

**DETERMINATION OF MICRO CRACK OR MICRO PORE DENSITY IN
ELECTROPLATED CHROMIUM COATINGS****Application**

This method is used to determine the crack or pore density of electroplated chromium coatings by depositing copper in the cracks or pores, with subsequent microscopic examination under reflected light.

Apparatus and Chemicals Required**Microscope**

Capable of magnifying to 100X, with reflected light.

Micrometer Eyepiece

Graduated in .02 mm divisions.

Copper Sulphate c.p.

($\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$)

Sulphuric Acid c.p.

(1.84 g/cm³)

Nitric Acid c.p.

(1.42g/cm³)

Plating Unit

Of suitable size with copper anode, capable of operating at 0.3A/dm², and 3.5 - 5.0 volts.

Degreasing Agent**Conditioning and Test Conditions**

All test values indicated herein are based on material conditioned in a controlled atmosphere of 23 +/- 2 °C and 50 +/- 5 % relative humidity for not less than 24 h prior to testing and tested under the same conditions unless otherwise specified.

Date	Action	Revisions
2000 11 09	Revised	Editorial - no technical change A. Cockman
1994 02 28		

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Procedure

Method A - For Checking Parts Immediately After Plating Cycle

1. Prepare plating solution by dissolving 200 g/L of copper sulphate in distilled water, add 20 g/L of the sulphuric acid.
2. Clean the samples if there is any delay after chromium plating using the degreasing agent.

Note: Avoid use of any electrolytic treatment.
3. Connect sample and anode to the electrical supply and activate.
4. Immerse anode plus sample in the plating solution. Plate for approximately 1 minute, at 23 +/- 2 °C, at an average current density of approximately 0.3 A/dm² between 3.5 and 5.0 volts.
5. Remove sample from plating solution and switch off current.
6. Wash the sample under hot running tap water, rinse with distilled water, and then acetone. Dry by means of warm air.

Evaluation

1. Using the micrometer eyepiece, examine the sample at 100X magnification under the microscope using reflected light, and determine the length over which a minimum of 40 cracks/pores occur.
2. Calculate cracks/mm for micro cracked chromium. Calculate pores/sq mm for micro porous chromium.

Method B - For Checking Parts That Have Been Plated in Excess of 24 Hours

1. Immerse samples in 15 % nitric acid solution for 4 minutes at approximately 95 °C. This assists in revealing cracks or pores.
2. Remove the samples from the nitric acid and rinse in distilled water.
3. Continue as in Method A, para 3 - 6.

Evaluation

As outlined under Method A.

Chemicals, materials, parts, and equipment referenced in this document must be used and handled properly. Each party is responsible for determining proper use and handling in its facilities.