

NAVISTAR, INC.		
Material, Parts, and Process Specifications (MPAPS)		NUMBER: MPAPS G-9009
		Former Designation: TMS-9009
TITLE: Painting, Parts		CURRENT REV No.: 1706
		DATE: June 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 outlines the requirements for primed and/or painted metal parts used in NAVISTAR trucks, parts, and components. For painting of thermoplastic parts, see MPAPS G-9008. For painting of FRP parts, see MPAPS G-9005. High temperature paint for exhaust components are covered by MPAPS G-9015.

2.0 SCOPE

This specification covers the general requirements, specific properties and performance requirements of painted metal parts, and is divided into multiple classes.

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.

2.2 Finish Classification

Class of finish of painted parts shall be specified on the engineering drawing. Painted parts shall meet all requirements for the specified class as described herein. Paint covered by this specification should not be exposed to continuous service temperatures above 150°C (see MPAPS G-9015 for parts requiring high temperature paint, such as exhaust components).

2.2.1 Class I

For decorative exterior parts which require excellent corrosion resistance and appearance performance requirements such as exterior portions of the cab and parts which mount to the cab. Class I parts are assumed to meet the Suffix A level requirements unless otherwise indicated.

2.2.2 Class II

For decorative and non-decorative exterior chassis/frame or powertrain parts that require good corrosion resistance. Decorative parts would be specified as Class IIA. Non-decorative parts would be specified as Class IIB or IIP. Examples of non-decorative Class IIP parts that will be top coated are frame rails and cross members, fabricated brackets, clips, steering arms, pitman arms, torque rods, U-bolts, disc wheels, rims, rings, spacer bars, drag links, etc. Class IIB parts that are not topcoated are parts that shall not be exposed to direct ultraviolet radiation, such as underhood brackets and engine-mounted components.

2.2.3 Class III

For decorative and non-decorative interior cab parts that require minimal corrosion resistance. Decorative interior cab parts are specified by adding the suffix A, which means part finish must meet corrosion resistance, as well as appearance performance requirements that include color match, gloss,

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and weathering/ultraviolet exposure. Decorative examples include visible parts. Non-decorative includes parts such as brake and clutch lever arms and mounting brackets.

2.2.4 Class IV

For parts that are not cosmetically important such as castings, engines and engine attachments. Class IV replaces TMS-9009 Class V, and TMS-9009 Class VI (casting sealer such as old CEMS G-5 Casting Sealer Grades -41, -43, and -43W, as examples) and CEMS G-5 Classes F and G. It may also be used in lieu of EMS G5-0001. Class IVC replaces MPAPS G-9009 Class IIC for engine, interior underhood parts, and casting sealers.

2.3 Suffix Requirements

2.3.1 Suffix P

2.3.1.1 This suffix may be applied to a paint Class specification (Example: Class IP or IIP) if it is established that the subject part will **always** be top coated after assembly. Primers are subject to the part performance requirements listed in Table 1A (primer only) but do not have to meet the performance requirements listed in Table 1B. *Note: Primed parts are generally not resistant to UV, so they shall not be stored outdoors or in sunlight prior to topcoat*

2.3.1.2 Electrocoat or E-coat is often used as a primer. Where it may be used as such, but it is not required, the P suffix is sufficient. In those cases where E-coat is desired to be specified as either the primer or as a finish coat, see section 2.3.5.

2.3.2 Suffix A

2.3.2.1 When this modification is made to the below-described class, it indicates final part finish must meet corrosion resistance, as well as appearance performance requirements that include color match, gloss, and weathering/ultraviolet exposure. Examples: Class IA parts would be body colored skirts and bumpers. Class IIA parts would be steps, modesty panels, exhaust stack supports, fuel tanks and straps.

2.3.2.2 Bumpers - Class IIA replaces TMS-9016 (Painting, Bumpers), though new bumper releases should be specified to Class IB.

2.3.3 Suffix B

2.3.3.1 This modification indicates slightly lower performance on a decorative part such as a bumper (IB), bus body/exterior parts and visible body brackets. Class IIB replaces TMS-9009 Class II and Class IV. Class IIB and IIP are functionally interchangeable in many cases.

2.3.3.2 Class IIB has minimal UV protection where Class IIP has effectively none. Both are usually recoated in chassis paint. IIB should be used when a part may not be recoated and IIP when a part will always be recoated.

2.3.4 Suffix C

2.3.4.1 Suffix C represents a further performance reduction for parts that are not cosmetically important. This is not recommended for use and requires the Validation Director approval for use beyond these applications. This suffix should only apply to Class IV parts.

2.3.4.2 Class IC is common with Thermosetting acrylic paints (TSA) which have minimal exterior weathering but good corrosion performance. Typical applications include mounting brackets for exterior component mounting that does not get significant direct light exposure. Some glamour surfaces may be specified this way for specific components requiring a TSA paint.

2.3.4.3 Class IIC and IIIC should not be used.

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2.3.5 Suffix E

2.3.5.1 This suffix requires that the prime system uses an approved chemical pretreatment with an electrodeposition (E-coat) or autodeposition type primer. See MPAPS G-5 Primer Grade -56 as an example. In general, these two systems can be used interchangeably, provided the other requirements can be met- such as surface finish (if required). In the rare instance that one or the other is required, then it shall be so noted on the print as E1 for electrodeposition and E2 for autodeposition.

Example Drawing Designation:

Prime per MPAPS G-9009 Class IIE1 (part that requires E-coat as the primer)

2.3.5.2 In some cases, Electodepostion or Autodeposition parts may be used in applications that will not be further painted. In these cases, paint compatibility and associated testing may be waived. Please contact Materials Engineering for further guidance.

Example Drawing Designation:

Finish per MPAPS G-9009 Class IIE1 (part that requires E-coat as the topcoat – no further painting)

2.3.5.3 E-coat is subject to the part performance requirements listed in Table 1A (primer only) but do not have to meet the performance requirements listed in Table 1B.

Note: Primed parts are generally not resistant to UV, so they shall not be stored outdoors or in sunlight prior to topcoat/assembly.

2.3.6 Suffix K

2.3.6.1 This requires a powder coat type paint system (rather than a liquid system). Powder and liquid paint systems can both meet this specification and usual requirements do not discriminate or require one or the other. In some cases, a powder system may be required and so designated by this suffix. All other specification requirements still apply.

2.3.6.2 If a specific polymer type of powder coating is required, it shall be so designated on the engineering print.

2.3.7 Suffix S

2.3.7.1 This suffix indicates a critical structural joint and areas on the part will be designated for special paint film thickness control and requirements, as excessive paint can degrade such joints.

2.3.7.2 In some cases, paint may need to be completely removed or masked from specific areas. This should be so designated on the controlling engineering print.

2.3.8 Grandfathered Suffixes

2.3.8.1 Suffix P Special Case (suffix letter “P” located in part number):

2.3.8.1.1 When the **ordered part number** contains the suffix letter "P" instead of “C”, it is to be supplied in the "Prime Only" condition ready for paint in the intended Navistar paint process. Past practice allowed a part to be ordered just in prime condition ready for paint in the plant. This practice while still allowed should be avoided. Example: Drawing P/N is 3811259C1, with TMS-9009, Class I, finish note on drawing; part number ordered to 3811259P1 should be supplied to the plant primed only, to be final painted at assembly. The supplier is responsible to insure that the part meets the requirements for primed parts as indicated in Tables 1A and 1C per this specification.

2.3.2 Suffix L:

2.3.2.1 When the **ordered part number** contains the suffix letter "L" instead of “C”, it is to be supplied “less finish” (without painting). The using NAVISTAR plant is responsible to insure conformance to the engineering requirements of the finish class specified for that part. Example:

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P/N 3811259C1 would be ordered from the supplier as P/N 3811259L1 if supplier is not required to provide a painted part.

2.3.2.2 As with the “P” designation above, this practice should be avoided.

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 D7396	DIN 6175-2
CFR Title 29, Part 1910	NAVISTAR MPAPS G-5	ASTM D523
NAVISTAR Supplier Packing and Shipping Std. D-13	MPAPS G-4519	ASTM D3363
NAVISTAR Engineering Design Std A-16	ASTM B117	ASTM D3359
NAVISTAR MPAPS B-50	ASTM D1729	ASTM D1730
The Society For Protective Coatings SSPC-VIS-2	SAE J400	ASTM D1186
NAVISTAR MPAPS GT-31	SAE J2334	SAE J1545
MPAPS P-9543	ASTM D6386	MPAPS G-9013
MPAPS GT-Paint		MPAPS G-8

4.0 GENERAL REQUIREMENTS

Performance requirements for parts furnished to this specification are shown in Tables 1A and 1B (see Test Procedures). Finish quality requirements for purchased painted parts are shown in Table 2. Test panel data shall be submitted at the time painted parts from new sources are submitted for approval. This specification is not intended to limit or specify the metal pretreatment or painting process, but please note that iron phosphate is not recommended for galvanized steel (or other zinc-coated) or zinc die-cast substrates. Liquid or powder coat systems, thermoset acrylic, urethane, acrylics, etc., may be used providing that all requirements of this specification are met including final finished film requirements with the final top coat. If a chemical surface pretreatment is required, any process such as zinc phosphate or iron phosphate, acid wash prime or conversion coating which provides finished parts meeting the requirements of this specification may be approved. However, Navistar Materials Engineering must approve systems from new vendors, deviations to this specification or changes in currently approved systems. Previously approved systems on new parts do not need complete validation to this specification just part level validation shown in Table 3 and documentation that the approved system is running in control and to system supplier requirements.

4.1 Color

All parts, whether painted by Navistar or purchased, will meet all color match specification requirements (Table 2). Suppliers are to adhere to these guidelines in order to avoid mismatch and noticeable lot-to-lot variation. Color specification and measurement requirements at Navistar are changing. The current measurement and tolerance is being replaced by DIN 6175-2. This will provide a more robust and realistic color specification and tolerance.

4.2 Finish

All parts, whether painted by Navistar or purchased, will be finished with paints which meet all dry film requirements of this specification or MPAPS G-5 as appropriate. Finish quality requirements are detailed in Table 2. Mating or contact surfaces of finished parts must be free of all paint defects or other defects which might prevent properly fastened joints from being achieved in assembly or retained in service. Also, threaded sections of parts or assemblies shall be protected from excessive paint buildup to insure proper assembly.

The MPAPS G-5 equivalents are listed below. When Dry Film requirements are in conflict, the G-5 requirements shall prevail for purchased liquid paint and G-9009 for purchased painted components.

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MPAPS G-9009	MPAPS G-5	TMS-9009
Class IA	Grade 18	Class I
Class IB	Grade 17HS	
Class IC	Grade 19HS	
Class IP, IPE, IPE1	Grade 56	Class IP
Class IIA	Grade 32HS/Ur	Class IIA
Class IIB	Grade 32W	Classes II, IV
Class IIC	UPDATED TO MPAPS G-9009 CLASS IVC	
Class IIK	Grade 20	
Class IIP, IIPe1, IIPe2	Grade 57	
Class IIIA	Grades 29, 29T, 29HS, 29THS	Class IIIA
Class IIIB		Class III
Class IVC	Grade 81W	Classes V, VI, VIA

4.3 Compatibility

Class I and II finishes are often recoated during vehicle assembly. These coatings and those supplied in prime shall be compatible with the appropriate production paint system as detailed in MPAPS G-5. See Section 4.5 for test requirements to determine compatibility. Parts received to be processed through Navistar pretreatment and e-coat shall meet the requirements of MPAPS G-9013.

4.4 Film Thickness for Steel Wheels, Rims, Rings, Spacer Bands and other Structural Joints

4.4.1 Prime Finish – Class IIE1-S (Formerly Type P, TMS-9014)

The film thickness must be between 0.6 mils and 1.4 mils in *Designated Control Areas* ([Figure 1](#)) or on the engineering print. The film thickness in non-designated control areas must be the minimum necessary to provide uniform total coverage and meet all the requirements of the specification. A maximum limit of 1.5 mils is allowed in non-designated control areas. Touch-up paint may be used only in non-designated control areas and must meet the appearance requirements of the specification. Total coverage is required.

4.4.2 Top Coat Finish – Class IIA–S (Formerly Type TK, TMS-9014)

The topcoat film thickness must be a minimum of 1.7 mils and the total film thickness a maximum of 3.1 mils in *Designated Control Areas* ([Figure 1](#) or as designated on the engineering print), and uniform total coverage (i.e., complete hiding of primer) must be achieved. The total film thickness in non-designated control areas must be a minimum necessary to provide uniform total coverage (complete hiding of primer), but not less than 2.0 mils. A maximum of 3.5 mils is allowed in non-designated control areas, provided all other areas of the specification are met. Areas designated as relief areas should not be considered under the thickness requirements. Total coverage is not required, overspray is not required, however, overspray is acceptable in these areas.

4.4.3 Powder Coat Finish – Class IIA-KS (Formerly Type PK, TMS-9014)

The powder coat thickness must be a minimum of 1.7 mils and a maximum total thickness of 3.5 mils in *Designated Control Areas* ([Figure 1](#) or as designated on the engineering print) and uniform total coverage (i.e., complete hiding of primer, if used) must be achieved. The powder coat thickness in non-designated control areas must be a minimum necessary to provide uniform total coverage (if primer is used, it must be completely covered), but not less than 1.7 mils. A maximum total thickness of 5.0 mils is allowed in non-designated control areas, provided all other areas of the specification are met. Areas designated as relief areas should not be considered under the thickness requirements. Total coverage is required.

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4.5 Paint Compatibility

Parts that are supplied in prime or as finish coated but will be repainted at times need to prove compatibility with the using plant's finish paint system (see MPAPS G-5 for various finish coatings that may be applied, contact Materials Engineering for clarification of which finish shall be tested). These requirements are in addition to the part finish requirements.

4.5.1 Preparation

Panels shall be prepared for paint compatibility testing in the same manner, including cleaning and pretreatment, that production parts shall use. These panels shall be submitted to Navistar's certified paint lab for compatibility testing. A sufficient number of panels shall be submitted to perform the required testing on all of the required paint systems.

4.5.2 Painting

The submitted test panels shall be painted with the specified finish in a manner that closely represents the application and cure in Navistar's manufacturing plants. Sufficient cure and aging shall be allowed before further testing.

4.5.3 Testing

The following tests shall be performed on the specified finishes to the requirements of that Class of finish:

Test	Procedure
Salt Spray	GT-Paint Method 7D/ASTM B117
Cyclic Corrosion	GT-Paint 7D/SAE J2334
Humidity	GT-Paint 7E
Accelerated Adhesion	GT-Paint 5C
Adhesion	ASTM D3359 Method B

Note: Only one corrosion test shall be done on metal coatings which can be omitted with Navistar's Materials Engineering's concurrence if the prime system is demonstrated to be compliant. (Humidity may be omitted at Navistar's discretion). Salt spray shall not be used on galvanized or aluminized coated metals (cyclic only). No corrosion tests shall be done on plastic parts (humidity is required).

4.5.4 Required

Panels shall pass adhesion testing per ASTM D3359 method B after each exposure. Corrosion tests shall meet the scribe creep requirement for that Class or the visual assessment as required.

4.6 Special Considerations

Some finishes specified under this specification may have special considerations for certain applications. These may include performance variations or special process requirements.

4.6.1 Casting Sealers

Casting sealers shall be specified as Class IVC. Casting sealers are usually recoated in chassis paint. These materials can be different from other paint materials. So long as the paint and chassis paint do not lose adhesion and meet the test cycle requirements without blistering or peeling then cohesive failure of the paint film is acceptable when tested as specified.

4.6.2 Pretreatment of Aluminum Parts (formerly TMS-4002)

Aluminum parts specified to the obsolete specification TMS-4002 shall meet Class IIB. New parts specified to Suffix A or B and/or P, regardless of Class, shall also meet these process requirements.

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