

NAVISTAR, INC.		
Material, Parts, and Process Specifications (MPAPS)		NUMBER: MPAPS G-21
		Former Designation: CEMS G-21
TITLE: Anodic Coatings on Aluminum		CURRENT REV. No.: 1406
		DATE: JUNE 2014
WRITTEN/REVIEWED BY: Materials Engineering	APPROVED BY: Materials Engineering	SUPERSEDES; CEMS G-21 – Feb. 2007
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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 format; added Section A.0 (formerly CEMS G-21 Appendix) to end of this spec; added section A.4 on anodizing of weld metal; editorial changes.		

1.0 SCOPE

This specification covers the requirements for an electrolytically oxidized coating applied to aluminum or aluminum alloys for purposes of appearance, corrosion resistance, electrical (insulating) properties, or abrasion resistance. The coating may be color dyed for identification or decoration.

2.0 INTRODUCTION

The method used for applying this finish generally consists of an electrolytic treatment of the aluminum in an acid bath. Coatings for decorative purposes may be dyed. All coatings, except those specifically used for abrasion resistance, must be hot water sealed. Details of processing are not limited by this specification. Three classes of anodic coatings are described in this specification:

- Class A - Decorative exterior
- Class B – Decorative interior
- Class C – Hard coat for abrasion resistance

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.

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4.0 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	CFR Title 29, Part 1910	ASTM B 244
NAVISTAR Manufacturing Standard MS-D-13	ASTM B 136	ASTM B 368
NAVISTAR MPAPS C-8	ASTM B 137	ASTM D 4060
NAVISTAR MPAPS C-10	ASTM B 487	ASTM B 680
NAVISTAR MPAPS GT-31		

5.0 CLASSIFICATION

Anodic coatings are classified by their application and the thickness of the coating.

6.0 PROPERTY REQUIREMENTS

TABLE I - COATING REQUIREMENTS

Requirement [†]		Class		
Typical Application		A	B	C*
		Decorative (for exterior exposure)	Decorative (for interior exposure)	Primarily for wear resistance
Thickness, min	inch	0.0003	0.00015	0.002
	µm	8	4	50
Weight, min	mg/inch ²	13	7	85
	g/m ²	20.2	10.8	132
Sealing Required		yes	yes	not permitted
Sealing Test		pass	pass	not required
CASS Test, hours**		6	not required	not required
Color-dyed Coatings				
color stability, hours ^{††}		500	250	not required
color leaching		pass	pass	not required
Heat Test		not required	pass	not required
Abrasion Resistance		not required	not required	*

* This is a hard abrasion resistant coating. Depending upon the alloy, thicknesses are available up to 0.008 inch (0.2 mm). When special thicknesses are required, they will be specified on the drawing. Specific requirements for abrasion resistance shall be specified on drawing or purchase order.

** After the specified hours of test, there will be no corrosion spots visible to the unaided eye on significant surfaces. Significant surfaces are defined as those which are visible, subject to wear or corrosion, or surfaces on which the coating is otherwise functionally necessary. Surfaces considered significant for a given part may be indicated on the part drawing.

† Test methods are described in Section 8.0.

†† Other requirements for test duration may be specified on the part drawing or purchase order.

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6.1 Material

The type of aluminum to be anodized will be designated on the part drawing, referencing applicable NAVISTAR materials specifications (see MPAPS C-10 for wrought aluminum and MPAPS C-8 for aluminum castings).

6.2 Pretreatment

Anodic coatings reproduce the texture of the surface from which they are formed. Therefore, limitations to surface defects (such as scratches, porosity, cracks, etc.) which might adversely affect the final appearance of the part, along with the desired surface pretreatment, should be specified on the part drawing and/or purchase order.

6.2.1 Pretreatments are either mechanical or chemical in nature. Used alone or in combination, they provide a wide variety of glosses and textures to the aluminum surface. Selected finishes suitable for routine use are listed in Table II. Numerous other surface effects can be achieved by other chemical and mechanical treatments of the surface texture. Consultation with Materials Engineers and/or suppliers can provide information on other surface effects that may be available for use.

TABLE II - PRETREATMENT FINISHES

Aluminum Association Designation*	Description
Mechanical Finishes	
M10	mill finish or as fabricated- gloss unspecified
M11**	as fabricated – high gloss
M21	polished and buffed – smooth, high gloss
M22	buffed – moderately high gloss
M32	directional polish – medium satin
M35	directional brush with wheels or sanders moderately coarse
M42	nondirectional matte using very fine grit or glass beads
M45	nondirectional texture using fine shot
Chemical Finishes	
C10	nonetched, cleansed – gloss unspecified
C22	etched – medium matte
C31	bright dipped – high gloss

* Partial list extracted from "Designation System for Aluminum Finishes", document #45, available from the Aluminum Association, 750 Third Avenue, New York, NY 10017.

** Often referred to as Automotive Trim Finish, and used primarily for rolled, not extruded, sections.

7.0 QUALITY

The anodic coating will be continuous, smooth, adherent, uniform in appearance, and will be free from powdery areas, stains, discontinuities such as breaks and scratches, or other damage.

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