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STACBOND
TEST REPORT

SCOPE OF WORK
AC25 EVALUATION OF ACM PANELS WITH FR, PE, AND A2 CORES ACCORDING TO ASTM D1761 FOR FASTENER PROPERTIES, ASTM D1781 FOR PEEL STRENGTH, AND ASTM C393 FOR FLEXURAL STRENGTH.

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I6239.01-106-31 R0

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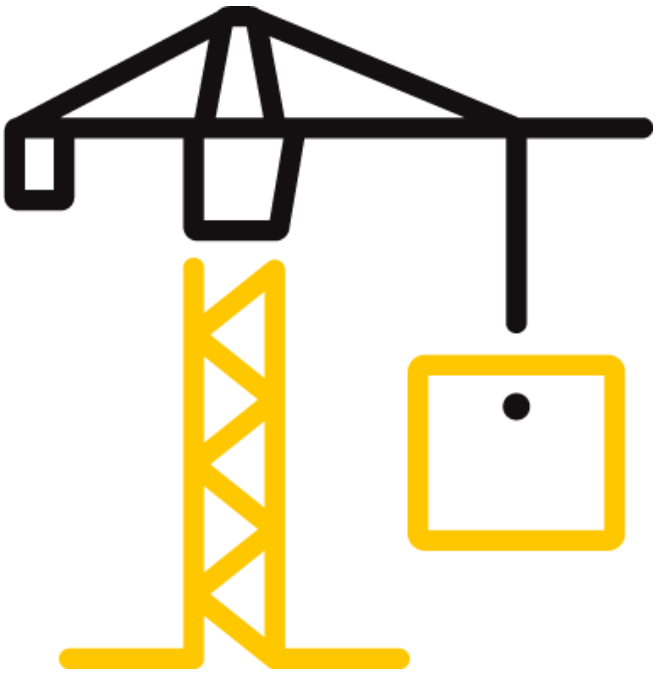

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REPORT ISSUED TO

STACBOND
Polígono Industrial Picusa, La Matanza s/n
15900 Padrón, Spain

SECTION 1

SCOPE

Products: ACM Panels with FR, PE, and A2 Cores

Intertek Building & Construction (B&C) was contracted by STACBOND to evaluate their ACM Panel Products for compliance to AC25 in accordance with ASTM D1761 for Fastener Properties, ASTM D1781 for Peel Strength, and ASTM C393 for Flexural Properties. Results obtained are tested values and were secured by using the designated test methods. Testing was conducted at the Intertek B&C test facility in York, Pennsylvania.

Intertek-ATI in York, PA has demonstrated compliance with ANS/ISO/IEC Standard 17025 and is consequently accredited as a Testing Laboratory (TL-144) by International Accreditation Service, Inc. Intertek-ATI is accredited to perform all testing reported herein.

This report does not constitute certification of this product nor an opinion or endorsement by this laboratory.

For INTERTEK B&C:

COMPLETED BY:	Joshua A Kennedy	**REVIEWED BY:**	Joseph M. Brickner
TITLE:	Technician I Materials Laboratory	**TITLE:**	Laboratory Supervisor Materials Laboratory
SIGNATURE:	Joshua A Kennedy Digitally Signed by: Joshua Kennedy	**SIGNATURE:**	Joseph M. Brickner Digitally Signed by: Joseph M. Brickner
DATE:	05/13/19	**DATE:**	05/13/19

JAK:jmb/als

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SECTION 2
SUMMARY OF TEST RESULTS

PROCEDURE	PROPERTY	CONDITION	AVERAGE RESULT		
			FR CORE	PE CORE	A2 CORE
ASTM D1761	Pull-Through	Standard	504 lb_f	453 lb_f	362 lb_f
	Shear Load	Standard	530 lb_f	486 lb_f	413 lb_f
ASTM D1781 (AC25)	Peel Torque	Group 1	82.8 $in{\cdot}lb_f/in$	92.2$in{\cdot}lb_f/in$	8.30 $in{\cdot}lb_f/in$
		Group 2	38.8 $in{\cdot}lb_f/in$	44.3 $in{\cdot}lb_f/in$	4.50 $in{\cdot}lb_f/in$
		Group 3	70.0 $in{\cdot}lb_f/in$	83.0 $in{\cdot}lb_f/in$	5.35 $in{\cdot}lb_f/in$
		Freeze/Thaw	65.9 $in{\cdot}lb_f/in$	75.0 $in{\cdot}lb_f/in$	6.49 $in{\cdot}lb_f/in$
ASTM C393	Flexural Strength	Standard	206 psi	193 psi	189 psi
IBC 803.14	Detachment	200°F	No detachment	No detachment	Skin detachment

SECTION 3
TEST METHODS

The specimens were evaluated in accordance with the following:

ICC-ES AC25 (2015), *Acceptance Criteria for Metal Composite Material (MCM)*

ASTM D1761-12, *Standard Test Methods for Mechanical Fasteners in Wood*

ASTM D1781-98 (Reapproved 2012), *Standard Test Method for Climbing Drum Peel for Adhesives*

ASTM C393/C393M-16, *Standard Test Method for Core Shear Properties of Sandwich Constructions by Beam Flexure*

ICC-ES IBC 2018, *International Building Code*, Section 803.14

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SECTION 4
MATERIAL SOURCE

The ACM panel materials were provided by STACBOND. The following were received on 2/11/19: Two (2), nominally 15-foot long by 5-foot wide by 0.16-inch thick sheets of ACM. The material was sampled by a QAI Laboratories representative at the Sistemas Tecnicos del Accesorio y Componentes manufacturing facility, located at Poligono Industrial La Rozada, Parcela 2, Calle Isaac Prado Bodelon Parandones – Toral de los Vados – Leon Villadecanes, 24516 Spain. Refer to QAI Laboratories Inspection Report VJ3053, dated 9/13/18. Refer to the product description photos in Section 10. The material was tested as received except for preparing the smaller test specimens from the provided materials. Representative materials/test specimens will be retained by Intertek B&C for a minimum of four years from the test completion date.

SECTION 5
LIST OF OFFICIAL OBSERVERS

NAME	COMPANY
Joshua A Kennedy	Intertek B&C
Joseph M. Brickner	Intertek B&C

SECTION 6
TEST PROCEDURES

All conditioning of test specimens and test conditions were at standard laboratory conditions unless otherwise reported. Refer to the test photos in Section 10 and datasheets in Section 11.

ASTM D1761 - Fastener Pull-Through
The load required to pull a fastener head through the ACM panels was determined utilizing a SATEC UTM Model 50UD (ICN: Y002011) equipped with a 5,000 lb_f load cell (ICN: 516509A) operating at a crosshead speed of 0.1 in/min. Each specimen was comprised of one #8 x 3/4" long self-drilling flat head screw fastened into the middle of a 6-inch square piece of an ACM panel. The assembly was secured to the base of the UTM with the fastener head installed with a two-inch clearance around the fastener. UTM grips applied load to the threaded portion of the fastener until the head pulled through the ACM panel.

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ASTM D1761 - Fastener Shear
The fastener shear load between the ACM panel and aluminum bracket was determined utilizing a SATEC UTM Model 50UD (ICN: Y002011) equipped with a 5,000 lb_f load cell (ICN: 516509A) operating at a crosshead speed of 0.1 in/min. Each specimen was comprised of one #8 x 3/4" long self-drilling flat head screw fastened 0.4125-inches from the edge of the ACM panel through the aluminum bracket. The assembly was held with grips secured to the base of the UTM and the aluminum bracket was pulled with a steel fixture until a failure mode was observed.

ICC-ES AC25 - Conditioning and Freeze-Thaw
Four sets of six specimens underwent different exposure conditions. Group 1 (Room Temperature) was exposed to 70°F and 50% relative humidity for one week. Group 2 (Boiling Water) was submerged in boiling water for eight hours. Group 3 (Water Immersion) was submerged in 70°F water for 21 days. The Freeze-Thaw set was exposed to 10 cycles consisting of: 120°F in an oven (ICN: Y002568) for eight hours, submerged in 75°F water for eight hours, and -20°F in a freezer (ICN: INT00208) for 16 hours. The four sets were utilized for the climbing drum peels in the following section.

ASTM D1781 - Climbing Drum Peel
The peel strength of the ACM panel material was determined utilizing an Instron UTM (ICN: 005740) equipped with a 10 kN load cell (ICN: 005965) operating at a crosshead speed of 1.0 in/min. Prior to testing, the panels were machined to have a 2" overhang of one aluminum face and a 1" tab excluding one aluminum face for clamping. A peeling apparatus consisting of a flanged drum, flexible loading straps, and a steel plate with clamps for holding the specimen was utilized to peel one aluminum face from the panel. Dimensions were measured with a Fowler digital caliper (ICN: INT01066).

The PE core material has an additional result that represents the lowest average peel strength obtained after the initial peak and before the panel stretches and bends. These Adjusted Peel Strength and Adjusted Peel Torque values are conservative results to demonstrate that the lowest peel values exceed the minimum requirement of 22.5 $in{\cdot}lb_f/in$. The shortened area for average peel values was calculated due to the strength of the panel bond and to avoid damage to the test equipment.

ASTM C393 - Flexural Properties
The flexural properties of the ACM panels were determined utilizing an Instron UTM (ICN: 005740) equipped with a 2.0 kN load cell (ICN: 005742) operating at a crosshead speed of 0.25 in/min. A three-point loading configuration was used with a support span of six inches and one-inch diameter support and loading bars. Load was applied to the center of each specimen with six of each face in tension for both the machine and cross directions. A deflectometer (ICN: E95457) was used to measure the center deflection of each specimen. A nominal skin thickness of 0.020 inches was used for calculations. Dimensions were measured with a Fowler digital caliper (ICN: INT01066).

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IBC 803.14 - Stability

The interior temperature stability of the ACM panels was determined utilizing a Fisher Scientific oven (ICN: Y002764) to expose three of each core material to 200°F (93°C) air for 30 minutes. After removal from the oven, specimens were immediately evaluated to determine if the material would readily detach. One corner from each face of the skin underwent an attempt to pull the skin away from the core. Temperatures were confirmed with an Omega thermocouple reader (ICN: INT01294).

SECTION 7

TEST SPECIMEN DESCRIPTIONS

TEST PROCEDURE	NUMBER OF SPECIMENS	NOMINAL SPECIMEN DIMENSIONS	VISUAL CHARACTERISTICS
ASTM D1761	10 each core Pull-Through	6" x 6" x 0.16"	Off-White FR Core
	10 each core Shear	6" x 3" x 0.16"	Black PE Core
ASTM D1781	24 each core	16" x 3" x 0.16"	White A2 Core
ASTM C393	24 each core	8" x 3" x 0.16"	
IBC 803.14	3 each core	4" x 4" x 0.16"	

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SECTION 8
TEST RESULTS

ASTM D1761 - Fastener Pull-Through, FR Core

SPECIMEN	MAXIMUM LOAD (lb_f)	EXTENSION AT MAXIMUM LOAD (in)	FAILURE MODE
1	493	0.2325	Fastener Pulled Through
2	521	0.2428	Fastener Pulled Through
3	511	0.2432	Fastener Pulled Through
4	511	0.2384	Fastener Pulled Through
5	503	0.2343	Fastener Pulled Through
6	489	0.2365	Fastener Pulled Through
7	494	0.2502	Fastener Pulled Through
8	500	0.2425	Fastener Pulled Through
9	512	0.2580	Fastener Pulled Through
10	510	0.3237	Fastener Pulled Through
Average	**504**	**0.2502**	
Std. Dev.	10.37	0.027	

ASTM D1761 - Fastener Pull-Through, PE Core

SPECIMEN	MAXIMUM LOAD (lb_f)	EXTENSION AT MAXIMUM LOAD (in)	FAILURE MODE
1	444	0.2442	Fastener Pulled Through
2	455	0.2617	Fastener Pulled Through
3	463	0.2893	Fastener Pulled Through
4	459	0.2434	Fastener Pulled Through
5	461	0.2618	Fastener Pulled Through
6	447	0.2454	Fastener Pulled Through
7	450	0.2562	Fastener Pulled Through
8	453	0.2467	Fastener Pulled Through
9	437	0.2713	Fastener Pulled Through
10	461	0.2375	Fastener Pulled Through
Average	**453**	**0.2557**	
Std. Dev.	8.41	0.016	

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ASTM D1761 - Fastener Pull-Through, A2 Core

SPECIMEN	MAXIMUM LOAD (lb_f)	EXTENSION AT MAXIMUM LOAD (in)	FAILURE MODE
1	372	0.2254	Fastener Pulled Through
2	334	0.2018	Fastener Pulled Through
3	365	0.1981	Fastener Pulled Through
4	365	0.2213	Fastener Pulled Through
5	382	0.2217	Fastener Pulled Through
6	363	0.2279	Fastener Pulled Through
7	347	0.2230	Fastener Pulled Through
8	360	0.2207	Fastener Pulled Through
9	370	0.2262	Fastener Pulled Through
10	365	0.2083	Fastener Pulled Through
Average	**362**	**0.2174**	
Std. Dev.	13.37	0.011	

ASTM D1761 - Fastener Shear, FR Core

SPECIMEN	MAXIMUM LOAD (lb_f)	EXTENSION AT MAXIMUM LOAD (in)	FAILURE MODE
1	559	0.256	ACP Rupture
2	518	0.253	ACP Rupture
3	524	0.240	ACP Rupture
4	545	0.269	ACP Rupture
5	538	0.254	ACP Rupture
6	510	0.254	ACP Rupture
7	493	0.264	ACP Rupture
8	542	0.267	ACP Rupture
9	536	0.272	ACP Rupture
10	530	0.269	ACP Rupture
Average	**530**	**0.260**	
Std. Dev.	19.0	0.010	

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ASTM D1761 - Fastener Shear, PE Core

SPECIMEN	MAXIMUM LOAD (lb_f)	EXTENSION AT MAXIMUM LOAD (in)	FAILURE MODE
1	490	0.258	ACP Rupture
2	486	0.242	ACP Rupture
3	479	0.227	ACP Rupture
4	497	0.258	ACP Rupture
5	485	0.273	ACP Rupture
6	485	0.252	ACP Rupture
7	495	0.258	ACP Rupture
8	465	0.230	ACP Rupture
9	483	0.268	ACP Rupture
10	494	0.252	ACP Rupture
Average	**486**	**0.252**	
Std. Dev.	9.29	0.015	

ASTM D1761 - Fastener Shear, A2 Core

SPECIMEN	MAXIMUM LOAD (lb_f)	EXTENSION AT MAXIMUM LOAD (in)	FAILURE MODE
1	381	0.138	ACP Rupture
2	429	0.126	ACP Rupture
3	387	0.127	ACP Rupture
4	405	0.176	ACP Rupture
5	405	0.128	ACP Rupture
6	417	0.194	ACP Rupture
7	447	0.130	ACP Rupture
8	423	0.218	ACP Rupture
9	381	0.129	ACP Rupture
10	454	0.204	ACP Rupture
Average	**413**	**0.157**	
Std. Dev.	26	0.037	

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AC25 - Conditioning and Freeze-Thaw

CONDITIONING SET	FR CORE PANEL OBSERVATIONS	PE CORE PANEL OBSERVATIONS	A2 CORE PANEL OBSERVATIONS
Group 1 Room Temperature	No visible deleterious effects	No visible deleterious effects	No visible deleterious effects
Group 2 Boiling Water	No visible deleterious effects	No visible deleterious effects	No visible deleterious effects
Group 3 Water Immersion	No visible deleterious effects	No visible deleterious effects	No visible deleterious effects
Freeze-Thaw	No visible deleterious effects	No visible deleterious effects	No visible deleterious effects

ASTM D1781 - Climbing Drum Peel Strength, Group 1, FR Core

SPECIMEN	PEAK LOAD (lb_f)	AVERAGE LOAD (lb_f)	AVERAGE PEEL TORQUE ($in{\cdot}lb_f/in$)	AVERAGE PEEL TORQUE ($N{\cdot}mm/mm$)	FAILURE MODE
1	580	557.8	91.80	408.37	Cohesive
2	534	426.5	69.25	308.03	Cohesive
3	516	448.2	73.07	325.03	Cohesive
4	560	514.9	84.34	375.15	Cohesive
5	549	507.7	83.22	370.18	Cohesive
6	830	577.7	95.11	423.09	Cohesive
Average	**595**	**505.5**	**82.80**	**368.31**	

AC25 Acceptance Criteria Peel Torque Value: 69.25 $in{\cdot}lb_f/in$

ASTM D1781 - Climbing Drum Peel Strength, Group 2, FR Core

SPECIMEN	PEAK LOAD (lb_f)	AVERAGE LOAD (lb_f)	AVERAGE PEEL TORQUE ($in{\cdot}lb_f/in$)	AVERAGE PEEL TORQUE ($N{\cdot}mm/mm$)	FAILURE MODE
1	260	238.3	36.77	163.58	Adhesion to Skin
2	278	262.7	41.04	182.55	Cohesive
3	252	238.6	36.97	164.47	Adhesion to Skin
4	273	257.9	40.26	179.08	Cohesive
5	255	235.3	36.51	162.40	Adhesion to Skin
6	282	263.1	41.20	183.27	Cohesive
Average	**267**	**249.3**	**38.79**	**172.56**	

AC25 Acceptance Criteria Peel Torque Value: 38.79 $in{\cdot}lb_f/in$

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ASTM D1781 - Climbing Drum Peel Strength, Group 3, FR Core

SPECIMEN	PEAK LOAD (lb_f)	AVERAGE LOAD (lb_f)	AVERAGE PEEL TORQUE ($in \cdot lb_f/in$)	AVERAGE PEEL TORQUE ($N \cdot mm/mm$)	FAILURE MODE
1	497	372.7	60.15	267.58	Adhesion to Skin
2	511	378.8	61.21	272.25	Adhesion to Skin
3	524	450.5	73.42	326.57	Cohesive
4	496	369.9	59.64	265.27	Adhesion to Skin
5	528	504.2	82.40	366.54	Cohesive
6	536	506.9	82.89	368.70	Cohesive
Average	**515**	**430.5**	**69.95**	**311.15**	

AC25 Acceptance Criteria Peel Torque Value: 59.64 $in \cdot lb_f/in$

ASTM D1781 - Climbing Drum Peel Strength, Freeze-Thaw, FR Core

SPECIMEN	PEAK LOAD (lb_f)	AVERAGE LOAD (lb_f)	AVERAGE PEEL TORQUE ($in \cdot lb_f/in$)	AVERAGE PEEL TORQUE ($N \cdot mm/mm$)	FAILURE MODE
1	556	530.0	87.12	387.55	Cohesive
2	535	415.4	67.36	299.62	Cohesive
3	264	247.7	38.49	171.21	Adhesion to Skin
4	272	254.6	39.73	176.73	Adhesion to Skin
5	535	498.2	81.39	362.05	Cohesive
6	530	496.3	81.07	360.61	Cohesive
Average	**449**	**407.0**	**65.86**	**292.96**	

AC25 Acceptance Criteria Peel Torque Value: 38.49 $in \cdot lb_f/in$

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ASTM D178 - Climbing Drum Peel Strength, Group 1, PE Core

SPECIMEN	PEAK LOAD (lb_f)	AVERAGE LOAD (lb_f)	AVERAGE PEEL TORQUE ($in \cdot lb_f/in$)	ADJUSTED AVERAGE LOAD (lb_f)	ADJUSTED AVERAGE PEEL TORQUE ($in \cdot lb_f/in$)	FAILURE MODE
1	812	542.0	88.97	432.6	70.25	Cohesive
2	1,090	607.9	100.09	339.1	54.15	Cohesive
3	762	550.7	90.46	449.1	73.08	Cohesive
4	1,010	574.6	94.47	348.7	55.84	Cohesive
5	650	522.4	85.74	431.7	70.19	Cohesive
6	993	567.4	93.23	349.6	55.99	Cohesive
Average	**886**	**560.8**	**92.16**	**391.8**	**63.25**	

AC25 Acceptance Criteria Peel Torque Value: 54.15 $in \cdot lb_f/in$

ASTM D1781 - Climbing Drum Peel Strength, Group 2, PE Core

SPECIMEN	PEAK LOAD (lb_f)	AVERAGE LOAD (lb_f)	AVERAGE PEEL TORQUE ($in \cdot lb_f/in$)	ADJUSTED AVERAGE LOAD (lb_f)	ADJUSTED AVERAGE PEEL TORQUE ($in \cdot lb_f/in$)	FAILURE MODE
1	330	302.6	47.87	278.2	43.71	Cohesive
2	312	274.5	42.93	246.7	38.20	Cohesive
3	314	289.1	45.41	263.2	41.00	Cohesive
4	308	267.5	41.80	239.5	37.03	Cohesive
5	317	291.5	45.95	262.2	40.96	Cohesive
6	312	270.3	42.39	243.8	37.88	Cohesive
Average	**316**	**282.6**	**44.39**	**255.6**	**39.79**	

AC25 Acceptance Criteria Peel Torque Value: 39.79 $in \cdot lb_f/in$

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ASTM D1781 - Climbing Drum Peel Strength, Group 3, PE Core

SPECIMEN	PEAK LOAD (lb_f)	AVERAGE LOAD (lb_f)	AVERAGE PEEL TORQUE ($in \cdot lb_f/in$)	ADJUSTED AVERAGE LOAD (lb_f)	ADJUSTED AVERAGE PEEL TORQUE ($in \cdot lb_f/in$)	FAILURE MODE
1	537	474.1	77.15	399.8	64.46	Cohesive
2	950	541.4	88.58	337.7	53.82	Cohesive
3	531	477.0	78.53	400.6	65.34	Cohesive
4	1,020	591.3	96.93	341.6	54.39	Cohesive
5	526	466.1	75.63	396.9	63.84	Cohesive
6	908	498.5	81.16	327.5	52.01	Cohesive
Average	**746**	**508.1**	**83.00**	**367.3**	**58.98**	

AC25 Acceptance Criteria Peel Torque Value: 52.01 $in \cdot lb_f/in$

ASTM D1781 - Climbing Drum Peel Strength, Freeze-Thaw, PE Core

SPECIMEN	PEAK LOAD (lb_f)	AVERAGE LOAD (lb_f)	AVERAGE PEEL TORQUE ($in \cdot lb_f/in$)	ADJUSTED AVERAGE LOAD (lb_f)	ADJUSTED AVERAGE PEEL TORQUE ($in \cdot lb_f/in$)	FAILURE MODE
1	980	514.0	83.71	338.8	53.88	Cohesive
2	527	476.9	77.42	405.8	65.32	Cohesive
3	382	334.3	53.08	300.5	47.34	Cohesive
4	396	372.9	59.75	348.7	55.63	Cohesive
5	872	572.7	94.20	341.9	54.70	Cohesive
6	534	490.9	81.53	425.1	70.09	Cohesive
Average	**615**	**460.3**	**74.95**	**360.1**	**57.83**	

AC25 Acceptance Criteria Peel Torque Value: 47.34 $in \cdot lb_f/in$

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ASTM D178 - Climbing Drum Peel Strength, Group 1, A2 Core

SPECIMEN	PEAK LOAD (lb_f)	AVERAGE LOAD (lb_f)	AVERAGE PEEL TORQUE ($in \cdot lb_f/in$)	AVERAGE PEEL TORQUE ($N \cdot mm/mm$)	FAILURE MODE
1	87.9	68.7	7.94	35.31	Core Surface
2	77.9	67.4	7.72	34.34	Core Surface
3	85.5	67.0	7.66	34.07	Core Surface
4	76.1	64.8	7.27	32.32	Core Surface
5	94.0	82.6	10.30	45.80	Core Surface
6	82.5	74.5	8.90	39.61	Core Surface
Average	**84.0**	**70.8**	**8.30**	**36.91**	

AC25 Acceptance Criteria Peel Torque Value: 7.27 $in \cdot lb_f/in$

ASTM D1781 - Climbing Drum Peel Strength, Group 2, A2 Core

SPECIMEN	PEAK LOAD (lb_f)	AVERAGE LOAD (lb_f)	AVERAGE PEEL TORQUE ($in \cdot lb_f/in$)	AVERAGE PEEL TORQUE ($N \cdot mm/mm$)	FAILURE MODE
1	63.0	57.9	6.09	27.11	Core Surface
2	51.4	46.6	4.17	18.55	Core Surface
3	55.9	50.4	4.80	21.35	Core Surface
4	56.7	50.4	4.81	21.38	Core Surface
5	48.1	41.1	3.22	14.31	Core Surface
6	50.1	45.1	3.90	17.34	Core Surface
Average	**54.2**	**48.6**	**4.50**	**20.01**	

AC25 Acceptance Criteria Peel Torque Value: 3.22 $in \cdot lb_f/in$

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ASTM D1781 - Climbing Drum Peel Strength, Group 3, A2 Core

SPECIMEN	PEAK LOAD (lb_f)	AVERAGE LOAD (lb_f)	AVERAGE PEEL TORQUE ($in \cdot lb_f/in$)	AVERAGE PEEL TORQUE ($N \cdot mm/mm$)	FAILURE MODE
1	60.7	52.3	5.11	22.71	Core Surface
2	57.8	54.6	5.49	24.42	Core Surface
3	57.9	52.6	5.21	23.16	Core Surface
4	62.1	55.9	5.74	25.54	Core Surface
5	65.1	56.6	5.85	26.03	Core Surface
6	54.7	49.9	4.71	20.97	Core Surface
Average	**59.7**	**53.7**	**5.35**	**23.81**	

AC25 Acceptance Criteria Peel Torque Value: 5.35 $in \cdot lb_f/in$

ASTM D1781 - Climbing Drum Peel Strength, Freeze-Thaw, A2 Core

SPECIMEN	PEAK LOAD (lb_f)	AVERAGE LOAD (lb_f)	AVERAGE PEEL TORQUE ($in \cdot lb_f/in$)	AVERAGE PEEL TORQUE ($N \cdot mm/mm$)	FAILURE MODE
1	52.4	45.6	4.00	17.78	Core Surface
2	57.7	54.0	5.42	24.11	Core Surface
3	78.7	70.2	8.19	36.43	Core Surface
4	66.3	59.3	6.34	28.21	Core Surface
5	78.5	71.4	8.36	37.21	Core Surface
6	71.9	61.0	6.61	29.40	Core Surface
Average	**67.6**	**60.3**	**6.49**	**28.86**	

AC25 Acceptance Criteria Peel Torque Value: 4.00 $in \cdot lb_f/in$

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ASTM C393 - Flexural Properties, FR Core

SPECIMEN	WIDTH (in)	THICKNESS (in)	MAXIMUM LOAD (lb_f)	ULTIMATE SHEAR STRENGTH (psi)	CORE YIELD SHEAR STRESS (psi)	FACING STRESS (psi)
FR-ME-1	3.009	0.157	160.560	195	153	29,212
FR-ME-2	3.014	0.158	161.440	194	152	29,111
FR-ME-3	2.994	0.160	165.508	197	155	29,614
FR-ME-4	3.007	0.159	165.190	198	154	29,641
FR-ME-5	2.992	0.157	158.777	194	151	29,051
FR-ME-6	3.009	0.156	160.265	196	152	29,372
FR-MI-1	3.012	0.158	167.198	201	146	30,169
FR-MI-2	2.998	0.158	165.207	200	145	29,949
FR-MI-3	2.999	0.160	170.648	203	142	30,483
FR-MI-4	2.991	0.161	171.979	204	144	30,584
FR-MI-5	3.002	0.157	165.765	202	143	30,229
FR-MI-6	2.994	0.158	165.520	200	142	30,046
FR-CE-1	2.996	0.158	172.668	209	176	31,322
FR-CE-2	2.991	0.160	172.612	206	174	30,916
FR-CE-3	2.977	0.162	177.077	209	177	31,416
FR-CE-4	2.989	0.163	179.661	210	177	31,525
FR-CE-5	2.999	0.158	170.038	205	174	30,814
FR-CE-6	2.986	0.158	170.180	206	174	30,974
FR-CI-1	3.003	0.157	180.295	219	170	32,868
FR-CI-2	3.006	0.157	180.332	219	169	32,842
FR-CI-3	2.982	0.163	188.178	221	172	33,097
FR-CI-4	2.987	0.162	186.300	220	170	32,942
FR-CI-5	2.997	0.157	178.446	217	167	32,596
FR-CI-6	2.997	0.157	178.689	218	167	32,640
Average			**171.356**	**206**	**160**	**30,892**
Standard Deviation			8.26	8.94	12.99	1,340.38
Coefficient of Variation (%)			4.82	4.34	8.10	4.34

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ASTM C393 - Flexural Properties, PE Core

SPECIMEN	WIDTH (in)	THICKNESS (in)	MAXIMUM LOAD (lb_f)	ULTIMATE SHEAR STRENGTH (psi)	CORE YIELD SHEAR STRESS (psi)	FACING STRESS (psi)
PE-ME-1	3.018	0.157	154.486	187	143	28,023
PE-ME-2	3.019	0.157	154.301	187	142	27,980
PE-ME-3	2.994	0.155	150.297	186	145	27,889
PE-ME-4	2.995	0.156	150.618	185	142	27,733
PE-ME-5	3.008	0.157	154.469	187	143	28,113
PE-ME-6	2.995	0.157	153.626	187	143	28,081
PE-MI-1	3.014	0.157	155.582	188	149	28,259
PE-MI-2	3.007	0.158	156.216	188	148	28,234
PE-MI-3	3.001	0.155	150.479	186	145	27,857
PE-MI-4	3.016	0.155	152.017	187	146	28,002
PE-MI-5	2.985	0.157	153.263	187	148	28,108
PE-MI-6	3.017	0.158	157.136	189	148	28,306
PE-CE-1	2.995	0.156	161.490	198	165	29,735
PE-CE-2	2.997	0.155	161.359	199	167	29,911
PE-CE-3	2.985	0.156	161.359	199	165	29,811
PE-CE-4	2.999	0.156	162.190	199	165	29,824
PE-CE-5	2.968	0.156	160.020	198	165	29,733
PE-CE-6	2.933	0.157	160.280	199	166	29,916
PE-CI-1	3.003	0.157	164.433	200	167	29,976
PE-CI-2	3.006	0.157	164.929	200	167	30,036
PE-CI-3	3.007	0.157	164.025	199	166	29,862
PE-CI-4	2.993	0.157	162.577	198	165	29,737
PE-CI-5	2.988	0.156	160.864	198	165	29,689
PE-CI-6	2.984	0.157	162.077	198	166	29,735
Average			**157.837**	**193**	**156**	**28,940**
Standard Deviation			4.79	6.14	10.77	920.91
Coefficient of Variation (%)			3.04	3.18	6.93	3.18

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ASTM C393 - Flexural Properties, A2 Core

SPECIMEN	WIDTH (in)	THICKNESS (in)	MAXIMUM LOAD (lb_f)	ULTIMATE SHEAR STRENGTH (psi)	CORE YIELD SHEAR STRESS (psi)	FACING STRESS (psi)
A2-ME-1	3.016	0.157	142.275	172	144	25,825
A2-ME-2	3.004	0.159	142.877	171	144	25,663
A2-ME-3	3.024	0.159	143.630	171	145	25,628
A2-ME-4	3.009	0.160	144.378	171	145	25,705
A2-ME-5	2.996	0.161	144.541	171	145	25,662
A2-ME-6	3.017	0.160	146.035	173	146	25,931
A2-MI-1	3.032	0.158	159.568	191	145	28,602
A2-MI-2	3.026	0.157	158.229	191	143	28,626
A2-MI-3	3.001	0.160	159.501	190	142	28,473
A2-MI-4	3.002	0.160	158.893	189	144	28,355
A2-MI-5	2.989	0.161	160.584	191	145	28,577
A2-MI-6	3.007	0.160	161.326	192	145	28,741
A2-CE-1	3.013	0.158	154.303	186	163	27,833
A2-CE-2	3.000	0.160	155.403	185	162	27,750
A2-CE-3	2.989	0.159	153.057	184	161	27,630
A2-CE-4	2.960	0.159	152.022	185	162	27,712
A2-CE-5	3.009	0.160	155.665	185	162	27,714
A2-CE-6	3.018	0.157	155.040	187	164	28,123
A2-CI-1	3.016	0.159	172.369	206	166	30,837
A2-CI-2	3.002	0.160	175.262	209	170	31,276
Average			**157.970**	**189**	**155**	**28,310**
Standard Deviation			11.14	13.24	11.05	1,985.45
Coefficient of Variation (%)			7.05	7.013	7.13	7.01

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IBC 803.14 - Stability

SPECIMEN	DETACHED	OBSERVATIONS
FR-1	No	No visible deleterious effects
FR-2	No	No visible deleterious effects
FR-3	No	No visible deleterious effects
PE-1	No	No visible deleterious effects
PE-2	No	No visible deleterious effects
PE-3	No	No visible deleterious effects
A2-1	Yes	Both skins easily detached due to core softening
A2-2	Yes	Both skins easily detached due to core softening
A2-3	Yes	Both skins easily detached due to core softening

SECTION 9
CONCLUSION

The ACM panels with the FR core met the specified performance requirements of AC25 for climbing drum peel strength with all peel torque results for each conditioned group greater than 22.5 in·lb_f/in**.** and IBC 803.14 Stability testing displaying no detachment. The ASTM D1761 fastener testing and ASTM C393 do not contain specific performance criteria.

The ACM panels with the PE core met the specified performance requirements of AC25 for climbing drum peel strength with all peel torque results for each conditioned group greater than 22.5 in·lb_f/in**.** and IBC 803.14 Stability testing displaying no detachment. The ASTM D1761 fastener testing and ASTM C393 do not contain specific performance criteria.

The ACM panels with the A2 core did not met the specified performance requirements of AC25 for the climbing drum peel strength with all peel torque results for each conditioned group less than 22.5 in·lb_f/in**.** and IBC 803.14 Stability testing displaying detachment. The ASTM D1761 fastener testing and ASTM C393 do not contain specific performance criteria.

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SECTION 10
PHOTOGRAPHS

Photo No. 1
ACM Panels As-Received

Photo No. 2
Sampling Detail

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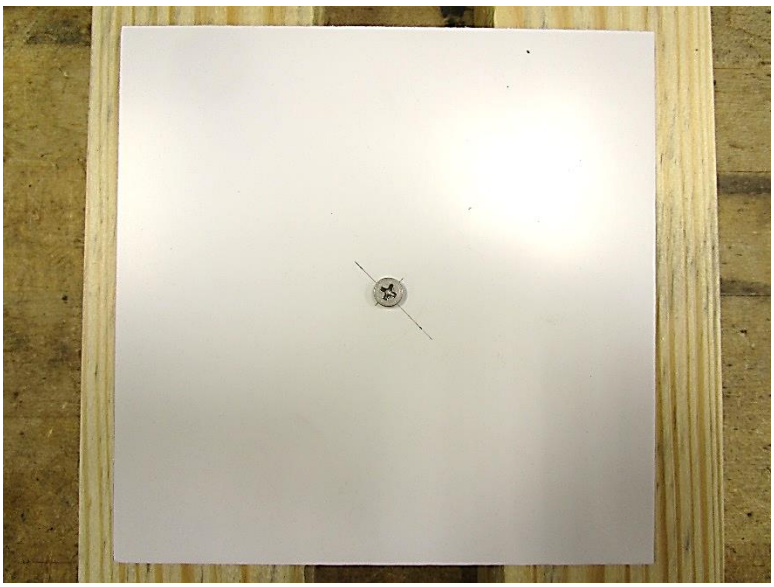

Photo No. 3
Typical Fastener Pull-Through Specimen Detail

Photo No. 4
Typical Fastener Pull-Through Test Setup Detail

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Photo No. 5
Typical Fastener Pull-Through Failure Mode Detail

Photo No. 6
Typical Post-Test Fastener Pull-Through Specimen Detail

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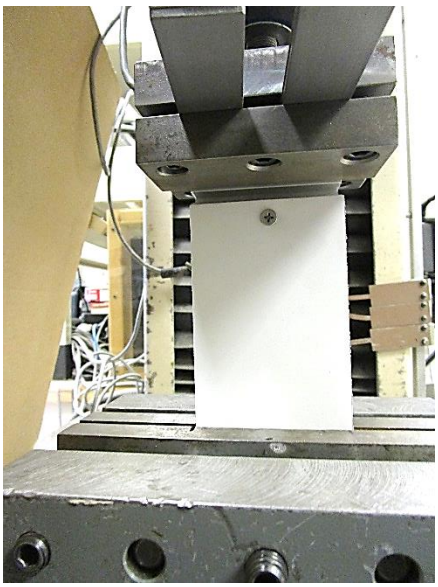

Photo No. 7
Typical Fastener Shear Test Setup Detail

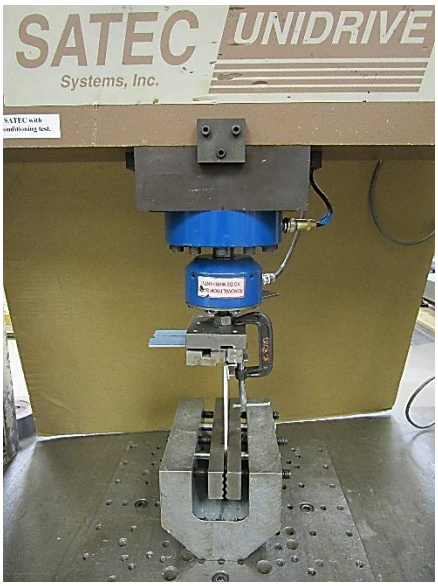

Photo No. 8
Typical Fastener Shear Test In-Progress Detail

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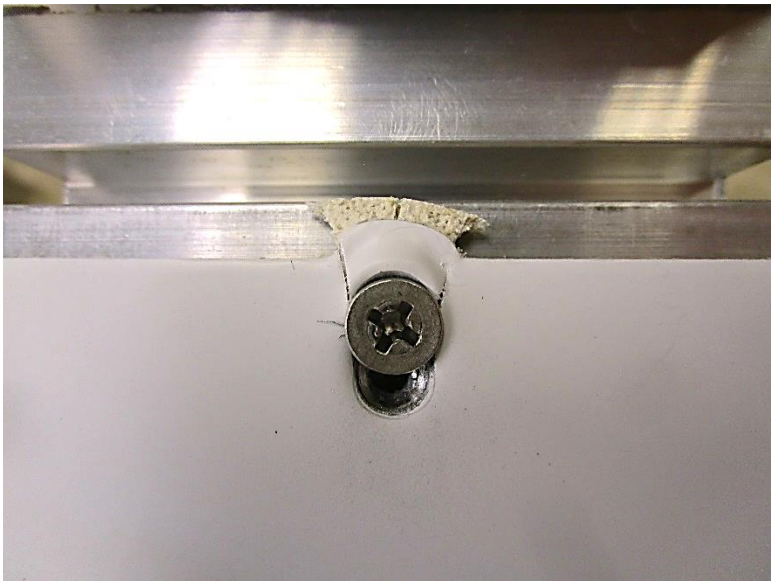

Photo No. 9
Typical Fastener Shear Failure Mode Detail

Photo No. 10
Typical Climbing Drum Peel Specimen Detail

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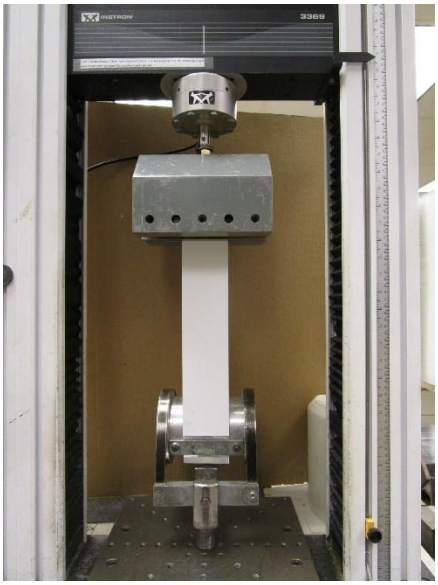

Photo No. 11
Typical Climbing Drum Peel Test Setup Detail

Photo No. 12
Typical Climbing Drum Peel Test In-Progress Detail

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Photo No. 13
Typical Climbing Drum Peel Post-Test Specimen Detail

Photo No. 14
Typical FR Core Peel Failure Mode Detail

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Photo No. 15
Typical PE Core Peel Failure Mode Detail

Photo No. 16
Typical A2 Core Peel Failure Mode Detail

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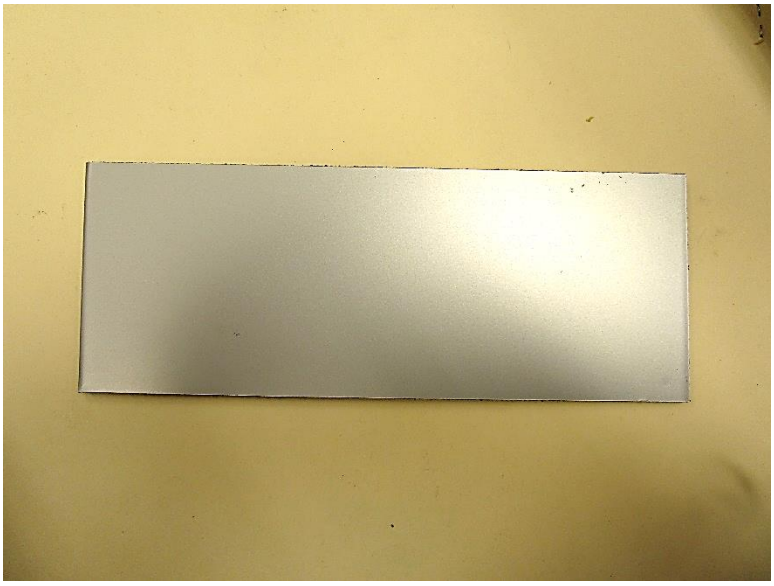

Photo No. 17
Typical Flexural Specimen Detail

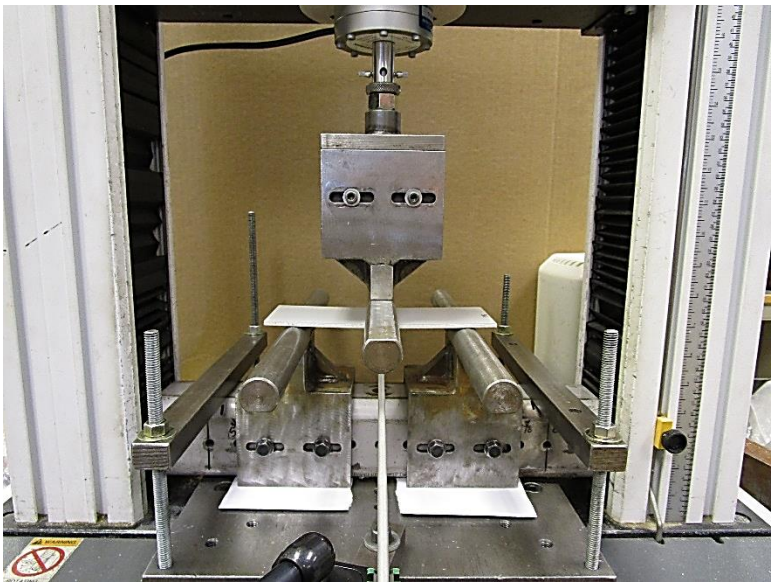

Photo No. 18
Typical Flexural Test Setup Detail

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Photo No. 19
Typical Flexure Test In-Progress Detail

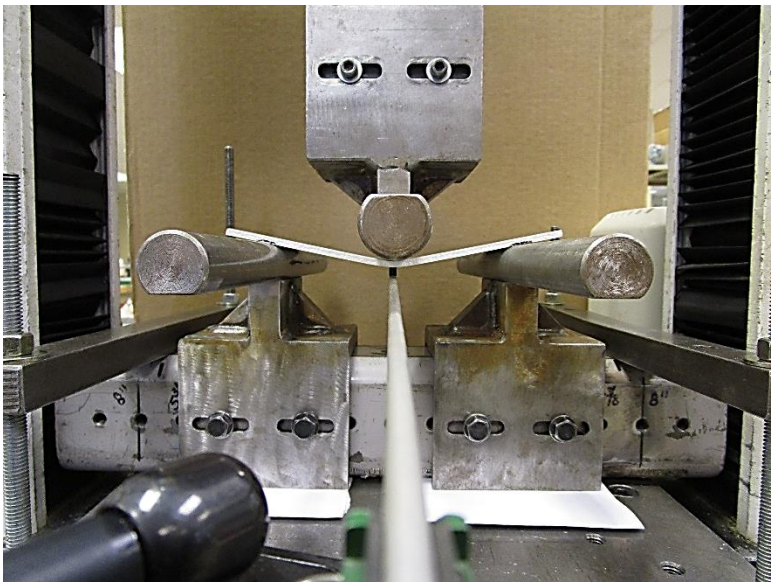

Photo No. 20
Typical Post-Flexural Test Detail

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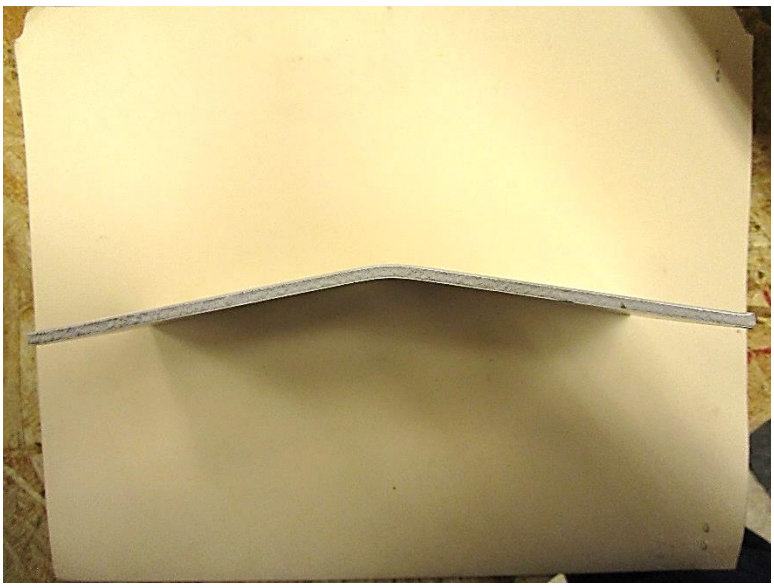

Photo No. 21
Typical Post-Flexure FR Specimen Detail

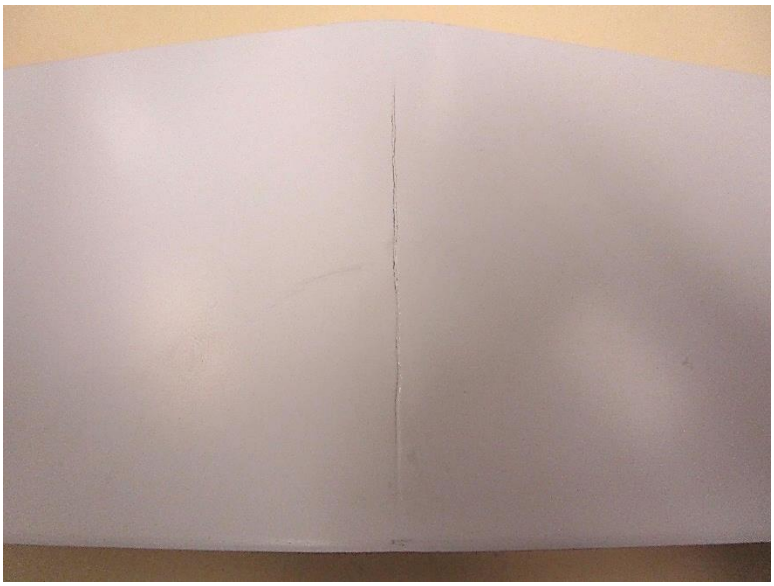

Photo No. 22
Typical Post-Flexure FR Specimen Failure Detail

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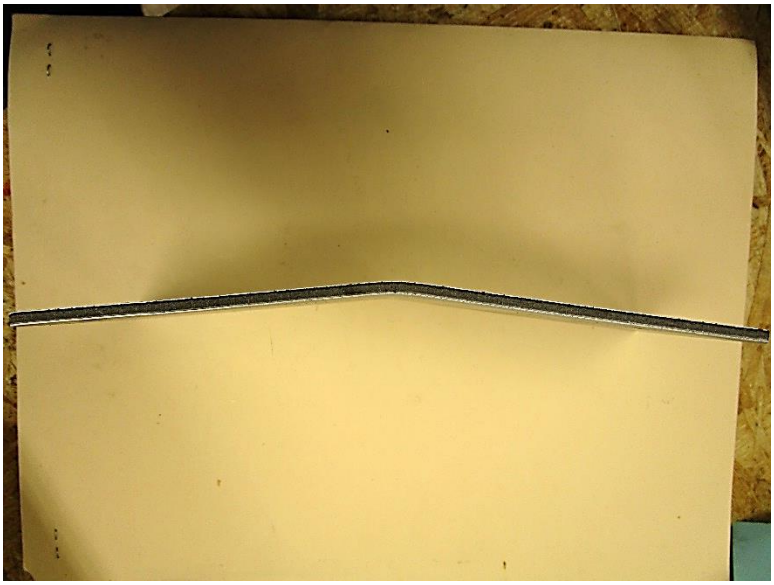

Photo No. 23
Typical Post-Flexure PE Specimen Detail

Photo No. 24
Typical Post-Flexure PE Specimen Failure Detail

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Photo No. 25
Typical Post-Flexure A2 Specimen Detail

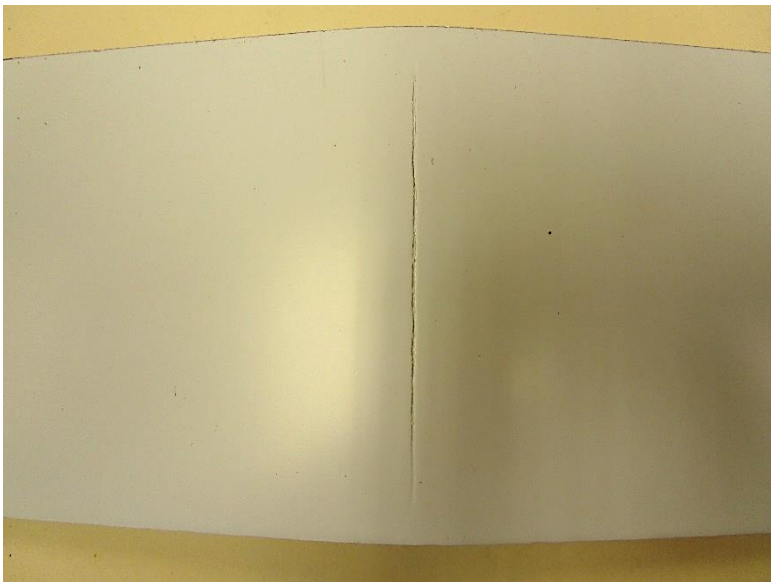

Photo No. 26
Typical Post-Flexure A2 Specimen Failure Detail

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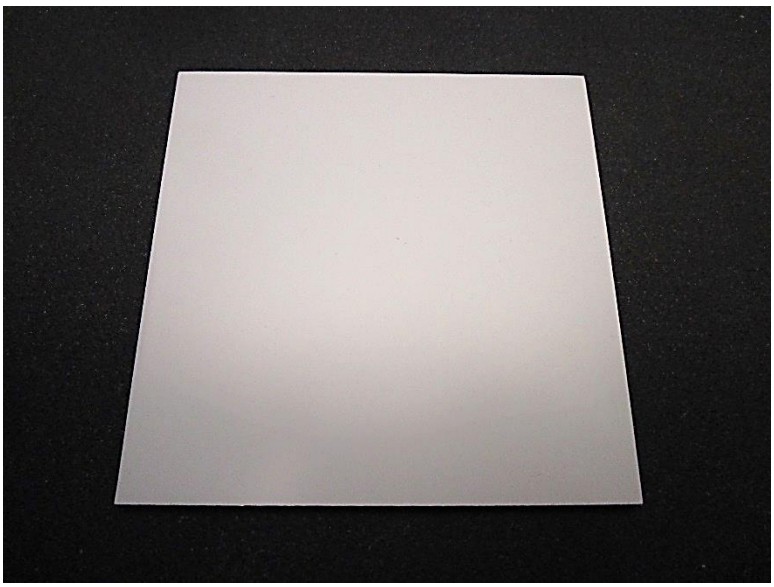

Photo No. 27
Typical Stability FR Specimen Detail

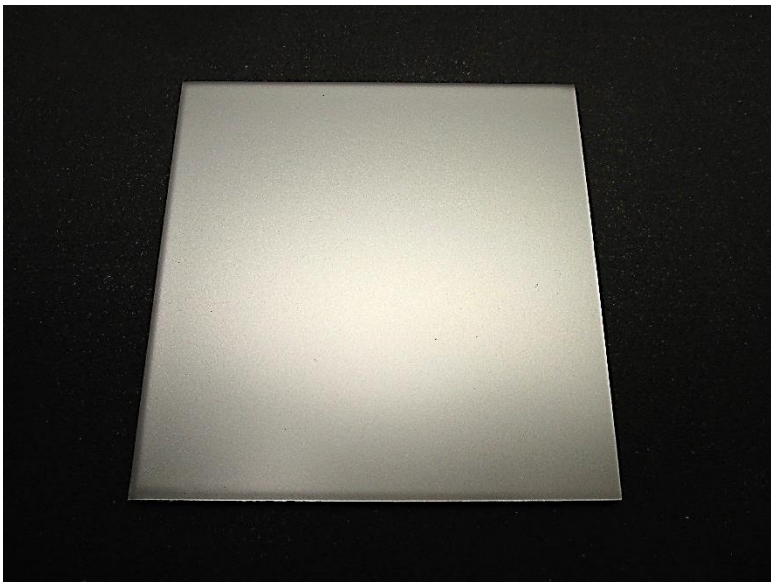

Photo No. 28
Typical Stability PE Specimen Detail

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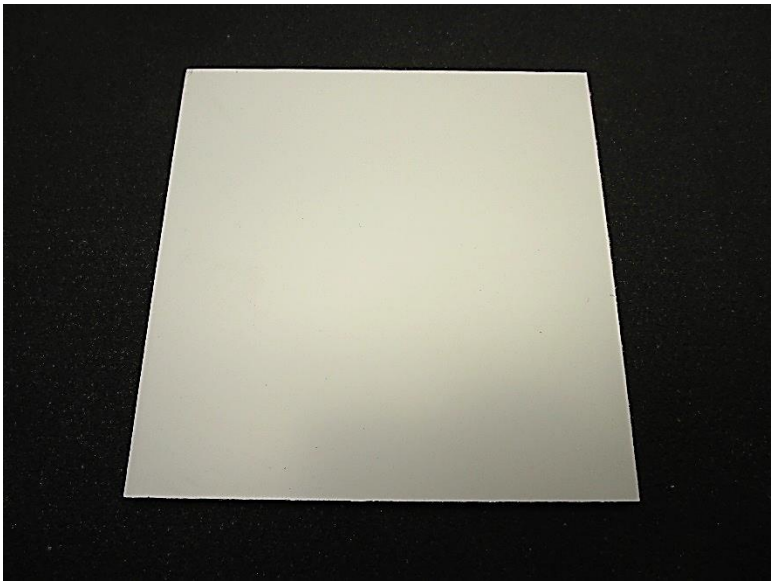

Photo No. 29
Typical Stability A2 Specimen Detail

Photo No. 30
Stability A2 Specimen Failure Detail

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SECTION 11
DATA SHEETS

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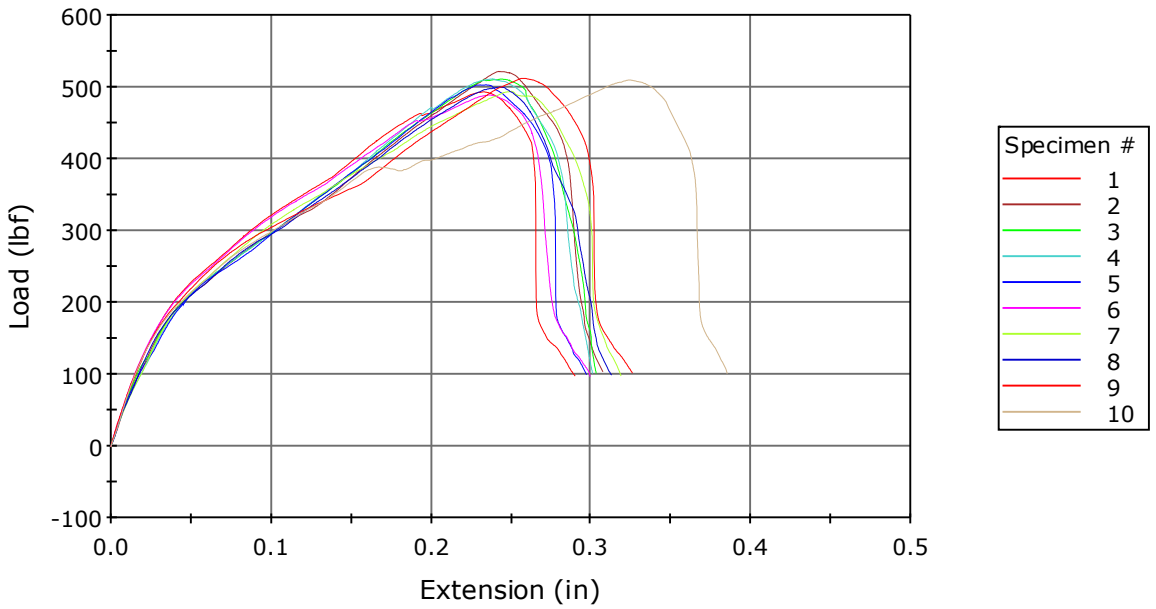
ASTM D1761, Fastener Pull-Through

Intertek-ATI Job #	I6239.01-106-31
Client Name	STACBOND
Sample Description	ACP FR
Test Speed	0.10000 in/min
Test Frame / ICN	Satec 50UD / Y002011
Load Cell Capacity / ICN	5,000 lbs / 2314575a
Lab Conditions	70.0°F / 43.1% R.H.
User	Josh K.

Specimen 1 to 10



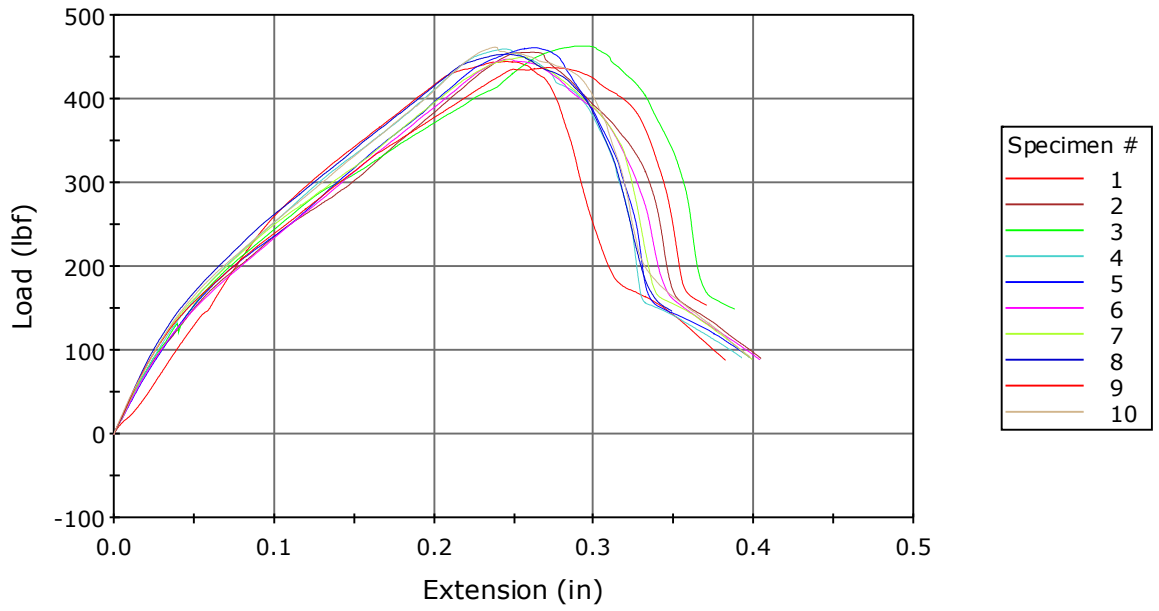
	Specimen ID	Maximum Load (lbf)	Tensile Extension at Maximum Load (in)	Mode of Failure
1	P-FR-1	493	0.2325	Fastener Pulled Through
2	P-FR-2	521	0.2428	Fastener Pulled Through
3	P-FR-3	511	0.2432	Fastener Pulled Through
4	P-FR-4	511	0.2384	Fastener Pulled Through
5	P-FR-5	503	0.2343	Fastener Pulled Through
6	P-FR-6	489	0.2365	Fastener Pulled Through
7	P-FR-7	494	0.2502	Fastener Pulled Through
8	P-FR-8	500	0.2425	Fastener Pulled Through
9	P-FR-9	512	0.2580	Fastener Pulled Through
10	P-FR-10	510	0.3237	Fastener Pulled Through
Mean		504	0.2502	
Standard Deviation		10.370	0.027	
Coefficient of Variation		2.05620	10.75119	

intertek
Total Quality. Assured.

ASTM D1761, Fastener Pull-Through

Intertek-ATI Job #	I6239.01-106-31
Client Name	STACBOND
Sample Description	ACP PE
Test Speed	0.10000 in/min
Test Frame / ICN	Satec 50UD / Y002011
Load Cell Capacity / ICN	5,000 lbs / 2314575a
Lab Conditions	70.2°F / 43.5% R.H.
User	Josh K.

Specimen 1 to 10



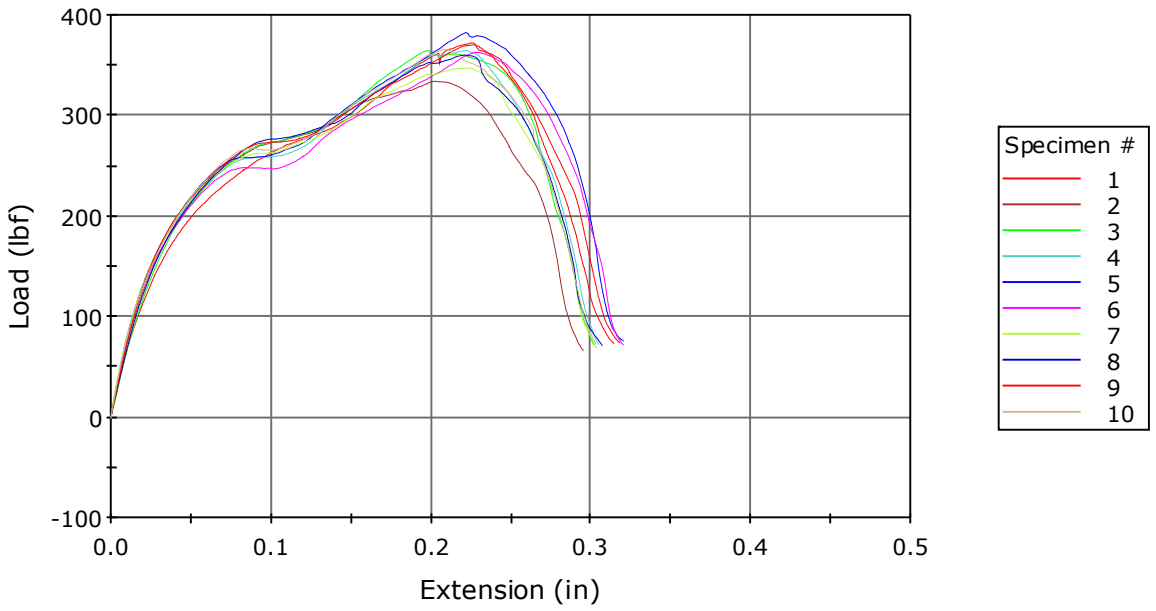
	Specimen ID	Maximum Load (lbf)	Tensile Extension at Maximum Load (in)	Mode of Failure
1	P-PE-1	444	0.2442	Fastener Pulled Through
2	P-PE-2	455	0.2617	Fastener Pulled Through
3	P-PE-3	463	0.2893	Fastener Pulled Through
4	P-PE-4	459	0.2434	Fastener Pulled Through
5	P-PE-5	461	0.2618	Fastener Pulled Through
6	P-PE-6	447	0.2454	Fastener Pulled Through
7	P-PE-7	450	0.2562	Fastener Pulled Through
8	P-PE-8	453	0.2467	Fastener Pulled Through
9	P-PE-9	437	0.2713	Fastener Pulled Through
10	P-PE-10	461	0.2375	Fastener Pulled Through
Mean		453	0.2557	
Standard Deviation		8.414	0.016	
Coefficient of Variation		1.85652	6.18304	

intertek
Total Quality. Assured.

ASTM D1761, Fastener Pull-Through

Intertek-ATI Job #	I6239.01-106-31
Client Name	STACBOND
Sample Description	ACP A2
Test Speed	0.10000 in/min
Test Frame / ICN	Satec 50UD / Y002011
Load Cell Capacity / ICN	5,000 lbs / 2314575a
Lab Conditions	70.8°F / 44.1% R.H.
User	Josh K.

Specimen 1 to 10



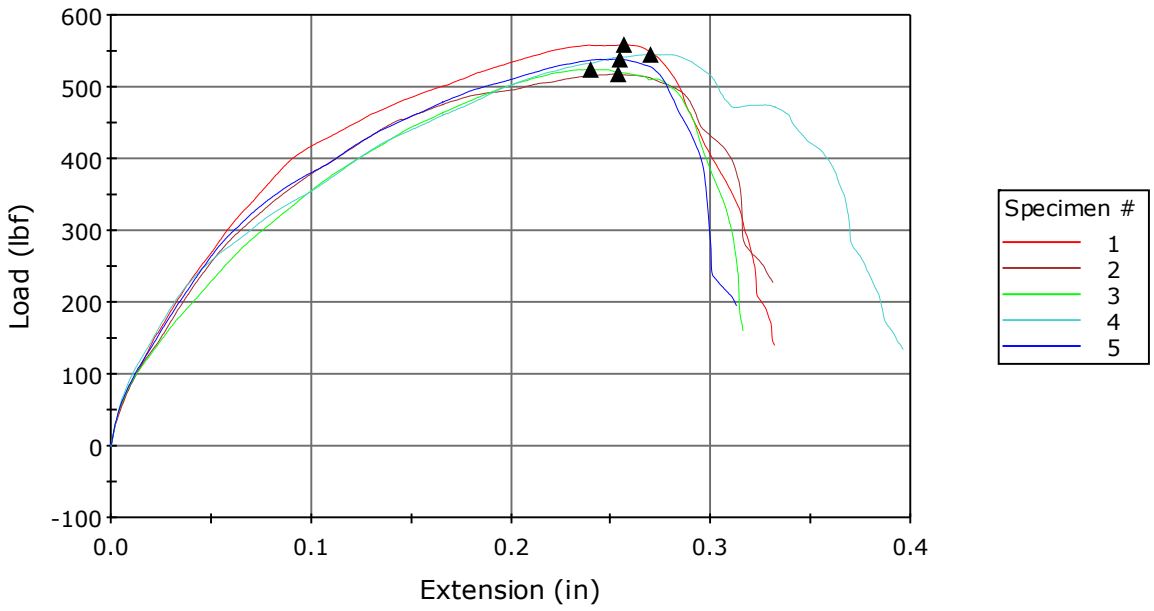
	Specimen ID	Maximum Load (lbf)	Tensile Extension at Maximum Load (in)	Mode of Failure
1	P-A2-1	372	0.2254	Fastener Pulled Through
2	P-A2-2	334	0.2018	Fastener Pulled Through
3	P-A2-3	365	0.1981	Fastener Pulled Through
4	P-A2-4	365	0.2213	Fastener Pulled Through
5	P-A2-5	382	0.2217	Fastener Pulled Through
6	P-A2-6	363	0.2279	Fastener Pulled Through
7	P-A2-7	347	0.2230	Fastener Pulled Through
8	P-A2-8	360	0.2207	Fastener Pulled Through
9	P-A2-9	370	0.2262	Fastener Pulled Through
10	P-A2-10	365	0.2083	Fastener Pulled Through
Mean		362	0.2174	
Standard Deviation		13.367	0.011	
Coefficient of Variation		3.68889	4.90930	

Total Quality. Assured.

ASTM D1761-12, Fasteners Shear Evaluation

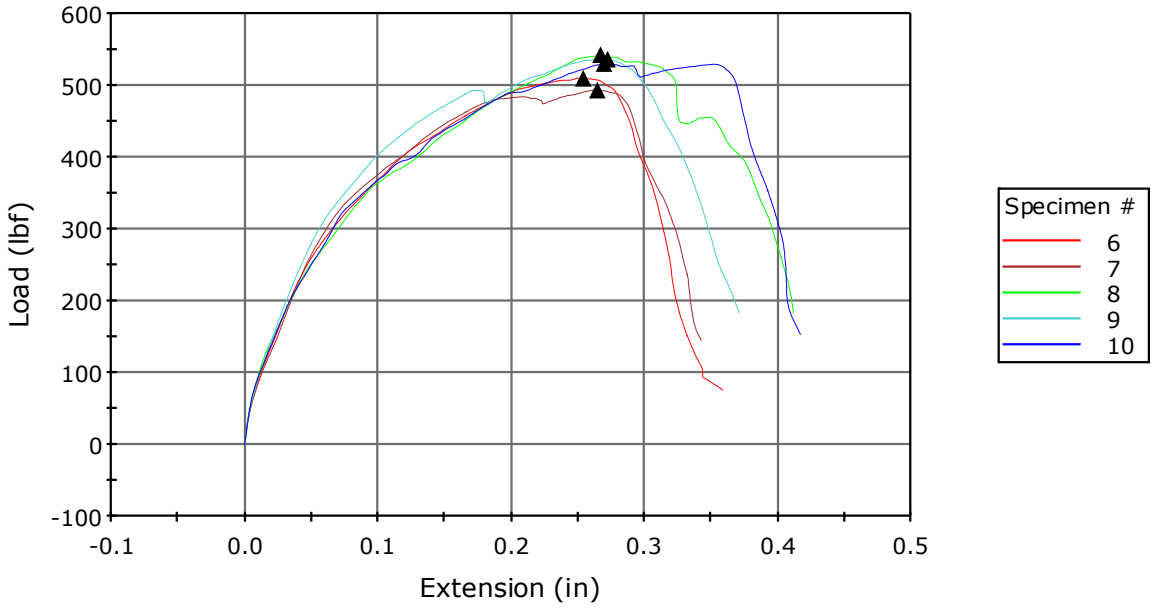
Intertek-ATI Project #	I6239.01-106-31
Client Name	STACBOND
Sample Description	ACP A2
Crosshead Speed	0.100 in/min
Test Frame / ICN	SATEC Model 50 UD / Y002011
Load Cell Capacity / ICN	22.2 kN (5,000 lbf) / 516509A
Laboratory Conditions	70.7°F / 45.1% RH
User	Josh K.

Specimen 1 to 5



Total Quality. Assured.

Specimen 6 to 10



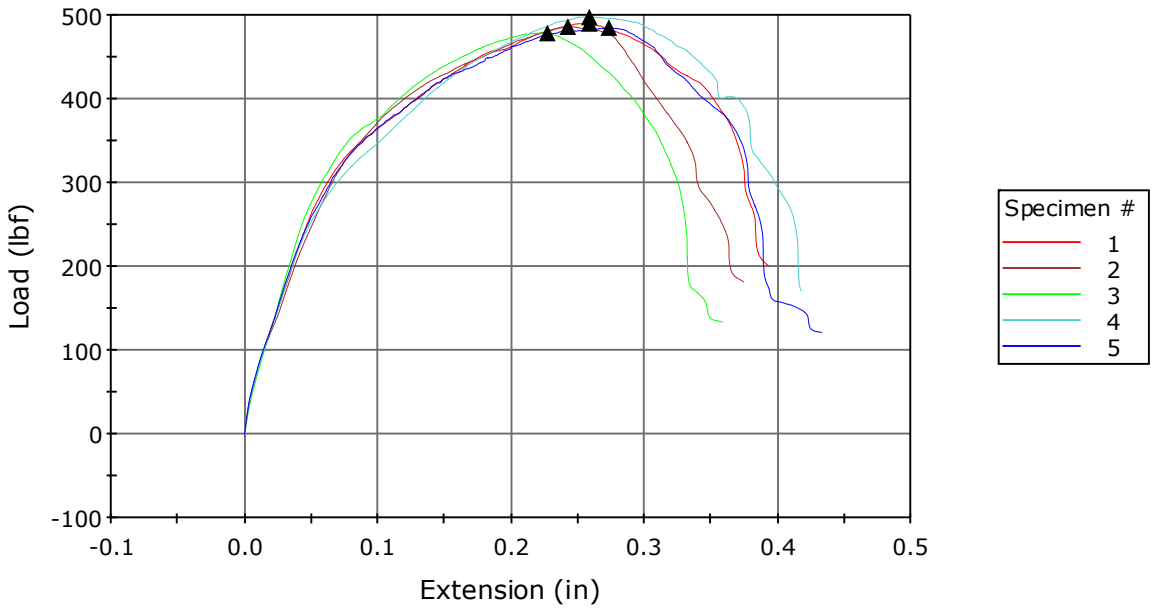
	Specimen ID	Maximum Load (lbf)	Extension at Maximum Load (in)	Failure Mode
1	S-FR-M-1	559	0.256	ACP Rupture
2	S-FR-M-2	518	0.253	ACP Rupture
3	S-FR-M-3	524	0.240	ACP Rupture
4	S-FR-M-4	545	0.269	ACP Rupture
5	S-FR-M-5	538	0.254	ACP Rupture
6	S-FR-C-1	510	0.254	ACP Rupture
7	S-FR-C-2	493	0.264	ACP Rupture
8	S-FR-C-3	542	0.267	ACP Rupture
9	S-FR-C-4	536	0.272	ACP Rupture
10	S-FR-C-5	530	0.269	ACP Rupture
Mean		530	0.260	
Standard Deviation		19.0	0.0	

Total Quality. Assured.

ASTM D1761-12, Fasteners Shear Evaluation

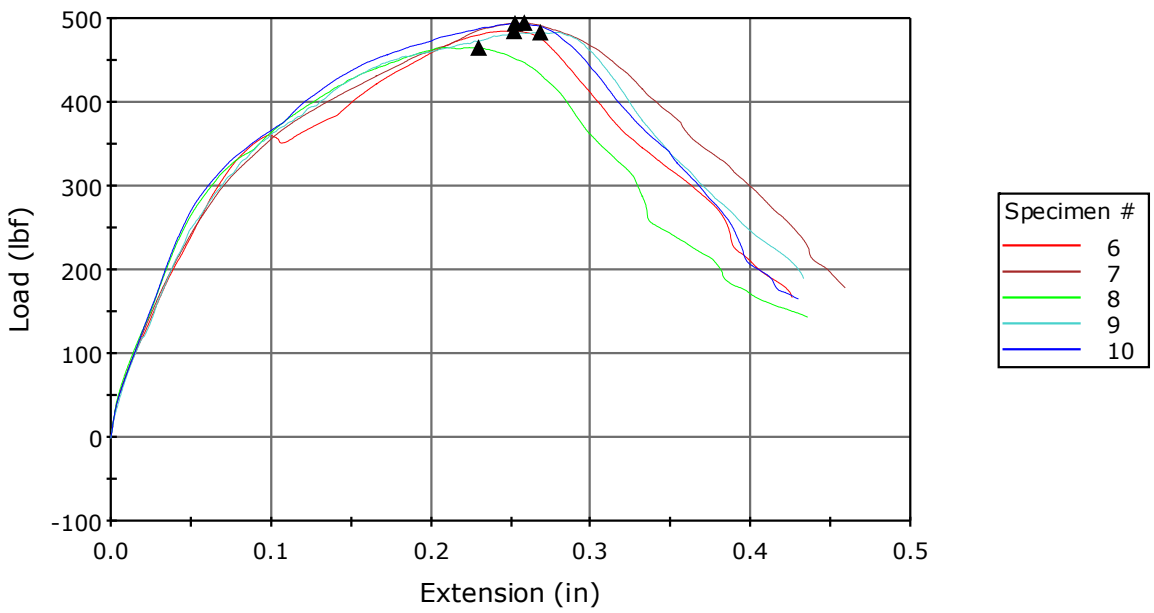
Intertek-ATI Project #	I6239.01-106-31
Client Name	STACBOND
Sample Description	ACP A2
Crosshead Speed	0.100 in/min
Test Frame / ICN	SATEC Model 50 UD / Y002011
Load Cell Capacity / ICN	22.2 kN (5,000 lbf) / 516509A
Laboratory Conditions	70.9°F / 45.2% RH
User	Josh K.

Specimen 1 to 5



Total Quality. Assured.

Specimen 6 to 10



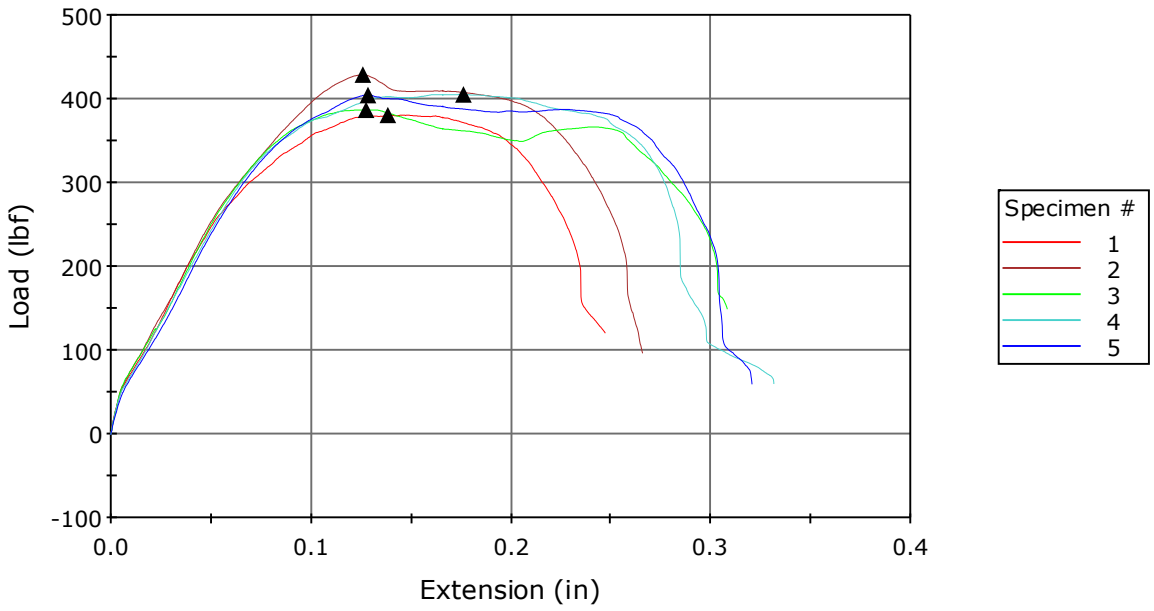
	Specimen ID	Maximum Load (lbf)	Extension at Maximum Load (in)	Failure Mode
1	S-PE-M-1	490	0.258	ACP Rupture
2	S-PE-M-2	486	0.242	ACP Rupture
3	S-PE-M-3	479	0.227	ACP Rupture
4	S-PE-M-4	497	0.258	ACP Rupture
5	S-PE-M-5	485	0.273	ACP Rupture
6	S-PE-C-1	485	0.252	ACP Rupture
7	S-PE-C-2	495	0.258	ACP Rupture
8	S-PE-C-3	465	0.230	ACP Rupture
9	S-PE-C-4	483	0.268	ACP Rupture
10	S-PE-C-5	494	0.252	ACP Rupture
Mean		486	0.252	
Standard Deviation		9.29	0.0	

Total Quality. Assured.

ASTM D1761-12, Fasteners Shear Evaluation

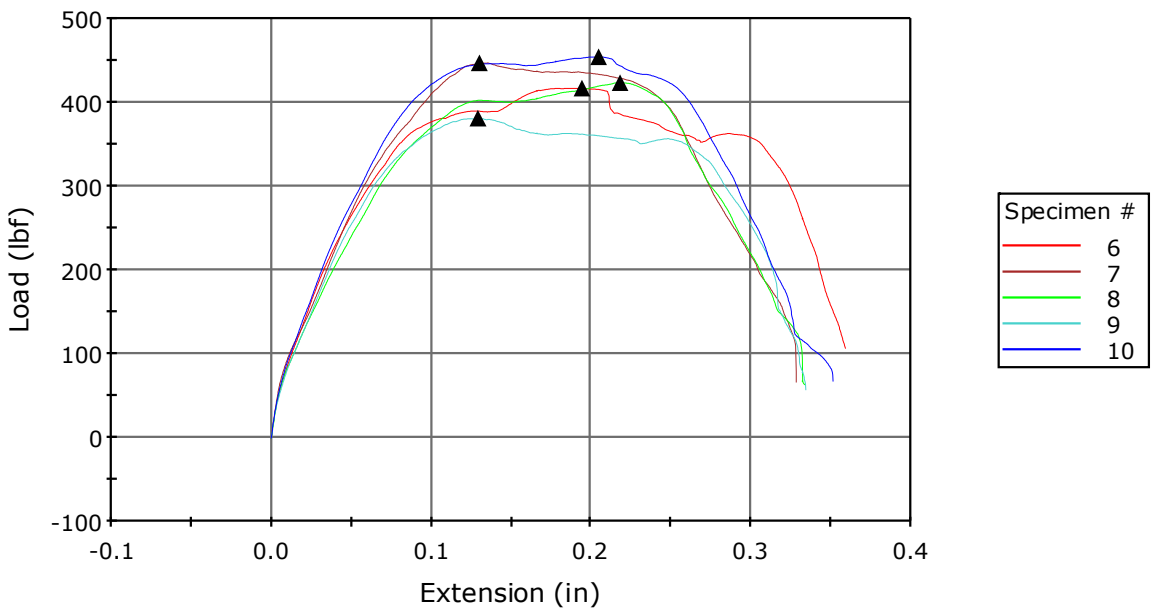
Intertek-ATI Project #	I6239.01-106-31
Client Name	STACBOND
Sample Description	ACP A2
Crosshead Speed	0.100 in/min
Test Frame / ICN	SATEC Model 50 UD / Y002011
Load Cell Capacity / ICN	22.2 kN (5,000 lbf) / 516509A
Laboratory Conditions	71.0°F / 42.5% RH
User	Josh K.

Specimen 1 to 5



Total Quality. Assured.

Specimen 6 to 10



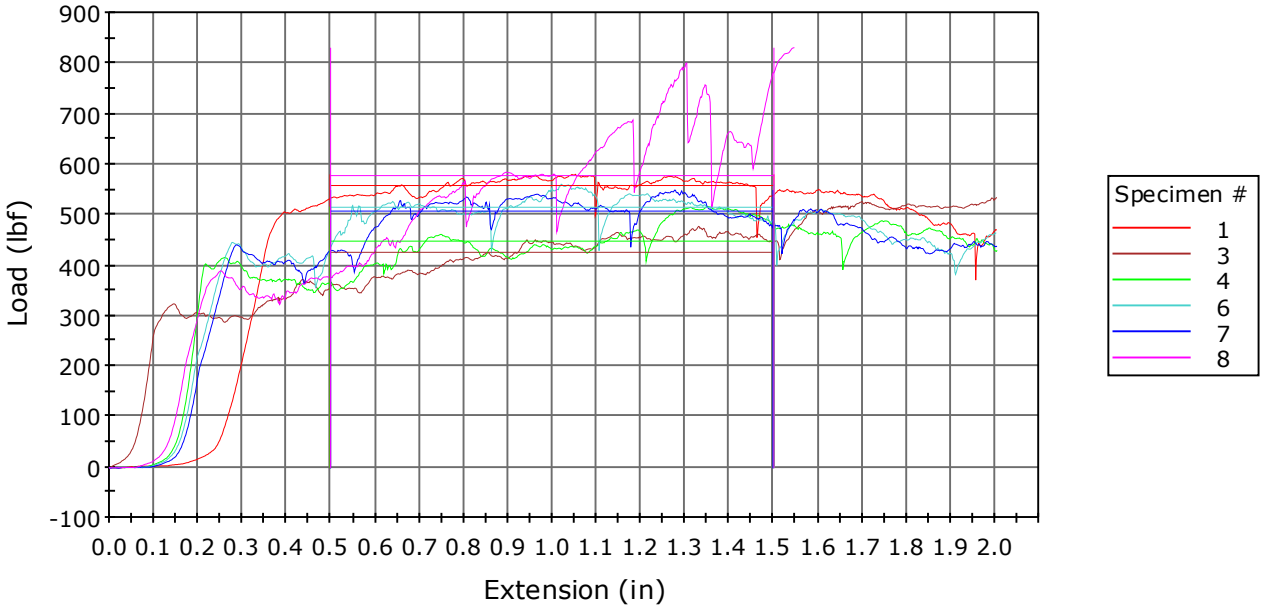
	Specimen ID	Maximum Load (lbf)	Extension at Maximum Load (in)	Failure Mode
1	S-A2-M-1	381	0.138	ACP Rupture
2	S-A2-M-2	429	0.126	ACP Rupture
3	S-A2-M-3	387	0.127	ACP Rupture
4	S-A2-M-4	405	0.176	ACP Rupture
5	S-A2-M-5	405	0.128	ACP Rupture
6	S-A2-C-1	417	0.194	ACP Rupture
7	S-A2-C-2	447	0.130	ACP Rupture
8	S-A2-C-3	423	0.218	ACP Rupture
9	S-A2-C-4	381	0.129	ACP Rupture
10	S-A2-C-5	454	0.204	ACP Rupture
Mean		413	0.157	
Standard Deviation		26.0	0.0	

Total Quality. Assured.

ASTM D1781-98(2012), Climbing Drum Peel Test for Sandwich Panels

Intertek-ATI Job #	I6239.01-106-31
Client Name	STACBOND
User	Josh K.
Sample Description	ACP FR - Control
Calibration Peel	26.4 lbf
Test Speed	1.00000 in/min
Lab Conditions	71.1 °F / 43.7 %RH
Test Frame / ICN	INSTRON 3369 / 005740
Load Cell / ICN	10kN / 005965

Specimen 1 to 8



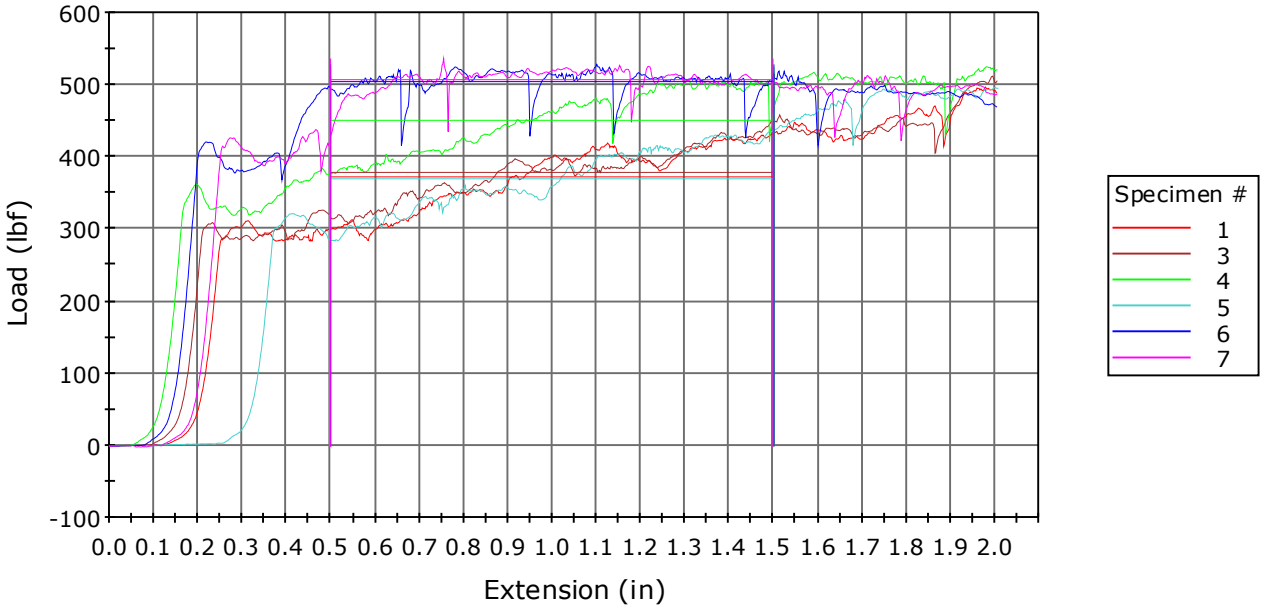
	Specimen ID	Peak Load (lbf)	Average Load (lbf)	Average Peel Torque (in·lb/in)	Average Peel Torque (Nmm/mm)	Peel Strength (kgf/25mm)	Mode of Failure:
1	FR-C1	580	557.8	91.80	408.37	79.89	Cohesive
3	FR-C2	534	426.5	69.25	308.03	60.27	Cohesive
4	FR-C3	516	448.2	73.07	325.03	63.59	Cohesive
6	FR-C4	560	514.9	84.34	375.15	73.40	Cohesive
7	FR-C5	549	507.7	83.22	370.18	72.42	Cohesive
8	FR-C6	830	577.7	95.11	423.09	82.77	Cohesive
Mean		595	505.5	82.80	368.31	72.06	
Standard Deviation		117.20	59.27	10.13	45.08	8.82	

Total Quality. Assured.

ASTM D1781-98(2012), Climbing Drum Peel Test for Sandwich Panels

Intertek-ATI Job #	I6239.01-106-31
Client Name	STACBOND
User	Josh K.
Sample Description	ACP FR - Water
Calibration Peel	26.4 lbf
Test Speed	1.00000 in/min
Lab Conditions	70.6 °F / 44.7 %RH
Test Frame / ICN	INSTRON 3369 / 005740
Load Cell / ICN	10kN / 005965

Specimen 1 to 7



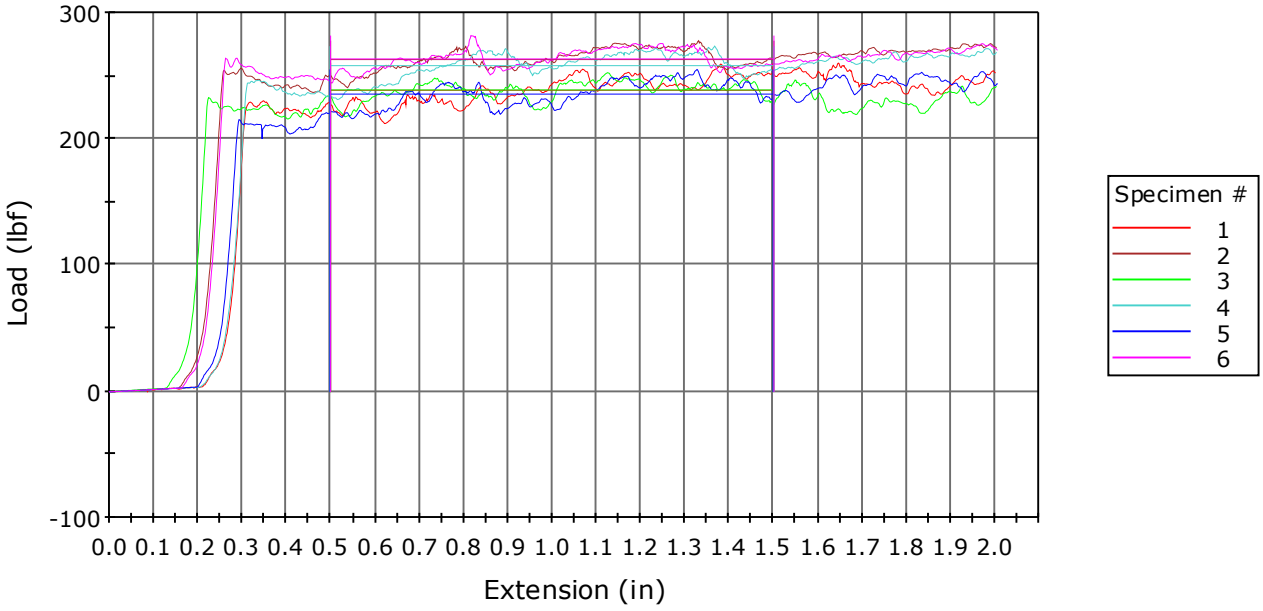
	Specimen ID	Peak Load (lbf)	Average Load (lbf)	Average Peel Torque (in·lb/in)	Average Peel Torque (Nmm/mm)	Peel Strength (kgf/25mm)	Mode of Failure:
1	FR-W1	497	372.7	60.15	267.58	52.35	Adhesion to Skin
3	FR-W2	511	378.8	61.21	272.25	53.27	Adhesion to Skin
4	FR-W3	524	450.5	73.42	326.57	63.89	Cohesive
5	FR-W4	496	369.9	59.64	265.27	51.90	Adhesion to Skin
6	FR-W5	528	504.2	82.40	366.54	71.71	Cohesive
7	FR-W6	536	506.9	82.89	368.70	72.13	Cohesive
Mean		515	430.5	69.95	311.15	60.88	
Standard Deviation		16.82	65.37	11.08	49.26	9.64	

Total Quality. Assured.

ASTM D1781-98(2012), Climbing Drum Peel Test for Sandwich Panels

Intertek-ATI Job #	I6239.01-106-31
Client Name	STACBOND
User	Josh K.
Sample Description	ACP FR - Boil
Calibration Peel	26.4 lbf
Test Speed	1.00000 in/min
Lab Conditions	70.6 °F / 44.7 %RH
Test Frame / ICN	INSTRON 3369 / 005740
Load Cell / ICN	10kN / 005965

Specimen 1 to 6



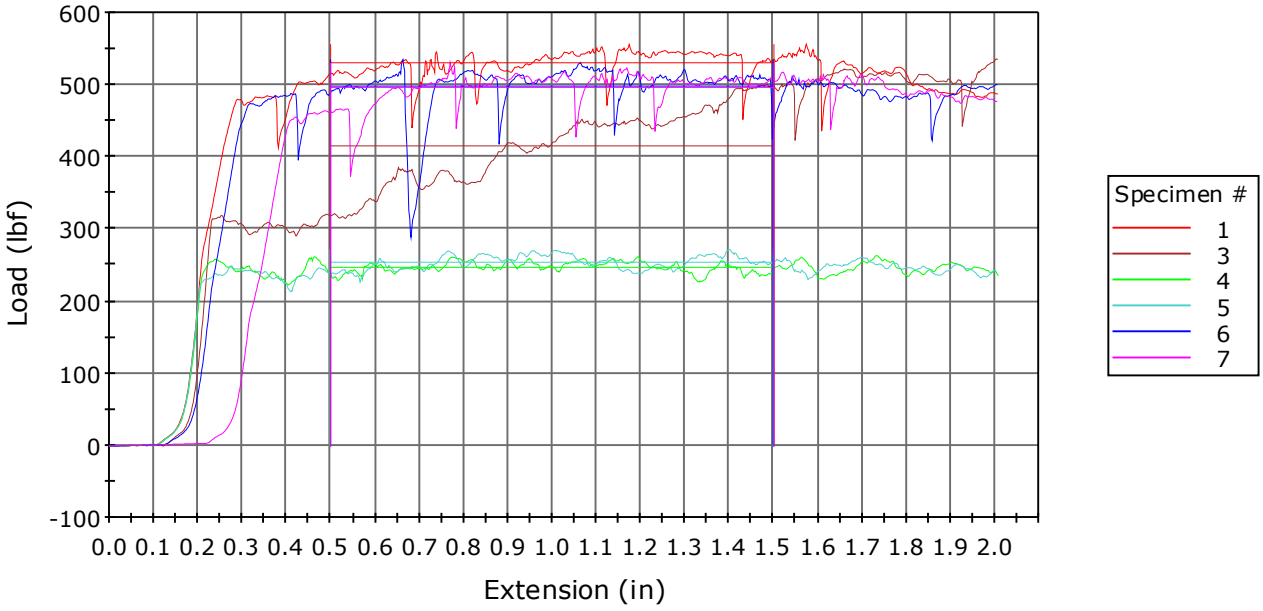
	Specimen ID	Peak Load (lbf)	Average Load (lbf)	Average Peel Torque (in·lb/in)	Average Peel Torque (Nmm/mm)	Peel Strength (kgf/25mm)	Mode of Failure:
1	FR-B1	260	238.3	36.77	163.58	32.00	Adhesion to Skin
2	FR-B2	278	262.7	41.04	182.55	35.72	Cohesive
3	FR-B3	252	238.6	36.97	164.47	32.18	Adhesion to Skin
4	FR-B4	273	257.9	40.26	179.08	35.04	Cohesive
5	FR-B5	255	235.3	36.51	162.40	31.77	Adhesion to Skin
6	FR-B6	282	263.1	41.20	183.27	35.86	Cohesive
Mean		267	249.3	38.79	172.56	33.76	
Standard Deviation		12.55	13.22	2.26	10.07	1.97	

Total Quality. Assured.

ASTM D1781-98(2012), Climbing Drum Peel Test for Sandwich Panels

Intertek-ATI Job #	I6239.01-106-31
Client Name	STACBOND
User	Josh K.
Sample Description	ACP FR - Freeze/Thaw
Calibration Peel	26.4 lbf
Test Speed	1.00000 in/min
Lab Conditions	71.1 °F / 49.2 %RH
Test Frame / ICN	INSTRON 3369 / 005740
Load Cell / ICN	10kN / 005965

Specimen 1 to 7



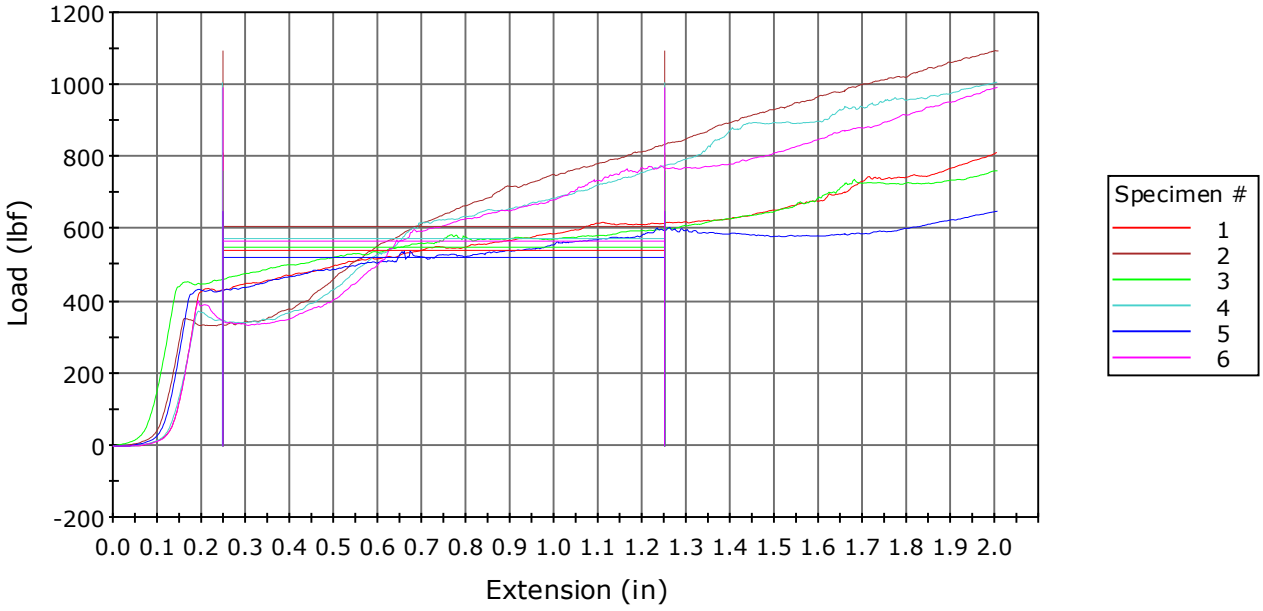
	Specimen ID	Peak Load (lbf)	Average Load (lbf)	Average Peel Torque (in·lb/in)	Average Peel Torque (Nmm/mm)	Peel Strength (kgf/25mm)	Mode of Failure:
1	FR-F1	556	530.0	87.12	387.55	75.82	Cohesive
3	FR-F2	535	415.4	67.36	299.62	58.62	Cohesive
4	FR-F3	264	247.7	38.49	171.21	33.50	Adhesion to Skin
5	FR-F4	272	254.6	39.73	176.73	34.58	Adhesion to Skin
6	FR-F5	535	498.2	81.39	362.05	70.83	Cohesive
7	FR-F6	530	496.3	81.07	360.61	70.55	Cohesive
Mean		449	407.0	65.86	292.96	57.32	
Standard Deviation		140.23	126.55	21.72	96.62	18.90	

Total Quality. Assured.

ASTM D1781-98(2012), Climbing Drum Peel Test for Sandwich Panels

Intertek-ATI Job #	I6239.01-106-31
Client Name	STACBOND
User	Josh K.
Sample Description	ACP PE - Control
Calibration Peel	26.4 lbf
Test Speed	1.00000 in/min
Lab Conditions	70.8 °F / 45.4 %RH
Test Frame / ICN	INSTRON 3369 / 005740
Load Cell / ICN	10kN / 005965

Specimen 1 to 6



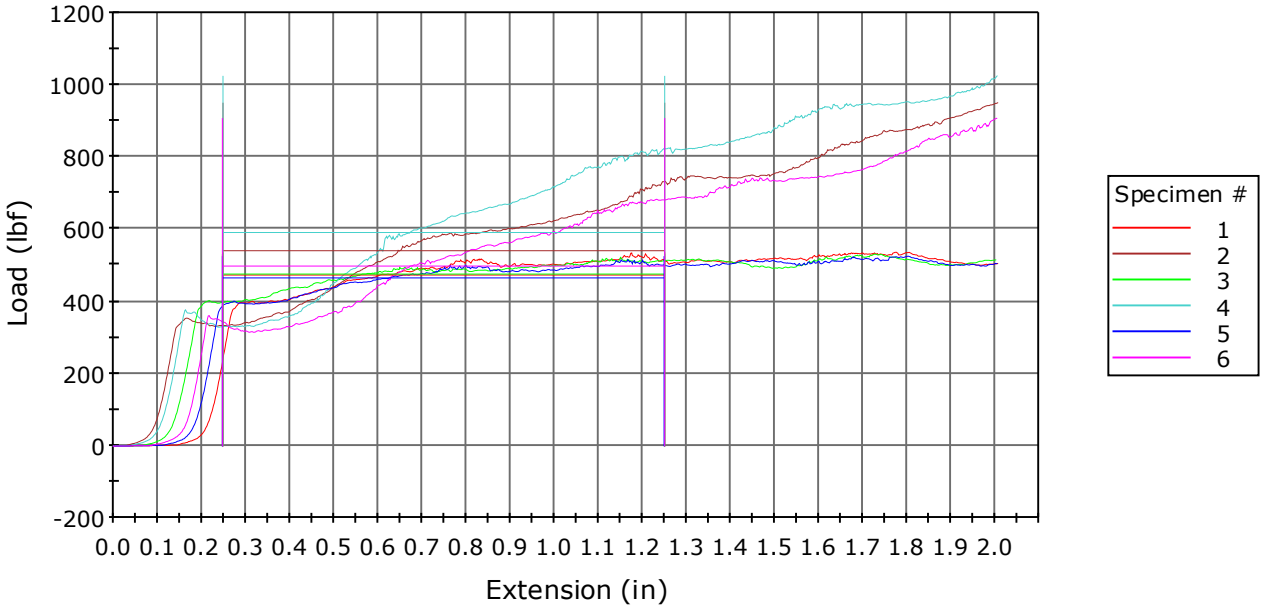
	Specimen ID	Peak Load (lbf)	Average Load (lbf)	Average Peel Torque (in·lb/in)	Adjusted Average Load (lbf)	Adjusted Average Peel Torque (in·lb/in)	Mode of Failure:
1	PE-C1	812	542.0	88.97	432.6	70.25	Cohesive
2	PE-C2	1090	607.9	100.09	339.1	54.15	Cohesive
3	PE-C3	762	550.7	90.46	449.1	73.08	Cohesive
4	PE-C4	1010	574.6	94.47	348.7	55.84	Cohesive
5	PE-C5	650	522.4	85.74	431.7	70.19	Cohesive
6	PE-C6	993	567.4	93.23	349.6	55.99	Cohesive
Mean		886	560.8	92.16	391.8	63.25	
Standard Deviation		170.54	29.61	4.97	50.92	8.77	

Total Quality. Assured.

ASTM D1781-98(2012), Climbing Drum Peel Test for Sandwich Panels

Intertek-ATI Job #	I6239.01-106-31
Client Name	STACBOND
User	Josh K.
Sample Description	ACP PE - Water
Calibration Peel	26.4 lbf
Test Speed	1.00000 in/min
Lab Conditions	70.7 °F / 42.8 %RH
Test Frame / ICN	INSTRON 3369 / 005740
Load Cell / ICN	10kN / 005965

Specimen 1 to 6



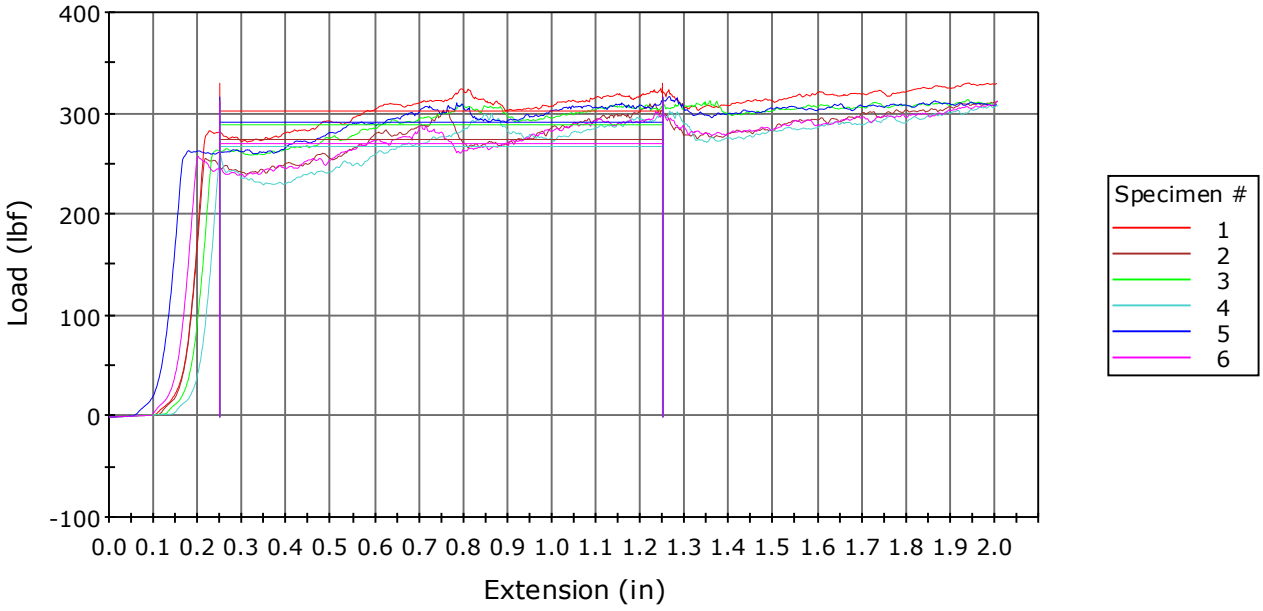
	Specimen ID	Peak Load (lbf)	Average Load (lbf)	Average Peel Torque (in·lb/in)	Adjusted Average Load (lbf)	Adjusted Average Peel Torque (in·lb/in)	Mode of Failure:
1	PE-W1	537	474.1	77.15	399.8	64.46	Cohesive
2	PE-W2	950	541.4	88.58	337.7	53.82	Cohesive
3	PE-W3	531	477.0	78.53	400.6	65.34	Cohesive
4	PE-W4	1020	591.3	96.93	341.6	54.39	Cohesive
5	PE-W5	526	466.1	75.63	396.9	63.84	Cohesive
6	PE-W6	908	498.5	81.16	327.5	52.01	Cohesive
Mean		746	508.1	83.00	367.3	58.98	
Standard Deviation		238.23	49.01	8.21	35.13	6.17	

Total Quality. Assured.

ASTM D1781-98(2012), Climbing Drum Peel Test for Sandwich Panels

Intertek-ATI Job #	I6239.01-106-31
Client Name	STACBOND
User	Josh K.
Sample Description	ACP PE - Boil
Calibration Peel	26.4 lbf
Test Speed	1.00000 in/min
Lab Conditions	70.7 °F / 49.1 %RH
Test Frame / ICN	INSTRON 3369 / 005740
Load Cell / ICN	10kN / 005965

Specimen 1 to 6



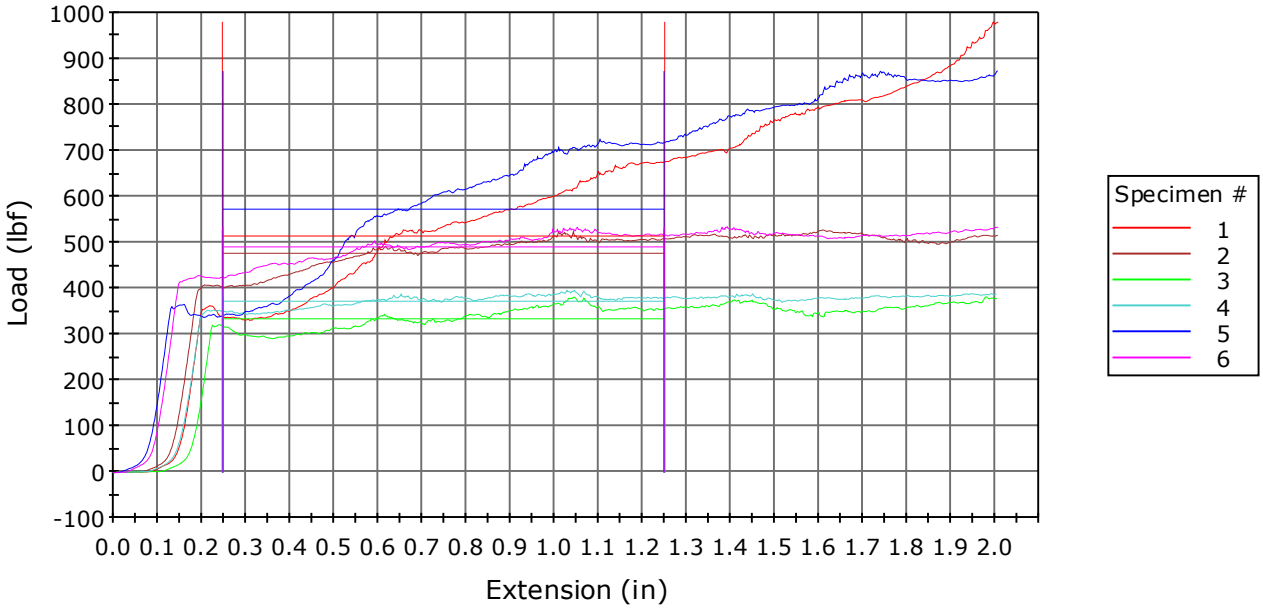
	Specimen ID	Peak Load (lbf)	Average Load (lbf)	Average Peel Torque (in·lb/in)	Adjusted Average Load (lbf)	Adjusted Average Peel Torque (in·lb/in)	Mode of Failure:
1	PE-B1	330	302.6	47.87	278.2	43.71	Cohesive
2	PE-B2	312	274.5	42.93	246.7	38.20	Cohesive
3	PE-B3	314	289.1	45.41	263.2	41.00	Cohesive
4	PE-B4	308	267.5	41.80	239.5	37.03	Cohesive
5	PE-B5	317	291.5	45.95	262.2	40.96	Cohesive
6	PE-B6	312	270.3	42.39	243.8	37.88	Cohesive
Mean		316	282.6	44.39	255.6	39.79	
Standard Deviation		7.78	13.91	2.38	14.77	2.53	

Total Quality. Assured.

ASTM D1781-98(2012), Climbing Drum Peel Test for Sandwich Panels

Intertek-ATI Job #	I6239.01-106-31
Client Name	STACBOND
User	Josh K.
Sample Description	ACP PE - Freeze
Calibration Peel	26.4 lbf
Test Speed	1.00000 in/min
Lab Conditions	70.4 °F / 45.2 %RH
Test Frame / ICN	INSTRON 3369 / 005740
Load Cell / ICN	10kN / 005965

Specimen 1 to 6



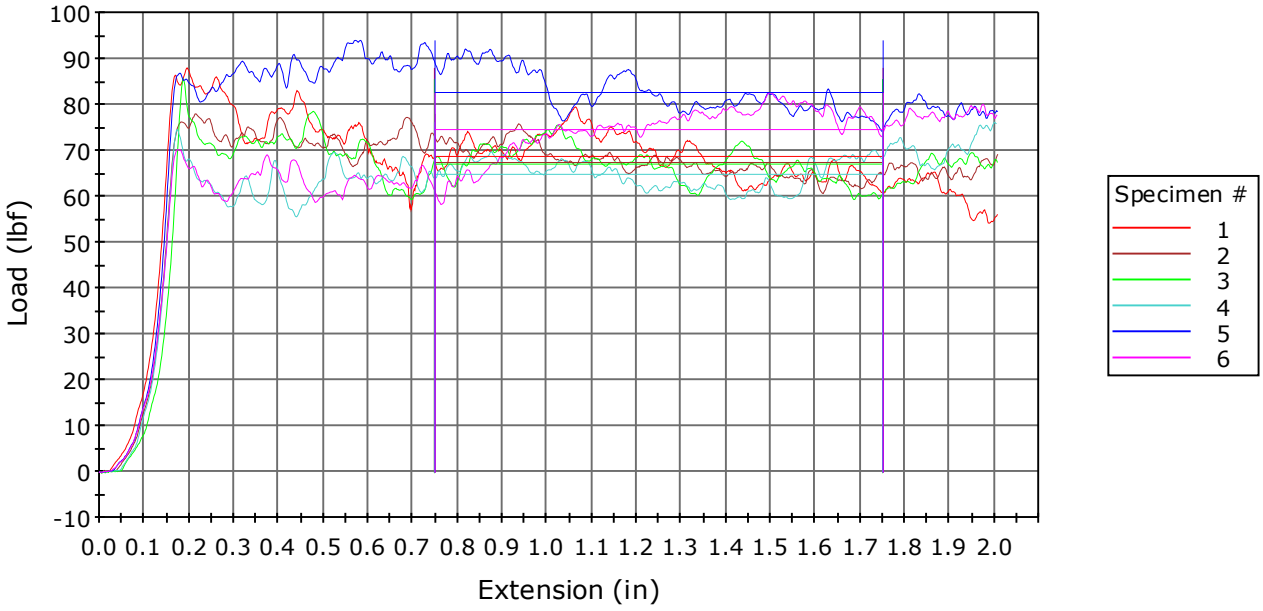
	Specimen ID	Peak Load (lbf)	Average Load (lbf)	Average Peel Torque (in·lb/in)	Adjusted Average Load (lbf)	Adjusted Average Peel Torque (in·lb/in)	Mode of Failure:
1	PE-F1	980	514.0	83.71	338.8	53.88	Cohesive
2	PE-F2	527	476.9	77.42	405.8	65.32	Cohesive
3	PE-F3	382	334.3	53.08	300.5	47.34	Cohesive
4	PE-F4	396	372.9	59.75	348.7	55.63	Cohesive
5	PE-F5	872	572.7	94.20	341.9	54.70	Cohesive
6	PE-F6	534	490.9	81.53	425.1	70.09	Cohesive
Mean		615	460.3	74.95	360.1	57.83	
Standard Deviation		251.19	89.73	15.53	46.43	8.32	

Total Quality. Assured.

ASTM D1781-98(2012), Climbing Drum Peel Test for Sandwich Panels

Intertek-ATI Job #	I6239.01-106-31
Client Name	STACBOND
User	Josh K.
Sample Description	ACP A2 - Control
Calibration Peel	26.4 lbf
Test Speed	1.00000 in/min
Lab Conditions	71.0 °F / 41.9 %RH
Test Frame / ICN	INSTRON 3369 / 005740
Load Cell / ICN	10kN / 005965

Specimen 1 to 6



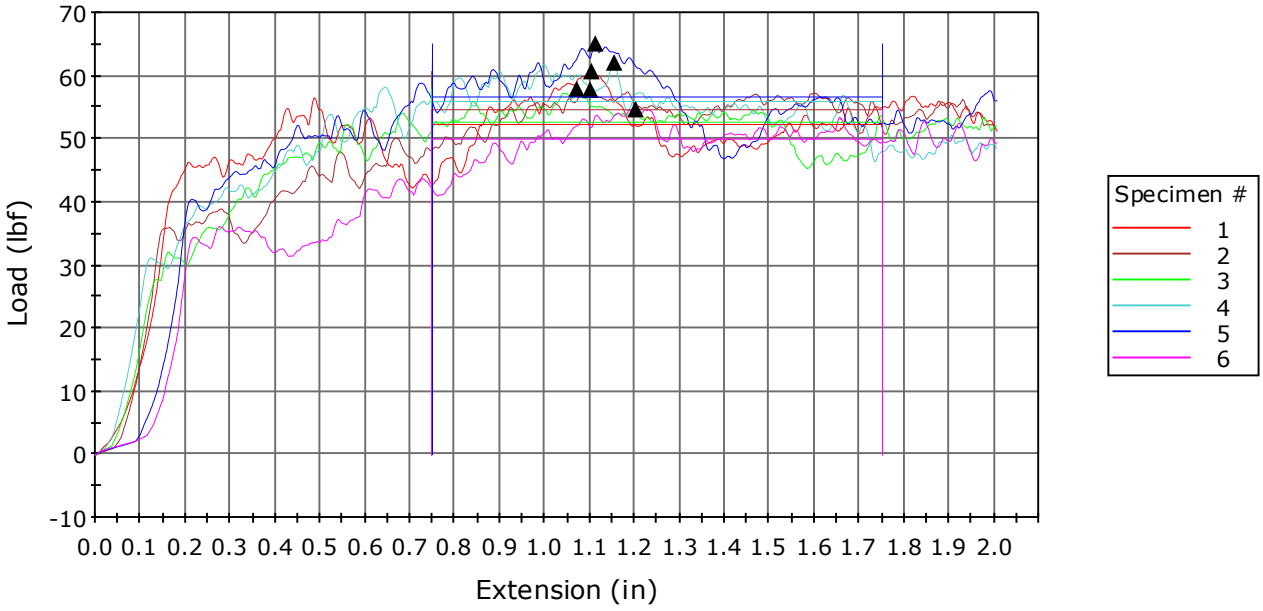
	Specimen ID	Peak Load (lbf)	Average Load (lbf)	Average Peel Torque (in·lb/in)	Average Peel Torque (Nmm/mm)	Peel Strength (kgf/25mm)	Mode of Failure:
1	A2-C1	87.9	68.7	7.94	35.31	6.91	Core Surface
2	A2-C2	77.9	67.4	7.72	34.34	6.72	Core Surface
3	A2-C3	85.5	67.0	7.66	34.07	6.66	Core Surface
4	A2-C4	76.1	64.8	7.27	32.32	6.32	Core Surface
5	A2-C5	94.0	82.6	10.30	45.80	8.96	Core Surface
6	A2-C6	82.5	74.5	8.90	39.61	7.75	Core Surface
Mean		84.0	70.8	8.30	36.91	7.22	
Standard Deviation		6.62	6.61	1.12	4.99	0.98	

Total Quality. Assured.

ASTM D1781-98(2012), Climbing Drum Peel Test for Sandwich Panels

Intertek-ATI Job #	I6239.01-106-31
Client Name	STACBOND
User	Josh K.
Sample Description	ACP A2 - Water
Calibration Peel	26.4 lbf
Test Speed	1.00000 in/min
Lab Conditions	70.7 °F / 43.1 %RH
Test Frame / ICN	INSTRON 3369 / 005740
Load Cell / ICN	2kN / 005742

Specimen 1 to 6



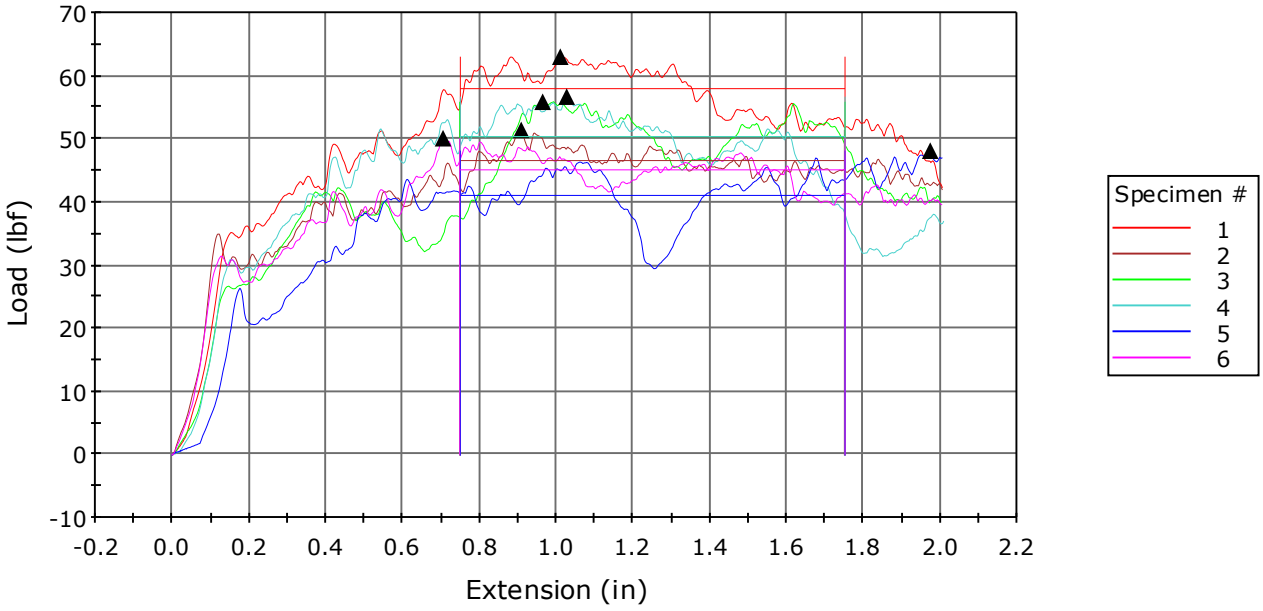
	Specimen ID	Peak Load (lbf)	Average Load (lbf)	Average Peel Torque (in·lb/in)	Average Peel Torque (Nmm/mm)	Peel Strength (kgf/25mm)	Mode of Failure:
1	A2-W1	60.7	52.3	5.11	22.71	4.44	Core Surface
2	A2-W2	57.8	54.6	5.49	24.42	4.78	Core Surface
3	A2-W3	57.9	52.6	5.21	23.16	4.53	Core Surface
4	A2-W4	62.1	55.9	5.74	25.54	5.00	Core Surface
5	A2-W5	65.1	56.6	5.85	26.03	5.09	Core Surface
6	A2-W6	54.7	49.9	4.71	20.97	4.10	Core Surface
Mean		59.7	53.7	5.35	23.81	4.66	
Standard Deviation		3.67	2.51	0.43	1.90	0.37	

Total Quality. Assured.

ASTM D1781-98(2012), Climbing Drum Peel Test for Sandwich Panels

Intertek-ATI Job #	I6239.01-106-31
Client Name	STACBOND
User	Josh K.
Sample Description	ACP A2 - Boil
Calibration Peel	26.4 lbf
Test Speed	1.00000 in/min
Lab Conditions	69.6 °F / 42.1 %RH
Test Frame / ICN	INSTRON 3369 / 005740
Load Cell / ICN	2kN / 005742

Specimen 1 to 6



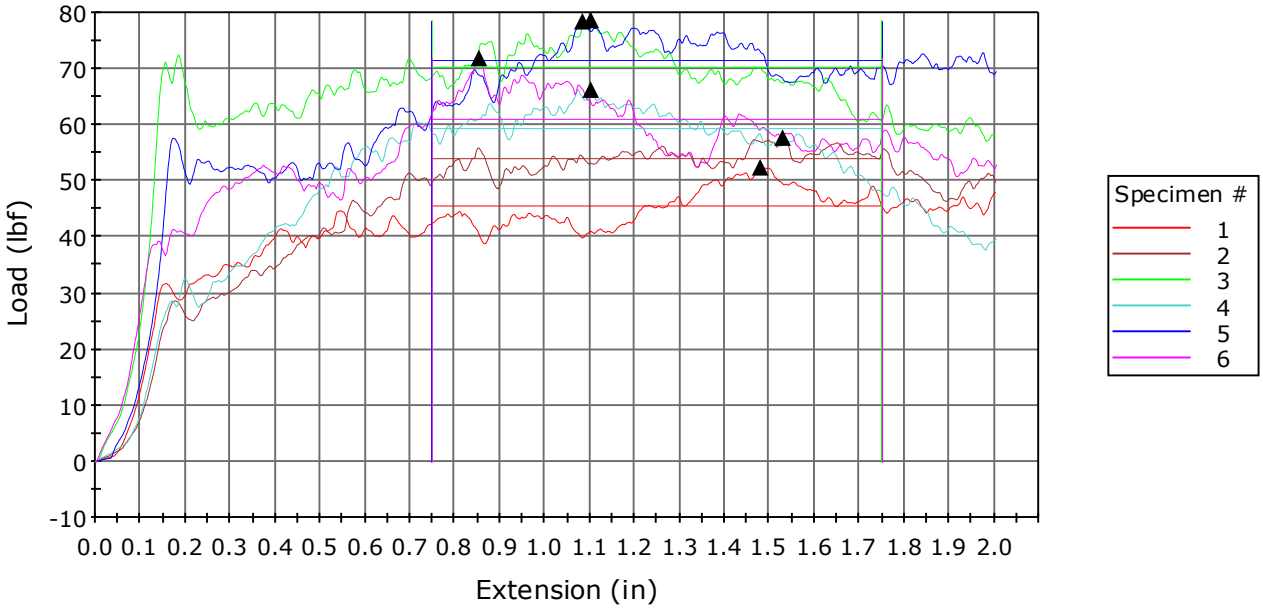
	Specimen ID	Peak Load (lbf)	Average Load (lbf)	Average Peel Torque (in·lb/in)	Average Peel Torque (Nmm/mm)	Peel Strength (kgf/25mm)	Mode of Failure:
1	A2-B1	63.0	57.9	6.09	27.11	5.30	Core Surface
2	A2-B2	51.4	46.6	4.17	18.55	3.63	Core Surface
3	A2-B3	55.9	50.4	4.80	21.35	4.18	Core Surface
4	A2-B4	56.7	50.4	4.81	21.38	4.18	Core Surface
5	A2-B5	48.1	41.1	3.22	14.31	2.80	Core Surface
6	A2-B6	50.1	45.1	3.90	17.34	3.39	Core Surface
Mean		54.2	48.6	4.50	20.01	3.91	
Standard Deviation		5.42	5.76	0.98	4.38	0.86	

Total Quality. Assured.

ASTM D1781-98(2012), Climbing Drum Peel Test for Sandwich Panels

Intertek-ATI Job #	I6239.01-106-31
Client Name	STACBOND
User	Josh K.
Sample Description	ACP A2 - Freeze/Thaw
Calibration Peel	26.4 lbf
Test Speed	1.00000 in/min
Lab Conditions	70.8 °F / 44.6 %RH
Test Frame / ICN	INSTRON 3369 / 005740
Load Cell / ICN	2kN / 005742

Specimen 1 to 6



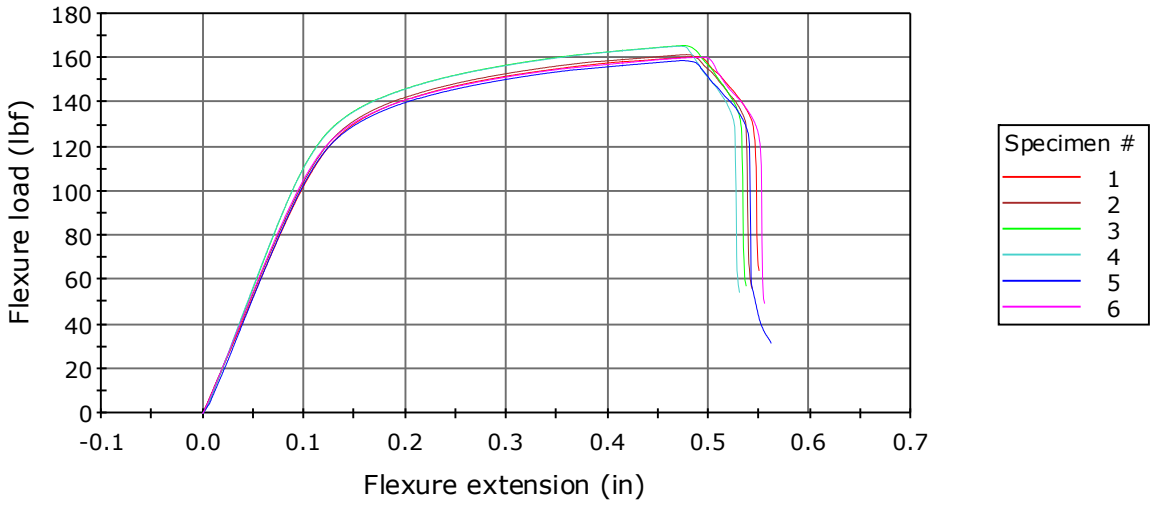
	Specimen ID	Peak Load (lbf)	Average Load (lbf)	Average Peel Torque (in·lb/in)	Average Peel Torque (Nmm/mm)	Peel Strength (kgf/25mm)	Mode of Failure:
1	A2-F1	52.4	45.6	4.00	17.78	3.48	Core Surface
2	A2-F2	57.7	54.0	5.42	24.11	4.72	Core Surface
3	A2-F3	78.7	70.2	8.19	36.43	7.13	Core Surface
4	A2-F4	66.3	59.3	6.34	28.21	5.52	Core Surface
5	A2-F5	78.5	71.4	8.36	37.21	7.28	Core Surface
6	A2-F6	71.9	61.0	6.61	29.40	5.75	Core Surface
Mean		67.6	60.3	6.49	28.86	5.65	
Standard Deviation		10.85	9.81	1.66	7.39	1.45	

Total Quality. Assured.

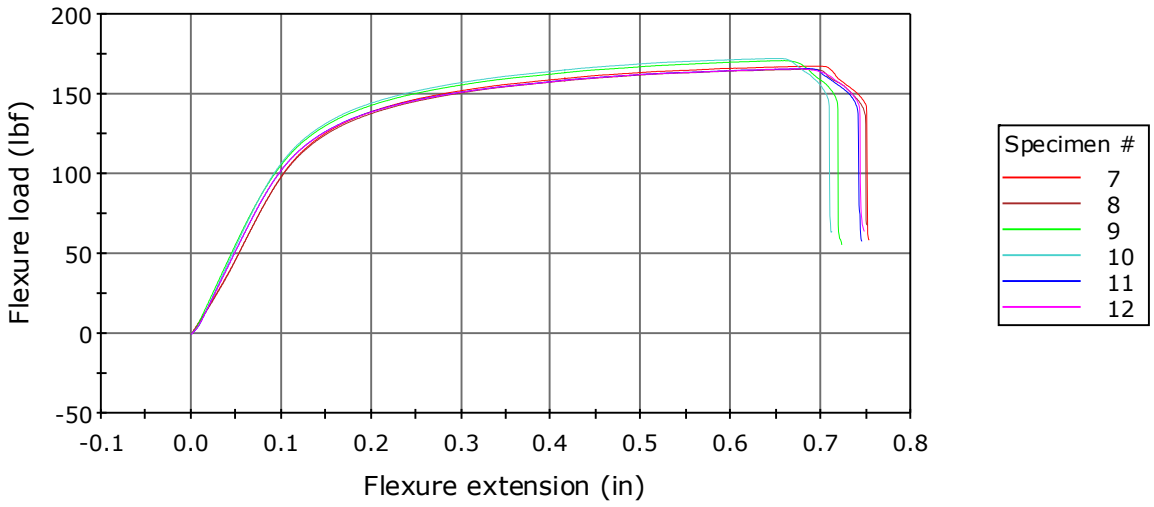
ASTM C393/C393M-16, Core Shear Properties of Sandwich Constructions by Beam Flexure, 3-point

Intertek-ATI Job #	I6239.01-106-31
Client Name	STACBOND
Sample description	FR
Lab Conditions	69.8ºF / 45.1% RH
Test Speed	0.250 in/min
Load Cell	2 kN / 005742
Load Cell Calibration Due Date	10/19
Test Frame	INSTRON 3369 / 005740
Frame Calibration Due Date	10/19
User	Josh K.

Specimen 1 to 6

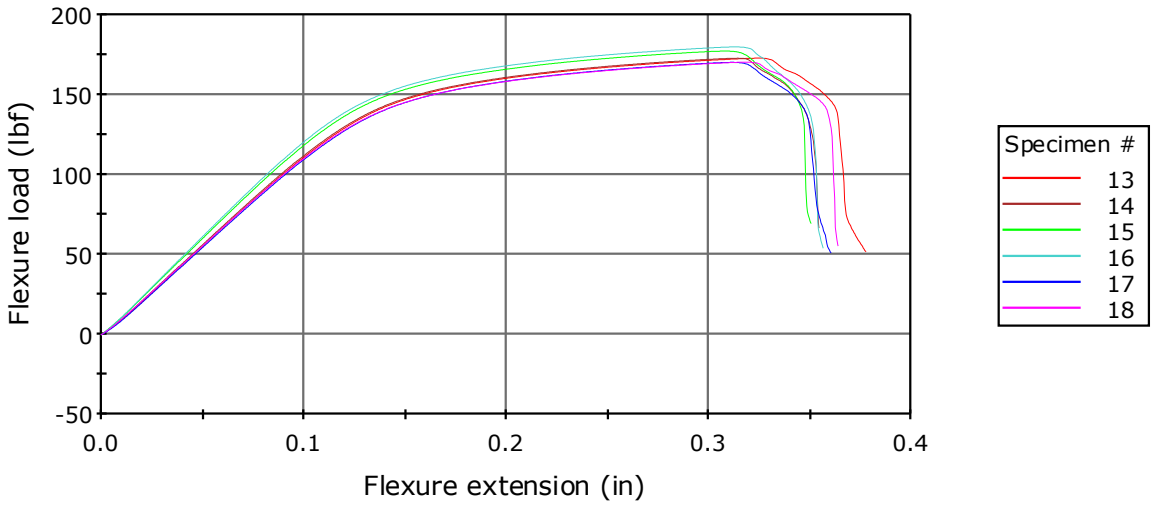


Specimen 7 to 12

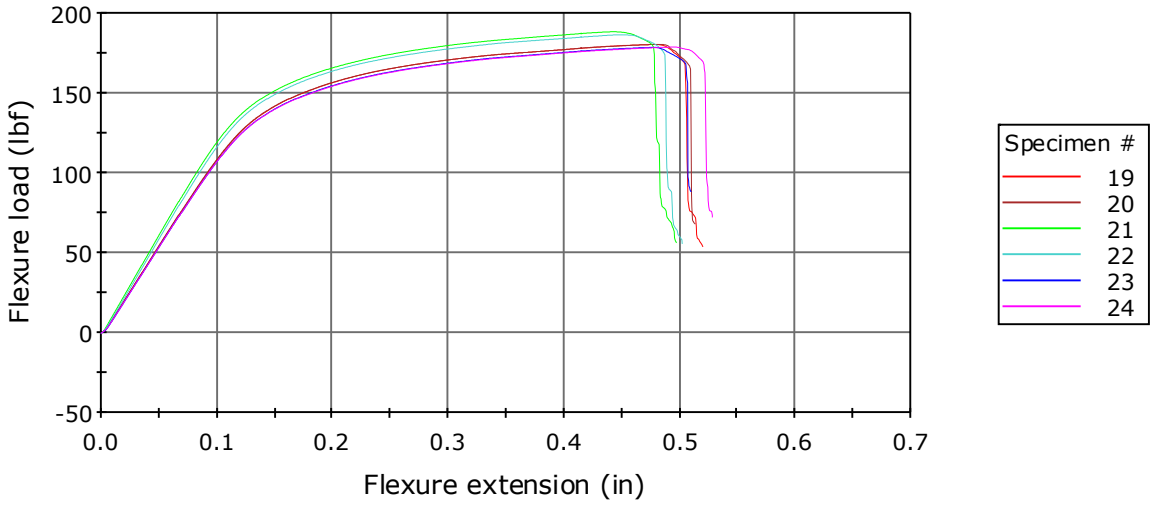


Total Quality. Assured.

Specimen 13 to 18

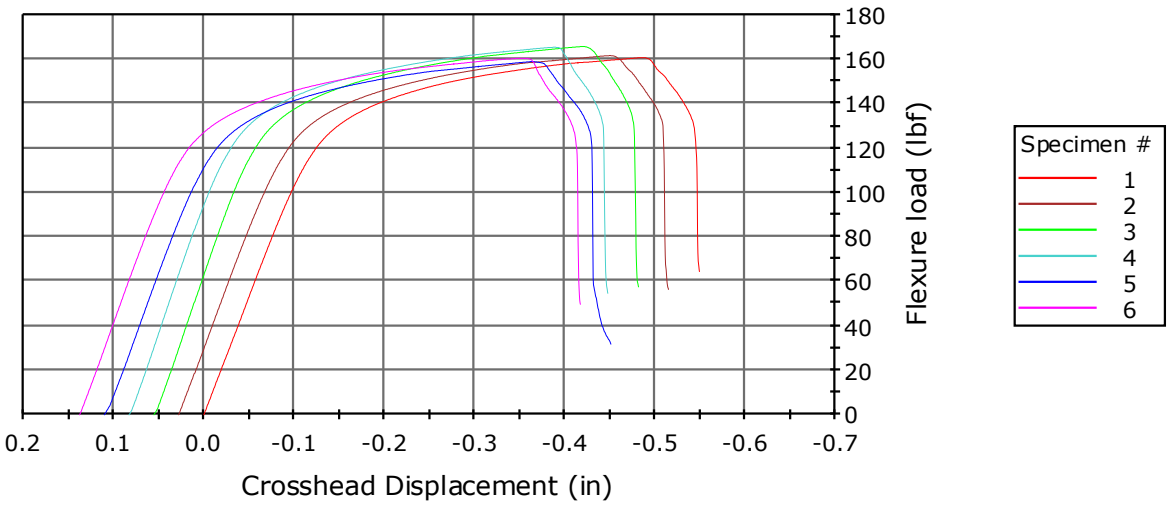


Specimen 19 to 24

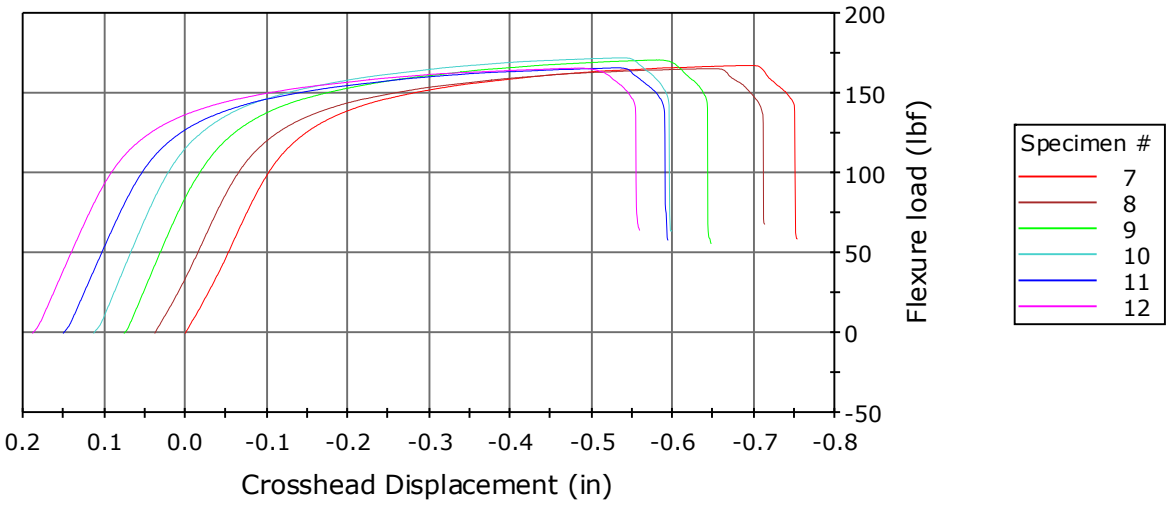


Total Quality. Assured.

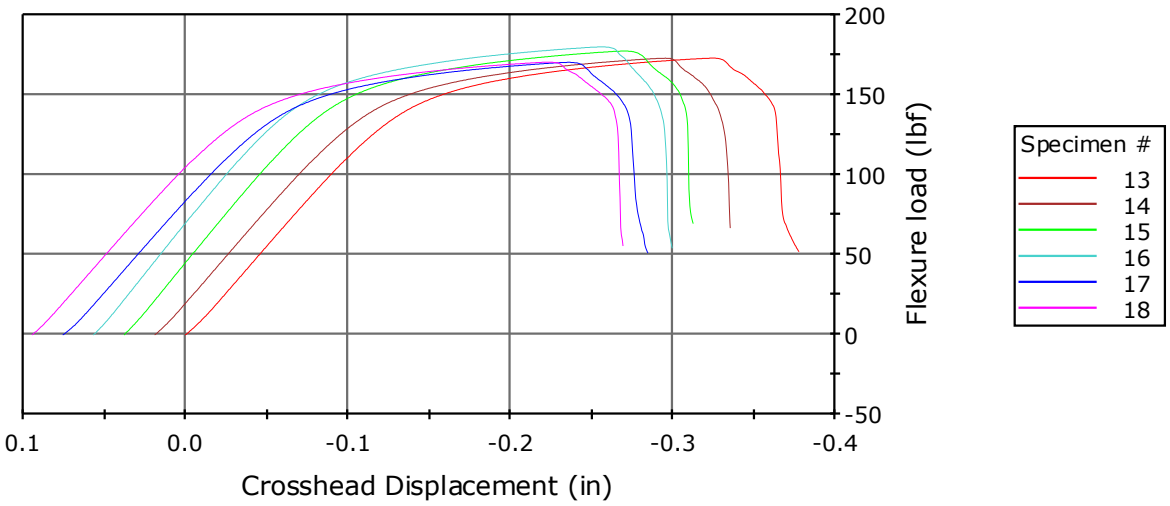
Specimen 1 to 6



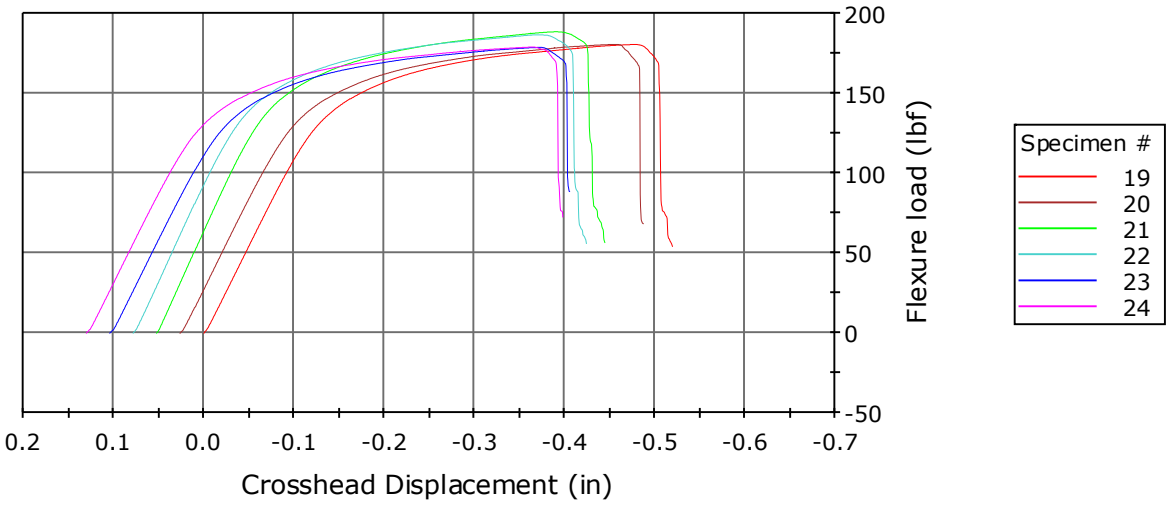
Specimen 7 to 12



Specimen 13 to 18



Specimen 19 to 24



intertek
Total Quality. Assured.

	Specimen ID	Width (in)	Thickness (in)	Maximum Load (lbf)
1	FR-ME-1	3.009	0.157	160.560
2	FR-ME-2	3.014	0.158	161.440
3	FR-ME-3	2.994	0.160	165.508
4	FR-ME-4	3.007	0.159	165.190
5	FR-ME-5	2.992	0.157	158.777
6	FR-ME-6	3.009	0.156	160.265
7	FR-MI-1	3.012	0.158	167.198
8	FR-MI-2	2.998	0.158	165.207
9	FR-MI-3	2.999	0.160	170.648
10	FR-MI-4	2.991	0.161	171.979
11	FR-MI-5	3.002	0.157	165.765
12	FR-MI-6	2.994	0.158	165.520
13	FR-CE-1	2.996	0.158	172.668
14	FR-CE-2	2.991	0.160	172.612
15	FR-CE-3	2.977	0.162	177.077
16	FR-CE-4	2.989	0.163	179.661
17	FR-CE-5	2.999	0.158	170.038
18	FR-CE-6	2.986	0.158	170.180
19	FR-CI-1	3.003	0.157	180.295
20	FR-CI-2	3.006	0.157	180.332
21	FR-CI-3	2.982	0.163	188.178
22	FR-CI-4	2.987	0.162	186.300
23	FR-CI-5	2.997	0.157	178.446
24	FR-CI-6	2.997	0.157	178.689
Mean		2.997	0.159	171.356
Standard Deviation		0.00951	0.00208	8.25822
Coefficient of Variation		0.31719	1.31286	4.81935

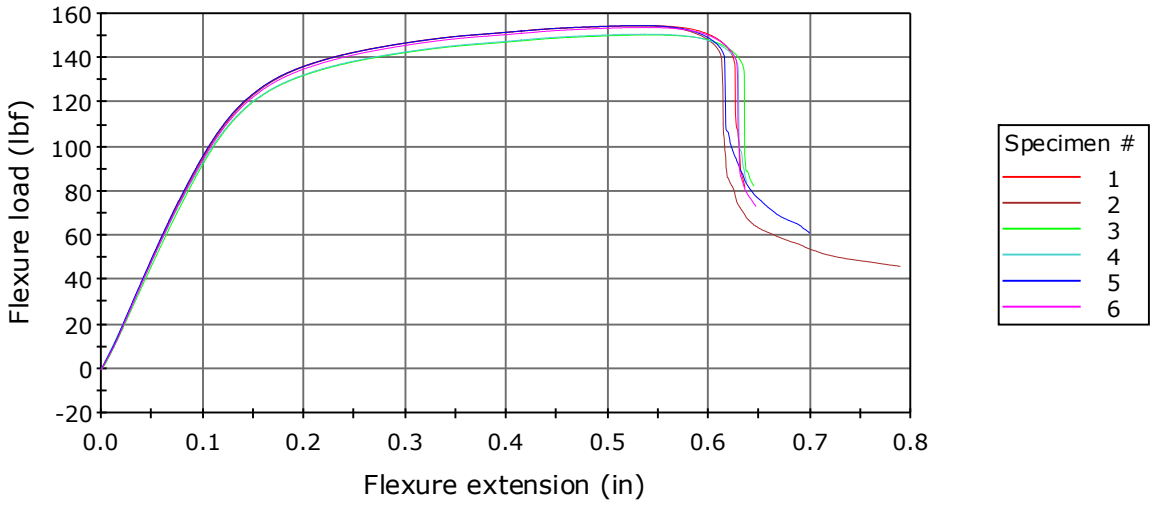
	Specimen ID	Core Shear Ultimate Stress (psi)	Core Shear Yield Stress (psi)	Facing Stress (psi)
1	FR-ME-1	195	153	29212
2	FR-ME-2	194	152	29111
3	FR-ME-3	197	155	29614
4	FR-ME-4	198	154	29641
5	FR-ME-5	194	151	29051
6	FR-ME-6	196	152	29372
7	FR-MI-1	201	146	30169
8	FR-MI-2	200	145	29949
9	FR-MI-3	203	142	30483
10	FR-MI-4	204	144	30584
11	FR-MI-5	202	143	30229
12	FR-MI-6	200	142	30046
13	FR-CE-1	209	176	31322
14	FR-CE-2	206	174	30916
15	FR-CE-3	209	177	31416
16	FR-CE-4	210	177	31525
17	FR-CE-5	205	174	30814
18	FR-CE-6	206	174	30974
19	FR-CI-1	219	170	32868
20	FR-CI-2	219	169	32842
21	FR-CI-3	221	172	33097
22	FR-CI-4	220	170	32942
23	FR-CI-5	217	167	32596
24	FR-CI-6	218	167	32640
Mean		206	160	30892
Standard Deviation		8.93586	12.99104	1340.37840
Coefficient of Variation		4.33889	8.09938	4.33889

Total Quality. Assured.

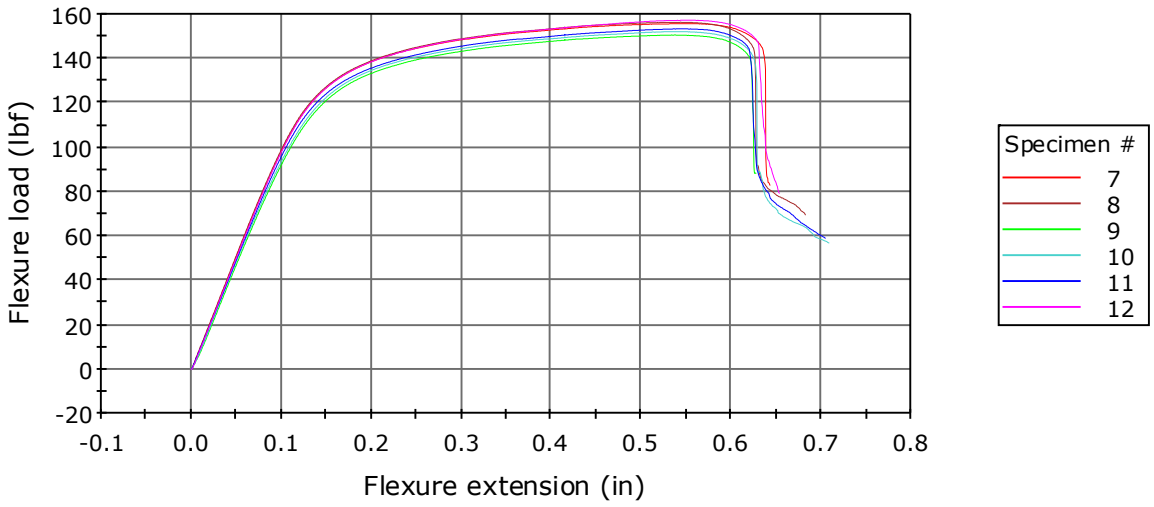
ASTM C393/C393M-16, Core Shear Properties of Sandwich Constructions by Beam Flexure, 3-point

Intertek-ATI Job #	I6239.01-106-31
Client Name	STACBOND
Sample description	PE
Lab Conditions	70.0°F / 48.3% RH
Test Speed	0.250 in/min
Load Cell	2 kN / 005742
Load Cell Calibration Due Date	10/19
Test Frame	INSTRON 3369 / 005740
Frame Calibration Due Date	10/19
User	Josh K.

Specimen 1 to 6

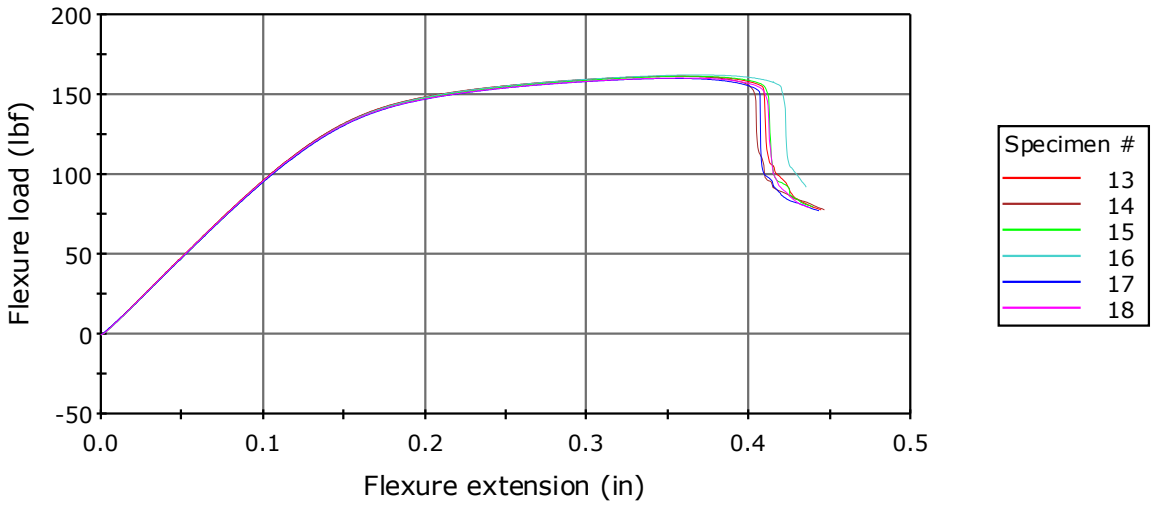


Specimen 7 to 12

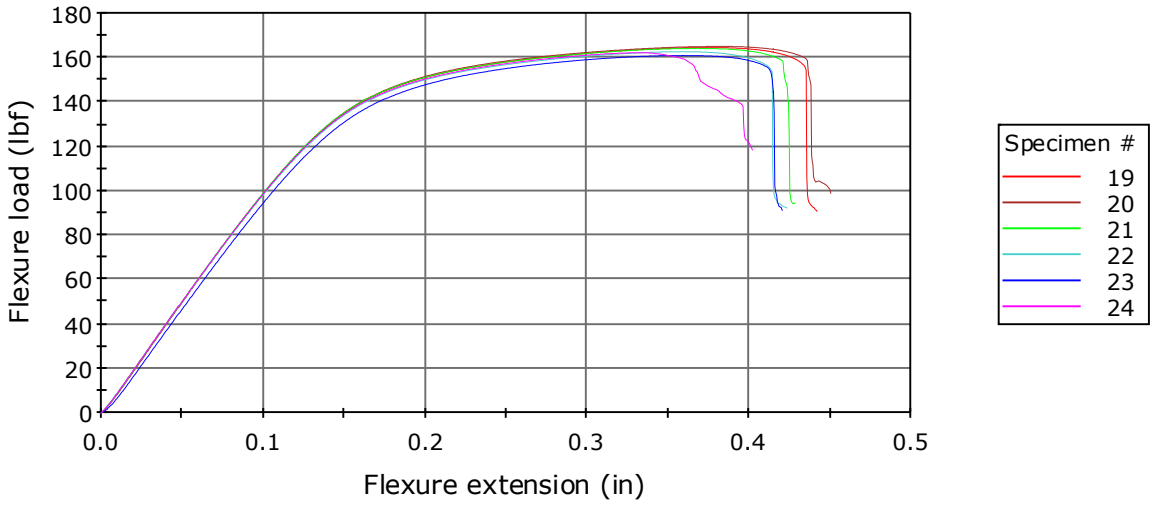


Total Quality. Assured.

Specimen 13 to 18

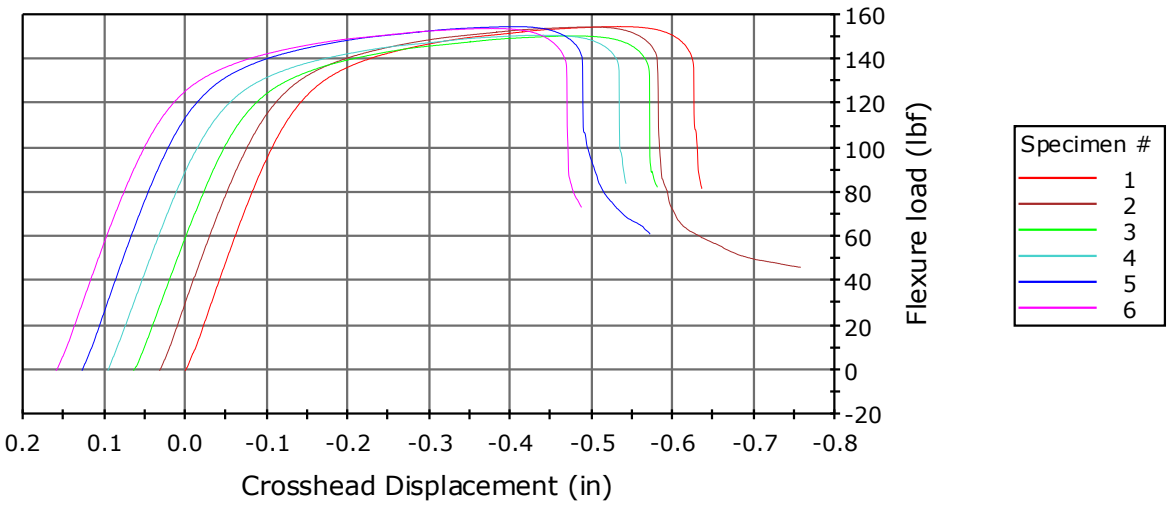


Specimen 19 to 24

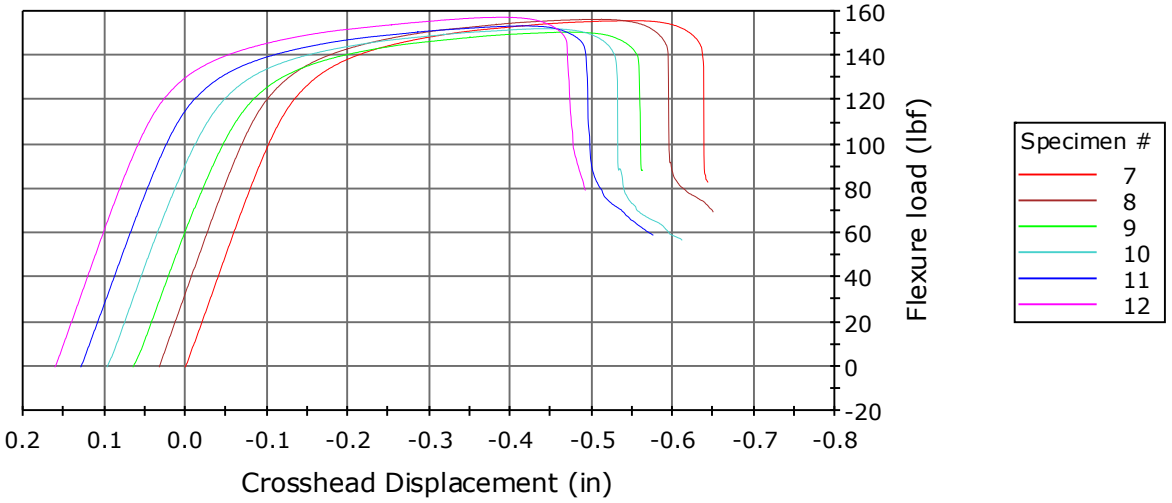


Total Quality. Assured.

Specimen 1 to 6

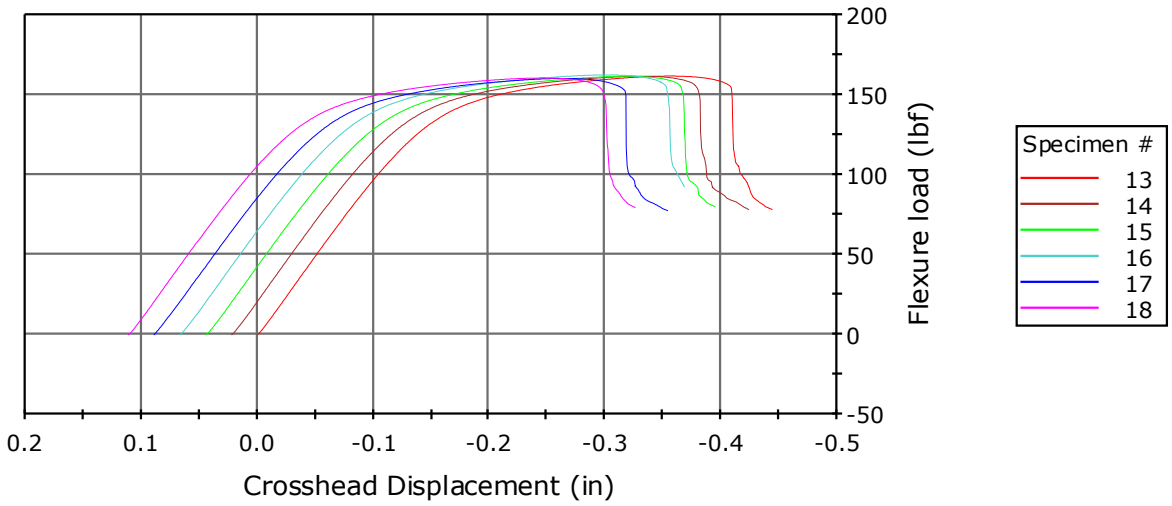


Specimen 7 to 12

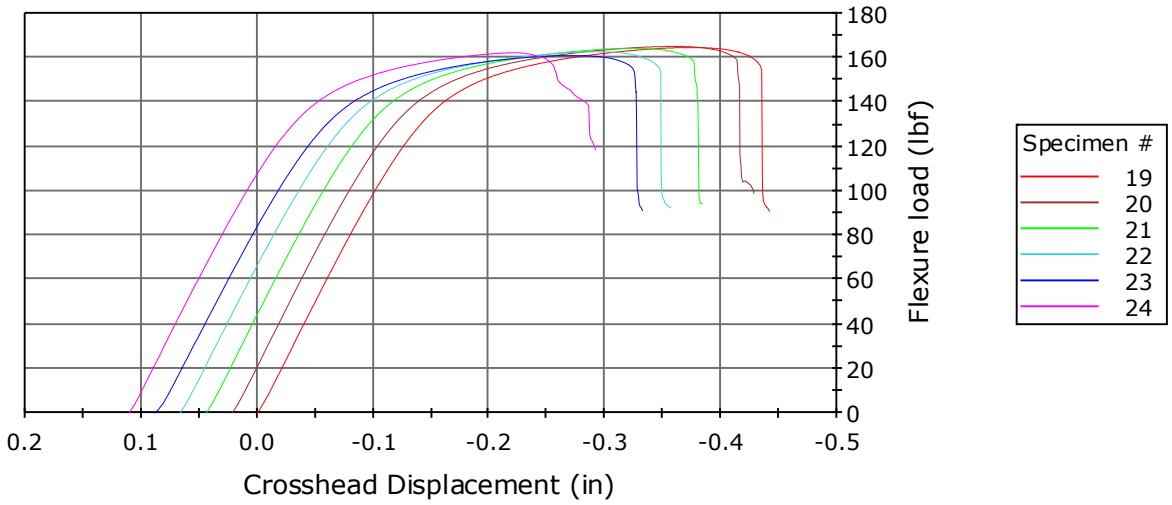


Total Quality. Assured.

Specimen 13 to 18



Specimen 19 to 24



intertek
Total Quality. Assured.

	Specimen ID	Width (in)	Thickness (in)	Maximum Load (lbf)
1	PE-ME-1	3.018	0.157	154.486
2	PE-ME-2	3.019	0.157	154.301
3	PE-ME-3	2.994	0.155	150.297
4	PE-ME-4	2.995	0.156	150.618
5	PE-ME-5	3.008	0.157	154.469
6	PE-ME-6	2.995	0.157	153.626
7	PE-MI-1	3.014	0.157	155.582
8	PE-MI-2	3.007	0.158	156.216
9	PE-MI-3	3.001	0.155	150.479
10	PE-MI-4	3.016	0.155	152.017
11	PE-MI-5	2.985	0.157	153.263
12	PE-MI-6	3.017	0.158	157.136
13	PE-CE-1	2.995	0.156	161.490
14	PE-CE-2	2.997	0.155	161.359
15	PE-CE-3	2.985	0.156	161.359
16	PE-CE-4	2.999	0.156	162.190
17	PE-CE-5	2.968	0.156	160.020
18	PE-CE-6	2.933	0.157	160.280
19	PE-CI-1	3.003	0.157	164.433
20	PE-CI-2	3.006	0.157	164.929
21	PE-CI-3	3.007	0.157	164.025
22	PE-CI-4	2.993	0.157	162.577
23	PE-CI-5	2.988	0.156	160.864
24	PE-CI-6	2.984	0.157	162.077
Mean		2.997	0.157	157.837
Standard Deviation		0.01859	0.00088	4.79339
Coefficient of Variation		0.62016	0.56527	3.03692

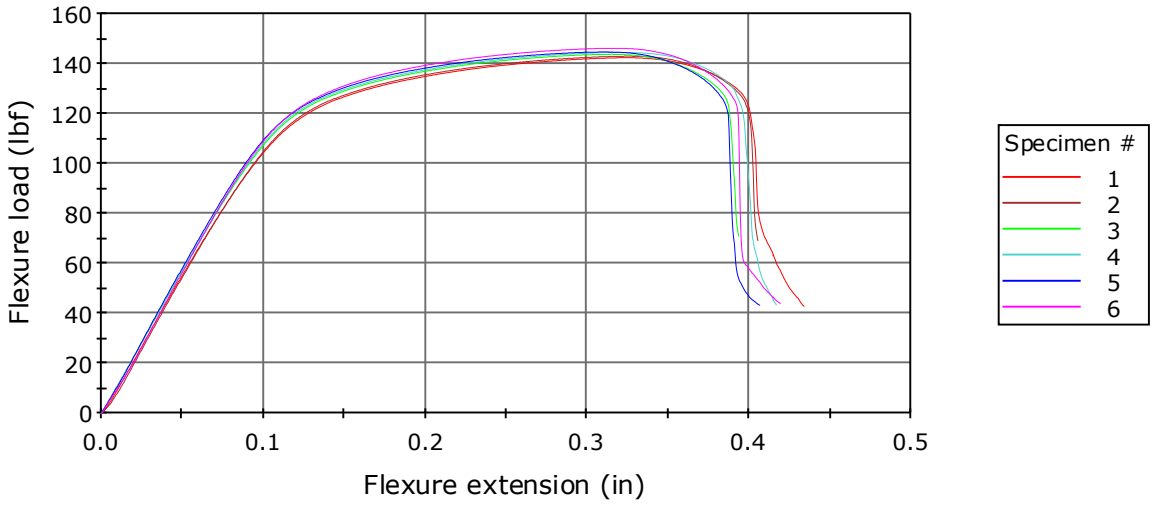
	Specimen ID	Core Shear Ultimate Stress (psi)	Core Shear Yield Stress (psi)	Facing Stress (psi)
1	PE-ME-1	187	143	28023
2	PE-ME-2	187	142	27980
3	PE-ME-3	186	145	27889
4	PE-ME-4	185	142	27733
5	PE-ME-5	187	143	28113
6	PE-ME-6	187	143	28081
7	PE-MI-1	188	149	28259
8	PE-MI-2	188	148	28234
9	PE-MI-3	186	145	27857
10	PE-MI-4	187	146	28002
11	PE-MI-5	187	148	28108
12	PE-MI-6	189	148	28306
13	PE-CE-1	198	165	29735
14	PE-CE-2	199	167	29911
15	PE-CE-3	199	165	29811
16	PE-CE-4	199	165	29824
17	PE-CE-5	198	165	29733
18	PE-CE-6	199	166	29916
19	PE-CI-1	200	167	29976
20	PE-CI-2	200	167	30036
21	PE-CI-3	199	166	29862
22	PE-CI-4	198	165	29737
23	PE-CI-5	198	165	29689
24	PE-CI-6	198	166	29735
Mean		193	156	28940
Standard Deviation		6.13939	10.77491	920.90896
Coefficient of Variation		3.18218	6.92887	3.18218

Total Quality. Assured.

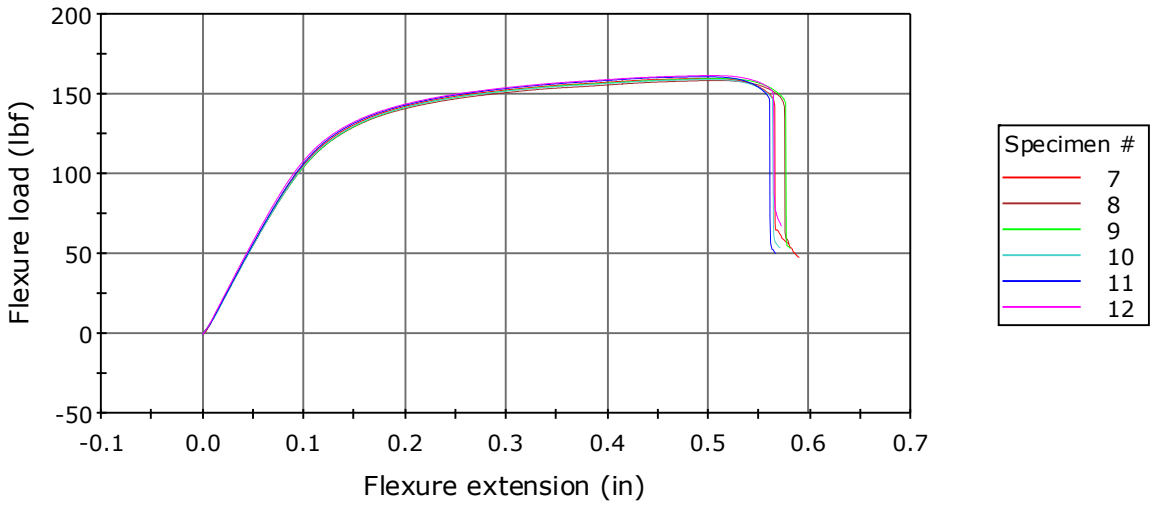
ASTM C393/C393M-16, Core Shear Properties of Sandwich Constructions by Beam Flexure, 3-point

Intertek-ATI Job #	I6239.01-106-31
Client Name	STACBOND
Sample description	A2
Lab Conditions	70.5°F / 49.6% RH
Test Speed	0.250 in/min
Load Cell	2 kN / 005742
Load Cell Calibration Due Date	10/19
Test Frame	INSTRON 3369 / 005740
Frame Calibration Due Date	10/19
User	Josh K.

Specimen 1 to 6

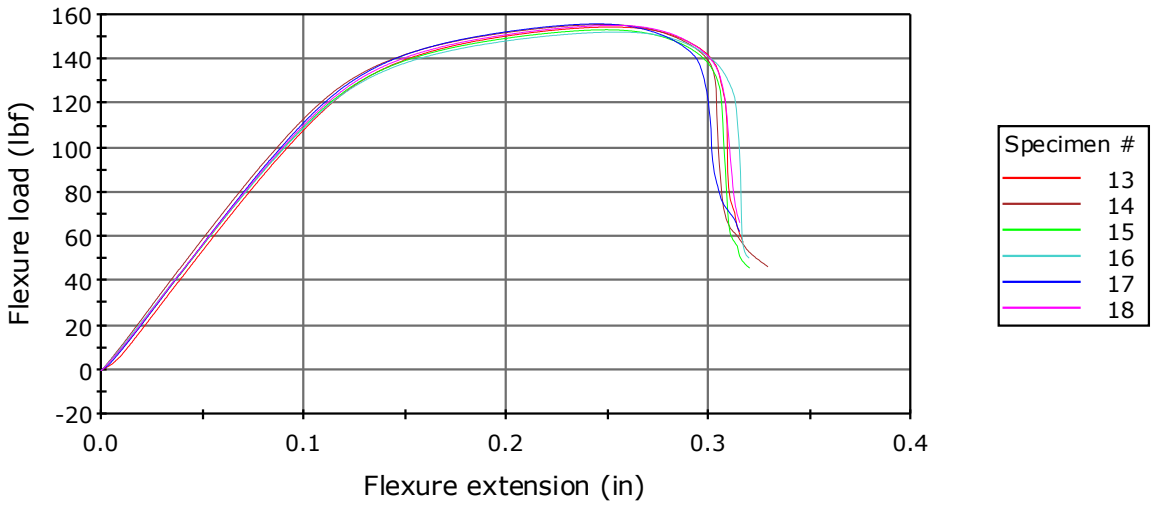


Specimen 7 to 12

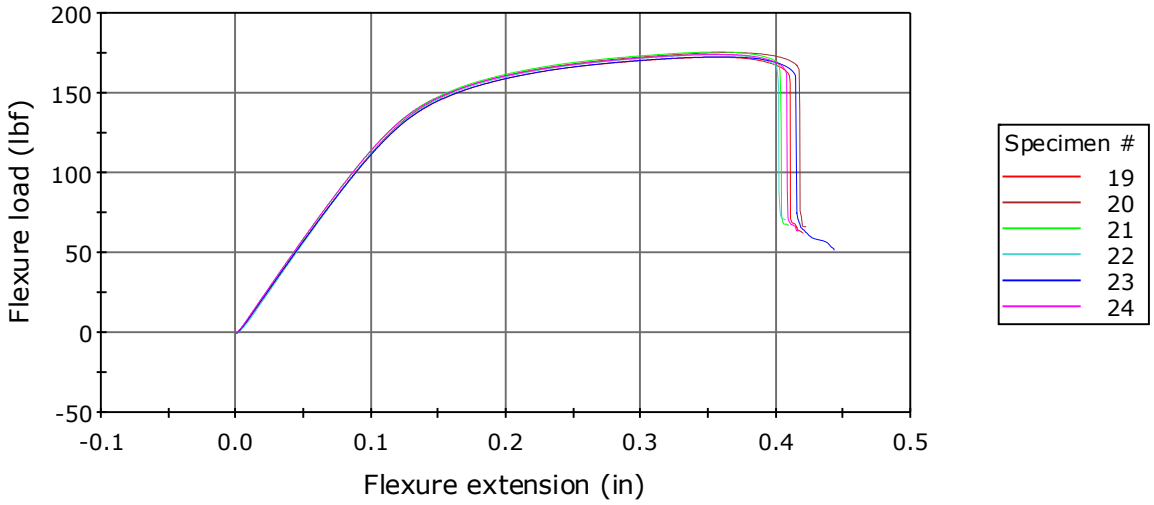


Total Quality. Assured.

Specimen 13 to 18

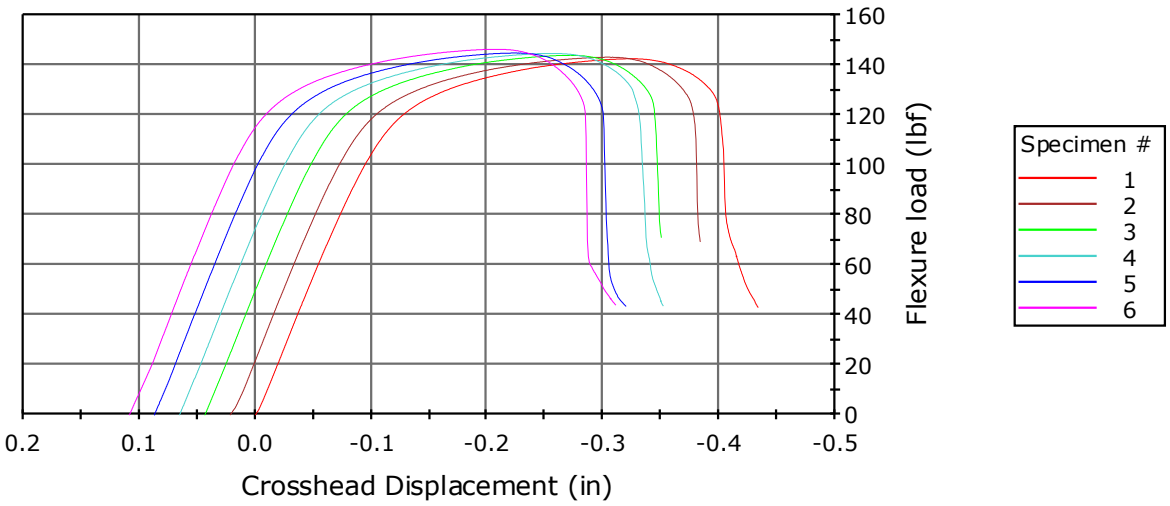


Specimen 19 to 24

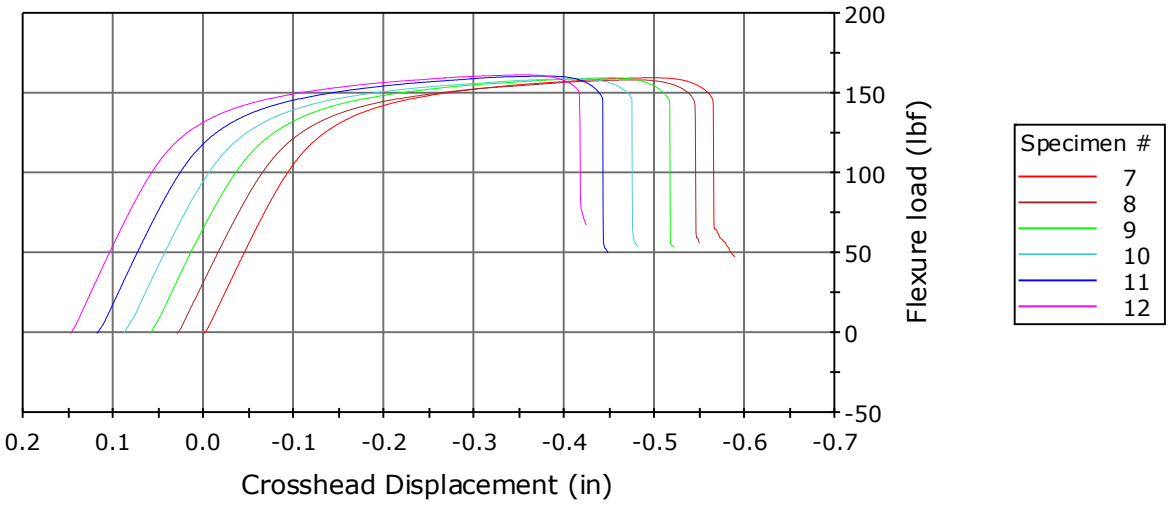


Total Quality. Assured.

Specimen 1 to 6

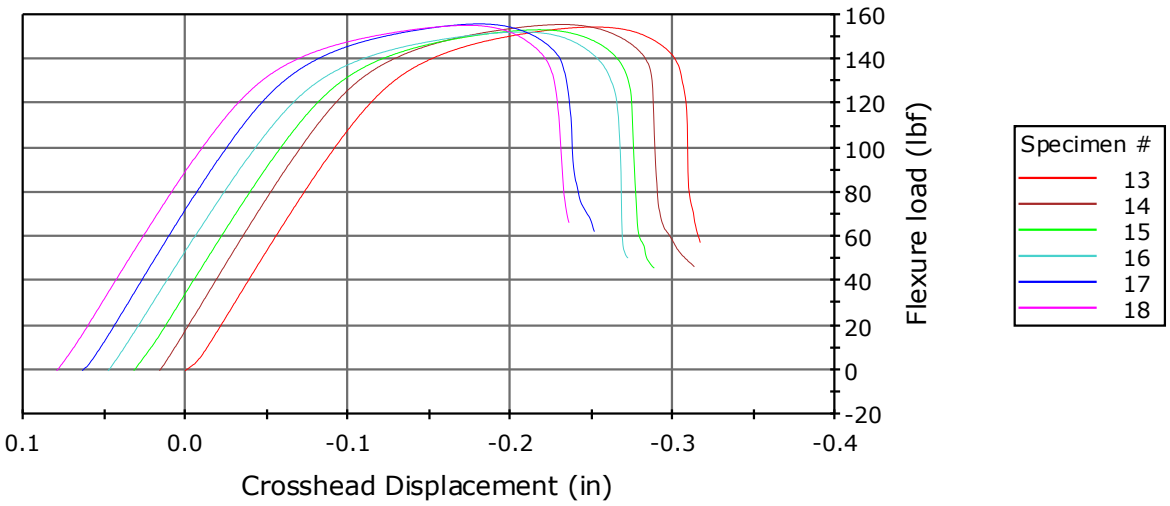


Specimen 7 to 12

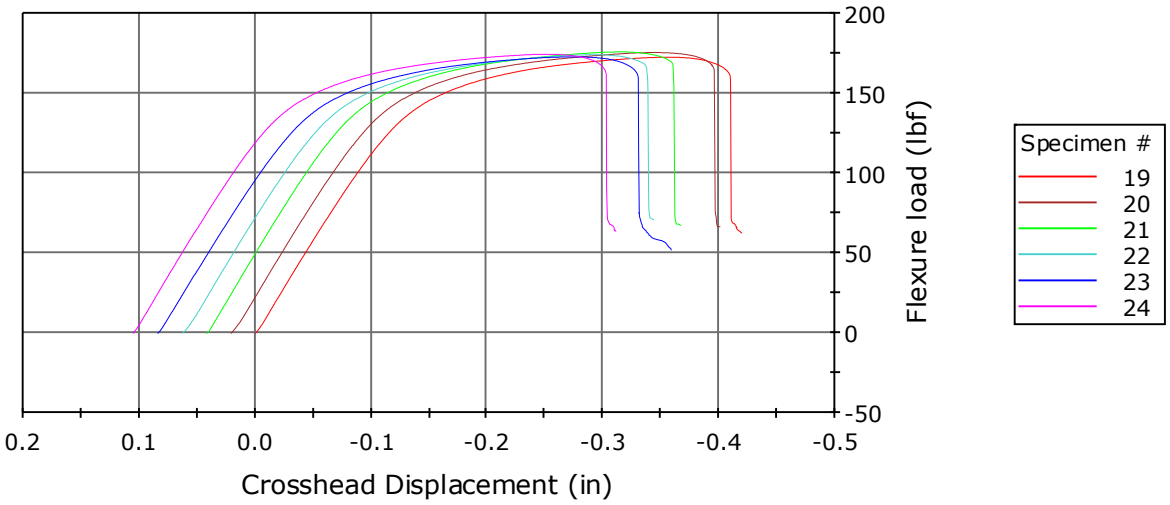


Total Quality. Assured.

Specimen 13 to 18



Specimen 19 to 24



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Total Quality. Assured.

	Specimen ID	Width (in)	Thickness (in)	Maximum Load (lbf)
1	A2-ME-1	3.016	0.157	142.275
2	A2-ME-2	3.004	0.159	142.877
3	A2-ME-3	3.024	0.159	143.630
4	A2-ME-4	3.009	0.160	144.378
5	A2-ME-5	2.996	0.161	144.541
6	A2-ME-6	3.017	0.160	146.035
7	A2-MI-1	3.032	0.158	159.568
8	A2-MI-2	3.026	0.157	158.229
9	A2-MI-3	3.001	0.160	159.501
10	A2-MI-4	3.002	0.160	158.893
11	A2-MI-5	2.989	0.161	160.584
12	A2-MI-6	3.007	0.160	161.326
13	A2-CE-1	3.013	0.158	154.303
14	A2-CE-2	3.000	0.160	155.403
15	A2-CE-3	2.989	0.159	153.057
16	A2-CE-4	2.960	0.159	152.022
17	A2-CE-5	3.009	0.160	155.665
18	A2-CE-6	3.018	0.157	155.040
19	A2-CI-1	3.016	0.159	172.369
20	A2-CI-2	3.002	0.160	175.262
21	A2-CI-3	2.994	0.160	175.647
22	A2-CI-4	3.002	0.159	173.910
23	A2-CI-5	3.020	0.158	172.567
24	A2-CI-6	3.006	0.160	174.192
Mean		3.006	0.159	157.970
Standard Deviation		0.01500	0.00118	11.13900
Coefficient of Variation		0.49906	0.74039	7.05135

	Specimen ID	Core Shear Ultimate Stress (psi)	Core Shear Yield Stress (psi)	Facing Stress (psi)
1	A2-ME-1	172	144	25825
2	A2-ME-2	171	144	25663
3	A2-ME-3	171	145	25628
4	A2-ME-4	171	145	25705
5	A2-ME-5	171	145	25662
6	A2-ME-6	173	146	25931
7	A2-MI-1	191	145	28602
8	A2-MI-2	191	143	28626
9	A2-MI-3	190	142	28473
10	A2-MI-4	189	144	28355
11	A2-MI-5	191	145	28577
12	A2-MI-6	192	145	28741
13	A2-CE-1	186	163	27833
14	A2-CE-2	185	162	27750
15	A2-CE-3	184	161	27630
16	A2-CE-4	185	162	27712
17	A2-CE-5	185	162	27714
18	A2-CE-6	187	164	28123
19	A2-CI-1	206	166	30837
20	A2-CI-2	209	170	31276
21	A2-CI-3	210	170	31428
22	A2-CI-4	208	170	31258
23	A2-CI-5	207	168	31055
24	A2-CI-6	207	168	31044
Mean		189	155	28310
Standard Deviation		13.23631	11.04888	1985.44612
Coefficient of Variation		7.01316	7.12982	7.01316

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SECTION 12
REVISION LOG

REVISION #	DATE	PAGES	REVISION
0	05/13/19	N/A	Original Report Issue