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## REPAIR OF DAMAGED HOT DIP GALVANIZED COATINGS

Repair of damaged hot dip galvanized coatings as a result of welding or cutting (flame) or excessively rough handling during shipment or erection can be accomplished by allowing the use of one of the following three types of material that possess the required properties.

### A. ZINC-BASES SOLDER (Low-melting Point Zinc Alloy Repair Rods)

The most common types of this solder are:

1. Zinc Cadmium – Liquid temperature - 518°F-527°F (270°C-275°C)
2. Zinc-tin Lead – Liquid temperature - 446°F-500°F (230°C-260°C)
3. Zinc-tin Copper Alloys – Liquid temperature - 660°F-670°F (349°C-354°C)

Zinc-tin copper alloys must be applied while in a semi-solid state in the preferred application temperature range from 480°F-570°F (250°C-300°C). The solders can be used in a rod form or as a powder.

#### Repair Procedures Using Zinc-Based Solder (Alloy)

1. Surfaces must be cleaned using a wire brush, a light grinding action or a mild blasting. To ensure a smooth reconditioned coating can be affected, surface preparation shall extend into the surrounding, undamaged galvanized coating.
2. If the area to be repaired includes welds, all weld flux residue and weld spatter shall be removed by wire brush, chipping, grinding or power scaling.
3. Areas to be repaired shall be preheated to at least 600°F (315°C). **NOTE:** Do not heat the surface over 750°F (400°C) or allow the surrounding galvanized coating to be burned. Wire-brush (again) the surface to be reconditioned during preheating and pre-flux if needed. Pre-flux is needed when there is an adhesion problem.
4. Rub the cleaned, preheated welds/areas with the repair stick to deposit an evenly distributed layer of zinc alloy. When powdered zinc alloys are used, sprinkle the powder on the cleaned preheated surface and spread out with a spatula.
5. Thickness shall be adequate and as originally specified.
6. When repair is completed, rinse with water or wipe with a damp cloth to remove flux residue.

### B. PAINTS CONTAINING ZINC DUST

These types of paints contain zinc dust and are suitable for repairing damaged galvanized coatings provided the paint containing zinc dust shall have a concentration of zinc dust in the range of at least 65-69% or above 92% in the dried film.

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Repair Procedures Using Paint Containing Zinc Dust

1. Surfaces to be repaired with paint containing zinc dust shall be clean, dry, free of oil, grease, pre-existing paint, corrosion, and/or rust.
2. Surfaces to be repaired shall be blast-cleaned to the requirements of SSPC SP10 (near-white). Where circumstances do not allow blast or power tool cleaning to be used, then hand tools may be used. Cleaning shall meet the requirements of SSPC SP2 (removal of loose rust, mil scale, or paint to the degree specified, by hand chipping, crapping, sanding and wire-brushing). **NOTE:** To ensure that a smooth reconditioned coating can be affected, surface preparation shall extend into the undamaged galvanized coating.
3. If the areas/surfaces to be repaired include welds, first remove all weld flux residue and weld spatter by blasting, chipping, grinding or power scaling, etc.
4. Spray or brush-apply the paints containing zinc dust to the prepared surfaces/areas. Apply the paint in accordance with the manufacturer's recommendations in a single application employing multiple passes to achieve a dry film thickness as specified. Allow adequate curing time before shipping or subjecting the repaired items to service. The cure shall be in accordance with manufacturer's recommendations.
5. Thickness shall be adequate and/or as originally specified.

**C. SPRAYED ZINC (METALLIZING)**

This method is not for field application and cannot be used in the field. This method involves the application of a zinc coating by spraying the surface to be repaired with droplets of molten metal using wire, ribbon, or powder processes.

Repair Procedures Using Sprayed Zinc (Metallizing)

1. Surfaces to be repaired by zinc metallizing process shall be clean, free of soil, grease, and corrosion products, and dry.
2. If areas/surfaces to be repaired include welds, first remove all flux residues and weld spatter of a size or type that cannot be removed by blast cleaning or by mechanical means, that is chipping, grinding or power scaling.
3. Blast clean the surface to be reconditioned in accordance with the requirements of SSPC SP5 (white metal).
4. To assure that a smooth reconditioned coating can be affected, surface preparation shall extend into the surrounding, undamaged galvanized coating.
5. Apply the coating by means of metal spraying pistols fed with either zinc wire or zinc powder. Apply the sprayed coating as soon as possible after surface preparation and before visible deterioration of the surface has occurred.

6. The surface of the sprayed coating shall be of a uniform texture, free of lumps, coarse areas and loosely adherent particles.
7. The nominal thickness of the sprayed zinc coating shall be **adequate and** as specified.

**NOTE:** Zinc-rich paint is not considered as a galvanized coating.

### **TERMINOLOGY**

GALVANIZED COATING is a coating of virtually pure zinc on steel, applied by various methods (processes) including hot-dip and electrodeposition processes. For hot-dipped galvanized coatings, the molten bath is typically at least 99% zinc.

METALLIZING is the process of spraying molten metal onto a surface-to-form coating. In the metallizing process a pure zinc wire is usually used, which passes through a specialized gun. The gun produces a flame that melts the wire as it moved through.

DELAMINATION is the separation of a coating (either full or partial thickness) from the underlying layers. The separation can occur in small localized areas or large areas of surface. (It is also referred to as 'peeling'.)

HOT-DIP PROCESS is the application of a metallic coating on a steel product by immersion of the steel product in a bath of the molten metal, which forms the coating. The coating may be applied in a continuous process or a batch process.

SPANGLE in hot-dip coatings, is the crystalline structure that develops on a metallic-coated surface when the molten coating metal solidifies, especially on steel sheet and article coated after fabrication.

**COLD GALVANIZING:** zinc rich paints are commonly referred to as "cold galvanizing".

**NOTE:** The use of the word "Galvanizing" to represent a family of coatings that use zinc as a means of corrosion protection has falsely portrayed all zinc coatings as being equal with regard to their corrosion performance.