

NAVISTAR, INC.		
Material, Parts, and Process Specifications (MPAPS)		NUMBER: MPAPS F-6050
		Former Designation: TMS-6050
CNG Vent Lines and Fuel Hoses with End Fittings & Tube Assemblies		CURRENT REV No.: 1412
		DATE: Dec. 2014
WRITTEN/EDITED BY: Materials Engineering	APPROVED BY: Materials Engineering	SUPERSEDES: TMS-6050 – Dec. 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 covers the types of hose, with end-fittings, and tube assemblies used in the vehicle compressed natural gas (CNG) fuel system.

2.0 SCOPE

This specification covers general requirements, property and performance requirements, identification, quality, packing and shipping and source approval and quality control requirements.

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-9009	ISO 15500
NAVISTAR Eng. Design Std A-16	NAVISTAR MPAPS B-50	ISO 1307
NAVISTAR Manufacturing Std MS-D-13	NAVISTAR MPAPS A-37	ASTM D 610
NFPA 52	NAVISTAR MPAPS G-1	ASTM D 573
ECE 110	NAVISTAR MPAPS G-20	SAE J343
ANSI/IAS NGV 4.2-1999/CSA 12.52-M99	NAVISTAR MPAPS G-22	ASTM D 622
SAE J1405	NAVISTAR MPAPS C-10	ASTM B 117
SAE J517	NAVISTAR MPAPS A-0, Part II	ASTM D 638
NAVISTAR CEMS C-3	NAVISTAR MPAPS F-2	ASTM A 269
NAVISTAR CEMS A-45	ISO 6945	ASTM D 380

4.0 GENERAL REQUIREMENTS

- All hose assemblies shall meet the requirements of NFPA 52 and ANSI/IAS NGV 4.2-1999 / CSA 12.52-M99.
- Low pressure fuel lines (hose assembly or tube assembly) are any fuel line downstream of the high pressure regulator.

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3. High pressure fuel lines (hose assembly or tube assembly) are any fuel line upstream of the high pressure regulator.
4. Vent Lines (hose or tube assemblies) are any fuel lines to vent high pressure fuel to the atmosphere.
5. Hoses for use in vehicle engine compartments shall be capable of withstanding temperatures of – 40 to 121°C (– 40 to 250°F) within the engine compartment and – 40 to 82°C (– 40 to 180°F) in all other locations.

4.1 Fitting Materials

Low pressure fuel line fittings shall meet the following requirements, as applicable.

Brass	UNS C36000, C34500, C35000, or C37700 per CEMS C-3
Steel	0-100, 0-115 or 0-201 per MPAPS A-0, Part II
Finish	For steel fittings: a) Zinc Plating (trivalent), Class 6A, per MPAPS G-20 b) Zinc-Nickel Plating (trivalent) Class ZNi-C3, per MPAPS G-22 c) For inner when specified: phosphate coating, Class B-2, per MPAPS G-1
Stainless Steel	Only for stainless steel tubing: Austenitic (18-8) Stainless Steel per MPAPS A-37; Passivated per MPAPS A-37, Type 5.
Aluminum	Only for aluminum tubing: 6061-T6 aluminum per MPAPS C-10

4.2 Fuel Line Tubing Material

4.2.1 Low Pressure

4.2.1.1 Steel - Steel tubing will be single-wall, electric-resistance welded (ERW) low carbon steel per CEMS A-45 Part II with flash height controlled to 380 µm (0.015 inch) max.

4.2.1.2 Tubing Finish – unless otherwise specified, steel tubing will have one of the following finishes and meet the performance requirements as specified in the applicable specification:

- a) Zinc plating (trivalent), Class 6A, per MPAPS G-20
- b) Paint, Class II, per MPAPS G-9009
- c) Hot-dipped zinc-aluminum coating (95% zinc, 5% aluminum) (Galfan)
(Must provide ASTM B117 salt spray performance of 360 hrs to red rust, with no more than 1% red rust per ASTM D610, Plate #6)
- d) Zinc-nickel plating (trivalent), Class ZNi-C3, per MPAPS G-22

4.2.1.3 Aluminum – 3003-H14 or 6061-T6 aluminum per MPAPS C-10. Aluminum tubing will be seamless and plain (no finish).

4.2.1.4 Copper - Copper tubing shall not be used as a fuel line on a vehicle as per CSA B109.

4.2.1.5 Stainless Steel – Seamless 304, 304L, 316 or 316L per ASTM A269 or ASTM A213/A213M

4.2.2 High Pressure

4.2.2.1 High-pressure or vent stainless steel tubing shall meet the requirements of ASTM A 269 or A 213/A 213M tubing providing an equivalent level of safety. Tubing shall be seamless 304, 304L, 316, or 316L, and capable of minimum 3600 psi working pressure.

4.3 Vent Line Tubing and Hose

All vent line tubing and hose must be capable of:

- i. Minimum burst pressure of 1.5 times maximum vent pressure or 5400 psi.
- ii. Maintaining gas carrying capability after being exposed to 1120°C for 20 minutes.

4.4 Performance Requirements – All low and high pressure hose assemblies must meet the performance and test requirements of ANSI/IAS NGV 4.2-1999 / CSA 12.52-M99

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