



Standard Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting¹

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1. Scope

1.1 This practice describes methods of preparing surfaces of new and weathered hot-dip galvanized steel for painting. Hot-dip galvanized steel is produced by the immersion of fabricated or unfabricated products in a bath of molten zinc, as specified in Specifications A 123 or A 153/A 153M. This practice covers surface preparation on iron and steel products and hardware that have not been painted previously. Galvanized surfaces may have been treated with protective coatings to prevent the occurrence of wet storage stain. This practice does not apply to sheet galvanized steel products nor to the coil coating or continuous roller coating processes.

1.2 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and to determine the application of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:

A 123 Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products²

A 153/A 153M Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware²

A 780 Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings²

B 201 Practice for Testing Chromate Coatings on Zinc and Cadmium Surfaces³

E 376 Practice for Measuring Coating Thickness by Magnetic-Field or Eddy-Current (Electromagnetic) Test Methods⁴

2.2 Society for Protective Coatings Specifications:⁵

Surface Preparation Specification No. 1 Solvent Cleaning
Surface Preparation Specification No. 2 Hand Tool Cleaning

Surface Preparation Specification No. 3 Power Tool Cleaning

Surface Preparation Specification No. 7 Brush-Off Blast Cleaning

Paint Specification No. 27 Basic Zinc Chromate-Vinyl Butyral Wash Primer

3. Summary of Practice

3.1 This practice describes the preparation methods that provide clean and suitable galvanized surfaces for painting, specifically so that an applied coating system can develop the adhesion necessary for a satisfactory service life.

3.2 The zinc coating is constantly in a state of change. From the time the steel part is removed from the galvanizing kettle, the exposed zinc coating interacts with the environment to form, first zinc oxides, next zinc hydroxides, and then zinc carbonates.⁶ The process of complete conversion of the outer layer of zinc carbonates can take up to two years of exposure to the environment, depending on the local climatological conditions. During the first stage, known as newly galvanized steel, the exposed surface consists mainly of zinc metal with a small amount of zinc oxide. During the second stage, known as partially weathered galvanized steel, the exposed surface consists mainly of zinc oxides and zinc hydroxides with some zinc carbonates. At the final stage, known as weathered galvanized steel, the exposed surface consists mainly of water-insoluble zinc carbonates, some zinc oxides, and rarely, zinc hydroxides. The surface preparation for each of these stages must be treated separately.

3.3 Variations in surface preparation produce end conditions that differ, hence they do not necessarily yield identical results when paints are subsequently applied. Service conditions will dictate the type of surface preparation to be selected, although the quality produced by any individual process may vary with different compositions of the zinc surface.

4. Significance and Use

4.1 This practice describes the procedures that can be used

¹ This practice is under the jurisdiction of ASTM Committee D-01 on Paint and Related Coatings, Materials, and Applications, and is the direct responsibility of Subcommittee D01.46 on Industrial Protective Clothing.

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² Annual Book of ASTM Standards, Vol 01.06.

³ Annual Book of ASTM Standards, Vol 02.05.

⁴ Annual Book of ASTM Standards, Vol 03.03.

⁵ Available from the Society for Protective Coatings, 40 24th St., 6th Floor, Pittsburgh, PA 15222-4623.

⁶ This interaction is described in "Duplex Systems," van Eijnsbergen, J.F.H., Elsevier Science, New York, NY 1994, and in *Zinc Handbook*, Porter, F., Marcel Dekker, Inc., New York, NY 1991.