

NAVISTAR, INC.		
Material, Parts, and Process Specifications (MPAPS)		NUMBER: MPAPS K-6929
		Former Designation: TMS-6929
TITLE: Mounting Tapes – Parts 1 & 2	CURRENT REV No.: 1612	DATE: Dec. 2016
WRITTEN/EDITED BY: A. Hasan	APPROVED BY: R. Goluch	SUPERSEDES: Rev. 1412 – Dec. 2014
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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>		

Part 1 – General, Property, and Performance Requirements

1.0 APPLICATION

Part 1 of this specification covers mounting tape adhesive systems, adhesive transfer tapes and pre-applied pressure sensitive adhesives (PSA) used for bonding parts in the construction of truck and tractor cabs and components. Part 2 covers the production process requirements for these types of bonding systems.

2.0 SCOPE

Part 1 of 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 shall apply. The following Specifications, Standards, and Regulations are referenced in this specification.

Quality System Standard ISO 9001 or TS-16949	NAVISTAR MPAPS G-5	ASTM D 2919
CFR Title 29, Part 1910	NAVISTAR MPAPS G-7051	ASTM D 2979
NAVISTAR Supplier Packing and Shipping Std. D-13	NAVISTAR MPAPS G-9009	ASTM D 3163
NAVISTAR Engineering Design Std A-16	NAVISTAR MPAPS P-9522	ASTM D 3330
NAVISTAR MPAPS B-50	NAVISTAR MPAPS P-9543	ASTM D 3654
NAVISTAR MPAPS A-6	ASTM B 117	ASTM D 5041
NAVISTAR MPAPS C-10	ASTM D 1002	SAE J243
NAVISTAR MPAPS D-22	ASTM D 1056	SAE J1523
NAVISTAR MPAPS D-28	ASTM D 1600	SAE J1525
NAVISTAR MPAPS G-19 Part I	ASTM D 1667	SAE J1553
NAVISTAR GT-PAINT Method 7E	ASTM D 2240	
NAVISTAR MPAPS D-7133	ASTM D 2294	

4.0 REQUIREMENTS

Adhesive materials supplied to this specification shall bond the intended substrates (see Table 2 for listed substrates, this is not intended to be an exhaustive list or define all materials that should be tested) to produce a permanent bond. The general properties of as received tape materials are indicated in Table 3.

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Adhesive materials supplied to this specification must be compatible with all subsequent cleaning and paint operations used in the Assembly Plant and with the current production materials for which the new adhesive system approval is sought. It is the responsibility of the supplier to insure compatibility of new materials with the Assembly Plant's currently used materials and processes and to obtain approval from the Production Process Manager of the Assembly Plant for the use of new adhesive materials.

Clarification: *This specification should be viewed as a Design Requirements Document Template or Test Plan Template for applications using a PSA type bonding system. As this is intended to cover all types of these applications, the test requirements and the "general expected values" in Table 1 are guidelines rather than hard limits for all applications. In all cases, it is the discretion of Navistar Materials Engineering group as to which requirements are pertinent to the application. The process should follow these steps:*

1. *Engineering reviews a PSA application with Materials Engineering and releases prints referencing this specification if the application is appropriate and Materials Engineering concurs.*
2. *Supplier submits and reviews a test plan to this specification with guidance from Materials Engineering and other appropriate groups at Navistar.*
3. *The test plan may be approved or modified. Once accepted, the supplier shall commence testing to the approved plan.*
4. *Upon test completion, the report is submitted to Materials Engineering and reviewed with other groups as necessary.*
5. *If the results are deemed acceptable, a report documenting approval of that application with those specific materials will be issued by Materials Engineering.*
6. *On a future revision of this specification, that report number and pertinent information will be listed in Table 4 if appropriate.*

4.1 General Properties

Properties described are for reference. Property values will be reported on all newly submitted test reports and will be added into Table 3 when the adhesive system receives final approval.

4.1.1 Material – The polymer base for the foam carrier and adhesive shall be described using terminology consistent with ASTM D1600.

4.1.2 Tack – ASTM D 2979 shall be used to measure the tack of an adhesive. The adhesive shall be categorized or described as high, medium, or low tack.

4.1.3 Foam Carrier – The foam properties shall be measured and reported in accordance with ASTM D 1056.

4.1.4 Release Liner – The release liner will be either a moisture resistant coated paper or a polyethylene film. The force to release the liner shall not exceed 0.05 N/mm for paper liner or 0.09 N/mm for polyethylene, as measured by ASTM D 3330, 180° peel at 300 mm/min.

4.1.5 Density – Density of the adhesive and foam carrier will be measured and reported per ASTM D 1667.

Note: Requirements related to the foam carrier are not applicable to adhesive transfer tapes or pre-applied PSA.

4.2 Sample Preparation

A minimum of five samples will be prepared for each condition tested. The surface condition tested should be representative of production conditions and must be fully described in the test report. The bond overlap for lap shear tests shall be 25 mm x 25 mm (1 inch x 1 inch). Peel specimens may typically use a 25 mm by 150 mm strip with a 25 mm tab at one end, as appropriate. The geometry for each test may

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vary as necessary to comply with the specified test methods. Test specimens must be fully described in the report. The adhesive application conditions (applied pressure, dwell time, and temperature) should match the production conditions as closely as possible and must be described fully in the test report. The application conditions used for qualification testing must be reproducible for subsequent laboratory and production process testing. All samples shall be conditioned for 72 hours at ambient lab conditions prior to testing or exposures. Report both the load and failure mode for each sample. Summarize test data with the average values and standard deviation including all samples. Any discarded test samples will be included in the report and reasons for discarding the test explained.

Note: *There are obvious cases when it is not appropriate to use both actual adherends for a test. It may be necessary and proper to use separate samples made with a dummy adherend to drive the test of the actual surface interface that it is desired to test. Please consult with Materials Engineering prior to test if it is felt that this is necessary and describe completely in the final report.*

Example: *A foam mounting tape is being used to bond a rigid plastic part to a steel reinforcement. It would be preferred to use a foil dummy adherend to perform peel tests to each surface. The actual surface tested is the foam to adherend, not the foil to foam. By making this substitution, an accurate assessment of the bond surface in peel can be made.*

4.3 Property And Performance Requirements

The requirements for the following shear and peel tests are listed in Tables 1A and 1B.

4.3.1 Lap Shear Strength

4.3.1.1 Method: Prepare samples as directed in Section 4.2. 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 temperatures specified in Table 1A after holding at that temperature for 30 minutes.

4.3.2 Peel Adhesion

4.3.2.1 Method: ASTM D 3330 test method, except that the substrate shall be appropriate to the application and that the peel backing should be 0.127 mm (0.005 inch) thick anodized aluminum foil. Tests will be performed on samples prepared as directed in Section 4.2, except for the geometry requirements of the test. Perform a 90° peel at 300 mm/min. Test peel at the temperatures specified in Table 1B after holding at that temperature for 30 minutes.

4.3.3 Stress Durability

4.3.3.1 Method: Test per ASTM D 2919 or ASTM D 3654 using a fixture described in ASTM D 2294, ASTM D 2919, or ASTM D 3654. Prepare samples as indicated in Section 4.2, Sample Preparation, except for the geometry requirements of the fixture used. Load shear samples to 750 grams per 25 mm by 25 mm overlap. Load peel samples to 250 grams per 25 mm sample width. Expose separate sets of samples to 500 hours heat aging at 70± 2°C and 500 hours at 100% relative humidity at 35± 2°C.

4.3.3.2 Required: Samples shall remain intact with no more than 2 mm of creep. Samples shall be tested for residual strength as in 4.3.1, Lap Shear Strength, or 4.3.3, Peel Adhesion. Report test values.

4.3.4 Corrosion

4.3.4.1 Method: Test per ASTM B 117 for 500 hours on coupons prepared as per Section 4.2. Samples shall be tested as in Section 4.3.1 for residual strength and test values reported.

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4.3.5 Humidity

4.3.5.1 Method: Test per MPAPS GT-Paint Method 7E for 500 hours on unstressed coupons prepared per Section 4.2. Samples shall be tested as in Section 4.3.1 and 4.3.2, Peel Adhesion, as applicable, for residual strength and test values reported.

4.3.6 Water Immersion

4.3.6.1 Method: Immerse unstressed specimens in distilled water at $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$ for 500 hours. Samples shall be tested as in 4.3.1, Lap Shear, and 4.3.2, Peel Adhesion, as applicable. Report residual strength values. This test may be modified to 168 hour exposure for a “screen” evaluation as defined in Table 1.

4.3.7 Shrinkage

4.3.7.1 Method: Apply a 170 mm piece of the product to a 150 mm steel panel and trim evenly at the edge of the panel. Bake the assembly at 70°C for 48 hours. Remove, allow panels to cool, and examine for shrinkage.

4.3.7.2 Required: Shall show no more than 0.5% shrinkage.

4.3.8 Heat Age

4.3.8.1 Method: Expose unstressed specimens to $90^{\circ}\text{C} \pm 2^{\circ}\text{C}$ for 500hrs. Samples shall be tested as in 4.3.1, Lap Shear, and 4.3.2, Peel Adhesion, as applicable. Report residual strength values. This test may be modified to 168 hour exposure for a “screen” evaluation as defined in Table 1.

5.0 QUALITY

All material produced to this specification shall be clean and free of dirt, grease, and contamination. All debris from cutting and processing shall be removed. Parts shall be free of voids, cuts or tears.

5.1 Qualification

Material and processes submitted for approval to this specification shall include the following:

5.1.1. A detailed, signed test report as per MPAPS P-9543, documenting testing to this specification.

5.1.2. Test coupons or photographs showing failure modes for each test.

5.1.3. The complete procedure used for preparing and curing materials for test, especially surface preparation and condition of the test coupons.

5.1.4. Adhesive, substrate and any chemicals used for bonding.

5.2 Submission

The material and test report shall be submitted to: Manager of Non-Metallic Materials, Materials Engineering and Technology, Navistar, Inc., 10400 West North Avenue, Melrose Park, IL 60160.

5.3 Approval

A report from Navistar, Inc. will be issued approving material to this specification. Approval is not formally granted until this report has been published. A change to this Specification listing the new approval may be delayed. The approval report serves as authorization for the use of that adhesive system prior to the changes to this specification.

6.0 QUALIFICATION

Engineering qualification of sources is required in advance of production shipments.

6.1 Quality Control Plan

A Quality Control Plan for products supplied to the requirements of this specification will be established by mutual agreement between NAVISTAR and the supplier. Unless specific exception is noted, the

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following characteristics, where applicable*, shall be included in the plan as features for management by statistical process control.**



- * Other characteristics for inclusion in the control plan may be specified on the engineering drawing and/or purchase order.
- ** See NAVISTAR Engineering Design Standard A-16

7.0 SOURCE APPROVAL AND QUALITY CONTROL

7.1 Supplier Requirements

All suppliers to NAVISTAR are required to be registered to ISO 9001 Quality System Requirements. NAVISTAR will also accept TS-16949 registration as long as the supplier can also fulfill all AIAG PPAP (Production Part Approval Process) documentation and approval requirements. Suppliers must maintain their certification with an accredited registrar and must furnish copies of registration certificates to their Corporate Buyer upon request.

7.2 Approval

Parts supplied against contracts or purchase orders citing this specification shall be equivalent in all respects to those samples which were approved by the purchaser. No changes in formulation or processing practices are permitted without approval. In the event that changes in material, properties, processing practices, construction, color, or labeling of the product are required, the supplier shall notify NAVISTAR Materials Engineering and Purchasing and Supplier Development of the proposed change(s). Test data indicating conformance to all requirements of this specification, test samples, and new or amended or updated Material Safety Data Sheet(s) (MSDS), in accordance with CFR Title 29, Part 1910 shall be submitted with the request for change.

7.3 Process Control

The supplier shall either, perform and report results of tests on specific lots of parts produced using ISO 9001 or TS-16949 guidelines, or provide statistical evidence of the lot having been produced in a state of statistical control and with a process capable of providing all required properties. The part supplier and the quality control manager of the using NAVISTAR plant may determine testing and reporting requirements on specific products.

8.0 SHIPPING AND HANDLING

Shipping and identification shall be in accordance with NAVISTAR Supplier Packing and Shipping Standard D-13. Parts shall be packaged so as to avoid any damage in shipment detrimental to the appearance of the part.

9.0 DESIGNATION ON DRAWINGS

The drawing designation may be written in a general or specific manner depending on the system design.

9.1 Bonded Assembly

The specification for a bonded assembly may be written as: **Bond per MPAPS K-6929**