NATIONAL INSTITUTE FOR AVIATION RESEARCH

WICHITA STATE UNIVERSITY

Core Material Qualification Guidance for Aircraft Design and Certification

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CECAM center of excellence for composites and advanced materials

A Center of Excellence AMTAS Advanced Materials in Transport Aircraft Structures

JAMS JOINT ADVANCED MATERIALS & STRUCTURES CENTER OF EXCELLENCE

Federal Aviation Administration

Research Team & Project Objectives

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Project Objectives

- Develop a framework for the qualification of **core materials** including guidelines and recommendations for their characterization, testing, design and utilization within the aerospace industry.
- To transition the test data and guidelines generated in this program into shared databases, such as **CMH-17.**

Project Roadmap

Project Objectives

- Develop a framework for the qualification of **core materials** including guidelines and recommendations for their characterization, testing, design and utilization within the aerospace industry.
- Second goal: To transition the test data and guidelines generated in this program into shared databases, such as **CMH-17.**

Research Outputs

- **Trial test results** that provide valuable lessons learned regarding test methods best suited for core materials
- **Qualification framework for core materials**
  - **Material and process specifications**
  - **Test matrix and subsequent test plan including required physical and mechanical test methods. Mechanical test plan inclusive of relevant environments for these materials and applications.**
- Lessons learned, guidelines, and data made available to **CMH-17**

Establishment of Industry Steering Committee

Trial Testing & DRAFT Framework Development

- **Industry Survey**
- **Material Selection**
- **Material Acquisition and Fabrication**
- **Testing, Data Reduction and Data Analysis**
- **Steering Committee Review**

Qualification Program

- **Test Plan & Specification Development**
- **Material Acquisition & Panel Fabrication**
- **Testing & Data Reduction**
- **Data Review (Statistical Analysis)**
- **Reports and Specifications Published**

Industry Survey

- **Goal of Survey: *Generate industry driven input on the development of a qualification framework for core materials***
- **48 responses from 23 organizations** (50% OEMS, 24% Tier 1 suppliers, others – consultants, government, academia)
  - Question 5 – Core materials primarily used by respondents:
    - **98% Honeycomb**
    - 80% Foam
    - 20% Corrugated
  - Question 6 – Core materials and parts/applications currently in use:
    - Materials: **Nomex honeycomb core** mentioned in nearly every response but other materials mentioned (fiberglass, closed cell foams)
    - Parts/applications: Secondary structures – control surfaces, access panels, fairings, spoilers
  - Questions 7 – Materials for future aircraft structures (5-10 years):
    - **91% Honeycomb**
    - 72% Foam
    - 20% Corrugated

Question	Answer Type
Q1: Company Name	Text box
Q2: What is your company's role in the aviation industry?	Radio buttons with pre-selected options + "other" option and comments box
Q3: Are you familiar with CMH-17 (previously known as MIL-17)?	Yes/No
Q4: Are you familiar with the NCAMP qualification and equivalency program through Wichita State University – NIAR?	Yes/No
Q5: Please identify the core material forms that you are currently utilizing in aircraft structures. Check all that apply.	**Select from following general options (multiple selections allowed):** ***Honeycomb, Cross-Banded, Corrugate, Waffle-Type, Foam, Natural (balsa wood and others), Other (please specify)***
Q6: Please specify the core materials and parts/applications currently in use- Multiple materials/parts can be listed	**Text box**
Q7: Please identify the core material forms that are proposed for future aircraft structures (5-10 years). Check all that apply.	**Select from following general options (multiple selections allowed):** ***Honeycomb, Cross-Banded, Corrugated, Waffle-Type, Foams, Natural (balsa wood and others), Other (please specify)***
Q8: Please specify the core material and parts/applications proposed for future aircraft- Multiple materials can be listed	Text box
Q9: Are there other core materials that you believe are likely to produce structural components in aircraft within the next 5-10 years?	List core type List materials (facesheet/core) List parts/application
Q10: Please rate the following statements for implementing new core materials from Strongly Disagree to Strongly Agree.	*Cost, Availability, Producibility, Lack of trained personnel , Lack of design and certification guidelines, Lack of available qualification data, Joint design, Flaw detection by NDI, Reparability*
Q11: Are you interested in serving on a peer advisory committee to provide technical expertise on the development of the methodology?	Yes/No If Yes, users directed page to enter contact information
Q12: Is your company interested in contributing materials and/or resources to the development of data for incorporation of results into CMH-17 and other sources for the general public?	Yes/No If Yes, users directed page to enter contact information

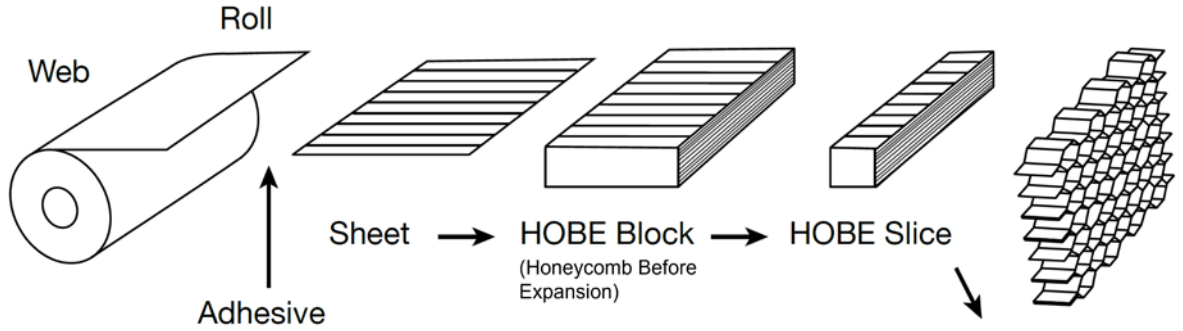
Material Selection

Material	Description	Selection Support
Honeycomb Core	**HexWeb® HRH-10-1/8-3.0**	**Committee feedback & Survey Commonly used in industry**
Facesheet Prepreg	HexPly® AGP193P(NT)/8552S;38%;193AW;50	NCAMP Qualified
Film Adhesive	FM 300-2M	NCAMP Qualification in Progress

HexWeb® — Hexcel Product Line

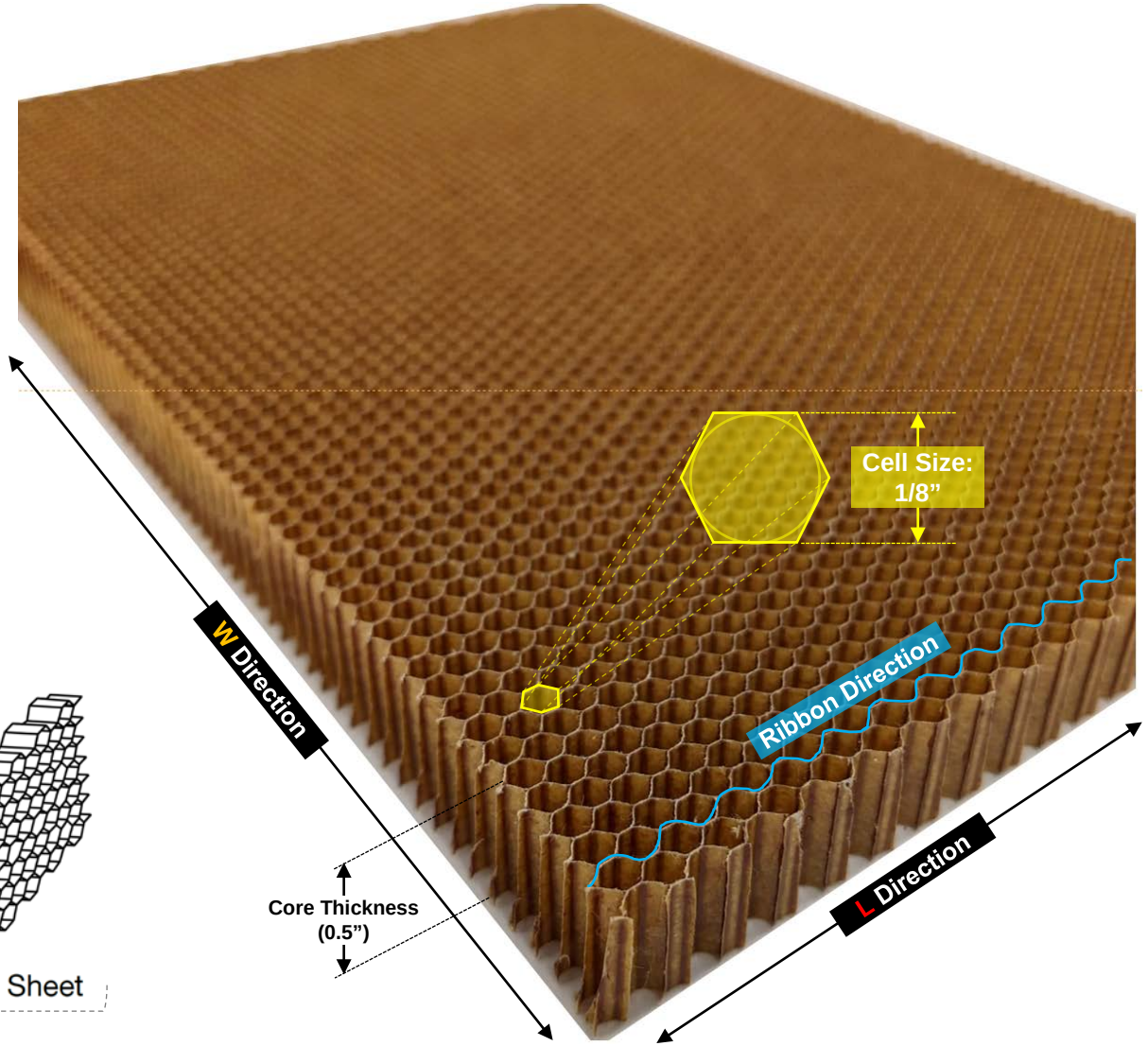
HRH-10-1/8-3.0

- **HRH**: Honeycomb Type: Aramid Fiber/Phenolic Resin Honeycomb
- **10**: Nominal Density (lbm/ft³)
- **1/8**: Cell Size (inches)
- **3.0**



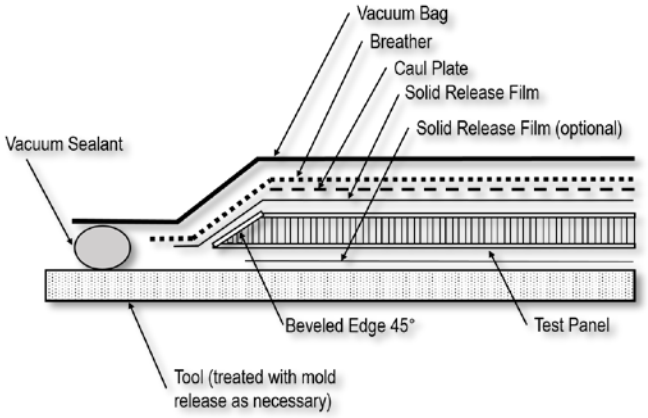
2016, Hexcel, HexWeb® Honeycomb Attributes and Properties

Non-metallic honeycomb is generally expanded before slicing



Summary of Qualification Documentation

- **NCAMP Test Plan**
  - Batch Definition
    - Paper is tracked via distinguishable lots
    - Resin Dip Date is tracked via a “unique” resin batch with at least 3-4 weeks between the dates.
- **NCAMP Material Specification**
  - Material Spec Limits
    - Core Mechanical & Physical Properties
- **NCAMP Process Specification**



Batch Definition

Core Batch	A	B	C
Paper Lot	Paper Lot 1	Paper Lot 2	Paper Lot 3
Resin Dip Date	MM/DD/YYYY	MM/DD/YYYY	MM/DD/YYYY

Material Specification Required Mechanical Properties

Property	Test Method	Number of Replicates
Bare Compression Strength	ASTM C365	3 per batch
Plate Shear Strength (L)	ASTM C273	3 per batch
Plate Shear Strength (W)	ASTM C273	3 per batch

Material Specification Required Physical Properties

Property	Test Method	Number of Replicates
Core Density	ASTM C271	3 per batch
Flame Resistance (1)	DOT/FAA/AR-00/12 Chapter 1	3 per batch
Note 1: Flammability will only be tested as part of the qualification program and will be removed as long as the material passes FAA requirements. The data will be left in the reports to show the material does pass this requirement and provide information for potential users.		

Hexcel Casa Grande Visit – NCAMP Facility Audit

- NCAMP Personnel:
  - Michelle Man
  - Nicole Stahl
- Reviewed Hexcel's Internal PCD and Core Fabrication Process:
  - Hexcel will make an NCAMP specific PCD with a few minor changes.
  - NCAMP will review before program completion.

Qualification Test Matrix

Mechanical Test Matrix

Layup (Warp Direction)	Test Type and Direction	Core Thickness	Property	Number of Batches x Number of Sheets x Number of Test Specimens			
				Test Temperature/Moisture Condition			
				CTD	RTD	ETD1	ETW1
N/A	Core Shear (L) ASTM C273	0.5"	Strength and Modulus	3x2x3	3x2x3	3x2x3	1x2x3
N/A	Core Shear (W) ASTM C273	0.5"	Strength and Modulus	3x2x3	3x2x3	3x2x3	1x2x3
N/A	Core Shear (L) ASTM C273	0.25" 0.375" 0.75" 1.0" 1.5"	Strength and Modulus (thickness correction factor)	1x2x4	1x2x4	1x2x4	1x2x4
N/A	Core Shear (W) ASTM C273	0.25" 0.375" 0.75" 1.0" 1.5"	Strength and Modulus (thickness correction factor)	1x2x4	1x2x4	1x2x4	1x2x4
N/A	Bare Flatwise Core Compression ASTM C365	0.5"	Strength	3x2x3	3x2x3	3x2x3	1x2x3
4 core 4 (1)	Stabilized Flatwise Core Compression ASTM C365	0.5"	Strength and Modulus	3x2x3	3x2x3	3x2x3	1x2x3
4 core 4 (1)	Flatwise Tension ASTM C297	0.5"	Strength	3x2x3	3x2x3	3x2x3	1x2x3
4 core 2 (1)	Climbing Drum Peel ASTM D1781	0.5"	Strength	3x2x3	3x2x3	3x2x3	1x2x3
4 core 4 (1)	Core Shear Stress ASTM C393	0.5"	Strength and Modulus	3x2x3	3x2x3	3x2x3	1x2x3
4 core 4 (1)	Long Beam Flex ASTM D7249	0.5"	Strength and Modulus	3x2x3	3x2x3	3x2x3	1x2x3

Note 1: “4 core 4” corresponds to 4 plies for top facesheet bonded to core with 2 plies of film adhesive and 4 plies for the bottom facesheet bonded to the core with 2 plies of film adhesive. Facesheet layup will be [0,90,90,0] for 4 ply facesheets and [0,90] for 2 ply facesheets.

Physical Test Matrix

Property	Condition/Method	Min Replicates per Test Type
Core Thickness	ASTM C366	All data from mechanical test specimens
Core Density	ASTM C271	Density to be taken from each sheet of core material used with 10 replicates per sheet.

Fluid Sensitivity Test Matrix (ASTM C365 Bare)

Extended Contact:	Exposure	Test Condition	Code
ASTM D1655 Jet A Fuel (other jet fuel may be used but its type must be reported)	90 days min. @ 70°F±10°F	70°F	FS12RT
	90 days min. @ 70°F±10°F	180°F	FS12ET
MIL-PRF-5606 Hydraulic Oil	90 days min. @ 70°F±10°F	70°F	FS13RT
	90 days min. @ 70°F±10°F	180°F	FS13ET
MIL-PRF-83282 Hydraulic Oil	90 days min. @ 70°F±10°F	70°F	FS14RT
	90 days min. @ 70°F±10°F	180°F	FS14ET
MIL-PRF-7808 Engine Oil	90 days min. @ 70°F±10°F	70°F	FS15RT
	90 days min. @ 70°F±10°F	180°F	FS15ET
MIL-PRF-23699, Class STD Engine Oil	90 days min. @ 70°F±10°F	70°F	FS16RT
	90 days min. @ 70°F±10°F	180°F	FS16ET
Sea Water (ASTM D1141 or equiv.)	90 days min. @ 70°F±10°F	70°F	FS17RT
	90 days min. @ 70°F±10°F	180°F	FS17ET
Skydrol LD-4 (SAE AS1241, Type IV, Class 1)	90 days min. @ 70°F±10°F	70°F	FS18RT
	90 days min. @ 70°F±10°F	180°F	FS18ET
50% Water with 50% Skydrol LD-4 (SAE AS1241, Type IV, Class 1)	90 days min. @ 70°F±10°F	70°F	FS19RT
	90 days min. @ 70°F±10°F	180°F	FS19ET
Short Duration Contact:			
MEK washing fluid. ASTM D740	90 minutes min. @ 70°F±10°F	70°F	FS21RT
	90 minutes min. @ 70°F±10°F	180°F	FS21ET
Polypropylene Glycol Deicer (Type I) SAE AMS 1424	90 minutes min. @ 70°F±10°F	70°F	FS22RT
	90 minutes min. @ 70°F±10°F	180°F	FS22ET
Isopropyl Alcohol Deicing Agent (TT-I-735)	48±4 hours @70°F±10°F	70°F	FS23RT
	48±4 hours @70°F±10°F	180°F	FS23ET
Control Tests:			
Distilled Water	90 days min. at 70°F±10°F	70°F	FS31RT
	90 days min. at 70°F±10°F	180°F	FS31ET
Dry	Dry per section 6.1	70°F	FS32RT
	Dry per section 6.1	180°F	FS32ET
85% Relative Humidity	Per section 6.1	70°F	FS33RT
	Per section 6.1	180°F	FS33ET

Qualification Test Matrix

Mechanical Test Matrix

Layup (Warp Direction)	Test Type and Direction	Core Thickness	Property	Number of Batches x Number of Sheets x Number of Test Specimens			
				Test Temperature/Moisture Condition			
				CTD	RTD	ETD1	ETW1
N/A	Core Shear (L) ASTM C273	0.5"	Strength and Modulus	3x2x3	3x2x3	3x2x3	1x2x3
N/A	Core Shear (W) ASTM C273	0.5"	Strength and Modulus	3x2x3	3x2x3	3x2x3	1x2x3
N/A	Core Shear (L) ASTM C273	0.25" 0.375" 0.75" 1.0" 1.5"	Strength and Modulus (thickness correction factor)	1x2x4	1x2x4	1x2x4	1x2x4
N/A	Core Shear (W) ASTM C273	0.25" 0.375" 0.75" 1.0" 1.5"	Strength and Modulus (thickness correction factor)	1x2x4	1x2x4	1x2x4	1x2x4
N/A	Bare Flatwise Core Compression ASTM C365	0.5"	Strength	3x2x3	3x2x3	3x2x3	1x2x3
4 core 4 (1)	Stabilized Flatwise Core Compression ASTM C365	0.5"	Strength and Modulus	3x2x3	3x2x3	3x2x3	1x2x3
4 core 4 (1)	Flatwise Tension ASTM C297	0.5"	Strength	3x2x3	3x2x3	3x2x3	1x2x3
4 core 2 (1)	Climbing Drum Peel ASTM D1781	0.5"	Strength	3x2x3	3x2x3	3x2x3	1x2x3
4 core 4 (1)	Core Shear Stress ASTM C393	0.5"	Strength and Modulus	3x2x3	3x2x3	3x2x3	1x2x3
4 core 4 (1)	Long Beam Flex ASTM D7249	0.5"	Strength and Modulus	3x2x3	3x2x3	3x2x3	1x2x3

Thickness Correction Factor Range

Single Batch for Wet Properties

Note 1: "4 core 4" corresponds to 4 plies for top facesheet bonded to core with 2 plies of film adhesive and 4 plies for the bottom facesheet bonded to the core with 2 plies of film adhesive. Facesheet layup will be [0,90,90,0] for 4 ply facesheets and [0,90] for 2 ply facesheets.

Physical Test Matrix

Property	Condition/Method	Min Replicates per Test Type
Core Thickness	ASTM C366	All data from mechanical test specimens
Core Density	ASTM C271	Density to be taken from each sheet of core material used with 10 replicates per sheet.

Fluid Sensitivity Test Matrix (ASTM C365 Bare)

Extended Contact:	Exposure	Test Condition	Code
ASTM D1655 Jet A Fuel (other jet fuel may be used but its type must be reported)	90 days min. @ 70°F±10°F	70°F	FS12RT
	90 days min. @ 70°F±10°F	180°F	FS12ET
MIL-PRF-5606 Hydraulic Oil	90 days min. @ 70°F±10°F	70°F	FS13RT
	90 days min. @ 70°F±10°F	180°F	FS13ET
MIL-PRF-83282 Hydraulic Oil	90 days min. @ 70°F±10°F	70°F	FS14RT
	90 days min. @ 70°F±10°F	180°F	FS14ET
MIL-PRF-7808 Engine Oil	90 days min. @ 70°F±10°F	70°F	FS15RT
	90 days min. @ 70°F±10°F	180°F	FS15ET
MIL-PRF-23699, Class STD Engine Oil	90 days min. @ 70°F±10°F	70°F	FS16RT
	90 days min. @ 70°F±10°F	180°F	FS16ET
Sea Water (ASTM D1141 or equiv.)	90 days min. @ 70°F±10°F	70°F	FS17RT
	90 days min. @ 70°F±10°F	180°F	FS17ET
Skydrol LD-4 (SAE AS1241, Type IV, Class 1)	90 days min. @ 70°F±10°F	70°F	FS18RT
	90 days min. @ 70°F±10°F	180°F	FS18ET
50% Water with 50% Skydrol LD-4 (SAE AS1241, Type IV, Class 1)	90 days min. @ 70°F±10°F	70°F	FS19RT
	90 days min. @ 70°F±10°F	180°F	FS19ET
Short Duration Contact:			
MEK washing fluid. ASTM D740	90 minutes min. @ 70°F±10°F	70°F	FS21RT
	90 minutes min. @ 70°F±10°F	180°F	FS21ET
Polypropylene Glycol Deicer (Type I) SAE AMS 1424	90 minutes min. @ 70°F±10°F	70°F	FS22RT
	90 minutes min. @ 70°F±10°F	180°F	FS22ET
Isopropyl Alcohol Deicing Agent (TT-I-735)	48±4 hours @70°F±10°F	70°F	FS23RT
	48±4 hours @70°F±10°F	180°F	FS23ET
Control Tests:			
Distilled Water	90 days min. at 70°F±10°F	70°F	FS31RT
	90 days min. at 70°F±10°F	180°F	FS31ET
Dry	Dry per section 6.1	70°F	FS32RT
	Dry per section 6.1	180°F	FS32ET
85% Relative Humidity	Per section 6.1	70°F	FS33RT
	Per section 6.1	180°F	FS33ET

Fluid Sensitivity Using Bare ASTM C365

Outline of Test Specimens per Batch & Sheet

Core Batch	Core Thickness	Sheet	Test Type	Geometry (0°x90°)	Test Method	CTD -65°F	RTD 70°F	ETD 180°F	ETW 180°F	Core Panel Size (0°x90°)	Panel Name
Batch A NA34151	0.5"	1	Stabilized Compression (SFWC)	2"x2"	ASTM C365	5	5	5	5	15"x13"	*NTP1018Q1-HXL-H21-NIAR-SFWC-A-S1-C1-1*
			Flatwise Tension (FWT)	2"x2"	ASTM C297	5	5	5	5	15"x13"	*NTP1018Q1-HXL-H21-NIAR-FWT-A-S1-C1-1*
			Long Beam Flex (LBF)	24"x3"	ASTM D7249	2	2	3	3	29"x36"	*NTP1018Q1-HXL-H21-NIAR-LBF-A-S1-C1-1*
			Core Shear (CSL)	6"x2"	ASTM C273	5	5	5	5	N/A	*N/A*
			Core Shear (CSW)	2"x6"	ASTM C273	5	5	5	5	N/A	*N/A*
			Bare Flatwise Core Compression (BFWC)	2"x2"	ASTM C365	5	5	5	5	N/A	*N/A*
			Bare Flatwise Core Compression - Fluids	2"x2"	ASTM C365		35		35	N/A	*N/A*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
		2	Stabilized Compression (SFWC)	2"x2"	ASTM C365	5	5	5	5	15"x13"	*NTP1018Q1-HXL-H21-NIAR-SFWC-A-S2-C1-1*
			Flatwise Tension (FWT)	2"x2"	ASTM C297	5	5	5	5	15"x13"	*NTP1018Q1-HXL-H21-NIAR-FWT-A-S2-C1-1*
			Long Beam Flex (LBF)	24"x3"	ASTM D7249	2	2	3	3	29"x36"	*NTP1018Q1-HXL-H21-NIAR-LBF-A-S2-C1-1*
			Core Shear (CSL)	6"x2"	ASTM C273	5	5	5	5	N/A	*N/A*
			Core Shear (CSW)	2"x6"	ASTM C273	5	5	5	5	N/A	*N/A*
			Bare Flatwise Core Compression (BFWC)	2"x2"	ASTM C365	5	5	5	5	N/A	*N/A*
			Bare Flatwise Core Compression - Fluids	2"x2"	ASTM C365		35		35	N/A	*N/A*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
		3	Climbing Drum Peel (CDP)	14"x3"	ASTM D1781	5	5	5	5	33"x36"	*NTP1018Q1-HXL-H21-NIAR-CDP-A-S3-C1-1*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
		4	Climbing Drum Peel (CDP)	14"x3"	ASTM D1781	5	5	5	5	33"x36"	*NTP1018Q1-HXL-H21-NIAR-CDP-A-S4-C1-1*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
		5	Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	3	2	2	29"x36"	*NTP1018Q1-HXL-H21-NIAR-LBF-A-S5-C1-1*
			Core Shear Stress (CSS)	8"x3"	ASTM C393	5	5	5	5	37"x20"	*NTP1018Q1-HXL-H21-NIAR-CSS-A-S5-C1-1*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
		6	Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	3	2	2	29"x36"	*NTP1018Q1-HXL-H21-NIAR-LBF-A-S6-C1-1*
			Core Shear Stress (CSS)	8"x3"	ASTM C393	5	5	5	5	37"x20"	*NTP1018Q1-HXL-H21-NIAR-CSS-A-S6-C1-1*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
		7	N/A	N/A	N/A					N/A	*N/A*
	0.25"	1	Core Shear (CSL)	3"x2"	ASTM C273	6	6	6	6	N/A	*N/A*
			Core Shear (CSW)	2"x3"	ASTM C273	6	6	6	6	N/A	*N/A*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
	0.375"	1	Core Shear (CSL)	4.5"x2"	ASTM C273	6	6	6	6	N/A	*N/A*
			Core Shear (CSW)	2"x4.5"	ASTM C273	6	6	6	6	N/A	*N/A*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
	0.75"	1	Core Shear (CSL)	9"x2"	ASTM C273	6	6	6	6	N/A	*N/A*
			Core Shear (CSW)	2"x9"	ASTM C273	6	6	6	6	N/A	*N/A*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
	1.0"	1	Core Shear (CSL)	12"x2"	ASTM C273	6	6	6	6	N/A	*N/A*
			Core Shear (CSW)	2"x12"	ASTM C273	6	6	6	6	N/A	*N/A*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
	1.5"	1	Core Shear (CSL)	18"x2"	ASTM C273	6	6	6	6	N/A	*N/A*
			Core Shear (CSW)	2"x18"	ASTM C273	6	6	6	6	N/A	*N/A*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*

Core Batch	Core Thickness	Sheet	Test Type	Geometry (0°x90°)	Test Method	CTD -65°F	RTD 70°F	ETD 180°F	ETW 180°F	Core Panel Size (0°x90°)	Panel Name
Batch B NA34469	0.5"	1	Stabilized Compression (SFWC)	2"x2"	ASTM C365	5	5	5		15"x13"	*NTP1018Q1-HXL-H21-NIAR-SFWC-B-S1-C1-1*
			Flatwise Tension (FWT)	2"x2"	ASTM C297	5	5	5		15"x13"	*NTP1018Q1-HXL-H21-NIAR-FWT-B-S1-C1-1*
			Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	3	4		29"x36"	*NTP1018Q1-HXL-H21-NIAR-LBF-B-S1-C1-1*
			Core Shear (CSL)	6"x2"	ASTM C273	5	5	5		N/A	*N/A*
			Core Shear (CSW)	2"x6"	ASTM C273	5	5	5		N/A	*N/A*
			Bare Flatwise Core Compression (BFWC)	2"x2"	ASTM C365	5	5	5		N/A	*N/A*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
		2	Stabilized Compression (SFWC)	2"x2"	ASTM C365	5	5	5		15"x13"	*NTP1018Q1-HXL-H21-NIAR-SFWC-B-S2-C1-1*
			Flatwise Tension (FWT)	2"x2"	ASTM C297	5	5	5		15"x13"	*NTP1018Q1-HXL-H21-NIAR-FWT-B-S2-C1-1*
			Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	3	4		29"x36"	*NTP1018Q1-HXL-H21-NIAR-LBF-B-S2-C1-1*
			Core Shear (CSL)	6"x2"	ASTM C273	5	5	5		N/A	*N/A*
			Core Shear (CSW)	2"x6"	ASTM C273	5	5	5		N/A	*N/A*
			Bare Flatwise Core Compression (BFWC)	2"x2"	ASTM C365	5	5	5		N/A	*N/A*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
		3	Climbing Drum Peel (CDP)	14"x3"	ASTM D1781	5	5	5		33"x36"	*NTP1018Q1-HXL-H21-NIAR-CDP-B-S3-C1-1*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
		4	Climbing Drum Peel (CDP)	14"x3"	ASTM D1781	5	5	5		33"x36"	*NTP1018Q1-HXL-H21-NIAR-CDP-B-S4-C1-1*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
		5	Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	4	3		29"x36"	*NTP1018Q1-HXL-H21-NIAR-LBF-B-S5-C1-1*
			Core Shear Stress (CSS)	8"x3"	ASTM C393	5	5	5		37"x20"	*NTP1018Q1-HXL-H21-NIAR-CSS-B-S5-C1-1*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
		6	Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	4	3		29"x36"	*NTP1018Q1-HXL-H21-NIAR-LBF-B-S6-C1-1*
			Core Shear Stress (CSS)	8"x3"	ASTM C393	5	5	5		37"x20"	*NTP1018Q1-HXL-H21-NIAR-CSS-B-S6-C1-1*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
Batch C NA34523	0.5"	1	Stabilized Compression (SFWC)	2"x2"	ASTM C365	5	5	5		15"x13"	*NTP1018Q1-HXL-H21-NIAR-SFWC-C-S1-C1-1*
			Flatwise Tension (FWT)	2"x2"	ASTM C297	5	5	5		15"x13"	*NTP1018Q1-HXL-H21-NIAR-FWT-C-S1-C1-1*
			Long Beam Flex (LBF)	24"x3"	ASTM D7249	5	5	5		29"x36"	*NTP1018Q1-HXL-H21-NIAR-LBF-C-S1-C1-1*
			Core Shear (CSL)	6"x2"	ASTM C273	5	5	5		N/A	*N/A*
			Core Shear (CSW)	2"x6"	ASTM C273	5	5	5		N/A	*N/A*
			Bare Flatwise Core Compression (BFWC)	2"x2"	ASTM C365	5	5	5		N/A	*N/A*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
		2	Stabilized Compression (SFWC)	2"x2"	ASTM C365	5	5	5		15"x13"	*NTP1018Q1-HXL-H21-NIAR-SFWC-C-S2-C1-1*
			Flatwise Tension (FWT)	2"x2"	ASTM C297	5	5	5		15"x13"	*NTP1018Q1-HXL-H21-NIAR-FWT-C-S2-C1-1*
			Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	3	4		29"x36"	*NTP1018Q1-HXL-H21-NIAR-LBF-C-S2-C1-1*
			Core Shear (CSL)	6"x2"	ASTM C273	5	5	5		N/A	*N/A*
			Core Shear (CSW)	2"x6"	ASTM C273	5	5	5		N/A	*N/A*
			Bare Flatwise Core Compression (BFWC)	2"x2"	ASTM C365	5	5	5		N/A	*N/A*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
		3	Climbing Drum Peel (CDP)	14"x3"	ASTM D1781	5	5	5		33"x36"	*NTP1018Q1-HXL-H21-NIAR-CDP-C-S3-C1-1*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
		4	Climbing Drum Peel (CDP)	14"x3"	ASTM D1781	5	5	5		33"x36"	*NTP1018Q1-HXL-H21-NIAR-CDP-C-S4-C1-1*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
		5	Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	4	3		29"x36"	*NTP1018Q1-HXL-H21-NIAR-LBF-C-S5-C1-1*
			Core Shear Stress (CSS)	8"x3"	ASTM C393	5	5	5		37"x20"	*NTP1018Q1-HXL-H21-NIAR-CSS-C-S5-C1-1*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
		6	Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	4	3		29"x36"	*NTP1018Q1-HXL-H21-NIAR-LBF-C-S6-C1-1*
			Core Shear Stress (CSS)	8"x3"	ASTM C393	5	5	5		37"x20"	*NTP1018Q1-HXL-H21-NIAR-CSS-C-S6-C1-1*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*

Outline of Test Specimens per Batch & Sheet

Core Batch	Core Thickness	Sheet	Test Type	Geometry (0°x90°)	Test Method	CTD -65°F	RTD 70°F	ETD 180°F	ETW 180°F	Core Panel Size (0°x90°)	Panel Name
Batch A NA34151	0.5"	1	Stabilized Compression (SFWC)	2"x2"	ASTM C365	5	5	5	5	15"x13"	NTP1018Q1-HXL-H21-NIAR-SFWC-A-S1-C1-1
			Flatwise Tension (FWT)	2"x2"	ASTM C297	5	5	5	5	15"x13"	NTP1018Q1-HXL-H21-NIAR-FWT-A-S1-C1-1
			Long Beam Flex (LBF)	24"x3"	ASTM D7249	2	2	3	3	29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-A-S1-C1-1
			Core Shear (CSL)	6"x2"	ASTM C273	5	5	5	5	N/A	N/A
			Core Shear (CSW)	2"x6"	ASTM C273	5	5	5	5	N/A	N/A
			Bare Flatwise Core Compression (BFWC)	2"x2"	ASTM C365	5	5	5	5	N/A	N/A
			Bare Flatwise Core Compression - Fluids	2"x2"	ASTM C365		35		35	N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		2	Stabilized Compression (SFWC)	2"x2"	ASTM C365	5	5	5	5	15"x13"	NTP1018Q1-HXL-H21-NIAR-SFWC-A-S2-C1-1
			Flatwise Tension (FWT)	2"x2"	ASTM C297	5	5	5	5	15"x13"	NTP1018Q1-HXL-H21-NIAR-FWT-A-S2-C1-1
			Long Beam Flex (LBF)	24"x3"	ASTM D7249	2	2	3	3	29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-A-S2-C1-1
			Core Shear (CSL)	6"x2"	ASTM C273	5	5	5	5	N/A	N/A
			Core Shear (CSW)	2"x6"	ASTM C273	5	5	5	5	N/A	N/A
			Bare Flatwise Core Compression (BFWC)	2"x2"	ASTM C365	5	5	5	5	N/A	N/A
			Bare Flatwise Core Compression - Fluids	2"x2"	ASTM C365		35		35	N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		3	Climbing Drum Peel (CDP)	14"x3"	ASTM D1781	5	5	5	5	33"x36"	NTP1018Q1-HXL-H21-NIAR-CDP-A-S3-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		4	Climbing Drum Peel (CDP)	14"x3"	ASTM D1781	5	5	5	5	33"x36"	NTP1018Q1-HXL-H21-NIAR-CDP-A-S4-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		5	Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	3	2	2	29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-A-S5-C1-1
			Core Shear Stress (CSS)	8"x3"	ASTM C393	5	5	5	5	37"x20"	NTP1018Q1-HXL-H21-NIAR-CSS-A-S5-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		6	Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	3	2	2	29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-A-S6-C1-1
			Core Shear Stress (CSS)	8"x3"	ASTM C393	5	5	5	5	37"x20"	NTP1018Q1-HXL-H21-NIAR-CSS-A-S6-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		7	N/A	N/A	N/A					N/A	N/A
	0.25"	1	Core Shear (CSL)	3"x2"	ASTM C273	6	6	6	6	N/A	N/A
			Core Shear (CSW)	2"x3"	ASTM C273	6	6	6	6	N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
	0.375"	1	Core Shear (CSL)	4.5"x2"	ASTM C273	6	6	6	6	N/A	N/A
			Core Shear (CSW)	2"x4.5"	ASTM C273	6	6	6	6	N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
	0.75"	1	Core Shear (CSL)	9"x2"	ASTM C273	6	6	6	6	N/A	N/A
			Core Shear (CSW)	2"x9"	ASTM C273	6	6	6	6	N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
	1.0"	1	Core Shear (CSL)	12"x2"	ASTM C273	6	6	6	6	N/A	N/A
			Core Shear (CSW)	2"x12"	ASTM C273	6	6	6	6	N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
	1.5"	1	Core Shear (CSL)	18"x2"	ASTM C273	6	6	6	6	N/A	N/A
			Core Shear (CSW)	2"x18"	ASTM C273	6	6	6	6	N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A

Core Batch	Core Thickness	Sheet	Test Type	Geometry (0°x90°)	Test Method	CTD -65°F	RTD 70°F	ETD 180°F	ETW 180°F	Core Panel Size (0°x90°)	Panel Name
Batch B NA34469	0.5"	1	Stabilized Compression (SFWC)	2"x2"	ASTM C365	5	5	5		15"x13"	NTP1018Q1-HXL-H21-NIAR-SFWC-B-S1-C1-1
			Flatwise Tension (FWT)	2"x2"	ASTM C297	5	5	5		15"x13"	NTP1018Q1-HXL-H21-NIAR-FWT-B-S1-C1-1
			Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	3	4		29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-B-S1-C1-1
			Core Shear (CSL)	6"x2"	ASTM C273	5	5	5		N/A	N/A
			Core Shear (CSW)	2"x6"	ASTM C273	5	5	5		N/A	N/A
			Bare Flatwise Core Compression (BFWC)	2"x2"	ASTM C365	5	5	5		N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		2	Stabilized Compression (SFWC)	2"x2"	ASTM C365	5	5	5		15"x13"	NTP1018Q1-HXL-H21-NIAR-SFWC-B-S2-C1-1
			Flatwise Tension (FWT)	2"x2"	ASTM C297	5	5	5		15"x13"	NTP1018Q1-HXL-H21-NIAR-FWT-B-S2-C1-1
			Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	3	4		29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-B-S2-C1-1
			Core Shear (CSL)	6"x2"	ASTM C273	5	5	5		N/A	N/A
			Core Shear (CSW)	2"x6"	ASTM C273	5	5	5		N/A	N/A
			Bare Flatwise Core Compression (BFWC)	2"x2"	ASTM C365	5	5	5		N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		3	Climbing Drum Peel (CDP)	14"x3"	ASTM D1781	5	5	5		33"x36"	NTP1018Q1-HXL-H21-NIAR-CDP-B-S3-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		4	Climbing Drum Peel (CDP)	14"x3"	ASTM D1781	5	5	5		33"x36"	NTP1018Q1-HXL-H21-NIAR-CDP-B-S4-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		5	Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	4	3		29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-B-S5-C1-1
			Core Shear Stress (CSS)	8"x3"	ASTM C393	5	5	5		37"x20"	NTP1018Q1-HXL-H21-NIAR-CSS-B-S5-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		6	Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	4	3		29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-B-S6-C1-1
			Core Shear Stress (CSS)	8"x3"	ASTM C393	5	5	5		37"x20"	NTP1018Q1-HXL-H21-NIAR-CSS-B-S6-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
Batch C NA34523	0.5"	1	Stabilized Compression (SFWC)	2"x2"	ASTM C365	5	5	5		15"x13"	NTP1018Q1-HXL-H21-NIAR-SFWC-C-S1-C1-1
			Flatwise Tension (FWT)	2"x2"	ASTM C297	5	5	5		15"x13"	NTP1018Q1-HXL-H21-NIAR-FWT-C-S1-C1-1
			Long Beam Flex (LBF)	24"x3"	ASTM D7249	5	5	5		29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-C-S1-C1-1
			Core Shear (CSL)	6"x2"	ASTM C273	5	5	5		N/A	N/A
			Core Shear (CSW)	2"x6"	ASTM C273	5	5	5		N/A	N/A
			Bare Flatwise Core Compression (BFWC)	2"x2"	ASTM C365	5	5	5		N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		2	Stabilized Compression (SFWC)	2"x2"	ASTM C365	5	5	5		15"x13"	NTP1018Q1-HXL-H21-NIAR-SFWC-C-S2-C1-1
			Flatwise Tension (FWT)	2"x2"	ASTM C297	5	5	5		15"x13"	NTP1018Q1-HXL-H21-NIAR-FWT-C-S2-C1-1
			Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	3	4		29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-C-S2-C1-1
			Core Shear (CSL)	6"x2"	ASTM C273	5	5	5		N/A	N/A
			Core Shear (CSW)	2"x6"	ASTM C273	5	5	5		N/A	N/A
			Bare Flatwise Core Compression (BFWC)	2"x2"	ASTM C365	5	5	5		N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		3	Climbing Drum Peel (CDP)	14"x3"	ASTM D1781	5	5	5		33"x36"	NTP1018Q1-HXL-H21-NIAR-CDP-C-S3-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		4	Climbing Drum Peel (CDP)	14"x3"	ASTM D1781	5	5	5		33"x36"	NTP1018Q1-HXL-H21-NIAR-CDP-C-S4-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		5	Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	4	3		29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-C-S5-C1-1
			Core Shear Stress (CSS)	8"x3"	ASTM C393	5	5	5		37"x20"	NTP1018Q1-HXL-H21-NIAR-CSS-C-S5-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		6	Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	4	3		29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-C-S6-C1-1
			Core Shear Stress (CSS)	8"x3"	ASTM C393	5	5	5		37"x20"	NTP1018Q1-HXL-H21-NIAR-CSS-C-S6-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A

Sheet Definition

3 Batches

Status of Qualification Testing

Core Batch	Core Thickness	Sheet	Test Type	Geometry (0°x90°)	Test Method	CTD -65°F	RTD 70°F	ETD 180°F	ETW 180°F	Core Panel Size (0°x90°)	Panel Name
Batch A NA34151	0.5"	1	Stabilized Compression (SFWC)	2"x2"	ASTM C365	5	5	5	5	15"x13"	NTP1018Q1-HXL-H21-NIAR-SFWC-A-S1-C1-1
			Flatwise Tension (FWT)	2"x2"	ASTM C297	5	5	5	5	15"x13"	NTP1018Q1-HXL-H21-NIAR-FWT-A-S1-C1-1
			Long Beam Flex (LBF)	24"x3"	ASTM D7249	2	2	3	3	29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-A-S1-C1-1
			Core Shear (CSL)	6"x2"	ASTM C273	5	5	5	5	N/A	N/A
			Core Shear (CSW)	2"x6"	ASTM C273	5	5	5	5	N/A	N/A
			Bare Flatwise Core Compression (BFWC)	2"x2"	ASTM C365	5	5	5	5	N/A	N/A
			Bare Flatwise Core Compression - Fluids	2"x2"	ASTM C365		35		35	N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		2	Stabilized Compression (SFWC)	2"x2"	ASTM C365	5	5	5	5	15"x13"	NTP1018Q1-HXL-H21-NIAR-SFWC-A-S2-C1-1
			Flatwise Tension (FWT)	2"x2"	ASTM C297	5	5	5	5	15"x13"	NTP1018Q1-HXL-H21-NIAR-FWT-A-S2-C1-1
			Long Beam Flex (LBF)	24"x3"	ASTM D7249	2	2	3	3	29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-A-S2-C1-1
			Core Shear (CSL)	6"x2"	ASTM C273	5	5	5	5	N/A	N/A
			Core Shear (CSW)	2"x6"	ASTM C273	5	5	5	5	N/A	N/A
			Bare Flatwise Core Compression (BFWC)	2"x2"	ASTM C365	5	5	5	5	N/A	N/A
			Bare Flatwise Core Compression - Fluids	2"x2"	ASTM C365		35		35	N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		3	Climbing Drum Peel (CDP)	14"x3"	ASTM D1781	5	5	5	5	33"x36"	NTP1018Q1-HXL-H21-NIAR-CDP-A-S3-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		4	Climbing Drum Peel (CDP)	14"x3"	ASTM D1781	5	5	5	5	33"x36"	NTP1018Q1-HXL-H21-NIAR-CDP-A-S4-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		5	Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	3	2	2	29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-A-S5-C1-1
			Core Shear Stress (CSS)	8"x3"	ASTM C393	5	5	5	5	37"x20"	NTP1018Q1-HXL-H21-NIAR-CSS-A-S5-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		6	Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	3	2	2	29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-A-S6-C1-1
			Core Shear Stress (CSS)	8"x3"	ASTM C393	5	5	5	5	37"x20"	NTP1018Q1-HXL-H21-NIAR-CSS-A-S6-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		7	N/A	N/A	N/A					N/A	N/A
	0.25"	1	Core Shear (CSL)	3"x2"	ASTM C273	6	6	6	6	N/A	N/A
			Core Shear (CSW)	2"x3"	ASTM C273	6	6	6	6	N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
	0.375"	1	Core Shear (CSL)	4.5"x2"	ASTM C273	6	6	6	6	N/A	N/A
			Core Shear (CSW)	2"x4.5"	ASTM C273	6	6	6	6	N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
	0.75"	1	Core Shear (CSL)	9"x2"	ASTM C273	6	6	6	6	N/A	N/A
			Core Shear (CSW)	2"x9"	ASTM C273	6	6	6	6	N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
	1.0"	1	Core Shear (CSL)	12"x2"	ASTM C273	6	6	6	6	N/A	N/A
			Core Shear (CSW)	2"x12"	ASTM C273	6	6	6	6	N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
	1.5"	1	Core Shear (CSL)	18"x2"	ASTM C273	6	6	6	6	N/A	N/A
			Core Shear (CSW)	2"x18"	ASTM C273	6	6	6	6	N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A

Core Batch	Core Thickness	Sheet	Test Type	Geometry (0°x90°)	Test Method	CTD -65°F	RTD 70°F	ETD 180°F	ETW 180°F	Core Panel Size (0°x90°)	Panel Name
Batch B NA34469	0.5"	1	Stabilized Compression (SFWC)	2"x2"	ASTM C365	5	5	5		15"x13"	NTP1018Q1-HXL-H21-NIAR-SFWC-B-S1-C1-1
			Flatwise Tension (FWT)	2"x2"	ASTM C297	5	5	5		15"x13"	NTP1018Q1-HXL-H21-NIAR-FWT-B-S1-C1-1
			Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	3	4		29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-B-S1-C1-1
			Core Shear (CSL)	6"x2"	ASTM C273	5	5	5		N/A	N/A
			Core Shear (CSW)	2"x6"	ASTM C273	5	5	5		N/A	N/A
			Bare Flatwise Core Compression (BFWC)	2"x2"	ASTM C365	5	5	5		N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		2	Stabilized Compression (SFWC)	2"x2"	ASTM C365	5	5	5		15"x13"	NTP1018Q1-HXL-H21-NIAR-SFWC-B-S2-C1-1
			Flatwise Tension (FWT)	2"x2"	ASTM C297	5	5	5		15"x13"	NTP1018Q1-HXL-H21-NIAR-FWT-B-S2-C1-1
			Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	3	4		29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-B-S2-C1-1
			Core Shear (CSL)	6"x2"	ASTM C273	5	5	5		N/A	N/A
			Core Shear (CSW)	2"x6"	ASTM C273	5	5	5		N/A	N/A
			Bare Flatwise Core Compression (BFWC)	2"x2"	ASTM C365	5	5	5		N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		3	Climbing Drum Peel (CDP)	14"x3"	ASTM D1781	5	5	5		33"x36"	NTP1018Q1-HXL-H21-NIAR-CDP-B-S3-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		4	Climbing Drum Peel (CDP)	14"x3"	ASTM D1781	5	5	5		33"x36"	NTP1018Q1-HXL-H21-NIAR-CDP-B-S4-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		5	Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	4	3		29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-B-S5-C1-1
			Core Shear Stress (CSS)	8"x3"	ASTM C393	5	5	5		37"x20"	NTP1018Q1-HXL-H21-NIAR-CSS-B-S5-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		6	Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	4	3		29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-B-S6-C1-1
			Core Shear Stress (CSS)	8"x3"	ASTM C393	5	5	5		37"x20"	NTP1018Q1-HXL-H21-NIAR-CSS-B-S6-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
Batch C NA34523	0.5"	1	Stabilized Compression (SFWC)	2"x2"	ASTM C365	5	5	5		15"x13"	NTP1018Q1-HXL-H21-NIAR-SFWC-C-S1-C1-1
			Flatwise Tension (FWT)	2"x2"	ASTM C297	5	5	5		15"x13"	NTP1018Q1-HXL-H21-NIAR-FWT-C-S1-C1-1
			Long Beam Flex (LBF)	24"x3"	ASTM D7249	5	5	5		29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-C-S1-C1-1
			Core Shear (CSL)	6"x2"	ASTM C273	5	5	5		N/A	N/A
			Core Shear (CSW)	2"x6"	ASTM C273	5	5	5		N/A	N/A
			Bare Flatwise Core Compression (BFWC)	2"x2"	ASTM C365	5	5	5		N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		2	Stabilized Compression (SFWC)	2"x2"	ASTM C365	5	5	5		15"x13"	NTP1018Q1-HXL-H21-NIAR-SFWC-C-S2-C1-1
			Flatwise Tension (FWT)	2"x2"	ASTM C297	5	5	5		15"x13"	NTP1018Q1-HXL-H21-NIAR-FWT-C-S2-C1-1
			Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	3	4		29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-C-S2-C1-1
			Core Shear (CSL)	6"x2"	ASTM C273	5	5	5		N/A	N/A
			Core Shear (CSW)	2"x6"	ASTM C273	5	5	5		N/A	N/A
			Bare Flatwise Core Compression (BFWC)	2"x2"	ASTM C365	5	5	5		N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		3	Climbing Drum Peel (CDP)	14"x3"	ASTM D1781	5	5	5		33"x36"	NTP1018Q1-HXL-H21-NIAR-CDP-C-S3-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		4	Climbing Drum Peel (CDP)	14"x3"	ASTM D1781	5	5	5		33"x36"	NTP1018Q1-HXL-H21-NIAR-CDP-C-S4-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		5	Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	4	3		29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-C-S5-C1-1
			Core Shear Stress (CSS)	8"x3"	ASTM C393	5	5	5		37"x20"	NTP1018Q1-HXL-H21-NIAR-CSS-C-S5-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		6	Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	4	3		29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-C-S6-C1-1
			Core Shear Stress (CSS)	8"x3"	ASTM C393	5	5	5		37"x20"	NTP1018Q1-HXL-H21-NIAR-CSS-C-S6-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A

Test Completed

Conditioning

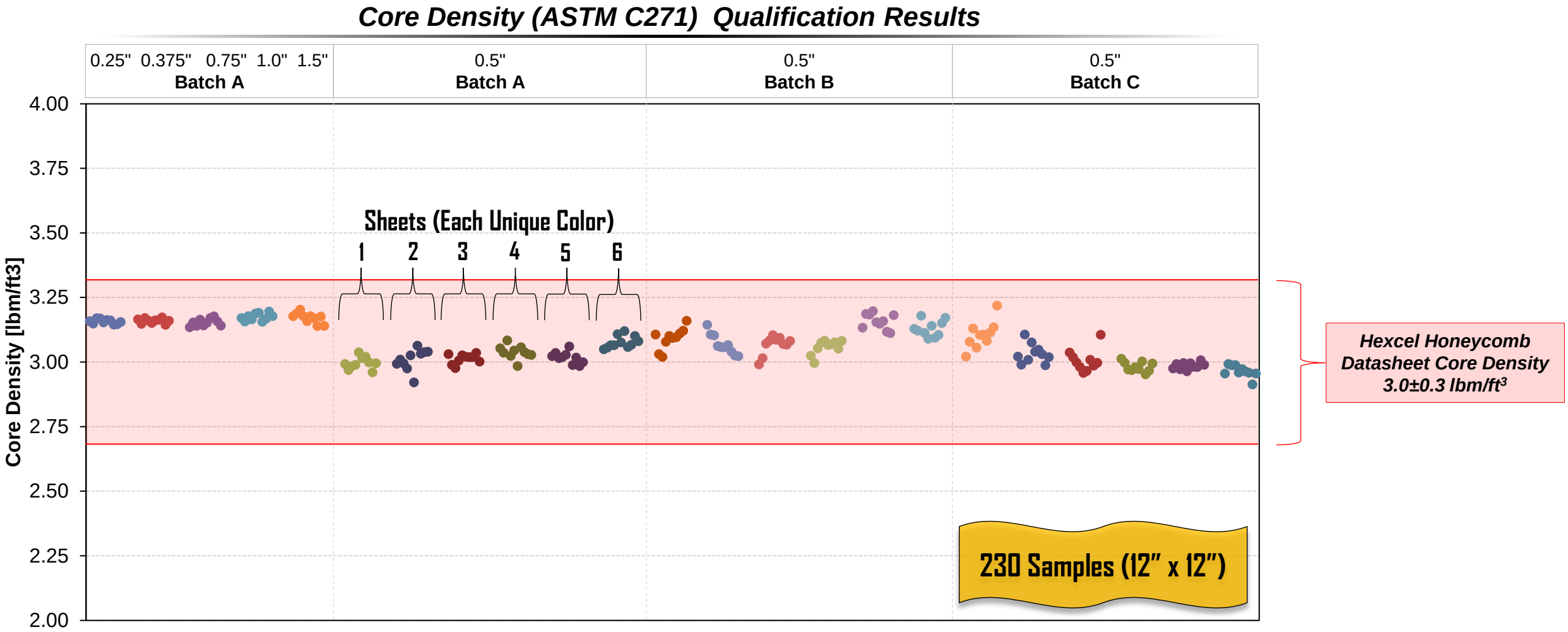
>1400 Samples

Qualification Testing – Core Density

Core Batch	Core Thickness	Sheet	Test Type	Geometry (0°x90°)	Test Method	CTD -65°F	RTD 70°F	ETD 180°F	ETW 180°F	Core Panel Size (0°x90°)	Panel Name
Batch A NA34151	0.5"	1	Stabilized Compression (SFWC)	2"x2"	ASTM C365	5	5	5	5	15"x13"	*NTP1018Q1-HXL-H21-NIAR-SFWC-A-S1-C1-1*
			Flatwise Tension (FWT)	2"x2"	ASTM C297	5	5	5	5	15"x13"	*NTP1018Q1-HXL-H21-NIAR-FWT-A-S1-C1-1*
			Long Beam Flex (LBF)	24"x3"	ASTM D7249	2	2	3	3	29"x36"	*NTP1018Q1-HXL-H21-NIAR-LBF-A-S1-C1-1*
			Core Shear (CSL)	6"x2"	ASTM C273	5	5	5	5	N/A	*N/A*
			Core Shear (CSW)	2"x6"	ASTM C273	5	5	5	5	N/A	*N/A*
			Bare Flatwise Core Compression (BFWC)	2"x2"	ASTM C365	5	5	5	5	N/A	*N/A*
			Bare Flatwise Core Compression - Fluids	2"x2"	ASTM C365		35		35	N/A	*N/A*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
		2	Stabilized Compression (SFWC)	2"x2"	ASTM C365	5	5	5	5	15"x13"	*NTP1018Q1-HXL-H21-NIAR-SFWC-A-S2-C1-1*
			Flatwise Tension (FWT)	2"x2"	ASTM C297	5	5	5	5	15"x13"	*NTP1018Q1-HXL-H21-NIAR-FWT-A-S2-C1-1*
			Long Beam Flex (LBF)	24"x3"	ASTM D7249	2	2	3	3	29"x36"	*NTP1018Q1-HXL-H21-NIAR-LBF-A-S2-C1-1*
			Core Shear (CSL)	6"x2"	ASTM C273	5	5	5	5	N/A	*N/A*
			Core Shear (CSW)	2"x6"	ASTM C273	5	5	5	5	N/A	*N/A*
			Bare Flatwise Core Compression (BFWC)	2"x2"	ASTM C365	5	5	5	5	N/A	*N/A*
			Bare Flatwise Core Compression - Fluids	2"x2"	ASTM C365		35		35	N/A	*N/A*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
		3	Climbing Drum Peel (CDP)	14"x3"	ASTM D1781	5	5	5	5	33"x36"	*NTP1018Q1-HXL-H21-NIAR-CDP-A-S3-C1-1*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
		4	Climbing Drum Peel (CDP)	14"x3"	ASTM D1781	5	5	5	5	33"x36"	*NTP1018Q1-HXL-H21-NIAR-CDP-A-S4-C1-1*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
		5	Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	3	2	2	29"x36"	*NTP1018Q1-HXL-H21-NIAR-LBF-A-S5-C1-1*
			Core Shear Stress (CSS)	8"x3"	ASTM C393	5	5	5	5	37"x20"	*NTP1018Q1-HXL-H21-NIAR-CSS-A-S5-C1-1*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
		6	Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	3	2	2	29"x36"	*NTP1018Q1-HXL-H21-NIAR-LBF-A-S6-C1-1*
			Core Shear Stress (CSS)	8"x3"	ASTM C393	5	5	5	5	37"x20"	*NTP1018Q1-HXL-H21-NIAR-CSS-A-S6-C1-1*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
		7	N/A	N/A	N/A					N/A	*N/A*
	0.25"	1	Core Shear (CSL)	3"x2"	ASTM C273	6	6	6	6	N/A	*N/A*
			Core Shear (CSW)	2"x3"	ASTM C273	6	6	6	6	N/A	*N/A*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
	0.375"	1	Core Shear (CSL)	4.5"x2"	ASTM C273	6	6	6	6	N/A	*N/A*
			Core Shear (CSW)	2"x4.5"	ASTM C273	6	6	6	6	N/A	*N/A*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
	0.75"	1	Core Shear (CSL)	9"x2"	ASTM C273	6	6	6	6	N/A	*N/A*
			Core Shear (CSW)	2"x9"	ASTM C273	6	6	6	6	N/A	*N/A*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
	1.0"	1	Core Shear (CSL)	12"x2"	ASTM C273	6	6	6	6	N/A	*N/A*
			Core Shear (CSW)	2"x12"	ASTM C273	6	6	6	6	N/A	*N/A*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
	1.5"	1	Core Shear (CSL)	18"x2"	ASTM C273	6	6	6	6	N/A	*N/A*
			Core Shear (CSW)	2"x18"	ASTM C273	6	6	6	6	N/A	*N/A*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*

Core Batch	Core Thickness	Sheet	Test Type	Geometry (0°x90°)	Test Method	CTD -65°F	RTD 70°F	ETD 180°F	ETW 180°F	Core Panel Size (0°x90°)	Panel Name
Batch B NA34469	0.5"	1	Stabilized Compression (SFWC)	2"x2"	ASTM C365	5	5	5		15"x13"	*NTP1018Q1-HXL-H21-NIAR-SFWC-B-S1-C1-1*
			Flatwise Tension (FWT)	2"x2"	ASTM C297	5	5	5		15"x13"	*NTP1018Q1-HXL-H21-NIAR-FWT-B-S1-C1-1*
			Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	3	4		29"x36"	*NTP1018Q1-HXL-H21-NIAR-LBF-B-S1-C1-1*
			Core Shear (CSL)	6"x2"	ASTM C273	5	5	5		N/A	*N/A*
			Core Shear (CSW)	2"x6"	ASTM C273	5	5	5		N/A	*N/A*
			Bare Flatwise Core Compression (BFWC)	2"x2"	ASTM C365	5	5	5		N/A	*N/A*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
		2	Stabilized Compression (SFWC)	2"x2"	ASTM C365	5	5	5		15"x13"	*NTP1018Q1-HXL-H21-NIAR-SFWC-B-S2-C1-1*
			Flatwise Tension (FWT)	2"x2"	ASTM C297	5	5	5		15"x13"	*NTP1018Q1-HXL-H21-NIAR-FWT-B-S2-C1-1*
			Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	3	4		29"x36"	*NTP1018Q1-HXL-H21-NIAR-LBF-B-S2-C1-1*
			Core Shear (CSL)	6"x2"	ASTM C273	5	5	5		N/A	*N/A*
			Core Shear (CSW)	2"x6"	ASTM C273	5	5	5		N/A	*N/A*
			Bare Flatwise Core Compression (BFWC)	2"x2"	ASTM C365	5	5	5		N/A	*N/A*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
		3	Climbing Drum Peel (CDP)	14"x3"	ASTM D1781	5	5	5		33"x36"	*NTP1018Q1-HXL-H21-NIAR-CDP-B-S3-C1-1*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
		4	Climbing Drum Peel (CDP)	14"x3"	ASTM D1781	5	5	5		33"x36"	*NTP1018Q1-HXL-H21-NIAR-CDP-B-S4-C1-1*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
		5	Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	4	3		29"x36"	*NTP1018Q1-HXL-H21-NIAR-LBF-B-S5-C1-1*
			Core Shear Stress (CSS)	8"x3"	ASTM C393	5	5	5		37"x20"	*NTP1018Q1-HXL-H21-NIAR-CSS-B-S5-C1-1*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
		6	Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	4	3		29"x36"	*NTP1018Q1-HXL-H21-NIAR-LBF-B-S6-C1-1*
			Core Shear Stress (CSS)	8"x3"	ASTM C393	5	5	5		37"x20"	*NTP1018Q1-HXL-H21-NIAR-CSS-B-S6-C1-1*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
Batch C NA34523	0.5"	1	Stabilized Compression (SFWC)	2"x2"	ASTM C365	5	5	5		15"x13"	*NTP1018Q1-HXL-H21-NIAR-SFWC-C-S1-C1-1*
			Flatwise Tension (FWT)	2"x2"	ASTM C297	5	5	5		15"x13"	*NTP1018Q1-HXL-H21-NIAR-FWT-C-S1-C1-1*
			Long Beam Flex (LBF)	24"x3"	ASTM D7249	5	5	5		29"x36"	*NTP1018Q1-HXL-H21-NIAR-LBF-C-S1-C1-1*
			Core Shear (CSL)	6"x2"	ASTM C273	5	5	5		N/A	*N/A*
			Core Shear (CSW)	2"x6"	ASTM C273	5	5	5		N/A	*N/A*
			Bare Flatwise Core Compression (BFWC)	2"x2"	ASTM C365	5	5	5		N/A	*N/A*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
		2	Stabilized Compression (SFWC)	2"x2"	ASTM C365	5	5	5		15"x13"	*NTP1018Q1-HXL-H21-NIAR-SFWC-C-S2-C1-1*
			Flatwise Tension (FWT)	2"x2"	ASTM C297	5	5	5		15"x13"	*NTP1018Q1-HXL-H21-NIAR-FWT-C-S2-C1-1*
			Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	3	4		29"x36"	*NTP1018Q1-HXL-H21-NIAR-LBF-C-S2-C1-1*
			Core Shear (CSL)	6"x2"	ASTM C273	5	5	5		N/A	*N/A*
			Core Shear (CSW)	2"x6"	ASTM C273	5	5	5		N/A	*N/A*
			Bare Flatwise Core Compression (BFWC)	2"x2"	ASTM C365	5	5	5		N/A	*N/A*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
		3	Climbing Drum Peel (CDP)	14"x3"	ASTM D1781	5	5	5		33"x36"	*NTP1018Q1-HXL-H21-NIAR-CDP-C-S3-C1-1*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
		4	Climbing Drum Peel (CDP)	14"x3"	ASTM D1781	5	5	5		33"x36"	*NTP1018Q1-HXL-H21-NIAR-CDP-C-S4-C1-1*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
		5	Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	4	3		29"x36"	*NTP1018Q1-HXL-H21-NIAR-LBF-C-S5-C1-1*
			Core Shear Stress (CSS)	8"x3"	ASTM C393	5	5	5		37"x20"	*NTP1018Q1-HXL-H21-NIAR-CSS-C-S5-C1-1*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
		6	Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	4	3		29"x36"	*NTP1018Q1-HXL-H21-NIAR-LBF-C-S6-C1-1*
			Core Shear Stress (CSS)	8"x3"	ASTM C393	5	5	5		37"x20"	*NTP1018Q1-HXL-H21-NIAR-CSS-C-S6-C1-1*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*

Qualification Testing – Core Density



Qualification Testing – Core Shear (CSL & CSW)

Core Batch	Core Thickness	Sheet	Test Type	Geometry (0°x90°)	Test Method	CTD -65°F	RTD 70°F	ETD 180°F	ETW 180°F	Core Panel Size (0°x90°)	Panel Name
Batch A NA34151	0.5"	1	Stabilized Compression (SFWC)	2"x2"	ASTM C365	5	5	5	5	15"x13"	*NTP1018Q1-HXL-H21-NIAR-SFWC-A-S1-C1-1*
			Flatwise Tension (FWT)	2"x2"	ASTM C297	5	5	5	5	15"x13"	*NTP1018Q1-HXL-H21-NIAR-FWT-A-S1-C1-1*
			Long Beam Flex (LBF)	24"x3"	ASTM D7249	2	2	3	3	29"x36"	*NTP1018Q1-HXL-H21-NIAR-LBF-A-S1-C1-1*
			Core Shear (CSL)	6"x2"	ASTM C273	5	5	5	5	N/A	*N/A*
			Core Shear (CSW)	2"x6"	ASTM C273	5	5	5	5	N/A	*N/A*
			Bare Flatwise Core Compression (BFWC)	2"x2"	ASTM C365	5	5	5	5	N/A	*N/A*
			Bare Flatwise Core Compression - Fluids	2"x2"	ASTM C365		35		35	N/A	*N/A*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
		2	Stabilized Compression (SFWC)	2"x2"	ASTM C365	5	5	5	5	15"x13"	*NTP1018Q1-HXL-H21-NIAR-SFWC-A-S2-C1-1*
			Flatwise Tension (FWT)	2"x2"	ASTM C297	5	5	5	5	15"x13"	*NTP1018Q1-HXL-H21-NIAR-FWT-A-S2-C1-1*
			Long Beam Flex (LBF)	24"x3"	ASTM D7249	2	2	3	3	29"x36"	*NTP1018Q1-HXL-H21-NIAR-LBF-A-S2-C1-1*
			Core Shear (CSL)	6"x2"	ASTM C273	5	5	5	5	N/A	*N/A*
			Core Shear (CSW)	2"x6"	ASTM C273	5	5	5	5	N/A	*N/A*
			Bare Flatwise Core Compression (BFWC)	2"x2"	ASTM C365	5	5	5	5	N/A	*N/A*
			Bare Flatwise Core Compression - Fluids	2"x2"	ASTM C365		35		35	N/A	*N/A*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
		3	Climbing Drum Peel (CDP)	14"x3"	ASTM D1781	5	5	5	5	33"x36"	*NTP1018Q1-HXL-H21-NIAR-CDP-A-S3-C1-1*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
		4	Climbing Drum Peel (CDP)	14"x3"	ASTM D1781	5	5	5	5	33"x36"	*NTP1018Q1-HXL-H21-NIAR-CDP-A-S4-C1-1*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
		5	Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	3	2	2	29"x36"	*NTP1018Q1-HXL-H21-NIAR-LBF-A-S5-C1-1*
			Core Shear Stress (CSS)	8"x3"	ASTM C393	5	5	5	5	37"x20"	*NTP1018Q1-HXL-H21-NIAR-CSS-A-S5-C1-1*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
		6	Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	3	2	2	29"x36"	*NTP1018Q1-HXL-H21-NIAR-LBF-A-S6-C1-1*
			Core Shear Stress (CSS)	8"x3"	ASTM C393	5	5	5	5	37"x20"	*NTP1018Q1-HXL-H21-NIAR-CSS-A-S6-C1-1*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
		7	N/A	N/A	N/A					N/A	*N/A*
	0.25"	1	Core Shear (CSL)	3"x2"	ASTM C273	6	6	6	6	N/A	*N/A*
			Core Shear (CSW)	2"x3"	ASTM C273	6	6	6	6	N/A	*N/A*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
	0.375"	1	Core Shear (CSL)	4.5"x2"	ASTM C273	6	6	6	6	N/A	*N/A*
			Core Shear (CSW)	2"x4.5"	ASTM C273	6	6	6	6	N/A	*N/A*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
	0.75"	1	Core Shear (CSL)	9"x2"	ASTM C273	6	6	6	6	N/A	*N/A*
			Core Shear (CSW)	2"x9"	ASTM C273	6	6	6	6	N/A	*N/A*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
	1.0"	1	Core Shear (CSL)	12"x2"	ASTM C273	6	6	6	6	N/A	*N/A*
			Core Shear (CSW)	2"x12"	ASTM C273	6	6	6	6	N/A	*N/A*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
	1.5"	1	Core Shear (CSL)	18"x2"	ASTM C273	6	6	6	6	N/A	*N/A*
			Core Shear (CSW)	2"x18"	ASTM C273	6	6	6	6	N/A	*N/A*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*

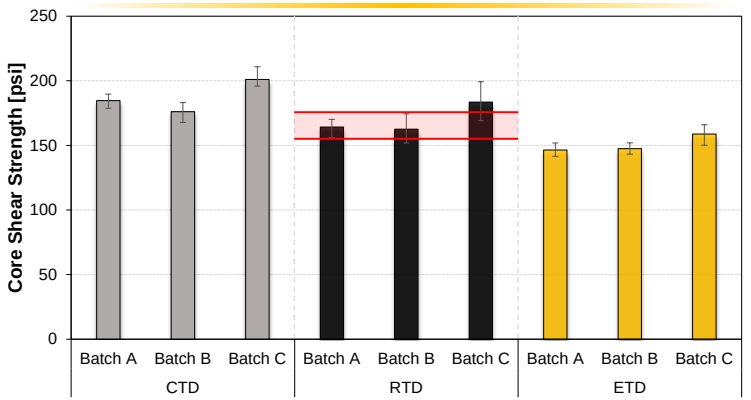
Core Batch	Core Thickness	Sheet	Test Type	Geometry (0°x90°)	Test Method	CTD -65°F	RTD 70°F	ETD 180°F	ETW 180°F	Core Panel Size (0°x90°)	Panel Name
Batch B NA34469	0.5"	1	Stabilized Compression (SFWC)	2"x2"	ASTM C365	5	5	5		15"x13"	*NTP1018Q1-HXL-H21-NIAR-SFWC-B-S1-C1-1*
			Flatwise Tension (FWT)	2"x2"	ASTM C297	5	5	5		15"x13"	*NTP1018Q1-HXL-H21-NIAR-FWT-B-S1-C1-1*
			Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	3	4		29"x36"	*NTP1018Q1-HXL-H21-NIAR-LBF-B-S1-C1-1*
			Core Shear (CSL)	6"x2"	ASTM C273	5	5	5		N/A	*N/A*
			Core Shear (CSW)	2"x6"	ASTM C273	5	5	5		N/A	*N/A*
			Bare Flatwise Core Compression (BFWC)	2"x2"	ASTM C365	5	5	5		N/A	*N/A*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
		2	Stabilized Compression (SFWC)	2"x2"	ASTM C365	5	5	5		15"x13"	*NTP1018Q1-HXL-H21-NIAR-SFWC-B-S2-C1-1*
			Flatwise Tension (FWT)	2"x2"	ASTM C297	5	5	5		15"x13"	*NTP1018Q1-HXL-H21-NIAR-FWT-B-S2-C1-1*
			Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	3	4		29"x36"	*NTP1018Q1-HXL-H21-NIAR-LBF-B-S2-C1-1*
			Core Shear (CSL)	6"x2"	ASTM C273	5	5	5		N/A	*N/A*
			Core Shear (CSW)	2"x6"	ASTM C273	5	5	5		N/A	*N/A*
			Bare Flatwise Core Compression (BFWC)	2"x2"	ASTM C365	5	5	5		N/A	*N/A*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
		3	Climbing Drum Peel (CDP)	14"x3"	ASTM D1781	5	5	5		33"x36"	*NTP1018Q1-HXL-H21-NIAR-CDP-B-S3-C1-1*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
		4	Climbing Drum Peel (CDP)	14"x3"	ASTM D1781	5	5	5		33"x36"	*NTP1018Q1-HXL-H21-NIAR-CDP-B-S4-C1-1*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
		5	Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	4	3		29"x36"	*NTP1018Q1-HXL-H21-NIAR-LBF-B-S5-C1-1*
			Core Shear Stress (CSS)	8"x3"	ASTM C393	5	5	5		37"x20"	*NTP1018Q1-HXL-H21-NIAR-CSS-B-S5-C1-1*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
		6	Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	4	3		29"x36"	*NTP1018Q1-HXL-H21-NIAR-LBF-B-S6-C1-1*
			Core Shear Stress (CSS)	8"x3"	ASTM C393	5	5	5		37"x20"	*NTP1018Q1-HXL-H21-NIAR-CSS-B-S6-C1-1*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
Batch C NA34523	0.5"	1	Stabilized Compression (SFWC)	2"x2"	ASTM C365	5	5	5		15"x13"	*NTP1018Q1-HXL-H21-NIAR-SFWC-C-S1-C1-1*
			Flatwise Tension (FWT)	2"x2"	ASTM C297	5	5	5		15"x13"	*NTP1018Q1-HXL-H21-NIAR-FWT-C-S1-C1-1*
			Long Beam Flex (LBF)	24"x3"	ASTM D7249	5	5	5		29"x36"	*NTP1018Q1-HXL-H21-NIAR-LBF-C-S1-C1-1*
			Core Shear (CSL)	6"x2"	ASTM C273	5	5	5		N/A	*N/A*
			Core Shear (CSW)	2"x6"	ASTM C273	5	5	5		N/A	*N/A*
			Bare Flatwise Core Compression (BFWC)	2"x2"	ASTM C365	5	5	5		N/A	*N/A*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
		2	Stabilized Compression (SFWC)	2"x2"	ASTM C365	5	5	5		15"x13"	*NTP1018Q1-HXL-H21-NIAR-SFWC-C-S2-C1-1*
			Flatwise Tension (FWT)	2"x2"	ASTM C297	5	5	5		15"x13"	*NTP1018Q1-HXL-H21-NIAR-FWT-C-S2-C1-1*
			Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	3	4		29"x36"	*NTP1018Q1-HXL-H21-NIAR-LBF-C-S2-C1-1*
			Core Shear (CSL)	6"x2"	ASTM C273	5	5	5		N/A	*N/A*
			Core Shear (CSW)	2"x6"	ASTM C273	5	5	5		N/A	*N/A*
			Bare Flatwise Core Compression (BFWC)	2"x2"	ASTM C365	5	5	5		N/A	*N/A*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
		3	Climbing Drum Peel (CDP)	14"x3"	ASTM D1781	5	5	5		33"x36"	*NTP1018Q1-HXL-H21-NIAR-CDP-C-S3-C1-1*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
		4	Climbing Drum Peel (CDP)	14"x3"	ASTM D1781	5	5	5		33"x36"	*NTP1018Q1-HXL-H21-NIAR-CDP-C-S4-C1-1*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
		5	Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	4	3		29"x36"	*NTP1018Q1-HXL-H21-NIAR-LBF-C-S5-C1-1*
			Core Shear Stress (CSS)	8"x3"	ASTM C393	5	5	5		37"x20"	*NTP1018Q1-HXL-H21-NIAR-CSS-C-S5-C1-1*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*
		6	Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	4	3		29"x36"	*NTP1018Q1-HXL-H21-NIAR-LBF-C-S6-C1-1*
			Core Shear Stress (CSS)	8"x3"	ASTM C393	5	5	5		37"x20"	*NTP1018Q1-HXL-H21-NIAR-CSS-C-S6-C1-1*
			Core Density	12"x12"	ASTM C271		10			N/A	*N/A*

Qualification Testing – Core Shear (CSL & CSW)

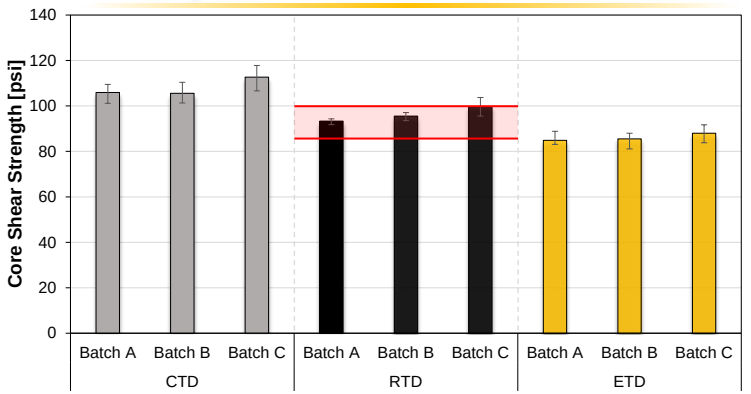
Test Method Description	Thickness	Property	CTD	RTD	ETD
Core Shear (L)	0.25"	***Strength (psi)***	**247.1**	**207.1**	**170.7**
		St. Dev.	6.506	2.128	2.620
		C.V. (%)	2.633	1.027	1.535
		No. of Specimens	4	4	4
		Modulus (ksi)	**7.649**	**6.741**	**5.253**
		St. Dev.	0.2985	0.1164	0.1451
		C.V. (%)	3.902	1.727	2.762
		No. of Specimens	4	4	4
	0.375"	***Strength (psi)***	**207.6**	**184.6**	**157.0**
		St. Dev.	3.146	3.712	1.461
		C.V. (%)	1.516	2.011	0.9310
		No. of Specimens	4	4	4
		Modulus (ksi)	**6.971**	**6.205**	**5.168**
		St. Dev.	0.2705	0.1031	0.1669
		C.V. (%)	3.880	1.662	3.229
		No. of Specimens	4	4	4
	0.5"	***Strength (psi)***	**187.3**	**172.2**	**150.9**
		St. Dev.	11.82	13.14	7.172
		C.V. (%)	6.312	7.630	4.753
		No. of Specimens	18	27	18
		Modulus (ksi)	**6.643**	**6.077**	**5.309**
		St. Dev.	0.3946	0.3946	0.1925
		C.V. (%)	5.940	6.494	3.625
		No. of Specimens	18	27	18
	0.75"	***Strength (psi)***	**179.4**	**162.6**	**145.3**
		St. Dev.	7.175	5.778	3.474
		C.V. (%)	3.998	3.554	2.391
		No. of Specimens	4	4	4
		Modulus (ksi)	**6.842**	**6.103**	**5.369**
		St. Dev.	0.2362	0.1494	0.1278
		C.V. (%)	3.452	2.447	2.380
		No. of Specimens	4	4	4
	1.0"	***Strength (psi)***	**168.4**	**147.8**	**137.0**
		St. Dev.	0.7744	4.048	1.076
		C.V. (%)	0.4599	2.740	0.7853
		No. of Specimens	4	4	4
		Modulus (ksi)	**6.944**	**6.167**	**5.415**
		St. Dev.	0.07162	0.08980	0.04069
		C.V. (%)	1.031	1.456	0.7514
		No. of Specimens	4	4	4
	1.5"	***Strength (psi)***	**142.3**	**130.9**	**119.5**
		St. Dev.	5.174	1.935	2.345
		C.V. (%)	3.637	1.478	1.963
		No. of Specimens	4	4	4
		Modulus (ksi)	**6.889**	**6.255**	**5.432**
		St. Dev.	0.09513	0.01552	0.07423
		C.V. (%)	1.381	0.248	1.366
		No. of Specimens	4	4	4

Test Method Description	Thickness	Property	CTD	RTD	ETD
Core Shear (W)	0.25"	***Strength (psi)***	**133.2**	**115.2**	**98.08**
		St. Dev.	1.609	3.743	1.469
		C.V. (%)	1.208	3.249	1.498
		No. of Specimens	4	4	4
		Modulus (ksi)	**4.804**	**4.335**	**3.358**
		St. Dev.	0.1043	0.1472	0.09100
		C.V. (%)	2.172	3.395	2.710
		No. of Specimens	4	4	4
	0.375"	***Strength (psi)***	**122.5**	**108.5**	**93.07**
		St. Dev.	1.932	2.117	3.404
		C.V. (%)	1.577	1.952	3.657
		No. of Specimens	4	4	4
		Modulus (ksi)	**4.340**	**3.968**	**3.229**
		St. Dev.	0.1245	0.08821	0.1707
		C.V. (%)	2.869	2.223	5.287
		No. of Specimens	4	4	4
	0.5"	***Strength (psi)***	**108.0**	**96.18**	**86.11**
		St. Dev.	4.874	3.333	2.854
		C.V. (%)	4.511	3.465	3.314
		No. of Specimens	18	18	18
		Modulus (ksi)	**3.873**	**3.478**	**3.176**
		St. Dev.	0.1464	0.06997	0.1061
		C.V. (%)	3.781	2.012	3.341
		No. of Specimens	18	18	18
	0.75"	***Strength (psi)***	**106.5**	**96.22**	**87.53**
		St. Dev.	3.282	2.284	1.286
		C.V. (%)	3.082	2.374	1.470
		No. of Specimens	4	4	4
		Modulus (ksi)	**4.007**	**3.711**	**3.274**
		St. Dev.	0.1389	0.1110	0.06763
		C.V. (%)	3.466	2.991	2.066
		No. of Specimens	4	4	4
	1.0"	***Strength (psi)***	**96.60**	**92.02**	**83.68**
		St. Dev.	1.3112	2.0863	1.6090
		C.V. (%)	1.3573	2.2672	1.9228
		No. of Specimens	4	4	4
		Modulus (ksi)	**3.961**	**3.786**	**3.260**
		St. Dev.	0.03827	0.06700	0.05240
		C.V. (%)	0.9662	1.769	1.607
		No. of Specimens	4	4	4
	1.5"	***Strength (psi)***	**91.40**	**83.83**	**72.61**
		St. Dev.	0.9184	1.100	0.8264
		C.V. (%)	1.005	1.312	1.138
		No. of Specimens	4	4	4
		Modulus (ksi)	**3.992**	**3.775**	**3.255**
		St. Dev.	0.04969	0.08713	0.06904
		C.V. (%)	1.245	2.308	2.121
		No. of Specimens	4	4	4

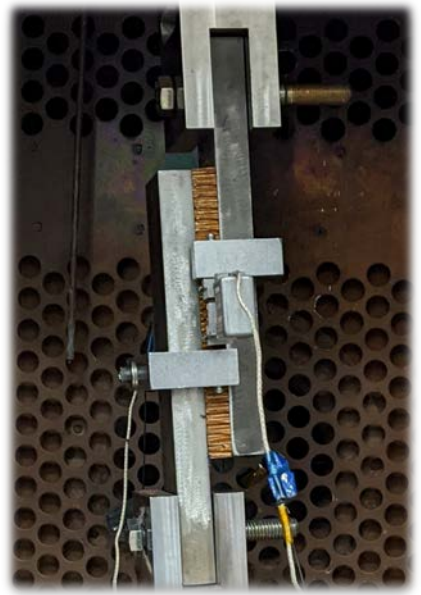
Core Shear Strength- L

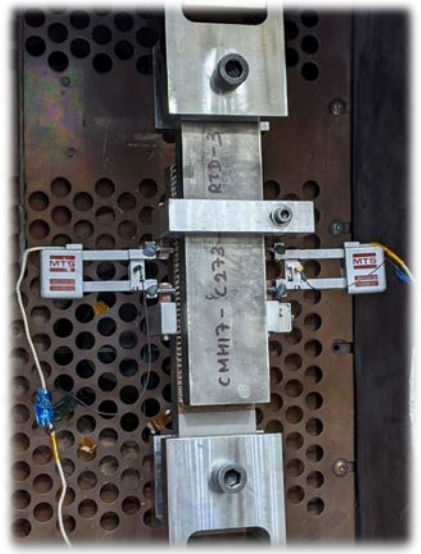


Core Shear Strength - W



Hexcel Values		RTD
Core Shear (L)	*Typical Strength (psi)*	175
	Minimum Strength (psi)	155
	Typical Modulus (ksi)	6
Core Shear (W)	*Typical Strength (psi)*	100
	Minimum Strength (psi)	85
	Typical Modulus (ksi)	3.5





Qualification Testing – Compression (Bare & Stabilized)

NIAR
Wichita State University

Core Batch	Core Thickness	Sheet	Test Type	Geometry (0°x90°)	Test Method	CTD -65°F	RTD 70°F	ETD 180°F	ETW 180°F	Core Panel Size (0°x90°)	Panel Name
Batch A NA34151	0.5"	1	Stabilized Compression (SFWC)	2"x2"	ASTM C365	5	5	5	5	15"x13"	NTP1018Q1-HXL-H21-NIAR-SFWC-A-S1-C1-1
			Flatwise Tension (FWT)	2"x2"	ASTM C297	5	5	5	5	15"x13"	NTP1018Q1-HXL-H21-NIAR-FWT-A-S1-C1-1
			Long Beam Flex (LBF)	24"x3"	ASTM D7249	2	2	3	3	29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-A-S1-C1-1
			Core Shear (CSL)	6"x2"	ASTM C273	5	5	5	5	N/A	N/A
			Core Shear (CSW)	2"x6"	ASTM C273	5	5	5	5	N/A	N/A
			Bare Flatwise Core Compression (BFWC)	2"x2"	ASTM C365	5	5	5	5	N/A	N/A
			Bare Flatwise Core Compression - Fluids	2"x2"	ASTM C365		35		35	N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		2	Stabilized Compression (SFWC)	2"x2"	ASTM C365	5	5	5	5	15"x13"	NTP1018Q1-HXL-H21-NIAR-SFWC-A-S2-C1-1
			Flatwise Tension (FWT)	2"x2"	ASTM C297	5	5	5	5	15"x13"	NTP1018Q1-HXL-H21-NIAR-FWT-A-S2-C1-1
			Long Beam Flex (LBF)	24"x3"	ASTM D7249	2	2	3	3	29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-A-S2-C1-1
			Core Shear (CSL)	6"x2"	ASTM C273	5	5	5	5	N/A	N/A
			Core Shear (CSW)	2"x6"	ASTM C273	5	5	5	5	N/A	N/A
			Bare Flatwise Core Compression (BFWC)	2"x2"	ASTM C365	5	5	5	5	N/A	N/A
			Bare Flatwise Core Compression - Fluids	2"x2"	ASTM C365		35		35	N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		3	Climbing Drum Peel (CDP)	14"x3"	ASTM D1781	5	5	5	5	33"x36"	NTP1018Q1-HXL-H21-NIAR-CDP-A-S3-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		4	Climbing Drum Peel (CDP)	14"x3"	ASTM D1781	5	5	5	5	33"x36"	NTP1018Q1-HXL-H21-NIAR-CDP-A-S4-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		5	Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	3	2	2	29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-A-S5-C1-1
			Core Shear Stress (CSS)	8"x3"	ASTM C393	5	5	5	5	37"x20"	NTP1018Q1-HXL-H21-NIAR-CSS-A-S5-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		6	Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	3	2	2	29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-A-S6-C1-1
			Core Shear Stress (CSS)	8"x3"	ASTM C393	5	5	5	5	37"x20"	NTP1018Q1-HXL-H21-NIAR-CSS-A-S6-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		7	N/A	N/A	N/A					N/A	N/A
	0.25"	1	Core Shear (CSL)	3"x2"	ASTM C273	6	6	6	6	N/A	N/A
			Core Shear (CSW)	2"x3"	ASTM C273	6	6	6	6	N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
	0.375"	1	Core Shear (CSL)	4.5"x2"	ASTM C273	6	6	6	6	N/A	N/A
			Core Shear (CSW)	2"x4.5"	ASTM C273	6	6	6	6	N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
	0.75"	1	Core Shear (CSL)	9"x2"	ASTM C273	6	6	6	6	N/A	N/A
			Core Shear (CSW)	2"x9"	ASTM C273	6	6	6	6	N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
	1.0"	1	Core Shear (CSL)	12"x2"	ASTM C273	6	6	6	6	N/A	N/A
			Core Shear (CSW)	2"x12"	ASTM C273	6	6	6	6	N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
	1.5"	1	Core Shear (CSL)	18"x2"	ASTM C273	6	6	6	6	N/A	N/A
			Core Shear (CSW)	2"x18"	ASTM C273	6	6	6	6	N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A

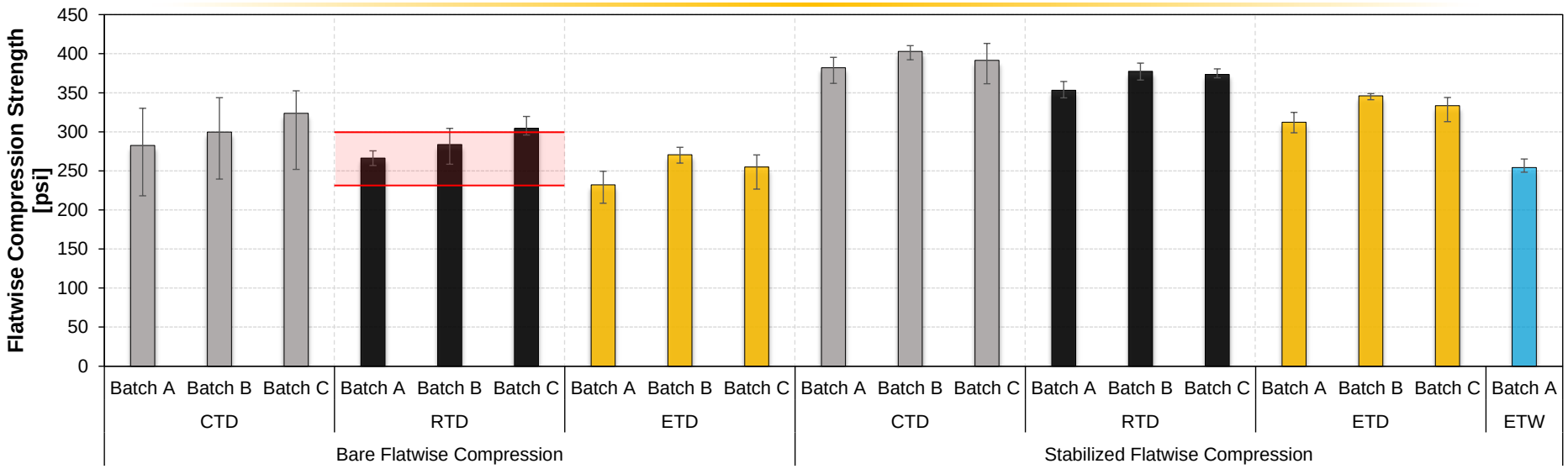
Core Batch	Core Thickness	Sheet	Test Type	Geometry (0°x90°)	Test Method	CTD -65°F	RTD 70°F	ETD 180°F	ETW 180°F	Core Panel Size (0°x90°)	Panel Name
Batch B NA34469	0.5"	1	Stabilized Compression (SFWC)	2"x2"	ASTM C365	5	5	5		15"x13"	NTP1018Q1-HXL-H21-NIAR-SFWC-B-S1-C1-1
			Flatwise Tension (FWT)	2"x2"	ASTM C297	5	5	5		15"x13"	NTP1018Q1-HXL-H21-NIAR-FWT-B-S1-C1-1
			Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	3	4		29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-B-S1-C1-1
			Core Shear (CSL)	6"x2"	ASTM C273	5	5	5		N/A	N/A
			Core Shear (CSW)	2"x6"	ASTM C273	5	5	5		N/A	N/A
			Bare Flatwise Core Compression (BFWC)	2"x2"	ASTM C365	5	5	5		N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		2	Stabilized Compression (SFWC)	2"x2"	ASTM C365	5	5	5		15"x13"	NTP1018Q1-HXL-H21-NIAR-SFWC-B-S2-C1-1
			Flatwise Tension (FWT)	2"x2"	ASTM C297	5	5	5		15"x13"	NTP1018Q1-HXL-H21-NIAR-FWT-B-S2-C1-1
			Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	3	4		29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-B-S2-C1-1
			Core Shear (CSL)	6"x2"	ASTM C273	5	5	5		N/A	N/A
			Core Shear (CSW)	2"x6"	ASTM C273	5	5	5		N/A	N/A
			Bare Flatwise Core Compression (BFWC)	2"x2"	ASTM C365	5	5	5		N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		3	Climbing Drum Peel (CDP)	14"x3"	ASTM D1781	5	5	5		33"x36"	NTP1018Q1-HXL-H21-NIAR-CDP-B-S3-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		4	Climbing Drum Peel (CDP)	14"x3"	ASTM D1781	5	5	5		33"x36"	NTP1018Q1-HXL-H21-NIAR-CDP-B-S4-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		5	Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	4	3		29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-B-S5-C1-1
			Core Shear Stress (CSS)	8"x3"	ASTM C393	5	5	5		37"x20"	NTP1018Q1-HXL-H21-NIAR-CSS-B-S5-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		6	Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	4	3		29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-B-S6-C1-1
			Core Shear Stress (CSS)	8"x3"	ASTM C393	5	5	5		37"x20"	NTP1018Q1-HXL-H21-NIAR-CSS-B-S6-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
Batch C NA34523	0.5"	1	Stabilized Compression (SFWC)	2"x2"	ASTM C365	5	5	5		15"x13"	NTP1018Q1-HXL-H21-NIAR-SFWC-C-S1-C1-1
			Flatwise Tension (FWT)	2"x2"	ASTM C297	5	5	5		15"x13"	NTP1018Q1-HXL-H21-NIAR-FWT-C-S1-C1-1
			Long Beam Flex (LBF)	24"x3"	ASTM D7249	5	5	5		29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-C-S1-C1-1
			Core Shear (CSL)	6"x2"	ASTM C273	5	5	5		N/A	N/A
			Core Shear (CSW)	2"x6"	ASTM C273	5	5	5		N/A	N/A
			Bare Flatwise Core Compression (BFWC)	2"x2"	ASTM C365	5	5	5		N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		2	Stabilized Compression (SFWC)	2"x2"	ASTM C365	5	5	5		15"x13"	NTP1018Q1-HXL-H21-NIAR-SFWC-C-S2-C1-1
			Flatwise Tension (FWT)	2"x2"	ASTM C297	5	5	5		15"x13"	NTP1018Q1-HXL-H21-NIAR-FWT-C-S2-C1-1
			Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	3	4		29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-C-S2-C1-1
			Core Shear (CSL)	6"x2"	ASTM C273	5	5	5		N/A	N/A
			Core Shear (CSW)	2"x6"	ASTM C273	5	5	5		N/A	N/A
			Bare Flatwise Core Compression (BFWC)	2"x2"	ASTM C365	5	5	5		N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		3	Climbing Drum Peel (CDP)	14"x3"	ASTM D1781	5	5	5		33"x36"	NTP1018Q1-HXL-H21-NIAR-CDP-C-S3-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		4	Climbing Drum Peel (CDP)	14"x3"	ASTM D1781	5	5	5		33"x36"	NTP1018Q1-HXL-H21-NIAR-CDP-C-S4-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		5	Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	4	3		29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-C-S5-C1-1
			Core Shear Stress (CSS)	8"x3"	ASTM C393	5	5	5		37"x20"	NTP1018Q1-HXL-H21-NIAR-CSS-C-S5-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		6	Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	4	3		29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-C-S6-C1-1
			Core Shear Stress (CSS)	8"x3"	ASTM C393	5	5	5		37"x20"	NTP1018Q1-HXL-H21-NIAR-CSS-C-S6-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A

Qualification Testing – Compression (Bare & Stabilized)

Test Method Description	ASTM	Property	CTD	RTD	ETD	ETW
Bare Flatwise Compression	C365	***Strength (psi)***	**301.1**	**284.8**	**252.6**	
		St. Dev.	36.00	20.49	20.69	
		C.V. (%)	11.95	7.195	8.192	
		No. of Specimens	22	18	18	
Stabilized Flatwise Compression	C365	***Strength (psi)***	**392.2**	**368.1**	**330.6**	**254.2**
		St. Dev.	14.75	12.96	16.73	6.409
		C.V. (%)	3.762	3.520	5.060	2.521
		No. of Specimens	18	18	18	6
		Modulus (ksi)	**24.23**	**23.48**		**16.59**
		St. Dev.	0.7795	1.045		0.9930
		C.V. (%)	3.216	4.450		5.985
		No. of Specimens	18	18		6

Hexcel Values		RTD
Bare Flatwise Compression	*Typical Strength (psi)*	300
	Minimum Strength (psi)	235

Bare & Stabilized Flatwise Compression

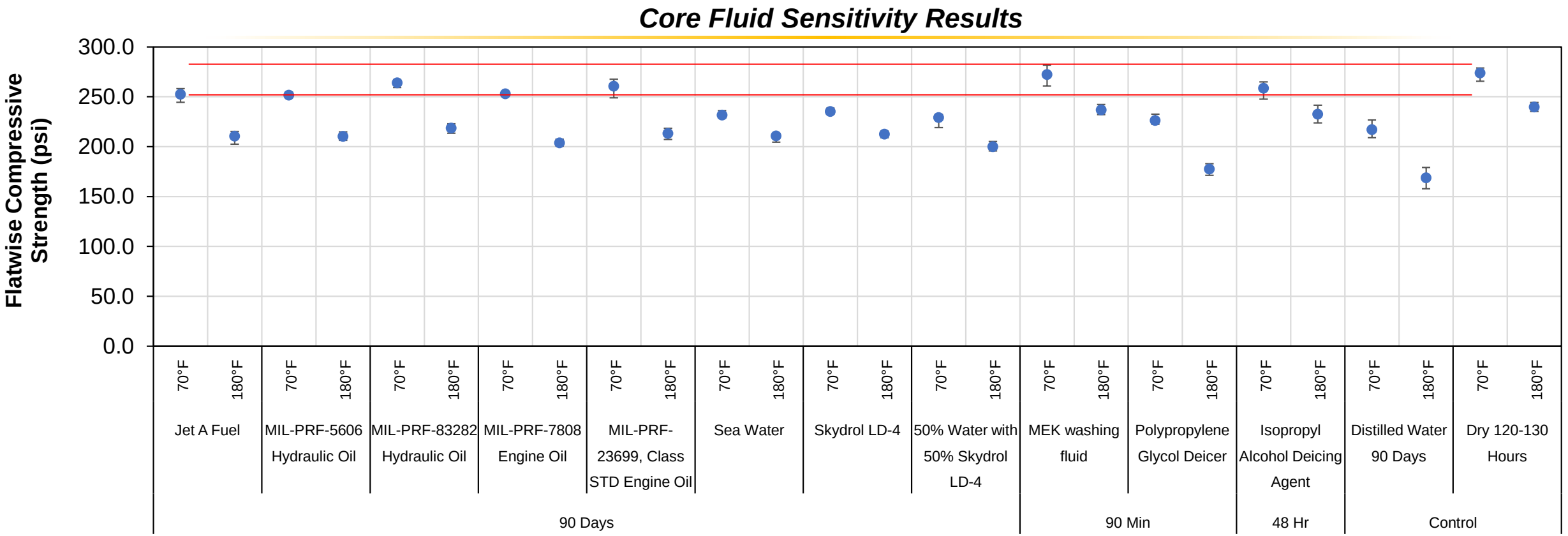


Qualification Testing – Fluid Sensitivity

Core Batch	Core Thickness	Sheet	Test Type	Geometry (0°x90°)	Test Method	CTD -65°F	RTD 70°F	ETD 180°F	ETW 180°F	Core Panel Size (0°x90°)	Panel Name
Batch A NA34151	0.5"	1	Stabilized Compression (SFWC)	2"x2"	ASTM C365	5	5	5	5	15"x13"	NTP1018Q1-HXL-H21-NIAR-SFWC-A-S1-C1-1
			Flatwise Tension (FWT)	2"x2"	ASTM C297	5	5	5	5	15"x13"	NTP1018Q1-HXL-H21-NIAR-FWT-A-S1-C1-1
			Long Beam Flex (LBF)	24"x3"	ASTM D7249	2	2	3	3	29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-A-S1-C1-1
			Core Shear (CSL)	6"x2"	ASTM C273	5	5	5	5	N/A	N/A
			Core Shear (CSW)	2"x6"	ASTM C273	5	5	5	5	N/A	N/A
			Bare Flatwise Core Compression (BFWC)	2"x2"	ASTM C365	5	5	5	5	N/A	N/A
			Bare Flatwise Core Compression - Fluids	2"x2"	ASTM C365		35		35	N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		2	Stabilized Compression (SFWC)	2"x2"	ASTM C365	5	5	5	5	15"x13"	NTP1018Q1-HXL-H21-NIAR-SFWC-A-S2-C1-1
			Flatwise Tension (FWT)	2"x2"	ASTM C297	5	5	5	5	15"x13"	NTP1018Q1-HXL-H21-NIAR-FWT-A-S2-C1-1
			Long Beam Flex (LBF)	24"x3"	ASTM D7249	2	2	3	3	29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-A-S2-C1-1
			Core Shear (CSL)	6"x2"	ASTM C273	5	5	5	5	N/A	N/A
			Core Shear (CSW)	2"x6"	ASTM C273	5	5	5	5	N/A	N/A
			Bare Flatwise Core Compression (BFWC)	2"x2"	ASTM C365	5	5	5	5	N/A	N/A
			Bare Flatwise Core Compression - Fluids	2"x2"	ASTM C365		35		35	N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		3	Climbing Drum Peel (CDP)	14"x3"	ASTM D1781	5	5	5	5	33"x36"	NTP1018Q1-HXL-H21-NIAR-CDP-A-S3-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		4	Climbing Drum Peel (CDP)	14"x3"	ASTM D1781	5	5	5	5	33"x36"	NTP1018Q1-HXL-H21-NIAR-CDP-A-S4-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		5	Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	3	2	2	29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-A-S5-C1-1
			Core Shear Stress (CSS)	8"x3"	ASTM C393	5	5	5	5	37"x20"	NTP1018Q1-HXL-H21-NIAR-CSS-A-S5-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		6	Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	3	2	2	29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-A-S6-C1-1
			Core Shear Stress (CSS)	8"x3"	ASTM C393	5	5	5	5	37"x20"	NTP1018Q1-HXL-H21-NIAR-CSS-A-S6-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		7	N/A	N/A	N/A					N/A	N/A
	0.25"	1	Core Shear (CSL)	3"x2"	ASTM C273	6	6	6	6	N/A	N/A
			Core Shear (CSW)	2"x3"	ASTM C273	6	6	6	6	N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
	0.375"	1	Core Shear (CSL)	4.5"x2"	ASTM C273	6	6	6	6	N/A	N/A
			Core Shear (CSW)	2"x4.5"	ASTM C273	6	6	6	6	N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
	0.75"	1	Core Shear (CSL)	9"x2"	ASTM C273	6	6	6	6	N/A	N/A
			Core Shear (CSW)	2"x9"	ASTM C273	6	6	6	6	N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
	1.0"	1	Core Shear (CSL)	12"x2"	ASTM C273	6	6	6	6	N/A	N/A
			Core Shear (CSW)	2"x12"	ASTM C273	6	6	6	6	N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
	1.5"	1	Core Shear (CSL)	18"x2"	ASTM C273	6	6	6	6	N/A	N/A
			Core Shear (CSW)	2"x18"	ASTM C273	6	6	6	6	N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A

Core Batch	Core Thickness	Sheet	Test Type	Geometry (0°x90°)	Test Method	CTD -65°F	RTD 70°F	ETD 180°F	ETW 180°F	Core Panel Size (0°x90°)	Panel Name
Batch B NA34469	0.5"	1	Stabilized Compression (SFWC)	2"x2"	ASTM C365	5	5	5		15"x13"	NTP1018Q1-HXL-H21-NIAR-SFWC-B-S1-C1-1
			Flatwise Tension (FWT)	2"x2"	ASTM C297	5	5	5		15"x13"	NTP1018Q1-HXL-H21-NIAR-FWT-B-S1-C1-1
			Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	3	4		29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-B-S1-C1-1
			Core Shear (CSL)	6"x2"	ASTM C273	5	5	5		N/A	N/A
			Core Shear (CSW)	2"x6"	ASTM C273	5	5	5		N/A	N/A
			Bare Flatwise Core Compression (BFWC)	2"x2"	ASTM C365	5	5	5		N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		2	Stabilized Compression (SFWC)	2"x2"	ASTM C365	5	5	5		15"x13"	NTP1018Q1-HXL-H21-NIAR-SFWC-B-S2-C1-1
			Flatwise Tension (FWT)	2"x2"	ASTM C297	5	5	5		15"x13"	NTP1018Q1-HXL-H21-NIAR-FWT-B-S2-C1-1
			Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	3	4		29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-B-S2-C1-1
			Core Shear (CSL)	6"x2"	ASTM C273	5	5	5		N/A	N/A
			Core Shear (CSW)	2"x6"	ASTM C273	5	5	5		N/A	N/A
			Bare Flatwise Core Compression (BFWC)	2"x2"	ASTM C365	5	5	5		N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		3	Climbing Drum Peel (CDP)	14"x3"	ASTM D1781	5	5	5		33"x36"	NTP1018Q1-HXL-H21-NIAR-CDP-B-S3-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		4	Climbing Drum Peel (CDP)	14"x3"	ASTM D1781	5	5	5		33"x36"	NTP1018Q1-HXL-H21-NIAR-CDP-B-S4-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		5	Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	4	3		29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-B-S5-C1-1
			Core Shear Stress (CSS)	8"x3"	ASTM C393	5	5	5		37"x20"	NTP1018Q1-HXL-H21-NIAR-CSS-B-S5-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		6	Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	4	3		29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-B-S6-C1-1
			Core Shear Stress (CSS)	8"x3"	ASTM C393	5	5	5		37"x20"	NTP1018Q1-HXL-H21-NIAR-CSS-B-S6-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
Batch C NA34523	0.5"	1	Stabilized Compression (SFWC)	2"x2"	ASTM C365	5	5	5		15"x13"	NTP1018Q1-HXL-H21-NIAR-SFWC-C-S1-C1-1
			Flatwise Tension (FWT)	2"x2"	ASTM C297	5	5	5		15"x13"	NTP1018Q1-HXL-H21-NIAR-FWT-C-S1-C1-1
			Long Beam Flex (LBF)	24"x3"	ASTM D7249	5	5	5		29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-C-S1-C1-1
			Core Shear (CSL)	6"x2"	ASTM C273	5	5	5		N/A	N/A
			Core Shear (CSW)	2"x6"	ASTM C273	5	5	5		N/A	N/A
			Bare Flatwise Core Compression (BFWC)	2"x2"	ASTM C365	5	5	5		N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		2	Stabilized Compression (SFWC)	2"x2"	ASTM C365	5	5	5		15"x13"	NTP1018Q1-HXL-H21-NIAR-SFWC-C-S2-C1-1
			Flatwise Tension (FWT)	2"x2"	ASTM C297	5	5	5		15"x13"	NTP1018Q1-HXL-H21-NIAR-FWT-C-S2-C1-1
			Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	3	4		29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-C-S2-C1-1
			Core Shear (CSL)	6"x2"	ASTM C273	5	5	5		N/A	N/A
			Core Shear (CSW)	2"x6"	ASTM C273	5	5	5		N/A	N/A
			Bare Flatwise Core Compression (BFWC)	2"x2"	ASTM C365	5	5	5		N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		3	Climbing Drum Peel (CDP)	14"x3"	ASTM D1781	5	5	5		33"x36"	NTP1018Q1-HXL-H21-NIAR-CDP-C-S3-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		4	Climbing Drum Peel (CDP)	14"x3"	ASTM D1781	5	5	5		33"x36"	NTP1018Q1-HXL-H21-NIAR-CDP-C-S4-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		5	Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	4	3		29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-C-S5-C1-1
			Core Shear Stress (CSS)	8"x3"	ASTM C393	5	5	5		37"x20"	NTP1018Q1-HXL-H21-NIAR-CSS-C-S5-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		6	Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	4	3		29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-C-S6-C1-1
			Core Shear Stress (CSS)	8"x3"	ASTM C393	5	5	5		37"x20"	NTP1018Q1-HXL-H21-NIAR-CSS-C-S6-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A

Qualification Testing – Fluid Sensitivity



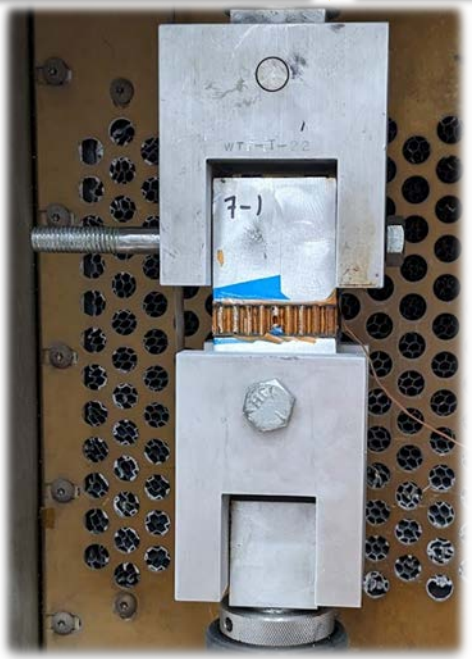
Qualification Testing – Flatwise Tension

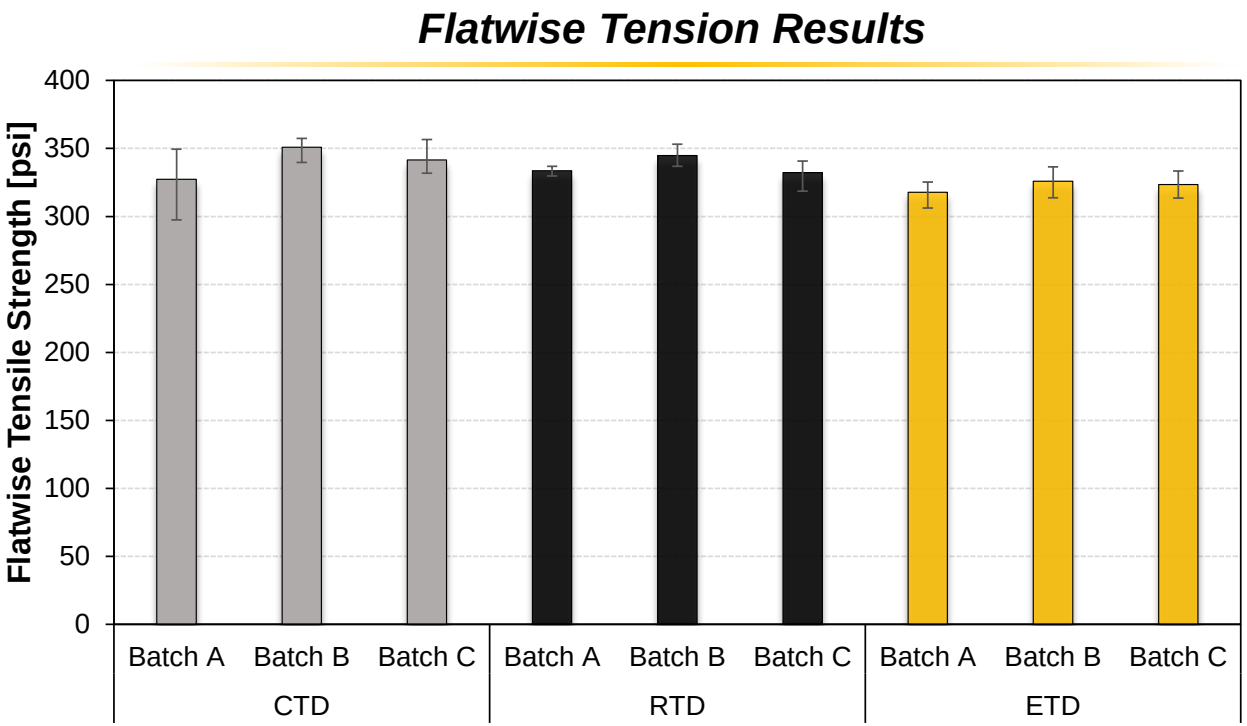
Core Batch	Core Thickness	Sheet	Test Type	Geometry (0°x90°)	Test Method	CTD -65°F	RTD 70°F	ETD 180°F	ETW 180°F	Core Panel Size (0°x90°)	Panel Name
Batch A NA34151	0.5"	1	Stabilized Compression (SFWC)	2"x2"	ASTM C365	5	5	5	5	15"x13"	NTP1018Q1-HXL-H21-NIAR-SFWC-A-S1-C1-1
			Flatwise Tension (FWT)	2"x2"	ASTM C297	5	5	5	5	15"x13"	NTP1018Q1-HXL-H21-NIAR-FWT-A-S1-C1-1
			Long Beam Flex (LBF)	24"x3"	ASTM D7249	2	2	3	3	29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-A-S1-C1-1
			Core Shear (CSL)	6"x2"	ASTM C273	5	5	5	5	N/A	N/A
			Core Shear (CSW)	2"x6"	ASTM C273	5	5	5	5	N/A	N/A
			Bare Flatwise Core Compression (BFWC)	2"x2"	ASTM C365	5	5	5	5	N/A	N/A
			Bare Flatwise Core Compression - Fluids	2"x2"	ASTM C365		35		35	N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		2	Stabilized Compression (SFWC)	2"x2"	ASTM C365	5	5	5	5	15"x13"	NTP1018Q1-HXL-H21-NIAR-SFWC-A-S2-C1-1
			Flatwise Tension (FWT)	2"x2"	ASTM C297	5	5	5	5	15"x13"	NTP1018Q1-HXL-H21-NIAR-FWT-A-S2-C1-1
			Long Beam Flex (LBF)	24"x3"	ASTM D7249	2	2	3	3	29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-A-S2-C1-1
			Core Shear (CSL)	6"x2"	ASTM C273	5	5	5	5	N/A	N/A
			Core Shear (CSW)	2"x6"	ASTM C273	5	5	5	5	N/A	N/A
			Bare Flatwise Core Compression (BFWC)	2"x2"	ASTM C365	5	5	5	5	N/A	N/A
			Bare Flatwise Core Compression - Fluids	2"x2"	ASTM C365		35		35	N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		3	Climbing Drum Peel (CDP)	14"x3"	ASTM D1781	5	5	5	5	33"x36"	NTP1018Q1-HXL-H21-NIAR-CDP-A-S3-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		4	Climbing Drum Peel (CDP)	14"x3"	ASTM D1781	5	5	5	5	33"x36"	NTP1018Q1-HXL-H21-NIAR-CDP-A-S4-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		5	Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	3	2	2	29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-A-S5-C1-1
			Core Shear Stress (CSS)	8"x3"	ASTM C393	5	5	5	5	37"x20"	NTP1018Q1-HXL-H21-NIAR-CSS-A-S5-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		6	Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	3	2	2	29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-A-S6-C1-1
			Core Shear Stress (CSS)	8"x3"	ASTM C393	5	5	5	5	37"x20"	NTP1018Q1-HXL-H21-NIAR-CSS-A-S6-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		7	N/A	N/A	N/A					N/A	N/A
	0.25"	1	Core Shear (CSL)	3"x2"	ASTM C273	6	6	6	6	N/A	N/A
			Core Shear (CSW)	2"x3"	ASTM C273	6	6	6	6	N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
	0.375"	1	Core Shear (CSL)	4.5"x2"	ASTM C273	6	6	6	6	N/A	N/A
			Core Shear (CSW)	2"x4.5"	ASTM C273	6	6	6	6	N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
	0.75"	1	Core Shear (CSL)	9"x2"	ASTM C273	6	6	6	6	N/A	N/A
			Core Shear (CSW)	2"x9"	ASTM C273	6	6	6	6	N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
	1.0"	1	Core Shear (CSL)	12"x2"	ASTM C273	6	6	6	6	N/A	N/A
			Core Shear (CSW)	2"x12"	ASTM C273	6	6	6	6	N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
	1.5"	1	Core Shear (CSL)	18"x2"	ASTM C273	6	6	6	6	N/A	N/A
			Core Shear (CSW)	2"x18"	ASTM C273	6	6	6	6	N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A

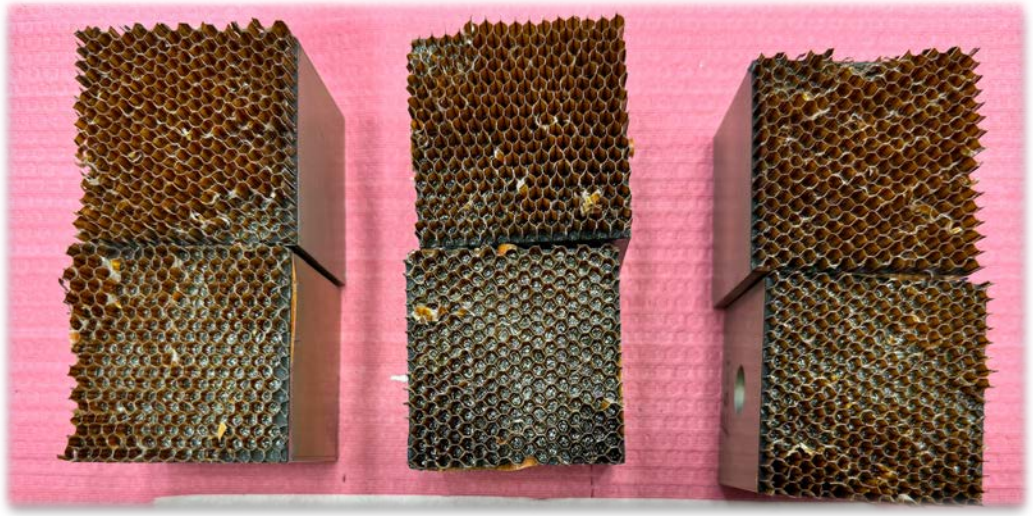
Core Batch	Core Thickness	Sheet	Test Type	Geometry (0°x90°)	Test Method	CTD -65°F	RTD 70°F	ETD 180°F	ETW 180°F	Core Panel Size (0°x90°)	Panel Name
Batch B NA34469	0.5"	1	Stabilized Compression (SFWC)	2"x2"	ASTM C365	5	5	5		15"x13"	NTP1018Q1-HXL-H21-NIAR-SFWC-B-S1-C1-1
			Flatwise Tension (FWT)	2"x2"	ASTM C297	5	5	5		15"x13"	NTP1018Q1-HXL-H21-NIAR-FWT-B-S1-C1-1
			Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	3	4		29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-B-S1-C1-1
			Core Shear (CSL)	6"x2"	ASTM C273	5	5	5		N/A	N/A
			Core Shear (CSW)	2"x6"	ASTM C273	5	5	5		N/A	N/A
			Bare Flatwise Core Compression (BFWC)	2"x2"	ASTM C365	5	5	5		N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		2	Stabilized Compression (SFWC)	2"x2"	ASTM C365	5	5	5		15"x13"	NTP1018Q1-HXL-H21-NIAR-SFWC-B-S2-C1-1
			Flatwise Tension (FWT)	2"x2"	ASTM C297	5	5	5		15"x13"	NTP1018Q1-HXL-H21-NIAR-FWT-B-S2-C1-1
			Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	3	4		29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-B-S2-C1-1
			Core Shear (CSL)	6"x2"	ASTM C273	5	5	5		N/A	N/A
			Core Shear (CSW)	2"x6"	ASTM C273	5	5	5		N/A	N/A
			Bare Flatwise Core Compression (BFWC)	2"x2"	ASTM C365	5	5	5		N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		3	Climbing Drum Peel (CDP)	14"x3"	ASTM D1781	5	5	5		33"x36"	NTP1018Q1-HXL-H21-NIAR-CDP-B-S3-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		4	Climbing Drum Peel (CDP)	14"x3"	ASTM D1781	5	5	5		33"x36"	NTP1018Q1-HXL-H21-NIAR-CDP-B-S4-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		5	Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	4	3		29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-B-S5-C1-1
			Core Shear Stress (CSS)	8"x3"	ASTM C393	5	5	5		37"x20"	NTP1018Q1-HXL-H21-NIAR-CSS-B-S5-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		6	Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	4	3		29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-B-S6-C1-1
			Core Shear Stress (CSS)	8"x3"	ASTM C393	5	5	5		37"x20"	NTP1018Q1-HXL-H21-NIAR-CSS-B-S6-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
Batch C NA34523	0.5"	1	Stabilized Compression (SFWC)	2"x2"	ASTM C365	5	5	5		15"x13"	NTP1018Q1-HXL-H21-NIAR-SFWC-C-S1-C1-1
			Flatwise Tension (FWT)	2"x2"	ASTM C297	5	5	5		15"x13"	NTP1018Q1-HXL-H21-NIAR-FWT-C-S1-C1-1
			Long Beam Flex (LBF)	24"x3"	ASTM D7249	5	5	5		29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-C-S1-C1-1
			Core Shear (CSL)	6"x2"	ASTM C273	5	5	5		N/A	N/A
			Core Shear (CSW)	2"x6"	ASTM C273	5	5	5		N/A	N/A
			Bare Flatwise Core Compression (BFWC)	2"x2"	ASTM C365	5	5	5		N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		2	Stabilized Compression (SFWC)	2"x2"	ASTM C365	5	5	5		15"x13"	NTP1018Q1-HXL-H21-NIAR-SFWC-C-S2-C1-1
			Flatwise Tension (FWT)	2"x2"	ASTM C297	5	5	5		15"x13"	NTP1018Q1-HXL-H21-NIAR-FWT-C-S2-C1-1
			Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	3	4		29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-C-S2-C1-1
			Core Shear (CSL)	6"x2"	ASTM C273	5	5	5		N/A	N/A
			Core Shear (CSW)	2"x6"	ASTM C273	5	5	5		N/A	N/A
			Bare Flatwise Core Compression (BFWC)	2"x2"	ASTM C365	5	5	5		N/A	N/A
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		3	Climbing Drum Peel (CDP)	14"x3"	ASTM D1781	5	5	5		33"x36"	NTP1018Q1-HXL-H21-NIAR-CDP-C-S3-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		4	Climbing Drum Peel (CDP)	14"x3"	ASTM D1781	5	5	5		33"x36"	NTP1018Q1-HXL-H21-NIAR-CDP-C-S4-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		5	Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	4	3		29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-C-S5-C1-1
			Core Shear Stress (CSS)	8"x3"	ASTM C393	5	5	5		37"x20"	NTP1018Q1-HXL-H21-NIAR-CSS-C-S5-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A
		6	Long Beam Flex (LBF)	24"x3"	ASTM D7249	3	4	3		29"x36"	NTP1018Q1-HXL-H21-NIAR-LBF-C-S6-C1-1
			Core Shear Stress (CSS)	8"x3"	ASTM C393	5	5	5		37"x20"	NTP1018Q1-HXL-H21-NIAR-CSS-C-S6-C1-1
			Core Density	12"x12"	ASTM C271		10			N/A	N/A

Qualification Testing – Flatwise Tension

Test Method Description	ASTM	Property	CTD	RTD	ETD
Flatwise Tension	C297	***Strength (psi)***	**340.0**	**336.9**	**322.5**
		St. Dev.	14.84	8.364	7.773
		C.V. (%)	4.366	2.483	2.410
		No. of Specimens	18	18	18







Program Status & Next Steps

- **Honeycomb Core Qualification Program**
  - Specimen ETW Saturation & Testing
  - Data Review & Statistical Analysis
  - Publish Specs, MPDR, and Statistical Report
- **Benefit to Aviation**
  - Publicly available honeycomb core data along with framework for qualifying core materials.
  - Guidelines generated in this program will be transitioned into shared databases, such as CMH-17

Questions?

- **Contact:**
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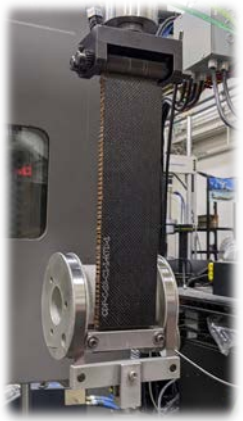
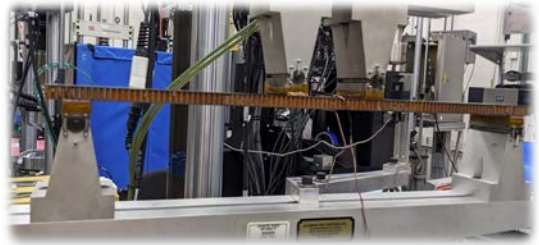
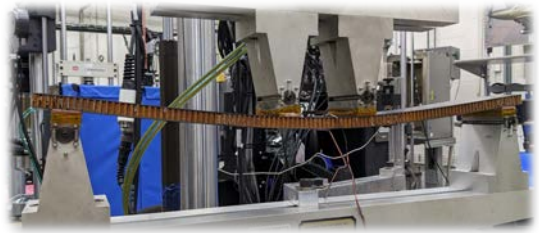
Qualification Testing – CDP, CSS, & LBF

Test Method Description	ASTM	Property	CTD	RTD	ETD	ETW
Climbing Drum Peel	D1781	***Peel Torque (in-lb/in)***	**9.851**	**11.48**	**10.69**	
		St. Dev.	0.9440	0.4786	0.5694	
		C.V. (%)	9.582	4.169	5.324	
		No. of Specimens	18	18	18	
Core Shear Stress	C393	***Ultimate Stress (psi)***	**203.1**	**189.1**	**173.3**	**130.0**
		St. Dev.	7.973	5.997	3.879	3.698
		C.V. (%)	3.925	3.171	2.238	2.845
		No. of Specimens	18	18	18	6
		Bending Stress (ksi)	**22.57**	**20.46**	**19.34**	**15.43**
		St. Dev.	2.994	1.965	1.814	0.7913
		C.V. (%)	13.26	9.605	9.381	5.129
		No. of Specimens	18	18	18	6
Long Beam Flex	D7249	***Ultimate Stress (psi)***	**57.26**	**52.45**	**47.01**	
		St. Dev.	2.996	2.959	3.180	
		C.V. (%)	5.231	5.642	6.765	
		No. of Specimens	34	34	34	
		Chord Modulus (tensile) (Msi)	**10.69**	**10.39**	**10.22**	
		St. Dev.	0.58441	0.5098	0.7195	
		C.V. (%)	5.469	4.909	7.039	
		No. of Specimens	34	34	34	
		Chord Modulus (compressive) (Msi)	**9.803**	**9.627**	**9.426**	
		St. Dev.	0.5167	0.4840	0.7600	
		C.V. (%)	5.271	5.027	8.063	
		No. of Specimens	34	34	34	
		Stiffness (M lb.in2)	**0.1151**	**0.1153**	**0.1132**	
		St. Dev.	0.001779	0.001265	0.002906	
		C.V. (%)	1.546	1.097	2.568	
		No. of Specimens	34	34	34