



Designation: D2201 – 99 (Reapproved 2011)

## Standard Practice for Preparation of Zinc-Coated and Zinc-Alloy-Coated Steel Panels for Testing Paint and Related Coating Products<sup>1</sup>

This standard is issued under the fixed designation D2201; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope

1.1 This practice covers the preparation of zinc-coated and zinc-alloy-coated sheet steel panels to be used for testing paint, varnish, lacquer, conversion coatings, and related products. It covers sheet steel coated with hot dipped galvanized, one-side galvanized, electrogalvanized, zinc-iron alloy coatings (such as galvaneal), and zinc-5 % aluminum alloy coatings. It does not cover steel panels coated with 55 % aluminum-45 % zinc alloy, because these behave more like aluminum than zinc.

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 problems, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

### 2. Referenced Documents

#### 2.1 ASTM Standards:<sup>2</sup>

**A525** Specification for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process (Withdrawn 1994)<sup>3</sup>

**A591/A591M** Specification for Steel Sheet, Electrolytic Zinc-Coated, for Light Coating Weight [Mass] Applications (Withdrawn 2005)<sup>3</sup>

**A875/A875M** Specification for Steel Sheet, Zinc-5 % Aluminum Alloy-Coated by the Hot-Dip Process

**D609** Practice for Preparation of Cold-Rolled Steel Panels for Testing Paint, Varnish, Conversion Coatings, and

#### Related Coating Products

**D2092** Guide for Preparation of Zinc-Coated (Galvanized) Steel Surfaces for Painting (Withdrawn 2008)<sup>3</sup>

#### 2.2 ISO Standards:<sup>4</sup>

**ISO 3575** Continuous hot-dip zinc-coated carbon steel sheet of commercial, lock-forming and drawing qualities

**ISO 5002** Hot-rolled and cold-reduced electrolytic zinc-coated carbon steel sheet of commercial and drawing qualities

### 3. Significance and Use

3.1 The procedures described in this practice are designed to provide uniform zinc coated steel panels for testing of paint, varnish, lacquer, conversion coatings and related products.

3.2 The proper description of the zinc coating on the substrate is an important part of this practice. Seemingly slight differences in zinc coating can produce substantial differences in coating performance.

### 4. Metal Substrate

4.1 The test panels shall be completely free of any visible signs of storage stain or white rust (zinc corrosion). All corners and edges shall be smooth and uniformly rounded.

4.2 The type of zinc coating, zinc thickness, metal thickness, and panel size shall be agreed upon between the purchaser and seller.

4.3 Zinc coated steel may be shipped from the mills unoiled. However, zinc coated steel that has been oiled with a nonre-active rust preventative oil shall be acceptable under this specification.

4.4 Zinc coated steel may be shipped from the mill with a phosphate pretreatment for improved paint bonding.

**NOTE 1—Caution:** Alkaline cleaning such pre-phosphated metal will often remove the phosphate coating

#### 4.5 Elimination of Passivating Treatments:

4.5.1 The test panels shall be free of passivating treatments (**Note 2**), because such treatments interfere with paint bonding.

<sup>1</sup> This practice is under the jurisdiction of ASTM Committee D01 on Paint and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee D01.27 on Accelerated Testing.

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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

<sup>3</sup> The last approved version of this historical standard is referenced on [www.astm.org](http://www.astm.org).

<sup>4</sup> Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.



NOTE 2—Passivating treatments are applied at the mill to prevent oxidation of the zinc (white rust) during storage. Because they bond tightly to the zinc, they also prevent paints and other coatings from bonding to the zinc. Zinc coated material stocked in commercial warehouses almost always has a passivating treatment. To obtain nonpassivated zinc coated steel, it's generally necessary to special order steel directly from a steel mill, or to buy panels from manufacturers of standard test panels. See Appendix titled Identifying the Presence of and Removing Chromate Treatments used as Wet-Storage (Also Called Humid-Storage) Stain Inhibitors of Guide D2092 for further information on identifying the presence of passivating treatments.

4.5.2 Zinc coated sheet that has never been subjected to any kind of passivating treatment is preferred for this practice.

4.5.3 Zinc coated sheet that has been passivated may be used if the passivating treatment is removed in accordance with 5.1.

NOTE 3—**Caution:** Removing the passivation may alter the morphology of the zinc crystal structure.

## 5. Methods of Preparation

5.1 If the surface has a passivating treatment, remove it by rubbing with a non-woven abrasive pad and rinsing with distilled or deionized water.

5.2 Use one of the methods of preparation described in Practice D609 or Guide D2092.

NOTE 4—Oiled electrogalvanized or zinc-iron alloy sometimes needs to be cleaned with mineral spirits before alkaline cleaning, depending on the length of time the metal has been stored with the oil on the surface.

5.3 After preparation, the surface of the panel shall be water-break free. This is determined by immersing a representative panel momentarily in distilled water. The water should form a continuous unbroken film over the entire surface, without beading up into droplets or other water breaks. If the surface is not water-break free, it is generally an indication of contaminants on the surface, and further cleaning is required.

## 6. Protection after Processing

6.1 To prevent corrosion, panels should be used as quickly as possible after processing. Panels that are not to be used immediately after preparation shall be wrapped in a paper impregnated with a volatile corrosion inhibitor (VCI) specifically designed for zinc, and then placed in a waterproof bag or envelope. In order to avoid contamination from fingerprints, do not touch the surface of the panel after it has been cleaned. Handle the panels by the edges only.

## 7. Report

7.1 Report the following information:

7.1.1 Panel size and thickness,

7.1.2 Steel temper (for example, commercial quality, drawing quality, drawing quality special killed),

7.1.3 Method of preparation used,

7.1.4 *Description of Zinc Coating*—It is absolutely essential to report a detailed description of zinc coating. Seemingly slight differences in zinc coating can make a large difference in coating performance. Information on describing the zinc coating can be found in **Appendix X1**. The description of zinc coating should include:

7.1.4.1 Type of coating,

7.1.4.2 Coating weight (on each side of the panels if there is a difference),

7.1.4.3 Spangle (for hot dipped galvanized),

7.1.4.4 Passivating treatment, if any, and

7.1.4.5 Phosphate pretreatment applied at the steel mill, if any.

## 8. Keywords

8.1 galvanized surfaces; specimen preparation; steel panels; test specimens; zinc

## APPENDIX

### (Nonmandatory Information)

#### X1. CHARACTERIZATION OF ZINC COATING

X1.1 This appendix briefly describes many of the zinc and zinc alloy coatings, but is not exhaustive. New types of coatings and variations on existing coatings are always being developed. Further information on zinc coated steel can be obtained from the applicable ASTM specification, or ISO specification, or from the American Iron and Steel Institute (AISI), 1133 15th Street NW, Washington, DC 20005.

X1.2 *Hot-Dipped Zinc Coated*(Specification A525): This is a pure zinc “galvanized” coating produced by immersing the steel in a bath of molten zinc. Unless special steps are taken, it produces a “full spangle” pattern of zinc crystals like the familiar pattern on sheet metal air ducts. For improved paint appearance, special processing can create a “minimized spangle” with much smaller crystals, or a “spangle free” surface where the crystal structure is not visible. Common

ASTM Specification A525 coating weights are G60 (0.60 oz/ft<sup>2</sup>), or G90 (0.90 oz/ft<sup>2</sup>), up to G235 (2.35 oz/ft<sup>2</sup>). Common ISO coating weights are Z700 (700 g/m<sup>2</sup>), Z350 (350 g/m<sup>2</sup>), Z100 (100 g/m<sup>2</sup>) and Z001 (no minimum). Refer to ISO 3575 for further information.

X1.3 *Zinc-Iron Alloy Coated*(Specification A525): This coating is often called “galvannealed.” It is produced by heating or wiping a hot dipped zinc coating to convert it completely into a zinc-iron alloy. Common Specification A525 coating weights are A60 (0.60 oz/ft<sup>2</sup>), A40 (0.40 oz/ft<sup>2</sup>), down to A01 (no minimum coating weight). Common ISO coating weights are ZF 180 (180 g/m<sup>2</sup>), ZF 100 (100 g/m<sup>2</sup>), and ZF 001 (no minimum). Refer to ISO 3575 for further information.

X1.4 *Electroplated Zinc Coated*(Specification A591/A591M): Often called “electrogalvanized,” this coating is





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produced by continuous electroplating. ASTM coating weight is expressed as A (no minimum), B (0.070 oz/ft<sup>2</sup>), or C (0.150 oz/ft<sup>2</sup>). Common ISO coating weights are ZE 10/10 (1.0 µm) and ZE 75/75 (7.5 µm). Refer to ISO 5002 for further information. In addition to pure zinc, electroplated coatings are also made in zinc/iron alloy and zinc/nickel alloy.

**X1.5 One Sided or Differentially Coated:** Zinc and zinc alloy coatings are frequently produced with no coating on one side or with a much lower coating weight on one side. In such cases, it's important to report the coating weight on both sides. Also, sheet steels can be coated with a heavier coating of hot-dipped zinc or electroplated zinc on one side, and a lighter

coating of zinc-iron alloy on the back side. The two sides of such sheets will have very different characteristics in terms of paint performance. Common ISO coating weights are ZE 135/0 (13.5 µm/0 µm) and ZE 150/0 (15.0 µm/0 µm).

**X1.6 Zinc-5 % Aluminum Alloy Coated (Specification A875/A875M):** This hot dipped coating, often called "Galfan" is approximately 95 % zinc, 5 % aluminum, and approximately 0.1 % other metals (either magnesium or "mischmetal," a mixture of rare earth metals). Common ASTM Specification A875/A875M coating weights are GF30 (0.30 oz/ft<sup>2</sup>), GF45 (0.45 oz/ft<sup>2</sup>), up to GF235 (2.35 oz/ft<sup>2</sup>).

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