product data

carboline®

Thermaline® 450
Novolac

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 and non-insulated 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.

Features
- Temperature resistance up to 450°F (232°C)
- High-build single-coat capabilities
- Excellent resistance to thermal shock
- Superior abrasion and chemical resistance through internal reinforcement
- Ambient-temperature cure
- VOC compliant to current AIM regulations

Color
Red (0500); Gray (5742)

Finish
Eggshell

Primers
Self-priming. May be applied over epoxies and phenolics.

Topcoats
Epoxies, Polyurethanes

Dry Film Thickness
8.0-10.0 mils (200-250 microns)
Do not exceed 15 mils (375 microns) per coat.

Solids Content
By Volume: 70% ± 2%

Theoretical Coverage Rate
1117 mil ft^2 (27.9 m^2/l at 25 microns)
Allow for loss in mixing and application

VOC Values
As supplied: 2.08 lbs/gal (250 g/l)
Thinned:
13 oz/gal w/ #213: 2.58 lbs/gal (308 g/l)
13 oz/gal w/#2 2.54 lbs/gal (305 g/l)
These are nominal values.

Dry Temp. Resistance
Continuous: 425°F (218°C)
Non-Continuous: 450°F (232°C)
Discoloration and loss of gloss may be observed above 200°F (93°C).

Limitations
Epoxies lose gloss, discolor and eventually chalk in sunlight exposure.

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)

Stainless Steel
Surface profile should be a dense angular 2.0-3.0 mils and is best 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

Test Method	System	Results
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
ASTM D2794 Impact	Blasted Steel 1 ct. 450	.375 in. from damaged area. 100-in./lbs
Heat Cycling Test	Blasted Steel 1 ct. 450	No cracking, blistering or delamination of film after 425°F for 1 hr/ambient/ -10°F for 24 hrs/ambient/ 425°F for 24 hrs/ambient/ -10°F for 24 hrs/ambient/ 425°F for 200 hr/ambient
Modified NACE Std. TM-01-74B Immersion	Blasted Steel 2 cts. 450	No effect to coating film except discoloration after 6 month exposure, Deionized water
Chemical Resistance	Blasted Steel 1 ct. 450	Resistant to fumes of commons acids, alkalis, solvents and hydrocarbon compounds. Resistant to splash and spillage of alkalis, solvents and hydrocarbons. Acid contact may cause discoloration of coating.

Thermaline® 450 Novolac

Application Equipment

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.
General Guidelines:

Spray Application (General) The following spray equipment has been found suitable and is available from manufacturers such as Binks, DeVilbiss and Graco.

Conventional Spray Pressure pot equipped with dual regulators, ½" I.D. minimum material hose, .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:	.035-.041"
Output PSI:	2200-2500

*Teflon packings are recommended and available from the pump manufacturer.

Brush For striping of welds and touch-up of small areas only. Use a medium natural bristle brush and avoid rebrushing.

Roller Not recommended.

Mixing & Thinning

Mixing Power mix separately, then combine and power mix. DO NOT MIX PARTIAL KITS.

Ratio 4:1 Ratio (A to B)

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.

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.

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 MSDS for this product. Employ normal workmanlike safety precautions. Hypersensitive persons should wear protective clothing, gloves and use protective cream on face, hands and all exposed areas.

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.

Caution This product contains flammable solvents. Keep away from sparks and open flames. All electrical equipment and installations should be made and grounded in accordance with the National Electric Code. In areas where explosion hazards exist, workmen should be required to use non-ferrous tools and wear conductive and non-sparking shoes.

Application Conditions

Condition	Material	Surface	Ambient	Humidity
Normal	65°-85°F (18°-29°C)	65°-85°F (18°-29°C)	65°-85°F (18°-29°C)	30-60%
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)	90%

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. & 50% Relative Humidity	Dry to Handle	Dry to Topcoat w/ Other Finishes	Final Cure
50°F (10°C)	18 Hours	48 Hours	21 Days
60°F (16°C)	12 Hours	32 Hours	14 Days
75°F (24°C)	6 Hours	16 Hours	7 Days
90°F (32°C)	3 Hours	8 Hours	4 Days

These times are based on a 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 final cure time is exceeded, the surface must be abraded by sweep blasting prior to the application of additional coats.

Packaging, Handling & Storage

	1 Gallon Kit	5 Gallon Kit
Shipping Weight (Approximate)	12 lbs (6 kg)	58 lbs (26 kg)

Flash Point (Setaflash) Part A: 53°F (12°C)
Part B: >200°F (93°C)

Storage (General) Store Indoors.

Storage Temperature & Humidity 40° - 110°F (4°-43°C)
0-90% Relative Humidity

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.**

carboline®
Coatings - Linings - Fireproofing
2150 Schuetz Rd., St. Louis, MO 63146
PH: 314-644-1000 Toll-Free: 800-848-4645
www.carboline.com

An RPM Company

August 2011 replaces February 2011