Thermaline® 450

PRODUCT DATA SHEET

SELECTION & SPECIFICATION DATA

Generic Type	Amine-Cured Novolac Epoxy
Description	Highly cross-linked, glass-flake filled polymer that offers exceptional barrier protection and resistance to wet/dry cycling at elevated temperatures. Suitable for insulated or uninsulated pipes, stacks and equipment operating up to 450 °F (232 °C). This coating provides excellent resistance to corrosion, abrasion and permeation, and its novolac-modification resists severe chemical attack. This extreme performance product has decades of performance and is recommended for CS-1,3,4 and SS-1,2,3 systems of NACE SP0198 Standard Practice for coatings to control corrosion under insulation (CUI).
Features	• Temperature resistance up to 450 °F (232 °C) • High-build single-coat capabilities • Excellent resistance to thermal shock • Superior abrasion and chemical resistance • Glass flake reinforcement • Ambient-temperature cure • VOC compliant to current AIM regulations
Color	Red (0500); Gray (5742)
Finish	Eggshell
Primer	Self-priming. May be applied over epoxies and phenolics.
Dry Film Thickness	8 - 10 mils (203 - 254 microns) minimum to be achieved in 1 or 2 coats Do not exceed 15 mils (375 microns) per coat.
Solids Content	By Volume 70% +/- 2%
Theoretical Coverage Rate	1123 ft²/gal at 1.0 mils (27.6 m²/l at 25 microns) 140 ft²/gal at 8.0 mils (3.4 m²/l at 200 microns) 112 ft²/gal at 10.0 mils (2.8 m²/l at 250 microns) Allow for loss in mixing and application.
VOC Values	**As Supplied** : 2.08 lbs/gal (250 g/l) Thinner 2 : 13 oz/gal: 2.54 lbs/gal (305 g/l) Thinner 213 : 13 oz/gal: 2.58 lbs/gal (308 g/l)
Limitations	Epoxies lose gloss, discolor and eventually chalk in sunlight exposure.
Topcoats	May be coated with Epoxies or Polyurethanes depending on exposure and need.

SUBSTRATES & SURFACE PREPARATION

General	Surfaces must be clean and dry. Employ adequate methods to remove dirt, dust, oil and all other contaminants that could interfere with adhesion of the coating.
Steel	Non-Insulated: SSPC-SP6 Insulated: SSPC-SP10 Surface Profile: 2.0-3.0 mils (50-75 microns)

SUBSTRATES & SURFACE PREPARATION

Stainless Steel	Surface profile shall be a dense angular 2.0-3.0 mils in accordance with SSPC-SP16 as achieved through abrasive blasting. Remove all surface contaminants that would interfere with the performance of stainless steel for the intended service such as, but not limited to, imbedded iron or chlorides.

PERFORMANCE DATA

All test data was generated under laboratory conditions. Field testing results may vary.

Test Method	System	Results
ASTM D2794 Impact	Blasted Steel 1 ct. 450	0.375 in. from damaged area. 100-in./lbs
ASTM D3359 Adhesion	Blasted Steel 2 cts. 450	4A
ASTM D4060 Abrasion	Blasted Steel 2 cts 450	171 mg loss after 1000 cycles; CS17 wheel, 1000 gram load
Heat Cycling Test	Blasted Steel 1 ct. 450	No cracking, blistering, or delamination after thermal cycling (-10 to 425°F)
Modified NACE Std. Tm-01-74B Immersion	Blasted Steel 2 cts. 450	No effect after 6 month exposure, 200°F deionized water

Test reports and additional data available upon written request.

MIXING & THINNING

Mixing	Power mix separately, then combine and power mix. DO NOT MIX PARTIAL KITS.
Thinning	May be thinned up to 13 oz/gal (10%) with Thinner 213. For application on horizontal surfaces, may be thinned up to 13 oz/gal (10)% with Thinner 2. Agitate Thinner 213 before use. Thinner 213 will have a thick viscous appearance which is normal. Use of thinners other than those supplied by Carboline may adversely affect product performance and void product warranty, whether expressed or implied.
Ratio	4:1 Ratio (A to B)
Pot Life	3 Hours at 75°F (24°C). Pot life ends when coating loses body and begins to sag. Pot life times will be less at higher temperatures.

APPLICATION EQUIPMENT GUIDELINES

Listed below are general equipment guidelines for the application of this product. Job site conditions may require modifications to these guidelines to achieve the desired results.

Spray Application (General)	The following spray equipment has been found suitable and is available from manufacturers.
Conventional Spray	Pressure pot equipped with dual regulators, ½" I.D. minimum material hose, 0.110" I.D. fluid tip and appropriate air cap.
Airless Spray	Pump Ratio: 45:1 (min.)* GPM Output: 3.0 (min.) Material Hose: ½" I.D. (min.) Tip Size: 0.035-0.041" Output PSI: 2200-2500 *PTFE packings are recommended and available from the pump manufacturer.

APPLICATION EQUIPMENT GUIDELINES

Listed below are general equipment guidelines for the application of this product. Job site conditions may require modifications to these guidelines to achieve the desired results.

Brush	For striping of welds and touch-up of small areas only. Use a medium natural bristle brush and avoid rebrushing.
Roller	Not recommended.

APPLICATION CONDITIONS

Condition	Material	Surface	Ambient	Humidity
Minimum	55°F (13°C)	50°F (10°C)	50°F (10°C)	0%
Maximum	90°F (32°C)	110°F (43°C)	100°F (38°C)	85%

This product simply requires the substrate temperature to be above the dew point. Condensation due to substrate temperatures below the dew point can cause flash rusting on prepared steel and interfere with proper adhesion to the substrate. Special application techniques may be required above or below normal application conditions.

CURING SCHEDULE

Surface Temp.	Dry to Handle	Dry to Recoat or Topcoat	Final Cure	Maximum Recoat Time
50°F (10°C)	18 Hours	48 Hours	21 Days	21 Days
60°F (16°C)	12 Hours	32 Hours	14 Days	14 Days
75°F (24°C)	6 Hours	16 Hours	7 Days	7 Days
90°F (32°C)	3 Hours	8 Hours	4 Days	4 Days

These times are based on 8.0-10.0 mil (250 micron) dry film thickness. Higher film thickness, insufficient ventilation or cooler temperatures will require longer cure times and could result in solvent entrapment and premature failure. Excessive humidity or condensation on the surface during curing can interfere with the cure, can cause discoloration and may result in a surface haze. Any haze or blush must be removed by water washing before recoating. During high humidity conditions, it is recommended that the application be done while temperatures are increasing. If the maximum recoat time is exceeded, the surface must be abraded by sweep blasting prior to the application of additional coats.

CLEANUP & SAFETY

Cleanup	Use Thinner 2 or Acetone. In case of spillage, absorb and dispose of in accordance with local applicable regulations.
Safety	Read and follow all caution statements on this product data sheet and on the SDS for this product. Employ normal workmanlike safety precautions.
Ventilation	When used in enclosed areas, thorough air circulation must be used during and after application until the coating is cured. The ventilation system should be capable of preventing the solvent vapor concentration from reaching the lower explosion limit for the solvents used. User should test and monitor exposure levels to insure all personnel are below guidelines. If not sure or if not able to monitor levels, use MSHA/NIOSH approved supplied air respirator.

PACKAGING, HANDLING & STORAGE

Shelf Life	Part A & B: Min. 36 months at 75 °F (24 °C) *Shelf Life: (actual stated shelf life) when kept at recommended storage conditions and in original unopened containers.
Storage Temperature & Humidity	40-110 °F (4-43 °C) 0-90% Relative Humidity
Storage	Store Indoors.
Shipping Weight (Approximate)	1 Gallon Kit - 12 lbs (6 kg) 5 Gallon Kit - 58 lbs (26 kg)
Flash Point (Setaflash)	Part A: 53°F (12°C) Part B: >200°F (93°C)

WARRANTY

To the best of our knowledge the technical data contained herein is true and accurate on the date of publication and is subject to change without prior notice. User must contact Carboline Company to verify correctness before specifying or ordering. No guarantee of accuracy is given or implied. We guarantee our products to conform to Carboline quality control. We assume no responsibility for coverage, performance, injuries or damages resulting from use. Carbolines sole obligation, if any, is to replace or refund the purchase price of the Carboline product(s) proven to be defective, at Carbolines option. Carboline shall not be liable for any loss or damage. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY CARBOLINE, EXPRESS OR IMPLIED, STATUTORY, BY OPERATION OF LAW, OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. All of the trademarks referenced above are the property of Carboline International Corporation unless otherwise indicated.