

SSPC: The Society for Protective Coatings

TECHNOLOGY GUIDE NO. 14

Guide for the Repair of Imperfections in Galvanized, Organic, or Inorganic Zinc-Coated Steel Using Organic Zinc-Rich Coatings

1. Scope

1.1 This guide describes one method for repairing galvanized, organic, or inorganic zinc coatings using an organic zinc-rich coating. ASTM A 780 briefly describes this and other alternative methods (metallizing and zinc-based solders) for repair of damaged and uncoated areas of hot-dip galvanized coatings.

1.2 This method is intended to repair imperfections resulting from application, welding, cutting, drilling, grinding, abrading, or rough handling during transport or erection. It may also be used to repair imperfections in galvanizing, organic, or inorganic zinc coating that have occurred from weathering during storage or after erection.

1.3 This method can also be used to repair topcoated galvanizing, organic, or inorganic zinc coating.

1.4 This guide is intended for use to supplement the coating manufacturer's printed instructions and literature.

2. Description

2.1 This method consists of selecting organic zinc-rich coatings and topcoats and preparing and applying the coatings to damaged galvanizing, organic or inorganic zinc coating.

2.2 This method is intended for repairing localized imperfections where the major portion of the existing zinc coating is intact.

2.3 Organic zinc-rich coatings are suitable for repairing damaged zinc coatings because they combine several favorable properties. They can be readily applied by brush or spray under field conditions to small and irregular shapes and are compatible with both zinc and steel substrates.

3. Referenced Standards

3.1 SSPC STANDARDS:

PA 1	Shop, Field, and Maintenance Painting of Steel
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PA 2	Measurement of Dry Coating Thickness with Magnetic Gages
PA 3	A Guide to Safety in Paint Application
Paint 5	Zinc Dust, Zinc Oxide, and Phenolic Varnish Paint
Paint 20	Zinc-Rich Coating Type I –Inorganic and Type II–Organic
Paint 29	Zinc Dust Sacrificial Primer, Performance-Based
PS Guide 12.00	Guide to Zinc-Rich Coating Systems
SP 1	Solvent Cleaning
SP 2	Hand Tool Cleaning
SP 3	Power Tool Cleaning
SP 11	Power Tool Cleaning to Bare Metal
SP 15	Commercial Grade Power Tool Cleaning

3.2 SSPC/NACE INTERNATIONAL STANDARDS:¹

SSPC-SP 5/NACE No. 1	White Metal Blast Cleaning
SSPC-SP 6/NACE No. 3	Commercial Blast Cleaning
SSPC-SP 7/NACE No. 4	Brush-Off Blast Cleaning
SSPC-SP 10/NACE No. 2	Near-White Blast Cleaning
SSPC-SP 14/NACE No. 8	Industrial Blast Cleaning
SSPC-SP 12/NACE No. 5	Surface Preparation and Cleaning of Metals by Water-jetting Prior to Recoating

3.3 ASTM INTERNATIONAL STANDARDS:²

A 780	Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
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4. Selecting Materials

4.1 GENERAL: Compositions and performances of organic zinc-rich primers vary with regard to the individual resin system, the level of metallic zinc, the volatile organic compound (VOC) content, along with other formulation variables. It is often desirable to require the zinc-rich coatings to meet performance criteria to verify that they can withstand the corrosion and weathering environments to which they will be subjected. Some performance tests are described in SSPC-Paint 20 and SSPC-Paint 29. Coating selection can best be

¹ Joint standards may also be obtained from NACE International at <http://nace.org>

² ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959 or online at <http://www.astm.org>

made from actual field testing of candidate coatings in the environment in which the coatings are to be located.

The paragraphs below describe some of the decisions to be made when selecting an organic zinc-rich repair primer. SSPC-PS Guide 12.00 provides general information on the description, selection, and application of zinc-rich coatings and the selection of topcoats.

4.2 TYPE OF BINDER: Organic zinc-rich coating formulations are available with a variety of binders. The choice of a particular generic type of binder is up to the user. The most common binders for organic zinc-rich primers are two-component epoxy, epoxy ester, and moisture-curing polyurethane.

4.3 METALLIC ZINC LEVELS: Suppliers, applicators, and owners do not agree on the metallic zinc level (or loading) necessary for long-term protection of steel by organic zinc-rich coatings. The user can select any metallic zinc level found to provide the best performance, or conversely, not specify a zinc level. SSPC-Paint 20 defines three levels of zinc dust by weight present in the dried film as follows:

Level 1	equal to or greater than 85%
Level 2	equal to or greater than 77% and less than 85%
Level 3	equal to or greater than 65% and less than 77%

The above levels may be used to specify zinc loading of repair products meeting requirements of SSPC-Paints 5, 20, and 29 and ASTM A 780. The user may specify any percentage of zinc loading (for example 95%) if desired.

4.4 VOLATILE ORGANIC COMPOUND (VOC) CONTENT: The VOC content of organic zinc-rich coatings used for repair may vary widely. Each coating, after recommended thinning, must conform to published government regulations regarding VOC content. VOC information should be supplied on the label or the technical data sheet. Various governmental agencies may have different VOC limits or use different methods of testing. The owner may modify the coating specification as necessary to specify a particular VOC content limit consistent with local

regulations. Organic zinc-rich coatings used for repair usually have a VOC level less than 500 g/L (4.2 lb/gal).

4.5 TOPCOAT SELECTION: If a topcoat is to be applied over the zinc-rich primer, select the topcoat in accordance with SSPC-PS Guide 12.00. Topcoating will usually provide additional service life to both zinc-rich primers and hot-dip galvanized coating. Topcoats must be formulated not only for environmental resistance, but also for compatibility with the organic zinc-rich coating, hot-dip galvanizing, or inorganic zinc coating. Generally, topcoating will be required in more severe environments, as recommended by the manufacturer.

5. Procedures

5.1 SURFACE PREPARATION

5.1.1 Identify Damaged Areas: Visually identify damaged areas based on deterioration of the zinc, rusting of steel substrate, disbondment, or other defects of the zinc coating.

5.1.2 Select Surface Preparation Methods: Suitable methods include:

- Hand and power tools SSPC-SP2, SSPC-SP3, SSPC-SP 15, or SSPC-SP 11
- Waterjetting SSPC-SP 12/NACE No. 5
- Abrasive blast cleaning SSPC-SP5/NACE No. 1, SSPC-SP 10/NACE No. 2, SSPC-SP 6/NACE No. 3, SSPC-SP 14/NACE No. 8, or SSPC-SP 7/NACE No. 4, depending upon the service environment.

Table 1 can be used as a general guideline for appropriate surface preparation for a variety of exposures. In all cases, the surface cleanliness should be at least as great as that recommended by the supplier of the primer.

5.1.3 Surface Contaminants: Remove all grease, oil, corrosion by-products, dirt, and other surface contaminants

TABLE 1
RECOMMENDED MINIMUM SURFACE PREPARATION

Service Environment	Dry Abrasive Blast	SSPC-SP 12/NACE No. 5, Waterjetting	Hand or Power Tool Cleaning
Immersion	SP 10	WJ 2	None
Splash/Spillage	SP 10	WJ 2	SP 11
Chemical Fume, Neutral pH	SP 6	WJ 3	SP 11
Atmospheric	SP 7	WJ 4	SP 2