

NAVISTAR, INC.		
Material, Parts, and Process Specifications (MPAPS)		NUMBER: MPAPS G – 7
		Former Designation: CEMS G - 7
TITLE: Product Graphics		CURRENT REV No.: 1512
		DATE: December 2015
WRITTEN/EDITED BY: S. Brailey	APPROVED BY: R. Goluch	SUPERSEDES: Rev. 1510 – Oct 2015
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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: <i>Updated tables</i>		

1.0 APPLICATION

This specification covers the Corporation's requirements for pressure sensitive adhesive films used as product graphics for the purpose of identification, decoration, or instruction.

2.0 SCOPE

This specification covers construction and performance requirements for four (4) Grades of labels with pressure sensitive adhesive backing. General applications for labels and product graphics will be covered by generic Grades PSF-1 and PSF-2, while more sophisticated requirements are denoted by a system of suffix letters (C, D, F, G, etc.) each of which designates specific additional requirements which must be met.

The performance and durability of the label/product graphic are dependent upon the substrate (the surface to which the label is to be attached), and the location of the label in the vehicle. Therefore, provision is made for identification of the intended substrate by use of the suffix letter "Y" on the engineering drawing. In this way product qualification and performance evaluation can be based upon the appropriate substrate. Provisions are also made to denote location within the vehicle by the use of suffixes INT, and EXT.

Unless otherwise indicated on the engineering drawing/blue print and/or purchase order, product qualification and performance evaluation will be based upon tests performed using the substrate indicated in Table 1.

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 <i>ISO 9001 or TS-16949</i>	ASTM D471	ASTM D903
CFR Title 29, Section 1910	ASTM D1781	ASTM B117
Federal Motor Vehicle Safety Std. (FMVSS) 108	ASTM D1876	SAE J243
FMVSS 205	ASTM D3807	SAE J2402 (ISO 2575)

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NAVISTAR Manufacturing Standard MS-D-13	ASTM G155	NAVISTAR MPAPS D-7116
NAVISTAR Engineering Design Std. A-16	ASTM D609	NAVISTAR MPAPS B-50
NAVISTAR Eng Procedural Std (EPS) 143	NAVISTAR EPS-144	NAVISTAR EPS-145
NAVISTAR EPS-147	NAVISTAR EPS-148	ANSI Z26.1
ANSI Z535.3	ANSI Z535.4	

4.0 REQUIREMENTS

Product graphics/labels supplied to this specification shall meet all requirements described for the basic grade plus any additional requirements as indicated by the suffix letter(s) appended to the grade designation. Requirements apply to graphics/labels as applied to test panels of the appropriate substrate as indicated in Table 1 or as specified on the engineering drawing. Suffix letter requirements are shown in Table 2. Test panels are cleaned in accordance with ASTM D 609, Procedure A. Apply the graphic/label in accordance with the vendors recommended practice. The applied graphic-panel assembly should be conditioned for 72 hours at room temperature prior to test. These requirements apply for a minimum of 42 months from the date of manufacture of the graphic/label (until the expiration date), providing the product has not been stored in direct sunlight, moist conditions or at temperatures above 100°F (38°C). Product graphics supplied will have no less than 12 months shelf life remaining when received by the buyer.

Table 1 - Classification

Grade	Obsolete Navistar Type*	Film Description	Minimum Film Thickness Excluding Adhesive		Application-Test Substrate**
			Inch	mm	
PSF-1	1	OPAQUE PLASTIC (Typically these are non-shrinking vinyl, vinyl-acrylic, or polyester films, all parts supplied must have prior approval of both artwork and materials – see Section 7)	0.002	0.05	Y1
	1A				
	1B				
	3				
	4				
	5				
	6				
PSF-2	1	CLEAR PLASTIC (Typically these are polyester or vinyl but may be urethane, polycarbonate, or PVF, all parts supplied must have prior approval of both artwork and materials – see Section 7)	0.002	0.05	Y3
	2A				
	2B				
	3				
	5				
	9				
	10				
PSF-7	7	ALUMINUM FOIL	0.002	0.05	Y1
PSF-8	8	ANODIZED ALUMINUM SHEET OR PLASTIC	0.012	0.30	Y1
PSF-11	--	IN-MOLD GRAPHIC	As defined by engineering drawing	As defined by engineering drawing	Y2

See Table 3 for conversion of obsolete Navistar types to the new Grade designation.

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Table 2 - Suffix Descriptions

Suffix	Description
C ⁽¹⁾	Certification Label – Meet DOT requirements for certification labels
D	Self-Destruct – Tamper proof/void feature-label is permanently damaged if removed.
E	Fluid Resistance – VOID – added to standard requirements
F	Low Temperature Resistance – Severe service at lower temperatures
G	Low Strength Film – Film tears before peeling
H	High Temperature – Service application at higher temperatures
H1	Extreme High Temperature Exposure – High temperature durability
J	Low Temperature Application – Field service bonding application at lower temperature
K	Static Cling – Removable display labels
L	Laminated – Multi-layer decorative applications
M	Metalized Plastic – Metalized Polyester - Metalized decorative effects
M1	Material - Non-shrinking Vinyl
M2	Material - Vinyl-acrylic
M3	Material - Polyester Films
M4	Material – Urethane
M5	Material - Polycarbonate
M6	Material - Polyvinyl Fluoride - Tedlar
N	Pressure Wash – Stress of high pressure water spray
p	Paint Mask – Label is provided with a protective paint mask
Q	Brightness – Reflectorized film for safety effect per FMVSS-108
R	Surface Printable – Accepts Pen, ink writing on the label
S	Safety – Safety warnings or contains safety information
T	Temporary – Removable, similar to static cling
U	Subsurface Printed – Printing protected from contact
V	Abrasion Resistance - Brush and Branch Strike
W	Wet Release – Wet release adhesive system
X	Film Thickness – Non standard thickness specified on the drawing
Y	Substrate – Code indicates substrate to which graphic will be applied
Z	Special Requirements – Additional requirements specified on the blue print
EXT	Exterior Surface Application – Graphic is applied to an exterior surface, exposed to direct sunlight.
EXT1	Exterior Under Hood Application - Graphic is applied to an exterior surface, shielded from direct sunlight.
INT	Interior Surface application – Graphic is applied to an interior surface, exposed to sunlight.

(1) All surface printed labels containing the suffix C must be supplied with a separate, clear laminate cover.

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Table 3 - Conversion of Obsolete Types to New Grade Designation

Obsolete Navistar Type	New Grade Designation
1	PSF-1
1A	PSF-1
1B	PSF-1W
1S	PSF-1S
2	PSF-2
2A	PSF-2U (NO LAMINATES)
2B	PSF-2CU
3	PSF-1M OR PSF-2M
4	PSF-MX (0.08 MM)
5	PSF-1G OR PSF-2G
6	PSF-1K
7	PSF-7
8	PSF-8
9	*
10	PSF-2CDU

* For further information, contact Materials Engineering, MaterialsEngineering@navistar.com

4.1 Basic Property Requirements

4.1.1 Adhesion

This requirement is not applicable when Suffix D, Suffix G, Suffix K, or Suffix T is specified. Suffix S requires a higher adhesion value. When Suffix X is used to indicate a thicker version of grades PSF-1 or PSF-2, the minimum average adhesion value will be specified on the engineering drawing.

4.1.1.1 Method: Prepare the panels and test in accordance with ASTM D903 or ASTM D1781 or ASTM D1876 or ASTM D3807 as appropriate for the samples. Alternate test methods may be used by agreement between the supplier and purchaser.

4.1.1.2 Required: The product graphic will have a minimum average adhesion of 400 N/m (2.28 lb/in). The graphic will not break below this value and laminates will not delaminate.

4.1.2 Flexibility

4.1.2.1 Method: Bend the product graphic with backing face down in any direction over a 13mm (0.5 inch) mandrel. Examine for cracks or breaks.

4.1.2.2 Required: The product graphic will not crack nor show a break. This requirement is not applicable to Grades PSF-8 or PSF-11 (unless otherwise specified), and may be modified or excluded as noted on the engineering drawing when Suffix X is used to indicate a heavier version of grades PSF-1 or PSF-2

4.1.3 Dimensional Stability

4.1.3.1 Method: Apply a 165 x 165 mm (6.5 x 6.5 inch) piece of the product graphic to a 150 x 150 mm (6 x 6) panel and trim evenly at the edge of the panel. Bake the assembly at 66°C (150°F) for 48 hours. Remove and allow panels to cool, examine for shrinkage.

4.1.3.2 Required:

The product graphic will not shrink more than 0.5 mm (0.02 inches) from any edge.

4.1.4 Abrasion Resistance

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4.1.4.1 Method: ASTM D 3884 (RPDH): For sub-surface printed, laminated, or hot stamped graphics use CS-17 wheel, 1000 gram load, 1500 cycles. For surface printed graphics use CS-10 wheel, 500-gram load, 500 cycles.

4.1.4.2 Required: The product graphic will not show any appreciable change in the abraded area. The graphic will remain legible and pattern remains clear.

4.1.5 Aging

4.1.5.1 Method: Age the applied product graphic for 7 days at 66°C (150°F) and 24 hours at –40°C (-40°F) using a different panel for each condition. Immediately after each exposure, examine product graphic.

4.1.5.2 Required: The product graphic will not blister, crack, check, peel, discolor, or lose adhesion or gloss.

4.1.6 Elevated Temperature Exposure

4.1.6.1 Method: Prepare three panels as for DIMENSIONAL STABILITY Section 4.1.3. Bake three panels for 2 hours at 121°C (250°F). After cooling, examine product graphic.

4.1.6.2 Required: The product graphic will not blister, crack, check, peel, discolor, or lose adhesion or gloss. The graphic will not shrink more than 0.8 mm (0.03 inches) from any edge.

4.1.7 Thermal Shock

4.1.7.1 Method: Apply product graphics to three test panels of the appropriate substrate. Place panels in an oven for 16 hours at 66° C (150° F). Immediately after removal from oven place in a cold chest at –34° C (-30° F) for 8 hours. Repeat for 7 cycles and examine.

4.1.7.2 Required: The product graphic will not blister, crack, check, peel, discolor, or lose adhesion or gloss.

4.1.8 Humidity

4.1.8.1 Method: Apply product graphics to three test panels of the appropriate substrate. Test per MPAPS GT-Paint test method 7E using panels prepared as per Section 4.3, Panel Preparation. Expose product graphics for 100 hours of condensing humidity.

4.1.8.2 Required: The product graphic will not blister, crack, check, peel, discolor, or lose adhesion or gloss.

4.1.9 Salt Spray

4.1.9.1 Method: Apply product graphics to three test panels of the appropriate substrate. Test as per ASTM B 117. Mount panels at an angle of 15-30 degrees from vertical. Test for 200 hours and examine.

4.1.9.2 Required: The product graphic will not blister, crack, check, peel, discolor, or lose adhesion or gloss.

4.1.10 Ultra Violet Weathering

The supplier's product must pass South Florida Exposure testing for the specified period of time as indicated by suffixes INT, EXT, and EXT1 before final approval of the product is given. Initial vendor qualification and/or individual part qualification, and/or quality control testing may be based upon QUV or Xenon Arc Weatherometer for the test time specified by each suffix. However, final approval will not be granted until South Florida Exposure has been completed. Materials approved to suffixes INT and EXT1 cannot be used for other applications without re-testing. In the absence of a suffix, EXT will be assumed.

4.1.10.1 South Florida Exposure: Perform test per MPAPS GT-Paint test method 7F for 36 months or the exposure specified by the suffix on the print, except that panel preparation will be as described in

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