

# COMPOSITE GUARD™ FP

## COMPOSITE FIRE PROOFING SYSTEM



### Description

NRI's Composite Guard™FP system utilizes nano-technology to create an integrated fire proofing system for application on high risk piping within fire proofing zones in refineries and on offshore platforms. The Composite Guard FP System protects the composite repair under extreme fire conditions by creating a barrier between the external flame temperature and the composite repair's outer substrate. The extremely low thermal conductivity of the barrier prevents the composite repair system from reaching temperatures exceeding the maximum temperature rating, preventing degradation or failure of the composite.

### Mechanical Properties

Test	Method	Result
Compressive Strength	ASTM C 165	Stress at 10% strain = 14.8 psi (102 kPa) Stress at 25% strain = 26.6 psi (183 kPa)
Linear Shrinkage Under Soaking Heat	ASTM C 356	< 1.3% @ 1200°F (650°C)
Hot Surface Performance	ASTM C 411	Passed
Estimation of Maximum Use Temperature	ASTM C 447	1200°F (650°C)
Insulation for Use Over Austenitic Stainless Steel	ASTM C 795	Passed
Classifying the Flexibility of Mineral Fiber Blankets	ASTM C 1101	Class: Resilient Flexible
Water Vapor Sorption	ASTM C 1104	2.25% (by weight)
Fungal Resistance of Insulation Materials	ASTM C 1338	Passed
Liquid Water Retention After Submersion	ASTM C 1511	4% (by weight)
Surface Burning Characteristics	ASTM E 84	Flame Spread Index = 0 Smoke Developed Index = 0
Cone Calorimetry	ASTM E 1354	No ignition at 50 kW/m2
Non-Combustibility	ISO 1182:1190	Meets criteria outlined in ISO 1882:1990
Rapid Rise Fire Tests of Protection Materials for Structural Steel	UL 1709	12mm → 68min      48mm → 184min 30mm → 132min    66mm → 240min

### Typical Applications

- Offshore platforms
- Refineries
- Chemical processing plants

### Benefits

- Increase safety
- Designed specifically for use with composite repairs
- Fast Installation
- Lightweight
- Impact resistant
- Long term durability
- Provides instant fire protection
- Does not require flame exposure to form a thermal barrier like other coatings

### Physical Properties

VOCs: None

Color: White

Thickness: Approximately 1.2" (90 mm)

Hydrophobic: Yes

UV Stable: Yes

Impact Resistant: Yes

Corrosion Resistant: Yes

Service Temperature:

Max: Up to 2000°F (1093°C)

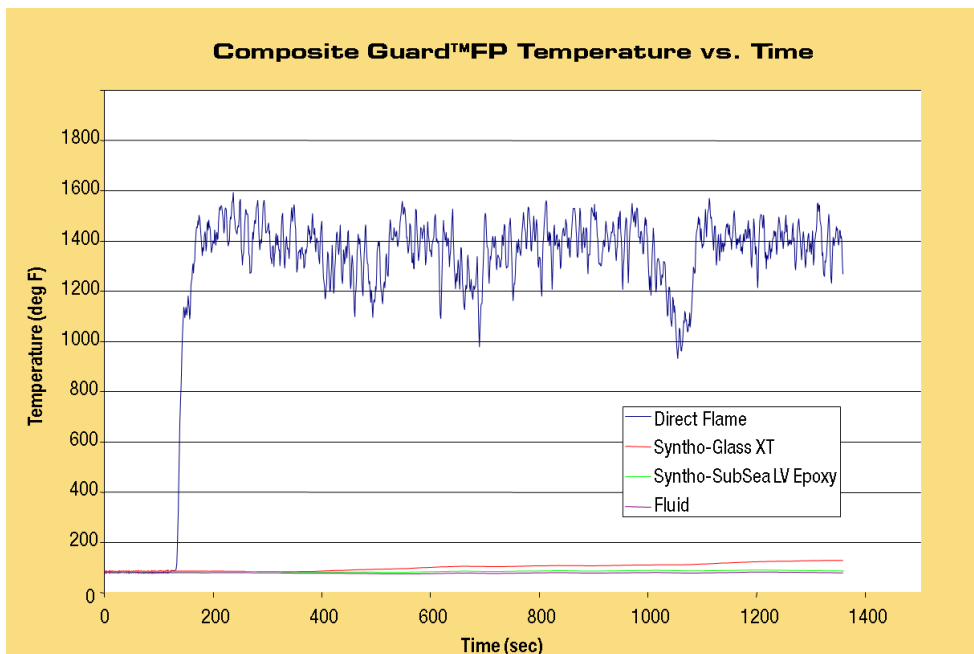


## Fire Resistance Testing

NRI's Composite Guard™ FP (CGFP) system was tested at a third party laboratory by wrapping the system over an existing composite repair, Syntho-Glass®XT, in order to test its fire proofing and heat resistance capabilities. CGFP was installed per specifications and then subjected to a direct, live flame for one hour. Temperature probes were placed in four locations to measure the thermal stability of each location. As seen in the results and graph below, the direct flame remained at an average of 1,370°F (743°C) throughout the test, while the temperature on the composite repair remained below 140°F (60°C) which is well below the temperature limit of the repair. The temperature of the fluid being transported inside the pipe never rose above room temperature.

Based on this testing, the CGFP System can give a minimum fire rating of 2 hours under direct flame with the average temperature stated. Further burst testing was completed on the composite repair system after submersion in the fire and has shown no degradation effects, thereby confirming the validity and effectiveness of the Composite Guard FP. This system can give a very high degree of confidence in the safety of the repair system even in the event of a fire in the facility.

Probe Location	Min Temp	Max Temp	Delta
Direct Flame	78°F (25°C)	1596°F (869°C)	1518°F (825°C)
Syntho-Glass XT Substrate	80°F (26°C)	130°F (54°C)	49°F (9°C)
Syntho-Subsea™ LV	81°F (27°C)	90°F (32°C)	9°F (12°C)
Fluid	76°F (24°C)	85°F (29°C)	9°F (12°C)



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