

NAVISTAR, INC.		
Material, Parts, and Process Specifications (MPAPS)		NUMBER: MPAPS G-19 Part II
		Former Designation: CEMS G-19 Part II
TITLE: Electrodeposited Engineering (Hard) Chromium Coatings		CURRENT REV No.: 1412
		DATE: Dec. 2014
WRITTEN/EDITED BY: Materials Engineering	APPROVED BY: Materials Engineering	SUPERSEDES: CEMS G-19 Pt II – April 2002
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<i>This specification may involve hazardous materials, equipment, and procedures. This specification does not purport to address all of the safety issues associated with its use. The user is responsible to consult appropriate safety and health practices and to determine the applicability of regulatory limits prior to use.</i>		
Change Notice: Changed to new MPAPS spec format; extensive revision, editorial changes.		

1.0 APPLICATION

1.1 Engineering coatings of chrome plate are generally used to increase the surface hardness of a part or to improve its wear resistance

1.2 Chromium plate is hard and dense with good corrosion resistance to most materials. It has a lower friction coefficient than any other metal and good anti-galling properties as long as it is not used against itself. Despite its hardness, it should not be used as a general substitute for hardening but only when properly engineered for this purpose. It may be applied to aluminum, copper, steel and cast iron substrates.

1.3 Hard chromium, as differentiated from decorative chromium, is applied for functional reasons regardless of thickness. If a 0.00005 inch (1.3 µm) deposit is applied to a surface, its apparent hardness will reflect that of the basis metal. If, however, a 0.0015-.0020 inch (38-51 µm) deposit is applied over an unhardened part, it will be hard. In short, a deposit of over 0.001 inch (25 µm) is essential before chromium will assume its true hardness characteristics when applied to unhardened basis metals, whereas over a hardened base, this thickness is not necessary because of the substantial backing provided.

2.0 SCOPE

This specification covers the basic requirements for electrodeposited hard chromium as used to meet service conditions involving wear, corrosion, friction or a combination of these.

2.1 Restricted Chemical Substances

Effective January 1, 2007, all product supplied to the requirements of this specification must comply with the requirements of the MPAPS B-50 specification.

3.0 REFERENCE DOCUMENTS

Unless otherwise specified, the latest issue of all referenced standards shall apply. The following Specifications, Standards, and Regulations are referenced in this specification.

Quality System Standard ISO 9001 or TS-16949	ASTM B177	ASTM B499
NAVISTAR Engineering Design Std A-16	ASTM B117	ASTM B504
NAVISTAR Manufacturing Std. MS-D-13	ASTM B456	ASTM E384
NAVISTAR MPAPS B-50	ASTM B487	ASTM B650
CFR Title 29, Part 1910	ASTM B242	ASTM B183
ASTM B322	ASTM B253	ASTM B281

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ASTM B242
ASTM B578
ASTM F519

ASTM B254
ASTM B571
ASTM B850

ASTM B320
ASTM B849
ASTM B851

4.0 REQUIREMENTS

Three classes of plating for engineering applications are provided for in this specification as shown in the table below:

Class	Resistance to		Typical Applications	Chromium Thickness *		Adhesion Test	Porosity Test
	wear	corrosion		mils	µm		
DS	excellent	good	Pump shafts, Hyd. Piston rods	1.00 min	25 min	Pass	Pass
				1.50 avg	38 avg		
ES	good	good	Hyd. Piston rods	0.40 to 0.80	10 to 20	Pass	Pass
FS	Fair	Fair	Air valves	0.25 min	6 min	Pass	Not required
				0.35 avg	9 avg		

*Production parts, when required, will be produced undersize to allow for the plating thickness shown in above table. They will then be plated to meet specified size requirements.

4.1 Surface Preparation

4.1.1 Cleaning

The articles to be plated will be thoroughly cleaned and free from rust, scale, oil and other foreign matter detrimental to the final finish as recommended in ASTM B177. The surface will have a sufficiently fine finish to assure the desired final plating quality. Parts to be electroplated may be cleaned in accordance with ASTM Practices B183, B254, B242, B281, B320, B322, B481, B558 or B630 or Guide B253.

4.1.2 Hydrogen Embrittlement

The cleaning on ferrous operation will be controlled to prevent hydrogen embrittlement, especially in those parts that are hardened, cold worked or subject to high service stresses.

4.1.3 Stress Relief

High strength/high hardness steel parts that are subjected to machining, grinding, cold forming or cold straightening after heat treatment are particularly susceptible to hydrogen absorption. Therefor such parts should be stress relieved prior to cleaning and plating per ASTM B849.

4.1.4 Shot Peening

Parts for which fatigue life after plating will benefit from compressive residual surface stresses may be shot peened per ASTM B851.

4.2 Thickness

The thickness of plating is shown in the table above. Measurements will be made on significant surfaces. These are defined as those that can be touched with a 0.75 inch (19 mm) diameter ball. This definition may be superseded by notations on the engineering drawing.

4.3 Hardness

The hardness of the plating will be 800 VHN minimum. As a routine check, engineering chromium should be file hard.

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