

PART I GENERAL

1.01 SCOPE

- A. This guide details the procedures recommended by the Carboline Company for the application of Plasite 4301 HT protective coating system to the interior of process and storage vessels.
- B. In cases where there is a procedure difference between this specification and any other specification or standard referred to, the other specification's author and the Carboline Company technical service department should be consulted.
- C. The applicator should review this specification and consult the Carboline Company technical service department regarding its interpretation, disapproval or request for procedure changes. Deviations from this specification should be discussed and agreed to by the Carboline Company 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 specification. The applicator should adhere to all accommodations of product shelf life, mixing ratios and acceptable thinners.
- E. The applicator should 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 a minimum of two coats to a nominal film thickness of 40 mils. The acceptable minimum is 35 mils and the maximum is 45 mils with acceptable spot readings at 50 mils.
- 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 chemical resistance data for the lining. Include certification indicating compliance of materials with requirements.

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PART II PRODUCTS

2.01 COATING MATERIALS

- A. Material should be Plasite 4301 HT as manufactured by the Carboline Company.
- B. Material should be stored in a clean, dry room capable of being heated or cooled. The ideal storage temperature is 70°F. Shelf life is approximately 2 months at 75°F. Cooler storage temperatures will increase shelf life. Storage at higher temperatures will result in substantially shorter shelf life.
- C. All material should be in the original and unopened container, plainly marked with the proper designation of the product.
- D. All material used should be within the manufacturer's stated shelf life.

2.02 COLOR

- A. Gray

PART III EXECUTION

3.01 PRELIMINARY INSPECTION

Before any coating is begun, the interior surfaces of the vessel should be inspected to see that the following has been done.

- A. All weld splatter, sharp projections, slivers and pits should be removed.
 - 1. Weld metal should be used to fill repairs. Putty should not be used without consulting the Carboline Company technical service department.
- B. Welds that are rough, irregular and not well formed should be corrected by grinding smooth.
- C. All sharp corners and edges should be rounded to at least a 1/8" radius.
- D. No other conditions exist which would shorten the expected life of the applied coatings.
- E. Used vessels. (Based on the previous service environment, decontamination may be required.)
 - 1. Decontamination should be performed by one or a combination of the following methods.

- (a) Prebaking of 400°F or a minimum of 50°F above maximum service temperature for 4 hours.
 - (b) Steaming for 24 hours with 15 psi steam.
 - (c) Ultra high pressure (30,000 psi) washing.
 - (d) High pressure washing with cleaning or neutralizing chemicals.
2. Decontamination should be verified by the use of a chloride test kit, pH test or black light, whatever is dictated by the previous service conditions.

3.02 SURFACE PREPARATION

- A. Oil and grease should be removed from the surfaces to be coated with a suitable safety solvent prior to abrasive blasting.
 1. Vessel design and fabrication details should be in accordance with NACE SP0178. All sharp edges and welds should be ground smooth to a rounded contour in accordance with NACE Weld Preparation Designation "D" and all weld splatter should be removed prior to abrasive blasting.
 2. Non-carbon steel parts that will not be coated should be removed and/or protected prior to blasting, including but not limited to hatch covers, hatch rings, outlet valves and vents. The lining should be terminated on the non-carbon steel approximately 1" past the interface.
 3. The compressed air used for blasting should be free of water and oil. To determine cleanliness, blast without abrasive into a white cloth. The trap and separators should be blown down until subsequent cloth tests show no oil or water contamination.
 4. All weld seams should be individually blasted prior to blasting other areas of the vessel. Weld seams are the areas of early coating failure. Removal of contaminants and achieving the proper anchor pattern in the heat affected zone at the welds is critical to the service life of the lining.
- B. Surfaces should be blasted to a "near-white metal" in accordance with SSPC-SP10 / NACE No. 2 Joint Surface Preparation Standard.

CARBON STEEL

The degree of profile should be a minimum of 3.5 mils. In preparing the surface, compressed air should be used maintaining a minimum of 100 psig at the blasting nozzle. The size of nozzle used should be dictated by the scfm/psi available. Proper abrasive

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should be a sharp natural abrasive, steel grit, slag grit similar to or equal to Black Beauty® BB1040 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.

Natural abrasives such as flints and slags should be used only once and not recycled. Recycling of steel grit will be permitted when new grit is added on a regular basis to maintain the media size. The recovery system must be a commercially manufactured air wash system capable of removing all media fines and contaminants from the blasting process.

STAINLESS STEEL

An abrasive with the proper shape, size and hardness should be used to ensure that the proper anchor pattern as described under CARBON STEEL is achieved.

ALUMINUM

In addition to requirements described under CARBON STEEL, following blast, the blasted surface should be given a chemical treatment such as:

ALODINE® 1200S
available from
Henkel Surface Tech.
Madison Heights, MI

IRIDITE® 14-2
produced by
MacDermid, Inc.
Waterbury, CT

OAKITE® CRYSCOAT
747 LTS plus
OAKITE® CRYSCOAT
ULTRASEAL produced
by Oakite Products

- C. All internal surfaces should 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 should be permitted between the time of blasting and priming the blasted surface.
 2. The interior of the vessel should 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, OSHA approved material safety data sheet, product data sheet and backup label.
- B. Do not apply the coating at air or substrate temperatures below 50°F. When surface temperatures are over 100°F, consult the Carboline Company technical service department.
- C. Plasite 4301 HT does not require thinning. Use methyl ethyl ketone (MEK) for cleaning spray equipment.
- D. The lining application must not proceed until the substrate temperature is a minimum of 5°F above the dew point.
- E. Coating is supplied in 4.7-gallon and 0.94-gallon kits.
- F. Individually stir each separate Part A and Part B components to a smooth, uniform consistency and color. Any sediment in the container must be thoroughly scraped up and dispersed. Pour the entire contents of Part B into the Part A and mix for at least two minutes. The pot-life of the combined mixture is 35 minutes at 75F (significantly less at elevated temperatures).
- G. The coating should be brush applied to all welds and seams. The technique for brushing should be to brush out and not to flow on the coating.
- H. Airless or conventional atomizing spray should be used for applying Plasite 4301 HT. For airless spraying, use a minimum 30 to 1 unit such as a Graco Bulldog or larger having a minimum capacity of 3 gallons per minute. A tip with .025" orifice size or larger and a 12" minimum spray pattern are recommended. All screens should be removed from pump and gun.
- I. The mixed coating should be applied utilizing a multi-pass spray system. Apply horizontal and vertical passes with 50% overlap. The total wet mils per coat should be approximately 24 to 26 mils, resulting in a dry film thickness of 18 to 22 mils. Special precautions are required at overlaps and welds to eliminate excessive film build. Spray gun should be perpendicular to surface at all times, approximately 14" from surface.
- J. Air supply should be uncontaminated.
- K. Venting from the bottom of the vessel is recommended during the application and initial curing process.

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L. Coating may be overcoated after initial “set” which will occur normally in 5 hours at 75°F with proper ventilation. Initial “set” time will decrease as surface temperature increases. When physical contact (foot traffic, scaffolding, etc.) with the previously applied coating is required, a minimum of 10 hours at 70°F substrate and air temperature with ventilation is normally required before proceeding. Previously applied coats must have reached a “non-tacky” stage before being exposed to physical contact. This condition will occur in less time as surface temperature increases. **NOTE:** Previously applied coating exposed to direct sunlight or surface temperature in excess of 130°F may result in intercoat disbondment. Coating film exposed to an accumulation of over 24 hours of UV exposure before topcoating will result in intercoat disbondment. Special procedures (such as shading with tarps) should be used to prevent an accumulation of 24 hours of UV exposure. Overcoating should be performed as soon as possible to prevent contamination and to assure adhesion without any special preparations. Applied coating must be recoated with 7 days at an average temperature of 75F in order to avoid special preparation requirements. Any moisture from condensation or any source will kill the cure on freshly applied coating before it reaches a “non-tacky” stage.

1. Do not apply the coating at air or substrate temperatures below 50°F. Within 12 hours after application, the substrate temperature must be raised to a minimum temperature of 70°F and held until the coating has reached a set condition.

M. Prior to applying the topcoat, all runs, drips and rough areas should be removed from the primer by light sanding and recoating.

NOTE: Be sure to remove any dust from sanding before applying topcoat.

N. Topcoat - By repeating Step I, using Plasite 4301 HT, a homogenous film of 35 to 45 mils is obtained.

1. Topcoat should be smooth in appearance and holiday-free as determined with a holiday tester.

O. Defects should be sanded smooth and recoated for retest for film thickness and holidays.

3.04 CURING

A. The minimum air dry time at 75°F surface temperature is 48 hours prior to immersion service.

3.05 INSPECTION

- A. Dry film thickness should be determined utilizing a non-destructive magnetic type high range gauge. The anticipated film thickness should be in the middle range of the gauge. The total dry film thickness should be a minimum of 35 mils, with a maximum of 45 mils and acceptable spot readings at 50 mils. A suspect area, that being in excess of 45 mils, should then be acceptable if an average of 35 to 45 mils is obtained when four additional readings are observed, taken approximately one foot from the suspect area at top, bottom and both sides.
- B. For immersion service, a pinhole-free film is essential and testing with Tinker & Razor Model AP-W or equivalent is required on final film. Use 4000 to 4500 volts for Plasite 4301 HT. Allow a minimum cure of 48 hours at 75°F or 36 hours at 90°F before holiday testing.

3.08 REPAIR

- A. Clean damaged area, removing all contaminants and loose coating.
- B. Abrasive blast substrate to original specification where coating has been exposed to environment and where oxidation is evident. Feather the original coating not less than 2 inches from damaged area.
- C. If new coating is physically damaged and has not been in service, repair as shown above. For repairing holidays, sand surface and brush apply proper thickness of coating.
- D. Apply coating by brush or spray. Do not apply by brush on areas larger than 1 square foot. **WARNING!** Contamination of previously exposed coating film may be detrimental to adhesion of the repair and may affect service life expectancy.

3.09 SAFETY CONSIDERATIONS

- A. THE SOLVENT IN THIS COATING IS FLAMMABLE AND CARE AS DETERMINED BY GOOD PRACTICE, OSHA, STATE AND LOCAL SAFETY CODES, ETC., MUST BE FOLLOWED CLOSELY. Keep away from heat, sparks and open flame and use necessary safety equipment, such as air mask, explosion-proof electrical equipment, non-sparking tools and ladders, etc. Avoid contact with skin and breathing of vapor or spray mist. When working in tanks, rooms and other enclosed spaces, adequate ventilation must be provided. Refer to the Carboline Company Bulletin PA-3. In the event of skin contact complications, the affected areas should be washed with soap and water. Eye protection is required.