SAE The Engineering Society For Advancing Mobility Land Sea Air and Space®
INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE STANDARD

SAE AS150

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Submitted for recognition as an American National Standard

HOSE ASSEMBLY, TYPE CLASSIFICATIONS OF, BASIC PERFORMANCE AND FIRE RESISTANCE

1. SCOPE:

This SAE Aerospace Standard (AS) establishes Type classification for those hose assemblies commonly used in aerospace fuel, lubricating oil, and hydraulic fluid systems.

1.1 Purpose:

The purpose of this AS is to create a common Classification (Type) system for the aforementioned hose assemblies. This is to facilitate determining comparability within a Type, and offer a consolidated listing of active hose assembly types with performance references including fire resistance properties. (See also Section 6.)

1.2 Product Classification:

Hose assemblies are classified (Type): (See 1.2.4 for examples.)

1.2.1 Basic Performance (Using Roman Numerals): Each basic type is identified by performance in accordance with a military, SAE, or other industry specification(s) based upon pressure rating, temperature rating, and application(s).

1.2.2 Fire Resistance:

1.2.2.1 Suffix Using Lowercase Letters "a" and "b":

a. "a" indicates a fluid flow rate of 5 x ID^2 [generally fuel and lube oil applications]

1.2.2.1 (Continued):

b. "b" indicates a fluid flow rate of 1 x ID^2 [generally hydraulic (pressure and return) applications]

c. No suffix indicates no requirement/qualification for fire resistance.

NOTE: TSO-C75 lists various flow rates based on type, size, and pressure. (See 3.2.)

1.2.2.2 Suffix using upper case letters "A" and "B":

a. "A" indicates AS1055 Class A (5 min) fire resistant. (Same as fire resistance of TSO-C53a and TSO-C75.)

b. "B" indicates AS1055 Class B (15 min) fireproof.

c. No suffix indicates no requirement/qualification for fire resistance.

1.2.3 Special, suffix using the letter "S" to designate an exception.

1.2.3.1 "S" may replace any or all standard codes per 1.2.1 and 1.2.2.

1.2.3.2 "S" may indicate special pressure, special temperature, special flow rate, etc. (See also 3.1.2.3 and 3.1.2.4.)

1.2.4 Type Classification, Examples:

a. Type IV a A
MIL-H-8795 (Fuel)
a = 5 x ID^2 Flow Rate
A = Fire Resistant (5 min)

b. Type VIII b B
AS604
b = 1 x ID^2 Flow Rate
B = Fireproof (15 min)

c. Type VII S B
MIL-H-25579
S = Zero Flow Rate
B = Fireproof (15 min)

Identification must include, as minimum: For Type VII with zero flow rate (special) for 15 min.

a. "1500 psi" OPS Pressure
b. "450 °F" OPS Temperature
c. "0 GPM Flow/CL-B" or "0GPM Flow/15 min"

1.2.5 A further special case is a single performance (pressure rating) standard, such as AS1227 or MIL-H-25579, with two or more temperature classes. The temperature limit must be stated.

1.3 Application:

Section 6 describes the shortcomings of current classification systems in adequately providing for the variety of hose (assembly) materials, operating pressures, temperatures, and fire resistance.

2. APPLICABLE DOCUMENTS:

2.1 SAE Publications:

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

AS604	Hose Assembly, Tetrafluoroethylene, 400 °F, 3000 psi, Hydraulic, Heavyweight
AS614	Hose Assembly, Tetrafluoroethylene, Heavy Duty, High Temperature, High Pressure, 4000 psi, Hydraulic and Pneumatic
AS620	High Temperature Hose Assembly, Convoluted Tetrafluoroethylene, for Aircraft
AIR797	Hose Characteristics and Selection Chart
AS824	Hose Assemblies, Flexible Metal, High Pressure and High Temperature
AS1055	Fire Testing of Flexible Hose, Tube Assemblies, Coils, Fittings and Similar System Components
AS1072	Sleeve, Hose Assembly, Fire Protection
AS1227	High-Temperature, Low Pressure Hose Assembly, Convoluted Tetrafluoroethylene, for Aerospace
AS1339	Hose Assembly, Tetrafluoroethylene, 400 °F, 3000 psi, Hydraulic, Lightweight
AS1424	Hose Assemblies, Metal, Medium Pressure, High Temperature
AIR1569	Handling and Installation Practice for Aerospace Hose Assemblies
AS1946	Hose Assembly Polytetrafluoroethylene (PTFE), Up to 450 °F (232 °C) and 1500 psi (10 500 kPa), Procurement Specification
AS1975	Hose Assemblies, Polytetrafluoroethylene, Aramid Reinforced, 4000 lbf/in^2 (27 500 kPa), Hydraulic and Pneumatic
AS4098	Hose Assembly, Polytetrafluoroethylene, Heavy Duty, Metallic Reinforced, 400 °F (204 °C), 5000 psi, Hydraulic and Pneumatic
AS4388	Hose Assembly, PTFE, Heavy Duty, -65 to 400 °F (-55 to 205 °C), 8000 psi, Hydraulic and Pneumatic
AS4604	Hose Assembly, Polytetrafluoroethylene, Cres Reinforced, Heavy Duty, 400 °F, 3000 psi, Aircraft Hydraulic Systems
AS4623	Hose Assembly, Polytetrafluorethylene, Para Aramid Reinforced, Heavy Duty, 275 °F, 3000 psi, Aircraft Hydraulic Systems

2.2 Military:

Available from DODSSP, Subscription Services Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

MIL-H-8790	Hose Assembly, Rubber, Hydraulic, High Pressure (3000 psi)
MIL-H-8795	Hose Assembly, Rubber, Hydraulic, Fuel & Oil Resistant
MIL-H-25579	Hose Assembly, Tetrafluoroethylene, High Temperature Medium Pressure, General Requirements for
MIL-H-38390	Hose Assembly, Tetrafluoroethylene, Pneumatic, High Pressure
MIL-H-85800	Hose Assembly, Tetrafluoroethylene, Aramid Fiber Reinforced, 5000 and 8000 psi General Specifications for

2.3 Department of Transportation:

Available from U.S. Department of Transportation, Utilization and Storage Section (M-443.2), Washington, DC 20590.

TSO-C42	Propeller Feathering Hose Assemblies (Rubber and Wire Braid Construction)
TSO-C53a	Fuel and Engine Oil System Hose Assemblies (Rubber or Tetrafluoroethylene Tube and Wire Braid Construction)
TSO-C75	Hydraulic Hose Assemblies

3. TECHNICAL REQUIREMENTS:

3.1 Qualification:

Qualification for each Type of hose assembly shall be as specified in the applicable SAE, other industry or military specification(s).

3.1.1 Performance: Materials, form, fit and functional qualification shall be as specified in the hose assembly procurement specification: e.g., AS1946, MIL-H-25579, etc., unless exception(s) is noted in Table 1.

3.1.1.1 AIR797 provides additional tabular data regarding pressure, temperature, sizes available and general notes relative to most hose assembly procurement specifications.

3.1.1.2 AIR1569 provides information guiding selection and installation of various hose (assembly) styles.

3.1.2 Fire Resistance: Fire resistance properties of the hose assembly Type (3.1.1) shall be demonstrated by satisfactory completion of fire test in accordance with AS1055 to the flow rate and class (fire resistant or fireproof) as classified in 1.2.2.1 and 1.2.2.2.

3.1.2.1 Protective sleeve(s), such as those of AS1072, or other accessory(ies) may be used to provide fire protection. Such a device(s) shall not degrade any operational performance characteristic except outer diameter and weight as qualified in 3.1.1. Installation and retention of such device(s) for qualification shall be as provided for an operational/production hose assembly.

TABLE 1 - Reflects Standard Types

AS150[1] Type	Performance Qualification	AS1055[2]	TSO[3/4]
I	[TBD] MIL-H-25579 or AS1946 except at 500 psi operating pressure and hose construction similar to but not necessarily identical to MIL-H-27267 (Ref. G3D93-7)	--	--
IaA	[TBD] MIL-H-25579 or AS1946 except at 500 psi operating pressure and hose construction similar to but not necessarily identical to MIL-H-27267 (Ref. G3D93-7)	IaA	--
IaB	[TBD] MIL-H-25579 or AS1946 except at 500 psi operating pressure and hose construction similar to but not necessarily identical to MIL-H-27267 (Ref. G3D93-7)	IaB	--
II	AS1227[7]	--	--
IIaA	AS1227	IIaA	--
IIaB	AS1227	IIaB	--
III	AS620 or MA2079	--	--
IIIaA	AS620 or MA2079	IIaA	--
IIIaB	AS620 or MA2079	IIaB	--
IV	MIL-H-8795 (Fuel/Oil)	--	C53aA
IVaA	MIL-H-8795 (Fuel/Oil)	IaA	C53aC
IVaB	MIL-H-8795 (Fuel/Oil)	IaB	--
V	MIL-H-83796	--	C53aA
VaA	MIL-H-83796	IaA	C53aC
VaB	MIL-H-83796	IaB	--
VI	MIL-H-8790 or MIL-H-8795 (Hydraulic)	--	C75-1B-P
VIaA	MIL-H-8790 or MIL-H-8795 (Hydraulic)	IbA	C75-1B-P-F
VIaB	MIL-H-8790 or MIL-H-8795 (Hydraulic)	IbB	--
VII	MIL-H-25579 or AS1946 or MA2146[7]	--	C53aB
VIIaA	MIL-H-25579 or AS1946 or MA2146	IIaA	C53aD
VIIaB	MIL-H-25579 or AS1946 or MA2146	IIaB	--
VIII	AS604 (formerly MIL-H-38360)	--	C75-1IIB-S/P
VIIIbA	AS604 (formerly MIL-H-38360)	IIbA	C75-1IIB-S/P-F
VIIIbB	AS604 (formerly MIL-H-38360)	IIbB	--
IX	AS1339 or MA2007 (formerly MIL-H-38360)	--	C75-1IIB-S/P
IXbA	AS1339 or MA2007 (formerly MIL-H-38360)	IIbA	C75-1IIB-S/P-F
IXbB	AS1339 or MA2007 (formerly MIL-H-38360)	IIbB	--
X	AS614 or MA2140 (similar to MIL-H-38390)	--	5
XbA	AS614 or MA2140 (similar to MIL-H-38390)	IIbA	--
XbB	AS614 or MA2140 (similar to MIL-H-38390)	IIbB	--
XI	AS/MA4098	--	--
XII	AS4388	--	--
XIII	AS1975 (Aramid reinforced)	-- 6	--
XIV	AS4623	--	--
XV	MIL-H-85800, Class 5000 (Aramid reinforced)	--	--
XVI	MIL-H-85800, Class 8000 (Aramid reinforced)	--	--
XVII	AS1424 Metal Hose	--	--
XVIII	AS824 Metal Hose	--	--
XIX	AS4604	--	--

1 Typical flow rate code is shown, either rate/code may be applicable.
2 AS1055 addresses fire resistance only.
3 TSO includes "system" performance as well as fire resistance.
4 TSO-C75 Type IA, IIA, or IIIA option may also be qualified where TSO-C53a is the normal qualification for 1500 psi and less. See 3.2.1.2.
5 TSO-C75 Type IIIB does not differentiate 4000 psi, etc., operating pressure from 3000 psi. ("B" is "Greater than 1500 psi up to and including 3000 psi", TSO Table 1 Type Designations.)
6 Aramid reinforced assemblies are normally limited to 275 °F versus AS1055 Type II implication of 400 to 450 °F.
7 For type(s) with two or more temperature classes shall identify temperature limit.

3.1.2.2 A minimum of three hose assemblies of each type and size (ID) shall be satisfactorily tested per AS1055 for each level of qualification - see also 3.1.2.3 and 3.1.2.4.

3.1.2.3 Satisfactory test at a "low" flow rate (1.2.2.1 b or lower) shall be considered qualification at a higher flow rate(s). Likewise qualification at the specified (3.1.1) pressure shall be qualification at a lower pressure with similar flow rate.

3.1.2.4 Satisfactory testing of a higher temperature Type product can be used as a lower temperature "Type" product provided that all other performance requirements of the lower temperature product specification have been met.

3.2 TSO Equivalency:

Table 1 lists current FAA Technical Standard Order (TSO) equivalency to Type classification(s) of this AS.

3.2.1 TSO-C75 flow rate(s) during fire resistance testing may be less severe (higher) than AS150 Type...a or b or AS1055 Type...a or b.

3.2.1.1 TSO-C75 Type IA and IIA (generally rubber, medium pressure) test flow rate is 7 x ID^2 versus 1 x ID^2 of this AS and AS1055 through -16 size with 3 x ID^2 for -20 and 1 x ID^2 for -24 for "hydraulic". This AS shall equate these types to "Type...aA of 5 x ID^2" flow rate for 5 min exposure.

3.2.1.2 TSO-C75 Type IA and IIA "Standards" are not shown in Table 1, as TSO-C53a Types A and C are more common and are 5 x ID^2 flow.

3.3 Type Classification:

See Table 1.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Qualification:

4.1.1 Unless otherwise specified in the contract or purchase order, the manufacturer shall qualify the product(s) of 3.1.1 in accordance with the provisions of the respective procurement/performance specification/standard.

4.1.2 Unless otherwise specified in the contract or purchase order, the manufacturer shall qualify the product(s) of 3.1.2 in accordance with AS1055.

4.1.3 Any "Special application/qualification" shall be addressed in relation to 1.2.3, 3.1.2.3, and 3.1.2.4.