

NAVISTAR, INC.		
Material, Parts, and Process Specifications (MPAPS)		NUMBER: MPAPS F-7137
		Former Designation: TMS-7137
TITLE: Nonmetallic Tubing for SCR Systems		CURRENT REV No.: 1610
		DATE: Oct. 2016
WRITTEN/EDITED BY: M. Ghaddar/ W. Cook	APPROVED BY: R. Goluch	SUPERSEDES: 1402 - February 2012
PRINTED COPIES OF THIS DOCUMENT MUST BE VERIFIED FOR CURRENT REVISION		
<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>		

1.0 APPLICATION

This specification outlines the requirements for hoses used to transport Diesel Emissions Fluid (DEF) or ammonia gas for the Selective Catalytic Reduction (SCR) exhaust after-treatment system. These lines are designed to be used in altitudes ranging from -300ft. to 14,000ft.

2.0 SCOPE

This specification covers the general requirements, property and performance requirements, quality control, and KCC requirements for SCR lines.

2.1 Type A: Designates a 6 mm DEF suction and throttle line hose. These lines must be able to withstand 300 mbar of vacuum without collapse. Additionally, these lines must terminate in 1/4", 5/16", or 3/8" SAE J2044 quick connect fittings. The maximum length of these hoses is 2 m and the maximum supply line pressure loss at the dosing unit inlet must be less than 200 mbar. This tubing must be capable of operating in an ambient temperature range of -40° C to 50° C. The line heating elements should be designed so that the DEF temperatures do not exceed 30° C sustained and do not to spike over 40° C.

2.2 Type B: Designates a 6 mm tube used in DEF pressure line applications. These lines must be able to withstand normal operating pressures of 9 bar and spikes of 13 bar. These lines must be less than 3 m in length and exhibit a pressure loss of less than 200 mbar. The ends of these lines must terminate in a 1/4", 5/16", or 3/8" SAE J2044 quick connect fitting. This tubing must be capable of operating in an ambient temperature range of -40° C to 50° C. The line heating elements should be designed so that the DEF temperatures do not exceed 30° C sustained and do not to spike over 40° C.

2.3 Restricted Chemical Substances

All product supplied to the requirements of this specification must comply with the requirements of the MPAPS B-50 specification.

2.4 Safety

This specification does not address the safety of the chemicals or procedures used. It is up to the user to use good laboratory safety practices and take all appropriate safeguards in using, mixing and storing these chemicals.

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. ©2016 by Navistar, Inc.

OCTOBER 2016



Documents

Page 1 of 9

Document Sharing Hub

NUMBER: MPAPS F-7137	TITLE: Nonmetallic Tubing for SCR Systems	REVISION: 1610
--------------------------------	---	--------------------------

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:

Quality System Standard ISO 9001 or TS-16949	SAE J2044
Cummins AEB 21.112	ASTM D 638
NAVISTAR MPAPS F-2	ISO 22241-1
CFR Title 29, Part 1910	ISO 16750-2
NAVISTAR MPAPS B-50	ASTM B 117

4.0 GENERAL REQUIREMENTS

All lines shall comply with Cummins AEB 21.112.

4.0.1 DEF Requirement: All references to DEF shall refer to DEF complying with ISO 22241-1

4.1 Material

All types of tubing must be able to withstand repeated freezing and thaw cycles. All electrical heating components are to function on 12 V systems. All DEF contacting materials must be chemically compatible with both DEF and water at operating temperatures.

4.1.1 Type A Construction: A core of seamless polyamide (PA), perfluoroalkoxy (PFA), or ethylene propylene (EPDM) material. The core should be covered with an electrical resistance heating element and then separated by an insulating air gap before being covered by an outer cover made from PA, PP, or EPDM foam.

4.1.2 Type B Construction: A core of seamless PA or EPDM material. The core should be covered with an electrical resistance heating element and then separated by an insulating air gap before being covered by an outer cover made from PA, PP, or EPDM foam.

4.2 Appearance

The tubing shall compare to and be equivalent in surface finish and color to the original samples approved by NAVISTAR Integrated Product Development. Tubing supplied to this specification shall be smooth and uniform, free from any visible defects, foreign matter, kinks, seams or any other condition that would impair the performance.

4.3 Color

Tubing color formulation shall be consistent in hue and of uniform saturation.

4.3.1 For all SCR line types the outer cover and the principle color of the quick connect fittings shall be solid black in color, unless otherwise specified.

4.3.2 For all DEF return lines, the outer cover shall be blue in color.

4.4 Cleanliness

All supplied DEF assemblies must meet the particulate contamination requirements in MPAPS F-2 Sec. 5.3. Additionally, all assemblies must be supplied free of grease and oil. The use of paper or cloth towels to clean components is prohibited to prevent contamination of the lines with fibers and fluffs. All plastic debris or flash from cutting and processing shall be removed. All assemblies should be shipped with protective shipping caps. These caps must stay in place for shipping and storage and should not be removed until final installation on the vehicle.

NUMBER: MPAPS F-7137	TITLE: Nonmetallic Tubing for SCR Systems	REVISION: 1610
--------------------------------	---	--------------------------

4.5 Tolerances

Table 1 tolerances shall be used unless the engineering print specifically directs otherwise.

TABLE 1 DEF LINE TOLERANCES

SCR Line Type	OD (Tube)	OD Tolerance (Tube)	ID (Tube)	ID Tolerance (Tube)	OD (Cover)	OD Tolerance (Cover)	ID (Cover)	ID Tolerance (Cover)
A & B	8.05 mm	±0.04 mm	6.0 mm	±0.2 mm	15.6mm	+2, -1 mm	12.0 mm	+2, -1 mm

4.6 Property And Performance Requirements - Tubing

4.6.1 Burst Strength

4.6.1.1 Method: Perform per SAE J844 at $23^{\circ} \pm 3^{\circ}$ C and $+110^{\circ}$ C.

4.6.1.2 Required: Tubing shall withstand their burst pressures found in Table 2.

TABLE 2 MECHANICAL PROPERTIES - SCR TUBING

Nominal ID	Type	Minimum Burst Pressure at 24° C (75° F)	Minimum Bend Radius	Maximum Stiffness*
6.0 mm (5/32")	A & B	1.85 MPa (268 psi)	75 mm (2.95 in.)	27 N (6 lbf)

* Stiffness determined in accordance with SAE J844.

4.6.2 Tensile and Elongation

4.6.2.1 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.)

4.6.2.2 Required: 24 MPa minimum tensile strength and 200% minimum ultimate elongation.

4.6.3 Extraction in DEF

4.6.3.1 Method: Store ten tensile bars, with dimensions per ASTM D638 Type I , or bars of equivalent surface area, for each material in contact with DEF (i.e. both DEF line and quick connect materials, if different) in 1 kg of DEF for 500 hours at a fluid temperature of $23^{\circ} \pm 3^{\circ}$ C in polyethylene Nalgene® or glass containers. Following the 500 hours exposure, the tensile bar samples shall be removed from solution and discarded, and the DEF solution drained. The DEF solution shall be filtered with a general purpose paper filter and all of DEF solution retained in a polyethylene Nalgene® or glass sample bottle. The general appearance, odor, turbidity, and foaminess of the solution shall be reported and recorded as well as any indicators of DEF line material degradation including amount of filtrate separated from solution. Photographs of the filtrate shall be submitted and if an excess of filtrate is observed, indicating material degradation, samples shall be submitted to Navistar Materials Engineering for approval. ICP-OES or ICP-AES may be required on the retained, filtered DEF per Navistar Materials Engineering.

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. ©2016 by Navistar, Inc.

OCTOBER 2016



Documents

Page 3 of 9

Document Sharing Hub