

NAVISTAR, INC.		
Material, Parts, and Process Specifications (MPAPS)		NUMBER: MPAPS K-6930
		Former Designation: TMS-6930
TITLE: Glass Assembly Adhesive		CURRENT REV No.: 1704
		DATE: April 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 glass assembly adhesive systems used primarily for bonding laminated or tempered glass to metal or plastic components in the construction of trucks and tractors. Components include such items as: studs, latches, hinges, and sashes, etc.

2.0 SCOPE

This specification covers the material properties, performance requirements, production quality and process control, supplier's responsibility, source approval and quality control, general information, and sources for approved adhesive systems.

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 applies. The following specifications, standards, and regulations are referenced herein.

Quality System Standard ISO 9001 or TS-16949
 CFR Title 29, Section 1910
 NAVISTAR Supplier Packing and Shipping Std. D-13
 NAVISTAR Eng. Design Std. A-16
 NAVISTAR MPAPS B-50
 NAVISTAR MPAPS C-10
 NAVISTAR MPAPS G-5
 NAVISTAR MPAPS GT-Paint

NAVISTAR TMS-9522
 NAVISTAR MPAPS P-9543
 SAE J243
 SAE J1523
 ASTM D 1002
 ASTM D 3163
 ASTM B 117

4.0 GENERAL REQUIREMENTS

Adhesive materials supplied to this specification shall bond the intended substrates to produce a permanent and structural bond. The general properties of as-received materials in the uncured state are listed in Table 5. It is the responsibility of the adhesive supplier to insure compatibility of the new adhesive materials with the Assembly Plant's product materials and processes and obtain approval from the Production Process Manager of the Assembly Plant for the use of new adhesive materials.

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4.1 General Properties

All properties shall be reported on submitted test reports and specific material properties will be included in Table 4. Performance requirements are listed in Section 4.3.

4.1.1 Uncured Properties

Requirements for specific uncured properties are to be agreed upon between the material supplier, equipment supplier and the applicator. Uncured properties shown herein are provided for reference only.

4.2 Sample Preparation

A minimum of five samples shall be prepared for each condition tested. Prepare samples per SAE J1523 except as indicated. See Figure 1. The surface condition tested shall be representative of production conditions and fully described in the test report. The bond line shall be between .5 and 1 mm (.020 and .040 inches) with an overlap of 12.5 mm (.5 inch) unless otherwise directed. The cure conditions* shall be described fully in the test report and should closely match the production cure conditions. These cure conditions will be listed on the attached tables and shall be reproducible for future testing.

* Times and temperatures should represent actual bond line conditions.

4.3 Property And Performance Requirements

4.3.1 Lap Shear Strength

4.3.1.1 Method: Prepare samples as directed in 4.2 Sample Preparation. Test per ASTM D 3163 or ASTM D 1002, as appropriate. Tensile machine jaw separation rate shall be 13 mm (.5 in) per minute. Test overlap shear at the indicated specified temperatures (see Table 1) after holding at temperature for 30 minutes. Report the average failure loads of the five tests.

4.3.1.2 Required: See Table 1 for required values.

TABLE 1: BOND STRENGTH (1) – Lap Shear ⁽¹⁾

Material:	Glass to Metal
Condition	MPa [psi] minimum ⁽¹⁾
25± 2°C *	2.1 [305] ⁽²⁾
-40± 2°C *	2.1 [305]
120± 2°C *	1.5 [218] ⁽²⁾
Heat Age	2.1 [305]
Water Immersion	2.1 [305] ⁽²⁾
500 hr Humidity	2.1 [305]
1000 hr Humidity	2.1 [305]
Cyclic Aging	2.1 [305] ⁽²⁾

*Test at these conditions.

⁽¹⁾ Samples will be pulled at the rate as specified in 4.3.1 Lap Shear Strength until failure. Report the failure mode for each test.

⁽²⁾ Screening tests.

4.3.1.3 Humidity

4.3.1.3.1 Method: Test per MPAPS GT-Paint on coupons prepared in 4.2 Sample Preparation for length of time (see Table 1) and then perform shear test upon removal from humidity. Shear strength test for 500 hours.

4.3.1.3.2 Required: See Table 1.

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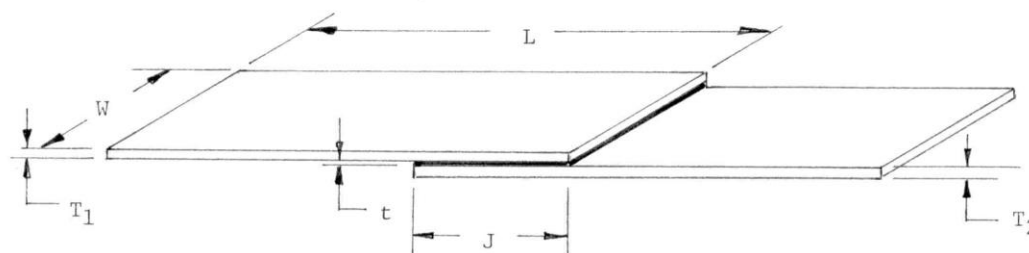
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4.3.1.4 Water Immersion

4.3.1.4.1 Method: Prepare coupons per Section 4.2 Sample Preparation. Immerse coupons in distilled water at $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$ ($77^{\circ}\text{F} \pm 3.6^{\circ}\text{F}$) for 500 hours. Perform shear strength test as soon as samples are removed from immersion.

4.3.1.4.2 Required: See Table 1.

OVERLAP SHEAR TEST SAMPLE



T ₁	(Steel)	0.8-1.5 mm (0.033-0.060 in)
T ₂	(FRP)	2.5 mm (0.100 in)
t	(Bondline)	0.5-1.0 mm (0.020-0.040 in)
W	(Width)	25 mm (1.0 in)
L	(Length)	76 mm (3.0 in) Min.
J	(Overlap)	25 mm (1.0 in)

Note: Edges of specimens shall be smooth and contain no stress risers perpendicular to the direction of loading.

FIGURE 1

4.3.1.5 Heat Aging

4.3.1.5.1 Method: Prepare samples for lap shear as directed in 4.2 Sample Preparation. Heat age in a recirculating air oven for 500 hours at $90 \pm 2^{\circ}\text{C}$ ($194 \pm 3.6^{\circ}\text{F}$). Perform shear test, as indicated in Section 4.3.1.1, upon removal from heat aging.

4.3.1.5.2 Required: See Table 1.

4.3.1.6 Cyclic Aging

4.3.1.6.1 Method: Prepare samples for lap shear as directed in 4.2 Sample Preparation. Test overlap shear after the 6-week environmental conditioning period listed below, allowing samples to return to ambient room temperature for 24 hours prior to testing. The 6-week cyclic aging shall be as follows:

4.3.1.6.1.1 16 hours humidity

4.3.1.6.1.2 2 hours $-30 \pm 2^{\circ}\text{C}$ ($-22 \pm 3.6^{\circ}\text{F}$)

4.3.1.6.1.3 2 hours at ambient conditions

4.3.1.6.1.4 2 hours $70 \pm 2^{\circ}\text{C}$ ($158 \pm 3.6^{\circ}\text{F}$)

4.3.1.6.1.5 2 hours salt spray per ASTM B 117

4.3.1.6.1.6 Repeat 24 hour cycle until 6-week period has elapsed - cycle may be interrupted for weekends and holidays, in which case leave the samples in humidity for that period.

4.3.1.6.2 Required: See Table 1.

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