

Trimer Resin Project Update



- ◆ **Project Title:** Fire Resistance (FR) Testing of Trimer Resin for Infrastructure & Construction
- ◆ **Project team:** Orenco Composites, Trimer Technologies, UDRI, SWRI, and IACMI



trimer

Potential Applications for Current Project

Primarily web-stiffened, cored panels

- Bridges
- Enclosures for Micro Data Centers
- Tunnels
- Train / Subway Station Platforms
- Heliports / Vertiports
- Enclosures for Remote Power
- Building Facades
- Prefabricated Balconies
- Accessory Dwelling Units
- Industrial small Buildings



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- **Scope:** Conduct a series of FR tests with Trimer NFUSE resin and glass/core reinforcements. Scaling to 10' x 10' assemblies.
 - E1354- Cone Calorimetry Testing (at UDRI)
 - E84- Standard Test Method for Surface Burning Characteristics of Building Materials (at SWRI)
 - E119 "Mini" test
 - E119- Standard Test Methods for Fire Tests of Building Construction Materials (at SWRI)

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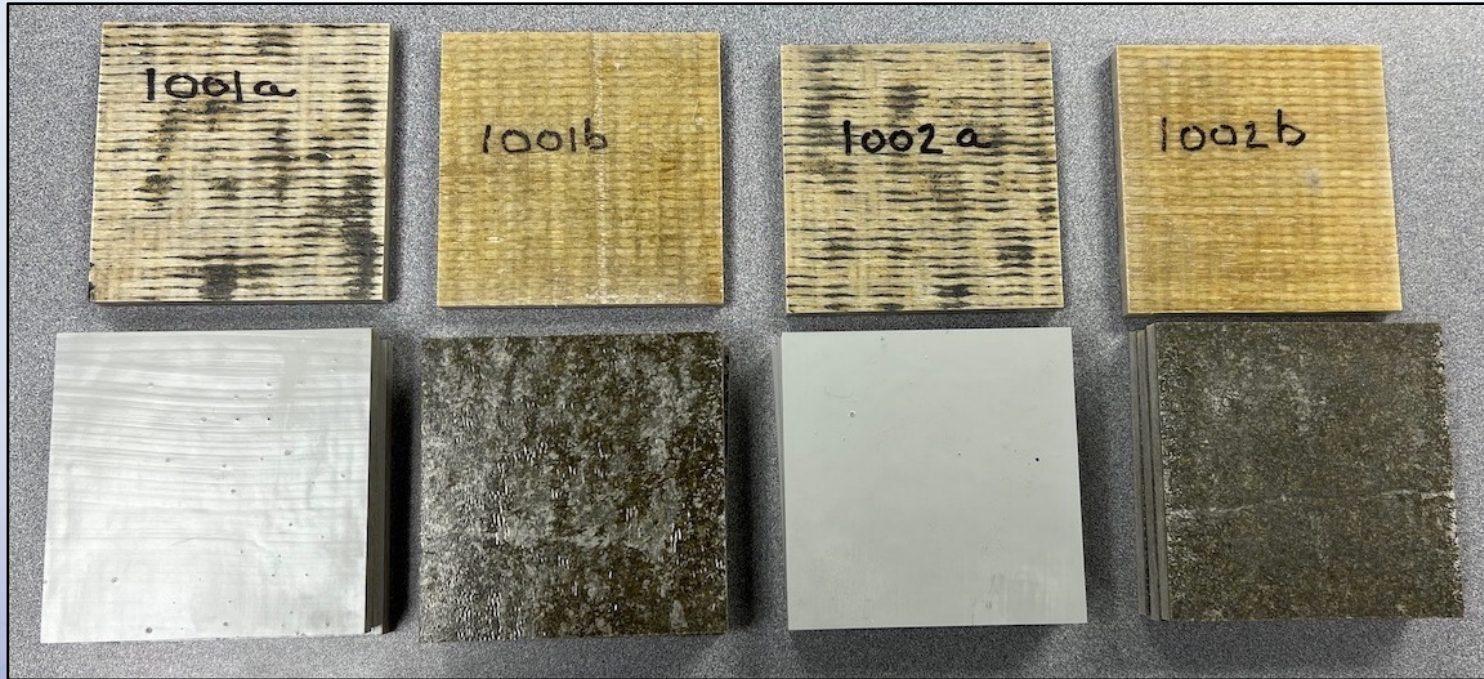


- Scope:** Conduct a series of FR tests with Trimer NFUSE resin and glass/core reinforcements. Scaling to 10' x 10' assemblies.

Test	Serial #	Resin	Coating	Core	Reinforcement	Sizing	Panel Size	Specimen Dimensions	Summary	Testing Lab
E1354	1001a	HARP RAPID standard w 11 N-fuse catalyst	Ceramic Hybrid RED	none	Vectorply 3610 (6 plies)	silane	16" x 16"	4.0" x 4.0" (4 specimens per panel)	4 total tests	UDRI
	1001b		Technofire 60152C							
	1002a	HARP F1005 w N-fuse catalyst	Ceramic Hybrid RED							
	1002b		Technofire 60152C							
E84	2001a	downselect after E1354. Based on results, HARP RAPID standard resin was chosen	No coating	none	Vectorply 3610 (4 plies)	silane	2'x8' (qty.3)		2 total tests	SWRI
	2001b		Technofire 60152C	PET 1.00" 100	Wrap core with 3 plies 3610					
E119 Mini	3001a	downselect after E1354/E84	Ceramic Hybrid RED	3" thick PET	FG multiaxial	silane			4 total tests	SWRI
	3001b		Technofire 60152C							
	3001c		Ceramic Hybrid RED	3" thick Polyiso						
	3001d		Technofire 60152C							
E119 Full Size	4001a	downselect after E119 Mini	downselect after E119 Mini	downselect after E119 Mini	FG multiaxial	silane			2 total tests (one loaded floor and one unloaded wall)	SWRI
	4001b									

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◆ E1354- Cone Calorimetry Testing



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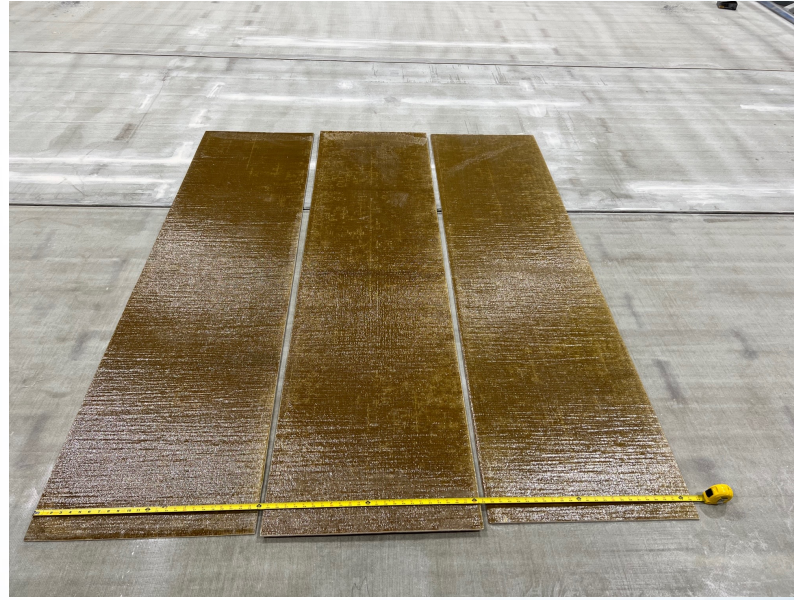
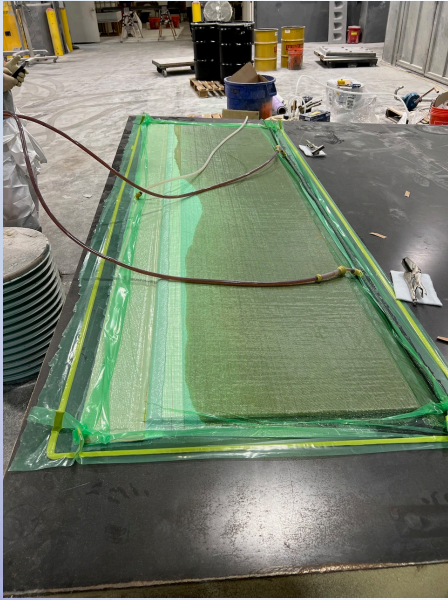


◆ E1354- Cone Calorimetry Testing - Brief discussion of results

- ◆ Trimer resin with Technofire 60152C appear to work rather well with one another, with notable delays in time to ignition, and low fire growth rate and MARHE for this particular combination. Given how E119 is a “time to burn through” test with an aggressive heat growth curve, delaying ignition while maximizing char and lowering Total HR is a preferred fire performance for a material going into E119 testing.
- ◆ Trimer Resin with Ceramic Hybrid Red as a coating looks to be the better performer due to the notably lower heat release for this material. Further, it should be noted that the ability of the Ceramic Hybrid Red to prevent thermal damage to the aluminum foil suggests that it would do well in E119.

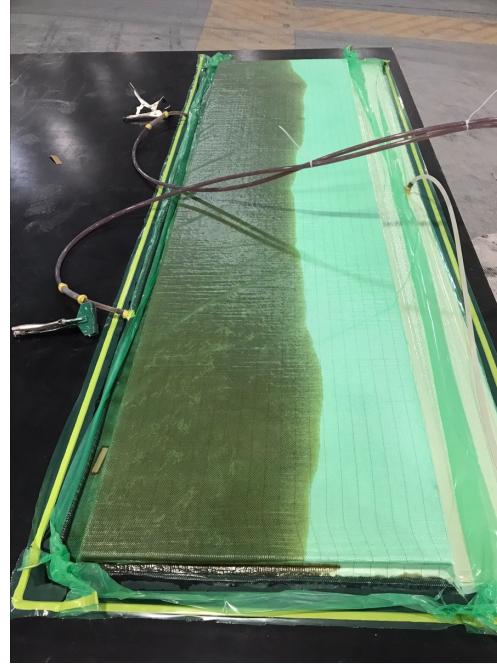
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- ◆ E84 non-cored test panels and no coating



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- ◆ E84 cored panel with Technofire 60152C



ASTM E84 Test Results

Classification per Section 803.1.2 of IBC

Rating	FSI	SDI
A	0 – 25	0 – 450
B	26 – 75	0 – 450
C	76 – 200	0 – 450

Test Results		
Material ID	FSI	SDI
Serial No. 2001a (Trimer laminate, no coating)	15	250



Classification per Section 803.1.2 of IBC

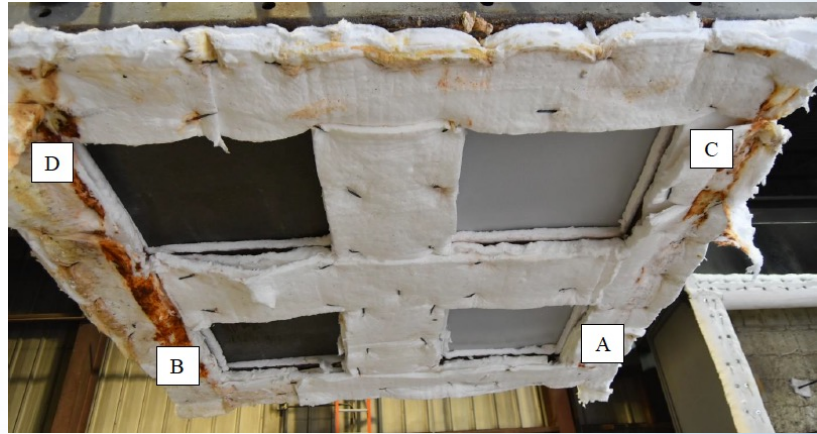
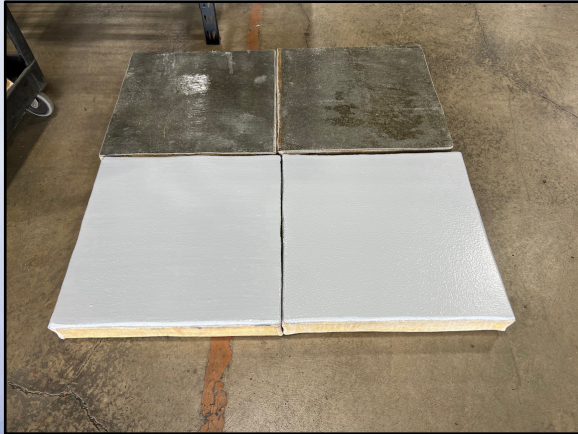
Rating	FSI	SDI
A	0 – 25	0 – 450
B	26 – 75	0 – 450
C	76 – 200	0 – 450

Test Results		
Material ID	FSI	SDI
Serial No. 2001b (Trimer PET-cored panel with Technofire 60152C)	15	400



ASTM E119 Mini Samples were Tested at SWRI

- Sample A: Trimer PET-Cored Panel with Ceramic Hybrid RED Coating
- Sample B: Trimer PET-Cored Panel with Technofire 60152C
- Sample C: Trimer PolyIso-Cored Panel with Ceramic Hybrid RED Coating
- Sample D: Trimer PolyIso-Cored Panel with Technofire 60152C

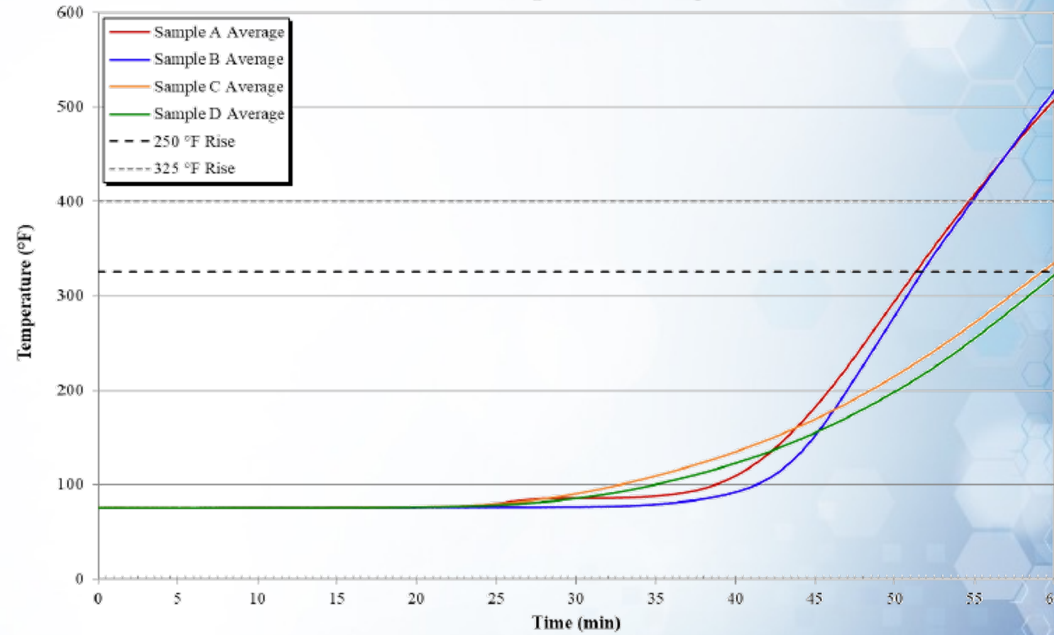


ASTM E119 Test Results



Orengo Composites
SwRI Project No. 01.27685.23.304
Test Date: April 18, 2023
Test ID: 23-108col304.csv

All Sample TC Averages



ASTM E119 Test Results

- ◆ PET cored samples showed complete loss of core
- ◆ Polyiso cures showed better char yield leading to reduced heat transfer
- ◆ Hybrid RED Coating exhibited greater mechanical degradation of surface plies than the Technofire 60152C



