TORAY COMPOSITES (AMERICA), INC.

REPORT NO.: TCQAL-T-1026 **DATE : December 4, 2002**

AGATE LAMINATE
MATERIAL QUALIFICATION
OF
T700G/#2510, 150 g/m^2, Unidirectional Tape

T700s/#2510, 190 g/m2, Plain Weave Fabric

Style 7781 Finish 558/#2510, 295 g/m2, Glass Fiber Fabric

TEST REPORT

Revision Letter: **Revision Date:**

Prepared By: _____ **Date:** _____

Reviewed By: _____ **Date:** _____

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REVISION RECORD

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1.0 INTRODUCTION

This material characterization program was performed to characterize the laminate properties of the following Toray Composites (America), Inc. (TCA) prepreg materials:
1. T700GC-12K-31E/#2510, 150 g/m^2, unidirectional tape, herein designated P707AG-15
2. T700SC-12K-50C/#2510, 190 g/m^2, plain weave fabric, herein designated F6273C-07M
3. Style 7781 Finish 558/#2510, 250 g/m^2, 8H glass fiber fabric, herein designated FGF7781-07I

The P707AG-15, F6273C-07M and FGF7781-07I prepreg material system designation shall be used to refer the prepreg material forms in this report, respectively. The material qualification was conducted under FAA project number SP2626WI-Q.

This report contains the test results obtained from the tests conducted for the laminate material qualification of P707AG-15, F6273C-07M and FGF7781-07I in accordance with TCQAL-T-1016, dated 26 October 2000 and respective TCA Material Process Specifications, delineated in section 1.2.5.1. TCA Test laboratories performed the testing on the unexposed and exposed prepreg materials for laminate baseline test properties in accordance with ASTM test methods, SACMA test methods, and TCA test work instructions.

One batches each of the prepreg materials, namely; P707AG-15, F6273C-07M and FGF7781-07I were tested for baseline test properties. The Raw Test Data, Inspection Records, Fabrication Records, Processing Records and all other relevant documents of this report, TCQAL-T-1026, are archived at Toray Composites (America), Inc. The documents are available only upon request.

The physical tests were performed on the cured prepreg laminates. The cured neat resin density values were generated from the lamina qualification tests. The cured prepreg laminates were tested for fiber volume, resin volume, void content and Tg (glass transition temperature) by DMA (Dynamic Mechanical Analyzer).

Wichita State University/National Institute for Aviation Research (WSU/NIAR) performed all the cured laminate physical tests on the cured prepreg laminates.

TCA Test Laboratories performed the fabrication of all the test panels and test specimens, ultrasonic inspection and humidity conditioning. Also, the TCA Test Laboratories performed the attachment of strain gauges and mechanical testing.

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

1.1 SCOPE

The test methods and results described in this document are intended to provide substantiating data for composite airframe certification programs that utilize a building block test approach. This approach typically includes laboratory testing at the coupon, element and full-scale article levels, in addition to flight-testing. Moreover, the laminate design allowable described herein was performed at the coupon level.

The test laminate and test specimen configurations described in this document were selected to be representative of a wide range of typical airframe structures and were not intended to reflect structural details that were unique to a specific frame design. Any unique characteristics of a particular design may require additional testing and/or analysis.

1.2. REFERENCES

1.2.1 ASTM Standards

D792-91 "Standard Test Method for Density and Specific Gravity of Plastics by Displacement," American Society for Testing and Materials, Philadelphia, PA 1991.

D2584-94 "Standard Test Method for Ignition Loss of Cured Reinforced Resins," American Society for Testing and Materials, Philadelphia, PA 1994.

D2734-94 "Standard Test Method for Void Content of Reinforced Plastics," American Society for Testing and Materials, Philadelphia, PA 1994.

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

D5766-95 "Standard Test Method for Open Hole Tensile Strength of Polymer Matrix Composite Laminates," America Society for Testing and Materials, Philadelphia, PA 1995.

D5961-96 "Standard Test Method for Bearing Response of Polymer Matrix Composites Laminates," America Society for Testing and Materials, Philadelphia, PA 1996.

D6484-99 "Standard Test Method for Open-Hole Compressive Strength of Polymer Matrix Composite Laminates," American Society for Testing and Materials, Philadelphia, PA 1999.

1.2.2 SACMA Standards

SRM 3R-94 "Open-Hole Compression Properties of Oriented Fiber-Resin Composites," Suppliers of Advanced Composite Materials Association, 1994.

SRM 5R-94 "Open-Hole Tensile Properties of Oriented Fiber-resin Composites," Suppliers of Advanced Composite Materials Association, 1994.

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

1.2.3 FAA Technical Reports

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

1.2.4 Military Handbook

MIL-HDBK-17 Polymer Matrix Composites
Volume 1 – Guidelines for Characterization of Structural Materials
Volume 2 – Material Properties
Volume 3 – Materials Usage, Design and Analysis

1.2.5 Toray Composites (America), Inc. Documents

TCQAL-T-1016 Test Plan, "AGATE Laminate Material Qualification of
T700G/#2510, 150 g/m^2, Unidirectional Tape
T700S/#2510, 190 g/m^2, Plain Weave Fabric
Style 7781 Finish 558/#2510, 295 g/m^2, Fiberglass Fabric,"

1.2.5.1 Material Process Specifications

TCSPF-T-FC05 "Plain Weave Carbon Fiber Preimpregnated with Epoxy Resin (EP-resin) Prepreg Fabric - 250°F Curing System," Revision 3, Toray Composites (America), Inc., Puyallup, WA, December 18, 2000.

TCSPF-T-FG03 "Fiberglass Fabric Preimpregnated with Epoxy Resin (EP-resin) Prepreg Fabric - 250°F Curing System," Revision 3, Toray Composites (America), Inc., Puyallup, WA, December 18, 2000.

TCSPF-T-UD06 "Unidirectional Carbon Fiber Preimpregnated with Epoxy Resin (EP-resin) Prepreg Tape - 250°F Curing System," Revision 3, Toray Composites (America), Inc., Puyallup, WA, December 18, 2000.

1.2.5.2 Work Instructions

TCWIN-U-M003 "Lay-up/Vacuum Debulking," Toray Composites (America), Inc., Puyallup, WA1999.

TCWIN-U-M006 "Autoclave Curing," Toray Composites (America), Inc., Puyallup, WA 2001.

TCWIN-U-M105 "OHC/OHT Specimen Machining," Toray Composites (America), Inc., Puyallup, WA 1998.

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

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

1.3 METHODOLOGY

1.3.1 Test Matrix

Testing was performed in accordance with the test matrix for each prepreg material and methods described in FAA approved Test Plan, TCQAL-T-1016, "AGATE Laminate Material Qualification of T700G/#2510, 150 g/m^2, Unidirectional Tape, T700S/#2510, 190 g/m^2, Plain Weave Fabric and Style 7781 Finish 558/#2510, 295 g/m^2, Fiberglass Fabric". The test matrices for mechanical properties of each prepreg material are listed below, with notations cited in the columns.

1.3.1.1 Test Matrices for P707AG-15, 150 g/m^2 Unidirectional Tape

Table 1.3.1.1 Laminate Tension Test Properties

Lay-up	Specimen Type(2)	Material Batch	Environment			Total
			-65°F/Dry(5)	75°F/Dry(5)	180°F/Wet(6)	
50/40/10	No Hole(1)	1		3		3
	Filled Hole(3,4)	1	5	5		10
25/50/25	No Hole(1)	1		3		3
	Filled Hole(3,4)	1	5	5		10
	Open Hole	1	5	5		10
	Critical Hole Condition(3,4,7)	1			5	5
10/80/10	No Hole(1)	1		3		3
	Filled Hole(3,4)	1	5	5		10
	Open Hole	1	5	5		10
	Critical Hole Condition(3,4,7)	1			5	5
				Total =		**69**

Notes:

1 No-hole specimens were instrumented back-to-back with C-960401-A uniaxial strain gauge.
2 Test methods are described in Table 15 of TCQAL-T-1016.
3 Fasteners: Pin = NAS1134V()A; Collar = MS21042L4 or equivalent. ( ) – Refer to appropriate fastener standard for the appropriate grip length call-outs. This is described in the raw test result summaries.
4 Install fasteners at 70 ± 5 in-lbs for filled hole tension specimens (high clamp-up critical).
5 Dry specimens are "as fabricated" specimens that have been maintained at ambient conditions in an environmentally controlled laboratory.
6 Wet specimens are humidity aged until an equilibrium moisture weight gain is achieved per section 1.3.2.
7 Critical hole condition shall be preformed using the hole condition associated with the lower tension strength, when tested at -65°F (dry) and 75°F (dry) – open hole tension or filled hole tension.

Table 1.3.1.2 Laminate Compression Test Properties

Lay-up	Specimen Type[2]	Material Batch	Environment		Total Specimens
			75°F/Dry[5]	180°F/Wet[6]	
50/40/10	No Hole[1]	1	3		3
	Open Hole	1	5	5	10
	Filled Hole[3,4]	1		5	5
25/50/25	No Hole[1]	1	3		3
	Open Hole	1	5	5	10
	Filled Hole[3,4]	1		5	5
10/80/10	No Hole[1]	1	3		3
	Open Hole	1	5	5	10
	Filled Hole[3,4]	1		5	5
Total =					**54**

Notes:

1 No-hole specimens were instrumented back-to-back with CEA-06-125UT-120 uniaxial strain gauge.
2 Test methods are described in Table 15 of TCQAL-T-1016.
3 Fasteners: Pin = NAS1134V()A; Collar = MS21042L4 or equivalent. ( ) – Refer to appropriate fastener standard for the appropriate grip length call-outs. This is described in the raw test result summaries.
4 Install fasteners to 35 ± 5 in-lbs for filled hole compression specimens (low clamp-up critical).
5 Dry specimens are "as fabricated" specimens that have been maintained at ambient conditions in an environmentally controlled laboratory.
6 Wet specimens are humidity aged until an equilibrium moisture weight gain is achieved per section 1.3.2.

Table 1.3.1.3 Laminate Bearing Tension Test Properties

Lay-up	Specimen Type[2]	Material Batch	Environment		Total Specimens
			75°F/Dry[4]	180°F/Wet[5]	
50/40/10	Double Shear[1,3]	1	5	5	10
	Single Shear Stabilized[1,3]	1	5	5	10
25/50/25	Double Shear[1,3]	1	5	5	10
	Single Shear Stabilized[1,3]	1	5	5	10
Total =					40

Notes:

1 Fasteners to be installed at 35 ± 5 in-lb torque (Low clamp-up critical).
2 Test methods are described in Table 15 of TCQAL-T-1016.
3 Fasteners: Pin = NAS1134V()A; Collar = MS21042L4; Washer = NAS1149V0432M or equivalent. ( ) – Refer to appropriate fastener standard for the appropriate grip length call-outs. This is described in the raw test result summaries.
4 Dry specimens are "as fabricated" specimens that have been maintained at ambient conditions in an environmentally controlled laboratory.
5 Wet specimens are humidity aged until an equilibrium moisture weight gain is achieved per section 1.3.2.

Table 1.3.1.4 Laminate Bearing-Bypass Interaction Test Properties

Lay-up	Bearing/Bypass Ratio(3)	Specimen Type	Loading	Environment(5)	No. of Specimens
50/40/10	0.5 (50% Load Transfer)	Single Shear	Tension(1)	RTD	5
			Compression(2)	RTD	5
	0.25 (25% Load Transfer)	Double Shear	Tension(1)	RTD	5
			Compression(2)	RTD	5
25/50/25	0.5 (50% Load Transfer)	Single Shear	Tension(1)	RTD	5
			Compression(2)	RTD	5
	0.25 (25% Load Transfer)	Double Shear	Tension(1)	RTD	5
			Compression(2)	RTD	5
10/80/10	0.5 (50% Load Transfer)	Single Shear	Tension(1)	RTD	5
			Compression(2)	RTD	5
	0.25 (25% Load Transfer)	Double Shear	Tension(1)	RTD	5
			Compression(2)	RTD	5
				Total =	**60**

Notes:

1 Fasteners to be installed at 35 ± 5 in-lb torque (Low clamp-up critical).
2 Fasteners to be installed at 70 ± 10 in-lb torque (High clamp-up critical)
3 Test methods are described in Table 15 of TCQAL-T-1016.
4 Fasteners: Pin = NAS1134V()A; Collar = MS21042L4; Washer = NAS1149V0432M or equivalent. ( ) – Refer to appropriate fastener standard for the appropriate grip length call-outs. This is described in the raw test result summaries.
5 Dry specimens are "as fabricated" specimens that have been maintained at ambient conditions in an environmentally controlled laboratory.

1.3.1.2 Test Matrices for F6273C-07M, 190 g/m^2, Plain Weave Fabric, and FGF7781-07I, 295 g/m^2, 8-Harness Fiberglass Fabric

Table 1.3.2.1 Laminate Tension Test Properties

Lay-up	Specimen Type[2]	Material Batch	Environment			Total
			-65°F/Dry[5]	75°F/Dry[5]	180°F/Wet[6]	
40/20/40	No Hole[1]	1		3		3
	Filled Hole[3,4]	1	5	5		10
25/50/25	No Hole[1]	1		3		3
	Filled Hole[3,4]	1	5	5		10
	Open Hole	1	5	5		10
	Critical Hole Condition[3,4]	1			5	5
10/80/10	No Hole[1]	1		3		3
	Filled Hole[3,4]	1	5	5		10
	Open Hole	1	5	5		10
	Critical Hole Condition[3,4]	1			5	5
				Total =		**69**

Notes:

1 No-hole specimens were instrumented back-to-back with C-960401-A uniaxial strain gauge.
2 Test methods are described in Table 15 of TCQAL-T-1016.
3 Fasteners: Pin = NAS1134V()A; Collar = MS21042L4 or equivalent. ( ) – Refer to appropriate fastener standard for the appropriate grip length call-outs. This is described in the raw test result summaries.
4 Install fasteners at 70 ± 5 in-lbs for filled hole tension specimens (high clamp-up critical).
5 Dry specimens are "as fabricated" specimens that have been maintained at ambient conditions in an environmentally controlled laboratory.
6 Wet specimens are humidity aged until an equilibrium moisture weight gain is achieved per section 1.3.2.
7 Critical hole condition shall be preformed using the hole condition associated with the lower tension strength, when tested at -65°F (dry) and 75°F (dry) – open hole tension or filled hole tension.

Table 1.3.2.2 Laminate Compression Test Properties

Lay-up	Specimen Type[2]	Material Batch	Environment		Total Specimens
			75°F/Dry[5]	180°F/Wet[6]	
40/20/40	No Hole[1]	1	3		3
	Open Hole	1	5	5	10
	Filled Hole[3,4]	1		5	5
25/50/25	No Hole[1]	1	3		3
	Open Hole	1	5	5	10
	Filled Hole[3,4]	1		5	5
10/80/10	No Hole[1]	1	3		3
	Open Hole	1	5	5	10
	Filled Hole[3,4]	1		5	5
				Total =	**54**

Notes:

1 No-hole specimens were instrumented back-to-back with CEA-06-125UT-120 uniaxial strain gauge.
2 Test methods are described in Table 15 of TCQAL-T-1016.
3 Fasteners: Pin = NAS1134V()A; Collar = MS21042L4 or equivalent. ( ) – Refer to appropriate fastener standard for the appropriate grip length call-outs. This is described in the raw test result summaries.
4 Install fasteners to 35 ± 5 in-lbs for filled hole compression specimens (low clamp-up critical).
5 Dry specimens are "as fabricated" specimens that have been maintained at ambient conditions in an environmentally controlled laboratory.
6 Wet specimens are humidity aged until an equilibrium moisture weight gain is achieved per section 1.3.2.

Table 1.3.2.3 Laminate Bearing Tension Test Properties

Lay-up	Specimen Type[2]	Material Batch	Environment		Total Specimens
			75°F/Dry[4]	180°F/Wet[5]	
40/20/40	Double Shear[1,3]	1	5	5	10
	Single Shear Stabilized[1,3]	1	5	5	10
25/50/25	Double Shear[1,3]	1	5	5	10
	Single Shear Stabilized[1,3]	1	5	5	10
				Total =	40

Notes:

1 Fasteners to be installed at 35 ± 5 in-lb torque (Low clamp-up critical).
2 Test methods are described in Table 15 of TCQAL-T-1016.
3 Fasteners: Pin = NAS1134V()A; Collar = MS21042L4; Washer = NAS1149V0432M or equivalent. ( ) – Refer to appropriate fastener standard for the appropriate grip length call-outs. This is described in the raw test result summaries.
4 Dry specimens are "as fabricated" specimens that have been maintained at ambient conditions in an environmentally controlled laboratory.
5 Wet specimens are humidity aged until an equilibrium moisture weight gain is achieved per section 1.3.2.

Table 1.3.2.4 Laminate Bearing-Bypass Interaction Test Properties

Lay-up	Bearing/Bypass Ratio(3)	Specimen Type	Loading	Environment(5)	No. of Specimens
40/20/40	0.50 (50% Load Transfer)	Single Shear	Tension(1)	RTD	5
			Compression(2)	RTD	5
	0.25 (25% Load Transfer)	Double Shear	Tension(1)	RTD	5
			Compression(2)	RTD	5
25/50/25	0.5 (50% Load Transfer)	Single Shear	Tension(1)	RTD	5
			Compression(2)	RTD	5
	0.25 (25% Load Transfer)	Double Shear	Tension(1)	RTD	5
			Compression(2)	RTD	5
10/80/10	0.50 (50% Load Transfer)	Single Shear	Tension(1)	RTD	5
			Compression(2)	RTD	5
	0.25 (25% Load Transfer)	Double Shear	Tension(1)	RTD	5
			Compression(2)	RTD	5
				Total =	**60**

Notes:

1 Fasteners to be installed at 35 ± 5 in-lb torque (Low clamp-up critical).
2 Fasteners to be installed at 70 ± 10 in-lb torque (High clamp-up critical)
3 Test methods are described in Table 15 of TCQAL-T-1016.
4 Fasteners: Pin = NAS1134V()A; Collar = MS21042L4; Washer = NAS1149V0432M or equivalent. ( ) – Refer to appropriate fastener standard for the appropriate grip length call-outs. This is described in the raw test result summaries.
5 Dry specimens are "as fabricated" specimens that have been maintained at ambient conditions in an environmentally controlled laboratory.

1.3.2 Environmental Conditioning

1.3.2.1 Wet Mechanical Test specimens

All "wet" specimens were conditioned in accordance with instructions described in AGATE, " Material Qualification Methodology and Equivalency for Polymer Matrix Composite Material Systems", section 3.2. ASTM D5229 and SACMA SRM 11 provide the general guidelines regarding environmental conditioning and moisture absorption. The specimens were continuously exposed at 85% relative humidity and 145 ±5 °F until moisture equilibrium was achieved. Effective moisture equilibrium was achieved when the average moisture content of the traveler specimen (1" x 1" x specimen thickness) changed by less than 0.05% within a span of 7 ± 0.5 days for two consecutive readings and 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

Conditioning took place in a calibrated temperature/humidity-conditioning chamber. After conditioning, the specimens were placed in a heat sealed polyethylene bag, with moist paper towel, at Room Temperature for at least 12 hours and no more than 14 days prior to testing.

1.3.2.2 Thermal Conditioning

Specimens to be tested in the "dry", as fabricated, condition should be exposed to ambient laboratory conditions until mechanical testing. Ambient laboratory conditions are defined as a temperature range of 65° ` 75°F and 45 ~ 55 % Relative Humidity.

Mechanical specimens that were tested at –65°F and 180°F in the load frames were thermally conditioned, within ± 5 °F of test temperature, in a calibrated test chamber before initiating test loading in accordance with the following test stabilization time:

all -65°F (Dry) tests ---------- 5 + 1/-0 minutes
all 180°F (Dry and Wet) tests ------- 2 + 1/-0 minutes

The test chamber and fixture were either pre-cooled or pre-heated to –65°F or 180°F before test specimen was conditioned. Test specimens tested at elevated temperature were heated up to the test temperature within 5 minutes.

1.3.3 Statistical Analysis

1.3.3.1 Statistical Data Reduction

The mechanical test data were statistically reduced to average, sample (n-1) standard deviation and sample (n-1) coefficient of variation values. The physical and chemical tests were averaged.

1.3.3.1.1 Averages

The average of a data set was calculated as follows:

$$\overline{X} = \frac{\sum_{i=1}^{n} X_i}{n}$$

1.3.3.1.2 Standard Deviation

The standard deviation of a data set was calculated by the sample method:

$$S_X = \sqrt{\frac{\sum_{i=1}^{n} \left(X_i - \overline{X}\right)^2}{n-1}}$$

1.3.3.1.3 Coefficient of Variation

The coefficient of variation of a data set was calculated using both the average (*2.1.8.1*) and the standard deviation (*2.1.8.2*):

$$C_x = \frac{S_X}{\overline{X}}$$

1.3.3.2 Normalization

The laminate mechanical properties were normalized with a calculation process that used the nominal thickness and width of the individual specimen.

1.3.3.3 B-Basis Values

Statistical B-Basis values were determined from test data using the proposed methods and procedures developed by Steve Ward as guidance. The details of the methods and procedures are described in draft section 8.3.5 Method for Determining Laminate Basis Values from Small Samples, Volume 1, Chapter 8 of MIL-HDBK-17.

The proposed method works on the premise that for determination of B-Basis value from a small sample of laminate level data will give conservative (but not excessively low) allowable, provided the laminate population CV is not higher than assumed. Extreme care should be taken in applying this method for high temperature data, and for test methods, failure modes and

material types for which there is little experience. This method should not be extended for calculating A-Basis values.

The equations used to calculate the B-Basis values were derived from the following equations:

The normal distribution statistic is given by:

$$z_\gamma = \frac{\mu - \bar{x}}{\sigma / \sqrt{N}} = \frac{\mu - \bar{x}}{x.CV / \sqrt{N}}$$

where:

$\bar{x}$ = unknown population mean
μ = sample mean
σ = unknown population standard deviation
CV = population coefficient of variation (assumed value)
N = sample size
z_γ = normal distribution statistic for differences in the means

Combining the above equation with the standard B level basis equation will result in the equation below:

$$\text{B-Value} = \bar{x}(1\text{-}k_B CV) = \mu \frac{(1 - k_B CV)}{\left(1 + z_\gamma CV / \sqrt{N}\right)}$$

Appropriate values for k_B and z_γ must be determined. In order to provide a sufficient level of conservatism, the following values are recommended:

k_B = 1.6 which corresponds to a sample size of 63.
z_γ = 2.33 based on allowing for 1% probability that the sample does not come from the population.

With these values the equation becomes (with no batch-to-batch variability)

$$\text{B-Value} = \mu \frac{(1 - 1.6CV)}{\left(1 + 2.33CV / \sqrt{N}\right)}$$

In some cases there are statistically significant batch-to-batch variations that need to be accounted for in the B-Basis calculations. For this report, the batch-to-batch variability need to be accounted for in the B-Basis value calculation. Since laminate data were generated from small sample, the batch-to batch variation was determined from the lamina level multi-batch qualification test data. The multi-batch qualification test data is used to either verify the batch-to batch variation is not significant, or to provide the data to account for the batch-to-batch variation. The batch variability was evaluated at the lamina level for the same failure mode and environment as the laminate sample.

There are two methods considered in the calculation of the B-Basis value that accounted for the batch variation:

The first method assumes that batch effects are correlated between different tests. Using this approach, the equation for calculating the small sample laminate B-Basis value is

$$\text{B-Value} = \mu \frac{(1-1.6CV)}{(1+2.33CV/\sqrt{N})}\left(\frac{\mu_{la\min a,batch}}{\mu_{la\min a,avrageQT}}\right)$$

The B-Basis value for the P707AG-15 UD Tape was calculated using the equation that included the ratio of $\mu_{\text{lamina, batch}}/\mu_{\text{lamina, average QT}}$. The B-Basis values were obtained from 0° Tension and 0° Compression properties. Moreover, B-Basis value for the bearing tension test was determined using the 0° Compression property factor.

The second method assumes that the lamina sample comes from a "high" batch. The ratio of the ANOVA basis value to the Normal Distribution basis value is used to reduce the B-Basis value. Using this approach, the equation for calculating the small sample laminate B-Basis value is

$$\text{B-Value} = \mu \frac{(1-1.6CV)}{(1+2.33CV/\sqrt{N})}\left(\frac{QTLa\min aANOVAB - Basisvalue}{QTLa\min aNormalB - Baisvalue}\right)$$

The B-Basis value for F6273C-07M and FGF7781-07I was calculated using the equation that included the ratio $\frac{La\min aANOVAB - BasisvalueofQT}{La\min aNormalB - BasisvalueofQT}$. The B-Basis values were obtained from tension and compression test properties that were tested in the warp direction. Moreover, B-Basis value for the bearing tension test was determined using the Compression property factor.

In order to calculate B-Basis laminate allowable from the small sample of test results, and to avoid excessively low results, a value for the laminate population variance must be assumed and estimated. The laminate B-Basis values calculated using draft section 8.3.5 assumed the following population Coefficient of Variation (CV);

- 8 % CV for fiber tension or compression failure modes.
- 12 % CV for bearing and interlaminar failure modes.

2.0 PROCEDURES FOR AGATE PREPREG MATERIALS LAMINATE PROPERTIES

- **P707AG-15 Unidirectional Tape**
- **F6273C-07M Plain Weave Carbon Fiber Fabric**
- **FGF7781-07I 8-Harness Glass Fiber Fabric**

2.1 GENERAL

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

Test Laboratory	*Test Property*
Wichita State University (WSU) / National Institute for Aviation Research (NIAR), Wichita, KS	*acid digestions (fiber volume, resin volume, laminate density and void content)*

2.1.1 Materials

Three forms of prepreg materials presented in Table 2.1 were evaluated during this test program. These prepreg materials were manufactured by the hot melt method of resin impregnation. Toray, Ehime of Japan and Carbon Fibers America in Decatur, Alabama manufactured the carbon fiber. Sakai Composites of Japan performed the weaving of the plain weave fabric. The sizing and weaving of the 8 harness glass fiber fabric was performed by BGF Industries in Greensboro, North Carolina. The resin mixing and impregnation were done by TCA at the Frederickson, WA facilities.

This material qualification program characterized the laminate physical and mechanical properties of the prepreg materials. One batch each of the prepreg materials was characterized in this qualification program. The prepreg batches and its nominal resin content and fiber areal weight are described in Table 2.1.

Table 2.1. Prepreg Materials

Designation	Prepreg Material Form	Prepreg Batch No.	Nominal Prepreg Mfg.	
			Resin, %(w)	FAW, g/m^2
P707AG-15	150g/m^2, Unidirectional Tape	AB991035	35	150
F6273C-07M	190g/m^2, Plain Weave Carbon Fabric	AF010271	42	190
FGF7781-07I	295g/m^2, 8H Glass Fiber Fabric	AF010363	38	295

2.1.2 Lay-up/Bagging

TCA Test Laboratories manufactured all the mechanical test laminates by laying up plies of the prepreg materials in the desired orientations, and by vacuum bag cure. The mechanical test laminates were comprised of three laminate configurations for each of the prepreg material forms in accordance with TCQAL-T-1016. The layup and ply stacking sequence of the three laminate configurations for each of the prepreg material forms are shown in Table 2.2, Table 2.3 and Table 2.4, respectively.

The vacuum bag assembly for cure of each prepreg material test laminates was in accordance with Figure 2.1 and its respective TCA Material Process Specification, namely; TCSPF-T-UD06 Rev. 3 for unidirectional tape, TCSPF-T-FC05 Rev. 3 for plain weave carbon fabric and TCSPF-T-FG03 Rev. 3 for 8H glass fiber fabric. The test laminates were vacuum debulked in accordance with TCA work instructions, TCWIN-U-M003.

Table 2.2. Laminate Configurations for P707AG-15 Unidirectional Tape

Laminate Configuration % 0°/45°/90°	Ply Stacking Sequence	Total Plies
50/40/10	$[45/0/-45/90/0/0/45/0/-45/0]_S$	20
25/50/25	$[(45/0/-45/90)_3]_S$	24
10/80/10	$[45/-45/90/45/-45/45/-45/0/45/-45]_S$	20

Table 2.3. Laminate Configurations for F6273C-07M Plain Weave Fabric

Laminate Configuration % 0°/45°/90°	Ply Stacking Sequence	Total Plies
40/20/40	$[0/90/0/90/45/-45/90/0/90/0]_S$	20
25/50/25	$[(45/0/-45/90)_2]_S$	16
10/80/10	$[45/-45/90/45/-45/45/-45/0/45/-45]_S$	20

Notes: 0 → warp direction
90 → fill direction

Table 2.4 Laminate Configurations for FGF7781-7I 8-Harness Glass Fiber Fabric

Laminate Configuration % 0°/45°/90°	Ply Stacking Sequence	Total Plies
40/20/40	$[0/90/0/90/45/-45/90/0/90/0]_S$	20
25/50/25	$[(45/0/-45/90)_2]_S$	16
10/80/10	$[45/-45/90/45/-45/45/-45/0/45/-45]_S$	20

Notes: 0 → warp direction
90 → fill direction

2.1.3 Cure

The test panels were cured in accordance with TCWIN-Q-M006 and per Figure 2-2.
For the specimen selection methodology and batch traceability of each test property, batch replicates were sampled from at least two different panels covering at least two

independent cycles. Test specimens were selected from each individual test panel. The test specimens were extracted from panel areas that were visually good.

2.1.4 Non-Destructive Inspection (NDI)

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

2.1.5 Tabbing

Tabs were applied to the laminate bearing-bypass (single shear and double shear) specimens in accordance with Section 3.1.4 of the FAA Document DOT/FAA/AR-00/47: *Material Qualification and Equivalency for Polymer Matrix Composite Material Systems*, using Hysol EA9628 film adhesive. The Hysol EA9628 film adhesive was cured at 248 ± 3 °F for 60 +10/-0 minutes.
The tabs used for the bearing-bypass (single shear) was the same material and thickness as the test coupon. The tabs used for the bearing-bypass (double shear) was the same material and thickness as the side plate, which was made from $[45/0]_S$ layup of F6273C-07M.

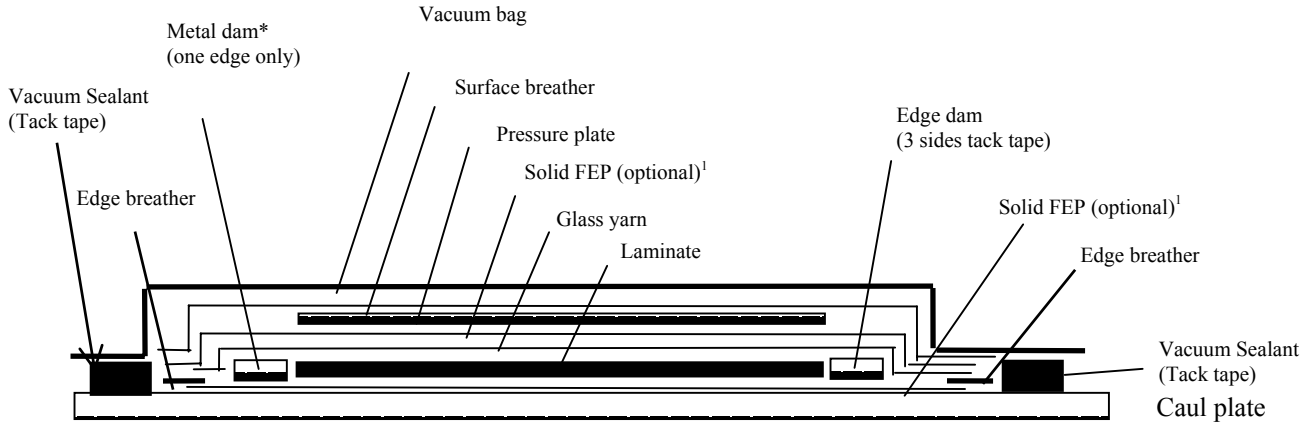
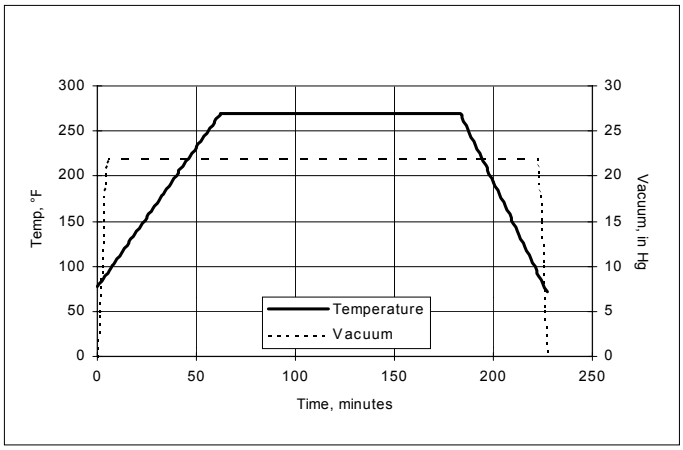


Figure 2-1. Vacuum Bagging Stack Sequence

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



Notes:

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

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

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

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

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

FIGURE 2-2. #2510 CURE CYCLE

2.1.6 FAA Test Coupon Conformity and Test Witness

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

2.1.6.1 Test Coupon Conformity

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

2.1.6.2 Test Witness

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

2.1.7 Environmental Conditioning

TCA Test Laboratories performed moisture absorption and thermal conditioning of test specimens in accordance with section 1.3.2 of this report, prior to and during mechanical testing.

2.2 DATA DOCUMENTATION

2.2.1 P707AG-15

MATERIAL IDENTIFICATION		
R	material identification	T700GC-12K-31E/#2510 Unidirectional Tape
R	material class	Carbon/Epoxy
PREPREG ANALYSIS		
R	ply manufacturer	Toray Composites (America), Inc
R	date of manufacture	10/1999
R	material lot number	AB991035
R	commercial designation	P707AG-15
R	material form	Unidirectional Tape Prepreg
R	reinforcement areal weight	144 – 156 g/m^2
	reinforcement areal weight test method	Solvent Extraction
R	resin content	32 – 38 %
REINFORCEMENT ANALYSIS		
F	precursor type	PAN
R	commercial designation	T700GC-12K-31E
R	manufacturer	Torayca
R	date of manufacture	09/1999
R	lot number	A909092
R	surface treatment (Y/N)	Y
R	surface finish (sizing) identification	31E
R	density (Average per lot)	1.79 g/cm^3
	density test method	JIS R 7601, TY-030B-02
R	nominal filament count	12000/tow
R	nominal tow or yarn count/inch	N/A
R	twist	No Twist
R	fiber areal weight (when applicable)	144 – 156 g/m^2
	fiber areal weight test method	SRM 23
MATRIX MATERIAL ANALYSIS		
R	commercial designation	#2510
R	manufacturer	Toray Composites (America), Inc
R	date of manufacture	10/1999
R	lot number (R – not prepregged, F – prepregged)	2-BFC
R	nominal density and test method	1.267 g/cc ASTM D792

PROCESSING INFORMATION

F	part (panel) manufacturer	Toray Composites (America), Inc
R	date of manufacture (date completed)	02/2001 – 11/2002
	cure cycle (for each state)	
R	process stage type	Cure Cycle
R	process time	120 +10/-0 minutes
R	process temperature	270 ± 3 °F
R	process pressure	none
R	other critical control parameters	minimum 22 inches Hg vacuum

LAMINA ANALYSIS

R	form (panel, tube, etc.)	Panel
R	ply count	50/40/10: 20 plies
		25/50/25: 24 plies
		10/80/10: 20 plies
R	lay-up code	50/40/10: $[45/0/-45/90/0/0/45/0/-45/0]_S$
		25/50/25: $[(45/0/-45/90)_3]_S$
		10/80/10: $[45/-45/90/45/-45/45/-45/0/45/-45]_S$
R	fiber volume	55.2% Average
F	void content	2.2% Average
	density	1.53 g/cc Average
R	glass transition temperature (wet, nominal)	261°F
R	glass transition temperature (dry, nominal)	298°F
R	glass transition temperature test method	DMA E'

SPECIMEN PREPARATION

R	specimen orientation	see layup code
F	tab adhesive curing temperature (nominal)	up to 260°F

MECHANICAL TESTING

R	number of specimens	See data files
R	test procedure	Tension/OHT/FHT: ASTM D5766Modified)
	(citing all deviations from standard	Comp/OHC/FHC: ASTM D6484 (Modified)
	Laminate procedures including reporting	Bearing tests: ASTM D5961 (Modified)
	requirements)	
R	date of applicable standard	ASTM D5766-95, ASTM D6484-99,
		ASTM D5961-96
R	date of testing	04/2001 ~ 11/2002
R	specimen thickness for each specimen	50/40/10: 0.120 inch nominal
		25/50/25: 0.144 inch nominal
		10/80/10: 0.120 inch nominal
R	specimen conditioning method	SACMA SRM 11-94
R	conditioning temperature	145 ± 5°F

R	conditioning humidity	85 ± 5%
R	conditioning time	until saturation < 0.05% for two weeks
R	conditioning environment (if not lab air)	N/A
R	fastener type (if any)	pin: NAS1134V()A; Collar/nut: MS21042L4; washer: NAS1149V0432M
R	fastener torque-up conditions (if any)	FHT: 70 ± 5 in-lbs; FHC: 35 ± 5 in-lbs Bearing Tension: 35 ± 5 in-lbs Bearing Bypass Tension: 35 ± 5 in-lbs Bearing Bypass Comp: 70 ± 5 in-lbs
R	test temperature	-65 ± 5°F, 75 ± 5°F, 180 ± 5°F
F	moisture content	dry: as fabricated; wet: until saturation <0.05%
R	soak time at test conditions	-65°F: 5 – 6 minutes 180°F: 2 – 3 minutes
R	failure mode identification and location	Per specimen
R	all non-normalized (raw) data	Per specimen
R	method of calculating modulus	1000 – 3000 microstrain
	nominal ply thickness	0.0060 in.
	nominal fiber density	1.79 g/cm^3
	nominal fiber areal weight	150 g/m^2

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

2.2.2 F6273C-07M

MATERIAL IDENTIFICATION		
R	material identification	T700SC-12K-50C/#2510 Plain Weave Fabric
R	material class	Carbon/Epoxy
PREPREG ANALYSIS		
R	ply manufacturer	Toray Composites (America), Inc
R	date of manufacture	02/2001
R	material lot number	AF010271
R	commercial designation	F6273C-07M
R	material form	Plain Weave Fabric Prepreg
R	reinforcement areal weight	185 – 201 g/m^2
	reinforcement areal weight test method	Solvent Extraction
R	resin content	39 – 45 %
REINFORCEMENT ANALYSIS		
F	precursor type	PAN
R	commercial designation	T700SC-12K-50C
R	manufacturer	Torayca
R	date of manufacture	02/2000
R	lot number	fabric: 120021 warp fiber: 719123; fill fiber: 719071
R	surface treatment (Y/N)	Y
R	surface finish (sizing) identification	50C
R	density (Average per lot)	1.78 g/cm^3
	density test method	JIS R 7601, TY-030B-02
R	nominal filament count	12000/tow
R	nominal tow or yarn count/inch	3.0
R	twist	No Twist
R	fiber areal weight (when applicable)	185 – 201 g/m^2
	fiber areal weight test method	SRM 23
MATRIX MATERIAL ANALYSIS		
R	commercial designation	#2510
R	manufacturer	Toray Composites (America), Inc
R	date of manufacture	02/15/2001 ~ 02/16/2001
R	lot number (R – not prepregged, F – prepregged)	2-BZZ, 2-CAA, 2-CAB
R	nominal density and test method	1.267 g/cc ASTM D792

PROCESSING INFORMATION

F	part (panel) manufacturer	Toray Composites (America), Inc
R	date of manufacture (date completed)	02/2001 – 11/2002
	cure cycle (for each state)	
R	process stage type	Cure Cycle
R	process time	120 +10/-0 minutes
R	process temperature	270 ± 3 °F
R	process pressure	none
R	other critical control parameters	minimum 22 inHg vacuum

LAMINA ANALYSIS

R	form (panel, tube, etc.)	Panel
R	ply count	40/20/40: 20 plies
		25/50/25: 16 plies
		10/80/10: 20 plies
R	lay-up code	40/20/40: $[0/90/0/90/45/-45/90/0/90/0]_S$
		25/50/25: $[(45/0/-45/90)_2]_S$
		10/80/10: $[45/-45/90/45/-45/45/-45/0/45/-45]_S$
R	fiber volume	49.5% Average
F	void content	1.5% Average
	density	1.51g/cc Average
R	glass transition temperature (wet, nominal)	270°F
R	glass transition temperature (dry, nominal)	283°F
R	glass transition temperature test method	DMA E'

SPECIMEN PREPARATION

R	specimen orientation	see layup code
F	tab adhesive curing temperature (nominal)	up to 260°F

MECHANICAL TESTING

R	number of specimens	See data files
R	test procedure (citing all deviations from standard procedures including reporting requirements)	Tension/OHT/FHT: ASTM D5766 (Modified) Comp/OHC/FHC: ASTM D6484 (Modified) Bearing tests: ASTM D5961 (Modified)
R	date of applicable standard	ASTM D5766-95, ASTM D6484-99, ASTM D5961-96
R	date of testing	05/2001 ~ 11/2002
R	specimen thickness for each specimen	50/40/10: 0.172 inch nominal
		25/50/25: 0.138 inch nominal
		10/80/10: 0.172 inch nominal
R	specimen conditioning method	SACMA SRM 11-94
R	conditioning temperature	145 ± 5°F

R	conditioning humidity	85 ± 5%
R	conditioning time	until saturation < 0.05% for two weeks
R	conditioning environment (if not lab air)	N/A
R	fastener type (if any)	pin: NAS1134V()A; Collar/nut: MS21042L4; washer: NAS1149V0432M
R	fastener torque-up conditions (if any)	FHT: 70 ± 5 in-lbs; FHC: 35 ± 5 in-lbs Bearing Tension: 35 ± 5 in-lbs Bearing Bypass Tension: 35 ± 5 in-lbs Bearing Bypass Comp: 70 ± 5 in-lbs
R	test temperature	-65 ± 5°F, 75 ± 5°F, 180 ± 5°F
F	moisture content	dry: as fabricated; wet: until saturation ≤0.05%
R	soak time at test conditions	-65°F: 5 – 6 minutes 180°F: 2 – 3 minutes
R	failure mode identification and location	Per specimen
R	all non-normalized (raw) data	Per specimen
R	method of calculating modulus	1000 – 3000 microstrain
	nominal ply thickness	0.0086 in
	nominal fiber density	1.78 g/cm^3
	nominal fiber areal weight	193 g/m^2

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

2.2.3 FGF7781-07I

MATERIAL IDENTIFICATION		
R	material identification	Style 7781/#2510 8-harness Fiberglass Fabric
R	material class	Fiberglass/Epoxy
PREPREG ANALYSIS		
R	ply manufacturer	Toray Composites (America), Inc
R	date of manufacture	03/13/2001
R	material lot number	AF010363
R	commercial designation	FGF7781-07I
R	material form	8-harness Fiberglass Woven Fabric Prepreg
R	reinforcement areal weight	285 – 305 g/m^2
	reinforcement areal weight test method	Solvent Extraction
R	resin content	35 – 41 %
REINFORCEMENT ANALYSIS		
F	precursor type	Silica
R	commercial designation	Style 7781 Finish 558
R	manufacturer	BGF Industries, Inc.
R	date of manufacture	01/2000
R	lot number	924237, 924274
R	surface treatment (Y/N)	Y
R	surface finish (sizing) identification	558
R	density (Average per lot)	2.565 g/cm^3
	density test method	
R	nominal filament count	1/tow
R	nominal tow or yarn count/inch	warp: 56/inch ; fill: 53/inch
R	twist	No Twist
R	fiber areal weight (when applicable)	285 – 305 g/m^2
	fiber areal weight test method	SRM 23
MATRIX MATERIAL ANALYSIS		
R	commercial designation	#2510
R	manufacturer	Toray Composites (America), Inc
R	date of manufacture	03/05/2001 ~ 03/06/2001
R	lot number (R – not prepregged, F – prepregged)	2-CAR, 2-CAS
R	nominal density and test method	1.267 g/cc ASTM D792

PROCESSING INFORMATION		
F	part (panel) manufacturer	Toray Composites (America), Inc
R	date of manufacture (date completed)	05/2001 – 10/2001
	cure cycle (for each state)	
R	process stage type	Cure Cycle
R	process time	120 +10/-0 minutes
R	process temperature	270 ± 3 °F
R	process pressure	none
R	other critical control parameters	minimum 22 inHg vacuum
LAMINA ANALYSIS		
R	form (panel, tube, etc.)	Panel
R	ply count	40/20/40: 20 plies
		25/50/25: 16 plies
		10/80/10: 20 plies
R	lay-up code	40/20/40: $[0/90/0/90/45/-45/90/0/90/0]_S$
		25/50/25: $[(45/0/-45/90)_2]_S$
		10/80/10: $[45/-45/90/45/-45/45/-45/0/45/-45]_S$
R	fiber volume	44.8% Average
F	void content	2.7% Average
	density	1.812 g/cc Average
R	glass transition temperature (wet, nominal)	270°F
R	glass transition temperature (dry, nominal)	287°F
R	glass transition temperature test method	DMA E'
SPECIMEN PREPARATION		
R	specimen orientation	see layup code
F	tab adhesive curing temperature (nominal)	up to 260°F
MECHANICAL TESTING		
R	number of specimens	See data files
R	test procedure	Laminate Tension/OHT/FHT: ASTM D5766 (Modified)
	(citing all deviations from standard	Laminate Comp/OHC/FHC: ASTM D6484 (Modified)
	procedures including reporting	Bearing tests: ASTM D5961 (Modified)
	requirements)	
R	date of applicable standard	ASTM D5766-95, ASTM D6484-99, ASTM D5961-96
R	date of testing	08/2001 ~ 05/2002
R	specimen thickness for each specimen	50/40/10: 0.208 inch nominal
		25/50/25: 0.166 inch nominal
		10/80/10: 0.208 inch nominal
R	specimen conditioning method	SACMA SRM 11-94
R	conditioning temperature	145 ± 5°F
R	conditioning humidity	85 ± 5%

R	conditioning humidity	85 ± 5%
R	conditioning time	until saturation < 0.05% for two weeks
R	conditioning environment (if not lab air)	N/A
R	fastener type (if any)	pin: NAS1134V()A; Collar/nut: MS21042L4; washer: NAS1149V0432M
R	fastener torque-up conditions (if any)	FHT: 70 ± 5 in-lbs; FHC: 35 ± 5 in-lbs Bearing Tension: 35 ± 5 in-lbs Bearing Bypass Tension: 35 ± 5 in-lbs Bearing Bypass Comp: 70 ± 5 in-lbs
R	test temperature	-65 ± 5°F, 75 ± 5°F, 180 ± 5°F
F	moisture content	dry: as fabricated; wet: until saturation ≤0.05%
R	soak time at test conditions	-65°F: 5 – 6 minutes 180°F: 2 – 3 minutes
R	failure mode identification and location	Per specimen
R	all non-normalized (raw) data	Per specimen
R	method of calculating modulus	1000 – 3000 microstrain
	nominal ply thickness	0.0104 in.
	nominal fiber density	2.565 g/cm^3
	nominal fiber areal weight	295 g/m^2

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

2.3 Prepreg Documentation

2.3.1 P707AG-15 T700G-12K/#2510 Unidirectional Tape Laminate Qualification

Prepreg Documentation	**Prepreg Manufacturer & Product ID: Toray Composites P707AG-15 Material Identification (weave, form, class, etc.): Carbon/Epoxy Unidirectional Tape Impregnation Method: Hot Melt**
Prepreg Batch or Lot #	AB991035
Batch (Lot) ID as labeled on samples	**1 thru 62; 202 thru 207**
Date of Manufacture	10/06/1999
Expiration Date	10/06/2001
Resin Content [%]	34.9%
Reinforcement Areal Weight & Test Method	149 g/m^2 SACMA SRM 23R-94
Resin Flow & Test Conditions	17.7% @ 250°F
Gel Time & Test Conditions	6.2 minutes @ 250°F
Volatile Content	0.14%
Reinforcement Documentation	**Fiber/Fabric Manufacturer & Product ID: Toray T700G-12K-31E** **Precursor Type: PAN** **Nominal Filament Count: 12K** **Finish/Sizing Type and %: 31E (0.5%)** **Nominal tow or yarn count/inch: n/a** **Twist: Never twisted**
Fiber Batch or Lot #	A909092
Date of Manufacture	09/1999
Average Fiber Density per Lot & Test Method	1.79 g/cc TY-030B-02
Matrix Documentation	**Resin Manufacturer & Product ID: Toray Composites #2510**
Matrix Batch or Lot #	2-BFC
Date of Manufacture	10/04/1999
Average Neat Resin Density by Lot & Test Method	1.266 ASTM D792

2.3.2 F6273C-07M T700S-12K/#2510 Plain Weave Fabric Laminate Qualification

Prepreg Documentation	**Prepreg Manufacturer & Product ID: Toray Composites F6273C-07M Material Identification (weave, form, class, etc.): Carbon/Epoxy Plain Weave Fabric Impregnation Method: Hot Melt**
Prepreg Batch or Lot #	AF010271
Batch (Lot) ID as labeled on samples	**68 thru 134**
Date of Manufacture	02/21/2001
Expiration Date	02/20/2003
Resin Content [%]	42.3 %
Reinforcement Areal Weight & Test Method	191 g/m^2 SACMA SRM 23R-94
Gel Time & Test Conditions	12 minutes @ 250°F
Volatile Content	0.21%
Reinforcement Documentation	**Fiber Manufacturer & Product ID: Toray T700S-12K-50C** **Fabric Manufacturer & Product ID: Sakai CK6273C** **Precursor Type: PAN** **Nominal Filament Count: 12K** **Finish/Sizing Type and %: 50C (1.0%)** **Nominal tow or yarn count/inch: 3.05/inch** **Twist: Never twisted**
Fabric Batch or Lot #	120021
Date of Manufacture	02/2000
Average Fiber Density per Lot & Test Method	1.79 g/cc TY-030B-02
Matrix Documentation	**Resin Manufacturer & Product ID: Toray Composites #2510**
Matrix Batch or Lot #	2-BZZ, 2-CAA, 2-CAB
Date of Manufacture	02/15/2001 ~ 02/16/2001
Average Neat Resin Density by Lot & Test Method	1.267 ASTM D792

2.3.3 FGF7781-07I Style 7781/#2510 Fiberglass 8-Harness Fabric Laminate Qualification

Prepreg Documentation	**Prepreg Manufacturer & Product ID: Toray Composites FGF7781-07I Material Identification (weave, form, class, etc.): Fiberglass/Epoxy 8HS Woven Fabric Impregnation Method: Hot Melt**
Prepreg Batch or Lot #	AF010363
Batch (Lot) ID as labeled on samples	**135 thru 209**
Date of Manufacture	03/13/2001
Expiration Date	03/12/2003
Resin Content [%]	38.0 %
Reinforcement Areal Weight & Test Method	293 g/m^2 SACMA SRM 23R-94
Gel Time & Test Conditions	12 minutes @ 250°F
Volatile Content	0.15 %
Reinforcement Documentation	**Fiber/Fabric Manufacturer & Product ID: BGF Industries, Inc Style 7781 Finish 558** **Precursor Type: E-glass** **Nominal Filament Count:** **Finish/Sizing Type and %: 558 (0.1%)** **Nominal tow or yarn count/inch: warp 56/inch, fill 53/inch** **Twist: None**
Fabric Batch or Lot #	924237, 924274
Date of Manufacture	01/2000
Average Fiber Density	2.565 g/cc
Matrix Documentation	**Resin Manufacturer & Product ID: Toray Composites #2510**
Matrix Batch or Lot #	2-CAR, 2-CAS
Date of Manufacture	03/05/2001 ~ 03/06/2001
Average Neat Resin Density by Lot & Test Method	1.267 g/cc ASTM D792

3.0 LAMINATE PROPERTIES TEST RESULTS

T700G-12K-31E/#2510 Unidirectional Tape (P707AG-15)

3.1. Summary Results of T700G-12K-31E/#2510 Unidirectional Tape

PREPREG MATERIAL: T700G-12K-31E/#2510 Unidirectional Tape

PREPREG: Toray Composites P707AG-15

FIBER: T700G-12K-31E **RESIN:** Toray Composites #2510

Tg (Dry): 297 °F **Tg (Wet):** 262 °F **Tg METHOD:** DMA (SRM 18-94)

PROCESSING: Vacuum bag cure (22 inches Hg, minimum); 270 ± 3 °F for 120 +10/-0 minutes

Date of fiber manufacture:	**Sep-99**	**Date of testing:**	**Apr-01 ~ Nov-02**
Date of resin manufacture:	**Oct-99**	**Date of analysis:**	**May-01 ~ Oct-02**
Date of prepreg manufacture:	**Oct-99**	**Date of data submittal:**	
Date of composite manufacture:	**Feb-01 ~ Nov-02**		

LAMINATE MECHANICAL PROPERTY SUMMARY

Data Reported as: Normalized using Nominal Thickness and Width

Test Property		Layup:	50/40/10		25/50/25		10/80/10	
	Test Condition	Unit	B-Value	Mean	B-Value	Mean	B-Value	Mean
No Hole Tension								
Ult. Strength	75°F/Dry	ksi	124	157	77.3	98.2	42.1	53.5
Modulus		msi	-	10.8	-	6.92	-	4.42
Filled Hole Tension	-65°F/Dry	ksi	47.1	60.3	35.1	45.0	34.9	44.7
Ult. Strength	75°F/Dry		57.3	71.2	41.3	51.3	34.9	43.4
Open Hole Tension	-65°F/Dry	ksi	-	-	32.9	42.2	30.8	39.4
Ult. Strength	75°F/Dry		-	-	40.6	50.5	30.9	38.4
	180°F/Wet		-	-	51.6	64.1	29.1	36.2
No Hole Compression								
Ult. Strength	75°F/Dry	ksi	78.7	103	60.8	79.6	40.1	52.5
Modulus		msi	-	9.71	-	6.43	-	4.24
Open Hole Compression	75°F/Dry	ksi	39	50.0	31.3	40.1	26.5	34.0
Ult. Strength	180°F/Wet		32.3	42.7	27.1	35.8	19.5	25.8
Filled Hole Compression								
Ult. Strength	180°F/Wet	ksi	47.5	62.8	40	52.9	27.1	35.8
Bearing Tension, Double Shear	75°F/Dry	ksi	105	151	100	143	-	-
Ult. Strength	180°F/Wet		79.0	117	79.0	117	-	-
Bearing Tension, Single Shear	75°F/Dry	ksi	59.9	86.0	49.3	70.7	-	-
Strength at 4% Hole Elongation (Stabilized)	180°F/Wet		51.2	75.9	43.4	64.3	-	-
Bearing-Bypass Single Shear, Tension								
Ult. Bearing Strength			70.7	98.4	62.4	86.9	78.3	109
Ult. Gross Bypass Strength	75°F/Dry	ksi	23.6	32.8	20.8	29.0	26.0	36.2
Ult. Net Bypass Strength			11.8	16.4	10.4	14.5	13.0	18.1
Bearing-Bypass Single Shear, Comp.								
Ult. Bearing Strength	75°F/Dry	ksi	79.4	114	75.2	108	78.0	112
Ult. Bypass Strength			13.2	19.0	12.5	18.0	13.0	18.7
Bearing-Bypass, Double Shear, Tension								
Bearing Strength at Ultimate Load			27.1	37.7	24.8	34.6	34.6	48.2
Ult. Gross Bypass Strength	75°F/Dry	ksi	48.7	67.8	34.2	47.6	28.7	39.9
Ult. Net Bypass Strength			44.2	61.5	30.1	41.9	22.9	31.9
Actual Bearing Load at Ult. Load		%	-	9.28	-	12.1	-	20.1
Bearing-Bypass, Double Shear, Comp.								
Bearing Strength at Ultimate Load		ksi	32.1	46.1	31.4	45.1	53.8	77.2
Ult. Bypass Strength	75°F/Dry		42.6	61.2	34.8	50.0	23.3	33.5
Actual Bearing Load at Ult. Load		%	-	11.1	-	13.1	-	28.0

3.1.1 Individual Test Summaries --- P707AG-15

3.1.1.1 No Hole Tension

Material:	TCA T700G-12K-31E/#2510		**No Hole Tension**
Resin Content:	32 ~ 38 %(w)	**Composite Density:** 1.527 ~ 1.543 g/cc	**Gr/Ep**
Fiber Volume:	55.1 ~ 55.7 % (v)	**Void Content:** 1.17 ~ 2.13 % (v)	**TCA T700G-12K-31E/#2510 Unidirectional Tape**
Ply Thickness	0.0059 ~ 0.0060 inch		
Test Method:	ASTM D5766-95 (modified); SACMA SRM 5 (modified)	**Modulus calculation:** difference between 1000 ~ 3000 με	

Test Temperature [°F]	-65						75						180					
Moisture Conditioning	Dry						Dry						equilibrium					
Equilibrium at T, RH	as fabricated						as fabricated						145 F, 85%					
Laminate Lay-up [%, 0°/45°/90°]	**50/40/10**		**25/50/25**		**10/80/10**		**50/40/10**		**25/50/25**		**10/80/10**		**50/40/10**		**25/50/25**		**10/80/10**	
	Nominal	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**
No Hole Tension																		
Ultimate Strength (ksi)																		
Mean							157	158	98.2	100	53.5	54.1						
Minimum							149	149	95.1	97.9	51.3	51.8						
Maximum							168	170	101	103	57.9	58.6						
COV, %							6.56	7.02	3.00	2.50	7.05	7.15						
B-Value							124	124	77.3	78.7	42.1	42.6						
No. of Specimens							3		3		3							
Prepreg Batch							AB991035		AB991035		AB991035							
Modulus (msi)																		
Mean							10.8	10.8	6.92	7.03	4.42	4.47						
Minimum							10.6	10.8	6.90	6.93	4.42	4.46						
Maximum							10.9	11.0	9.65	7.15	4.43	4.48						
COV, %							1.32	0.99	0.43	1.58	0.23	0.26						
No. of Specimens							3		3		3							
Prepreg Batch							AB991035		AB991035		AB991035							

3.1.1.2 Filled Hole Tension

Material:	TCA T700G-12K-31E/#2510		**Filled Hole Tension**
Resin Content:	32 ~ 38 %(w)	**Composite Density:** 1.527 ~ 1.543 g/cc	**Gr/Ep**
Fiber Volume:	55.1 ~ 55.7 % (v)	**Void Content:** 1.17 ~ 2.13 % (v)	**TCA T700G-12K-31E/#2510 Unidirectional Tape**
Ply Thickness	0.0059 ~ 0.0060 inch		
Test Method:	ASTM D5766-95 (modified); SACMA SRM 5 (modified)	**Modulus calculation:** N/A	

Test Temperature [°F]	-65						75						180					
Moisture Conditioning	Dry						Dry						equilibrium					
Equilibrium at T, RH	as fabricated						as fabricated						145 F, 85%					
Laminate Lay-up [%, 0°/45°/90°]	**50/40/10**		**25/50/25**		**10/80/10**		**50/40/10**		**25/50/25**		**10/80/10**		**50/40/10**		**25/50/25**		**10/80/10**	
	Nominal	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**
Filled Hole Tensile																		
Ultimate Strength (ksi)																		
Mean	60.3	61.4	45.0	45.8	44.7	45.8	71.2	71.9	51.3	52.1	43.4	44.1						
Minimum	57.3	57.9	43.4	44.1	43.2	44.2	66.4	67.5	48.8	49.2	42.7	43.3						
Maximum	63.4	64.6	45.9	46.9	46.1	47.5	74.6	75.8	53.6	54.5	44.9	45.5						
COV, %	4.40	4.72	2.11	2.33	2.67	2.81	4.32	4.30	3.77	4.00	2.03	1.95						
B-Value	47.1	47.9	35.1	35.8	34.9	35.8	57.3	57.9	41.3	41.9	34.9	35.5						
No. of Specimens	5		5		5		5		5		5							
Prepreg Batch	AB991035		AB991035		AB991035		AB991035		AB991035		AB991035							

3.1.1.3 Open Hole Tension

Material:	TCA T700G-12K-31E/#2510		**Open Hole Tension**
Resin Content:	32 ~ 38 %(w)	**Composite Density:** 1.522 ~ 1.535 g/cc	**Gr/Ep**
Fiber Volume:	54.5 ~ 55.6 % (v)	**Void Content:** 1.49 ~ 2.58 % (v)	**TCA T700G-12K-31E/#2510 Unidirectional Tape**
Ply Thickness	0.0059 ~ 0.0060 inch		
Test Method:	ASTM D5766-95; SACMA SRM 5	**Modulus calculation:** N/A	

Test Temperature [°F]	-65						75						180					
Moisture Conditioning	Dry						Dry						equilibrium					
Equilibrium at T, RH	as fabricated						as fabricated						145 F, 85%					
Laminate Lay-up [%, 0°/45°/90°]	**50/40/10**		**25/50/25**		**10/80/10**		**50/40/10**		**25/50/25**		**10/80/10**		**50/40/10**		**25/50/25**		**10/80/10**	
	Nominal	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**
Open Hole Tension																		
Ultimate Strength (ksi)																		
Mean			42.2	42.9	39.4	39.9			50.5	50.7	38.4	38.3			64.1	64.6	36.2	36.3
Minimum			40.4	41.5	39.0	39.3			47.9	48.1	38.0	37.7			62.2	62.5	35.3	35.2
Maximum			43.6	44.5	40.0	40.5			55.4	55.6	39.4	39.7			67.0	68.4	38.0	38.0
COV, %			2.96	2.86	1.13	1.14			5.91	5.84	1.97	2.09			3.02	3.52	2.92	2.97
B-Value			32.9	33.5	30.8	31.2			40.6	40.8	30.9	30.8			51.6	52.0	29.1	29.2
No. of Specimens			5		5				5		5				5		5	
Prepreg Batch			AB991035		AB991035				AB991035		AB991035				AB991035		AB991035	

3.1.1.4 No Hole Compression

Material:	TCA T700G-12K-31E/#2510			**No Hole Compression**	
Resin Content:	32 ~ 38 %(w)	**Composite Density:**	1.527 ~ 1.543 g/cc	**Gr/Ep**	
Fiber Volume:	54.8 ~ 55.7 % (v)	**Void Content:**	1.17 ~ 2.13 % (v)	**TCA T700G-12K-31E/#2510 Unidirectional Tape**	
Ply Thickness	0.0060 inch				
Test Method:	ASTM D6484-99 (modified); SACMA SRM 3 (modified)	**Modulus calculation:**	between 1000 ~ 3000 με		

Test Temperature [°F]	-65						75						180					
Moisture Conditioning	Dry						Dry						equilibrium					
Equilibrium at T, RH	as fabricated						as fabricated						145 F, 85%					
Laminate Lay-up [%, 0°/45°/90°]	**50/40/10**		**25/50/25**		**10/80/10**		**50/40/10**		**25/50/25**		**10/80/10**		**50/40/10**		**25/50/25**		**10/80/10**	
	Nominal	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**
No Hole Compression																		
Ultimate Strength (ksi)																		
Mean							103	103	79.6	79.9	52.5	52.6						
Minimum							96.0	96.4	78.9	78.9	51.0	51.2						
Maximum							110	110	80.9	81.8	53.2	53.6						
COV, %							6.64	6.69	1.48	2.02	2.37	2.43						
B-Value							78.7	78.7	60.8	61.0	40.1	40.2						
No. of Specimens							3		3		3							
Prepreg Batch							AB991035		AB991035		AB991035							
Modulus (msi)																		
Mean							9.71	9.76	6.43	6.46	4.24	4.25						
Minimum							9.52	9.58	6.42	6.44	4.20	4.21						
Maximum							9.90	9.94	6.44	6.49	4.29	4.29						
COV, %							1.93	1.84	0.14	0.41	1.12	0.95						
No. of Specimens							3		3		3							
Prepreg Batch							AB991035		AB991035		AB991035							

3.1.1.5 Open Hole Compression

Material:	TCA T700G-12K-31E/#2510			**Open Hole Compression**
Resin Content:	32 ~ 38 %(w)	**Composite Density:**	1.519 ~ 1.532 g/cc	**Gr/Ep**
Fiber Volume:	54.3 ~ 55.7 % (v)	**Void Content:**	1.72 ~ 2.58 % (v)	**TCA T700G-12K-31E/#2510 Unidirectional Tape**
Ply Thickness	0.0059 ~ 0.0060 inch			
Test Method:	ASTM D6484-99; SACMA SRM 3	**Modulus calculation:**	N/A	

Test Temperature [°F]	-65						75						180					
Moisture Conditioning	Dry						Dry						equilibrium					
Equilibrium at T, RH	as fabricated						as fabricated						145 F, 85%					
Laminate Lay-up [%, 0°/45°/90°]	**50/40/10**		**25/50/25**		**10/80/10**		**50/40/10**		**25/50/25**		**10/80/10**		**50/40/10**		**25/50/25**		**10/80/10**	
	Nominal	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**
Open Hole Compression																		
Ultimate Strength (ksi)																		
Mean							50.0	50.5	40.1	40.2	34.0	34.0	42.7	43.0	35.8	36.0	25.8	25.9
Minimum							48.5	49.2	38.6	38.8	33.5	33.4	39.9	40.2	34.5	34.7	25.0	25.0
Maximum							52.6	52.6	41.2	41.4	34.3	34.5	45.3	45.6	37.2	37.6	26.7	26.7
COV, %							3.12	2.95	2.50	2.50	1.18	1.39	5.81	6.1	3.00	3.18	2.95	2.95
B-Value							39.0	39.4	31.3	31.4	26.5	26.5	32.3	32.5	27.1	27.2	19.5	19.6
No. of Specimens							5		5		5		5		5		5	
Prepreg Batch							AB991035		AB991035		AB991035		AB991035		AB991035		AB991035	

3.1.1.6 Filled Hole Compression

				Filled Hole Compression
Material:	TCA T700G-12K-31E/#2510			**Gr/Ep**
Resin Content:	32 ~ 38 %(w)	**Composite Density:**	1.523 ~ 1.540 g/cc	**TCA T700G-12K-31E/#2510 Unidirectional Tape**
Fiber Volume:	54.2 ~ 55.6 % (v)	**Void Content:**	1.33 ~ 2.24 % (v)	
Ply Thickness	0.0059 ~ 0.0060 inch			
Test Method:	ASTM D6484-99 (modified); SACMA SRM 3 (modified)	**Modulus calculation:**	N/A	

Test Temperature [°F]	-65						75						180					
Moisture Conditioning	Dry						Dry						equilibrium					
Equilibrium at T, RH	as fabricated						as fabricated						145 F, 85%					
Laminate Lay-up [%, 0°/45°/90°]	**50/40/10**		**25/50/25**		**10/80/10**		**50/40/10**		**25/50/25**		**10/80/10**		**50/40/10**		**25/50/25**		**10/80/10**	
	Nominal	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**
Filled Hole Compression																		
Ultimate Strength (ksi)																		
Mean													62.8	63	52.9	53.1	35.8	36.2
Minimum													60.5	60.1	51.7	52.1	34.8	35.0
Maximum													65.9	66.7	54.6	54.7	36.8	37.3
COV, %													3.54	4.12	2.22	2.09	2.00	2.24
B-Value													47.5	47.7	40.0	40.2	27.1	27.4
No. of Specimens													5		5		5	
Prepreg Batch													AB991035		AB991035		AB991035	

3.1.1.7 Bearing Tension, Double Shear

Material:	TCA T700G-12K-31E/#2510		**Bearing Tension, Double Shear**
Resin Content:	32 ~ 38 %(w)	**Composite Density:** 1.517 ~ 1.526 g/cc	**Gr/Ep**
Fiber Volume:	54.4 ~ 54.8 % (v)	**Void Content:** 2.16 ~ 2.72 % (v)	**TCA T700G-12K-31E/#2510 Unidirectional Tape**
Ply Thickness	0.0060 inch		
Test Method:	ASTM D5961-96	**Modulus calculation:** N/A	

Test Temperature [°F]	-65						75						180					
Moisture Conditioning	Dry						Dry						equilibrium					
Equilibrium at T, RH	as fabricated						as fabricated						145 F, 85%					
Laminate Lay-up [%, 0°/45°/90°]	**50/40/10**		**25/50/25**		**10/80/10**		**50/40/10**		**25/50/25**		**10/80/10**		**50/40/10**		**25/50/25**		**10/80/10**	
	Nominal	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**
Bearing, Double Shear																		
Ultimate Strength (ksi)																		
Mean							151	151	143	143			117	116	117	117		
Minimum							150	150	141	140			113	113	109	109		
Maximum							153	152	146	147			126	125	122	123		
COV, %							0.75	0.66	1.45	1.96			4.42	4.39	4.22	4.79		
B-Value							105	105	100	100			79.0	78.3	79.0	78.3		
No. of Specimens							5		5				5		5			
Prepreg Batch							AB991035		AB991035				AB991035		AB991035			

3.1.1.8 Bearing Tension, Single Shear

Material:	TCA T700G-12K-31E/#2510			**Bearing Tension, Single Shear**	
Resin Content:	32 ~ 38 %(w)	**Composite Density:**	1.510 ~ 1.536 g/cc	**Gr/Ep**	
Fiber Volume:	54.4 ~ 54.8 % (v)	**Void Content:**	1.90 ~ 3.12 % (v)	**TCA T700G-12K-31E/#2510 Unidirectional Tape**	
Ply Thickness	0.0059 ~ 0.0060 inch				
Test Method:	ASTM D5961-96 (modified)	**Modulus calculation:**	N/A		

Test Temperature [°F]	-65						75						180					
Moisture Conditioning	Dry						Dry						equilibrium					
Equilibrium at T, RH	as fabricated						as fabricated						145 F, 85%					
Laminate Lay-up [%, 0°/45°/90°]	**50/40/10**		**25/50/25**		**10/80/10**		**50/40/10**		**25/50/25**		**10/80/10**		**50/40/10**		**25/50/25**		**10/80/10**	
	Nominal	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**
Bearing, Single Shear Strength @ 4% Hole Elongation (Stabilized) [ksi]																		
Mean							86.0	85.5	70.7	70.4			75.9	75.8	64.3	64.7		
Minimum							77.3	76.2	64.2	64			69.9	69.8	56.9	56.9		
Maximum							92.2	93.7	78.8	79.6			80.0	80.6	68.2	69.4		
COV, %							6.87	6.94	8.64	8.46			4.97	4.70	7.19	7.01		
B-Value							59.9	59.6	49.3	49.0			51.2	51.2	43.4	43.7		
No. of Specimens							5		5				5		5			
Prepreg Batch							AB991035		AB991035				AB991035		AB991035			

3.1.1.9 Bearing-Bypass Tension, Single Shear

Material:	TCA T700G-12K-31E/#2510		**Bearing-Bypass, Single Shear (Tension)**
Resin Content:	32 ~ 38 %(w)	**Composite Density:** 1.525 ~ 1.546 g/cc	**Gr/Ep**
Fiber Volume:	54.9 ~ 57.6 % (v)	**Void Content:** 1.71 ~ 2.31 % (v)	**TCA T700G-12K-31E/#2510 Unidirectional Tape**
Ply Thickness	0.0060 inch		
Test Method:	ASTM D5961-96 (modified)	**Modulus calculation:** N/A	

Test Temperature [°F]	-65						75						180					
Moisture Conditioning	Dry						Dry						equilibrium					
Equilibrium at T, RH	as fabricated						as fabricated						145 F, 85%					
Laminate Lay-up [%, 0°/45°/90°]	**50/40/10**		**25/50/25**		**10/80/10**		**50/40/10**		**25/50/25**		**10/80/10**		**50/40/10**		**25/50/25**		**10/80/10**	
	Nominal	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**
Bearing-Bypass, Single Shear																		
Ult. Bearing Strength, (ksi)																		
Mean							98.4	98.0	86.9	86.5	109	109						
Minimum							88.0	87.5	73.2	72.0	102	102						
Maximum							109	106	101	101	112	113						
COV, %							7.82	6.66	12.7	11.9	3.56	3.76						
B-Value							70.70	70.4	62.4	62.1	78.3	78.3						
Ult. Gross Bypass Strength, (ksi)																		
Mean							32.8	32.8	29.0	28.9	36.2	36.3						
Minimum							29.3	29.3	24.4	24.1	34.0	34.0						
Maximum							36.3	35.5	33.8	33.8	37.2	37.8						
COV, %							7.82	6.65	12.7	12	3.56	3.73						
B-Value							23.60	23.6	20.8	20.8	26.0	26.1						
Ult. Net Bypass Strength, (ksi)																		
Mean							16.4	16.4	14.5	14.4	18.1	18.2						
Minimum							14.7	14.6	12.2	12.0	17.0	17.0						
Maximum							18.1	17.7	16.9	16.9	18.6	18.9						
COV, %							7.82	6.66	12.6	12.1	3.54	3.77						
B-Value							11.8	11.8	10.4	10.3	13	13.1						
No. of Specimens							5		5		5							
Prepreg Batch							AB991035		AB991035		AB991035							

3.1.1.10 Bearing-Bypass Compression, Single Shear

Material:	TCA T700G-12K-31E/#2510		**Bearing-Bypass, Single Shear (Comp.)**
Resin Content:	32 ~ 38 %(w)	**Composite Density:** 1.517 ~ 1.546 g/cc	**Gr/Ep**
Fiber Volume:	54.7 ~ 57.5 % (v)	**Void Content:** 1.71 ~ 3.54 % (v)	**TCA T700G-12K-31E/#2510 Unidirectional Tape**
Ply Thickness	0.0060 inch		
Test Method:	ASTM D5961-96 (modified)	**Modulus calculation:** N/A	

Test Temperature [°F]	-65						75						180					
Moisture Conditioning	Dry						Dry						equilibrium					
Equilibrium at T, RH	as fabricated						as fabricated						145 F, 85%					
Laminate Lay-up [%, 0°/45°/90°]	**50/40/10**		**25/50/25**		**10/80/10**		**50/40/10**		**25/50/25**		**10/80/10**		**50/40/10**		**25/50/25**		**10/80/10**	
	Nominal	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**
Bearing-Bypass, Single Shear																		
Ult. Bearing Strength, (ksi)																		
Mean							114	113	108	108	112	113						
Minimum							109	108	106	106	109	109						
Maximum							118	118	109	110	117	119						
COV, %							3.47	3.24	1.04	1.24	2.96	3.78						
B-Value							79.4	78.7	75.2	75.2	78.0	78.7						
Ult. Bypass Strength, (ksi)																		
Mean							19.0	18.9	18.0	18.1	18.7	18.8						
Minimum							18.2	18.1	17.7	17.6	18.1	18.2						
Maximum							19.7	19.6	18.1	18.3	19.5	19.9						
COV, %							3.47	3.22	1.04	1.32	2.96	3.57						
B-Value							13.2	13.2	12.5	12.6	13.0	13.1						
No. of Specimens							5		5		5							
Prepreg Batch							AB991035		AB991035		AB991035							

3.1.1.11 Bearing-Bypass Tension, Double Shear

				Bearing-Bypass, Double Shear (Tension)
Material:	TCA T700G-12K-31E/#2510			**Gr/Ep**
Resin Content:	32 ~ 38 %(w)	**Composite Density:**	1.517 ~ 1.535 g/cc	**TCA T700G-12K-31E/#2510 Unidirectional Tape**
Fiber Volume:	53.3 ~ 56.4 % (v)	**Void Content:**	1.99 ~ 2.54 % (v)	
Ply Thickness	0.0060 ~ 0.0061 inch			
Test Method:	ASTM D5961-96 (modified)	**Modulus calculation:**	N/A	

Test Temperature [°F]	-65						75						180					
Moisture Conditioning	Dry						Dry						equilibrium					
Equilibrium at T, RH	as fabricated						as fabricated						145 F, 85%					
Laminate Lay-up [%, 0°/45°/90°]	**50/40/10**		**25/50/25**		**10/80/10**		**50/40/10**		**25/50/25**		**10/80/10**		**50/40/10**		**25/50/25**		**10/80/10**	
	Nominal	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**
Bearing-Bypass, Double Shear																		
Bearing Strength at Ult. Load, (ksi)																		
Mean							37.7	37.4	34.6	34.4	48.2	47.6						
Minimum							34.6	34.2	26.2	25.7	41.0	39.9						
Maximum							40.7	39.9	40.7	40.9	55.7	55.1						
COV, %							6.07	5.79	15.9	16.6	13.2	13.9						
B-Value							27.1	26.9	24.8	24.7	34.6	33.9						
Ult. Gross Bypass Strength, (ksi)																		
Mean							67.8	67.4	47.6	47.4	39.9	39.6						
Minimum							65.2	64.9	46.4	46.1	38.6	37.7						
Maximum							72.9	72.8	50.8	50.4	41.4	41.4						
COV, %							4.73	4.79	3.93	3.6	2.48	3.36						
B-Value							48.7	48.4	34.2	34.0	28.7	28.4						
Ult. Net Bypass Strength, (ksi)																		
Mean							61.5	61.2	41.9	41.7	31.9	31.6						
Minimum							58.7	58.5	39.8	39.8	30.6	30.3						
Maximum							66.6	66.5	45.2	44.8	32.6	32.1						
COV, %							5.06	5.17	5.76	5.2	2.51	2.79						
B-Value							44.2	44.0	30.1	29.9	22.9	22.7						
Bearing Load at Ult. Load, [%(w)]																		
Mean								9.28		12.1		20.1						
Minimum								8.63		9.08		17.7						
Maximum								9.94		14.6		23.3						
COV, %								6.42		17.9		11.7						
No. of Specimens								5		5		5						
Prepreg Batch								AB991035		AB991035		AB991035						

3.1.1.12 Bearing-Bypass Compression, Double Shear

Material:	TCA T700G-12K-31E/#2510		**Bearing-Bypass, Double Shear (Comp.)**
Resin Content:	32 ~ 38 %(w)	**Composite Density:** 1.517 ~ 1.535 g/cc	**Gr/Ep**
Fiber Volume:	53.3 ~ 56.4 % (v)	**Void Content:** 1.99 ~ 2.54 % (v)	**TCA T700G-12K-31E/#2510 Unidirectional Tape**
Ply Thickness	0.0060 ~ 0.0061 inch		
Test Method:	ASTM D5961-96 (modified)	**Modulus calculation:** N/A	

Test Temperature [°F]	-65						75						180					
Moisture Conditioning	Dry						Dry						equilibrium					
Equilibrium at T, RH	as fabricated						as fabricated						145 F, 85%					
Laminate Lay-up [%, 0°/45°/90°]	**50/40/10**		**25/50/25**		**10/80/10**		**50/40/10**		**25/50/25**		**10/80/10**		**50/40/10**		**25/50/25**		**10/80/10**	
	Nominal	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**
Bearing-Bypass, Double Shear																		
Bearing Strength at Ult. Load, (ksi)																		
Mean							46.1	45.2	45.1	44.3	77.2	76.6						
Minimum							39.2	38.2	34.0	33.4	45.5	45.9						
Maximum							52.6	51.6	51.0	50.1	101	99.2						
COV, %							11.1	11.1	14.9	14.9	27.9	27.2						
B-Value							32.1	31.5	31.4	30.9	53.8	53.4						
Ult. Bypass Strength, (ksi)																		
Mean							61.2	60.3	50.0	49.3	33.5	33.5						
Minimum							59.1	58.3	45.9	45.2	27.0	26.8						
Maximum							64.5	63.9	54.9	53.9	40.6	41.2						
COV, %							3.22	3.53	7.32	7.3	15.1	16.1						
B-Value							42.6	42.0	34.8	34.3	23.3	23.3						
Bearing Load at Ult. Load, [%(w)]																		
Mean								11.1		13.1		28.0						
Minimum								9.68		10.7		15.7						
Maximum								12.9		15.6		38.2						
COV, %								10.5		15.0		30.7						
No. of Specimens								5		5		5						
Prepreg Batch								AB991035		AB991035		AB991035						

T700S-12K-50C/#2510 Plain Weave Carbon Fiber Fabric (F6273C-07M)

3.2. Summary Results of T700S-12K-50C/#2510 Plain Weave Fabric

PREPREG MATERIAL: T700S-12K-50C/#2510 Plain Weave Fabric

PREPREG: Toray Composites F6273C-07M

FIBER: T700S-12K-50C **RESIN:** Toray Composites #2510

Tg (Dry): 297 °F **Tg (Wet):** 262 °F **Tg METHOD:** DMA (SRM 18-94)

PROCESSING: Vacuum bag cure (22 inches Hg, minimum); 270 ± 3 °F for 120 +10/-0 minutes

Date of fiber manufacture:	**Feb-00**	**Date of testing:**	**May-01 ~ Nov-02**
Date of resin manufacture:	**Feb-01**	**Date of analysis:**	**Jun-01 ~ Nov-02**
Date of prepreg manufacture:	**Feb-01**	**Date of data submittal:**	
Date of composite manufacture:	**Feb-01 ~ Nov-02**		

LAMINATE MECHANICAL PROPERTY SUMMARY

Data Reported as: Normalized using Nominal Thickness and Width

Test Property	Layup:		40/20/40		25/50/25		10/80/10	
	Test Condition	Unit	B-Value	Mean	B-Value	Mean	B-Value	Mean
No Hole Tension								
Ult. Strength	75°F/Dry	ksi	85.6	111	68.9	89.3	41.4	53.6
Modulus		msi	-	7.25	-	5.89	-	3.79
Filled Hole Tension	-65°F/Dry	ksi	40.5	51.4	40.3	51.1	36.6	46.4
Ult. Strength	75°F/Dry		43.0	54.5	41.1	52.1	35.3	44.7
Open Hole Tension	-65°F/Dry		-	-	36.6	46.4	33.1	41.9
Ult. Strength	75°F/Dry	ksi	-	-	38.1	49.3	32.2	40.8
	180°F/Wet		-	-	46.3	57.5	30.5	37.9
No Hole Compression								
Ult. Strength	75°F/Dry	ksi	57.5	74.5	57.9	75.0	39.1	50.7
Modulus		msi	-	6.72	-	5.43	-	3.7
Open Hole Compression	75°F/Dry	ksi	33.2	42.1	30.5	38.7	27.8	35.2
Ult. Strength	180°F/Wet		27.2	33.8	26.5	32.9	21.7	26.9
Filled Hole Compression								
Ult. Strength	180°F/Wet	ksi	46.7	58.0	42.5	52.8	26.2	32.6
Bearing Tension, Double Shear	75°F/Dry	ksi	78.8	112	98.5	140	-	-
Ult. Strength	180°F/Wet		68.7	95.6	89.1	124	-	-
Bearing Tension, Single Shear	75°F/Dry	ksi	45.5	64.7	52.4	74.4	-	-
Strength at 4% Hole Elongation (Stabilized)	180°F/Wet		40.4	56.3	47.6	66.3	-	-
Bearing-Bypass Single Shear, Tension								
Ult. Bearing Strength			65.4	92.9	95.0	135	76.7	109
Ult. Gross Bypass Strength	75°F/Dry	ksi	21.8	31.0	31.7	45.1	25.6	36.4
Ult. Net Bypass Strength			10.9	15.5	15.8	22.5	12.8	18.2
Bearing-Bypass Single Shear, Comp.								
Ult. Bearing Strength	75°F/Dry	ksi	75.3	107	83.1	118	76.0	108
Ult. Bypass Strength			12.5	17.8	13.8	19.6	12.7	18.0
Bearing-Bypass, Double Shear, Tension								
Bearing Strength at Ultimate Load			19.8	28.2	27.5	39.1	33.0	46.9
Ult. Gross Bypass Strength	75°F/Dry	ksi	39.1	55.6	33.9	48.2	30.3	43.1
Ult. Net Bypass Strength			35.8	50.9	29.3	41.7	24.8	35.3
Actual Bearing Load at Ult. Load		%	-	8.45	-	13.5	-	18.1
Bearing-Bypass, Double Shear, Comp.								
Bearing Strength at Ultimate Load		ksi	42.5	60.4	38.6	54.9	57.1	81.1
Ult. Bypass Strength	75°F/Dry		40.4	57.4	32.7	46.5	24.7	35.1
Actual Bearing Load at Ult. Load		%	-	14.9	-	16.4	-	27.7

3.2.1 Individual Test Summaries --- F6273C-07M

3.2.1.1. No Hole Tension

Material:	TCA T700S-12K-50C/#2510			**No Hole Tension**
Resin Content:	39 ~ 45 %(w)	**Composite Density:**	1.502 ~ 1.510 g/cc	**Gr/Ep**
Fiber Volume:	47.6 ~ 50.1 % (v)	**Void Content:**	1.10 ~ 1.52 % (v)	**TCA T700S-12K-50C/#2510 Plain Weave Fabric**
Ply Thickness	0.0084 ~ 0.0085 inch			
Test Method:	ASTM D5766-95 (modified); SACMA SRM 5 (modified)	**Modulus calculation:**	difference between 1000 ~ 3000 με	

Test Temperature [°F]	-65						75						180					
Moisture Conditioning	Dry						Dry						equilibrium					
Equilibrium at T, RH	as fabricated						as fabricated						145 F, 85%					
Laminate Lay-up [%, 0°/45°/90°]	**40/20/40**		**25/50/25**		**10/80/10**		**40/20/40**		**25/50/25**		**10/80/10**		**40/20/40**		**25/50/25**		**10/80/10**	
	Nominal	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**
No Hole Tension																		
Ultimate Strength (ksi)																		
Mean							111	114	89.3	91.3	53.6	54.8						
Minimum							111	114	86.4	88.3	51.2	52.4						
Maximum							111	115	90.9	93.2	55.9	57.5						
COV, %							0.06	0.39	2.79	2.84	4.41	4.71						
B-Value							85.6	88.0	68.9	70.4	41.4	42.3						
No. of Specimens							3		3		3							
Prepreg Batch							AF010271		AF010271		AF010271							
Modulus (msi)																		
Mean							7.25	7.43	5.89	6.02	3.79	3.88						
Minimum							7.17	7.38	5.76	5.89	3.72	3.83						
Maximum							7.33	7.5	5.97	6.09	3.82	3.91						
COV, %							1.06	0.87	1.81	1.82	1.52	1.07						
No. of Specimens							3		3		3							
Prepreg Batch							AF010271		AF010271		AF010271							

3.2.1.2 Filled Hole Tension

Material:	TCA T700S-12K-50C/#2510			**Filled Hole Tension**
Resin Content:	39 ~ 45 %(w)	**Composite Density:**	1.493 ~ 1.516 g/cc	**Gr/Ep**
Fiber Volume:	48.7 ~ 50.2 % (v)	**Void Content:**	1.03 ~ 2.26 % (v)	**TCA T700S-12K-50C/#2510 Plain Weave Fabric**
Ply Thickness	0.0084 ~ 0.0086 inch			
Test Method:	ASTM D5766-95 (modified); SACMA SRM 5 (modified)	**Modulus calculation:**	N/A	

Test Temperature [°F]	-65						75						180					
Moisture Conditioning	Dry						Dry						equilibrium					
Equilibrium at T, RH	as fabricated						as fabricated						145 F, 85%					
Laminate Lay-up [%, 0°/45°/90°]	**40/20/40**		**25/50/25**		**10/80/10**		**40/20/40**		**25/50/25**		**10/80/10**		**40/20/40**		**25/50/25**		**10/80/10**	
	Nominal	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**
Filled Hole Tensile																		
Ultimate Strength (ksi)																		
Mean	51.4	51.7	51.1	52.1	46.4	47.7	54.5	54.4	52.1	52.6	44.7	45.2						
Minimum	46.1	46.7	48.8	49.7	45.2	46.4	51.5	51.5	49.4	49.8	43.7	44.3						
Maximum	53.3	53.7	52.5	53.4	47.6	48.9	57.3	57.3	57.1	57.6	45.3	45.7						
COV, %	6.05	5.64	2.86	2.73	2.03	1.86	4.33	4.17	5.66	5.61	1.98	2.1						
B-Value	40.5	40.8	40.3	41.1	36.6	37.6	43	42.9	41.1	41.5	35.3	35.7						
No. of Specimens	5		5		5		5		5		5							
Prepreg Batch	AF010271		AF010271		AF010271		AF010271		AF010271		AF010271							

3.2.1.3 Open Hole Tension

Material:	TCA T700S-12K-50C/#2510		**Open Hole Tension**
Resin Content:	39 ~ 45 %(w)	**Composite Density:** 1.502 ~ 1.527 g/cc	**Gr/Ep**
Fiber Volume:	48.8 ~ 50.9 % (v)	**Void Content:** 0.39 ~ 2.23 % (v)	**TCA T700S-12K-50C/#2510 Plain Weave Fabric**
Ply Thickness	0.0082 ~ 0.0085 inch		
Test Method:	ASTM D5766-95; SACMA SRM 5	**Modulus calculation:** N/A	

Test Temperature [°F]	-65						75						180			
Moisture Conditioning	Dry						Dry						equilibrium			
Equilibrium at T, RH	as fabricated						as fabricated						145 F, 85%			
Laminate Lay-up [%, 0°/45°/90°]	**40/20/40**		**25/50/25**		**10/80/10**		**40/20/40**		**25/50/25**		**10/80/10**		**40/20/40**		**25/50/25**		**10/80/10**	
	Nominal	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**
Open Hole Tension																		
Ultimate Strength (ksi)																		
Mean			46.4	48.0	41.9	43.4			49.3	50.0	40.8	41.6			57.5	58.7	37.9	38.5
Minimum			45.4	47.4	41.2	42.8			45.6	46.4	39.5	40.6			56.6	58.1	37.3	37.7
Maximum			46.6	48.2	42.8	44.2			53.0	51.8	41.9	42.4			58.3	59.5	39.2	39.8
COV, %			1.96	1.49	1.65	1.4			6.28	6.22	2.54	1.97			1.3	0.98	2.11	1.99
B-Value			36.6	37.9	33.1	34.2			38.1	39.4	32.2	32.8			46.3	47.2	30.5	31.0
No. of Specimens			5		5				5		5				5		5	
Prepreg Batch			AF010271		AF010271				AF010271		AF010271				AF010271		AF010271	

3.2.1.4. No Hole Compression

Material:	TCA T700S-12K-50C/#2510			**No Hole Compression**
Resin Content:	39 ~ 45 %(w)	**Composite Density:**	1.502 ~ 1.510 g/cc	**Gr/Ep**
Fiber Volume:	47.6 ~ 50.1 % (v)	**Void Content:**	1.10 ~ 1.52 % (v)	**TCA T700S-12K-50C/#2510 Plain Weave Fabric**
Ply Thickness	0.0084 ~ 0.0085 inch			
Test Method:	ASTM D6484-99 (modified); SACMA SRM 3 (modified)	**Modulus calculation:**	between 1000 ~ 3000 με	

Test Temperature [°F]	-65						75						180					
Moisture Conditioning	Dry						Dry						equilibrium					
Equilibrium at T, RH	as fabricated						as fabricated						145 F, 85%					
Laminate Lay-up [%, 0°/45°/90°]	**40/20/40**		**25/50/25**		**10/80/10**		**40/20/40**		**25/50/25**		**10/80/10**		**40/20/40**		**25/50/25**		**10/80/10**	
	Nominal	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**
No Hole Compression																		
Ultimate Strength (ksi)																		
Mean							74.5	76.4	75.0	76.7	50.7	51.9						
Minimum							69.0	70.9	72.8	75.1	49.8	51						
Maximum							79.2	81.1	78.1	79.6	51.6	52.9						
COV, %							6.88	6.69	3.63	3.22	1.78	1.87						
B-Value							57.5	58.9	57.9	59.2	39.1	40.0						
No. of Specimens							3		3		3							
Prepreg Batch							AF010271		AF010271		AF010271							
Modulus (msi)																		
Mean							6.72	6.89	5.43	5.55	3.7	3.79						
Minimum							6.71	6.88	5.39	5.51	3.64	3.73						
Maximum							6.73	6.9	5.49	2.59	3.74	3.82						
COV, %							0.16	0.06	0.98	0.72	1.41	1.24						
No. of Specimens																		
Prepreg Batch							AF010271		AF010271		AF010271							

3.2.1.5 Open Hole Compression

Material:	TCA T700S-12K-50C/#2510		**Open Hole Compression**
Resin Content:	39 ~ 45 %(w)	**Composite Density:** 1.502 ~ 1.527 g/cc	**Gr/Ep**
Fiber Volume:	48.6 ~ 50.7 % (v)	**Void Content:** 0.39 ~ 2.23 % (v)	**TCA T700S-12K-50C/#2510 Plain Weave Fabric**
Ply Thickness	0.0084 ~ 0.0086 inch		
Test Method:	ASTM D6484-99; SACMA SRM 3	**Modulus calculation:** N/A	

Test Temperature [°F]	-65						75						180					
Moisture Conditioning	Dry						Dry						equilibrium					
Equilibrium at T, RH	as fabricated						as fabricated						145 F, 85%					
Laminate Lay-up [%, 0°/45°/90°]	**40/20/40**		**25/50/25**		**10/80/10**		**40/20/40**		**25/50/25**		**10/80/10**		**40/20/40**		**25/50/25**		**10/80/10**	
	Nominal	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**
Open Hole Compression																		
Ultimate Strength (ksi)																		
Mean							42.1	42.8	38.7	39.2	35.2	35.7	33.8	34.0	32.9	33.2	26.9	27.3
Minimum							41.0	41.5	37.0	37.6	34.3	34.5	32.6	32.8	32.0	32.3	25.9	26.4
Maximum							43.7	44.0	42.1	42.8	36.4	37.1	34.8	34.8	34.7	35.1	27.7	28.1
COV, %							2.43	2.17	5.16	5.27	2.16	2.73	2.34	2.23	3.34	3.44	3.19	3.04
B-Value							33.2	33.8	30.5	30.9	27.8	28.2	27.2	27.4	26.5	26.7	21.7	22.0
No. of Specimens							5		5		5		5		5		5	
Prepreg Batch							AF010271		AF010271		AF010271		AF010271		AF010271		AF010271	

3.2.1.6 Filled Hole Compression

				Filled Hole Compression
Material:	TCA T700S-12K-50C/#2510			**Gr/Ep**
Resin Content:	39 ~ 45 %(w)	**Composite Density:**	1.489~ 1.513 g/cc	**TCA T700S-12K-50C/#2510 Plain Weave Fabric**
Fiber Volume:	47.8 ~ 49.8 % (v)	**Void Content:**	0.96 ~ 2.15 % (v)	
Ply Thickness	0.0084 ~ 0.0086 inch			
Test Method:	ASTM D6484-99 (modified); SACMA SRM 3 (modified)	**Modulus calculation:**	N/A	

Test Temperature [°F]	-65						75						180					
Moisture Conditioning	Dry						Dry						equilibrium					
Equilibrium at T, RH	as fabricated						as fabricated						145 F, 85%					
Laminate Lay-up [%, 0°/45°/90°]	**40/20/40**		**25/50/25**		**10/80/10**		**40/20/40**		**25/50/25**		**10/80/10**		**40/20/40**		**25/50/25**		**10/80/10**	
	Nominal	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**
Filled Hole Compression																		
Ultimate Strength (ksi)																		
Mean													58.0	58.2	52.8	53.2	32.6	33.0
Minimum													55.2	55.0	49.4	49.9	32.3	32.6
Maximum													60.5	60.4	56.7	57.0	33.3	33.4
COV, %													3.69	3.55	5.23	5.11	1.26	0.84
B-Value													46.7	46.8	42.5	42.8	26.20	26.6
No. of Specimens													5		5		5	
Prepreg Batch													AF010271		AF010271		AF010271	

3.2.1.7 Bearing Tension, Double Shear

Material:	TCA T700S-12K-50C/#2510		**Bearing Tension, Double Shear**
Resin Content:	39 ~ 45 %(w)	**Composite Density:** 1.495 ~ 1.513 g/cc	**Gr/Ep**
Fiber Volume:	47.8 ~ 49.8 % (v)	**Void Content:** 1.10 ~ 2.11 % (v)	**TCA T700S-12K-50C/#2510 Plain Weave Fabric**
Ply Thickness	0.0083 ~ 0.0086 inch		
Test Method:	ASTM D5961-96	**Modulus calculation:** N/A	

Test Temperature [°F]	-65						75						180					
Moisture Conditioning	Dry						Dry						equilibrium					
Equilibrium at T, RH	as fabricated						as fabricated						145 F, 85%					
Laminate Lay-up [%, 0°/45°/90°]	**40/20/40**		**25/50/25**		**10/80/10**		**40/20/40**		**25/50/25**		**10/80/10**		**40/20/40**		**25/50/25**		**10/80/10**	
	Nominal	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**
Bearing, Double Shear																		
Ultimate Strength (ksi)																		
Mean							112	112	140	142			95.6	97.4	124	126		
Minimum							110	111	133	136			93.7	95.6	121	125		
Maximum							113	114	144	148			96.7	100	126	129		
COV, %							1.17	1.06	2.97	3.38			1.59	1.94	1.62	1.24		
B-Value							78.8	78.8	98.5	100			68.7	70.0	89.1	90.5		
No. of Specimens							5		5				5		5			
Prepreg Batch							AF010271		AF010271				AF010271		AF010271			

3.2.1.8 Bearing Tension, Single Shear

Material:	TCA T700S-12K-50C/#2510		**Bearing Tension, Single Shear**
Resin Content:	39 ~ 45 %(w)	**Composite Density:** 1.495~ 1.507 g/cc	**Gr/Ep**
Fiber Volume:	48.7 ~ 50.0 % (v)	**Void Content:** 1.34 ~ 2.31 % (v)	**TCA T700S-12K-50C/#2510 Plain Weave Fabric**
Ply Thickness	0.0081~ 0.0086 inch		
Test Method:	ASTM D5961-96 (modified)	**Modulus calculation:** N/A	

Test Temperature [°F]	-65						75						180					
Moisture Conditioning	Dry						Dry						equilibrium					
Equilibrium at T, RH	as fabricated						as fabricated						145 F, 85%					
Laminate Lay-up [%, 0°/45°/90°]	**40/20/40**		**25/50/25**		**10/80/10**		**40/20/40**		**25/50/25**		**10/80/10**		**40/20/40**		**25/50/25**		**10/80/10**	
	Nominal	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**
Bearing, Single Shear Strength @ 4% Hole Elongation (Stabilized) [ksi]																		
Mean							64.7	64.3	74.4	74.4			56.3	57.1	66.3	68.3		
Minimum							60.5	59.8	71.6	71.2			53.8	54.4	58.6	60.0		
Maximum							68.9	68.3	79.3	79.9			62.6	62.8	71.1	71.7		
COV, %							5.85	5.43	4.10	4.16			6.48	5.43	7.03	6.77		
B-Value							45.5	45.3	52.4	52.4			40.4	41.0	47.6	49.1		
No. of Specimens							5		5				5		5			
Prepreg Batch							AF010271		AF010271				AF010271		AF010271			

3.2.1.9 Bearing-Bypass Tension, Single Shear

Material:	TCA T700S-12K-50C/#2510			**Bearing-Bypass, Single Shear (Tension)**
Resin Content:	39 ~ 45 %(w)	**Composite Density:**	1.502 ~ 1.516 g/cc	**Gr/Ep**
Fiber Volume:	48.7 ~ 50.8 % (v)	**Void Content:**	1.19 ~ 1.99 % (v)	**TCA T700S-12K-50C/#2510 Plain Weave Fabric**
Ply Thickness	0.0084 ~ 0.0087 inch			
Test Method:	ASTM D5961-96 (modified)	**Modulus calculation:**	N/A	

Test Temperature [°F]	-65						75						180					
Moisture Conditioning	Dry						Dry						equilibrium					
Equilibrium at T, RH	as fabricated						as fabricated						145 F, 85%					
Laminate Lay-up [%, 0°/45°/90°]	**40/20/40**		**25/50/25**		**10/80/10**		**40/20/40**		**25/50/25**		**10/80/10**		**40/20/40**		**25/50/25**		**10/80/10**	
	Nominal	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**
Bearing-Bypass, Single Shear																		
Ult. Bearing Strength, (ksi)																		
Mean							92.9	92.2	135	136	109	110						
Minimum							86.0	84.4	133	135	106	109						
Maximum							99.0	98.0	137	137	112	113						
COV, %							5.41	5.30	0.96	0.56	2.24	1.52						
B-Value							65.4	64.9	95.0	95.7	76.7	77.4						
Ult. Gross Bypass Strength, (ksi)																		
Mean							31.0	30.9	45.1	45.4	36.4	36.9						
Minimum							28.7	28.3	44.4	44.9	35.5	36.1						
Maximum							33.0	32.8	45.5	45.8	37.4	37.7						
COV, %							5.41	5.31	0.96	0.65	2.24	1.57						
B-Value							21.8	21.7	31.7	32.0	25.6	26.0						
Ult. Net Bypass Strength, (ksi)																		
Mean							15.5	15.4	22.5	22.7	18.2	18.5						
Minimum							14.3	14.1	22.2	22.5	17.7	18.1						
Maximum							16.5	16.4	22.8	22.9	18.7	18.8						
COV, %							5.41	5.27	0.96	0.60	2.24	1.45						
B-Value							10.9	10.8	15.8	16.0	12.8	13.0						
No. of Specimens							5		5		5							
Prepreg Batch							AF010271		AF010271		AF010271							

3.2.1.10 Bearing-Bypass Compresson, Single Shear

Material:	TCA T700S-12K-50C/#2510		**Bearing-Bypass, Single Shear (Comp.)**
Resin Content:	39 ~ 45 %(w)	**Composite Density:** 1.517 ~ 1.546 g/cc	**Gr/Ep**
Fiber Volume:	48.7 ~ 49.8 % (v)	**Void Content:** 1.71 ~ 3.54 % (v)	**TCA T700S-12K-50C/#2510 Plain Weave Fabric**
Ply Thickness	0.0084 ~ 0.0087 inch		
Test Method:	ASTM D5961-96 (modified)	**Modulus calculation:** N/A	

Test Temperature [°F]	-65						75						180					
Moisture Conditioning	Dry						Dry						equilibrium					
Equilibrium at T, RH	as fabricated						as fabricated						145 F, 85%					
Laminate Lay-up [%, 0°/45°/90°]	**40/20/40**		**25/50/25**		**10/80/10**		**40/20/40**		**25/50/25**		**10/80/10**		**40/20/40**		**25/50/25**		**10/80/10**	
	Nominal	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**
Bearing-Bypass, Single Shear																		
Ult. Bearing Strength, (ksi)																		
Mean							107	107	118	118	108	111						
Minimum							101	101	116	116	105	106						
Maximum							112	112	119	121	110	111						
COV, %							4.76	4.33	0.80	1.54	1.70	1.67						
B-Value							75.3	75.3	83.1	83.1	76.0	78.1						
Ult. Bypass Strength, (ksi)																		
Mean							17.8	17.8	19.6	19.7	18.0	18.2						
Minimum							16.8	16.8	19.4	19.4	17.6	17.7						
Maximum							18.6	18.8	19.8	20.2	18.3	18.6						
COV, %							4.76	4.43	0.8	1.47	1.70	1.58						
B-Value							12.5	12.5	13.8	13.9	12.7	12.8						
No. of Specimens							5		5		5							
Prepreg Batch							AF010271		AF010271		AF010271							

3.2.1.11 Bearing-Bypass Tension, Double Shear

Material:	TCA T700S-12K-50C/#2510		**Bearing-Bypass, Double Shear (Tension)**
Resin Content:	39 ~ 45 %(w)	**Composite Density:** 1.490 ~ 1.507 g/cc	**Gr/Ep**
Fiber Volume:	48.6 ~ 50.2 % (v)	**Void Content:** 1.54 ~ 2.63 % (v)	**TCA T700S-12K-50C/#2510 Plain Weave Fabric**
Ply Thickness	0.0083 ~ 0.0087 inch		
Test Method:	ASTM D5961-96 (modified)	**Modulus calculation:** N/A	

Test Temperature [°F]	-65						75						180					
Moisture Conditioning	Dry						Dry						equilibrium					
Equilibrium at T, RH	as fabricated						as fabricated						145 F, 85%					
Laminate Lay-up [%, 0°/45°/90°]	**40/20/40**		**25/50/25**		**10/80/10**		**40/20/40**		**25/50/25**		**10/80/10**		**40/20/40**		**25/50/25**		**10/80/10**	
	Nominal	Measured	Nominal	Measured	Nominal	Measured	Nominal	Measured	Nominal	Measured	Nominal	Measured	Nominal	Measured	Nominal	Measured	Nominal	Measured
Bearing-Bypass, Double Shear																		
Bearing Strength at Ult. Load, (ksi)																		
Mean							28.2	28.8	39.1	39.5	46.9	46.7						
Minimum							25.7	26.3	36.6	36.6	44.8	44.8						
Maximum							31.8	32.8	41.3	42.1	50.6	50.3						
COV, %							8.42	8.80	4.56	5.09	4.77	4.69						
B-Value							19.8	20.3	27.5	27.8	33.0	32.9						
Ult. Gross Bypass Strength, (ksi)																		
Mean							55.6	56.9	48.2	48.9	43.1	42.9						
Minimum							51.3	52.3	46.1	46.3	42.1	42.0						
Maximum							57.7	59.6	50.2	50.6	43.8	43.6						
COV, %							5.26	5.53	3.04	3.30	1.43	1.34						
B-Value							39.1	40.0	33.9	34.4	30.3	30.2						
Ult. Net Bypass Strength, (ksi)																		
Mean							50.9	52.1	41.7	42.3	35.3	35.2						
Minimum							46.8	47.7	40.0	40.1	34.4	34.3						
Maximum							53.2	54.6	43.5	43.9	35.7	35.5						
COV, %							5.47	5.71	3.18	3.37	1.48	1.44						
B-Value							35.8	36.7	29.3	29.8	24.8	24.8						
Bearing Load at Ult. Load, [%(w)]																		
Mean								8.45		13.5		18.1						
Minimum								7.45		13.1		17.4						
Maximum								9.21		13.5		19.2						
COV, %								7.65		3.90		4.15						
No. of Specimens								5		5		5						
Prepreg Batch								AF010271		AF010271		AF010271						

3.2.1.12 Bearing-Bypass Compression, Double Shear

Material:	TCA T700S-12K-50C/#2510		**Bearing-Bypass, Double Shear (Comp.)**
Resin Content:	39 ~ 45 %(w)	**Composite Density:** 1.490 ~ 1.507 g/cc	**Gr/Ep**
Fiber Volume:	48.6 ~ 50.2 % (v)	**Void Content:** 1.54 ~ 2.63 % (v)	**TCA T700S-12K-50C/#2510 Plain Weave Fabric**
Ply Thickness	0.0083 ~ 0.0087 inch		
Test Method:	ASTM D5961-96 (modified)	**Modulus calculation:** N/A	

Test Temperature [°F]	-65						75						180					
Moisture Conditioning	Dry						Dry						equilibrium					
Equilibrium at T, RH	as fabricated						as fabricated						145 F, 85%					
Laminate Lay-up [%, 0°/45°/90°]	**40/20/40**		**25/50/25**		**10/80/10**		**40/20/40**		**25/50/25**		**10/80/10**		**40/20/40**		**25/50/25**		**10/80/10**	
	Nominal	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**
Bearing-Bypass, Double Shear																		
Bearing Strength at Ult. Load, (ksi)																		
Mean							60.4	60.6	54.9	55.1	81.1	80.9						
Minimum							35.9	35.8	40.1	40.8	46.1	46.6						
Maximum							78.5	79.1	70.5	70.3	113	112						
COV, %							26.6	26.9	26.7	24.8	31.5	31.0						
B-Value							42.5	42.7	38.6	38.8	57.1	56.9						
Ult. Bypass Strength, (ksi)																		
Mean							57.4	57.7	46.5	46.9	35.1	35.2						
Minimum							53.1	53.7	44.3	44.3	30.6	30.4						
Maximum							60.6	61.0	48.4	49.1	40.5	41.0						
COV, %							5.36	5.40	3.37	4.01	11.2	11.7						
B-Value							40.4	40.6	32.7	33.0	24.7	24.8						
Bearing Load at Ult. Load, [%(w)]																		
Mean								14.9		16.4		27.7						
Minimum								9.70		12.4		15.9						
Maximum								19.8		21.0		38.0						
COV, %								25.1		23.5		30.7						
No. of Specimens								5		5		5						
Prepreg Batch								AF010271		AF010271		AF010271						

Style 7781 Finish 558/#2510 8-Harness Glass Fiber Fabric (FGF7781-07I)

3.3. Summary Results of Style 7781 Finish 558/#2510 8-H Glass Fabric

PREPREG MATERIAL: Style 7781 Finish 558/#2510 8-Harness Glass Fabric

PREPREG: Toray Composites FGF7781-07I

FIBER: Style 7781 Finish 558 **RESIN:** Toray Composites #2510

Tg (Dry): 290 °F **Tg (Wet):** 261 °F **Tg METHOD:** DMA (SRM 18-94)

PROCESSING: Vacuum bag cure (22 inches Hg, minimum); 270 ± 3 °F for 120 +10/-0 minutes

Date of fiber manufacture:	**Jan-00**	**Date of testing:**	**Aug-01 ~ May-02**
Date of resin manufacture:	**Mar-01**	**Date of analysis:**	**Oct-01 ~ Oct-02**
Date of prepreg manufacture:	**Mar-01**	**Date of data submittal:**	
Date of composite manufacture:	**May-01 ~ Oct-01**		

LAMINATE MECHANICAL PROPERTY SUMMARY

Data Reported as: Normalized using Nominal Thickness and Width

Test Property	Layup:		40/20/40		25/50/25		10/80/10	
	Test Condition	Unit	B-Value	Mean	B-Value	Mean	B-Value	Mean
No Hole Tension								
Ult. Strength	75°F/Dry	ksi	38.1	49.4	39.0	50.6	27.2	35.3
Modulus		msi	-	3.37	-	2.92	-	2.42
Filled Hole Tension	-65°F/Dry	ksi	27.8	35.2	25.6	32.4	25.5	32.3
Ult. Strength	75°F/Dry		22.1	28.0	20.8	26.4	21.2	26.9
Open Hole Tension	-65°F/Dry		-	-	24.8	31.4	24.9	31.6
Ult. Strength	75°F/Dry	ksi	-	-	19.6	24.8	20.6	26.1
	180°F/Wet		-	-	16.7	20.7	16.7	20.7
No Hole Compression								
Ult. Strength	75°F/Dry	ksi	49.2	62.5	49.4	62.8	35.8	45.5
Modulus		msi	-	4.36	-	3.86	-	3.12
Open Hole Compression	75°F/Dry	ksi	32.1	39.9	29.2	36.3	25.9	32.2
Ult. Strength	180°F/Wet		23.5	29.2	22.5	27.9	19.6	24.4
Filled Hole Compression								
Ult. Strength	180°F/Wet	ksi	30.5	37.9	30.5	37.9	22.9	28.5
Bearing Tension, Double Shear	75°F/Dry	ksi	61.8	86.1	65.3	90.9	-	-
Ult. Strength	180°F/Wet		45.5	63.4	56.2	78.3	-	-
Bearing Tension, Single Shear	75°F/Dry	ksi	31.5	43.9	33.8	47.1	-	-
Strength at 4% Hole Elongation (Stabilized)	180°F/Wet		24.9	34.7	30.9	43.0	-	-
Bearing-Bypass Single Shear, Tension								
Ult. Bearing Strength			51.3	72.9	47.2	67.1	53.1	75.5
Ult. Gross Bypass Strength	75°F/Dry	ksi	17.1	24.3	15.8	22.4	17.5	24.8
Ult. Net Bypass Strength			8.52	12.1	7.88	11.2	8.73	12.4
Bearing-Bypass Single Shear, Comp.								
Ult. Bearing Strength	75°F/Dry	ksi	61.7	85.9	72.5	101	59.8	83.2
Ult. Bypass Strength			10.3	14.3	12.1	16.9	10.0	13.9
Bearing-Bypass, Double Shear, Tension								
Bearing Strength at Ultimate Load			20.5	29.1	28.8	40.9	22.5	32.0
Ult. Gross Bypass Strength	75°F/Dry	ksi	17.4	24.7	16.7	23.7	18.4	26.1
Ult. Net Bypass Strength			13.9	19.8	11.9	16.9	14.6	20.8
Actual Bearing Load at Ult. Load		%	-	19.7	-	28.7	-	20.4
Bearing-Bypass, Double Shear, Comp.								
Bearing Strength at Ultimate Load		ksi	32.0	44.5	45.9	63.9	43.7	60.9
Ult. Bypass Strength	75°F/Dry		33.0	46.0	27.4	38.2	21.4	29.8
Actual Bearing Load at Ult. Load		%	-	13.9	-	21.8	-	25.5

3.3.1 Individual Test Summaries --- FGF7781-07I

3.3.1.1. No Hole Tension

Material:	TCA Style 7781 Finish 558/#2510			**No Hole Tension**
Resin Content:	35 ~ 41 %(w)	**Composite Density:**	1.791 ~ 1.824 g/cc	**Glass/Epoxy**
Fiber Volume:	43.4~ 45.6 % (v)	**Void Content:**	2.42 ~ 3.01 % (v)	**TCA Style 7781 Finish 558/#2510 8-H Glass Fabric**
Ply Thickness	0.0099 ~ 0.0101 inch			
Test Method:	ASTM D5766-95 (modified); SACMA SRM 5 (modified)	**Modulus calculation:**	difference between 1000 ~ 3000 με	

Test Temperature [°F]	-65						75						180					
Moisture Conditioning	Dry						Dry						equilibrium					
Equilibrium at T, RH	as fabricated						as fabricated						145 F, 85%					
Laminate Lay-up [%, 0°/45°/90°]	**40/20/40**		**25/50/25**		**10/80/10**		**40/20/40**		**25/50/25**		**10/80/10**		**40/20/40**		**25/50/25**		**10/80/10**	
	Nominal	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**
No Hole Tension																		
Ultimate Strength (ksi)																		
Mean							49.4	50.0	50.6	50.4	35.3	35.1						
Minimum							47.6	48.3	49.5	49.2	35.1	34.9						
Maximum							51.9	52.8	51.4	51.5	35.5	35.2						
COV, %							4.45	4.96	1.91	2.21	0.58	0.37						
B-Value							38.1	38.6	39.0	38.9	27.2	27.1						
No. of Specimens							3		3		3							
Prepreg Batch							AF010363		AF010363		AF010363							
Modulus (msi)																		
Mean							3.37	3.40	2.92	2.91	2.42	2.41						
Minimum							3.35	3.37	2.91	2.89	2.40	2.38						
Maximum							3.40	3.42	2.95	2.92	2.44	2.45						
COV, %							0.75	0.78	0.67	0.6	0.86	1.57						
No. of Specimens							3		3		3							
Prepreg Batch							AF010363		AF010363		AF010363							

3.3.1.2 Filled Hole Tension

Material:	TCA Style 7781 Finish 558/#2510			**Filled Hole Tension**
Resin Content:	35 ~ 41 %(w)	**Composite Density:**	1.809 ~ 1.830 g/cc	**Glass/Epoxy**
Fiber Volume:	44.3 ~ 45.8 % (v)	**Void Content:**	2.29 ~ 3.01 % (v)	**TCA Style 7781 Finish 558/#2510 8-H Glass Fabric**
Ply Thickness	0.0099 ~ 0.0104 inch			
Test Method:	ASTM D5766-95 (modified); SACMA SRM 5 (modified)	**Modulus calculation:**	N/A	

Test Temperature [°F]	-65						75						180					
Moisture Conditioning	Dry						Dry						equilibrium					
Equilibrium at T, RH	as fabricated						as fabricated						145 F, 85%					
Laminate Lay-up [%, 0°/45°/90°]	**40/20/40**		**25/50/25**		**10/80/10**		**40/20/40**		**25/50/25**		**10/80/10**		**40/20/40**		**25/50/25**		**10/80/10**	
	Nominal	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**
Filled Hole Tensile																		
Ultimate Strength (ksi)																		
Mean	35.2	34.4	32.4	31.8	32.3	31.7	28.0	27.7	26.4	25.8	26.9	26.2						
Minimum	34.3	33.8	31.7	31.3	31.4	31.4	27.5	27.0	25.8	25.3	26.7	25.9						
Maximum	36.3	35.0	32.8	32.0	33.1	32.4	28.4	28.0	26.9	26.3	27.2	26.5						
COV, %	2.19	1.55	1.28	0.86	2.12	2.18	1.4	1.72	1.67	1.55	0.68	0.82						
B-Value	27.8	27.1	25.6	25.1	25.5	25.0	22.1	21.8	20.8	20.4	21.2	20.7						
No. of Specimens	5		5		5		5		5		5							
Prepreg Batch	AF010363		AF010363		AF010363		AF010363		AF010363		AF010363							

3.3.1.3 Open Hole Tension

Material:	TCA Style 7781 Finish 558/#2510		**Open Hole Tension**
Resin Content:	35 ~ 41 %(w)	**Composite Density:** 1.803 ~ 1.819 g/cc	**Glass/Ep0xy**
Fiber Volume:	43.8 ~ 45.3 % (v)	**Void Content:** 2.17 ~ 3.33 % (v)	**TCA Style 7781 Finish 558/#2510 8-h Glass Fabric**
Ply Thickness	0.0101 ~ 0.0103 inch		
Test Method:	ASTM D5766-95; SACMA SRM 5	**Modulus calculation:** N/A	

Test Temperature [°F]	-65						75						180					
Moisture Conditioning	Dry						Dry						equilibrium					
Equilibrium at T, RH	as fabricated						as fabricated						145 F, 85%					
Laminate Lay-up [%, 0°/45°/90°]	**40/20/40**		**25/50/25**		**10/80/10**		**40/20/40**		**25/50/25**		**10/80/10**		**40/20/40**		**25/50/25**		**10/80/10**	
	Nominal	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**
Open Hole Tension																		
Ultimate Strength (ksi)																		
Mean			31.4	30.9	31.6	30.9			24.8	24.5	26.1	25.6			20.7	20.3	20.7	20.2
Minimum			31.0	30.4	31.3	30.5			24.5	24.2	26.0	25.3			20.3	20.0	20.4	19.8
Maximum			31.8	31.4	31.8	31.3			25.5	24.8	26.2	25.8			21.0	20.6	20.9	20.6
COV, %			0.90	1.30	0.88	1.07			1.71	1.17	0.38	0.83			1.29	0.99	0.95	1.42
B-Value			24.8	24.4	24.9	24.4			19.6	19.3	20.6	20.2			16.7	16.3	16.7	16.3
No. of Specimens			5		5				5		5				5		5	
Prepreg Batch			AF010363		AF010363				AF010363		AF010363				AF010363		AF010363	

3.3.1.4. No Hole Compression

Material:	TCA Style 7781 Finish 558/#2510			**No Hole Compression**	
Resin Content:	35 ~ 41 %(w)	**Composite Density:**	1.791 ~ 1.824 g/cc	**Gr/Ep**	
Fiber Volume:	43.4 ~ 45.6 % (v)	**Void Content:**	2.42 ~ 3.01 % (v)	**TCA T700S-12K-50C/#2510 Plain Weave Fabric**	
Ply Thickness	0.0099 ~ 0.0105 inch				
Test Method:	ASTM D6484-99 (modified); SACMA SRM 3 (modified)	**Modulus calculation:**	between 1000 ~ 3000 με		

Test Temperature [°F]	-65						75						180					
Moisture Conditioning	Dry						Dry						equilibrium					
Equilibrium at T, RH	as fabricated						as fabricated						145 F, 85%					
Laminate Lay-up [%, 0°/45°/90°]	**40/20/40**		**25/50/25**		**10/80/10**		**40/20/40**		**25/50/25**		**10/80/10**		**40/20/40**		**25/50/25**		**10/80/10**	
	Nominal	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**
No Hole Compression																		
Ultimate Strength (ksi)																		
Mean							62.5	62.3	62.8	61.8	45.5	44.2						
Minimum							60.6	60.2	60.6	59.3	45.2	43.2						
Maximum							64.3	64.7	64.3	63.6	45.9	45.0						
COV, %							3.01	3.58	3.16	3.60	0.71	2.10						
B-Value							49.2	49.0	49.4	48.7	35.8	34.8						
No. of Specimens							3		3		3							
Prepreg Batch							AF010363		AF010363		AF010363							
Modulus (msi)																		
Mean							4.36	4.35	3.86	3.80	3.12	3.03						
Minimum							4.34	4.31	3.83	3.79	3.07	3.02						
Maximum							4.39	4.41	3.89	3.81	3.19	3.05						
COV, %							0.60	1.22	0.75	0.26	1.99	0.50						
No. of Specimens							3		3		3							
Prepreg Batch							AF010363		AF010363		AF010363							

3.3.1.5 Open Hole Compression

Material:	TCA Style 7781 Finish 558/#2510			**Open Hole Compression**
Resin Content:	35 ~ 41 %(w)	**Composite Density:**	1.800 ~ 1.834 g/cc	**Glass/Epoxy**
Fiber Volume:	43.8 ~ 45.9 % (v)	**Void Content:**	2.15 ~ 3.33 % (v)	**TCA Style 7781 Finish 558/#2510 8-H Glass Fabric**
Ply Thickness	0.0098 ~ 0.0103 inch			
Test Method:	ASTM D6484-99; SACMA SRM 3	**Modulus calculation:**	N/A	

Test Temperature [°F]	-65						75						180					
Moisture Conditioning	Dry						Dry						equilibrium					
Equilibrium at T, RH	as fabricated						as fabricated						145 F, 85%					
Laminate Lay-up [%, 0°/45°/90°]	**40/20/40**		**25/50/25**		**10/80/10**		**40/20/40**		**25/50/25**		**10/80/10**		**40/20/40**		**25/50/25**		**10/80/10**	
	Nominal	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**
Open Hole Compression																		
Ultimate Strength (ksi)																		
Mean							39.9	39.6	36.3	35.6	32.2	31.2	29.2	29.4	27.9	27.1	24.4	24.0
Minimum							37.8	37.4	35.7	35.0	31.7	30.7	28.2	28.6	26.3	25.8	23.9	23.3
Maximum							41.6	41.7	37.0	36.3	32.5	31.6	30.0	30.3	28.7	28.1	25.2	24.8
COV, %							3.61	3.90	1.49	1.64	1.06	1.10	2.42	2.45	4.19	4.00	2.19	2.43
B-Value							32.1	31.9	29.2	28.7	25.9	25.1	23.5	23.7	22.5	21.8	19.6	19.3
No. of Specimens							5		5		5		5		5		5	
Prepreg Batch							AF010363		AF010363		AF010363		AF010363		AF010363		AF010363	

3.3.1.6 Filled Hole Compression

				Filled Hole Compression
Material:	TCA Style 7781 Finish 558/#2510			**Glass/Epoxy**
Resin Content:	35 ~ 41 %(w)	**Composite Density:**	1.809~ 1.815 g/cc	**TCA Style 7781 Finish 558/#2510 8-H Glass Fabric**
Fiber Volume:	44.1 ~ 46.0 % (v)	**Void Content:**	2.23 ~ 2.80 % (v)	
Ply Thickness	0.0098 ~ 0.0103 inch			
Test Method:	ASTM D6484-99 (modified); SACMA SRM 3 (modified)	**Modulus calculation:**	N/A	

Test Temperature [°F]	-65						75						180					
Moisture Conditioning	Dry						Dry						equilibrium					
Equilibrium at T, RH	as fabricated						as fabricated						145 F, 85%					
Laminate Lay-up [%, 0°/45°/90°]	**40/20/40**		**25/50/25**		**10/80/10**		**40/20/40**		**25/50/25**		**10/80/10**		**40/20/40**		**25/50/25**		**10/80/10**	
	Nominal	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**
Filled Hole Compression																		
Ultimate Strength (ksi)																		
Mean													37.9	38.1	37.9	37.4	28.5	27.9
Minimum													36.3	36.2	36.2	35.5	28.0	27.5
Maximum													39.0	39.5	39.3	38.5	29.1	28.4
COV, %													3.25	3.57	3.34	3.22	1.61	1.37
B-Value													30.5	30.7	30.5	30.1	22.9	22.5
No. of Specimens													5		5		5	
Prepreg Batch													AF010363		AF010363		AF010363	

3.3.1.7 Bearing Tension, Double Shear

Material:	TCA Style 7781 Finish 558/#2510		**Bearing Tension, Double Shear**
Resin Content:	35 ~ 41 %(w)	**Composite Density:** 1.793 ~ 1.824 g/cc	**Glass/Epoxy**
Fiber Volume:	44.1 ~ 45.2 % (v)	**Void Content:** 2.22 ~ 3.50 % (v)	**TCA Style 7781 Finish 558/#2510 8-H Glass Fabric**
Ply Thickness	0.0099 ~ 0.0104 inch		
Test Method:	ASTM D5961-96	**Modulus calculation:** N/A	

Test Temperature [°F]	-65						75						180					
Moisture Conditioning	Dry						Dry						equilibrium					
Equilibrium at T, RH	as fabricated						as fabricated						145 F, 85%					
Laminate Lay-up [%, 0°/45°/90°]	**40/20/40**		**25/50/25**		**10/80/10**		**40/20/40**		**25/50/25**		**10/80/10**		**40/20/40**		**25/50/25**		**10/80/10**	
	Nominal	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**
Bearing, Double Shear																		
Ultimate Strength (ksi)																		
Mean							86.1	82.4	90.9	88.0			63.4	62.4	78.3	77.2		
Minimum							84.4	80.6	89.5	86.4			60.7	59.7	73.7	73.6		
Maximum							86.9	83.2	93.1	90.7			65.4	63.5	82.9	82.6		
COV, %							1.15	1.26	1.62	1.82			2.7	2.54	4.92	4.93		
B-Value							61.8	59.2	65.3	63.2			45.5	44.8	56.2	55.4		
No. of Specimens							5		5				5		5			
Prepreg Batch							AF010363		AF010363				AF010363		AF010363			

3.3.1.8 Bearing Tension, Single Shear

Material:	TCA Style 7781 Finish 558/#2510		**Bearing Tension, Single Shear**
Resin Content:	35 ~ 41 %(w)	**Composite Density:** 1.795~ 1.821 g/cc	**Glass/Epoxy**
Fiber Volume:	44.3 ~ 45.2 % (v)	**Void Content:** 2.16 ~ 3.56 % (v)	**TCA Style 7781 Finish 558/#2510 8-H Glass Fabric**
Ply Thickness	0.0100~ 0.0105 inch		
Test Method:	ASTM D5961-96 (modified)	**Modulus calculation:** N/A	

Test Temperature [°F]	-65						75						180					
Moisture Conditioning	Dry						Dry						equilibrium					
Equilibrium at T, RH	as fabricated						as fabricated						145 F, 85%					
Laminate Lay-up [%, 0°/45°/90°]	**40/20/40**		**25/50/25**		**10/80/10**		**40/20/40**		**25/50/25**		**10/80/10**		**40/20/40**		**25/50/25**		**10/80/10**	
	Nominal	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**
Bearing, Single Shear Strength @ 4% Hole Elongation (Stabilized) [ksi]																		
Mean							43.9	42.7	47.1	45.7			34.7	33.7	43.0	41.6		
Minimum							42.5	41.6	42.9	41.4			33.5	32.3	37.5	36.4		
Maximum							45.0	44.2	49.7	48.1			36.7	36	48.1	45.8		
COV, %							2.35	2.21	5.88	5.27			3.64	3.92	8.99	7.77		
B-Value							31.5	30.7	33.8	32.8			24.9	24.2	30.9	29.9		
No. of Specimens							5		5				5		5			
Prepreg Batch							AF010363		AF010363				AF010363		AF010363			

3.3.1.9 Bearing-Bypass Tension, Single Shear

Material:	TCA Style 7781 Finish 558/#2510		**Bearing-Bypass, Single Shear (Tension)**
Resin Content:	35 ~ 41 %(w)	**Composite Density:** 1.799 ~ 1.817 g/cc	**Gass/Epoxy**
Fiber Volume:	44.1 ~ 45.4 % (v)	**Void Content:** 2.41 ~ 3.51 % (v)	**TCA Style Finish 558/#2510 8-H Glass Fabric**
Ply Thickness	0.0101 ~ 0.0106 inch		
Test Method:	ASTM D5961-96 (modified)	**Modulus calculation:** N/A	

Test Temperature [°F]	-65						75						180					
Moisture Conditioning	Dry						Dry						equilibrium					
Equilibrium at T, RH	as fabricated						as fabricated						145 F, 85%					
Laminate Lay-up [%, 0°/45°/90°]	**40/20/40**		**25/50/25**		**10/80/10**		**40/20/40**		**25/50/25**		**10/80/10**		**40/20/40**		**25/50/25**		**10/80/10**	
	Nominal	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**
Bearing-Bypass, Single Shear																		
Ult. Bearing Strength, (ksi)																		
Mean							72.9	70.7	67.1	64.9	74.5	71.5						
Minimum							70.7	68.8	65.8	64.3	72.6	70.2						
Maximum							74.7	71.9	68.2	65.5	75.2	73.7						
COV, %							2.03	1.59	1.41	0.55	1.49	1.76						
B-Value							51.3	49.8	47.2	45.7	53.1	50.30						
Ult. Gross Bypass Strength, (ksi)																		
Mean							24.3	23.6	22.4	21.7	24.8	23.9						
Minimum							23.6	23	21.9	21.5	24.2	23.4						
Maximum							24.9	24	22.7	21.9	25.1	24.6						
COV, %							2.03	0.37	1.41	0.61	1.49	1.74						
B-Value							17.1	16.6	15.8	15.3	17.5	16.8						
Ult. Net Bypass Strength, (ksi)																		
Mean							12.1	11.8	11.2	10.8	12.4	12.0						
Minimum							11.8	11.5	11.0	10.7	12.1	11.7						
Maximum							12.4	12	11.4	10.9	12.5	12.3						
COV, %							2.03	2.60	1.41	0.62	1.49	1.66						
B-Value							8.52	8.31	7.88	7.60	8.73	8.45						
No. of Specimens							5		5		5							
Prepreg Batch							AF010363		AF010363		AF010363							

3.3.1.10 Bearing-Bypass Compression, Single Shear

Material:	TCA Style 7781 Finish 558/#2510		**Bearing-Bypass, Single Shear (Compression)**
Resin Content:	35 ~ 41 %(w)	**Composite Density:** 1.800 ~ 1.833 g/cc	**Glass/Epoxy**
Fiber Volume:	44.2 ~ 46.1 % (v)	**Void Content:** 2.44 ~ 3.22 % (v)	**TCA Style 7781 Finish 558/#2510 8-H Glass Fabric**
Ply Thickness	0.0101 ~ 0.0106 inch		
Test Method:	ASTM D5961-96 (modified)	**Modulus calculation:** N/A	

Test Temperature [°F]	-65						75						180					
Moisture Conditioning	Dry						Dry						equilibrium					
Equilibrium at T, RH	as fabricated						as fabricated						145 F, 85%					
Laminate Lay-up [%, 0°/45°/90°]	**40/20/40**		**25/50/25**		**10/80/10**		**40/20/40**		**25/50/25**		**10/80/10**		**40/20/40**		**25/50/25**		**10/80/10**	
	Nominal	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**
Bearing-Bypass, Single Shear																		
Ult. Bearing Strength, (ksi)																		
Mean							85.9	82.8	101	98.4	83.2	80.4						
Minimum							82.5	77.8	99.2	96.3	79.4	76.3						
Maximum							88.5	87.0	103	100	84.9	83.2						
COV, %							2.51	3.55	1.54	1.36	2.66	2.86						
B-Value							61.7	59.5	72.5	70.7	59.8	57.7						
Ult. Bypass Strength, (ksi)																		
Mean							14.3	13.8	16.9	16.4	13.9	13.4						
Minimum							13.7	13.0	16.5	16.1	13.2	12.8						
Maximum							14.7	14.5	17.2	16.7	14.1	13.9						
COV, %							2.51	3.49	1.54	1.38	2.66	2.74						
B-Value							10.3	9.91	12.1	11.8	10.0	9.62						
No. of Specimens							5		5		5							
Prepreg Batch							AF010363		AF010363		AF010363							

3.3.1.11 Bearing-Bypass Tension, Double Shear

Material:	TCA Style 7781 Finish 558/#2510		**Bearing-Bypass, Double Shear (Tension)**
Resin Content:	35 ~ 41 %(w)	**Composite Density:**	1.808 ~ 1.818 g/cc	**Glass/Epoxy**
Fiber Volume:	44.1 ~ 45.3 % (v)	**Void Content:**	2.24 ~ 3.11 % (v)	**TCA Style 7781 Finish 558/#2510 8-H Glass Fabric**
Ply Thickness	0.0099 ~ 0.0104 inch		
Test Method:	ASTM D5961-96 (modified)	**Modulus calculation:**	N/A

Test Temperature [°F]	-65						75						180					
Moisture Conditioning	Dry						Dry						equilibrium					
Equilibrium at T, RH	as fabricated						as fabricated						145 F, 85%					
Laminate Lay-up [%, 0°/45°/90°]	**40/20/40**		**25/50/25**		**10/80/10**		**40/20/40**		**25/50/25**		**10/80/10**		**40/20/40**		**25/50/25**		**10/80/10**	
	Nominal	Measured	Nominal	Measured	Nominal	Measured	Nominal	Measured	Nominal	Measured	Nominal	Measured	Nominal	Measured	Nominal	Measured	Nominal	Measured
Bearing-Bypass, Double Shear																		
Bearing Strength at Ult. Load, (ksi)																		
Mean							29.1	28.8	40.9	39.6	32.0	31.2						
Minimum							27.4	27.1	36.0	35.1	30.6	30.0						
Maximum							31.9	31.2	44.3	42.9	34.1	33.0						
COV, %							6.15	5.77	8.01	7.83	4.42	4.44						
B-Value							20.5	20.3	28.8	27.9	22.5	22.0						
Ult. Gross Bypass Strength, (ksi)																		
Mean							24.7	24.4	23.7	23.0	26.1	25.6						
Minimum							24.4	23.9	23.2	22.5	25.8	25.3						
Maximum							24.8	25.0	24.5	23.8	26.3	25.7						
COV, %							0.67	1.68	2.34	2.23	0.75	0.60						
B-Value							17.4	17.2	16.7	16.2	18.4	18.0						
Ult. Net Bypass Strength, (ksi)																		
Mean							19.8	19.6	16.9	16.4	20.8	20.3						
Minimum							19.1	18.7	16.2	15.7	20.4	19.8						
Maximum							20.1	20.2	17.5	17.0	21.2	20.7						
COV, %							2.21	2.97	3.44	3.55	1.72	1.62						
B-Value							13.9	13.8	11.9	11.5	14.6	14.3						
Bearing Load at Ult. Load, [%(w)]																		
Mean								19.7		28.7		20.4						
Minimum								18.5		25.9		19.5						
Maximum								21.8		31.3		21.8						
COV, %								6.71		7.37		4.15						
No. of Specimens								5		5		5						
Prepreg Batch								AF010363		AF010363		AF010363						

3.3.1.12 Bearing-Bypass Compression, Double Shear

Material:	TCA Style 7781 Finish 558/#2510			**Bearing-Bypass, Double Shear (Compression)**	
Resin Content:	35 ~ 41 %(w)	**Composite Density:**	1.808 ~ 1.818 g/cc	**Glass/Epoxy**	
Fiber Volume:	44.1 ~ 45.3 % (v)	**Void Content:**	2.24 ~ 3.11 % (v)	**TCA Style 7781 Finish 558/#2510 8-H Glass Fabric**	
Ply Thickness	0.0099 ~ 0.0104 inch				
Test Method:	ASTM D5961-96 (modified)	**Modulus calculation:**	N/A		

Test Temperature [°F]	-65						75						180					
Moisture Conditioning	Dry						Dry						equilibrium					
Equilibrium at T, RH	as fabricated						as fabricated						145 F, 85%					
Laminate Lay-up [%, 0°/45°/90°]	**40/20/40**		**25/50/25**		**10/80/10**		**40/20/40**		**25/50/25**		**10/80/10**		**40/20/40**		**25/50/25**		**10/80/10**	
	Nominal	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**	**Nominal**	**Measured**
Bearing-Bypass, Double Shear																		
Bearing Strength at Ult. Load, (ksi)																		
Mean							44.5	43.3	63.9	61.6	60.9	58.8						
Minimum							32.9	32.1	48.0	46.3	42.9	41.5						
Maximum							53.0	51.7	86.8	83.7	93.7	89.8						
COV, %							17.6	17.5	22.6	22.6	33.2	32.8						
B-Value							32.0	31.1	45.9	44.2	43.7	42.2						
Ult. Bypass Strength, (ksi)																		
Mean							46.0	44.9	38.2	36.9	29.8	28.9						
Minimum							43.1	41.9	36.5	35.1	23.6	22.6						
Maximum							49.8	48.9	41.4	40.0	33.8	32.7						
COV, %							5.28	5.54	5.26	5.37	13.3	13.5						
B-Value							33.0	32.2	27.4	26.50	21.4	20.8						
Bearing Load at Ult. Load, [%(w)]																		
Mean								13.9		21.8		25.5						
Minimum								9.93		16.2		17.5						
Maximum								16.4		28.4		39.8						
COV, %								18.6		20.7		34.8						
No. of Specimens								5		5		5						
Prepreg Batch								AF010363		AF010363		AF010363						

APPENDIX A. PHYSICAL AND MECHANICAL TEST PROCEDURES

A.1. PHYSICAL PROPERTIES

A.1.1 Laminate Density

The laminate (composite) density of the specimens was performed in accordance with ASTM D792 Method A and TCWIN-U-M215. The density was calculated as follows:

$$\rho_C = \rho_L \left(\frac{W_1}{W_1 - W_2} \right)$$

where: ρ_C = Composite density, g/cc
ρ_L = density of ethanol or water, g/cc
W_1 = weight of sample in air
W_2 = weight of sample in ethanol or water

A.1.2 Fiber Volume

The fiber volume of each mechanical test laminate was determined in accordance with ASTM D3171-90 for the carbon fiber reinforcement material. The fiber volume of each mechanical test laminate was determined in accordance with ASTM D2584-94 for the glass reinforcement material. The calculation was performed in accordance with the following equation;

$$V_F = \rho_C * \left(\frac{W_F}{\rho_F} \right)$$

where:
V_F = calculated fiber volume, %
ρ_C = laminate density, g/cc
W_F = weight of fibrous residue, g
ρ_F = nominal fiber density, g/cc

A.1.3 Resin Volume

The resin volume of each mechanical test laminate was determined in accordance with ASTM D3171-90 for the carbon fiber reinforcement material. The resin volume of each mechanical test laminate was determined in accordance with ASTM D2584-94 for the glass reinforcement material. The calculation was performed in accordance with the following equation;

$$V_R = \rho_C * \left(\frac{100 - W_F}{\rho_R} \right)$$

where:
V_F = calculated fiber volume, %(v)
ρ_C = laminate density, g/cc
W_F = weight of fibrous residue, g
ρ_R = nominal cured neat resin density, g/cc = 1.267

A.1.4 Void Content

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

$$V_V = 100 - \left[\rho_C * \left(\frac{100 - W_F}{\rho_R} + \frac{W_F}{\rho_F} \right) \right]$$

where:

V_V = Void content, %(v)
ρ_C = laminate density, g/cc
W_F = weight of fibrous residue, g
ρ_F = nominal fiber density, g/cc
ρ_R = nominal cured neat resin density, g/cc = 1.267

A.1.5 Cured Laminate Tg by DMA

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

A.2. LAMINATE TENSION TEST PROPERTIES

Note: The following descriptions apply to No Hole Tension, Open Hole Tension and Filled Hole Tension specimens unless otherwise specified.

The test matrix for the laminate tension test properties were presented in Table 1.3.1.1 and Table 1.3.2.1. These included the lay-up and the number of specimens tested. All notched laminate (open hole and filled hole tension) testing were conducted on a specimen with a centrally located 0.25 inch diameter hole and a w/D ratio of 6. The no hole tension and filled hole tension test properties were performed in accordance with ASTM D5766-95 (modified) and SACMA SRM 5-94 (modified). The open hole tension was conducted in accordance with ASTM D5766-95 and SACMA SRM 5-94.

The ply stacking sequence described in Tables 2.2, 2.3 and 2.4 were used to fabricate the initial test panels. The test specimens were wet cut, to nominal length of 12.0 inches and a nominal width of 1.50 inches. Moreover, the notched specimens were prepared in accordance with TCWIN-U-M105 to a nominal diameter of 0.250 inch. Each specimen was labeled with batch number, autoclave number (“A” or “B”), unique test panel number and individual specimen number.

The widths of the test specimens were measured with digital ¼” diameter flat anvil and spindle micrometer. The thickness of the specimens were measured with digital ¼” diameter

hemispherical anvil and spindle micrometer. The hole diameter of the notched specimens was measured with an inside micrometer. The measurements were recorded onto TCFOR-Q-033. The width, thickness and hole diameter measurements were entered into the test frame computer along with the material type, batch number, test condition and specimen identification.

MTS Alliance RF/300 load frame, operated in stroke control mode, was used to apply loading to the specimens at a crosshead rate of 0.05 inch/minute. The loads and crosshead displacements or longitudinal strains were recorded throughout each test using a calibrated, computerized data assimilation system.

A.2.1 Tensile Calculations

The ultimate strength of the notched (open hole and filled hole tension) specimens is calculated based on the gross cross-sectional area, disregarding the presence of the hole.

A.2.1.1 Tensile Stress (Actual)

$$F^{tu} = \frac{P}{w * t * \left(\frac{1{,}000\,psi}{ksi}\right)}$$

where:

F^{tu} = the ultimate tensile stress (ksi)
P = the maximum load, (lb.)
w = the averaged measured width of the specimen (inch)
t = the averaged measured thickness of the specimen (inch)

A.2.1.2 Tensile Stress (Nominal)

The nominal tensile strength was calculated using the following equation:

$$F^{tu} = \frac{P}{W * T * \left(\frac{1{,}000\,psi}{ksi}\right)}$$

where:

W = the nominal width of the specimen (inch)
T = the nominal thickness of the specimen (inch)

A.2.1.3 Tensile Modulus of Elasticity (Actual)

$$E^{t} = \frac{P_{0.3\%} - P_{0.1\%}}{w * t * \left(\varepsilon_{0.3\%} - \varepsilon_{0.1\%}\right) * \left(\frac{1{,}000{,}000\,psi}{msi}\right)}$$

where:

E^{t} = the tensile modulus of elasticity (msi)
w = the averaged measured width of the specimen (inch)
t = the averaged measured thickness of the specimen (inch)

$P_{0.3\%}$ = the applied load at 3000 microstrain (kips)
$P_{0.1\%}$ = the applied load at 1000 microstrain (kips)
$\varepsilon_{0.3\%}$ = 0.3% measured longitudinal strain = 3000 microinches/inch (μin/in)
$\varepsilon_{0.1\%}$ = 0.1% measured longitudinal strain = 1000 microinches/inch (μin/in)

A.2.1.4 Tensile Modulus of Elasticity (Nominal)

$$E^t = \frac{P_{0.3\%} - P_{0.1\%}}{W * T * (\varepsilon_{0.3\%} - \varepsilon_{0.1\%}) * \left(\frac{1{,}000{,}000\,psi}{msi}\right)}$$

where:
W = the nominal width of the specimen (inch)
T = the nominal thickness of the specimen (inch)

A.3. LAMINATE COMPRESSION TEST PROPERTIES

Note: The following descriptions apply to No Hole Compression, Open Hole Compression and Filled Hole Compression specimens unless otherwise specified.

The test matrix for the laminate compression test properties were presented in Table 1.3.1.2 and Table 1.3.2.2. These included the lay-up and the number of specimens tested. All notched laminate (open hole and filled hole compression) testing were conducted on a specimen with a centrally located 0.25 inch diameter centerline hole and a w/D ratio of 6. The no hole compression and filled hole compression test properties were performed in accordance with ASTM D6484-99 (modified) and SACMA SRM 3-94 (modified). The open hole compression was conducted in accordance with ASTM D6484-99 and SACMA SRM 3-94.

The ply stacking sequence described in Tables 2.2, 2.3 and 2.4 were used to fabricate the initial test panels. The test specimens were wet cut to nominal length of 12.0 inches and a nominal width of 1.50 inches. Moreover, the notched specimens were prepared in accordance with TCWIN-U-M105 to a nominal diameter of 0.250 inch. Each specimen was labeled with batch number, autoclave number ("A" or "B"), unique test panel number and individual specimen number.

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

During testing, the specimen was face-supported in a multipiece bolted support fixture described in ASTM D6484 and SACMA SRM 3. The specimen/fixture assembly was clamped in a hydraulic wedge grips and the load was sheared into the support fixture and then sheared into the test specimen. MTS Alliance RF/300 load frame, operated in stroke control mode, was used to apply loading to the specimens at a crosshead rate of 0.05 inch/minute. The loads and crosshead

displacements or longitudinal strains were recorded throughout each test using a calibrated, computerized data assimilation system.

A.3.1 Compression Calculations

The ultimate strength of the notched (open hole and filled hole compression) specimens is calculated based on the gross cross-sectional area, disregarding the presence of the hole.

A.3.1.1 Compressive Stress (Actual)

$$F^{cu} = \frac{P}{w * t * \left(\frac{1{,}000\,psi}{ksi}\right)}$$

where:

F^{cu} = the ultimate compressive strength (ksi)
P = the maximum load, (lb.)
w = the averaged measured width of the specimen (inch)
t = the averaged measured thickness of the specimen (inch)

A.3.1.2 Compressive Stress (Nominal)

$$F^{cu} = \frac{P}{W * T * \left(\frac{1{,}000\,psi}{ksi}\right)}$$

where:

W = the nominal width of the specimen (inch)
T = the nominal thickness of the specimen (inch)

A.3.1.3 Compressive Modulus of Elasticity (Actual)

$$E^{c} = \frac{P_{0.3\%} - P_{0.1\%}}{w * t * \left(\varepsilon_{0.3\%} - \varepsilon_{0.1\%}\right) * \left(\frac{1{,}000{,}000\,psi}{msi}\right)}$$

where:

E^{c} = the compression modulus of elasticity (msi)
w = the averaged measured width of the specimen (inch)
t = the averaged measured thickness of the specimen (inch)
$P_{0.3\%}$ = the applied load at 3000 microstrain (kips)
$P_{0.1\%}$ = the applied load at 1000 microstrain (kips)
$\varepsilon_{0.3\%}$ = 0.3% measured longitudinal strain = 3000 microinches/inch (μin/in)
$\varepsilon_{0.1\%}$ = 0.1% measured longitudinal strain = 1000 microinches/inch (μin/in)

A.3.1.4 Compressive Modulus of Elasticity (Nominal)

$$E^c = \frac{P_{0.3\%} - P_{0.1\%}}{W * T * (\varepsilon_{0.3\%} - \varepsilon_{0.1\%}) * \left(\frac{1{,}000{,}000\,psi}{msi}\right)}$$

where:

W = the nominal width of the specimen (inch)
T = the nominal thickness of the specimen (inch)

A.4. LAMINATE BEARING TENSION TEST PROPERTIES

Note: The following descriptions apply to Stabilized Single Shear and Double Shear specimens unless otherwise specified.

The test matrix for the laminate bearing test properties were presented in Table 1.3.1.3 and Table 1.3.2.3. These included the lay-up and the number of specimens tested. All bearing tension (single shear and double shear) testing were conducted on specimens with a 0.25 inch diameter hole, and a w/D ratio of 6 and e/D ratio of 3. w = width of the specimens, D = the hole diameter and e = distance from the coupon end to the center of the hole. The stabilized single shear, bearing tension test property was performed in accordance with ASTM D5961-96 (modified). The double shear, bearing tension test property was performed in accordance with ASTM D5961-96.

The ply stacking sequence described in Tables 2.2, 2.3 and 2.4 were used to fabricate the initial test panels. The double shear test specimens were wet cut to nominal length of 6.75 inches, a nominal width of 1.50 inches and a nominal diameter of 0.25 inch centerline hole. The single shear test specimens were wet cut to nominal length of 6.00 inches, a nominal width of 1.50 inches and a nominal diameter of 0.25 inch centerline hole. The centerline hole of the double shear and single shear specimens were prepared in accordance with TCWIN-U-M105. Moreover, the centerline hole was located near the end of the test double shear and single shear specimens, as shown in TCQAL-T-1016, Figure 4 and 5. Each specimen was labeled with batch number, autoclave number (“A” or “B”), unique test panel number and individual specimen number.

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

During testing, the double shear specimen was loaded by means of a double-shear clevis fixture as shown in TCQAL-T-1016, Figure B.5 ~ B.9. The fixture was modified to meet the intended requirement of ASTM D5961, Figure 3and 4.

Meanwhile, the single shear specimen was composed of two like halves that were loaded in accordance with the test specimen configuration described in TCQAL-T-1016, Figure 5 to 4 % hole deformation, instead of ultimate bearing strength. The reason for loading the single shear specimens to 4 % hole deformation was due to specimen thickness. The specimen thickness should have been reduced to approximately half the current thickness because the two-single shear specimens were loaded at the same time. Given the thicker composite members of the joint, the fastener diameter-to-laminate thickness (D/t) ratio was too low and caused significant bolt bending that probably made the joint fastener critical instead of the desired bearing critical failure mode.

MTS Alliance RF/300 load frame, operated in stroke control mode, was used to apply loading to the specimens at a crosshead rate of 0.05 inch/minute. The loads and crosshead displacements or bearing strains were recorded throughout each test using a calibrated, computerized data assimilation system.

A.4.1 Bearing Calculations

A.4.1.1 Bearing Stress (Actual)

$$F^{bru} = \frac{P^{\max}}{d * t * \left(\frac{1{,}000\,psi}{ksi}\right)} \rightarrow \text{Double Shear}$$

$$F^{bru} = \frac{P^{\max} / 2}{d * t * \left(\frac{1{,}000\,psi}{ksi}\right)} \rightarrow \text{Single Shear}$$

where:

F^{bru} = the ultimate bearing strength (ksi)
P^{max} = the maximum load, (lb.)
d = the averaged measured hole diameter of the specimen (inch)
t = the averaged measured thickness of the specimen (inch)

A.4.1.2 Bearing Stress (Nominal)

$$F^{bru} = \frac{P^{\max}}{D * T * \left(\frac{1{,}000\,psi}{ksi}\right)} \rightarrow \text{Double Shear}$$

$$F^{bru} = \frac{P^{\max} / 2}{D * T * \left(\frac{1{,}000\,psi}{ksi}\right)} \rightarrow \text{Single Shear}$$

where:

D = the nominal hole diameter of the specimen (inch)
T = the nominal thickness of the specimen (inch)

A.5. LAMINATE BEARING-BYPASS INTERACTION TEST PROPERTIES

Note: The following descriptions apply to bearing-bypass (single shear) tension, bearing-bypass (single shear) compression, bearing-bypass (double shear) tension and bearing-bypass (double shear) compression specimens unless otherwise specified.

The test matrix for the laminate bearing-bypass interaction test properties were presented in Table 1.3.1.4 and Table 1.3.2.4. These included the lay-up and the number of specimens tested. The bearing-bypass (single shear and double shear) tension and compression testing were conducted on specimens with a 0.25 inch diameter hole, a w/D ratio of 6 and e/D ratio of 3. w = the width of the specimens, D = the hole diameter and e = distance from coupon end to center of the hole. The laminate bearing-bypass interaction test properties were performed in accordance with ASTM D5961-96 (modified).

The ply stacking sequence described in Tables 2.2, 2.3 and 2.4 were used to fabricate the initial test panels.
The double shear test specimens were wet cut to a nominal length of 13.5 inches, a nominal width of 1.50 inches and two centerline holes with a nominal diameter of 0.250 inch. The holes of the double shear test specimens were prepared in accordance with TCWIN-U-M105 as shown in TCQAL-T-1016, Figure 6.
The single shear test specimen was composed of two like halves that were wet cut to a nominal length of 8.25 inches, a nominal width of 1.50 inches and two centerline holes with a nominal diameter of 0.250 inch. The holes of the single shear test specimens were match drilled in pairs in accordance with TCWIN-U-M105 as shown in TCQAL-T-1016, Figure 7.
Each specimen was labeled with autoclave number (“A” or “B”), unique test panel number and individual specimen number.

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

The bearing-bypass (single shear) tension and compression, and bearing-bypass (double shear) compression was loaded at the hole in bearing using a fixture as shown in TCQAL-T-1016, Figure B.1 ~ B.4. MTS Alliance RF/300 load frame, operated in stroke control mode, was used to apply loading to the specimens at a crosshead rate of 0.05 inch/minute. The loads and

crosshead displacements or bearing strains were recorded throughout each test using a calibrated, computerized data assimilation system.

A.5.1 Bearing-Bypass Stress Calculations

A.5.1.1 Bearing-Bypass (Single Shear) Tension Load

A.5.1.1.1 Bearing Stress (Actual)

$$F^{bru} = \frac{PB}{d * t * \left(\frac{1{,}000\,psi}{ksi}\right)}$$

where:

F^{bru} = ultimate bearing strength (ksi)

P^{max} = maximum load, (lb.)

PB = bearing load, (lb.) = $\frac{P^{max}}{2}$

d = the averaged measured hole diameter of the specimen (inch)

t = the averaged measured thickness of the specimen (inch)

A.5.1.1.2 Bearing Stress (Nominal)

$$F^{bru} = \frac{PB}{D * T * \left(\frac{1{,}000\,psi}{ksi}\right)}$$

where:

D = the nominal hole diameter of the specimen (inch)

T = the nominal thickness of the specimen (inch)

A.5.1.1.3 Gross Bypass Stress (Actual)

$$F^{byp\_gross} = \frac{P^{max}}{w * t * \left(\frac{1{,}000\,psi}{ksi}\right)}$$

where:

F^{byp_gross} = gross bypass strength (ksi)

P^{max} = maximum load, (lb.)

w = the averaged measured width of the specimen (inch)

t = the averaged measured thickness of the specimen (inch)

A.5.1.1.4 Gross Bypass Stress (Nominal)

$$F^{byp\_gross} = \frac{P^{max}}{W * T * \left(\frac{1{,}000\,psi}{ksi}\right)}$$

where:

W = the nominal width of the specimen (inch)
T = the nominal thickness of the specimen (inch)

A.5.1.1.5 Net Bypass Stress (Actual)

$$F^{byp\_net} = \frac{P^{max} - PB}{w * t * \left(\frac{1{,}000\,psi}{ksi}\right)}$$

where:

F^{byp_net} = net bypass strength (ksi)
P^{max} = maximum load, (lb.)
PB = bearing load, (lb.) = $\frac{P^{max}}{2}$
w = the averaged measured width of the specimen (inch)
t = the averaged measured thickness of the specimen (inch)

A.5.1.1.6 Net Bypass Stress (Nominal)

$$F^{byp\_net} = \frac{P^{max} - PB}{W * T * \left(\frac{1{,}000\,psi}{ksi}\right)}$$

where:

W = the nominal width of the specimen (inch)
T = the nominal thickness of the specimen (inch)

A.5.1.2. Bearing-Bypass (Single Shear) Compression Load

A.5.1.2.1 Bearing Stress (Actual)

$$F^{bru} = \frac{PB}{d * t * \left(\frac{1{,}000\,psi}{ksi}\right)}$$

where:

F^{bru} = ultimate bearing strength (ksi)
P^{max} = maximum load, (lb.)
PB = bearing load, (lb.) = $\frac{P^{max}}{2}$

d = the averaged measured hole diameter of the specimen (inch)
h = the averaged measured thickness of the specimen (inch)

A.5.1.2.2 Bearing Stress (Nominal)

$$F^{bru} = \frac{PB}{D * T * \left(\frac{1{,}000\,psi}{ksi}\right)}$$

where:

D = the nominal hole diameter of the specimen (inch)
T = the nominal thickness of the specimen (inch)

A.5.1.2.3 Gross Bypass Stress (Actual)

$$F^{byp\_gross} = \frac{P^{\max} - PB}{w * t * \left(\frac{1{,}000\,psi}{ksi}\right)}$$

where:

F^{byp_gross} = gross bypass strength (ksi)
$P^{\max}$ = maximum load, (lb.)
PB = bearing load, (lb.) = $\frac{P^{\max}}{2}$
w = the averaged measured width of the specimen (inch)
t = the averaged measured thickness of the specimen (inch)

A.5.1.2.4 Gross Bypass Stress (Nominal)

$$F^{byp\_gross} = \frac{P^{\max} - PB}{W * T * \left(\frac{1{,}000\,psi}{ksi}\right)}$$

where:

W = the nominal width of the specimen (inch)
T = the nominal thickness of the specimen (inch)

A.5.1.2.5 Net Bypass Stress = Gross Bypass Stress

A.5.1.3 Bearing-Bypass (Double Shear) Tension Load

A.5.1.3.1 Bearing Stress (Actual)

$$F^{bru} = \frac{PB}{d * t * \left(\frac{1{,}000\,psi}{ksi}\right)}$$

where:

F^{bru} = ultimate bearing strength (ksi)
PB = bearing load, (lb.) = $P_{S1} + P_{S2}$
P_{S1} = load in side plate 1, (lb.)
P_{S2} = load in side plate 2, (lb.)
d = the averaged measured hole diameter of the specimen (inch)
t = the averaged measured thickness of the specimen (inch)

Note: load in each side plate was determined, as follows;

a. Obtain calibration curve (load versus strain) of side plates.
b. Record the strain in each side plate at ultimate load of test specimen.
c. Determine load in each side plate from calibration curve.

A.5.1.3.2 Bearing Stress (Nominal)

$$F^{bru} = \frac{PB}{D * T * \left(\frac{1{,}000\,psi}{ksi}\right)}$$

where:

D = the nominal hole diameter of the specimen (inch)
T = the nominal thickness of the specimen (inch)

A.5.1.3.3 Gross Bypass Stress (Actual)

$$F^{byp\_gross} = \frac{P^{\max}}{w * t * \left(\frac{1{,}000\,psi}{ksi}\right)}$$

where:

F^{byp_gross} = gross bypass strength (ksi)
$P^{\max}$ = maximum load, (lb.)
w = the averaged measured width of the specimen (inch)
t = the averaged measured thickness of the specimen (inch)

A.5.1.3.4 Gross Bypass Stress (Nominal)

$$F^{byp\_gross} = \frac{P^{\max}}{W * T * \left(\frac{1{,}000\,psi}{ksi}\right)}$$

where:

W = the nominal width of the specimen (inch)

T = the nominal thickness of the specimen (inch)

A.5.1.3.5 Net Bypass Stress (Actual)

$$F^{byp\_net} = \frac{P^{max} - PB}{w * t * \left(\frac{1{,}000\,psi}{ksi}\right)}$$

where:

F^{byp_net} = net bypass strength (ksi)
P^{max} = maximum load, (lb.)
PB = bearing load, (lb.) = $P_{S1} + P_{S2}$
w = the averaged measured width of the specimen (inch)
t = the averaged measured thickness of the specimen (inch)

A.5.1.3.6 Net Bypass Stress (Nominal)

$$F^{byp\_net} = \frac{P^{max} - PB}{W * T * \left(\frac{1{,}000\,psi}{ksi}\right)}$$

where:

W = the nominal width of the specimen (inch)
T = the nominal thickness of the specimen (inch)

A.5.1.4 Bearing-Bypass (Double Shear) Compression Load

A.5.1.4 Bearing Stress (Actual)

$$F^{bru} = \frac{PB}{d * t * \left(\frac{1{,}000\,psi}{ksi}\right)}$$

where:

F^{bru} = ultimate bearing strength (ksi)
PB = bearing load, (lb.) = $P_{S1} + P_{S2}$
P_{S1} = load in side plate 1, (lb.)
P_{S2} = load in side plate 2, (lb.)
d = the averaged measured hole diameter of the specimen (inch)
t = the averaged measured thickness of the specimen (inch)

Note: load in each side plate was determined, as follows;

c. Obtain calibration curve (load versus strain) of side plates.
d. Record the strain in each side plate at ultimate load of test specimen.
c. Determine load in each side plate from calibration curve.

A.5.1.4.2 Bearing Stress (Nominal)

$$F^{bru} = \frac{PB}{D * T * \left(\frac{1{,}000\,psi}{ksi}\right)}$$

where:

D = the nominal hole diameter of the specimen (inch)
T = the nominal thickness of the specimen (inch)

A.5.1.4.3 Gross Bypass Stress (Actual)

$$F^{byp\_gross} = \frac{P^{\max} - PB}{w * t * \left(\frac{1{,}000\,psi}{ksi}\right)}$$

where:

F^{byp_gross} = gross bypass strength (ksi)
$P^{\max}$ = maximum load, (lb.)
PB = bearing load, (lb.) = $P_{S1} + P_{S2}$
w = the averaged measured width of the specimen (inch)
t = the averaged measured thickness of the specimen (inch)

A.5.1.4.4 Gross Bypass Stress (Nominal)

$$F^{byp\_gross} = \frac{P^{\max} - PB}{W * T * \left(\frac{1{,}000\,psi}{ksi}\right)}$$

where:

W = the nominal width of the specimen (inch)
T = the nominal thickness of the specimen (inch)

A.5.1.4.5 Net Bypass Stress = Gross Bypass Stress

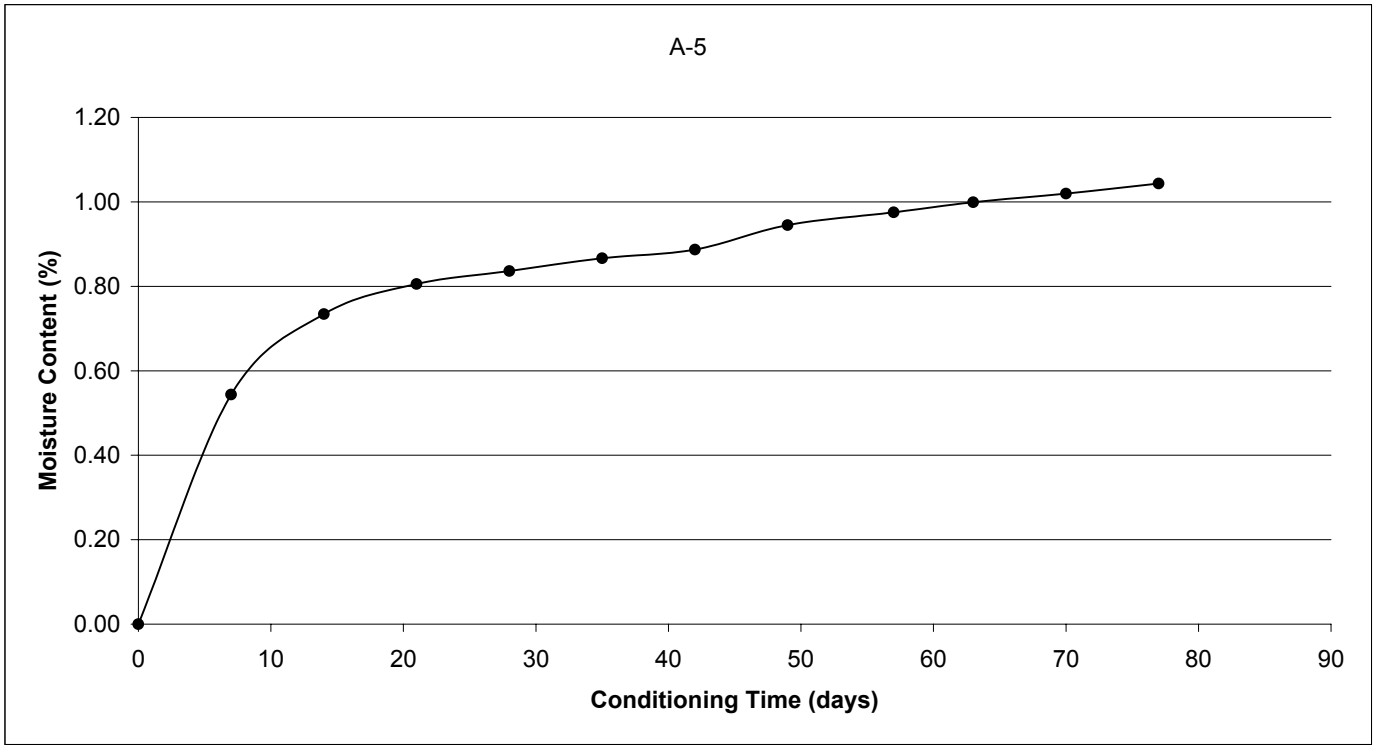
APPENDIX B. MOISTURE CONDITIONING HISTORY CHARTS

B.1. Moisture Conditioning Charts of P707AG-15

Laminate Moisture Conditioning

Panel ID:	**A-5**	**Product Type:**	**P707AG-15**
Batch #:	**AB991035**	**Baseline Weight (W_B):**	**2.9422**
Test Type:	**50/40/10 Laminate Ten/Comp**	**Conditioning Date:**	**05/04/01**
# of Plies:	**20**	**Removal Date:**	**07/20/01**
Traveler ID:	**A-5**		

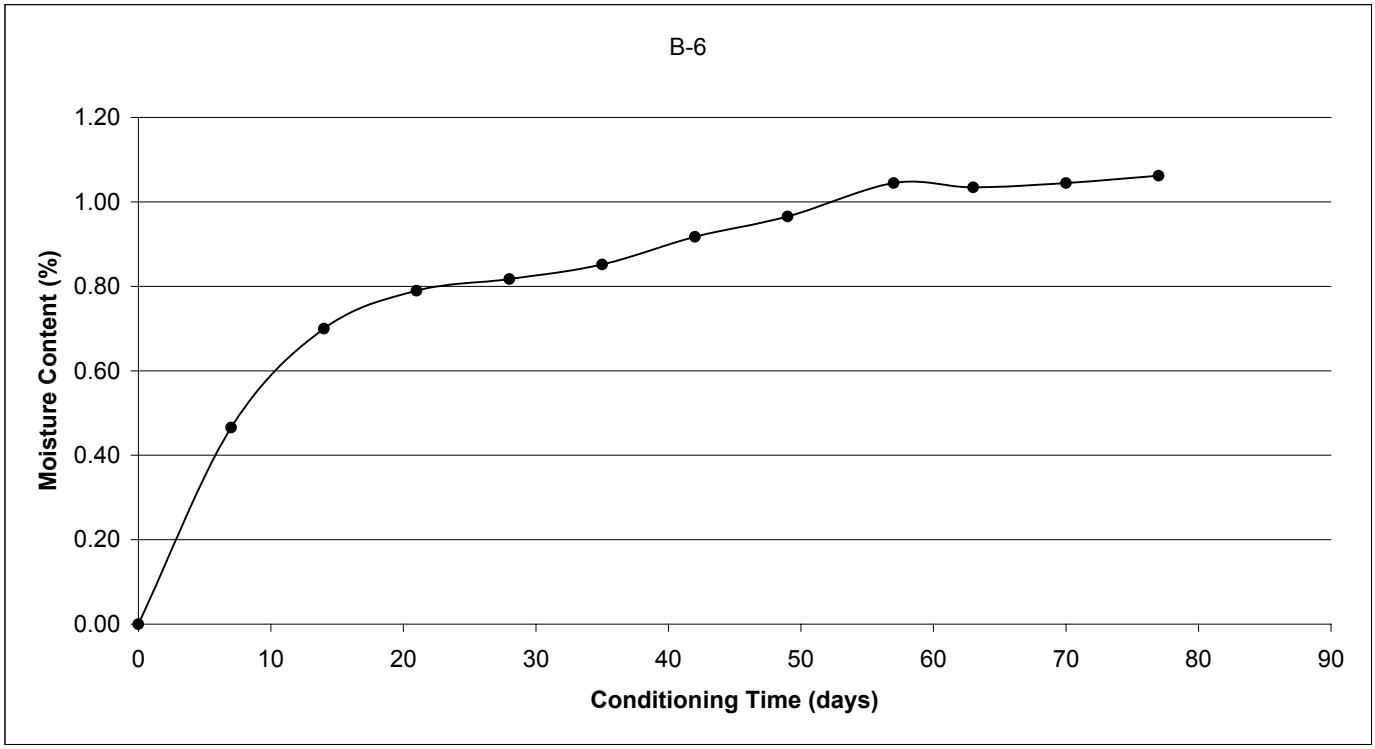
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	5/4/2001	Initial	0	2.9422	0.0000	0.00	0.000	-	-
1	5/11/2001	7	7	2.9582	2.9422	0.54	0.544	**No**	**No**
2	5/18/2001	7	14	2.9638	2.9582	0.73	0.190	**No**	**No**
3	5/25/2001	7	21	2.9659	2.9638	0.81	0.071	**No**	**No**
4	6/1/2001	7	28	2.9668	2.9659	0.84	0.031	**Yes**	**No**
5	6/8/2001	7	35	2.9677	2.9668	0.87	0.031	**Yes**	**Yes**
6	6/15/2001	7	42	2.9683	2.9677	0.89	0.020	**Yes**	**Yes**
7	6/22/2001	7	49	2.9700	2.9683	0.94	0.058	**No**	**No**
8	6/30/2001	8	57	2.9709	2.9700	0.98	0.031	**Yes**	**No**
9	7/6/2001	6	63	2.9716	2.9709	1.00	0.024	**Yes**	**Yes**
10	7/13/2001	7	70	2.9722	2.9716	1.02	0.020	**Yes**	**Yes**
11	7/20/2001	7	77	2.9729	2.9722	1.04	0.024	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**B-6**	**Product Type:**	**P707AG-15**
Batch #:	**AB991035**	**Baseline Weight (W_B):**	**2.9000**
Test Type:	**50/40/10 Laminate Ten/Comp**	**Conditioning Date:**	**05/04/01**
# of Plies:	**20**	**Removal Date:**	**07/20/01**
Traveler ID:	**B-6**		

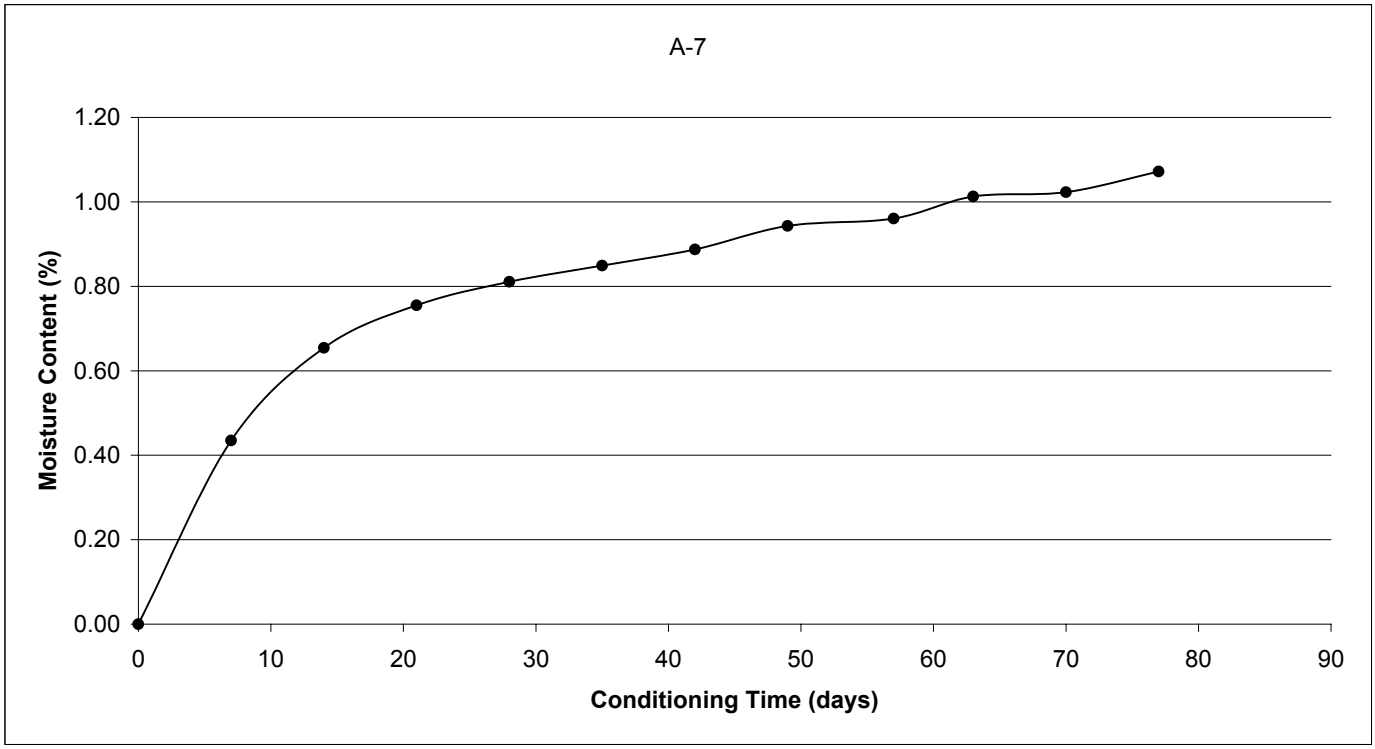
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	5/4/2001	Initial	0	2.9000	0.0000	0.00	0.000	-	-
1	5/11/2001	7	7	2.9135	2.9000	0.47	0.466	**No**	**No**
2	5/18/2001	7	14	2.9203	2.9135	0.70	0.234	**No**	**No**
3	5/25/2001	7	21	2.9229	2.9203	0.79	0.090	**No**	**No**
4	6/1/2001	7	28	2.9237	2.9229	0.82	0.028	**Yes**	**No**
5	6/8/2001	7	35	2.9247	2.9237	0.85	0.034	**Yes**	**Yes**
6	6/15/2001	7	42	2.9266	2.9247	0.92	0.066	**No**	**No**
7	6/22/2001	7	49	2.9280	2.9266	0.97	0.048	**Yes**	**No**
8	6/30/2001	8	57	2.9303	2.9280	1.04	0.079	**No**	**No**
9	7/6/2001	6	63	2.9300	2.9303	1.03	-0.010	**Yes**	**No**
10	7/13/2001	7	70	2.9303	2.9300	1.04	0.010	**Yes**	**Yes**
11	7/20/2001	7	77	2.9308	2.9303	1.06	0.017	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**A-7**	**Product Type:**	**P707AG-15**
Batch #:	**AB991035**	**Baseline Weight (W_B):**	**2.8734**
Test Type:	**50/40/10 Laminate Ten/Comp**	**Conditioning Date:**	**05/04/01**
# of Plies:	**20**	**Removal Date:**	**07/20/01**
Traveler ID:	**A-7**		

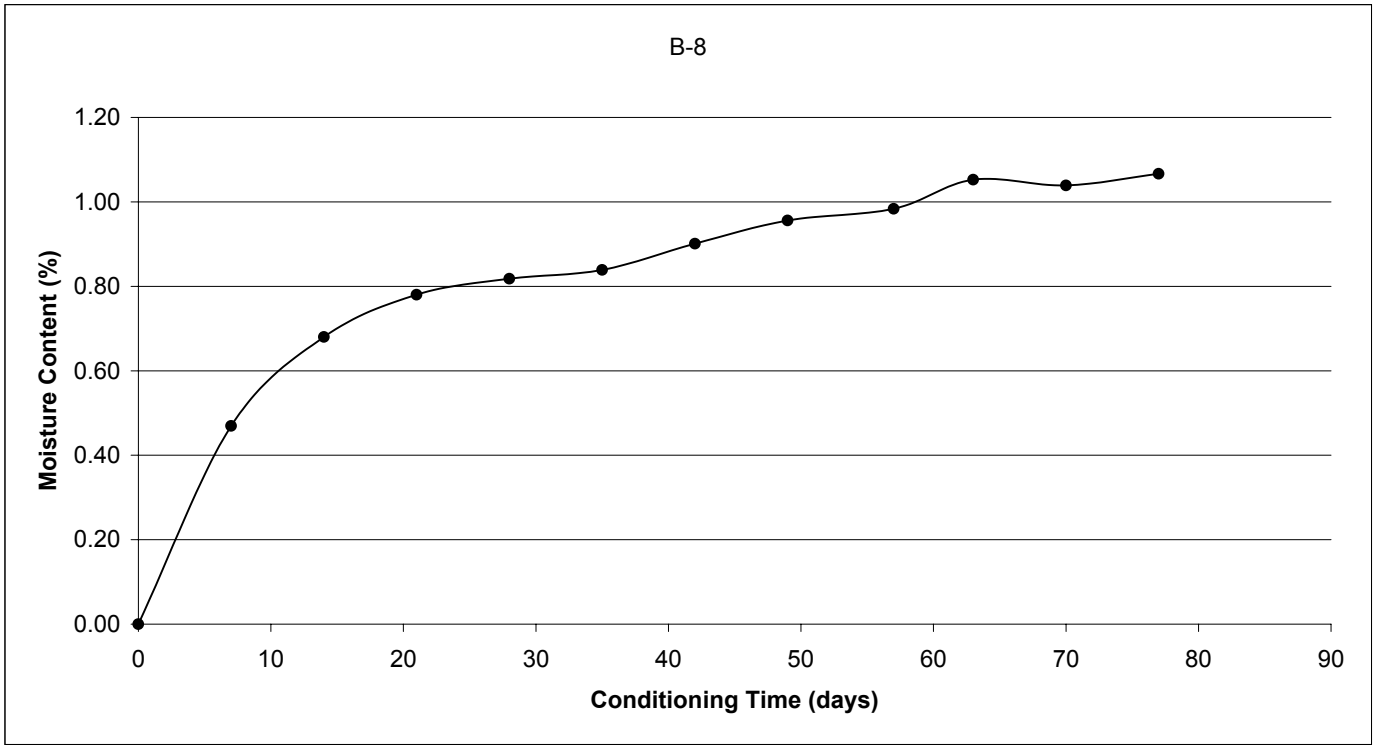
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	5/4/2001	Initial	0	2.8734	0.0000	0.00	0.000	-	-
1	5/11/2001	7	7	2.8859	2.8734	0.44	0.435	**No**	**No**
2	5/18/2001	7	14	2.8922	2.8859	0.65	0.219	**No**	**No**
3	5/25/2001	7	21	2.8951	2.8922	0.76	0.101	**No**	**No**
4	6/1/2001	7	28	2.8967	2.8951	0.81	0.056	**No**	**No**
5	6/8/2001	7	35	2.8978	2.8967	0.85	0.038	**Yes**	**No**
6	6/15/2001	7	42	2.8989	2.8978	0.89	0.038	**Yes**	**Yes**
7	6/22/2001	7	49	2.9005	2.8989	0.94	0.056	**No**	**No**
8	6/30/2001	8	57	2.9010	2.9005	0.96	0.017	**Yes**	**No**
9	7/6/2001	6	63	2.9025	2.9010	1.01	0.052	**No**	**No**
10	7/13/2001	7	70	2.9028	2.9025	1.02	0.010	**Yes**	**No**
11	7/20/2001	7	77	2.9042	2.9028	1.07	0.049	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**B-8**	**Product Type:**	**P707AG-15**
Batch #:	**AB991035**	**Baseline Weight (W_B):**	**2.8972**
Test Type:	**50/40/10 Laminate Ten/Comp**	**Conditioning Date:**	**05/04/01**
# of Plies:	**20**	**Removal Date:**	**07/20/01**
Traveler ID:	**B-8**		

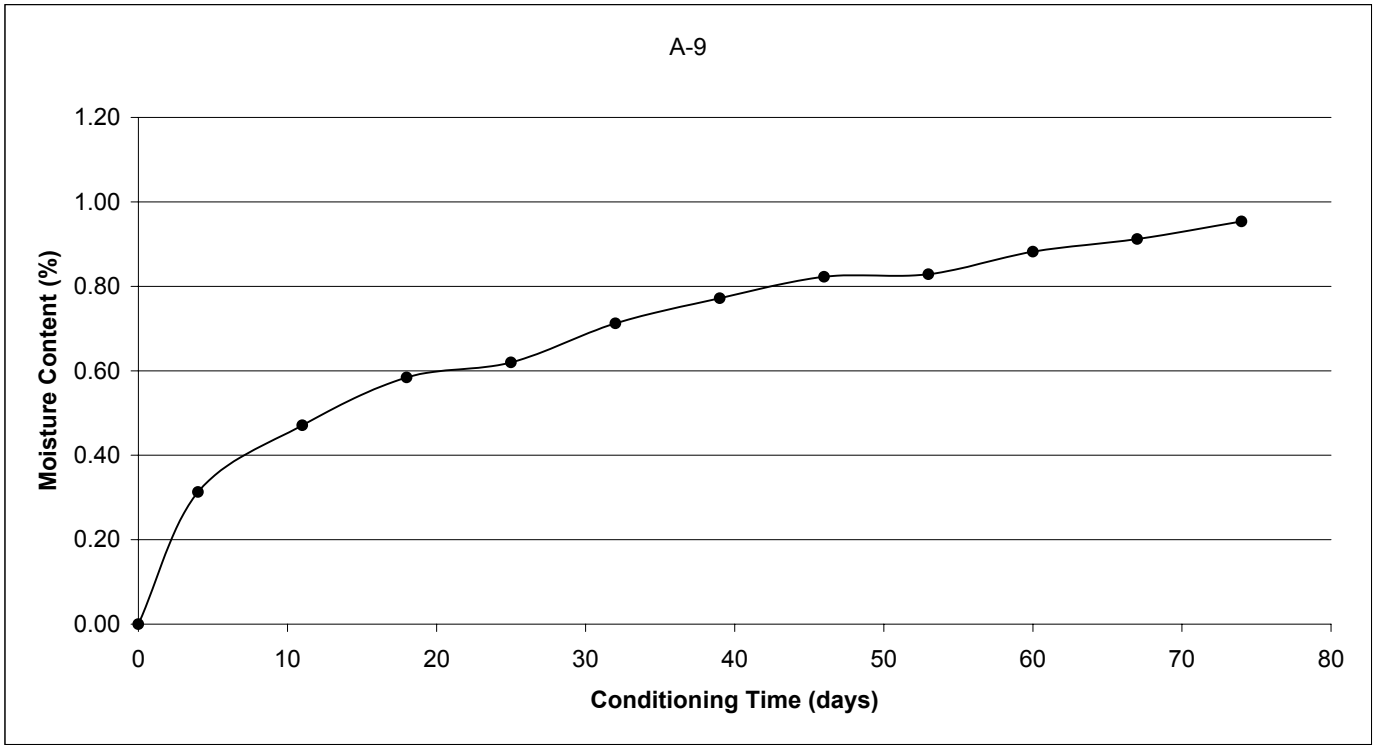
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	5/4/2001	Initial	0	2.8972	0.0000	0.00	0.000	-	-
1	5/11/2001	7	7	2.9108	2.8972	0.47	0.469	**No**	**No**
2	5/18/2001	7	14	2.9169	2.9108	0.68	0.211	**No**	**No**
3	5/25/2001	7	21	2.9198	2.9169	0.78	0.100	**No**	**No**
4	6/1/2001	7	28	2.9209	2.9198	0.82	0.038	**Yes**	**No**
5	6/8/2001	7	35	2.9215	2.9209	0.84	0.021	**Yes**	**Yes**
6	6/15/2001	7	42	2.9233	2.9215	0.90	0.062	**No**	**No**
7	6/22/2001	7	49	2.9249	2.9233	0.96	0.055	**No**	**No**
8	6/30/2001	8	57	2.9257	2.9249	0.98	0.028	**Yes**	**No**
9	7/6/2001	6	63	2.9277	2.9257	1.05	0.069	**No**	**No**
10	7/13/2001	7	70	2.9273	2.9277	1.04	-0.014	**Yes**	**No**
11	7/20/2001	7	77	2.9281	2.9273	1.07	0.028	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**A-9**	**Product Type:**	**P707AG-15**
Batch #:	**AB991035**	**Baseline Weight (W_B):**	**3.3555**
Test Type:	**50/40/10 Laminate Bolt Bearing**	**Conditioning Date:**	**09/07/01**
# of Plies:	**20**	**Removal Date:**	**11/20/01**
Traveler ID:	**A-9**		

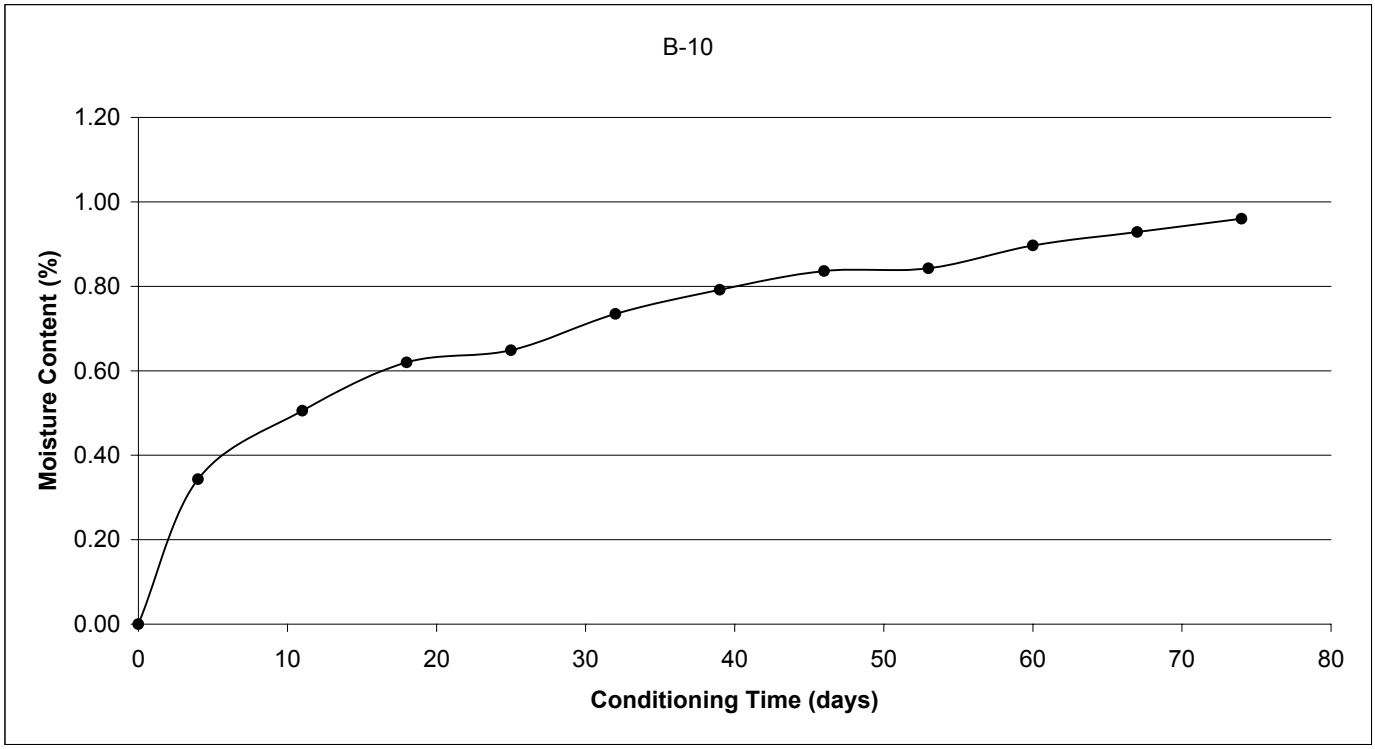
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	9/7/2001	Initial	0	3.3555	0.0000	0.00	0.000	-	-
1	9/11/2001	4	4	3.3660	3.3555	0.31	0.313	**No**	**No**
2	9/18/2001	7	11	3.3713	3.3660	0.47	0.158	**No**	**No**
3	9/25/2001	7	18	3.3751	3.3713	0.58	0.113	**No**	**No**
4	10/2/2001	7	25	3.3763	3.3751	0.62	0.036	**Yes**	**No**
5	10/9/2001	7	32	3.3794	3.3763	0.71	0.092	**No**	**No**
6	10/16/2001	7	39	3.3814	3.3794	0.77	0.060	**No**	**No**
7	10/23/2001	7	46	3.3831	3.3814	0.82	0.051	**No**	**No**
8	10/30/2001	7	53	3.3833	3.3831	0.83	0.006	**Yes**	**No**
9	11/6/2001	7	60	3.3851	3.3833	0.88	0.054	**No**	**No**
10	11/13/2001	7	67	3.3861	3.3851	0.91	0.030	**Yes**	**No**
11	11/20/2001	7	74	3.3875	3.3861	0.95	0.042	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**B-10**	**Product Type:**	**P707AG-15**
Batch #:	**AB991035**	**Baseline Weight (W_B):**	**3.1448**
Test Type:	**50/40/10 Laminate Bolt Bearing**	**Conditioning Date:**	**09/07/01**
# of Plies:	**20**	**Removal Date:**	**11/20/01**
Traveler ID:	**B-10**		

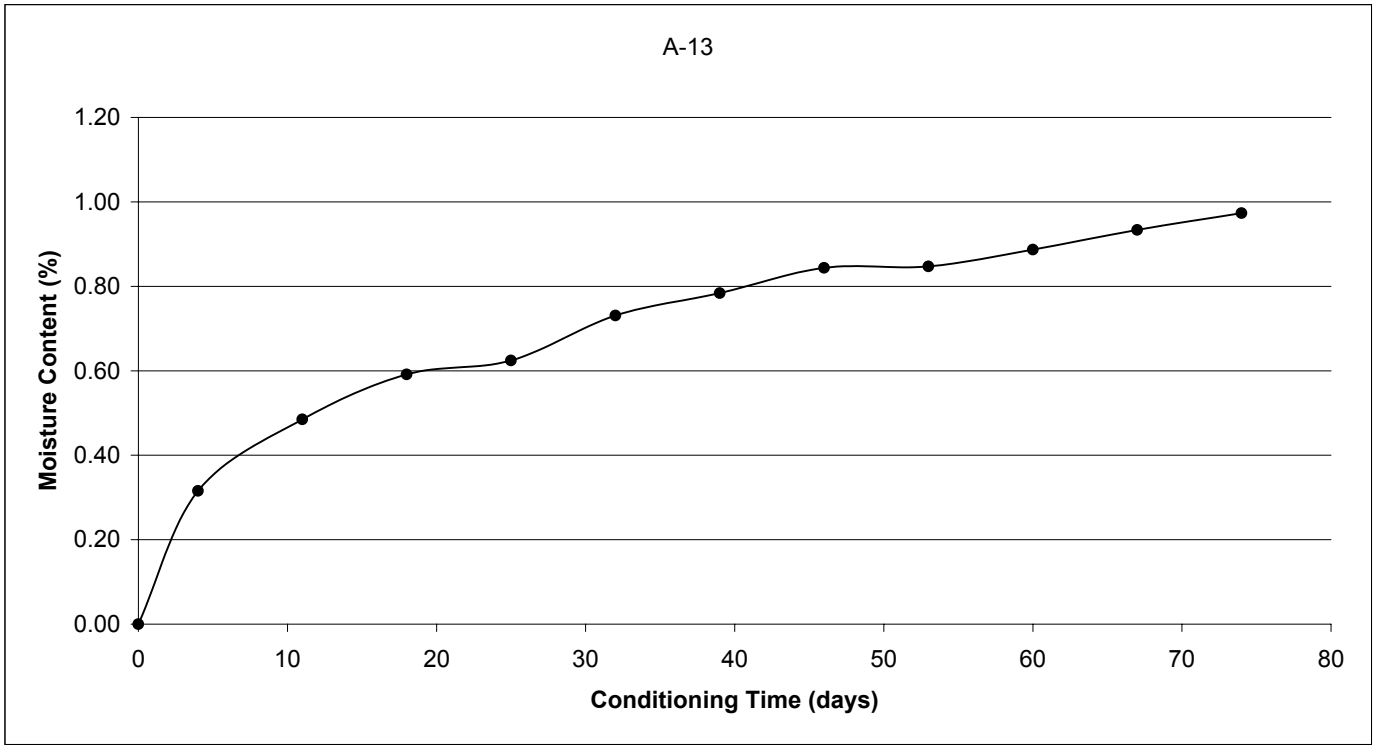
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	9/7/2001	Initial	0	3.1448	0.0000	0.00	0.000	-	-
1	9/11/2001	4	4	3.1556	3.1448	0.34	0.343	**No**	**No**
2	9/18/2001	7	11	3.1607	3.1556	0.51	0.162	**No**	**No**
3	9/25/2001	7	18	3.1643	3.1607	0.62	0.114	**No**	**No**
4	10/2/2001	7	25	3.1652	3.1643	0.65	0.029	**Yes**	**No**
5	10/9/2001	7	32	3.1679	3.1652	0.73	0.086	**No**	**No**
6	10/16/2001	7	39	3.1697	3.1679	0.79	0.057	**No**	**No**
7	10/23/2001	7	46	3.1711	3.1697	0.84	0.045	**Yes**	**No**
8	10/30/2001	7	53	3.1713	3.1711	0.84	0.006	**Yes**	**Yes**
9	11/6/2001	7	60	3.1730	3.1713	0.90	0.054	**No**	**No**
10	11/13/2001	7	67	3.1740	3.1730	0.93	0.032	**Yes**	**No**
11	11/20/2001	7	74	3.1750	3.1740	0.96	0.032	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**A-13**	**Product Type:**	**P707AG-15**
Batch #:	**AB991035**	**Baseline Weight (W_B):**	**3.0101**
Test Type:	**50/40/10 Laminate Bolt Bearing**	**Conditioning Date:**	**09/07/01**
# of Plies:	**20**	**Removal Date:**	**11/20/01**
Traveler ID:	**A-13**		

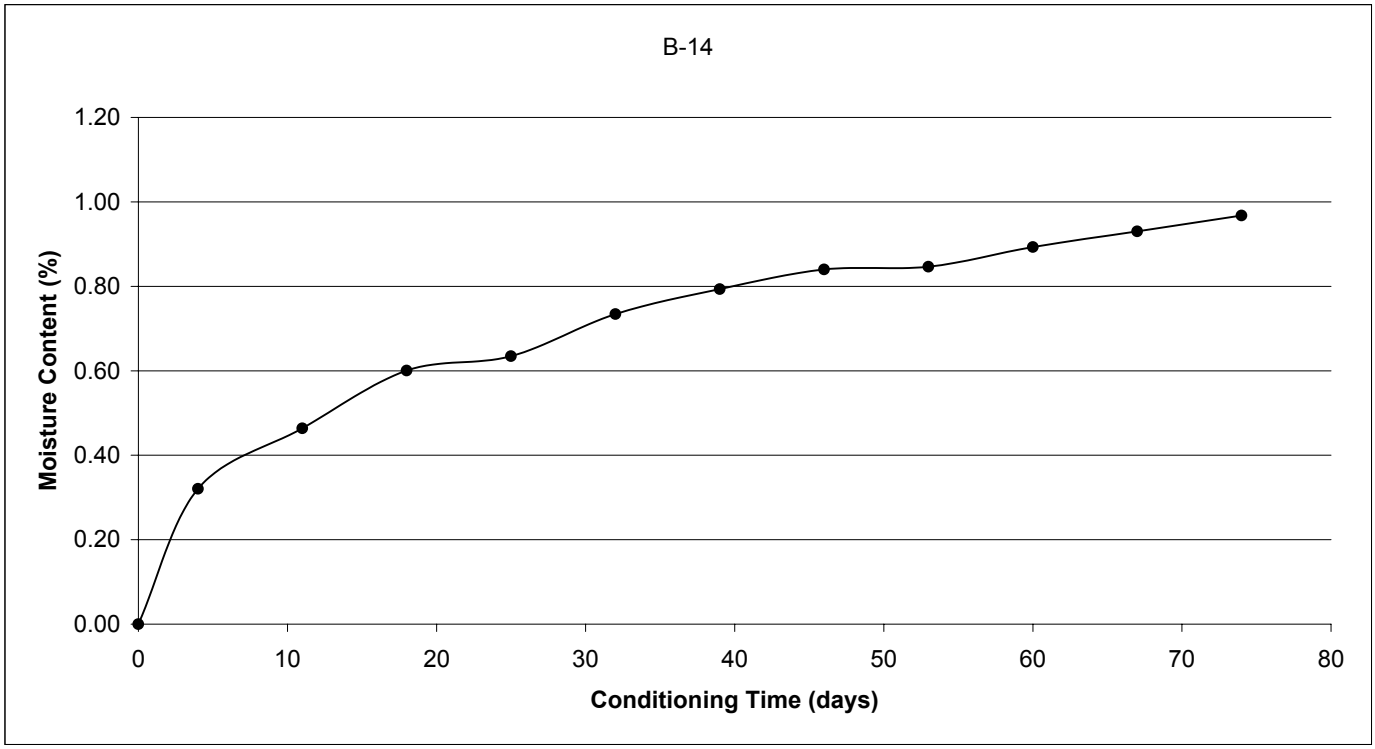
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	9/7/2001	Initial	0	3.0101	0.0000	0.00	0.000	-	-
1	9/11/2001	4	4	3.0196	3.0101	0.32	0.316	**No**	**No**
2	9/18/2001	7	11	3.0247	3.0196	0.49	0.169	**No**	**No**
3	9/25/2001	7	18	3.0279	3.0247	0.59	0.106	**No**	**No**
4	10/2/2001	7	25	3.0289	3.0279	0.62	0.033	**Yes**	**No**
5	10/9/2001	7	32	3.0321	3.0289	0.73	0.106	**No**	**No**
6	10/16/2001	7	39	3.0337	3.0321	0.78	0.053	**No**	**No**
7	10/23/2001	7	46	3.0355	3.0337	0.84	0.060	**No**	**No**
8	10/30/2001	7	53	3.0356	3.0355	0.85	0.003	**Yes**	**No**
9	11/6/2001	7	60	3.0368	3.0356	0.89	0.040	**Yes**	**Yes**
10	11/13/2001	7	67	3.0382	3.0368	0.93	0.047	**Yes**	**Yes**
11	11/20/2001	7	74	3.0394	3.0382	0.97	0.040	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**B-14**	**Product Type:**	**P707AG-15**
Batch #:	**AB991035**	**Baseline Weight (W_B):**	**3.2138**
Test Type:	**50/40/10 Laminate Bolt Bearing**	**Conditioning Date:**	**09/07/01**
# of Plies:	**20**	**Removal Date:**	**11/20/01**
Traveler ID:	**B-14**		

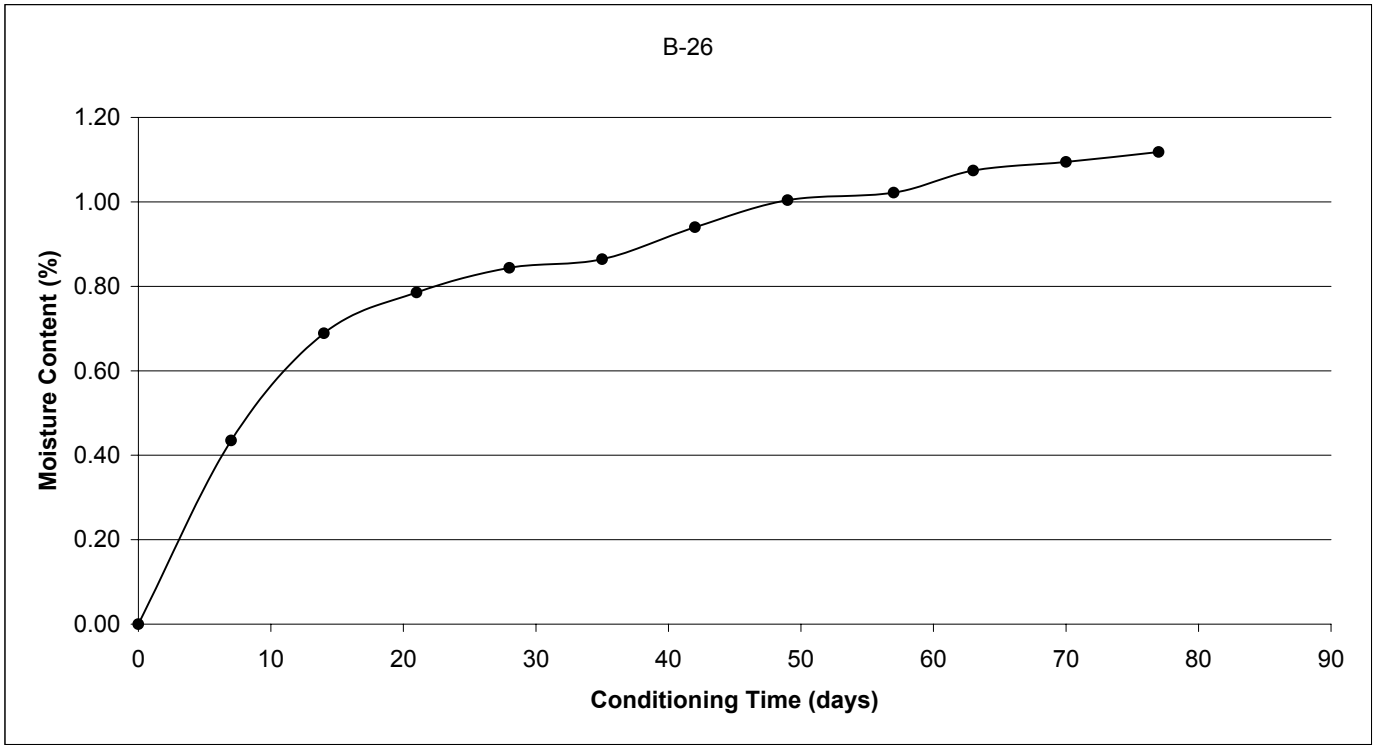
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	9/7/2001	Initial	0	3.2138	0.0000	0.00	0.000	-	-
1	9/11/2001	4	4	3.2241	3.2138	0.32	0.320	**No**	**No**
2	9/18/2001	7	11	3.2287	3.2241	0.46	0.143	**No**	**No**
3	9/25/2001	7	18	3.2331	3.2287	0.60	0.137	**No**	**No**
4	10/2/2001	7	25	3.2342	3.2331	0.63	0.034	**Yes**	**No**
5	10/9/2001	7	32	3.2374	3.2342	0.73	0.100	**No**	**No**
6	10/16/2001	7	39	3.2393	3.2374	0.79	0.059	**No**	**No**
7	10/23/2001	7	46	3.2408	3.2393	0.84	0.047	**Yes**	**No**
8	10/30/2001	7	53	3.2410	3.2408	0.85	0.006	**Yes**	**Yes**
9	11/6/2001	7	60	3.2425	3.2410	0.89	0.047	**Yes**	**Yes**
10	11/13/2001	7	67	3.2437	3.2425	0.93	0.037	**Yes**	**Yes**
11	11/20/2001	7	74	3.2449	3.2437	0.97	0.037	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**B-26**	**Product Type:**	**P707AG-15**
Batch #:	**AB991035**	**Baseline Weight (W_B):**	**3.4253**
Test Type:	**25/50/25 Laminate Ten/Comp**	**Conditioning Date:**	**05/04/01**
# of Plies:	**24**	**Removal Date:**	**07/20/01**
Traveler ID:	**B-26**		

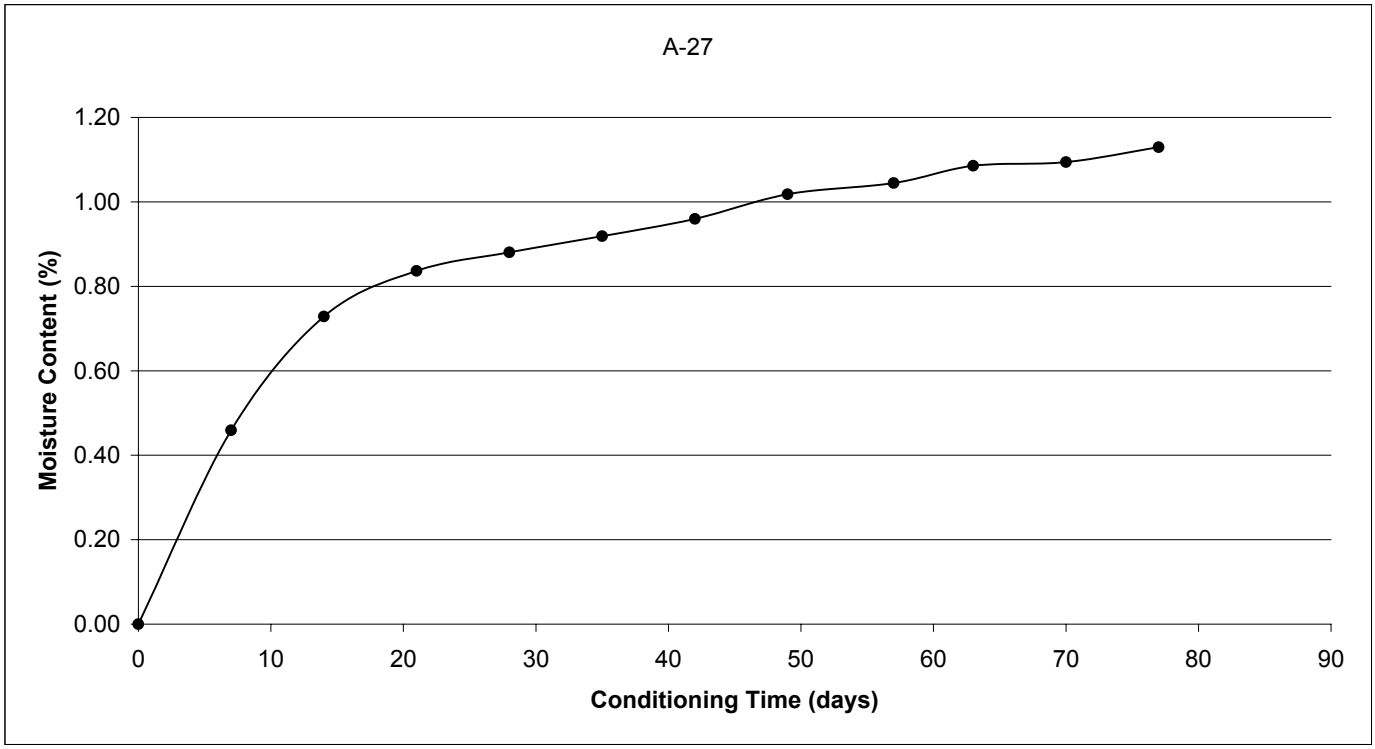
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	5/4/2001	Initial	0	3.4253	0.0000	0.00	0.000	-	-
1	5/11/2001	7	7	3.4402	3.4253	0.43	0.435	**No**	**No**
2	5/18/2001	7	14	3.4489	3.4402	0.69	0.254	**No**	**No**
3	5/25/2001	7	21	3.4522	3.4489	0.79	0.096	**No**	**No**
4	6/1/2001	7	28	3.4542	3.4522	0.84	0.058	**No**	**No**
5	6/8/2001	7	35	3.4549	3.4542	0.86	0.020	**Yes**	**No**
6	6/15/2001	7	42	3.4575	3.4549	0.94	0.076	**No**	**No**
7	6/22/2001	7	49	3.4597	3.4575	1.00	0.064	**No**	**No**
8	6/30/2001	8	57	3.4603	3.4597	1.02	0.018	**Yes**	**No**
9	7/6/2001	6	63	3.4621	3.4603	1.07	0.053	**No**	**No**
10	7/13/2001	7	70	3.4628	3.4621	1.09	0.020	**Yes**	**No**
11	7/20/2001	7	77	3.4636	3.4628	1.12	0.023	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**A-27**	**Product Type:**	**P707AG-15**
Batch #:	**AB991035**	**Baseline Weight (W_B):**	**3.4179**
Test Type:	**25/50/25 Laminate Ten/Comp**	**Conditioning Date:**	**05/04/01**
# of Plies:	**24**	**Removal Date:**	**07/20/01**
Traveler ID:	**A-27**		

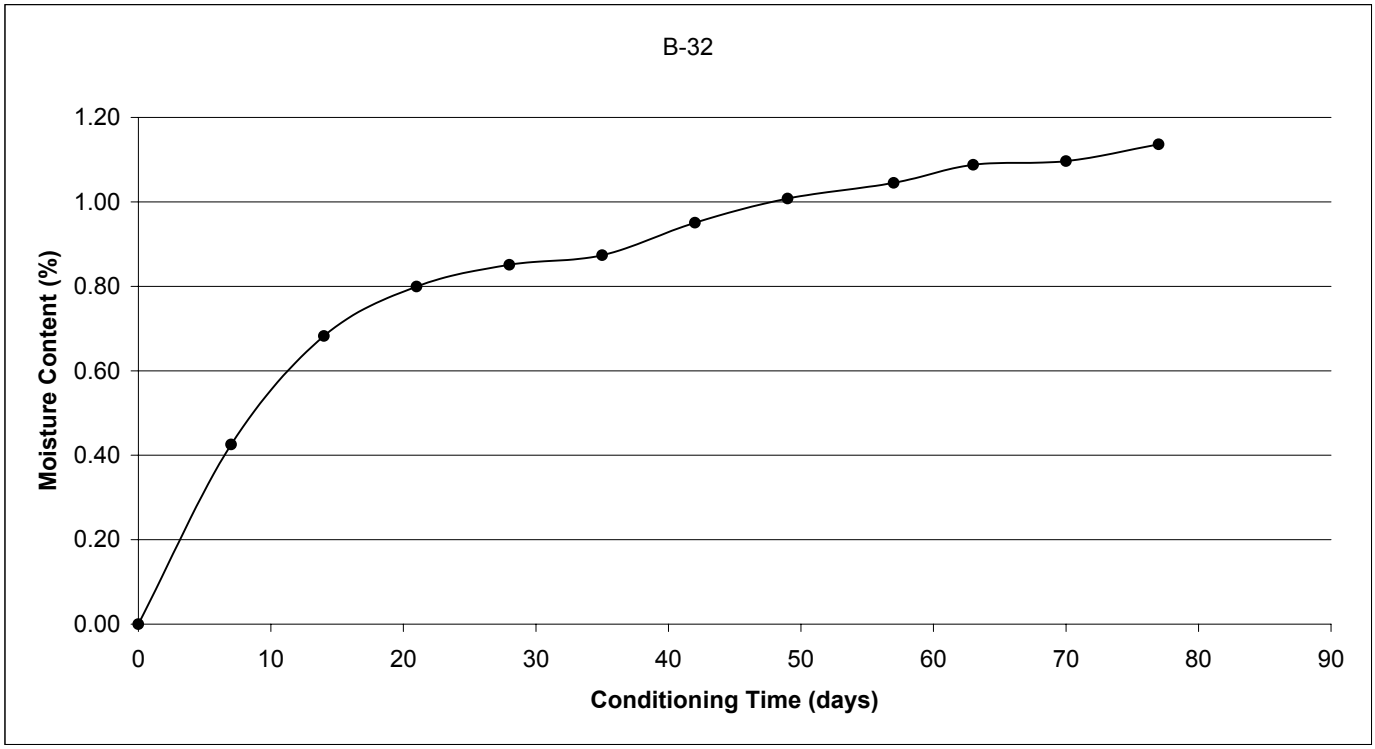
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	5/4/2001	Initial	0	3.4179	0.0000	0.00	0.000	-	-
1	5/11/2001	7	7	3.4336	3.4179	0.46	0.459	**No**	**No**
2	5/18/2001	7	14	3.4428	3.4336	0.73	0.269	**No**	**No**
3	5/25/2001	7	21	3.4465	3.4428	0.84	0.108	**No**	**No**
4	6/1/2001	7	28	3.4480	3.4465	0.88	0.044	**Yes**	**No**
5	6/8/2001	7	35	3.4493	3.4480	0.92	0.038	**Yes**	**Yes**
6	6/15/2001	7	42	3.4507	3.4493	0.96	0.041	**Yes**	**Yes**
7	6/22/2001	7	49	3.4527	3.4507	1.02	0.059	**No**	**No**
8	6/30/2001	8	57	3.4536	3.4527	1.04	0.026	**Yes**	**No**
9	7/6/2001	6	63	3.4550	3.4536	1.09	0.041	**Yes**	**Yes**
10	7/13/2001	7	70	3.4553	3.4550	1.09	0.009	**Yes**	**Yes**
11	7/20/2001	7	77	3.4565	3.4553	1.13	0.035	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**B-32**	**Product Type:**	**P707AG-15**
Batch #:	**AB991035**	**Baseline Weight (W_B):**	**3.5024**
Test Type:	**25/50/25 Laminate Ten/Comp**	**Conditioning Date:**	**05/04/01**
# of Plies:	**24**	**Removal Date:**	**07/20/01**
Traveler ID:	**B-32**		

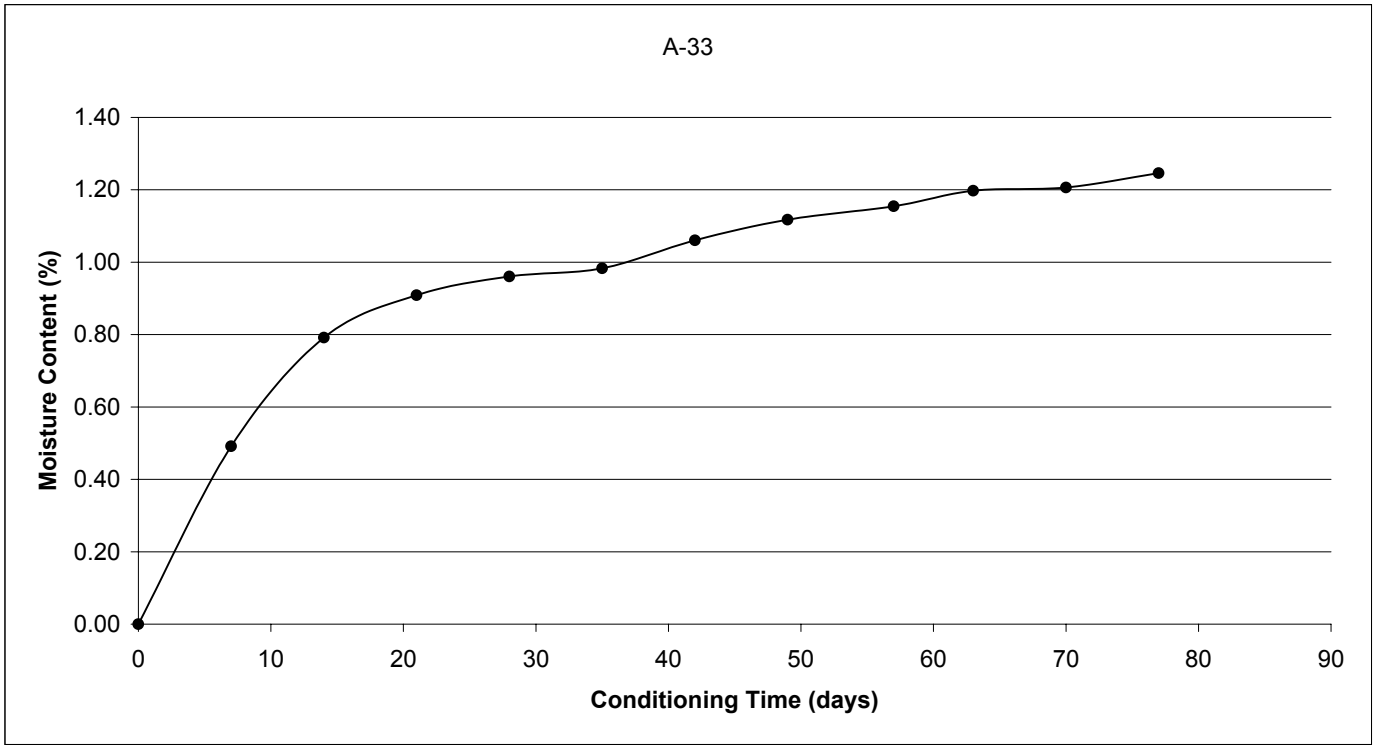
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	5/4/2001	Initial	0	3.5024	0.0000	0.00	0.000	-	-
1	5/11/2001	7	7	3.5173	3.5024	0.43	0.425	**No**	**No**
2	5/18/2001	7	14	3.5263	3.5173	0.68	0.257	**No**	**No**
3	5/25/2001	7	21	3.5304	3.5263	0.80	0.117	**No**	**No**
4	6/1/2001	7	28	3.5322	3.5304	0.85	0.051	**No**	**No**
5	6/8/2001	7	35	3.5330	3.5322	0.87	0.023	**Yes**	**No**
6	6/15/2001	7	42	3.5357	3.5330	0.95	0.077	**No**	**No**
7	6/22/2001	7	49	3.5377	3.5357	1.01	0.057	**No**	**No**
8	6/30/2001	8	57	3.5390	3.5377	1.04	0.037	**Yes**	**No**
9	7/6/2001	6	63	3.5405	3.5390	1.09	0.043	**Yes**	**Yes**
10	7/13/2001	7	70	3.5408	3.5405	1.10	0.009	**Yes**	**Yes**
11	7/20/2001	7	77	3.5422	3.5408	1.14	0.040	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**A-33**	**Product Type:**	**P707AG-15**
Batch #:	**AB991035**	**Baseline Weight (W_B):**	**3.4986**
Test Type:	**25/50/25 Laminate Ten/Comp**	**Conditioning Date:**	**05/04/01**
# of Plies:	**24**	**Removal Date:**	**07/20/01**
Traveler ID:	**A-33**		

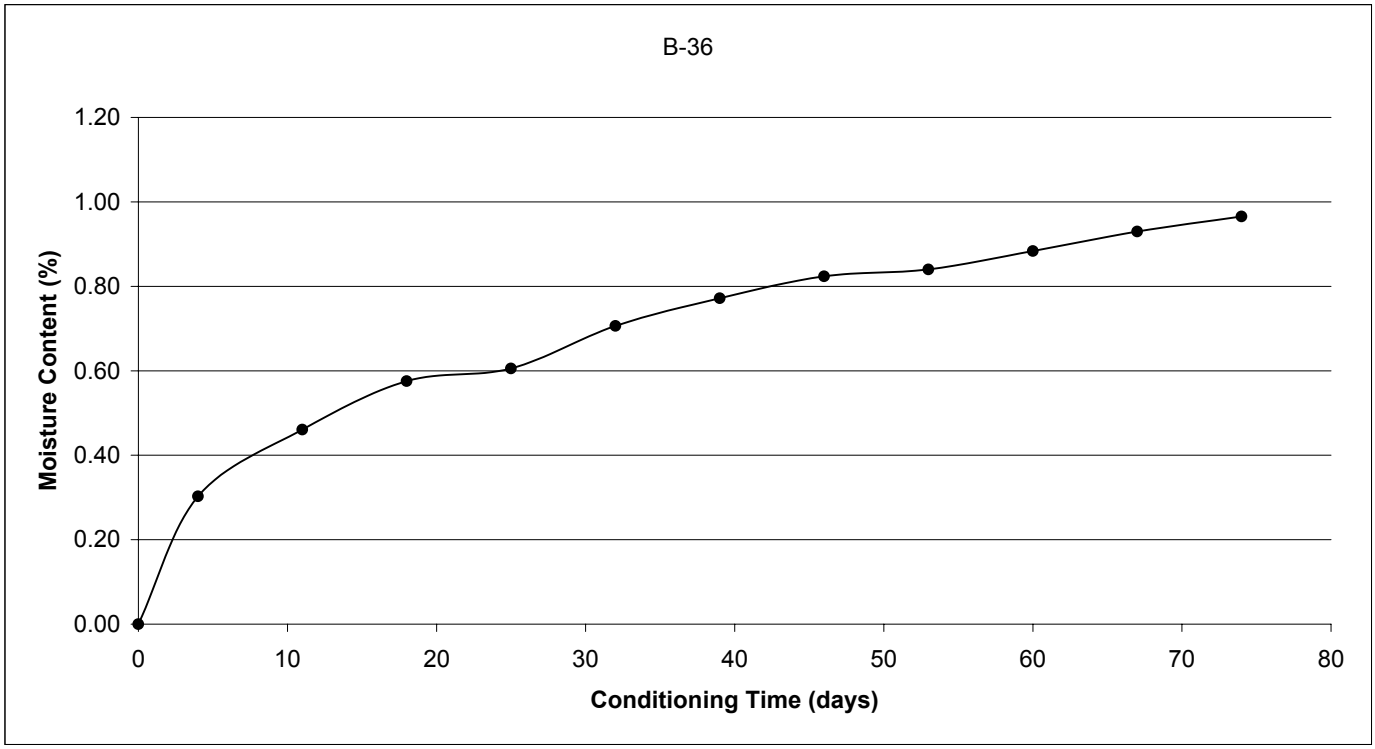
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	5/4/2001	Initial	0	3.4986	0.0000	0.00	0.000	-	-
1	5/11/2001	7	7	3.5158	3.4986	0.49	0.492	**No**	**No**
2	5/18/2001	7	14	3.5263	3.5158	0.79	0.300	**No**	**No**
3	5/25/2001	7	21	3.5304	3.5263	0.91	0.117	**No**	**No**
4	6/1/2001	7	28	3.5322	3.5304	0.96	0.051	**No**	**No**
5	6/8/2001	7	35	3.5330	3.5322	0.98	0.023	**Yes**	**No**
6	6/15/2001	7	42	3.5357	3.5330	1.06	0.077	**No**	**No**
7	6/22/2001	7	49	3.5377	3.5357	1.12	0.057	**No**	**No**
8	6/30/2001	8	57	3.5390	3.5377	1.15	0.037	**Yes**	**No**
9	7/6/2001	6	63	3.5405	3.5390	1.20	0.043	**Yes**	**Yes**
10	7/13/2001	7	70	3.5408	3.5405	1.21	0.009	**Yes**	**Yes**
11	7/20/2001	7	77	3.5422	3.5408	1.25	0.040	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**B-36**	**Product Type:**	**P707AG-15**
Batch #:	**AB991035**	**Baseline Weight (W_B):**	**3.6668**
Test Type:	**25/50/25 Bolt Bearing**	**Conditioning Date:**	**09/07/01**
# of Plies:	**24**	**Removal Date:**	**11/20/01**
Traveler ID:	**B-36**		

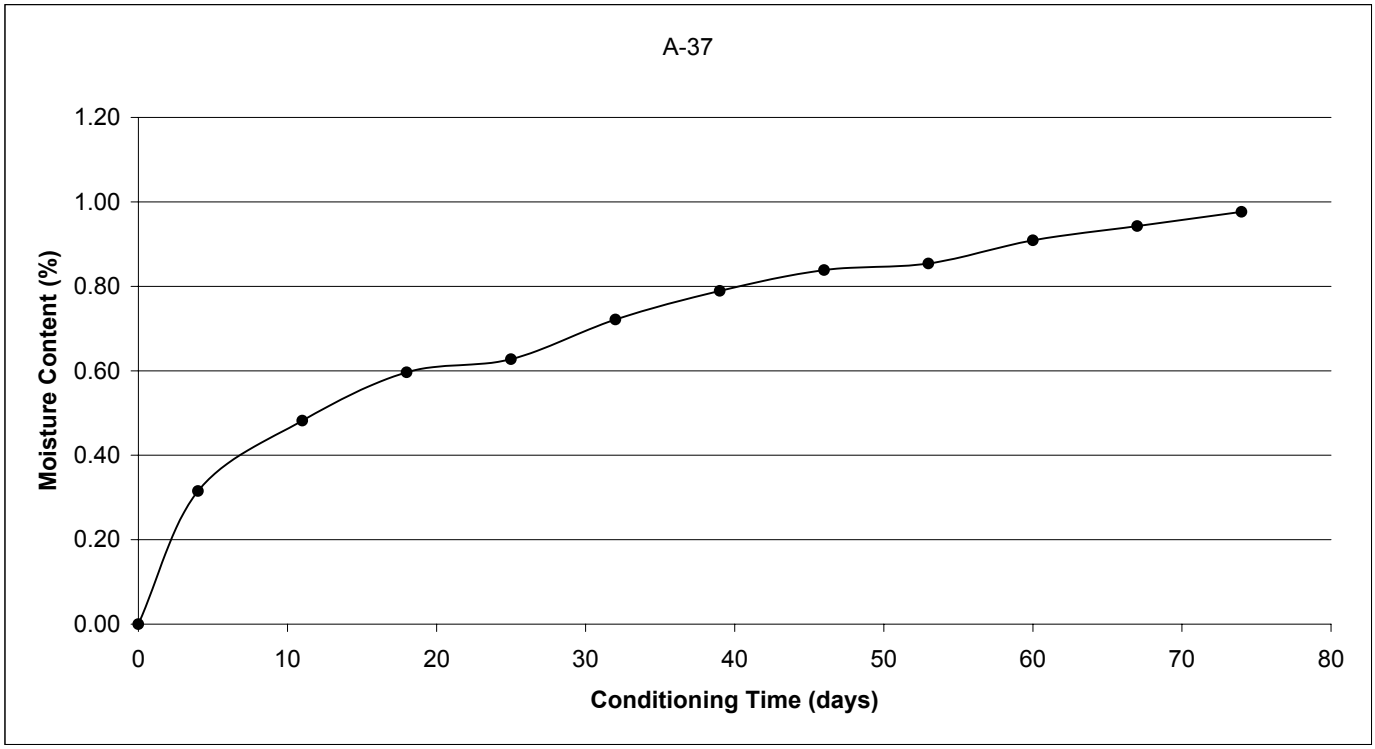
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	9/7/2001	Initial	0	3.6668	0.0000	0.00	0.000	-	-
1	9/11/2001	4	4	3.6779	3.6668	0.30	0.303	**No**	**No**
2	9/18/2001	7	11	3.6837	3.6779	0.46	0.158	**No**	**No**
3	9/25/2001	7	18	3.6879	3.6837	0.58	0.115	**No**	**No**
4	10/2/2001	7	25	3.6890	3.6879	0.61	0.030	**Yes**	**No**
5	10/9/2001	7	32	3.6927	3.6890	0.71	0.101	**No**	**No**
6	10/16/2001	7	39	3.6951	3.6927	0.77	0.065	**No**	**No**
7	10/23/2001	7	46	3.6970	3.6951	0.82	0.052	**No**	**No**
8	10/30/2001	7	53	3.6976	3.6970	0.84	0.016	**Yes**	**No**
9	11/6/2001	7	60	3.6992	3.6976	0.88	0.044	**Yes**	**Yes**
10	11/13/2001	7	67	3.7009	3.6992	0.93	0.046	**Yes**	**Yes**
11	11/20/2001	7	74	3.7022	3.7009	0.97	0.035	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**A-37**	**Product Type:**	**P707AG-15**
Batch #:	**AB991035**	**Baseline Weight (W_B):**	**3.8399**
Test Type:	**25/50/25 Bolt Bearing**	**Conditioning Date:**	**09/07/01**
# of Plies:	**24**	**Removal Date:**	**11/20/01**
Traveler ID:	**A-37**		

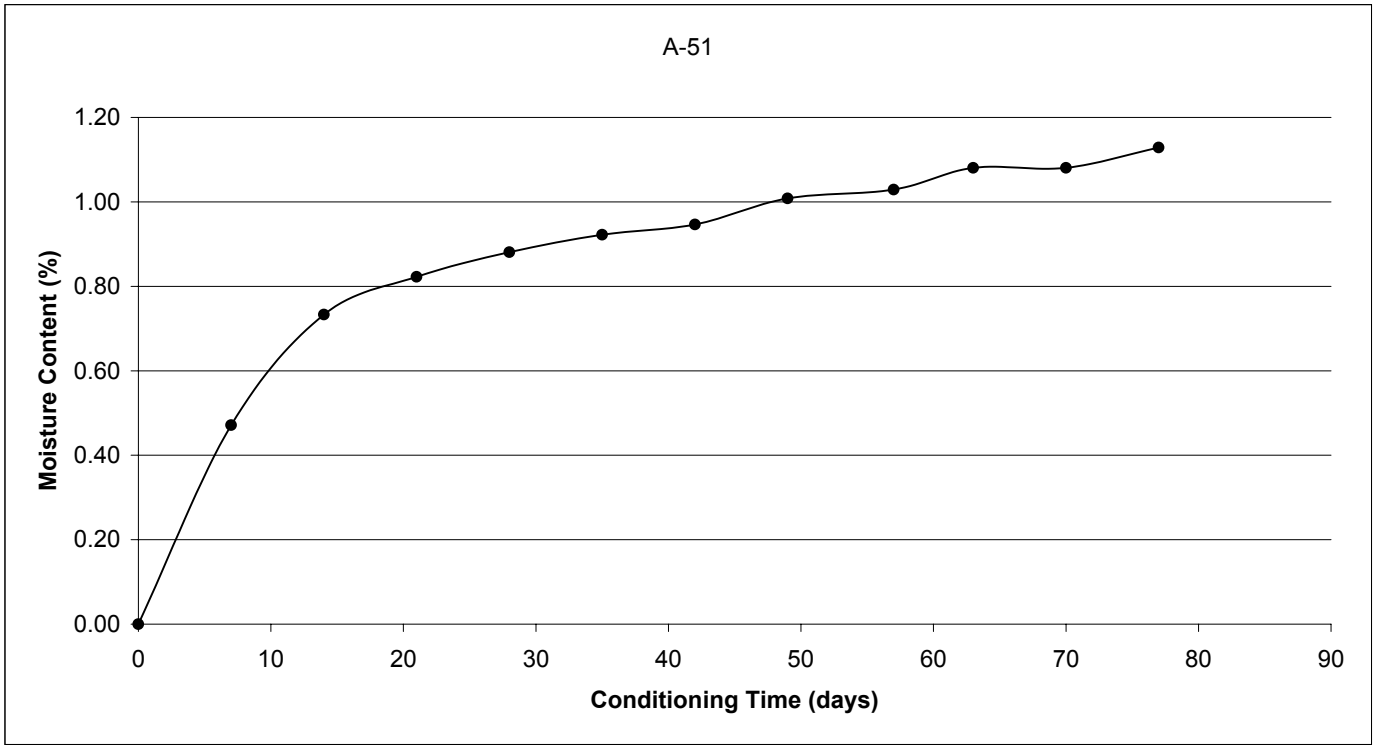
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	9/7/2001	Initial	0	3.8399	0.0000	0.00	0.000	-	-
1	9/11/2001	4	4	3.8520	3.8399	0.32	0.315	**No**	**No**
2	9/18/2001	7	11	3.8584	3.8520	0.48	0.167	**No**	**No**
3	9/25/2001	7	18	3.8628	3.8584	0.60	0.115	**No**	**No**
4	10/2/2001	7	25	3.8640	3.8628	0.63	0.031	**Yes**	**No**
5	10/9/2001	7	32	3.8676	3.8640	0.72	0.094	**No**	**No**
6	10/16/2001	7	39	3.8702	3.8676	0.79	0.068	**No**	**No**
7	10/23/2001	7	46	3.8721	3.8702	0.84	0.049	**Yes**	**No**
8	10/30/2001	7	53	3.8727	3.8721	0.85	0.016	**Yes**	**Yes**
9	11/6/2001	7	60	3.8748	3.8727	0.91	0.055	**No**	**No**
10	11/13/2001	7	67	3.8761	3.8748	0.94	0.034	**Yes**	**No**
11	11/20/2001	7	74	3.8774	3.8761	0.98	0.034	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**A-51**	**Product Type:**	**P707AG-15**
Batch #:	**AB991035**	**Baseline Weight (W_B):**	**2.9055**
Test Type:	**10/80/10 Laminate Ten/Comp**	**Conditioning Date:**	**05/04/01**
# of Plies:	**20**	**Removal Date:**	**07/20/01**
Traveler ID:	**A-51**		

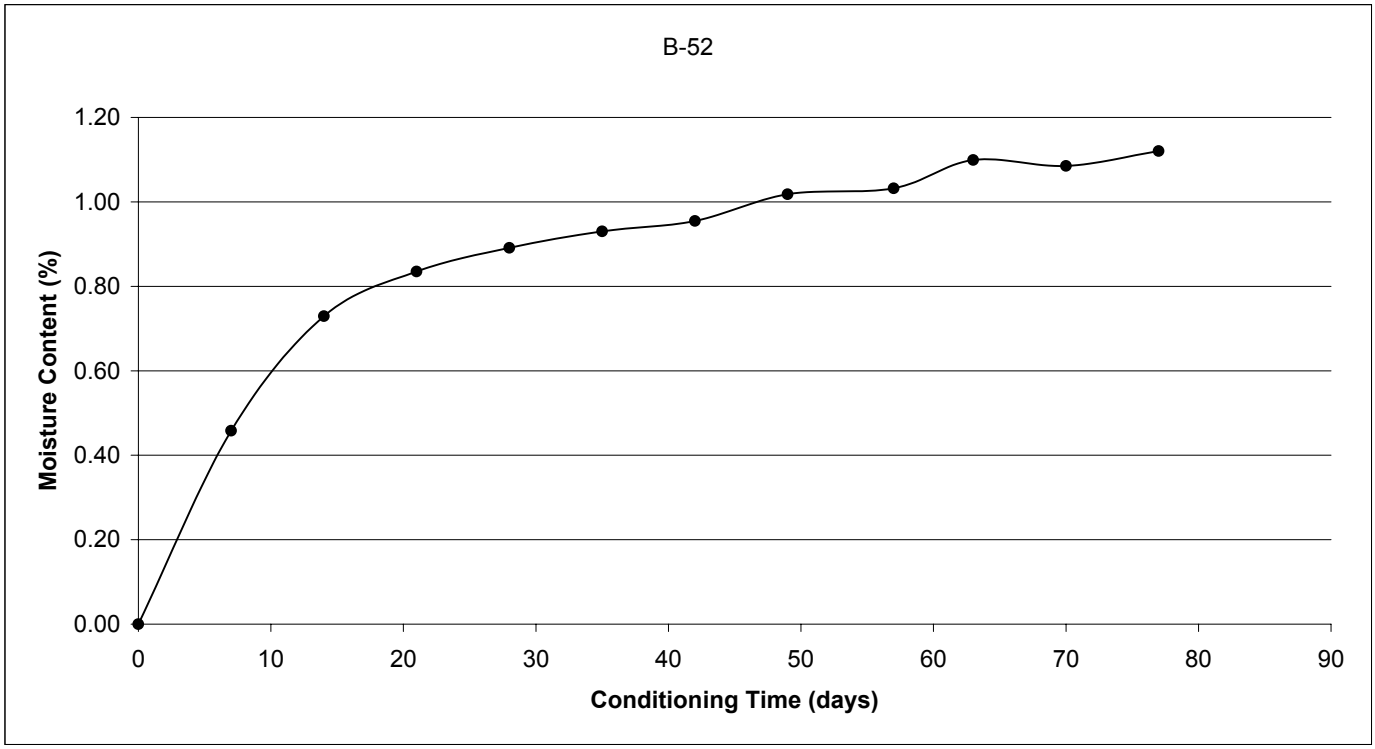
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	5/4/2001	Initial	0	2.9055	0.0000	0.00	0.000	-	-
1	5/11/2001	7	7	2.9192	2.9055	0.47	0.472	**No**	**No**
2	5/18/2001	7	14	2.9268	2.9192	0.73	0.262	**No**	**No**
3	5/25/2001	7	21	2.9294	2.9268	0.82	0.089	**No**	**No**
4	6/1/2001	7	28	2.9311	2.9294	0.88	0.059	**No**	**No**
5	6/8/2001	7	35	2.9323	2.9311	0.92	0.041	**Yes**	**No**
6	6/15/2001	7	42	2.9330	2.9323	0.95	0.024	**Yes**	**Yes**
7	6/22/2001	7	49	2.9348	2.9330	1.01	0.062	**No**	**No**
8	6/30/2001	8	57	2.9354	2.9348	1.03	0.021	**Yes**	**No**
9	7/6/2001	6	63	2.9369	2.9354	1.08	0.052	**No**	**No**
10	7/13/2001	7	70	2.9369	2.9369	1.08	0.000	**Yes**	**No**
11	7/20/2001	7	77	2.9383	2.9369	1.13	0.048	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**B-52**	**Product Type:**	**P707AG-15**
Batch #:	**AB991035**	**Baseline Weight (W_B):**	**2.8385**
Test Type:	**10/80/10 Laminate Ten/Comp**	**Conditioning Date:**	**05/04/01**
# of Plies:	**20**	**Removal Date:**	**07/20/01**
Traveler ID:	**B-52**		

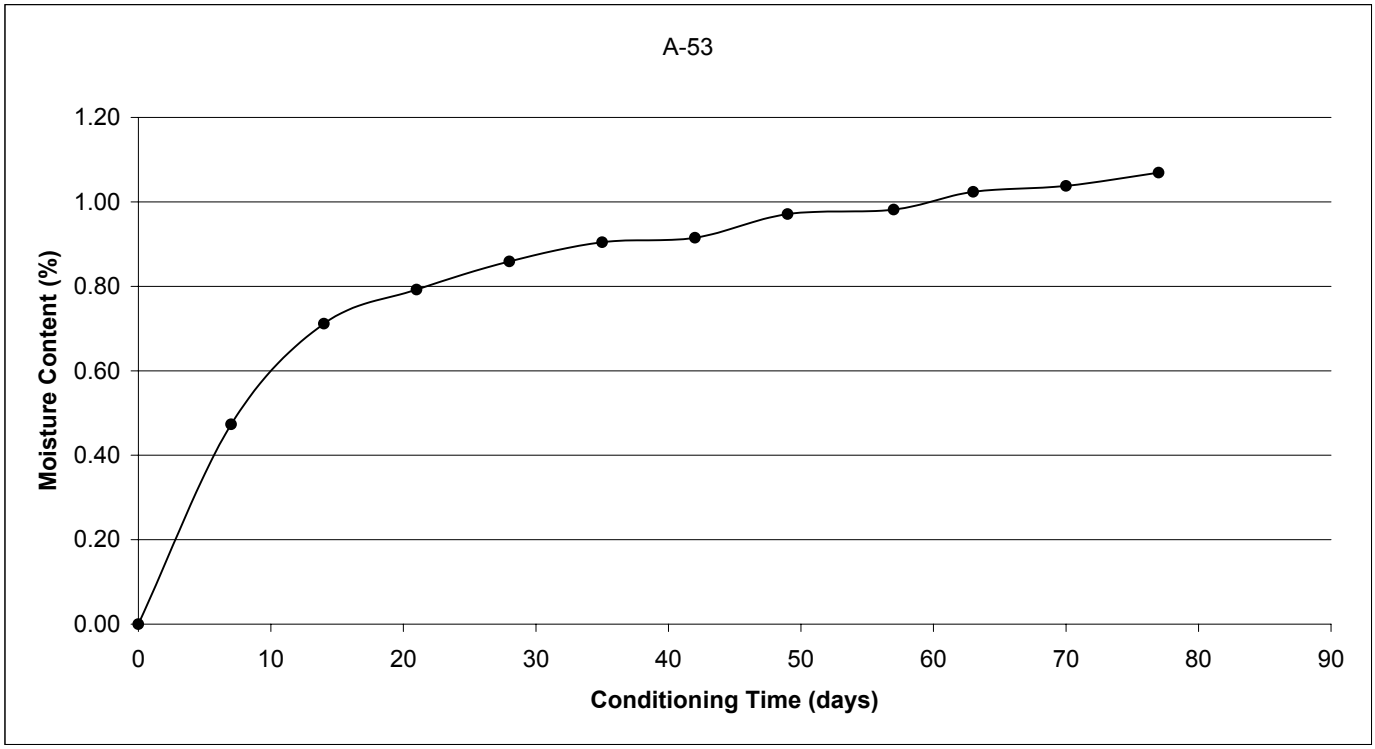
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	5/4/2001	Initial	0	2.8385	0.0000	0.00	0.000	-	-
1	5/11/2001	7	7	2.8515	2.8385	0.46	0.458	**No**	**No**
2	5/18/2001	7	14	2.8592	2.8515	0.73	0.271	**No**	**No**
3	5/25/2001	7	21	2.8622	2.8592	0.83	0.106	**No**	**No**
4	6/1/2001	7	28	2.8638	2.8622	0.89	0.056	**No**	**No**
5	6/8/2001	7	35	2.8649	2.8638	0.93	0.039	**Yes**	**No**
6	6/15/2001	7	42	2.8656	2.8649	0.95	0.025	**Yes**	**Yes**
7	6/22/2001	7	49	2.8674	2.8656	1.02	0.063	**No**	**No**
8	6/30/2001	8	57	2.8678	2.8674	1.03	0.014	**Yes**	**No**
9	7/6/2001	6	63	2.8697	2.8678	1.10	0.067	**No**	**No**
10	7/13/2001	7	70	2.8693	2.8697	1.09	-0.014	**Yes**	**No**
11	7/20/2001	7	77	2.8703	2.8693	1.12	0.035	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**A-53**	**Product Type:**	**P707AG-15**
Batch #:	**AB991035**	**Baseline Weight (W_B):**	**2.8521**
Test Type:	**10/80/10 Laminate Ten/Comp**	**Conditioning Date:**	**05/04/01**
# of Plies:	**20**	**Removal Date:**	**07/20/01**
Traveler ID:	**A-53**		

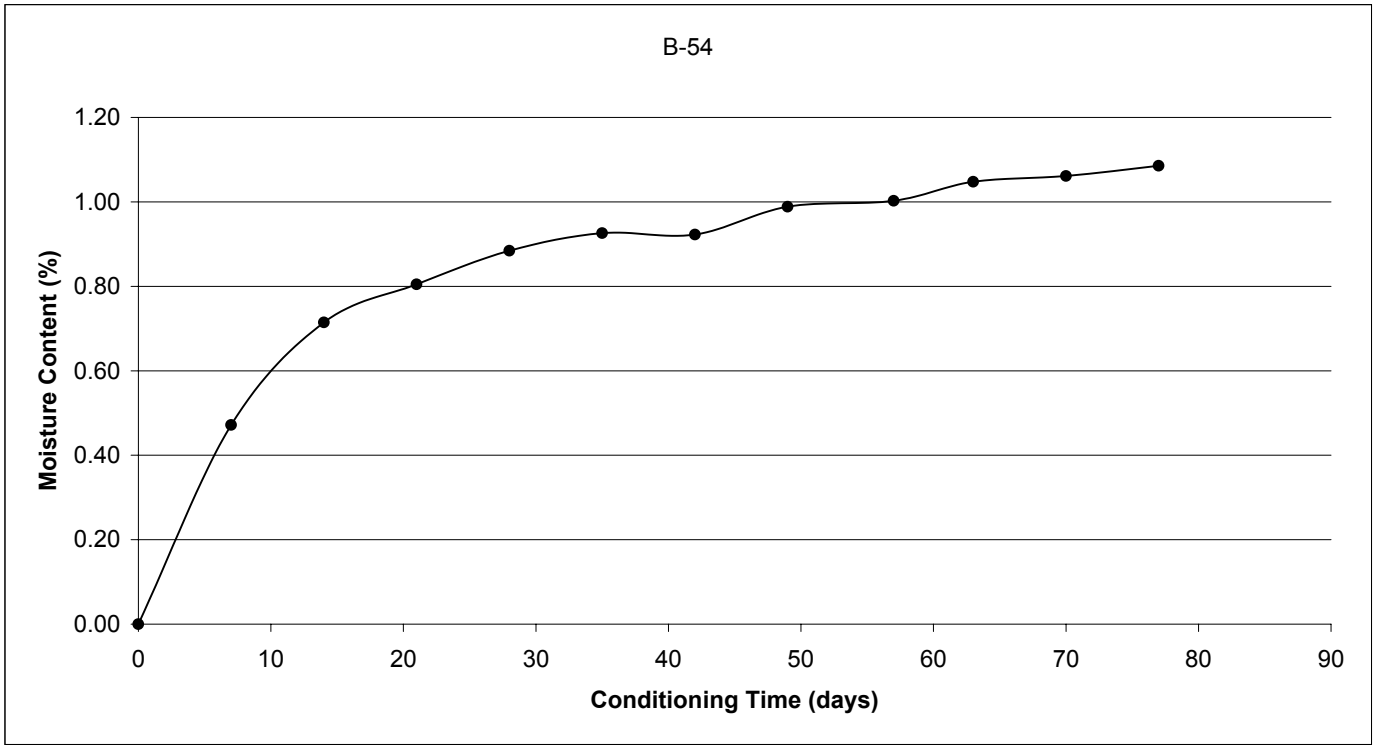
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	5/4/2001	Initial	0	2.8521	0.0000	0.00	0.000	-	-
1	5/11/2001	7	7	2.8656	2.8521	0.47	0.473	**No**	**No**
2	5/18/2001	7	14	2.8724	2.8656	0.71	0.238	**No**	**No**
3	5/25/2001	7	21	2.8747	2.8724	0.79	0.081	**No**	**No**
4	6/1/2001	7	28	2.8766	2.8747	0.86	0.067	**No**	**No**
5	6/8/2001	7	35	2.8779	2.8766	0.90	0.046	**Yes**	**No**
6	6/15/2001	7	42	2.8782	2.8779	0.92	0.011	**Yes**	**Yes**
7	6/22/2001	7	49	2.8798	2.8782	0.97	0.056	**No**	**No**
8	6/30/2001	8	57	2.8801	2.8798	0.98	0.011	**Yes**	**No**
9	7/6/2001	6	63	2.8813	2.8801	1.02	0.042	**Yes**	**Yes**
10	7/13/2001	7	70	2.8817	2.8813	1.04	0.014	**Yes**	**Yes**
11	7/20/2001	7	77	2.8826	2.8817	1.07	0.032	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**B-54**	**Product Type:**	**P707AG-15**
Batch #:	**AB991035**	**Baseline Weight (W_B):**	**2.8830**
Test Type:	**10/80/10 Laminate Ten/Comp**	**Conditioning Date:**	**05/04/01**
# of Plies:	**20**	**Removal Date:**	**07/20/01**
Traveler ID:	**B-54**		

Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	5/4/2001	Initial	0	2.8830	0.0000	0.00	0.000	-	-
1	5/11/2001	7	7	2.8966	2.8830	0.47	0.472	**No**	**No**
2	5/18/2001	7	14	2.9036	2.8966	0.71	0.243	**No**	**No**
3	5/25/2001	7	21	2.9062	2.9036	0.80	0.090	**No**	**No**
4	6/1/2001	7	28	2.9085	2.9062	0.88	0.080	**No**	**No**
5	6/8/2001	7	35	2.9097	2.9085	0.93	0.042	**Yes**	**No**
6	6/15/2001	7	42	2.9096	2.9097	0.92	-0.003	**Yes**	**Yes**
7	6/22/2001	7	49	2.9115	2.9096	0.99	0.066	**No**	**No**
8	6/30/2001	8	57	2.9119	2.9115	1.00	0.014	**Yes**	**No**
9	7/6/2001	6	63	2.9132	2.9119	1.05	0.045	**Yes**	**Yes**
10	7/13/2001	7	70	2.9136	2.9132	1.06	0.014	**Yes**	**Yes**
11	7/20/2001	7	77	2.9143	2.9136	1.09	0.024	**Yes**	**Yes**

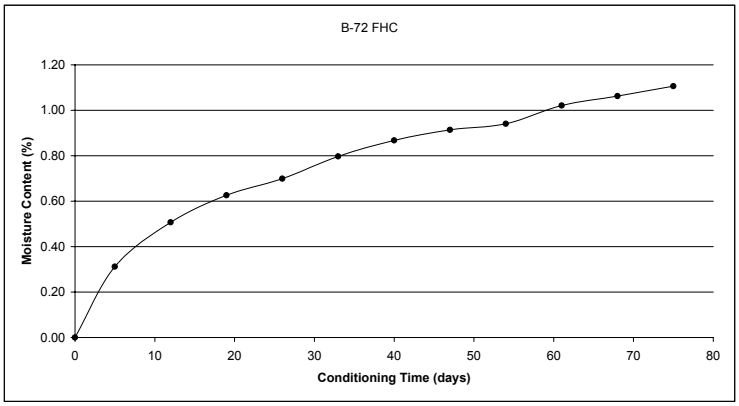


B.2. Moisture Conditioning Charts of F6273C-07M

Laminate Moisture Conditioning

Panel ID:	**B-72**	**Product Type:**	**F6273C-07M**
Batch #:	**AF010271**	**Baseline Weight (W_B):**	**4.1030**
Test Type:	**40/20/40 FHC**	**Conditioning Date:**	**10/04/01**
# of Plies:	**20**	**Removal Date:**	**12/18/01**
Traveler ID:	**B-72 FHC**		

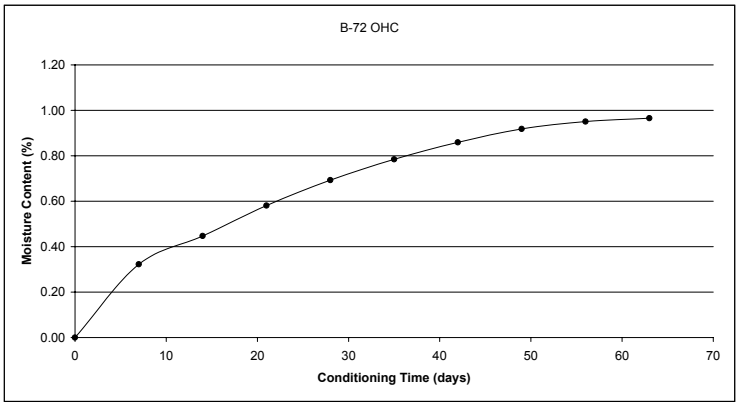
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	10/4/2001	Initial	0	4.1030	0.0000	0.00	0.000	-	-
1	10/9/2001	5	5	4.1158	4.1030	0.31	0.312	**No**	**No**
2	10/16/2001	7	12	4.1238	4.1158	0.51	0.195	**No**	**No**
3	10/23/2001	7	19	4.1287	4.1238	0.63	0.119	**No**	**No**
4	10/30/2001	7	26	4.1317	4.1287	0.70	0.073	**No**	**No**
5	11/6/2001	7	33	4.1357	4.1317	0.80	0.097	**No**	**No**
6	11/13/2001	7	40	4.1386	4.1357	0.87	0.071	**No**	**No**
7	11/20/2001	7	47	4.1405	4.1386	0.91	0.046	**Yes**	**No**
8	11/27/2001	7	54	4.1416	4.1405	0.94	0.027	**Yes**	**Yes**
9	12/4/2001	7	61	4.1449	4.1416	1.02	0.080	**No**	**No**
10	12/11/2001	7	68	4.1466	4.1449	1.06	0.041	**Yes**	**No**
11	12/18/2001	7	75	4.1484	4.1466	1.11	0.044	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**B-72**	**Product Type:**	**F6273C-07M**
Batch #:	**AF010271**	**Baseline Weight (W_B):**	**4.0278**
Test Type:	**40/20/40 OHC**	**Conditioning Date:**	**07/31/01**
# of Plies:	**20**	**Removal Date:**	**10/02/01**
Traveler ID:	**B-72 OHC**		

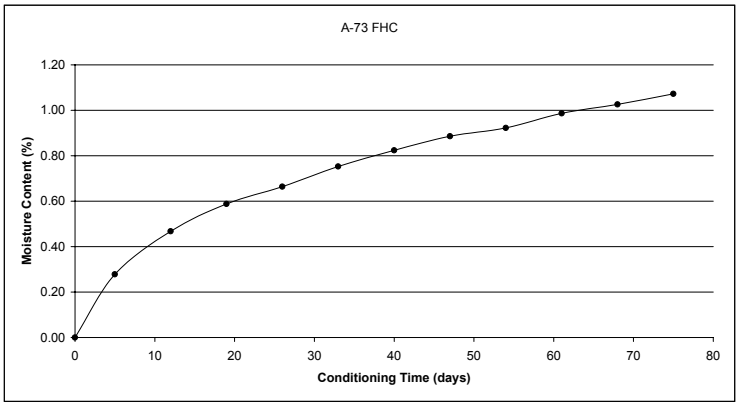
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	7/31/2001	Initial	0	4.0278	0.0000	0.00	0.000	-	-
1	8/7/2001	7	7	4.0408	4.0278	0.32	0.323	**No**	**No**
2	8/14/2001	7	14	4.0458	4.0408	0.45	0.124	**No**	**No**
3	8/21/2001	7	21	4.0512	4.0458	0.58	0.134	**No**	**No**
4	8/28/2001	7	28	4.0557	4.0512	0.69	0.112	**No**	**No**
5	9/4/2001	7	35	4.0594	4.0557	0.78	0.092	**No**	**No**
6	9/11/2001	7	42	4.0624	4.0594	0.86	0.074	**No**	**No**
7	9/18/2001	7	49	4.0648	4.0624	0.92	0.060	**No**	**No**
8	9/25/2001	7	56	4.0661	4.0648	0.95	0.032	**Yes**	**No**
9	10/2/2001	7	63	4.0667	4.0661	0.97	0.015	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**A-73**	**Product Type:**	**F6273C-07M**
Batch #:	**AF010271**	**Baseline Weight (W_B):**	**4.0650**
Test Type:	**40/20/40 FHC**	**Conditioning Date:**	**10/04/01**
# of Plies:	**20**	**Removal Date:**	**12/18/01**
Traveler ID:	**A-73 FHC**		

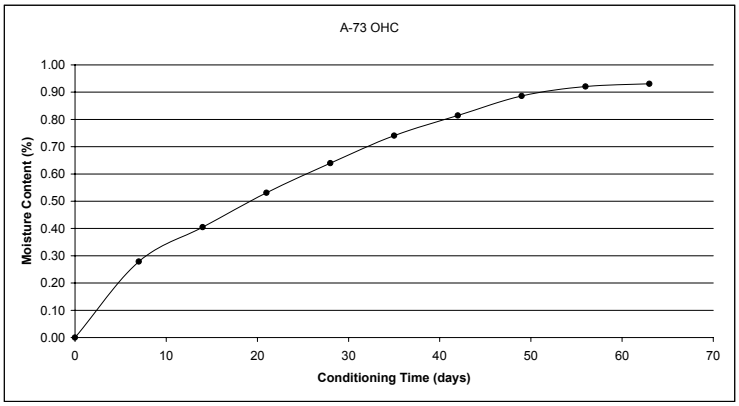
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	10/4/2001	Initial	0	4.0650	0.0000	0.00	0.000	-	-
1	10/9/2001	5	5	4.0763	4.0650	0.28	0.278	**No**	**No**
2	10/16/2001	7	12	4.0840	4.0763	0.47	0.189	**No**	**No**
3	10/23/2001	7	19	4.0889	4.0840	0.59	0.121	**No**	**No**
4	10/30/2001	7	26	4.0920	4.0889	0.66	0.076	**No**	**No**
5	11/6/2001	7	33	4.0956	4.0920	0.75	0.089	**No**	**No**
6	11/13/2001	7	40	4.0985	4.0956	0.82	0.071	**No**	**No**
7	11/20/2001	7	47	4.1010	4.0985	0.89	0.062	**No**	**No**
8	11/27/2001	7	54	4.1025	4.1010	0.92	0.037	**Yes**	**No**
9	12/4/2001	7	61	4.1051	4.1025	0.99	0.064	**No**	**No**
10	12/11/2001	7	68	4.1067	4.1051	1.03	0.039	**Yes**	**No**
11	12/18/2001	7	75	4.1086	4.1067	1.07	0.047	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**A-73**	**Product Type:**	**F6273C-07M**
Batch #:	**AF010271**	**Baseline Weight (W_B):**	**4.0500**
Test Type:	**40/20/40 OHC**	**Conditioning Date:**	**07/31/01**
# of Plies:	**20**	**Removal Date:**	**10/02/01**
Traveler ID:	**A-73 OHC**		

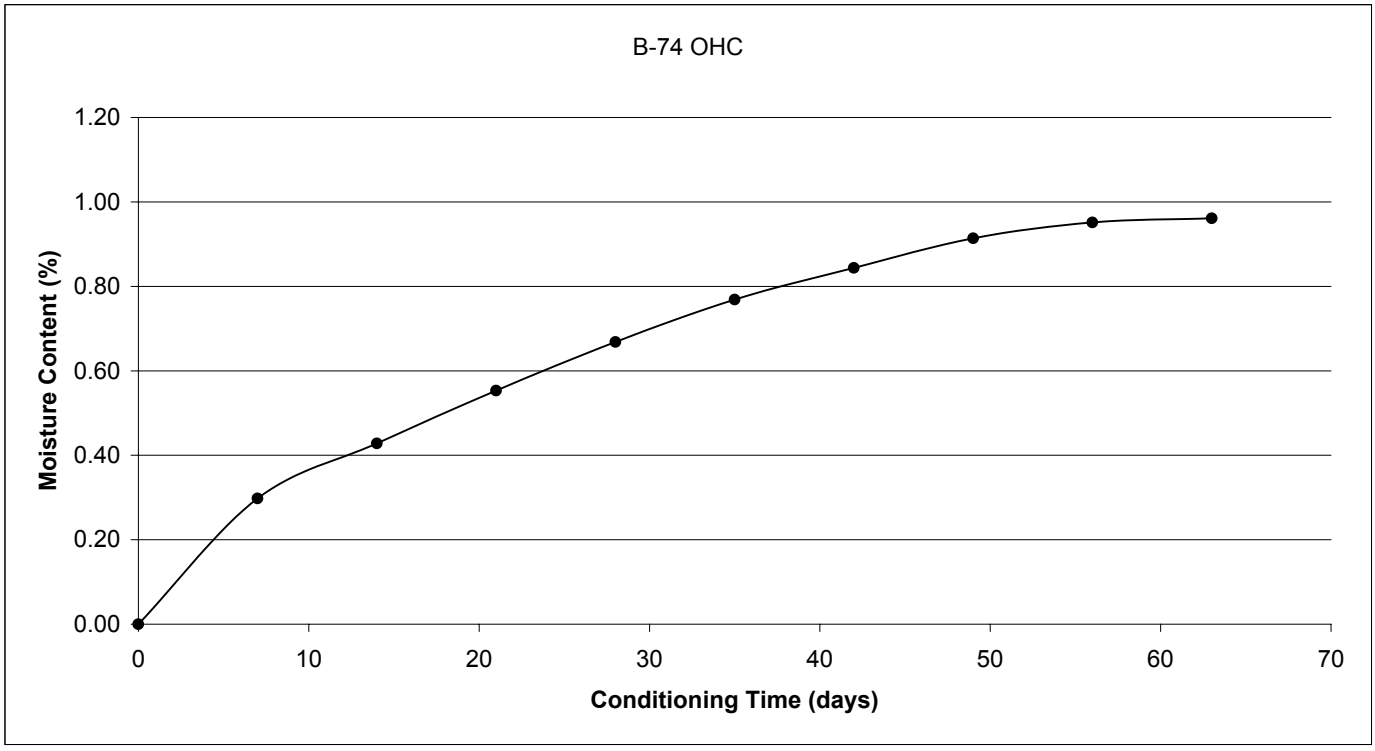
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	7/31/2001	Initial	0	4.0500	0.0000	0.00	0.000	-	-
1	8/7/2001	7	7	4.0613	4.0500	0.28	0.279	**No**	**No**
2	8/14/2001	7	14	4.0664	4.0613	0.40	0.126	**No**	**No**
3	8/21/2001	7	21	4.0715	4.0664	0.53	0.126	**No**	**No**
4	8/28/2001	7	28	4.0759	4.0715	0.64	0.109	**No**	**No**
5	9/4/2001	7	35	4.0800	4.0759	0.74	0.101	**No**	**No**
6	9/11/2001	7	42	4.0830	4.0800	0.81	0.074	**No**	**No**
7	9/18/2001	7	49	4.0859	4.0830	0.89	0.072	**No**	**No**
8	9/25/2001	7	56	4.0873	4.0859	0.92	0.035	**Yes**	**No**
9	10/2/2001	7	63	4.0877	4.0873	0.93	0.010	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**B-74**	**Product Type:**	**F6273C-07M**
Batch #:	**AF010271**	**Baseline Weight (W_B):**	**3.9942**
Test Type:	**40/20/40 Laminate Ten/Comp**	**Conditioning Date:**	**07/31/01**
# of Plies:	**20**	**Removal Date:**	**10/02/01**
Traveler ID:	**B-74 OHC**		

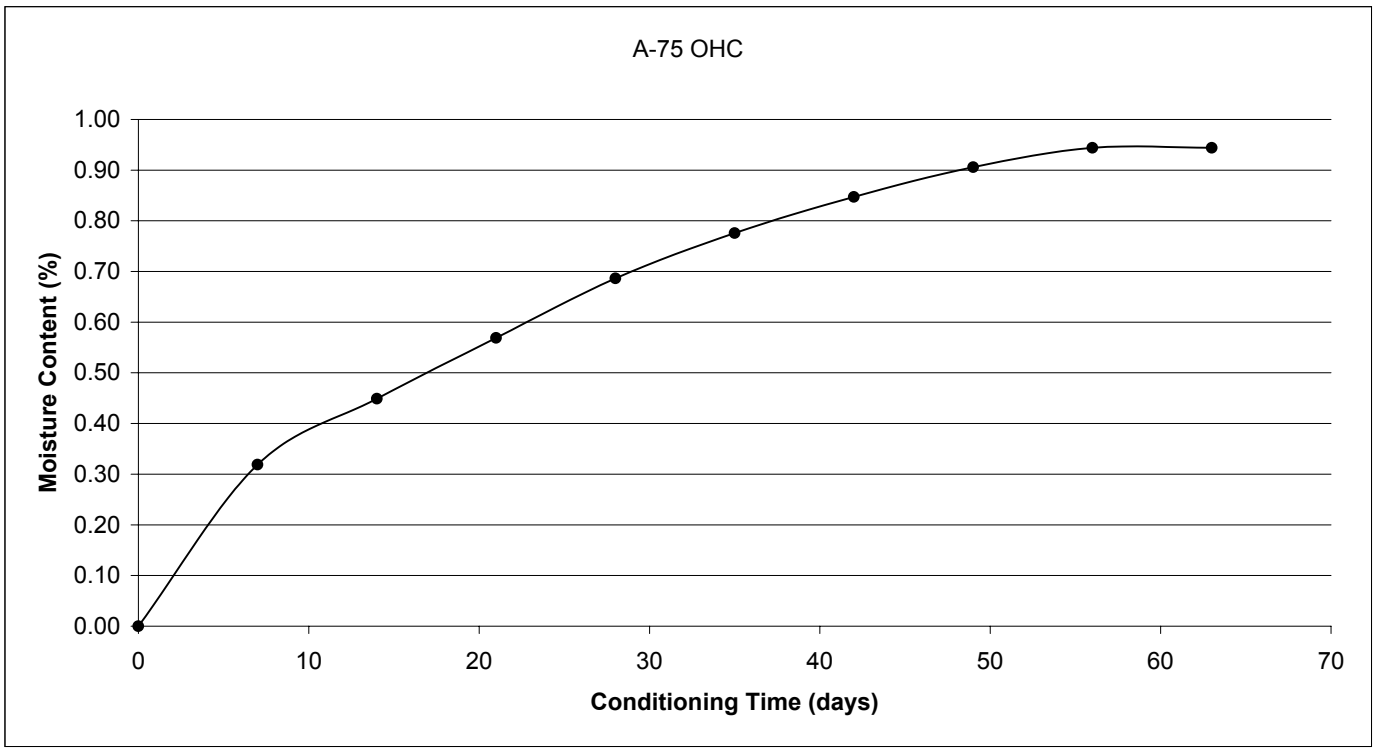
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	7/31/2001	Initial	0	3.9942	0.0000	0.00	0.000	-	-
1	8/7/2001	7	7	4.0061	3.9942	0.30	0.298	**No**	**No**
2	8/14/2001	7	14	4.0113	4.0061	0.43	0.130	**No**	**No**
3	8/21/2001	7	21	4.0163	4.0113	0.55	0.125	**No**	**No**
4	8/28/2001	7	28	4.0209	4.0163	0.67	0.115	**No**	**No**
5	9/4/2001	7	35	4.0249	4.0209	0.77	0.100	**No**	**No**
6	9/11/2001	7	42	4.0279	4.0249	0.84	0.075	**No**	**No**
7	9/18/2001	7	49	4.0307	4.0279	0.91	0.070	**No**	**No**
8	9/25/2001	7	56	4.0322	4.0307	0.95	0.038	**Yes**	**No**
9	10/2/2001	7	63	4.0326	4.0322	0.96	0.010	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**A-75**	**Product Type:**	**F6273C-07M**
Batch #:	**AF010271**	**Baseline Weight (W_B):**	**3.9185**
Test Type:	**40/20/40 Laminate Ten/Comp**	**Conditioning Date:**	**07/31/01**
# of Plies:	**20**	**Removal Date:**	**10/02/01**
Traveler ID:	**A-75 OHC**		

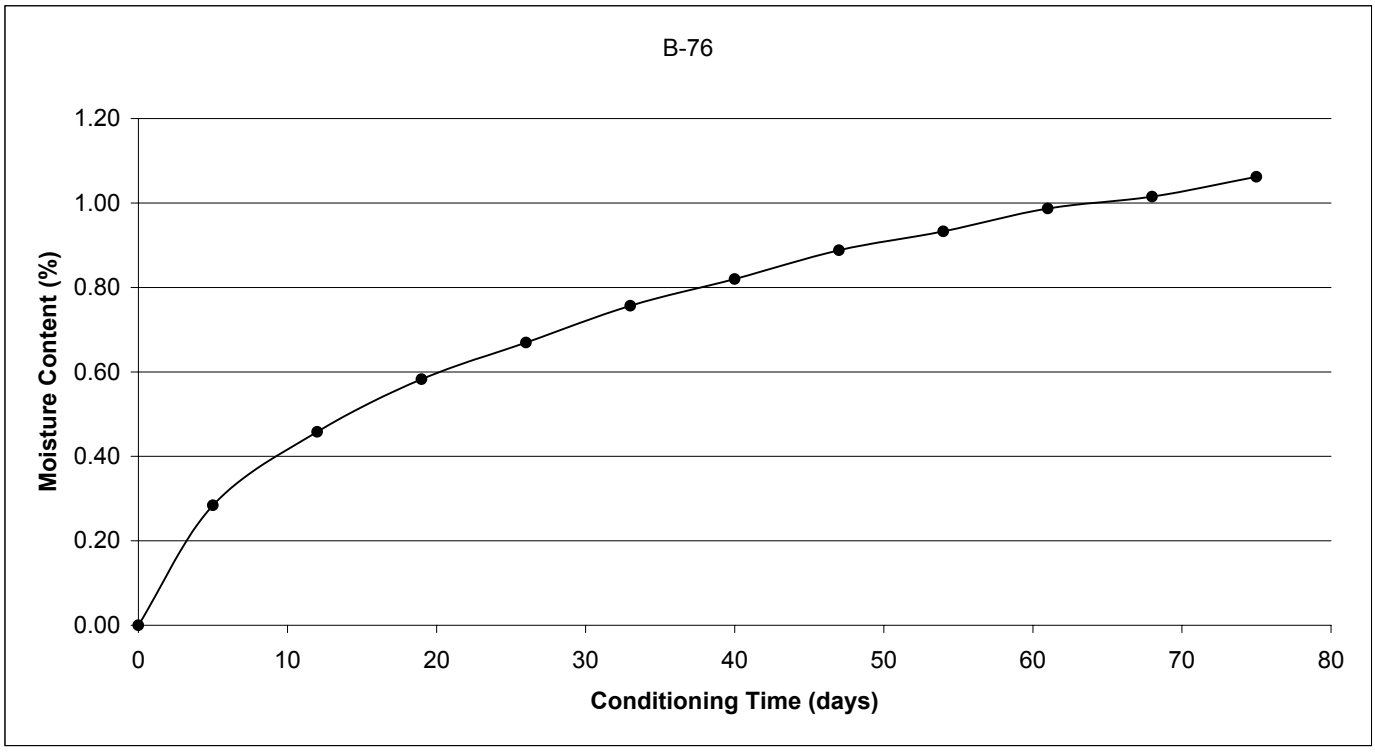
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	7/31/2001	Initial	0	3.9185	0.0000	0.00	0.000	-	-
1	8/7/2001	7	7	3.9310	3.9185	0.32	0.319	**No**	**No**
2	8/14/2001	7	14	3.9361	3.9310	0.45	0.130	**No**	**No**
3	8/21/2001	7	21	3.9408	3.9361	0.57	0.120	**No**	**No**
4	8/28/2001	7	28	3.9454	3.9408	0.69	0.117	**No**	**No**
5	9/4/2001	7	35	3.9489	3.9454	0.78	0.089	**No**	**No**
6	9/11/2001	7	42	3.9517	3.9489	0.85	0.071	**No**	**No**
7	9/18/2001	7	49	3.9540	3.9517	0.91	0.059	**No**	**No**
8	9/25/2001	7	56	3.9555	3.9540	0.94	0.038	**Yes**	**No**
9	10/2/2001	7	63	3.9555	3.9555	0.94	0.000	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**B-76**	**Product Type:**	**F6273C-07M**
Batch #:	**AF010271**	**Baseline Weight (W_B):**	**4.2558**
Test Type:	**40/20/40 Bolt Bearing**	**Conditioning Date:**	**10/04/01**
# of Plies:	**20**	**Removal Date:**	**12/18/01**
Traveler ID:	**B-76**		

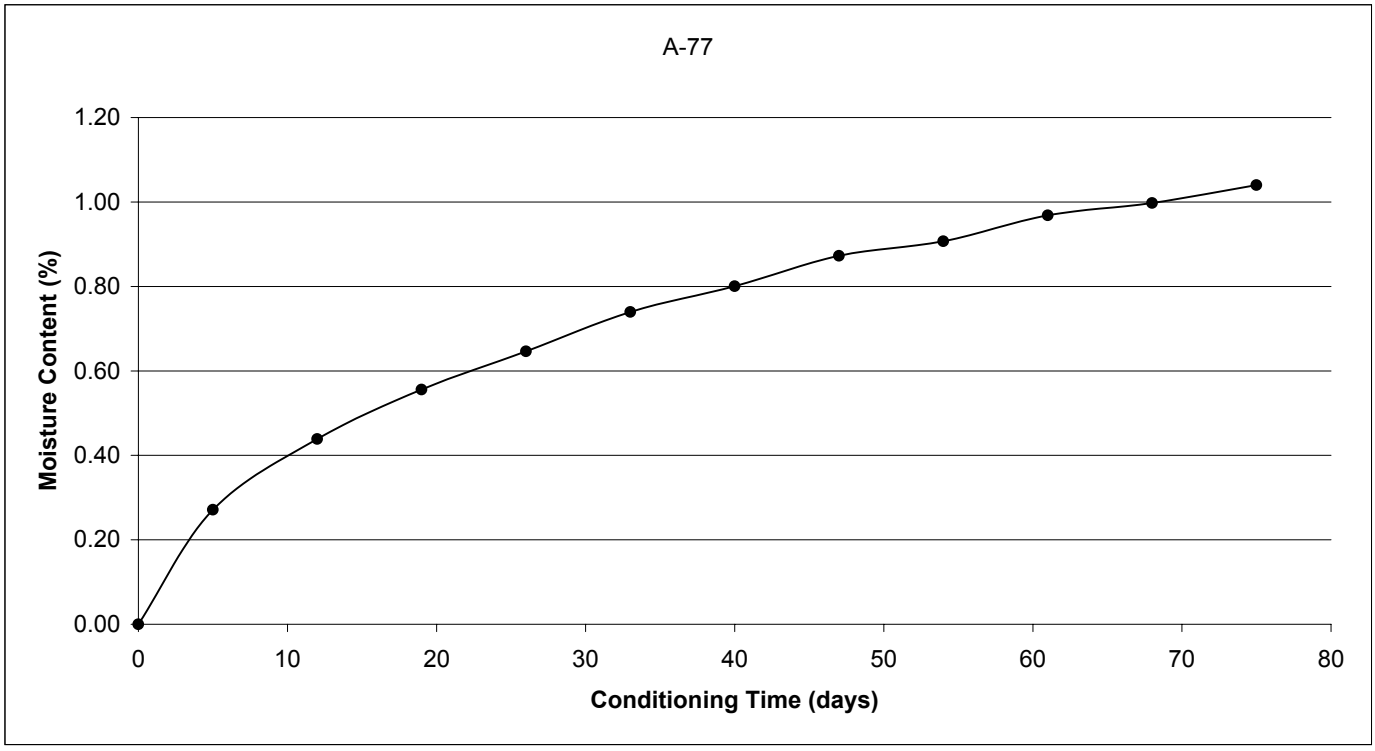
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	10/4/2001	Initial	0	4.2558	0.0000	0.00	0.000	-	-
1	10/9/2001	5	5	4.2679	4.2558	0.28	0.284	**No**	**No**
2	10/16/2001	7	12	4.2753	4.2679	0.46	0.174	**No**	**No**
3	10/23/2001	7	19	4.2806	4.2753	0.58	0.125	**No**	**No**
4	10/30/2001	7	26	4.2843	4.2806	0.67	0.087	**No**	**No**
5	11/6/2001	7	33	4.2880	4.2843	0.76	0.087	**No**	**No**
6	11/13/2001	7	40	4.2907	4.2880	0.82	0.063	**No**	**No**
7	11/20/2001	7	47	4.2936	4.2907	0.89	0.068	**No**	**No**
8	11/27/2001	7	54	4.2955	4.2936	0.93	0.045	**Yes**	**No**
9	12/4/2001	7	61	4.2978	4.2955	0.99	0.054	**No**	**No**
10	12/11/2001	7	68	4.2990	4.2978	1.02	0.028	**Yes**	**No**
11	12/18/2001	7	75	4.3010	4.2990	1.06	0.047	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**A-77**	**Product Type:**	**F6273C-07M**
Batch #:	**AF010271**	**Baseline Weight (W_B):**	**3.7589**
Test Type:	**40/20/40 Bolt Bearing**	**Conditioning Date:**	**10/04/01**
# of Plies:	**20**	**Removal Date:**	**12/18/01**
Traveler ID:	**A-77**		

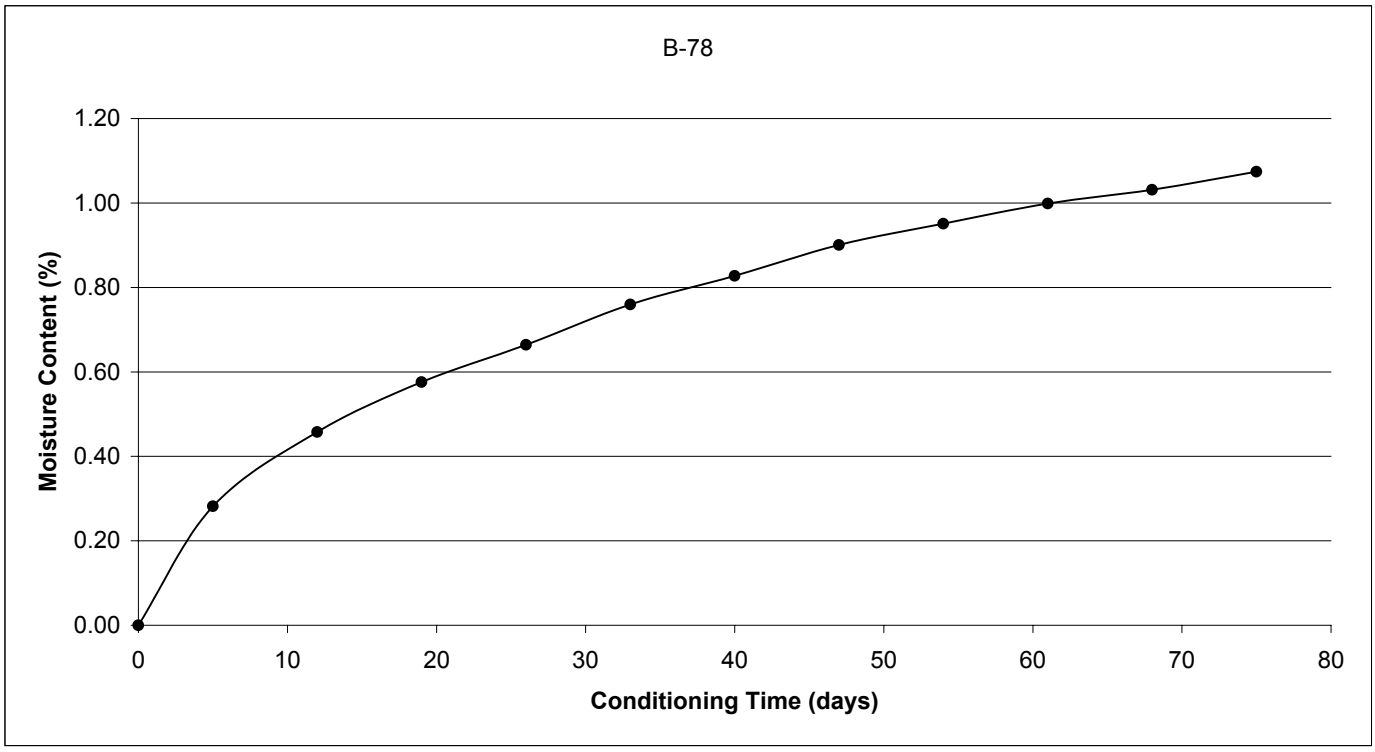
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	10/4/2001	Initial	0	3.7589	0.0000	0.00	0.000	-	-
1	10/9/2001	5	5	3.7691	3.7589	0.27	0.271	**No**	**No**
2	10/16/2001	7	12	3.7754	3.7691	0.44	0.168	**No**	**No**
3	10/23/2001	7	19	3.7798	3.7754	0.56	0.117	**No**	**No**
4	10/30/2001	7	26	3.7832	3.7798	0.65	0.090	**No**	**No**
5	11/6/2001	7	33	3.7867	3.7832	0.74	0.093	**No**	**No**
6	11/13/2001	7	40	3.7890	3.7867	0.80	0.061	**No**	**No**
7	11/20/2001	7	47	3.7917	3.7890	0.87	0.072	**No**	**No**
8	11/27/2001	7	54	3.7930	3.7917	0.91	0.035	**Yes**	**No**
9	12/4/2001	7	61	3.7953	3.7930	0.97	0.061	**No**	**No**
10	12/11/2001	7	68	3.7964	3.7953	1.00	0.029	**Yes**	**No**
11	12/18/2001	7	75	3.7980	3.7964	1.04	0.043	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**B-78**	**Product Type:**	**F6273C-07M**
Batch #:	**AF010271**	**Baseline Weight (W_B):**	**3.9752**
Test Type:	**40/20/40 Bolt Bearing**	**Conditioning Date:**	**10/04/01**
# of Plies:	**20**	**Removal Date:**	**12/18/01**
Traveler ID:	**B-78**		

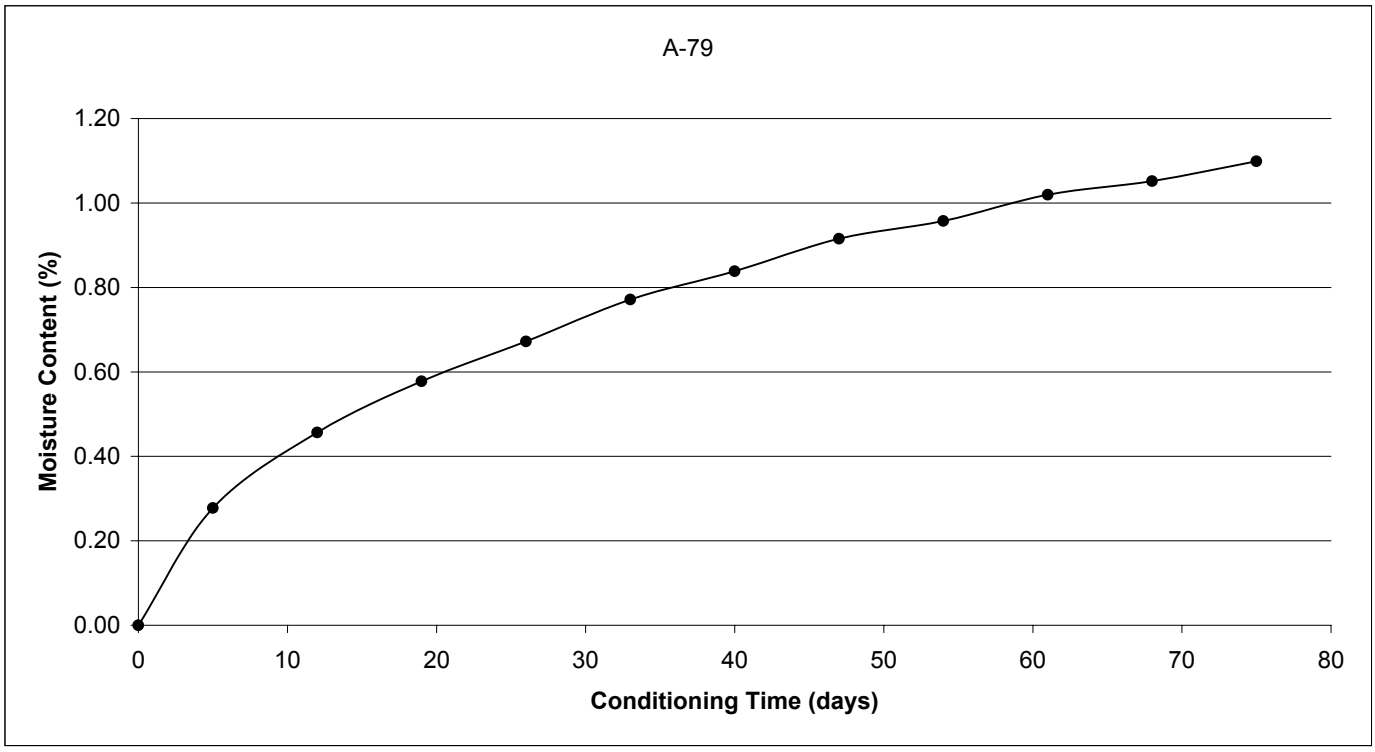
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	10/4/2001	Initial	0	3.9752	0.0000	0.00	0.000	-	-
1	10/9/2001	5	5	3.9864	3.9752	0.28	0.282	**No**	**No**
2	10/16/2001	7	12	3.9934	3.9864	0.46	0.176	**No**	**No**
3	10/23/2001	7	19	3.9981	3.9934	0.58	0.118	**No**	**No**
4	10/30/2001	7	26	4.0016	3.9981	0.66	0.088	**No**	**No**
5	11/6/2001	7	33	4.0054	4.0016	0.76	0.096	**No**	**No**
6	11/13/2001	7	40	4.0081	4.0054	0.83	0.068	**No**	**No**
7	11/20/2001	7	47	4.0110	4.0081	0.90	0.073	**No**	**No**
8	11/27/2001	7	54	4.0130	4.0110	0.95	0.050	**No**	**No**
9	12/4/2001	7	61	4.0149	4.0130	1.00	0.048	**Yes**	**No**
10	12/11/2001	7	68	4.0162	4.0149	1.03	0.033	**Yes**	**Yes**
11	12/18/2001	7	75	4.0179	4.0162	1.07	0.043	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**A-79**	**Product Type:**	**F6273C-07M**
Batch #:	**AF010271**	**Baseline Weight (W_B):**	**4.0315**
Test Type:	**40/20/40 Bolt Bearing**	**Conditioning Date:**	**10/04/01**
# of Plies:	**20**	**Removal Date:**	**12/18/01**
Traveler ID:	**A-79**		

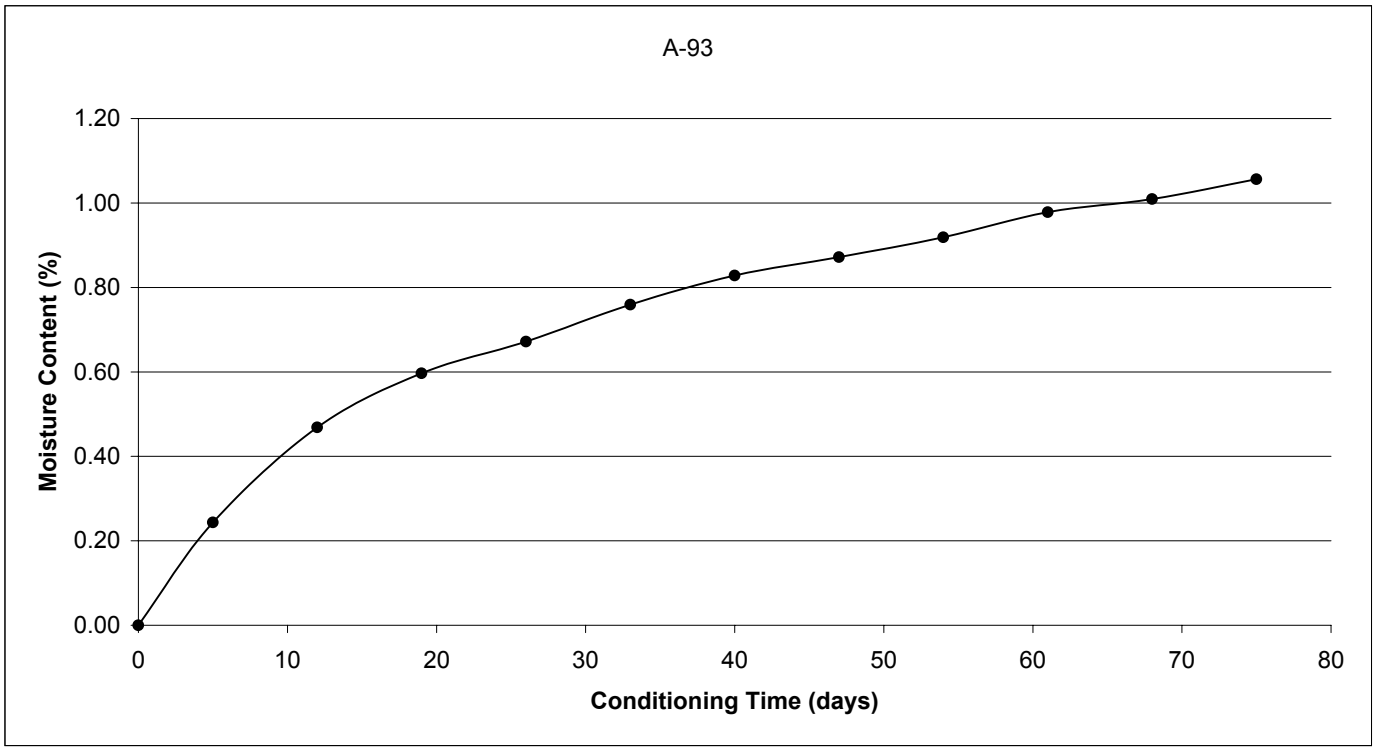
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	10/4/2001	Initial	0	4.0315	0.0000	0.00	0.000	-	-
1	10/9/2001	5	5	4.0427	4.0315	0.28	0.278	**No**	**No**
2	10/16/2001	7	12	4.0499	4.0427	0.46	0.179	**No**	**No**
3	10/23/2001	7	19	4.0548	4.0499	0.58	0.122	**No**	**No**
4	10/30/2001	7	26	4.0586	4.0548	0.67	0.094	**No**	**No**
5	11/6/2001	7	33	4.0626	4.0586	0.77	0.099	**No**	**No**
6	11/13/2001	7	40	4.0653	4.0626	0.84	0.067	**No**	**No**
7	11/20/2001	7	47	4.0684	4.0653	0.92	0.077	**No**	**No**
8	11/27/2001	7	54	4.0701	4.0684	0.96	0.042	**Yes**	**No**
9	12/4/2001	7	61	4.0726	4.0701	1.02	0.062	**No**	**No**
10	12/11/2001	7	68	4.0739	4.0726	1.05	0.032	**Yes**	**No**
11	12/18/2001	7	75	4.0758	4.0739	1.10	0.047	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**A-93**	**Product Type:**	**F6273C-07M**
Batch #:	**AF010271**	**Baseline Weight (W_B):**	**3.1995**
Test Type:	**25/50/25 Laminate Ten/Com**	**Conditioning Date:**	**10/04/01**
# of Plies:	**16**	**Removal Date:**	**12/18/01**
Traveler ID:	**A-93**		

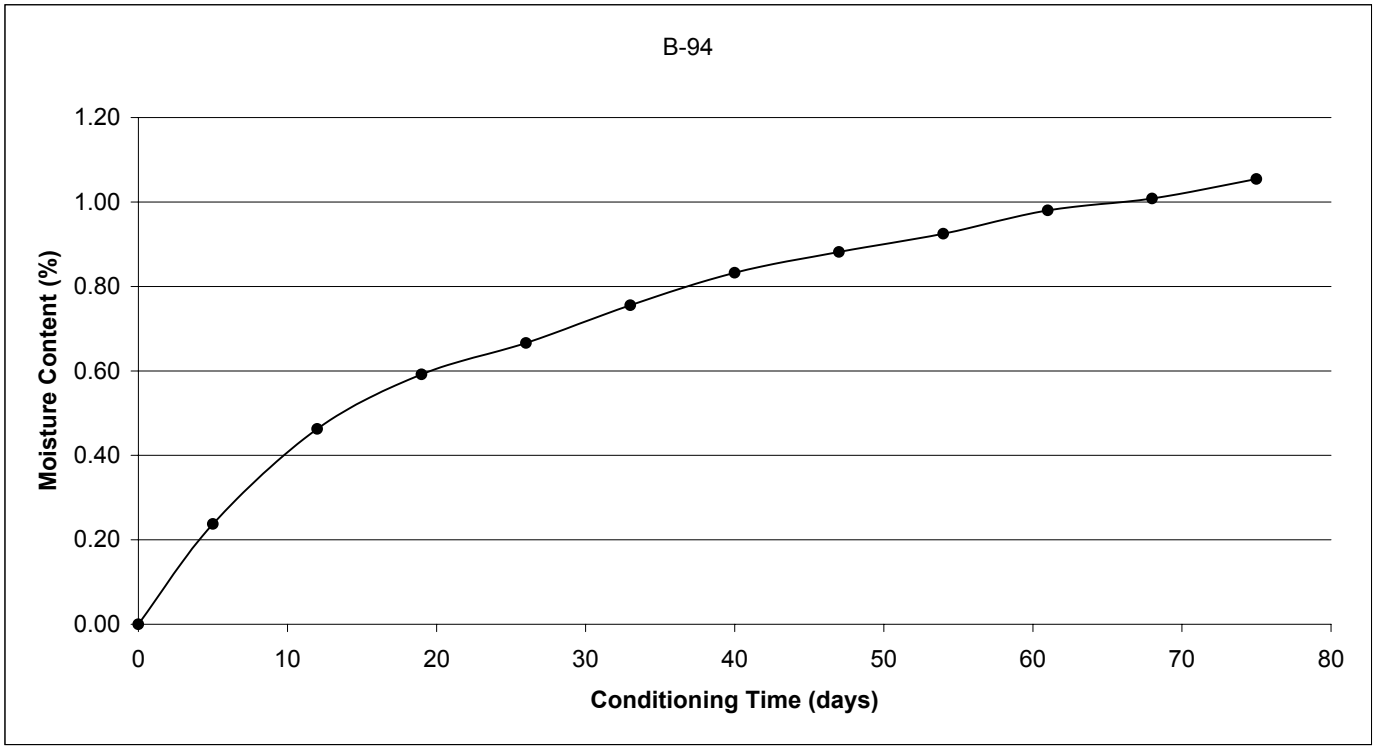
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	10/4/2001	Initial	0	3.1995	0.0000	0.00	0.000	-	-
1	10/9/2001	5	5	3.2073	3.1995	0.24	0.244	**No**	**No**
2	10/16/2001	7	12	3.2145	3.2073	0.47	0.225	**No**	**No**
3	10/23/2001	7	19	3.2186	3.2145	0.60	0.128	**No**	**No**
4	10/30/2001	7	26	3.2210	3.2186	0.67	0.075	**No**	**No**
5	11/6/2001	7	33	3.2238	3.2210	0.76	0.088	**No**	**No**
6	11/13/2001	7	40	3.2260	3.2238	0.83	0.069	**No**	**No**
7	11/20/2001	7	47	3.2274	3.2260	0.87	0.044	**Yes**	**No**
8	11/27/2001	7	54	3.2289	3.2274	0.92	0.047	**Yes**	**Yes**
9	12/4/2001	7	61	3.2308	3.2289	0.98	0.059	**No**	**No**
10	12/11/2001	7	68	3.2318	3.2308	1.01	0.031	**Yes**	**No**
11	12/18/2001	7	75	3.2333	3.2318	1.06	0.047	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**B-94**	**Product Type:**	**F6273C-07M**
Batch #:	**AF010271**	**Baseline Weight (W_B):**	**3.2435**
Test Type:	**25/50/25 Laminate Ten/Com**	**Conditioning Date:**	**10/04/01**
# of Plies:	**16**	**Removal Date:**	**12/18/01**
Traveler ID:	**B-94**		

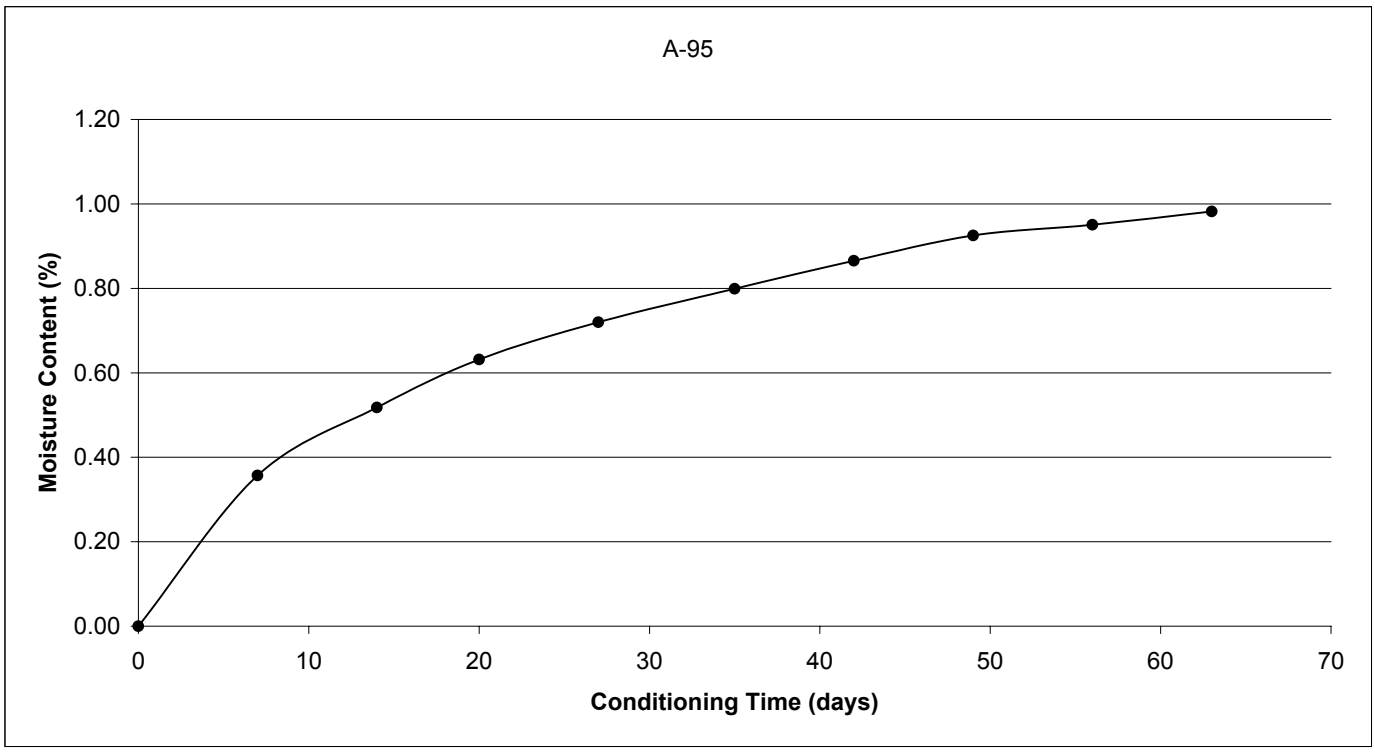
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	10/4/2001	Initial	0	3.2435	0.0000	0.00	0.000	-	-
1	10/9/2001	5	5	3.2512	3.2435	0.24	0.237	**No**	**No**
2	10/16/2001	7	12	3.2585	3.2512	0.46	0.225	**No**	**No**
3	10/23/2001	7	19	3.2627	3.2585	0.59	0.129	**No**	**No**
4	10/30/2001	7	26	3.2651	3.2627	0.67	0.074	**No**	**No**
5	11/6/2001	7	33	3.2680	3.2651	0.76	0.089	**No**	**No**
6	11/13/2001	7	40	3.2705	3.2680	0.83	0.077	**No**	**No**
7	11/20/2001	7	47	3.2721	3.2705	0.88	0.049	**Yes**	**No**
8	11/27/2001	7	54	3.2735	3.2721	0.92	0.043	**Yes**	**Yes**
9	12/4/2001	7	61	3.2753	3.2735	0.98	0.055	**No**	**No**
10	12/11/2001	7	68	3.2762	3.2753	1.01	0.028	**Yes**	**No**
11	12/18/2001	7	75	3.2777	3.2762	1.05	0.046	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**A-95**	**Product Type:**	**F6273C-07M**
Batch #:	**AF010271**	**Baseline Weight (W_B):**	**3.1662**
Test Type:	**25/50/25 Laminate Ten/Com**	**Conditioning Date:**	**11/21/01**
# of Plies:	**16**	**Removal Date:**	**01/23/02**
Traveler ID:	**A-95**		

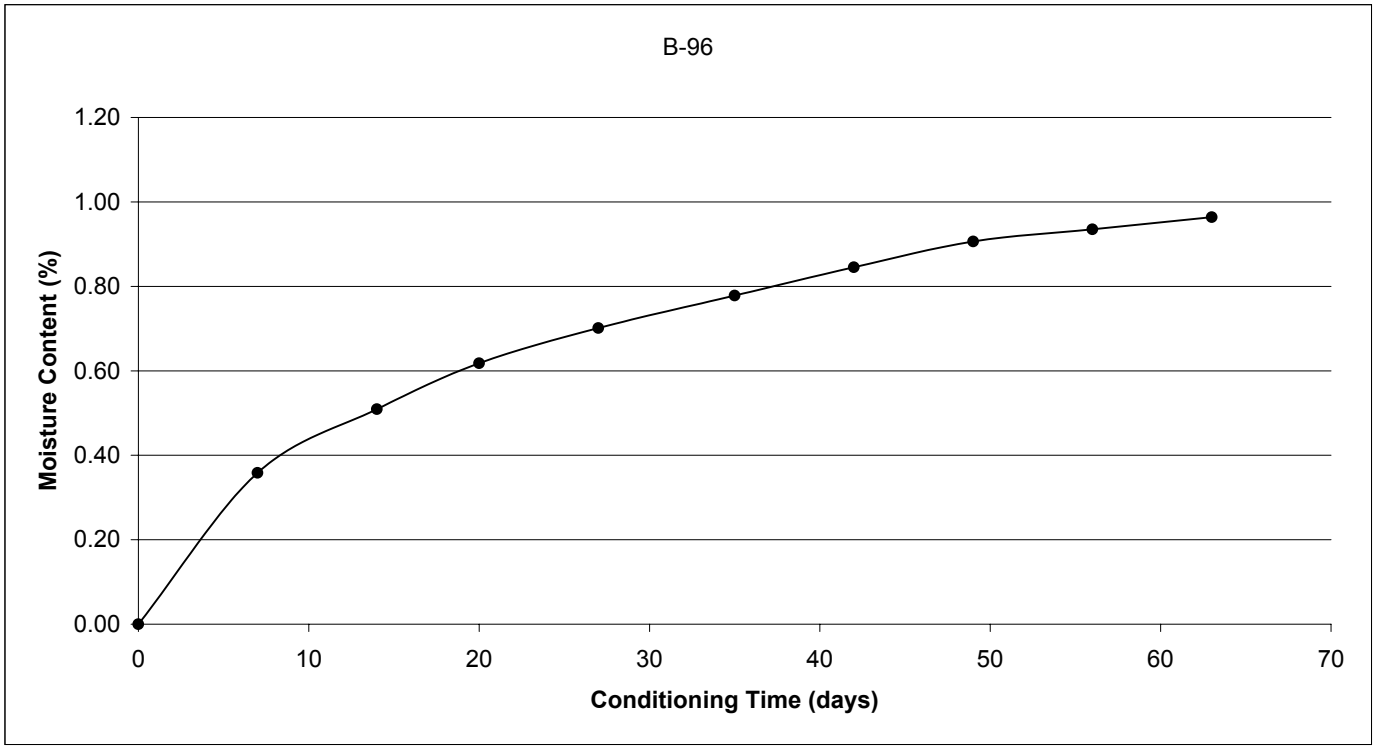
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	11/21/2001	Initial	0	3.1662	0.0000	0.00	0.000	-	-
1	11/28/2001	7	7	3.1775	3.1662	0.36	0.357	**No**	**No**
2	12/5/2001	7	14	3.1826	3.1775	0.52	0.161	**No**	**No**
3	12/11/2001	6	20	3.1862	3.1826	0.63	0.114	**No**	**No**
4	12/18/2001	7	27	3.1890	3.1862	0.72	0.088	**No**	**No**
5	12/26/2001	8	35	3.1915	3.1890	0.80	0.079	**No**	**No**
6	1/2/2002	7	42	3.1936	3.1915	0.87	0.066	**No**	**No**
7	1/9/2002	7	49	3.1955	3.1936	0.93	0.060	**No**	**No**
8	1/16/2002	7	56	3.1963	3.1955	0.95	0.025	**Yes**	**No**
9	1/23/2002	7	63	3.1973	3.1963	0.98	0.032	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**B-96**	**Product Type:**	**F6273C-07M**
Batch #:	**AF010271**	**Baseline Weight (W_B):**	**3.1230**
Test Type:	**25/50/25 Laminate Ten/Com**	**Conditioning Date:**	**11/21/01**
# of Plies:	**16**	**Removal Date:**	**01/23/02**
Traveler ID:	**B-96**		

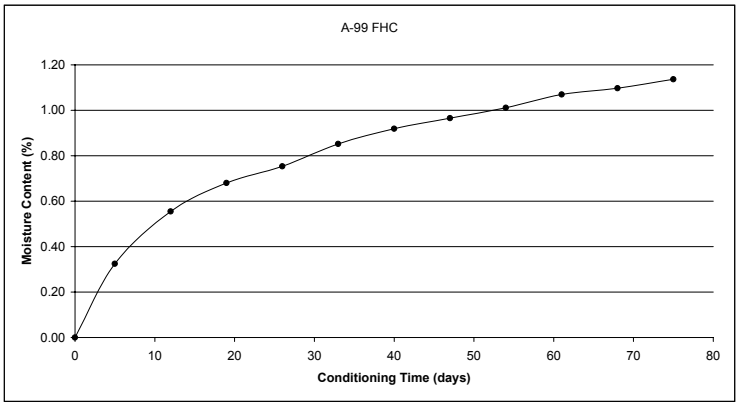
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	11/21/2001	Initial	0	3.1230	0.0000	0.00	0.000	-	-
1	11/28/2001	7	7	3.1342	3.1230	0.36	0.359	**No**	**No**
2	12/5/2001	7	14	3.1389	3.1342	0.51	0.150	**No**	**No**
3	12/11/2001	6	20	3.1423	3.1389	0.62	0.109	**No**	**No**
4	12/18/2001	7	27	3.1449	3.1423	0.70	0.083	**No**	**No**
5	12/26/2001	8	35	3.1473	3.1449	0.78	0.077	**No**	**No**
6	1/2/2002	7	42	3.1494	3.1473	0.85	0.067	**No**	**No**
7	1/9/2002	7	49	3.1513	3.1494	0.91	0.061	**No**	**No**
8	1/16/2002	7	56	3.1522	3.1513	0.93	0.029	**Yes**	**No**
9	1/23/2002	7	63	3.1531	3.1522	0.96	0.029	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**A-99**	**Product Type:**	**F6273C-07M**
Batch #:	**AF010271**	**Baseline Weight (W_B):**	**3.2635**
Test Type:	**25/50/25 FHC**	**Conditioning Date:**	**10/04/01**
# of Plies:	**16**	**Removal Date:**	**12/18/01**
Traveler ID:	**A-99 FHC**		

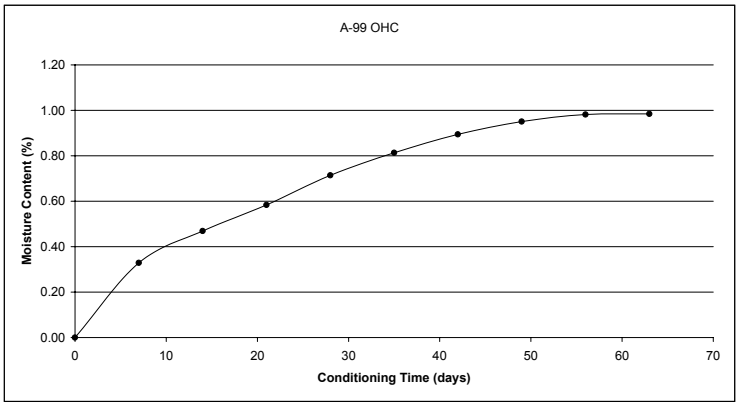
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	10/4/2001	Initial	0	3.2635	0.0000	0.00	0.000	-	-
1	10/9/2001	5	5	3.2741	3.2635	0.32	0.325	**No**	**No**
2	10/16/2001	7	12	3.2816	3.2741	0.55	0.230	**No**	**No**
3	10/23/2001	7	19	3.2857	3.2816	0.68	0.126	**No**	**No**
4	10/30/2001	7	26	3.2881	3.2857	0.75	0.074	**No**	**No**
5	11/6/2001	7	33	3.2913	3.2881	0.85	0.098	**No**	**No**
6	11/13/2001	7	40	3.2935	3.2913	0.92	0.067	**No**	**No**
7	11/20/2001	7	47	3.2950	3.2935	0.97	0.046	**Yes**	**No**
8	11/27/2001	7	54	3.2965	3.2950	1.01	0.046	**Yes**	**Yes**
9	12/4/2001	7	61	3.2984	3.2965	1.07	0.058	**No**	**No**
10	12/11/2001	7	68	3.2993	3.2984	1.10	0.028	**Yes**	**No**
11	12/18/2001	7	75	3.3006	3.2993	1.14	0.040	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**A-99**	**Product Type:**	**F6273C-07M**
Batch #:	**AF010271**	**Baseline Weight (W_B):**	**3.2198**
Test Type:	**25/50/25 OHC**	**Conditioning Date:**	**07/31/01**
# of Plies:	**16**	**Removal Date:**	**10/02/01**
Traveler ID:	**A-99 OHC**		

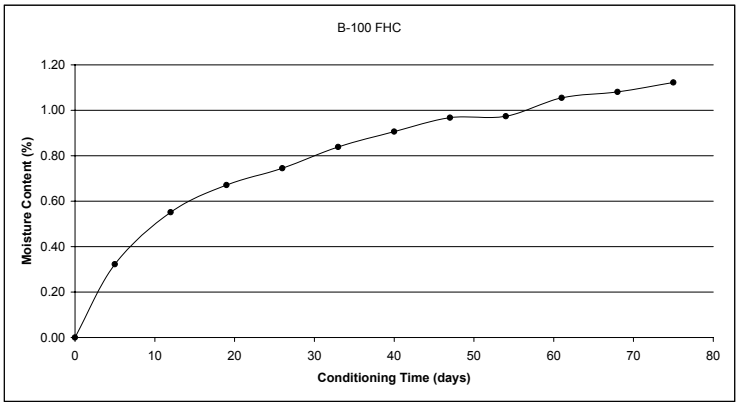
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	7/31/2001	Initial	0	3.2198	0.0000	0.00	0.000	-	-
1	8/7/2001	7	7	3.2304	3.2198	0.33	0.329	**No**	**No**
2	8/14/2001	7	14	3.2349	3.2304	0.47	0.140	**No**	**No**
3	8/21/2001	7	21	3.2386	3.2349	0.58	0.115	**No**	**No**
4	8/28/2001	7	28	3.2428	3.2386	0.71	0.130	**No**	**No**
5	9/4/2001	7	35	3.2460	3.2428	0.81	0.099	**No**	**No**
6	9/11/2001	7	42	3.2486	3.2460	0.89	0.081	**No**	**No**
7	9/18/2001	7	49	3.2504	3.2486	0.95	0.056	**No**	**No**
8	9/25/2001	7	56	3.2514	3.2504	0.98	0.031	**Yes**	**No**
9	10/2/2001	7	63	3.2515	3.2514	0.98	0.003	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**B-100**	**Product Type:**	**F6273C-07M**
Batch #:	**AF010271**	**Baseline Weight (W_B):**	**3.0998**
Test Type:	**25/50/25 FHC**	**Conditioning Date:**	**10/04/01**
# of Plies:	**16**	**Removal Date:**	**12/18/01**
Traveler ID:	**B-100 FHC**		

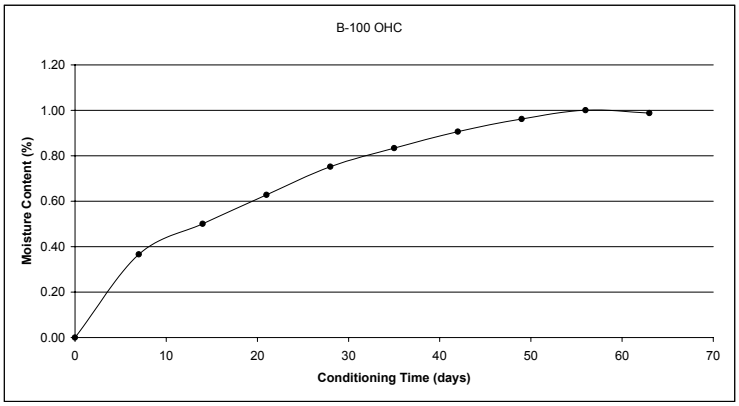
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	10/4/2001	Initial	0	3.0998	0.0000	0.00	0.000	-	-
1	10/9/2001	5	5	3.1098	3.0998	0.32	0.323	**No**	**No**
2	10/16/2001	7	12	3.1169	3.1098	0.55	0.229	**No**	**No**
3	10/23/2001	7	19	3.1206	3.1169	0.67	0.119	**No**	**No**
4	10/30/2001	7	26	3.1229	3.1206	0.75	0.074	**No**	**No**
5	11/6/2001	7	33	3.1258	3.1229	0.84	0.094	**No**	**No**
6	11/13/2001	7	40	3.1279	3.1258	0.91	0.068	**No**	**No**
7	11/20/2001	7	47	3.1298	3.1279	0.97	0.061	**No**	**No**
8	11/27/2001	7	54	3.1300	3.1298	0.97	0.006	**Yes**	**No**
9	12/4/2001	7	61	3.1325	3.1300	1.05	0.081	**No**	**No**
10	12/11/2001	7	68	3.1333	3.1325	1.08	0.026	**Yes**	**No**
11	12/18/2001	7	75	3.1346	3.1333	1.12	0.042	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**B-100**	**Product Type:**	**F6273C-07M**
Batch #:	**AF010271**	**Baseline Weight (W_B):**	**3.0572**
Test Type:	**25/50/25 OHC**	**Conditioning Date:**	**07/31/01**
# of Plies:	**16**	**Removal Date:**	**10/02/01**
Traveler ID:	**B-100 OHC**		

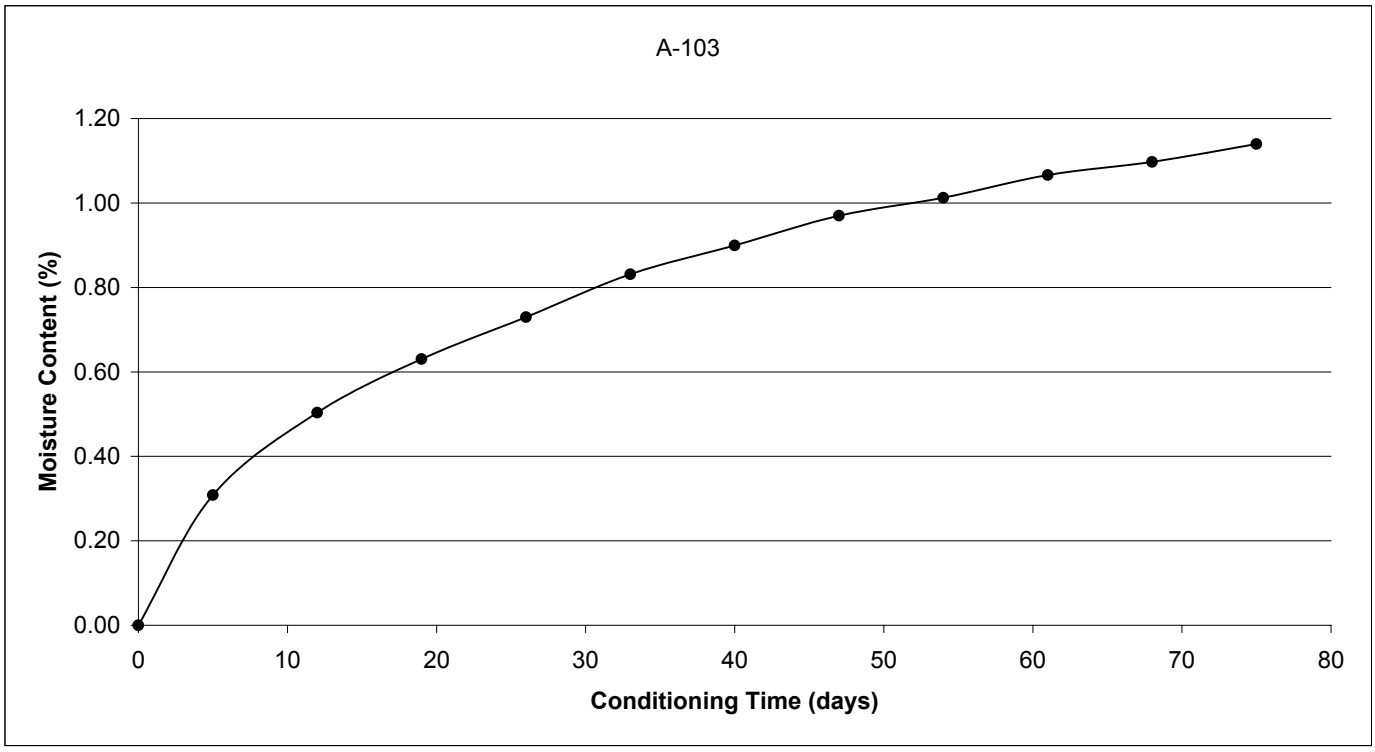
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	7/31/2001	Initial	0	3.0572	0.0000	0.00	0.000	-	-
1	8/7/2001	7	7	3.0684	3.0572	0.37	0.366	**No**	**No**
2	8/14/2001	7	14	3.0725	3.0684	0.50	0.134	**No**	**No**
3	8/21/2001	7	21	3.0764	3.0725	0.63	0.128	**No**	**No**
4	8/28/2001	7	28	3.0802	3.0764	0.75	0.124	**No**	**No**
5	9/4/2001	7	35	3.0827	3.0802	0.83	0.082	**No**	**No**
6	9/11/2001	7	42	3.0849	3.0827	0.91	0.072	**No**	**No**
7	9/18/2001	7	49	3.0866	3.0849	0.96	0.056	**No**	**No**
8	9/25/2001	7	56	3.0878	3.0866	1.00	0.039	**Yes**	**No**
9	10/2/2001	7	63	3.0874	3.0878	0.99	-0.013	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**A-103**	**Product Type:**	**F6273C-07M**
Batch #:	**AF010271**	**Baseline Weight (W_B):**	**3.5359**
Test Type:	**25/50/25 Bolt Bearing**	**Conditioning Date:**	**10/04/01**
# of Plies:	**16**	**Removal Date:**	**12/18/01**
Traveler ID:	**A-103**		

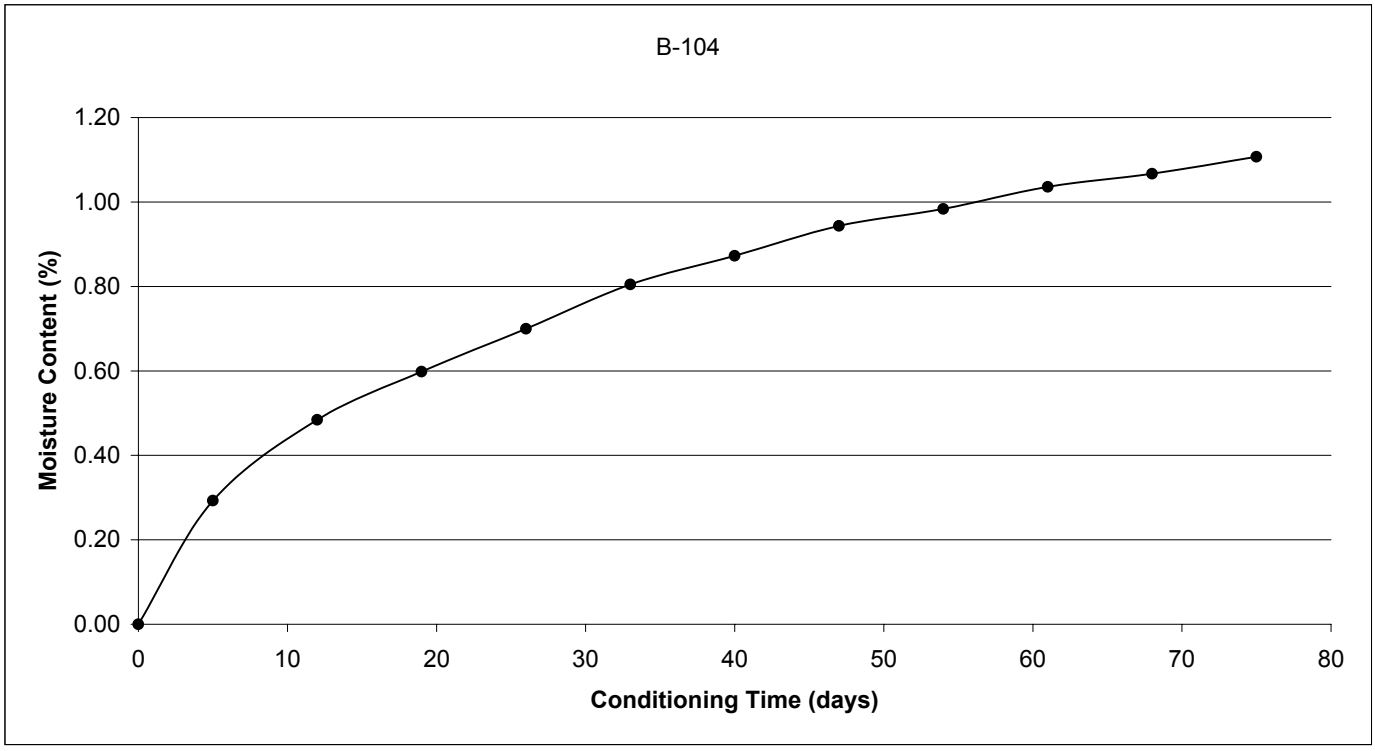
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	10/4/2001	Initial	0	3.5359	0.0000	0.00	0.000	-	-
1	10/9/2001	5	5	3.5468	3.5359	0.31	0.308	**No**	**No**
2	10/16/2001	7	12	3.5537	3.5468	0.50	0.195	**No**	**No**
3	10/23/2001	7	19	3.5582	3.5537	0.63	0.127	**No**	**No**
4	10/30/2001	7	26	3.5617	3.5582	0.73	0.099	**No**	**No**
5	11/6/2001	7	33	3.5653	3.5617	0.83	0.102	**No**	**No**
6	11/13/2001	7	40	3.5677	3.5653	0.90	0.068	**No**	**No**
7	11/20/2001	7	47	3.5702	3.5677	0.97	0.071	**No**	**No**
8	11/27/2001	7	54	3.5717	3.5702	1.01	0.042	**Yes**	**No**
9	12/4/2001	7	61	3.5736	3.5717	1.07	0.054	**No**	**No**
10	12/11/2001	7	68	3.5747	3.5736	1.10	0.031	**Yes**	**No**
11	12/18/2001	7	75	3.5762	3.5747	1.14	0.042	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**B-104**	**Product Type:**	**F6273C-07M**
Batch #:	**AF010271**	**Baseline Weight (W_B):**	**3.2430**
Test Type:	**25/50/25 Bolt Bearing**	**Conditioning Date:**	**10/04/01**
# of Plies:	**16**	**Removal Date:**	**12/18/01**
Traveler ID:	**B-104**		

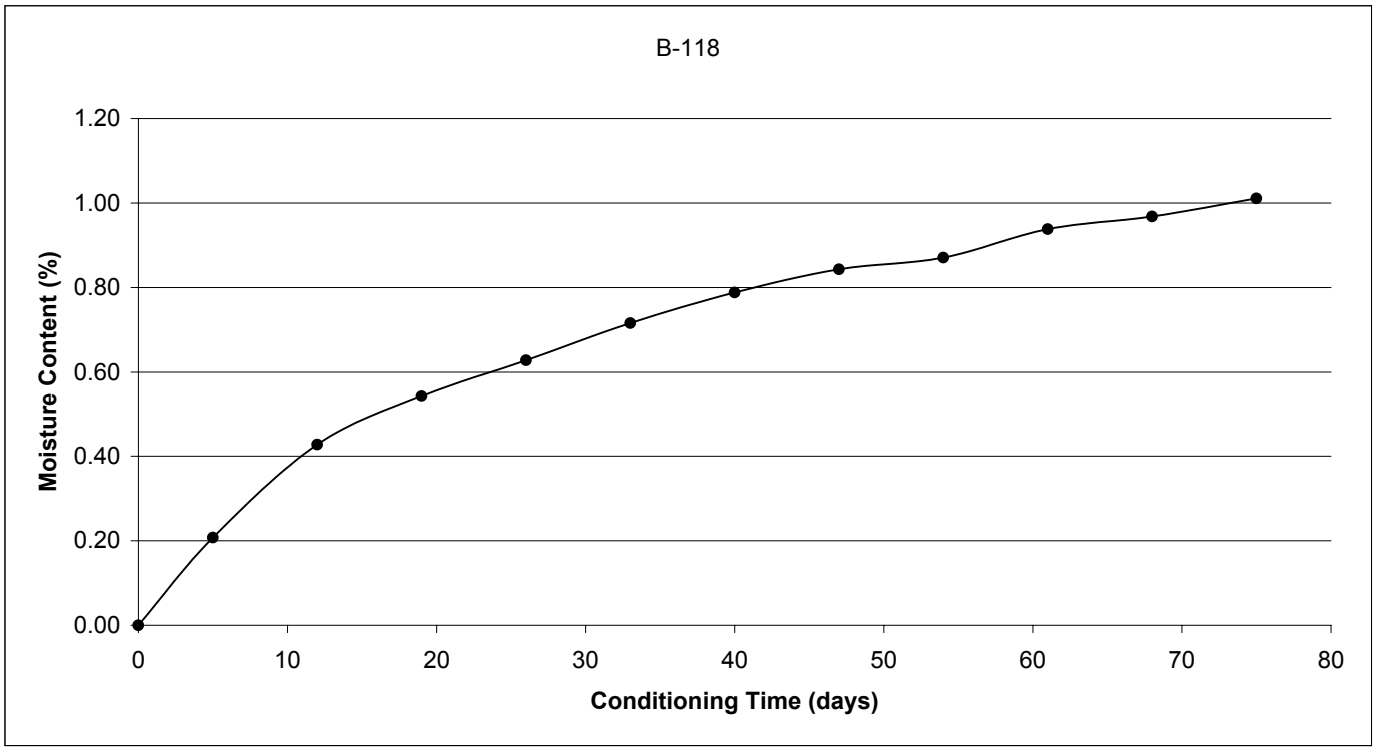
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	10/4/2001	Initial	0	3.2430	0.0000	0.00	0.000	-	-
1	10/9/2001	5	5	3.2525	3.2430	0.29	0.293	**No**	**No**
2	10/16/2001	7	12	3.2587	3.2525	0.48	0.191	**No**	**No**
3	10/23/2001	7	19	3.2624	3.2587	0.60	0.114	**No**	**No**
4	10/30/2001	7	26	3.2657	3.2624	0.70	0.102	**No**	**No**
5	11/6/2001	7	33	3.2691	3.2657	0.80	0.105	**No**	**No**
6	11/13/2001	7	40	3.2713	3.2691	0.87	0.068	**No**	**No**
7	11/20/2001	7	47	3.2736	3.2713	0.94	0.071	**No**	**No**
8	11/27/2001	7	54	3.2749	3.2736	0.98	0.040	**Yes**	**No**
9	12/4/2001	7	61	3.2766	3.2749	1.04	0.052	**No**	**No**
10	12/11/2001	7	68	3.2776	3.2766	1.07	0.031	**Yes**	**No**
11	12/18/2001	7	75	3.2789	3.2776	1.11	0.040	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**B-118**	**Product Type:**	**F6273C-07M**
Batch #:	**AF010271**	**Baseline Weight (W_B):**	**3.9968**
Test Type:	**10/80/10 Laminate Ten/Com**	**Conditioning Date:**	**10/04/01**
# of Plies:	**20**	**Removal Date:**	**12/18/01**
Traveler ID:	**B-118**		

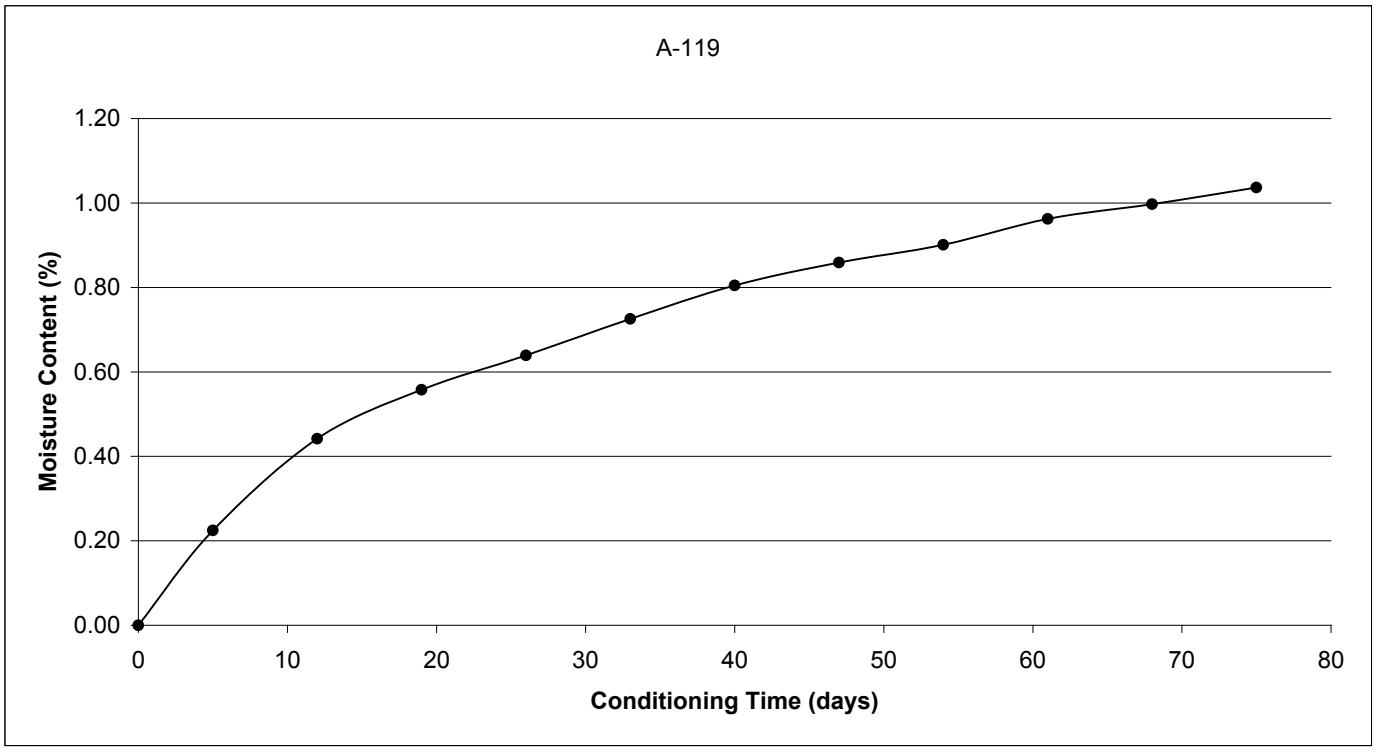
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	10/4/2001	Initial	0	3.9968	0.0000	0.00	0.000	-	-
1	10/9/2001	5	5	4.0051	3.9968	0.21	0.208	**No**	**No**
2	10/16/2001	7	12	4.0139	4.0051	0.43	0.220	**No**	**No**
3	10/23/2001	7	19	4.0185	4.0139	0.54	0.115	**No**	**No**
4	10/30/2001	7	26	4.0219	4.0185	0.63	0.085	**No**	**No**
5	11/6/2001	7	33	4.0254	4.0219	0.72	0.088	**No**	**No**
6	11/13/2001	7	40	4.0283	4.0254	0.79	0.073	**No**	**No**
7	11/20/2001	7	47	4.0305	4.0283	0.84	0.055	**No**	**No**
8	11/27/2001	7	54	4.0316	4.0305	0.87	0.028	**Yes**	**No**
9	12/4/2001	7	61	4.0343	4.0316	0.94	0.068	**No**	**No**
10	12/11/2001	7	68	4.0355	4.0343	0.97	0.030	**Yes**	**No**
11	12/18/2001	7	75	4.0372	4.0355	1.01	0.043	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**A-119**	**Product Type:**	**F6273C-07M**
Batch #:	**AF010271**	**Baseline Weight (W_B):**	**4.0516**
Test Type:	**10/80/10 Laminate Ten/Com**	**Conditioning Date:**	**10/04/01**
# of Plies:	**20**	**Removal Date:**	**12/18/01**
Traveler ID:	**A-119**		

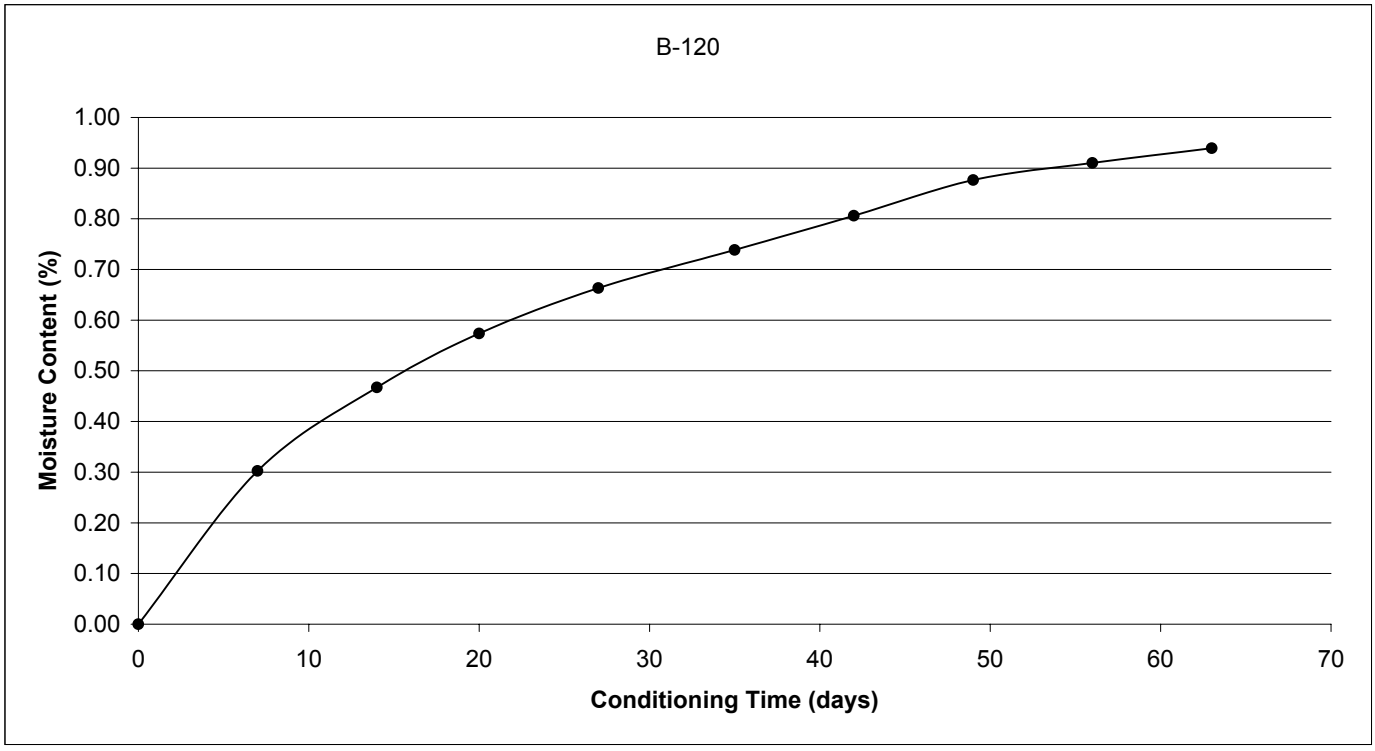
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	10/4/2001	Initial	0	4.0516	0.0000	0.00	0.000	-	-
1	10/9/2001	5	5	4.0607	4.0516	0.22	0.225	**No**	**No**
2	10/16/2001	7	12	4.0695	4.0607	0.44	0.217	**No**	**No**
3	10/23/2001	7	19	4.0742	4.0695	0.56	0.116	**No**	**No**
4	10/30/2001	7	26	4.0775	4.0742	0.64	0.081	**No**	**No**
5	11/6/2001	7	33	4.0810	4.0775	0.73	0.086	**No**	**No**
6	11/13/2001	7	40	4.0842	4.0810	0.80	0.079	**No**	**No**
7	11/20/2001	7	47	4.0864	4.0842	0.86	0.054	**No**	**No**
8	11/27/2001	7	54	4.0881	4.0864	0.90	0.042	**Yes**	**No**
9	12/4/2001	7	61	4.0906	4.0881	0.96	0.062	**No**	**No**
10	12/11/2001	7	68	4.0920	4.0906	1.00	0.035	**Yes**	**No**
11	12/18/2001	7	75	4.0936	4.0920	1.04	0.039	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**B-120**	**Product Type:**	**F6273C-07M**
Batch #:	**AF010271**	**Baseline Weight (W_B):**	**4.1303**
Test Type:	**10/80/10 Laminate Ten/Com**	**Conditioning Date:**	**11/21/01**
# of Plies:	**20**	**Removal Date:**	**01/23/02**
Traveler ID:	**B-120**		

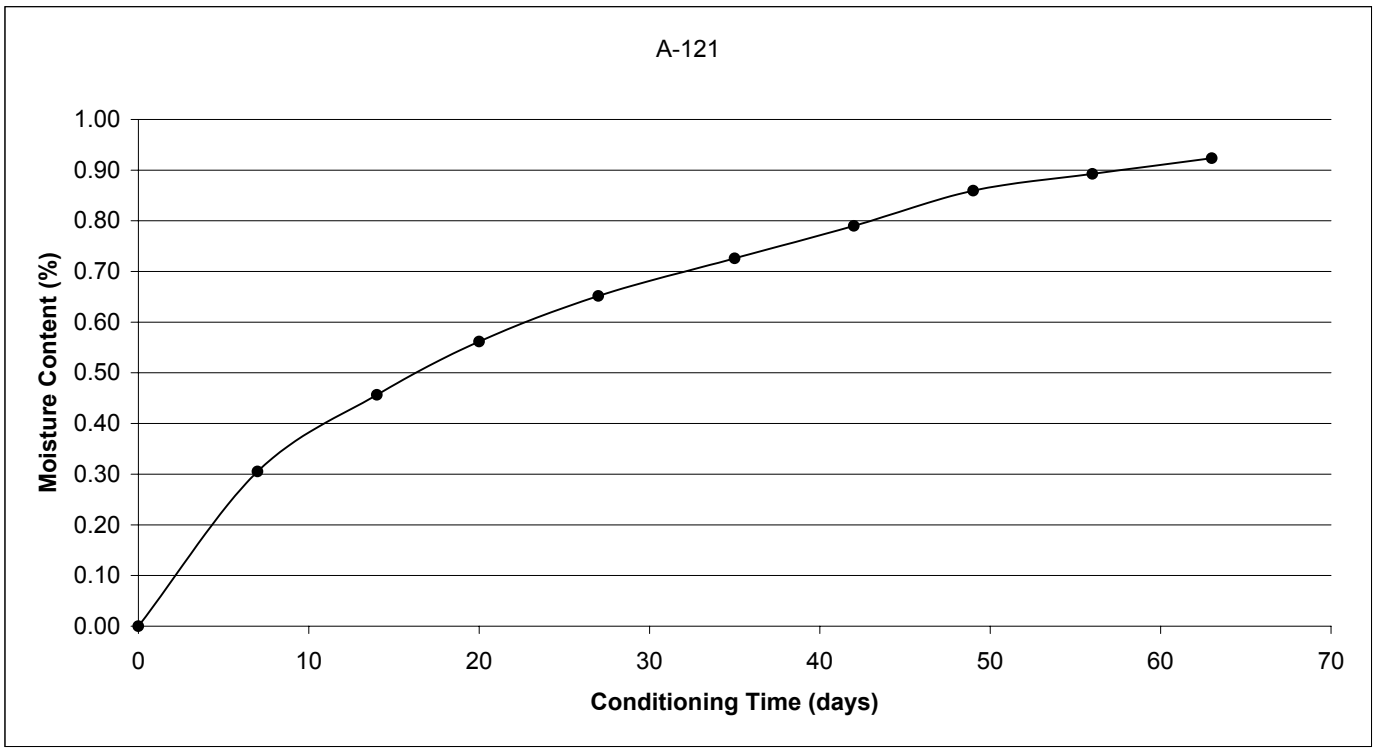
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	11/21/2001	Initial	0	4.1303	0.0000	0.00	0.000	-	-
1	11/28/2001	7	7	4.1428	4.1303	0.30	0.303	**No**	**No**
2	12/5/2001	7	14	4.1496	4.1428	0.47	0.165	**No**	**No**
3	12/11/2001	6	20	4.1540	4.1496	0.57	0.107	**No**	**No**
4	12/18/2001	7	27	4.1577	4.1540	0.66	0.090	**No**	**No**
5	12/26/2001	8	35	4.1608	4.1577	0.74	0.075	**No**	**No**
6	1/2/2002	7	42	4.1636	4.1608	0.81	0.068	**No**	**No**
7	1/9/2002	7	49	4.1665	4.1636	0.88	0.070	**No**	**No**
8	1/16/2002	7	56	4.1679	4.1665	0.91	0.034	**Yes**	**No**
9	1/23/2002	7	63	4.1691	4.1679	0.94	0.029	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**A-121**	**Product Type:**	**F6273C-07M**
Batch #:	**AF010271**	**Baseline Weight (W_B):**	**3.8980**
Test Type:	**10/80/10 Laminate Ten/Com**	**Conditioning Date:**	**11/21/01**
# of Plies:	**20**	**Removal Date:**	**01/23/02**
Traveler ID:	**A-121**		

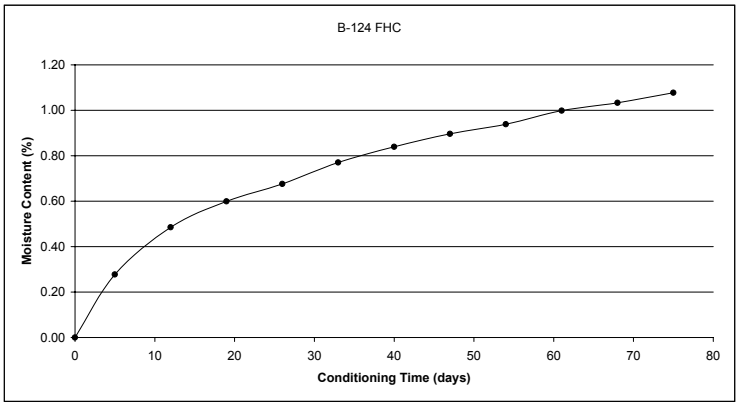
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	11/21/2001	Initial	0	3.8980	0.0000	0.00	0.000	-	-
1	11/28/2001	7	7	3.9099	3.8980	0.31	0.305	**No**	**No**
2	12/5/2001	7	14	3.9158	3.9099	0.46	0.151	**No**	**No**
3	12/11/2001	6	20	3.9199	3.9158	0.56	0.105	**No**	**No**
4	12/18/2001	7	27	3.9234	3.9199	0.65	0.090	**No**	**No**
5	12/26/2001	8	35	3.9263	3.9234	0.73	0.074	**No**	**No**
6	1/2/2002	7	42	3.9288	3.9263	0.79	0.064	**No**	**No**
7	1/9/2002	7	49	3.9315	3.9288	0.86	0.069	**No**	**No**
8	1/16/2002	7	56	3.9328	3.9315	0.89	0.033	**Yes**	**No**
9	1/23/2002	7	63	3.9340	3.9328	0.92	0.031	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**B-124**	**Product Type:**	**F6273C-07M**
Batch #:	**AF010271**	**Baseline Weight (W_B):**	**4.0368**
Test Type:	**10/80/10 FHC**	**Conditioning Date:**	**10/04/01**
# of Plies:	**20**	**Removal Date:**	**12/18/01**
Traveler ID:	**B-124 FHC**		

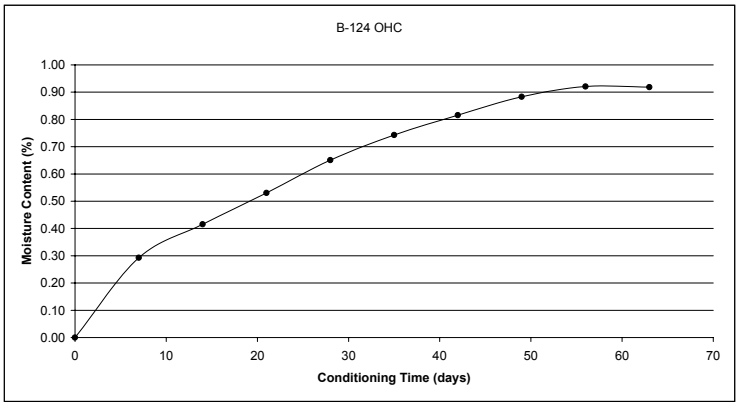
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	10/4/2001	Initial	0	4.0368	0.0000	0.00	0.000	-	-
1	10/9/2001	5	5	4.0480	4.0368	0.28	0.277	**No**	**No**
2	10/16/2001	7	12	4.0564	4.0480	0.49	0.208	**No**	**No**
3	10/23/2001	7	19	4.0610	4.0564	0.60	0.114	**No**	**No**
4	10/30/2001	7	26	4.0641	4.0610	0.68	0.077	**No**	**No**
5	11/6/2001	7	33	4.0679	4.0641	0.77	0.094	**No**	**No**
6	11/13/2001	7	40	4.0707	4.0679	0.84	0.069	**No**	**No**
7	11/20/2001	7	47	4.0730	4.0707	0.90	0.057	**No**	**No**
8	11/27/2001	7	54	4.0747	4.0730	0.94	0.042	**Yes**	**No**
9	12/4/2001	7	61	4.0771	4.0747	1.00	0.059	**No**	**No**
10	12/11/2001	7	68	4.0785	4.0771	1.03	0.035	**Yes**	**No**
11	12/18/2001	7	75	4.0803	4.0785	1.08	0.045	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**B-124**	**Product Type:**	**F6273C-07M**
Batch #:	**AF010271**	**Baseline Weight (W_B):**	**3.9961**
Test Type:	**10/80/10 OHC**	**Conditioning Date:**	**07/31/01**
# of Plies:	**20**	**Removal Date:**	**10/02/01**
Traveler ID:	**B-124 OHC**		

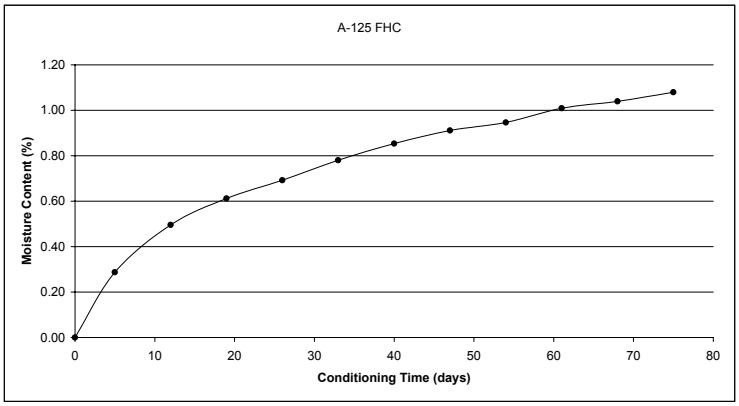
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	7/31/2001	Initial	0	3.9961	0.0000	0.00	0.000	-	-
1	8/7/2001	7	7	4.0078	3.9961	0.29	0.293	**No**	**No**
2	8/14/2001	7	14	4.0127	4.0078	0.42	0.123	**No**	**No**
3	8/21/2001	7	21	4.0173	4.0127	0.53	0.115	**No**	**No**
4	8/28/2001	7	28	4.0221	4.0173	0.65	0.120	**No**	**No**
5	9/4/2001	7	35	4.0258	4.0221	0.74	0.093	**No**	**No**
6	9/11/2001	7	42	4.0287	4.0258	0.82	0.073	**No**	**No**
7	9/18/2001	7	49	4.0314	4.0287	0.88	0.068	**No**	**No**
8	9/25/2001	7	56	4.0329	4.0314	0.92	0.038	**Yes**	**No**
9	10/2/2001	7	63	4.0328	4.0329	0.92	-0.003	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**A-125**	**Product Type:**	**F6273C-07M**
Batch #:	**AF010271**	**Baseline Weight (W_B):**	**3.9725**
Test Type:	**10/80/10 FHC**	**Conditioning Date:**	**10/04/01**
# of Plies:	**20**	**Removal Date:**	**12/18/01**
Traveler ID:	**A-125 FHC**		

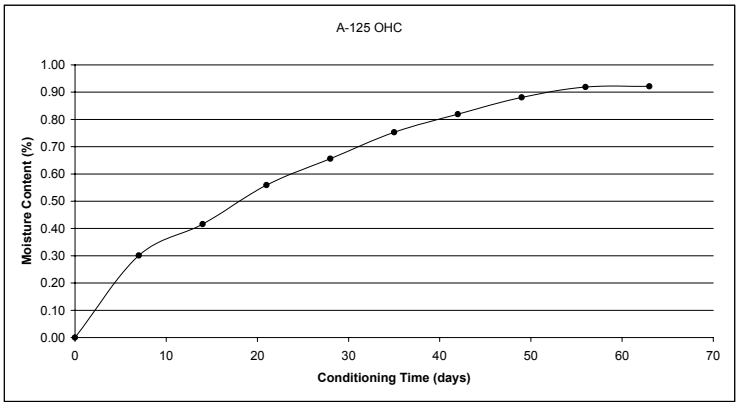
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	10/4/2001	Initial	0	3.9725	0.0000	0.00	0.000	-	-
1	10/9/2001	5	5	3.9839	3.9725	0.29	0.287	**No**	**No**
2	10/16/2001	7	12	3.9922	3.9839	0.50	0.209	**No**	**No**
3	10/23/2001	7	19	3.9968	3.9922	0.61	0.116	**No**	**No**
4	10/30/2001	7	26	4.0000	3.9968	0.69	0.081	**No**	**No**
5	11/6/2001	7	33	4.0035	4.0000	0.78	0.088	**No**	**No**
6	11/13/2001	7	40	4.0064	4.0035	0.85	0.073	**No**	**No**
7	11/20/2001	7	47	4.0087	4.0064	0.91	0.058	**No**	**No**
8	11/27/2001	7	54	4.0101	4.0087	0.95	0.035	**Yes**	**No**
9	12/4/2001	7	61	4.0126	4.0101	1.01	0.063	**No**	**No**
10	12/11/2001	7	68	4.0138	4.0126	1.04	0.030	**Yes**	**No**
11	12/18/2001	7	75	4.0154	4.0138	1.08	0.040	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**A-125**	**Product Type:**	**F6273C-07M**
Batch #:	**AF010271**	**Baseline Weight (W_B):**	**3.9175**
Test Type:	**10/80/10 OHC**	**Conditioning Date:**	**07/31/01**
# of Plies:	**20**	**Removal Date:**	**10/02/01**
Traveler ID:	**A-125 OHC**		

Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	7/31/2001	Initial	0	3.9175	0.0000	0.00	0.000	-	-
1	8/7/2001	7	7	3.9293	3.9175	0.30	0.301	**No**	**No**
2	8/14/2001	7	14	3.9338	3.9293	0.42	0.115	**No**	**No**
3	8/21/2001	7	21	3.9394	3.9338	0.56	0.143	**No**	**No**
4	8/28/2001	7	28	3.9432	3.9394	0.66	0.097	**No**	**No**
5	9/4/2001	7	35	3.9470	3.9432	0.75	0.097	**No**	**No**
6	9/11/2001	7	42	3.9496	3.9470	0.82	0.066	**No**	**No**
7	9/18/2001	7	49	3.9520	3.9496	0.88	0.061	**No**	**No**
8	9/25/2001	7	56	3.9535	3.9520	0.92	0.038	**Yes**	**No**
9	10/2/2001	7	63	3.9536	3.9535	0.92	0.003	**Yes**	**Yes**

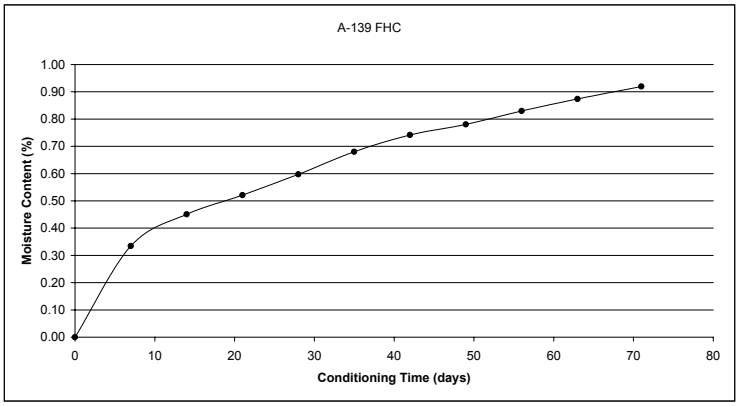


B.3. Moisture Conditioning Charts of FGF7781-07I

Laminate Moisture Conditioning

Panel ID:	**A-139**	**Product Type:**	**FGF7781-07I**
Batch #:	**AF010363**	**Baseline Weight (W_B):**	**5.6770**
Test Type:	**40/20/40 FHC**	**Conditioning Date:**	**12/26/01**
# of Plies:	**20**	**Removal Date:**	**03/07/02**
Traveler ID:	**A-139 FHC**		

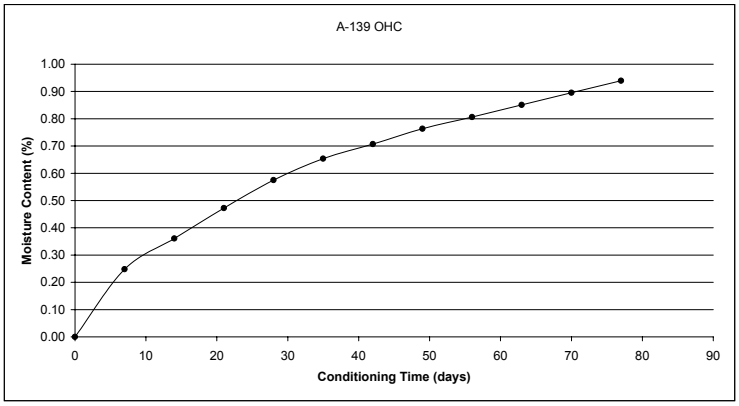
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	12/26/2001	Initial	0	5.6770	0.0000	0.00	0.000	-	-
1	1/2/2002	7	7	5.6960	5.6770	0.33	0.335	**No**	**No**
2	1/9/2002	7	14	5.7026	5.6960	0.45	0.116	**No**	**No**
3	1/16/2002	7	21	5.7066	5.7026	0.52	0.070	**No**	**No**
4	1/23/2002	7	28	5.7109	5.7066	0.60	0.076	**No**	**No**
5	1/30/2002	7	35	5.7156	5.7109	0.68	0.083	**No**	**No**
6	2/6/2002	7	42	5.7191	5.7156	0.74	0.062	**No**	**No**
7	2/13/2002	7	49	5.7213	5.7191	0.78	0.039	**Yes**	**No**
8	2/20/2002	7	56	5.7241	5.7213	0.83	0.049	**Yes**	**Yes**
9	2/27/2002	7	63	5.7266	5.7241	0.87	0.044	**Yes**	**Yes**
10	3/7/2002	8	71	5.7292	5.7266	0.92	0.046	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**A-139**	**Product Type:**	**FGF7781-07I**
Batch #:	**AF010363**	**Baseline Weight (W_B):**	**5.8417**
Test Type:	**40/20/40 OHC**	**Conditioning Date:**	**08/07/01**
# of Plies:	**20**	**Removal Date:**	**10/23/01**
Traveler ID:	**A-139 OHC**		

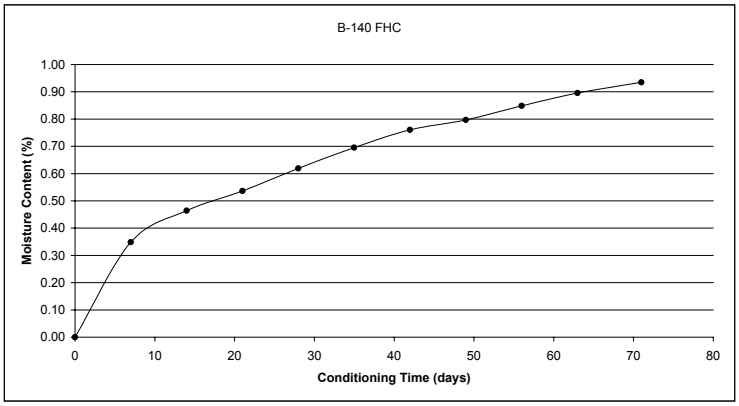
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	8/7/2001	Initial	0	5.8417	0.0000	0.00	0.000	-	-
1	8/14/2001	7	7	5.8562	5.8417	0.25	0.248	**No**	**No**
2	8/21/2001	7	14	5.8628	5.8562	0.36	0.113	**No**	**No**
3	8/28/2001	7	21	5.8693	5.8628	0.47	0.111	**No**	**No**
4	9/4/2001	7	28	5.8753	5.8693	0.58	0.103	**No**	**No**
5	9/11/2001	7	35	5.8799	5.8753	0.65	0.079	**No**	**No**
6	9/18/2001	7	42	5.8830	5.8799	0.71	0.053	**No**	**No**
7	9/25/2001	7	49	5.8863	5.8830	0.76	0.056	**No**	**No**
8	10/2/2001	7	56	5.8888	5.8863	0.81	0.043	**Yes**	**No**
9	10/9/2001	7	63	5.8914	5.8888	0.85	0.045	**Yes**	**Yes**
10	10/16/2001	7	70	5.8940	5.8914	0.90	0.045	**Yes**	**Yes**
11	10/23/2001	7	77	5.8966	5.8940	0.94	0.045	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**B-140**	**Product Type:**	**FGF7781-07I**
Batch #:	**AF010363**	**Baseline Weight (W_B):**	**5.7964**
Test Type:	**40/20/40 FHC**	**Conditioning Date:**	**12/26/01**
# of Plies:	**20**	**Removal Date:**	**03/07/02**
Traveler ID:	**B-140 FHC**		

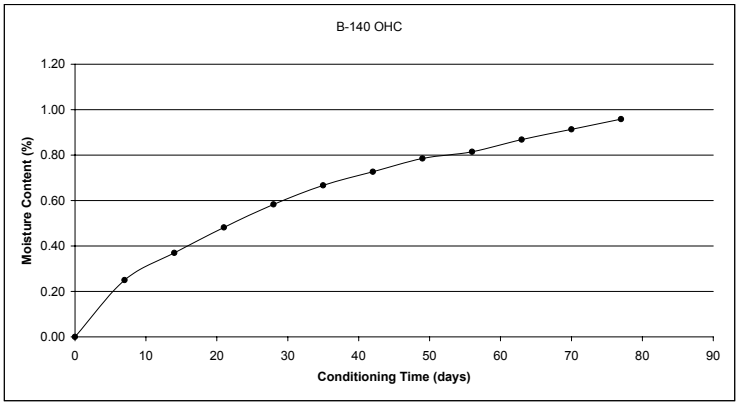
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	12/26/2001	Initial	0	5.7964	0.0000	0.00	0.000	-	-
1	1/2/2002	7	7	5.8166	5.7964	0.35	0.348	**No**	**No**
2	1/9/2002	7	14	5.8233	5.8166	0.46	0.116	**No**	**No**
3	1/16/2002	7	21	5.8275	5.8233	0.54	0.072	**No**	**No**
4	1/23/2002	7	28	5.8323	5.8275	0.62	0.083	**No**	**No**
5	1/30/2002	7	35	5.8367	5.8323	0.70	0.076	**No**	**No**
6	2/6/2002	7	42	5.8405	5.8367	0.76	0.066	**No**	**No**
7	2/13/2002	7	49	5.8426	5.8405	0.80	0.036	**Yes**	**No**
8	2/20/2002	7	56	5.8456	5.8426	0.85	0.052	**No**	**No**
9	2/27/2002	7	63	5.8483	5.8456	0.90	0.047	**Yes**	**No**
10	3/7/2002	8	71	5.8506	5.8483	0.94	0.040	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**B-140**	**Product Type:**	**FGF7781-07I**
Batch #:	**AF010363**	**Baseline Weight (W_B):**	**6.0003**
Test Type:	**40/20/40 OHC**	**Conditioning Date:**	**08/07/01**
# of Plies:	**20**	**Removal Date:**	**10/23/01**
Traveler ID:	**B-140 OHC**		

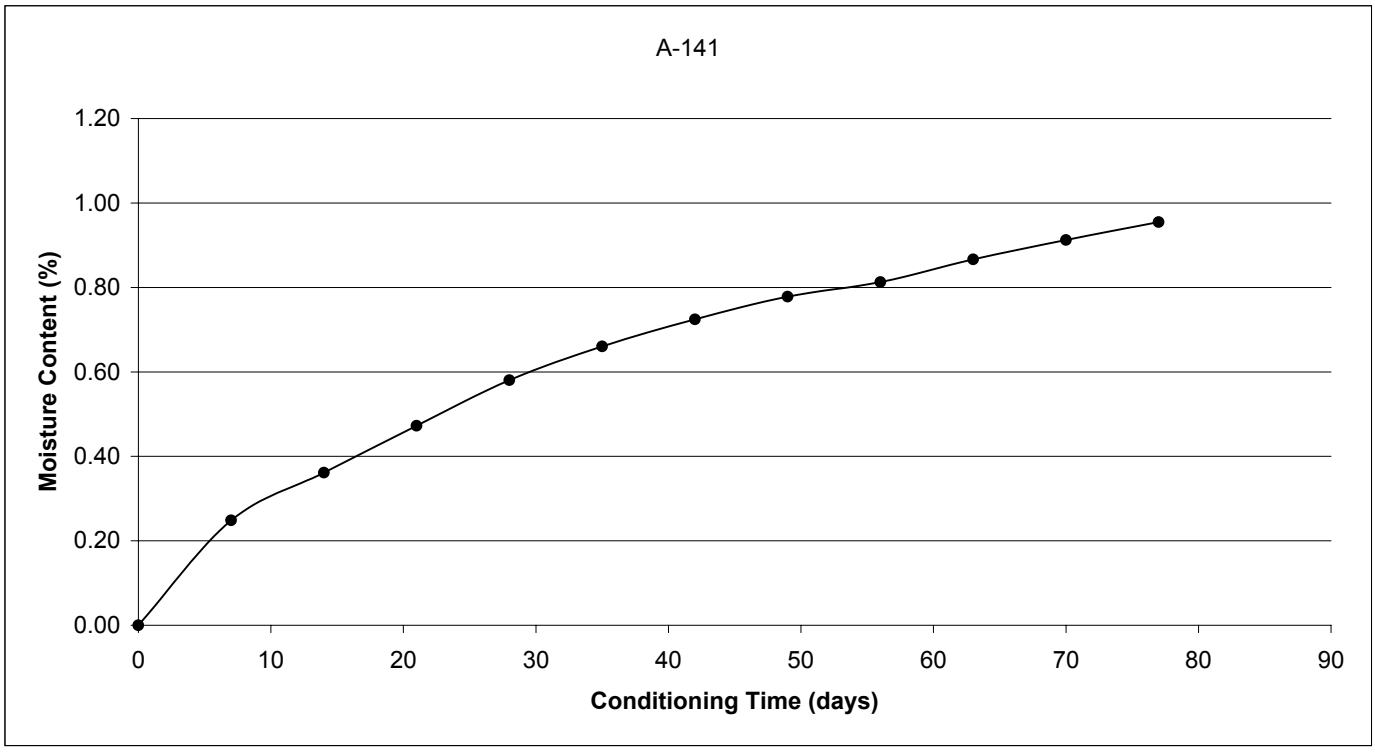
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	8/7/2001	Initial	0	6.0003	0.0000	0.00	0.000	-	-
1	8/14/2001	7	7	6.0153	6.0003	0.25	0.250	**No**	**No**
2	8/21/2001	7	14	6.0225	6.0153	0.37	0.120	**No**	**No**
3	8/28/2001	7	21	6.0292	6.0225	0.48	0.112	**No**	**No**
4	9/4/2001	7	28	6.0353	6.0292	0.58	0.102	**No**	**No**
5	9/11/2001	7	35	6.0403	6.0353	0.67	0.083	**No**	**No**
6	9/18/2001	7	42	6.0439	6.0403	0.73	0.060	**No**	**No**
7	9/25/2001	7	49	6.0474	6.0439	0.78	0.058	**No**	**No**
8	10/2/2001	7	56	6.0492	6.0474	0.81	0.030	**Yes**	**No**
9	10/9/2001	7	63	6.0524	6.0492	0.87	0.053	**No**	**No**
10	10/16/2001	7	70	6.0551	6.0524	0.91	0.045	**Yes**	**No**
11	10/23/2001	7	77	6.0578	6.0551	0.96	0.045	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**A-141**	**Product Type:**	**FGF7781-07I**
Batch #:	**AF010363**	**Baseline Weight (W_B):**	**6.1163**
Test Type:	**40/20/40 Laminate Ten/Comp**	**Conditioning Date:**	**08/07/01**
# of Plies:	**20**	**Removal Date:**	**10/23/01**
Traveler ID:	**A-141**		

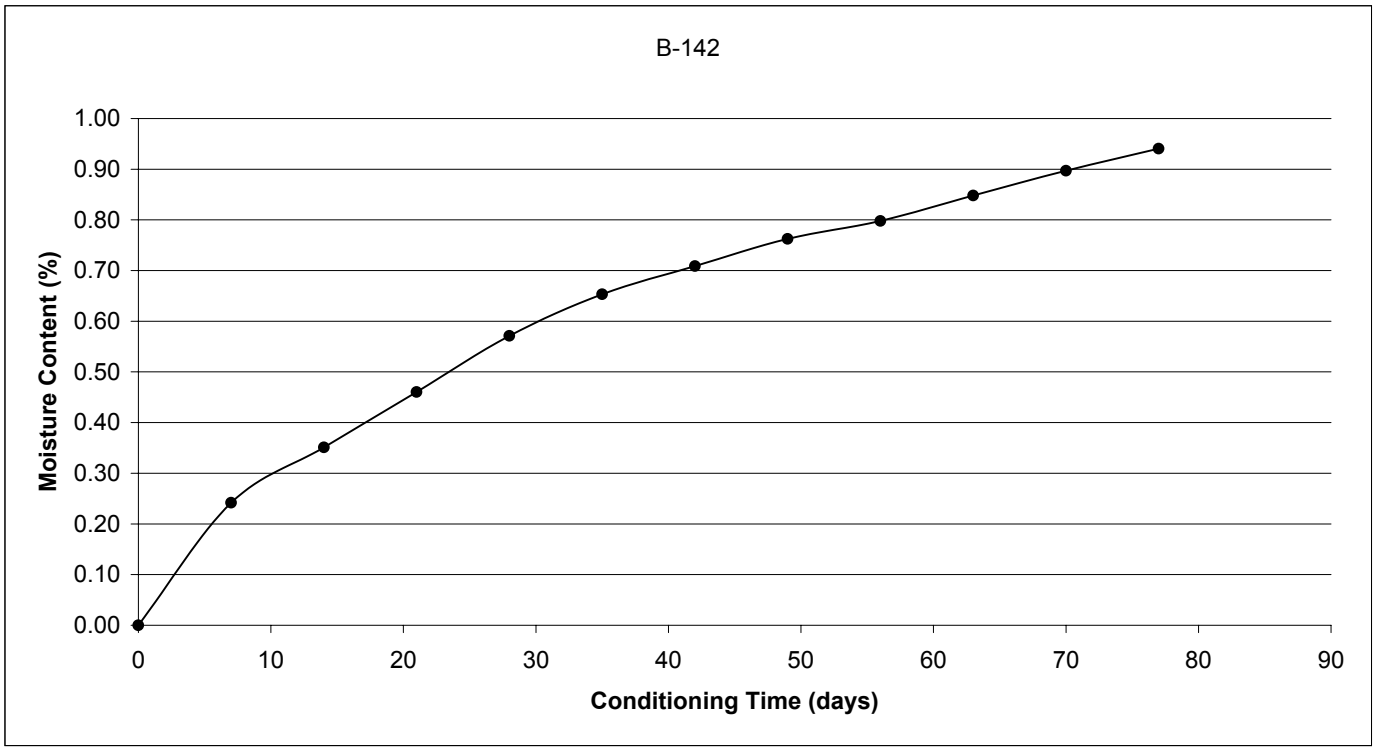
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	8/7/2001	Initial	0	6.1163	0.0000	0.00	0.000	-	-
1	8/14/2001	7	7	6.1315	6.1163	0.25	0.249	**No**	**No**
2	8/21/2001	7	14	6.1384	6.1315	0.36	0.113	**No**	**No**
3	8/28/2001	7	21	6.1452	6.1384	0.47	0.111	**No**	**No**
4	9/4/2001	7	28	6.1518	6.1452	0.58	0.108	**No**	**No**
5	9/11/2001	7	35	6.1567	6.1518	0.66	0.080	**No**	**No**
6	9/18/2001	7	42	6.1606	6.1567	0.72	0.064	**No**	**No**
7	9/25/2001	7	49	6.1639	6.1606	0.78	0.054	**No**	**No**
8	10/2/2001	7	56	6.1660	6.1639	0.81	0.034	**Yes**	**No**
9	10/9/2001	7	63	6.1693	6.1660	0.87	0.054	**No**	**No**
10	10/16/2001	7	70	6.1721	6.1693	0.91	0.046	**Yes**	**No**
11	10/23/2001	7	77	6.1747	6.1721	0.95	0.043	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**B-142**	**Product Type:**	**FGF7781-07I**
Batch #:	**AF010363**	**Baseline Weight (W_B):**	**5.9536**
Test Type:	**40/20/40 Laminate Ten/Comp**	**Conditioning Date:**	**08/07/01**
# of Plies:	**20**	**Removal Date:**	**10/23/01**
Traveler ID:	**B-142**		

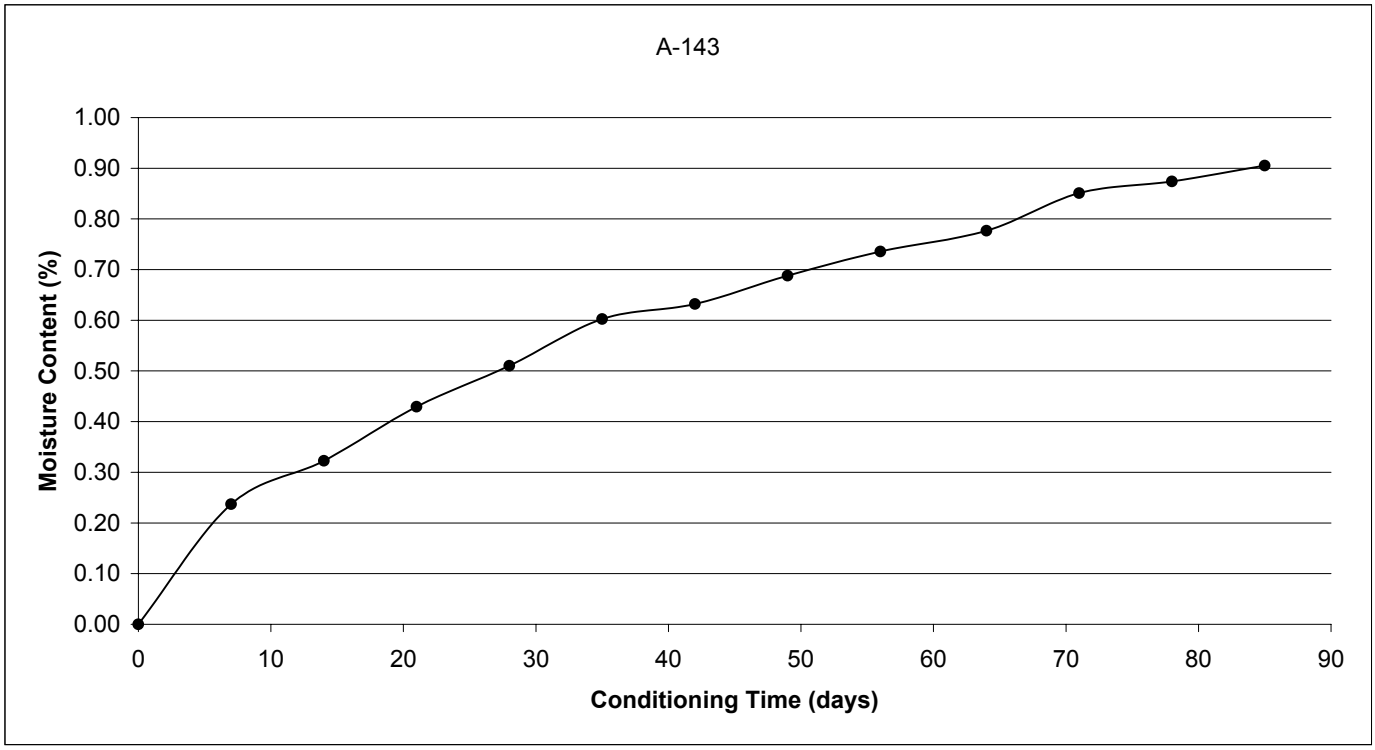
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	8/7/2001	Initial	0	5.9536	0.0000	0.00	0.000	-	-
1	8/14/2001	7	7	5.9680	5.9536	0.24	0.242	**No**	**No**
2	8/21/2001	7	14	5.9745	5.9680	0.35	0.109	**No**	**No**
3	8/28/2001	7	21	5.9810	5.9745	0.46	0.109	**No**	**No**
4	9/4/2001	7	28	5.9876	5.9810	0.57	0.111	**No**	**No**
5	9/11/2001	7	35	5.9925	5.9876	0.65	0.082	**No**	**No**
6	9/18/2001	7	42	5.9958	5.9925	0.71	0.055	**No**	**No**
7	9/25/2001	7	49	5.9990	5.9958	0.76	0.054	**No**	**No**
8	10/2/2001	7	56	6.0011	5.9990	0.80	0.035	**Yes**	**No**
9	10/9/2001	7	63	6.0041	6.0011	0.85	0.050	**No**	**No**
10	10/16/2001	7	70	6.0070	6.0041	0.90	0.049	**Yes**	**No**
11	10/23/2001	7	77	6.0096	6.0070	0.94	0.044	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**A-143**	**Product Type:**	**FGF7781-07I**
Batch #:	**AF010363**	**Baseline Weight (W_B):**	**6.0759**
Test Type:	**40/20/40 Bolt Bearing**	**Conditioning Date:**	**01/02/02**
# of Plies:	**20**	**Removal Date:**	**03/28/02**
Traveler ID:	**A-143**		

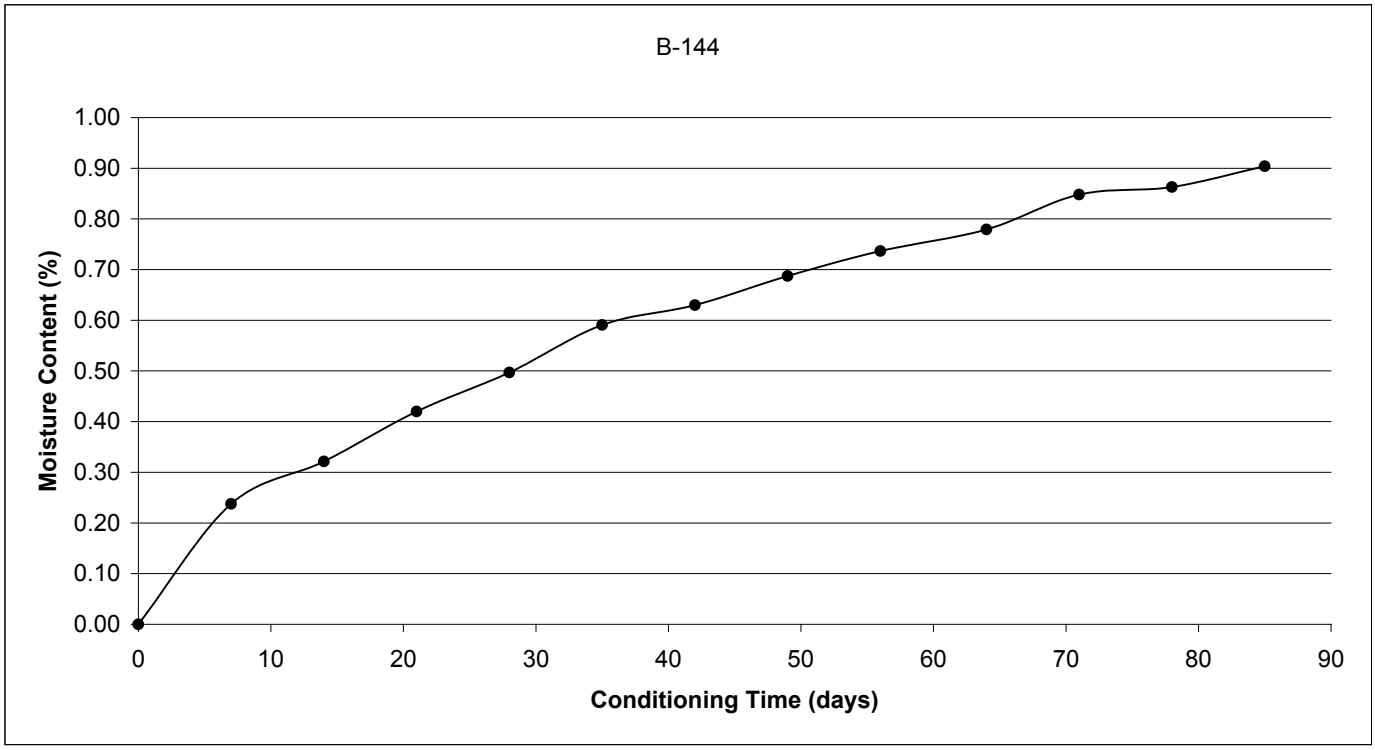
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	1/2/2002	Initial	0	6.0759	0.0000	0.00	0.000	-	-
1	1/9/2002	7	7	6.0903	6.0759	0.24	0.237	**No**	**No**
2	1/16/2002	7	14	6.0955	6.0903	0.32	0.086	**No**	**No**
3	1/23/2002	7	21	6.1020	6.0955	0.43	0.107	**No**	**No**
4	1/30/2002	7	28	6.1069	6.1020	0.51	0.081	**No**	**No**
5	2/6/2002	7	35	6.1125	6.1069	0.60	0.092	**No**	**No**
6	2/13/2002	7	42	6.1143	6.1125	0.63	0.030	**Yes**	**No**
7	2/20/2002	7	49	6.1177	6.1143	0.69	0.056	**No**	**No**
8	2/27/2002	7	56	6.1206	6.1177	0.74	0.048	**Yes**	**No**
9	3/7/2002	8	64	6.1231	6.1206	0.78	0.041	**Yes**	**Yes**
10	3/14/2002	7	71	6.1276	6.1231	0.85	0.074	**No**	**No**
11	3/21/2002	7	78	6.1290	6.1276	0.87	0.023	**Yes**	**No**
12	3/28/2002	7	85	6.1309	6.1290	0.91	0.031	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**B-144**	**Product Type:**	**FGF7781-07I**
Batch #:	**AF010363**	**Baseline Weight (W_B):**	**6.0950**
Test Type:	**40/20/40 Bolt Bearing**	**Conditioning Date:**	**01/02/02**
# of Plies:	**20**	**Removal Date:**	**03/28/02**
Traveler ID:	**B-144**		

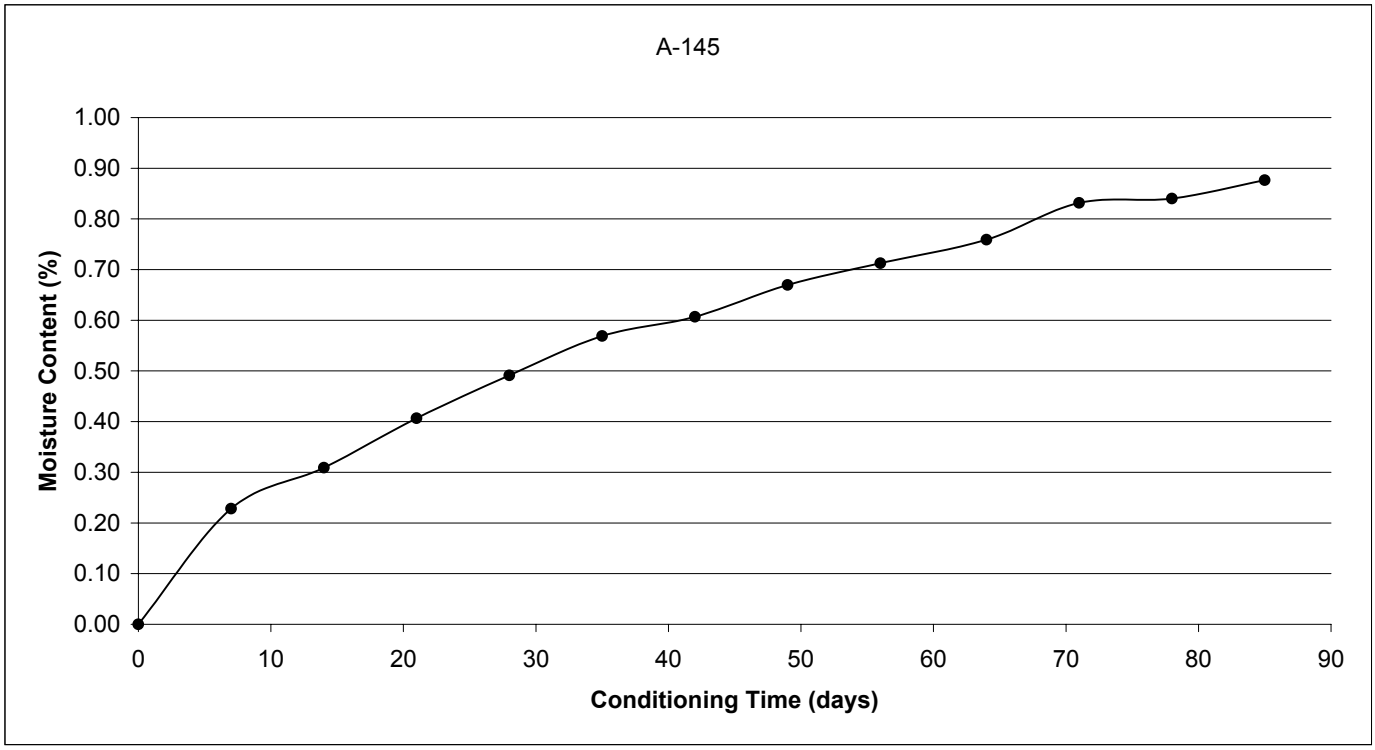
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	1/2/2002	Initial	0	6.0950	0.0000	0.00	0.000	-	-
1	1/9/2002	7	7	6.1095	6.0950	0.24	0.238	**No**	**No**
2	1/16/2002	7	14	6.1146	6.1095	0.32	0.084	**No**	**No**
3	1/23/2002	7	21	6.1206	6.1146	0.42	0.098	**No**	**No**
4	1/30/2002	7	28	6.1253	6.1206	0.50	0.077	**No**	**No**
5	2/6/2002	7	35	6.1310	6.1253	0.59	0.094	**No**	**No**
6	2/13/2002	7	42	6.1334	6.1310	0.63	0.039	**Yes**	**No**
7	2/20/2002	7	49	6.1369	6.1334	0.69	0.057	**No**	**No**
8	2/27/2002	7	56	6.1399	6.1369	0.74	0.049	**Yes**	**No**
9	3/7/2002	8	64	6.1425	6.1399	0.78	0.043	**Yes**	**Yes**
10	3/14/2002	7	71	6.1467	6.1425	0.85	0.069	**No**	**No**
11	3/21/2002	7	78	6.1476	6.1467	0.86	0.015	**Yes**	**No**
12	3/28/2002	7	85	6.1501	6.1476	0.90	0.041	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**A-145**	**Product Type:**	**FGF7781-07I**
Batch #:	**AF010363**	**Baseline Weight (W_B):**	**6.0468**
Test Type:	**40/20/40 Bolt Bearing**	**Conditioning Date:**	**01/02/02**
# of Plies:	**20**	**Removal Date:**	**03/28/02**
Traveler ID:	**A-145**		

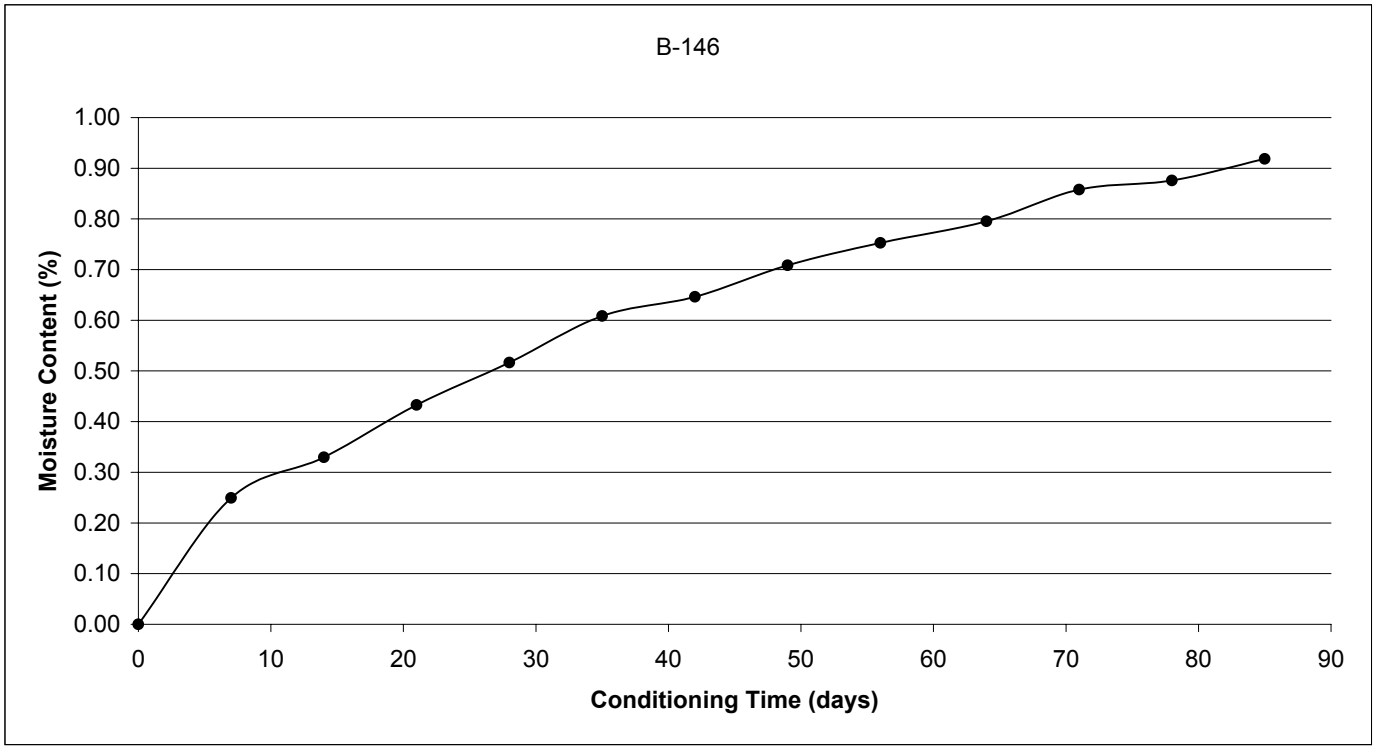
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	1/2/2002	Initial	0	6.0468	0.0000	0.00	0.000	-	-
1	1/9/2002	7	7	6.0606	6.0468	0.23	0.228	**No**	**No**
2	1/16/2002	7	14	6.0655	6.0606	0.31	0.081	**No**	**No**
3	1/23/2002	7	21	6.0714	6.0655	0.41	0.098	**No**	**No**
4	1/30/2002	7	28	6.0765	6.0714	0.49	0.084	**No**	**No**
5	2/6/2002	7	35	6.0812	6.0765	0.57	0.078	**No**	**No**
6	2/13/2002	7	42	6.0835	6.0812	0.61	0.038	**Yes**	**No**
7	2/20/2002	7	49	6.0873	6.0835	0.67	0.063	**No**	**No**
8	2/27/2002	7	56	6.0899	6.0873	0.71	0.043	**Yes**	**No**
9	3/7/2002	8	64	6.0927	6.0899	0.76	0.046	**Yes**	**Yes**
10	3/14/2002	7	71	6.0971	6.0927	0.83	0.073	**No**	**No**
11	3/21/2002	7	78	6.0976	6.0971	0.84	0.008	**Yes**	**No**
12	3/28/2002	7	85	6.0998	6.0976	0.88	0.036	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**B-146**	**Product Type:**	**FGF7781-07I**
Batch #:	**AF010363**	**Baseline Weight (W_B):**	**6.0968**
Test Type:	**40/20/40 Bolt Bearing**	**Conditioning Date:**	**01/02/02**
# of Plies:	**20**	**Removal Date:**	**03/28/02**
Traveler ID:	**B-146**		

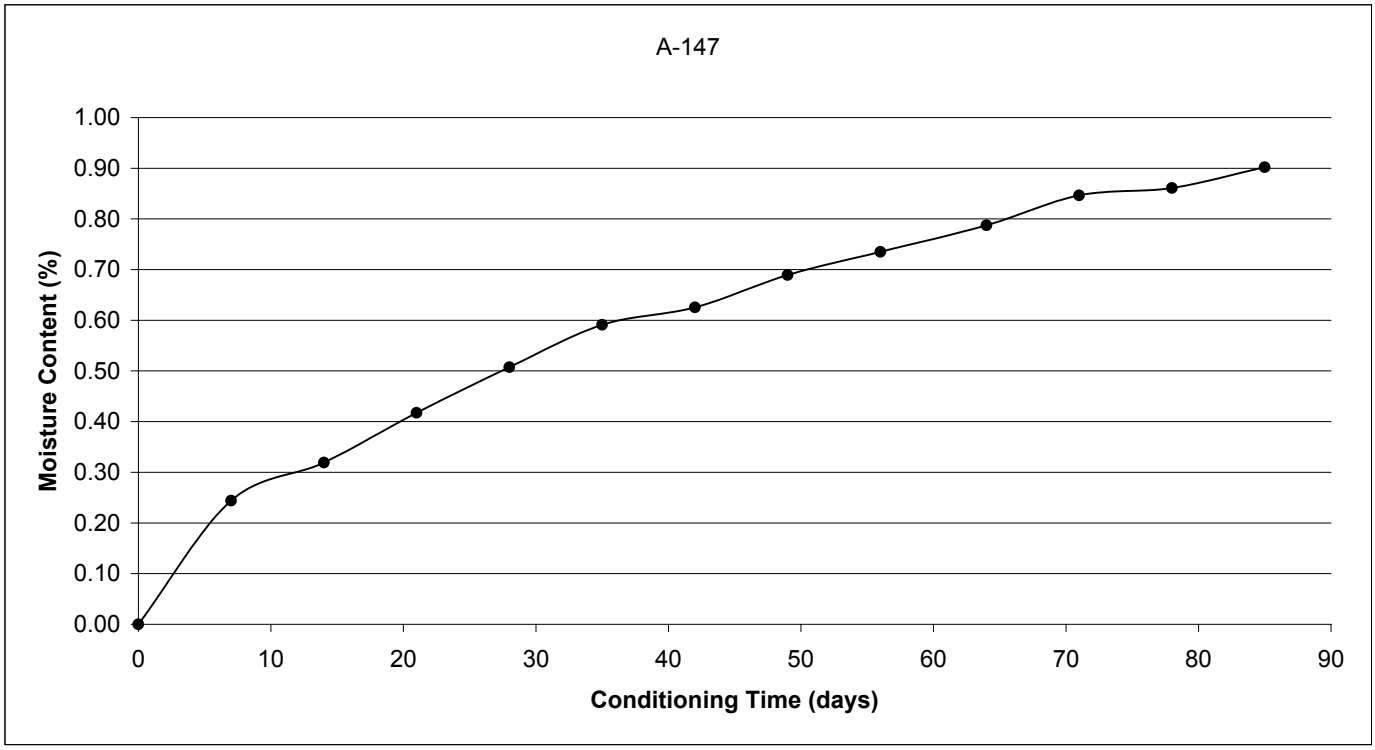
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	1/2/2002	Initial	0	6.0968	0.0000	0.00	0.000	-	-
1	1/9/2002	7	7	6.1120	6.0968	0.25	0.249	**No**	**No**
2	1/16/2002	7	14	6.1169	6.1120	0.33	0.080	**No**	**No**
3	1/23/2002	7	21	6.1232	6.1169	0.43	0.103	**No**	**No**
4	1/30/2002	7	28	6.1283	6.1232	0.52	0.084	**No**	**No**
5	2/6/2002	7	35	6.1339	6.1283	0.61	0.092	**No**	**No**
6	2/13/2002	7	42	6.1362	6.1339	0.65	0.038	**Yes**	**No**
7	2/20/2002	7	49	6.1400	6.1362	0.71	0.062	**No**	**No**
8	2/27/2002	7	56	6.1427	6.1400	0.75	0.044	**Yes**	**No**
9	3/7/2002	8	64	6.1453	6.1427	0.80	0.043	**Yes**	**Yes**
10	3/14/2002	7	71	6.1491	6.1453	0.86	0.062	**No**	**No**
11	3/21/2002	7	78	6.1502	6.1491	0.88	0.018	**Yes**	**No**
12	3/28/2002	7	85	6.1528	6.1502	0.92	0.043	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**A-147**	**Product Type:**	**FGF7781-07I**
Batch #:	**AF010363**	**Baseline Weight (W_B):**	**6.1076**
Test Type:	**40/20/40 Bolt Bearing**	**Conditioning Date:**	**01/02/02**
# of Plies:	**20**	**Removal Date:**	**03/28/02**
Traveler ID:	**A-147**		

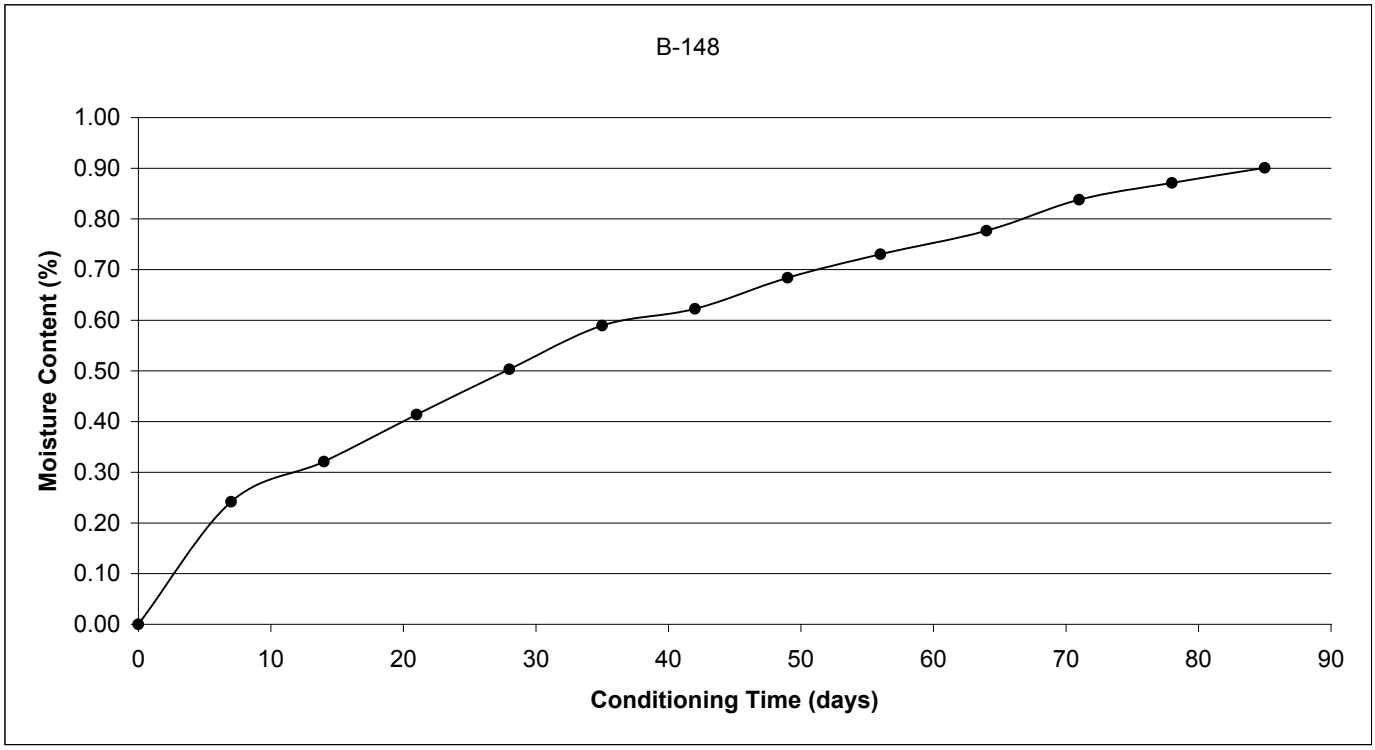
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	1/2/2002	Initial	0	6.1076	0.0000	0.00	0.000	-	-
1	1/9/2002	7	7	6.1225	6.1076	0.24	0.244	**No**	**No**
2	1/16/2002	7	14	6.1271	6.1225	0.32	0.075	**No**	**No**
3	1/23/2002	7	21	6.1331	6.1271	0.42	0.098	**No**	**No**
4	1/30/2002	7	28	6.1386	6.1331	0.51	0.090	**No**	**No**
5	2/6/2002	7	35	6.1437	6.1386	0.59	0.084	**No**	**No**
6	2/13/2002	7	42	6.1458	6.1437	0.63	0.034	**Yes**	**No**
7	2/20/2002	7	49	6.1497	6.1458	0.69	0.064	**No**	**No**
8	2/27/2002	7	56	6.1525	6.1497	0.74	0.046	**Yes**	**No**
9	3/7/2002	8	64	6.1557	6.1525	0.79	0.052	**No**	**No**
10	3/14/2002	7	71	6.1593	6.1557	0.85	0.059	**No**	**No**
11	3/21/2002	7	78	6.1602	6.1593	0.86	0.015	**Yes**	**No**
12	3/28/2002	7	85	6.1627	6.1602	0.90	0.041	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**B-148**	**Product Type:**	**FGF7781-07I**
Batch #:	**AF010363**	**Baseline Weight (W_B):**	**6.0387**
Test Type:	**40/20/40 Bolt Bearing**	**Conditioning Date:**	**01/02/02**
# of Plies:	**20**	**Removal Date:**	**03/28/02**
Traveler ID:	**B-148**		

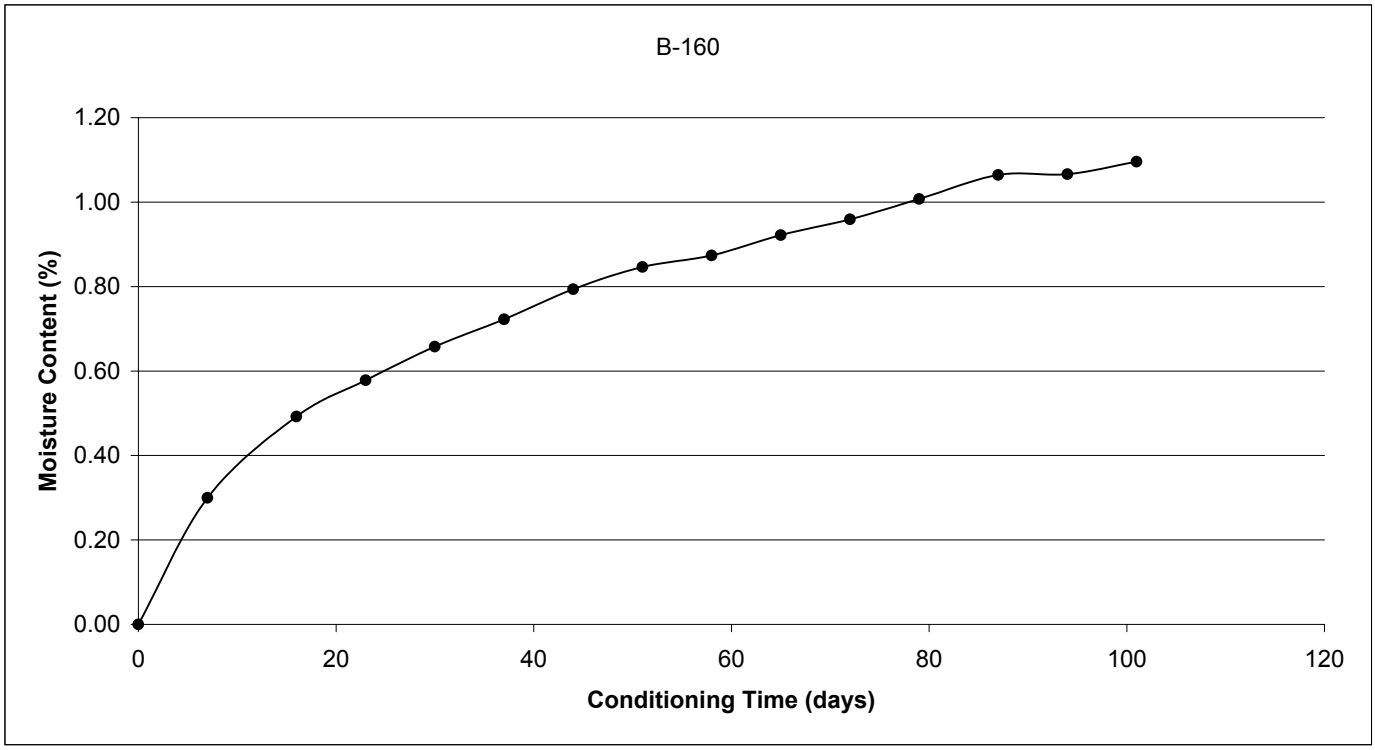
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	1/2/2002	Initial	0	6.0387	0.0000	0.00	0.000	-	-
1	1/9/2002	7	7	6.0533	6.0387	0.24	0.242	**No**	**No**
2	1/16/2002	7	14	6.0581	6.0533	0.32	0.079	**No**	**No**
3	1/23/2002	7	21	6.0637	6.0581	0.41	0.093	**No**	**No**
4	1/30/2002	7	28	6.0691	6.0637	0.50	0.089	**No**	**No**
5	2/6/2002	7	35	6.0743	6.0691	0.59	0.086	**No**	**No**
6	2/13/2002	7	42	6.0763	6.0743	0.62	0.033	**Yes**	**No**
7	2/20/2002	7	49	6.0800	6.0763	0.68	0.061	**No**	**No**
8	2/27/2002	7	56	6.0828	6.0800	0.73	0.046	**Yes**	**No**
9	3/7/2002	8	64	6.0856	6.0828	0.78	0.046	**Yes**	**Yes**
10	3/14/2002	7	71	6.0893	6.0856	0.84	0.061	**No**	**No**
11	3/21/2002	7	78	6.0913	6.0893	0.87	0.033	**Yes**	**No**
12	3/28/2002	7	85	6.0931	6.0913	0.90	0.030	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**B-160**	**Product Type:**	**FGF7781-07I**
Batch #:	**AF010363**	**Baseline Weight (W_B):**	**4.7734**
Test Type:	**25/50/25 Laminate Ten/Com**	**Conditioning Date:**	**12/10/01**
# of Plies:	**16**	**Removal Date:**	**03/21/02**
Traveler ID:	**B-160**		

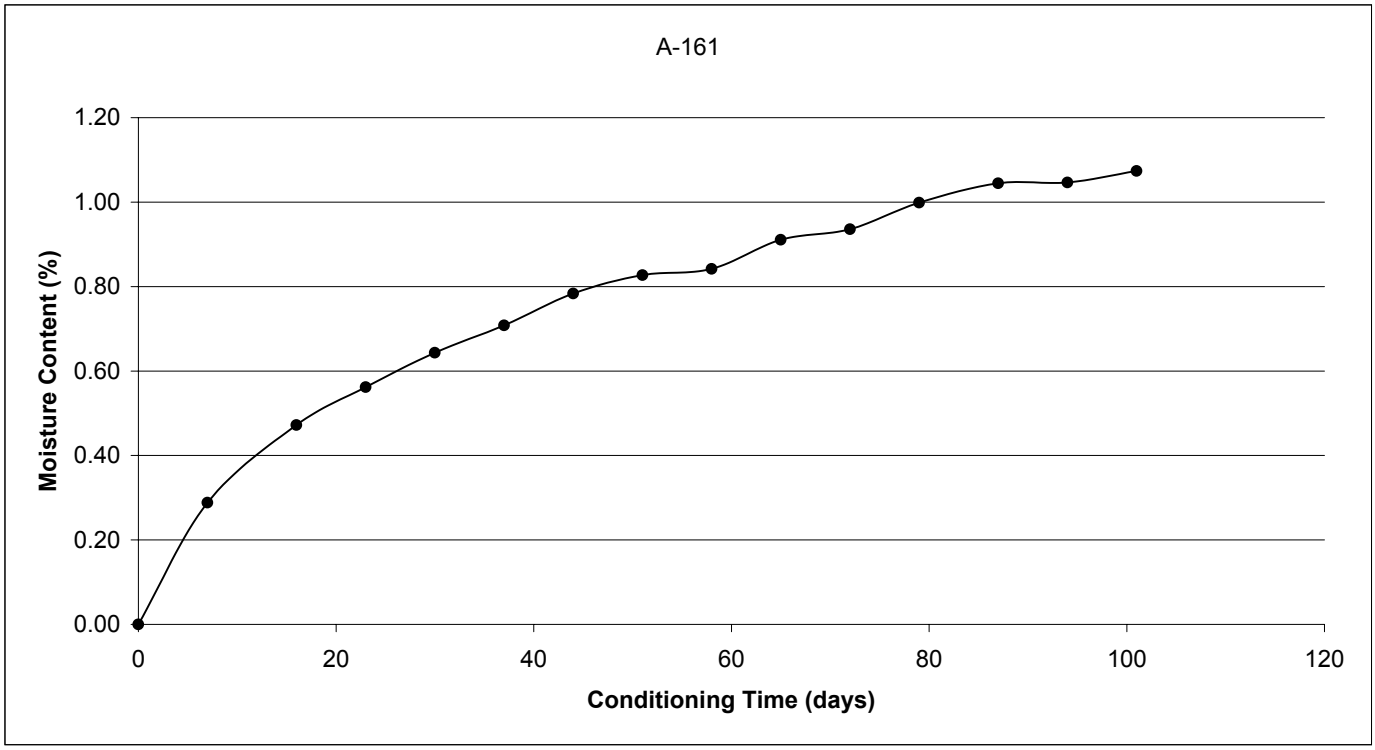
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	12/10/2001	Initial	0	4.7734	0.0000	0.00	0.000	-	-
1	12/17/2001	7	7	4.7877	4.7734	0.30	0.300	**No**	**No**
2	12/26/2001	9	16	4.7969	4.7877	0.49	0.193	**No**	**No**
3	1/2/2002	7	23	4.8010	4.7969	0.58	0.086	**No**	**No**
4	1/9/2002	7	30	4.8048	4.8010	0.66	0.080	**No**	**No**
5	1/16/2002	7	37	4.8079	4.8048	0.72	0.065	**No**	**No**
6	1/23/2002	7	44	4.8113	4.8079	0.79	0.071	**No**	**No**
7	1/30/2002	7	51	4.8138	4.8113	0.85	0.052	**No**	**No**
8	2/6/2002	7	58	4.8151	4.8138	0.87	0.027	**Yes**	**No**
9	2/13/2002	7	65	4.8174	4.8151	0.92	0.048	**Yes**	**Yes**
10	2/20/2002	7	72	4.8192	4.8174	0.96	0.038	**Yes**	**Yes**
11	2/27/2002	7	79	4.8215	4.8192	1.01	0.048	**Yes**	**Yes**
12	3/7/2002	8	87	4.8242	4.8215	1.06	0.057	**No**	**No**
13	3/14/2002	7	94	4.8243	4.8242	1.07	0.002	**Yes**	**No**
14	3/21/2002	7	101	4.8257	4.8243	1.10	0.029	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**A-161**	**Product Type:**	**FGF7781-07I**
Batch #:	**AF010363**	**Baseline Weight (W_B):**	**4.7864**
Test Type:	**25/50/25 Laminate Ten/Com**	**Conditioning Date:**	**12/10/01**
# of Plies:	**16**	**Removal Date:**	**03/21/02**
Traveler ID:	**A-161**		

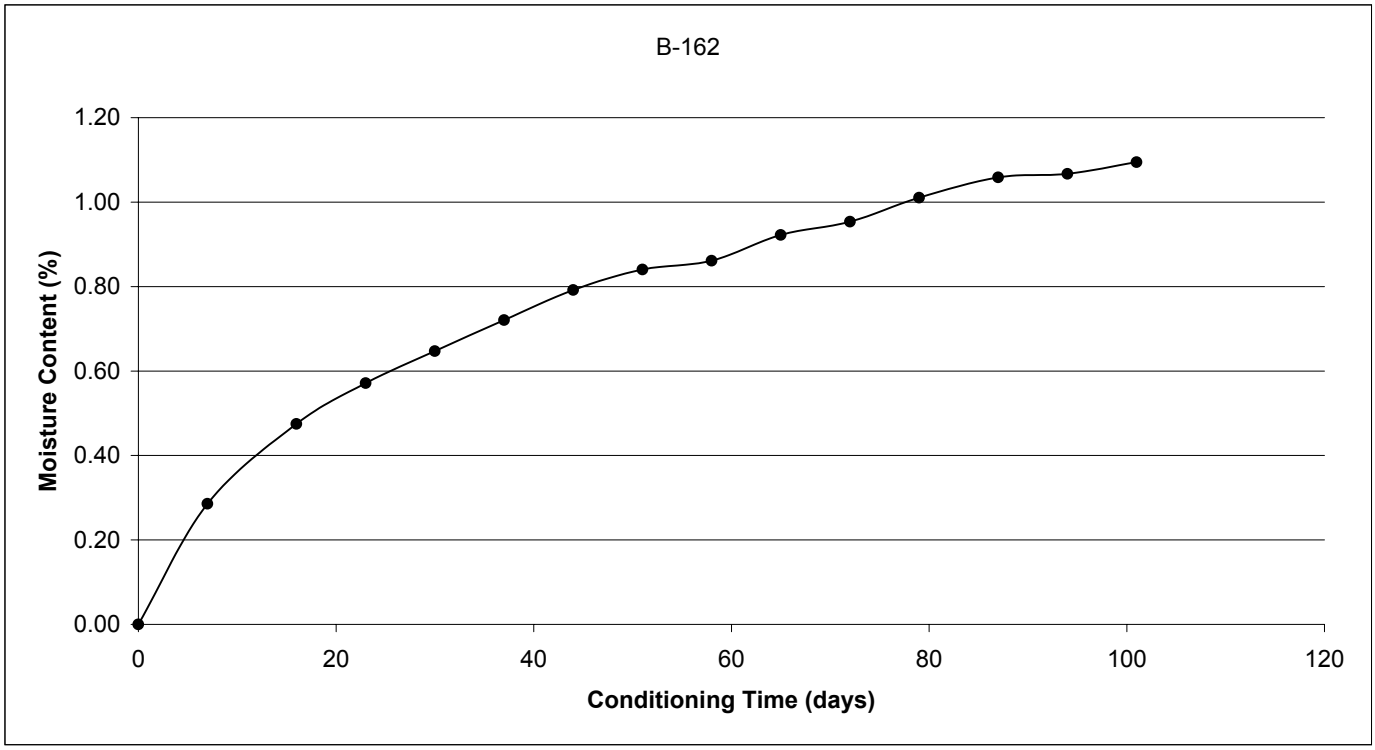
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	12/10/2001	Initial	0	4.7864	0.0000	0.00	0.000	-	-
1	12/17/2001	7	7	4.8002	4.7864	0.29	0.288	**No**	**No**
2	12/26/2001	9	16	4.8090	4.8002	0.47	0.184	**No**	**No**
3	1/2/2002	7	23	4.8133	4.8090	0.56	0.090	**No**	**No**
4	1/9/2002	7	30	4.8172	4.8133	0.64	0.081	**No**	**No**
5	1/16/2002	7	37	4.8203	4.8172	0.71	0.065	**No**	**No**
6	1/23/2002	7	44	4.8239	4.8203	0.78	0.075	**No**	**No**
7	1/30/2002	7	51	4.8260	4.8239	0.83	0.044	**Yes**	**No**
8	2/6/2002	7	58	4.8267	4.8260	0.84	0.015	**Yes**	**Yes**
9	2/13/2002	7	65	4.8300	4.8267	0.91	0.069	**No**	**No**
10	2/20/2002	7	72	4.8312	4.8300	0.94	0.025	**Yes**	**No**
11	2/27/2002	7	79	4.8342	4.8312	1.00	0.063	**No**	**No**
12	3/7/2002	8	87	4.8364	4.8342	1.04	0.046	**Yes**	**No**
13	3/14/2002	7	94	4.8365	4.8364	1.05	0.002	**Yes**	**Yes**
14	3/21/2002	7	101	4.8378	4.8365	1.07	0.027	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**B-162**	**Product Type:**	**FGF7781-07I**
Batch #:	**AF010363**	**Baseline Weight (W_B):**	**4.7602**
Test Type:	**25/50/25 Laminate Ten/Com**	**Conditioning Date:**	**12/10/01**
# of Plies:	**16**	**Removal Date:**	**03/21/02**
Traveler ID:	**B-162**		

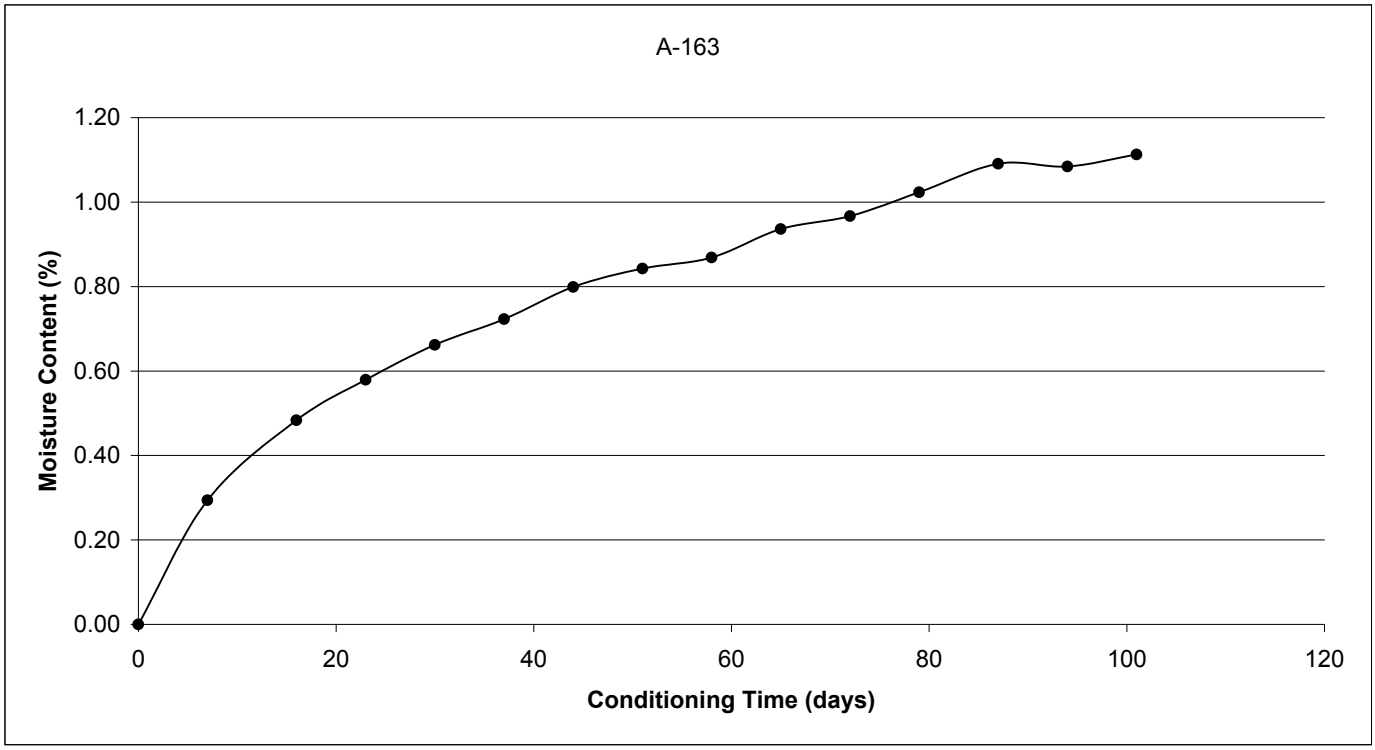
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	12/10/2001	Initial	0	4.7602	0.0000	0.00	0.000	-	-
1	12/17/2001	7	7	4.7738	4.7602	0.29	0.286	**No**	**No**
2	12/26/2001	9	16	4.7828	4.7738	0.47	0.189	**No**	**No**
3	1/2/2002	7	23	4.7874	4.7828	0.57	0.097	**No**	**No**
4	1/9/2002	7	30	4.7910	4.7874	0.65	0.076	**No**	**No**
5	1/16/2002	7	37	4.7945	4.7910	0.72	0.074	**No**	**No**
6	1/23/2002	7	44	4.7979	4.7945	0.79	0.071	**No**	**No**
7	1/30/2002	7	51	4.8002	4.7979	0.84	0.048	**Yes**	**No**
8	2/6/2002	7	58	4.8012	4.8002	0.86	0.021	**Yes**	**Yes**
9	2/13/2002	7	65	4.8041	4.8012	0.92	0.061	**No**	**No**
10	2/20/2002	7	72	4.8056	4.8041	0.95	0.032	**Yes**	**No**
11	2/27/2002	7	79	4.8083	4.8056	1.01	0.057	**No**	**No**
12	3/7/2002	8	87	4.8106	4.8083	1.06	0.048	**Yes**	**No**
13	3/14/2002	7	94	4.8110	4.8106	1.07	0.008	**Yes**	**Yes**
14	3/21/2002	7	101	4.8123	4.8110	1.09	0.027	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**A-163**	**Product Type:**	**FGF7781-07I**
Batch #:	**AF010363**	**Baseline Weight (W_B):**	**4.5920**
Test Type:	**25/50/25 Laminate Ten/Com**	**Conditioning Date:**	**12/10/01**
# of Plies:	**16**	**Removal Date:**	**03/21/02**
Traveler ID:	**A-163**		

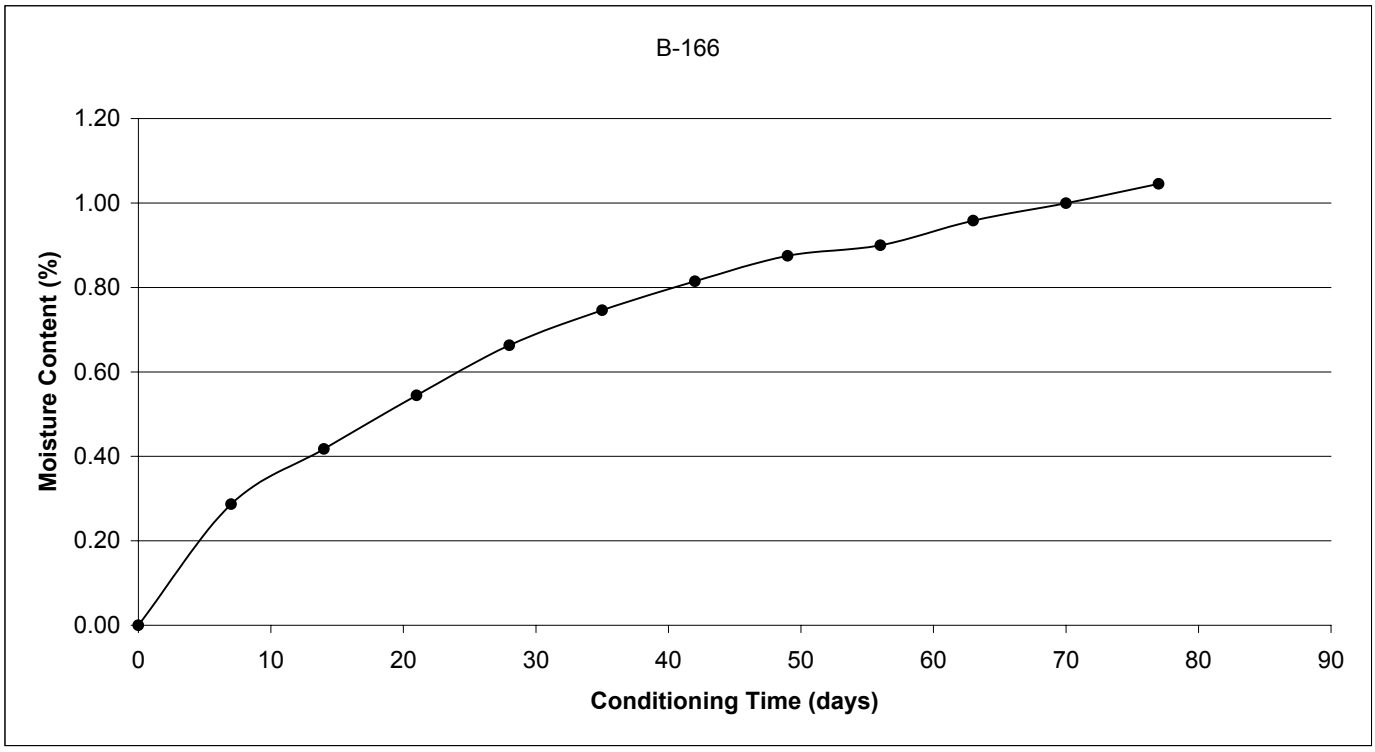
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	12/10/2001	Initial	0	4.5920	0.0000	0.00	0.000	-	-
1	12/17/2001	7	7	4.6055	4.5920	0.29	0.294	**No**	**No**
2	12/26/2001	9	16	4.6142	4.6055	0.48	0.189	**No**	**No**
3	1/2/2002	7	23	4.6186	4.6142	0.58	0.096	**No**	**No**
4	1/9/2002	7	30	4.6224	4.6186	0.66	0.083	**No**	**No**
5	1/16/2002	7	37	4.6252	4.6224	0.72	0.061	**No**	**No**
6	1/23/2002	7	44	4.6287	4.6252	0.80	0.076	**No**	**No**
7	1/30/2002	7	51	4.6307	4.6287	0.84	0.044	**Yes**	**No**
8	2/6/2002	7	58	4.6319	4.6307	0.87	0.026	**Yes**	**Yes**
9	2/13/2002	7	65	4.6350	4.6319	0.94	0.068	**No**	**No**
10	2/20/2002	7	72	4.6364	4.6350	0.97	0.030	**Yes**	**No**
11	2/27/2002	7	79	4.6390	4.6364	1.02	0.057	**No**	**No**
12	3/7/2002	8	87	4.6421	4.6390	1.09	0.068	**No**	**No**
13	3/14/2002	7	94	4.6418	4.6421	1.08	-0.007	**Yes**	**No**
14	3/21/2002	7	101	4.6431	4.6418	1.11	0.028	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**B-166**	**Product Type:**	**FGF7781-07I**
Batch #:	**AF010363**	**Baseline Weight (W_B):**	**4.8117**
Test Type:	**25/50/25 Laminate Ten/Com**	**Conditioning Date:**	**08/07/01**
# of Plies:	**16**	**Removal Date:**	**10/23/01**
Traveler ID:	**B-166**		

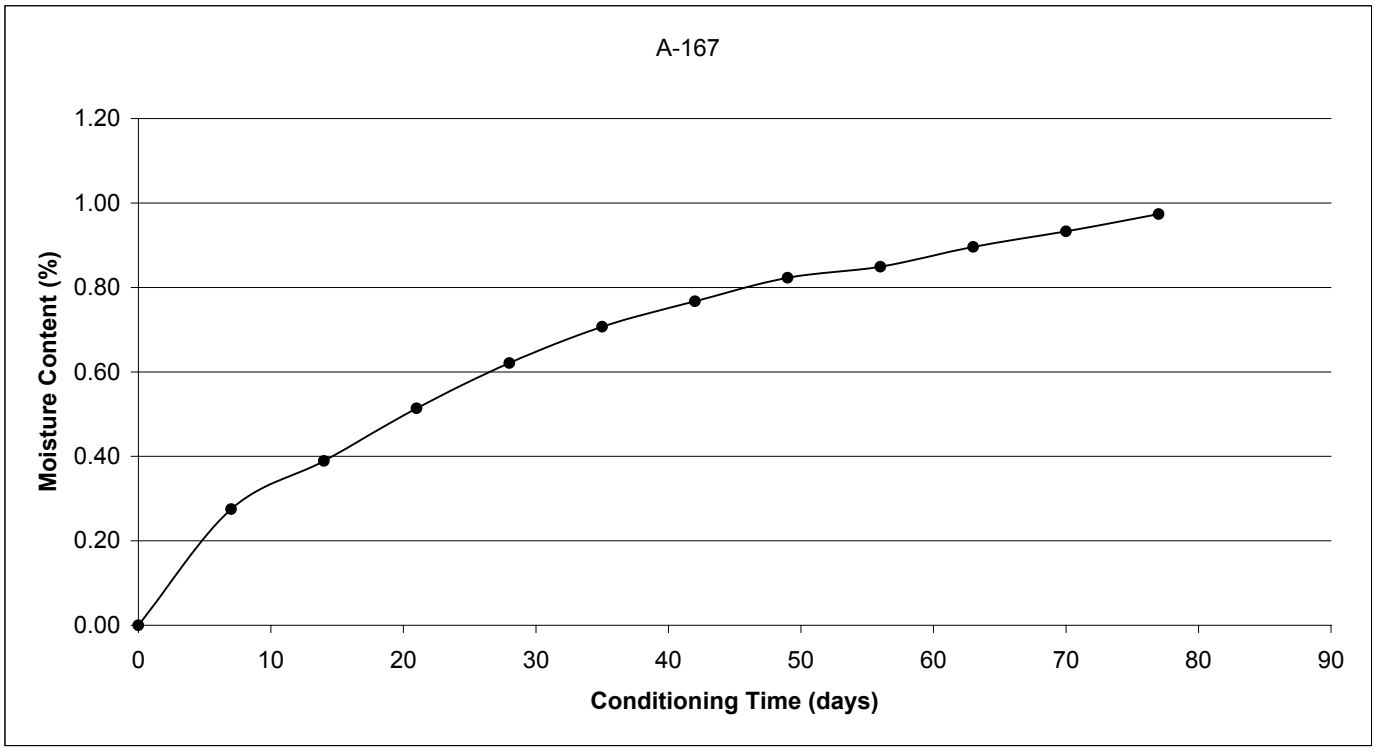
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	8/7/2001	Initial	0	4.8117	0.0000	0.00	0.000	-	-
1	8/14/2001	7	7	4.8255	4.8117	0.29	0.287	**No**	**No**
2	8/21/2001	7	14	4.8318	4.8255	0.42	0.131	**No**	**No**
3	8/28/2001	7	21	4.8379	4.8318	0.54	0.127	**No**	**No**
4	9/4/2001	7	28	4.8436	4.8379	0.66	0.118	**No**	**No**
5	9/11/2001	7	35	4.8476	4.8436	0.75	0.083	**No**	**No**
6	9/18/2001	7	42	4.8509	4.8476	0.81	0.069	**No**	**No**
7	9/25/2001	7	49	4.8538	4.8509	0.87	0.060	**No**	**No**
8	10/2/2001	7	56	4.8550	4.8538	0.90	0.025	**Yes**	**No**
9	10/9/2001	7	63	4.8578	4.8550	0.96	0.058	**No**	**No**
10	10/16/2001	7	70	4.8598	4.8578	1.00	0.042	**Yes**	**No**
11	10/23/2001	7	77	4.8620	4.8598	1.05	0.046	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**A-167**	**Product Type:**	**FGF7781-07I**
Batch #:	**AF010363**	**Baseline Weight (W_B):**	**4.6528**
Test Type:	**25/50/25 Laminate Ten/Com**	**Conditioning Date:**	**08/07/01**
# of Plies:	**16**	**Removal Date:**	**10/23/01**
Traveler ID:	**A-167**		

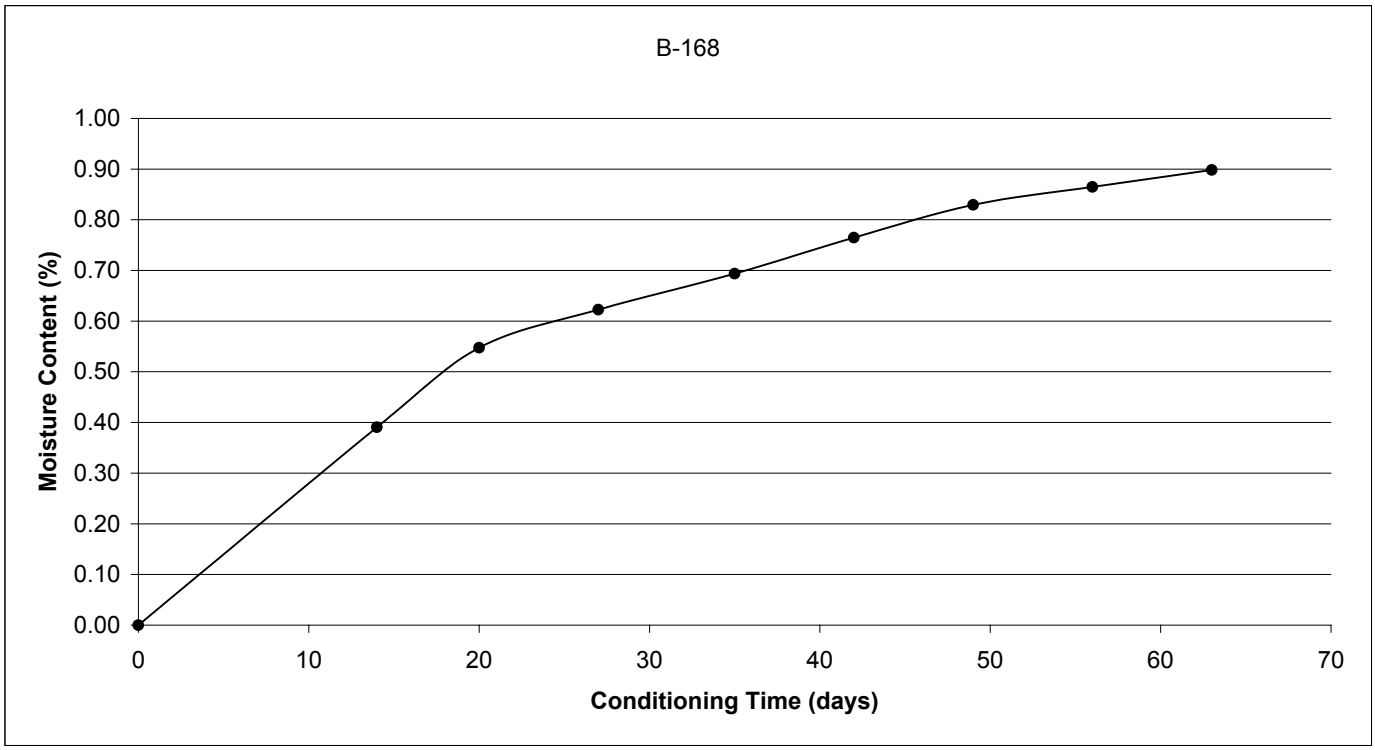
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	8/7/2001	Initial	0	4.6528	0.0000	0.00	0.000	-	-
1	8/14/2001	7	7	4.6656	4.6528	0.28	0.275	**No**	**No**
2	8/21/2001	7	14	4.6709	4.6656	0.39	0.114	**No**	**No**
3	8/28/2001	7	21	4.6767	4.6709	0.51	0.125	**No**	**No**
4	9/4/2001	7	28	4.6817	4.6767	0.62	0.107	**No**	**No**
5	9/11/2001	7	35	4.6857	4.6817	0.71	0.086	**No**	**No**
6	9/18/2001	7	42	4.6885	4.6857	0.77	0.060	**No**	**No**
7	9/25/2001	7	49	4.6911	4.6885	0.82	0.056	**No**	**No**
8	10/2/2001	7	56	4.6923	4.6911	0.85	0.026	**Yes**	**No**
9	10/9/2001	7	63	4.6945	4.6923	0.90	0.047	**Yes**	**Yes**
10	10/16/2001	7	70	4.6962	4.6945	0.93	0.037	**Yes**	**Yes**
11	10/23/2001	7	77	4.6981	4.6962	0.97	0.041	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**B-168**	**Product Type:**	**FGF7781-07I**
Batch #:	**AF010363**	**Baseline Weight (W_B):**	**4.7863**
Test Type:	**25/50/25 Bolt Bearing**	**Conditioning Date:**	**11/21/01**
# of Plies:	**16**	**Removal Date:**	**01/23/02**
Traveler ID:	**B-168**		

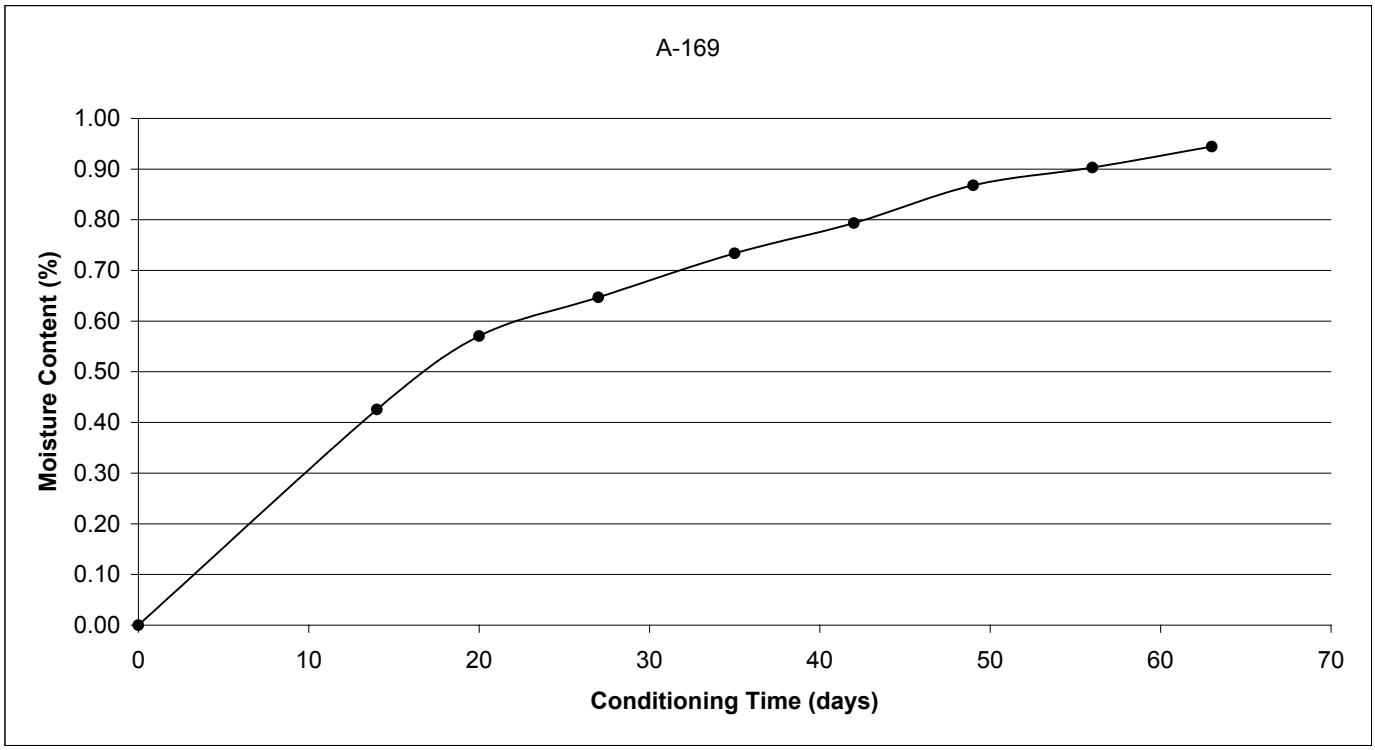
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	11/21/2001	Initial	0	4.7863	0.0000	0.00	0.000	-	-
1	12/5/2001	14	14	4.8050	4.7863	0.39	0.391	**No**	**No**
2	12/11/2001	6	20	4.8125	4.8050	0.55	0.157	**No**	**No**
3	12/18/2001	7	27	4.8161	4.8125	0.62	0.075	**No**	**No**
4	12/26/2001	8	35	4.8195	4.8161	0.69	0.071	**No**	**No**
5	1/2/2002	7	42	4.8229	4.8195	0.76	0.071	**No**	**No**
6	1/9/2002	7	49	4.8260	4.8229	0.83	0.065	**No**	**No**
7	1/16/2002	7	56	4.8277	4.8260	0.86	0.036	**Yes**	**No**
8	1/23/2002	7	63	4.8293	4.8277	0.90	0.033	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**A-169**	**Product Type:**	**FGF7781-07I**
Batch #:	**AF010363**	**Baseline Weight (W_B):**	**4.8384**
Test Type:	**25/50/25 Bolt Bearing**	**Conditioning Date:**	**11/21/01**
# of Plies:	**16**	**Removal Date:**	**01/23/02**
Traveler ID:	**A-169**		

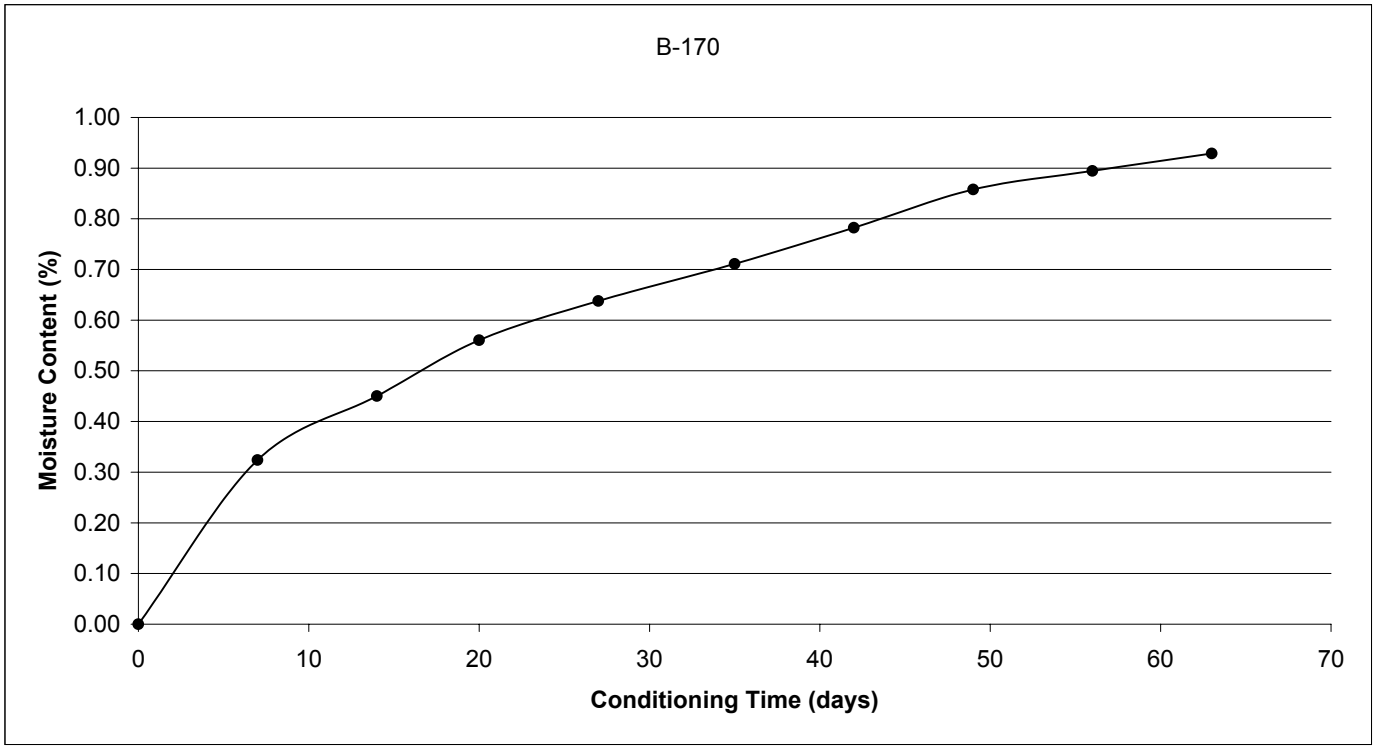
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	11/21/2001	Initial	0	4.8384	0.0000	0.00	0.000	-	-
1	12/5/2001	14	14	4.8590	4.8384	0.43	0.426	**No**	**No**
2	12/11/2001	6	20	4.8660	4.8590	0.57	0.145	**No**	**No**
3	12/18/2001	7	27	4.8697	4.8660	0.65	0.076	**No**	**No**
4	12/26/2001	8	35	4.8739	4.8697	0.73	0.087	**No**	**No**
5	1/2/2002	7	42	4.8768	4.8739	0.79	0.060	**No**	**No**
6	1/9/2002	7	49	4.8804	4.8768	0.87	0.074	**No**	**No**
7	1/16/2002	7	56	4.8821	4.8804	0.90	0.035	**Yes**	**No**
8	1/23/2002	7	63	4.8841	4.8821	0.94	0.041	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**B-170**	**Product Type:**	**FGF7781-07I**
Batch #:	**AF010363**	**Baseline Weight (W_B):**	**4.9080**
Test Type:	**25/50/25 Bolt Bearing**	**Conditioning Date:**	**11/21/01**
# of Plies:	**16**	**Removal Date:**	**01/23/02**
Traveler ID:	**B-170**		

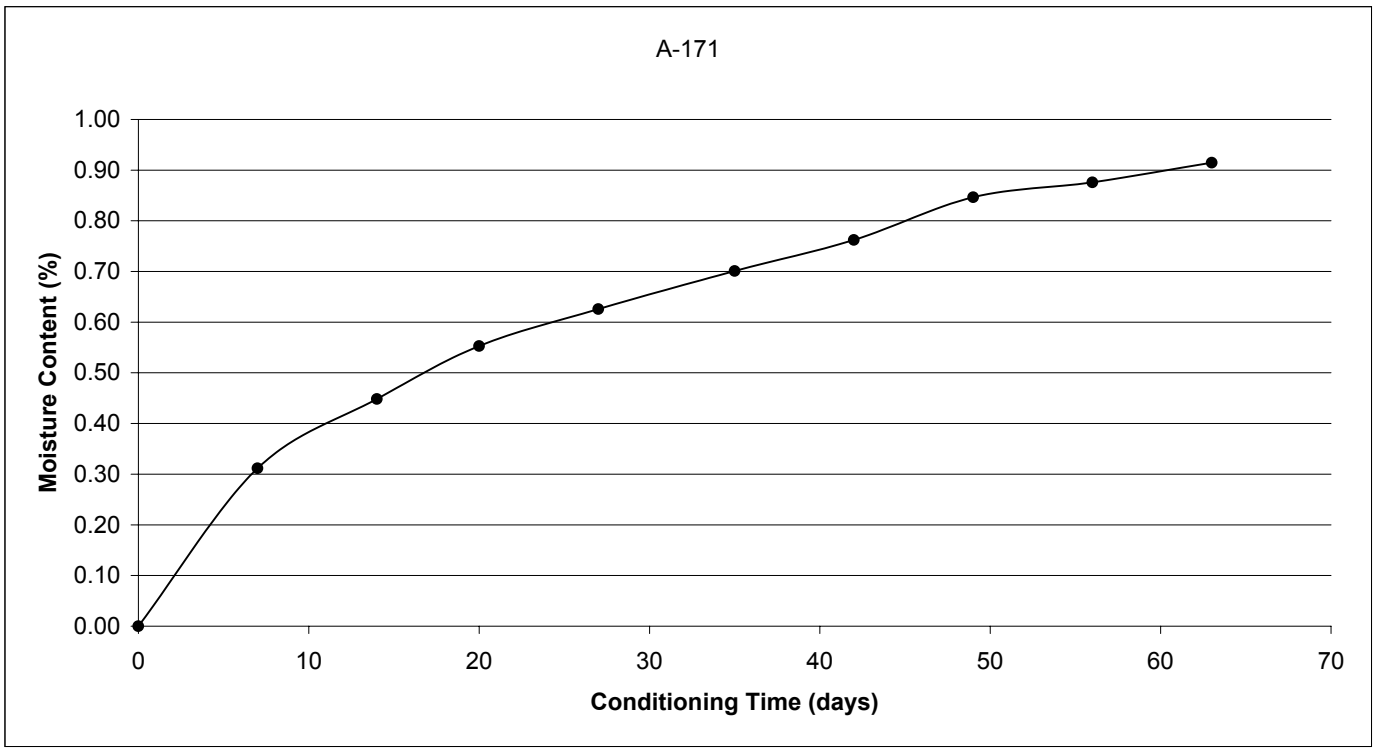
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	11/21/2001	Initial	0	4.9080	0.0000	0.00	0.000	-	-
1	11/28/2001	7	7	4.9239	4.9080	0.32	0.324	**No**	**No**
2	12/5/2001	7	14	4.9301	4.9239	0.45	0.126	**No**	**No**
3	12/11/2001	6	20	4.9355	4.9301	0.56	0.110	**No**	**No**
4	12/18/2001	7	27	4.9393	4.9355	0.64	0.077	**No**	**No**
5	12/26/2001	8	35	4.9429	4.9393	0.71	0.073	**No**	**No**
6	1/2/2002	7	42	4.9464	4.9429	0.78	0.071	**No**	**No**
7	1/9/2002	7	49	4.9501	4.9464	0.86	0.075	**No**	**No**
8	1/16/2002	7	56	4.9519	4.9501	0.89	0.037	**Yes**	**No**
9	1/23/2002	7	63	4.9536	4.9519	0.93	0.035	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**A-171**	**Product Type:**	**FGF7781-07I**
Batch #:	**AF010363**	**Baseline Weight (W_B):**	**4.3948**
Test Type:	**25/50/25 Bolt Bearing**	**Conditioning Date:**	**11/21/01**
# of Plies:	**16**	**Removal Date:**	**01/23/02**
Traveler ID:	**A-171**		

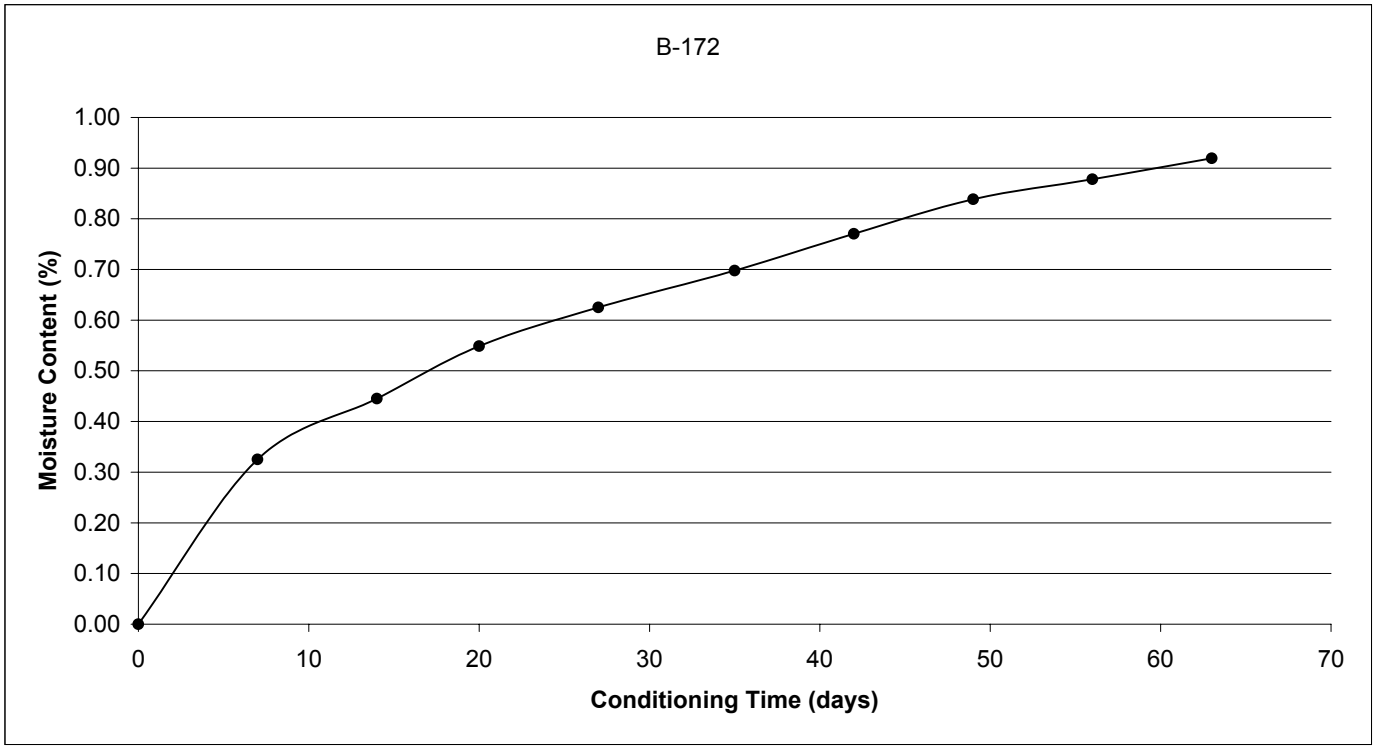
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	11/21/2001	Initial	0	4.3948	0.0000	0.00	0.000	-	-
1	11/28/2001	7	7	4.4085	4.3948	0.31	0.312	**No**	**No**
2	12/5/2001	7	14	4.4145	4.4085	0.45	0.137	**No**	**No**
3	12/11/2001	6	20	4.4191	4.4145	0.55	0.105	**No**	**No**
4	12/18/2001	7	27	4.4223	4.4191	0.63	0.073	**No**	**No**
5	12/26/2001	8	35	4.4256	4.4223	0.70	0.075	**No**	**No**
6	1/2/2002	7	42	4.4283	4.4256	0.76	0.061	**No**	**No**
7	1/9/2002	7	49	4.4320	4.4283	0.85	0.084	**No**	**No**
8	1/16/2002	7	56	4.4333	4.4320	0.88	0.030	**Yes**	**No**
9	1/23/2002	7	63	4.4350	4.4333	0.91	0.039	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**B-172**	**Product Type:**	**FGF7781-07I**
Batch #:	**AF010363**	**Baseline Weight (W_B):**	**4.8293**
Test Type:	**25/50/25 Bolt Bearing**	**Conditioning Date:**	**11/21/01**
# of Plies:	**16**	**Removal Date:**	**01/23/02**
Traveler ID:	**B-172**		

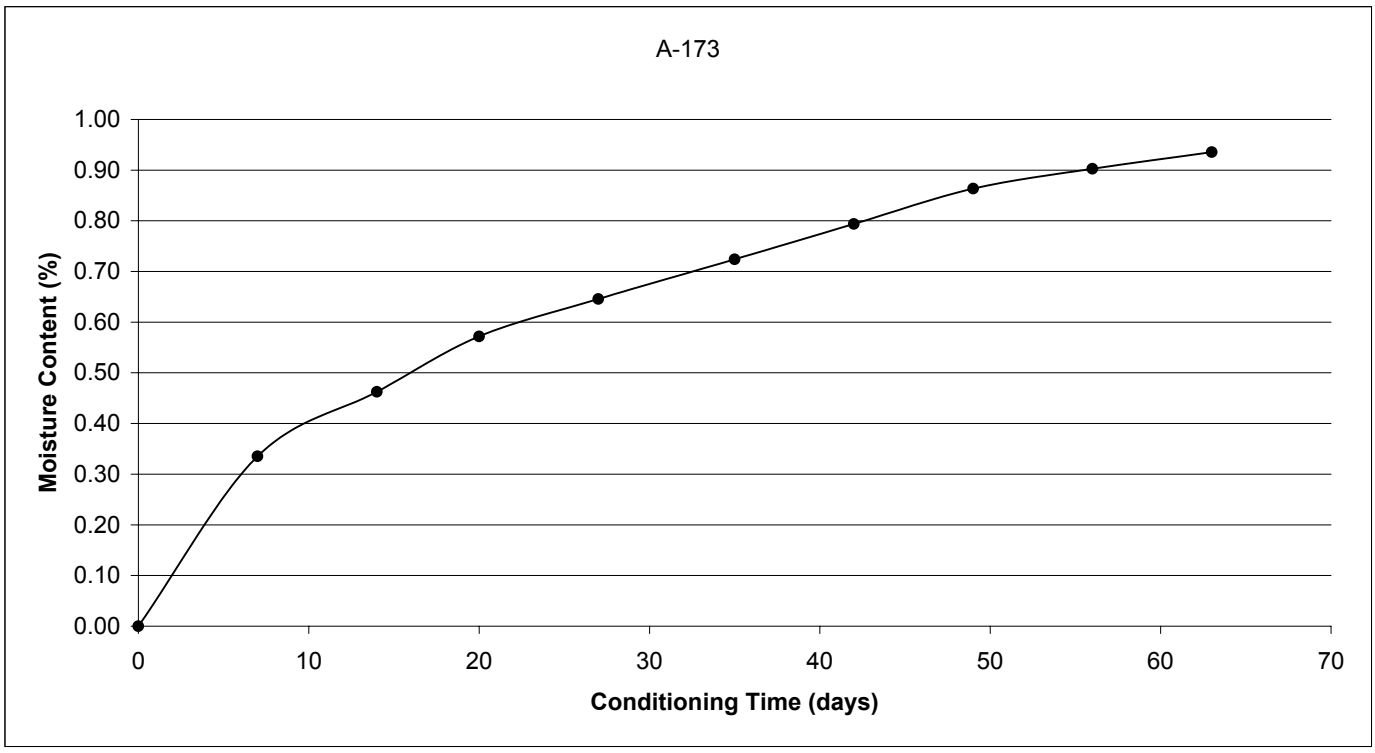
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	11/21/2001	Initial	0	4.8293	0.0000	0.00	0.000	-	-
1	11/28/2001	7	7	4.8450	4.8293	0.33	0.325	**No**	**No**
2	12/5/2001	7	14	4.8508	4.8450	0.45	0.120	**No**	**No**
3	12/11/2001	6	20	4.8558	4.8508	0.55	0.104	**No**	**No**
4	12/18/2001	7	27	4.8595	4.8558	0.63	0.077	**No**	**No**
5	12/26/2001	8	35	4.8630	4.8595	0.70	0.072	**No**	**No**
6	1/2/2002	7	42	4.8665	4.8630	0.77	0.072	**No**	**No**
7	1/9/2002	7	49	4.8698	4.8665	0.84	0.068	**No**	**No**
8	1/16/2002	7	56	4.8717	4.8698	0.88	0.039	**Yes**	**No**
9	1/23/2002	7	63	4.8737	4.8717	0.92	0.041	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**A-173**	**Product Type:**	**FGF7781-07I**
Batch #:	**AF010363**	**Baseline Weight (W_B):**	**4.8626**
Test Type:	**25/50/25 Bolt Bearing**	**Conditioning Date:**	**11/21/01**
# of Plies:	**16**	**Removal Date:**	**01/23/02**
Traveler ID:	**A-173**		

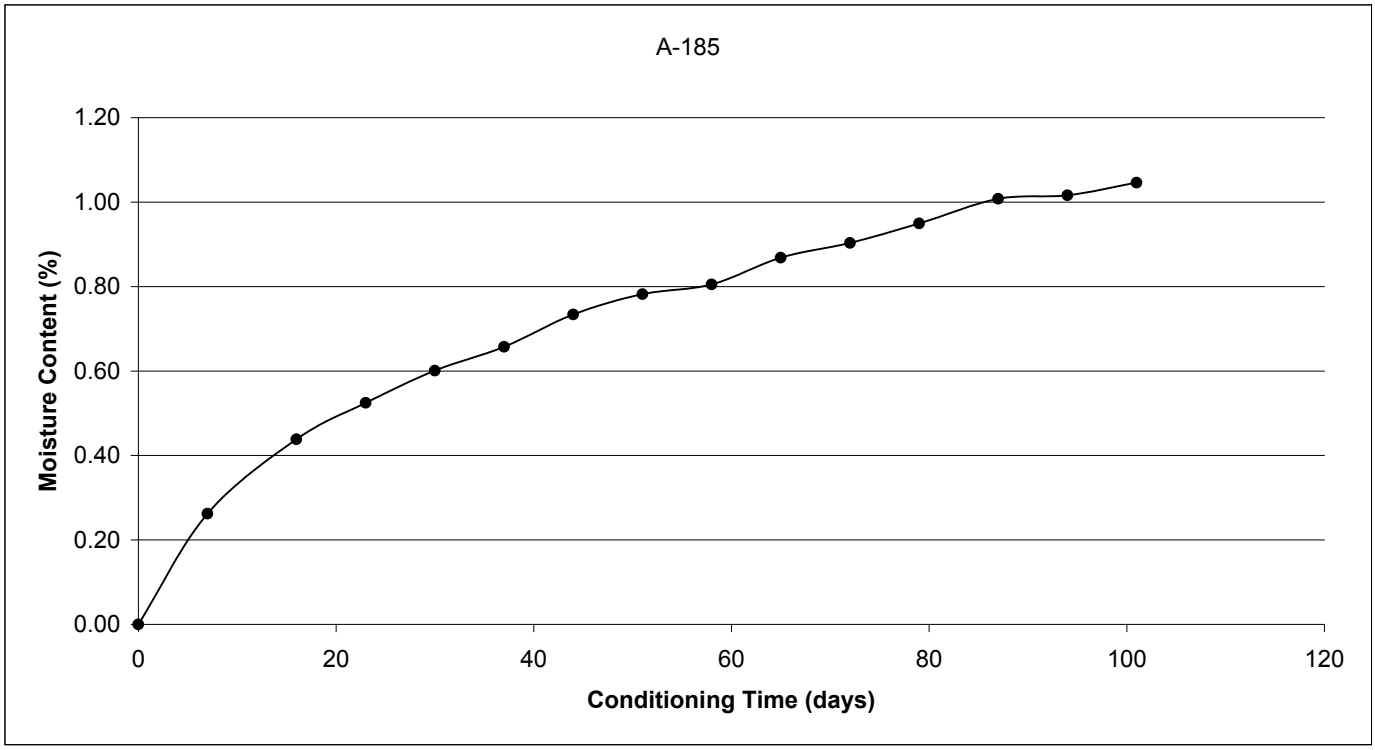
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	11/21/2001	Initial	0	4.8626	0.0000	0.00	0.000	-	-
1	11/28/2001	7	7	4.8789	4.8626	0.34	0.335	**No**	**No**
2	12/5/2001	7	14	4.8851	4.8789	0.46	0.128	**No**	**No**
3	12/11/2001	6	20	4.8904	4.8851	0.57	0.109	**No**	**No**
4	12/18/2001	7	27	4.8940	4.8904	0.65	0.074	**No**	**No**
5	12/26/2001	8	35	4.8978	4.8940	0.72	0.078	**No**	**No**
6	1/2/2002	7	42	4.9012	4.8978	0.79	0.070	**No**	**No**
7	1/9/2002	7	49	4.9046	4.9012	0.86	0.070	**No**	**No**
8	1/16/2002	7	56	4.9065	4.9046	0.90	0.039	**Yes**	**No**
9	1/23/2002	7	63	4.9081	4.9065	0.94	0.033	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**A-185**	**Product Type:**	**FGF7781-07I**
Batch #:	**AF010363**	**Baseline Weight (W_B):**	**6.0230**
Test Type:	**10/80/10 Laminate Ten/Com**	**Conditioning Date:**	**12/10/01**
# of Plies:	**20**	**Removal Date:**	**03/21/02**
Traveler ID:	**A-185**		

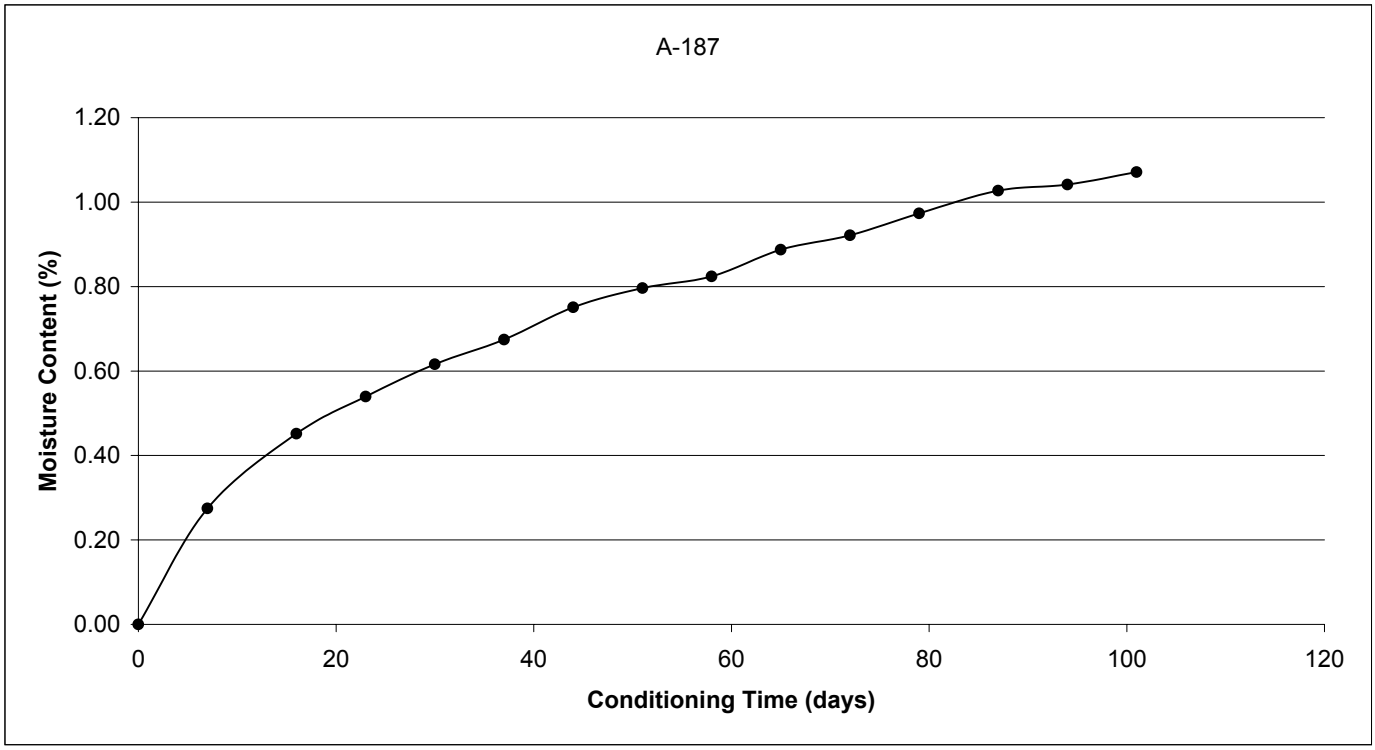
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	12/10/2001	Initial	0	6.0230	0.0000	0.00	0.000	-	-
1	12/17/2001	7	7	6.0388	6.0230	0.26	0.262	**No**	**No**
2	12/26/2001	9	16	6.0494	6.0388	0.44	0.176	**No**	**No**
3	1/2/2002	7	23	6.0546	6.0494	0.52	0.086	**No**	**No**
4	1/9/2002	7	30	6.0592	6.0546	0.60	0.076	**No**	**No**
5	1/16/2002	7	37	6.0626	6.0592	0.66	0.056	**No**	**No**
6	1/23/2002	7	44	6.0672	6.0626	0.73	0.076	**No**	**No**
7	1/30/2002	7	51	6.0701	6.0672	0.78	0.048	**Yes**	**No**
8	2/6/2002	7	58	6.0715	6.0701	0.81	0.023	**Yes**	**Yes**
9	2/13/2002	7	65	6.0753	6.0715	0.87	0.063	**No**	**No**
10	2/20/2002	7	72	6.0774	6.0753	0.90	0.035	**Yes**	**No**
11	2/27/2002	7	79	6.0802	6.0774	0.95	0.046	**Yes**	**Yes**
12	3/7/2002	8	87	6.0837	6.0802	1.01	0.058	**No**	**No**
13	3/14/2002	7	94	6.0842	6.0837	1.02	0.008	**Yes**	**No**
14	3/21/2002	7	101	6.0860	6.0842	1.05	0.030	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**A-187**	**Product Type:**	**FGF7781-07I**
Batch #:	**AF010363**	**Baseline Weight (W_B):**	**6.1531**
Test Type:	**10/80/10 Laminate Ten/Com**	**Conditioning Date:**	**12/10/01**
# of Plies:	**20**	**Removal Date:**	**03/21/02**
Traveler ID:	**A-187**		

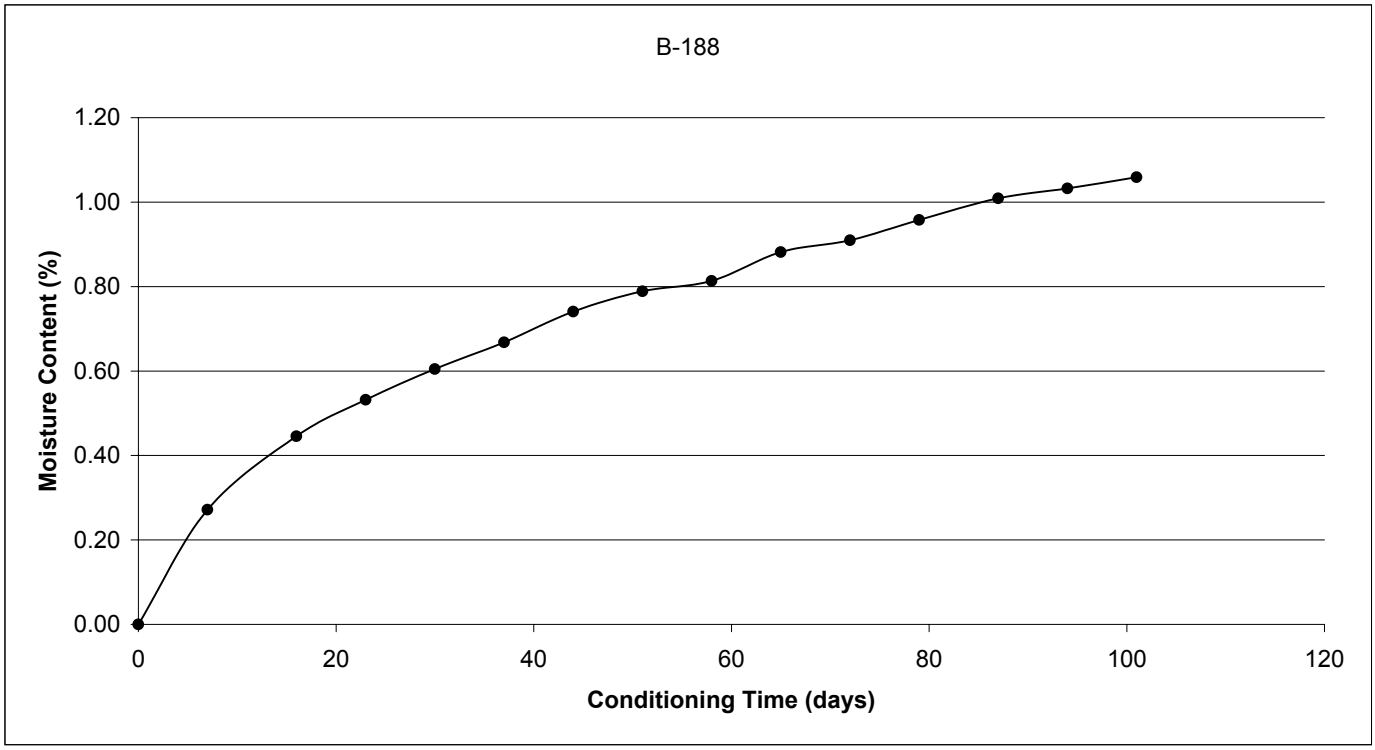
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	12/10/2001	Initial	0	6.1531	0.0000	0.00	0.000	-	-
1	12/17/2001	7	7	6.1700	6.1531	0.27	0.275	**No**	**No**
2	12/26/2001	9	16	6.1809	6.1700	0.45	0.177	**No**	**No**
3	1/2/2002	7	23	6.1863	6.1809	0.54	0.088	**No**	**No**
4	1/9/2002	7	30	6.1910	6.1863	0.62	0.076	**No**	**No**
5	1/16/2002	7	37	6.1946	6.1910	0.67	0.059	**No**	**No**
6	1/23/2002	7	44	6.1993	6.1946	0.75	0.076	**No**	**No**
7	1/30/2002	7	51	6.2021	6.1993	0.80	0.046	**Yes**	**No**
8	2/6/2002	7	58	6.2038	6.2021	0.82	0.028	**Yes**	**Yes**
9	2/13/2002	7	65	6.2077	6.2038	0.89	0.063	**No**	**No**
10	2/20/2002	7	72	6.2098	6.2077	0.92	0.034	**Yes**	**No**
11	2/27/2002	7	79	6.2130	6.2098	0.97	0.052	**No**	**No**
12	3/7/2002	8	87	6.2163	6.2130	1.03	0.054	**No**	**No**
13	3/14/2002	7	94	6.2172	6.2163	1.04	0.015	**Yes**	**No**
14	3/21/2002	7	101	6.2190	6.2172	1.07	0.029	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**B-188**	**Product Type:**	**FGF7781-07I**
Batch #:	**AF010363**	**Baseline Weight (W_B):**	**6.0345**
Test Type:	**10/80/10 Laminate Ten/Com**	**Conditioning Date:**	**12/10/01**
# of Plies:	**20**	**Removal Date:**	**03/21/02**
Traveler ID:	**B-188**		

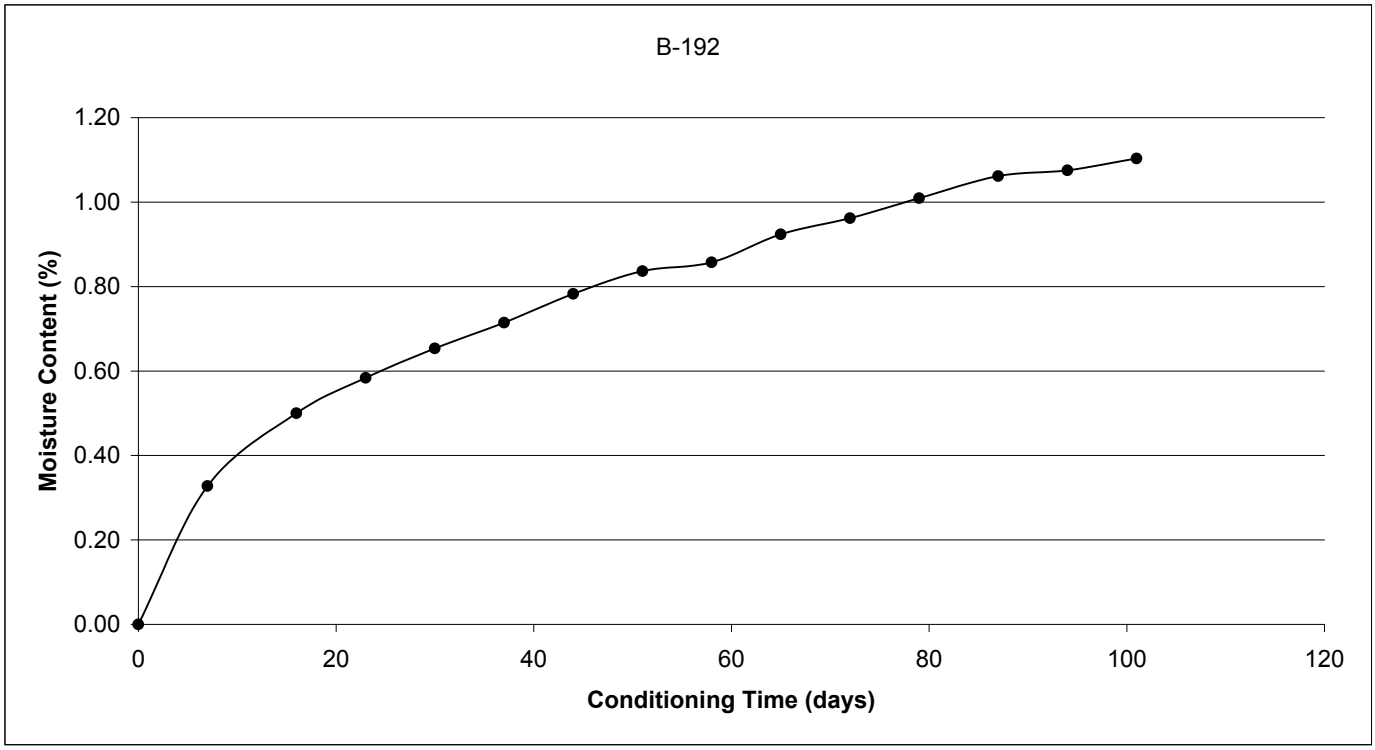
Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	12/10/2001	Initial	0	6.0345	0.0000	0.00	0.000	-	-
1	12/17/2001	7	7	6.0509	6.0345	0.27	0.272	**No**	**No**
2	12/26/2001	9	16	6.0614	6.0509	0.45	0.174	**No**	**No**
3	1/2/2002	7	23	6.0666	6.0614	0.53	0.086	**No**	**No**
4	1/9/2002	7	30	6.0710	6.0666	0.60	0.073	**No**	**No**
5	1/16/2002	7	37	6.0748	6.0710	0.67	0.063	**No**	**No**
6	1/23/2002	7	44	6.0792	6.0748	0.74	0.073	**No**	**No**
7	1/30/2002	7	51	6.0821	6.0792	0.79	0.048	**Yes**	**No**
8	2/6/2002	7	58	6.0836	6.0821	0.81	0.025	**Yes**	**Yes**
9	2/13/2002	7	65	6.0877	6.0836	0.88	0.068	**No**	**No**
10	2/20/2002	7	72	6.0894	6.0877	0.91	0.028	**Yes**	**No**
11	2/27/2002	7	79	6.0923	6.0894	0.96	0.048	**Yes**	**Yes**
12	3/7/2002	8	87	6.0954	6.0923	1.01	0.051	**No**	**No**
13	3/14/2002	7	94	6.0968	6.0954	1.03	0.023	**Yes**	**No**
14	3/21/2002	7	101	6.0984	6.0968	1.06	0.027	**Yes**	**Yes**



Laminate Moisture Conditioning

Panel ID:	**B-192**	**Product Type:**	**FGF7781-07I**
Batch #:	**AF010363**	**Baseline Weight (W_B):**	**5.7369**
Test Type:	**10/80/10 Laminate Ten/Com**	**Conditioning Date:**	**12/10/01**
# of Plies:	**20**	**Removal Date:**	**03/21/02**
Traveler ID:	**B-192**		

Weighing Schedule (Week)	Date (mm/dd/yy)	Δ Time Previous (days)	Total Δ Time (days)	Present Weight (W_i)	Previous Weight (W_{i-1})	Moisture Content (%)	Weight Gain (%)	≤0.05%	Ready to Test
0	12/10/2001	Initial	0	5.7369	0.0000	0.00	0.000	-	-
1	12/17/2001	7	7	5.7557	5.7369	0.33	0.328	**No**	**No**
2	12/26/2001	9	16	5.7656	5.7557	0.50	0.173	**No**	**No**
3	1/2/2002	7	23	5.7704	5.7656	0.58	0.084	**No**	**No**
4	1/9/2002	7	30	5.7744	5.7704	0.65	0.070	**No**	**No**
5	1/16/2002	7	37	5.7779	5.7744	0.71	0.061	**No**	**No**
6	1/23/2002	7	44	5.7818	5.7779	0.78	0.068	**No**	**No**
7	1/30/2002	7	51	5.7849	5.7818	0.84	0.054	**No**	**No**
8	2/6/2002	7	58	5.7861	5.7849	0.86	0.021	**Yes**	**No**
9	2/13/2002	7	65	5.7899	5.7861	0.92	0.066	**No**	**No**
10	2/20/2002	7	72	5.7921	5.7899	0.96	0.038	**Yes**	**No**
11	2/27/2002	7	79	5.7948	5.7921	1.01	0.047	**Yes**	**Yes**
12	3/7/2002	8	87	5.7978	5.7948	1.06	0.052	**No**	**No**
13	3/14/2002	7	94	5.7986	5.7978	1.08	0.014	**Yes**	**No**
14	3/21/2002	7	101	5.8002	5.7986	1.10	0.028	**Yes**	**Yes**



APPENDIX C. CURED LAMINATE PHYSICAL TEST RESULTS

C.1 Cured Laminate Physical Properties of P707AG-15

Test Panel #	Laminate Density (g/cc)	Fiber Volume [% (v)]	Resin Content [% (w)]	Void Content [% (v)]	Glass Transition Temperature °F	
					Dry*	Wet*
A-1	1.5434	55.69	35.41	1.17		
B-2	1.53	55.73	34.93	2.01		
A-3	1.5193	54.26	36.08	2.48		
B-4	1.5284	55.16	35.40	2.14		
A-5	1.5273	55.73	34.68	2.46		
B-6	1.5228	55.12	35.20	2.57		
A-7	1.5304	55.28	35.34	2.03		
B-8	1.5273	54.95	35.60	2.14		
A-9	1.5263	54.82	35.71	2.16		
B-10	1.5173	54.44	35.77	2.72		
A-11	1.5358	56.01	34.72	1.90		
B-12	1.5150	54.73	35.33	3.02		
A-13	1.5312	55.19	35.48	1.93		
B-14	1.5169	54.26	35.97	2.68		
A-15	1.5344	55.41	35.36	1.77		
B-16	1.5352	55.99	34.72	1.94		
A-17	1.5207	55.50	34.67	2.89		
B-18	1.5173	56.44	33.42	3.54		
B-24	1.5271	54.80	35.76	2.09		
A-25	1.5303	55.50	35.08	2.13		
B-26	1.5233	54.18	36.34	2.14	298	263
A-27	1.5251	54.32	36.24	2.05		
B-28	1.5349	54.84	36.05	1.49	300	260
A-29	1.5282	55.23	35.30	2.19		
B-30	1.5324	54.93	35.84	1.72	295	261
A-31	1.5224	55.10	35.22	2.58		
B-32	1.5255	54.64	35.89	2.15		
A-33	1.5230	54.37	36.09	2.24		
B-34	1.5234	54.5	35.97	2.26		
A-35	1.5228	54.61	35.8	2.36		
B-36	1.5296	54.95	35.69	1.95		
A-37	1.5218	54.09	36.38	2.22		
B-38	1.5101	54.04	35.94	3.12		
A-39	1.5292	55.46	35.08	2.20		
B-40	1.5262	55.06	35.43	2.27		
A-41	1.5309	55.87	34.68	2.23		
B-42	1.5170	54.70	35.45	2.85		
A-43	1.5229	55.16	35.17	2.57		
A-49	1.5365	54.99	35.94	1.43		
B-50	1.5353	55.62	35.15	1.79		
A-51	1.5405	55.52	35.49	1.33		
B-52	1.5403	56.21	34.67	1.63		
A-53	1.5265	55.50	34.92	2.43		
B-54	1.5317	55.54	35.10	2.03		
A-55	1.5289	54.63	36.04	1.88		
B-56	1.5252	54.90	35.56	2.28		
A-57	1.5259	54.49	36.08	2.06		
A-59	1.5464	57.57	33.36	1.71		
B-60	1.5250	54.91	35.55	2.31		
A-61	1.5203	55.83	34.27	3.06		
B-62	1.5406	56.13	34.78	1.57		
B-202	1.5263	55.73	34.65	2.53		
A-203	1.5318	56.44	34.05	2.40		
B-204	1.5219	53.86	36.65	2.11		
A-205	1.5173	53.27	37.16	2.24		
B-206	1.5347	55.97	34.72	1.98		
A-207	1.5285	55.16	35.40	2.13		
Average	**1.5276**	**55.15**	**35.38**	**2.20**	**298**	**261**
Std. Dev.	**0.0074**	**0.75**	**0.71**	**0.45**	**2.52**	**1.53**
COV, %	**0.4855**	**1.36**	**2.01**	**20.50**	**0.85**	**0.58**
Minimum	**1.5101**	**53.27**	**33.36**	**1.17**	**295**	**260**
Maximum	**1.5464**	**57.57**	**37.16**	**3.54**	**300**	**263**

* --- Three specimens per batch

C.2. Cured Laminate Physical Properties of F6273C-07M

Test Panel #	Laminate Density (g/cc)	Fiber Volume [% (v)]	Resin Content [% (w)]	Void Content [% (v)]	Glass Transition Temperature °F	
					Dry*	Wet*
B-68	1.5018	49.08	41.51	1.72		
A-69	1.4942	49.11	41.17	2.34		
B-70	1.493	48.7	41.61	2.26		
A-71	1.4958	48.82	41.58	2.09		
B-72	1.4898	47.81	42.56	2.15		
A-73	1.5127	49.29	41.67	0.96		
B-74	1.504	49.47	41.12	1.72		
A-75	1.5049	49.05	41.66	1.47		
B-76	1.5059	49.86	40.74	1.73		
A-77	1.5133	49.77	41.13	1.10		
B-78	1.5066	49.06	41.72	1.34		
A-79	1.5036	48.96	41.71	1.54		
B-80	1.5017	49.47	41.03	1.90		
A-81	1.4963	48.68	41.77	2.00		
B-82	1.5016	48.67	41.98	1.58		
A-83	1.5074	49.88	40.77	1.62		
B-84	1.5037	48.7	42.03	1.42		
A-85	1.5214	49.27	42.03	0.26		
A-89	1.5068	49.86	40.77	1.66		
B-90	1.5027	49.19	41.41	1.70		
A-91	1.5075	48.78	42.08	1.15		
B-92	1.5048	49.66	40.93	1.73		
A-93	1.509	49.20	41.64	1.21		
B-94	1.5066	49.20	41.55	1.40		
A-95	1.5063	49.22	41.52	1.43		
B-96	1.5109	49.31	41.59	1.10		
A-97	1.5023	48.80	41.86	1.57	283	270
B-98	1.5019	50.31	40.04	2.23		
A-99	1.5029	48.98	41.66	1.60	283	270
B-100	1.5047	48.63	42.14	1.32		
A-101	1.5037	50.21	40.22	2.05	282	271
B-102	1.505	50.60	39.81	2.11		
A-103	1.4947	49.13	41.16	2.31		
B-104	1.4982	49.30	41.10	2.11		
A-105	1.4994	49.04	41.46	1.90		
B-106	1.5062	49.99	40.59	1.75		
A-107	1.4988	49.14	41.32	1.99		
B-108	1.5106	49.46	41.40	1.19		
A-109	1.4985	49.29	41.12	2.07		
B-110	1.5062	49.73	40.90	1.65		
B-114	1.4902	49.05	41.08	2.63		
A-115	1.5043	50.21	40.25	2.00		
B-116	1.5106	49.30	41.59	1.12		
A-117	1.5101	49.93	40.82	1.42		
B-118	1.5087	49.80	40.91	1.48		
A-119	1.5127	49.44	41.49	1.02		
B-120	1.5173	49.88	41.16	0.83		
A-121	1.5201	50.93	40.03	1.04		
B-122	1.5164	50.18	40.77	1.03		
A-123	1.5270	50.65	40.62	0.39		
B-124	1.5124	49.43	41.50	1.04		
A-125	1.5136	49.69	41.24	1.05		
B-126	1.5073	49.42	41.31	1.44		
A-127	1.5155	50.75	40.06	1.33		
B-128	1.5068	49.30	41.43	1.43		
A-129	1.5049	49.84	40.72	1.79		
A-133	1.5017	48.60	42.07	1.54		
B-134	1.5028	49.68	40.83	1.89		
A-210	1.5074	48.73	42.13	1.14		
B-211	1.5022	47.63	43.24	1.10		
A-212	1.5097	50.07	40.63	1.52		
B-213	1.5057	48.87	41.9	1.34		
A-214	1.5071	48.84	41.99	1.21		
B-215	1.5085	49.81	40.89	1.50		
Average	**1.5058**	**49.39**	**41.29**	**1.54**	**283**	**270**
Std. Dev.	**0.0070**	**0.63**	**0.64**	**0.46**	**0.58**	**0.58**
COV, %	**0.4666**	**1.28**	**1.55**	**29.84**	**0.20**	**0.21**
Minimum	**1.4898**	**47.63**	**39.81**	**0.26**	**282**	**270**
Maximum	**1.5270**	**50.93**	**43.24**	**2.63**	**283**	**271**

* --- Three specimens per batch

C.3 Cured Laminate Physical Properties of FGF7781-07I

Test Panel #	Laminate Density (g/cc)	Fiber Volume [% (v)]	Resin Content [% (v)]	Void Content [% (v)]	Glass Transition Temperature °F	
					Dry*	Wet*
A-135	1.813	44.6	53.0	2.42		
B-136	1.824	45.6	51.8	2.61		
A-137	1.830	45.8	51.9	2.29		
B-138	1.819	45.1	52.5	2.47		
A-139	1.830	46.0	51.4	2.52		
B-140	1.813	44.9	52.3	2.76		
A-141	1.814	44.6	53.0	2.38		
B-142	1.834	45.9	51.9	2.15		
A-143	1.800	44.5	52.1	3.40		
B-144	1.793	44.1	52.4	3.50		
A-145	1.821	45.2	52.4	2.41		
B-146	1.795	44.3	52.1	3.56		
A-147	1.808	44.5	52.8	2.72		
B-148	1.807	44.6	52.5	2.88		
A-149	1.816	45.4	51.7	2.96		
B-150	1.807	44.9	51.9	3.22		
A-151	1.816	45.5	51.4	3.11		
B-152	1.821	45.6	51.5	2.86		
A-155	1.813	45.2	51.7	3.11		
B-156	1.814	45.3	51.6	3.06		
B-158	1.806	44.6	52.4	3.01		
A-159	1.809	44.3	53.3	2.45		
B-160	1.809	44.7	52.5	2.80		
A-161	1.815	45.0	52.3	2.68		
B-162	1.811	44.7	52.6	2.69		
A-163	1.812	44.6	52.9	2.51		
B-164	1.815	45.3	51.8	2.95		
A-165	1.807	45	51.6	3.33	285	270
B-166	1.800	44.2	52.9	2.98		
A-167	1.826	46.3	50.6	3.13	288	270
B-168	1.824	45.2	52.6	2.22		
A-179	1.804	44.3	53.0	2.76	287	270
B-170	1.814	44.4	53.4	2.16		
A-171	1.805	44.7	52.1	3.18		
B-172	1.816	44.8	52.8	2.41		
A-173	1.807	44.3	53.1	2.59		
B-174	1.817	44.9	52.7	2.41		
A-175	1.799	44.1	52.9	3.00		
B-176	1.803	43.8	53.8	2.41		
A-177	1.820	45.2	52.4	2.46		
B-180	1.820	45.2	52.3	2.50		
A-181	1.833	46.1	51.4	2.44		
B-182	1.818	44.9	52.8	2.34		
A-183	1.806	44.5	52.7	2.81		
B-184	1.791	43.4	53.6	2.97		
A-185	1.815	44.8	52.6	2.52		
B-186	1.804	44.2	53.1	2.73		
A-187	1.803	44.1	53.1	2.74		
B-188	1.807	44.4	52.8	2.77		
A-189	1.803	43.8	53.9	2.36		
B-190	1.819	44.8	53.1	2.17		
A-191	1.800	44.0	53.3	2.78		
B-192	1.810	44.1	53.6	2.23		
A-193	1.806	45.1	51.4	3.51		
B-194	1.807	44.6	52.6	2.84		
A-195	1.807	44.9	51.9	3.22		
B-196	1.815	44.9	52.6	2.57		
A-199	1.813	44.7	52.8	2.51		
B-200	1.800	44.2	52.7	3.07		
B-208	1.808	44.1	53.6	2.30		
A-209	1.810	44.2	53.6	2.24		
Average	**1.812**	**44.8**	**52.5**	**2.72**	**287**	**270**
Std. Dev.	**0.009**	**0.60**	**0.70**	**0.37**	**1.53**	**0.00**
COV, %	**0.513**	**1.34**	**1.33**	**13.5**	**0.53**	**0.00**
Minimum	**1.791**	**43.4**	**50.6**	**2.15**	**285**	**270**
Maximum	**1.834**	**46.3**	**53.9**	**3.56**	**288**	**270**

* --- Three specimens per batch

APPENDIX D. MECHANICAL RAW TEST RESULTS

D.1. Mechanical Raw Test Results of P707AG-15

Laminate No Hole Tension Properties, 75 °F (Dry)

Material Type: **P707AG-15**
Batch Number: AB991035
Test Method: ASTM D5766-95 (modified); SACMA SRM 5-94 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **50/40/10**
Ply Stacking Sequence: **$(45/0/-45/90/0/0/45/0/-45/0)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 4/10/01
Test Operator: John Smith
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: C-960401-A
Fiber Volume (average): 55.1%
Nominal Fastener Diameter N/A
Nominal Panel Thickness: 0.1200 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: N/A
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	*Specimen Thickness* (in.)	*Specimen Width* (in.)	*Ultimate Tensile Load* (lbs.)	*Ultimate Tensile Strength* Actual (ksi)	*Ultimate Tensile Strength* Nominal (ksi)	*Tensile Modulus (0.1-0.3% strain)* Actual (msi)	*Tensile Modulus (0.1-0.3% strain)* Nominal (msi)	*Failure Mode* (per Table I Three-Place Failure Mode Codes of ASTM D5766-95)
A-1-1	0.11955	1.50017	26750	149	149	10.8	10.7	Explosive failure in gage area
B-2-1	0.11857	1.50027	30319	170	168	10.8	10.6	Explosive failure in gage area
B-2-2	0.11958	1.50033	27700	154	154	11.0	10.9	Explosive failure in gage area
Average	0.11923	1.50026	28256	158	157	10.8	10.8	
Std. Dev.	0.00057	0.00008	1848.5	11.1	10.3	0.11	0.14	
COV, %	0.48	0.01	6.54	7.02	6.54	0.99	1.32	

Material Type: **P707AG-15**
Batch Number: AB991035
Test Method: ASTM D5766-95 (modified); SACMA SRM 5-94 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[(45/0/-45/90)_3]_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 4/10/01
Test Operator: John Smith
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: C-960401-A
Fiber Volume (average): 55.2%
Nominal Fastener Diameter N/A
Nominal Panel Thickness: 0.1440 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: N/A
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	*Specimen Thickness* (in.)	*Specimen Width* (in.)	*Ultimate Tensile Load* (lbs.)	*Ultimate Tensile Strength* Actual (ksi)	*Ultimate Tensile Strength* Nominal (ksi)	*Tensile Modulus (0.1-0.3% strain)* Actual (msi)	*Tensile Modulus (0.1-0.3% strain)* Nominal (msi)	*Failure Mode* (per Table I Three-Place Failure Mode Codes of ASTM D5766-95)
A-25-1	0.13982	1.50077	20545	97.9	95.1	7.15	6.95	Center portion of gauge area
A-25-2	0.14165	1.50097	21816	103	101	7.01	6.90	Center portion of gauge area
B-24-1	0.14335	1.50057	21254	98.8	98.4	6.93	6.90	Gauge area, explosive
Average	0.14161	1.50077	21205	100	98.2	7.03	6.92	
Std. Dev.	0.00177	0.00020	636.9	2.49	2.95	0.11	0.03	
COV, %	1.25	0.01	3.00	2.50	3.00	1.58	0.38	

Material Type: **P707AG-15**
Batch Number: AB991035
Test Method: ASTM D5766-95 (modified); SACMA SRM 5-94 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **10/80/10**
Ply Stacking Sequence: **$(45/-45/90/45/-45/45/-45/0/45/-45)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 4/10/01
Test Operator: John Smith
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: C-960401-A
Fiber Volume (average): 55.1%
Nominal Fastener Diameter N/A
Nominal Panel Thickness: 0.1200 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: N/A
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	*Specimen Thickness* (in.)	*Specimen Width* (in.)	*Ultimate Tensile Load* (lbs.)	*Ultimate Tensile Strength* Actual (ksi)	*Ultimate Tensile Strength* Nominal (ksi)	*Tensile Modulus (0.1-0.3% strain)* Actual (msi)	*Tensile Modulus (0.1-0.3% strain)* Nominal (msi)	*Failure Mode* (per Table I Three-Place Failure Mode Codes of ASTM D5766-95)
A-49-1	0.11878	1.50102	9251.5	51.9	51.4	4.46	4.42	Failure in gage area
B-50-1	0.11865	1.50032	9229.9	51.8	51.3	4.48	4.43	Failure in gage area
B-50-2	0.11855	1.50017	10416	58.6	57.9	4.48	4.43	Failure in gage area
Average	0.11866	1.50050	9632.3	54.1	53.5	4.47	4.42	
Std. Dev.	0.00012	0.00045	678.41	3.87	3.77	0.01	0.01	
COV, %	0.10	0.03	7.04	7.15	7.04	0.26	0.15	

Laminate Filled Hole Tension Properties, -65 °F (Dry)

Material Type: **P707AG-15**
Batch Number: AB991035
Test Method: ASTM D5766-95 (modified); SACMA SRM 5-94 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: -65 °F (Dry)
Ply Layup, [%, 0/45/90]: **50/40/10**
Ply Stacking Sequence: **$(45/0/-45/90/0/0/45/0/-45/0)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 4/24/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 55.7%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1200 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: Pin=NAS1134V3A; Collar=MS21042L4

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Hole Diameter (in.)	Ultimate Tensile Load (lbs.)	Ultimate Tensile Strength Actual (ksi)	Ultimate Tensile Strength Nominal (ksi)	Failure Mode (per Table I Three-Place Failure Mode Code of ASTM D5766-95)
A-1-7	0.11772	1.50055	0.25130	11408	64.6	63.4	Lateral-Gage-Middle
A-1-8	0.11895	1.50068	0.25140	10693	59.9	59.4	Lateral-Gage-Middle
B-2-7	0.11725	1.50063	0.25160	11293	64.2	62.7	Lateral-Gage-Middle
B-2-8	0.11622	1.50052	0.25160	10535	60.4	58.5	Lateral-Gage-Middle
A-3-1	0.11890	1.50052	0.25080	10322	57.9	57.3	Lateral-Gage-Middle
Average	0.11781	1.50058	0.25134	10850	61.4	60.3	
Std. Dev.	0.00116	0.00007	0.00033	477	2.90	2.65	
COV, %	0.98	0.00	0.13	4.40	4.72	4.40	

Material Type: **P707AG-15**
Batch Number: AB991035
Test Method: ASTM D5766-95 (modified); SACMA SRM 5-94 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: -65 °F (Dry)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[(45/0/-45/90)_3]_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 4/24/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 55.0%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1440 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: Pin=NAS1134V3A; Collar=MS21042L4

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Hole Diameter (in.)	Ultimate Tensile Load (lbs.)	Ultimate Tensile Strength Actual (ksi)	Ultimate Tensile Strength Nominal (ksi)	Failure Mode (per Table I Three-Place Failure Mode Code of ASTM D5766-95)
B-24-7	0.14097	1.50027	0.25180	9771.5	46.2	45.2	Lateral-Gage-Middle
B-24-8	0.14165	1.50035	0.25130	9829.6	46.3	45.5	Lateral-Gage-Middle
A-25-7	0.14165	1.50077	0.25050	9381.7	44.1	43.4	Lateral-Gage-Middle
A-25-8	0.14085	1.50088	0.25060	9918.5	46.9	45.9	Lateral-Gage-Middle
B-26-5	0.14277	1.50050	0.25080	9724.5	45.4	45.0	Lateral-Gage-Middle
Average	0.14158	1.50055	0.25100	9725.2	45.8	45.0	
Std. Dev.	0.00076	0.00026	0.00054	205.18	1.07	0.95	
COV, %	0.54	0.02	0.22	2.11	2.33	2.11	

Material Type: **P707AG-15**
Batch Number: AB991035
Test Method: ASTM D5766-95 (modified); SACMA SRM 5-94 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: -65 °F (Dry)
Ply Layup, [%, 0/45/90]: **10/80/10**
Ply Stacking Sequence: **$(45/-45/90/45/-45/45/-45/0/45/-45)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 4/10/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 55.3%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1200 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: Pin=NAS1134V3A; Collar=MS21042L4

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Hole Diameter (in.)	Ultimate Tensile Load (lbs.)	Ultimate Tensile Strength Actual (ksi)	Ultimate Tensile Strength Nominal (ksi)	Failure Mode (per Table I Three-Place Failure Mode Code of ASTM D5766-95)
A-49-7	0.11732	1.50058	0.25100	7781.0	44.2	43.2	Lateral-Gage-Middle
A-49-8	0.11788	1.50082	0.25080	7981.3	45.1	44.3	Angled-Gage-Middle
B-50-7	0.11650	1.50063	0.25080	8306.5	47.5	46.1	Lateral-Gage-Middle
B-50-8	0.11788	1.49998	0.25060	8237.8	46.6	45.8	Angled-Gage-Middle
A-51-7	0.11647	1.50055	0.25080	7965.9	45.6	44.3	Lateral-Gage-Middle
Average	0.11721	1.50051	0.25080	8054.5	45.8	44.7	
Std. Dev.	0.00070	0.00032	0.00014	215.12	1.29	1.20	
COV, %	0.60	0.02	0.06	2.67	2.81	2.67	

Laminate Filled Hole Tension Properties, 75 °F (Dry)

Material Type: **P707AG-15**
Batch Number: AB991035
Test Method: ASTM D5766-95 (modified); SACMA SRM 5-94 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **50/40/10**
Ply Stacking Sequence: **$(45/0/-45/90/0/0/45/0/-45/0)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 4/24/01
Test Operator: John Smith
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 54.7%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1200 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: Pin=NAS1134V3A; Collar=MS21042L4

Specimen Number	*Specimen Thickness (in.)*	*Specimen Width (in.)*	*Hole Diameter (in.)*	*Ultimate Tensile Load (lbs.)*	*Ultimate Tensile Strength Actual (ksi)*	*Ultimate Tensile Strength Nominal (ksi)*	*Failure Mode (per Table I Three-Place Failure Mode Code of ASTM D5766-95)*
A-3-7	0.11813	1.50027	0.25070	13433	75.8	74.6	Lateral-Gage-Middle
A-3-8	0.11803	1.50075	0.25080	11952	67.5	66.4	Lateral-Gage-Middle
B-4-2	0.11973	1.50042	0.25100	12961	72.1	72.0	Lateral-Gage-Middle
B-4-3	0.11903	1.50062	0.25120	12650	70.8	70.3	Lateral-Gage-Middle
B-4-4	0.11843	1.50003	0.25110	13041	73.4	72.4	Lateral-Gage-Middle
Average	0.11867	1.50042	0.25096	12807	71.9	71.2	
Std. Dev.	0.00071	0.00028	0.00021	554	3.09	3.08	
COV, %	0.60	0.02	0.08	4.32	4.30	4.32	

Material Type: **P707AG-15**
Batch Number: AB991035
Test Method: ASTM D5766-95 (modified); SACMA SRM 5-94 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[(45/0/-45/90)_3]_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 4/26/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 54.2%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1440 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: Pin=NAS1134V3A; Collar=MS21042L4

Specimen Number	*Specimen Thickness (in.)*	*Specimen Width (in.)*	*Hole Diameter (in.)*	*Ultimate Tensile Load (lbs.)*	*Ultimate Tensile Strength Actual (ksi)*	*Ultimate Tensile Strength Nominal (ksi)*	*Failure Mode (per Table I Three-Place Failure Mode Code of ASTM D5766-95)*
B-26-7	0.14130	1.50042	0.25080	10786	50.9	49.9	Lateral-Gage-Middle
B-26-8	0.14152	1.50058	0.25050	11570	54.5	53.6	Lateral-Gage-Middle
A-27-5	0.14305	1.50050	0.25080	11269	52.5	52.2	Lateral-Gage-Middle
A-27-6	0.14267	1.50088	0.25060	10539	49.2	48.8	Lateral-Gage-Middle
A-27-7	0.14092	1.50030	0.25080	11293	53.4	52.3	Lateral-Gage-Middle
Average	0.14189	1.50054	0.25070	11091	52.1	51.3	
Std. Dev.	0.00092	0.00022	0.00014	418.27	2.08	1.94	
COV, %	0.65	0.01	0.06	3.77	4.00	3.77	

Material Type: **P707AG-15**
Batch Number: AB991035
Test Method: ASTM D5766-95 (modified); SACMA SRM 5-94 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **10/80/10**
Ply Stacking Sequence: **$(45/-45/90/45/-45/45/-45/0/45/-45)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 4/26/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 55.9%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1200 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: Pin=NAS1134V3A; Collar=MS21042L4

Specimen Number	*Specimen Thickness (in.)*	*Specimen Width (in.)*	*Hole Diameter (in.)*	*Ultimate Tensile Load (lbs.)*	*Ultimate Tensile Strength Actual (ksi)*	*Ultimate Tensile Strength Nominal (ksi)*	*Failure Mode (per Table I Three-Place Failure Mode Code of ASTM D5766-95)*
A-51-5	0.11910	1.50040	0.25080	7730.9	43.3	42.9	Lateral-Gage-Middle
A-51-6	0.11682	1.50070	0.25080	7742.5	44.2	43.0	Lateral-Gage-Middle
B-52-5	0.11897	1.50022	0.25100	7827.0	43.9	43.5	Lateral-Gage-Middle
B-52-6	0.11828	1.50050	0.25090	8081.4	45.5	44.9	Lateral-Gage-Middle
B-52-7	0.11710	1.50065	0.25070	7685.0	43.7	42.7	Angled-Gage-Middle
Average	0.11805	1.50049	0.25084	7813.4	44.1	43.4	
Std. Dev.	0.00105	0.00019	0.00011	158.37	0.86	0.88	
COV, %	0.89	0.01	0.05	2.03	1.95	2.03	

Laminate Open Hole Tension Properties, -65 °F (Dry)

Material Type: **P707AG-15**
Batch Number: AB991035
Test Method: ASTM D5766-95; SACMA SRM 5-94
Specimen Preconditioning: As Fabricated
Test Condition: -65 °F (Dry)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[(45/0/-45/90)_3]_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 4/25/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 55.0%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1440 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	*Specimen Thickness (in.)*	*Specimen Width (in.)*	*Hole Diameter (in.)*	*Ultimate Tensile Load (lbs.)*	*Ultimate Tensile Strength*		*Failure Mode (per Table I Three-Place Failure Mode Code of ASTM D5766-95)*
					Actual (ksi)	*Nominal (ksi)*	
B-28-7	0.14027	1.50042	0.25050	8726.6	41.5	40.4	Lateral-Gage-Middle
B-28-8	0.14112	1.50022	0.25070	9424.8	44.5	43.6	Lateral-Gage-Middle
A-29-6	0.14287	1.50077	0.25080	9129.5	42.6	42.3	Lateral-Gage-Middle
A-29-7	0.14210	1.50050	0.25130	9013.5	42.3	41.7	Lateral-Gage-Middle
A-29-9	0.14145	1.50025	0.25080	9298.4	43.8	43.0	Lateral-Gage-Middle
Average	0.14156	1.50043	0.25082	9118.6	42.9	42.2	
Std. Dev.	0.00098	0.00022	0.00029	269.68	1.23	1.25	
COV, %	0.70	0.01	0.12	2.96	2.86	2.96	

Material Type: **P707AG-15**
Batch Number: AB991035
Test Method: ASTM D5766-95; SACMA SRM 5-94
Specimen Preconditioning: As Fabricated
Test Condition: -65 °F (Dry)
Ply Layup, [%, 0/45/90]: **10/80/10**
Ply Stacking Sequence: **$(45/-45/90/45/-45/45/-45/0/45/-45)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 4/25/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 55.5%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1200 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	*Specimen Thickness (in.)*	*Specimen Width (in.)*	*Hole Diameter (in.)*	*Ultimate Tensile Load (lbs.)*	*Ultimate Tensile Strength*		*Failure Mode (per Table I Three-Place Failure Mode Code of ASTM D5766-95)*
					Actual (ksi)	*Nominal (ksi)*	
A-53-7	0.11775	1.50093	0.25050	7013.0	39.7	39.0	Angled-Gage-Middle
A-53-8	0.11775	1.50037	0.25070	7066.6	40.0	39.3	Angled-Gage-Middle
B-54-6	0.12153	1.50048	0.25070	7167.2	39.3	39.8	Angled-Gage-Middle
B-54-7	0.11823	1.50075	0.25100	7194.2	40.5	40.0	Angled-Gage-Middle
B-54-8	0.11778	1.50010	0.25090	7037.8	39.8	39.1	Angled-Gage-Middle
Average	0.11861	1.50053	0.25076	7095.8	39.9	39.4	
Std. Dev.	0.00165	0.00032	0.00019	80.394	0.46	0.45	
COV, %	1.39	0.02	0.08	1.13	1.14	1.13	

Laminate Open Hole Tension Properties, 75 °F (Dry)

Material Type: **P707AG-15**
Batch Number: AB991035
Test Method: ASTM D5766-95; SACMA SRM 5-94
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[(45/0/-45/90)_3]_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 4/10/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 55.0%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1440 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	*Specimen Thickness (in.)*	*Specimen Width (in.)*	*Hole Diameter (in.)*	*Ultimate Tensile Load (lbs.)*	*Ultimate Tensile Strength*		*Failure Mode (per Table I Three-Place Failure Mode Code of ASTM D5766-95)*
					Actual (ksi)	*Nominal (ksi)*	
B-30-1	0.14315	1.50047	0.25090	10633	49.5	49.2	Lateral-Gage-Middle
B-30-2	0.14353	1.49982	0.25070	11972	55.6	55.4	Lateral-Gage-Middle
B-30-3	0.14360	1.50040	0.25090	10567	49.0	48.9	Lateral-Gage-Middle
A-31-1	0.14305	1.50100	0.25000	10337	48.1	47.9	Lateral-Gage-Middle
A-31-2	0.14348	1.50113	0.25010	11022	51.2	51.0	Lateral-Gage-Middle
Average	0.14336	1.50056	0.25052	10906	50.7	50.5	
Std. Dev.	0.00025	0.00052	0.00044	644.79	2.96	2.99	
COV, %	0.17	0.03	0.17	5.91	5.84	5.91	

Material Type: **P707AG-15**
Batch Number: AB991035
Test Method: ASTM D5766-95; SACMA SRM 5-94
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **10/80/10**
Ply Stacking Sequence: **$(45/-45/90/45/-45/45/-45/0/45/-45)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 4/10/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 54.8%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1200 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	*Specimen Thickness (in.)*	*Specimen Width (in.)*	*Hole Diameter (in.)*	*Ultimate Tensile Load (lbs.)*	*Ultimate Tensile Strength*		*Failure Mode (per Table I Three-Place Failure Mode Code of ASTM D5766-95)*
					Actual (ksi)	*Nominal (ksi)*	
A-55-1	0.11908	1.50052	0.25100	7085.2	39.7	39.4	Lateral-Gage-Middle
A-55-2	0.12033	1.50057	0.25100	6834.8	37.9	38.0	Angled-Gage-Middle
A-55-3	0.12082	1.50550	0.25090	7005.7	38.5	38.9	Angled-Gage-Middle
B-56-1	0.11940	1.50010	0.25130	6743.7	37.7	37.5	Lateral-Gage-Middle
B-56-2	0.12055	1.49948	0.25110	6874.3	38.0	38.2	Lateral-Gage-Middle
Average	0.12004	1.50123	0.25106	6908.7	38.3	38.4	
Std. Dev.	0.00076	0.00242	0.00015	136.41	0.80	0.76	
COV, %	0.63	0.16	0.06	1.97	2.09	1.97	

Laminate Open Hole Tension Properties, 180 °F (Wet)

Material Type: **P707AG-15**
Batch Number: AB991035
Test Method: ASTM D5766-95; SACMA SRM 5-94
Specimen Preconditioning: per Section 3.2 of DOT/FAA/AR-00/47 (2000 Draft Report)
Test Condition: 180 °F (Wet)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[(45/0/-45/90)_3]_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 8/8/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 54.5%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1440 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	*Specimen Thickness (in.)*	*Specimen Width (in.)*	*Hole Diameter (in.)*	*Ultimate Tensile Load (lbs.)*	*Ultimate Tensile Strength*		*Failure Mode (per Table I Three-Place Failure Mode Code of ASTM D5766-95)*
					Actual (ksi)	*Nominal (ksi)*	
B-32-5	0.14348	1.50065	0.25100	13709	63.7	63.5	Lateral-Gage-Middle
B-32-6	0.14227	1.50048	0.25010	13569	63.6	62.8	Lateral-Gage-Middle
A-33-5	0.14405	1.50063	0.25000	14046	65.0	65.0	Lateral-Gage-Middle
B-32-7	0.14108	1.50060	0.25000	14478	68.4	67.0	Lateral-Gage-Middle
A-33-6	0.14328	1.50067	0.25000	13443	62.5	62.2	Lateral-Gage-Middle
Average	0.14283	1.50061	0.25022	13849	64.6	64.1	
Std. Dev.	0.00117	0.00008	0.00044	417.64	2.28	1.93	
COV, %	0.82	0.01	0.18	3.02	3.52	3.02	

Material Type: **P707AG-15**
Batch Number: AB991035
Test Method: ASTM D5766-95; SACMA SRM 5-94
Specimen Preconditioning: per Section 3.2 of DOT/FAA/AR-00/47 (2000 Draft Report)
Test Condition: 180 °F (Wet)
Ply Layup, [%, 0/45/90]: **10/80/10**
Ply Stacking Sequence: **$(45/-45/90/45/-45/45/-45/0/45/-45)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 8/8/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 55.6%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1200 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	*Specimen Thickness (in.)*	*Specimen Width (in.)*	*Hole Diameter (in.)*	*Ultimate Tensile Load (lbs.)*	*Ultimate Tensile Strength*		*Failure Mode (per Table I Three-Place Failure Mode Code of ASTM D5766-95)*
					Actual (ksi)	*Nominal (ksi)*	
A-53-3	0.12017	1.50023	0.25090	6353.4	35.2	35.3	Angled-Gage-Middle
A-53-4	0.12028	1.50027	0.25090	6485.6	35.9	36.0	Angled-Gage-Middle
A-53-5	0.11973	1.50033	0.25060	6834.4	38.0	38.0	Angled-Gage-Middle
B-54-2	0.11952	1.50027	0.25070	6529.5	36.4	36.3	Angled-Gage-Middle
B-52-3	0.11918	1.50033	0.25070	6389.0	35.7	35.5	Angled-Gage-Middle
Average	0.11978	1.50029	0.25076	6518.4	36.3	36.2	
Std. Dev.	0.00046	0.00004	0.00013	190.41	1.08	1.06	
COV, %	0.38	0.00	0.05	2.92	2.97	2.92	

Laminate No Hole Compression Properties, 75 °F (Dry)

Material Type: **P707AG-15**
Batch Number: AB991035
Test Method: ASTM D6484-99 (modified); SACMA SRM 3-94 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **50/40/10**
Ply Stacking Sequence: **$(45/0/-45/90/0/0/45/0/-45/0)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 4/23/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: FAE-12S-AS-S6EL-2
Fiber Volume (average): 55.7%
Nominal Fastener Diameter N/A
Nominal Panel Thickness: 0.1200 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: N/A
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ultimate Compressive Load (lbs.)	Ultimate Compressive Strength Actual (ksi)	Ultimate Compressive Strength Nominal (ksi)	Compression Modulus (0.1-0.3% strain) Actual (msi)	Compression Modulus (0.1-0.3% strain) Nominal. (msi)	Failure Mode (per Table I Three-Place Failure Mode Code of ASTM D6484-99)
A-1-2	0.11948	1.50013	18501	103	103	9.94	9.90	Multimode-Gage-Bottom
A-1-3	0.11923	1.50063	19726	110	110	9.58	9.52	Lateral-Gage-Bottom
B-2-3	0.11937	1.50023	17270	96.4	95.9	9.76	9.71	Multimode-Gage-Bottom
Average	0.11936	1.50033	18499	103	103	9.76	9.71	
Std. Dev.	0.00013	0.00026	1228.5	6.91	6.82	0.18	0.19	
COV, %	0.10	0.02	6.64	6.69	6.64	1.84	1.93	

Material Type: **P707AG-15**
Batch Number: AB991035
Test Method: ASTM D6484-99 (modified); SACMA SRM 3-94 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[(45/0/-45/90)_3]_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 4/23/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: FAE-12S-AS-S6EL-2
Fiber Volume (average): 55.0%
Nominal Fastener Diameter N/A
Nominal Panel Thickness: 0.1440 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: N/A
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ultimate Compression Load (lbs.)	Ultimate Compression Strength Actual (ksi)	Ultimate Compression Strength Nominal (ksi)	Compression Modulus (0.1-0.3% strain) Actual (msi)	Compression Modulus (0.1-0.3% strain) Nominal (msi)	Failure Mode (per Table I Three-Place Failure Mode Code of ASTM D6484-99)
B-24-3	0.14378	1.50048	17048	79.0	78.9	6.45	6.44	Lateral-Gage-Top
B-24-4	0.14388	1.50007	17036	78.9	78.9	6.44	6.43	Lateral-Gage-Bottom
A-25-3	0.14247	1.50075	17484	81.8	80.9	6.49	6.42	Lateral-Gage-Middle
Average	0.14338	1.50043	17189	79.9	79.6	6.46	6.43	
Std. Dev.	0.00079	0.00034	255.23	1.61	1.18	0.03	0.01	
COV, %	0.55	0.02	1.48	2.02	1.48	0.41	0.14	

Material Type: **P707AG-15**
Batch Number: AB991035
Test Method: ASTM D6484-99 (modified); SACMA SRM 3-94 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **10/80/10**
Ply Stacking Sequence: **$(45/-45/90/45/-45/45/-45/0/45/-45)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 4/23/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: FAE-12S-AS-S6EL-2
Fiber Volume (average): 55.4%
Nominal Fastener Diameter N/A
Nominal Panel Thickness: 0.1200 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: N/A
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ultimate Compressive Load (lbs.)	Ultimate Compressive Strength Actual (ksi)	Ultimate Compressive Strength Nominal (ksi)	Compressive Modulus (0.1-0.3% strain) Actual (msi)	Compressive Modulus (0.1-0.3% strain) Nominal (msi)	Failure Mode (per Table I Three-Place Failure Mode Code of ASTM D6484-99)
A-49-2	0.11962	1.50002	9183.2	51.2	51.0	4.21	4.20	Multimode-Gage-Various
A-49-3	0.11998	1.50017	9574.2	53.2	53.2	4.29	4.29	Multimode-Gage-Various
B-50-3	0.11907	1.50033	9567.0	53.6	53.2	4.26	4.23	Lateral-Gage-Middle
Average	0.11956	1.50017	9441.5	52.6	52.5	4.25	4.24	
Std. Dev.	0.00046	0.00016	223.69	1.28	1.24	0.04	0.05	
COV, %	0.38	0.01	2.37	2.43	2.37	0.95	1.12	

Laminate Open Hole Compression Properties, 75 °F (Dry)

Material Type: **P707AG-15**
Batch Number: AB991035
Test Method: ASTM D6484-99; SACMA SRM 3-94
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **50/40/10**
Ply Stacking Sequence: **$(45/0/-45/90/0/0/45/0/-45/0)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 4/23/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 54.7%
Nominal Fastener Diameter N/A
Nominal Panel Thickness: 0.1200 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Hole Diameter (in.)	Ultimate Compressive Load (lbs.)	Ultimate Compressive Strength Actual (ksi)	Ultimate Compressive Strength Nominal (ksi)	Failure Mode (per Table I Three-Place Failure Mode Code of ASTM D6484-99)
A-3-3	0.11950	1.50050	0.25100	8839.6	49.3	49.1	Lateral-Gage-Middle
A-3-4	0.11962	1.50052	0.25090	8949.5	49.9	49.7	Lateral-Gage-Middle
A-3-5	0.11987	1.50050	0.25090	9466.7	52.6	52.6	Lateral-Gage-Middle
B-4-6	0.11840	1.50075	0.25100	8738.3	49.2	48.5	Lateral-Gage-Middle
B-4-7	0.11688	1.50077	0.25120	9007.9	51.4	50.0	Lateral-Gage-Middle
Average	0.11885	1.50061	0.25100	9000.4	50.5	50.0	
Std. Dev.	0.00124	0.00014	0.00012	280.46	1.49	1.56	
COV, %	1.04	0.01	0.05	3.12	2.95	3.12	

Material Type: **P707AG-15**
Batch Number: AB991035
Test Method: ASTM D6484-99; SACMA SRM 3-94
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[(45/0/-45/90)_3]_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 4/23/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 55.0%
Nominal Fastener Diameter N/A
Nominal Panel Thickness: 0.1440 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Hole Diameter (in.)	Ultimate Compressive Load (lbs.)	Ultimate Compressive Strength Actual (ksi)	Ultimate Compressive Strength Nominal (ksi)	Failure Mode (per Table I Three-Place Failure Mode Code of ASTM D6484-99)
B-30-4	0.14335	1.49995	0.25120	8656.8	40.3	40.1	Lateral-Gage-Middle
B-30-5	0.14328	1.50055	0.25090	8332.5	38.8	38.6	Lateral-Gage-Middle
A-31-3	0.14337	1.50107	0.25000	8904.2	41.4	41.2	Lateral-Gage-Middle
A-31-4	0.14407	1.50103	0.25000	8630.5	39.9	40.0	Lateral-Gage-Middle
A-31-5	0.14333	1.50100	0.25000	8799.4	40.9	40.7	Lateral-Gage-Middle
Average	0.14348	1.50072	0.25042	8664.7	40.2	40.1	
Std. Dev.	0.00033	0.00048	0.00058	216.27	1.00	1.00	
COV, %	0.23	0.03	0.23	2.50	2.50	2.50	

Material Type: **P707AG-15**
Batch Number: AB991035
Test Method: ASTM D6484-99; SACMA SRM 3-94
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **10/80/10**
Ply Stacking Sequence: **$(45/-45/90/45/-45/45/-45/0/45/-45)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 4/23/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 54.8%
Nominal Fastener Diameter N/A
Nominal Panel Thickness: 0.1200 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Hole Diameter (in.)	Ultimate Compressive Load (lbs.)	Ultimate Compressive Strength Actual (ksi)	Ultimate Compressive Strength Nominal (ksi)	Failure Mode (per Table I Three-Place Failure Mode Code of ASTM D6484-99)
A-55-4	0.12013	1.50053	0.25100	6026.9	33.4	33.5	Lateral-Gage-Middle
A-55-5	0.11922	1.50030	0.25100	6171.2	34.5	34.3	Lateral-Gage-Middle
B-56-3	0.12018	1.50030	0.25110	6173.7	34.2	34.3	Lateral-Gage-Middle
B-56-4	0.12008	1.50038	0.25120	6165.8	34.2	34.3	Lateral-Gage-Middle
B-56-5	0.12030	1.50008	0.25130	6051.8	33.5	33.6	Lateral-Gage-Middle
Average	0.11998	1.50032	0.25112	6117.9	34.0	34.0	
Std. Dev.	0.00043	0.00016	0.00013	72.283	0.47	0.40	
COV, %	0.36	0.01	0.05	1.18	1.39	1.18	

Laminate Open Hole Compression Properties,180°F (Wet)

Material Type: **P707AG-15**
Batch Number: AB991035
Test Method: ASTM D6484-99; SACMA SRM 3-94
Specimen Preconditioning: per Section 3.2 of DOT/FAA/AR-00/47
Test Condition: 180 °F (Wet)
Ply Layup, [%, 0/45/90]: **50/40/10**
Ply Stacking Sequence: **$(45/0/-45/90/0/0/45/0/-45/0)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 8/7/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 55.4%
Nominal Fastener Diameter N/A
Nominal Panel Thickness: 0.1200 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Hole Diameter (in.)	Ultimate Compressive Load (lbs.)	Ultimate Open Hole Compressive Strength Actual (ksi)	Ultimate Open Hole Compressive Strength Nominal (ksi)	Failure Mode (per Table I Three-Place Failure Mode Code of ASTM D6484-99)
A-5-1	0.11985	1.50012	0.25090	7228.8	40.2	40.2	Lateral-Gage-Middle
A-5-2	0.11973	1.49997	0.25100	7913.5	44.1	44.0	Lateral-Gage-Middle
B-6-1	0.11780	1.50038	0.25120	7945.7	45.0	44.1	Lateral-Gage-Middle
B-6-2	0.11903	1.50018	0.25110	8149.3	45.6	45.3	Lateral-Gage-Middle
B-6-3	0.11902	1.50085	0.25090	7181.7	40.2	39.9	Lateral-Gage-Middle
Average	0.11909	1.50030	0.25102	7683.8	43.0	42.7	
Std. Dev.	0.00082	0.00034	0.00013	446.42	2.62	2.48	
COV, %	0.68	0.02	0.05	5.81	6.10	5.81	

Material Type: **P707AG-15**
Batch Number: AB991035
Test Method: ASTM D6484-99; SACMA SRM 3-94
Specimen Preconditioning: per Section 3.2 of DOT/FAA/AR-00/47
Test Condition: 180 °F (Wet)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[(45/0/-45/90)_3]_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 8/7/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 54.5%
Nominal Fastener Diameter N/A
Nominal Panel Thickness: 0.1440 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Hole Diameter (in.)	Ultimate Compressive Load (lbs.)	Ultimate Compressive Strength Actual (ksi)	Ultimate Compressive Strength Nominal (ksi)	Failure Mode (per Table I Three-Place Failure Mode Code of ASTM D6484-99)
B-32-3	0.14323	1.50077	0.25020	7810.9	36.3	36.2	Lateral-Gage-Middle
B-32-4	0.14360	1.50105	0.25050	7565.7	35.1	35.0	Lateral-Gage-Middle
A-33-1	0.14270	1.50068	0.25030	8043.1	37.6	37.2	Lateral-Gage-Middle
A-33-2	0.14337	1.50067	0.25000	7456.2	34.7	34.5	Lateral-Gage-Middle
A-33-3	0.14387	1.50073	0.25020	7829.3	36.3	36.2	Lateral-Gage-Middle
Average	0.14335	1.50078	0.25024	7741.0	36.0	35.8	
Std. Dev.	0.00044	0.00016	0.00018	232.27	1.14	1.08	
COV, %	0.31	0.01	0.07	3.00	3.18	3.00	

Material Type: **P707AG-15**
Batch Number: AB991035
Test Method: ASTM D6484-99; SACMA SRM 3-94
Specimen Preconditioning: per Section 3.2 of DOT/FAA/AR-00/47
Test Condition: 180 °F (Wet)
Ply Layup, [%, 0/45/90]: **10/80/10**
Ply Stacking Sequence: **$(45/-45/90/45/-45/45/-45/0/45/-45)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 8/8/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 55.5%
Nominal Fastener Diameter N/A
Nominal Panel Thickness: 0.1200 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Hole Diameter (in.)	Ultimate Compressive Load (lbs.)	Ultimate Compressive Strength Actual (ksi)	Ultimate Compressive Strength Nominal (ksi)	Failure Mode (per Table I Three-Place Failure Mode Code of ASTM D6484-99)
A-53-1	0.11887	1.50012	0.25100	4587.3	25.7	25.5	Lateral-Gage-Middle
A-53-2	0.11973	1.50047	0.25120	4805.3	26.7	26.7	Lateral-Gage-Middle
B-54-3	0.11982	1.50015	0.25080	4570.6	25.4	25.4	Lateral-Gage-Middle
B-54.4	0.11982	1.50005	0.25090	4495.2	25.0	25.0	Lateral-Gage-Middle
B-54-5	0.11942	1.50027	0.25080	4776.0	26.7	26.5	Lateral-Gage-Middle
Average	0.11953	1.50021	0.25094	4646.9	25.9	25.8	
Std. Dev.	0.00040	0.00016	0.00017	136.15	0.76	0.76	
COV, %	0.34	0.01	0.07	2.93	2.95	2.93	

Laminate Filled Hole Compression Properties,180°F (Wet)

Material Type: **P707AG-15**
Batch Number: AB991035
Test Method: ASTM D6484-99 (modified); SACMA SRM 3-94 (modified)
Specimen Preconditioning: per Section 3.2 of DOT/FAA/AR-00/47
Test Condition: 180 °F (Wet)
Ply Layup, [%, 0/45/90]: **50/40/10**
Ply Stacking Sequence: **$(45/0/-45/90/0/0/45/0/-45/0)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 8/7/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 55.6%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1200 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: Pin=NAS1134V3A; Collar=MS21042L4

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Hole Diameter (in.)	Ultimate Compressive Load (lbs.)	Ultimate Filled Hole Compressive Strength Actual (ksi)	Ultimate Filled Hole Compressive Strength Nominal (ksi)	Failure Mode (per Table I Three-Place Failure Mode Code of ASTM D6484-99)
A-7-1	0.11955	1.50042	0.25080	11550	64.4	64.2	Lateral-Gage-Middle
A-7-2	0.12065	1.50068	0.25100	10885	60.1	60.5	Lateral-Gage-Middle
A-7-3	0.12043	1.50042	0.25110	11178	61.9	62.1	Lateral-Gage-Middle
B-8-1	0.11858	1.50018	0.25060	11871	66.7	65.9	Lateral-Gage-Middle
B-8-2	0.11915	1.49998	0.25070	11044	61.8	61.4	Lateral-Gage-Middle
Average	0.11967	1.50034	0.25084	11306	63.0	62.8	
Std. Dev.	0.00087	0.00027	0.00021	400.21	2.59	2.22	
COV, %	0.72	0.02	0.08	3.54	4.12	3.54	

Material Type: **P707AG-15**
Batch Number: AB991035
Test Method: ASTM D6484-99 (modified); SACMA SRM 3-94 (modified)
Specimen Preconditioning: per Section 3.2 of DOT/FAA/AR-00/47
Test Condition: 180 °F (Wet)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[(45/0/-45/90)_3]_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 8/6/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 54.4%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1440 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: Pin=NAS1134V3A; Collar=MS21042L4

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Hole Diameter (in.)	Ultimate Compressive Load (lbs.)	Ultimate Compressive Strength Actual (ksi)	Ultimate Compressive Strength Nominal (ksi)	Failure Mode (per Table I Three-Place Failure Mode Code of ASTM D6484-99)
A-27-3	0.14375	1.50062	0.25070	11266	52.2	52.2	Lateral-Gage-Middle
A-33-3	0.14387	1.50073	0.25020	11371	52.7	52.6	Lateral-Gage-Middle
B-26-4	0.14368	1.50040	0.25060	11593	53.8	53.7	Lateral-Gage-Middle
B-32-1	0.14263	1.50102	0.25000	11160	52.1	51.7	Lateral-Gage-Middle
B-32-2	0.14358	1.50100	0.25000	11789	54.7	54.6	Lateral-Gage-Middle
Average	0.14350	1.50075	0.25030	11436	53.1	52.9	
Std. Dev.	0.00050	0.00026	0.00033	254.36	1.11	1.18	
COV, %	0.35	0.02	0.13	2.22	2.09	2.22	

Material Type: **P707AG-15**
Batch Number: AB991035
Test Method: ASTM D6484-99 (modified); SACMA SRM 3-94 (modified)
Specimen Preconditioning: per Section 3.2 of DOT/FAA/AR-00/47
Test Condition: 180 °F (Wet)
Ply Layup, [%, 0/45/90]: **10/80/10**
Ply Stacking Sequence: **$(45/-45/90/45/-45/45/-45/0/45/-45)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 8/7/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 55.9%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1200 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: Pin=NAS1134V3A; Collar=MS21042L4

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Hole Diameter (in.)	Ultimate Compressive Load (lbs.)	Ultimate Compressive Strength Actual (ksi)	Ultimate Compressive Strength Nominal (ksi)	Failure Mode (per Table I Three-Place Failure Mode Code of ASTM D6484-99)
A-51-2	0.11940	1.49963	0.25080	6270.8	35.0	34.8	Lateral-Gage-Middle
A-51-3	0.11950	1.50040	0.25090	6455.7	36.0	35.9	Lateral-Gage-Middle
A-51-4	0.11835	1.50020	0.25060	6451.6	36.3	35.8	Lateral-Gage-Middle
B-52-1	0.11770	1.50017	0.25070	6411.1	36.3	35.6	Lateral-Gage-Middle
B-52-2	0.11855	1.50027	0.25110	6631.3	37.3	36.8	Lateral-Gage-Middle
Average	0.11870	1.50013	0.25082	6444.1	36.2	35.8	
Std. Dev.	0.00075	0.00030	0.00019	128.80	0.81	0.72	
COV, %	0.64	0.02	0.08	2.00	2.24	2.00	

Laminate Bearing Tension, Double Shear Properties, 75 °F (Dry)

Material Type: **P707AG-15**
Batch Number: AB991035
Test Method: ASTM D5961-96
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **50/40/10**
Ply Stacking Sequence: **(45/0/-45/90/0/0/45/0/-45/0)S**
Testing Facility: Toray Composites (America), Inc.
Test Date: 4/30/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 54.6%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1200 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V12A; Collar=MS21042L4

Specimen Number	*Specimen Thickness (in.)*	*Specimen Width (in.)*	*Hole Diameter (in.)*	*Ultimate Tensile Load (lbs.)*	*Ultimate Double Shear Bearing Strength*		*Failure Mode (per Figure 9 Bearing Test Failure Codes with Illustrations of Common Modes of ASTM D5961-96)*
					Actual (ksi)	*Nominal (ksi)*	
A-9-6	0.12033	1.50028	0.25077	4511.2	150	150	Bearing-1st hole-Bolt & Nut sides
A-9-2	0.11992	1.50003	0.25079	4556.4	152	152	Bearing-1st hole-Bolt & Nut sides
A-9-3	0.12037	1.50050	0.25075	4539.4	150	151	Bearing-1st hole-Bolt & Nut sides
B-10-1	0.11913	1.50058	0.25087	4524.8	151	151	Bearing-1st hole-Bolt & Nut sides
B-10-2	0.12005	1.50053	0.25081	4576.7	152	153	Bearing-1st hole-Bolt & Nut sides
Average	0.11996	1.50038	0.25080	4541.7	151	151	
Std. Dev.	0.00050	0.00023	0.00005	25.8	1.00	0.86	
COV, %	0.42	0.02	0.02	0.57	0.66	0.57	

Material Type: **P707AG-15**
Batch Number: AB991035
Test Method: ASTM D5961-96
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[(45/0/-45/90)_3]_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 8/13/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 54.6%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1440 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V12A; Collar=MS21042L4

Specimen Number	*Specimen Thickness (in.)*	*Specimen Width (in.)*	*Hole Diameter (in.)*	*Ultimate Tensile Load (lbs.)*	*Ultimate Double Shear Bearing Strength*		*Failure Mode (per Figure 9 Bearing Test Failure Codes with Illustrations of Common Modes of ASTM D5961-96)*
					Actual (ksi)	*Nominal (ksi)*	
B-34-2	0.14360	1.50038	0.25100	5189.8	144	144	Bearing-1st hole-Bolt & Nut sides
B-34-3	0.14428	1.50037	0.25100	5063.4	140	141	Bearing-1st hole-Bolt & Nut sides
A-35-1	0.14208	1.50035	0.25100	5253.6	147	146	Bearing-1st hole-Bolt & Nut sides
A-35-2	0.14322	1.50038	0.25100	5171.6	144	144	Bearing-1st hole-Bolt & Nut sides
A-35-3	0.14353	1.50022	0.25090	5101.6	142	142	Bearing-1st hole-Bolt & Nut sides
Average	0.14334	1.50034	0.25098	5156.0	143	143	
Std. Dev.	0.00080	0.00007	0.00004	74.909	2.82	2.08	
COV, %	0.56	0.00	0.02	1.45	1.96	1.45	

Laminate Bearing Tension, Double Shear Properties, 180 °F (Wet)

Material Type: **P707AG-15**
Batch Number: AB991035
Test Method: ASTM D5961-96
Specimen Preconditioning: per Section 3.2 of DOT/FAA/AR-00/47 (2000 Draft Report)
Test Condition: 180 °F (Wet)
Ply Layup, [%, 0/45/90]: **50/40/10**
Ply Stacking Sequence: **(45/0/-45/90/0/0/45/0/-45/0)S**
Testing Facility: Toray Composites (America), Inc.
Test Date: 11/29/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 54.6%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1200 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V12A; Collar=MS21042L4

Specimen Number	*Specimen Thickness (in.)*	*Specimen Width (in.)*	*Hole Diameter (in.)*	*Ultimate Tensile Load (lbs.)*	*Ultimate Double Shear Bearing Strength*		*Failure Mode (per Figure 9 Bearing Test Failure Codes with Illustrations of Common Modes in ASTM D5961-96)*
					Actual (ksi)	*Nominal (ksi)*	
A-9-4	0.12057	1.50012	0.25060	3776.7	125	126	Bearing-1st hole-Bolt & Nut sides
A-9-5	0.12072	1.50048	0.25070	3447.9	114	115	Bearing-1st hole-Bolt & Nut sides
B-10-4	0.12032	1.50070	0.25070	3398.1	113	113	Bearing-1st hole-Bolt & Nut sides
B-10-5	0.12037	1.50027	0.25060	3415.5	113	114	Bearing-1st hole-Bolt & Nut sides
B-10-6	0.12080	1.50050	0.25070	3511.4	116	117	Bearing-1st hole-Bolt & Nut sides
Average	0.12056	1.50041	0.25066	3509.9	116	117	
Std. Dev.	0.00021	0.00022	0.00005	155.27	5.10	5.18	
COV, %	0.17	0.01	0.02	4.42	4.39	4.42	

Material Type: **P707AG-15**
Batch Number: AB991035
Test Method: ASTM D5961-96
Specimen Preconditioning: per Section 3.2 of DOT/FAA/AR-00/47 (2000 Draft Report)
Test Condition: 180 °F (Wet)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[(45/0/-45/90)_3]_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 11/28/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 54.6%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1440 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V12A; Collar=MS21042L4

Specimen Number	*Specimen Thickness (in.)*	*Specimen Width (in.)*	*Hole Diameter (in.)*	*Ultimate Tensile Load (lbs.)*	*Ultimate Double Shear Bearing Strength*		*Failure Mode (per Fig. 9 Bearing Test Failure Codes with Illustrations of Common Modes of ASTM D5961-96)*
					Actual (ksi)	*Nominal (ksi)*	
B-34-4	0.14467	1.50037	0.25090	4296.7	118	119	Bearing-1st hole-Bolt & Nut sides
B-34-5	0.14450	1.50048	0.25090	4162.1	115	116	Bearing-1st hole-Bolt & Nut sides
B-34-6	0.14473	1.50052	0.25090	3940.4	109	109	Bearing-1st hole-Bolt & Nut sides
A-35-6	0.14418	1.50055	0.25110	4339.6	120	121	Bearing-1st hole-Bolt & Nut sides
A-35-8	0.14170	1.50037	0.25090	4380.4	123	122	Bearing-1st hole-Bolt & Nut sides
Average	0.14396	1.50046	0.25094	4223.8	117	117	
Std. Dev.	0.00128	0.00008	0.00009	178.44	5.60	4.96	
COV, %	0.89	0.01	0.04	4.22	4.79	4.22	

Laminate Bearing Tension, Single Shear Properties, 75 °F (Dry)

Material Type: **P707AG-15**
Batch Number: AB991035
Test Method: ASTM D5961-96
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **50/40/10**
Ply Stacking Sequence: **(45/0/-45/90/0/0/45/0/-45/0)S**
Testing Facility: Toray Composites (America), Inc.
Test Date: 4/30/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 55.4%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1200 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V7A; Collar=MS21042L4

ID of Specimens (nut side) #1	ID of Specimens (bolt side) #2	Specimen Thickness #1 (in.)	Specimen Thickness #2 (in.)	Hole Diameter of Specimen #1 (in.)	Hole Diameter of Specimen #2 (in.)	Tensile Load at 4% Hole Elongation (lbs.)	Bearing Strength at 4 % Hole Elongation Actual (#1) (ksi)	Actual (#2) (ksi)	Nominal (ksi)	Failure Mode (per Figure 9 Bearing Test Failure Codes with illustration of common modes of ASTM D5961)
A-11-1	A-11-2	0.11780	0.11962	0.25070	0.25080	5532.7	93.7	92.2	92.2	Bearing-1st hole-Bolt & Nut sides
A-11-3	A-11-4	0.12143	0.12143	0.25070	0.25080	5410.8	88.9	88.8	90.2	Bearing-1st hole-Bolt & Nut sides
A-11-5	A-11-6	0.12077	0.12022	0.25070	0.25080	5206.0	86.0	86.3	86.8	Bearing-1st hole-Bolt & Nut sides
B-12-1	B-12-2	0.11945	0.12077	0.25070	0.25080	5004.6	83.6	82.6	83.4	Bearing-1st hole-Bolt & Nut sides
B-12-3	B-12-4	0.12105	0.12128	0.25070	0.25080	4635.8	76.4	76.2	77.3	Bearing-1st hole-Bolt & Nut sides
Average		0.12010	0.12066	0.25070	0.25080	5158.0	85.7	85.2	86.0	
Std. Dev.		0.00149	0.00075	0.00000	0.00000	354.55	6.42	6.15	5.91	
COV, %		1.24	0.62	0.00	0.00	6.87	7.50	7.21	6.87	

Material Type: **P707AG-15**
Batch Number: AB991035
Test Method: ASTM D5961-96
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[(45/0/-45/90)_3]_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 4/30/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 54.8%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1440 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V8A; Collar=MS21042L4

ID of Specimen (nut side) #1	ID of Specimen (bolt side) #2	Thickness of Specimen #1 (in.)	Thickness of Specimen #2 (in.)	Hole Diameter of Specimens #1 (in.)	Hole Diameter of Specimens #2 (in.)	Tensile Load 4% Hole Elongation (lbs.)	Bearing Strength at 4 % Hole Elongation Actual (#1) (ksi)	Actual (#2) (ksi)	Nominal (ksi)	Failure Mode (per Figure 9 Bearing Test Failure Codes with illustration of common modes of ASTM D5961-96)
A-39-1	A-39-2	0.14207	0.14370	0.25090	0.25090	5671.9	79.6	78.7	78.8	Bearing-1st hole-Bolt & Nut sides
A-39-3	A-39-4	0.14498	0.14553	0.25090	0.25090	5203.2	71.5	71.3	72.3	Fastener or Pin-1st hole-Nut side
A-39-5	A-39-6	0.14427	0.14378	0.25090	0.25090	5267.4	72.8	73.0	73.2	Bearing-1st hole-Bolt & Nut sides
B-38-1	B-38-2	0.14355	0.14398	0.25090	0.25090	4624.4	64.2	64.0	64.2	Fastener or Pin-1st hole-Nut side
B-38-3	B-38-4	0.14435	0.14485	0.25090	0.25090	4673.0	64.5	64.3	64.9	Fastener or Pin-1st hole-Nut side
Average		0.14384	0.14437	0.25090	0.25090	5088.0	70.5	70.2	70.7	
Std. Dev.		0.00111	0.00079	0.00000	0.00000	439.74	6.40	6.20	6.11	
COV, %		0.77	0.55	0.00	0.00	8.64	9.07	8.83	8.64	

Laminate Bearing Tension, Single Shear Properties, 180 °F (Wet)

Material Type: **P707AG-15**
Batch Number: AB991035
Test Method: ASTM D5961-96
Specimen Preconditioning: per Section 3.2 of DOT/FAA/AR-00/47 (2000 Draft Report)
Test Condition: 180 °F (Wet)
Ply Layup, [%, 0/45/90]: **50/40/10**
Ply Stacking Sequence: **(45/0/-45/90/0/0/45/0/-45/0)S**
Testing Facility: Toray Composites (America), Inc.
Test Date: 11/28/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 54.7%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1200 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V7A; Collar=MS21042L4

ID of Specimens (nut side) #1	ID of Specimens (bolt side) #2	Specimen Thickness #1 (in.)	Specimen Thickness #2 (in.)	Hole Diameter of Specimen #1 (in.)	Hole Diameter of Specimen #2 (in.)	Tensile Load at 4% Hole Elongation (lbs.)	Bearing Strength at 4 % Hole Elongation Actual (#1) (ksi)	Bearing Strength at 4 % Hole Elongation Actual (#2) (ksi)	Bearing Strength at 4 % Hole Elongation Nominal (ksi)	Failure Mode (per Figure 9 Bearing Test Failure Codes with illustration of common modes of ASTM D5961)
A-13-2	A-13-9	0.11973	0.12178	0.25100	0.25070	4639.5	77.2	76.0	77.3	Bearing-1st hole-Bolt & Nut sides
A-13-1	A-13-8	0.11930	0.12120	0.25100	0.25070	4520.2	75.5	74.4	75.3	Bearing-1st hole-Bolt & Nut sides
B-14-1	B-14-8	0.11892	0.12007	0.25100	0.25070	4628.4	77.5	76.9	77.1	Bearing-1st hole-Bolt & Nut sides
B-14-2	B-14-9	0.11860	0.12020	0.25100	0.25070	4798.8	80.6	79.6	80.0	Bearing-1st hole-Bolt & Nut sides
B-14-3	B-14-10	0.11917	0.11982	0.25100	0.25070	4192.2	70.1	69.8	69.9	Bearing-1st hole-Bolt & Nut sides
Average		0.11914	0.12061	0.25100	0.25070	4555.8	76.2	75.3	75.9	
Std. Dev.		0.00042	0.00084	0.00000	0.00000	226.29	3.88	3.64	3.77	
COV, %		0.35	0.69	0.00	0.00	4.97	5.09	4.83	4.97	

Material Type: **P707AG-15**
Batch Number: AB991035
Test Method: ASTM D5961-96
Specimen Preconditioning: per Section 3.2 of DOT/FAA/AR-00/47 (2000 Draft Report)
Test Condition: 180 °F (Wet)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[(45/0/-45/90)_3]_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 11/28/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 54.5%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1440 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V8A; Collar=MS21042L4

ID of Specimen (nut side) #1	ID of Specimen (bolt side) #2	Thickness of Specimen #1 (in.)	Thickness of Specimen #2 (in.)	Hole Diameter of Specimens #1 (in.)	Hole Diameter of Specimens #2 (in.)	Tensile Load 4% Hole Elongation (lbs.)	Bearing Strength at 4 % Hole Elongation Actual (#1) (ksi)	Bearing Strength at 4 % Hole Elongation Actual (#2) (ksi)	Bearing Strength at 4 % Hole Elongation Nominal (ksi)	Failure Mode (per Figure 9 Bearing Test Failure Codes with illustration of common modes of ASTM D5961)
B-36-1	B-36-8	0.14170	0.14223	0.25070	0.25090	4625.9	65.1	64.8	64.2	Bearing-1st hole-Bolt & Nut sides
B-36-2	B-36-9	0.14303	0.14333	0.25070	0.25090	4093.5	57.1	56.9	56.9	Bearing-1st hole-Bolt & Nut sides
B-36-3	B-36-10	0.14407	0.14392	0.25070	0.25090	4613.3	63.9	63.9	64.1	Bearing-1st hole-Bolt & Nut sides
A-37-1	A-37-8	0.14227	0.14105	0.25070	0.25090	4909.8	68.8	69.4	68.2	Bearing-1st hole-Bolt & Nut sides
A-37-2	A-37-9	0.14315	0.14348	0.25070	0.25090	4908.3	68.4	68.2	68.2	Bearing-1st hole-Bolt & Nut side
Average		0.14284	0.14280	0.25070	0.25090	4630.2	64.7	64.6	64.3	
Std. Dev.		0.00090	0.00116	0.00000	0.00000	333.13	4.73	4.88	4.63	
COV, %		0.63	0.81	0.00	0.00	7.19	7.32	7.55	7.19	

Laminate Bearing-Bypass, Single Shear Properties, 75°F (Dry)

Material Type: **P707AG-15**
Batch Number: AB991035
Test Method: ASTM D5961-96 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **50/40/10**
Ply Stacking Sequence: **(45/0/-45/90/0/0/45/0/-45/0)S**
Testing Facility: Toray Composites (America), Inc.
Test Date: 11/19/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 55.7%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1200 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V4A; Collar=MS21042L4

Tension

Specimen ID		Specimen Thickness		Specimen Width		Hole Diameter		Ultimate	Ultimate Gross Bypass Strength		
#1 Nut Side	#2 Bolt Side	#1 (inch)	#2 (inch)	#1 (inch)	#2 (inch)	#1 (inch)	#2 (inch)	Tension Load (lbs.)	Actual (#1) (ksi)	Actual (#2) (ksi)	Nominal (ksi)
A-15-1	A-15-2	0.11875	0.12055	1.50092	1.50085	0.25070	0.25065	5805.7	32.6	32.1	32.3
A-15-3	A-15-4	0.12273	0.12268	1.50097	1.50093	0.25080	0.25095	6527.8	35.4	35.5	36.3
A-15-6	A-15-7	0.12015	0.11890	1.50105	1.50088	0.25075	0.25090	6122.2	33.9	34.3	34.0
B-16-2	B-16-1	0.11900	0.11717	1.50103	1.50072	0.25110	0.25105	5787.5	32.4	32.9	32.2
B-16-4	B-16-3	0.12016	0.11996	1.5011	1.50072	0.25086	0.25090	5277.9	29.3	29.3	29.3
Average		0.12016	0.11985	1.50101	1.50082	0.25084	0.25089	5904.2	32.7	32.8	32.8
Std. Dev.		0.00158	0.00204	0.00007	100.01	0.00016	0.00015	461.51	2.29	2.34	2.56
COV, %		1.31	1.70	0.00	6663.47	0.06	0.06	7.82	7.00	7.14	7.82

Specimen ID		Ultimate Net Bypass Strength			Ultimate Bearing Strength			Failure Mode
#1 Nut Side	#2 Bolt Side	Actual (#1) (ksi)	Actual (#2) (ksi)	Nominal (ksi)	Actual (#1) (ksi)	Actual (#2) (ksi)	Nominal (ksi)	(Per Figur 9 Bearing Test Failure Codes with Illustrations of Common Modes of ASTM D5961-96)
A-15-1	A-15-2	16.3	16.0	16.1	97.5	96.1	96.8	Bearing-Both holes-Bolt & Nut sides
A-15-3	A-15-4	17.7	17.7	18.1	106	106	109	Bearing-Both holes-Bolt & Nut sides
A-15-6	A-15-7	17.0	17.2	17.0	102	103	102	Bearing-Both holes-Bolt & Nut sides
B-16-2	B-16-1	16.2	16.5	16.1	96.8	98.4	96.5	Bearing-Both holes-Bolt & Nut sides
B-16-4	B-16-3	14.6	14.7	14.7	87.5	87.7	88.0	Bearing-Both holes-Bolt & Nut sides
Average		16.4	16.4	16.4	97.9	98.2	98.4	
Std. Dev.		1.14	1.17	1.28	6.86	7.00	7.69	
COV, %		7.00	7.14	7.82	7.01	7.13	7.82	

Material Type: **P707AG-15**
Batch Number: AB991035
Test Method: ASTM D5961-96 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **50/40/10**
Ply Stacking Sequence: **(45/0/-45/90/0/0/45/0/-45/0)S**
Testing Facility: Toray Composites (America), Inc.
Test Date: 12/6/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 56.0%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1200 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V4A; Collar=MS21042L4

Compression

Specimen ID		Specimen Thickness		Specimen Width		Hole Diameter		Ultimate	Ultimate Bypass Strength		
#1 Nut Side	#2 Bolt Side	#1 (inch)	#2 (inch)	#1 (inch)	#2 (inch)	#1 (inch)	#2 (inch)	Comp. Load (lbs.)	Actual (#1) (ksi)	Actual (#2) (ksi)	Nominal (ksi)
A-17-2	A-17-1	0.12078	0.12027	1.50112	1.50100	0.25100	0.25090	7090.8	19.6	19.6	19.7
A-17-3	A-17-4	0.12060	0.11987	1.50023	1.50082	0.25095	0.25090	7069.2	19.5	19.6	19.6
B-18-1	B-18-2	0.11960	0.12047	1.49997	1.50145	0.25070	0.25100	6738.5	18.8	18.6	18.7
B-18-4	B-18-3	0.12087	0.12060	1.50148	1.50022	0.25080	0.25080	6752.4	18.6	18.7	18.8
B-18-5	B-18-6	0.12035	0.12033	1.50043	1.50108	0.25090	0.25070	6537.2	18.1	18.1	18.2
Average		0.12044	0.12031	1.50065	1.50091	0.25087	0.25086	6837.6	18.9	18.9	19.0
Std. Dev.		0.00051	0.00028	0.00063	0.00045	0.00012	0.00011	237.21	0.63	0.69	0.66
COV, %		0.42	0.23	0.04	0.03	0.05	0.05	3.47	3.32	3.62	3.47

Specimen ID		Ultimate Bearing Strength			Failure Mode
#1 Nut Side	#2 Bolt Side	Actual (#1) (ksi)	Actual (#2) (ksi)	Nominal (ksi)	(Per Figur 9 Bearing Test Failure Codes with Illustrations of Common Modes of ASTM D5961-96)
A-17-2	A-17-1	117	117	118	Bearing-Both holes-Bolt & Nut sides
A-17-3	A-17-4	117	118	118	Bearing-Both holes-Bolt & Nut sides
B-18-1	B-18-2	112	111	112	Bearing-Both holes-Bolt & Nut sides
B-18-4	B-18-3	111	112	113	Bearing-Both holes-Bolt & Nut sides
B-18-5	B-18-6	108	108	109	Bearing-1st hole-Nut side
Average		113	113	114	
Std. Dev.		3.72	4.07	3.95	
COV, %		3.29	3.59	3.47	

Laminate Bearing-Bypass, Single Shear Properties, 75°F (Dry)

Material Type: **P707AG-15**
Batch Number: AB991035
Test Method: ASTM D5961-96 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[]_{45/0/-45/90)_3]_S}$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 11/19/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 55.5%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1440 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V5A; Collar=MS21042L4

Tension

Specimen ID		Specimen Thickness		Specimen Width		Hole Diameter		Ultimate	Ultimate Gross Bypass Strength		
Nut side #1	Bolt side #2	#1 (inch)	#2 (inch)	#1 (inch)	#2 (inch)	#1 (inch)	#2 (inch)	Tension Load (Lbs)	Actual (#1) (ksi)	Actual (#2) (ksi)	Nominal (ksi)
B-40-2	B-40-1	0.14333	0.14183	1.50042	1.50070	0.25085	0.25090	6473.2	30.1	30.4	30.0
B-40-4	B-40-3	0.14485	0.14402	1.50075	1.50097	0.25090	0.25100	7301.1	33.6	33.8	33.8
B-40-6	B-40-5	0.14583	0.14537	1.50083	1.50075	0.25100	0.25080	6537.1	29.9	30.0	30.3
A-41-2	A-41-1	0.14317	0.14207	1.50092	1.50053	0.25085	0.25105	5688.8	26.5	26.7	26.3
A-41-4	A-41-3	0.14592	0.14492	1.50012	1.50095	0.25100	0.25090	5270.7	24.1	24.2	24.4
Average		0.14462	0.14364	1.50061	1.50078	0.25092	0.25093	6254.2	28.8	29.0	29.0
Std. Dev.		0.00132	0.00162	0.00033	0.00018	0.00008	0.00010	792.30	3.66	3.67	3.67
COV, %		0.91	1.13	0.02	0.01	0.03	0.04	12.7	12.7	12.6	12.7

Specimen ID		Ultimate Net Bypass Strength			Ultimate Bearing Strength			Failure Mode
Nut side #1	Bolt side #2	Actual (#1) (ksi)	Actual (#2) (ksi)	Nominal (ksi)	Actual (#1) (ksi)	Actual (#2) (ksi)	Nominal (ksi)	(Per Figur 9 Bearing Test Failure Codes with Illustrations of Common Modes of ASTM D5961-96)
B-40-2	B-40-1	15.1	15.2	15.0	90.0	91.0	90	Bearing-Both holes-Bolt & Nut sides
B-40-4	B-40-3	16.8	16.9	16.9	100	101	101	Bearing-Both holes-Bolt & Nut sides
B-40-6	B-40-5	14.9	15.0	15.1	89.3	89.7	90.8	Bearing-Both holes-Bolt & Nut sides
A-41-2	A-41-1	13.2	13.3	13.2	79.2	79.7	79.0	Bearing-Both holes-Bolt & Nut sides
A-41-4	A-41-3	12.0	12.1	12.2	72.0	72.5	73.2	Bearing-Both holes-Bolt & Nut sides
Average		14.4	14.5	14.5	86.2	86.8	86.9	
Std. Dev.		1.83	1.83	1.83	10.9	11.0	11.0	
COV, %		12.7	12.6	12.67	12.7	12.6	12.7	

Material Type: **P707AG-15**
Batch Number: AB991035
Test Method: ASTM D5961-96 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[]_{45/0/-45/90)_3]_S}$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 12/6/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 54.9%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1440 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V5A; Collar=MS21042L4

Compression

Specimen ID		Specimen Thickness		Specimen Width		Hole Diameter		Ultimate	Ultimate BypassStrength		
Nut side #1	Bolt side #2	#1 (inch)	#2 (inch)	#1 (inch)	#2 (inch)	#1 (inch)	#2 (inch)	Comp. Load (Lbs)	Actual (#1) (ksi)	Actual (#2) (ksi)	Nominal (ksi)
B-42-2	B-42-1	0.14208	0.14067	1.50087	1.50105	0.25090	0.25110	7739.7	18.1	18.3	17.9
B-42-4	B-42-3	0.14403	0.14358	1.50085	1.50078	0.25095	0.25070	7630.5	17.6	17.7	17.7
A-43-2	A-43-1	0.14345	0.14242	1.50078	1.50083	0.25080	0.25105	7816.6	18.2	18.3	18.1
A-43-4	A-43-3	0.14340	0.14378	1.50073	1.50098	0.25115	0.25090	7833.7	18.2	18.1	18.1
A-43-6	A-43-5	0.14287	0.14280	1.50082	1.50075	0.25060	0.25070	7780.8	18.1	18.2	18.0
Average		0.14317	0.14265	1.50081	1.50088	0.25088	0.25089	7760.3	18.1	18.1	18.0
Std. Dev.		0.00073	0.00124	0.00006	0.00013	0.00020	0.00019	81.01	0.23	0.25	0.19
COV, %		0.51	0.87	0.00	0.01	0.08	0.08	1.04	1.27	1.36	1.04

Specimen ID		Ultimate Bearing Strength			Failure Mode
Nut side #1	Bolt side #2	Actual (#1) (ksi)	Actual (#2) (ksi)	Nominal (ksi)	(Per Figur 9 Bearing Test Failure Codes with Illustrations of Common Modes of ASTM D5961-96)
B-42-2	B-42-1	109	110	107	Bearing-2nd hole-Nut side
B-42-4	B-42-3	106	106	106	Bearing-Both holes-Bolt & Nut sides
A-43-2	A-43-1	109	109	109	Bearing-Both holes-Bolt & Nut sides
A-43-4	A-43-3	109	109	109	Bearing-Both holes-Bolt & Nut sides
A-43-6	A-43-5	109	109	108	Bearing-Both holes-Bolt & Nut sides
Average		108	108	108	
Std. Dev.		1.39	1.42	1.13	
COV, %		1.28	1.31	1.04	

Laminate Bearing-Bypass, Single Shear Properties, 75°F (Dry)

Material Type: **P707AG-15**
Batch Number: AB991035
Test Method: ASTM D5961-96 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **10/80/10**
Ply Stacking Sequence: **$(45/-45/90/45/-45/45/-45/0/45/-45)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 11/19/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 56.5%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1200 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V4A; Collar=MS21042L4

Tension

Specimen ID		Specimen Thickness		Specimens Width		Hole Diameter		Ultimate	Ultimate Gross Bypass Strength		
Nut side #1	Bolt side #2	#1 (inch)	#2 (inch)	#1 (inch)	#2 (inch)	#1 (inch)	#2 (inch)	Tensile Load (Lbs)	Actual (#1) (ksi)	Actual (#2) (ksi)	Nominal (ksi)
A-59-1	A-59-2	0.11878	0.11983	1.50115	1.50060	0.25085	0.25090	6695.2	37.5	37.2	37.2
A-59-3	A-59-4	0.11960	0.12027	1.50143	1.50117	0.25030	0.25070	6528.2	36.4	36.2	36.3
A-59-5	A-59-6	0.12075	0.12153	1.50093	1.50080	0.25070	0.25105	6545.5	36.1	35.9	36.4
B-60-1	B-60-2	0.11802	0.11917	1.50028	1.50108	0.25085	0.25085	6696.6	37.8	37.4	37.2
B-60-3	B-60-4	0.12013	0.12003	1.50037	1.50045	0.25085	0.25075	6128.8	34.0	34.0	34.0
Average		0.11946	0.12017	1.50083	1.50082	0.25071	0.25085	6518.9	36.4	36.1	36.2
Std. Dev.		0.00108	0.00087	0.00050	0.00031	0.00024	0.00014	232.18	1.51	1.36	1.29
COV, %		0.90	0.72	0.03	0.02	0.10	0.05	3.56	4.16	3.76	3.56

Specimen ID		Ultimate Net Bypass Strength			Ultimate Bearing Strength			Failure Mode
Nut side #1	Bolt side #2	Actual (#1) (ksi)	Actual (#2) (ksi)	Nominal (ksi)	Actual (#1) (ksi)	Actual (#2) (ksi)	Nominal (ksi)	(Per Figur 9 Bearing Test Failure Codes with Illustrations of Common Modes of ASTM D5961-96)
A-59-1	A-59-2	18.8	18.6	18.6	112	111	112	Lateral(net tension)-2nd hole-Bolt side
A-59-3	A-59-4	18.2	18.1	18.1	109	108	109	Lateral(net tension)-2nd hole-Bolt side
A-59-5	A-59-6	18.1	17.9	18.2	108	107	109	Lateral(net tension)-2nd hole-Bolt side
B-60-1	B-60-2	18.9	18.7	18.6	113	112	112	Bearing-Both holes-Bolt & Nut sides
B-60-3	B-60-4	17.0	17.0	17.0	102	102	102	Bearing-Both holes-Bolt & Nut sides
Average		18.2	18.1	18.1	109	108	109	
Std. Dev.		0.76	0.68	0.64	4.53	4.06	3.87	
COV, %		4.16	3.76	3.56	4.16	3.76	3.56	

Material Type: **P707AG-15**
Batch Number: AB991035
Test Method: ASTM D5961-96 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **10/80/10**
Ply Stacking Sequence: **$(45/-45/90/45/-45/45/-45/0/45/-45)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 12/18/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 56.0%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1200 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V4A; Collar=MS21042L4

Compression

Specimen ID		Specimen Thickness		Specimen Width		Hole Diameter		Ultimate	Ultimate Bypass Strength		
Nut side #1	Bolt side #2	#1 (inch)	#2 (inch)	#1 (inch)	#2 (inch)	#1 (inch)	#2 (inch)	Comp. Load (Lbs)	Actual (#1) (ksi)	Actual (#2) (ksi)	Nominal (ksi)
A-61-1	A-61-2	0.11715	0.11762	1.50072	1.50068	0.25085	0.25075	7006.9	19.9	19.8	19.5
A-61-3	A-61-4	0.11907	0.11858	1.50097	1.50067	0.25110	0.25075	6519.7	18.2	18.3	18.1
B-62-1	B-62-2	0.11793	0.11925	1.50060	1.50072	0.25055	0.25055	6825.3	19.3	19.1	19.0
B-62-3	B-62-4	0.11983	0.12018	1.50075	1.50080	0.25075	0.25050	6664.7	18.5	18.5	18.5
B-62-5	B-62-6	0.12038	0.12045	1.50115	1.50050	0.25065	0.25065	6572.0	18.2	18.2	18.3
Average		0.11887	0.11922	1.50084	1.50067	0.25078	0.25064	6717.7	18.8	18.8	18.7
Std. Dev.		0.00133	0.00116	0.00022	0.00011	0.00021	0.00011	199.03	0.75	0.69	0.55
COV, %		1.12	0.98	0.01	0.01	0.08	0.05	2.96	4.00	3.66	2.96

Specimen ID		Ultimate Bearing Strength			Failure Mode
Nut side #1	Bolt side #2	Actual (#1) (ksi)	Actual (#2) (ksi)	Nominal (ksi)	(Per Figur 9 Bearing Test Failure Codes with Illustrations of Common Modes of ASTM D5961-96)
A-61-1	A-61-2	119	119	117	Lateral(net tension)-1st hole-Nut side
A-61-3	A-61-4	109	110	109	Lateral(net tension)-2nd hole-Bolt side
B-62-1	B-62-2	115	114	114	Lateral(net tension)-1st hole-Nut side
B-62-3	B-62-4	111	111	111	Lateral(net tension)-1st hole-Nut side
B-62-5	B-62-6	109	109	110	See Note*
Average		113	112	112	
Std. Dev.		4.51	4.10	3.32	
COV, %		4.00	3.65	2.96	

Note * Failure Mode fo specimen # B-62-5 and B-62-6: Multiple with Lateral (net tension) in 1st hole and Splitting in 2nd hole

Laminate Bearing-Bypass, Double Shear Properties, 75°F (Dry)

Material Type: **P707AG-15**
Batch Number: AB991035
Test Method: ASTM D5961-96 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **50/40/10**
Ply Stacking Sequence: **$(45/0/-45/90/0/0/45/0/-45/0)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 11/19/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 55.7%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1200 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V3A; Collar=MS21042L4

Tension

Specimen ID	Specimen Thickness			Specimen Width			Specimen Hole Diameter			Ultimate Load	Ultimate Gross Bypass Strength		Ultimate Net Bypass Strength	
	Specimen inch	Plate #1 Nut side (inch)	Plate#2 Bolt side (inch)	Specimen inch	Plate #1 Nut side (inch)	Plate#2 Bolt side (inch)	Hole #1 inch	Hole #2 (inch)	Nominal (inch)	(lbs)	Actual (ksi)	Nominal (ksi)	Actual (ksi)	Nominal (ksi)
B-202-1	0.12045	0.03400	0.03455	1.49902	1.50100	1.50000	0.25045	0.25070	0.25000	11919	66.0	66.2	59.9	60.1
B202-2	0.12193	0.03430	0.03435	1.5003	1.50100	1.50000	0.25070	0.25100	0.25000	12430	67.9	69.1	61.3	62.3
A-203-1	0.12065	0.03425	0.03455	1.49913	1.50000	1.50100	0.25115	0.25100	0.25000	11829	65.4	65.7	59.7	60.0
A-203-2	0.12045	0.03425	0.0322	1.50018	1.49900	1.50000	0.25070	0.25060	0.25000	11733	64.9	65.2	58.5	58.7
A-203-3	0.12017	0.03345	0.03415	1.49907	1.50050	1.50100	0.25100	0.25070	0.25000	13119	72.8	72.9	66.5	66.6
Average	0.12073	0.03405	0.03396	1.49954	1.50030	1.50040	0.25080	0.25080	0.25000	12206	67.4	67.8	61.2	61.5
Std. Dev.	0.00069	0.00036	0.00100	0.00064	0.00084	0.00055	0.00028	0.00019	0.00000	577.21	3.23	3.21	3.16	3.11
COV, %	0.57	1.04	2.94	0.04	0.06	0.04	0.11	0.07	0.00	4.73	4.79	4.73	5.17	5.06

Specimen ID	Strain in Side Plate at Ultimate Load		Load in Side Plate at Ultimate Load		Bearing Load at Ultimate	Percent Bearing Load at Ultimate	Bearing Strength at Ultimate Load		Failure Mode (Per Figure 9 Bearing Test Failure Codes with Illustration of Common Modes in accrodance with ASTM D5961-95)
	Plate #1 gage # 2 (in/in)	Plate #2 gage # 3 (in/in)	Plate #1 Nut side (lbs)	Plate#2 Bolt side (lbs)	(lbs)	(%)	Actual (ksi)	Nominal (ksi)	
B-202-1	0.00075	0.00118	451.15	651.44	1102.6	9.25	36.5	36.8	Lateral(net tension)-1st Hole-Bolt & Nut sides
B-202-2	0.00085	0.00131	500.61	719.74	1220.3	9.82	39.9	40.7	Lateral(net tension)-2nd Hole-Bolt & Nut sides
A-203-1	0.00072	0.00108	438.20	598.86	1037.1	8.77	34.2	34.6	Lateral(net tension)-2nd Hole-Bolt & Nut sides
A-203-2	0.00096	0.00110	554.66	612.15	1166.8	9.94	38.7	38.9	Lateral(net tension)-2nd Hole-Bolt & Nut sides
A-203-3	0.00090	0.00114	521.60	629.67	1131.7	8.63	37.6	37.7	Lateral(net tension)-2nd Hole-Bolt & Nut sides
Average	0.00084	0.00116	493.24	642.37	1131.7	9.28	37.4	37.7	
Std. Dev.	0.00010	0.00009	48.562	47.527	68.732	0.60	2.16	2.29	
COV, %	12.0	7.85	9.85	7.40	6.07	6.42	5.77	6.07	

Laminate Bearing-Bypass, Double Shear Properties, 75°F (Dry)

Material Type: **P707AG-15**
Batch Number: AB991035
Test Method: ASTM D5961-96 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **50/40/10**
Ply Stacking Sequence: **$(45/0/-45/90/0/0/45/0/-45/0)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 5/8/01
Test Operator: John Smith
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 56.2%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1200 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V3A; Collar=MS21042L4

Compression

Specimen ID	Specimen Thickness			Specimen Width			Specimen Hole Diameter			Ultimate Load
	Specimen	Plate #1 Nut side	Plate#2 Bolt side	Specimen	Plate #1 Nut side	Plate#2 Bolt side	Hole #1	Hole #2	Nominal	
	inch	(inch)	(inch)	inch	(inch)	(inch)	inch	(inch)	(inch)	(lbs)
B-202-3	0.12217	0.03485	0.0344	1.49908	1.50100	1.50100	0.25080	0.25070	0.25000	12253
B-202-4	0.12163	0.03480	0.03435	1.50033	1.50100	1.50100	0.25060	0.25080	0.25000	12154
B-202-5	0.12115	0.03490	0.035	1.49923	1.50100	1.50050	0.25085	0.25060	0.25000	13076
A-203-4	0.12173	0.03450	0.03465	1.49997	1.50100	1.50050	0.25125	0.25080	0.25000	12223
A-203-5	0.12252	0.03455	0.03535	1.4995	1.50150	1.50150	0.25065	0.25060	0.25000	12289
Average	0.12184	0.03472	0.03475	1.49962	1.50110	1.50090	0.25083	0.25070	0.25000	12399
Std. Dev.	0.00053	0.00018	0.00042	0.00052	0.00022	0.00042	0.00026	0.00010	0.00000	381.88
COV, %	0.43	0.53	1.22	0.03	0.01	0.03	0.10	0.04	0.00	3.08

Specimen ID	Ultimate Bypass Strength		Strain in Side Plate at Ultimate Load		Load in Side Plate at Ultimate Load		Bearing Load at Ultimate	Percent Bearing Load at Ultimate	Bearing Strength at Ultimate Load		Failure Mode (Per Figure 9 Bearing Test Failure Codes with Illustration of Common Modes in accrodance with ASTM D5961-96)
	Actual (ksi)	Nominal (ksi)	Plate #1 gage # 2 (in/in)	Plate #2 gage # 3 (in/in)	Plate #1 Nut side (lbs)	Plate#2 Bolt side (lbs)	(lbs)	(%)	Actual (ksi)	Nominal (ksi)	
B-202-3	59.8	60.8	0.00108	0.00170	478.01	826.55	1304.6	10.6	42.6	43.5	Lateral(net tension)-1st Hole-Bolt & Nut sides
B-202-4	60.2	61.0	0.00175	0.00062	847.00	329.01	1176.0	9.68	38.6	39.2	Lateral(net tension)-2nd Hole-Bolt & Nut sides
B-202-5	63.9	64.5	0.00312	-0.00031	1469.5	0.00	1469.5	11.2	48.4	49.0	Lateral(net tension)-2nd Hole-Bolt & Nut sides
A-203-4	58.3	59.1	0.00059	0.00284	321.36	1255.3	1576.7	12.9	51.6	52.6	Lateral(net tension)-1st Hole-Bolt & Nut sides
A-203-5	59.4	60.6	0.00090	0.00249	398.89	1079.4	1381.7	11.2	45.0	46.1	Lateral(net tension)-1st Hole-Bolt & Nut sides
Average	60.3	61.2	0.00149	0.00147	702.95	698.06	1381.7	11.1	45.2	46.1	
Std. Dev.	2.13	1.97	0.00101	0.00131	473.55	523.44	153.28	1.17	5.06	5.11	
COV, %	3.53	3.22	67.6	89.2	67.4	75.0	11.1	10.5	11.2	11.1	

Laminate Bearing-Bypass, Double Shear Properties, 75°F (Dry)

Material Type: **P707AG-15**
Batch Number: AB991035
Test Method: ASTM D5961-96 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[]_{45/0/-45/90)_3]_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 12/19/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 55.7%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1440 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V4A; Collar=MS21042L4

Tension

Specimen ID	Specimen Thickness: Specimen inch	Specimen Thickness: Plate #1 Nut side (inch)	Specimen Thickness: Plate#2 Bolt side (inch)	Specimen Width: Specimen inch	Specimen Width: Plate #1 Nut side (inch)	Specimen Width: Plate#2 Bolt side (inch)	Specimen Hole Diameter: Hole #1 inch	Specimen Hole Diameter: Hole #2 (inch)	Specimen Hole Diameter: Nominal (inch)	Ultimate Load (lbs)	Ultimate Gross Bypass Strength: Actual (ksi)	Ultimate Gross Bypass Strength: Nominal (ksi)	Ultimate Net Bypass Strength: Actual (ksi)	Ultimate Net Bypass Strength: Nominal (ksi)
B-204-1	0.14282	0.03375	0.03450	1.50093	1.50050	1.50050	0.25050	0.25050	0.25000	10053	46.9	46.5	40.1	39.8
B204-2	0.14435	0.03375	0.0341	1.50093	1.50100	1.50100	0.25090	0.25080	0.25000	10032	46.3	46.4	40.5	40.7
A-205-1	0.14475	0.03160	0.03445	1.50098	1.49900	1.50150	0.25075	0.25090	0.25000	10025	46.1	46.4	39.8	40.1
A-205-2	0.14505	0.03315	0.0332	1.50102	1.50100	1.49950	0.25090	0.25080	0.25000	10964	50.4	50.8	44.8	45.2
A-205-3	0.14597	0.03315	0.03445	1.50118	1.50100	1.50070	0.25080	0.25090	0.25000	10375	47.3	48.0	43.0	43.7
Average	0.14459	0.03308	0.03414	1.50101	1.50050	1.50064	0.25077	0.25078	0.25000	10290	47.4	47.6	41.7	41.9
Std. Dev.	0.00115	0.00088	0.00055	0.00010	0.00087	0.00074	0.00016	0.00016	0.00000	404.48	1.72	1.87	2.18	2.41
COV, %	0.80	2.66	1.61	0.01	0.06	0.05	0.07	0.07	0.00	3.93	3.62	3.93	5.23	5.76

Specimen ID	Strain in Side Plate at Ultimate Load: Plate #1 gage # 2 (in/in)	Strain in Side Plate at Ultimate Load: Plate #2 gage # 3 (in/in)	Load in Side Plate at Ultimate Load: Plate #1 Nut side (lbs)	Load in Side Plate at Ultimate Load: Plate#2 Bolt side (lbs)	Bearing Load at Ultimate (lbs)	Percent Bearing Load at Ultimate (%)	Bearing Strength at Ultimate Load: Actual (ksi)	Bearing Strength at Ultimate Load: Nominal (ksi)	Failure Mode (Per Figure 9 Bearing Test Failure Codes with Illustration of Common Modes in accrodance with ASTM D5961-95)
B-204-1	0.00125	0.00139	693.17	771.40	1464.6	14.6	40.9	40.7	Lateral(net tension)-1st Hole-Bolt & Nut sides
B-204-2	0.00106	0.00120	587.35	661.35	1248.7	12.4	34.5	34.7	Lateral(net tension)-2nd Hole-Bolt & Nut sides
A-205-1	0.00123	0.00124	681.10	687.13	1368.2	13.6	37.7	38.0	Lateral(net tension)-2nd Hole-Bolt & Nut sides
A-205-2	0.00088	0.00118	554.66	651.44	1206.1	11.0	33.2	33.5	Lateral(net tension)-2nd Hole-Bolt & Nut sides
A-205-3	0.00084	0.00074	495.43	446.81	942.2	9.1	25.7	26.2	Lateral(net tension)-2nd Hole-Bolt & Nut sides
Average	0.00105	0.00115	602.34	643.63	1246.0	12.1	34.4	34.6	
Std. Dev.	0.00019	0.00024	84.231	119.72	197.85	2.17	5.70	5.50	
COV, %	18.1	21.2	14.0	18.6	15.9	17.9	16.6	15.9	

Laminate Bearing-Bypass, Double Shear Properties, 75°F (Dry)

Material Type: **P707AG-15**
Batch Number: AB991035
Test Method: ASTM D5961-96 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[]_{45/0/-45/90)_3]_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 5/8/02
Test Operator: John Smith
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 53.5%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1440 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V4A; Collar=MS21042L4

Compression

Specimen ID	*Specimen Thickness*			*Specimen Width*			*Specimen Hole Diameter*			*Ultimate Load (lbs)*
	Specimen inch	*Plate #1 Nut side (inch)*	*Plate#2 Bolt side (inch)*	*Specimen inch*	*Plate #1 Nut side (inch)*	*Plate#2 Bolt side (inch)*	*Hole #1 inch*	*Hole #2 (inch)*	*Nominal (inch)*	
B-204-3	0.14523	0.03400	0.03335	1.50082	1.50100	1.50150	0.25090	0.25100	0.25000	13009
B204-4	0.14652	0.03475	0.03405	1.50125	1.50150	1.50000	0.25085	0.25090	0.25000	13449
B-204-5	0.14623	0.03475	0.03495	1.501	1.50100	1.50100	0.25085	0.25080	0.25000	11757
A-205-4	0.14592	0.03460	0.03485	1.5001	1.50050	1.50100	0.25080	0.25090	0.25000	11476
A-205-5	0.14557	0.03335	0.03515	1.50117	1.50150	1.50100	0.25080	0.25080	0.25000	12378
Average	0.14589	0.03429	0.03447	1.50087	1.50110	1.50090	0.25084	0.25088	0.25000	12414
Std. Dev.	0.00051	0.00061	0.00075	0.00046	0.00042	0.00055	0.00004	0.00008	0.00000	827.10
COV, %	0.35	1.78	2.18	0.03	0.03	0.04	0.02	0.03	0.00	6.66

Specimen ID	*Ultimate Bypass Strength*		*Strain in Side Plate at Ultimate Load*		*Load in Side Plate at Ultimate Load*		*Bearing Load at Ultimate (lbs)*	*Percent Bearing Load at Ultimate (%)*	*Bearing Strength at Ultimate Load*		*Failure Mode* (Per Figure 9 Bearing Test Failure Codes with Illustration of Common Modes in accrodance with ASTM D5961-96)
	Actual (ksi)	*Nominal (ksi)*	*Plate #1 gage # 2 (in/in)*	*Plate #2 gage # 3 (in/in)*	*Plate #1 Nut side (lbs)*	*Plate#2 Bolt side (lbs)*			*Actual (ksi)*	*Nominal (ksi)*	
B-204-3	52.0	52.5	0.00278	0.00100	1237.0	441.81	1678.9	12.9	46.1	46.6	Lateral(net tension)-2nd Hole-Bolt & Nut sides
B-204-4	53.9	54.9	0.00346	0.00027	1430.6	168.27	1598.9	11.9	43.5	44.4	Lateral(net tension)-1st Hole-Bolt & Nut sides
B-204-5	45.2	45.9	0.00224	0.00172	1002.3	834.99	1837.3	15.6	50.1	51.0	Lateral(net tension)-1st Hole-Bolt & Nut sides
A-205-4	46.8	47.5	0.00147	0.00116	697.54	525.74	1223.3	10.7	33.4	34.0	Lateral(net tension)-1st Hole-Bolt & Nut sides
A-205-5	48.5	49.1	0.00197	0.00177	919.47	856.19	1775.7	14.3	48.6	49.3	Lateral(net tension)-2nd Hole-Bolt & Nut sides
Average	49.3	50.0	0.00238	0.00118	1057.39	565.40	1622.8	13.1	44.3	45.1	
Std. Dev.	3.59	3.66	0.00077	0.00061	284.23	288.01	241.190	1.96	6.60	6.70	
COV, %	7.29	7.32	32.1	51.73	26.9	50.9	14.9	15.0	14.9	14.9	

Laminate Bearing-Bypass, Double Shear Properties, 75°F (Dry)

Material Type: **P707AG-15**
Batch Number: AB991035
Test Method: ASTM D5961-96 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **10/80/10**
Ply Stacking Sequence: **$(45/-45/90/45/-45/45/-45/0/45/-45)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 12/19/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 55.7%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1200 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V3A; Collar=MS21042L4

Tension

Specimen ID	Specimen Thickness			Specimen Width			Specimen Hole Diameter			Ultimate Load	Ultimate Gross Bypass Strength		Ultimate Net Bypass Strength	
	Specimen inch	Plate #1 Nut side (inch)	Plate#2 Bolt side (inch)	Specimen inch	Plate #1 Nut side (inch)	Plate#2 Bolt side (inch)	Hole #1 inch	Hole #2 (inch)	Nominal (inch)	(lbs)	Actual (ksi)	Nominal (ksi)	Actual (ksi)	Nominal (ksi)
B-206-8	0.12002	0.03230	0.03220	1.50123	1.50000	1.50000	0.25075	0.25080	0.25000	7142.5	39.6	39.7	32.2	32.2
B206-4	0.12300	0.03305	0.03275	1.50033	1.50000	1.49950	0.25070	0.25090	0.25000	6953.9	37.7	38.6	31.0	31.8
B-206-5	0.12203	0.03410	0.03370	1.49932	1.50000	1.50050	0.25065	0.25075	0.25000	7219.0	39.5	40.1	32.1	32.6
A-207-2	0.12088	0.03265	0.0338	1.5007	1.50100	1.49950	0.25090	0.25090	0.25000	7172.6	39.5	39.8	30.3	30.6
A-207-1	0.11985	0.03395	0.0339	1.50048	1.50050	1.50100	0.25070	0.25070	0.25000	7451.0	41.4	41.4	32.4	32.4
Average	0.12116	0.03321	0.03327	1.50041	1.50030	1.50010	0.25074	0.25081	0.25000	7187.8	39.6	39.9	31.6	31.9
Std. Dev.	0.00135	0.00079	0.00075	0.00070	0.00045	0.00065	0.00010	0.00009	0.00000	178.35	1.33	0.99	0.88	0.80
COV, %	1.11	2.38	2.27	0.05	0.03	0.04	0.04	0.04	0.00	2.48	3.36	2.48	2.79	2.50

Specimen ID	Strain in Side Plate at Ultimate Load		Load in Side Plate at Ultimate Load		Bearing Load at Ultimate	Percent Bearing Load at Ultimate	Bearing Strength at Ultimate Load		Failure Mode (Per Figure 9 Bearing Test Failure Codes with Illustration of Common Modes in accrodance with ASTM D5961-95)
	Plate #1 gage # 2 (in/in)	Plate #2 gage # 3 (in/in)	Plate #1 Nut side (lbs)	Plate#2 Bolt side (lbs)	(lbs)	(%)	Actual (ksi)	Nominal (ksi)	
B-206-8	0.00112	0.00132	622.30	725.47	1347.8	18.9	44.8	44.9	Lateral(net tension)-1st Hole-Bolt & Nut sides
B-206-4	0.00111	0.00110	618.62	612.15	1230.8	17.7	39.9	41.0	Lateral(net tension)-2nd Hole-Bolt & Nut sides
B-206-5	0.00112	0.00133	622.31	732.29	1354.6	18.8	44.3	45.2	Lateral(net tension)-2nd Hole-Bolt & Nut sides
A-207-2	0.00142	0.00158	786.45	883.50	1669.9	23.3	55.1	55.7	Lateral(net tension)-2nd Hole-Bolt & Nut sides
A-207-1	0.00137	0.00156	759.74	863.99	1623.7	21.8	54.0	54.1	Lateral(net tension)-2nd Hole-Bolt & Nut sides
Average	0.00123	0.00138	681.88	763.48	1445.4	20.1	47.6	48.2	
Std. Dev.	0.00015	0.00020	83.810	111.61	191.09	2.35	6.62	6.37	
COV, %	12.5	14.4	12.3	14.6	13.2	11.7	13.9	13.2	

Laminate Bearing-Bypass, Double Shear Properties, 75°F (Dry)

Material Type: **P707AG-15**
Batch Number: AB991035
Test Method: ASTM D5961-96 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **10/80/10**
Ply Stacking Sequence: **$(45/-45/90/45/-45/45/-45/0/45/-45)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 5/8/02
Test Operator: John Smith
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 55.6%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1200 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V3A; Collar=MS21042L4

Compression

Specimen ID	Specimen Thickness: Specimen inch	Specimen Thickness: Plate #1 Nut side (inch)	Specimen Thickness: Plate#2 Bolt side (inch)	Specimen Width: Specimen inch	Specimen Width: Plate #1 Nut side (inch)	Specimen Width: Plate#2 Bolt side (inch)	Specimen Hole Diameter: Hole #1 inch	Specimen Hole Diameter: Hole #2 (inch)	Specimen Hole Diameter: Nominal (inch)	Ultimate Load (lbs)
B-206-1	0.11843	0.03475	0.03500	1.49940	1.50100	1.50100	0.25075	0.25075	0.25000	8671.6
B206-2	0.11962	0.03410	0.03500	1.50180	1.50100	1.50100	0.25060	0.25070	0.25000	8308.7
A-207-3	0.12125	0.03435	0.03385	1.50078	1.50100	1.50150	0.25080	0.25080	0.25000	8586.6
A-207-4	0.12140	0.03480	0.03415	1.50078	1.50100	1.50050	0.25060	0.25060	0.25000	8319.8
A-207-5	0.12115	0.03430	0.03400	1.50070	1.50110	1.50100	0.25071	0.25073	0.25000	7878.8
Average	0.12037	0.03446	0.03440	1.50069	1.50102	1.50100	0.25069	0.25072	0.25000	8353.1
Std. Dev.	0.00130	0.00030	0.00056	0.00085	0.00004	0.00035	0.00009	0.00007	0.00000	309.84
COV, %	1.08	0.88	1.62	0.06	0.00	0.02	0.04	0.03	0.00	3.71

Specimen ID	Ultimate Bypass Strength: Actual (ksi)	Ultimate Bypass Strength: Nominal (ksi)	Strain in Side Plate at Ultimate Load: Plate #1 gage # 2 (in/in)	Strain in Side Plate at Ultimate Load: Plate #2 gage # 3 (in/in)	Load in Side Plate at Ultimate Load: Plate #1 Nut side (lbs)	Load in Side Plate at Ultimate Load: Plate#2 Bolt side (lbs)	Bearing Load at Ultimate (lbs)	Percent Bearing Load at Ultimate (%)	Bearing Strength at Ultimate Load: Actual (ksi)	Bearing Strength at Ultimate Load: Nominal (ksi)	Failure Mode (Per Figure 9 Bearing Test Failure Codes with Illustration of Common Modes in accrodance with ASTM D5961-96)
B-206-1	41.2	40.6	0.00253	0.00047	1092.6	271.35	1364.0	15.7	45.9	45.5	Lateral(net tension)-Outside the holes-Below 2nd hole
B-206-2	34.8	34.8	0.00288	0.00162	1273.2	778.06	2051.3	24.7	68.4	68.4	Lateral(net tension)-Outside the holes-Above 1st hole
A-207-3	34.1	34.5	0.00337	0.00204	1443.0	941.12	2384.1	27.8	78.4	79.5	Lateral(net tension)-Outside the holes-Above 1st hole
A-207-4	30.4	30.8	0.00272	0.00325	1376.5	1397.6	2774.1	33.3	91.2	92.5	Lateral(net tension)-Outside the holes-Above 1st hole
A-207-5	26.8	27.0	0.00304	0.00392	1331.2	1682.4	3013.6	38.2	99.2	100	Lateral(net tension)-Outside the holes-Above 1st hole
Average	33.5	33.5	0.00291	0.00226	1303.3	1014.1	2317.4	28.0	76.6	77.2	
Std. Dev.	5.37	5.05	0.00032	0.00136	133.17	549.18	647.59	8.59	20.8	21.6	
COV, %	16.06	15.1	11.0	60.2	10.2	54.15	27.9	30.7	27.2	27.9	

D.2. Mechanical Raw Test Results of F6273C-07M

Laminate No Hole Tension Properties, 75 °F (Dry)

Material Type: **F6273C-07M**
Batch Number: AF010271
Test Method: ASTM D5766-95 (modified); SACMA SRM 5-94 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **40/20/40**
Ply Stacking Sequence: **$(0/90/0/90/45/-45/90/0/90/0)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 11/21/02
Test Operator: John Smith
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: C-960401-A
Fiber Volume (average): 49.1%
Nominal Fastener Diameter N/A
Nominal Panel Thickness: 0.1720 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: N/A
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ultimate Tensile Load (lbs.)	Ultimate Tensile Strength Actual (ksi)	Ultimate Tensile Strength Nominal (ksi)	Tensile Modulus (0.1-0.3% strain) Actual (msi)	Tensile Modulus (0.1-0.3% strain) Nominal (msi)	Failure Location & Comments (per Table 1 Three-Place Failure Mode Codes in ASTM D5766-95)
A-210-5	0.16793	1.49953	28737	114	111	7.51	7.33	Multiple(S,L)-Gage-Bottom & Top
B-211-1	0.16705	1.50163	28735	115	111	7.38	7.17	Multiple(S,L)-Gage-Top
B-211-2	0.16827	1.50095	28706	114	111	7.42	7.26	Angel-Gage-Top
Average	0.16775	1.50070	28726	114	111	7.43	7.25	
Std. Dev.	0.00063	0.00107	17.6	0.45	0.07	0.06	0.08	
COV, %	0.38	0.07	0.06	0.39	0.06	0.87	1.06	

Material Type: **F6273C-07M**
Batch Number: AF010271
Test Method: ASTM D5766-95 (modified); SACMA SRM 5-94 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[(45/0/-45/90)_2]_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 11/21/02
Test Operator: John smith
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: C-960401-A
Fiber Volume (average): 49.2%
Nominal Fastener Diameter N/A
Nominal Panel Thickness: 0.1376 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: N/A
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ultimate Tensile Load (lbs.)	Ultimate Tensile Strength Actual (ksi)	Ultimate Tensile Strength Nominal (ksi)	Tensile Modulus (0.1-0.3% strain) Actual (msi)	Tensile Modulus (0.1-0.3% strain) Nominal (msi)	Failure Location & Comments (per Table 1 Three-Place Failure Mode Codes in ASTM D5766-95)
A-212-2	0.13460	1.50075	17843	88.3	86.4	5.89	5.76	Lateral-Gage-Top & Bottom
A-212-6	0.13377	1.50063	18707	93.2	90.6	6.09	5.93	Lateral-Gage-Middle & Top
B-213-4	0.13540	1.50018	18755	92.3	90.9	6.06	5.97	Lateral-Gage-Top & Bottom
Average	0.13459	1.50052	18435	91.3	89.3	6.02	5.89	
Std. Dev.	0.00082	0.00030	513.63	2.60	2.49	0.11	0.11	
COV, %	0.61	0.02	2.79	2.84	2.79	1.82	1.81	

Material Type: **F6273C-07M**
Batch Number: AF010271
Test Method: ASTM D5766-95 (modified); SACMA SRM 5-94 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **10/80/10**
Ply Stacking Sequence: **$(45/-45/90/45/-45/45/-45/0/45/-45)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 11/22/02
Test Operator: John Smith
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: C-960401-A
Fiber Volume (average): 49.6%
Nominal Fastener Diameter N/A
Nominal Panel Thickness: 0.1720 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: N/A
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ultimate Tensile Load (lbs.)	Ultimate Tensile Strength Actual (ksi)	Ultimate Tensile Strength Nominal (ksi)	Tensile Modulus (0.1-0.3% strain) Actual (msi)	Tensile Modulus (0.1-0.3% strain) Nominal (msi)	Failure Mode (per Table I Three-Place Failure Mode Codes of ASTM D5766-95)
A-214-3	0.16818	1.50028	13214	52.4	51.2	3.91	3.82	Angled-Gage-Middle
B-215-1	0.16713	1.50163	14434	57.5	55.9	3.83	3.72	Angled-Gage-Bottom
B-215-2	0.16868	1.50088	13824	54.6	53.6	3.90	3.82	Angled-Gage-Middle
Average	0.16800	1.50093	13824	54.8	53.6	3.88	3.79	
Std. Dev.	0.00079	0.00068	610.3	2.58	2.37	0.04	0.06	
COV, %	0.47	0.05	4.41	4.71	4.41	1.07	1.52	

Laminate Filled Hole Tension Properties, -65 °F (Dry)

Material Type: **F6273C-07M**
Batch Number: AF010271
Test Method: ASTM D5766-95 (modified); SACMA SRM 5-94 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: -65 °F (Dry)
Ply Layup, [%, 0/45/90]: **40/20/40**
Ply Stacking Sequence: **$(0/90/0/90/45/-45/90/0/90/0)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 12/10/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 48.8%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1720 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: Pin=NAS1134V3A; Collar=MS21042L4

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Hole Diameter (in.)	Ultimate Tensile Load (lbs.)	Ultimate Tensile Strength Actual (ksi)	Ultimate Tensile Strength Nominal (ksi)	Failure Mode (per Table I Three-Place Failure Mode Code of ASTM D5766-95)
B-70-4	0.17137	1.50042	0.25060	13739	53.4	53.3	Lateral-Gage-Middle
B-70-5	0.17058	1.50038	0.25060	13168	51.5	51.0	Lateral-Gage-Middle
B-70-6	0.16960	1.50040	0.25060	11892	46.7	46.1	Lateral-Gage-Middle
A-71-5	0.17207	1.50053	0.25080	13743	53.2	53.3	Lateral-Gage-Middle
A-71-6	0.17055	1.50097	0.25090	13740	53.7	53.3	Lateral-Gage-Middle
Average	0.17083	1.50054	0.25070	13256	51.7	51.4	
Std. Dev.	0.00093	0.00025	0.00014	802	2.91	3.11	
COV, %	0.55	0.02	0.06	6.05	5.64	6.05	

Material Type: **F6273C-07M**
Batch Number: AF010271
Test Method: ASTM D5766-95 (modified); SACMA SRM 5-94 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: -65 °F (Dry)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[(45/0/-45/90)_2]_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 12/10/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 49.2%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1376 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: Pin=NAS1134V3A; Collar=MS21042L4

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Hole Diameter (in.)	Ultimate Tensile Load (lbs.)	Ultimate Tensile Strength Actual (ksi)	Ultimate Tensile Strength Nominal (ksi)	Failure Mode (per Table I Three-Place Failure Mode Codes of ASTM D5766-95)
A-91-7	0.13517	1.50068	0.25080	10830	53.4	52.5	Lateral-Gage-Middle
A-91-8	0.13497	1.50037	0.25090	10062	49.7	48.8	Lateral-Gage-Middle
B-92-7	0.13403	1.50083	0.25100	10499	52.2	50.9	Lateral-Gage-Middle
B-92-8	0.13547	1.50017	0.25080	10731	52.8	52.0	Lateral-Gage-Middle
A-93-7	0.13560	1.50027	0.25080	10663	52.4	51.7	Lateral-Gage-Middle
Average	0.13505	1.50046	0.25086	10557	52.1	51.1	
Std. Dev.	0.00062	0.00028	0.00009	301.67	1.42	1.46	
COV, %	0.46	0.02	0.04	2.86	2.73	2.86	

Material Type: **F6273C-07M**
Batch Number: AF010271
Test Method: ASTM D5766-95 (modified); SACMA SRM 5-94 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: -65 °F (Dry)
Ply Layup, [%, 0/45/90]: **10/80/10**
Ply Stacking Sequence: **$(45/-45/90/45/-45/45/-45/0/45/-45)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 12/10/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 49.6%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1720 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: Pin=NAS1134V3A; Collar=MS21042L4

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Hole Diameter (in.)	Ultimate Tensile Load (lbs.)	Ultimate Tensile Strength Actual (ksi)	Ultimate Tensile Strength Nominal (ksi)	Failure Mode (per Table I Three-Place Failure Mode Codes of ASTM D5766-95)
B-116-7	0.16725	1.50097	0.25090	11655	46.4	45.2	Lateral-Gage-Middle
B-116-8	0.16903	1.50115	0.25080	12145	47.9	47.1	Lateral-Gage-Middle
B-118-7	0.16532	1.50085	0.25090	11896	47.9	46.1	Lateral-Gage-Middle
A-119-8	0.16748	1.50028	0.25080	12284	48.9	47.6	Lateral-Gage-Middle
B-122-6	0.16707	1.50107	0.25080	11925	47.6	46.2	Lateral-Gage-Middle
Average	0.16723	1.50086	0.25084	11981	47.7	46.4	
Std. Dev.	0.00132	0.00035	0.00005	243	0.89	0.94	
COV, %	0.79	0.02	0.02	2.03	1.86	2.03	

Laminate Filled Hole Tension Properties, 75 °F (Dry)

Material Type: **F6273C-07M**
Batch Number: AF010271
Test Method: ASTM D5766-95 (modified); SACMA SRM 5-94 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **40/20/40**
Ply Stacking Sequence: **$(0/90/0/90/45/-45/90/0/90/0)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 5/24/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 48.8%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1720 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: Pin=NAS1134V3A; Collar=MS21042L4

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Hole Diameter (in.)	Ultimate Tensile Load (lbs.)	Ultimate Tensile Strength Actual (ksi)	Ultimate Tensile Strength Nominal (ksi)	Failure Mode (per Table 1 Three-Place Failure Mode Codes of ASTM D5766-95)
B-70-1	0.17172	1.50008	0.25070	13277	51.5	51.5	Lateral-Gage-Middle
B-70-2	0.17193	1.50055	0.25060	14786	57.3	57.3	Lateral-Gage-Middle
A-71-1	0.17177	1.50075	0.25080	13655	53.0	52.9	Lateral-Gage-Middle
A-71-2	0.17297	1.50037	0.25080	14477	55.8	56.1	Lateral-Gage-Middle
A-71-3	0.17287	1.50032	0.25080	14133	54.5	54.8	Lateral-Gage-Middle
Average	0.17225	1.50041	0.25074	14066	54.4	54.5	
Std. Dev.	0.00062	0.00025	0.00009	609	2.27	2.36	
COV, %	0.36	0.02	0.04	4.33	4.17	4.33	

Material Type: **F6273C-07M**
Batch Number: AF010271
Test Method: ASTM D5766-95 (modified); SACMA SRM 5-94 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[(45/0/-45/90)_2]_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 5/24/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 49.2%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1376 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: Pin=NAS1134V3A; Collar=MS21042L4

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Hole Diameter (in.)	Ultimate Tensile Load (lbs.)	Ultimate Tensile Strength Actual (ksi)	Ultimate Tensile Strength Nominal (ksi)	Failure Mode (per Table 1 Three-Place Failure Mode Codes of ASTM D5766-95)
A-93-1	0.13647	1.50060	0.25080	10189	49.8	49.4	Lateral-Gage-Middle
A-93-2	0.13692	1.50048	0.25080	10714	52.2	51.9	Lateral-Gage-Middle
B-94-1	0.13540	1.50052	0.25090	10465	51.5	50.7	Lateral-Gage-Middle
B-94-2	0.13643	1.50050	0.25090	11784	57.6	57.1	Lateral-Gage-Middle
B-94-3	0.13673	1.50057	0.25090	10630	51.8	51.5	Lateral-Gage-Middle
Average	0.13639	1.50053	0.25086	10757	52.6	52.1	
Std. Dev.	0.00059	0.00005	0.00005	608.41	2.95	2.95	
COV, %	0.43	0.00	0.02	5.66	5.61	5.66	

Material Type: **F6273C-07M**
Batch Number: AF010271
Test Method: ASTM D5766-95 (modified); SACMA SRM 5-94 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **10/80/10**
Ply Stacking Sequence: **$(45/-45/90/45/-45/45/-45/0/45/-45)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 5/24/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 49.6%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1720 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: Pin=NAS1134V3A; Collar=MS21042L4

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Hole Diameter (in.)	Ultimate Tensile Load (lbs.)	Ultimate Tensile Strength Actual (ksi)	Ultimate Tensile Strength Nominal (ksi)	Failure Mode (per Table 1 Three-Place Failure Mode of Codes of ASTM D5766-95)
B-118-1	0.17022	1.50040	0.25070	11680	45.7	45.3	Angled-Gage-Middle
B-118-2	0.17140	1.50065	0.25060	11632	45.2	45.1	Angled-Gage-Middle
A-119-1	0.16890	1.50005	0.25080	11790	46.5	45.7	Angled-Gage-Middle
A-119-2	0.16950	1.50080	0.25070	11268	44.3	43.7	Angled-Gage-Middle
A-119-3	0.17030	1.50053	0.25080	11331	44.3	43.9	Angled-Gage-Middle
Average	0.17006	1.50049	0.25072	11540	45.2	44.7	
Std. Dev.	0.00094	0.00029	0.00008	228	0.95	0.88	
COV, %	0.55	0.02	0.03	1.98	2.10	1.98	

Laminate Open Hole Tension Properties, -65 °F (Dry)

Material Type: **F6273C-07M**
Batch Number: AF010271
Test Method: ASTM D5766-95; SACMA SRM 5-94
Specimen Preconditioning: As Fabricated
Test Condition: -65 °F (Dry)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[(45/0/-45/90)_2]_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 11/27/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 49.3%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1376 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	*Specimen Thickness (in.)*	*Specimen Width (in.)*	*Hole Diameter (in.)*	*Ultimate Tensile Load (lbs.)*	*Ultimate Tensile Strength*		*Failure Mode (per Table I Three-Place Failure Mode Codes of ASTM D5766-95)*
					Actual (ksi)	*Nominal (ksi)*	
A-95-7	0.13155	1.50088	0.25090	9361.1	47.4	45.4	Lateral-Gage-Middle
A-95-8	0.13247	1.50048	0.25090	9574.1	48.2	46.4	Lateral-Gage-Middle
B-96-6	0.13465	1.50030	0.25070	9613.8	47.6	46.6	Lateral-Gage-Middle
B-96-7	0.13223	1.50075	0.25070	9451.9	47.6	45.8	Lateral-Gage-Middle
B-96-8	0.13362	1.50028	0.25070	9856.3	49.2	47.8	Lateral-Gage-Middle
Average	0.13290	1.50054	0.25078	9571.4	48.0	46.4	
Std. Dev.	0.00123	0.00027	0.00011	188.07	0.71	0.91	
COV, %	0.92	0.02	0.04	1.96	1.49	1.96	

Material Type: **F6273C-07M**
Batch Number: AF010271
Test Method: ASTM D5766-95; SACMA SRM 5-94
Specimen Preconditioning: As Fabricated
Test Condition: -65 °F (Dry)
Ply Layup, [%, 0/45/90]: **10/80/10**
Ply Stacking Sequence: **$(45/-45/90/45/-45/45/-45/0/45/-45)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 5/27/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 50.5%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1720 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	*Specimen Thickness (in.)*	*Specimen Width (in.)*	*Hole Diameter (in.)*	*Ultimate Tensile Load (lbs.)*	*Ultimate Tensile Strength*		*Failure Mode (per Table I Three-Place Failure Mode Codes of ASTM D5766-95)*
					Actual (ksi)	*Nominal (ksi)*	
B-120-7	0.16533	1.50087	0.25070	10624	42.8	41.2	Angled-Gage-Middle
B-120-8	0.16650	1.50033	0.25070	11038	44.2	42.8	Angled-Gage-Middle
A-121-6	0.16642	1.50052	0.25100	10924	43.7	42.3	Angled-Gage-Middle
A-121-7	0.16450	1.49688	0.25080	10643	43.2	41.3	Angled-Gage-Middle
A-121-8	0.16843	1.50055	0.25070	10817	42.8	41.9	Angled-Gage-Middle
Average	0.16624	1.49983	0.25078	10809	43.4	41.9	
Std. Dev.	0.00148	0.00166	0.00013	178.67	0.61	0.69	
COV, %	0.89	0.11	0.05	1.65	1.40	1.65	

Laminate Open Hole Tension Properties, 75 °F (Dry)

Material Type: **F6273C-07M**
Batch Number: AF010271
Test Method: ASTM D5766-95; SACMA SRM 5-94
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[(45/0/-45/90)_2]_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 5/23/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 49.4%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1376 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	*Specimen Thickness (in.)*	*Specimen Width (in.)*	*Hole Diameter (in.)*	*Ultimate Tensile Load (lbs.)*	*Ultimate Tensile Strength*		*Failure Mode (per Table I Three-Place Failure Mode Codes of ASTM D5766-95)*
					Actual (ksi)	*Nominal (ksi)*	
A-97-1	0.13482	1.50048	0.25090	10247	50.7	49.6	Lateral-Gage-Middle
A-97-2	0.13555	1.50042	0.25070	10944	53.8	53.0	Lateral-Gage-Middle
A-97-3	0.13633	1.50078	0.25080	10603	51.8	51.4	Lateral-Gage-Middle
B-98-1	0.13522	1.50037	0.25070	9410.8	46.4	45.6	Lateral-Gage-Middle
B-98-2	0.13613	1.50030	0.25080	9658.8	47.3	46.8	Lateral-Gage-Middle
Average	0.13561	1.50047	0.25078	10173	50.0	49.3	
Std. Dev.	0.00063	0.00019	0.00008	638.41	3.11	3.09	
COV, %	0.46	0.01	0.03	6.28	6.22	6.28	

Material Type: **F6273C-07M**
Batch Number: AF010271
Test Method: ASTM D5766-95; SACMA SRM 5-94
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **10/80/10**
Ply Stacking Sequence: **$(45/-45/90/45/-45/45/-45/0/45/-45)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 5/24/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 50.4%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1720 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	*Specimen Thickness (in.)*	*Specimen Width (in.)*	*Hole Diameter (in.)*	*Ultimate Tensile Load (lbs.)*	*Ultimate Tensile Strength*		*Failure Mode (per Table I Three-Place Failure Mode Codes of ASTM D5766-95)*
					Actual (ksi)	*Nominal (ksi)*	
B-122-1	0.16857	1.50105	0.25070	10630	42.0	41.2	Angled-Gage-Middle
B-122-2	0.16898	1.50105	0.25070	10705	42.2	41.5	Angled-Gage-Middle
B-122-3	0.16973	1.50115	0.25070	10803	42.4	41.9	Angled-Gage-Middle
A-123-1	0.16597	1.50065	0.25090	10180	40.9	39.5	Angled-Gage-Middle
A-123-2	0.16927	1.50047	0.25070	10313	40.6	40.0	Angled-Gage-Middle
Average	0.16850	1.50087	0.25074	10526	41.6	40.8	
Std. Dev.	0.00148	0.00030	0.00009	266.87	0.82	1.03	
COV, %	0.88	0.02	0.04	2.54	1.97	2.54	

Laminate Open Hole Tension Properties, 180 °F (Wet)

Material Type: **F6273C-07M**
Batch Number: AF010271
Test Method: ASTM D5766-95; SACMA SRM 5-94
Specimen Preconditioning: per Section 3.2 of DOT/FAA/AR-00/47 (2000 Draft Report)
Test Condition: 180 °F (Wet)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[(45/0/-45/90)_2]_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 1/29/02
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 49.3%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1376 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	*Specimen Thickness (in.)*	*Specimen Width (in.)*	*Hole Diameter (in.)*	*Ultimate Tensile Load (lbs.)*	*Ultimate Tensile Strength*		*Failure Mode (per Table I Three-Place Failure Mode Codes of ASTM D5766-95)*
					Actual (ksi)	*Nominal (ksi)*	
A-95-1	0.13403	1.50012	0.25090	11677	58.1	56.6	Lateral-Gage-Middle
A-95-2	0.13463	1.50035	0.25070	11849	58.7	57.4	Lateral-Gage-Middle
A-95-3	0.13500	1.50002	0.25080	12041	59.5	58.3	Lateral-Gage-Middle
B-96-1	0.13445	1.50027	0.25090	11750	58.3	56.9	Lateral-Gage-Middle
B-96-2	0.13520	1.50025	0.25080	11989	59.1	58.1	Lateral-Gage-Middle
Average	0.13466	1.50020	0.25082	11861	58.7	57.5	
Std. Dev.	0.00046	0.00013	0.00008	154.09	0.58	0.75	
COV, %	0.34	0.01	0.03	1.30	0.98	1.30	

Material Type: **F6273C-07M**
Batch Number: AF010271
Test Method: ASTM D5766-95; SACMA SRM 5-94
Specimen Preconditioning: per Section 3.2 of DOT/FAA/AR-00/47 (2000 Draft Report)
Test Condition: 180 °F (Wet)
Ply Layup, [%, 0/45/90]: **10/80/10**
Ply Stacking Sequence: **$(45/-45/90/45/-45/45/-45/0/45/-45)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 1/29/02
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 50.3%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1720 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	*Specimen Thickness (in.)*	*Specimen Width (in.)*	*Hole Diameter (in.)*	*Ultimate Tensile Load (lbs.)*	*Ultimate Tensile Strength*		*Failure Mode (per Table I Three-Place Failure Mode Codes of ASTM D5766-95)*
					Actual (ksi)	*Nominal (ksi)*	
B-120-1	0.16780	1.50033	0.25070	9633.3	38.3	37.3	Angled-Gage-Middle
B-120-2	0.16907	1.50067	0.25070	9743.3	38.4	37.8	Angled-Gage-Middle
B-120-3	0.16962	1.50050	0.25070	10126	39.8	39.2	Angled-Gage-Middle
A-121-1	0.16985	1.50053	0.25080	9830.5	38.6	38.1	Angled-Gage-Middle
A-121-2	0.17000	1.50072	0.25070	9617.2	37.7	37.3	Angled-Gage-Middle
Average	0.16927	1.50055	0.25072	9790.1	38.5	37.9	
Std. Dev.	0.00089	0.00015	0.00004	206.92	0.77	0.80	
COV, %	0.53	0.01	0.02	2.11	1.99	2.11	

Laminate No Hole Compression Properties, 75 °F (Dry)

Material Type: **F6273C-07M**
Batch Number: AF010271
Test Method: ASTM D6484-99 (modified); SACMA SRM 3-94 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **40/20/40**
Ply Stacking Sequence: **$(0/90/0/90/45/-45/90/0/90/0)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 11/22/02
Test Operator: John Smith
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: C-960401-A
Fiber Volume (average): 49.1%
Nominal Fastener Diameter N/A
Nominal Panel Thickness: 0.1720 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: N/A
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ultimate Compressive Load (lbs.)	Ultimate Compressive Strength Actual (ksi)	Ultimate Compressive Strength Nominal (ksi)	Compressive Modulus (0.1-0.3% strain) Actual (msi)	Compressive Modulus (0.1-0.3% strain) Nominal (msi)	Failure Location & Comments (per Table 1 Three-Place Failure Mode Codes in ASTM D6484-99)
A-210-3	0.16810	1.49950	20431	81.1	79.2	6.89	6.73	Multiple(Angled,Lateral,Splitting)-Gage-Middle
A-210-4	0.16782	1.49935	19411	77.1	75.2	6.88	6.71	Lateral-Gage-Middle
B-211-6	0.16733	1.50077	17809	70.9	69.0	6.89	6.71	Lateral-Gage-Middle
Average	0.16775	1.49987	19217	76.4	74.5	6.89	6.72	
Std. Dev.	0.00039	0.00078	1321.7	5.11	5.12	0.00	0.01	
COV, %	0.23	0.05	6.88	6.69	6.88	0.06	0.16	

Material Type: **F6273C-07M**
Batch Number: AF010271
Test Method: ASTM D6484-99 (modified); SACMA SRM 3-94 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[(45/0/-45/90)_2]_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 11/22/02
Test Operator: John Smith
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: C-960401-A
Fiber Volume (average): 49.2%
Nominal Fastener Diameter N/A
Nominal Panel Thickness: 0.1376 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: N/A
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ultimate Compressive Load (lbs.)	Ultimate Compressive Strength Actual (ksi)	Ultimate Compressive Strength Nominal (ksi)	Compressive Modulus (0.1-0.3% strain) Actual (msi)	Compressive Modulus (0.1-0.3% strain) Nominal (msi)	Failure Location & Comments (per Table 1 Three-Place Failure Mode Codes in ASTM D6484-99)
A-212-1	0.13337	1.50182	15035	75.1	72.8	5.55	5.39	Angled-Gage-Top
B-213-3	0.13507	1.50045	15311	75.5	74.2	5.59	5.49	Lateral-Gage-Top
B-213-5	0.13503	1.50025	16118	79.6	78.1	5.51	5.41	Lateral-Gage-Middle
Average	0.13449	1.50084	15488	76.7	75.0	5.55	5.43	
Std. Dev.	0.00097	0.00085	562.93	2.47	2.73	0.04	0.05	
COV, %	0.72	0.06	3.63	3.22	3.63	0.72	0.98	

Material Type: **F6273C-07M**
Batch Number: AF010271
Test Method: ASTM D6484-99 (modified); SACMA SRM 3-94 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **10/80/10**
Ply Stacking Sequence: **$(45/-45/90/45/-45/45/-45/0/45/-45)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 11/22/02
Test Operator: John Smith
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: C-960401-A
Fiber Volume (average): 49.6%
Nominal Fastener Diameter N/A
Nominal Panel Thickness: 0.1720 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: N/A
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ultimate Compressive Load (lbs.)	Ultimate Compressive Strength Actual (ksi)	Ultimate Compressive Strength Nominal (ksi)	Compressive Modulus (0.1-0.3% strain) Actual (msi)	Compressive Modulus (0.1-0.3% strain) Nominal (msi)	Failure Location & Comments (per Table 1 Three-Place Failure Mode Codes in ASTM D6484-99)
A-214-4	0.16825	1.50037	13083	51.8	50.7	3.82	3.74	Angled-Gage-Top
A-214-5	0.16762	1.50037	13306	52.9	51.6	3.73	3.64	Angled-Gage-Middle
B-215-6	0.16782	1.50105	12840	51.0	49.8	3.80	3.71	Angled-Gage-Top
Average	0.16790	1.50060	13076	51.9	50.7	3.79	3.70	
Std. Dev.	0.00032	0.00039	233.0	0.97	0.90	0.05	0.05	
COV, %	0.19	0.03	1.78	1.87	1.78	1.24	1.41	

Laminate Open Hole Compression Properties, 75 °F (Dry)

Material Type: **F6273C-07M**
Batch Number: AF010271
Test Method: ASTM D6484-99; SACMA SRM 3-94
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **40/20/40**
Ply Stacking Sequence: **$(0/90/0/90/45/-45/90/0/90/0)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 10/12/01
Test Operator: John Smith
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 49.4%
Nominal Fastener Diameter N/A
Nominal Panel Thickness: 0.1720 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Hole Diameter (in.)	Ultimate Compressive Load (lbs.)	Ultimate Compressive Strength Actual (ksi)	Ultimate Compressive Strength Nominal (ksi)	Failure Mode (per Table I Three-Place Failure Mode Codes of ASTM D6484-99)
B-74-6	0.17048	1.50050	0.25070	11268	44.0	43.7	Lateral-Gage-Middle
B-74-7	0.16858	1.50067	0.25080	10776	42.6	41.8	Lateral-Gage-Middle
B-74-8	0.17002	1.50027	0.25080	10576	41.5	41.0	Lateral-Gage-Middle
A-75-7	0.16708	1.50075	0.25080	10719	42.7	41.5	Lateral-Gage-Middle
A-75-8	0.16940	1.49978	0.25080	10924	43.0	42.3	Lateral-Gage-Middle
Average	0.16911	1.50039	0.25078	10852	42.8	42.1	
Std. Dev.	0.00134	0.00039	0.00004	264	0.93	1.02	
COV, %	0.79	0.03	0.02	2.43	2.17	2.43	

Material Type: **F6273C-07M**
Batch Number: AF010271
Test Method: ASTM D6484-99; SACMA SRM 3-94
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[(45/0/-45/90)_2]_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 10/12/01
Test Operator: John Smith
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 49.7%
Nominal Fastener Diameter N/A
Nominal Panel Thickness: 0.1376 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Hole Diameter (in.)	Ultimate Compressive Load (lbs.)	Ultimate Compressive Strength Actual (ksi)	Ultimate Compressive Strength Nominal. (ksi)	Failure Mode (per Table I Three-Place Failure Mode Codes of ASTM D6484-99)
A-97-4	0.13565	1.50045	0.25070	7798.4	38.3	37.8	Lateral-Gage-Middle
A-97-5	0.13540	1.50035	0.25080	8686.8	42.8	42.1	Lateral-Gage-Middle
B-98-3	0.13642	1.50032	0.25090	7812.7	38.2	37.9	Lateral-Gage-Middle
B-98-4	0.13615	1.50042	0.25060	8043.1	39.4	39.0	Lateral-Gage-Middle
B-98-5	0.13537	1.50060	0.25060	7636	37.6	37.0	Lateral-Gage-Middle
Average	0.13580	1.50043	0.25072	7995	39.2	38.7	
Std. Dev.	0.00047	0.00011	0.00013	413	2.07	2.00	
COV, %	0.34	0.01	0.05	5.16	5.27	5.16	

Material Type: **F6273C-07M**
Batch Number: AF010271
Test Method: ASTM D6484-99; SACMA SRM 3-94
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **10/80/10**
Ply Stacking Sequence: **$(45/-45/90/45/-45/45/-45/0/45/-45)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 10/12/01
Test Operator: John Smith
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 50.4%
Nominal Fastener Diameter N/A
Nominal Panel Thickness: 0.1720 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Hole Diameter (in.)	Ultimate Compressive Load (lbs.)	Ultimate Compressive Strength Actual (ksi)	Ultimate Compressive Strength Nominal (ksi)	Failure Mode (per Table I Three-Place Failure Mode Codes of ASTM D6484-99)
B-122-4	0.16957	1.50090	0.25060	9104.7	35.8	35.3	Lateral-Gage-Middle
B-122-5	0.16882	1.50018	0.25080	9100.0	35.9	35.3	Lateral-Gage-Middle
A-123-3	0.17075	1.50060	0.25100	8837.4	34.5	34.3	Lateral-Gage-Middle
A-123-4	0.17053	1.50052	0.25070	9023.3	35.3	35.0	Lateral-Gage-Middle
A-123-5	0.16832	1.50078	0.25070	9382.9	37.1	36.4	Lateral-Gage-Middle
Average	0.16960	1.50060	0.25076	9089.7	35.7	35.2	
Std. Dev.	0.00105	0.00028	0.00015	196	0.97	0.76	
COV, %	0.62	0.02	0.06	2.16	2.73	2.16	

Laminate Open Hole Compression Properties,180°F (Wet)

Material Type: **F6273C-07M**
Batch Number: AF010271
Test Method: ASTM D6484-99; SACMA SRM 3-94
Specimen Preconditioning: per Section 3.2 of DOT/FAA/AR-00/47
Test Condition: 180 °F (Wet)
Ply Layup, [%, 0/45/90]: **40/20/40**
Ply Stacking Sequence: **$(0/90/0/90/45/-45/90/0/90/0)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 10/10/01
Test Operator: John Smith
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 49.4%
Nominal Fastener Diameter N/A
Nominal Panel Thickness: 0.1720 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	*Specimen Thickness (in.)*	*Specimen Width (in.)*	*Hole Diameter (in.)*	*Ultimate Compressive Load (lbs.)*	*Ultimate Compressive Strength Actual (ksi)*	*Ultimate Compressive Strength Nominal (ksi)*	*Failure Mode (per Table I Three-Place Failure Mode Codes of ASTM D6484-99)*
B-74-1	0.17092	1.50008	0.25070	8714.6	34.0	33.8	Lateral-Gage-Middle
B-74-2	0.17120	1.50040	0.25060	8418.5	32.8	32.6	Lateral-Gage-Middle
A-75-1	0.17087	1.49952	0.25080	8814.4	34.4	34.2	Lateral-Gage-Middle
A-75-2	0.17177	1.50080	0.25070	8979.4	34.8	34.8	Lateral-Gage-Middle
A-75-3	0.17133	1.49997	0.25070	8720.1	33.9	33.8	Lateral-Gage-Middle
Average	0.17122	1.50015	0.25070	8729.4	34.0	33.8	
Std. Dev.	0.00036	0.00048	0.00007	204	0.77	0.79	
COV, %	0.21	0.03	0.03	2.34	2.26	2.34	

Material Type: **F6273C-07M**
Batch Number: AF010271
Test Method: ASTM D6484-99; SACMA SRM 3-94
Specimen Preconditioning: per Section 3.2 of DOT/FAA/AR-00/47
Test Condition: 180 °F (Wet)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[(45/0/-45/90)_2]_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 10/10/01
Test Operator: John Smith
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 48.8%
Nominal Fastener Diameter N/A
Nominal Panel Thickness: 0.1376 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	*Specimen Thickness (in.)*	*Specimen Width (in.)*	*Hole Diameter (in.)*	*Ultimate Compressive Load (lbs.)*	*Ultimate Compressive Strength Actual (ksi)*	*Ultimate Compressive Strength Nominal (ksi)*	*Failure Mode (per Table I Three-Place Failure Mode Codes of ASTM D6484-99)*
A-99-3	0.13605	1.50035	0.25090	7165.6	35.1	34.7	Lateral-Gage-Middle
A-99-4	0.13575	1.50052	0.25080	6811.9	33.4	33.0	Lateral-Gage-Middle
B-100-2	0.13658	1.50062	0.25090	6769.5	33.0	32.8	Lateral-Gage-Middle
B-100-3	0.13685	1.50032	0.25090	6625.6	32.3	32.1	Lateral-Gage-Middle
B-100-4	0.13573	1.50057	0.25090	6597.8	32.4	32.0	Lateral-Gage-Middle
Average	0.13619	1.50048	0.25088	6794.1	33.2	32.9	
Std. Dev.	0.00050	0.00013	0.00004	227	1.14	1.10	
COV, %	0.37	0.01	0.02	3.34	3.44	3.34	

Material Type: **F6273C-07M**
Batch Number: AF010271
Test Method: ASTM D6484-99; SACMA SRM 3-94
Specimen Preconditioning: per Section 3.2 of DOT/FAA/AR-00/47
Test Condition: 180 °F (Wet)
Ply Layup, [%, 0/45/90]: **10/80/10**
Ply Stacking Sequence: **$(45/-45/90/45/-45/45/-45/0/45/-45)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 10/10/01
Test Operator: John Smith
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 49.6%
Nominal Fastener Diameter N/A
Nominal Panel Thickness: 0.1720 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	*Specimen Thickness (in.)*	*Specimen Width (in.)*	*Hole Diameter (in.)*	*Ultimate Compressive Load (lbs.)*	*Ultimate Compressive Strength Actual (ksi)*	*Ultimate Compressive Strength Nominal (ksi)*	*Failure Mode (per Table I Three-Place Failure Mode Codes of ASTM D6484-99)*
B-124-1	0.16925	1.50093	0.25080	6694.9	26.4	25.9	Multi-mode(Lateral,Angled)-Gage-Middle
B-124-4	0.16945	1.50012	0.25070	7140.6	28.1	27.7	Multi-mode(Lateral,Angled)-Gage-Middle
A-125-2	0.16897	1.50105	0.25080	6721.1	26.5	26.1	Multi-mode(Lateral,Angled)-Gage-Middle
A-125-3	0.16942	1.50082	0.25080	7055.0	27.7	27.3	Lateral-Gage-Middle
A-125-4	0.16998	1.50078	0.25070	7126.3	27.9	27.6	Multi-mode(Lateral,Angled)-Gage-Middle
Average	0.16941	1.50074	0.25076	6947.6	27.3	26.9	
Std. Dev.	0.00037	0.00036	0.00005	221.29	0.83	0.86	
COV, %	0.22	0.02	0.02	3.19	3.04	3.19	

Laminate Filled Hole Compression Properties,180°F (Wet)

Material Type: **F6273C-07M**
Batch Number: AF010271
Test Method: ASTM D6484-99 (modified); SACMA SRM 3-94 (modified)
Specimen Preconditioning: per Section 3.2 of DOT/FAA/AR-00/47
Test Condition: 180 °F (Wet)
Ply Layup, [%, 0/45/90]: **40/20/40**
Ply Stacking Sequence: **$(0/90/0/90/45/-45/90/0/90/0)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 12/21/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 487.4%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1720 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: Pin=NAS1134V3A; Collar=MS21042L4

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Hole Diameter (in.)	Ultimate Compressive Load (lbs.)	Ultimate Compressive Strength Actual (ksi)	Ultimate Compressive Strength Nominal (ksi)	Failure Mode (per Table I Three-Place Failure Mode Codes of ASTM D6484-99)
B-72-1	0.17227	1.50028	0.25090	15611.3	60.4	60.5	Angled-Gage-Middle
A-73-1	0.16872	1.50015	0.25080	14580.4	57.6	56.5	Angled-Gage-Middle
A-73-2	0.17128	1.50060	0.25080	15207.4	59.2	58.9	Angled-Gage-Middle
A-73-3	0.17245	1.50023	0.25070	15233.3	58.9	59.0	Lateral-Gage-Top
B-72-3	0.17265	1.50038	0.25070	14239.6	55.0	55.2	Lateral-Gage-Middle
Average	0.17147	1.50033	0.25078	14974.4	58.2	58.0	
Std. Dev.	0.00163	0.00017	0.00008	553	2.06	2.14	
COV, %	0.95	0.01	0.03	3.69	3.55	3.69	

Material Type: **F6273C-07M**
Batch Number: AF010271
Test Method: ASTM D6484-99 (modified); SACMA SRM 3-94 (modified)
Specimen Preconditioning: per Section 3.2 of DOT/FAA/AR-00/47
Test Condition: 180 °F (Wet)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[(45/0/-45/90)_2]_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 12/21/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 49.2%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1376 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: Pin=NAS1134V3A; Collar=MS21042L4

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Hole Diameter (in.)	Ultimate Compressive Load (lbs.)	Ultimate Compressive Strength Actual (ksi)	Ultimate Compressive Strength Nominal (ksi)	Failure Mode (per Table I Three-Place Failure Mode Codes of ASTM D6484-99)
A-93-3	0.13695	1.50038	0.25100	10921	53.1	52.9	Lateral-Gage-Middle
A-93-4	0.13683	1.50073	0.25090	11711	57.0	56.7	Lateral-Gage-Middle
A-93-5	0.13615	1.49973	0.25090	11087	54.3	53.7	Lateral-Gage-Middle
B-94-4	0.13668	1.50077	0.25100	10567	51.5	51.2	Lateral-Gage-Middle
B-94-5	0.13612	1.50078	0.25080	10195	49.9	49.4	Lateral-Gage-Middle
Average	0.13655	1.50048	0.25092	10896	53.2	52.8	
Std. Dev.	0.00039	0.00045	0.00008	570	2.72	2.76	
COV, %	0.28	0.03	0.03	5.23	5.11	5.23	

Material Type: **F6273C-07M**
Batch Number: AF010271
Test Method: ASTM D6484-99 (modified); SACMA SRM 3-94 (modified)
Specimen Preconditioning: per Section 3.2 of DOT/FAA/AR-00/47
Test Condition: 180 °F (Wet)
Ply Layup, [%, 0/45/90]: **10/80/10**
Ply Stacking Sequence: **$(45/-45/90/45/-45/45/-45/0/45/-45)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 1/2/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 49.6%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1720 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: Pin=NAS1134V3A; Collar=MS21042L4

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Hole Diameter (in.)	Ultimate Compressive Load (lbs.)	Ultimate Compressive Strength Actual (ksi)	Ultimate Compressive Strength Nominal (ksi)	Failure Mode (per Table I Three-Place Failure Mode Codes of ASTM D6484-99)
B-118-3	0.17098	1.50045	0.25070	8372.0	32.6	32.4	Angled-Gage-Top
B-118-4	0.17167	1.50037	0.25070	8592.1	33.4	33.3	Lateral-Gage-Top
B-118-5	0.16910	1.50072	0.25070	8333.4	32.8	32.3	Lateral-Gage-Top
A-119-4	0.17028	1.50083	0.25070	8460.5	33.1	32.8	Lateral-Gage-Bottom
A-119-5	0.16937	1.50047	0.25070	8356.4	32.9	32.4	Lateral-Gage-Top
Average	0.17028	1.50057	0.25070	8422.9	33.0	32.6	
Std. Dev.	0.00108	0.00020	0.00000	106	0.28	0.41	
COV, %	0.63	0.01	0.00	1.26	0.84	1.26	

Laminate Bearing Tension, Double Shear Properties, 75 °F (Dry)

Material Type: **F6273C-07M**
Batch Number: AF010271
Test Method: ASTM D5961-96
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **40/20/40**
Ply Stacking Sequence: **$(0/90/0/90/45/-45/90/0/90/0)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 10/18/01
Test Operator: John Smith
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 49.8%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1720 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V12A; Collar=MS21042L4

Specimen Number	*Specimen Thickness (in.)*	*Specimen Width (in.)*	*Hole Diameter (in.)*	*Ultimate Tensile Load (lbs.)*	*Ultimate Double Shear Bearing Strength*		*Failure Mode (per Figure 9 Bearing Test Failure Codes with Illustration of Common Modes of ASTM D5961-96)*
					Actual (ksi)	*Nominal (ksi)*	
B-76-11	0.17147	1.50055	0.25075	4845.6	113	113	Bearing-1st hole-Bolt & Nut sides
B-76-10	0.17070	1.50045	0.25075	4866.7	114	113	Bearing-1st hole-Bolt & Nut sides
A-77-10	0.17027	1.50027	0.25070	4729.0	111	110	Bearing-1st hole-Bolt & Nut sides
A-77-11	0.17115	1.50040	0.25080	4768.4	111	111	Bearing-1st hole-Bolt & Nut sides
A-77-12	0.17117	1.50095	0.25060	4805.1	112	112	Bearing-1st hole-Bolt & Nut sides
Average	0.17095	1.50052	0.25072	4803.0	112	112	
Std. Dev.	0.00047	0.00026	0.00008	56.0	1.19	1.30	
COV, %	0.27	0.02	0.03	1.17	1.06	1.17	

Material Type: **F6273C-07M**
Batch Number: AF010271
Test Method: ASTM D5961-96
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[(45/0/-45/90)_2]_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 11/1/01
Test Operator: John Smith
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 50.4%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1376 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V12A; Collar=MS21042L4

Specimen Number	*Specimen Thickness (in.)*	*Specimen Width (in.)*	*Hole Diameter (in.)*	*Ultimate Tensile Load (lbs.)*	*Ultimate Double Shear Bearing Strength*		*Failure Mode (per Figure 9 Bearing Test Failure Codes with Illustration of Common Modes of ASTM D5961-96)*
					Actual (ksi)	*Nominal (ksi)*	
A-101-10	0.13440	1.50032	0.25010	4884.3	145	142	Bearing-1st hole-Bolt & Nut sides
A-101-11	0.13510	1.50040	0.25080	4764.7	141	139	Bearing-1st hole-Bolt & Nut sides
A-101-12	0.13505	1.50035	0.25080	4591.1	136	133	Bearing-1st hole-Bolt & Nut sides
B-102-10	0.13370	1.50060	0.25090	4970.2	148	144	Bearing-1st hole-Bolt & Nut sides
B-102-11	0.13478	1.50043	0.25080	4788.1	142	139	Bearing-1st hole-Bolt & Nut sides
Average	0.13461	1.50042	0.25068	4799.7	142	140	
Std. Dev.	0.00058	0.00011	0.00033	142.39	4.80	4.14	
COV, %	0.43	0.01	0.13	2.97	3.38	2.97	

Laminate Bearing Tension, Double Shear Properties, 180 °F (Wet)

Material Type: **F6273C-7M**
Batch Number: AF010271
Test Method: ASTM D5961-96
Specimen Preconditioning: per Section 3.2 of DOT/FAA/AR-00/47 (2000 Draft Report)
Test Condition: 180 °F (Wet)
Ply Layup, [%, 0/45/90]: **40/20/40**
Ply Stacking Sequence: **$(0/90/0/90/45/-45/90/0/90/0)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 12/20/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 49.6%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1720 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V12A; Collar=MS21042L4

Specimen Number	*Specimen Thickness (in.)*	*Specimen Width (in.)*	*Hole Diameter (in.)*	*Ultimate Tensile Load (lbs.)*	*Ultimate Double Shear Bearing Strength*		*Failure Mode (per Figure 9 Bearing Test Failure Codes with Illustration of Common Modes of ASTM D5961)*
					Actual (ksi)	*Nominal (ksi)*	
B-76-1	0.16553	1.50072	0.25080	4159.6	100	96.7	Bearing-1st hole-Bolt & Nut sides
B-76-2	0.16915	1.50053	0.25070	4134.7	97.5	96.2	Bearing-1st hole-Bolt & Nut sides
A-77-1	0.16807	1.50050	0.25070	4029.9	95.6	93.7	Bearing-1st hole-Bolt & Nut sides
A-77-2	0.16913	1.50048	0.25070	4054.3	95.6	94.3	Bearing-1st hole-Bolt & Nut sides
A-77-3	0.17017	1.50032	0.25090	4176.6	97.8	97.1	Bearing-1st hole-Bolt & Nut sides
Average	0.16841	1.50051	0.25076	4111.0	97.4	95.6	
Std. Dev.	0.00177	0.00014	0.00009	65.2	1.89	1.52	
COV, %	1.05	0.01	0.04	1.59	1.94	1.59	

Material Type: **F6273C-7M**
Batch Number: AF010271
Test Method: ASTM D5961-96
Specimen Preconditioning: per Section 3.2 of DOT/FAA/AR-00/47 (2000 Draft Report)
Test Condition: 180 °F (Wet)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[(45/0/-45/90)_2]_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 12/20/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 50.4%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1376 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V12A; Collar=MS21042L4

Specimen Number	*Specimen Thickness (in.)*	*Specimen Width (in.)*	*Hole Diameter (in.)*	*Ultimate Tensile Load (lbs.)*	*Ultimate Double Shear Bearing Strength*		*Failure Mode (per Figure 9 Bearing Test Failure Codes with Illustration of Common Modes of ASTM D5961)*
					Actual (ksi)	*Nominal (ksi)*	
A-101-1	0.13325	1.49998	0.25090	4216.5	126	123	Bearing-1st hole-Bolt & Nut sides
A-101-2	0.13448	1.50052	0.25080	4242.2	126	123	Bearing-1st hole-Bolt & Nut sides
B-102-1	0.13260	1.50060	0.25090	4158.6	125	121	Bearing-1st hole-Bolt & Nut sides
B-102-2	0.13320	1.50050	0.25090	4311.6	129	125	Bearing-1st hole-Bolt & Nut sides
B-102-3	0.13720	1.50042	0.25080	4324.5	126	126	Bearing-1st hole-Bolt & Nut sides
Average	0.13415	1.50040	0.25086	4250.7	126	124	
Std. Dev.	0.00184	0.00025	0.00005	68.7	1.56	2.00	
COV, %	1.37	0.02	0.02	1.62	1.24	1.62	

Laminate Bearing Tension, Single Shear Properties, 75°F (Dry)

Material Type: **F6273C-07M**
Batch Number: AF010271
Test Method: ASTM D5961-96
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **40/20/40**
Ply Stacking Sequence: **$(0/90/0/90/45/-45/90/0/90/0)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 11/1/01
Test Operator: John Smith
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 49.0%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1720 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V9A; Collar=MS21042L4

ID of Specimen		Specimen Thickness		Hole Diameter of Specimen		Tensile Load at 4% Hole Elongation	Bearing Strength at 4% Hole Elongation			Failure Mode (per Figure 9 Bearing Test Failure Codes with illustration of common modes of ASTM D5961-96)
nut side #1	bolt side #2	#1 (in.)	#2 (in.)	#1 (in.)	#2 (in.)	(lbs.)	Actual (#1) (ksi)	Actual (#2) (ksi)	Nominal (ksi)	
B-80-10	B-80-3	0.17242	0.17197	0.25080	0.25080	5889.9	68.1	68.3	68.5	None - stopped test just above 4% strain
B-80-4	B-80-11	0.17200	0.17292	0.25070	0.25080	5435.3	63.0	62.7	63.2	None - stopped test just above 4% strain
A-81-10	A-81-3	0.17175	0.17183	0.25080	0.25080	5372.0	62.4	62.3	62.5	None- stopped test just above 4% strain
A-81-11	A-81-4	0.17265	0.17342	0.25080	0.25080	5202.0	60.1	59.8	60.5	None - stopped test just above 4% strain
A-81-12	A-81-5	0.17302	0.17403	0.25070	0.25090	5928.4	68.3	67.9	68.9	None - stopped test just above 4% strain
Average		0.17237	0.17283	0.25076	0.25082	5565.5	64.4	64.2	64.7	
Std. Dev.		0.00051	0.00094	0.00005	0.00004	325.37	3.68	3.72	3.78	
COV, %		0.29	0.54	0.02	0.02	5.85	5.71	5.80	5.85	

Material Type: **F6273C-07M**
Batch Number: AF010271
Test Method: ASTM D5961-96
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[(45/0/-45/90)_2]_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 11/8/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 49.4%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1376 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V8A; Collar=MS21042L4

ID of Specimens		Specimen Thickness		Hole Diameter		Tensile Load at 4% Hole Elongation	Bearing Strength at 4 % Hole Elongation			Failure Mode (per Figure 9 Bearing Test Failure Codes with illustration of common modes of ASTM D5961-96)
nut side #1	bolt side #2	#1 (in.)	#2 (in.)	#1 (in.)	#2 (in.)	(lbs.)	Actual (#1) (ksi)	Actula (#2) (ksi)	Nominal ksi	
A-105-10	A-105-3	0.13713	0.13760	0.25070	0.25080	4982.9	72.5	72.2	72.4	None - stopped test just above 4% strain
A-105-11	A-105-4	0.13773	0.13805	0.25100	0.25080	5190.4	75.1	75.0	75.4	None - stopped test just above 4% strain
A-105-12	A-105-5	0.13773	0.13792	0.25100	0.25080	4928.4	71.3	71.2	71.6	None - stopped test just above 4% strain
B-106-10	B-106-3	0.13658	0.13687	0.25000	0.25080	5453.8	79.9	79.4	79.3	None - stopped test just above 4% strain
B-106-11	B-106-4	0.13738	0.13725	0.25000	0.25080	5051.4	73.5	73.4	73.4	None - stopped test just above 4% strain
Average		0.13731	0.13754	0.25054	0.25080	5121.4	74.4	74.2	74.4	
Std. Dev.		0.00048	0.00049	0.00051	0.00000	210.11	3.33	3.22	3.05	
COV, %		0.35	0.35	0.20	0.00	4.10	4.48	4.34	4.10	

Laminate Bearing Tension, Single Shear Properties, 180°F (Wet)

Material Type: **F6273C-07M**
Batch Number: AF010271
Test Method: ASTM D5961-96
Specimen Preconditioning: per Section 3.2 of DOT/FAA/AR-00/47 (2000 Draft Report)
Test Condition: 180 °F (Wet)
Ply Layup, [%, 0/45/90]: **40/20/40**
Ply Stacking Sequence: **$(0/90/0/90/45/-45/90/0/90/0)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 12/21/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 49.5%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1720 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V9A; Collar=MS21042L4

ID of Specimen		Specimen Thickness		Hole Diameter of Specimen		Tensile Load at 4% Hole Elongation	Bearing Strength at 4 % Hole Elongation			Failure Mode (per Figure 9 Bearing Test Failure Codes with illustration of common modes of ASTM D5961)
nut side #1	bolt side #2	#1 (in.)	#2 (in.)	#1 (in.)	#2 (in.)	(lbs.)	Actual (#1) (ksi)	Actual (#2) (ksi)	Nominal (ksi)	
B-78-1	B-78-8	0.16803	0.16793	0.25080	0.25080	4629.4	54.9	55.0	53.8	Bearing-Both holes-Bolt & Nut sides
B-78-2	B-78-9	0.16948	0.16960	0.25080	0.25080	4806.0	56.5	56.5	55.9	Bearing-Both holes-Bolt & Nut sides
B-78-3	B-78-10	0.17115	0.17087	0.25080	0.25080	5383.0	62.7	62.8	62.6	Bearing-Both holes-Bolt & Nut sides
A-79-1	A-79-8	0.16552	0.16673	0.25080	0.25080	4738.6	57.1	56.7	55.1	Fastener-Fastener-Bolt & Nut sides
A-79-2	A-79-9	0.16992	0.16862	0.25080	0.25080	4633.9	54.4	54.8	53.9	Fastener-Fastener-Bolt & Nut sides
Average		0.16882	0.16875	0.25080	0.25080	4838.2	57.1	57.1	56.3	
Std. Dev.		0.00216	0.00158	0.00000	0.00000	313.50	3.31	3.28	3.65	
COV, %		1.28	0.94	0.00	0.00	6.48	5.80	5.74	6.48	

Material Type: **F6273C-07M**
Batch Number: AF010271
Test Method: ASTM D5961-96
Specimen Preconditioning: per Section 3.2 of DOT/FAA/AR-00/47 (2000 Draft Report)
Test Condition: 180 °F (Wet)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[(45/0/-45/90)_2]_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 11/8/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 49.2%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1376 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V8A; Collar=MS21042L4

ID of Specimens		Specimen Thickness		Hole Diameter		Tensile Load 4% Hole Elongation	Bearing Strength at 4% Hole Elongation			Failure Mode (per Figure 9 Bearing Test Failure Codes with illustration of common modes of ASTM D5961)
nut side #1	bolt side #2	#1 (in.)	#2 (in.)	#1 (in.)	#2 (in.)	(lbs.)	Actual (#1) (ksi)	Actual (#2) (ksi)	Nominal (ksi)	
B-104-1	B-104-8	0.13047	0.12972	0.25090	0.25090	4697.1	71.7	72.2	68.3	Bearing-Both holes-Bolt & Nut sides
B-104-2	B-104-9	0.13400	0.13377	0.25090	0.25090	4034.7	60.0	60.1	58.6	Bearing-Both holes-Bolt & Nut sides
B-104-3	B-104-10	0.13632	0.13620	0.25090	0.25090	4893.4	71.5	71.6	71.1	Bearing-Both holes-Bolt & Nut sides
A-103-1	A-103-8	0.13158	0.13142	0.25090	0.25090	4637.2	70.2	70.3	67.4	Bearing-Both holes-Bolt & Nut sides
A-103-2	A-103-9	0.13363	0.13455	0.25090	0.25090	4556.0	67.9	67.5	66.2	Bearing-Both holes-Bolt & Nut sides
Average		0.13320	0.13313	0.25090	0.25090	4563.7	68.3	68.3	66.3	
Std. Dev.		0.00227	0.00257	0.00000	0.00000	320.86	4.87	4.94	4.66	
COV, %		1.71	1.93	0.00	0.00	7.03	7.14	7.23	7.03	

Laminate Bearing-Bypass, Single Shear Properties, 75°F (Dry)

Material Type: **F6273C-07M**
Batch Number: AF010271
Test Method: ASTM D5961-96 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **40/20/40**
Ply Stacking Sequence: **$(0/90/0/90/45/-45/90/0/90/0)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 11/15/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 49.5%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1720 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V6A; Collar=MS21042L4

Tension

Specimen ID		Specimen Thickness		Specimen Width		Hole Diameter		Ultimate	Ultimate Gross Bypass Strength		
#1 Nut side	#2 Bolt side	#1 (inch)	#2 (inch)	#1 (inch)	#2 (inch)	#1 (inch)	#2 (inch)	Tensile Load (Lbs)	Actual (#1) (ksi)	Actual (#2) (ksi)	Nominal (ksi)
B-82-1	B-82-2	0.17062	0.17173	1.50055	1.50053	0.25080	0.25070	8081.9	31.6	31.4	31.3
B-82-3	B-82-4	0.17300	0.17310	1.50065	1.50115	0.25105	0.25090	8516.2	32.8	32.8	33.0
B-82-5	B-82-6	0.17280	0.17217	1.50060	1.50018	0.25100	0.25100	8218.6	31.7	31.8	31.9
A-83-1	A-83-2	0.17265	0.17440	1.50125	1.50050	0.25065	0.25110	7393.5	28.5	28.3	28.7
A-83-3	A-83-4	0.17398	0.17245	1.50021	1.50137	0.25090	0.25085	7754.8	29.7	30.0	30.1
Average		0.17261	0.17277	1.50065	1.50075	0.25088	0.25091	7993.0	30.9	30.8	31.0
Std. Dev.		0.00123	0.00104	0.00038	0.00050	0.00016	0.00015	432.63	1.71	1.76	1.68
COV, %		0.71	0.60	0.03	0.03	0.06	0.06	5.41	5.55	5.72	5.41

Specimen ID		Ultimate Net Bypass Strength			Ultimate Bearing Strength			Failure Mode
#1 Nut side	#2 Bolt side	Actual (#1) (ksi)	Actual (#2) (ksi)	Nominal (ksi)	Actual (#1) (ksi)	Actual (#2) (ksi)	Nominal (ksi)	(Per Figur 9 Bearing Test Failure Codes with Illustrations of Common Modes of ASTM D5961-96)
B-82-1	B-82-2	15.8	15.7	15.7	94.4	93.9	94.0	Bearing-Both holes-Bolt & Nut side
B-82-3	B-82-4	16.4	16.4	16.5	98.0	98.0	99.0	Bearing-Both holes-Bolt & Nut side
B-82-5	B-82-6	15.8	15.9	15.9	94.7	95.1	95.6	Bearing-Both holes-Bolt & Nut side
A-83-1	A-83-2	14.3	14.1	14.3	85.4	84.4	86.0	Bearing-Both holes-Bolt & Nut side
A-83-3	A-83-4	14.9	15.0	15.0	88.8	89.6	90.2	Bearing-Both holes-Bolt & Nut side
Average		15.4	15.4	15.5	92.3	92.2	92.9	
Std. Dev.		0.86	0.88	0.84	5.07	5.30	5.03	
COV, %		5.55	5.72	5.41	5.49	5.75	5.41	

Material Type: **F6273C-07M**
Batch Number: AF010271
Test Method: ASTM D5961-96 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **40/20/40**
Ply Stacking Sequence: **$(0/90/0/90/45/-45/90/0/90/0)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 12/6/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 49.0%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1720 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V6A; Collar=MS21042L4

Compression

Specimen ID		Specimen Thickness		Specimen Width		Hole Diameter		Ultimate	Ultimate Bypass Strength		
Nut side #1	Bolt side #2	#1 (inch)	#2 (inch)	#1 (inch)	#2 (inch)	#1 (inch)	#2 (inch)	Tensile Load (Lbs)	Actual (#1) (ksi)	Actual (#2) (ksi)	Nominal (ksi)
B-84-1	B-84-2	0.1706	0.17253	1.50102	1.50038	0.25095	0.25110	9524.2	18.6	18.4	18.5
B-84-3	B-84-4	0.17288	0.17327	1.50043	1.50118	0.25095	0.25100	9260.5	17.9	17.8	17.9
A-85-1	A-85-2	0.16875	0.17180	1.50028	1.50117	0.25100	0.25100	8679.0	17.1	16.8	16.8
A-85-3	A-85-4	0.17047	0.17048	1.50075	1.50127	0.25090	0.25105	9611.9	18.8	18.8	18.6
A-85-5	A-85-6	0.17092	0.16995	1.50102	1.50102	0.25080	0.25095	8731.4	17.0	17.1	16.9
Average		0.17072	0.17161	1.50070	1.50100	0.25092	0.25102	9161.4	17.9	17.8	17.8
Std. Dev.		0.00147	0.00138	0.00034	0.00036	0.00008	0.00006	436.46	0.81	0.83	0.85
COV, %		0.86	0.81	0.02	0.02	0.03	0.02	4.76	4.53	4.65	4.76

Specimen ID		Ultimate Bearing Strength			Failure Mode
Nut side #1	Bolt side #2	Actual (#1) (ksi)	Actual (#2) (ksi)	Nominal (ksi)	(Per Figur 9 Bearing Test Failure Codes with Illustrations of Common Modes of ASTM D5961-96))
B-84-1	B-84-2	111	110	111	Lateral(net tension)-2nd hole-Bolt side
B-84-3	B-84-4	107	106	108	Lateral(net tension)-1st hole-Nut side
A-85-1	A-85-2	102	101	101	Lateral(net tension)-2nd hole-Bolt side
A-85-3	A-85-4	112	112	112	Lateral(net tension)-2nd hole-Bolt side
A-85-5	A-85-6	102	102	102	Lateral(net tension)-1st hole-Nut side
Average		107	106	107	
Std. Dev.		4.85	4.92	5.08	
COV, %		4.53	4.62	4.76	

Laminate Bearing-Bypass, Single Shear Properties, 75°F (Dry)

Material Type: **F6273C-07M**
Batch Number: AF010271
Test Method: ASTM D5961-96 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[]_{45/0/-45/90)_2]_S}$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 11/9/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 49.3%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1376 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V5A; Collar=MS21042L4

Tension

Specimen ID		Specimen Thickness		Specimen Width		Hole Diameter		Ultimate	Ultimate Gross Bypass Strength		
Nut side #1	Bolt side #2	#1 (inch)	#2 (inch)	#1 (inch)	#2 (inch)	#1 (inch)	#2 (inch)	Tensile Load (Lbs)	Actual (#1) (ksi)	Actual (#2) (ksi)	Nominal (ksi)
A-107-1	A-107-2	0.13430	0.13550	1.50037	1.50110	0.25085	0.25085	9160.0	45.5	45.0	44.4
A-107-3	A-107-4	0.13630	0.13708	1.50063	1.50050	0.25090	0.25090	9331.8	45.6	45.4	45.2
A-107-5	A-107-6	0.13615	0.13625	1.50103	1.50095	0.25085	0.25100	9328.5	45.6	45.6	45.2
B-108-3	B-108-4	0.13702	0.13767	1.50038	1.50095	0.25045	0.25005	9283.6	45.2	44.9	45.0
B-108-1	B-108-2	0.13673	0.13743	1.50108	1.50050	0.25105	0.25070	9401.1	45.8	45.6	45.5
Average		0.13610	0.13679	1.50070	1.50080	0.25082	0.25070	9301.0	45.5	45.3	45.1
Std. Dev.		0.00106	0.00090	0.00034	0.00028	0.00022	0.00038	89.315	0.25	0.31	0.43
COV, %		0.78	0.66	0.02	0.02	0.09	0.15	0.96	0.54	0.70	0.96

Specimen ID		Ultimate Net Bypass Strength			Ultimate Bearing Strength			Failure Mode
Nut side #1	Bolt side #2	Actual (#1) (ksi)	Actual (#2) (ksi)	Nominal (ksi)	Actual (#1) (ksi)	Actual (#2) (ksi)	Nominal (ksi)	(Per Figur 9 Bearing Test Failure Codes with Illustrations of Common Modes of ASTM D5961-96)
A-107-1	A-107-2	22.7	22.5	22.2	136	135	133	Lateral Tension-First hole-Bolt side
A-107-3	A-107-4	22.8	22.7	22.6	136	136	136	Bearing-Both holes-Bolt & Nut side
A-107-5	A-107-6	22.8	22.8	22.6	137	136	136	Bearing-Both holes-Bolt & Nut side
B-108-3	B-108-4	22.6	22.5	22.5	135	135	135	Bearing-Both holes-Bolt & Nut side
B-108-1	B-108-2	22.9	22.8	22.8	137	136	137	Bearing-Both holes-Bolt & Nut side
Average		22.8	22.7	22.5	136	136	135	
Std. Dev.		0.12	0.16	0.22	0.65	0.81	1.30	
COV, %		0.54	0.70	0.96	0.47	0.60	0.96	

Material Type: **F6273C-07M**
Batch Number: AF010271
Test Method: ASTM D5961-96 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[]_{45/0/-45/90)_2]_S}$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 12/4/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 49.5%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1376 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V5A; Collar=MS21042L4

Compression

Specimen ID		Specimen Thickness		Specimen Width		Hole Diameter		Ultimate	Ultimate Bypass Strength		
Nut side #1	Bolt side #2	#1 (inch)	#2 (inch)	#1 (inch)	#2 (inch)	#1 (inch)	#2 (inch)	Tensile Load (Lbs)	Actual (#1) (ksi)	Actual (#2) (ksi)	Nominal (ksi)
A-109-2	A-109-1	0.13670	0.13660	1.50092	1.50040	0.25055	0.2506	8125.9	19.8	19.8	19.7
A-109-4	A-109-3	0.13755	0.13735	1.50092	1.50085	0.25080	0.25070	7995.5	19.4	19.4	19.4
B-110-1	B-110-2	0.13527	0.13458	1.49932	1.50103	0.25070	0.25090	8170.8	20.1	20.2	19.8
B-110-3	B-110-4	0.13753	0.13876	1.50072	1.50105	0.25105	0.2507	8090.8	19.6	19.4	19.6
B-110-5	B-110-6	0.13890	0.13740	1.50055	1.50085	0.25065	0.2507	8113.2	19.5	19.7	19.7
Average		0.13719	0.13694	1.50049	1.50084	0.25075	0.25072	8099.2	19.7	19.7	19.6
Std. Dev.		0.00133	0.00153	0.00067	0.00026	0.00019	0.00011	64.922	0.31	0.34	0.16
COV, %		0.97	1.12	0.04	0.02	0.08	0.04	0.80	1.57	1.72	0.80

Specimen ID		Ultimate Bearing Strength			Failure Mode
Nut side #1	Bolt side #2	Actual (#1) (ksi)	Actual (#2) (ksi)	Nominal (ksi)	(Per Figur 9 Bearing Test Failure Codes with Illustrations of Common Modes of ASTM D5961-96)
A-109-2	A-109-1	119	119	118	Lateral(net tension)-2nd hole-Nut side
A-109-4	A-109-3	116	116	116	Bearing-Both holes-Bolt & Nut side
B-110-1	B-110-2	120	121	119	Lateral(net tension)-2nd hole-Bolt side
B-110-3	B-110-4	117	116	118	Lateral(net tension)-2nd hole-Nut side
B-110-5	B-110-6	117	118	118	Lateral(net tension)-2nd hole-Bolt side
Average		118	118	118	
Std. Dev.		1.84	2.00	0.94	
COV, %		1.56	1.70	0.80	

Laminate Bearing-Bypass, Single Shear Properties, 75°F (Dry)

Material Type: **F6273C-07M**
Batch Number: AF010271
Test Method: ASTM D5961-96 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **10/80/10**
Ply Stacking Sequence: **$(45/-45/90/45/-45/45/-45/0/45/-45)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 11/15/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 50.0%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1720 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V6A; Collar=MS21042L4

Tension

Specimen ID		Specimen Thickness		Specimen Width		Hole Diameter		Ultimate	Ultimate Gross Bypass Strength		
Nut side #1	Bolt side #2	#1 (inch)	#2 (inch)	#1 (inch)	#2 (inch)	#1 (inch)	#2 (inch)	Tensile Load (Lbs)	Actual (#1) (ksi)	Actual (#2) (ksi)	Nominal (ksi)
B-126-1	B-126-2	0.16722	0.16855	1.50058	1.50153	0.25070	0.25070	9194.7	36.6	36.3	35.6
B-126-3	B-126-4	0.16935	0.17043	1.50107	1.50087	0.25110	0.25070	9476.3	37.3	37.0	36.7
B-126-5	B-126-6	0.17085	0.17067	1.50137	1.50050	0.25095	0.25080	9645.5	37.6	37.7	37.4
A-127-1	A-127-2	0.16878	0.16862	1.50090	1.50092	0.25075	0.25080	9150.8	36.1	36.2	35.5
A-127-3	A-127-4	0.16995	0.17018	1.50083	1.50085	0.25070	0.25090	9486.2	37.2	37.1	36.8
Average		0.16923	0.16969	1.50095	1.50093	0.25084	0.25078	9390.7	37.0	36.9	36.4
Std. Dev.		0.00136	0.00102	0.00029	0.00037	0.00018	0.00008	210.56	0.58	0.62	0.82
COV, %		0.80	0.60	0.02	0.02	0.07	0.03	2.24	1.58	1.68	2.24

Specimen ID		Ultimate Net Bypass Strength			Ultimate Bearing Strength			Failure Mode
Nut side #1	Bolt side #2	Actual (#1) (ksi)	Actual (#2) (ksi)	Nominal (ksi)	Actual (#1) (ksi)	Actual (#2) (ksi)	Nominal (ksi)	(Per Figur 9 Bearing Test Failure Codes with Illustrations of Common Modes of ASTM D5961-96)
B-126-1	B-126-2	18.3	18.2	17.8	110	109	107	Fastener-First hole-Nut side
B-126-3	B-126-4	18.6	18.5	18.4	111	111	110	Fastener-First hole-Nut side
B-126-5	B-126-6	18.8	18.8	18.7	112	113	112	Fastener-First hole-Nut side
A-127-1	A-127-2	18.1	18.1	17.7	108	108	106	Fastener-First hole-Nut side
A-127-3	A-127-4	18.6	18.6	18.4	111	111	110	Fastener-First hole-Nut side
Average		18.5	18.4	18.2	111	110	109	
Std. Dev.		0.29	0.31	0.41	1.72	1.82	2.45	
COV, %		1.58	1.68	2.24	1.55	1.65	2.24	

Material Type: **F6273C-07M**
Batch Number: AF010271
Test Method: ASTM D5961-96 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **10/80/10**
Ply Stacking Sequence: **$(45/-45/90/45/-45/45/-45/0/45/-45)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 12/5/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 49.6%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1720 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V6A; Collar=MS21042L4

Compression

Specimen ID		Specimen Thickness		Specimen Width		Hole Diameter		Ultimate	Ultimate Bypass Strength		
Nut side #1	Bolt side #2	#1 (inch)	#2 (inch)	#1 (inch)	#2 (inch)	#1 (inch)	#2 (inch)	Comp. Load (Lbs)	Actual (#1) (ksi)	Actual (#2) (ksi)	Nominal (ksi)
B-128-1	B-128-2	0.16902	0.17087	1.50123	1.50045	0.25065	0.25065	9063.6	17.9	17.7	17.6
B-128-3	B-128-4	0.17210	0.16985	1.50050	1.50118	0.25065	0.25070	9453.6	18.3	18.5	18.3
A-129-1	A-129-2	0.16788	0.16967	1.50082	1.50103	0.25090	0.25105	9376.7	18.6	18.4	18.2
A-129-3	A-129-4	0.16917	0.17072	1.50120	1.50088	0.25095	0.25075	9171.7	18.1	17.9	17.8
A-129-5	A-129-6	0.17142	0.17197	1.50098	1.50068	0.25065	0.25095	9325.0	18.1	18.1	18.1
Average		0.16992	0.17062	1.50095	1.50084	0.25076	0.25082	9278.1	18.2	18.1	18.0
Std. Dev.		0.00177	0.00092	0.00030	0.00029	0.00015	0.00017	158.16	0.28	0.36	0.31
COV, %		1.04	0.54	0.02	0.02	0.06	0.07	1.70	1.55	1.97	1.70

Specimen ID		Ultimate Bearing Strength			Failure Mode
Nut side #1	Bolt side #2	Actual (#1) (ksi)	Actual (#2) (ksi)	Nominal (ksi)	(Per Figur 9 Bearing Test Failure Codes with Illustrations of Common Modes of ASTM D5961-96)
B-128-1	B-128-2	107.0	105.8	105.4	Lateral(net tension)-1st hole-Bolt side
B-128-3	B-128-4	109.6	111.0	109.9	See Note: *
A-129-1	A-129-2	111.3	110.1	109.0	See Note: *
A-129-3	A-129-4	108.0	107.1	106.6	See Note: *
A-129-5	A-129-6	108.5	108.0	108.4	Lateral(net tension)-2nd hole-Bolt side
Average		108.9	108.4	107.9	
Std. Dev.		1.65	2.12	1.84	
COV, %		1.52	1.96	1.70	

Note: * Failure mode of specimens --- Lateral (net tension)-Both holes-Bolt side (2nd hole) & Nut side side (1st hole)

Laminate Bearing-Bypass, Double Shear Properties, 75°F (Dry)

Material Type: **F6273C-7M**
Batch Number: AF010271
Test Method: ASTM D5961-96 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **40/20/40**
Ply Stacking Sequence: **$(0/90/0/90/45/-45/90/0/90/0)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 12/18/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 49.5%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1720 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V4A; Collar=MS21042L4

Tension

Specimen ID	Specimen Thickness			Specimen Width			Specimen Hole Diameter			Ultimate Load	Ultimate Gross Bypass Strength		Ultimate Net Bypass Strength	
	Specimen inch	Plate #1 Nut side (inch)	Plate#2 Bolt side (inch)	Specimen inch	Plate #1 Nut side (inch)	Plate#2 Bolt side (inch)	Hole #1 inch	Hole #2 (inch)	Nominal (inch)	(lbs)	Actual (ksi)	Nominal (ksi)	Actual (ksi)	Nominal (ksi)
A-89-1	0.16622	0.03380	0.03420	1.50073	1.49950	1.50100	0.25070	0.25050	0.25000	14860	59.6	57.6	54.1	52.3
A-89-2	0.16775	0.03360	0.0342	1.50093	1.50100	1.50000	0.25060	0.25060	0.25000	13861	55.1	53.7	50.4	49.2
B-90-1	0.16762	0.03375	0.03415	1.49825	1.50100	1.50100	0.25050	0.25070	0.25000	14826	59.0	57.5	54.6	53.2
B-90-2	0.16873	0.03395	0.03415	1.49998	1.50000	1.50000	0.25070	0.25080	0.25000	13232	52.3	51.3	47.7	46.8
B-90-3	0.16935	0.03425	0.03367	1.4985	1.49950	1.50060	0.25070	0.25080	0.25000	14898	58.7	57.7	53.8	52.9
Average	0.16793	0.03387	0.03407	1.49968	1.50020	1.50052	0.25064	0.25068	0.25000	14335	56.9	55.6	52.1	50.9
Std. Dev.	0.00119	0.00025	0.00023	0.00124	0.00076	0.00050	0.00009	0.00013	0.00000	754.27	3.15	2.92	2.98	2.78
COV, %	0.71	0.73	0.67	0.08	0.05	0.03	0.04	0.05	0.00	5.26	5.53	5.26	5.714	5.47

Specimen ID	Strain in Side Plate at Ultimate Load		Load in Side Plate at Ultimate Load		Bearing Load at Ultimate	Percent Bearing Load at Ultimate	Bearing Strength at Ultimate Load		Failure Mode (Per Figure 9 Bearing Test Failure Codes with Illustration of Common Modes in accrodance with ASTM D5961-96)
	Plate #1 gage # 2 (in/in)	Plate #2 gage # 3 (in/in)	Plate #1 Nut side (lbs)	Plate#2 Bolt side (lbs)	(lbs)	(%)	Actual (ksi)	Nominal (ksi)	
A-89-1	0.00112	0.00135	622.31	746.27	1368.6	2297.35	32.9	31.8	Lateral(net tension)-1st Hole-Bolt & Nut sides
A-89-2	0.00095	0.00112	549.68	622.31	1172.0	2128.95	27.9	27.3	Lateral(net tension)-1st Hole-Bolt & Nut sides
B-90-1	0.00094	0.00098	544.70	560.47	1105.2	1872.06	26.3	25.7	Lateral(net tension)-2nd Hole-Bolt & Nut sides
B-90-2	0.00098	0.00108	560.47	598.86	1159.3	2217.51	27.4	27.0	Lateral(net tension)-2nd Hole-Bolt & Nut sides
B-90-3	0.00098	0.00124	560.47	687.13	1247.6	2125.18	29.4	29.0	Lateral(net tension)-2nd Hole-Bolt & Nut sides
Average	0.00099	0.00115	567.53	643.01	1210.5	2128.21	28.8	28.2	
Std. Dev.	0.00007	0.00014	31.386	73.824	101.933	159.85	2.54	2.37	
COV, %	7.3	12.46	5.53	11.48	8.42	7.51	8.83	8.42	

Laminate Bearing-Bypass, Double Shear Properties, 75°F (Dry)

Material Type: **F6273C-7M**
Batch Number: AF010271
Test Method: ASTM D5961-96 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **40/20/40**
Ply Stacking Sequence: **$(0/90/0/90/45/-45/90/0/90/0)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 1/3/02
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 49.5%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1720 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V4A; Collar=MS21042L4

Compression

Specimen ID	*Specimen Thickness*			*Specimen Width*			*Specimen Hole Diameter*			*Ultimate Load (lbs)*
	Specimen inch	*Plate #1 Nut side (inch)*	*Plate#2 Bolt side (inch)*	*Specimen inch*	*Plate #1 Nut side (inch)*	*Plate#2 Bolt side (inch)*	*Hole #1 inch*	*Hole #2 (inch)*	*Nominal (inch)*	
A-89-4	0.17012	0.03470	0.03425	1.4996	1.50050	1.50050	0.25080	0.25080	0.25000	17083
A-89-3	0.17065	0.03285	0.0345	1.5008	1.50050	1.50000	0.25100	0.25080	0.25000	17998
A-89-5	0.17027	0.03465	0.03470	1.5003	1.50000	1.50100	0.25100	0.25110	0.25000	18400
B-90-5	0.17173	0.03480	0.03490	1.5005	1.50100	1.50050	0.25090	0.25070	0.25000	17619
B-90-6	0.17192	0.03370	0.0326	1.5002	1.50000	1.50000	0.25080	0.25070	0.25000	15915
Average	0.17094	0.03414	0.03419	1.50028	1.50040	1.50040	0.25090	0.25082	0.25000	17403
Std. Dev.	0.00084	0.00085	0.00092	0.00044	0.00042	0.00042	0.00010	0.00016	0.00000	963.27
COV, %	0.49	2.48	2.69	0.03	0.03	0.03	0.04	0.07	0.00	5.54

Specimen ID	*Ultimate Bypass Strength*		*Strain in Side Plate at 14,000 lbs Load*		*Load in Side Plate at Ultimate Load*		*Bearing Load at Ultimate (lbs)*	*Percent Bearing Load at Ultimate (%)*	*Bearing Strength at Ultimate Load*		*Failure Mode* (Per Figure 9 Bearing Test Failure Codes with Illustration of Common Modes in accrodance with ASTM D5961-96)
	Actual (ksi)	*Nominal (ksi)*	*Plate #1 gage # 2 (in/in)*	*Plate #2 gage # 3 (in/in)*	*Plate #1 Nut side (lbs)*	*Plate#2 Bolt side (lbs)*			*Actual (ksi)*	*Nominal (ksi)*	
A-89-4	53.7	53.1	0.00401	0.00238	2095.0	1279.2	3374.2	19.8	79.1	78.5	Mult-mode-1st hole-Bolt & Nut sides
A-89-3	61.0	60.6	0.00193	0.00200	1168.7	1193.9	2362.7	13.1	55.2	54.9	Lateral-Outside the holes-Below 2nd hole
A-89-5	60.5	59.9	0.00317	0.00178	1801.0	1134.5	2935.4	16.0	68.7	68.3	Lateral-1st hole-Bolt & Nut sides
B-90-5	57.6	57.5	0.00225	0.00274	1265.0	1514.2	2779.2	15.8	64.5	64.6	Lateral-1st hole-Bolt & Nut sides
B-90-6	55.7	55.7	0.00233	0.00062	1169.2	374.01	1543.2	9.70	35.8	35.9	Lateral-Outside the holes-Below 2nd hole
Average	57.7	57.4	0.00274	0.00190	1499.8	1099.2	2598.9	14.9	60.6	60.4	
Std. Dev.	3.12	3.07	0.00085	0.00081	423.95	430.34	692.29	3.73	16.3	16.10	
COV, %	5.40	5.36	30.9	42.3	28.3	39.2	26.6	25.1	26.9	26.64	

Laminate Bearing-Bypass, Double Shear Properties, 75°F (Dry)

Material Type: **F6273C-07M**
Batch Number: AF010271
Test Method: ASTM D5961-96 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[)45/0/-45/90)_2]_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 12/19/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 49.7%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1376 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V4A; Collar=MS21042L4

Tension

Specimen ID	Specimen Thickness: Specimen inch	Specimen Thickness: Plate #1 Nut side (inch)	Specimen Thickness: Plate#2 Bolt side (inch)	Specimen Width: Specimen inch	Specimen Width: Plate #1 Nut side (inch)	Specimen Width: Plate#2 Bolt side (inch)	Specimen Hole Diameter: Hole #1 inch	Specimen Hole Diameter: Hole #2 (inch)	Specimen Hole Diameter: Nominal (inch)	Ultimate Load (lbs)	Ultimate Gross Bypass Strength: Actual (ksi)	Ultimate Gross Bypass Strength: Nominal (ksi)	Ultimate Net Bypass Strength: Actual (ksi)	Ultimate Net Bypass Strength: Nominal (ksi)
B-114-1	0.13467	0.03455	0.03445	1.49885	1.50100	1.50100	0.25040	0.25070	0.25000	9853.6	48.8	47.7	41.8	40.9
B-114-2	0.13577	0.03460	0.03355	1.50015	1.50050	1.50050	0.25060	0.25070	0.25000	10024	49.2	48.6	42.5	42.0
A-115-1	0.13462	0.03345	0.03400	1.49923	1.50000	1.50100	0.25070	0.25070	0.25000	9994.1	49.5	48.4	43.0	42.1
A-115-2	0.13638	0.03335	0.03400	1.50033	1.50100	1.49950	0.25060	0.25080	0.25000	10358	50.6	50.2	43.9	43.5
A-115-3	0.13727	0.03440	0.0342	1.49958	1.49950	1.50100	0.25070	0.25080	0.25000	9521.9	46.3	46.1	40.1	40.0
Average	0.13574	0.03407	0.03404	1.49963	1.50040	1.50060	0.25060	0.25074	0.25000	9950.2	48.9	48.2	42.3	41.7
Std. Dev.	0.00113	0.00062	0.00033	0.00062	0.00065	0.00065	0.00012	0.00005	0.00000	302.51	1.61	1.47	1.43	1.33
COV, %	0.84	1.81	0.97	0.04	0.04	0.04	0.05	0.02	0.00	3.04	3.30	3.04	3.37	3.18

Specimen ID	Strain in Side Plate at Ultimate Load: Plate #1 gage # 2 (in/in)	Strain in Side Plate at Ultimate Load: Plate #2 gage # 3 (in/in)	Load in Side Plate at Ultimate Load: Plate #1 Nut side (lbs)	Load in Side Plate at Ultimate Load: Plate#2 Bolt side (lbs)	Bearing Load at Ultimate (lbs)	Percent Bearing Load at Ultimate (%)	Bearing Strength at Ultimate Load: Actual (ksi)	Bearing Strength at Ultimate Load: Nominal (ksi)	Failure Mode (Per Figure 9 Bearing Test Failure Codes with Illustration of Common Modes in accrodance with ASTM D5961-95)
B-114-1	0.00103	0.00152	573.55	845.54	1419.1	14.4	42.1	41.3	Lateral(net tension)-1st Hole-Bolt & Nut sides
B-114-2	0.00107	0.00138	592.03	766.04	1358.1	13.5	39.9	39.5	Lateral(net tension)-2nd Hole-Bolt & Nut sides
A-115-1	0.00105	0.00132	582.66	725.47	1308.1	13.1	38.8	38.0	Lateral(net tension)-2nd Hole-Bolt & Nut sides
A-115-2	0.00121	0.00128	666.31	707.65	1374.0	13.3	40.2	39.9	Lateral(net tension)-2nd Hole-Bolt & Nut sides
A-115-3	0.00108	0.00120	598.86	661.35	1260.2	13.2	36.6	36.6	Lateral(net tension)-2nd Hole-Bolt & Nut sides
Average	0.00109	0.00134	602.68	741.21	1343.9	13.5	39.5	39.1	
Std. Dev.	0.00007	0.00012	36.831	69.377	61.321	0.53	2.01	1.78	
COV, %	6.5	8.96	6.11	9.36	4.56	3.90	5.09	4.56	

Laminate Bearing-Bypass, Double Shear Properties, 75°F (Dry)

Material Type: **F6273C-07M**
Batch Number: AF010271
Test Method: ASTM D5961-96 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[]_{45/0/-45/90)_2]_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 5/1/02
Test Operator: John Smith
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 49.7%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1376 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V4A; Collar=MS21042L4

Compression

Specimen ID	*Specimen Thickness*			*Specimen Width*			*Specimen Hole Diameter*			*Ultimate Load*
	Specimen inch	*Plate #1 Nut side (inch)*	*Plate#2 Bolt side (inch)*	*Specimen inch*	*Plate #1 Nut side (inch)*	*Plate#2 Bolt side (inch)*	*Hole #1 inch*	*Hole #2 (inch)*	*Nominal (inch)*	*(lbs)*
B-114-3	0.13487	0.03400	0.03340	1.4992	1.50050	1.50000	0.25050	0.25040	0.25000	11083
B-114-4	0.13545	0.03415	0.03235	1.50025	1.50050	1.50050	0.25060	0.25070	0.25000	11443
B-114-5	0.13662	0.03420	0.03370	1.49898	1.49950	1.50100	0.25060	0.25070	0.25000	11249
A-115-4	0.13758	0.03400	0.03410	1.50035	1.50000	1.50100	0.25060	0.25070	0.25000	12045
A-115-5	0.13777	0.03305	0.0338	1.49927	1.49900	1.50050	0.25060	0.25070	0.25000	11567
Average	0.13646	0.03388	0.03347	1.49961	1.49990	1.50060	0.25058	0.25064	0.25000	11477.6
Std. Dev.	0.00128	0.00047	0.00067	0.00064	0.00065	0.00042	0.00004	0.00013	0.00000	367.01
COV, %	0.94	1.39	2.01	0.04	0.04	0.03	0.02	0.05	0.00	3.20

Specimen ID	*Ultimate Bypass Strength*		*Strain in Side Plate at 9,000 lbf Load*		*Load in Side Plate at Ultimate Load*		*Bearing Load at Ultimate*	*Percent Bearing Load at Ultimate*	*Bearing Strength at Ultimate Load*		*Failure Mode* (Per Figure 9 Bearing Test Failure Codes with Illustration of Common Modes in accrodance with ASTM D5961-95)
	Actual (ksi)	*Nominal (ksi)*	*Plate #1 gage # 2 (in/in)*	*Plate #2 gage # 3 (in/in)*	*Plate #1 Nut side (lbs)*	*Plate#2 Bolt side (lbs)*	*(lbs)*	*(%)*	*Actual (ksi)*	*Nominal (ksi)*	
B-114-3	48.0	47.0	0.00221	0.00017	1222.3	157.09	1379.3	12.4	40.8	40.1	Multi-mode-Outside both holes-Above 1st hole
B-114-4	49.1	48.4	0.00234	0.00012	1310.8	147.03	1457.8	12.7	42.9	42.4	Lateral(net comp.)-1st hole-Bolt & Nut sides
B-114-5	45.9	45.6	0.00140	0.00167	823.67	1018.2	1841.9	16.4	53.8	53.5	Lateral-Outside both holes-Below 2nd hole
A-115-4	47.0	47.0	0.00260	0.00136	1487.5	851.76	2339.3	19.4	67.8	68.0	Lateral(net comp.)-2nd hole-Bolt & Nut sides
A-115-5	44.3	44.3	0.00132	0.00289	787.37	1638.6	2426.0	21.0	70.3	70.5	Lateral-Outside both holes-above 1st hole
Average	46.9	46.5	0.00197	0.00124	1126.3	762.54	1888.9	16.4	55.1	54.9	
Std. Dev.	1.88	1.56	0.00058	0.00115	308.29	629.73	484.511	3.84	13.6	14.1	
COV, %	4.01	3.37	29.3	92.9	27.4	82.6	25.7	23.45	24.8	25.7	

Laminate Bearing-Bypass, Double Shear Properties, 75°F (Dry)

Material Type: **F6273C-07M**
Batch Number: AF010271
Test Method: ASTM D5961-96 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **10/80/10**
Ply Stacking Sequence: **$(45/-45/90/45/-45/45/-45/0/45/-45)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 12/19/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 49.0%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1720 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V4A; Collar=MS21042L4

Tension

Specimen ID	Specimen Thickness	Plate #1	Plate#2	Specimen Width	Plate #1	Plate#2	Specimen Hole Diameter			Ultimate Load	Ultimate Gross Bypass Strength		Ultimate Net Bypass Strength	
	Specimen inch	Nut side (inch)	Bolt side (inch)	Specimen inch	Nut side (inch)	Bolt side (inch)	Hole #1 inch	Hole #2 (inch)	Nominal (inch)	(lbs)	Actual (ksi)	Nominal (ksi)	Actual (ksi)	Nominal (ksi)
A-133-3	0.1718	0.03310	0.03365	1.50068	1.50100	1.50050	0.25050	0.25060	0.25000	11088	43.0	43.0	35.5	35.5
A-133-4	0.1724	0.03450	0.03345	1.5007	1.50100	1.50050	0.25060	0.25090	0.25000	10875	42.0	42.1	34.3	34.4
A-133-5	0.17267	0.03385	0.03300	1.50048	1.50000	1.50000	0.25080	0.25080	0.25000	11162	43.1	43.3	35.3	35.4
B-134-4	0.17277	0.03460	0.03435	1.50015	1.50000	1.50100	0.25060	0.25060	0.25000	11308	43.6	43.8	35.2	35.4
B-134-5	0.17333	0.03445	0.03425	1.49898	1.50100	1.50100	0.25060	0.25060	0.25000	11170	43.0	43.3	35.5	35.7
Average	0.17259	0.03410	0.03374	1.50020	1.50060	1.50060	0.25062	0.25070	0.25000	11121	42.9	43.1	35.2	35.3
Std. Dev.	0.00056	0.00063	0.00056	0.00072	0.00055	0.00042	0.00011	0.00014	0.00000	158.71	0.58	0.62	0.51	0.52
COV, %	0.32	1.85	1.67	0.05	0.04	0.03	0.04	0.06	0.00	1.43	1.34	1.43	1.439	1.48

Specimen ID	Strain in Side Plate at Ultimate Load		Load in Side Plate at Ultimate Load		Bearing Load at Ultimate	Percent Bearing Load at Ultimate	Bearing Strength at Ultimate Load		Failure Mode (Per Figure 9 Bearing Test Failure Codes with Illustration of Common Modes in accrodance with ASTM D5961-96)
	Plate #1 gage # 2 (in/in)	Plate #2 gage # 3 (in/in)	Plate #1 Nut side (lbs)	Plate#2 Bolt side (lbs)	(lbs)	(%)	Actual (ksi)	Nominal (ksi)	
A-133-3	0.00160	0.00182	895.52	1032.4	1927.9	17.4	44.8	44.8	Lateral(net tension)-2nd Hole-Bolt & Nut sides
A-133-4	0.0018	0.00175	1020.5	985.84	2006.4	18.5	46.4	46.7	Lateral(net tension)-2nd Hole-Bolt & Nut sides
A-133-5	0.00182	0.00176	1032.4	990.44	2022.8	18.1	46.7	47.0	Lateral(net tension)-2nd Hole-Bolt & Nut sides
B-134-4	0.00200	0.00181	1149.9	1026.5	2176.3	19.2	50.3	50.6	Lateral(net tension)-2nd Hole-Bolt & Nut sides
B-134-5	0.00170	0.00178	955.45	1001.4	1956.9	17.5	45.1	45.5	Lateral(net tension)-2nd Hole-Bolt & Nut sides
Average	0.00178	0.00178	1010.8	1007.3	2018.1	18.1	46.7	46.9	
Std. Dev.	0.00015	0.00003	95.199	21.067	96.277	0.75	2.19	2.24	
COV, %	8.4	1.71	9.42	2.09	4.77	4.15	4.69	4.77	

Laminate Bearing-Bypass, Double Shear Properties, 75°F (Dry)

Material Type: **F6273C-07M**
Batch Number: AF010271
Test Method: ASTM D5961-96 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **10/80/10**
Ply Stacking Sequence: **$(45/-45/90/45/-45/45/-45/0/45/-45)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 6/26/02
Test Operator: John Smith
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 49.0%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1720 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V4A; Collar=MS21042L4

Compression

Specimen ID	Specimen Thickness: Specimen inch	Specimen Thickness: Plate #1 Nut side (inch)	Specimen Thickness: Plate#2 Bolt side (inch)	Specimen Width: Specimen inch	Specimen Width: Plate #1 Nut side (inch)	Specimen Width: Plate#2 Bolt side (inch)	Specimen Hole Diameter: Hole #1 inch	Specimen Hole Diameter: Hole #2 (inch)	Specimen Hole Diameter: Nominal (inch)	Ultimate Load (lbs)
A-133-1	0.17145	0.03335	0.03420	1.50015	1.50000	1.50100	0.25080	0.25070	0.25000	12208
A-133-2	0.17147	0.03455	0.03395	1.50017	1.50050	1.50050	0.25090	0.25060	0.25000	12600
B-134-6	0.17290	0.03460	0.03455	1.50017	1.50050	1.50000	0.25090	0.25080	0.25000	12786
B-134-8	0.16967	0.03435	0.03295	1.5009	1.50150	1.50050	0.25080	0.25070	0.25000	12421
A-133-6	0.17298	0.03460	0.03455	1.50067	1.50100	1.50050	0.25080	0.25080	0.25000	12746
Average	0.17169	0.03429	0.03404	1.50041	1.50070	1.50050	0.25084	0.25072	0.25000	12552
Std. Dev.	0.00135	0.00054	0.00066	0.00035	0.00057	0.00035	0.00005	0.00008	0.00000	239.90
COV, %	0.79	1.56	1.94	0.02	0.04	0.02	0.02	0.03	0.00	1.91

Specimen ID	Ultimate Bypass Strength: Actual (ksi)	Ultimate Bypass Strength: Nominal (ksi)	Strain in Side Plate at 9,000 lbf Load: Plate #1 gage # 2 (in/in)	Strain in Side Plate at 9,000 lbf Load: Plate #2 gage # 3 (in/in)	Load in Side Plate at Ultimate Load: Plate #1 Nut side (lbs)	Load in Side Plate at Ultimate Load: Plate#2 Bolt side (lbs)	Bearing Load at Ultimate (lbs)	Percent Bearing Load at Ultimate (%)	Bearing Strength at Ultimate Load: Actual (ksi)	Bearing Strength at Ultimate Load: Nominal (ksi)	Failure Mode (Per Figure 9 Bearing Test Failure Codes with Illustration of Common Modes in accrodance with ASTM D5961-96)
A-133-1	34.7	34.6	0.00184	0.00358	1203.7	2078.4	3282.2	26.9	76.4	76.3	Lateral-Outside both holes-Above the 1st hole
A-133-2	32.6	32.5	0.00263	0.00433	1616.7	2596.0	4212.7	33.4	98.0	98.0	Lateral-Outside both holes-Above the 1st hole
B-134-6	37.3	37.5	0.00354	0.00144	2152.0	966.64	3118.6	24.4	71.9	72.5	Lateral(net comp.)-2nd hole-Bolt & Nut sides
B-134-8	41.0	40.5	0.00210	0.00108	1321.6	659.40	1981.0	15.9	46.6	46.1	Lateral(net comp.)-1st hole-Bolt & Nut sides
A-133-6	30.4	30.6	0.00418	0.00382	2532.64	2314.5	4847.1	38.0	112	113	Lateral-Outside both holes-Above the 1st hole
Average	35.2	35.1	0.00286	0.00285	1765.3	1723.0	3488.3	27.7	80.9	81.1	
Std. Dev.	4.11	3.92	0.00098	0.00148	564.05	857.55	1098.0	8.50	25.1	25.5	
COV, %	11.7	11.2	34.4	52.0	32.0	49.8	31.5	30.7	31.0	31.5	

D.3. Mechanical Raw Test Results of FGF7781-07I

Laminate No Hole Tension Properties, 75 °F (Dry)

Material Type: **FGF7781-07I**
Batch Number: AF010363
Test Method: ASTM D5766-95 (modified); SACMA SRM 5-94 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **40/20/40**
Ply Stacking Sequence: **$(0/90/0/90/45/-45/90/0/90/0)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 9/27/01
Test Operator: John Smith
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: C-960401-A
Fiber Volume (average): 45.3%
Nominal Fastener Diameter N/A
Nominal Panel Thickness: 0.2000 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: N/A
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ultimate Tensile Load (lbs.)	Ultimate Tensile Strength Actual (ksi)	Ultimate Tensile Strength Nominal (ksi)	Tensile Modulus (0.1-0.3% strain) Actual (msi)	Tensile Modulus (0.1-0.3% strain) Nominal (msi)	Failure Mode (per Table I Three-Place Failure Mode Codes of ASTM D5766-95)
A-135-1	0.19618	1.50098	15562	52.8	51.9	3.41	3.35	Lateral-At grip/tab-Top
B-136-1	0.19718	1.50015	14294	48.3	47.6	3.42	3.36	Angled-At grip/tab-Top
B-136-2	0.19918	1.50008	14611	48.9	48.7	3.37	3.40	Angled-At grip/tab-Top
Average	0.19751	1.50040	14822	50.0	49.4	3.40	3.37	
Std. Dev.	0.00153	0.00050	660.00	2.46	2.20	0.03	0.03	
COV, %	0.77	0.03	4.45	4.92	4.45	0.78	0.75	

Material Type: **FGF7781-07I**
Batch Number: AF010363
Test Method: ASTM D5766-95 (modified); SACMA SRM 5-94 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[(45/0/-45/90)_2]_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 9/26/01
Test Operator: John Smith
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: C-960401-A
Fiber Volume (average): 44.4%
Nominal Fastener Diameter N/A
Nominal Panel Thickness: 0.1600 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: N/A
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ultimate Tensile Load (lbs.)	Ultimate Tensile Strength Actual (ksi)	Ultimate Tensile Strength Nominal (ksi)	Tensile Modulus (0.1-0.3% strain) Actual (msi)	Tensile Modulus (0.1-0.3% strain) Nominal (msi)	Failure Mode (per Table I Three-Place Failure Mode Codes of ASTM D5766-95)
B-158-1	0.16148	1.49940	12199	50.4	50.8	2.92	2.95	Multimode(Lateral,Splitting)-Multiple Areas-Top
A-159-1	0.15983	1.50070	12344	51.5	51.4	2.92	2.92	Multimode(Lateral,Splitting)-Gage-Bottom
A-159-2	0.16095	1.50040	11890	49.2	49.5	2.89	2.91	Multimode(Lateral,Splitting)-Multiple Areas-Various
Average	0.16075	1.50017	12144	50.4	50.6	2.91	2.92	
Std. Dev.	0.00084	0.00068	231.68	1.11	0.97	0.02	0.02	
COV, %	0.52	0.05	1.91	2.21	1.91	0.60	0.67	

Material Type: **FGF7781-07I**
Batch Number: AF010363
Test Method: ASTM D5766-95 (modified); SACMA SRM 5-94 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **10/80/10**
Ply Stacking Sequence: **$(45/-45/90/45/-45/45/-45/0/45/-45)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 9/27/01
Test Operator: John Smith
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: C-960401-A
Fiber Volume (average): 43.8%
Nominal Fastener Diameter N/A
Nominal Panel Thickness: 0.2000 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: N/A
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ultimate Tensile Load (lbs.)	Ultimate Tensile Strength Actual (ksi)	Ultimate Tensile Strength Nominal (ksi)	Tensile Modulus (0.1-0.3% strain) Actual (msi)	Tensile Modulus (0.1-0.3% strain) Nominal (msi)	Failure Mode (per Table I Three-Place Failure Mode Codes of ASTM D5766-95)
A-183-1	0.20188	1.49955	10579	34.9	35.3	2.38	2.40	Multimode(Angled,Splitting)-Gage-Various
B-184-2	0.20243	1.49980	10654	35.1	35.5	2.39	2.42	Multimode(Lateral,Splitting)-Gage-Bottom
B-184-1	0.19947	1.49982	10532	35.2	35.1	2.45	2.44	Lateral-Gage-Bottom
Average	0.20126	1.49972	10588	35.1	35.3	2.41	2.42	
Std. Dev.	0.00157	0.00015	61.5	0.13	0.21	0.04	0.02	
COV, %	0.78	0.01	0.58	0.37	0.58	1.57	0.86	

Laminate Filled Hole Tension Properties, -65 °F (Dry)

Material Type: **FGF7781-07I**
Batch Number: AF010363
Test Method: ASTM D5766-95 (modified); SACMA SRM 5-94 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: -65 °F (Dry)
Ply Layup, [%, 0/45/90]: **40/20/40**
Ply Stacking Sequence: **$(0/90/0/90/45/-45/90/0/90/0)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 12/10/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 45.5%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.2000 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: Pin=NAS1134V4A; Collar=MS21042L4

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Hole Diameter (in.)	Ultimate Tensile Load (lbs.)	Ultimate Tensile Strength Actual (ksi)	Ultimate Tensile Strength Nominal (ksi)	Failure Mode (per Table I Three-Place Failure Mode Codes of ASTM D5766-95)
A-137-4	0.20312	1.50045	0.25120	10433	34.2	34.8	Lateral-Gage-Middle
A-137-5	0.20282	1.50032	0.25160	10279	33.8	34.3	Lateral-Gage-Middle
A-137-6	0.20218	1.50023	0.25110	10621	35.0	35.4	Lateral-Gage-Middle
B-138-5	0.20860	1.49720	0.25080	10897	34.9	36.3	Lateral-Gage-Middle
B-138-6	0.20585	1.50017	0.25080	10520	34.1	35.1	Lateral-Gage-Middle
Average	0.20451	1.49967	0.25110	10550	34.4	35.2	
Std. Dev.	0.00268	0.00139	0.00033	230.87	0.53	0.77	
COV, %	1.31	0.09	0.13	2.19	1.55	2.19	

Material Type: **FGF7781-07I**
Batch Number: AF010363
Test Method: ASTM D5766-95 (modified); SACMA SRM 5-94 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: -65 °F (Dry)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[(45/0/-45/90)_2]_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 12/10/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 44.5%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1600 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: Pin=NAS1134V3A; Collar=MS21042L4

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Hole Diameter (in.)	Ultimate Tensile Load (lbs.)	Ultimate Tensile Strength Actual (ksi)	Ultimate Tensile Strength Nominal (ksi)	Failure Mode (per Table I Three-Place Failure Mode Codes of ASTM D5766-95)
B-158-6	0.16345	1.50053	0.25080	7808.9	31.8	32.5	Lateral-Gage-Middle
B-158-7	0.16318	1.50038	0.25100	7825.7	32.0	32.6	Lateral-Gage-Middle
A-159-6	0.16258	1.50012	0.25090	7804.5	32.0	32.5	Lateral-Gage-Middle
B-158-8	0.16397	1.50042	0.25090	7860.9	32.0	32.8	Lateral-Gage-Middle
A-159-7	0.16182	1.50025	0.25100	7608.3	31.3	31.7	Lateral-Gage-Middle
Average	0.16300	1.50034	0.25092	7781.7	31.8	32.4	
Std. Dev.	0.00083	0.00016	0.00008	99.418	0.27	0.41	
COV, %	0.51	0.01	0.03	1.28	0.86	1.28	

Material Type: **FGF7781-07I**
Batch Number: AF010363
Test Method: ASTM D5766-95 (modified); SACMA SRM 5-94 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: -65 °F (Dry)
Ply Layup, [%, 0/45/90]: **10/80/10**
Ply Stacking Sequence: **$(45/-45/90/45/-45/45/-45/0/45/-45)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 12/10/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 43.8%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.2000 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: Pin=NAS1134V4A; Collar=MS21042L4

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Hole Diameter (in.)	Ultimate Tensile Load (lbs.)	Ultimate Tensile Strength Actual (ksi)	Ultimate Tensile Strength Nominal (ksi)	Failure Mode (per Table I Three-Place Failure Mode Codes of ASTM D5766-95)
A-183-7	0.20392	1.50025	0.25070	9923.5	32.4	33.1	Lateral-Gage-Middle
A-183-8	0.20285	1.50003	0.25070	9841.4	32.3	32.8	Lateral-Gage-Middle
B-184-7	0.20412	1.49980	0.25080	9637.9	31.5	32.1	Lateral-Gage-Middle
B-184-8	0.20285	1.50002	0.25070	9542.7	31.4	31.8	Lateral-Gage-Middle
A-185-7	0.20400	1.50067	0.25080	9431.4	30.8	31.4	Lateral-Gage-Middle
Average	0.20355	1.50015	0.25074	9675.4	31.7	32.3	
Std. Dev.	0.00064	0.00033	0.00005	204.73	0.69	0.68	
COV, %	0.31	0.02	0.02	2.12	2.18	2.12	

Laminate Filled Hole Tension Properties, 75 °F (Dry)

Material Type: **FGF7781-07I**
Batch Number: AF010363
Test Method: ASTM D5766-95 (modified); SACMA SRM 5-94 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **40/20/40**
Ply Stacking Sequence: **$(0/90/0/90/45/-45/90/0/90/0)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 9/10/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 45.5%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.2000 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: Pin=NAS1134V4A; Collar=MS21042L4

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Hole Diameter (in.)	Ultimate Tensile Load (lbs.)	Ultimate Tensile Strength Actual (ksi)	Ultimate Tensile Strength Nominal (ksi)	Failure Mode (per Table I Three-Place Failure Mode Codes of ASTM D5766-95)
A-137-2	0.20125	1.50038	0.25110	8514.3	28.2	28.4	Lateral-Gage-Middle
A-137-3	0.20273	1.50032	0.25110	8524.6	28.0	28.4	Lateral-Gage-Middle
B-138-2	0.19833	1.49953	0.25070	8242.0	27.7	27.5	Lateral-Gage-Middle
B-138-3	0.20338	1.50037	0.25090	8410.1	27.6	28.0	Lateral-Gage-Middle
B-138-4	0.20653	1.50030	0.25090	8356.9	27.0	27.9	Lateral-Gage-Middle
Average	0.20244	1.50018	0.25094	8409.6	27.7	28.0	
Std. Dev.	0.00300	0.00036	0.00017	117.32	0.48	0.39	
COV, %	1.48	0.02	0.07	1.40	1.72	1.40	

Material Type: **FGF7781-07I**
Batch Number: AF010363
Test Method: ASTM D5766-95 (modified); SACMA SRM 5-94 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[(45/0/-45/90)_2]_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 9/27/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 44.9%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1600 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: Pin=NAS1134V3A; Collar=MS21042L4

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Hole Diameter (in.)	Ultimate Tensile Load (lbs.)	Ultimate Tensile Strength Actual (ksi)	Ultimate Tensile Strength Norm. (ksi)	Failure Mode (per Table I Three-Place Failure Mode Codes of ASTM D5766-95)
B-160-5	0.16327	1.50052	0.25080	6264.5	25.6	26.1	Lateral-Gage-Middle
B-160-6	0.16335	1.49938	0.25090	6203.8	25.3	25.8	Lateral-Gage-Middle
A-161-5	0.16422	1.50043	0.25070	6346.3	25.8	26.4	Lateral-Gage-Middle
A-161-6	0.16422	1.50085	0.25070	6451.8	26.2	26.9	Lateral-Gage-Middle
A-161-7	0.16310	1.50020	0.25090	6428.2	26.3	26.8	Lateral-Gage-Middle
Average	0.16363	1.50028	0.25080	6338.9	25.8	26.4	
Std. Dev.	0.00054	0.00055	0.00010	105.55	0.40	0.44	
COV, %	0.33	0.04	0.04	1.67	1.55	1.67	

Material Type: **FGF7781-07I**
Batch Number: AF010363
Test Method: ASTM D5766-95 (modified); SACMA SRM 5-94 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **10/80/10**
Ply Stacking Sequence: **$(45/-45/90/45/-45/45/-45/0/45/-45)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 9/10/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 44.4%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.2000 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: Pin=NAS1134V4A; Collar=MS21042L4

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Hole Diameter (in.)	Ultimate Tensile Load (lbs.)	Ultimate Tensile Strength Actual (ksi)	Ultimate Tensile Strength Norm. (ksi)	Failure Mode (per Table I Three-Place Failure Mode Codes of ASTM D5766-95)
A-185-5	0.20595	1.50050	0.25090	8016.6	25.9	26.7	Lateral-Gage-Middle
A-185-6	0.20503	1.50050	0.25080	8049.4	26.2	26.8	Lateral-Gage-Middle
B-186-5	0.20627	1.50053	0.25070	8157.4	26.4	27.2	Lateral-Gage-Middle
B-186-6	0.20538	1.50080	0.25090	8071.3	26.2	26.9	Lateral-Gage-Middle
B-186-7	0.20390	1.50027	0.25090	8110.7	26.5	27.0	Lateral-Gage-Middle
Average	0.20531	1.50052	0.25084	8081.1	26.2	26.9	
Std. Dev.	0.00092	0.00019	0.00009	54.679	0.22	0.18	
COV, %	0.45	0.01	0.04	0.68	0.82	0.68	

Laminate Open Hole Tension Properties, -65 °F (Dry)

Material Type: **FGF7781-07I**
Batch Number: AF010363
Test Method: ASTM D5766-95; SACMA SRM 5-94
Specimen Preconditioning: As Fabricated
Test Condition: -65 °F (Dry)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[(45/0/-45/90)_2]_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 12/10/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 44.6%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1600 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	*Specimen Thickness (in.)*	*Specimen Width (in.)*	*Hole Diameter (in.)*	*Ultimate Tensile Load (lbs.)*	*Ultimate Tensile Strength*		*Failure Mode (per Table I Three-Place Failure Mode Codes of ASTM D5766-95)*
					Actual (ksi)	*Nominal (ksi)*	
B-162-7	0.16343	1.50067	0.25090	7547.5	30.8	31.4	Lateral-Gage-Middle
B-162-8	0.16275	1.50033	0.25110	7555.1	30.9	31.5	Lateral-Gage-Middle
A-163-6	0.16323	1.50012	0.25070	7435.2	30.4	31.0	Lateral-Gage-Middle
A-163-7	0.16210	1.49982	0.25090	7625.7	31.4	31.8	Lateral-Gage-Middle
A-163-8	0.16072	1.50075	0.25120	7541.1	31.3	31.4	Lateral-Gage-Middle
Average	0.16245	1.50034	0.25096	7540.9	30.9	31.4	
Std. Dev.	0.00109	0.00039	0.00019	68.21	0.40	0.28	
COV, %	0.67	0.03	0.08	0.90	1.30	0.90	

Material Type: **FGF7781-07I**
Batch Number: AF010363
Test Method: ASTM D5766-95; SACMA SRM 5-94
Specimen Preconditioning: As Fabricated
Test Condition: -65 °F (Dry)
Ply Layup, [%, 0/45/90]: **10/80/10**
Ply Stacking Sequence: **$(45/-45/90/45/-45/45/-45/0/45/-45)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 11/27/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 44.2%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.2000 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	*Specimen Thickness (in.)*	*Specimen Width (in.)*	*Hole Diameter (in.)*	*Ultimate Tensile Load (lbs.)*	*Ultimate Tensile Strength*		*Failure Mode (per Table I Three-Place Failure Mode Codes of ASTM D5766-95)*
					Actual (ksi)	*Nominal (ksi)*	
A-187-6	0.20518	1.49977	0.25090	9377.8	30.5	31.3	Angled-Gage-Middle
A-187-7	0.20410	1.50008	0.25090	9376.8	30.6	31.3	Angled-Gage-Middle
A-187-8	0.20328	1.50078	0.25140	9537.9	31.3	31.8	Angled-Gage-Middle
B-188-7	0.20442	1.50008	0.25120	9543.9	31.1	31.8	Angled-Gage-Middle
B-188-8	0.20535	1.50063	0.25100	9488.8	30.8	31.6	Angled-Gage-Middle
Average	0.20447	1.50027	0.25108	9465.0	30.9	31.6	
Std. Dev.	0.00084	0.00042	0.00022	82.90	0.33	0.28	
COV, %	0.41	0.03	0.09	0.88	1.07	0.88	

Laminate Open Hole Tension Properties, 75 °F (Dry)

Material Type: **FGF7781-07I**
Batch Number: AF010363
Test Method: ASTM D5766-95; SACMA SRM 5-94
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[(45/0/-45/90)_2]_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 9/10/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 45.2%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1600 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	*Specimen Thickness (in.)*	*Specimen Width (in.)*	*Hole Diameter (in.)*	*Ultimate Tensile Load (lbs.)*	*Ultimate Tensile Strength*		*Failure Mode (per Table I Three-Place Failure Mode Codes of ASTM D5766-95)*
					Actual (ksi)	*Nominal (ksi)*	
A-165-1	0.16127	1.50057	0.25090	5971.7	24.7	24.9	Lateral-Gage-Middle
A-165-2	0.16383	1.50078	0.25090	6109.8	24.8	25.5	Lateral-Gage-Middle
B-164-1	0.16068	1.49988	0.25070	5875.5	24.4	24.5	Lateral-Gage-Middle
B-164-2	0.16180	1.49967	0.25070	5888.3	24.3	24.5	Lateral-Gage-Middle
B-164-3	0.16193	1.49982	0.25090	5870.3	24.2	24.5	Lateral-Gage-Middle
Average	0.16190	1.50014	0.25082	5943.1	24.5	24.8	
Std. Dev.	0.00119	0.00050	0.00011	101.83	0.29	0.42	
COV, %	0.73	0.03	0.04	1.71	1.17	1.71	

Material Type: **FGF7781-07I**
Batch Number: AF010363
Test Method: ASTM D5766-95; SACMA SRM 5-94
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **10/80/10**
Ply Stacking Sequence: **$(45/-45/90/45/-45/45/-45/0/45/-45)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 9/10/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 44.2%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.2000 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	*Specimen Thickness (in.)*	*Specimen Width (in.)*	*Hole Diameter (in.)*	*Ultimate Tensile Load (lbs.)*	*Ultimate Tensile Strength*		*Failure Mode (per Table I Three-Place Failure Mode Codes of ASTM D5766-95)*
					Actual (ksi)	*Nominal (ksi)*	
A-189-1	0.20183	1.50035	0.25070	7805.4	25.8	26.0	Lateral-Gage-Middle
A-189-2	0.20338	1.50020	0.25070	7863.4	25.8	26.2	Lateral-Gage-Middle
A-189-3	0.20462	1.50055	0.25070	7814.8	25.5	26.0	Lateral-Gage-Middle
B-190-1	0.20333	1.50042	0.25070	7838.9	25.7	26.1	Lateral-Gage-Middle
B-190-2	0.20523	1.49995	0.25070	7788.3	25.3	26.0	Lateral-Gage-Middle
Average	0.20368	1.50029	0.25070	7822.2	25.6	26.1	
Std. Dev.	0.00132	0.00023	0.00000	29.42	0.21	0.10	
COV, %	0.65	0.02	0.00	0.38	0.83	0.38	

Laminate Open Hole Tension Properties, 180 °F (Wet)

Material Type: **FGF7781-07M**
Batch Number: AF010363
Test Method: ASTM D5766-95; SACMA SRM 5-94
Specimen Preconditioning: per Section 3.2 of DOT/FAA/AR-00/47 (2000 Draft Report)
Test Condition: 180 °F (Wet)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[(45/0/-45/90)_2]_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 4/23/02
Test Operator: John Smith
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 44.7%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1600 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	*Specimen Thickness (in.)*	*Specimen Width (in.)*	*Hole Diameter (in.)*	*Ultimate Tensile Load (lbs.)*	*Ultimate Tensile Strength*		*Failure Mode (per Table I Three-Place Failure Mode Codes of ASTM D5766-95)*
					Actual (ksi)	*Nominal (ksi)*	
B-162-1	0.16287	1.50007	0.25090	5028.2	20.6	21.0	Lateral-Gage-Middle
B-162-3	0.16405	1.50003	0.25120	4992.7	20.3	20.8	Lateral-Gage-Middle
B-162-4	0.16438	1.50038	0.25100	5004.2	20.3	20.9	Lateral-Gage-Middle
A-163-1	0.16195	1.49982	0.25100	4869.2	20.0	20.3	Lateral-Gage-Middle
A-163-2	0.16316	1.50006	0.25096	4932.4	20.2	20.6	Lateral-Gage-Middle
Average	0.16328	1.50007	0.25101	4965.3	20.3	20.7	
Std. Dev.	0.00097	0.00020	0.00011	64.300	0.20	0.27	
COV, %	0.59	0.01	0.04	1.29	0.99	1.29	

Material Type: **FGF7781-07M**
Batch Number: AF010363
Test Method: ASTM D5766-95; SACMA SRM 5-94
Specimen Preconditioning: per Section 3.2 of DOT/FAA/AR-00/47 (2000 Draft Report)
Test Condition: 180 °F (Wet)
Ply Layup, [%, 0/45/90]: **10/80/10**
Ply Stacking Sequence: **$(45/-45/90/45/-45/45/-45/0/45/-45)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 4/23/01
Test Operator: John Smith
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 44.2%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.2000 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	*Specimen Thickness (in.)*	*Specimen Width (in.)*	*Hole Diameter (in.)*	*Ultimate Tensile Load (lbs.)*	*Ultimate Tensile Strength*		*Failure Mode (per Table I Three-Place Failure Mode Codes of ASTM D5766-95)*
					Actual (ksi)	*Nominal (ksi)*	
A-187-2	0.20505	1.50090	0.25100	6201.9	20.2	20.7	Lateral-Gage-Middle
A-187-3	0.20548	1.50062	0.25100	6273.3	20.3	20.9	Lateral-Gage-Middle
A-187-4	0.20608	1.49907	0.25100	6130.6	19.8	20.4	Lateral-Gage-Middle
B-188-1	0.20263	1.49978	0.25050	6259.7	20.6	20.9	Lateral-Gage-Middle
B-188-2	0.20523	1.50047	0.25100	6175.8	20.1	20.6	Lateral-Gage-Middle
Average	0.20489	1.50017	0.25090	6208.3	20.2	20.7	
Std. Dev.	0.00132	0.00074	0.00022	59.16	0.29	0.20	
COV, %	0.65	0.05	0.09	0.95	1.42	0.95	

Laminate No Hole Compression Properties, 75 °F (Dry)

Material Type: **FGF7781-07I**
Batch Number: AF010363
Test Method: ASTM D6484-99 (modified); SACMA SRM 3-94 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **40/20/40**
Ply Stacking Sequence: **$(0/90/0/90/45/-45/90/0/90/0)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 10/31/01
Test Operator: John Smith
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: C-960401-A
Fiber Volume (average): 44.9%
Nominal Fastener Diameter N/A
Nominal Panel Thickness: 0.2000 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: N/A
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ultimate Compressive Load (lbs.)	Ultimate Compressive Strength Actual (ksi)	Ultimate Compressive Strength Nominal (ksi)	Compressive Modulus (0.1-0.3% strain) Actual (msi)	Compressive Modulus (0.1-0.3% strain) Nominal (msi)	Failure Mode (per Table I Three-Place Failure Mode Codes of ASTM D6484-99)
A-135-2	0.19887	1.50093	19304	64.7	64.3	4.41	4.39	Multimode(Angled,Lateral)-Gage-Top
A-135-3	0.20120	1.50043	18728	62.0	62.4	4.33	4.36	Lateral-Gage-Top
A-136-3	0.20117	1.50010	18178	60.2	60.6	4.31	4.34	Multimode(Splitting,Lateral)-Gage-Top
Average	0.20041	1.50049	18737	62.3	62.5	4.35	4.36	
Std. Dev.	0.00134	0.00042	563.15	2.23	1.88	0.05	0.03	
COV, %	0.67	0.03	3.01	3.58	3.01	1.22	0.60	

Material Type: **FGF7781-07I**
Batch Number: AF010363
Test Method: ASTM D6484-99 (modified); SACMA SRM 3-94 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[(45/0/-45/90)_2]_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 10/31/01
Test Operator: John Smith
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: C-960401-A
Fiber Volume (average): 44.5%
Nominal Fastener Diameter N/A
Nominal Panel Thickness: 0.1600 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: N/A
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ultimate Compressive Load (lbs.)	Ultimate Compressive Strength Actual (ksi)	Ultimate Compressive Strength Nominal (ksi)	Compressive Modulus (0.1-0.3% strain) Actual (msi)	Compressive Modulus (0.1-0.3% strain) Nominal (msi)	Failure Mode (per Table I Three-Place Failure Mode Codes of ASTM D6484-99)
B-158-2	0.16260	1.50045	15259	62.5	63.6	3.80	3.86	Lateral-Gage-Middle
B-158-3	0.16332	1.50017	14534	59.3	60.6	3.81	3.89	Angled-Gage-Middle
A-159-3	0.16167	1.50080	15430	63.6	64.3	3.79	3.83	Lateral-Gage-Middle
Average	0.16253	1.50047	15075	61.8	62.8	3.80	3.86	
Std. Dev.	0.00083	0.00032	475.67	2.23	1.98	0.01	0.03	
COV, %	0.51	0.02	3.16	3.60	3.16	0.26	0.75	

Material Type: **FGF7781-07I**
Batch Number: AF010363
Test Method: ASTM D6484-99 (modified); SACMA SRM 3-94 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **10/80/10**
Ply Stacking Sequence: **$(45/-45/90/45/-45/45/-45/0/45/-45)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 10/31/01
Test Operator: John Smith
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: C-960401-A
Fiber Volume (average): 44.1%
Nominal Fastener Diameter N/A
Nominal Panel Thickness: 0.2000 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: N/A
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Ultimate Compressive Load (lbs.)	Ultimate Compressive Strength Actual (ksi)	Ultimate Compressive Strength Nominal (ksi)	Compressive Modulus (0.1-0.3% strain) Actual (msi)	Compressive Modulus (0.1-0.3% strain) Nominal (msi)	Failure Mode (per Table I Three-Place Failure Mode Codes of ASTM D6484-99)
A-183-2	0.20355	1.50038	13755	45.0	45.9	3.02	3.07	Multimode(Angled,Splitting)-Gage-Various
A-183-3	0.20460	1.49968	13623	44.4	45.4	3.03	3.10	Multimode(Angled,Splitting)-Gage-Various
B-184-4	0.20932	1.49993	13567	43.2	45.2	3.05	3.19	Multimode(Angled,Splitting)-Gage-Middle
Average	0.20582	1.50000	13648	44.2	45.5	3.03	3.12	
Std. Dev.	0.00307	0.00035	96.9	0.93	0.32	0.02	0.06	
COV, %	1.49	0.02	0.71	2.10	0.71	0.50	1.99	

Laminate Open Hole Compression Properties, 75 °F (Dry)

Material Type: **FGF7781-07I**
Batch Number: AF010363
Test Method: ASTM D6484-99; SACMA SRM 3-94
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **40/20/40**
Ply Stacking Sequence: **$(0/90/0/90/45/-45/90/0/90/0)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 10/12/01
Test Operator: John Smith
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 45.1%
Nominal Fastener Diameter N/A
Nominal Panel Thickness: 0.2000 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Hole Diameter (in.)	Ultimate Compressive Load (lbs.)	Ultimate Compressive Strength Actual (ksi)	Ultimate Compressive Strength Nominal (ksi)	Failure Mode (per Table I Three-Place Failure Mode Codes of ASTM D6484-99)
A-141-6	0.20220	1.50072	0.25080	12063	39.8	40.2	Lateral-Gage-Middle
A-141-7	0.20242	1.50042	0.25080	12180	40.1	40.6	Lateral-Gage-Middle
A-141-8	0.20200	1.49975	0.25080	11337	37.4	37.8	Lateral-Gage-Middle
B-142-7	0.20063	1.50013	0.25110	11815	39.3	39.4	Lateral-Gage-Middle
B-142-8	0.19960	1.50063	0.25110	12490	41.7	41.6	Lateral-Gage-Middle
Average	0.20137	1.50033	0.25092	11977	39.6	39.9	
Std. Dev.	0.00121	0.00040	0.00016	432	1.54	1.44	
COV, %	0.60	0.03	0.07	3.61	3.90	3.61	

Material Type: **FGF7781-07I**
Batch Number: AF010363
Test Method: ASTM D6484-99; SACMA SRM 3-94
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[(45/0/-45/90)_2]_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 10/12/01
Test Operator: John Smith
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 45.1%
Nominal Fastener Diameter N/A
Nominal Panel Thickness: 0.1600 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Hole Diameter (in.)	Ultimate Compressive Load (lbs.)	Ultimate Compressive Strength Actual (ksi)	Ultimate Compressive Strength Nominal (ksi)	Failure Mode (per Table I Three-Place Failure Mode Codes of ASTM D6484-99)
B-164-4	0.16225	1.49993	0.25080	8799.7	36.2	36.7	Lateral-Gage-Middle
B-164-5	0.16260	1.50012	0.25070	8565.3	35.1	35.7	Lateral-Gage-Middle
A-165-3	0.16383	1.50027	0.25080	8606.8	35.0	35.9	Lateral-Gage-Middle
A-165-4	0.16295	1.50038	0.25080	8869.1	36.3	37.0	Lateral-Gage-Middle
A-165-5	0.16285	1.50023	0.25080	8659.7	35.4	36.1	Lateral-Gage-Middle
Average	0.16290	1.50019	0.25078	8700.1	35.6	36.3	
Std. Dev.	0.00059	0.00017	0.00004	129.41	0.58	0.54	
COV, %	0.36	0.01	0.02	1.49	1.64	1.49	

Material Type: **FGF7781-07I**
Batch Number: AF010363
Test Method: ASTM D6484-99; SACMA SRM 3-94
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **10/80/10**
Ply Stacking Sequence: **$(45/-45/90/45/-45/45/-45/0/45/-45)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 10/12/01
Test Operator: John Smith
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 44.5%
Nominal Fastener Diameter N/A
Nominal Panel Thickness: 0.2000 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Hole Diameter (in.)	Ultimate Compressive Load (lbs.)	Ultimate Compressive Strength Actual (ksi)	Ultimate Compressive Strength Nominal (ksi)	Failure Mode (per Table I Three-Place Failure Mode Codes of ASTM D6484-99)
A-189-4	0.20552	1.50022	0.25070	9625.0	31.2	32.1	Multimode(Angled,Lateral)-Gage-Middle
A-189-5	0.20580	1.50058	0.25080	9761.1	31.6	32.5	Multimode(Angled,Lateral)-Gage-Middle
B-190-3	0.20640	1.50047	0.25080	9517.4	30.7	31.7	Multimode(Angled,Lateral)-Gage-Middle
B-190-4	0.20633	1.49987	0.25090	9739.5	31.5	32.5	Multimode(Angled,Lateral)-Gage-Middle
B-190-5	0.20560	1.50053	0.25070	9589.3	31.1	32.0	Multimode(Angled,Lateral)-Gage-Middle
Average	0.20593	1.50033	0.25078	9646.5	31.2	32.2	
Std. Dev.	0.00041	0.00029	0.00008	103	0.34	0.34	
COV, %	0.20	0.02	0.03	1.06	1.10	1.06	

Laminate Open Hole Compression Properties,180°F (Wet)

Material Type: **FGF7781-07I**
Batch Number: AF010363
Test Method: ASTM D6484-99; SACMA SRM 3-94
Specimen Preconditioning: per Section 3.2 of DOT/FAA/AR-00/47
Test Condition: 180 °F (Wet)
Ply Layup, [%, 0/45/90]: **40/20/40**
Ply Stacking Sequence: **$(0/90/0/90/45/-45/90/0/90/0)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 10/30/01
Test Operator: John Smith
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 45.4%
Nominal Fastener Diameter N/A
Nominal Panel Thickness: 0.2000 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Hole Diameter (in.)	Ultimate Compressive Load (lbs.)	Ultimate Compressive Strength Actual (ksi)	Ultimate Compressive Strength Norm. (ksi)	Failure Mode (per Table I Three-Place Failure Mode Codes of ASTM D6484-99)
A-141-1	0.19668	1.50137	0.25080	8446.8	28.6	28.2	Lateral-Gage-Middle
A-141-2	0.19817	1.50093	0.25080	8784.5	29.5	29.3	Lateral-Gage-Middle
B-142-1	0.19767	1.49963	0.25080	8985.1	30.3	30.0	Lateral-Gage-Middle
B-142-2	0.19977	1.50047	0.25100	8908.1	29.7	29.7	Lateral-Gage-Middle
B-142-3	0.20133	1.49987	0.25080	8665.7	28.7	28.9	Angled-Gage-Middle
Average	0.19872	1.50045	0.25084	8758.0	29.4	29.2	
Std. Dev.	0.00184	0.00072	0.00009	212	0.72	0.71	
COV, %	0.92	0.05	0.04	2.42	2.45	2.42	

Material Type: **FGF7781-07I**
Batch Number: AF010363
Test Method: ASTM D6484-99; SACMA SRM 3-94
Specimen Preconditioning: per Section 3.2 of DOT/FAA/AR-00/47
Test Condition: 180 °F (Wet)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[(45/0/-45/90)_2]_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 10/30/01
Test Operator: John Smith
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 45.6%
Nominal Fastener Diameter N/A
Nominal Panel Thickness: 0.1600 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Hole Diameter (in.)	Ultimate Compressive Load (lbs.)	Ultimate Compressive Strength Actual (ksi)	Ultimate Compressive Strength Nominal (ksi)	Failure Mode (per Table I Three-Place Failure Mode Codes of ASTM D6484-99)
B-166-3	0.16358	1.50022	0.25090	6897.7	28.1	28.7	Lateral-Gage-Middle
B-166-4	0.16320	1.50005	0.25080	6323.7	25.8	26.3	Lateral-Gage-Middle
A-167-2	0.16242	1.50005	0.25080	6734.9	27.6	28.1	Lateral-Gage-Middle
A-167-3	0.16190	1.50040	0.25070	6316.7	26.0	26.3	Lateral-Gage-Middle
A-167-4	0.16308	1.50020	0.25070	6815.1	27.9	28.4	Lateral-Gage-Middle
Average	0.16284	1.50018	0.25078	6617.6	27.1	27.6	
Std. Dev.	0.00067	0.00015	0.00008	277.55	1.08	1.16	
COV, %	0.41	0.01	0.03	4.19	4.00	4.19	

Material Type: **FGF7781-07I**
Batch Number: AF010363
Test Method: ASTM D6484-99; SACMA SRM 3-94
Specimen Preconditioning: per Section 3.2 of DOT/FAA/AR-00/47
Test Condition: 180 °F (Wet)
Ply Layup, [%, 0/45/90]: **10/80/10**
Ply Stacking Sequence: **$(45/-45/90/45/-45/45/-45/0/45/-45)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 10/30/01
Test Operator: John Smith
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 44.1%
Nominal Fastener Diameter N/A
Nominal Panel Thickness: 0.2000 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: N/A

Specimen Number	Specimen Thickness (in.)	Specimen Width (in.)	Hole Diameter (in.)	Ultimate Compressive Load (lbs.)	Ultimate Compressive Strength Actual (ksi)	Ultimate Compressive Strength Nominal (ksi)	Failure Mode (per Table I Three-Place Failure Mode Codes of ASTM D6484-99)
A-191-2	0.20307	1.50048	0.25070	7546.7	24.8	25.2	Multimode(Angled,Lateral)-Gage-Middle
A-191-3	0.20382	1.50038	0.25090	7180.8	23.5	23.9	Lateral-Gage-Middle
B-192-3	0.20417	1.50027	0.25090	7391.6	24.1	24.6	Multimode(Angled,Lateral)-Gage-Middle
B-192-4	0.20463	1.50015	0.25080	7162.8	23.3	23.9	Multimode(Angled,Lateral)-Gage-Middle
B-192-8	0.20317	1.50067	0.25070	7379.2	24.2	24.6	Multimode(Angled,Lateral)-Gage-Middle
Average	0.20377	1.50039	0.25080	7332.2	24.0	24.4	
Std. Dev.	0.00066	0.00020	0.00010	161	0.58	0.54	
COV, %	0.32	0.01	0.04	2.19	2.43	2.19	

Laminate Filled Hole Compression Properties,180°F (Wet)

Material Type: **FGF7781-07I**
Batch Number: AF010363
Test Method: ASTM D6484-99 (modified); SACMA SRM 3-94 (modified)
Specimen Preconditioning: per Section 3.2 of DOT/FAA/AR-00/47
Test Condition: 180 °F (Wet)
Ply Layup, [%, 0/45/90]: **40/20/40**
Ply Stacking Sequence: **$(0/90/0/90/45/-45/90/0/90/0)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 4/26/02
Test Operator: John Smith
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 45.3%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.2000 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: Pin=NAS1134V4A; Collar=MS21042L4

Specimen Number	*Specimen Thickness (in.)*	*Specimen Width (in.)*	*Hole Diameter (in.)*	*Ultimate Compressive Load (lbs.)*	*Ultimate Compressive Strength*		*Failure Mode (per Table I Three-Place Failure Mode Codes of ASTM D6484-99)*
					Actual (ksi)	*Norm. (ksi)*	
A-139-1	0.19805	1.49997	0.25100	11080	37.3	36.9	Lateral-Gage-Top
A-139-2	0.19982	1.50062	0.25120	11565	38.6	38.5	Lateral-Gage-Top
B-140-1	0.19687	1.50017	0.25070	11657	39.5	38.9	Lateral-Gage-Top
B-140-2	0.19907	1.50047	0.25070	11690	39.1	39.0	Angled-Gage-Bottom
B-140-3	0.20040	1.49990	0.25080	10881	36.2	36.3	Lateral-Gage-Bottom
Average	0.19884	1.50023	0.25088	11375	38.1	37.9	
Std. Dev.	0.00141	0.00031	0.00022	369.34	1.36	1.23	
COV, %	0.71	0.02	0.09	3.25	3.57	3.25	

Material Type: **FGF7781-07I**
Batch Number: AF010363
Test Method: ASTM D6484-99 (modified); SACMA SRM 3-94 (modified)
Specimen Preconditioning: per Section 3.2 of DOT/FAA/AR-00/47
Test Condition: 180 °F (Wet)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[(45/0/-45/90)_2]_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 4/26/02
Test Operator: John Smith
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 44.8%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1600 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: Pin=NAS1134V3A; Collar=MS21042L4

Specimen Number	*Specimen Thickness (in.)*	*Specimen Width (in.)*	*Hole Diameter (in.)*	*Ultimate Compressive Load (lbs.)*	*Ultimate Compressive Strength*		*Failure Mode (per Table I Three-Place Failure Mode Codes of ASTM D6484-99)*
					Actual (ksi)	*Nominal (ksi)*	
B-160-1	0.16027	1.50023	0.25080	8909.1	37.1	37.1	Lateral-Gage-Top
B-160-2	0.16133	1.50008	0.25100	9314.3	38.5	38.8	Lateral-Gage-Top
B-160-3	0.16282	1.50060	0.25100	8683.5	35.5	36.2	Angled-Gage-Top
A-161-1	0.16193	1.50073	0.25100	9092.7	37.4	37.9	Lateral-Gage-Bottom
A-161-2	0.16375	1.50032	0.25090	9438.1	38.4	39.3	Lateral-Gage-Bottom
Average	0.16202	1.50039	0.25094	9087.5	37.4	37.9	
Std. Dev.	0.00134	0.00027	0.00009	303.90	1.20	1.27	
COV, %	0.83	0.02	0.04	3.34	3.22	3.34	

Material Type: **FGF7781-07I**
Batch Number: AF010363
Test Method: ASTM D6484-99 (modified); SACMA SRM 3-94 (modified)
Specimen Preconditioning: per Section 3.2 of DOT/FAA/AR-00/47
Test Condition: 180 °F (Wet)
Ply Layup, [%, 0/45/90]: **10/80/10**
Ply Stacking Sequence: **$(45/-45/90/45/-45/45/-45/0/45/-45)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 4/26/02
Test Operator: John Smith
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 44.5%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.2000 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: N/A
Fastener Type: Pin=NAS1134V4A; Collar=MS21042L4

Specimen Number	*Specimen Thickness (in.)*	*Specimen Width (in.)*	*Hole Diameter (in.)*	*Ultimate Compressive Load (lbs.)*	*Ultimate Compressive Strength*		*Failure Mode (per Table I Three-Place Failure Mode Codes of ASTM D6484-99)*
					Actual (ksi)	*Nominal (ksi)*	
A-185-1	0.20355	1.49902	0.25080	8400.0	27.5	28.0	Angled-Gage-Bottom
A-185-2	0.20520	1.50060	0.25090	8738.2	28.4	29.1	Angled-Gage-Middle
A-185-3	0.20605	1.50065	0.25090	8537.4	27.6	28.5	Angled-Gage-Middle
B-192-1	0.20172	1.49998	0.25100	8423.5	27.8	28.1	Angled-Gage-Top
B-192-2	0.20273	1.50022	0.25090	8597.8	28.3	28.7	Angled-Gage-Middle
Average	0.20385	1.50009	0.25090	8539.4	27.9	28.5	
Std. Dev.	0.00177	0.00066	0.00007	138	0.38	0.46	
COV, %	0.87	0.04	0.03	1.61	1.37	1.61	

Laminate Bearing Tension, Double Shear Properties, 75 °F (Dry)

Material Type: **FGF7781-07I**
Batch Number: AF010363
Test Method: ASTM D5961-96
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **40/20/40**
Ply Stacking Sequence: **$(0/90/0/90/45/-45/90/0/90/0)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 11/1/01
Test Operator: John Smith
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 44.3%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.2000 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V12A; Collar=MS21042L4

Specimen Number	*Specimen Thickness (in.)*	*Specimen Width (in.)*	*Hole Diameter (in.)*	*Ultimate Bearing Load (lbs.)*	*Ultimate Double Shear Bearing Strength*		*Failure Mode (per Table I Three-Place Failure Mode Codes of ASTM D5961-96)*
					Actual (ksi)	*Nominal (ksi)*	
A-143-11	0.20763	1.50070	0.25080	4313.2	82.8	86.3	Bearing-1st hole-Bolt & Nut sides
A-143-12	0.20830	1.50100	0.25090	4319.1	82.6	86.4	Bearing-1st hole-Bolt & Nut sides
B-144-11	0.20830	1.50098	0.25080	4346.4	83.2	86.9	Bearing-1st hole-Bolt & Nut sides
B-144-12	0.20883	1.50093	0.25080	4219.4	80.6	84.4	Bearing-1st hole-Bolt & Nut sides
A-143-13	0.20872	1.50078	0.25080	4325.7	82.6	86.5	Bearing-1st hole-Bolt & Nut sides
Average	0.20836	1.50088	0.25082	4304.8	82.4	86.1	
Std. Dev.	0.00047	0.00013	0.00004	49.335	1.04	0.99	
COV, %	0.23	0.01	0.02	1.15	1.26	1.15	

Material Type: **FGF7781-07I**
Batch Number: AF010363
Test Method: ASTM D5961-96
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[(45/0/-45/90)_2]_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 11/8/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 44.7%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1600 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V12A; Collar=MS21042L4

Specimen Number	*Specimen Thickness (in.)*	*Specimen Width (in.)*	*Hole Diameter (in.)*	*Ultimate Tensile Load (lbs.)*	*Ultimate Bearing Strength*		*Failure Mode (per Table I Three-Place Failure Mode Codes of ASTM D5961-96)*
					Actual (ksi)	*Nominal (ksi)*	
B-168-10	0.16347	1.50060	0.25070	3578.5	87.3	89.5	Lateral (net tension)-1st hole-Bolt & Nut sides
B-168-12	0.16552	1.50100	0.25090	3655.1	88.0	91.4	Lateral (net tension)-1st hole-Bolt & Nut sides
A-169-10	0.16390	1.50088	0.25060	3724.0	90.7	93.1	Lateral (net tension)-1st hole-Bolt & Nut sides
A-169-11	0.16535	1.50075	0.25060	3628.1	87.6	90.7	Lateral (net tension)-1st hole-Bolt & Nut sides
A-169-12	0.16567	1.50128	0.25060	3587.5	86.4	89.7	Lateral (net tension)-1st hole-Bolt & Nut sides
Average	0.16478	1.50090	0.25068	3634.6	88.0	90.9	
Std. Dev.	0.00102	0.00026	0.00013	58.780	1.60	1.47	
COV, %	0.62	0.02	0.05	1.62	1.82	1.62	

Laminate Bearing Tension, Double Shear Properties, 180 °F (Wet)

Material Type: **FGF7781-07I**
Batch Number: AF010363
Test Method: ASTM D5961-96
Specimen Preconditioning: per Section 3.2 of DOT/FAA/AR-00/47 (2000 Draft Report)
Test Condition: 180 °F (Wet)
Ply Layup, [%, 0/45/90]: **40/20/40**
Ply Stacking Sequence: **$(0/90/0/90/45/-45/90/0/90/0)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 4/23/02
Test Operator: John Smith
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 44.3%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.2000 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V12A; Collar=MS21042L4

Specimen Number	*Specimen Thickness (in.)*	*Specimen Width (in.)*	*Hole Diameter (in.)*	*Ultimate Bearing Load (lbs.)*	*Ultimate Double Shear Bearing Strength*		*Failure Mode (per Table I Three-Place Failure Mode Codes of ASTM D5961-96)*
					Actual (ksi)	*Nominal (ksi)*	
A-143-1	0.20247	1.50068	0.25110	3035.1	59.7	60.7	Bearing-1st hole-Bolt & Nut sides
A-143-2	0.20378	1.50037	0.25080	3194.7	62.5	63.9	Bearing-1st hole-Bolt & Nut sides
B-144-1	0.19792	1.50143	0.25090	3151.2	63.5	63.0	Bearing-1st hole-Bolt & Nut sides
B-144-2	0.20190	1.50090	0.25090	3193.8	63.0	63.9	Bearing-1st hole-Bolt & Nut sides
B-144-3	0.20487	1.50077	0.25110	3267.5	63.5	65.4	Bearing-1st hole-Bolt & Nut sides
Average	0.20219	1.50083	0.25096	3168.5	62.4	63.4	
Std. Dev.	0.00265	0.00039	0.00013	85.473	1.59	1.71	
COV, %	1.31	0.03	0.05	2.70	2.54	2.70	

Material Type: **FGF7781-07I**
Batch Number: AF010363
Test Method: ASTM D5961-96
Specimen Preconditioning: per Section 3.2 of DOT/FAA/AR-00/47 (2000 Draft Report)
Test Condition: 180 °F (Wet)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[(45/0/-45/90)_2]_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 2/5/02
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 44.8%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1600 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V12A; Collar=MS21042L4

Specimen Number	*Specimen Thickness (in.)*	*Specimen Width (in.)*	*Hole Diameter (in.)*	*Ultimate Tensile Load (lbs.)*	*Ultimate Bearing Strength*		*Failure Mode (per Table I Three-Place Failure Mode Codes of ASTM D5961-96)*
					Actual (ksi)	*Nominal (ksi)*	
B-168-1	0.15985	1.50107	0.25100	3314.0	82.6	82.9	Lateral (net tension)-1st hole-Bolt & Nut sides
B-168-2	0.16243	1.50095	0.25110	3224.4	79.1	80.6	Bearing-1st hole-Bolt & Nut sides
B-168-3	0.16392	1.50053	0.25110	3174.5	77.1	79.4	Bearing-1st hole-Bolt & Nut sides
A-169-1	0.15963	1.50052	0.25090	2949.3	73.6	73.7	Bearing-1st hole-Bolt & Nut sides
A-169-2	0.16223	1.50075	0.25090	2997.6	73.6	74.9	Bearing-1st hole-Bolt & Nut sides
Average	0.16161	1.50076	0.25100	3132.0	77.2	78.3	
Std. Dev.	0.00183	0.00025	0.00010	154.04	3.80	3.85	
COV, %	1.13	0.02	0.04	4.92	4.93	4.92	

Laminate Bearing Tension, Single Shear Properties, 75°F (Dry)

Material Type: **FGF7781-07I**
Batch Number: AF010363
Test Method: ASTM D5961-96
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **40/20/40**
Ply Stacking Sequence: **$(0/90/0/90/45/-45/90/0/90/0)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 11/8/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 44.6%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.2000 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V10A; Collar=MS21042L4

ID of Specimens		*Specimen Thickness*		*Hole Diameter*		*Load at*	*Bearing Strength at 4 %*			*Failure Mode*
						4% Hole	*Hole Elongation*			*(per Figure 9 Bearing Test Failure*
nut side	*bolt side*	*#1*	*#2*	*#1*	*#2*	*Elongation*	*Actual (#1)*	*Actual (#2)*	*Nominal*	*Codes with illustration of common*
#1	*#2*	*(in.)*	*(in.)*	*(in.)*	*(in.)*	*(lbs.)*	*(in.)*	*(in.)*	*(ksi)*	*modes of ASTM D5961-96)*
B-148-3	B-143-10	0.20282	0.20358	0.25070	0.25080	4245.2	41.7	41.6	42.5	None
B-148-4	B-148-11	0.20482	0.20542	0.25070	0.25080	4451.4	43.3	43.2	44.5	None
A-147-3	A-147-10	0.20462	0.20317	0.25080	0.25080	4501.3	43.9	44.2	45.0	None
A-147-4	A-147-11	0.20557	0.20435	0.25090	0.25090	4411.2	42.8	43.0	44.1	None
A-147-5	A-147-12	0.20610	0.20543	0.25080	0.25080	4318.5	41.8	41.9	43.2	None
Average		0.20479	0.20439	0.25078	0.25082	4385.5	42.7	42.8	43.9	
Std. Dev.		0.00125	0.00104	0.00008	0.00004	103.18	0.94	1.05	1.03	
COV, %		0.61	0.51	0.03	0.02	2.35	2.20	2.45	2.35	

Material Type: **FGF7781-07I**
Batch Number: AF010363
Test Method: ASTM D5961-96
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[(45/0/-45/90)_2]_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 11/8/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 44.5%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1600 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V8A; Collar=MS21042L4

Specimen Number		*Specimen Thickness*		*Hole Diameter*		*Load at*	*Bearing Strength at 4%*			*Failure Mode*
		nut side	*bolt side*	*nut side*	*bolt side*	*4% Hole*	*Hole Elongation*			*(per Figure 9 Bearing Test Failure*
nut side	*bolt side*	*#1*	*#2*	*#1*	*#2*	*Deformation*	*Actual (#1)*	*Actual (#2)*	*Nominal*	*Codes with illustration of common*
#1	*#2*	*(in.)*	*(in.)*	*(in.)*	*(in.)*	*(lbs.)*	*(ksi)*	*(ksi)*	*(ksi)*	*modes of ASTM D5961-96)*
B-172-10	B-172-3	0.16567	0.16427	0.25070	0.25060	3959.5	47.7	48.1	49.5	None
B-172-11	B-172-4	0.16652	0.16490	0.25070	0.25090	3978.5	47.7	48.1	49.7	None
A-173-10	A-173-3	0.16472	0.16210	0.25080	0.25070	3705.9	44.9	45.6	46.3	None
A-173-11	A-173-4	0.16532	0.16285	0.25080	0.25070	3435.3	41.4	42.1	42.9	None
A-173-12	A-173-5	0.16575	0.16245	0.25080	0.25070	3742.9	45.0	46.0	46.8	None
Average		0.16560	0.16331	0.25076	0.25072	3764.4	45.3	46.0	47.1	
Std. Dev.		0.00066	0.00121	0.00005	0.00011	221.41	2.57	2.46	2.77	
COV, %		0.40	0.74	0.02	0.04	5.88	5.67	5.36	5.88	

Laminate Bearing Tension, Single Shear Properties, 180°F (Wet)

Material Type: **FGF7781-07I**
Batch Number: AF010363
Test Method: ASTM D5961-96
Specimen Preconditioning: per Section 3.2 of DOT/FAA/AR-00/47 (2000 Draft Report)
Test Condition: 180 °F (Wet)
Ply Layup, [%, 0/45/90]: **40/20/40**
Ply Stacking Sequence: **$(0/90/0/90/45/-45/90/0/90/0)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 4/25/02
Test Operator: John Smith
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 44.6%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.2000 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V10A; Collar=MS21042L4

ID of Specimens nut side #1	ID of Specimens bolt side #2	Specimen Thickness #1 (in.)	Specimen Thickness #2 (in.)	Hole Diameter #1 (in.)	Hole Diameter #2 (in.)	Load at 4% Hole Elongation (lbs.)	Bearing Strength at 4 % Hole Elongation Actual (#1) (in.)	Bearing Strength at 4 % Hole Elongation Actual (#2) (in.)	Bearing Strength at 4 % Hole Elongation Nominal (ksi)	Failure Mode (per Figure 9 Bearing Test Failure Codes with illustration of common modes of ASTM D5961-96)
A-145-7	A-145-8	0.20485	0.19930	0.25080	0.25080	3432.1	33.4	34.3	34.3	Bearing-1st hole-Bolt & Nut sides
A-145-3	A-145-12	0.20280	0.20588	0.25070	0.25080	3516.9	34.6	34.1	35.2	Bearing-1st hole-Bolt & Nut sides
B-146-2	B-146-13	0.20628	0.20628	0.25080	0.25090	3346.8	32.3	32.3	33.5	Bearing-1st hole-Bolt & Nut sides
B-146-4	B-146-11	0.20837	0.20768	0.25080	0.25080	3388.3	32.4	32.5	33.9	Bearing-1st hole-Bolt & Nut sides
B-146-7	B-146-8	0.20790	0.20278	0.25080	0.25090	3665.5	35.1	36.0	36.7	Bearing-1st hole-Bolt & Nut sides
Average		0.20604	0.20438	0.25078	0.25084	3469.9	33.6	33.9	34.7	
Std. Dev.		0.00228	0.00336	0.00004	0.00005	126.21	1.26	1.50	1.26	
COV, %		1.11	1.64	0.02	0.02	3.64	3.76	4.44	3.64	

Material Type: **FGF7781-07I**
Batch Number: AF010363
Test Method: ASTM D5961-96
Specimen Preconditioning: per Section 3.2 of DOT/FAA/AR-00/47 (2000 Draft Report)
Test Condition: 180 °F (Wet)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[(45/0/-45/90)_2]_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 4/24/02
Test Operator: John Smith
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 44.5%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1600 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V8A; Collar=MS21042L4

Specimen Number nut side #1	Specimen Number bolt side #2	Specimen Thickness nut side #1 (in.)	Specimen Thickness bolt side #2 (in.)	Hole Diameter nut side #1 (in.)	Hole Diameter bolt side #2 (in.)	Load at 4% Hole Deformation (lbs.)	Bearing Strength at 4% Hole Elongation Actual (#1) (ksi)	Bearing Strength at 4% Hole Elongation Actual (#2) (ksi)	Bearing Strength at 4% Hole Elongation Nominal (ksi)	Failure Mode (per Figure 9 Bearing Test Failure Codes with illustration of common modes of ASTM D5961-96)
B-170-5	B-170-12	0.16383	0.16395	0.25090	0.25080	3454.8	42.0	42.0	43.2	Bearing-1st hole-Botl & Nut sides
B-170-6	B-170-13	0.16377	0.16397	0.25080	0.25090	2996.4	36.5	36.4	37.5	Bearing-1st hole-Botl & Nut sides
B-170-7	B-170-14	0.16358	0.16500	0.25080	0.25080	3549.3	43.3	42.9	44.4	Bearing-1st hole-Botl & Nut sides
A-171-7	A-171-14	0.16517	0.16530	0.25070	0.25090	3359.4	40.6	40.5	42.0	Bearing-1st hole-Botl & Nut sides
A-171-4	A-171-11	0.16748	0.16850	0.25080	0.25070	3849.8	45.8	45.6	48.1	Bearing-1st hole-Botl & Nut sides
Average		0.16477	0.16534	0.25080	0.25082	3441.9	41.6	41.5	43.0	
Std. Dev.		0.00164	0.00186	0.00007	0.00008	309.57	3.47	3.37	3.87	
COV, %		1.00	1.13	0.03	0.03	8.99	8.33	8.14	8.99	

Laminate Bearing-Bypass, Single Shear Properties, 75°F (Dry)

Material Type: **FGF7781-07I**
Batch Number: AF010363
Test Method: ASTM D5961-96 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **40/20/40**
Ply Stacking Sequence: **$(0/90/0/90/45/-45/90/0/90/0)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 12/4/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 45.2%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.2000 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V7A; Collar=MS21042L4

Tension

Specimen ID		Specimen Thickness		Specimen Width		Hole Diameter		Ultimate	Ultimate Gross Bypass Strength		
Nut side Strap #1	Bolt side Strap #2	Strap #1 (inch)	Strap #2 (inch)	Strap #1 (inch)	Strap #2 (inch)	Strap #1 (inch)	Strap #2 (inch)	Tensile Load (Lbs)	Actual (#1) (ksi)	Actual (#2) (ksi)	Nominal (ksi)
A-149-5	A-149-6	0.20662	0.20575	1.50060	1.49985	0.25095	0.25085	7322.5	23.6	23.7	24.4
B-150-3	B-150-4	0.20482	0.20560	1.49982	1.49960	0.25075	0.25065	7340.6	23.9	23.8	24.5
B-150-5	B-150-6	0.20475	0.20465	1.50055	1.50000	0.25070	0.25080	7067.1	23.0	23.0	23.6
A-151-5	A-151-6	0.20695	0.20727	1.50063	1.49963	0.25075	0.25070	7467.0	24.0	24.0	24.9
A-151-7	A-151-8	0.20480	0.20230	1.50060	1.50123	0.25050	0.25055	7234.6	23.5	23.8	24.1
Average		0.20559	0.20511	1.50044	1.50006	0.25073	0.25071	7286.4	23.6	23.7	24.3
Std. Dev.		0.00110	0.00183	0.00035	0.00067	0.00016	0.00012	148.01	0.40	0.38	0.49
COV, %		0.53	0.89	0.02	0.04	0.06	0.05	2.03	1.70	1.62	2.03

Specimen ID		Ultimate Net Bypass Strength			Ultimate Bearing Strength			Failure Mode
Nut side Strap #1	Bolt side Strap #2	Actual (#1) (ksi)	Actual (#2) (ksi)	Nominal (ksi)	Actual (#1) (ksi)	Actual (#2) (ksi)	Nominal (ksi)	(Per Figur 9 Bearing Test Failure Codes with Illustrations of Common Modes of ASTM D5961-96)
A-149-5	A-149-6	11.8	11.9	12.2	70.6	70.9	73.2	Lateral(net tension)-1st hole-Nut side
B-150-3	B-150-4	11.9	11.9	12.2	71.5	71.2	73.4	Lateral(net tension)-2nd hole-Bolt side
B-150-5	B-150-6	11.5	11.5	11.8	68.8	68.8	70.7	Lateral(net tension)-1st hole-Nut side
A-151-5	A-151-6	12.0	12.0	12.4	71.9	71.8	74.7	Fastener or Pin-2nd hole-Nut side
A-151-7	A-151-8	11.8	11.9	12.1	70.5	71.4	72.3	Lateral(net tension)-1st hole-Nut side
Average		11.8	11.8	12.1	70.7	70.8	72.9	
Std. Dev.		0.20	0.19	0.25	1.19	1.17	1.48	
COV, %		1.70	1.62	2.03	1.68	1.64	2.03	

Material Type: **FGF7781-07I**
Batch Number: AF010363
Test Method: ASTM D5961-96 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **40/20/40**
Ply Stacking Sequence: **$(0/90/0/90/45/-45/90/0/90/0)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 12/6/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 45.6%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.2000 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V7A; Collar=MS21042L4

Compression

Specimen ID		Specimen Thickness		Specimen Width		Hole Diameter		Ultimate	Ultimate Bypass Strength		
Nut side Strap #1	Bolt side Strap #2	Strap #1 (inch)	Strap #2 (inch)	Strap #1 (inch)	Strap #2 (inch)	Strap #1 (inch)	Strap #2 (inch)	Comp. Load (Lbs)	Actual (#1) (ksi)	Actual (#2) (ksi)	Nominal (ksi)
A-151-1	A-151-2	0.20558	0.20605	1.50060	1.49995	0.25085	0.25090	8614.2	14.0	13.9	14.4
A-151-3	A-151-4	0.20570	0.20646	1.50000	1.49983	0.25062	0.25070	8596.1	13.9	13.9	14.3
B-152-2	B-152-1	0.20723	0.20300	1.49952	1.49952	0.25010	0.25055	8847.4	14.2	14.5	14.7
B-152-3	B-152-4	0.21122	0.21123	1.50057	1.49843	0.25085	0.25085	8248.2	13.0	13.0	13.7
B-152-6	B-152-5	0.20447	0.20857	1.49972	1.50550	0.25035	0.25045	8634.8	14.1	13.7	14.4
Average		0.20684	0.20706	1.50008	1.50065	0.25055	0.25069	8588.1	13.8	13.8	14.3
Std. Dev.		0.00264	0.00306	0.00049	0.00278	0.00033	0.00019	215.46	0.48	0.54	0.36
COV, %		1.28	1.48	0.03	0.19	0.13	0.08	2.51	0.48	3.88	2.51

Specimen ID		Ultimate Bearing Strength			Failure Mode
Nut side Strap #1	Bolt side Strap #2	Actual (#1) (ksi)	Actual (#2) (ksi)	Nominal (ksi)	(Per Figur 9 Bearing Test Failure Codes with Illustrations of Common Modes of ASTM 5961-96)
A-151-1	A-151-2	83.5	83.3	86.1	Bearing(F1)-Both holes-Bolt & Nut sides
A-151-3	A-151-4	83.4	83.0	86.0	Bearing (F1,2)-Both holes-Bolt & Nut sides
B-152-2	B-152-1	85.4	87.0	88.5	Bearing (F1,2)-Both holes-Bolt & Nut sides
B-152-3	B-152-4	77.8	77.8	82.5	Bearing(F2)-Both holes-Bolt & Nut sides
B-152-6	B-152-5	84.3	82.7	86.3	Bearing(F2)-Both holes-Bolt & Nut sides
Average		82.9	82.8	85.9	
Std. Dev.		2.93	3.26	2.15	
COV, %		3.54	3.94	2.51	

Laminate Bearing-Bypass, Single Shear Properties, 75°F (Dry)

Material Type: **FGF7781-07I**
Batch Number: AF010363
Test Method: ASTM D5961-96 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[]_{45/0/-45/90)_2]_S}$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 12/4/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 44.4%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1600 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V6A; Collar=MS21042L4

Tension

Specimen ID		Specimen Thickness		Specimen Width		Hole Diameter		Ultimate	Ultimate Gross ypass Strength		
Nut side #1	Bolt side #2	#1 (inch)	#2 (inch)	#1 (inch)	#2 (inch)	#1 (inch)	#2 (inch)	Tensile Load (Lbs)	Actual (#1) (ksi)	Actual (#2) (ksi)	Nominal (ksi)
B-174-1	B-174-2	0.16325	0.16490	1.49942	1.50058	0.25040	0.25040	5325.3	21.8	21.5	22.2
B-174-4	B-174-3	0.16568	0.16562	1.49967	1.49917	0.25050	0.25065	5372.5	21.6	21.6	22.4
A-175-1	A-175-2	0.16205	0.16327	1.49935	1.50078	0.25055	0.25060	5263.7	21.7	21.5	21.9
A-175-3	A-175-4	0.16640	0.16660	1.49943	1.50068	0.25025	0.25035	5417.6	21.7	21.7	22.6
A-175-5	A-175-6	0.16710	0.16635	1.50003	1.49983	0.25055	0.25055	5456.2	21.8	21.9	22.7
Average		0.16490	0.16535	1.49958	1.50021	0.25045	0.25051	5367.1	21.7	21.6	22.4
Std. Dev.		0.00215	0.00134	0.00028	0.00069	0.00013	0.00013	75.758	0.061	0.152	0.316
COV, %		1.31	0.81	0.02	0.05	0.05	0.05	1.41	0.28	0.70	1.41

Specimen ID		Ultimate Net Bypass Strength			Ultimate Bearing Strength			Failure Mode
Nut side #1	Bolt side #2	Actual (#1) (ksi)	Actual (#2) (ksi)	Nominal (ksi)	Actual (#1) (ksi)	Actual (#2) (ksi)	Nominal (ksi)	(Per Figur 9 Bearing Test Failure Codes with Illustrations of Common Modes of ASTM D5961-96)
B-174-1	B-174-2	10.9	10.8	11.1	65.1	64.5	66.6	Lateral(net tension)-1st hole-Nut side
B-174-4	B-174-3	10.8	10.8	11.2	64.7	64.7	67.2	Lateral(net tension)-2nd hole-Nut side
A-175-1	A-175-2	10.8	10.7	11.0	64.8	64.3	65.8	Lateral(net tension)-1st hole-Nut side
A-175-3	A-175-4	10.9	10.8	11.3	65.1	64.9	67.7	Lateral(net tension)-1st hole-Nut side
A-175-5	A-175-6	10.9	10.9	11.4	65.2	65.5	68.2	Lateral(net tension)-1st hole-Nut side
Average		10.9	10.8	11.2	65.0	64.8	67.1	
Std. Dev.		0.03	0.08	0.16	0.20	0.44	0.95	
COV, %		0.28	0.70	1.41	0.30	0.68	1.41	

Material Type: **FGF7781-07I**
Batch Number: AF010363
Test Method: ASTM D5961-96 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[]_{45/0/-45/90)_2]_S}$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 12/5/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 45.6%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1600 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V6A; Collar=MS21042L4

Compression

Specimen ID		Specimen Thickness		Specimen Width		Hole Diameter		Ultimate	Ultimate Bypass Strength		
Nut side #1	Bolt side #2	#1 (inch)	#2 (inch)	#1 (inch)	#2 (inch)	#1 (inch)	#2 (inch)	Comp. Load (Lbs)	Actual (#1) (ksi)	Actual (#2) (ksi)	Nominal (ksi)
B-180-4	B-180-3	0.16540	0.16437	1.49960	1.49997	0.25055	0.25060	8236.7	16.6	16.7	17.2
B-180-6	B-180-5	0.16690	0.16670	1.49743	1.50082	0.25055	0.25050	8108.8	16.2	16.2	16.9
B-180-7	B-180-8	0.16463	0.16270	1.50075	1.50015	0.25040	0.25040	7935.6	16.1	16.3	16.5
A-181-2	A-181-1	0.16370	0.16190	1.50057	1.50002	0.25045	0.25035	8056.4	16.4	16.6	16.8
A-181-4	A-181-3	0.16528	0.16485	1.49913	1.49567	0.25030	0.25045	8223.4	16.6	16.7	17.1
Average		0.16518	0.16410	1.49950	1.49933	0.25045	0.25046	8112.2	16.4	16.5	16.9
Std. Dev.		0.00117	0.00188	0.00134	0.00207	0.00011	0.00010	124.678	0.24	0.24	0.26
COV, %		0.71	1.15	0.09	0.14	0.04	0.04	1.54	1.44	1.44	1.54

Specimen ID		Ultimate Bearing Strength			Failure Mode
Nut side #1	Bolt side #2	Actual (#1) (ksi)	Actual (#2) (ksi)	Nominal (ksi)	(Per Figur 9 Bearing Test Failure Codes with Illustrations of Common Modes of ASTM D5961-96)
B-180-4	B-180-3	99.4	100.0	103	Lateral(net tension)-1st hole-Bolt side
B-180-6	B-180-5	97.0	97.1	101	Lateral(net tension)-1st hole-Bolt side
B-180-7	B-180-8	96.3	97.4	99.2	Lateral(net tension)-2nd hole-Bolt side
A-181-2	A-181-1	98.3	99.4	101	Bearing-Both holes-Bolt & Nut sides
A-181-4	A-181-3	99.4	99.6	103	Lateral(net tension)-1st hole-Bolt side
Average		98.0	98.7	101.4	
Std. Dev.		1.42	1.34	1.56	
COV, %		1.45	1.36	1.54	

Laminate Bearing-Bypass, Single Shear Properties, 75°F (Dry)

Material Type: **FGF7781-07I**
Batch Number: AF010363
Test Method: ASTM D5961-96 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **10/80/10**
Ply Stacking Sequence: **$(45/-45/90/45/-45/45/-45/0/45/-45)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 9/27/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 44.8%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.2000 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V7A; Collar=MS21042L4

Tension

Specimen ID		Specimen Thickness		Specimen Width		Hole Diameter		Ultimate	Ultimate Gross Bypass Strength		
Nut side #1	Bolt side #2	#1 (inch)	#2 (inch)	#1 (inch)	#2 (inch)	#1 (inch)	#2 (inch)	Tensile Load (Lbs)	Actual (#1) (ksi)	Actual (#2) (ksi)	Nominal (ksi)
A-193-5	A-193-6	0.21178	0.20680	1.50063	1.50018	0.25065	0.25035	7452.8	23.5	24.0	24.8
A-193-3	A-193-4	0.21303	0.21400	1.50013	1.50003	0.25030	0.25025	7521.8	23.5	23.4	25.1
B-194-1	B-194-6	0.20270	0.20842	1.49997	1.49968	0.25050	0.25060	7484.9	24.6	23.9	24.9
B-194-2	B-194-5	0.20510	0.20838	1.50060	1.50038	0.25070	0.25055	7523.4	24.4	24.1	25.1
A-193-7	A-195-7	0.20412	0.20573	1.50058	1.50065	0.25080	0.25065	7256.1	23.7	23.5	24.2
Average		0.20735	0.20867	1.50038	1.50018	0.25059	0.25048	7447.8	23.9	23.8	24.8
Std. Dev.		0.00472	0.00319	0.00031	0.00037	0.00019	0.00017	111.06	0.54	0.30	0.37
COV, %		2.28	1.53	0.02	0.02	0.08	0.07	1.49	2.27	1.27	1.49

Specimen ID		Ultimate Net Bypass Strength			Ultimate Bearing Strength			Failure Mode
Nut side #1	Bolt side #2	Actual (#1) (ksi)	Actual (#2) (ksi)	Nominal (ksi)	Actual (#1) (ksi)	Actual (#2) (ksi)	Nominal (ksi)	(Per Figur 9 Bearing Test Failure Codes with Illustrations of Common Modes of ASTM D5961-96)
A-193-5	A-193-6	11.7	12.0	12.4	70.2	72.0	74.5	Bolt failure
A-193-3	A-193-4	11.8	11.7	12.5	70.5	70.2	75.2	Bolt failure
B-194-1	B-194-6	12.3	12.0	12.5	73.7	71.7	74.8	Bolt failure
B-194-2	B-194-5	12.2	12.0	12.5	73.2	72.0	75.2	Lateral-1st hole-Bolt side
A-193-7	A-195-7	11.8	11.8	12.1	70.9	70.4	72.6	Bolt failure
Average		12.0	11.9	12.4	71.7	71.3	74.5	
Std. Dev.		0.27	0.15	0.19	1.62	0.89	1.11	
COV, %		2.27	1.27	1.49	2.25	1.25	1.49	

Material Type: **FGF7781-07I**
Batch Number: AF010363
Test Method: ASTM D5961-96 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **10/80/10**
Ply Stacking Sequence: **$(45/-45/90/45/-45/45/-45/0/45/-45)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 8/20/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 44.5%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.2000 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V6A; Collar=MS21042L4

Compression

Specimen ID		Specimen Thickness		Specimen Width		Hole Diameter		Ultimate	Ultimate Bypass Strength		
Nut side #1	Bolt side #2	#1 (inch)	#2 (inch)	#1 (inch)	#2 (inch)	#1 (inch)	#2 (inch)	Comp. Load (Lbs)	Actual (#1) (ksi)	Actual (#2) (ksi)	Nominal (ksi)
A-195-1	A-195-6	0.20565	0.20628	1.50045	1.50037	0.25060	0.25065	8441.6	13.7	13.6	14.1
A-195-2	A-195-5	0.20605	0.20838	1.50040	1.50088	0.25050	0.25070	8395.0	13.6	13.4	14.0
B-200-1	B-200-6	0.20330	0.20837	1.49986	1.50013	0.25070	0.25070	8485.8	13.9	13.6	14.1
B-200-2	B-200-5	0.20390	0.20827	1.50090	1.50067	0.25060	0.25070	8340.1	13.6	13.3	13.9
B-200-3	B-200-4	0.20690	0.20733	1.49977	1.49978	0.25090	0.25085	7935.5	12.8	12.8	13.2
Average		0.20516	0.20773	1.50028	1.50037	0.25066	0.25072	8319.6	13.5	13.3	13.9
Std. Dev.		0.00151	0.00092	0.00046	0.00043	0.00015	0.00008	221.44	0.43	0.35	0.37
COV, %		0.74	0.44	0.03	0.03	0.06	0.03	2.66	3.17	2.61	2.66

Specimen ID		Ultimate Bearing Strength			Failure Mode
Nut side #1	Bolt side #2	Actual (#1) (ksi)	Actual (#2) (ksi)	Nominal (ksi)	(Per Figur 9 Bearing Test Failure Codes with Illustrations of Common Modes of ASTM D5961-96)
A-195-1	A-195-6	81.9	81.6	84.4	None --- Stopped test to prevent contact of fixture
A-195-2	A-195-5	81.3	80.3	84.0	None --- Stopped test to prevent contact of fixture
B-200-1	B-200-6	83.2	81.2	84.9	Adjusted specimen loading in fixture ---Both Bolts failed
B-200-2	B-200-5	81.6	79.9	83.4	Adjusted specimen loading in fixture ---Both Bolts failed
B-200-3	B-200-4	76.4	76.3	79.4	Adjusted specimen loading in fixture ---Both Bolts failed
Average		80.9	79.9	83.2	
Std. Dev.		2.60	2.12	2.21	
COV, %		3.22	2.65	2.66	

Laminate Bearing-Bypass, Double Shear Properties, 75°F (Dry)

Material Type:	**FGF7781-07I**
Batch Number:	AF010363
Test Method:	ASTM D5961-96 (modified)
Specimen Preconditioning:	As Fabricated
Test Condition:	75 °F (Dry)
Ply Layup, [%, 0/45/90]:	**40/20/40**
Ply Stacking Sequence:	**$(0/90/0/90/45/-45/90/0/90/0)_S$**
Testing Facility:	Toray Composites (America), Inc.
Test Date:	12/18/01
Test Operator:	Jeremy Bucholtz
Test Frame:	MTS Alliance RF/300

Test Speed:	0.05 inch/minute	
Control Mode:	Stroke	
Strain Gauge:	N/A	
Fiber Volume (average):	45.3%	
Nominal Fastener Diameter	0.2500	inch
Nominal Panel Thickness:	0.2000	inch
Nominal Width:	1.5000	inch
Nominal Width/Diameter ratio:	6.0000	
Edge/Diameter ratio:	3.0000	inch
Fastener Type:	Pin=NAS1134V5A; Collar=MS21042L4	

Tension

Specimen ID	*Specimen Thickness*			*Specimen Width*			*Specimen Hole Diameter*			*Ultimate Load*	*Ultimate Gross Bypass Strength*		*Ultimate Net Bypass Strength*	
	Specimen inch	*Plate #1 Nut side (inch)*	*Plate#2 Bolt side (inch)*	*Specimen inch*	*Plate #1 Nut side (inch)*	*Plate#2 Bolt side (inch)*	*Hole #1 inch*	*Hole #2 (inch)*	*Nominal (inch)*	*(lbs)*	*Actual (ksi)*	*Nominal (ksi)*	*Actual (ksi)*	*Nominal (ksi)*
A-155-1	0.20288	0.03560	0.03455	1.49942	1.50100	1.50100	0.25020	0.25040	0.25000	7411.2	24.4	24.7	19.5	19.8
A-155-2	0.2044	0.03535	0.03380	1.49765	1.50100	1.50100	0.25030	0.25040	0.25000	7316.4	23.9	24.4	18.7	19.1
B-156-1	0.19815	0.03410	0.03410	1.49823	1.50050	1.50000	0.25040	0.25040	0.25000	7433.4	25.0	24.8	20.2	20.0
B-156-2	0.20122	0.03445	0.03475	1.4992	1.50100	1.50050	0.25070	0.25030	0.25000	7390.4	24.5	24.6	20.0	20.1
B-156-3	0.20427	0.03360	0.03315	1.49847	1.50000	1.50100	0.25040	0.25030	0.25000	7439.0	24.3	24.8	19.7	20.1
Average	0.20218	0.03462	0.03407	1.49859	1.50070	1.50070	0.25040	0.25036	0.25000	7398.1	24.4	24.7	19.6	19.8
Std. Dev.	0.00260	0.00084	0.00064	0.00072	0.00045	0.00045	0.00019	0.00005	0.00000	49.560	0.41	0.17	0.58	0.44
COV, %	1.28	2.43	1.86	0.05	0.03	0.03	0.07	0.02	0.00	0.67	1.68	0.67	2.97	2.21

Specimen ID	*Strain in Side Plate at Ultimate Load*		*Load in Side Plate at Ultimate Load*		*Bearing Load at Ultimate*	*Percent Bearing Load at Ultimate*	*Bearing Strength at Ultimate Load*		*Failure Mode* (Per Figure 9 Bearing Test Failure Codes with Illustration of Common Modes in accrodance with ASTM D5961-96)
	Plate #1 gage # 2 (in/in)	*Plate #2 gage # 3 (in/in)*	*Plate #1 Nut side (lbs)*	*Plate#2 Bolt side (lbs)*	*(lbs)*	*(%)*	*Actual (ksi)*	*Nominal (ksi)*	
A-155-1	0.00162	0.00104	906.36	577.98	1484.3	20.0	29.2	29.7	Lateral(net tension)-2nd Hole-Bolt & Nut sides
A-155-2	0.00157	0.00131	877.39	719.74	1597.1	21.8	31.2	31.9	Lateral(net tension)-2nd Hole-Bolt & Nut sides
B-156-1	0.00143	0.00117	791.41	645.71	1437.1	19.3	29.0	28.7	Lateral(net tension)-1st Hole-Bolt & Nut sides
B-156-2	0.00140	0.00107	776.76	592.03	1368.8	18.5	27.1	27.4	Lateral(net tension)-2nd Hole-Bolt & Nut sides
B-156-3	0.00135	0.00118	746.27	651.44	1397.7	18.8	27.3	28.0	Lateral(net tension)-2nd Hole-Bolt & Nut sides
Average	0.00147	0.00115	819.64	637.38	1457.0	19.7	28.8	29.1	
Std. Dev.	0.00012	0.00011	68.691	56.202	89.545	1.32	1.66	1.79	
COV, %	7.8	9.22	8.38	8.82	6.15	6.71	5.77	6.15	

Laminate Bearing-Bypass, Double Shear Properties, 75°F (Dry)

Material Type: **FGF7781-07I**
Batch Number: AF010363
Test Method: ASTM D5961-96 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **40/20/40**
Ply Stacking Sequence: **$(0/90/0/90/45/-45/90/0/90/0)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 12/18/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 45.3%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.2000 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V5A; Collar=MS21042L4

Compression

Specimen ID	*Specimen Thickness*			*Specimen Width*			*Specimen Hole Diameter*			*Ultimate Load (lbs)*
	Specimen inch	*Plate #1 Nut side (inch)*	*Plate#2 Bolt side (inch)*	*Specimen inch*	*Plate #1 Nut side (inch)*	*Plate#2 Bolt side (inch)*	*Hole #1 inch*	*Hole #2 (inch)*	*Nominal (inch)*	
A-155-3	0.20530	0.03510	0.03470	1.4992	1.50100	1.50150	0.25010	0.25010	0.25000	15938
A-155-4	0.20567	0.03470	0.03440	1.49865	1.50100	1.50150	0.25030	0.25030	0.25000	16176
A-155-5	0.20585	0.03435	0.03335	1.49948	1.50100	1.50000	0.25060	0.25050	0.25000	15292
B-156-4	0.20473	0.03375	0.03460	1.49942	1.50150	1.50000	0.25040	0.25030	0.25000	16131
B-156-5	0.20438	0.03395	0.0345	1.49853	1.50100	1.50100	0.25050	0.25030	0.25000	16575
Average	0.20519	0.03437	0.03431	1.49906	1.50110	1.50080	0.25038	0.25030	0.25000	16022.0
Std. Dev.	0.00062	0.00055	0.00055	0.00044	0.00022	0.00076	0.00019	0.00014	0.00000	469.48
COV, %	0.30	1.60	1.60	0.03	0.01	0.05	0.08	0.06	0.00	2.93

Specimen ID	*Ultimate Bypass Strength*		*Strain in Side Plate at Ultimate Load*		*Load in Side Plate at Ultimate Load*		*Bearing Load at Ultimate (lbs)*	*Percent Bearing Load at Ultimate (%)*	*Bearing Strength at Ultimate Load*		*Failure Mode* (Per Figure 9 Bearing Test Failure Codes with Illustration of Common Modes in accrodance with ASTM D5961-96)
	Actual (ksi)	*Nominal (ksi)*	*Plate #1 gage # 2 (in/in)*	*Plate #2 gage # 3 (in/in)*	*Plate #1 Nut side (lbs)*	*Plate#2 Bolt side (lbs)*			*Actual (ksi)*	*Nominal (ksi)*	
A-155-3	45.1	46.3	0.00206	0.00256	946.81	1103.2	2050.0	12.9	39.9	41.0	Lateral-Outside both Holes-Below the 2nd hole
A-155-4	44.6	45.8	0.00222	0.00338	995.97	1447.1	2443.1	15.1	47.5	48.9	Lateral(net comp.)-1st Hole-Bolt & Nut sides
A-155-5	41.9	43.1	0.00212	0.00311	961.91	1384.7	2346.7	15.3	45.5	46.9	Lateral-Outside both Holes-Above the 1st hole
B-156-4	43.9	44.9	0.00269	0.00342	1188.0	1464.3	2652.3	16.4	51.8	53.0	Lateral-Outside both Holes-Between the holes
B-156-5	48.7	49.8	0.00090	0.00281	398.89	1246.35	1645.2	9.93	32.2	32.9	Lateral(net comp.)-1st Hole-Bolt & Nut sides
Average	44.9	46.0	0.00200	0.00306	898.32	1329.13	2227.5	13.9	43.4	44.5	
Std. Dev.	2.49	2.43	0.00066	0.00037	295.500	152.619	391.034	2.59	7.57	7.82	
COV, %	5.54	5.28	33.1	12.1	32.9	11.5	17.6	18.6	17.5	17.56	

Laminate Bearing-Bypass, Double Shear Properties, 75°F (Dry)

Material Type: **FGF7781-07I**
Batch Number: AF010363
Test Method: ASTM D5961-96 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[]_{45/0/-45/90)_2]_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 5/9/02
Test Operator: John Smith
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 44.6%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1600 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V4A; Collar=MS21042L4

Tension

Specimen ID	Specimen Thickness: Specimen inch	Specimen Thickness: Plate #1 Nut side (inch)	Specimen Thickness: Plate#2 Bolt side (inch)	Specimen Width: Specimen inch	Specimen Width: Plate #1 Nut side (inch)	Specimen Width: Plate#2 Bolt side (inch)	Specimen Hole Diameter: Hole #1 inch	Specimen Hole Diameter: Hole #2 (inch)	Specimen Hole Diameter: Nominal (inch)	Ultimate Load (lbs)	Ultimate Gross Bypass Strength: Actual (ksi)	Ultimate Gross Bypass Strength: Nominal (ksi)	Ultimate Net Bypass Strength: Actual (ksi)	Ultimate Net Bypass Strength: Nominal (ksi)
A-209-1	0.16492	0.03550	0.03475	1.49823	1.50050	1.50100	0.25050	0.25050	0.25000	5872.9	23.8	24.5	16.8	17.3
A-209-2	0.16492	0.03450	0.03445	1.49915	1.50100	1.50100	0.25080	0.25060	0.25000	5775.3	23.4	24.1	17.0	17.5
B-182-3	0.16377	0.03500	0.03460	1.49922	1.50000	1.50100	0.25070	0.25060	0.25000	5559.0	22.6	23.2	16.8	17.2
B-182-6	0.16533	0.03415	0.03425	1.49777	1.50100	1.50100	0.25070	0.25050	0.25000	5582.5	22.5	23.3	15.9	16.4
B-182-7	0.16478	0.03400	0.0337	1.4992	1.50100	1.50100	0.25060	0.25060	0.25000	5655.2	22.9	23.6	15.7	16.2
Average	0.16474	0.03463	0.03435	1.49871	1.50070	1.50100	0.25066	0.25056	0.25000	5689.0	23.0	23.7	16.4	16.9
Std. Dev.	0.00058	0.00062	0.00041	0.00067	0.00045	0.00000	0.00011	0.00005	0.00000	132.90	0.51	0.55	0.58	0.58
COV, %	0.35	1.79	1.19	0.04	0.03	0.00	0.05	0.02	0.00	2.34	2.23	2.34	3.55	3.44

Specimen ID	Strain in Side Plate at Ultimate Load: Plate #1 gage # 2 (in/in)	Strain in Side Plate at Ultimate Load: Plate #2 gage # 3 (in/in)	Load in Side Plate at Ultimate Load: Plate #1 Nut side (lbs)	Load in Side Plate at Ultimate Load: Plate#2 Bolt side (lbs)	Bearing Load at Ultimate (lbs)	Percent Bearing Load at Ultimate (%)	Bearing Strength at Ultimate Load: Actual (ksi)	Bearing Strength at Ultimate Load: Nominal (ksi)	Failure Mode (Per Figure 9 Bearing Test Failure Codes with Illustration of Common Modes in accrodance with ASTM D5961-96)
A-209-1	0.00172	0.00136	972.21	753.44	1725.6	29.4	41.8	43.1	Lateral(net tension)-1st Hole-Bolt & Nut sides
A-209-2	0.00154	0.00132	854.44	725.47	1579.9	27.4	38.2	39.5	Lateral(net tension)-2nd Hole-Bolt & Nut sides
B-182-3	0.00135	0.00125	746.27	693.17	1439.4	25.9	35.1	36.0	Lateral(net tension)-1st Hole-Bolt & Nut sides
B-182-6	0.00172	0.00123	972.21	681.10	1653.3	29.6	39.9	41.3	Lateral(net tension)-2nd Hole-Bolt & Nut sides
B-182-7	0.00170	0.00147	955.45	816.54	1772.0	31.3	42.9	44.3	Lateral(net tension)-2nd Hole-Bolt & Nut sides
Average	0.00161	0.00133	900.11	733.94	1634.1	28.7	39.6	40.9	
Std. Dev.	0.00016	0.00010	99.009	54.152	130.953	2.12	3.09	3.27	
COV, %	10.1	7.25	11.00	7.38	8.01	7.37	7.80	8.01	

Laminate Bearing-Bypass, Double Shear Properties, 75°F (Dry)

Material Type: **FGF7781-07I**
Batch Number: AF010363
Test Method: ASTM D5961-96 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **25/50/25**
Ply Stacking Sequence: **$[)45/0/-45/90)_2]_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 5/9/02
Test Operator: John Smith
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 44.6%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.1600 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V5A; Collar=MS21042L4

Compression

Specimen ID	Specimen Thickness: Specimen inch	Specimen Thickness: Plate #1 Nut side (inch)	Specimen Thickness: Plate#2 Bolt side (inch)	Specimen Width: Specimen inch	Specimen Width: Plate #1 Nut side (inch)	Specimen Width: Plate#2 Bolt side (inch)	Specimen Hole Diameter: Hole #1 inch	Specimen Hole Diameter: Hole #2 (inch)	Specimen Hole Diameter: Nominal (inch)	Ultimate Load (lbs)
B-182-4	0.16485	0.03330	0.03410	1.49863	1.50050	1.50200	0.25070	0.25060	0.25000	11556
B-182-5	0.16550	0.03425	0.03350	1.49927	1.50100	1.50200	0.25060	0.25060	0.25000	11845
A-209-3	0.16548	0.03430	0.03585	1.49845	1.50150	1.50200	0.25070	0.25050	0.25000	12237
A-209-4	0.16623	0.03415	0.03505	1.49935	1.50000	1.50100	0.25050	0.25050	0.25000	11408
A-209-5	0.16558	0.03435	0.0336	1.49865	0.50100	1.50100	0.25060	0.25050	0.25000	11556
Average	0.16553	0.03407	0.03442	1.49887	1.30080	1.50160	0.25062	0.25054	0.25000	11721
Std. Dev.	0.00049	0.00044	0.00101	0.00041	0.44710	0.00055	0.00008	0.00005	0.00000	329.48
COV, %	0.30	1.28	2.93	0.03	34.37	0.04	0.03	0.02	0.00	2.81

Specimen ID	Ultimate Bypass Strength: Actual (ksi)	Ultimate Bypass Strength: Nominal (ksi)	Strain in Side Plate at 7,000 lbf Load: Plate #1 gage # 2 (in/in)	Strain in Side Plate at 7,000 lbf Load: Plate #2 gage # 3 (in/in)	Load in Side Plate at Ultimate Load: Plate #1 Nut side (lbs)	Load in Side Plate at Ultimate Load: Plate#2 Bolt side (lbs)	Bearing Load at Ultimate (lbs)	Percent Bearing Load at Ultimate (%)	Bearing Strength at Ultimate Load: Actual (ksi)	Bearing Strength at Ultimate Load: Nominal (ksi)	Failure Mode (Per Figure 9 Bearing Test Failure Codes with Illustration of Common Modes in accrodance with ASTM D5961-96)
B-182-4	37.6	38.7	0.00170	0.00121	1364.2	905.03	2269.3	19.6	54.9	56.7	Lateral(net Comp.)-2nd hole-Bolt & Nut sides
B-182-5	40.0	41.4	0.00091	0.00153	681.03	1239.4	1920.4	16.2	46.3	48.0	Lateral-Outside both holes-Below the 2nd hole
A-209-3	35.4	36.5	0.0025	0.0019	1891.3	1579.1	3470.3	28.4	83.7	86.8	Lateral-Outside both holes-Above the 1st hole
A-209-4	35.1	36.5	0.00246	0.00123	1745.9	911.61	2657.5	23.3	63.8	66.4	Lateral-Outside both holes-Above the 1st hole
A-209-5	36.6	37.9	0.00266	0.00061	1930.7	538.43	2469.1	21.4	59.5	61.7	Lateral-Outside both holes-Below the 2nd hole
Average	36.9	38.2	0.00205	0.00130	1522.6	1034.7	2557.3	21.8	61.7	63.9	
Std. Dev.	1.98	2.01	0.00074	0.00047	520.97	392.57	578.80	4.51	13.9	14.5	
COV, %	5.37	5.26	36.0	36.6	34.2	37.9	22.6	20.7	22.6	22.6	

Laminate Bearing-Bypass, Double Shear Properties, 75°F (Dry)

Material Type: **FGF7781-07I**
Batch Number: AF010363
Test Method: ASTM D5961-96 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **10/80/10**
Ply Stacking Sequence: **$(45/-45/90/45/-45/45/-45/0/45/-45)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 8/19/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 44.5%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.2000 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V5A; Collar=MS21042L4

Tension

Specimen ID	Specimen Thickness	Plate #1 Nut side	Plate#2 Bolt side	Specimen Width	Plate #1 Nut side	Plate#2 Bolt side	Specimen Hole Diameter			Ultimate Load	Ultimate Gross Bypass Strength		Ultimate Net Bypass Strength	
	Specimen inch	(inch)	(inch)	inch	(inch)	(inch)	Hole #1 inch	Hole #2 (inch)	Nominal (inch)	(lbs)	Actual (ksi)	Nominal (ksi)	Actual (ksi)	Nominal (ksi)
A-199-1	0.20112	0.03435	0.03405	1.49852	1.50050	1.50100	0.25040	0.25040	0.25000	7743.1	25.7	25.8	20.3	20.4
A-199-2	0.20357	0.03385	0.03480	1.49913	1.50100	1.50100	0.25040	0.25040	0.25000	7848.4	25.7	26.2	20.7	21.1
A-199-3	0.20668	0.03390	0.03385	1.49843	1.50050	1.50100	0.25050	0.25050	0.25000	7895.9	25.5	26.3	20.5	21.2
B-208-1	0.20588	0.03410	0.03360	1.49997	1.50100	1.50000	0.25060	0.25060	0.25000	7827.7	25.3	26.1	19.8	20.4
B-208-2	0.20565	0.03390	0.0333	1.50008	1.50050	1.49900	0.25070	0.25070	0.25000	7871.8	25.5	26.2	20.3	20.9
Average	0.20458	0.03402	0.03392	1.49923	1.50070	1.50040	0.25052	0.25052	0.25000	7837.4	25.6	26.1	20.3	20.8
Std. Dev.	0.00225	0.00021	0.00057	0.00078	0.00027	0.00089	0.00013	0.00013	0.00000	58.552	0.15	0.20	0.33	0.36
COV, %	1.10	0.61	1.67	0.05	0.02	0.06	0.05	0.05	0.00	0.75	0.60	0.75	1.618	1.72

Specimen ID	Strain in Side Plate at Ultimate Load Plate #1 gage # 2 (in/in)	Plate #2 gage # 3 (in/in)	Load in Side Plate at Ultimate Load Plate #1 Nut side (lbs)	Plate#2 Bolt side (lbs)	Bearing Load at Ultimate (lbs)	Percent Bearing Load at Ultimate (%)	Bearing Strength at Ultimate Load Actual (ksi)	Nominal (ksi)	Failure Mode (Per Figure 9 Bearing Test Failure Codes with Illustration of Common Modes in accrodance with ASTM D5961-96)
A-199-1	0.00188	0.00094	1066.5	544.70	1611.2	20.8	32.0	32.2	Lateral(net tension)-1st Hole-Bolt & Nut sides
A-199-2	0.00172	0.00097	972.21	557.57	1529.8	19.5	30.0	30.6	Lateral(net tension)-2nd Hole-Bolt & Nut sides
A-199-3	0.00184	0.00084	1042.4	495.43	1537.8	19.5	29.7	30.8	Lateral(net tension)-2nd Hole-Bolt & Nut sides
B-208-1	0.00198	0.00103	1131.0	573.55	1704.6	21.8	33.0	34.1	Lateral(net tension)-2nd Hole-Bolt & Nut sides
B-208-2	0.00182	0.00104	1032.4	577.98	1610.4	20.5	31.2	32.2	Lateral(net tension)-1st Hole-Bolt & Nut sides
Average	0.00185	0.00096	1048.90	549.85	1598.7	20.4	31.2	32.0	
Std. Dev.	0.00009	0.00008	57.556	33.166	70.642	0.97	1.38	1.41	
COV, %	5.1	8.38	5.49	6.03	4.42	4.74	4.44	4.42	

Laminate Bearing-Bypass, Double Shear Properties, 75°F (Dry)

Material Type: **FGF7781-07I**
Batch Number: AF010363
Test Method: ASTM D5961-96 (modified)
Specimen Preconditioning: As Fabricated
Test Condition: 75 °F (Dry)
Ply Layup, [%, 0/45/90]: **10/80/10**
Ply Stacking Sequence: **$(45/-45/90/45/-45/45/-45/0/45/-45)_S$**
Testing Facility: Toray Composites (America), Inc.
Test Date: 8/19/01
Test Operator: Jeremy Bucholtz
Test Frame: MTS Alliance RF/300

Test Speed: 0.05 inch/minute
Control Mode: Stroke
Strain Gauge: N/A
Fiber Volume (average): 44.5%
Nominal Fastener Diameter 0.2500 inch
Nominal Panel Thickness: 0.2000 inch
Nominal Width: 1.5000 inch
Nominal Width/Diameter ratio: 6.0000
Edge/Diameter ratio: 3.0000 inch
Fastener Type: Pin=NAS1134V5A; Collar=MS21042L4

Compression

Specimen ID	Specimen Thickness: Specimen inch	Specimen Thickness: Plate #1 Nut side (inch)	Specimen Thickness: Plate#2 Bolt side (inch)	Specimen Width: Specimen inch	Specimen Width: Plate #1 Nut side (inch)	Specimen Width: Plate#2 Bolt side (inch)	Specimen Hole Diameter: Hole #1 inch	Specimen Hole Diameter: Hole #2 (inch)	Specimen Hole Diameter: Nominal (inch)	Ultimate Load (lbs)
A-199-4	0.20825	0.03420	0.03405	1.499	1.50050	1.50000	0.25050	0.25050	0.25000	11754
A-199-5	0.20675	0.03325	0.03305	1.49865	1.50050	1.50000	0.25050	0.25040	0.25000	12290
B-208-3	0.20600	0.03440	0.03460	1.50018	1.50000	1.50100	0.25060	0.25060	0.25000	12109
B-208-4	0.20645	0.03415	0.03375	1.50025	1.50050	1.50100	0.25050	0.25050	0.25000	11872
B-208-5	0.20603	0.03415	0.0355	1.50028	1.50050	1.50100	0.25030	0.25040	0.25000	11937
Average	0.20670	0.03403	0.03419	1.49975	1.50040	1.50060	0.25048	0.25048	0.25000	11992
Std. Dev.	0.00092	0.00045	0.00092	0.00072	0.00022	0.00055	0.00011	0.00008	0.00000	210.28
COV, %	0.45	1.32	2.70	0.05	0.01	0.04	0.04	0.03	0.00	1.75

Specimen ID	Ultimate Bypass Strength: Actual (ksi)	Ultimate Bypass Strength: Nominal (ksi)	Strain in Side Plate at 9,000 lbf Load: Plate #1 gage # 2 (in/in)	Strain in Side Plate at 9,000 lbf Load: Plate #2 gage # 3 (in/in)	Load in Side Plate at Ultimate Load: Plate #1 Nut side (lbs)	Load in Side Plate at Ultimate Load: Plate#2 Bolt side (lbs)	Bearing Load at Ultimate (lbs)	Percent Bearing Load at Ultimate (%)	Bearing Strength at Ultimate Load: Actual (ksi)	Bearing Strength at Ultimate Load: Nominal (ksi)	Failure Mode (Per Figure 9 Bearing Test Failure Codes with Illustration of Common Modes in accrodance with ASTM D5961-96)
A-199-4	22.6	23.6	0.00271*	0.00275*	2335.5	2348.4	4683.9	39.8	89.8	93.7	Lateral(net tension)-1st Hole-Bolt & Nut sides
A-199-5	32.7	33.8	0.00057	0.00285	430.65	1716.7	2147.3	17.5	41.5	42.9	Lateral(net tension)-2nd Hole-Bolt & Nut sides
B-208-3	31.1	32.0	0.00025	0.00410	141.67	2361.2	2502.8	20.7	48.5	50.1	Lateral(net tension)-2nd Hole-Bolt & Nut sides
B-208-4	30.0	31.0	0.00028	0.00415	229.23	2339.4	2568.6	21.6	49.7	51.4	Lateral(net tension)-2nd Hole-Bolt & Nut sides
B-208-5	27.9	28.7	0.00145	0.00426	907.79	2417.9	3325.7	27.9	64.5	66.5	Lateral(net tension)-1st Hole-Bolt & Nut sides
Average	28.9	29.8	0.00064	0.00384	808.97	2236.708	3045.7	25.5	58.8	60.9	
Std. Dev.	3.91	3.95	0.00056	0.00066	903.406	292.321	1011.4	8.86	19.3	20.2	
COV, %	13.5	13.3	87.9	17.3	112	13.1	33.2	34.8	32.8	33.2	