

Hose Assemblies, Metal Medium Pressure,
High Temperature, Metric

RATIONALE

This document has been reaffirmed to comply with the SAE 5-Year Review policy.

This standard is a word-for-word equivalent to ISO/DIS 7314 with the exception that United States material, test and process specifications are introduced where ISO equivalents are not available. Areas in this document that differ from ISO/DIS 7314 are indicated by a line on the margin. The ISO/DIS 7314 is similar to AS1424.

1. SCOPE:

This specification covers metric medium pressure, high temperature, flexible metal hose assemblies suitable for continuous operation in liquid and pneumatic systems from 55 to 400°C, with short duration excursion to 650°C, and primarily for use on jet aircraft power plants.

1.1 Types:

Hose assemblies furnished under this specification shall be of only one type: medium pressure, with pressure impulse and flexure capability.

2. APPLICABLE DOCUMENTS:

The following specifications and standards, of the issue in effect on the date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein:

2.1 Specifications:

2.1.1 Federal:

QQ-P-35	Passivation Treatment for Corrosion-Resistant Steel
QQ-S-423	Wire, Steel, Corrosion-Resistant
QQ-S-763	Steel Bars, Wire, Shapes, and Forgings, Corrosion-Resisting

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2.1.2 Military:

MIL-R-5031	Rods and Wire, Welding, Corrosion and Heat Resisting Alloys
MIL-C-5501	Caps and Plugs, Protective, Dust and Moisture Seal
MIL-H-6875	Heat Treatment of Steels (Aerospace Practice), Process for
MIL-W-8611	Welding, Metal Arc and Gas, Steels, and Corrosion and Heat Resistant Alloys, Process for
MIL-T-8808	Tubing, Steel, Corrosion-Resistant (18-8 Stabilized) Aircraft Hydraulic Quality

2.1.3 Industry:

AMS 5557F	Tubing, Seamless or Welded, Hydraulic, Sol. Heat Treated, 18.5Cr 10.5Ni 0.40Ti
AMS 5636D	Bars, 18Cr 9Ni, Solution Heat Treated and Cold Drawn - 100 000 psi (690 MPa) TS
AMS 5637E	Bars, 18Cr 9Ni, Solution Heat Treated and Cold Drawn - 125 000 psi (860 MPa) TS
AMS 5639E	Bars, Forgings, Tubing and Rings - 19Cr 10Ni Sol. Heat Treated
AMS 5645L	Bars, Forgings, Tubing and Rings - 18Cr 10Ni 0.040 Ti, Sol. Heat Treated
AMS 5646H	Bars, Forgings, Tubing and Rings - 18Cr 11Ni 0.60(Cb+Ta) Sol. Heat Treated
AMS 5689C	Wire, 18Cr 9.5Ni 0.40Ti, Solution Heat Treated
ARP908B	Hose and Tube Fitting - Installation and Qualification Test Torque Requirements
AS1055B	Fire Testing of Flexible Hose, Tube Assemblies, Coils, Fittings and Similar System Components

(Application for copies should be addressed to SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001)

ASTM A 380	Cleaning and Descaling Stainless Steel Parts, Equipment and Systems
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(Application for copies should be addressed to ASTM, 1916 Race Street, Philadelphia, PA 19103-1187)

2.2 Standards:

2.2.1 Military:

DOD-STD-100	Engineering Drawing Practices
MIL-STD-129	Marking for Shipment and Storage
MIL-STD-130	Identification Marking of U.S. Military Property
MIL-STD-810	Environment Test Methods

(Copies of documents required by suppliers in connection with specific procurement functions shall be obtained from the procuring activity or as directed by the Contracting Officer)

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2.2.2 Industry:

MA1370	Metric Screw Threads - MJ Profile
MA2014	Fitting End, Flareless Acorn, Metric
MA2040	Nut, Sleeve Coupling Flareless
MA2041	Sleeve, Coupling, Flareless
MA2095A	Fitting Design Standard, 24 Degree Cone
MA2101	Hose Assembly, Metal, Medium Pressure, Flareless, Welded, Straight to Straight
MA2102	Hose Assembly, Metal, Medium Pressure, Flareless, Welded, Straight to 45 Degree
MA2103	Hose Assembly, Metal, Medium Pressure, Flareless, Welded, Straight to 90 Degree
MA2104	Hose Assembly, Metal, Medium Pressure, Flareless, Welded, 45 Degree to 45 Degree
MA2105	Hose Assembly, Metal, Medium Pressure, Flareless, Welded, 45 Degree to 90 Degree
MA2106	Hose Assembly, Metal, Medium Pressure, Flareless, Welded, 90 Degree to 90 Degree

(Application for copies should be addressed to SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001)

3. REQUIREMENTS:

3.1 Qualification:

Any hose assembly furnished under this specification shall be a product identical in hose construction and end fitting attachment method to specimens which have been tested to and passed the qualification tests specified herein.

3.2 Materials:

The hose assembly materials shall be uniform in quality, free from defects, suitable for use in continuous ambient and or fluid temperatures up to 400°C, with short fluid temperature excursions up to 650°C, consistent with good manufacturing practices, and in conformance with the applicable specifications and the requirements specified herein. Materials used in these hose assemblies shall be selected from Table 1.

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TABLE 1 - Hose Assembly Materials & Finishes

COMPONENT	MATERIAL DESCRIPTION	SPECIFICATION	FINISH
Flexible Metal Hose Inner Tube	321 Cres Steel	MIL-T-8808 or QQ-S-763 AMS 5557	Passivate Per QQ-P-35
Hose Reinforcement Wire	321 Cres Steel	AMS 5689	
All Fitting Components Except Coupling Nuts	321 Cres Steel	MIL-T-8808 or QQ-S-763 AMS 5636, AMS 5637, AMS 5639	
Coupling Nuts	321 or 347 Cres Steel	QQ-S-763, AMS 5645, AMS 5646	
Nut Retaining Wire	321 or 347 Cres Steel	QQ-S-423 or QQ-S-763 AMS 5689	
Identification Band	300 Series Cres Steel	QQ-S-763	

3.3 Design and Construction:

The hose assembly shall consist of a seamless or welded and redrawn convoluted, corrosion-resistant steel pressure carrying tube, uniform in size and wall thickness; reinforced with corrosion resistant steel braided wire and having stabilized corrosion resistant steel end fitting and nuts. End fittings shall be attached to the hose by welding.

- 3.3.1 End Fitting: All standard end fittings shall be a single piece construction (except for terminations) from the mating surface to the attachment of the convoluted tube. For special complex end fittings, if welding is required in construction, welded butt joints shall be used. Fittings shall conform to applicable requirements in Tables 1 and 2. The end fitting outlet shall be of standard flared or flareless design. Flareless end fitting terminations shall conform to MA2014 and mate with MA2095.

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- 3.3.1.1 Coupling Nuts: When required, flareless MA2040 coupling nuts or functional equivalents shall be used. Wire retained coupling nuts shall be used to the minimum extent possible, and when used, shall have the retaining wire inserted in a clockwise direction when viewed from the open end of the nut.
- 3.3.1.2 Screw Threads: All fitting threads shall be per AS1370. A thread tolerance increase of 10% after assembly or testing shall not be a cause for rejection.

3.3.2 Hose:

- 3.3.2.1 Inner Tube: The hose inner tube shall be annular convoluted flexible metal construction made from seamless or welded and redrawn corrosion resistant steel tubing. It shall be uniform in size and quality and free from pitting and other defects. There shall be no inner tube splices on hose assemblies up to 1 m in length. One splice is allowed for each additional meter increment of hose assembly length. Splices are undesirable but if required, shall be low profile welds in accordance with 3.3.3 and Fig. 1. After welding, the convolutes shall be closed as shown in Fig. 1.

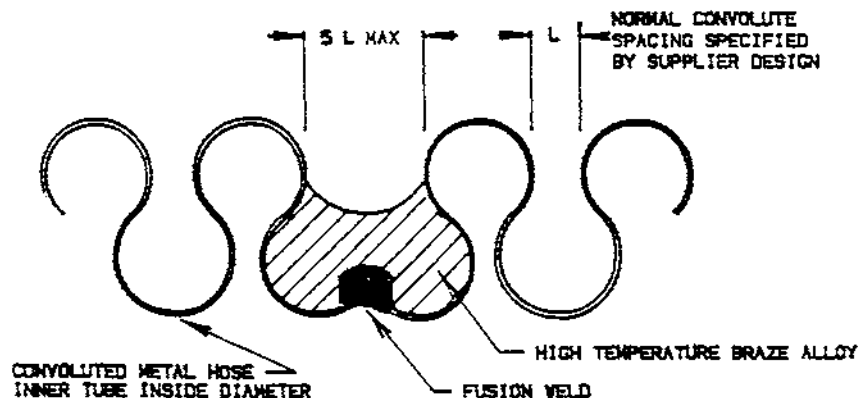


FIGURE 1 - Inner Tube Splice Configuration

- 3.3.2.2 Braid: Braid shall be of corrosion resistant steel wire, braided in such a manner as to meet the requirements of this specification. There shall be no splices or missing or broken wires in the braid wire reinforcement.
- 3.3.3 Welding: All welds shall be fusion welds per MIL-W-8611. Filler wire if required, shall be AISI Type 347 per MIL-R-5031, Class 7A. Equivalent vendor or other comparable welding specifications may be substituted with prior approval by the purchaser.
- 3.3.4 Heat Treatment: If stress relieving is required to meet corrosion and Strauss test requirements, the weld joints shall be stress relieved at $900 \pm 15^\circ\text{C}$ for $2 \text{ h} \pm 15 \text{ min}$ per MIL-H-6875.

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3.4 Dimensions and Weights:

3.4.1 Hose Diameter: The inside diameter of the convoluted hose and the outside diameter of the braid covering shall be as specified in Table 2.

TABLE 2 - Hose Assembly Data, Dimensional and Performance

HOSE NOM SIZE	HOSE		FITTING BORE MIN mm	MINIMUM C/L BEND RADIUS mm		OPERATING PRESSURE kPa MAX		PROOF PRESSURE kPa MIN	BURST PRESSURE kPa MIN	
	I.D. MIN mm	O.D. MAX mm		STATIC	FLEXING	21°C	450°C	21°C	21°C	450°C
DN06	5.5	11.0	3.35	50	100	13 750	7 975	20 650	55 150	31 897
DN08	7.0	13.5	6.50	75	150	12 000	6 960	18 000	48 000	27 840
DN12	11.0	20.5	8.76	100	200	9 600	5 568	14 500	38 600	22 388
DN16	14.0	24.0	10.92	115	230	8 300	4 814	13 400	33 000	19 140
DN20	17.5	29.0	14.4	127	254	7 200	4 176	10 700	29 000	16 820
DN25	23.0	36.0	19.3	150	300	5 500	3 190	8 300	22 000	12 760
DN32	30.0	44.0	23.4	180	360	3 800	2 204	5 700	15 200	8 816

NOTE: For pressure data at other elevated temperatures, multiply data in Table 2 by the percentage correction factor from Table 3 (expressed in decimal equivalent) for desired temperature level.

TABLE 3 - Correction Factor at Elevated Temperatures

Material	Austenitic chrome/nickel steel stabilized for carbide precipitation													
OPERATING TEMP°C	20	50	100	150	200	250	300	350	400	450	500	550	600	650
CORRECTION FACTOR	1.00	0.91	0.84	0.78	0.73	0.69	0.65	0.62	0.60	0.58	0.57	0.57	0.56	0.55