



PLATING, HARD CHROMIUM

WSE-M1P14-B

1. SCOPE

This specification defines performance requirements for electrodeposited hard chromium on metal surfaces.

2. APPLICATION

This specification was released originally to define performance criteria for an electrodeposited hard chromium finish for applications requiring a scuff, wear, and heat resistant surface. These include engine valve stems, piston rings, and piston rods for suspension dampers.

3. REQUIREMENTS

3.0 STANDARD REQUIREMENTS FOR PRODUCTION MATERIALS

Material suppliers and part producers must conform to the Company's Standard Requirements For Production Materials (WSS-M99P1111-A).

All requirements identified for each specification must be met to achieve acceptable field durability. No one requirement, exclusive of others, is capable of ensuring satisfactory performance. Any deviations to the requirements of these specifications may be subject to additional performance requirements. All part testing requirements apply to those areas of the part identified as a significant surfaces (see General Information) unless otherwise specified on the engineering drawing.

Parts shall be free from the detrimental effects of hydrogen embrittlement or other factors which result in part brittleness. Follow the requirements in WSS-M99A3-A.

3.1 PLATING ADHESION (ASTM B 571)

Adhesion of the electroplate to the base metal must conform to the requirements of the grind-saw test method per ASTM B 571 unless otherwise indicated. This test shall be performed both before and after heating for 4 h at 175 +/- 2 °C. No lifting or peeling of the electroplate from the substrate is permitted following the grind-saw test.

For chromium plated engine valves, plating adhesion shall be assessed by the bend test in which the valve stem is formed through 90° over a 10 mm radius. Tensile and compression surfaces shall show no flaking when viewed at 10 X magnification; cracking is permitted at these locations. In addition, the finished part shall exhibit no macro cracking, peeling, blisters or flaking when viewed at a nominal magnification X 20 but blemishes and pearls within the master sample range are permitted. Comparison standards, test procedures for bend test and appearance shall form part of the agreed control plan.

Date	Action	Revisions	Ver 4
2008 04 25	Revised	Para 3.2 & 3.3 revised, See Summary of Revisions.	A. Wedepohl, FNA
2003 07 25	Revised	Para 3.0 inserted; para 3.1, 3.6, 4 deleted	
1987 08 03	Released	SM/ER112TC	H Nikkel, J. C. NP Riley, EAO



3.2 PLATING THICKNESS (ASTM B 659)

It is the supplier's responsibility to identify the plating thickness distribution for each unique part design and rack design by mapping the plating racks and plated parts and to employ any special processing techniques, e.g., the use of auxiliary anodes and/or shields, reducing the number of parts per rack etc., which may be required to consistently meet the specified minimum plating thicknesses on all significant surfaces.

The Engineering Drawing should specify the minimum and maximum plating thickness for the hard chrome plating. If not specified on the engineering drawing, the following limits apply for all significant surfaces.

Engine valves	5.1 – 9.1 μm
Piston Rings	5.0 μm min.
Damper Piston Rods	10.0 μm min.

In case of dispute the umpire test method for measuring thickness shall be metallographic sectioning per ASTM B 487.

3.3 CLEANING PRIOR TO ELECTROPLATING

It is the supplier's responsibility to identify the correct cleaning method per the principles defined in ASTM B177, *Standard Guide for Engineering Chromium Electroplating*.

4. GENERAL INFORMATION

The information given below is provided for clarification and assistance in meeting the requirements of this specification.

4.1 SIGNIFICANT SURFACES

Significant surfaces are all surfaces specified on the engineering drawing requiring a controlled deposit. Unless otherwise specified on an engineering drawing, only those areas that can be touched with a 20 mm diameter ball shall be considered significant. In holes, corners, recesses and other areas where a controlled deposit cannot be obtained under normal electroplating conditions, the thickness of the deposit may be that which results from control on the significant surfaces, unless otherwise specified.

5. SUMMARY OF REVISIONS

2008 04 25	1. Renumbered paragraphs. 2. Added piston rings, engine valve stems, and suspension damper, piston rods to the application description. 3. Added default thickness requirements for valves, rings, and rods. 4. Changed cleaning method from the general electroplate methods ASTM B 242 and B 183 to ASTM B 177 which is specific to cleaning for hard chrome deposits.
1990 09 28	C01031540, Revised 3.2 W Janssen N Riley EAO H Nikkel NAAO