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# Standard Test Method for Measurement of Corrosion Sites in Nickel Plus Chromium or Copper Plus Nickel Plus Chromium Electroplated Surfaces with Double-Beam Interference Microscope[1]

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## 1. Scope

1.1 This test method provides a means for measuring the average dimensions and number of corrosion sites in an electroplated decorative nickel plus chromium or copper plus nickel plus chromium coating on steel after the coating has been subjected to corrosion tests. This test method is useful for comparing the relative corrosion resistances of different electroplating systems and for comparing the relative corrosivities of different corrosive environments. The numbers and sizes of corrosion sites are related to deterioration of appearance. Penetration of the electroplated coatings leads to appearance of basis metal corrosion products.

1.2 The values stated in SI units are to be regarded as the standard.

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 determine the applicability of regulatory limitations prior to use.*

## 2. Referenced Documents

2.1 *ASTM Standards:*

B 487 Test Method for Measurement of Metal and Oxide Coating Thickness by Microscopical Examination of a Cross Section[2]

## 3. Summary of Test Method

3.1 The depths and diameter of corrosion pits or the widths of corrosion crevices, and the number of pits per square millimetre or crevices per linear millimetre on a specimen surface, are determined using optical aids (magnifier, microscope, and interference microscope). The values are compared to dimensions and numbers of corrosion sites obtained from other specimens.

## 4. Significance and Use

4.1 Different electroplating systems can be corroded under the same conditions for the same length of time. Differences in the average values of the radius or half-width or of penetration into an underlying metal layer are significant measures of the relative corrosion resistance of the systems. Thus, if the pit radii are substantially higher on samples with a given electroplating system, when compared to other systems, a tendency for earlier failure of the former by formation of visible pits is indicated. If penetration into the semi-bright nickel layer is substantially higher, a tendency for earlier failure by corrosion of basis metal is evident.

## 5. Apparatus

5.1 *Double-Beam Interference Microscope* (lateral magnification about 100×), capable of producing, with white light, a visible group of interference fringes, and equipped with a calibrated fine focus and a graduated bifilar (movable cross hair) eyepiece.

5.2 *Magnifier or Microscope* (10× to 20×), with light source.

5.3 *Rule*, graduated in millimetres, and a *scriber* for producing visible lines on the specimen surface.

5.4 *Microscope*, with a magnification capability of 500×, equipped with a bifilar eyepiece, for making measurements on opaque surfaces.

5.5 Equipment for mounting and polishing of specimens for microscopical cross-sectional measurements.

## 6. Specimen Preparation

6.1 Clean the corroded specimen surface with an agent or agents that remove soil and corrosion products, but do not significantly change the surface of the corrosion sites. Scouring powder may be used to remove insoluble corrosion products, organic solvent to remove road tar, water accompanied by gentle abrasion with a cloth to remove lightly adherent soil, etc.

[1] This test method is under the jurisdiction of ASTM Committee B08 on Metallic and Inorganic Coatings and is the direct responsibility of Subcommittee B08.08.03 on Decorative Coatings.

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[2] *Annual Book of ASTM Standards,* Vol 02.05.