

AEROSPACE STANDARD

MA620

Issued 1998-03
Reaffirmed 2015-07

Hose Assemblies, Convuluted Polytetrafluoroethylene Metallic
Reinforced, High Temperature, Medium Pressure, Aircraft
Metric

RATIONALE

MA620 has been reaffirmed to comply with the SAE five-year review policy.

1. SCOPE:

This SAE Aerospace Standard (MA) defines the requirements for a convuluted polytetrafluoroethylene (PTFE) lined, metallic reinforced, hose assembly suitable for use in aircraft fluid systems at temperatures of -55 to 204 °C and at operating pressures per Table 1.

TABLE 1 - Physical Requirements of Hose Assemblies and Weight of Hose

Hose Size DN	Hose Weight Max ¹ kg/m	Operating Pressure Max kPa	Proof Pressure Max kPa	Burst Pressure Room Temperature Min kPa	Burst Pressure High Temperature Min kPa	Bend Radius At Inside of Bend Min mm
06	0.143	6900	13 800	27 600	19 300	32
10	0.179	6900	13 800	27 600	19 300	57
12	0.268	6900	13 800	27 600	19 300	73
16	0.357	6900	12 410	24 820	17 240	76
20	0.483	6900	12 410	24 820	17 240	95
25	0.590	6900	12 410	24 820	17 240	127
32	0.893	6900	12 410	24 820	17 240	159
40	1.071	5170	10 340	20 700	14 480	191
50	1.607	1720	3 440	6 900	4 820	254
63	1.964	689	1 380	2 760	1 930	318
76	2.589	689	1 380	2 760	1 930	381
101	3.572	689	1 380	2 760	1 930	610

¹ Hose weight shall be determined on a minimum length of 305 mm.

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Documents

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1.1 Types:

1.1.1 Hose assemblies furnished under this document may be of two types:

- Type I - Non-conductive Inner Tube
- Type II - Conductive Inner Tube

1.1.2 Hose assemblies furnished under this document may be of the following classes. If no class is defined then Class 1 shall prevail.

- Class 1 - Liquid Proof Test
- Class 2 - Liquid and Pneumatic Proof Test

2. REFERENCES:

2.1 Applicable Documents:

The following publications form a part of this specification 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 purchase order. In the event of conflict between the text of this specification and references cited herein, the text of this specification takes precedence. Nothing in this specification, however, supersedes applicable laws and regulations unless a specific exemption is 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 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
- AMS 5575 Steel, Corrosion and Heat Resistant, Welded Tubing, 18Cr 10.5Ni 0.70(Cb+Ta) (SAE 30347), Solution Heat Treated
- AMS 5636 Steel, Corrosion Resistant, Bars and Wire, 18Cr 9.0Ni (SAE 30302) Solution Heat Treated and Cold Drawn, 100 ksi Tensile Strength
- AMS 5637 Steel, Corrosion Resistant, Bars and Wire, 18Cr 9.0Ni (SAE 30302) Solution Heat Treated and Cold Drawn, 125 ksi Tensile Strength
- 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)

2.1.1 (Continued):

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 5656	Steel, Corrosion Resistant, Bars, Wire, Forgings, Extrusions and Rings, 9.0Mn 20Cr 6.5Ni 0.27N (SAE 21-6-9), 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 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
AS150	Hose Assembly, Type Classifications of, Basic Performance and Fire Resistance
AS611	Tetrafluoroethylene Hose Assembly Cleaning Methods
ARP908	Hose and Tube Fitting - Installation and Qualification Test Torque
AS1055	Fire Testing of Flexible Hose, Tube Assemblies, Coils, Fittings and Similar System Components
ARP1835	Preparation for Delivery General Requirements for Hose Assemblies
MA1370	Screw Threads, MJ Profile, Metric
MA2078	Test Methods, Hose Assemblies, Polytetrafluoroethylene (PTFE)
MA2014	Fitting End, Flareless Acorn, Metric
MA2095	Fitting Design Standard, 24 degree Cone, Metric

2.1.2 ASTM Publications: Available from ASTM, 100 Barr Harbor Drive, 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 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-S-763	Steel Bars, Wire Shapes, and Forgings, Corrosion-Resisting
QQ-P-35	Passivation Treatments for Corrosion-Resistant Steels
TT-I-735	Isopropyl Alcohol
TT-S-735	Standard Test Fluids, Hydrocarbons
MIL-C-5501	Caps and Plugs, Protective, Dust and Moisture Seal, General Specification
MIL-H-5606	Hydraulic Fluid, Petroleum Based, Aircraft, Missile and Ordnance
MIL-T-5624	Turbine Fuel, Aviation, Grades JP-4 and JP-5
MIL-L-7808	Lubricating Oil, Aircraft Turbine Engine, Synthetic Base
MIL-T-8504	Tubing, Steel, Corrosion-Resisting (304) Aerospace Vehicle, Hydraulic Systems, Annealed, Seamless and Welded
MIL-T-8808	Tubing, Steel, Corrosion-Resistant (18-8 Stabilized), Aircraft Hydraulic Quality
MIL-H-83282	Hydraulic Fluid, Fire Resistant Synthetic Hydrocarbon Base, Aircraft
MIL-STD-100	Engineering Drawing Practices
MIL-STD-130	Identification Marking of U.S. Military Property
MIL-STD-831	Test Reports, Preparation of

- 2.1.4 ASME Publications: Available from ASME, 345 E. 47th Street, New York, NY 10017.

ANSI/ASME B46.1 Surface Texture

2.2 Hose Assembly Procurement Specifications:

Refer to MA620SUP1 for a listing of applicable hose assembly procurement standards applicable to this document.

3. TECHNICAL REQUIREMENTS:

3.1 Qualification:

The hose assemblies furnished under this specification 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 and shall conform to applicable specifications and the requirements specified herein. All materials not specifically described herein shall be of the highest quality 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:

Bars and Forgings:

QQ-S-763 Class 304 - Cond. A or Cond. B (AMS 5639)
QQ-S-763 Class 302 - Cond. A or Cond. B (AMS 5636 or AMS 5637)
QQ-S-763 Class 321 - Cond. A (AMS 5645)
QQ-S-763 Class 347 - Cond. A (AMS 5646)
AMS 5643 17-4PH
AMS 5644 17-7PH
AMS 5656 21-6-9
AMS 5659 15-5PH

Tubing:

MIL-T-8504 Comp. 304 (AMS 5567)
MIL-T-8808 Type I or Type II, Comp. 321 (AMS 5570 or AMS 5557)
MIL-T-8808 Type I or Type II, Comp. 347 (AMS 5571, AMS 5575 or AMS 5556)

Wire:

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

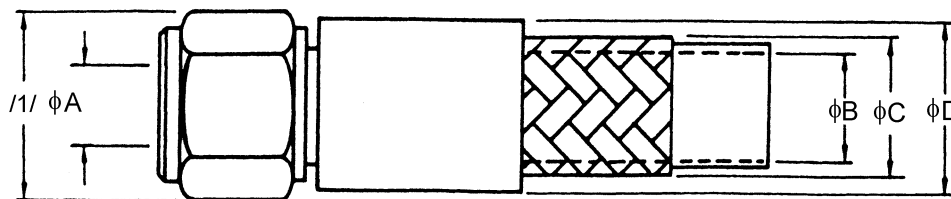
3.3 Construction:

The hose assembly shall consist of a convoluted polytetrafluoroethylene inner tube, which may be covered with convoluted woven glass cloth and/or other suitable materials, corrosion-resistant steel-wire reinforcement, and corrosion-resistant steel end fittings as required to meet the construction and performance requirements of this document and as required for its intended use.

- 3.3.1 Inner Tube: The inner tube shall be of a convoluted construction of virgin polytetrafluoroethylene resin designed to promote easy bending. It shall be free from pitting or projections on the inner surface. Additives may be included in the compound from which the tube is fabricated.
- 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 Interlayers: Interlayers, if used, shall be of a suitable material and shall be resistant to all fluids with which the hose may come in contact during normal service. They shall be capable of withstanding temperatures of -55 to 204 °C and shall not extrude through the outer braid during testing or in service.
- 3.3.4 Fittings: All fittings shall be permanently attached and proven to meet the requirements herein. Standard hose assemblies shall have flared fittings to meet MA2095, flareless fittings according to MA2014 in accordance with applicable documents (see 2.1). Fitting hex portions shall fit standard wrench openings.
- 3.3.4.1 Straight Fittings: Fittings shall be of one-piece construction. Weld or braze joints must not be located in the fluid paths, except welded and redrawn tubing per MIL-T-8504 or MIL-T-8808 may be used.
- 3.3.4.2 Other Fittings: Other fittings, including elbow fittings, shall be of one piece construction to the maximum extent possible. When one piece construction is not used, the joints shall be welded using either butt-weld or lap-weld design. For double elbow assemblies, the elbows may be treated as non-standard.
- 3.3.4.3 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.
- 3.3.4.4 Fitting Finish:
- 3.3.4.4.1 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 2.



¹ Cross corners of nut and socket hex may exceed "D" dimensions.

FIGURE 1 - Hose and Fitting Dimensions

TABLE 2 - Hose and Fitting Dimensions

Hose Size DN	Rigid Tubing OD Ref mm	Fitting ID Min A ¹ mm	Hose ID Min B mm	Hose Wire Braid OD C mm $\pm$ 0.81	Fitting OD Max D mm
06	6.35	3.35	6.86	11.30	14.0
10	9.53	6.50	9.02	14.10	17.3
12	12.70	8.76	12.95	19.18	21.8
16	15.88	10.92	15.24	21.60	24.1
20	19.05	16.12	19.43	26.92	32.5
25	25.40	21.21	24.89	32.97	37.3
32	31.75	27.56	30.99	38.76	43.2
40	38.10	33.27	37.59	45.47	50.8
50	50.80	46.36	49.20	59.26	65.0
63	63.50	57.86	61.90	73.03	76.2
76	76.20	70.38	74.46	87.12	94.0
101	101.60	93.98	100.00	113.16	119.4

¹Hose assembly conformance to minimum specified inside diameter shall be verified by passing the designated or larger spherical ball through the hose assembly.