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| <b>NAVISTAR, INC.</b>                                                                                                                                                                                                                                                                                                                   |                                              |                                 |
| <b>Material, Parts, and Process Specifications<br/>(MPAPS)</b>                                                                                                                                                                                                                                                                          |                                              | NUMBER:<br><b>MPAPS DT-18</b>   |
|                                                                                                                                                                                                                                                                                                                                         |                                              | Former Designation: N/A         |
| TITLE:<br><b>Environmental Testing for Interior Plastic Materials</b>                                                                                                                                                                                                                                                                   |                                              | CURRENT REV No.:<br><b>1402</b> |
|                                                                                                                                                                                                                                                                                                                                         |                                              | DATE:<br><b>Feb. 2014</b>       |
| WRITTEN/EDITED BY:<br><b>Materials Engineering</b>                                                                                                                                                                                                                                                                                      | APPROVED BY:<br><b>Materials Engineering</b> | SUPERSEDES:<br><b>N/A</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: New</b>                                                                                                                                                                                                                                                                                                               |                                              |                                 |

## **1.0 APPLICATION**

This document defines various environmental cycling and aging protocols for interior plastic trim components.

## **2.0 RESTRICTED CHEMICAL SUBSTANCES**

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.

NAVISTAR MPAPS B-50

## **4.0 REQUIREMENTS**

### **4.1 Equipment**

#### **4.1.1 Environmental Test Chamber**

The environmental test chamber(s) shall be capable of maintaining a temperature range of -40 +/-2°C to 100 +/-2°C and 93% relative humidity (RH) for a minimum of 24 hour increments. Chamber(s) shall also be large enough to hold entire component assemblies. Additionally, chamber(s) shall be capable of utilizing infrared (IR) heaters to maintain a constant 115°C surface temperature for horizontal components.

#### **4.1.2 Holding Fixtures**

Holding fixtures shall be sturdy in construction and capable of sustaining temperatures up to 120°C for extended period of time. The fixture must support components with attachment points simulating the in-truck position.

## **5.0 TEST METHODS**

**Additional information of test cycles is available in MPAPS DT-18 Appendix (restricted).**

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FEBRUARY 2014



**Documents**

Page 1 of 8  
Document Sharing Hub

|                               |                                                                           |                          |
|-------------------------------|---------------------------------------------------------------------------|--------------------------|
| NUMBER:<br><b>MPAPS DT-18</b> | TITLE:<br><b>ENVIRONMENTAL TESTING FOR<br/>INTERIOR PLASTIC MATERIALS</b> | REVISION:<br><b>1402</b> |
|-------------------------------|---------------------------------------------------------------------------|--------------------------|

## 5.1 Conditioning

All materials shall be conditioned in a controlled atmosphere of 23 +/-2°C and 50 +/-5% RH for at least 24 hours prior to testing.

## 5.2 Test Procedures

**5.2.1** Test procedures described are recommended. Alternative temperatures and time periods may be specified by Navistar Design and Materials Engineering.

**5.2.2** All components shall be mounted with attachment points simulating ‘in-truck’ use.

**5.2.3** Interior components are divided into three regions based on location as shown in Figure 1a-c for the driver environment and sleeper regions. Region A (red) depicts areas of direct sunlight above the belt line. Region B (yellow) depicts areas of direct light below the belt line. Region C (blue) depicts areas of indirect sunlight.

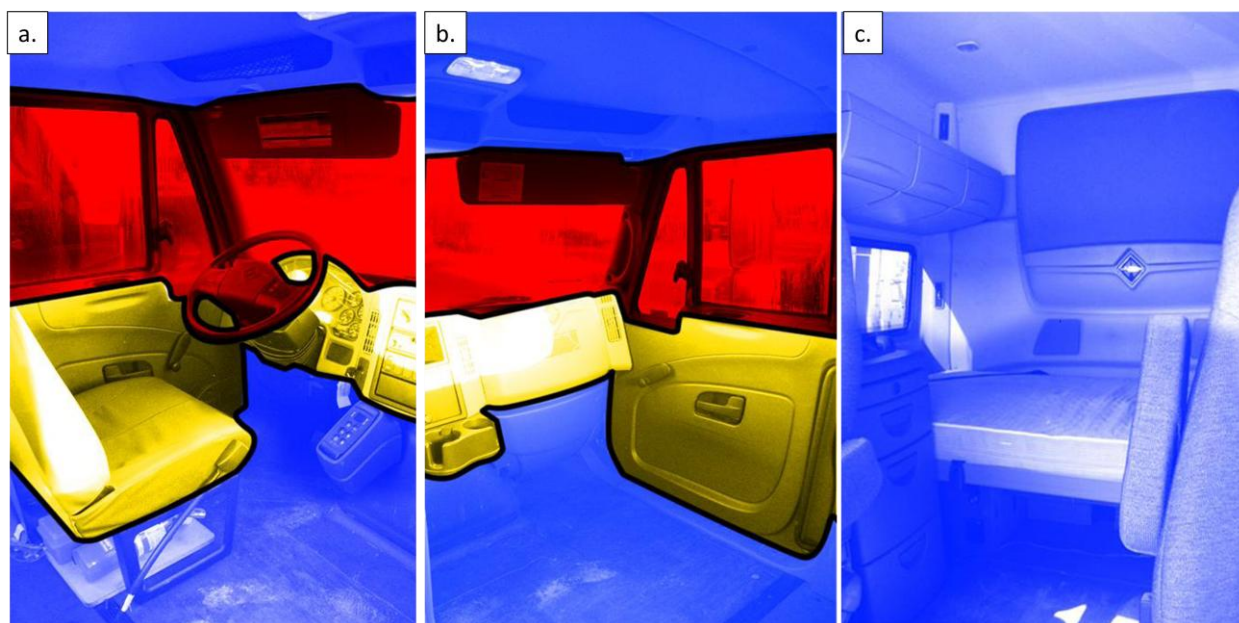


*Figure 1: Three regions of the interior cab defined by location and extent of sun exposure. The driver environment (a and b) and sleeper region (c) are shown.*

**5.2.4** Full components shall be tested. If a full component contains materials in multiple regions, the component shall be tested to the procedure in the highest temperature region. If the entire cab is tested at once, then all components must meet the dimensional stability requirements of Test Cycle 1. Additionally, if the entire cab is tested in one chamber, the IP assembly would still need to be tested with Test Cycle 4 in addition to Test Cycle 1. Exceptions need approval from Navistar Design and Materials Engineering.

**5.2.5 Test Cycle Applicability** is outlined in Table 1 below.

|                               |                                                                           |                          |
|-------------------------------|---------------------------------------------------------------------------|--------------------------|
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|-------------------------------|---------------------------------------------------------------------------|--------------------------|

**Table 1: Test Cycle Applicability**

| Test Cycle | Use                                                                            |
|------------|--------------------------------------------------------------------------------|
| 1          | Dimensional stability of regions of direct sunlight above belt line (region A) |
| 2          | Dimensional stability of direct sunlight below belt line (region B)            |
| 3          | Dimensional stability of indirect light regions (region C)                     |
| 4          | Temperature and Irradiation cycle for IP and Door Trim                         |

**5.2.6 Cycle 1: Dimensional stability of regions of direct sunlight above belt line.** To be used to evaluate the dimensional stability of finished interior trim panels. The number of repeat samples necessary shall be specified on the engineering drawing as well as ‘significant characteristic locations’ or locations requiring measurement.

**5.2.6.1 Application.** All interior components shown in region 1 (red) or Figure 1, including steering wheel, top of IP, sun visors, top of door trim.

**5.2.6.2 Requirement.** The test component shall exhibit no significant surface changes, particularly changes in color or gloss, no cracking, crazing, or any other changes detrimental to serviceability. Objectionable odors, bubbling or void formation, delamination or peeling, shrink, and warp are also unacceptable. The test piece shall comply with the dimensions and tolerances specified on the drawings after completion of the test. The dimensions of the entire test panel shall be checked for test compliance by the naked eye. Additionally, ‘significant characteristic locations’ or locations requiring measurement shall be measured in both the x/y plane as well as in the z-direction through the x/y plane. Measurements shall be made with respect to a reference spot also indicated on the engineering drawing. All measurements shall be included in the test report for approval.

**5.2.6.3 Procedure.** Test pieces shall be fixtured to simulate actual installed service conditions with appropriate constraints to simulate the interfacing components. The complete assembly shall undergo the cycle shown in Table 2. The test cycle may be commenced at any of the individual stages provided the full cycle is sequentially completed. The cycle shall be carried out without interruption. If interruption is necessary, the part is allowed to set at ambient conditions during the interruption. This adjustment shall be noted in the test report.

**5.2.7 Cycle 2: Dimensional stability of direct sunlight below belt line.** To be used to evaluate the dimensional stability of finished interior trim panels. The number of repeat samples necessary shall be specified on the engineering drawing as well as ‘significant characteristic locations’ or locations requiring measurement.

**5.2.7.1 Application.** All interior components shown in region 2 (yellow) or Figure 1, including door trim assembly, full IP and dashboard, sun visors, plastic seat components, etc.

**5.2.7.2 Requirement.** The test component shall exhibit no significant surface changes, particularly changes in color or gloss, no cracking, crazing, or any other changes detrimental to serviceability. Objectionable odors, bubbling or void formation, delamination or peeling, shrink, and warp are also unacceptable. The test piece shall comply with the dimensions and tolerances specified on the drawings after completion of the test. The dimensions of the entire test panel shall be checked for test compliance by the naked eye. Additionally, ‘significant characteristic locations’ or locations requiring measurement shall be measured in both the x/y plane as well as in the z-direction through the x/y plane. Measurements shall be made with respect to a reference spot also indicated on the engineering drawing. All measurements shall be included in the test report for approval.

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Page 3 of 8  
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