product data carboline®

Thermo-Lag 440-SP

fireproofing systems

Selection & Specification Data

Generic Type
A two component, 95% solids epoxy based intumescent coating for the fire protection of structural steel, spheres, tanks and railcars.

Description
Thermo-Lag® 440-SP is designed to fireproof steelwork for up to a 4 hour fire rating, depending on the design. The recommended use for this product is fireproofing of steel beams, columns, pressurized and non pressurized spheres, tanks and railcars to provide hydrocarbon pool fire and jet fire ratings.

Features
- UL listed - designs for many types of steel sections up to 4 hour fire ratings for both interior and exterior environments.
- Durable finish - provides a hard, durable finish resistant to normal wear.
- Thin film coating - offers an economical solution to alternative fireproofing.
- VOC compliant
- Easy repair - if damaged it can be repaired easily using material as putty.

Color
Part A: White
Part B: Beige
Mixed: Beige

Finish
Textured

*Aesthetics can be improved by trowel and back rolling.

Primers
Thermo-Lag® 440-SP must be applied over a compatible primer. If the steel has already been coated with an existing primer, refer to Carboline Technical Service for advice before applying Thermo-Lag® 440-SP. Contact Carboline Technical Service for a complete list of approved primers.

*The thickness range for primers used under Thermo-Lag® 440 must be 3-5 mils (75-125 microns) DFT per SSPC-PA2.

Fireproofing Topcoats
For interior conditioned space, topcoats are optional. For interior general purpose and exterior use, Carboline approved topcoats are required. Thermo-Lag®440-SP must be applied to the specified DFT and be fully cured before applying a topcoat. The choice of topcoat will depend on project requirements. Contact Carboline Technical Service for a complete list of approved topcoats.

Film Build
80-160 mils (2-4 mm)

Solids Content
By Volume 95%

Theoretical Coverage Rates
1,523 ft² at 1 mil (141 m² at 25 microns)

VOC Values
As Supplied 0.95 lbs/gal (114 g/l)

Mesh
Use FP-Fiberglass Mesh or High Temp Mesh depending on structural steel design.

*No mesh is required for tank and sphere applications. Contact Carboline Technical Service for specific design details.

Limitations
Not recommended for steelwork subject to long-term surface temperatures over 175°F (79°C) in normal use.

Substrates & Surface Preparation

General
Remove all oil or grease from the surface to be coated using Thinner #2 or Carboline Surface Cleaner #3.

Steel
Steel preparation before application of approved primer should meet SSPC-SP6 (onshore), SSPC-SP10 (offshore). 1.5-2.0 mil (37-50 micron) angular profile required.

*The thickness range for primers used under Thermo-Lag® 440 must be 3-5 mils (75-125 microns) DFT per SSPC-PA2.

Galvanized Steel
Steel preparation before priming should meet SSPC-SP7. 1.5-2.0 mil (37-50 micron) angular profile required. Prime with Carboguard 893 SG @ 3-5 mils (75-125 microns) DFT per SSPC-PA2.

Non-Ferrous Metals
Contact Carboline Technical Service for advice.

Performance Data

Test Method	Results
ASTM D2240 Hardness	Shore D - 55 (fully cured) Shore D - 40 (for topcoating)
ASTM D2794 Impact	24 ft. lb./in.
ASTM D4541 Bond Strength	300 psi (minimum)
ASTM D638 Tensile Strength	1,230 psi
ASTM D695 Compressive Strength	4,170 psi
ASTM D790 Flexural Strength	2,310 psi
ASTM E84 Surface Burning	Class A
Density	78 pcf

*All values derived under controlled laboratory conditions.

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.

Airless Spray
Use 45:1 airless (minimum) with Dura Flow lower cylinder (3/4" outlet) / 3.3 gal. per minute to provide an operating pressure of 3,000 p.s.i. (320 kg/cm2).

*Remove filters and surge tanks. Set bottom ball to greatest travel. Hopper feed required. Teflon packings are recommended.

Spray Gun
Binks 1M Mastic Gun (#44-6000)
Binks Tip Adapter (#49-1834)

Gun Swivel
Graco 5,000 psi (1/2"-3/8")

Spray Tips
0.039" - 0.065" (Use Graco heavy duty RAC non diffuser tips and housing)

Fan Size
6"-10" (depending on section being sprayed).

Static Mixer
Standard Static 12 turn (3/4" I.D.)

Hose Length
75' maximum

Material Hose
3/4" I.D. minimum (50')

Whip Hose
1/2" I.D. (25')

Compressor
Be certain that the air supply is a minimum of 185 cfm @ 100 psi (6.9 kPa). Air volume and pressure required will depend on equipment used.

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Mixing & Thinning

Mixer Use 1/2" electric or air driven drill with a slotted paddle mixer (300 rpm under load).

Mixing Thermo-Lag® 440-SP is supplied in 4.5 gallon kits, one 1/2 full pail of part A and one 1/2 full pail of part B. Add 1 quart (1 liter) of Thinner # 19 to part B and mix until fully incorporated. Stage material by adding part B on top of part A. Material can be left staged for entire days' production (8 hours), but not overnight. Mix staged material with slotted paddle mixing blade for 2 minutes or until completely blended and consistent color is achieved. Once mixed, material should be immediately poured into hopper and spraying should commence.

Thinning Thin with Thinner #19 or toluene – Maximum 1 quart (1 liter) per 4.5 gallon kit.

Ratio 1:1

Pot Life 30 - 40 minutes @ 77°F (25°C)
20 - 30 minutes @ 100°F (38°C)

Application Procedures

General Pre-cut all mesh before beginning application. Contact Carboline Technical Service for design details. All mesh must be kept clean and dry.
Prior to spraying using airless equipment, the Thermo-Lag® 440-SP must be preheated to a minimum of 70°F (21°C) to achieve a consistent fan pattern.
Apply first coat to point of mesh placement at 80-160 mils (2-4 mm). Allow material to gel for 20-30 minutes before installing mesh and backrolling. Apply pre-cut mesh into wet coating using solvent resistant mohair rollers. Use Thinner #19 to mist down rollers to prevent them from sticking to the material. Allow material to cure for 4 hours between coats. Continue building material at 80-160 mils (2-4 mm) per coat to specified thickness. Use solvent moistened rollers to back roll material after each subsequent coat to improve finish and level surface. Lighter coats will achieve a smoother finish. Contact Carboline Technical Service or refer to the Thermo-Lag® 440 application manual for more detailed information.

Application Rates At an ambient temperature of 70°F (21°C), the following application rates are applicable:
80-160 mils (2-4 mm) per coat (wet)
4 hour recoat time between coats
2 coats per day

Wet Film Thickness Frequent thickness measurements with a wet film gauge are recommended during the application process to ensure uniform thickness.

Dry Film Thickness Final thickness must be measured using an electronic dry film thickness gauge. For method of thickness determination and tolerances refer to: AWCI Technical Manual 12-B (Standard Practice for the Testing and Inspection of Field Applied Thin Film Intumescent Fire Resistive Materials).

Application Conditions

Condition	Material	Surface	Ambient	Humidity
Minimum	70 °F (21 °C)	41 °F (5 °C)	41 °F (5 °C)	0%
Maximum	105 °F (41 °C)	125 °F (52 °C)	110 °F (43 °C)	85%

*Air and substrate temperature must be at least 41°F (5°C) and rising. Steel surface temperature should be a minimum of 5°F (3°C) above the dew point. The maximum humidity is 85%. Area must be protected from rain or running water during application until material is cured and topcoated.

Curing Schedule

Surface Temp. & 50% Relative Humidity	Handle	Recoat	Topcoat	Touch
77 °F (25 °C)	24 Hours	4 Hours	24 Hours	4 Hours

*Curing times are dependent upon temperature, air movement and humidity. For optimum curing at 75°F (24°C), it is recommended to apply coats at 80-160 mils (2-4 mm)wet per coat. Material can be heated to achieve a quicker recoating and curing schedule. Material is ready to be topcoated when an average Shore D hardness of 40 is achieved. Consult Carboline Technical Service for specific details.

Cleanup & Safety

Cleanup Pump, mixer, hose, and gun should be cleaned with Thinner #19 at least once every 4 hours at 70°F (21°C), and more often at higher temperatures. After each use or any shut down, the pump, mixer, hopper and gun must be completely flushed. After flushing pump, remove hopper and bottom foot of pump to clean lower ball check valve. Also remove and hand clean gun, tips and tip housing. The hopper and mixing paddle must be kept clean continuously during application to prevent cured material from falling into the foot of the pump.

Safety Follow all safety precautions on the Thermo-Lag® 440-SP Material Safety Data Sheet. It is recommended that personal protective equipment be worn, including spray suits, gloves, eye protection and respirators when applying Thermo-Lag® 440-SP.

Overspray All adjacent and finished surfaces shall be protected from damage and overspray.

Ventilation In enclosed areas, ventilation shall not be less than 4 complete air exchanges per hour until the material is cured.

Maintenance

General If coating becomes damaged, rebuild required thickness by spray or trowel. When dry, smooth and finish with approved topcoat to match. Damaged areas must be abraded back to a firm edge by sanding or scraping. The topcoat should be abraded back by 1" (25.4 mm) from the damaged area. The surface must be clean and dry before re-applying Thermo-Lag® 440-SP. The coating shall then be built back to the original thickness. If the mesh is damaged, it must be cut out and replaced as well. Allow to cure and then overcoat with the specified topcoat or system.

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Testing / Certification / Listing

General	Underwriter's Laboratories, Inc. (UL) U.S. Department of Transportation (DOT) Lloyd's Register of Shipping (LRS) Bundesanstalt Fur Materialprufung (BAM)
Underwriters Laboratories, Inc	Thermo-Lag® 440-SP has been tested in accordance with UL 1709 at Underwriter's Laboratories, Inc. Thermo-Lag® 440-SP is listed by UL for the following designs: **Columns:** XR610 **Columns:** XR611 **Columns:** XR614 **Columns:** X622 *The product should be applied in accordance with the appropriate design.

Packaging, Handling & Storage

Shelf Life	12 Months *Shelf Life: (actual stated shelf life) when kept at recommended storage conditions and in original unopened containers.
Shipping Weight (Approximate)	11 lbs. per gallon
Flash Point (Setaflash)	Part A: 76°F (24°C) Part B: 64°F (18°C)
Storage	Store indoors in a dry environment between 32°F - 100°F (0°C - 38°C).
Packaging	Full Kits: 9.0 gallons Half Kits: 4.5 gallons

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