

NAVISTAR, INC.		
Material, Parts, and Process Specifications (MPAPS)	NUMBER: MPAPS G-23	
	Former Designation: CEMS G-23	
TITLE: Tin-Zinc Plating	CURRENT REV No.: 1412	DATE: Dec. 2014
WRITTEN/EDITED BY: Materials Engineering	APPROVED BY: Materials Engineering	SUPERSEDES: CEMS G-23 - December 2006
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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: Converted specification from CEMS to MPAPS format; editorial changes.		

1.0 APPLICATION

Tin-zinc plating is intended for applications which require corrosion resistance and electrical conductivity, such as steel fasteners and small parts used for grounding applications. The coating is highly lubricious and provides excellent solderability for electrical applications. This type of coating is very ductile, so can be used for fasteners which require bending or crimping (such as blind rivets). Temperature of plated parts should not exceed 195°C (380°F) during manufacture or service due to the low melting point of tin-zinc plating of 197°C (386°F).

2.0 SCOPE

This specification covers the Corporation's requirements for electrodeposited tin-zinc coatings on steel substrates, with a supplementary hexavalent-chromate-free passivation film.

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 B117
 CFR Title 29, Part 1910
 NAVISTAR Manufacturing Std. MS-D-13
 NAVISTAR Engineering Design Std A-16
 NAVISTAR MPAPS B-50

4.0 REQUIREMENTS

Parts to be plated will be thoroughly cleaned and free of rust, scale, oil and other foreign matter. The cleaning operation must be controlled to prevent hydrogen embrittlement, especially in those parts that are hardened, cold worked, or subject to high service stresses.

4.1 Chemical Composition

Plating alloy composition will be in the range 65-80% tin, with balance zinc.

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4.2 Passivation Treatments

A hexavalent-chromate-free passivation treatment (or trivalent chromium passivation) will be applied to the plating.

4.3 Plating Thickness

The minimum plating thickness on parts plated to this specification will be 8 µm (not including the supplementary passivation treatment). Maximum thickness on threaded parts will be twice the minimum specified plating thickness, and is limited by the basic thread size and its associated tolerances. Coated fasteners must pass all appropriate thread Go gages for thread sizing. Threads may be produced undersized prior to plating providing that the finished threaded part meets all mechanical property requirements specified for the part.

4.4 Corrosion Performance

Parts plated according to the requirements of this specification will be capable of withstanding neutral salt spray testing for 1000 hrs. Parts shall show no white corrosion on significant surfaces after 48 hr exposure, and no red rust on significant surfaces after 1000 hrs testing.

Significant surfaces for evaluation of fasteners will be defined as all exposed surfaces of fastener(s) when installed, including but not limited to fastener heads, socket recesses, SEMS washers, and external surfaces of nuts. Threads and points are excluded unless otherwise specified on drawing. On parts other than threaded fasteners, significant surfaces will include all plated surfaces. Deep recesses, blind holes, edges, and tubing interiors are excluded unless otherwise specified on drawing.

4.5 Adhesion

The coating shall have good adhesion to the base metal. Plating will not blister, chip or flake during the adhesion tests as described in Section 5.3.4.

5.0 QUALITY

The tin-zinc coating will be dense and uniform, free from porosity, pinholes and blisters, and substantially free from other defects that may affect the appearance or protective value of the coating. The plating will have no gray or burned area and will not flake off or develop "spotting out".

5.1 Hydrogen Embrittlement

All steel parts having core hardness greater than 32 HRC or surface hardness of 35 HRC and all highly stressed cold worked parts subsequently electroplated with tin-zinc are subject to embrittlement because of hydrogen absorption. For parts such as these, it will be the responsibility of the supplier to take appropriate process steps to prevent hydrogen embrittlement and to ensure that parts supplied to this specification are free of hydrogen embrittlement. Due to the low melting point of tin-zinc plating, parts requiring de-embrittlement bake shall be heated to a part temperature of 187°C and held for 4 hrs min.

5.2 Sampling Procedure

Select for test one or more random samples from each shipment, or from authorized test specimens. The number of samples to be selected from each size lot will be agreed upon between the supplier and the purchaser. If results fall below the test requirements, the shipment may be rejected.