



AEROSPACE STANDARD

MA1339Issued 1998-06
Reaffirmed 2015-07Hose Assembly, Polytetrafluoroethylene, Metallic Reinforced,
21,000 kPa, 204 °C, Lightweight, Hydraulic and Pneumatic, Metric

RATIONALE

MA1339 has been reaffirmed to comply with the SAE five-year review policy.

1. SCOPE:

This Aerospace Standard (AS) defines the requirements for a lightweight polytetrafluoroethylene (PTFE) lined, metallic reinforced, hose assembly suitable for use in high temperature, 204 °C, high pressure, 21,000 kPa (210 bar), aircraft hydraulic systems, also for use in pneumatic systems which allow some gaseous diffusion through the PTFE wall.

2. REFERENCES:

2.1 Applicable Documents:

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

2.1.1 SAE Publications: Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

AMS 5556	Steel, Corrosion and Heat Resistant, Seamless or Welded Tubing, 18Cr 11Ni 0.70(Cb+Ta) (SAE 30347), Hydraulic, Solution Heat Treated
AMS 5557	Steel Tubing, Seamless and Welded, Corrosion and Heat Resistant, 18.5Cr 10.5Ni 0.40Ti (SAE 30321), Hydraulic, Solution Heat Treated
AMS 5561	Steel Tubing, Welded and Drawn, Corrosion and Heat Resistant, 9.0Mn 20Cr 6.5Ni 0.28N (SAE 21-6-9), High-Pressure Hydraulic
AMS 5567	Steel Tubing, Seamless or Welded, Corrosion Resistant, 19Cr 10Ni (SAE 30304), Hydraulic, Annealed
AMS 5570	Steel, Corrosion and Heat Resistant, Seamless Tubing, 18Cr 11Ni 0.40Ti (SAE 30321), Solution Heat Treated
AMS 5571	Steel, Corrosion and Heat Resistant, Seamless Tubing, 18Cr 10.5Ni 0.70(Cb+Ta) (SAE 30347), Solution Heat Treated

SAE Technical Standards Board Rules provide that: "This report is published by SAE to advance the state of technical and engineering sciences. The use of this report is entirely voluntary, and its applicability and suitability for any particular use, including any patent infringement arising therefrom, is the sole responsibility of the user."

SAE reviews each technical report at least every five years at which time it may be revised, reaffirmed, stabilized, or cancelled. SAE invites your written comments and suggestions.

Copyright © 2015 SAE International

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of SAE.

TO PLACE A DOCUMENT ORDER: Tel: 877-606-7323 (inside USA and Canada)
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
<http://www.sae.org>

SAE WEB ADDRESS:

Full document details: SAE MA1339

SAE values your input. To provide feedback
on this Technical Report, please visit
<http://www.sae.org/technical/standards/MA1339>

Documents

Document Sharing Hub

2.1.1 (Continued):

AMS 5573	Steel, Corrosion and Heat Resistant, Seamless Tubing, 17Cr 12.5Ni 2.5Mo (SAE 30316), Solution Heat Treated
AMS 5575	Steel, Corrosion and Heat Resistant, Welded Tubing, 18Cr 10.5Ni 0.70(Cb+Ta) (SAE 30347), Solution Heat Treated
AMS 5581	Nickel Alloy, Corrosion and Heat Resistant, Seamless or Welded Tubing, 62Ni 21.5Cr 9.0Mo 3.7(Cb+Ta) (SAE Inconel 625), Annealed
AMS 5639	Steel Bars, Wire, Forgings, Tubing and Rings, Corrosion Resistant, 19Cr 10Ni (SAE 30304), Solution Heat Treated
AMS 5643	Steel, Corrosion Resistant, Bars, Wire, Forgings, Tubing and Rings, 16Cr 4.0Ni 0.30(Cb+Ta) 4.0Cu (SAE 17-4PH), Solution Heat Treated, Precipitation Hardenable
AMS 5644	Steel Bars and Forgings, Corrosion Resistant, 17Cr 7.0Ni 1.0Al (SAE 17-4PH)
AMS 5645	Steel, Corrosion and Heat Resistant, Bars, Wire, Forgings, Tubing and Rings, 18Cr 10Ni 0.40Ti (SAE 30321), Solution Heat Treated
AMS 5646	Steel, Corrosion and Heat Resistant, Bars, Wire, Forgings, Tubing and Rings, 18Cr 11Ni 0.60(Cb+Ta) (SAE 30347), Solution Heat Treated
AMS 5647	Steel, Corrosion Resistant, Bars, Wire, Forgings, Tubing and Rings, 19Cr 9.5Ni (SAE 304L), Solution Heat Treated
AMS 5648	Steel, Corrosion and Heat Resistant, Bars, Wire, Forgings, Tubing and Rings, 17Cr 12Ni 2.5Mo (SAE 30316), Solution Heat Treated
AMS 5653	Steel, Corrosion and Heat Resistant, Bars, Wire, Forgings, Tubing and Rings, 17Cr 12Ni 2.5Mo (SAE 30316L), Solution Heat Treated
AMS 5659	Steel, Corrosion Resistant, Bars, Wire, Forgings, Rings and Extrusions, 15Cr 4.5Ni 0.30Cb 3.5Cu (SAE 15-5PH), Consumable Electrode Melted, Solution Heat Treated, Precipitation Hardenable
AMS 5666	Nickel Alloy, Corrosion and Heat Resistant, Bars, Forgings, Extrusions and Rings, 62Ni 21.5Cr 9.0Mo 3.65(Cb+Ta)(SAE Inconel 625), Annealed
AMS 5688	Steel, Corrosion Resistant, Wire, 18Cr 9.0Ni (SAE 30302) Spring Temper
AMS 5689	Steel, Corrosion and Heat Resistant, Wire 18Cr 10.5Ni 0.40Ti (SAE 30321), Solution Heat Treated
AMS 5690	Steel, Corrosion and Heat Resistant, Wire 17Cr 12Ni 2.5Mo (SAE 30316), Solution Heat Treated
AMS 5697	Steel, Corrosion Resistant, Wire 19Cr 9.5Ni (SAE 30304), Solution Heat Treated
AMS 5743	Steel, Corrosion and Heat Resistant, Bars and Forgings 15.5Cr 4.5Ni 2.9Mo 0.10N (SAE AM-355), Solution Heat Treated, Sub-Zero Cooled, Equalized, and Over-Tempered
AS150	Hose Assembly, Type Classifications of, Basic Performance and Fire Resistance
AS611	Tetrafluoroethylene Hose Assembly Cleaning Methods
ARP908	Hose Fitting - Installation and Qualification Test Torque Requirements
AS1055	Fire Testing of Flexible Hose, Tube Assemblies, Coils, Fittings and Similar System Components

2.1.1 (Continued):

AS1072	Sleeve, Hose Assembly, Fire Protection
ARP1835	Preparation for Delivery, General Requirements for Hose Assemblies
AIR4092	Investigation of PTFE "Melt" Phenomenon for High Pressure Hoses
MA1370 (ISO 5855)	Screw Threads - MJ Profile, Metric
MA2014	Fitting End, Acorn Flareless, Design Standard, Metric
MA2078 (ISO 8829)	Test Methods, Hose Assemblies, Polytetrafluoroethylene (PTFE), Metric
MA2095	Fitting Design Standard, 24° Cone
MA2273	Fitting End, Beam Seal, External Thread, Design Standard, Metric
MA2274	Fitting End, Beam Seal, Bulkhead, External Thread, Design Standard, Metric

2.1.2 ASTM Publications: Available from ASTM, 100 Barr Harbor, West Conshohocken, PA 19428-2959.

ASTM A 262	Standard Recommended Practices for Detecting Susceptibility to Intergranular Attack in Stainless Steel
ASTM A 313	Standard Specification for Stainless Steel Spring Wire
ASTM A 580	Specification for Stainless and Heat Resisting Steel Wire

2.1.3 NAS Standards: Available from Aerospace Industries Association, 1250 Eye Street NW, Washington, DC 20005.

NAS 1760	Fitting End, Flareless Acorn, Standard Dimensions for
----------	---

2.1.4 U.S. Government Publications: Available from DODSSP, Subscription Services Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

P-D-680	Dry Cleaning Solvent
QQ-P-35	Passivation Treatments for Corrosion-Resistant Steels
QQ-S-763	Steel Bars, Wire Shapes, and Forgings, Corrosion-Resisting
MIL-C-5501	Caps and Plugs, Protective, Dust and Moisture Seal, General Specification for
MIL-H-5606	Hydraulic Fluid, Petroleum Based, Aircraft, Missile and Ordnance
MIL-PRF-7808	Lubricating Oil, Aircraft Turbine Engine, Synthetic Base
MIL-PRF-83282	Hydraulic Fluid, Fire Resistant Synthetic Hydrocarbon Base, Aircraft
MIL-F-85421	Fittings, Tube, Fluid Systems, Separable, 3000/4000 psi, General Specification for
MIL-PRF-87257	Hydraulic Fluid, Fire Resistant; Low Temperature, Synthetic Hydrocarbon Base, Aircraft and Missile
MIL-STD-100	Engineering Drawing Practices
MIL-STD-130	Identification Marking of U.S. Military Property
MIL-STD-831	Test Reports, Preparation of

2.1.5 ASME Publications: Available from ASME, 22 Law Drive, Box 2900, Fairfield, NJ 07007-2900.

ASME B46.1 Surface Texture

3. TECHNICAL REQUIREMENTS:

3.1 Qualification:

The hose assemblies furnished under this document shall be products which are qualified by meeting all the requirements covered by this document.

3.2 Material:

The hose assembly materials shall be uniform in quality, free from defects, consistent with good manufacturing practice, shall conform to applicable specifications and the requirements specified herein, and suitable for the purpose intended.

3.2.1 Metals: Metals used in the hose and fittings shall be corrosion-resistant and shall conform to the following specifications:

a. Bars and Forgings:

(1)	QQ-S-763	Class 304 - Cond. A or Cond. B (AMS 5639)
(2)	QQ-S-763	Class 304L - Cond. A (AMS 5647)
(3)	QQ-S-763	Class 316 - Cond. A (AMS 5648)
(4)	QQ-S-763	Class 316L - Cond. A (AMS 5653)
(5)	QQ-S-763	Class 321 - Cond. A (AMS 5645)
(6)	QQ-S-763	Class 347 - Cond. A (AMS 5646)
(7)	AMS 5643	17-4PH
(8)	AMS 5644	17-7PH
(9)	AMS 5659	15-5PH
(10)	AMS 5666	Nickel Alloy Type 625
(11)	AMS 5743	AM-355

b. Tubing:

(1)	AMS 5567	Type 1 or Type 2 Stainless Steel Tubing, 304
(2)	AMS 5573	Seamless Stainless Steel Tubing, 316
(3)	AMS 5557	Type 1 or Type 2 Stainless Steel Tubing, 321
(4)	AMS 5570	Seamless Stainless Steel Tubing, 321
(5)	AMS 5571	Seamless Stainless Steel Tubing, 347
(6)	AMS 5575	Welded Stainless Steel Tubing, 347
(7)	AMS 5556	Type 1 or Type 2 Stainless Steel Tubing, 347
(8)	AMS 5561	Welded Stainless Steel Tubing, 21-6-9
(9)	AMS 5581	Nickel Alloy Type 625

c. Wire:

(1)	ASTM A 580/ A 313	Comp. 302 (AMS 5688)
(2)	ASTM A 580/ A 313	Comp. 304 (AMS 5697)
(3)	ASTM A 580/ A 313	Comp. 316 (AMS 5690)
(4)	ASTM A 580/ A 313	Comp. 321 (AMS 5689)

3.3 Design and Construction:

The hose assembly shall consist of a seamless PTFE inner tube, corrosion-resistant steel-wire reinforcement, and corrosion-resistant steel or nickel alloy end fittings as required to meet the construction and performance requirements of this specification and as required for its intended use.

3.3.1 Inner Tube: The inner tube shall be of a seamless construction of virgin PTFE resin of uniform gage. It shall have a smooth bore and shall be free from pitting or projections on the inner surface. Additives may be included in the compound from which the tube is extruded.

- 3.3.2 Reinforcement: The reinforcement shall consist of corrosion-resistant steel wires conforming to the applicable specifications listed in 3.2.1. The wires shall be so arranged over the inner tube as to provide sufficient strength to ensure conformance with the requirements specified herein. Broken reinforcing wires shall be cause for rejection. Crossed-over reinforcing wires shall not be cause for rejection of the hose assembly.
- 3.3.3 Fittings: All fittings shall be permanently attached and proven to meet the requirements herein. Standard hose assemblies shall have flareless fittings according to MA2014 to mate with MA2095 or beam seal fittings to mate with MA2273 or MA2274. Fitting hex portions shall fit standard wrench openings.
- 3.3.3.1 Straight Fittings: Straight fittings shall be of one piece construction. Weld or braze joints must not be located in the fluid paths, except welded and redrawn corrosion-resistant steel tubing in accordance with 3.2.1 may be used.
- 3.3.3.2 Other Fittings: Other fittings, including elbow fittings, shall be of one piece construction to the maximum extent possible. However, those made with other than one piece construction can use welded and redrawn corrosion-resistant steel tubing in accordance with 3.2.1 and shall employ a butt weld joint method.
- 3.3.3.3 End Fitting Collars (Sockets): All end fitting collars (sockets) crimped or swaged, fabricated from Type 304 stainless steel are required to be capable of passing an embrittlement test as specified in ASTM A 262 Practice E, prior to assembly to the nipple or swaging operation. Sockets fabricated from stabilized austenitic steel (304L, 321, or 347) are acceptable without being subjected to the embrittlement test.
- 3.3.3.4 Fitting Finish:
- 3.3.3.4.1 Corrosion Resistant Steel Parts: Unless otherwise specified, corrosion resistant steel parts shall be passivated in accordance with QQ-P-35.

3.4 Dimensions:

The hose assembly dimensions, except for length, shall be as specified in Figure 1 and Table 1.

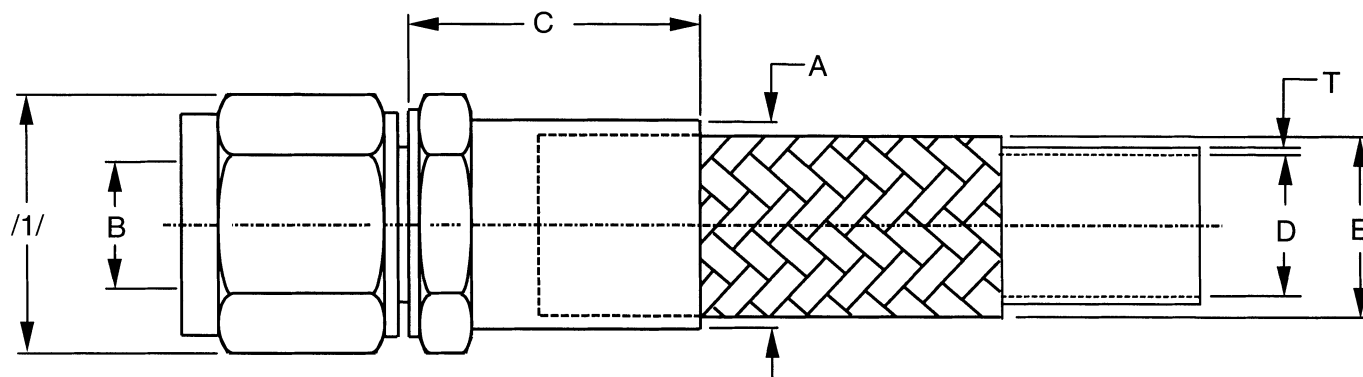


FIGURE 1 - Hose and Fitting Dimensions

TABLE 1 - Hose and Fitting Dimensions as Shown in Figure 1 (mm)

Hose Size	Rigid Tube OD (Ref)	Fitting OD A Max	Fitting ID B ²⁾ Min	Socket Length C Max	Hose ID D Min	Hose OD E Min	Hose OD E Max	Unbraided Inner Tube Wall T Min	Unbraided Inner Tube Wall T Max	Spherical Ball Size for Determining Min Hose Assy. ID ²⁾ in	Spherical Ball Size for Determining Min Hose Assy. ID ²⁾ in
										Straight Fittings	Elbow Fittings
DN06	6.0	17.5	3.6	25.6	5.4	9.1	9.9	0.9	1.2	3.1	2.9
DN10	10.0	20.3	6.4	28.0	7.6	11.6	12.4	0.9	1.2	5.5	5.2
DN12	12.0	24.6	9.1	34.0	9.9	14.9	15.6	1.0	1.3	7.7	7.3
DN16	16.0	27.9	11.6	35.0	12.3	17.5	18.5	1.1	1.4	9.4	8.8
DN20	20.0	35.0	14.4	36.0	15.3	24.1	25.1	1.1	1.4	11.6	11.0
DN25	25.0	42.2	19.3	41.0	21.6	31.2	32.3	1.1	1.4	17.4	16.4

¹ Cross corners of nut and socket hex may exceed "A" dimension.

² Minimum specified inside diameter shall be verified by passing a spherical ball through the hose assembly.

- 3.4.1 Hose Weight: Hose consisting of inner tube and reinforcement as outlined in 3.3.1 through 3.3.2 shall not exceed the maximum hose weights specified in Table 2.

TABLE 2 - Physical Requirements of Hose Assemblies and Weight of Hose

Hose Size	(Nominal Tube Size)	Hose Weight Max ¹ kg/m	Operating Pressure kPa	Proof Pressure kPa	Burst Pressure Room Temperature Minimum kPa	Burst Pressure High Temperature Minimum kPa	Bend Radius at Inside of Bend Minimum mm	Volumetric Expansion Maximum mL/m
DN06	6.0	0.16	21 000	42 000	110 000	82 700	38	2.6
DN10	10.0	0.27	21 000	42 000	96 000	72 400	64	3.3
DN12	12.0	0.36	21 000	42 000	96 000	72 400	73	5.3
DN16	16.0	0.48	21 000	42 000	84 000	62 000	83	8.7
DN20	20.0	1.04	21 000	42 000	84 000	62 000	102	11.8
DN25	25.0	1.52	21 000	42 000	84 000	62 000	127	29.5

¹ Hose weight shall be determined on a minimum length of 300 mm.

3.5 Performance:

The inner tube and hose assembly shall meet the following performance requirements:

3.5.1 Inner Tube:

- 3.5.1.1 Tube Roll: The tube shall not leak, split, burst, or show any evidence of malfunction when rolled to the flattening and rounding gaps of MA2078 (21,000 kPa and higher) values. The test method is specified in 4.6.2.1.
- 3.5.1.2 Tube Proof Pressure: The tube, without reinforcing wires, shall not leak, burst, or show any evidence of malfunction when tested to the MA2078 (21,000 kPa and higher) proof pressure values for 1 min. The test method is specified in 4.6.2.1.
- 3.5.1.3 Tensile Strength: The longitudinal tensile strength for all sizes of tubes shall be 15,100 kPa minimum. The transverse tensile strength for sizes DN16 and larger shall be 12,400 kPa minimum. For sizes DN10 and smaller the transverse tensile strength need not be tested. The test method is specified in 4.6.2.2.
- 3.5.1.4 Elongation: Elongation shall be a minimum of 200%. The test method is specified in 4.6.2.3.
- 3.5.1.5 Specific Gravity: The specific gravity values of the hose inner tube shall not exceed 2.155 apparent and 2.210 relative. The test method is specified in 4.6.2.4.