Technical Memo

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A NON-DESTRUCTIVE TEST FOR THE IDENTIFICATION OF CADMIUM PLATING

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ABSTRACT

A simple non-destructive chemical method for the identification of cadmium plating is presented. The test requires no special techniques or equipment and may be conducted in less than fifteen seconds.

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A NON-DESTRUCTIVE TEST FOR THE IDENTIFICATION OF CADMIUM PLATING

The basic procedure for the test may be carried out by two different methods. The first method is slightly more convenient, while the second may be employed should there be any objection to applying any corrosive material to the plated object.

The reagents required are as follows:

1. Dilute nitric acid (7%).
2. Dilute sodium sulfide solution (2%).
3. Emery cloth (Behr-Manning Metalite Cloth, 240 grit).

The two liquids should be stored in glass-stoppered bottles with self-contained droppers.

The test procedure should be carried out in the following manner:

METHOD I

1. A small drop of dilute nitric acid is applied to the grease-free plated surface by touching the dropper tip to the metal.
2. With the other hand, the drop is blotted with a folded square of tissue (Kleenex) as quickly as possible in order that the acid is in contact with the metal for only a brief moment. A drop of acid is applied to an unused portion of the tissue to serve as a control test.
3. One or two drops of the sodium sulfide solution are applied to the solution absorbed on the Kleenex, while an equal quantity of sulfide solution is applied to the spot of acid serving as the control.
4. A lemon-yellow coloration forming immediately after application of the sulfide solution to the solution blotted from the metal surface denotes cadmium. Of course, the control test must produce no coloration if the test is to be valid.

METHOD II

1. The surface of the metal to be examined is lightly abraded over a small area with a small square of emery cloth. Care should be taken in order that only a small area (approximately a four millimeter circle) of the cloth is used for the operation.
2. One drop of acid is applied to the used portion of the abrasive cloth in order to effect solution of the metal particles.

3. After approximately five seconds, the solution is blotted with tissue.
4. The remainder of the test is identical with steps 3 and following, under Method I.

The foundation of the described tests is the following chemical reactions; the dissolution of the metal followed by the precipitation of yellow cadmium sulfide.

Other metals used for plating, which have a somewhat similar appearance to cadmium, respond differently to the test. For example, nickel, zinc, silver, platinum, antimony or rhodium yield no coloration, while tin or lead respond with a brown stain. Although described as non-destructive, these tests do require a minute amount of metal. Experiments with carefully weighed cadmium foils have demonstrated that an average of only 0.0003 grams of metal is removed by either method.

Attention should be called to the fact that although these tests are specific for cadmium, a positive test makes no guarantee that the metal is entirely cadmium. Rather, such a test insures that a reasonable percentage of the surface of the plating material is cadmium. However, it is not common practice to plate with mixtures of metals so this is not a serious drawback. In view of the simplicity of the procedure, it is one that should find application.

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Case No. 523.0
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