

NAVISTAR, INC.		
Material, Parts, and Process Specifications (MPAPS)		NUMBER: MPAPS G-7051
		Former Designation: TMS-7051
Decorative Electroplated Chromium - Plastics		CURRENT REV No.: 1708
		DATE: Aug. 2017
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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>		

1.0 APPLICATION

This specification covers the decorative electroplated chromium used on interior or exterior plastics. These parts may be exterior grilles, light bezels, nameplates, interior ornaments, knobs, or similar applications.

2.0 SCOPE

This specification covers the material requirements of the base plastic, plating requirements, performance requirements, quality of the finished part, qualification, source approval and quality control.

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 standards, specifications and regulations are referenced in this specification.

Quality System Standard ISO 9001 or TS-16949	MPAPS DT-20	ASTM B604
CFR Title 29, Part 1910	MPAPS G-19 Part I	ASTM B727
NAVISTAR Supplier Packing and Shipping Std. D-13	ASTM B368	ASTM B764
NAVISTAR Engineering Design Std. A-16	ASTM B456	ASTM D883
NAVISTAR MPAPS B-50	ASTM B487	ASTM B532
NAVISTAR EPS-158	ASTM B504	ASTM B374
NAVISTAR EPS-159	ASTM B530	

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4.0 REQUIREMENTS

4.1 Base Plastic

The general plastic family from which the unplated plastic part is molded shall be compatible with the particular electroplating process used by the electroplater. The plastic part shall be free from visible molding defects, sink marks, weld or flow lines. Unless otherwise specified on the part drawing, the significant surface finish shall be equal to or better than the No. 2 diamond finish as found in the SPI-SPE Mold Finish Comparison Kit*. Where necessary, the plastic parts shall be stress relieved prior to plating.

* Available from D-M-E Corporation, 1975 N. 17th Street, Melrose Park, IL - Licensed by Society of Plastic Industry and Society for Plastic Engineers.

4.2. Plating

4.2.1 Appearance

Plated parts shall exhibit a bright and uniformly reflective finish, be smooth and free of stains, pin holes, or other defects affecting the plated appearance or the ability of the plating to pass required corrosion tests on class A and class B surfaces. The appearance of surfaces of production parts shall match color and finish of the master samples agreed upon by Navistar Industrial Design, Supplier Quality and the supplier per Navistar's Visual Component Approval Process (EPS-158) and Material Styling Evaluation Process (EPS-159).

The surface classifications are described below:

4.2.1.1. Class A surfaces are those surfaces which are most prominently visible, or visible by reflection, when the finished part is assembled on the truck.

4.2.1.2. Class B Surfaces are those surfaces that are directly but not prominently visible or visible by reflection when the finished part is assembled on the truck

4.2.1.3 Class C surfaces are those surfaces that may be partly, but not directly, visible or mating surfaces that may be partly covered or hidden when the part is assembled on the truck.

4.2.1.4 Class D surfaces are the non-visible surfaces or on the backside of the part.

4.2.1.5 The appearance of all surfaces shall be consistent with appearance attribute requirements listed for class A, B, C and D surfaces in the Appendix A.0 or as agreed during visual component approval process. The construction, anodic potential differences, Nickel Sulphur, Chrome micro-discontinuity, and performance requirements of sections 4.3 and 4.4 apply to class A and B surfaces. Class C surfaces must meet performance requirements in section 4.4.

4.2.1.6 Trivalent Chrome Plating. Some trivalent chrome plating systems produce chrome that is noted to tarnish in service. It will be the supplier's responsibility to warranty against tarnishing if trivalent chrome is used.

4.3 Plating Thickness and Construction

This section defines the minimum plated layer thicknesses and their properties required for bright and low gloss, interior and exterior plated plastics. Systems other than those specified which demonstrate satisfactory performance may be approved by Navistar Integrated Product Engineering (IPD).

4.3.1 Pretreatment:

4.3.1.1 Plastic part shall be prepared for electroplating in accordance with ASTM B727

4.3.1.2 ABS and ABS-PC Part designs shall be evaluated for substrate surface stress using Acetic Acid Stress Test (MPAPS DT-20). Report Results to Navistar Engineering.

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4.3.2 Thickness

Minimum Plating Thickness ⁽¹⁾, µm (mils)

	<u>Interior</u>	<u>Interior Low Gloss</u>	<u>Exterior ⁽⁷⁾</u>
Ductile Copper ⁽⁵⁾	13 (0.5)	20 (0.8) ⁽⁶⁾	20 (0.8) ⁽⁶⁾
Total Nickel	5 (0.2)	20 (0.8)	20 (0.8)
Semi-Bright ⁽²⁾	--	10 (0.5) ⁽³⁾	10 (0.5) ⁽³⁾
High Sulfur ⁽²⁾	NA	Opt.	Opt.
Bright ⁽²⁾ or Low Gloss ⁽³⁾	5 (0.2)	8 (0.3) ⁽³⁾	8 (0.3) ⁽³⁾
Chromium ⁽⁴⁾	0.127 (0.005)	0.254 (0.01)	0.254 (0.01)

⁽¹⁾Plating thickness generally and for sub layers may be determined by using methods described in ASTM B-487, B-504, B-530, or B-764 as appropriate. The plating thicknesses are the minimum values required in all Class A and B surface locations. Additional copper layer thickness may be required to meet performance requirements in some or all Class A and B surface locations. In such cases the supplier must document the validated minimum copper thickness and maintain that value in production. The drawing should be appropriately annotated with check (C-point) locations and thickness minimums.

⁽²⁾Semi-bright nickel is defined as a nickel plate containing less than 0.005% sulfur; bright nickel contains 0.04% sulfur minimum. The semi-bright and bright layers can be differentiated with an etchant consisting of one-part nitric acid (specific gravity - 1.42) and four parts glacial acetic acid. A third "High Sulfur Nickel" layer intermediate to the semi-bright and bright nickel layers is optional. When present, the mass % sulfur of the intermediate layer shall be greater than 0.15% and its thickness no greater than 10 % of the minimum total nickel thickness. Semi bright nickel shall be in no measure less than 50 % of the total nickel layer thickness and the Bright Nickel layer shall be no less the 40% of the minimum total nickel thickness if there is no intermediate high sulfur layer or less than 30 % of the minimum total nickel thickness if there is an intermediate high sulfur layer. The anodic electro-chemical potential differences between layers in multiple layer nickel systems shall be as indicated in MPAPS G-19 Part I.

⁽³⁾ Satin (Satylite) finish is low gloss and created by a mechanical treatment on the semi-bright nickel and a chemical treatment on the bright nickel. It may be specified for cosmetic appeal.

⁽⁴⁾Microporous chrome layers shall exhibit a minimum of 10,000 pores/cm² as determined by the copper deposition (Dubpernell) method as described in ASTM B 456 or a minimum of 2000 pores/cm² as determined by active corrosion sites after testing as described in ASTM B 456.

⁽⁵⁾ The pretreatment of plastics for decorative plating necessarily involves autocatalytic (electroless) deposition of nickel or copper layer and an additional electrodeposited nickel or copper "strike" before the ductile copper layer can be applied (ASTM B727).

⁽⁶⁾ The minimum ductile copper layer thickness on existing parts validated, PPAP'd and approved for production prior to August 1, 2017 is 0.7 mil (17.8 microns).

⁽⁷⁾ Where material specification on an existing drawing indicates Class 1, General Exterior Ductile Copper Thickness Requirements apply to all locations. Where Class 2 is indicated, the minimum Ductile Copper Thickness is 1.1 mil (28 microns) in all locations. Class designations are no longer required on new part drawings.

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