

NAVISTAR, INC.		
Material, Parts, and Process Specifications (MPAPS)		NUMBER: MPAPS F-7134
		Former Designation: TMS-7134
TITLE: Non-Metallic Tubing and Fittings, Fuel Systems		CURRENT REV No.: 1408
		DATE: AUGUST 2014
WRITTEN/EDITED BY: Materials Engineering	APPROVED BY: Materials Engineering	SUPERSEDES: TMS-7134 – Oct. 2013
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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: Changed to new MPAPS format; editorial changes.		

1.0 APPLICATION

This specification outlines the minimum requirements for non-metallic tubing to be used in fuel lines, fuel evaporative control systems, and related applications. This material is an alternate to Air Brake Tubing used in the fuel system as specified in MPAPS F-7006, but this material is limited to fuel systems.

NOTE: Effective January 1, 2007, all products supplied to the requirements of this specification must comply with the requirements of the MPAPS B-50 specification.

2.0 SCOPE

This specification covers general requirements, property and performance requirements, and the quality control requirements for three types of non-metallic tubing.

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 B-50	ASTM D 638
CFR Title 29, Part 1910	NAVISTAR CEMS DT-9	ASTM D 624
NAVISTAR Manufacturing Std. MS-D-13	SAE J2044	ASTM D 709
NAVISTAR Engineering Design Std A-16	SAE J844	ASTM D 746
NAVISTAR Engineering Drawing AD 6717	SAE J1131	ASTM D 2240
NAVISTAR Engineering Drawing AM 96105	SAE J1394	ASTM D 648
NAVISTAR MPAPS F-7006	ASTM D 471	ASTM D 792
NAVISTAR MPAPS P-9543	ASTM D 412	
NAVISTAR MPAPS A-37		

4.0 REQUIREMENTS

All material types shall meet the minimum property requirements shown in Table 1.

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4.1 Material Types:

4.1.1 Type A Construction

Non-reinforced, flexible tubing for use in the fuel system

Multi-layered extrusion consisting of inner and outer layers of polyamide (nylon 11 or 12) with an inner core of polyolefin

4.1.2 Type B Construction

Non-reinforced, semi-rigid tubing that is for use as a fuel tank drawtube.

Single wall polyamide (nylon 11 or 12) extrusion

4.1.3 Type C Construction

Non-reinforced, flexible tubing for use in the fuel system (except for drawtubes), similar to Type A, but rated for higher temperatures.

Multi-layered extrusion consisting of inner high temperature heat stabilized polyamide with an integrally bonded outer layer of TPE (thermoplastic elastomer).

4.1.5 Type D Construction

PTFE tubing used for high temperature engine applications

This hose shall consist of a seamless tube of virgin PTFE reinforced with 90% electrical grade continuous filament glass fibers blended with 10% aramid fibers having minimum 9000 yarn denier for 5/16 inch nominal inside diameter, 14000 yarn denier for 3/8 inch, and 14000 for 1/2 inch hose bonded to tube by means of Teflon coating with weaving construction of two over and two under such that a minimum 90% coverage is achieved.

4.2. Fittings

4.2.1 Types A, B, and C Hose Fittings

Shall have quick connect style fittings that comply with requirements of SAE J2044 or are of a similar design approved by Navistar Materials Engineering.

4.2.2 Type D Hose Fittings

Fittings are permanent (crimp). Reusable fittings are not recommended. Fittings shall comply with SAE J516 except as indicated on the engineering drawing.

4.2.3 Fitting Materials

Fittings shall meet the following requirements, or as specified on engineering drawing:

Stainless Steel - Austenitic (18-8) Stainless Steel per MPAPS A-37; Passivate per MPAPS A-37, Type 5.

4.3 Appearance

The tubing shall be equivalent and comparable in surface finish and color to the original samples approved by Materials Engineering. Tubing supplied will be smooth and uniform, free from any visible defects, foreign matter, kinks, seams or any other condition that would impair the performance.

4.4 Color

Tubing color formulation shall be consistent in hue and of uniform saturation. Type A tubing shall have a black cover, unless otherwise specified, and the core tube shall be of a contrasting color. Type B tubing shall be solid black in color, unless otherwise specified.

4.5 Tolerances

The following dimensions and tolerances shall be used unless the engineering print specifically directs otherwise

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Types A, B, and C

Outside Diameter Nominal	Inside Diameter	Wall Thickness	Tolerance I.D. and Wall
<u>mm</u>	<u>mm</u>	<u>mm</u>	<u>mm</u>
9.9	6.4	1.8	±0.15
11.2	7.6	1.8	±0.15
12.7	10.0	1.35	±0.15
13.33	9.53	1.9	±0.15
16.0	12.0	2.0	±0.13
17.14	12.09	2.54	±0.13

Type D

HOSE NOMINAL SIZE		HOSE ID				HOSE OD			
		Max		Min		Max		Min	
mm	in	mm	in	mm	in	mm	in	mm	in
6.4	1/4	6.81	0.268	5.99	0.236	10.87	0.428	9.25	0.364
7.9	5/16	8.26	0.325	7.44	0.293	12.68	0.499	11.06	0.435
9.5	3/8	9.83	0.387	9.01	0.355	15.37	0.605	13.75	0.541
11.1	7/16	11.33	0.446	10.51	0.414	16.87	0.664	15.25	0.600
12.7	1/2	13.59	0.535	12.57	0.495	19.53	0.769	17.29	0.681

4.6 Property And Performance Requirements - Tubing Only

The tubing for these applications shall meet the indicated requirements of SAE J844 (SAE J1394 for Metric Equivalents) Air Brake Tubing, and additional requirements as outlined in this specification.

4.6.1 Tube and Material Performance

4.6.1.1 Method: Test to methods indicated in Table 1.

4.6.1.2 Required: The tubing shall meet the requirements in Table 1 of this specification.

4.6.2 Fuel Resistance

4.6.2.1 Method: Fill a test sample 45 cm long with ASTM Fuel "B" (Reference ASTM D 471) and age 100 hours at $24 \pm 3^\circ\text{C}$. Determine volume change.

4.6.2.2 Required: $\pm 2.5\%$ maximum volume change

4.6.3 Tensile and Elongation

4.6.3.1 Method: ASTM D 638 (Perform test on production lots of tubing; determine elongation and tensile strength from original tube area. Rate of pull shall be 50 mm per minute.). For Type D use ASTM D412.

4.6.3.2 Required: Type A - 18 MPa minimum tensile strength and 200% minimum elongation.

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