

PART I GENERAL

1.01 SCOPE

- A. This guide details the procedures recommended by Carboline for the application of the Thermaline Heat Shield protective coating system.
- B. In cases where there is a procedure difference between this guide and any other document or standard referred to, the other guide's author and the Carboline Technical Service Department shall be consulted.
- C. The applicator shall review this guide and consult the Carboline Technical Service Department regarding its interpretation, disapproval or request for procedure changes. Deviations from this guide shall be discussed and agreed to by the Carboline Technical Service Department.
- D. The coating material manufacturer's current product data sheets are to be used in conjunction with and become a part of this guide. The applicator shall adhere to all accommodations of product shelf life, mixing ratios and acceptable thinners.
- E. The applicator shall use industry standard inspection equipment, quality control and inspection policies in regards to the application of this product.
- F. It is the responsibility of the applicator to adhere to industry standard application and inspection procedures for record keeping purposes.
- G. The coating system is to be applied in two coats, using alternate colors, to a nominal film thickness required for the intended service. For optimal performance apply 2 coats of 3.5-5.0 mils (90-125 microns) per coat. The acceptable minimum is 3.5 mils/90 microns in a single coat and the maximum for two coats is 10 mils/250 microns with acceptable spot measurements at 12 mils/300 microns DFT.
- H. It is the applicator's responsibility to compute and supply adequate ventilation to prevent explosion and toxicity hazard conditions as prescribed by standards of good safety practices, local and state regulations, OSHA and other federal regulations.

1.02 SUBMITTALS

- A. Product Data: Submit manufacturer's technical data, installation instructions, and performance data for the coating.

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PART II PRODUCTS

2.01 COATING MATERIALS

A. Reference: the Carboline Product Data Sheet Thermaline Heat Shield.

2.02 COLOR

A. Metallic Grey (0700) and Darker Metallic Grey (J700) are standard.

PART III EXECUTION

3.01 PRELIMINARY INSPECTION

Before any coating is begun, the surfaces of the substrate shall be inspected to see that the following has been done.

A. All weld splatter, sharp projections, slivers and pits shall be removed.

1. Weld metal shall be used to fill repairs. Putty shall not be used without consulting the Carboline Technical Service Department.

B. Welds that are rough, irregular and not well formed shall be corrected by grinding smooth.

C. All sharp corners and edges shall be rounded to at least a 1/8" radius.

3.02 SURFACE PREPARATION

A. Oil and grease shall be removed from the surfaces to be coated with a suitable safety solvent prior to abrasive blasting.

1. Non-carbon steel parts that will not be coated shall be removed and/or protected prior to blasting, including but not limited to hatch covers, hatch rings, outlet valves and vents. The coating shall be terminated on the non-carbon steel approximately 1" past the interface.

2. The compressed air used for blasting shall be free of water and oil. To determine cleanliness, blast without abrasive into a white cloth. The trap and separators shall be blown down until subsequent cloth tests show no oil or water contamination.

3. All weld seams shall be individually blasted prior to blasting other areas of the vessel. Weld seams are the areas of early coating failure. Removal of all

contaminants and achieving the proper anchor pattern in the heat-affected zone at and along the welds is critical to the service life of the coating.

- B. Surfaces shall be blasted to a "near-white metal" in accordance with SSPC-SP10 / NACE No. 2 Joint Surface Preparation Standard.
 - 1. The anchor pattern or "tooth" in the metal shall be a minimum of 1.0 mils/25 microns with an average representing 20 to 25% of the total dry film thickness of the coating system. Proper abrasive shall be a sharp natural abrasive, slag grit or steel grit similar to or equal to G80-G50 range or other abrasives having a sharp, hard-cutting surface, properly graded, dry, of best quality and of proper size to produce the specified anchor pattern.
- C. All surfaces shall be vacuum cleaned to remove all blast media and dust after blasting is completed. External surfaces may be air blown clean using dry, oil-free air.
 - 1. No visible oxidation shall be permitted between the time of blasting and priming the blasted surface.
 - 2. The steel substrate shall be protected from moisture from the time of blasting to the time that application and curing are completed.

3.03 COATING APPLICATION

- A. Before starting coating application, it is recommended that the applicator read all available safety data including, but not limited to, GHS-compliant safety data sheet, product data sheet and backup label.
- B. Thermaline Heat Shield consists of two parts which must be mixed prior to using. After the coating and curing agent have been combined and mixed, it has an approximate pot life of 8 hours at 75°F/24°C. Reference: the Carboline Product Data Sheet Thermaline Heat Shield.
 - 1. Thinning not normally required for spray application except when mist coating over approved Carbozinc 11 inorganic zinc primers on prepared carbon steel substrates when used for uninsulated service. For applications over hot surfaces (up to 500°F/260°C) conventional spray is the preferred method of application. For small areas or touch-ups use a brush and thin up to 6% by volume with Thinner #10 or Thinner 236 E for normal temperatures or up to 6% with Thinner 235 (or Thinner 230 as alternate) for hot surface applications. Use of thinners other than those supplied or approved by Carboline may adversely

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affect product performance and will void product warranty whether express or implied.

- C. The application must not proceed until the substrate temperature is a minimum of 5°F/3°C above the dew point. Minimum air or surface temperature at the time of application shall be 50°F/10°C.
- D. Weld seams, edges, and difficult to spray areas should be scrub striped before spray application begins.
 - 1. The striping shall be performed with a good quality bristle brush using Thermaline Heat Shield which has been thinned equal parts by volume with Thinner #10.
 - 2. Scrub striping is accomplished by moving the brush back and forth in a scrubbing motion to work the primer into crevices and undercut areas of the welds.
 - 3. Bristles left on the surface shall be removed before the coating dries.
- E. All areas subject to overspray and drips shall be protected by a suitable covering while spraying other areas in the vessel.
- F. When airless spray equipment is used (minimum 30:1 ratio or larger, the recommended liquid pressure is 1500 to 2000 psi with tip size from .017" to .021". Adjust spray tip orifice size and material fluid pressure to obtain a spray pattern with the best possible atomization. When conventional air spray equipment is employed, utilize a conventional spray pot with dual pressure regulators and gages, minimum 3/8" or 1/2" ID fluid hose and minimum 5/16" ID atomization air hose up to max 50-foot long, and industrial-type conventional air spray gun with 0.070" ID fluid tip and appropriate air cap set up.
- G. Air supply utilized for blow down and equipment use shall be uncontaminated.
- H. Apply a crisscross multi-pass moving gun at a fairly rapid rate maintaining a wet appearing film. By allowing the solvents to flash off for one or a couple of minutes, additional fast multi-passes may be applied until you have a wet film thickness of approximately 8.0-10.0 mils/200-250 microns (as measured using a wet film thickness gauge in accordance with ASTM D4414) which results in dry film thickness range approximately 3.5-5.0 mils/90-125 microns DFT.
- I. Prior to applying the topcoat, all runs, drips and rough areas shall be removed from the prime coat by light sanding and recoating as necessary.
NOTE: Be sure to remove any dust/debris from sanding before applying topcoat.

J. Topcoat – By repeating Step H, using Thermaline Heat Shield, a homogenous film of 7 to 10 mils/177-250 microns DFT is obtained.

1. Topcoat shall be smooth in appearance and holiday-free as visually inspected and when installed as a two-coat system of itself for use under insulation the continuity can be verified using a low voltage holiday tester.
2. NOTE: Thermaline Heat Shield has no approved topcoats other than itself.

K. Defects shall be sanded smooth and recoated for retest for film thickness and holidays.

3.04 FINAL HEAT CURE

NOTE: This product will achieve dry-to-handle characteristics in ambient conditions, but requires heat to fully cure with optimum film properties. Rapid substrate temperature rise/excursion for the first heat cycle, particularly early in the cure, should be avoided.

A: Raise substrate temperature slowly until it reaches 500°F. The maximum rate of heat increase is 30° F every thirty minutes, but Carboline recommends a gentle heat rise of 30° F every sixty minutes.

B: Once the substrate has reached 500°F, hold for two hours to achieve maximum film durability.

3.05 INSPECTION (prior to Final Heat Cure)

A. Dry film thickness shall be determined utilizing a non-destructive magnetic type-high range gauge. The anticipated film thickness shall be in the middle of the gauge. The total dry film thickness shall be a minimum of 3.5 mils/90 microns, with a maximum of 10 mils/250 microns not to exceed 12 mils/300 microns.

B. Any holiday testing of Thermaline Heat Shield intended for use under insulation shall be performed using low voltage wet sponge holiday tester in accordance with NACE SP0188 or ASTM D5162 (Test Method A) standard with a Tinker-Razor Model M-1, DeFelsko PosiTest LPD, Elcometer 270, (or equivalent equipment). Allow minimum ambient cure time of 72 hours at 70°F/21°C following final coat before holiday testing. Lower substrate temperatures will require longer cure time.

C. If insulation is being applied prior to final heat cure or exposure, a minimum ambient cure time of 4-days at 75°F/24°C is required.

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3.06 REPAIR

- A. Clean damaged area, removing all contaminants and loose coating. For repairing holidays, sand surface and brush apply proper thickness of coating. Do not apply by brush on areas larger than one square foot.
- B. Weld repair areas shall be prepared around the heat affected zone and out 4-6 inches. After that, transition areas shall be feather sanded into the existing, unaffected sound coating for a 2-inch overlap.
- C. Inadequate or excessive DFT.
 - 1. Inadequate DFT shall have additional material applied by either spray or brush depending on size of area.
 - 2. Excessive DFT shall be sanded down approximately 1 mil below acceptable maximum. Apply material by either brush or spray depending on size of area.
- D. Refer to Section 3.03 for application information.
- E. Refer to Section 3.04 for curing information.

3.07 SAFETY

- A. WHEN HANDLING THIS PRODUCT, REFER TO THE THERMALINE HEAT SHIELD PRODUCT DATA SHEET AND SAFETY DATA SHEET. PROPER CARE IS ALWAYS DEMANDED BY GOOD PRACTICE, AND/OR OSHA, STATE AND LOCAL SAFETY CODES, ETC. AND MUST BE FOLLOWED CLOSELY.