STANDARD SPECIFICATION FOR ELECTRODEPOSITED COATINGS
OF DUPLEX NICKEL - MICROPOROUS CHROME

1.0 Scope

1.1 This specification defines performance requirements for IMMI components which require a Duplex Nickel - Microporous Chromium Finish.

2.0 Purpose

2.1 To define a standard specification for electroplated duplex nickel with microporous chrome.

3.0 References

3.1 Standard Practice for Preparation of High Carbon Steel for Electroplating, ASTM B-242.

3.2 Standard Practice for Preparation of Low Carbon Steel for Electroplating, ASTM B-183.


3.4 Standard method for Measurement of Metal Oxide Coating Thickness by Microscopical Examination of a Cross Section, ASTM 487.

3.5 ASTM B 556 Measurement of Thin Chromium Coatings By Spot Test.
3.6 Federal Specification QQ-N-290A.

3.7 ASTM B-117 Standard method of salt spray testing.


3.9 ASTM B764 Simultaneous Thickness and Electrochemical Potential Determination of Individual Layers in Multi layer Nickel Deposit (Step Test).

4.0 Requirements
4.1 All of the following requirements must be met to achieve acceptable field durability. No one requirement, exclusive of others, is capable of insuring satisfactory performance. Any deviation to the requirements of these specifications may be subject to additional performance requirements.

4.2 All part testing requirements apply to those areas of the part identified as a significant surface per Paragraph 6.1 unless otherwise specified on the engineering drawing.

4.3 The following significant characteristics will be measured and kept on file by the supplier.

4.3.1 Cleaning Prior to Electroplating

4.3.1.1 Steel parts containing 0.35% carbon or more at the surface shall be cleaned using the principles defined in ASTM B 242, “Preparation of High Carbon Steel for Electroplating”.

4.3.1.2 Steels containing less than 0.35% carbon at the surface or lower than Rockwell C 30 in hardness, shall be cleaned using principles defined in ASTM B 183, “Preparation of Low Carbon Steel for Electroplating”.

4.3.2 Plating Adhesion (ASTM B 571)

4.3.2.1 Bend Testing (Bend the part or sections of the part) - No peeling, flaking, or lift-off of the electroplate from the substrate or between the layers of the electroplate is permitted.

4.3.2.2 Grind Saw Test - No lifting or peeling of the electroplate from the substrate or between layers of the electroplate is permitted following this test.

4.3.3 Plating Thickness (ASTM B 487, ASTM B 556)

4.3.3.1 It is the supplier’s responsibility to measure and control the minimum thickness for each plating layer. Unique part design and rack design may require mapping the plating racks and other special processing techniques to consistently meet plating specifications.
4.3.3.2 The plating thickness on significant surfaces shall be checked at locations specified on the drawing. Total nickel applied .5 mils (.0005 inch) minimum. Total chromium applied .007 mils (.000007 inch) minimum. The semi-bright nickel thickness shall be greater than or equal to 60% of the total nickel thickness. The bright nickel thickness shall be less than or equal to 40% of the total nickel thickness.

4.3.4 Post Plating Treatment

4.3.4.1 Baking, as a preventive to hydrogen embrittlement, when specified on the part drawing must begin within one hour after plating.

4.3.4.2 Baking must be done in accordance with Section 7 (Heat Treatment After Electroplating) of ASTM B 242.

4.3.4.3 Conform to the time and temperature requirement specified on part drawing.

4.3.5 Corrosion Protection

4.3.5.1 These components must meet corrosion requirement of 96 hour salt spray test as performed in accordance with ASTM B-117.

5.0 Process Controls

Control of the plating process is the sole responsibility of the vendor. The following methods are some of the suggested criteria for process control.

5.1 Sulphur Content

5.1.1 The sulphur content in the semi-bright nickel bath shall be less than 0.005% (weight %). The sulphur content is specified to indicate the type of nickel plating solution that is to be used and may be measured per the test procedures identified in ASTM B 456. In-process testing to determine conformance to the sulphur content requirement is essential to establish and maintain process capability and control.
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5.1.2 The sulphur content in the bright nickel bath shall be greater than 0.03% (weight %). The sulphur content is specified to indicate the type of nickel plating solution that is to be used and may be measured per the test procedures identified in ASTM B 456. In-process testing to determine conformance to the sulphur content requirement is essential to establish and maintain process capability and control.

5.2 Microporosity - 64,000 pores / square in. minimum

5.2.1 Microporosity measurements of the chromium layer per the Dupernel test.

6.0 General

6.1 Significant Surfaces

6.1.1 Unless otherwise specified on the Engineering Drawing, significant surfaces are defined as those surfaces of the finished part that are directly visible or visible by reflection when the finished part is assembled and/or can be the source of corrosion products directly visible, visible by reflection or that can be transferred to webbing or occupant clothing by contact resulting from use.

6.2 Sampling and Inspection

6.2.1 Sampling and inspection will be as required in Quality Assurance Procedure QA 62 and consistent with all appropriate design specifications.

6.2.2 The supplier will be required to perform a step test on each lot of plated parts per ASTM B 764. IMMI will test each lot for total nickel minimum thickness. If the minimum thickness criteria is not met, the components will be required to meet the corrosion protection requirements of paragraph 4.3.5.

6.2.3 Lots that do not meet the criteria of plating thickness and corrosion protection will be rejected.

6.2.4 Specific acceptance criteria that is related to the component or the application will be identified on the IMMI 5 digit drawing. Plating adhesion is an example of this type of criteria.