

NAVISTAR, INC.		
Material, Parts, and Process Specifications (MPAPS)		NUMBER: MPAPS DT-9
		Former Designation: CEMS DT-9
TITLE: Cold Leak Testing of Hose & Hose Assemblies		CURRENT REV No.: 1510
		DATE: October 2015
WRITTEN/EDITED BY: Materials Engineering	APPROVED BY: Materials Engineering	SUPERSEDES: 1410 – Oct. 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>		
Change Notice: Updated section 6.4, (pressurization requirements) and added 6.7 (acceptance criteria); editorial changes.		

1.0 APPLICATION

Test method for clamped joints and it can be applicable for other types of joints that require a thermal cycle test.

2.0 SCOPE

This is a method for leakage testing of fluid connectors subjected to successive hot/cold cycles.

3.0 REFERENCE DOCUMENTS

Unless otherwise specified the latest issue of all referenced standards shall apply. The following specifications and standards are referenced in this specification:

NAVISTAR MPAPS B-1	ASTM D471
TMS-6811	ASTM D1193

4.0 APPARATUS

4.1 A programmable temperature cabinet capable of cycling through and maintaining $-40^{\circ} \pm 2^{\circ}\text{C}$ through $150^{\circ} \pm 2^{\circ}\text{C}$ [$-40^{\circ} \pm 3.6^{\circ}\text{F}$ through $302^{\circ} \pm 3.6^{\circ}\text{F}$] or as appropriate to the cycle required.

4.2 An analytical balance capable of determining mass to the nearest 0.10 gram.

4.3 Air manifold installed in temperature cabinet that hose and fittings are hung and pressurized.

4.4 Pressure regulator capable of maintaining $340 \pm 5\text{kPa}$ [$50 \pm 1\text{ psi}$] or as appropriate for the required test.

5.0 MATERIALS

5.1 Fluid. Use one of the following fluids as specified for the system being tested (other fluids may be specified for other systems):

5.1.1 Ethylene Glycol - 50/50 Ethylene Glycol (per MPAPS B-1 Type III) and water (per ASTM D1193).

5.1.2 Power Steering Fluid - TMS-6811

5.1.3 Oil - ASTM #1 per ASTM D471.

5.2 Hose, as specified. *

5.3 Clamps or Fittings, as specified. *

5.4 Nipples or end plugs, as specified. *

*NAVISTAR Engineering will provide a list of parts for testing. The supplier is responsible to obtain the parts and fabricate them into test parts/assemblies.

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5.5 White, adsorbent, paper

5.6 Fittings, clamps and adapters as needed to attach to air manifold.

6.0 PROCEDURE

Note: The procedure described below is for coolant system applications. Applications in other systems may have some of the parameters modified to suit that situation. Please see the referring specification or contact Materials Engineering for further guidance.

6.1 Sample Preparation. Assemble hoses and fittings as specified for a production assembly. Each assembly shall be at least 100mm (4 inches) long and there shall be at least six (6) assemblies for each coupling type based on hose nipples. For example, clamped joints will require six sets of each nipple/clamp combination since the nipple may change in different applications. Bracket the assembly conditions as well as possible (high/low/nominal). Refer to the engineering control document or the manufacturer's recommendations, as appropriate, for the assembly specifications.

6.1.2 Weight assemblies empty - Tare weight

6.1.3 Fill the assembly with specified fluid, to a minimum of 75% full, and record the initial weight.

6.2 Assemble to an air manifold in a programmable environmental chamber.

6.3 Wrap the bottom joint with an adsorbent, white paper.

6.4 Pressurize assemblies 30% higher than the maximum operating pressure for the joint.

6.5 Test samples for ten (10) thermal cycles at the pressure indicated in 6.4. Each thermal cycle consists of the following 5 steps:

Step	Duration [hours]	Condition
1	0.5 to 1.0	Ramp from 20° [68°F] to 130°C[266°F]
2	4.0 ± 0.5	Hold at 130°C [266°F]
3	1.0 to 2.0	Ramp from 130°C [266°F] to -40°C [-40°F]
4	4.0 ± 1.0	Hold at -40°C [-40°F]
5	0.5 to 1.0	Ramp from -40°C [-40°F] to 20°C [68°F]

6.5.1 If an individual sample cannot maintain pressure, interrupt the test, remove that specimen, plug that space in the manifold and continue the test.

6.5.2 Observe for any signs of leakage as indicated by staining on the indicator paper.

6.6 Upon completion of the specified 10 cycles:

6.6.1 Remove samples and paper.

6.6.2 Weigh and record the final weight of each sample.

6.7 Acceptance Criteria:

6.7.1 All six samples should show no signs of leak after the completion of 10 full cycles.

7.0 REPORT

7.1 Material tested.

7.2 An itemized list of hoses, clamps, fittings and nipples.

7.3 Assembly conditions.

7.4 Fluid used.

7.5 Test conditions, if variance from above was specified on the drawing or purchase order.

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