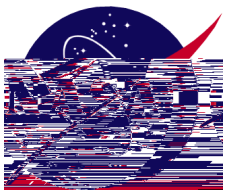


Testing Facility:
National Institute L3(i)-7.35.03 3(i)-7.35Av

List of Tabl856(t)3.61869( )-1.4-74s

The applicability of NCAMP material property data, material allowables, and specifications must be evaluated on case-by-case basis by aircraft companies and certifying agencies. NCAMP assumes no liability whatsoever, expressed or implied, related to the use of the material property data, material allowables, and specifications.

Aircraft companies should not use the data published in this report without specifying NCAMP Material Specification NMS 451/13. NMS 451/13 may have additional requirements that are listed in its prepreg process control document (PCD), fiber specification, fiber PCD and other raw material specifications and PCDs which impose essential quality controls on the raw materials and raw material manufacturing equipment and processes. *A cr co n es n o ce y n enc es ou u e e er o er y u s e n s e o no c ew en e e r s no ocur o S 5* NMS 451/13 is a free, publicly available, non-proprietary aerospace industry material specification.

1.2 Symbols Used

ν_{12}^{tu}	major Poisson's ratio, tension
μ	micro-strain
E_1^c	compressive modulus, longitudinal / warp direction
E_1^t	tensile modulus, longitudinal / warp direction
E_2^c	compressive modulus, transverse / fill direction
E_2^t	tensile modulus, transverse / fill direction
F_1^{cu}	ultimate compressive strength, longitudinal / warp direction
F_1^{tu}	ultimate tensile strength, longitudinal / warp direction
F_2^{cu}	ultimate compressive strength, transverse / fill direction
F_2^{tu}	ultimate tensile strength, transverse / fill direction
SBS	short beam strength
ν_{12}^c	major Poisson's Ratio, compression
ν_{21}^c	minor Poisson's Ratio, compression
$F_{12}^{s5\% \text{ strain}}$	

Superscripts

c	compression
cu	compression ultimate
s	shear
su	shear ultimate
t	tension
tu	tension ultimate
ν	Poisson's Ratio

Subscripts

1-axis;	longitudinal / warp direction (parallel to warp direction of reinforcement)
2-axis;	transverse / fill direction (parallel to fill direction of reinforcement)
12:	in-plane shear

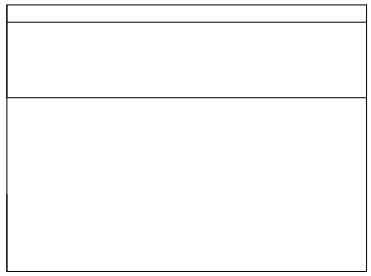
Acronyms and Definitions

ASTM	American Society for Testing and Materials
B – Basis	95% lower 2.94856(w)q856(13428(o)7.03268(s)0.9381781.47428(M)42437(e)7.03268(n)-2.94941p)1(T)-7.8

wet	specimen with an “equilibrium” moisture content
T, RH	temperature, relative humidity

1.3 NIAR NCAMP – ACG Specimen Naming Format

The NIAR specimen names can be correlated to ACG specimen names using the scheme in Figure 1-1.



CODE	CURE CYCLE
1	MH1
2	MH2
3	MH3
6	LH1
7	LH2
8	M1
9	M2

q (LSBS) Laminate Short Beam Shear (D2344)

A0	ACG(Advanced Composites Group)[NCAMP]
AC	ACG/Cessna
AR	ACG/AAR Composites
AA	ACG/Adam Aircraft
AB	ACG/Bell Helicopter
AI	ACG/Bombardier
AT	ACG/British Aerospace Limited
AD	ACG/Cirrus Design Corp
AK	ACG/Comtek Advanced Structures
AG	ACG/General Atomics
AU	ACG/Gulfstream Aerospace
AL	ACG/Lockheed Martin
AN	ACG/Northrop Grumman
AS	ACG/Scaled Composites
AP	ACG/Spirit Aerosystems

W (UNC1) Un-notched Compression Layup 1 (D6641)
X (UNC2) Un-notched Compression Layup 2 (D6641)
Y (UNC3) Un-notched Compression Layup 3 (D6641)

P (UNT0) Un-notched Tension 0/90 (D3039)
R (UNC0) Un-notched Compression 0/90 (D6641)

V (MOLC) Material Operating Limit Open Hole Compression (D2344)

1.4 ASTM Standards

ASTM D 3039/D 3039M – 00^{e2} *S n-o-es e o-o- ens e-o e- es o-oy e- - Co os e e- s*

ASTM D 6641/D 6641M – 01^{e1} *S n-o-es e o-o- De e- n n-g e Co -ess-ve-o e- es o-oy e- - Co os e L n es sn-g Co he-o -o- Co -ess on (CLC) es u-e*

ASTM D 3518/D 3518M – 94 (2001) *S n-o-es e o-o- n- ne S e-e-es onse o-oy e- - Co os e e- s-y ens e es o 5° L n e*

ASTM D 2344/D 2344M – 00^{e1} *S n-o-es e o-o- S o- Be S-en-g o-oy e- - Co os e e- s n-o e- L n es*

ASTM D 5766/D 5766M – 02a *S n-o-es e o-o- O en o e ens e S-en-g o-oy e- - Co os e L n es*

ASTM D 6484/D 6484M – 04 *S n-o-es e o-o- O en o e Co -ess-ve S-en-g o-oy e- - Co os e L n es*

SACMA Standards

- SACMA SRM 2R-94 *SAC A-eco en-o-es e o-o- Co -ess on A e- c -o e- es o O-en e-o Le-e-es n Co os es*

1.5 Methodology

1.5.1 Process Definition

For each combination of test, batch and condition, the specimens were selected from minimum two separate panels cured separately as shown in Figure 1-2 unless otherwise specified.

If more than 2 panels were required to obtain the minimum specimens, the additional panels were labeled accordingly and an equal number of specimens were tested from each panel.

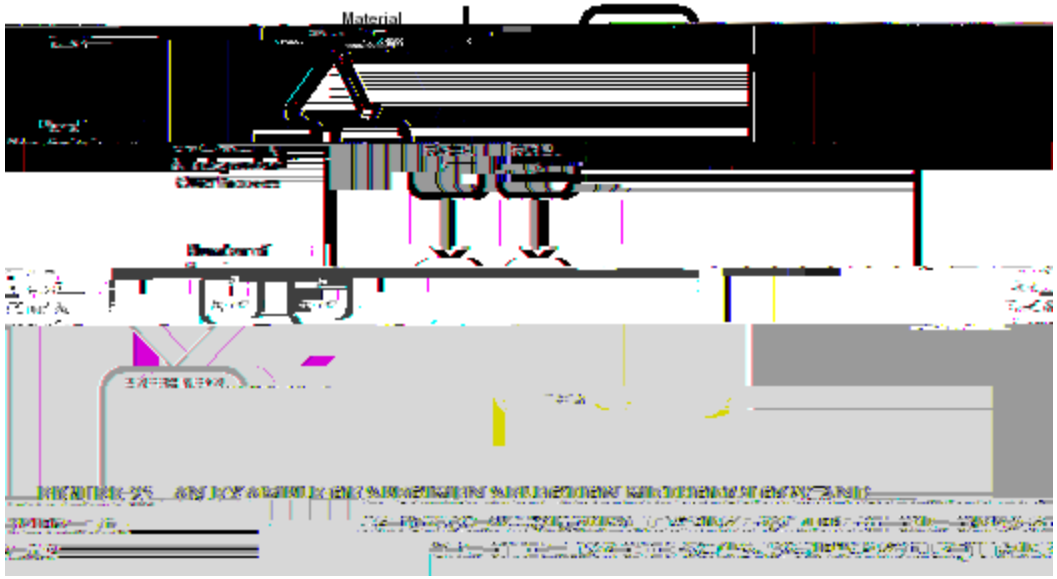


Figure 1-2: Cure Cycle Definition for Mechanical Test Panels

All panels were cured in accordance with ACG process specification ACGP 1001-02 Revision E.

In order to facilitate individual specimen traceability, individual specimen numbering and/or skewed lines were written or drawn across each sub-panel as shown in Figure 1-3.

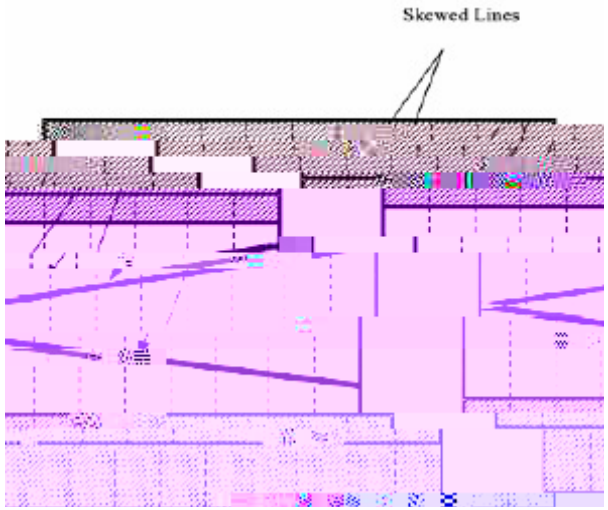


Figure 1-3: Specimen Traceability Line

1.5.2 Specimen & Testing Details

1.5.2.1 Tabbing

No tabs were used for this material system.

1.5.2.2 Strain gages

Strain gages were employed for modulus on selected test methods. The callouts below are requirements of the test plan and actual strain gages used can be found in the CD accompanying this report.

ASTM D3039 tensile: CEA-XX-250UW-120 or 350
ASTM D3518 in-plane shear: CEA-XX-250UW-120 or 350 (one each 0° and 90° to specimen axis) optionally CEA-XX-125UT-120 or 350 biaxial gage
All ASTM D6641 compression: CEA-XX-125UT-120 or 350
Optional ASTM D6641 compression of unidirectional materials and fabric materials of tow/yarn 3K or smaller: CEA-XX-062UT-120 or 350
Where XX = 03 or 06 the self temperature compensation factor for the purposes and procedures of this test plan considered equivalent.

Where modulus was required for other tests, extensometers were used.

1.5.2.3 Specimen Hole Dimensions & Test Configuration

For the open-hole tests, the hole diameter was 0.25 in ±0.003 in. For compression after impact, specimens received nond.47428(o)-2.94856(r)3.tr iteveiin.oen

1.5.3 Test Matrix

Table 1-2 summarizes the lamina level tests carried out on fabric materials. The lay-ups chosen have been designed to produce the appropriate thickness required for the various types of tests performed. This table emphasizes those properties and test condition combinations believed to constitute the worst case. Additional testing at some test conditions may be necessary depending on the results contained in this document.

Layup	Test Type and Direction	Property	Number of Batches x Number of Panels x Number of Test Specimens Test Temperature/Moisture Condition				
			CTD	RTD	ETD	ETW	ETW2(1)
[0°]n	0° Tension	Strength + Modulus	1x2x4	1x2x4			1x2x4
[0°]n	0° Compression	Strength + Modulus		1x2x4		1x2x4	1x2x4
[90]n	90° Tension	Strength + Modulus	1x2x4	1x2x4		1x2x4	1x2x4
[90]n	90° Compression	Strength + Modulus		1x2x4	1x2x4	1x2x4	1x2x4

1.5.4 Physical Testing

The following tests were conducted for each test laminate with the exception of DMA Tg which was conducted on one separate traveler laminate per batch from each oven cure conducted where that batch is present. This data is included at the top of each individual test summary sheet, located in section 2.1.1.

Property	Condition/Method(1)	# Replicates
Cured Ply Thickness	SACMA SRM10 - Data from mechanical test laminates	Report
Laminate Density	ASTM D792	3
Fiber Volume, % by Volume	ASTM D3171-99(2)	3
Resin Content, % by Volume	ASTM D3171-99(2)	3
Void Content, % by Volume	ASTM D3171-99(2)	3
Glass Transition Temperature, Tg, By DMA	Dry and Wet – SACMA SRM 18R-94	1 dry(3) 1 wet(3)

(1) Where the applicable standard allows variations

1.5.6 Normalization Procedures

The nominal cure ply thicknesses for each material type are given in appendix 3 of the ACG Test Plan. Lamina level tension and compression strength and modulus properties were normalized to the cured ply thickness indicated. Per ACG's request, the laminate level properties were also normalized. Wherever properties are normalized, both measured and normalized data were reported.

The nominal fiber areal weight was at 193 g/m2 and the average of the one batch of material was 186.92 g/m2 (LH) and 188.23 g/m2 (M) therefore normalization by cured ply thickness (CPT) was used, i.e.:

Normalized strength=Measured Strength x Measured CPT/Nominal CPT

The nominal CPT is 0.0079 and the average CPT was 0.0080. The CPT of the individual specimens were also shown to be close to the nominal CPT.

1.5.7 Conformity

All laminates and specimens for design allowable property and fluid sensitivity screening were inspected for conformance with the requirements of this document and appendices 1 and 2. For all materials requiring FAA approval, the conformance was verified by an FAA approved designated airworthiness representative (DAR). Test setups and testing were approved and witnessed by the FAA or authorized designated engineering representative (DER) as required. FAA conformity and approval documentation can be obtained in folder file entitled Conformity and is included on the CD accompanying this report.

1.5.8 Material Pedigree Information

The PMC Data collection template includes the mater

ACG Fabric Test results

The files below are available on the CD accompanying this report.

2. Test Results

See pages below for summary tables.

Prepreg Material: Advanced Composites Group - MTM45-1 PWC2 3K PW G30-500 Fabric
ACGM 1001-13 or NMS 451/13 Material Specification

Fiber: Tenax-J HTS40 E13 3K 200TEX **Resin** MTM45-1

Tg(dry): 274.57 F **Tg(wet):** 265.17 F **Tg METHOD:** DMA (SRM 18-94)

PROCESSING: ACGP 1001-02 Process Specification "M" Cure Cycle

Date of fiber manufacture 10/2003; 7/2004; 6/2005
Date of resin manufacture 11/2005 -12/2005
Date of prepreg manufacture 11/2005-12/2005; 4/2006
Date of composite manufactu 12/2005 -3/2006; 4/2006
Date of testing 02/2006 - 07/2006
Date of data submittal 03/2006 - 08/2006

LAMINA MECHANICAL PROPERTY SUMMARY
Data reported as: Normalized & Measured
(Normalized by CPT= .0079 inch)

	Normalized	Measured	Normalized	Measured	Normalized	Measured	Normalized	Measured	Normalized	Measured
F_1^{tu} (ksi)	154.17	152.91	150.51	149.50	---	---	---	---	---	---
E_1^t (Msi)	9.34	9.26	9.11	9.05	---	---	---	---	---	---
F_2^{tu} (ksi)	123.46	122.63	124.42	124.40	---	---	114.14	114.49	---	---
E_2^t (Msi)	8.80	8.74	8.68	8.67	---	---	8.75	8.77	---	---
F_1^{cu} (ksi)	---	---	95.71	97.30	---	---	62.52	63.47	---	---

Prepreg Material: Advanced Composites Group - MTM45-1 PWC2 3K PW G30-500 Fabric
ACGM 1001-13 or NMS 451/13 Material Specification

Fiber:	Tenax-J HTS40 E13 3K 200TEX	**Resin**	MTM45-1

Tg(dry):	353.2 F	**Tg(wet):**	318.58 F	**Tg METHOD DMA (SRM 18-94)**

Prepreg Material: Advanced Composites Group - MTM45-1 PWC2 3K PW G30-500 Fabric
ACGM 1001-13 or NMS 451/13 Material Specification

Fiber: Tenax-J HTS40 E13 3K 200TEX **Resin** MTM45-1

Tg(dry): 274.57 F **Tg(wet):** 265.17 F **Tg METHOD:** DMA (SRM 18-94)

PROCESSING: ACGP1(M)-17.6652(A)-314902(g).7323(P)-33.5488(1(

Prepreg Material:	Advanced Composites Group - MTM45-1 PWC2 3K PW G30-500 Fabric ACGM 1001-13 or NMS 451/13 Material Specification				
Fiber:	Tenax-J HTS40 E13 3K 200TEX			**Resin**	MTM45-1
Tg(dry):	353.2 F	**Tg(wet):**	318.58 F	**Tg METHOD:**	DMA (SRM 18-94)
PROCESSING:	ACGP 1001-02 Process Specification "LH" Cure Cycle				
Date of fiber manufacture	10/2003; 7/2004; 6/2005			**Date of testing**	02/2006 - 07/2006

2.1.1 Warp Tension Properties

Material: Advanced Composites Group - MTM45-1/ 3K Plain Weave G30-500 Fabric

Resin content: 36.33% vol **Comp. density:** 1.49 g/cc (.054 lb/cu in)
Fiber volume: 53.92 % vol
Ply count: 14

Test method: ASTM D3039-00 **Modulus calculation:** linear fit from 1000 to 3000 micro in./in.

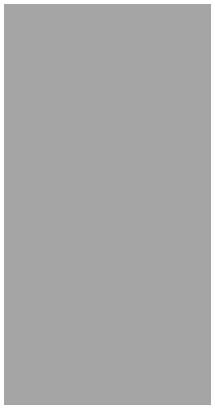
Normalized by: 0.0079 in. CPT

		CTD (B)		RTD (A)		ETW2 (D)	
Test Temperature [°F]		-65		75		250	
Moisture Conditioning		dry		dry		equilibrium	
Equilibrium at T, RH						160 F,85%	
Source code		A0NJXXXXB		A0NJXXXXA		A0NJXXXXD	
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean	137.07	136.68	140.97	138.25	131.52	131.17
F_1^{tu}	**Minimum**	132.17	131.75	132.49	130.59	128.01	124.76
(ksi)	**Maximum**	142.35	144.07	149.16	146.02	140.52	137.49
LH CURE CYCLE	**C.V.(%)**	2.65	3.16	3.34	3.05	2.30	3.00
	No. Specimens	8		8		15	
	No. Prepreg Lots	1		1		1	
	Mean	9.41	9.38	8.77	8.60	10.12	10.10
E_1^t	**Minimum**	9.25	9.12	8.63	8.41	9.15	8.96
(Msi)	**Maximum**	9.65	9.56	8.86	8.75	14.29	14.58
LH CURE CYCLE	**C.V.(%)**	1.50	1.47	0.96	1.38	13.40	14.39
	No. Specimens	8		8		15	
	No. Prepreg Lots	1		1		1	
	Mean	154.17	152.91	150.51	149.50		
F_1^{tu}	**Minimum**	148.25	147.69	142.10	142.34		
(ksi)	**Maximum**	158.80	157.47	156.71	155.53		
M CURE CYCLE	**C.V.(%)**	2.68	2.35	2.99	2.71		
	No. Specimens	8		16			
	No. Prepreg Lots	1		1			
	Mean	9.34	9.26	9.11	9.05		
E_1^t	**Minimum**	8.95	8.94	8.70	8.62		
(Msi)	**Maximum**	9.56	9.48	9.62	9.60		
M CURE CYCLE	**C.V.(%)**	1.93	1.72	3.56	3.59		
	No. Specimens	8		16			
	No. Prepreg Lots	1		1			

2.1.3 Warp Compression Properties

Material: MTM45-1/ 3K Plain Weave G30-500 Fabric

Resin content: 36.57 w t%



2.1.4 Fill Compression Properties

Material: MTM45-1/ 3K Plain Weave G30-500 Fabric

Resin content: not available **Comp. density:** 1.491g/cc (.054 lb/ cu in)
Fiber volume: not available
Ply count: 18

Test method: ASTM D6641-01 **Modulus calculation:** linear fit from 1000 to 3000 micro in./in.

Normalized by: 0.0079 in. CPT

		RTD (A)		ETD (C)		ETW (N)		ETW2 (D)	
Test Temperature [°F]		75		200		200		250	
Moisture Conditioning		dry		dry		equilibrium		equilibrium	
Equilibrium at T, RH						160 F,85%		160 F,85%	
Source code		A0NZXXXXA		A0NZXXXXC		A0NZXXXXN		A0NZXXXXD	
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean	92.93	95.05	79.55	79.73	60.41	60.22	55.76	55.87
	Minimum	80.34	85.85	74.72	74.70	56.10	55.91	51.27	51.17
F_2^{cu}	**Maximum**	100.86	101.13	86.65	86.33	63.79	63.40	59.08	58.99
(ksi)	**C.V.(%)**	7.52	5.68	5.10	4.97	4.80	4.75	4.82	5.02
LH CURE CYCLE									
	No. Specimens	8		8		8		8	
	No. Prepreg Lots	1		1		1		1	
	Mean	8.34	8.54	8.08	8.10	8.52	8.50	8.65	8.66
	Minimum	8.03	8.09	7.78	7.82	8.25	8.25	8.28	8.33
E_2^c	**Maximum**	8.71	9.07	8.50	8.52	8.67	8.63	9.23	9.22
(Msi)	**C.V.(%)**	2.82	4.50	2.69	2.68	1.66	63.79	3.98	3.68
LH CURE CYCLE									
	No. Specimens	8		8		8		8	
	No. Prepreg Lots	1		1		1		1	
	Mean	0.062		0.060		0.059		0.065	
v21	**No. Specimens**	8		8		8		8	
LH CURE CYCLE	**No. Prepreg Lots**	1		1		1		1	
	Mean	93.78	92.85	79.11	76.54	57.67	56.18		
	Minimum	89.40	86.27	71.85	70.33	47.09	45.04		
F_2^{cu}	**Maximum**	96.04	95.65	85.78	83.03	67.92	66.28		
(ksi)	**C.V.(%)**	2.66	3.04	6.31	4.90	13.04	14.28		
M CURE CYCLE									
	No. Specimens	8		8		8			
	No. Prepreg Lots	1		1		1			
	Mean	8.22	8.14	8.16	7.89	7.29	7.11		
	Minimum	8.01	7.90	7.87	7.53	6.20	5.89		
E_2^c	**Maximum**	8.45	8.35	8.48	8.24	8.44	8.34		
(Msi)	**C.V.(%)**	1.74	2.16	2.64	3.53	14.52	16.46		
M CURE CYCLE									
	No. Specimens	8		8					
	No. Prepreg Lots	1		1		1			
	Mean	0.059		0.068		0.048			
v21	**No. Specimens**	8		8		8			
M CURE CYCLE	**No. Prepreg Lots**	1		1		1			

Physical testing data not available

2.1.5 In-Plane Shear Properties

Material: Advanced Composites Group - MTM45/ 6K5HS AS4C Graphite Fabric

Resin content:	45.81 % vol	**Comp. density:**	1.490 g/cc(.054 lb/cu in)
Fiber volume:	54.19 % vol		
Ply count:	8		

Test method: ASTM D3518-94

2.1.6 Lamina Short Beam Strength Properties

Material:

2.1.7 Open Hole Tension 1 Properties

Material:

2.1.8 Open Hole Compression 1 Properties

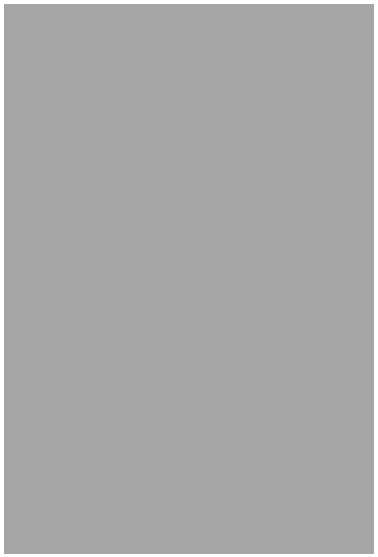
Material:	Advanced Composites Group -MTM45-1/ 3K Plain Weave G30-500 Fabric					**Open Hole Compression 1** **Gr/ Ep** **ACG - MTM45-1/ 3K Plain Weave G30-500 Fabric**	
Resin content:	45.85 % vol	**Comp. density:** 1.49 g/cc (.054 lb/cu in)					
Fiber volume:	55.13 % vol						
Ply count:	16						
Test method:	ASTM D6484-04						
Normalized by:	0.0079 in. CPT						
		RTD (A)		**ETW (N)**		**ETW2 (D)**	
Test Temperature [°F]		75		200		250	
Moisture Conditioning		dry		equilibrium		equilibrium	
Equilibrium at T, RH				160 F,85%		160 F,85%	
Source code		A0NGXXXXA		A0NGXXXXN		A0NGXXXXD	
		Normalized	**Measured**	**Normalized**	**Measured**	**Normalized**	**Measured**
	Mean	40.75	40.09	31.31	30.74	28.60	27.91
OHC1	**Minimum**	39.69	38.41	29.27	28.84	27.20	26.70
Strength (ksi)	**Maximum**	42.10	41.37	33.40	32.23	30.01	29.50
LH CURE CYCLE	**C.V.(%)**	2.07	2.23	4.77	4.04	3.19	3.30
	No. Specimens	8		8		8	
	No. Prepreg Lots	1		1		1	
	Mean	42.25	41.56	33.65	32.91		
OHC1	**Minimum**	40.43	39.55	32.11	31.22		
Strength (ksi)	**Maximum**	44.24	43.74	36.01	35.25		
M CURE CYCLE	**C.V.(%)**	2.76	3.24	4.02	4.25		
	No. Specimens	8		8			
	No. Prepreg Lots	1		1			

2.1.9 Compression after Impact Properties

Material: MTM45-1/ 3K Plain Weave G30-500 Fabric

Resin content: 56.28 w t% **Comp. density:** 1.491 g/cc (.054 lb/ cu in)

: C



2.1.10 Interlaminar Tension Properties

Material: Advanced Composites Group - MTM45-1/ 3K Plain Weave G30-500 Fabric

Resin content: 36.16 % wt
Fiber volume: 54.13 % vol
Ply thickness: 0.0086 - 0.0096
Ply count: 20

Comp. density: 1.49 [g/cc]

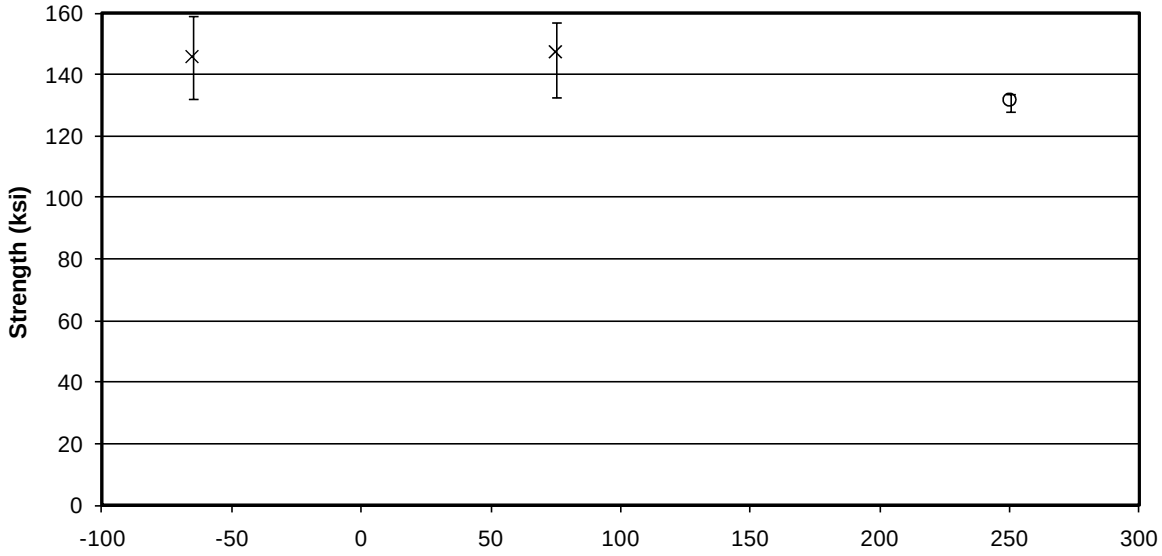
Test method: ASTM D6415-99^{E1}

Normalized by: NA

Test Temperature [°F]	250
Moisture Conditioning	equilibrium

Equi26.382(e)1.87Td [(E)128 -25.68 Td6eil

3.1 Warp Tension Properties



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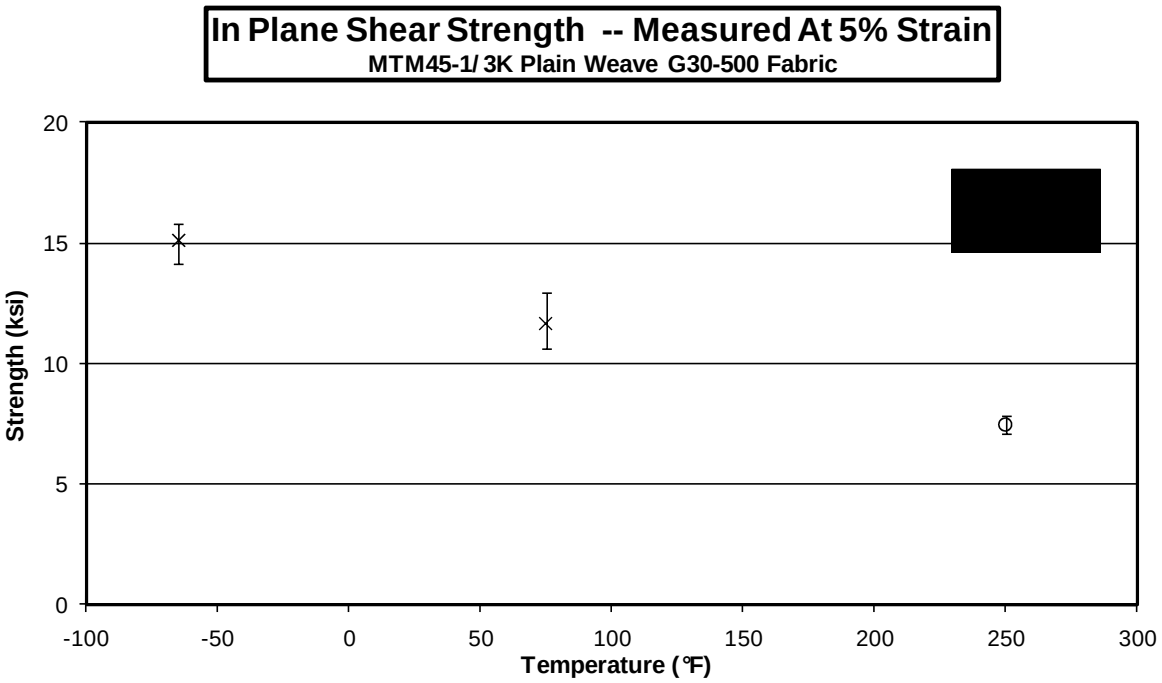
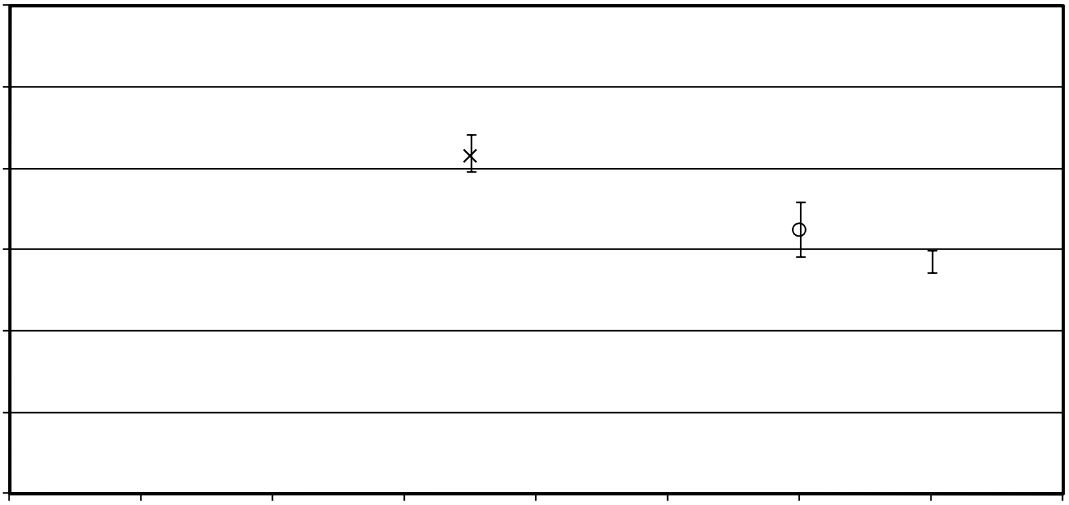
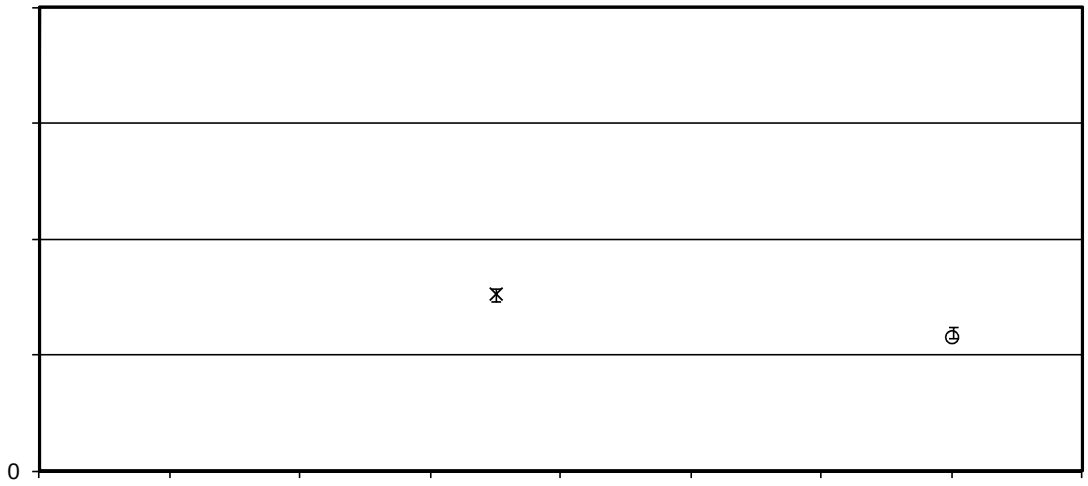
3.4 In-Plane Shear Properties



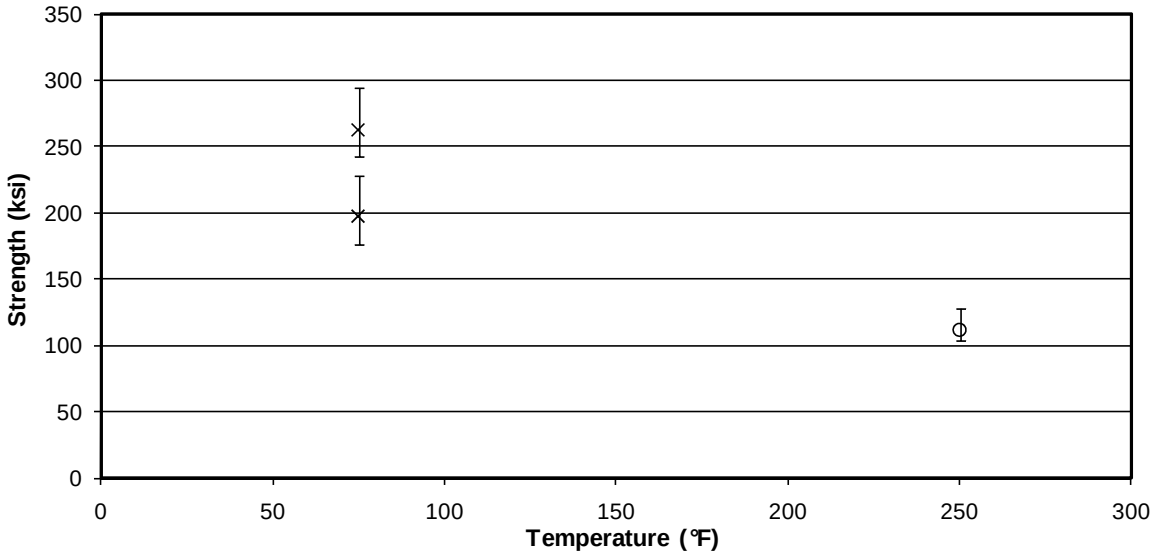
3.7 Open Hole Compression 1 Properties



3.8 Compression Strength after Impact 1 Properties



3.9 Interlaminar Tension Strength Properties



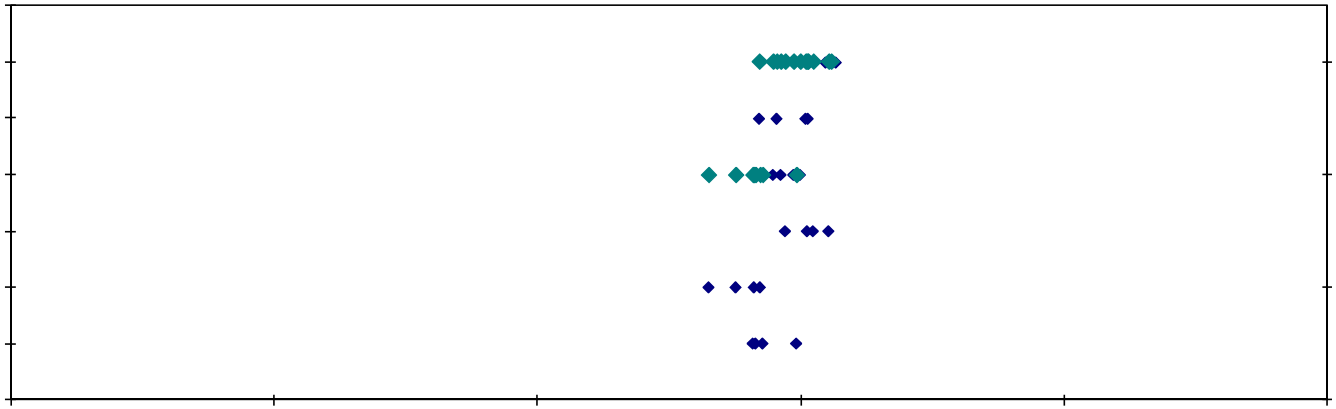
4.1 Warp Tension Properties

											normalizing t_{ply} [in] 0.0079
Specimen	ACG	ACG Cure	Prepreg	Cure Cycle	Strength	Modulus	Avg. Specimen	# Plies in	Failure	Avg. t_{ply}	Strength

Warp Tension Properties (WT) -- (RTD)
Strength & Modulus
MTM45-1/ 3K Plain Weave G30-500 Fabric

normalizing t_{ply} [in]: 0.0079

Specimen Number	ACG Batch #	ACG Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
A0NJB612A	B	LH1	2	1	146.018	8.483	0.113	14	LAB/LAT	0.0081	149.164	8.666
A0NJB613A	B	LH1	2	1	137.645	8.405	0.114	14	LAB	0.0081	141.399	8.634
A0NJB614A	B	LH1	2	1	138.319	8.542	0.114	14	LAB	0.0082	142.759	8.816
A0NJB615A	B	LH1	2	1	138.132	8.611	0.113	14	LAT/LAB	0.0081	140.900	8.784
A0NJB711A	B	LH2	2	2	139.308	8.680	0.113	14	LAT	0.0081	142.268	8.864
A0NJB712A	B	LH2	2	2	136.657	8.745	0.111	14	LAT/LAB	0.0080	137.646	8.808
A0NJB713A	B	LH2	2	2	130.586	8.722	0.112	14	LAT	0.0080	132.494	8.849
A0NJB714A	B	LH2	2	2	139.342	8.632	0.112	14	LAT/LAB	0.0080	141.106	8.741
				Average	**138.251**	**8.603**			**$Average_{norm}$**	**0.0081**	**140.967**	**8.770**
				Standard Dev.	**4.214**	**0.119**			**$Standard\ Dev._{norm}$**		**4.707**	**0.084**
				Coeff. of Var. [%]	**3.048**	**1.379**			**Coeff. of Var. [%]$_{norm}$**		**3.339**	**0.955**
				Min.	**130.586**	**8.405**			**Min.**	**0.0080**	**132.494**	**8.634**
				Max.	**146.018**	**8.745**			**Max.**	**0.0082**	**149.164**	**8.864**
				Number of Spec.	**8**	**8**			**Number of Spec.**	**8**	**8**	**8**
A0NJC812A	C	M1	3	3	151.931	8.772	0.113	14	LAB	0.0081	155.296	8.966
A0NJC813A	C	M1	3	3	152.385	8.841	0.111	14	LAT	0.0079	152.339	8.838
A0NJC814A	C	M1	3	3	145.675	8.624	0.112	14	LAB/LWT	0.0080	147.036	8.705
A0NJC815A	C	M1	3	3	148.930	8.635	0.112	14	LGM/LAT	0.0080	151.219	8.768
A0NJC911A	C	M2	3	4	146.944	8.804	0.110	14	LWT	0.0079	146.191	8.759
A0NJC912A	C	M2	3	4	148.225	8.765	0.111	14	LAB/LWT	0.0079	148.627	8.789
A0NJC913A	C	M2	3	4	145.158	8.832	0.110	14	LGM/LAT	0.0079	144.742	8.807
A0NJC914A	C	M2	3	4	148.833	8.753	0.111	14	LAB/LWT	0.0080	149.887	8.815
A0NJC8R6A	C	M1	3	5	147.313	9.230	0.113	14	LAT / LWB	0.0081	150.932	9.456
A0NJC8RBA	C	M1	3	5	151.799	9.484	0.110	14	LGM	0.0079	151.364	9.457
A0NJC8RCA	C	M1	3	5	144.464	9.249	0.111	14	LWB / LWT	0.0080	145.444	9.312
A0NJC8RDA	C	M1	3	5	142.337	9.443	0.110	14	LWB / LAT	0.0079	142.101	9.428
A0NJC9R5A	C	M2	3	6	153.280	9.205	0.112	14	LGM	0.0080	155.752	9.353
A0NJC9R6A	C	M2	3	6	155.534	9.156	0.111	14	LWT / LAB	0.0080	156.706	9.225
A0NJC9R7A	C	M2	3	6	153.738	9.334	0.111	14	LAT / LGM	0.0080	154.757	9.395
A0NJC9R8A	C	M2	3	6	155.405	9.596	0.111	14	LGM /LAB	0.008	155.733	9.617
				Average	**149.497**	**9.045**			**$Average_{norm}$**	**0.0080**	**150.508**	**9.106**
				Standard Dev.	**4.057**	**0.325**			**$Standard\ Dev._{norm}$**		**4.496**	**0.324**
				Coeff. of Var. [%]	**2.714**	**3.589**			**Coeff. of Var. [%]$_{norm}$**		**2.987**	**3.557**
				Min.	**142.337**	**8.624**			**Min.**	**0.0079**	**142.101**	**8.705**
				Max.	**155.534**	**9.596**			**Max.**	**0.0081**	**156.706**	**9.617**
				Number of Spec.	**16**	**16**			**Number of Spec.**	**16**	**16**	**16**

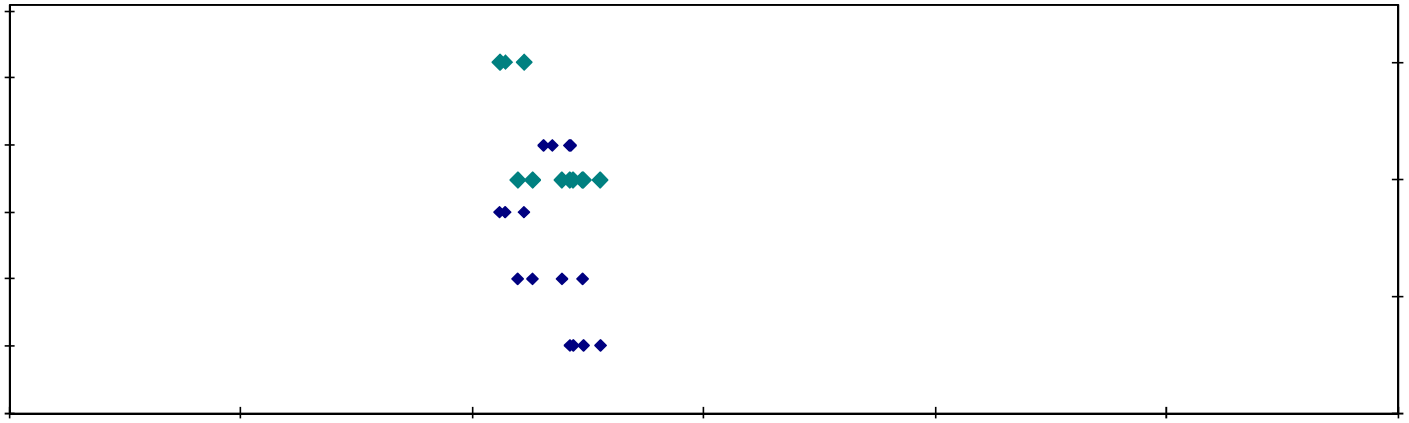


normalizing t_{ply} [in]
0.0079

Fill Tension Properties (FT) -- (ETW)
Strength & Modulus
MTM45-1/ 3K Plain Weave G30-500 Fabric

normalizing t_{ply} [in]: 0.0079

Specimen Number	ACG Batch #	ACG Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
A0NUB619N	B	LH1	2	1	125.285	9.356	0.107	14	LGM	0.0076	121.075	9.042
A0NUB61AN	B	LH1	2	1	135.158	9.413	0.104	14	LGM	0.0075	127.683	8.892
A0NUB61BN	B	LH1	2	1	126.518	9.078	0.108	14	LWT	0.0077	124.002	8.897
A0NUB61CN	B	LH1	2	1	122.192	9.158	0.110	14	LGM	0.0079	121.787	9.128
A0NUB719N	B	LH2	2	2	119.435	8.833	0.111	14	LGM	0.0079	119.363	8.828
A0NUB71AN	B	LH2	2	2	124.325	8.995	0.110	14	LGM	0.0079	123.800	8.957
A0NUB71BN	B	LH2	2	2	115.526	9.216	0.105	14	LGM	0.0075	109.781	8.758
A0NUB71CN	B	LH2	2	2	112.466	8.838	0.111	14	LGM	0.0079	112.992	8.879
				Average	**122.613**	**9.111**			**Average**	**0.0077**	**120.060**	**8.923**
				Standard Dev.	**7.032**	**0.217**			**Standard Dev.**		**5.949**	**0.118**
				Coeff. of Var. [%]	**5.735**	**2.386**			**Coeff. of Var. [%]**		**4.955**	**1.319**
				Min.	**112.466**	**8.833**			**Min.**	**0.0075**	**109.781**	**8.758**
				Max.	**135.158**	**9.413**			**Max.**	**0.0079**	**127.683**	**9.128**
				Number of Spec.	**8**	**8**			**Number of Spec.**	**8**	**8**	**8**
A0NUC814N	C	M1	3	3	104.928	8.439	0.112	14	LWT	0.0080	105.892	8.517
A0NUC815N	C	M1	3	3	110.221	8.593	0.112	14	LWB,LGM	0.0080	111.151	8.666
A0NUC816N	C	M1	3	3	105.188	8.569	0.113	14	LGM	0.0080	107.090	8.724
A0NUC91AN	C	M2	3	4	122.301	8.829	0.110	14	LWT	0.0078	121.232	8.752
A0NUC91BN	C	M2	3	4	118.659	9.245	0.109	14	LGM	0.0078	117.283	9.138
A0NUC91CN	C	M2	3	4	116.940	8.933	0.109	14	LWB,LGM	0.0078	115.407	8.816
A0NUC91DN	C	M2	3	4	123.211	8.786	0.109	14	LWT,LWB	0.0078	120.946	8.624
				Average	**114.493**	**8.771**			**$Average_{norm}$**	**0.0079**	**114.143**	**8.748**
				Standard Dev.	**7.710**	**0.270**			**$Standard\ Dev._{norm}$**		**6.255**	**0.197**
				Coeff. of Var. [%]	**6.734**	**3.078**			**Coeff. of Var. $[\%]_{norm}$**		**5.480**	**2.251**
				Min.	**104.928**	**8.439**			**Min.**	**0.0078**	**105.892**	**8.517**
				Max.	**123.211**	**9.245**			**Max.**	**0.0080**	**121.232**	**9.138**
				Number of Spec.	**7**	**7**			**Number of Spec.**	**7**	**7**	**7**



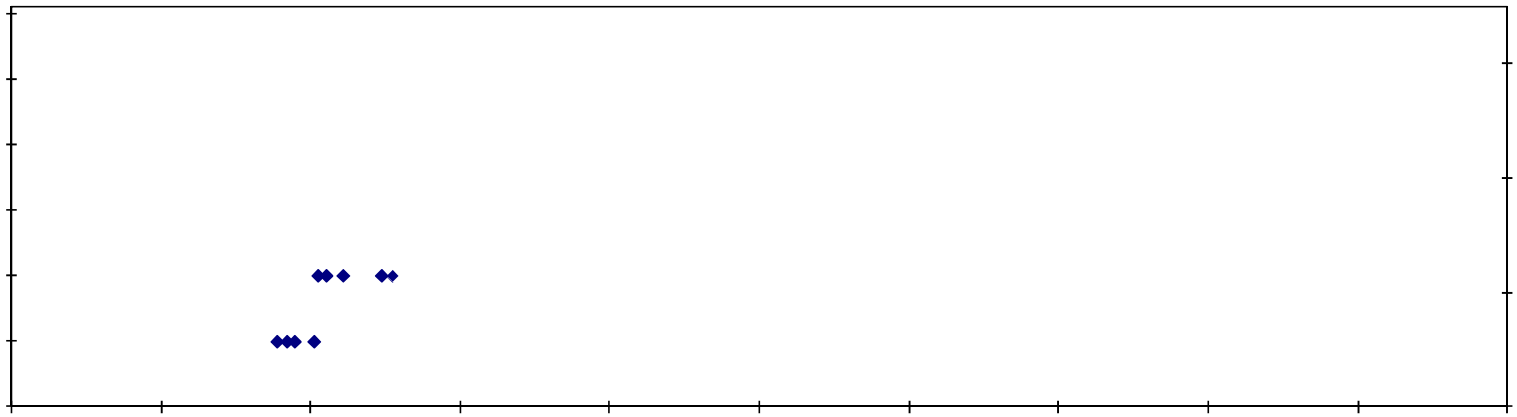
Fill Tension Properties (FT) -- (ETW2)
Strength & Modulus
MTM45-1/ 3K Plain Weave G30-500 Fabric

normalizing t_{ply} [in]: 0.0079

Specimen Number	ACG Batch #	ACG Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
A0NUB61ED	B	LH1	2	1	116.893	9.675	0.111	14	AGM	0.0080	117.791	9.749
A0NUB61FD	B	LH1	2	1	117.953	9.754	0.111	14	LGM	0.0080	118.824	9.826
A0NUB61GD	B	LH1	2	1	114.958	10.011	0.111	14	LGM	0.0080	115.842	10.088
A0NUB61HD	B	LH1	2	1	116.731	9.288	0.112	14	LGM	0.0080	117.787	9.372
A0NUB71GD	B	LH2	2	2	112.555	8.865	0.114	14	LGM	0.0081	115.761	9.117
A0NUB71HD	B	LH2	2	2	110.693	9.159	0.113	14	LGM	0.0081	113.429	9.385
A0NUB71ID	B	LH2	2	2	110.498	8.842	0.113	14	LGM	0.0081	113.328	9.069
A0NUB71JD	B	LH2	2	2	102.556	9.080	0.113	14	LGM	0.0081	104.596	9.261

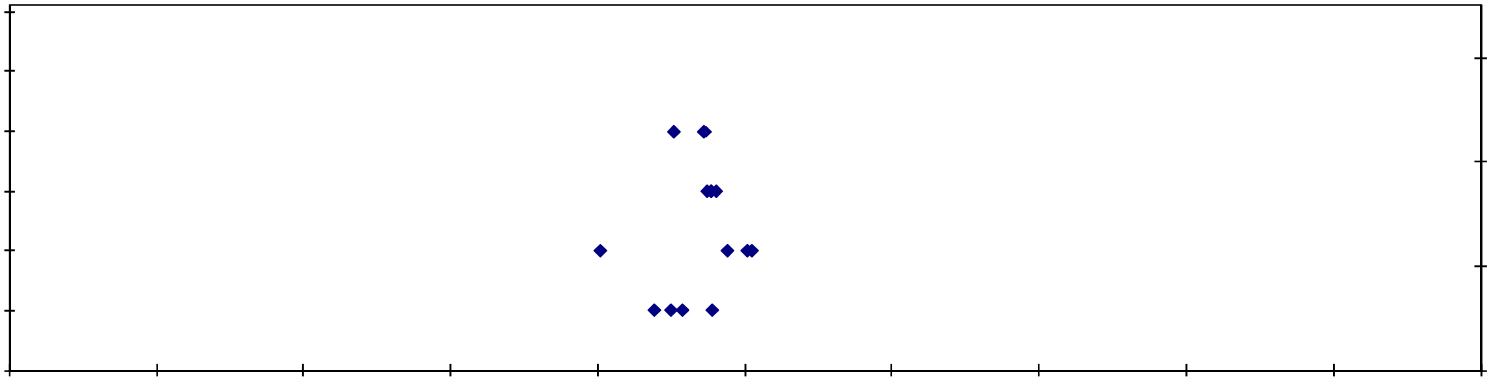
Average	**112.855**	**9.334**	**$Average_{norm}$**	**0.0080**	**114.670**	**9.483**
Standard Dev.	**5.045**	**0.433**	**$Standard\ Dev._{norm}$**		**4.537**	**0.365**
Coeff. of Var. [%]	**4.470**	**4.635**	**$Coeff.\ of\ Var.\ [\%]_{norm}$**		**3.957**	**3.846**
Min.	**102.556**	**8.842**	**Min.**	**0.0080**	**104.596**	**9.069**
Max.	**117.953**	**10.011**	**Max.**	**0.0081**	**118.824**	**10.088**
Number of Spec.	**8**	**8**	**Number of Spec.**		**8**	**8**

											normalizing t_{ply} [in]		
											0.0079		
Specimen Number	**ACG Batch #**	**ACG Cure Cycle**	**Prepreg Lot #**	**Cure Cycle #**	**Strength [ksi]**	**Modulus [Msi]**	**Poisson's Ratio**	**Avg. Specimen Thickn. [in]**	**# Plies in Laminate**	**Failure Mode**	**Avg. t_{ply} [in]**	**$Strength_{norm}$ [ksi]**	**$Modulus_{norm}$ [Msi]**
A0NLB617N	B	LH1	2	1	57.046	7.829	0.040	0.140	18	BGM	0.0078	56.324	7.730
A0NLB618N	B	LH1	2	1	50.153	7.213	0.047	0.143	18	HGM/HAT	0.0080	50.558	7.271
A0NLB619N	B	LH1	2	1	42.536	7.429	0.030	0.144	18	BGM/BAT	0.0080	43.015	7.513
A0NLB61AN	B	LH1	2	1	41.224	7.992	0.045	0.144	18	HGM	0.0080	41.659	8.076
A0NLB61BN	B	LH1	2	1	52.129	7.657	0.059	0.142	18	HGM//BGM	0.0079	52.062	7.647
A0NLB61CN	B	LH1	2	1	54.370	9.687	0.052	0.142	18	BAT	0.0079	54.262	9.668
A0NLB712N	B	LH2	2	2	48.741	7.149	0.034	0.138	18	HGM	0.0077	47.284	6.935
A0NLB713N	B	LH2	2	2	55.720	7.864	0.045	0.142	18	HGM	0.0079	55.779	7.872
A0NLB714N	B	LH2	2	2	46.104	7.439	0.106	0.142	18	BAT,BGM	0.0079	46.071	7.434
A0NLB715N	B	LH2	2	2	45.072	8.549	0.090	0.143	18	HGM	0.0079	45.330	8.598
A0NLB716N	B	LH2	2	2	54.253	7.368	0.097	0.144	18	HGM/BGM	0.0080	55.080	7.480
				Average	**49.759**	**7.834**	**0.058**			**$Average_{norm}$**	**0.0079**	**49.766**	**7.839**
				Standard Dev.	**5.452**	**0.734**	**0.027**			**Standard $Dev._{norm}$**		**5.332**	**0.746**
				Coeff. of Var. [%]	**10.957**	**9.375**	**45.499**			**Coeff. of Var. $[\%]_{norm}$**		**10.714**	**9.517**
				Min.	**41.224**	**7.149**	**0.030**			**Min.**	**0.0077**	**41.659**	**6.935**
				Max.	**57.046**	**9.687**	**0.106**			**Max.**	**0.0080**	**56.324**	**9.668**
				Number of Spec.	**11**	**11**	**11**			**Number of Spec.**	**11**	**11**	**11**
A0NLC817N	C	M1	3	3	55.572	7.954	0.053	0.137	18	HGM	0.0076	53.605	7.672
A0NLC819N	C	M1	3	3	59.636	9.037	0.104	0.139	18	HAT/HGM	0.0077	58.098	8.804
A0NLC81AN	C	M1	3	3	55.613	8.290	0.065	0.138	18	HGM	0.0077	53.919	8.037
A0NLC81BN	C	M1	3	3	62.945	8.091	0.038	0.138	18	HGM	0.0077	61.167	7.862
A0NLC81CN	C	M1	3	3	54.892	9.055	0.101	0.138	18	HGM/HAT	0.0077	53.342	8.799



4.4 Fill Compression Properties

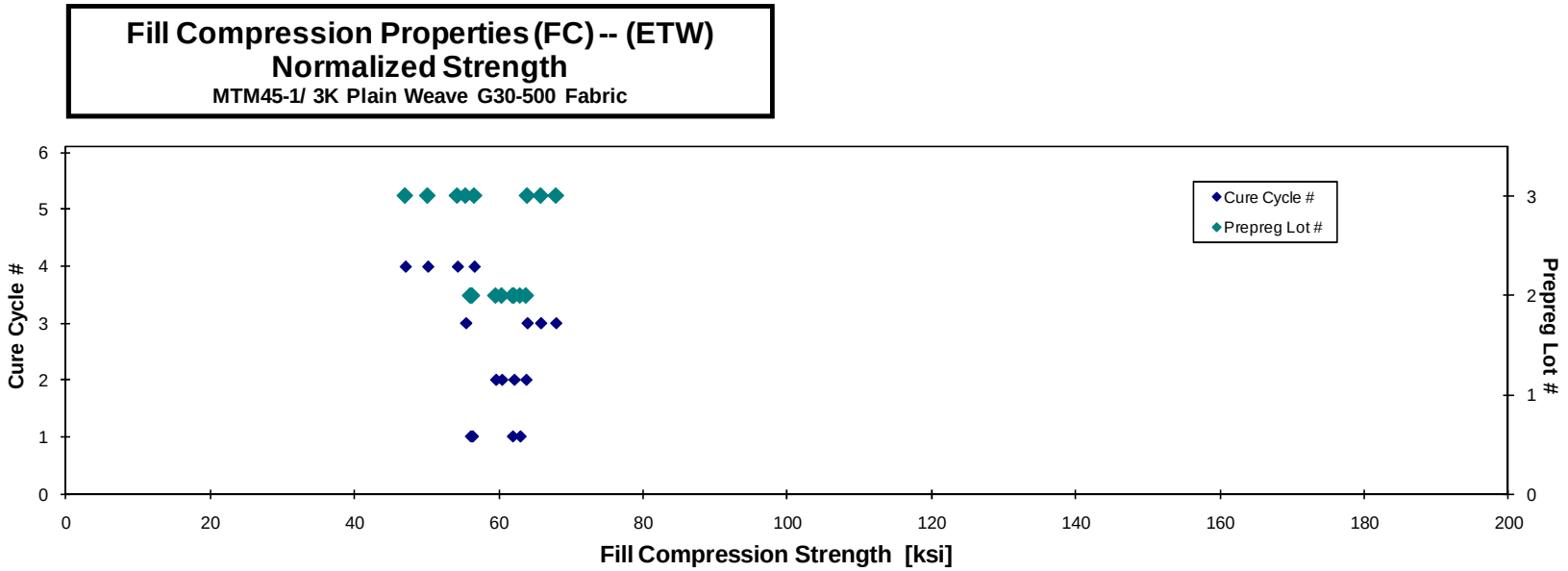
											normalizing t_{ply} [in]		
											0.0079		
Specimen Number	**ACG Batch #**	**ACG Cure Cycle**	**Prepreg Lot #**	**Cure Cycle #**	**Strength [ksi]**	**Modulus [Msi]**	**Poisson's Ratio**	**Avg. Specimen Thickn. [in]**	**# Plies in Laminate**	**Failure Mode**	**Avg. t_{ply} [in]**	**$Strength_{norm}$ [ksi]**	**$Modulus_{norm}$ [Msi]**
A0NZB611A	B	LH1	2	1	96.141	8.762	0.041	0.135	18	BGM	0.0075	91.454	8.335
A0NZB612A	B	LH1	2	1	90.203	8.968	0.047	0.138	18	BGM	0.0077	87.655	8.715
A0NZB613A	B	LH1	2	1	91.567	8.637	0.084	0.140	18	HAB	0.0078	89.904	8.480
A0NZB614A	B	LH1	2	1	96.449	8.492	0.080	0.141	18	BGM/HGM	0.0078	95.489	8.407
A0NZB711A	B	LH2	2	2	85.846	9.067	0.054	0.133	18	HAB	0.0074	80.342	8.486
A0NZB712A	B	LH2	2	2	98.266	8.086	0.063	0.141	18	HAB	0.0078	97.540	8.026
A0NZB713A	B	LH2	2	2	101.135	8.184	0.058	0.142	18	HAB	0.0079	100.862	8.162
A0NZB714A	B	LH2	2	2	100.778	8.116	0.069	0.141	18	HAB	0.0079	100.222	8.071
				Average	**95.048**	**8.539**	**0.062**			**$Average_{norm}$**	**0.0077**	**92.933**	**8.335**
				Standard Dev.	**5.394**	**0.384**	**0.015**			**$Standard\ Dev._{norm}$**		**6.985**	**0.235**
				Coeff. of Var. [%]	**5.675**	**4.502**	**24.399**			**Coeff. of Var. [%33.2657([)37.297.2650(336(.71.2849(.094-1 0 310.68 571.88 Tm [(n)-4**			

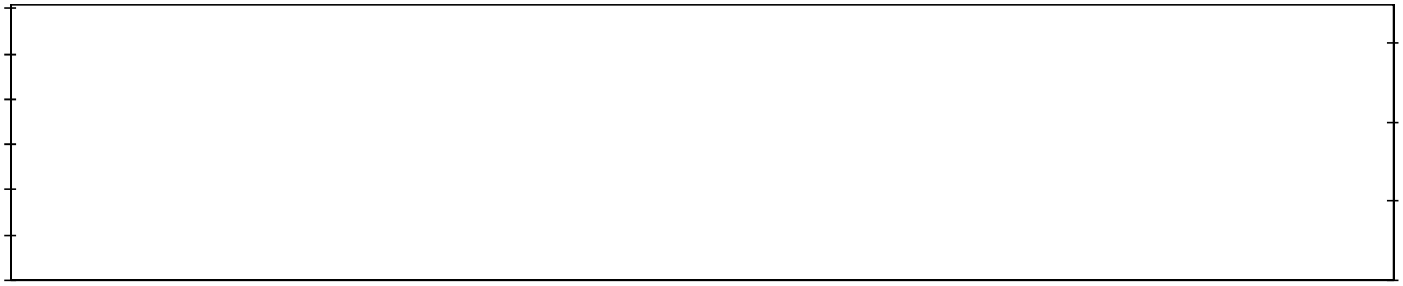


normalizing t_{ply}

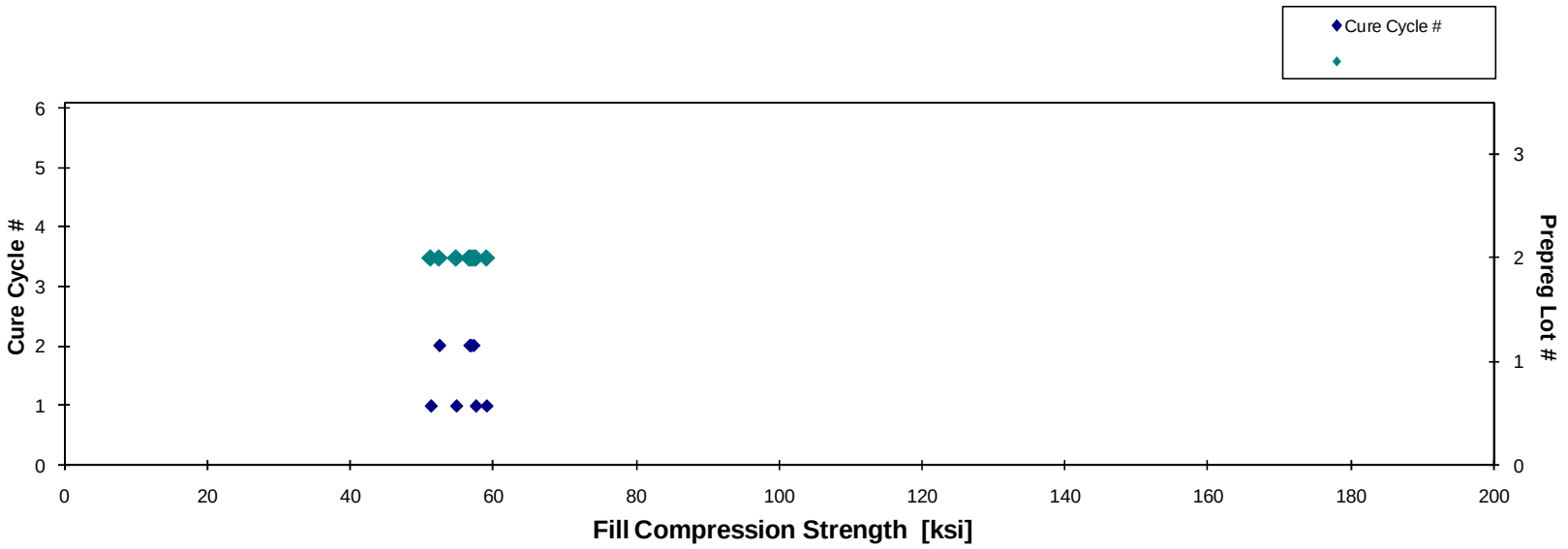
normalizing t_{ply} [in]
0.0079

Specimen Number	ACG Batch #	ACG Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Modulus [Msi]	Poisson's Ratio	Avg. Specimen Thickn. [in]	# Plies in Laminate	Failure Mode	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]	$Modulus_{norm}$ [Msi]
A0NZB619N	B	LH1	2	1	63.100	8.626	0.065	0.142	18	BGM	0.0079	62.952	8.606
A0NZB61AN	B	LH1	2	1	61.657	8.368	0.044	0.143	18	HGM	0.0079	61.924	8.404
A0NZB61BN	B	LH1	2	1	56.377	8.254	0.077	0.142	18	HGM	0.0079	56.351	8.250
A0NZB61CN	B	LH1	2	1	55.906	8.558	0.073	0.143	18	BGM	0.0079	56.103	8.588
A0NZB71EN	B	LH2	2	2	63.400	8.622	0.053	0.143	18	HGM	0.0079	63.786	8.675
A0NZB71FN	B	LH2	2	2	59.353	8.468	0.048	0.143	18	BGM	0.0079	59.596	8.503
A0NZB71GN	B	LH2	2	2	60.058	8.453	0.057	0.143	18	HGM	0.0079	60.431	8.506
A0NZB71HN	B	LH2	2	2	61.880	8.617	0.056	0.143	18	HAB	0.0079	62.134	8.652
				Average	**60.216**	**8.496**	**0.059**			**$Average_{norm}$**	**0.0079**	**60.410**	**8.523**
				Standard Dev.	**2.863**	**0.136**	**0.012**			**Standard Dev.$_{norm}$**		**2.899**	**0.141**
				Coeff. of Var. [%]	**4.755**	**1.597**	**19.991**			**Coeff. of Var. [%]$_{norm}$**		**4.798**	**1.660**
				Min.	**55.906**	**8.254**	**0.044**				**0.0079**	**56.103**	**8.250**
				Max.	**63.400**	**8.626**	**0.077**				**0.0079**	**63.786**	**8.675**
				Number of Spec.	**8**	**8**	**8**				**8**	**8**	**8**
A0NZC81CN	C	M1	3	3	65.068	8.343	0.058	0.144	18	HAB	0.0080	65.823	8.440
A0NZC81DN	C	M1	3	3	63.187	8.141	0.060	0.144	18	BAB	0.0080	63.942	8.238
A0NZC81EN	C	M1	3	3	56.180	8.216	0.067	0.140	18	BGM	0.0078	55.442	8.108
A0NZC81GN	C	M1	3	3	66.276	8.118	0.058	0.146	18	HGM	0.0081	67.915	8.319
A0NZC91DN	C	M2	3	4	51.617	5.892	0.032	0.150	18	HGM	0.0083	54.297	6.198
A0NZC91EN	C	M2	3	4	45.043	6.067	0.049	0.149	18	HGM/HAT	0.0083	47.086	6.342


Fill Compression Properties (FC) -- (ETW)
Normalized Strength
MTM45-1/ 3K Plain Weave G30-500 Fabric
Cure Cycle #
Prepreg Lot #
Fill Compression Strength [ksi]
0
20
40
60
80
100
120
140
160
180
200
1
2
3
4
5
6



												normalizing t_{ply} [in] 0.0079		
Specimen	**ACG**	**ACG Cure**	**Prepreg**	**Cure Cycle**	**Strength**	**Modulus**	**Poisson's**	**Avg. Specimen**	**# Plies in**	**Failure**	**Avg. t_{ply}**	**Strength$_{norm}$**	**Modulus$_{norm}$**


Cure Cycle #
Cure Cycle #
Prepreg Lot #
Fill Compression Strength [ksi]
0
1
2
3
4
5
6
0
20
40
60
80
100
120
140
160
180
200

4.5 In-Plane Shear Properties

In-Plane Shear Properties (IPS) -- (CTD) Strength & Modulus

Specimen Number	ACG Batch #	ACG Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength at 5% Strain [ksi]	0.2% Offset Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. tply [in]
A0NNB617B	B	LH1	2	1	15.398	9.137	0.747	0.065	8	0.0081
A0NNB618B	B	LH1	2	1	15.534	9.275	0.731	0.064	8	0.0080
A0NNB619B*	B	LH1	2	1		9.516	0.732	0.064	8	0.0080
A0NNB61AB*	B	LH1	2	1		9.462	0.741	0.064	8	0.0081
A0NNB717B	B	LH2	2	2	15.824	9.308	0.706	0.064	8	0.0080
A0NNB718B	B	LH2	2	2	15.328	8.911	0.700	0.064	8	0.0080
A0NNB719B	B	LH2	2	2	15.471	8.835	0.685	0.064	8	0.0080
A0NNB71AB	B	LH2	2	2	15.813	9.160	0.703	0.064	8	0.0080

*5% values not available, strain gauge failed before 50 000 micro strain reached

				Average	**15.561**	**9.200**	**0.718**		**Average**	**0.0080**
				Standard Dev.	**0.211**	**0.241**	**0.022**		**Standard Dev.**	
				Coeff. of Var. [%]	**1.356**	**2.623**	**3.121**		**Coeff. of Var. [%]**	
				Min.	**15.328**	**8.835**	**0.685**		**Min.**	**0.0080**
				Max.	**15.824**	**9.516**	**0.747**		**Max.**	**0.0081**
				Number of Spec.	**6**	**8**	**8**		**Number of Spec.**	**8**

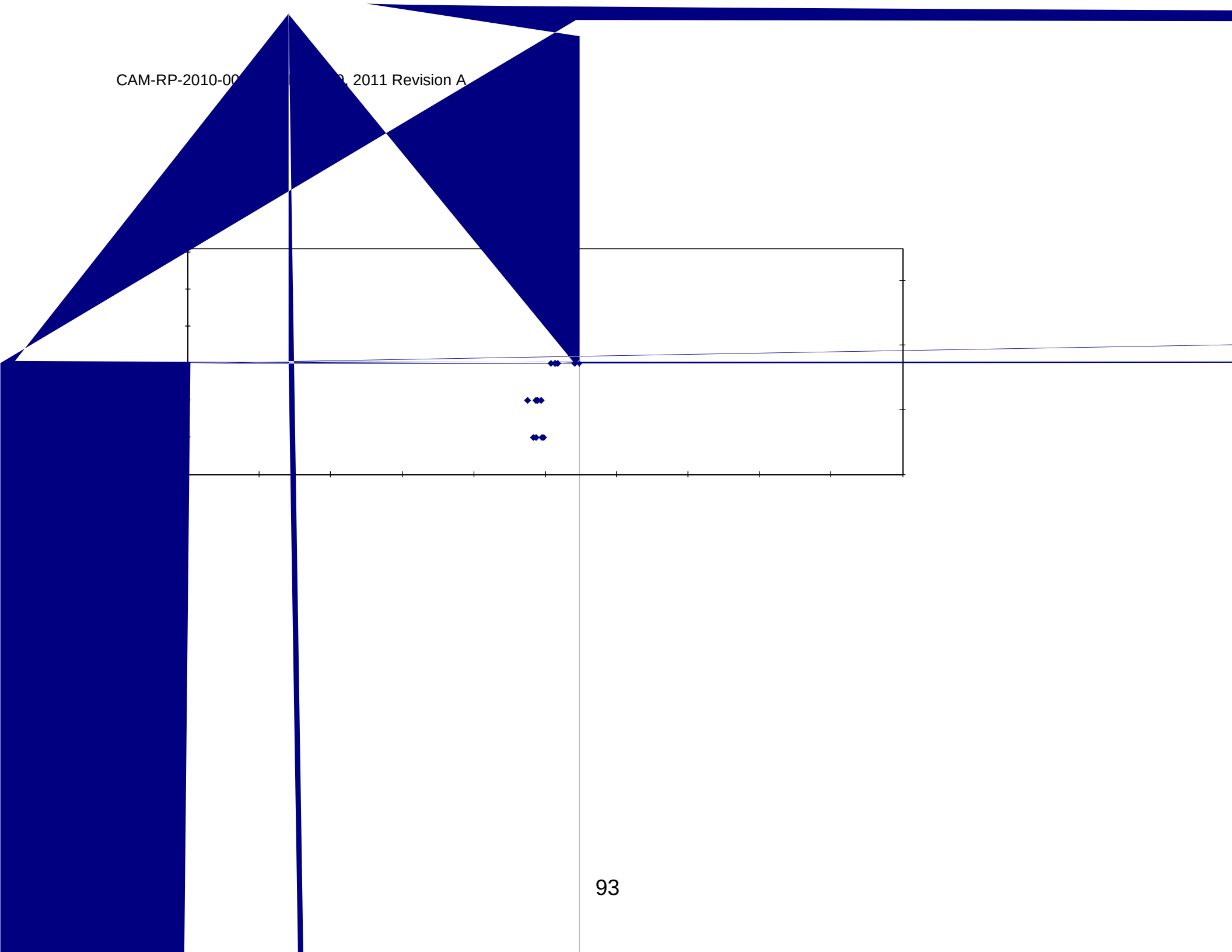
A0NNC817B	C	M1	3	3	14.922	8.600	0.688	0.064	8	0.0080
A0NNC818B	C	M1	3	3	15.040	8.715	0.674	0.065	8	0.0082
A0NNC819B	C	M1	3	3	14.556	8.496	0.678	0.064	8	0.0080
A0NNC81AB	C	M1	3	3	14.472	8.613	0.672	0.065	8	0.0081
A0NNC917B	C	M2	3	4	14.855	8.883	0.710	0.062	8	0.0078
A0NNC918B*	C	M2	3	4		8.725	0.714	0.063	8	0.0078
A0NNC919B	C	M2	3	4	15.141	8.969	0.716	0.065	8	0.0081
A0NNC91AB	C	M2	3	4	14.127	8.314	0.664	0.065	8	0.0081

*5% values not available, strain gauge failed before 50 000 micro strain reached

				Average	**14.731**	**8.664**	**0.690**		**Average**	**0.0080**
				Standard Dev.	**0.360**	**0.209**	**0.021**		**Standard Dev.**	
				Coeff. of Var. [%]	**2.444**	**2.407**	**3.029**		**Coeff. of Var. [%]**	
				Min.	**14.127**	**8.314**	**0.664**		**Min.**	**0.0078**
				Max.	**15.141**	**8.969**	**0.716**		**Max.**	**0.0082**
				Number of Spec.	**7**	**8**	**8**		**Number of Spec.**	**8**

Specimen Number	ACG Batch #	ACG Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength at 5% Strain [ksi]	0.2% Offset Strength [ksi]	Modulus [Msi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. tply [in]
A0NNB61DA	B	LH1	2	1	12.662	6.927	0.617	0.064	8	0.0080
A0NNB61EA	B	LH1	2	1		6.584	0.596	0.064	8	0.0080
A0NNB61FA	B	LH1	2	1	12.266	6.484	0.576	0.065	8	0.0081
A0NNB61GA	B	LH1	2	1	12.825	6.759	0.590	0.064	8	0.0080
A0NNB711A	B	LH2	2	2	12.854	7.062	0.622	0.064	8	0.0079
A0NNB712A	B	LH2	2	2		7.305	0.645	0.064	8	0.0080
A0NNB713A	B	LH2	2	2	12.960	7.049	0.637	0.063	8	0.0079
A0NNB714A	B	LH2	2	2	12.962	7.064	0.625	0.064	8	0.0080
				Average	**12.755**	**6.904**	**0.614**		**Average**	**0.0080**
				Standard Dev.	**0.264**	**0.276**	**0.024**		**Standard Dev.**	
				Coeff. of Var. [%]	**2.067**	**3.995**	**3.909**		**Coeff. of Var. [%]**	
				Min.	**12.266**	**6.484**	**0.576**		**Min.**	**0.0079**
				Max.	**12.962**	**7.305**	**0.645**		**Max.**	**0.0081**
				Number of Spec.	**6**	**8**	**8**		**Number of Spec.**	**8.0000**
A0NNC812A	C	M1	3	3	10.911	6.253	0.581	0.065	8	0.0081
A0NNC813A	C	M1	3	3	11.153	6.221	0.577	0.064	8	0.0080
A0NNC814A	C	M1	3	3	10.934	6.256	0.612	0.063	8	0.0079
A0NNC815A	C	M1	3	3	11.042	6.159	0.593	0.065	8	0.0081
A0NNC911A	C	M2	3	4	11.129	6.389	0.607	0.063	8	0.0079
A0NNC912A	C	M2	3	4	10.663	6.082	0.585	0.063	8	0.0079
A0NNC913A	C	M2	3	4	10.838	6.184	0.595	0.063	8	0.0079
A0NNC914A	C	M2	3	4	11.509	6.478	0.613	0.063	8	0.0078
A0NNC8R2A	C	M1	3	3	10.948	6.281	0.589	0.067	8	0.0083
A0NNC8R3A	C	M1	3	3	12.007	6.759	0.633	0.066	8	0.0083
A0NNC8R4A	C	M1	3	3		6.657	0.590	0.066	8	0.0083
A0NNC8R5A	C	M1	3	3	11.829	6.714	0.611	0.065	8	0.0082
A0NNC8R6A	C	M1	3	3	11.515	6.609	0.624	0.064	8	0.0080
A0NNC9R5A	C	M2	3	4	11.048	6.377	0.588	1.004	8	0.1254
A0NNC9R6A	C	M2	3	4	11.236	6.444	0.589	1.004	8	0.1254
A0NNC9RBA	C	M2	3	4	11.668	6.716	0.614	1.004	8	0.1255
A0NNC9RDA	C	M2	3	4	11.435	6.387	0.618	1.004	8	0.1254
				Average	**11.242**	**6.410**	**0.601**		**Average**	**0.0357**
				Standard Dev.	**0.381**	**0.215**	**0.016**		**Standard Dev.**	
				Coeff. of Var. [%]	**3.393**	**3.353**	**2.734**		**Coeff. of Var. [%]**	
				Min.	**10.663**	**6.082**	**0.577**		**Min.**	**0.0078**
				Max.	**12.007**	**6.759**	**0.633**		**Max.**	**0.1255**
				Number of Spec.	**16**	**17**	**17**		**Number of Spec.**	**17**

4.6 Lamina Short Beam Strength Properties



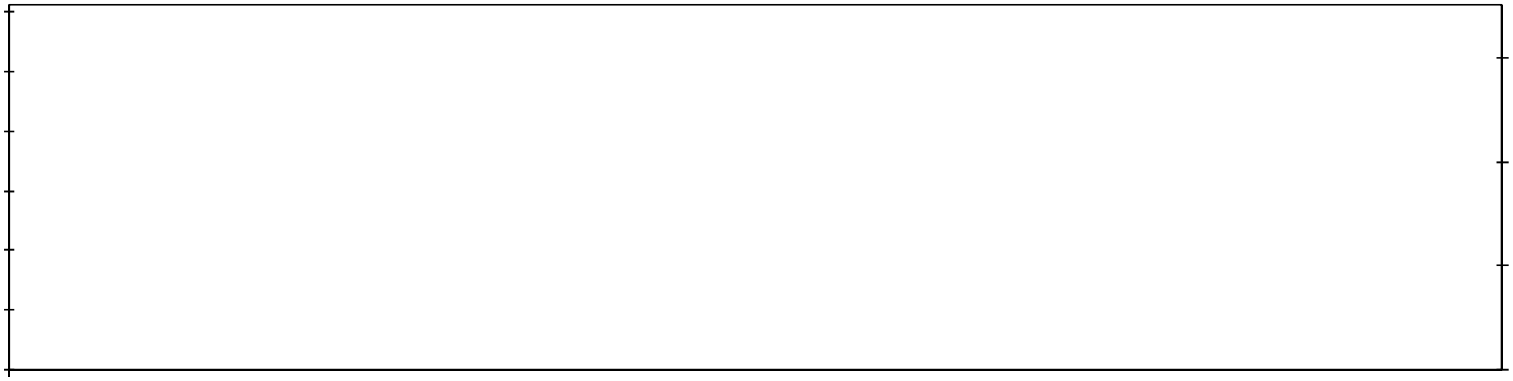
Short Beam Strength Properties (SBS) -- (ETW) Strength

Specimen Number	ACG Batch #	ACG Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. tply [in]	Failure Mode
A0NQB6U6N	B	LH1	2	1	6.308	0.109	14	0.0078	interlaminar shear
A0NQB6U7N	B	LH1	2	1	6.420	0.109	14	0.0078	interlaminar shear
A0NQB6U9N	B	LH1	2	1	6.445	0.111	14	0.0079	interlaminar shear
A0NQB6UAN	B	LH1	2	1	6.346	0.110	14	0.0079	interlaminar shear
A0NQB7U7N	B	LH2	2	2	6.654	0.108	14	0.0077	interlaminar shear
A0NQB7U8N	B	LH2	2	2	6.616	0.108	14	0.0077	interlaminar shear
A0NQB7U9N	B	LH2	2	2	6.392	0.109	14	0.0078	interlaminar shear
A0NQB7UAN	B	LH2	2	2	6.563	0.108	14	0.0077	interlaminar shear
A0NQB7UBN	B	LH2	2	2	6.484	0.108	14	0.0077	interlaminar shear
				Average	**6.470**		**Average**	**0.0078**	
				Standard Dev.	**0.120**		**Standard Dev.**		
				Coeff. of Var. [%]	**1.852**		**Coeff. of Var. [%]**		
				Min.	**6.308**		**Min.**	**0.0077**	
				Max.	**6.654**		**Max.**	**0.0079**	
				Number of Spec.	**9**		**Number of Spec.**	**9**	
A0NQC8UCN	C	M1	3	3	6.820	0.113	14	0.0081	interlaminar shear
A0NQC8UDN	C	M1	3	3	6.537	0.113	14	0.0081	interlaminar shear
A0NQC8UEN	C	M1	3	3	6.651	0.113	14	0.0081	interlaminar shear
A0NQC8UFN	C	M1	3	3	6.638	0.113	14	0.0081	interlaminar shear
A0NQC9UAN	C	M2	3	4	6.451	0.111	14	0.0079	interlaminar shear
A0NQC9UBN	C	M2	3	4	6.249	0.111	14	0.0079	interlaminar shear
A0NQC9UCN	C	M2	3	4	6.081	0.111	14	0.0079	interlaminar shear
A0NQC9UDN	C	M2	3	4	6.270	0.111	14	0.0079	interlaminar shear
				Average	**6.462**		**Average**	**0.0080**	
				Standard Dev.	**0.247**		**Standard Dev.**		
				Coeff. of Var. [%]	**3.826**		**Coeff. of Var. [%]**		
				Min.	**6.081**		**Min.**	**0.0079**	
				Max.	**6.820**		**Max.**	**0.0081**	
				Number of Spec.	**8**		**Number of Spec.**	**8**	

Short Beam Strength Properties (SBS) -- (ETW2)
Measured Strength
MTM45-1/ 3K Plain Weave G30-500 Fabric

Specimen Number	ACG Batch #	ACG Cure Cycle	Prepreg Lot #	Cure Cycle Batch #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. tply [in]	Failure Mode
A0NQB6UCD	B	LH1	2	1	5.179	0.112	14	0.0080	Interlaminar shear
A0NQB6UDD	B	LH1	2	1	5.071	0.113	14	0.0081	Interlaminar shear
A0NQB6UFD	B	LH1	2	1	5.198	0.111	14	0.0079	Interlaminar shear
A0NQB6UGD	B	LH1	2	1	5.084	0.112	14	0.0080	Interlaminar shear
A0NQB7UCD	B	LH2	2	2	5.326	0.108	14	0.0077	Interlaminar shear
A0NQB7UDD	B	LH2	2	2	5.141	0.108	14	0.0077	Interlaminar shear
A0NQB7UED	B	LH2	2	2	5.065	0.108	14	0.0077	Interlaminar shear
A0NQB7UFD	B	LH2	2	2	5.202	0.108	14	0.0077	Interlaminar shear

Average	**5.158**	**Average**	**0.0078**
Standard Dev.	**0.088**	**Standard Dev.**	
Coeff. of Var. [%]	**1.704**	**Coeff. of Var. [%]**	
Min.	**5.065**	**Min.**	**0.0077**
Max.	**5.326**	**Max.**	**0.0081**
Number of Spec.	**8**	**Number of Spec.**	**8**



4.7 Open Hole Tension 1 Properties

											normalizing t_{ply} [in]	
											0.0079	
Specimen Number	**ACG Batch #**	**ACG Cure Cycle**	**Prepreg Lot #**	**Cure Cycle #**	**Strength [ksi]**	**Avg. Specimen Thickn. [in]**	**# Plies in Laminate**	**Avg. t_{ply} [in]**	**Failure Modes**		**Avg. t_{ply} [in]**	**Strength$_{norm}$ [ksi]**
A0NDB616B	B	LH1	2	1	49.566	0.130	16	0.0081	LGM		0.0081	50.886
A0NDB617B	B	LH1	2	1	51.401	0.130	16	0.0081	LGM		0.0081	52.886
A0NDB618B	B	LH1	2	1	50.518	0.131	16	0.0082	LGM		0.0082	52.216
A0NDB619B	B	LH1	2	1	50.431	0.130	16	0.0081	LGM		0.0081	51.881
A0NDB716B	B	LH2	2	2	50.954	0.129	16	0.0080	LGM		0.0080	51.861
A0NDB717B	B	LH2	2	2	50.836	0.129	16	0.0080	LGM		0.0080	51.701
A0NDB718B	B	LH2	2	2	50.974	0.128	16	0.0080	LGM		0.0080	51.787
A0NDB719B	B	LH2	2	2	50.314	0.130	16	0.0081	LGM		0.0081	51.674
				Average	**50.624**		**Average**	**0.0081**		**Average$_{norm}$**	**0.0081**	**51.862**
				Standard Dev.	**0.554**					**Standard Dev.$_{norm}$**		**0.560**
				Coeff. of Var. [%]	**1.094**					**Coeff. of Var. [%]$_{norm}$**		**1.079**
				Min.	**49.566**		**Min.**	**0.0080**				

normalizing t_{ply} [in]
0.0079

											normalizing t_{ply} [in]	
											0.0079	
Specimen	**ACG**	**ACG Cure**	**Prepreg**	**Cure Cycle**	**Strength**	**Avg. Specimen**	**# Plies in**	**Avg. t_{ply}**	**Failure**		**Avg. t_{ply}**	**Strength$_{norm}$**

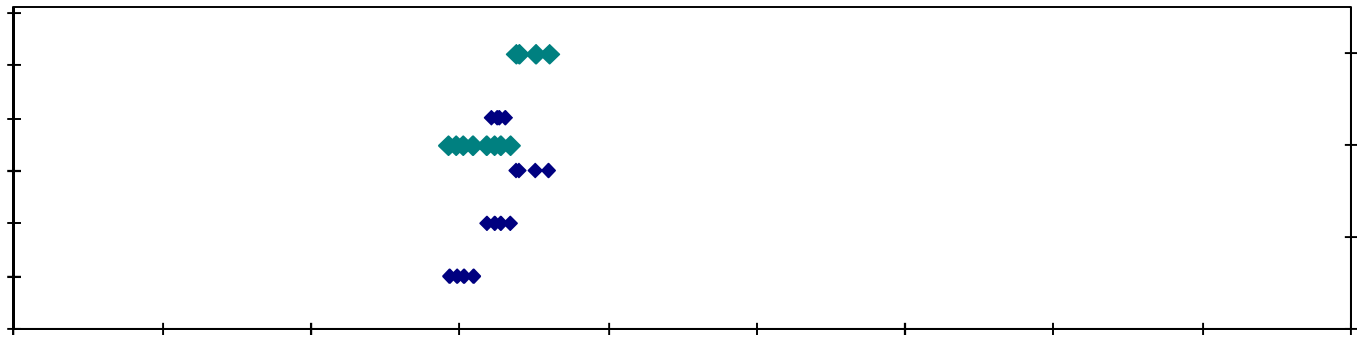
4.8 Open-Hole Compression 1 Properties

normalizing t_{ply} [in]
0.0079

Laminate Open-Hole Compression Properties (OHC1) -- (ETW)
Strength
MTM45-1/ 3K Plain Weave G30-500 Fabric

normalizing t_{ply} [in]
0.0079

Specimen Number	ACG Batch #	ACG Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]	Failure Modes	Avg. t_{ply} [in]	$Strength_{norm}$ [ksi]
A0NGB616N	B	LH1	2	1	29.986	0.128	16	0.0080	LGM	0.0080	30.250
A0NGB617N	B	LH1	2	1	30.613	0.128	16	0.0080	LGM	0.0080	30.904
A0NGB618N	B	LH1	2	1	29.479	0.128	16	0.0080	LGM	0.0080	29.778
A0NGB619N	B	LH1	2	1	28.838	0.128	16	0.0080	LGM	0.0080	29.268
A0NGB71EN	B	LH2	2	2	32.234	0.131	16	0.0082	LGM	0.0082	33.403
A0NGB71FN	B	LH2	2	2	30.997	0.130	16	0.0081	LGM	0.0081	31.814
A0NGB71GN	B	LH2	2	2	31.646	0.129	16	0.0081	LGM	0.0081	32.343
A0NGB71HN	B	LH2	2	2	32.121	0.129	16	0.0081	LGM	0.0081	32.756
				Average	**30.739**		**Average**	**0.0080**	**$Average_{norm}$**	**0.0080**	**31.315**
				Standard Dev.	**1.243**				**Standard $Dev._{norm}$**		**1.493**
				Coeff. of Var. [%]	**4.044**				**Coeff. of Var. $[\%]_{norm}$**		**4.767**
				Min.	**28.838**		**Min.**	**0.0080**	**Min.**	**0.0080**	**29.268**
				Max.	**32.234**		**Max.**	**0.0082**	**Max.**	**0.0082**	**33.403**
				Number of Spec.	**8**			**8**	**Number of Spec.**	**8**	**8**
AONGC816N	C	M1	3	3	33.351	0.128	16	0.0080	LGM	0.0080	33.791
AONGC817N	C	M1	3	3	35.246	0.129	16	0.0081	LGM	0.0081	36.008
AONGC818N	C	M1	3	3	33.469	0.128	16	0.0080	LGM	0.0080	33.994
AONGC819N	C	M1	3	3	34.246	0.130	16	0.0081	LGM	0.0081	35.104
A0NGC917N	C	M2	3	4	32.229	0.130	16	0.0081	LGM	0.0081	33.066
A0NGC918N	C	M2	3	4	31.644	0.130	16	0.0082	LGM	0.0082	32.654
A0NGC919N	C	M2	3	4	31.894	0.129	16	0.0081	LGM	0.0081	32.512
A0NGC91AN	C	M2	3	4	31.224	0.130	16	0.0081	LGM	0.0081	32.109
				Average	**32.913**		**Average**	**0.0081**	**$Average_{norm}$**	**0.0081**	**33.655**
				Standard Dev.	**1.398**				**Standard $Dev._{norm}$**		**1.353**
				Coeff. of Var. [%]	**4.249**				**Coeff. of Var. $[\%]_{norm}$**		**4.020**
				Min.	**31.224**		**Min.**	**0.0080**	**Min.**	**0.0080**	**32.109**
				Max.	**35.246**		**Max.**	**0.0082**	**Max.**	**0.0082**	**36.008**
				Number of Spec.	**8**			**8**	**Number of Spec.**	**8**	**8**



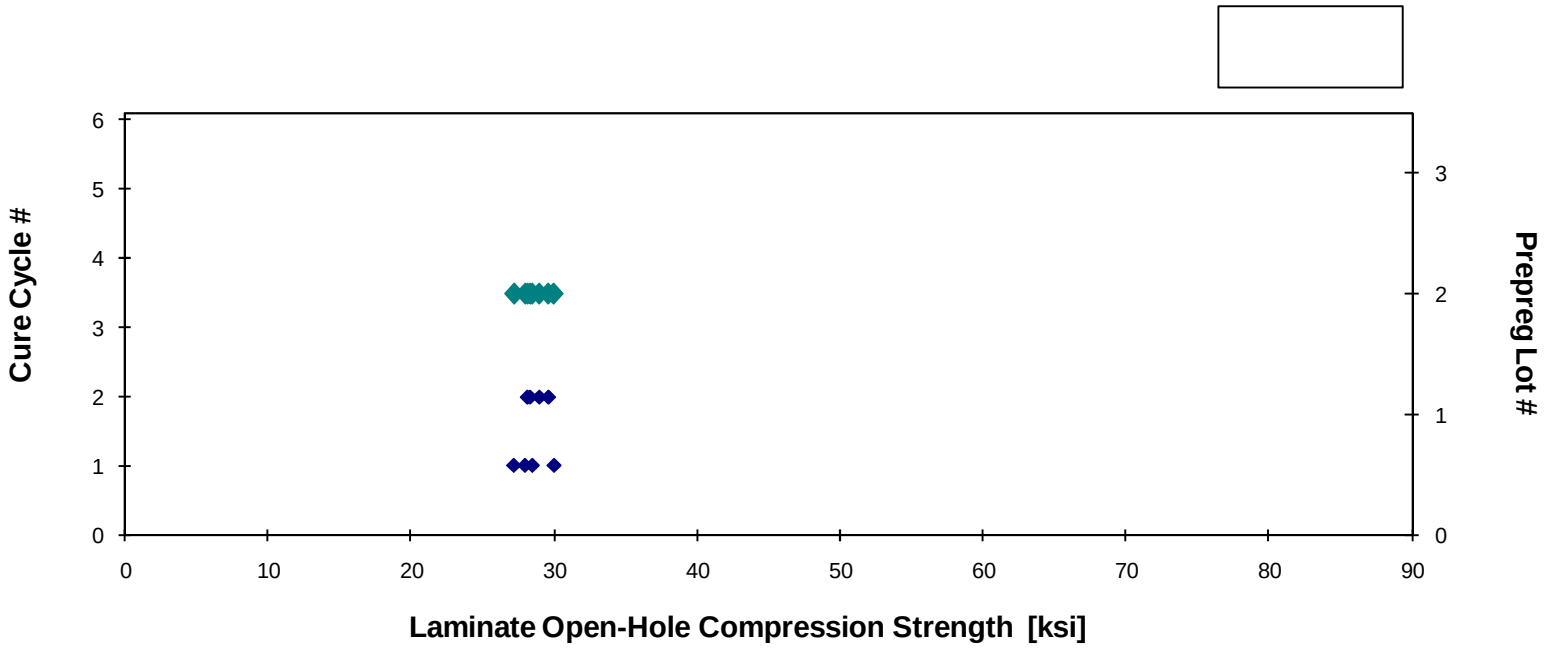
Laminate Open-Hole Compression Properties (OHC1) -- (ETW2) Strength

MTM45-1/ 3K Plain Weave G30-500 Fabric

normalizing t_{ply} [in]: 0.0079

Specimen Number	ACG Batch #	ACG Cure Cycle	Prepreg Lot #	Cure Cycle #	Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate	Avg. t_{ply} [in]	Failure Modes	Avg. t_{ply} [in]	Strength$_{norm}$ [ksi]
A0NGB61BD	B	LH1	2	1	26.703	0.129	16	0.0080	LGM	0.0080	27.200
A0NGB61CD	B	LH1	2	1	29.499	0.129	16	0.0080	LGM	0.0080	30.013
A0NGB61DD	B	LH1	2	1	27.853	0.129	16	0.0081	LGM	0.0081	28.492
A0NGB61ED	B	LH1	2	1	27.286	0.130	16	0.0081	LGM	0.0081	27.991
A0NGB711D	B	LH2	2	2	28.449	0.129	16	0.0081	LGM	0.0081	28.989
A0NGB712D	B	LH2	2	2	28.745	0.130	16	0.0081	LGM	0.0081	29.628
A0NGB713D	B	LH2	2	2	27.382	0.130	16	0.0081	LGM	0.0081	28.151
A0NGB714D	B	LH2	2	2	27.380	0.131	16	0.0082	LGM	0.0082	28.347

Average	**27.912**	**Average**	**0.0081**	
Standard Dev.	**0.920**			**Average$_{norm}$** **0.0081** **28.601**
Coeff. of Var. [%]	**3.295**			**Standard Dev.$_{norm}$** **0.911**
Min.	**26.703**	**Min.**	**0.0080**	**Coeff. of Var. [%]$_{norm}$** **3.186**
Max.	**29.499**	**Max.**	**0.0082**	**Min.** **0.0080** **27.200**
Number of Spec.	**8**			**Max.** **0.0082** **30.013**
				Number of Spec. **8**

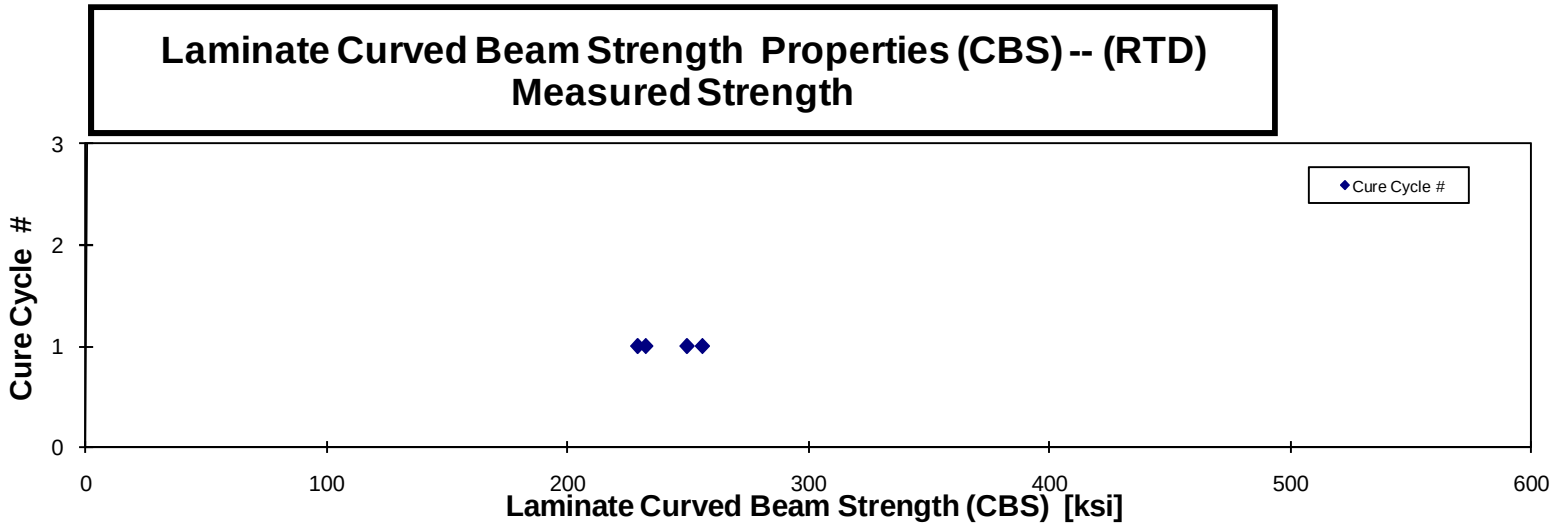

Cure Cycle #
Prepreg Lot #
Laminate Open-Hole Compression Strength [ksi]
0
1
2
3
4
5
6
0
10
20
30
40
50
60
70
80
90

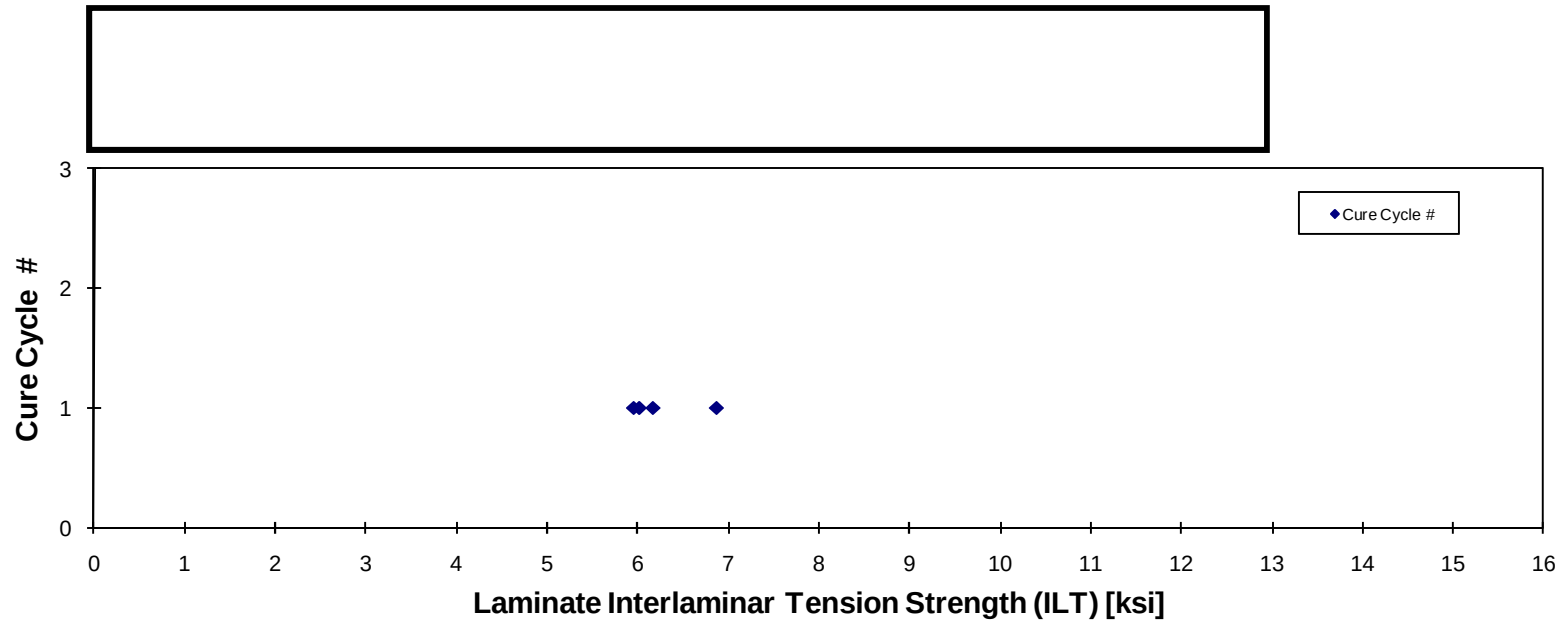
4.9 Compression Strength after Impact 1 Properties

normalizing t_{ply} [in]
0.0079

0

											normalizing t_{ply} [in]
											0.0079
Specimen Number	**ACG Batch #**	**ACG Cure Cycle**	**Prepreg Lot #**	**Cure Cycle #**	**Measured Impact Energy (in-lbf)**	**Strength [ksi]**	**Avg. Specimen Thickn. [in]**	**# Plies in Laminate**	**Failure Mode**	**Avg. t_{ply} [in]**	**$Strength_{norm}$ [ksi]**
A0NKB614D	A	LH1	2	1	237.18	22.409	0.158	20	LDM	0.0079	22.380
A0NKB615D	A	LH1	2	1	238.32	22.062	0.161	20	LDM	0.0081	22.497
A0NKB616D	A	LH1	2	1	237.82	23.912	0.158	20	LDM	0.0079	23.864
					Average	**22.794**			**$Average_{norm}$**	**0.00794**	**22.914**
					Standard Dev.	**0.983**			**$Standard\ Dev._{norm}$**		**0.825**
					Coeff. of Var. [%]						


Laminate Curved Beam Strength Properties (CBS) -- (RTD)
Measured Strength
Cure Cycle #
Cure Cycle #
0
1
2
3
0
100
200
300
400
500
600
Laminate Curved Beam Strength (CBS) [ksi]

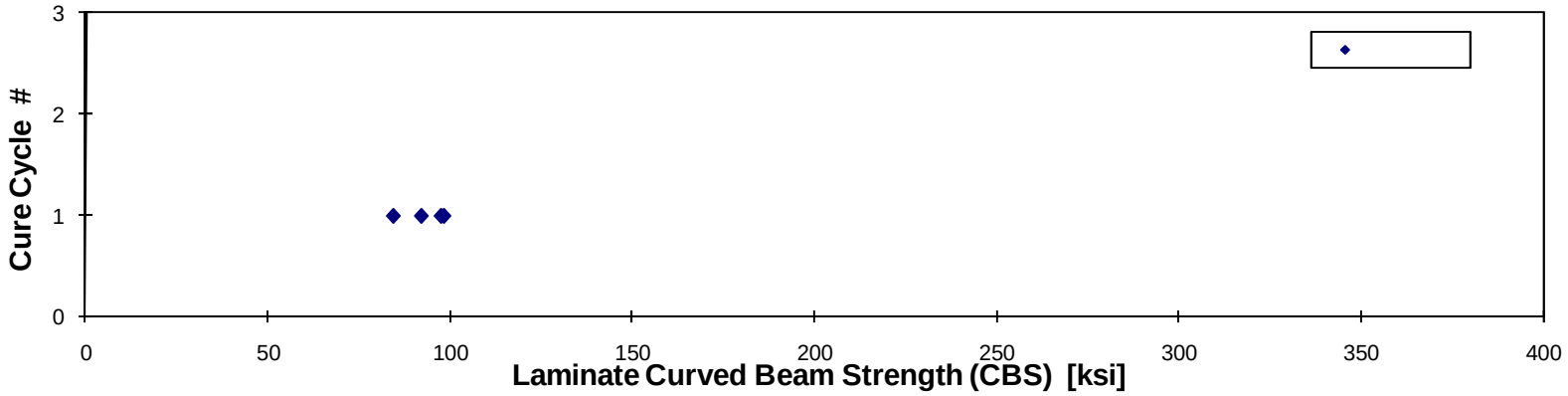

Cure Cycle #
Cure Cycle #
0
1
2
3
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
Laminate Interlaminar Tension Strength (ILT) [ksi]

Laminate Curved Beam Strength Properties (ILT) -- (ETW2) Strength

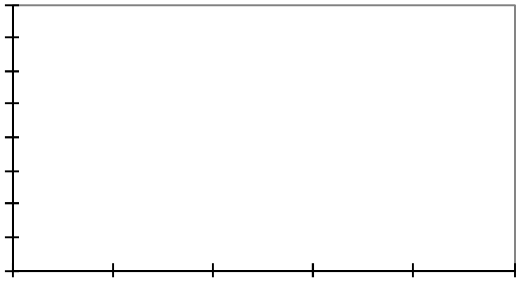
MTM45-1/ 3K Plain Weave G30-500 Fabric

Specimen Number	ACG Batch #	ACG Cure Cycle	Prepreg Lot #	Cure Cycle #	Curved Beam Strength [psi]	Interlaminar Tension Strength [ksi]	Avg. Specimen Thickn. [in]	# Plies in Laminate
A0NMB617D	A	LH1	1	1	98.520	2.650	0.172	20
A0NMB618D	A	LH1	1	1	97.685	2.558	0.176	20
A0NMB619D	A	LH1	1	1	84.259	2.204	0.176	20
A0NMB61AD	A	LH1	1	1	92.182	2.283	0.184	20

Average	**93.161**	**2.424**
Standard Dev.	**6.568**	**0.214**
Coeff. of Var. [%]	**7.050**	**8.839**
Min.	**84.259**	**2.204**
Max.	**98.520**	**2.650**
Number of Spec.	**4**	**4**


Cure Cycle #
0
1
2
3
0
50
100
150
200
250
300
350
400
Laminate Curved Beam Strength (CBS) [ksi]

5. Shear Stress vs. Shear Strain, RTD, M Cure



6.2 Fill Compression - Thickest Panel

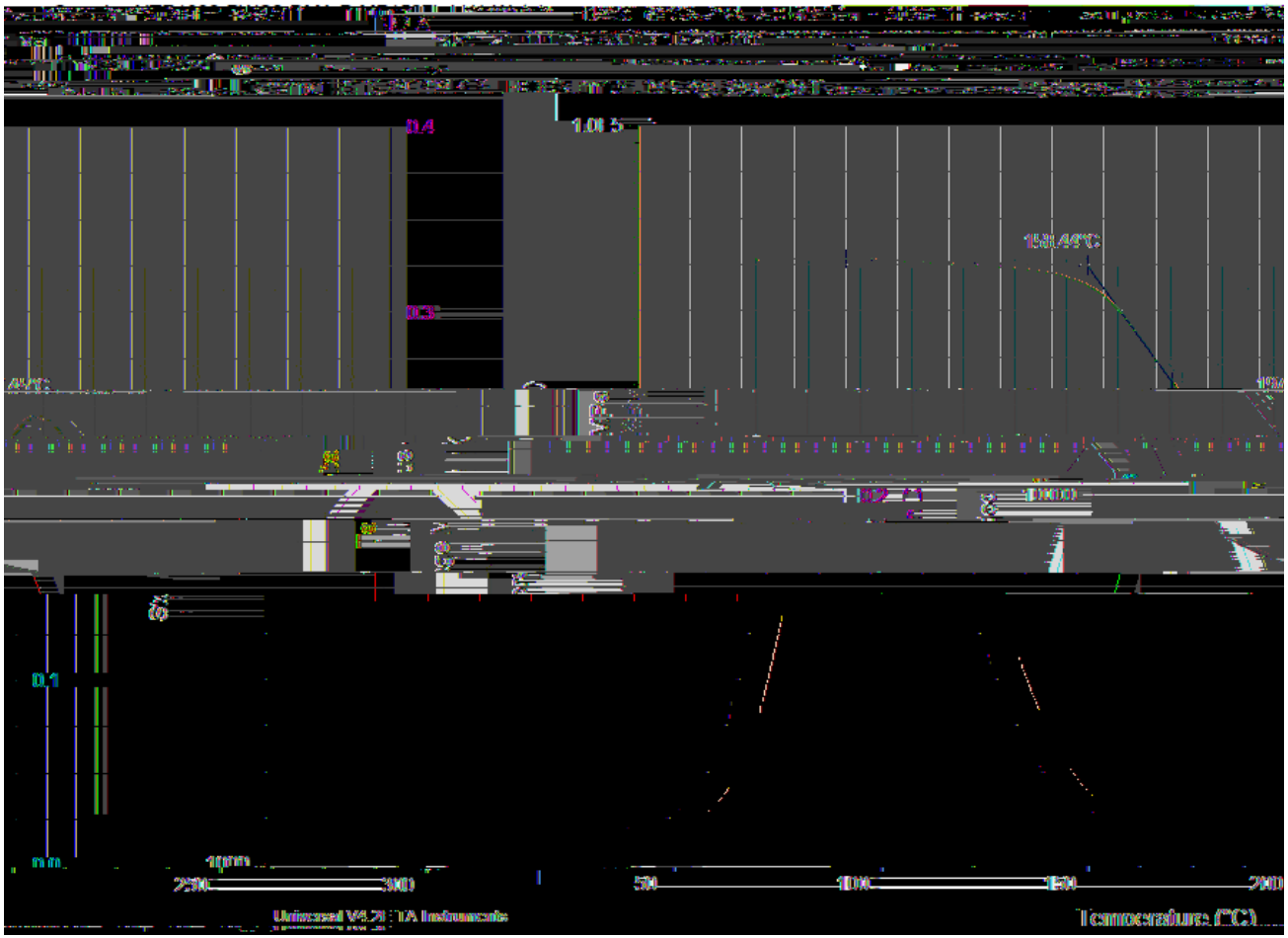
7. DMA Results

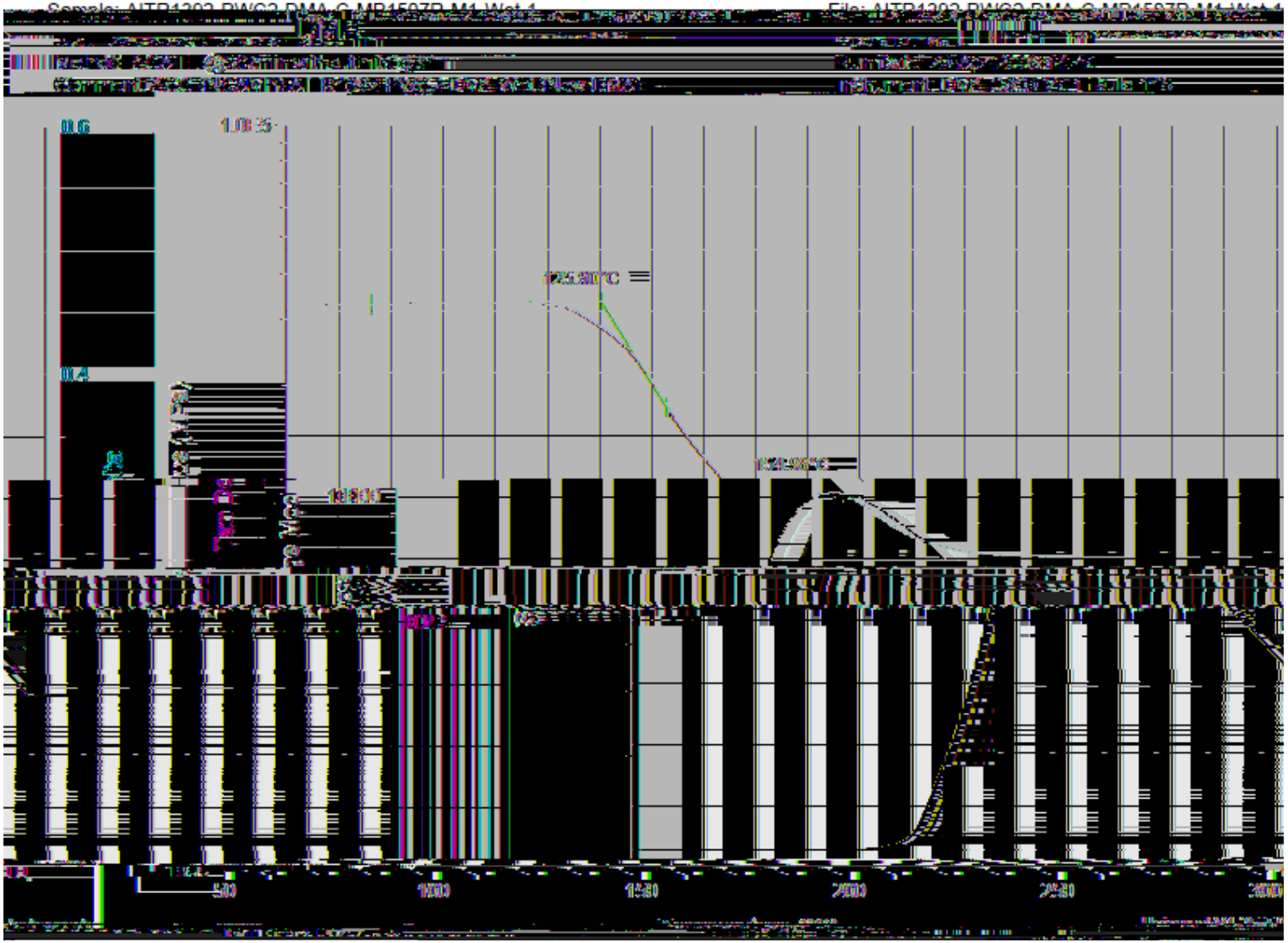
Test Plan-	Material-	Test-	Batch-	Cure	Tg [°C]	Tg [°F]	Tg [°C]	Tg [°F]	Tg [°C]	Tg [°F]	Tg [°C]	Tg [°F]
AITR1392-	PWC2-	WT-	B-	LH1								
AITR1392-	PWC2-	WC-	B-	LH1								
AITR1392-	PWC2-	FT-	B-	LH1								
AITR1392-	PWC2-	FC-	B-	LH1	180.89	357.60	158.44	317.19	202.56	396.608	197.45	387.41
AITR1392-	PWC2-	IPS-	B-	LH1	179.96	355.93	161.15	322.07	201.6	394.88	197.85	388.13
AITR1392-	PWC2-	OHT1-	B-	LH1	181.27	358.29	161.51	322.72	202.64	396.752	198.13	388.634
AITR1392-	PWC2-	OHC1-	B-	LH1								
AITR1392-	PWC2-	CAI1-	B-	LH1								
AITR1392-	PWC2-	WT-	B-	LH2								
AITR1392-	PWC2-	WC-	B-	LH2								
AITR1392-	PWC2-	FT-	B-	LH2	178	352.4	161.33	322.394	200.63	393.134	198.7	389.66

Test Panel Part Number					Representative DMA Sample #	M Cure DMA Results - Onset Storage Modulus						M Cure DMA Results - Peak Tangent Delta					
						AITR1392-PWC2						AITR1392-PWC2					
						DRY		Batch	85% RH WET		Batch	DRY		Batch	85% RH WET		Batch
Test Plan-	Material-	Test-	Batch-	Cure		Tg [°C]	Tg [°F]	Average	Tg [°C]	Tg [°F]	Average	Tg [°C]	Tg [°F]	Average	Tg [°C]	Tg [°F]	Average
					DMA-C-MP1507RM1;	131.11	268.00		125.9	258.62		150.47	302.85		154.98	310.96	
AITR1392-	PWC2-	ILT1-	C-	M1	DMA-C-MP1507RM1;	130.42	266.76		125.74	258.33		151.4	304.52		151.72	305.10	
					DMA-C-MP1507RM1;	130.18	266.32		127.98	262.36		149.91	301.84		152.29	306.12	
AITR1392-	PWC2-	WT-	C-	M1													
AITR1392-	PWC2-	WC-	C-	M1													
AITR1392-	PWC2-	FT-	C-	M1													
AITR1392-	PWC2-	FC-	C-	M1	DMA-C-MP1507SM1;	137.11	278.80		131.69	269.04		159.7	319.46		161.84	323.312	
AITR1392-	PWC2-	IPS-	C-	M1	DMA-C-MP1507SM1;	137.12	278.82		129.75	265.55		159.84	319.71		159.07	318.33	
AITR1392-	PWC2-	OHT1-	C-	M1	DMA-C-MP1507SM1;	137.73	279.91		130.31	266.56		158.48	317.264		160.57	321.026	
AITR1392-	PWC2-	OHC1-	C-	M1				**274.57**			**265.16**			**313.73**			**315.51**
AITR1392-	PWC2-	CAI1-	C-	M1													
AITR1392-	PWC2-	WT-	C-	M2													
AITR1392-	PWC2-	WC-	C-	M2													
AITR1392-	PWC2-	FT-	C-	M2	DMA-C-MP1507TM2; DMA-	139.14	282.452		131	267.8		160.09	320.162		157.91	316.238	
AITR1392-	PWC2-	FC-	C-	M2	C-MP1507TM2; DMA-C-	134.88	274.784		132.93	271.274		159.42	318.956		158.64	317.552	
AITR1392-	PWC2-	IPS-	C-	M2	MP1507TM2;	135.15	275.27		130.48	266.864		159.32	318.776		160.52	320.936	
AITR1392-	PWC2-	OHT1-	C-	M2													
AITR1392-	PWC2-	OHC1-	C-	M2													
					Average [°F]		274.57			265.16			313.73			315.51	
					Standard Deviation [°F]		6.12			4.50			8.06			6.62	
					Coefficient of Var. [%]		2.23			1.70			2.57			2.10	

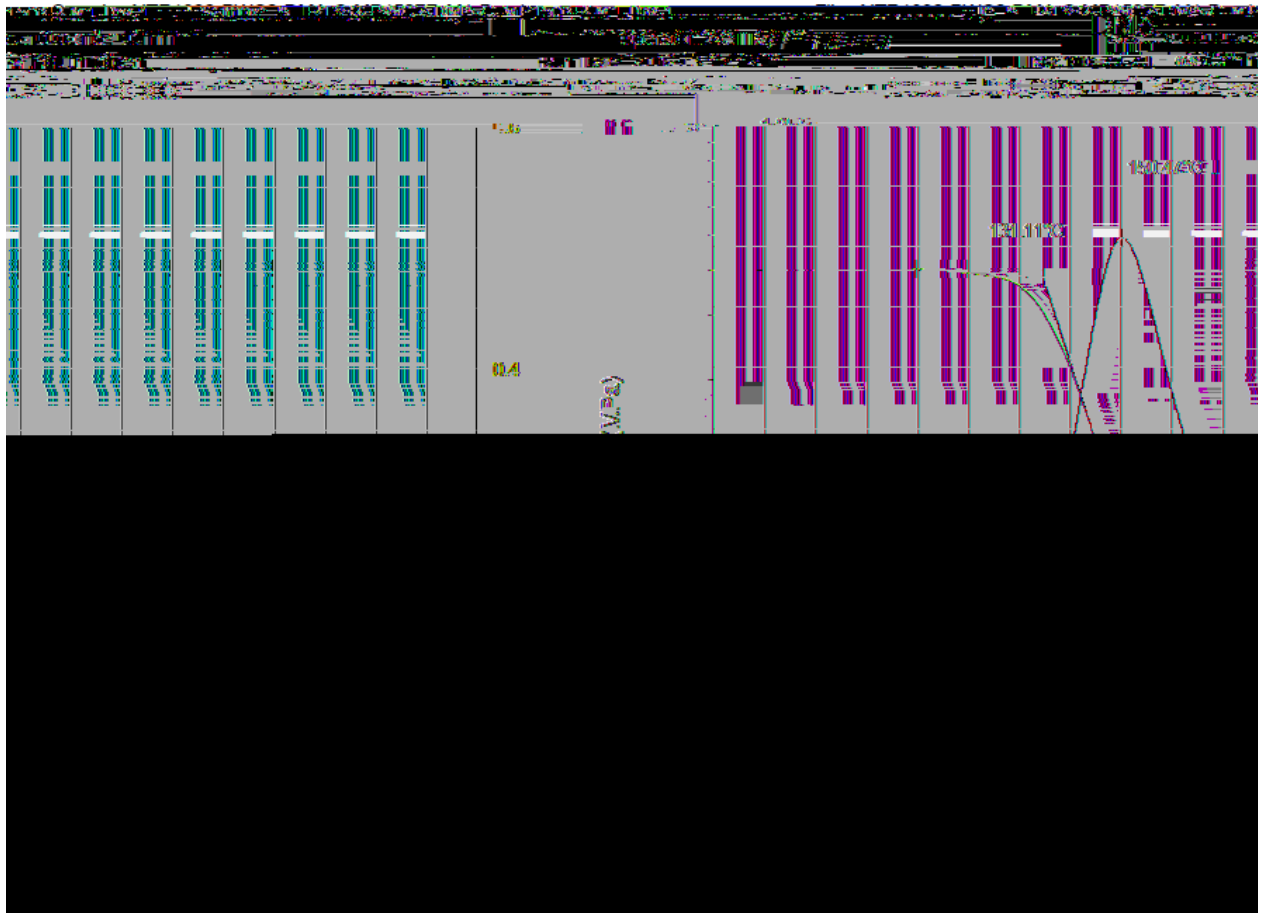
7.1 DMA Wet Batch B (LH Cure) & C (M Cure)

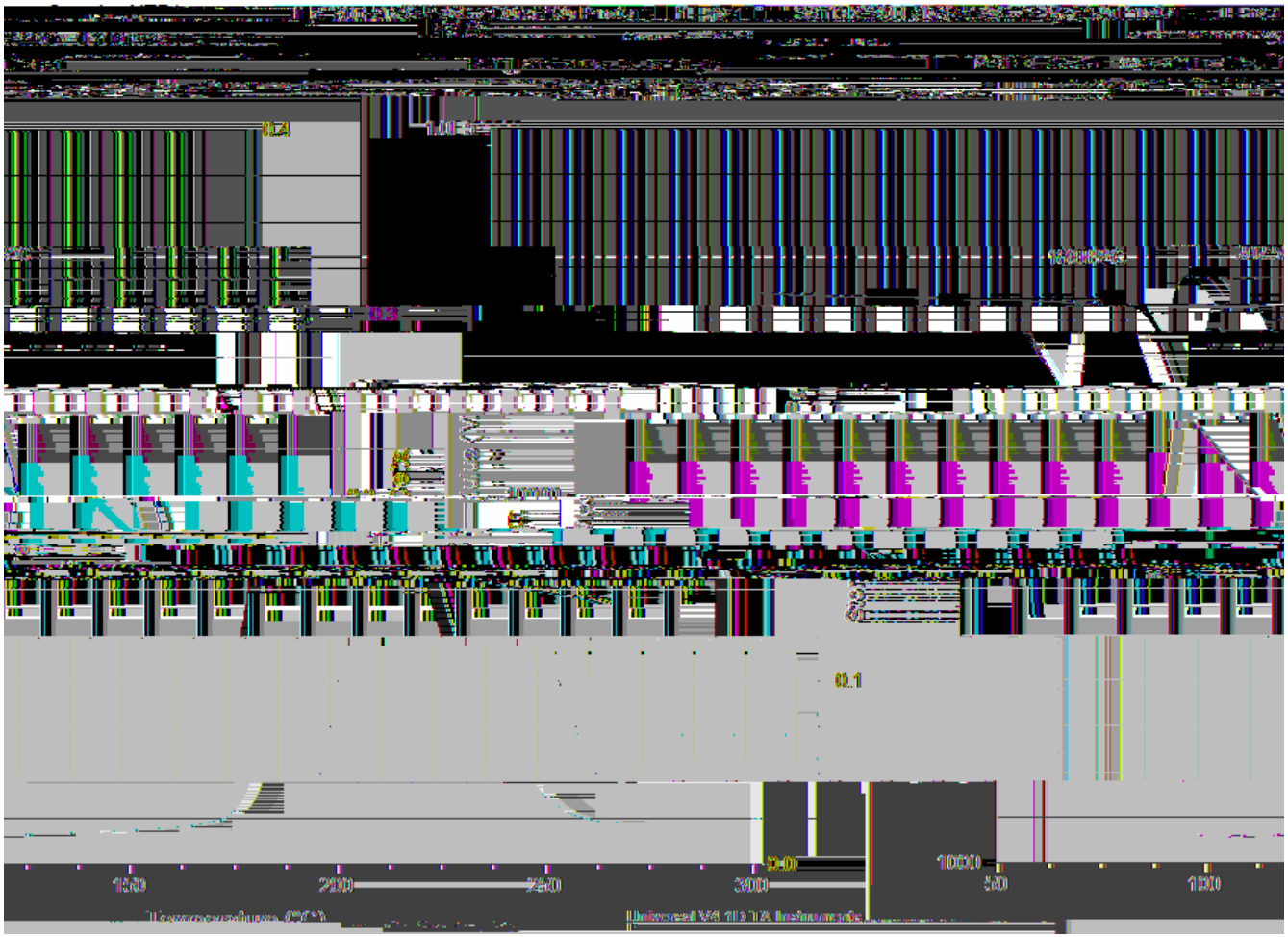
These graphs are only examples. The remaining files can be obtained in the CD accompanying this report.





7.2 DMA Dry Batch B (LH Cure) & C (M Cure)





8. Physical Test Results

The following physical test results were obtained at ACG's Tulsa, OK facility.

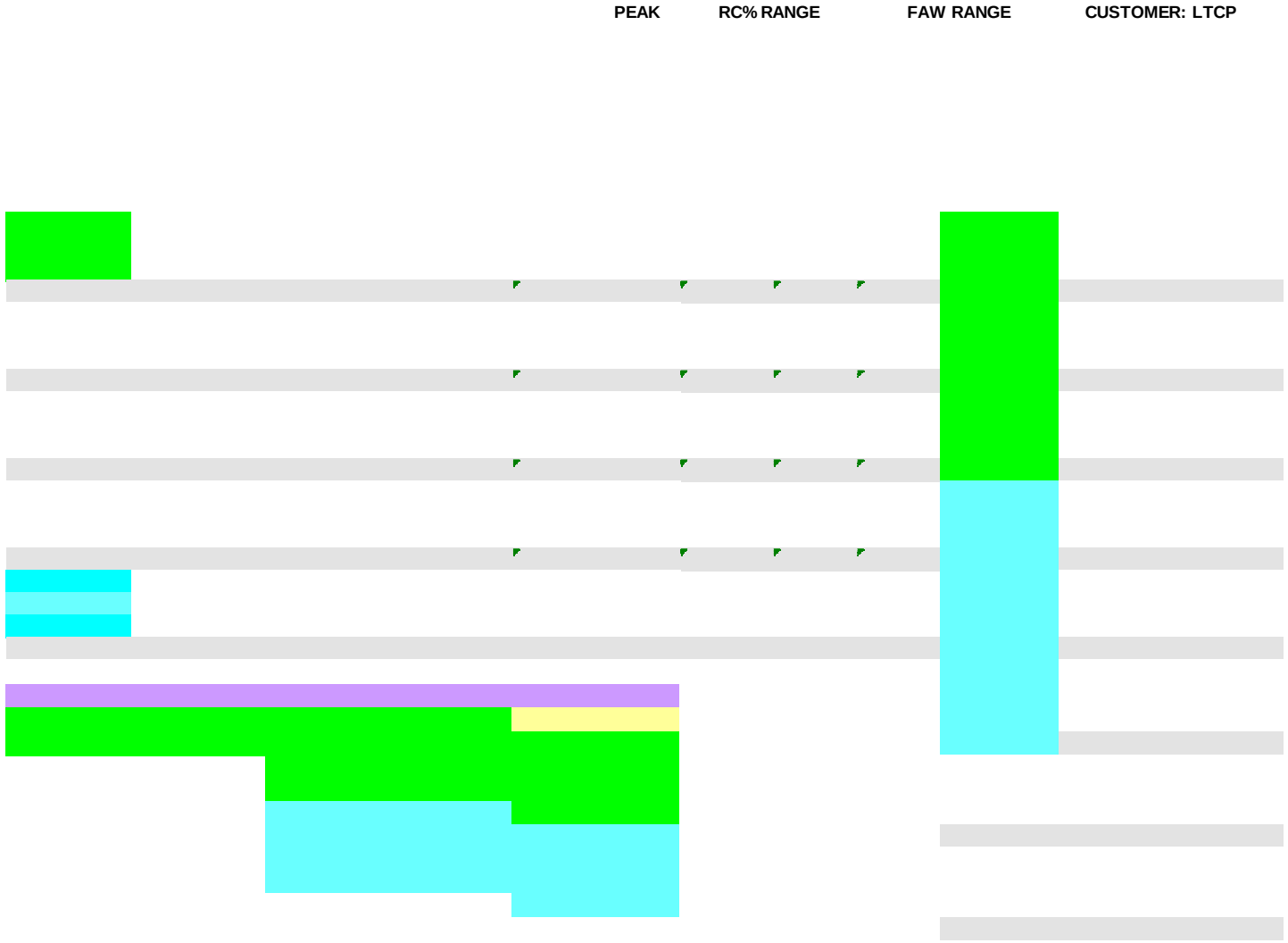


Table 8-1: Physical Test Results Summary

9. Deviations

1. Short beam shear specimen length is 6 times thickness, not 1.5 inches. Justification: Longer specimens may restrict shear failure to the center section only and preclude shear failures that run to one end of the specimens.
2. Use 350 ohm instead of 120 ohm strain gages. Specifically, in page 6,
    a. D3039: CEA-XX-250UW-120 will be replaced by CEA-XX-250UW-350
    b. D6641: CEA-XX-125UT-120 will be replaced by CEA-XX-125UT-350

Justification: 350 ohm gages will produce less heat than 120 ohm gages so we can increase excitation voltage to increase signal to noise ratio.

3. Option to use one 350 ohm biaxial gage instead of using two 120 ohm single axial gage
    a. D3518: two CEA-XX-250UW-120 were replaced by one CEA-XX-125UT-350

Justification: Using one biaxial gage ensured that the two single axial elements are perfectly perpendicular to each