



Standard Practice for Detection of Hexavalent Chromium On Zinc and Zinc/ Aluminum Alloy Coated Steel¹

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1. Scope

1.1 This practice can be used to detect the presence of hexavalent chromium on galvanized and zinc/aluminum alloy coated steel surfaces. Hexavalent chromium-bearing treatments (passivates) can be applied to coated steels to prevent storage stain. While passivated 55 % aluminum-zinc alloy coated steel is commonly painted, passivated galvanized steel is not. Chrome passivation may interfere with the successful pretreatment of galvanized steel, as well as contaminate cleaning and pretreatment baths on a coil coating line.

1.2 The amount of hexavalent chromium that will cause the indicator to produce a discernible pink color is in the range of 0.5 parts per million dissolved in the indicator solution. It is possible that a coated steel surface that produces a negative result does have chromium on the surface. If a material that yields a negative result is suspected of having chromium on the surface, instrumental methods should be used. Chrome deposits of 1 mg/ft² can be easily missed by analytical instruments such as the scanning electron microscope with energy dispersive x-ray analysis (EDXA) capability. Auger electron spectroscopy (AES) or electron spectroscopy for chemical analysis (ESCA) can identify chemical species present in the levels required for adequate detection. Stripping the metallic coating and analyzing for chrome by atomic absorption or inductively coupled plasma can also give reliable results in detecting the presence of chrome.

1.3 This practice is designed to be a qualitative means of screening chrome passivated coils from those which are not chrome passivated.

1.4 Some chromium-free passivates are being used commercially. Although these products will test negative for hexavalent chromium, they may interfere with cleaning and pretreating. Chromium bearing passivates that contain film forming constituents such as acrylic resins are also being commercially applied. The reaction of these products to the spot test will vary. Abrading the surface with emery paper will

improve the likelihood of reliable detection. This technique is not recommended for acrylic resin containing passivation treatments.

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

1.6 *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 determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:²

- D 2092 Guide for Treatment of Zinc-coated (Galvanized Steel Surfaces) for Painting
- D 5723 Practice for Determination of Chromium Treatment Weight on Metal Substrates by X-Ray Fluorescence

3. Apparatus

3.1 The following materials will be required to perform the stripping procedure:

3.1.1 *Dark colored or Brown Polyethylene Wash Bottle*, (500 mL) or brown glass dropper bottle.

3.1.2 *Test Specimens*, which may be cut panels or coil stock.

4. Reagents

4.1 The following chemical reagents are required to perform this procedure:

4.1.1 *1,5-Diphenylcarbohydrazide*.

4.1.2 *Acetone*.

4.1.3 *Ethanol*, 85 %.

4.1.4 *Phosphoric Acid*.

4.1.5 *Distilled Water*.

¹ 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 D01.53 on Coated Steel.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.