



www.clearcoproducts.com

215 639-2640

Painting Over Touched-Up And Repaired Galvanized Steel

Occasionally, galvanized steel is damaged during handling, installation or welding. These damaged areas should be repaired. According to ASTM A 780 *Repair of Damaged and Uncoated Areas of Hot Dip Galvanized Coatings*, proper repair ensures the galvanized coating provides the best corrosion resistance possible. When using a duplex system, any damaged area on the galvanized surface must be repaired prior to painting. The following steps help ensure the galvanized steel is adequately repaired and able to perform compatibly with a paint system.

1. Depending on the age of the galvanized product, properly prepare and clean the surface of the material to be painted before applying the touch-up product.
2. Touch-up damaged areas with a product conforming to ASTM A 780. These include paint products that are commonly known as zinc-rich paints, or cold galvanizing compounds. Zinc-rich paints can be sprayed or brushed on the damaged area.
3. After touch-up, prime the surface of the area to be painted. As a protective system, zinc-rich paints provide the best galvanic protection for long-term exposure of the duplex system.
4. Finish with a topcoat to complete the duplex system. Follow the manufacturers guidelines for proper dry times and surface preparation between coats.

PAINT SELECTIONS

Beyond the need for surface preparation, the paint itself must be compatible with the galvanized coating in order to create a successful duplex system. Many type of paint and paint systems have been used quite well with galvanized steel. However, some types of paint will not adhere adequately to galvanized steel, or will only do so under restricted conditions. In order to ensure a successful duplex system, it is important to find a suitable paint system with a first coat that is fully compatible with a zinc surface. The first coat serves as a “tie coat” or interface between the galvanized steel and the topcoat.

To achieve a good interface, it is important to understand the characteristics of all the types of paint that will be used. Each individual formulation of paint exhibits unique characteristics, which can affect its suitability for use with galvanized steel. Because of this, only individual paint manufacturers can provide specific guidance on the use of their products. Contact paint manufacturers for specific information regarding the suitability of paint systems for use on galvanized steel.

Zinc-Rich Paints- Zinc-rich paints have long been recognized for their excellent paint adherence to both new and weathered galvanized surfaces. Zinc-rich paints have been used in the U.S. for more than 75 years and in Europe for well over a century. One of the key reasons for the success of zinc-rich paints is their barrier and cathodic protection. In a 1960s study by the American Iron and Steel Institute and the Steel Structures Painting Council, zinc-rich paint outperformed all other classes of paint. Significantly, at the nine-year inspection in 1970, there was no loss of adhesion to the zinc surface.

Zinc-rich paints possess similar characteristics to a hot dip galvanized zinc coating. With a high percentage of zinc in the dry film, these paints can synergistically combine with the corrosion inhibitive properties of metallic zinc. The zinc dust in paint is integrated with organic binders. These binders allow the zinc particles to remain in contact with each other so the zinc paint can provide cathodic protection.

Zinc-rich paints are an accepted method of repairing damaged galvanized coatings according to ASTM A 780. Zinc-rich paints containing at least 65 percent meet the specification designations. They are widely used for touch-up and repair of damaged galvanized coatings because of their relative ease of application. Although zinc-rich paints are useful as primers to gain surface adherence, they are also satisfactory as a finish coat when a neutral, or matching, or gray color is desired.

These paints can be used alone, but for a more attractive finish, a topcoat is often employed. While most topcoats are easily used, some with very strong solvents may result in a lifting of the primer. Successful topcoats include polyvinyls, acrylic latexes, polyurethanes, and polyamid cured epoxies. Specific manufacturer's recommendations should be followed for application and top coating.

Acrylic: -Acrylics are single-component coatings, generally applied over a primer due to thin film build. A wash primer may be used with these paints, or they may be applied directly over the hot dip galvanized surface. If the pH of the paint is high, problems may occur due to ammonia reacting with the zinc. Acrylics provide exceptional gloss and color, combined with an extremely durable finish.

Aliphatic Polyurethanes: - This is a two-component, high performance system generally applied over a polyamide epoxy primer or a wash primer. These polyurethanes have superior weathering and chemical resistance characteristics with good adhesion, as well as an enamel-like finish. This system requires strict attention to application procedures. If top coating is necessary, a light abrading or roughening of the surface is generally required.

Alkyds: In moist areas, zinc will produce alkaline surface causing alkyds to saponify, causing premature peeling and flaking of the paint system, despite initial satisfactory adhesion. Due to this chemical incompatibility with zinc, alkyds are very difficult to use on galvanized surface unless the paint is specifically formulated for using over galvanized steel. Contact the paint manufacturer for more specific recommendations on using an alkyd paint system.

Asphalts: Asphalts are generally petroleum-based products, which are not recommended for use on galvanized steel.

Bituminous: These types of paints are thicker than conventional paint systems. As they are coal tar products, unlike asphalts, they can be used with galvanized steel. Bituminous paints are often used over galvanized steel that will be buried.

Chlorinated Rubbers: Although difficult to apply, chlorinated rubbers are fast drying and provide good protection for exterior exposures and chemical resistance to acids, alkalis and moist gases. However, they chalk readily and need a high surface profile for good adherence. In addition, their high VOC content has severely limited their availability and end use.

Coal Tar Epoxies: These types of epoxies are rarely used over galvanized steel. They provide outstanding resistance to acidic conditions in splash and spill areas. However, they are difficult to apply and require brush blasting or a wash primer to adhere to galvanized steel. Coal tar epoxies also are often used over galvanized steel that will be buried.

Epoxies: In most cases these epoxy –esters and epoxy-amines are not generally recommended for use directly on galvanized steel as they are typically high stress materials and may react with the zinc in certain environments. However, epoxies do have some limited success if the paint is specifically formulated for using over galvanized steel. Contact the paint manufacturer for more specific recommendations on using an epoxy paint system.

Epoxy- Polyamide Cured: These epoxies generally have superior adherence to any type of galvanized surface. Because they are not resistant to sunlight, they are typically used as a primer or for corrosive interior applications. A galvanized steel/polyamide epoxy primer/aliphatic urethane topcoat system is considered to be a superior high performance duplex system.

Latex- Acrylics:- Fast drying and water-based, latex-acrylics have great adhesion, durability and weathering characteristics. This system is often top coated with it self and is suitable for new and weathered galvanized steel. These paints have the added benefit of being environmentally friendly.

Latex (Water- based): This type of latex paint is also fast drying and weathers well, but takes time to cure before they provide acceptable adhesion and abrasion resistance. Therefore, these paints are not recommended for shop application. Adhesion and abrasion resistance improve with time (2 to 4 weeks).

Oil Base: Oil base paints are poorly suited for use directly over galvanized steel with very few exceptions because this type of paint must be cured with the help of air dryers. These paints are easy to apply, but have unsatisfactory chemical and solvent resistance. They are not generally used over galvanized steel as the oil can react with the alkalinity of the zinc and saponify in moist or humid environments. (see alkyds)

Portland Cement in Oil: These single package paints incorporate Portland cement as part of the pigment. They have outstanding adhesion to galvanized steel, but are often top coated as they do not weather as well as other coatings and may yellow with age. Occasionally they do become brittle with time, so formulas with special resins designed to preclude embrittlement may have better success.

Silicones: Silicones suitability for use directly over galvanized steel is poor, and therefore it is not widely used. However, silicones are sometimes employed in high temperature applications are sometimes employed in high temperature applications where it develops a cross-link silicate that prevents oxidation of the zinc coating. Silicone-alkyd compounds typically do not perform as well as silicon-acrylic compounds.

Vinyls: Vinyls have exceptional resistance to acid and alkali environments and can be supplied as either a thin film needing top coating or as a high build coating. As a rule, vinyls exhibit only fair adhesion and should be assisted by the use of surface profiling such as a sweep blast or a wash primer. Vinyl acrylics have a great glossy finish with good color retention. High VOC levels have extremely limited their availability and use in certain areas.

Powder Coating: Powder paint materials work very well over galvanized steel, provided the surface is prepared carefully. Some types of powder coatings containing polyesters may not be suitable for use over galvanized steel. Consult with the manufacturer for details.

Only a partial listing of available paints and paint systems has been provided. The paint manufacturer can provide more thorough information about the compatibility of specific systems with galvanized steel. **Always consult the paint manufacturer prior to painting galvanized steel.** Different physical and chemical characteristics of the same types of paint may have varied reactions with a galvanized surface. The paint manufacturer and the galvanizer can assist in the creation of a successful duplex system.

REPAINTING GALVANIZED STEEL

Repainting of painted galvanized steel can include spot repairing of isolated areas or total reconditioning of the entire structure. When spot treating, only areas free of old paint should be re-coated. Total reconditioning of a painted galvanized structure should be carefully evaluated. Coating thickness measurements should be taken to determine how many mils of zinc remain and what percentage of the surface area is exhibiting red rust. A distinction should be made between red rust of the base steel and the brown staining of the

zinc-iron alloy layers in the galvanized coating. It is difficult to visually distinguish red rust from brown staining. By using a coating thickness gauge, the presence of zinc can be detected. Red rust will be present only if there is no mil reading on the thickness gauge.

The type of paint system used to repaint the structure depends on the extent of deterioration of the original duplex system. If the steel substrate shows rusting over a substantial area, then a zinc-rich paint can be used with appropriate preparation and application techniques.

Obviously, the major problem with repainting galvanized structures is obtaining a good surface profile that will accept, and mechanically bond, the new paint system. Sweep blasting may be necessary to produce an acceptable surface. Extreme care should be taken not to strip any more of the zinc coating than needed. The more zinc is removed, the less cathodic protection is afforded to the base steel. Using a zinc-rich paint as a base coat may help provide extra cathodic protection in areas where the galvanized coating is very thin.