

# Surface Preparation Guideline: *Metal Surfaces*

*Prior to the application of coatings or linings, metal surfaces must be properly and adequately prepared to remove contaminants that may adversely affect coating adhesion and to roughen the surface in order to achieve a mechanical bond. The degree and type of surface preparation will vary depending on the type of metal surface to be coated and the intended service.*

**Proper surface inspection and preparation is a very important factor in any successful coating, lining or topping project, and is required for all PolySpec products. The following guideline steps are required for achieving a properly prepared floor for application of polymer coatings.**

## CARBON STEEL

Carbon steel is the most commonly used metal for tanks, structural steel and equipment. Tank linings protect the steel against corrosion and prevent product contamination. This immersion service requires optimum surface preparation and environmental conditions. For splash/spillage or chemical fume exposure, less stringent preparation is required.

### Immersion Service

Tanks should be designed and fabricated in accordance with NACE Standard RP-0178-89 Design, Fabrication, and Surface Finish of Metal Tanks and Vessels to be Lined for Chemical Immersion Service. This standard addresses the following items from a lining standpoint.

1. Joints. Butt welds are recommended instead of continuous lap welded joints. Rivets and bolted joints are not recommended. Welds should be continuous rather than spot welded. All rough welds should be ground to remove sharp edges, undercuts and pinholes. All weld splatter must be removed.
2. Connections. Flanged connections are preferred over threaded screwed connections. Connections greater than two inches in diameter shall be lined. Those less than two inches in diameter cannot be easily coated. Instead, fiberglass inserts made of chemical resistant resin should be used.
3. Appurtenances. These include agitators, baffles and internal piping. If these cannot be lined then they should be constructed of corrosion resistant materials. Dissimilar metal should be electrically insulated from the steel tank surface. Heating elements should be at least six inches from the tank surface. Structural reinforcement members, if any, should be fabricated of smooth round bars or pipe for ease of lining. The use of angles, I-beams and other complex shapes should be avoided.

4. Surface Finish. Sharp edges and fillets should be ground to a smooth radius of 1/2 to 1/4". Surfaces should be free of gouges, deep scratches, silvered steel and other surface flaws.
5. The surface should be degreased prior to grit blasting. Use organic solvents, caustic solutions, steam or hot water with detergents to remove dirt and grease. Pre-baking of old tanks is recommended.
6. The surface should be grit blasted to an SSPC-SP5 or NACE No. 1 White Metal surface. This is accomplished using a Venturi blast nozzle supplied with 80–100 psi. The anchor pattern in the metal shall correspond to about 20% of the film thickness of the coating. The anchor pattern should be sharp with no evidence of a polished surface.
7. The blasting media should be a natural abrasive, steel grit or slag grit (like Black Beauty). The ideal grit is angular with a hard cutting surface, properly graded, dry, free of contaminants and produces little dust. Contaminated grit should not be used for the finish work.
8. Any traces of grit should be vacuumed from the surface. Care should be taken not to contaminate the blasted surface with fingerprints, perspiration, etc.
9. The surface temperature should be maintained at a minimum of 5°F. above the dew point to prevent oxidation of the surface. The lining should be applied within the same day that the surface has been prepared unless dehumidification equipment is used to prolong the "window" of coatability.

### Atmospheric Service

For non-immersion service, such as atmospheric or occasional splash/spillage, follow these steps.

1. Degrease the surface as described in #5 above.
2. The surface should be grit blasted to an SSPC-SP10 or NACE No. 2 Near White Metal surface. The finished surface should be free of loose mill scale, rust scale and old paint.

## STAINLESS STEEL

There are various types of stainless steel, including 304 (the softest), 316, 316L and 904. The steps outlined under the Carbon Steel section generally apply. Because grit blasting may be more difficult to achieve the proper anchor profile, use 120 psi blast nozzle pressure. Avoid using iron or steel grit abrasive.

## GALVANIZED METAL

The surface should be clean and free of grease and properly etched with a standard solution such as Galvarep 5 (Henkel Surface Technologies, Madison Heights, MI, telephone 248-583-9300 or 800-521-1355, [www.hstna.com](http://www.hstna.com)) or a phosphating solution. After the surface is properly etched, it should be rinsed thoroughly with potable water and dried completely prior to coating application.

## ALUMINUM

Surface should be clean and free of grease with a blast produced anchor profile as outlined under the Carbon Steel section above. Normally the blast media used should be 80 mesh or finer grit. In addition, the blasted surface should be given a chemical treatment such as Alodine 1200S (Henkel Surface Technologies, Madison Heights, MI, telephone 248-583-9300 or 800-521-1355, [www.hstna.com](http://www.hstna.com)) or Iridite 14-2 (MacDermid Inc., Waterbury, CT, 203-575-5700 or 800-325-4158, [www.macdermid.com](http://www.macdermid.com)).

If the surface is prepared only by chemical etching, the total film thickness of the coating applied should be restricted to only half the film normally applied to blasted surfaces.

## COPPER OR BRASS

These metals should be lightly blasted to remove oxides or the surface treated with a solution consisting of 5% ferric chloride and 5% muriatic acid. After allowing the material to react for a few minutes, the surface should be rinsed thoroughly with potable water and allowed to dry.

## CAST IRON

Cast iron is a porous material that is likely to absorb moisture or other liquids with which it comes into contact. Heating before blasting will drive out absorbed material from its pores. This can be done by placing it in an oven for 8–12 hours at 300°F, or by heating with torches until this temperature is reached.

***For further information or clarification please consult your PolySpec technical sales representative.***