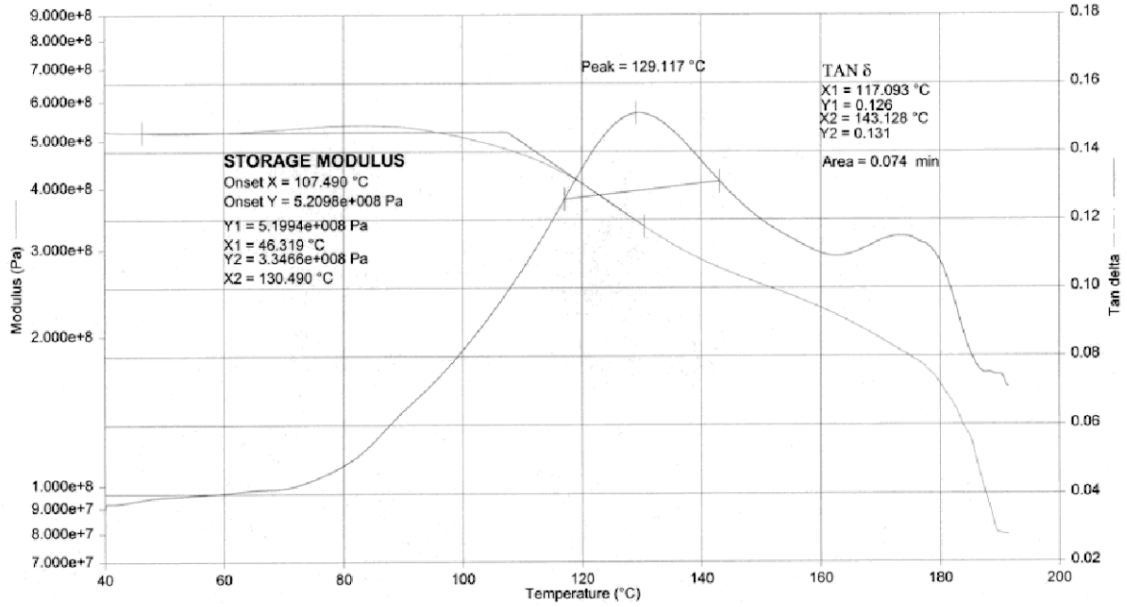
UKD 1112A



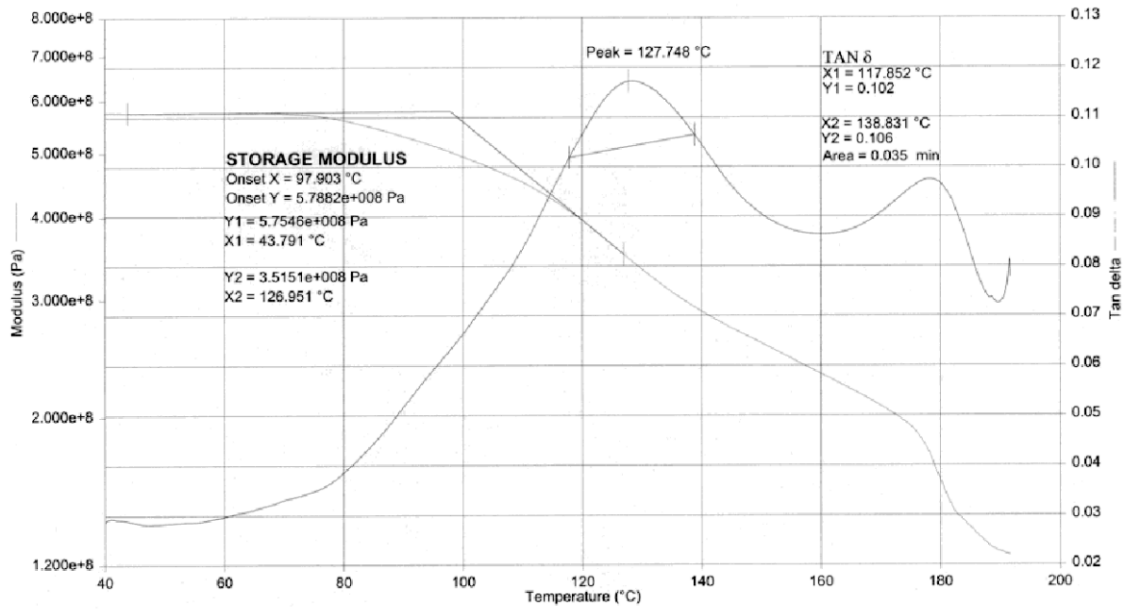
UKD 1114A



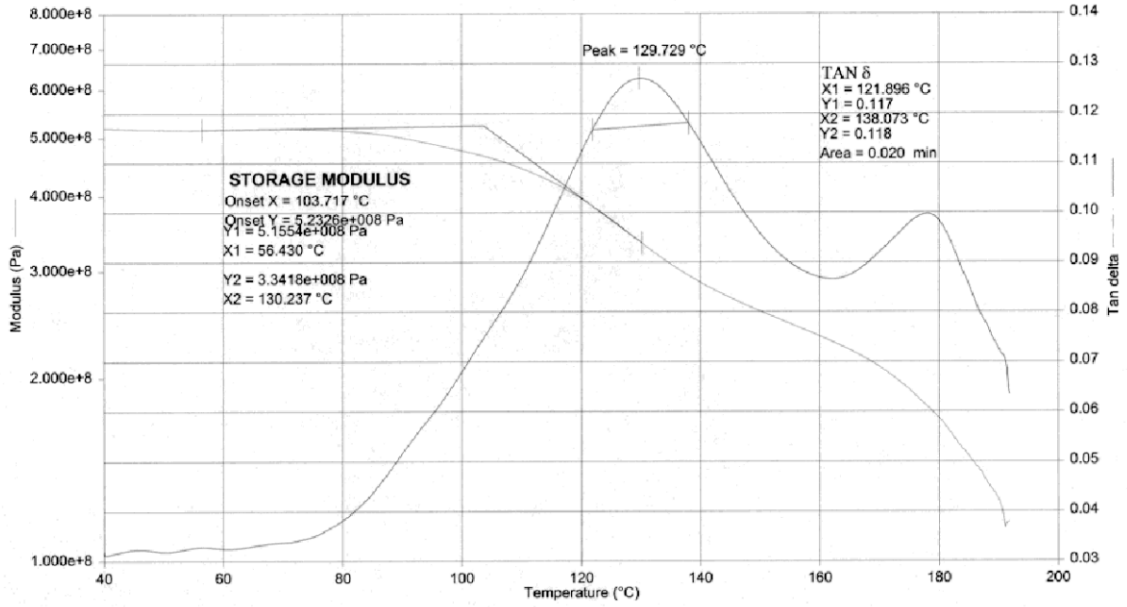
UKD 1111F



UKD 1112F



UKD 1113F



UKD 1114F

### 3.5.2. Physical Test Results

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

	Composite Density [g/cc]	Resin Content [wt%]	Fiber Volume [vol%]	Void Content [vol%]
<b>40/20/40 Laminate Tension</b>				
No. of Specimens	13	13	13	13
Mean	1.498	40.348	51.069	-0.214
Standard Deviation	0.006	0.728	0.706	0.398
<b>40/20/40 Laminate Compression</b>				
No. of Specimens				
Mean	Same as tension			
Standard Deviation	Same as tension			
<b>25/50/25 Laminate Tension</b>				
No. of Specimens	15	15	15	15
Mean	1.501	40.167	51.316	-0.329
Standard Deviation	0.005	1.168	1.050	0.459
<b>25/50/25 Laminate Compression</b>				
No. of Specimens				
Mean	Same as tension			
Standard Deviation	Same as tension			
<b>10/80/10 Laminate Tension</b>				
No. of Specimens	12	12	12	12
Mean	1.498	39.789	51.541	0.002
Standard Deviation	0.004	1.094	0.992	0.385
<b>10/80/10 Laminate Compression</b>				
No. of Specimens				
Mean	Same as tension			
Standard Deviation	Same as tension			
<b>Overall Summary</b>				
Overall No. of Specimens	40	40	40	40
Overall Mean	1.499	40.112	51.303	-0.192
Overall Std. Deviation	0.005	1.021	0.929	0.430

#### **4. 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).

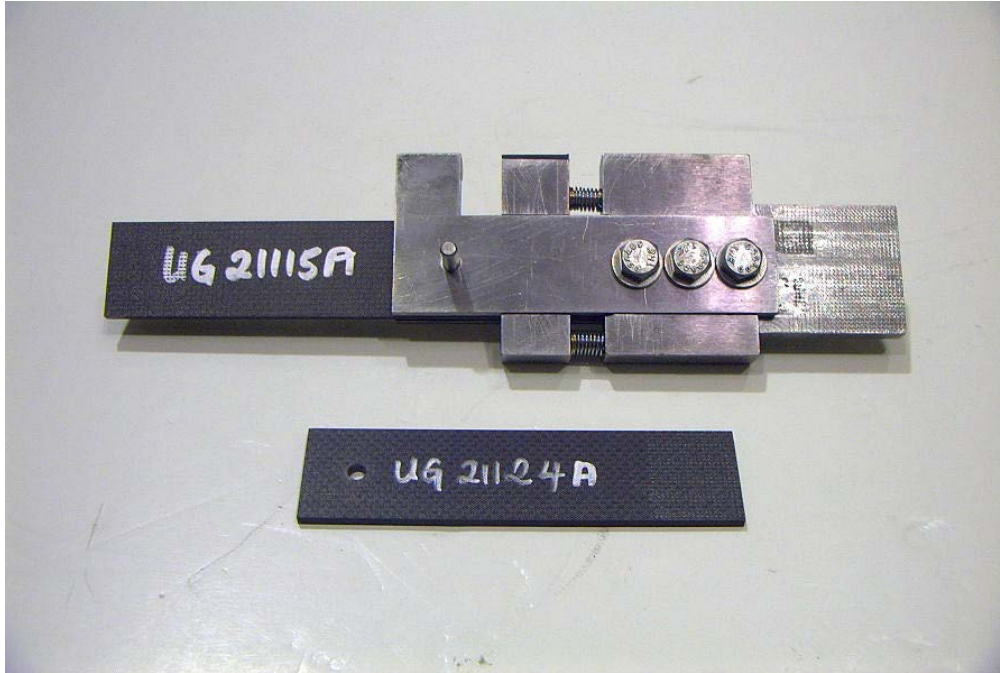
The identification will be made available to users of the material after the execution of a confidentiality agreement.

## 4.2. Pictures of Test Setup

50% bearing-bypass (single Shear)



Double Shear Bearing



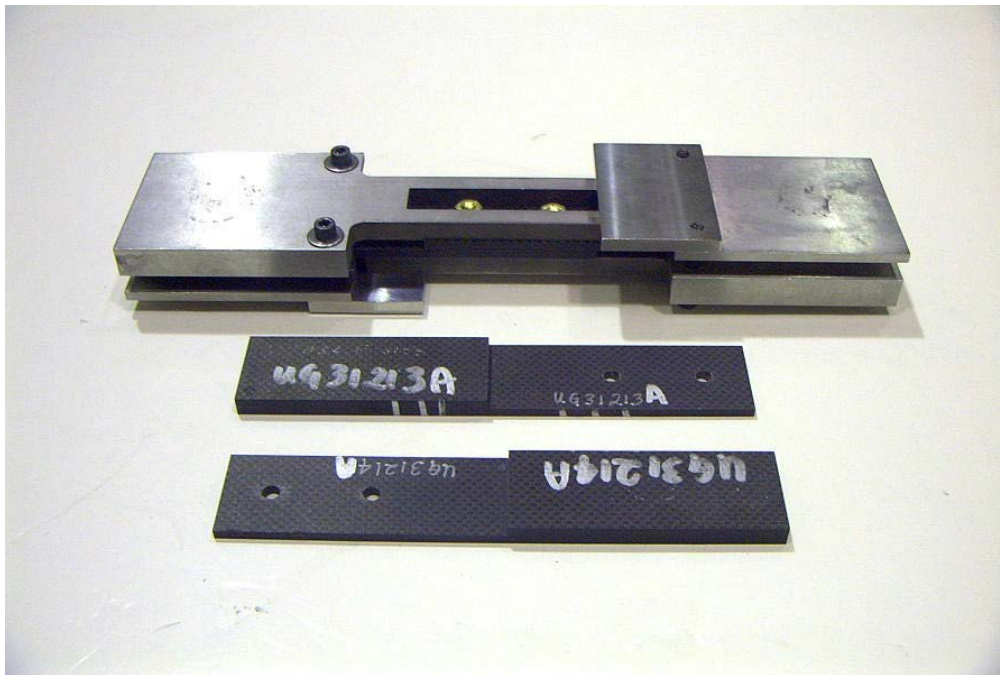
Single Shear Bearing



25% Bearing-Bypass (Double Shear with Side Plates)

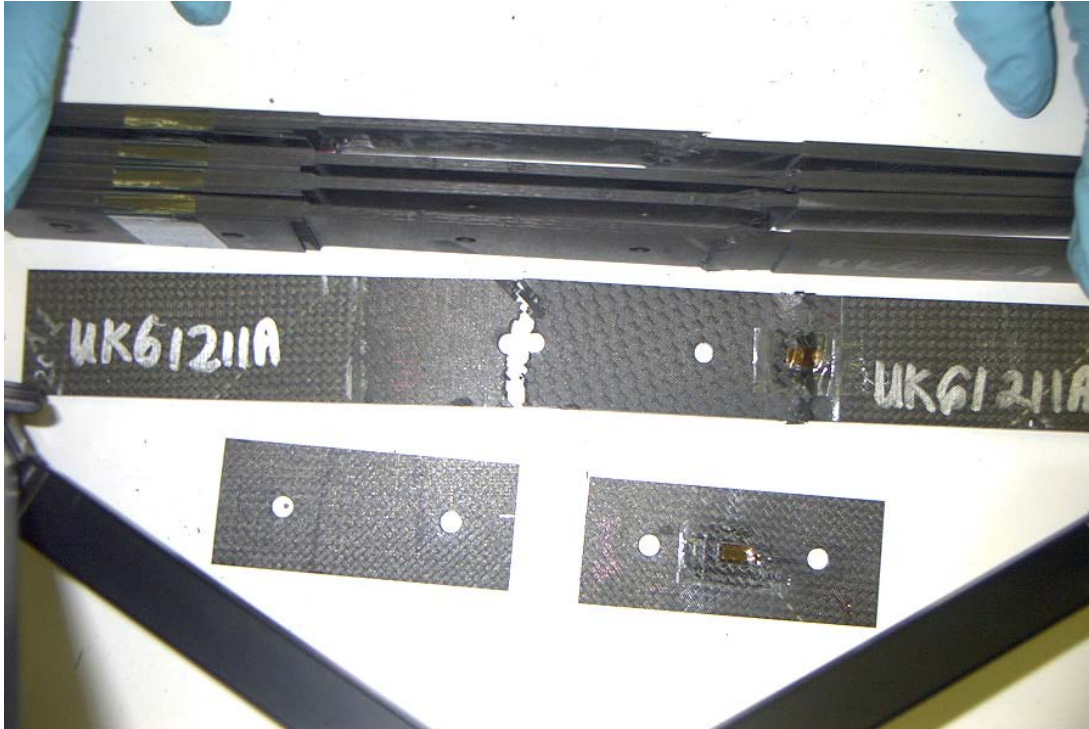


50% Bearing-Bypass (Single Shear with Two-Fasteners)



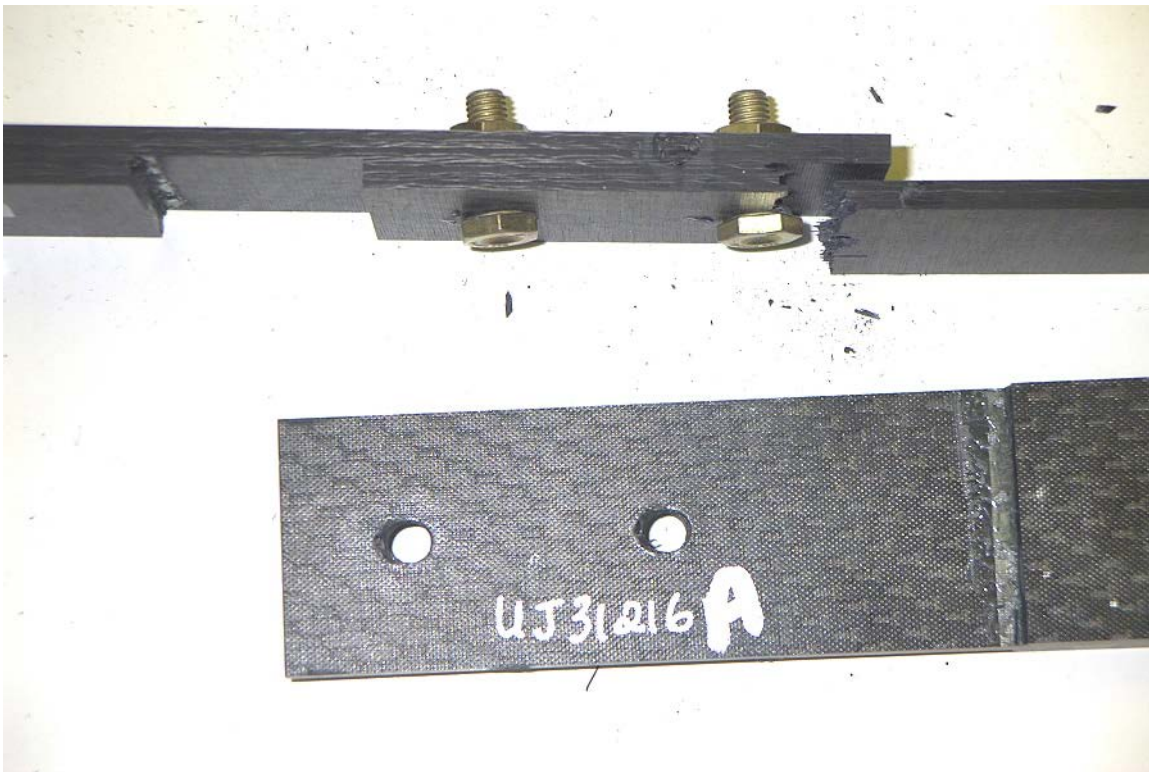
### 4.3. Pictures of Failure Modes

Please refer to the specimen names displayed in the figures for information regarding test method.









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

1. UNITED STATES		2. <b>FAA FORM 8130-3</b> <b>AIRWORTHINESS APPROVAL TAG</b> U.S. Department of Transportation <b>Federal Aviation Administration</b>		3. System Tracking Ref No. SP2626WI-Q-1722		
4. Organization Bell Helicopter Textron, Inc. P.O. Box 432 Ft. Worth, Texas 76101		5. Work Order, Contract, or Invoice Number: SP2626WI-Q-1722				
6. Item	7. Description	8. Part Number	9. Eligibility	10. Quantity	11. Serial/ Batch Number	12. Status/Work
1.	AGATE Test Panels	N/A	N/A	55	C3-1 thru C3-17 C3-1 thru C3-21 C3-1 thru C3-17	Test
10. Remarks These parts are made of Fiberglass (rd. 6K 5182 Graphite/E-705 with spec. M31000 rev 3 Type 2 Grade C <b>CONFORMITY</b> This is a Prototype Part Pending Approval. Design Data. Test reqs: M & P 00-038 FAA Project number SP2626WI-Q-1722 FAA Form 8130-10 No. SP2626WI-Q-1722 dated 5/12/2000.						
14. Limited life parts must be accompanied by maintenance history including total time/total cycle/time since new.						
15. <input checked="" type="checkbox"/> New <input type="checkbox"/> Newly Overhauled Certifies that the new or newly overhauled part(s) identified above, except as otherwise specified in block 13 was (were) manufactured in accordance with FAA approved design data and airworthiness. NOTE: In case of parts to be exported, the special requirements of the importing country have been met.						
16. 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.						
17. Signature Warren K. Pickering		18. FAA Authorization No. ODARF700696SW		20. Authorized Signature		21. Certificate Number
19. Date: February 6, 2001		22. Name (Typed or Printed)		23. Date:		
19. <b>Airworthiness Approval Tag</b> It is important to understand that the existence of this Document a one does not automatically constitute authority to install the part/component/assembly. Where the user/installer work in accordance with the national regulations of an Airworthiness Authority different than the Airworthiness Authority of the country specified in block 1 it is essential that the user/installer ensures that his/her Airworthiness Authority accepts parts/components/ assemblies from the Airworthiness Authority of the country specified in block 1. Statements in block 14 and 19 do not constitute installation certification. In all cases aircraft maintenance records must contain an installation certification issued in accordance with the national regulations by the user/installer before the aircraft may be flown.						
20. <b>User/Installer Responsibilities</b> The FAA Form 8130-3 and JAA Form One are equivalent. Other countries such as Canada also have equivalent acceptable documents. FAA Form 8130-3 (11-86)						

UNITED STATES OF AMERICA DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION STATEMENT OF CONFORMITY																																																									
Section I - Aircraft Test Panels																																																									
1. Make: Bell Helicopter Textron, Inc.	2. Model: N/A																																																								
3. Serial Number: N/A	4. Registration Number: N/A																																																								
Section II - Engine																																																									
1. Make:	2. Model:																																																								
3. Serial Number:																																																									
Section III - Propeller																																																									
1. Make:	2. Model:																																																								
3. Blade Model:	4. Hub Serial Number:																																																								
5. Blade Serial Numbers:																																																									
Section IV - Certification																																																									
I hereby certify that: (see below)																																																									
<input checked="" type="checkbox"/> A. I have complied with Section 21.33(a) <input type="checkbox"/> B. The aircraft described above, produced under type certificate only (FAR21 Subpart F), conforms to its type certificate is in a condition for safe operation, and was flight checked on _____. <input type="checkbox"/> C. The engine or propeller described above, presented herewith for type certification, conforms to the type design therefore. <input type="checkbox"/> D. The engine or propeller described above, produced under type certificate only (FAR21 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 check on _____.																																																									
The test panels listed below were manufactured in accordance with TR M&P 30-38, REV "A" (07-24-00).																																																									
<table style="width: 100%; border: none;"> <tr> <td>C1-1</td><td>C1-9</td><td>C1-17</td><td>C2-5</td><td>C2-18</td><td>C3-3</td><td>C3-11</td> </tr> <tr> <td>C1-2</td><td>C1-10</td><td>C2-1</td><td>C2-9</td><td>C2-17</td><td>C3-4</td><td>C3-12</td> </tr> <tr> <td>C1-3</td><td>C1-11</td><td>C2-2</td><td>C2-10</td><td>C2-19</td><td>C3-5</td><td>C3-13</td> </tr> <tr> <td>C1-4</td><td>C1-12</td><td>C2-3</td><td>C2-11</td><td>C2-19</td><td>C3-6</td><td>C3-14</td> </tr> <tr> <td>C1-5</td><td>C1-13</td><td>C2-4</td><td>C2-12</td><td>C2-20</td><td>C3-7</td><td>C3-15</td> </tr> <tr> <td>C1-6</td><td>C1-14</td><td>C2-5</td><td>C2-13</td><td>C2-21</td><td>C3-8</td><td>C3-16</td> </tr> <tr> <td>C1-7</td><td>C1-15</td><td>C2-6</td><td>C2-14</td><td>C3-1</td><td>C3-9</td><td>C3-17</td> </tr> <tr> <td>C1-8</td><td>C1-16</td><td>C2-7</td><td>C2-15</td><td>C3-2</td><td>C3-10</td><td></td> </tr> </table>		C1-1	C1-9	C1-17	C2-5	C2-18	C3-3	C3-11	C1-2	C1-10	C2-1	C2-9	C2-17	C3-4	C3-12	C1-3	C1-11	C2-2	C2-10	C2-19	C3-5	C3-13	C1-4	C1-12	C2-3	C2-11	C2-19	C3-6	C3-14	C1-5	C1-13	C2-4	C2-12	C2-20	C3-7	C3-15	C1-6	C1-14	C2-5	C2-13	C2-21	C3-8	C3-16	C1-7	C1-15	C2-6	C2-14	C3-1	C3-9	C3-17	C1-8	C1-16	C2-7	C2-15	C3-2	C3-10	
C1-1	C1-9	C1-17	C2-5	C2-18	C3-3	C3-11																																																			
C1-2	C1-10	C2-1	C2-9	C2-17	C3-4	C3-12																																																			
C1-3	C1-11	C2-2	C2-10	C2-19	C3-5	C3-13																																																			
C1-4	C1-12	C2-3	C2-11	C2-19	C3-6	C3-14																																																			
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C1-8	C1-16	C2-7	C2-15	C3-2	C3-10																																																				
Deviations:  NCNE																																																									
Signature of Certifier Robert Mark Chris <i>Robert Mark Chris</i>	Title Principle Engineer, Composite Materials and Processes																																																								
Organization Bell Helicopter Textron, Inc.	Date February 6, 2001																																																								



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T300/E-765 370 g/m<sup>2</sup> 5HS Fabric Panel Fabrication Record  
 (Panel C3-7 through C3-17 were added on 7/24/00)

Panel ID.	Ply Kit Date	Layup Date	Cure Date/Time	Cure Cycle No.	Comments
C3-7	11-27-00	12-20-00	12-29-00	5:00:22	
C3-8		12-20-00	12-27-00	7:28:10	
C3-9		12-21-00	12-27-00	7:28:10	
C3-10		12-20-00	12-27-00	7:28:10	
C3-11		12-20-00	12-27-00	7:28:10	
C3-12		12-20-00	12-27-00	7:28:10	
C3-13		12-20-00	12-27-00	7:28:10	
C3-14		12-28-00	12-28-00	9:49:30	
C3-15		12-28-00	12-28-00	9:49:30	
C3-16		12-28-00	12-28-00	9:49:30	
C3-17		12-28-00	12-28-00	9:49:30	

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T300/E-765 370 g/m<sup>2</sup> 5HS Fabric Panel Fabrication Record

Panel ID.	Ply Kit Date	Layup Date	Cure Date/Time	Cure Cycle No.	Comments
C1-1	11-27-00	12-14-00	12-20-00	7:44:52	
C1-2		12-14-00	12-20-00	7:44:52	
C1-3		12-14-00	12-20-00	7:44:52	
C1-4		12-14-00	12-21-00	12:32:15	
C1-5		12-14-00	12-21-00	12:32:15	
C1-6		12-14-00	12-21-00	12:32:15	
C2-1		12-16-00	12-20-00	10:57:49	
C2-2		12-16-00	12-20-00	10:57:49	
C2-3		12-16-00	12-20-00	10:57:49	
C2-4		12-16-00	12-20-00	10:57:49	
C2-5		12-16-00	12-20-00	10:57:49	
C2-6		12-16-00	12-20-00	10:57:49	
C2-7		12-16-00	12-20-00	5:49:08	
C3-1		12-15-00	12-21-00	12:32:15	
C3-2		12-15-00	12-21-00	12:32:15	
C3-3		12-15-00	12-21-00	12:32:15	
C3-4		12-15-00	12-21-00	0:05:20	
C3-5		12-15-00	12-21-00	0:05:20	
C3-6		12-15-00	12-21-00	0:05:20	

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T300/E-765 370 g/m<sup>2</sup> SHS Fabric Panel Fabrication Record  
 (Panels C2-7 through C2-21 were added on 7/24/00)

Panel I.D.	Ply Kit Date	Layup Date	Cure Date/Time	Cure Cycle No.	Comments
C2-7	11-27-00	Duplicate			
C2-8		12-17-00	12-21-00	6:05:20	
C2-9		12-17-00	12-21-00	6:05:20	
C2-10		12-17-00	12-21-00	6:05:20	
C2-11		12-20-00	12-20-00	7:44:52	
C2-12		12-20-00	12-20-00	7:44:52	
C2-13		12-20-00	12-20-00	7:44:52	
C2-14		12-20-00	12-28-00	5:00:22	
C2-15		12-20-00	12-28-00	5:00:22	
C2-16		12-20-00	12-28-00	5:00:22	
C2-17		12-20-00	12-28-00	5:00:22	
C2-18		12-20-00	12-28-00	5:00:22	
C2-19		12-20-00	12-28-00	9:49:30	
C2-20		12-20-00	12-28-00	9:49:30	
C2-21		12-20-00	12-28-00	9:49:30	

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**T300/E-765 370 g/m<sup>2</sup> 5HS Fabric Panel Fabrication Record**  
 (Panel C1-7 through C1-17 were added on 7/24/00)

Panel I.D.	Ply Kit Date	Layup Date	Cure Date/Time	Cure Cycle No.	Comments
C1-7	11-27-00	12-16-00	12-20-00	5:48:08	
C1-8		12-16-00	12-20-00	5:48:08	
C1-9		12-16-00	12-20-00	5:48:08	
C1-10		12-16-00	12-20-00	5:48:08	
C1-11		12-17-00	12-20-00	5:48:08	
C1-12		12-17-00	12-19-00	5:09:00	
C1-13		12-17-00	12-19-00	5:09:00	
C1-14		12-17-00	12-19-00	5:09:00	
C1-15		12-17-00	12-19-00	5:09:00	
C1-16		12-17-00	12-19-00	5:09:00	
C1-17		12-17-00	12-19-00	5:09:00	

