



SURFACE VEHICLE STANDARD

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Electroplate Requirements for Decorative Chromium Deposits on Zinc
Base Materials Used for Exterior Ornamentation

RATIONALE

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Foreword—This Document has not changed other than to put it into the new SAE Technical standards board Format.

1. Scope—This SAE Standard covers the physical and performance requirements for electrodeposited copper, nickel, and chromium deposits on exterior ornamentation fabricated from die cast zinc alloys (SAE J468 alloys 903 and 925), and wrought zinc strip (ASTM B 69). This type of coating is designed to provide a high degree of corrosion resistance for automotive, truck, marine, and farm usage where a bright, decorative finish is desired.

1.1 Purpose—This document details the physical and chemical properties that are necessary to optimize coating appearance and durability of decoratively plated parts. When properly applied, the electroplate described in this document has a bright, highly reflective, and specular finish with an inherently high degree of corrosion resistance. The coating's resistance to a corrosive environment is highly dependent on the proper maintenance of the processes used to produce the coating. Since the treatment of processing variables is outside the scope of this document, it is important for applicators of this coating to develop an intimate knowledge of their process, and control all parameters that affect the quality of the end product. The use of techniques such as statistical process control (SPC), capability studies, design of experiments, process optimization, etc., are critical to produce a material of consistently high quality.

The subjects included in this document are: substrate preparation, metal finishing, plate thickness, electrochemical potential difference, ductility, chromium microdiscontinuity, accelerated corrosion, adhesion, bend testing, and sampling. The appropriate specification limits and test methods are described in each section. Where possible, the test methods specified are well established and accepted within the plating industry. In a few instances, several test methods are specified. In these cases, it is up to the purchaser and supplier to agree on the test method to be used.

2. References

2.1 Applicable Publications—The following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply.

2.1.1 SAE PUBLICATION—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J468—Zinc Alloy Ingot and Die Casting Compositions

2.1.2 ASTM PUBLICATIONS—Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM B 69—Specification for Rolled Zinc
ASTM B 252—Preparation of Zinc Alloy Die Castings for Electroplating and Conversion Coatings
ASTM B 368—Copper-Accelerated Acetic Acid-Salt Spray (Fog) Testing (CASS Test)
ASTM B 374—Standard Definitions of Terms Relating to Electroplating
ASTM B 456—Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium
ASTM B 487—Measurement of Metal and Oxide Coating Thickness by Microscopical Examination of a Cross Section
ASTM B 490—Micrometer Bend Test for Ductility of Electrodeposits
ASTM B 504—Measurement of Thickness of Metallic Coatings by the Coulometric Method
ASTM B 507—Design of Articles to be Electroplated on Racks
ASTM B 537—Rating of Electroplated Panels Subjected to Atmospheric Exposure
ASTM B 556—Measurement of Thin Chromium Coatings by the Spot Test
ASTM B 571—Adhesion of Metallic Coatings
ASTM B 602—Attribute Sampling of Electrodeposited Metallic Coatings and Related Finishes
ASTM B 697—Selection of Sampling Plans for Inspection of Electrodeposited Metallic Coatings and Related Finishes on Products
ASTM B 762—Variables Sampling of Metallic and Inorganic Coatings
ASTM B 764—Simultaneous Thickness and Electrochemical Potential Determination of Individual Layers in Multilayer Nickel Deposit (STEP Test)

3. Definitions

3.1 Significant Surfaces—These are defined as surfaces that are visible when the finished component is assembled onto the vehicle and is observed in normal viewing position. Nonsignificant surfaces that may cause corrosion products to run onto significant surfaces are significant. Also, nonvisible surfaces, when designated by the customer, are significant.

3.2 Microdiscontinuous—A chromium deposit in which microscopic voids exist in the chromium, exposing the underlying nickel layer. The production of suitable microscopic voids or sites in the chromium layer causes a dispersion of the corrosion potential over a relatively large surface area. The resulting corrosion potential dispersion reduces the effects of localized high corrosion potentials and the associated large corrosion pits.

3.2.1 ASTM B 374 provides definitions of the more common terms related to plating.

4. Appearance—All parts manufactured to this document shall meet the visual requirements for color, luster, and other specific finish standards agreed on between the customer and supplier, on all significant surfaces.

Standard panels or typical production parts should be used to define the various appearance levels for major surfaces and parting line finishes.

Various classes or types of finish may be specified by the purchaser. The production drawing should indicate, via symbols or notes, the specifics of these requirements. Visual standards, including textured surface standards, may be used to supplement the drawing notes showing minimum acceptable appearance conditions.

5. Substrate Preparation—The substrate surface finish can affect the plated appearance. Suitable precautions in casting, forming, finishing, and cleaning must be taken to assure a satisfactorily finished plated part.

Evidence of surface porosity, stress cracks, blisters, or other surface defects may indicate improper substrate preparation or inferior castings that may not have adequate durability after plating. The proper practices for preparing the zinc die casting for plating are discussed in ASTM B 252.