

SELECTION & SPECIFICATION DATA

Generic Type	A two component, 100% solids epoxy based intumescent coating for the fire protection of structural steel, spheres, tanks and railcars.
Description	Thermo-Lag 440-P 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 style="list-style-type: none"> • 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.
Primer	Thermo-Lag 440-P 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-P. 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.
Film Build	80-200 mils (2-5 mm)
Solids Content	By Volume 100%
Theoretical Coverage Rates	1604 ft ² at 1 mil (149 m ² at 25 microns)
VOC Values	As Supplied : 0.00 lb/gal (0 g/L)* * Calculated
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.
Topcoats	For interior conditioned space, topcoats are optional. For interior general purpose and exterior use, Carboline approved topcoats are required. Thermo-Lag 440-P 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.

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

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

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	Typical Field Value 300 psi (2.07 MPa)
ASTM D638 Tensile Strength	1,230 psi (8.4 MPa)
ASTM D695 Compressive Strength	4,170 psi (28.7 MPa)
ASTM D790 Flexural Strength	2,310 psi (15.9 MPa)
ASTM E84 Surface Burning	Class A
Density	78 pcf (1,249 kg/m ³)

All values derived under controlled laboratory conditions unless otherwise noted.

MIXING & THINNING

Mixer	Use 1/2" (12.7 mm) electric or air driven drill with a slotted paddle mixer (300 rpm under load).
Mixing	<p>Plural Component Application: For plural component applications, the part A and part B components must be pre-mixed separately before introduction into the plural equipment.</p> <p>Trowel Application: Recommended for small areas only. The product is supplied in 9 gallon (34.0 liter) kits. The product must be mixed in equal volumes of part A and part B. It is recommended to split each kit in half and mix 2.25 gallons (8.5 liters) of part A and 2.25 gallons (8.5 liters) of part B to achieve a maximum mixing volume of 4.5 gallons (17.0 liters). Add up to 1 quart (1 liter) of Carboline Plasite Thinner 19 or Carboline approved equivalent to part B and mix until fully incorporated. Thinning is not required for this application and material should only be thinned as necessary to achieve the desired working time and consistency. 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 approximately 2 minutes or until completely blended and consistent color is achieved. Once mixed, material should be immediately poured out of mass onto a clean table or flat working surface to extend the pot life. Mixed material left in the pail will begin to exotherm and diminish pot life. Trowel application should commence immediately after mixing.</p>
Thinning	Plural Component Application:

MIXING & THINNING

	Do not thin Trowel Application: Only thin as required with Plasite Thinner 19 or Carboline approved equivalent – Maximum 1 quart (1 liter) per 4.5 gallon (17.0 liter) kit.
Ratio	1:1 (by volume)
Working Time	30-45 minutes @ 75°F (25°C) 15-20 minutes @ 100°F (38°C)

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.

General	Use only plural component equipment specifically designed for epoxy based PFP. Consult the manufacturers for specific information: AirTech Spray Systems (Houston, TX) Spray Quip (Houston, TX) Graco (Minneapolis, MN) WIWA (Alger, OH/Lahnau, Germany)
Pump	Plural Component: Graco® XM PFP WIWA® Duomix 333 or Carboline approved equivalent Contact the equipment manufacturers for specific models.
Spray Gun	WIWA 500 PFP, Binks 1M Mastic or equivalent Must be non-wetted spring assembly.
Gun Swivel	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" (152-254 mm) depending on section being sprayed
Static Mixer	Standard Static 12 turn 3/4" (19 mm) I.D.
Material Hose	Plural Component: 100' (30.4 m) heated hose bundle with 3/4" (19 mm) I.D. minimum and 3/4" (19 mm) mixer manifold
Whip Hose	20' (6.1 m) of 1/2" (12.7 mm) I.D. minimum
Compressor	185 cfm @ 100 psi (6.9 KPa) minimum. Air volume and pressure required will depend on equipment used.

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. Plural Component Application:
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APPLICATION PROCEDURES

Prior to introduction into the plural component equipment, the product must be preheated to 70-100°F (21-38°C). Perform at least two ratio checks per day and also after any equipment maintenance. Apply first coat at 80-200 mils (2-5 mm). Lighter coats will achieve a smoother finish. Allow material to gel for 15 minutes before installing mesh and backrolling. Apply pre-cut mesh into wet coating using solvent resistant mohair rollers. Use Carboline Plasite Thinner 19 or Carboline approved equal as rolling solvent to mist down rollers to prevent them from sticking to the material. Allow material to cure for approximately 1 hour (depending upon temperature) between coats. Continue building material at 80-200 mils (2-5 mm) per coat to specified thickness.

Trowel Application:

Recommended for small areas only. Prior to trowel application, the material must be preheated to a minimum of 70°F (21°C) to achieve a workable consistency. Once material is mixed, it must be poured out of mass onto a clean table or flat working surface to extend the pot life. The material can then be divided into workable amounts. Trowel apply first coat at 80-200 mils (2-5 mm). Allow material to gel for 15 minutes before installing mesh and backrolling. Apply pre-cut mesh into wet coating using solvent resistant mohair rollers. Use Carboline Plasite Thinner 19 or Carboline approved equal as rolling solvent to mist down rollers to prevent them from sticking to the material. Allow material to set up sufficiently to support the next trowel applied coat. This will range between 1-4 hours between coats. Continue building material at 80-200 mils (2-5 mm) per coat to specified thickness.

Avoid using excessive solvent when backrolling as this can lead to solvent entrapment and lengthen the cure time of the material. Use solvent moistened rollers to back roll material after each subsequent coat to improve finish and level surface if required. Lighter coats will achieve a smoother finish. Contact Carboline Technical Service or refer to the product application manual for more detailed information.

Application Rates

At an ambient temperature of 70°F (21°C), the following application rates are applicable:
80-200 mils (2-5 mm) per coat (wet)
1 hour recoat time between coats
Multiple 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	100°F (38°C)	41°F (5°C)	41°F (5°C)	0%
Maximum	140°F (60°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.	Handle	Recoat	Topcoat	Touch
77°F (25°C)	24 Hours	1 Hour	24 Hours	1 Hour

*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 80-200 mils (2-5 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	Flush static mixer, whip hose, gun and tips with hot water or Carboline approved thinner immediately after each use (depending on pump set up). Use Carboline Plasite Thinner 19 Carboline or approved equal for cleaning solvent. Break down static mixer, gun and tip assembly and hand clean.
Safety	Read and follow all caution statements on this product data sheet and on the SDS for this product. Employ normal workmanlike safety precautions. Use adequate ventilation. Keep container closed when not in use.
Overspray	All adjacent and finished surfaces shall be protected from damage and overspray.
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 respirator.
Caution	This product does not contain flammable solvents, however, clean-up solvents that may be used do contain 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, workers should be required to use non-ferrous tools and wear conductive and non-sparking shoes.

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-P. 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)
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Thermo-Lag[®] 440-P

PRODUCT DATA SHEET



TESTING / CERTIFICATION / LISTING

**Underwriters
Laboratories, Inc.**

Thermo-Lag 440-P has been tested in accordance with UL 1709 at Underwriter's Laboratories, Inc. Thermo-Lag 440-P 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

Packaging

Full Kits: 9.0 gallons (34.0 liters)
Part A: 4.5 gallons (17.0 liters)
Part B: 4.5 gallons (17.0 liters)

Shelf Life

12 Months

*Shelf Life: (actual stated shelf life) when kept at recommended storage conditions and in original unopened containers.

Storage

Store indoors in a dry environment between 32-100°F (0-38°C).

**Shipping Weight
(Approximate)**

11 lb. per gallon (1.3 kg per liter)

Flash Point (Setaflash)

Part A: >200°F (>93°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.