

| NAVISTAR, INC.                                                                                                                                                                                                                                                                                                                          |                                              |                                            |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|--------------------------------------------|
| <b>Material, Parts, and Process Specifications<br/>(MPAPS)</b>                                                                                                                                                                                                                                                                          | NUMBER:<br><b>MPAPS D-7095</b>               |                                            |
|                                                                                                                                                                                                                                                                                                                                         | Former Designation: TMS-7095                 |                                            |
| TITLE: <b>Material, Process And Quality Control Requirements<br/>For Open Molded FRP Parts</b>                                                                                                                                                                                                                                          | CURRENT REV No.:<br><b>1410</b>              | DATE:<br><b>Oct. 2014</b>                  |
| WRITTEN/EDITED BY:<br><b>Materials Engineering</b>                                                                                                                                                                                                                                                                                      | APPROVED BY:<br><b>Materials Engineering</b> | SUPERSEDES:<br><b>TMS-7095 – June 2013</b> |
| <b>PRINTED COPIES OF THIS DOCUMENT MUST BE VERIFIED FOR CURRENT REVISION</b>                                                                                                                                                                                                                                                            |                                              |                                            |
| <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> |                                              |                                            |
| <b>Change Notice: Changed to new MPAPS format; editorial changes.</b>                                                                                                                                                                                                                                                                   |                                              |                                            |

## 1.0 APPLICATION

This specification shall be applied to control material selection and production processes used in the fabrication of fiber reinforced plastic parts produced by the open mold method per MPAPS D-22.

## 2.0 SCOPE

This specification covers general tooling requirements for open molding; material and process parameters; analysis of data, and sample parts required to be submitted by the molder. It also covers minimum requirements for quality control of production parts.

### 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 standards, specifications and regulations are referenced in this specification.

Quality System Standard ISO 9001 or TS-16949

NAVISTAR MPAPS B-50

NAVISTAR MPAPS D-22

CFR Title 29, Part 1910

NAVISTAR Manufacturing Standard MS-D-13

OCF Test Method C-25-4A

OCF Test Method M-09-2

## 4.0 REQUIREMENTS

Before production approval is granted, sample parts must be submitted to Materials Engineering and to the appropriate NAVISTAR manufacturing plants.

### 4.1 Tooling

Selection of tooling materials, construction methods, and maintenance procedures shall be so as to yield a minimum of 1,000 parts without deterioration of surface finish. Repair of molds shall be restricted to a maximum of 25% of the mold surface and shall not result in degradation of the part surface quality.

This document is restricted and may not be sent outside Navistar, Inc. or reproduced without permission from Corporate Technical Standards. Suppliers are required to assume all patent liability. ©2014 by Navistar, Inc.

OCTOBER 2014



Documents

Page 1 of 9  
Document Sharing Hub

|                                       |                                                                                                          |                                 |
|---------------------------------------|----------------------------------------------------------------------------------------------------------|---------------------------------|
| <b>NUMBER:</b><br><b>MPAPS D-7095</b> | <b>TITLE:</b><br><b>Material, Process And Quality Control<br/>Requirements For Open Molded FRP Parts</b> | <b>REVISION:</b><br><b>1410</b> |
|---------------------------------------|----------------------------------------------------------------------------------------------------------|---------------------------------|

Tooling materials and fabrication methods must be approved by NAVISTAR Tooling Engineering prior to mold construction.

## **4.2 Materials**

### **4.2.1 Gel Coat**

Required for all high appearance and/or painted parts. Molders shall maintain on file complete data sheets for each lot and shall perform the following three tests as minimum quality control requirements for each batch prior to use. Material must be retested if the storage time or conditions do not fall within manufacturer recommended limits.

#### **4.2.1.1 SPI Gel Time**

#### **4.2.1.2 Barcol Hardness at Full Cure**

#### **4.2.1.3 Monomer Content**

#### **4.2.1.4 In addition, the gel coat must meet the following requirements:**

##### **4.2.1.4.1 Elongation - minimum of 1.5% per mandrel bend test**

##### **4.2.1.4.2 Paint - minimum 90% adhesion**

##### **4.2.1.4.3 Thickness - 0.38 - 0.76 mm (0.015 - 0.030 in)**

##### **4.2.1.4.4 Surface appearance - see Appendix at the end of this document for requirements**

#### **4.2.1.5 For test methods to determine the above listed properties, see Appendix.**

### **4.2.2 Resin**

Unless otherwise specified, the resin system is to be a prepromoted, isothalic polyester. Resin chemistry data information and minimum quality control tests as specified above under Gel Coat shall also apply for each lot of resin.

### **4.2.3 Reinforcement**

Type and amount of reinforcing fiber shall be such that the laminate complies with the mechanical property requirements specified per MPAPS D-22. Storage of material shall be per manufacturer recommended practices.

## **4.3 Processing**

The molder shall submit to Materials Engineering the following information, where applicable, relating to the production process. Information provided by the vendor to NAVISTAR per this specification shall be considered confidential. Distribution will be restricted to appropriate Materials Engineering and Quality Control personnel.

**4.3.1** A description of the constituent materials. This will include the molder's formulation identification; type and percentage by weight of resin, glass, and fillers; the level of promoters; resin/catalyst ratio; and system gel and cure times. Control limits for these factors shall also be included.

**4.3.2** A drawing of the reinforcement lay-up showing number of plies and physical dimensions of each. Also include tolerances of the ply dimensions with respect to location in the mold.

**4.3.3** A general description of the molding process. This is to include the basic steps involved in producing the part such as mold preparation, lay-up sequence, method of reinforcing overlap and wet-out, and all secondary and finishing operations.

## **5.0 QUALITY**

In addition to approval of initial production samples, NAVISTAR Product Quality will approve production part samples which the vendor will maintain at his facility. These samples will be inspected for cosmetic surface finish, component fit, edge finish, and other characteristics deemed appropriate.

This document is restricted and may not be sent outside Navistar, Inc. or reproduced without permission from Corporate Technical Standards. Suppliers are required to assume all patent liability. ©2014 by Navistar, Inc.

OCTOBER 2014



**Documents**

Page 2 of 9  
Document Sharing Hub

|                                |                                                                                                   |                          |
|--------------------------------|---------------------------------------------------------------------------------------------------|--------------------------|
| NUMBER:<br><b>MPAPS D-7095</b> | TITLE:<br><b>Material, Process And Quality Control<br/>Requirements For Open Molded FRP Parts</b> | REVISION:<br><b>1410</b> |
|--------------------------------|---------------------------------------------------------------------------------------------------|--------------------------|

These samples will be considered the standard of minimum acceptable finish quality for all future parts, and shall be carefully maintained as a standard reference both at the vendor and NAVISTAR locations.

**5.1** Each part shall be identified (i.e., serial number, date, etc.) so as to yield traceability to resin and gel coat lots, date molded, operator, and mold number.

**5.2** After approval of the molder's materials and processes, all parts must be produced exactly as described by the above procedure. No changes will be allowed without written approval of Materials Engineering. Field failures caused by unapproved changes in materials or process shall be the sole responsibility of the molder.

## **6.0 SOURCE APPROVAL AND QUALITY CONTROL**

### **6.1 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.

### **6.2 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 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.

### **6.3 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.

## **7.0 TECHNICAL INFORMATION**

|                                                                                                                                                                                                   |                                                                                                                                                                                                                                          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>For further information related to the technical content of this specification, contact:</b>                                                                                                   | <b>Suppliers may purchase controlled copies of this specification by contacting:</b>                                                                                                                                                     |
| Materials Engineering and Technology Dept.<br>10400 W. North Avenue<br>Melrose Park, IL 60160<br>E-mail: <a href="mailto:MaterialsEngineering@Navistar.com">MaterialsEngineering@Navistar.com</a> | IHS Global Inc.<br>15 Inverness Way East<br>Englewood CO 80112-5776<br>Phone: 1-800-854-7179<br>E-mail: <a href="mailto:Automotive@IHS.com">Automotive@IHS.com</a><br>Website: <a href="http://global.ihs.com">http://global.ihs.com</a> |

This document is restricted and may not be sent outside Navistar, Inc. or reproduced without permission from Corporate Technical Standards. Suppliers are required to assume all patent liability. ©2014 by Navistar, Inc.

OCTOBER 2014



**Documents**

Page 3 of 9  
Document Sharing Hub