AEROSPACE STANDARD	AS4468	REV. F
	Issued 1992-02 Revised 2013-10 Superseding AS4468E	

Hose Assembly, 125 psi, Lined Silicone, Potable Water, Procurement Specification

RATIONALE

Revision F changes the solid film lubricant (SFL) from AS5272 Type I to AS6449 Type I or II (lead-free). This affects the nut and nut retaining wire(s) if present.

1. SCOPE

This SAE Aerospace Standard (AS) covers the requirements for a flexible, lightweight, low pressure, self-extinguishing, silicone hose assembly. The hose has a fully fluorinated fluoropolymer inner liner and is primarily intended for use in aircraft potable water systems.

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 International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

AMS2472	Anodic Treatment of Aluminum Alloys Sulfuric Acid Process, Dyed Coating
AMS2700	Passivation of Corrosion Resistant Steels
AMS4124	Aluminum Alloy, Rolled or Cold Finished Bars, Rods, and Wire, 5.6Zn - 2.5Mg - 1.6Cu - 0.23Cr (7075-T73, T7351), Solution Heat Treated, Stress Relieved by Stretching, and Overaged
AMS4771	Silver Alloy, Brazing Filler Metal, 50Ag - 16Cd - 15.5Zn - 15.5Cu - 3.0Ni, 1170 to 1270 °F (632 to 688 °C) Solidus-Liquidus Range
AMS4772	Silver Alloy, Brazing Filler Metal, 54Ag - 40Cu - 5.0Zn - 1.0Ni, 1325 to 1575 °F (718 to 857 °C) Solidus-Liquidus Range

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
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SAE values your input. To provide feedback on this Technical Report, please visit
http://www.sae.org/technical/standards/AS4468F

AMS4777	Nickel Alloy, Brazing Filler Metal, 82Ni - 4.5Si - 7.0Cr - 3.1B - 3.0Fe, 1780 to 1830 °F (971 to 999 °C) Solidus-Liquidus Range
AMS4778	Nickel Alloy, Brazing Filler Metal, 92Ni - 4.5Si - 3.1B, 1800 to 1900 °F Solidus-Liquidus Range
AMS5556	Steel, Corrosion and Heat-Resistant, Seamless or Welded Hydraulic Tubing, 18Cr - 11Ni - 0.70Cb (SAE 30347) Solution Heat Treated
AMS5557	Steel, Corrosion and Heat-Resistant, Seamless or Welded Hydraulic Tubing, 18.5Cr - 10.5Ni - 0.40Ti (SAE 30321) Solution Heat Treated
AMS5567	Steel, Corrosion Resistant, Seamless or Welded Hydraulic Tubing, 19Cr - 10Ni (SAE 30304) Solution Heat Treated
AMS5570	Steel, Corrosion and Heat-Resistant, Seamless Tubing, 18Cr - 11Ni - 0.40Ti (321) Solution Heat Treated
AMS5571	Steel, Corrosion and Heat-Resistant, Seamless Tubing, 18Cr - 10.5Ni - 0.70Cb (Nb) (347) Solution Heat Treated
AMS5575	Steel, Corrosion and Heat-Resistant, Welded Tubing, 18Cr - 10.5Ni - 0.70Cb (Nb) (347) Solution Heat Treated
AMS5636	Steel, Corrosion-Resistant, Bars and Wire, 18Cr - 9.0Ni (SAE 30302) Solution Heat Treated and Cold Drawn, 100 ksi (689 MPa) Tensile Strength
AMS5637	Steel, Corrosion Resistant, Bars and Wire, 18Cr - 9.0Ni (SAE 30302) Solution Heat Treated, Cold Drawn and Stress Relieved, 125 ksi (862 MPa) Tensile Strength
AMS5639	Steel, Corrosion-Resistant, Bars, Wire, Forgings, Tubing, and Rings, 19Cr - 10Ni, Solution Heat Treated
AMS5640	Steel, Corrosion-Resistant, Bars, Wire, and Forgings, 18Cr - 9.0Ni, Free Machining
AMS5645	Steel, Corrosion and Heat Resistant, Bars, Wire, Forgings, Tubing, and Rings, 18Cr - 10Ni - 0.40Ti (321) Solution Heat Treated
AMS5646	Steel, Corrosion and Heat-Resistant, Bars, Wire, Forgings, Tubing, and Rings, 18Cr - 11Ni - 0.60Cb(Nb) (347) Solution Heat Treated
AMS5647	Steel, Corrosion-Resistant, Bars, Wire, Forgings, Tubing, and Rings, 19Cr - 9.5Ni, Solution Heat Treated
AMS5648	Steel, Corrosion and Heat-Resistant, Bars, Wire, Forgings, Tubing, and Rings, 17Cr - 12Ni - 2.5Mo (316), Solution Heat Treated
AMS5688	Steel, Corrosion-Resistant, Wire, 18Cr - 9.0Ni (SAE 30302) Spring Temper
AMS5689	Steel, Corrosion and Heat Resistant, Wire, 18Cr - 10.5Ni - 0.40Ti (SAE 30321) Solution Heat Treated
AMS5690	Steel, Corrosion and Heat Resistant, Wire, 17Cr - 12Ni - 2.5Mo (SAE 30316) Solution Heat Treated
AMS5697	Steel, Corrosion-Resistant, Wire, 19Cr - 9.5Ni (SAE 30304) Solution Heat Treated
AMS-QQ-A-225	Aluminum and Aluminum Alloy, Bar, Rod, Wire, or Special Shapes; Rolled, Drawn, or Cold Finished; General Specification For
AMS-QQ-S-763	Steel, Corrosion Resistant, Bars, Wire, Shapes, and Forgings

AMS-STD-2219	Fusion Welding for Aerospace Applications
AS611	Hose Assembly and Tubing, Polytetrafluoroethylene, Cleaning Methods for
ARP908	Torque Requirements, Installation and Qualification Test, Hose and Tube Fitting
AS1073	Sleeve Hose Assembly, Heat Shrinkable
AS1472	Hose Assembly, Low Pressure, Potable Water
AS1650	Coupling Assembly, Threadless, Flexible, Fixed Cavity, Self-Bonding, Procurement Specification
AS1656	Fitting End, Threadless - Flexible, Fixed Cavity, Self-Bonding, Male and Female, Design Standard
AS1791	Wire, Retainer - Tube Coupling Nut
AS4330	Tubing, Flared, Standard Dimensions for, Design Standard
AS4370	Nut, Fitting, Retained
AS4375	Fitting End, Flareless, Design Standard
AS4395	Fitting End, Flared, Tube Connection, Design Standard
AS4468SUP1A	Hose Assembly, 125 psi, Lined Silicone, Potable Water, Procurement Specification (Supplement 1)
AS5272	Lubricant, Solid Film, Heat Cured, Corrosion Inhibiting, Procurement Specification
AS6449	Solid Film Lubricant for Fluid Fittings in Oxygen, Potable Water, Hydraulic, and Other Systems
AS7003	Nadcap Program Requirements
AS7112	National Aerospace and Defense Contractors Accreditation Program Requirements for Fluid System Components
AS8879	Screw Threads - UNJ Profile, Inch, Controlled Radius Root with Increased Minor Diameter
ARP9013	Statistical Product Acceptance Requirements
AS21921	Nut, Sleeve Coupling, Flareless

2.1.2 U.S. Government Publications

Available from DLA Document Services, Building 4/D, 700 Robbins Avenue, Philadelphia, PA 19111-5094, Tel: 215-697-6396, http://quicksearch.dla.mil/.

MIL-A-8625	Anodic Coating for Aluminum and Aluminum Alloys
MIL-STD-129	Military Marking
MIL-STD-810	Environmental Test Methods

2.1.3 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM A269	Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service
ASTM A313/A313M	Standard Specification for Stainless Steel Spring Wire
ASTM A479/A479M	Standard Specification for Stainless Steel Bars and Shapes for Use in Boilers and Other Pressure Vessels
ASTM D570	Standard Method of Test for Water Absorption of Plastics
ASTM A580/A580M	Stainless and Heat-Resisting Steel Wire, Condition A
ASTM A582/A582M	Specification for Free Machining Stainless and Heat Resistant Steel Bars, Hot Rolled and Cold Finished
ASTM A632	Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing (Small Diameter) for General Service
ASTM E1417	Inspection, Penetrant Method of

2.1.4 NAS Publications

Available from Aerospace Industries Association, 1000 Wilson Boulevard, Suite 1700, Arlington, VA 22209-3928, Tel: 703-358-1000, www.aia-aerospace.org.

NAS847	Caps and Plugs, Protective, Dust and Moisture Seal
NAS1760	Fitting End, Flareless Acorn, Standard Dimension for

2.1.5 AWS Publications

Available from American Welding Society, 8669 NW 36 Street, #130, Miami, FL 33166-6672, Tel: 1-800-443-9353 or 305-443-9353, www.aws.org.

AWS A5.8/A5.8M	Filler Metals for Brazing and Braze Welding
AWS A5.9	Rods and Wire, Welding, Corrosion and Heat Resistant Alloys
AWS A5.14/A5.14M	Rods and Wire, Welding, Corrosion Resistant Alloys
AWS C3.6	Specification for Furnace Brazing
AWS D17.1	Specification for Fusion Welding for Aerospace Applications

2.1.6 PRI Publications

Available from Performance Review Institute, 161 Thorn Hill Road, Warrendale, PA 15086-7527, Tel: 724-772-1616, www.pri-network.org.

PD2001	Qualified Product Management Council Procedures for Qualified Products Group
PD2101	Aerospace Quality Assurance, Product Standard, Qualification Procedures, Fluid Systems

2.1.7 Public Health Service Publication

Available from The U.S. Department of Health and Human Services, 200 Independence Avenue, SW, Washington, DC 20201, Tel: 1-877-696-6775, www.hhs.gov.

USPHS No. 308 Handbook of Sanitation of Airlines (United States Public Health Service, Department of Health Education and Welfare)

3. REQUIREMENTS

3.1 Qualification

Hose assemblies supplied in accordance with this procurement specification shall be representative of products which have been subjected to and which have successfully passed the qualification tests specified in this specification.

3.1.1 Manufacturer Qualification

A manufacturer producing a product in conformance to this procurement specification shall be accredited in accordance with the requirements of PD2101, AS7003, and AS7112, and shall be listed in a Performance Review Institute (PRI) Qualified Manufacturers List (QML). See www.eAuditNet.com.

3.1.2 Product Qualification

All products shall conform to the requirements of this procurement specification and shall be approved in accordance with the requirements of PD2001 and PD2101 for listing in a Performance Review Institute (PRI) Qualified Parts List (QPL). See www.eAuditNet.com.

3.2 Materials

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

Materials used in these hose assemblies shall be selected from those listed in Table 1.

3.3 Design and Construction

The hose assembly shall consist of a smooth inner tube with reinforcement braid or covering to meet the requirements of this document and as required for its intended use. Unless other fittings are specified, hose assemblies may have flared fittings to mate with AS4395, flareless fittings per NAS1760 to mate with AS4375 fitting ends, or threadless coupling ends per AS1656-1 or -3. Hose end fittings shall be permanently attached to the hose by crimping or swaging. Hose splicing shall be used only for economical construction of long assemblies. Splices shall not be used in assembly lengths under 120 inches. Splice design and attachment method shall be the same as the hose end fitting.

TABLE 1 - ASSEMBLY MATERIALS

Component	Material Designation	Material Specification	Finish
Nut (Coupling) AS21921, AS4370 or Equivalent	AISI 300 Series Corrosion-Resistant Steel	AMS5636, AMS5637, AMS5639, AMS5645, AMS5646, ASTM A479/A479M	Passivate per AMS2700, Method 1, Type 6 or 7 as applicable and Solid Film Lubricate per AS6449 Type I or II. See Note /1/
	Type 2024 Aluminum Alloy	AMS-QQ-A-225/6	Anodize per AS2472 or MIL-A-8625 Type II, Class 2, Color Optional, Solid Film Lubricate per AS6449 Type I or II. See Note /1/
	Type 7075 Aluminum Alloy	AMS4124 or AMS-QQ-A-225/9	Anodize per AMS2472 or MIL-A-8625, Type II, Class 2, Brown Color, Solid Film Lubricate per AS6449 Type I or II. See Note /1/
Hose (Inner Tube)	Fully Fluorinated Fluoropolymer Lined Silicone Inner Tube		As Manufactured
Hose (Wire Reinforcement)	AISI 300 Series Corrosion-Resistant Steel	ASTM A313/A313M, ASTM A580/A580M (AMS5688, AMS5689, AMS5690, AMS5697)	As Manufactured
Hose (Nonmetallic Braid, Reinforcement, and/or Covering)	Aramid Fiber, Nylon, Polyester, Fire Resistant Composite Fiber, Fiberglass, or Similar Yarns	Commercial	Dark
Insert Fitting (Nipple or Elbow)	AISI Type 303 Series, 304, 304L, 316, or 321 or 347	AMS5567, AMS5556, AMS5557, AMS5570, AMS5571, AMS5575, AMS-QQ-S-763 (AMS5648) ASTM A582/A582M, AMS5640	Passivate per AMS2700, Method 1, Type 2, 6, or 7 as applicable
Socket	AISI Type 303 Series, 304, 304L, 321, or 347 Corrosion-Resistant Steel	AMS5567, AMS-QQ-S-763 (AMS5639) AMS5645, AMS5646 or AMS5647) ASTM A582/A582M, AMS5650, ASTM A269, ASTM A632	Passivate per AMS2700, Method 1, Type 2, 6, or 7 as applicable
	Aluminum 6061	AMS-QQ-A-225/8	Anodize per AS2472 or MIL-A-8625 Tye II, Class 2 Color Optional
Band (Identification)	Polyester Film or Polyolefin with Permanent Marking, Corrosion-Resistant Steel		As Manufactured
Nut Retaining Wire AS1791 or Equivalent	AISI Type 302, 304 or 305 Corrosion-Resistant Steel	ASTM A313/A313M and A580/A580M Condition A (AMS5688, AMS5689, AMS5690, AMS5697 or AMS5685)	Passivate per AMS2700, Method 1, Type 2, 6, or 7 as applicable and Solid Film Lubricate per AS6449 Type I or II. See Note /1/

NOTE /1/ - SOLID FILM LUBRICANT (SFL) PER AS6449 TYPE I OR II SHALL BE USED IN PLACE OF AS5272 TYPE I. EXISTING INVENTORY OF AS5272 TYPE I COATED COMPONENTS MAY BE USED FOR AN ADDITIONAL 6 MONTHS FROM THE DATE OF PUBLICATION OF AS4468 REVISION F. THIS CHANGE DOES NOT REQUIRE RE-QUALIFICATION.

3.3.1 End Fitting

3.3.1.1 Insert Fitting (Nipple and Elbow)

Inserts (nipples and elbows) shall be made of corrosion-resistant steel. They may be one-piece construction, welded or brazed assemblies. Only fusion welded butt joints or brazed lap joints shall be used.

3.3.1.2 Coupling Nuts

Coupling nuts shall be corrosion-resistant steel or aluminum as specified on the standard or drawing. Flareless fitting nuts shall be dimensionally equivalent to AS21921 or AS4370. Nut threads and internal surfaces shall be solid film lubricated in accordance with AS6449 Type I or II. Lubricant on external nut surfaces shall not be reason for rejection. Thread tolerances shall be maintained after the application of the lubricant.

3.3.1.3 Sockets (Collars)

Sockets (collars) shall be corrosion resistant steel or aluminum as specified on the standard or drawing. Sockets shall be crimped or swaged.

3.3.1.4 Screw Threads

All fitting threads shall be in accordance with AS8879, Class 3A or 3B as applicable. A 10% increase to the maximum thread tolerances is permissible after fitting connection.

3.3.1.5 Joining of End Fittings

Fusion welds shall be per AWS D17.1 Class C with 100% penetration. Filler wire, if required, shall be Type 347 per AWS A5.9 or AWS A5.14/A5.14M. Welds shall be penetrant inspected per ASTM E1417. Acceptance criteria shall be in accordance with MIL-STD-1907 grade C or by 100% proof pressure testing. Brazed joints shall be per AWS C3.6, Class C, using a brazing alloy BNi12 per AWS A5.8/A 5.8M.

Brazing alloys AMS4777, AMS4778, AMS4772, and AMS4771 are optional. Brazing shall be accomplished without flux in a vacuum, inert or dry hydrogen atmosphere.

3.3.1.6 Threadless Coupling

Hose assemblies with threadless couplings per AS1650 series standards shall have insert ends per AS1656-1-(size) or AS1656-3-(size).

3.3.1.7 The maximum allowable ID of AS1708 and NAS1760 style fittings shall be in accordance with Table 2.

TABLE 2 - MAXIMUM FITTING I.D.

Size	I.D.
04	0.194
06	0.319
08	0.440
10	0.567
12	0.676
16	0.927

3.3.2 Hose

3.3.2.1 Inner Tube

The inner tube shall be fully fluorinated fluoropolymer lined silicone of a seamless construction. It shall have a smooth inner surface, free of cracks, and shall be nonshedding or particle producing. Only virgin materials shall be used for the inner tube.

3.3.2.1.1 Inner Tube Liner

The inner liner shall be a fully fluorinated fluoropolymer. It shall be free of splits or holes. There shall be no leakage during 2 psi pneumatic proof testing of the fully chlorinated fluoropolymer inner liner, or visible defects when visually inspected against light. No rerun or reclaimed materials shall be used. The inner liner shall be clear, no carbon shall be added. No material or combination of materials that are known to produce toxic effects shall be used. The hose shall not cause an objectionable odor or taste in the water.

3.3.2.2 Reinforcement and Covering

The inner tube shall be reinforced with plies of nonmetallic material and/or wire of sufficient number to meet the requirements of this document. A nonmetallic reinforcement braid may be utilized as the hose outer cover.

3.3.3 Service Life

The hose assembly shall be designed such that it will meet all the requirements of this document. Expected service life (no age limit or environmental degradation) is 20 years.

3.3.4 Corrosion Resistance

Materials (see Table 1) used shall not corrode or have detrimental effect on each other when the hose assembly is exposed to conditions normally encountered in service.

3.3.5 Public Health Service Compliance

All hose assembly materials (see Table 1) which come in contact with the potable water shall comply with Public Health Service Publication 308. The supplier shall obtain Public Health Service approval for any material not already approved.

3.3.6 Temperature Compliance

Each type hose assembly shall be capable of operating at the fluid and ambient temperature between -65 °F (-54 °C) and +160 °F (71 °C).

3.4 Dimensions and Weights

3.4.1 Hose Dimensions

Minimum hose inside diameters and bend radii shall be in accordance with Table 3.

TABLE 3 - HOSE DATA, DIMENSIONS, AND PERFORMANCE RATINGS

Hose Size Code	Hose ID Min	Hose OD Max	Minimum Inside Bend Radius (inch)	Operating Pressure psi max	Proof Pressure psi min	Burst Pressure psi min	Weight pound/inch max
04	0.230	0.48	0.50	125	250	500	0.0060
06	0.355	0.59	0.75	125	250	500	0.0080
08	0.475	0.73	1.00	125	250	500	0.0088
10	0.600	0.85	1.25	125	250	500	0.0120
12	0.725	0.98	1.50	125	250	500	0.0146
16	0.975	1.23	2.00	125	250	500	0.0194

3.4.2 Fitting Dimensions

Basic fitting dimensions shall be as specified on the applicable standard or drawing.

3.4.3 Assembly Length

Hose assembly length designations shall be as specified on the applicable standard or drawing. Flareless hose assemblies with NAS1760 ends shall be measured from gage point to gage point. Flareless hose assemblies with combinations NAS1760 to AS4375 end terminations shall be measured from the NAS1760 gage point to the AS4375 end surface. Hose assemblies with AS1656 fitting ends for threadless coupling shall be measured to the end of the fitting.

3.4.4 Weights

Maximum bulk hose weights shall be in accordance with Table 3. Weights of hose assemblies with standard end fittings shall be determined as shown in the applicable standard or drawing. Weights of hose assemblies with nonstandard end fittings shall be listed on the supplier's drawing when submitted to purchaser for approval.

3.5 Performance

The hose dimensions and ratings, shown in Table 3, shall be verified by meeting or exceeding the following requirements and quality assurance provisions as specified herein.

3.5.1 Examination of Product

Each assembly shall conform dimensionally and materially to this document and the applicable standard or drawing, when examined in accordance with 4.6.1.

3.5.2 Proof Pressure

The hose assembly shall withstand proof pressure of 250 psi at room temperature (70 °F) for 5 minutes without wetting, leakage, or evidence of permanent deformation or malfunction when tested in accordance with 4.6.2.

3.5.3 Hose Length and Diameter Change

The hose assembly shall not change in length and diameter by more than plus or minus the percentage values shown in Table 4 when subjected to operating pressure shown in Table 3 for not less than 30 minutes. The hose assembly shall be tested in accordance with 4.6.3.

TABLE 4 - PERCENT CHANGE IN HOSE LENGTH, DIAMETER, AND FLATTENING

Hose Size Code	Length ± percent	Diameter ± percent	Flattening Percent Max
04	2	4	10
06	2	4	11
08	2	4	12
10	2.5	4	13
12	3	4	13
16	5	4	14

3.5.4 Repeated Freezing

The hose assembly shall be capable of withstanding at least 20 repeated freezing cycles without rupture, bulging, or collapsing hose cross section in excess of 10% of the original hose diameter when tested in accordance with 4.6.4.

3.5.5 Bend Radius

The hose assembly shall be capable of being bent a minimum of 180 degrees around a mandrel having a diameter equal to two times minimum bend radius given in Table 3 without cracking or flattening of hose in excess of the flattening percentage of Table 4 of the original diameter. The test shall be conducted at -20 °F (-29 °C) and +160 °F (71 °C). The hose assembly shall be tested in accordance with 4.6.5.

3.5.6 Hose Droop

The hose assembly shall not droop more than 0.25 inch in 20 inches when tested in accordance with 4.6.6.

3.5.7 Vacuum

The hose assembly shall be capable of withstanding 22 inches of mercury vacuum at 160 °F (71 °C) for at least 10 minutes without evidence of collapse and/or flattening of more than the flattening percentage of Table 4 of the original unbent, and unpressurized diameter when tested in accordance with 4.6.7.

3.5.8 Tensile Strength

The hose assembly end fittings shall be capable of withstanding the Table 5 specified tensile pull without end fitting pull off or hose parting when tested in accordance with 4.6.8.

TABLE 5 - MINIMUM TENSILE LOAD

Hose Size Code	04	06	08	10	12	16
Load (pound)	60	75	100	125	160	250

3.5.9 Repeated Torque

The hose assembly shall be capable of sealing and withstanding specified proof pressure requirements of 3.5.2 when tested in accordance with 4.6.9.

3.5.10 Chlorine and Detergent Resistance

The hose assembly shall show no evidence of leakage or deterioration from exposure to chlorinated water (500 ppm of chlorine) and detergents when tested in accordance with 4.6.10.

3.5.11 Odor and Taste Test

The hose assembly shall not cause any objectionable odor or taste to water when tested in accordance with 4.6.11.

3.5.12 Burst Pressure

The hose assembly shall not rupture and shall show no evidence of leakage at any pressure up to the burst pressure specified in Table 3 and during the 5-minute hold at minimum burst pressure when tested in accordance with 4.6.12.

3.5.13 Flammability

Flammability tests may be witnessed by the purchaser, FAA, or FAA designated Engineering Representative (DER) as applicable.

3.5.13.1 Self-Extinguishing

Hose, when tested vertically per 4.6.13, shall meet the following self-extinguishing requirements:

a. Average self-extinguishing time: 15 seconds max

b. Average burn length: 8 inches or less

c. Average extinguishing time for drippings: 5 seconds or less

3.5.14 Water Absorption

Water absorption of the hose inner tube shall not be greater than 0.1% when tested in accordance with 4.6.14.

3.5.15 Fungus Resistance

The hose assembly inner tube shall not show microscopic evidence of fungus growth that would affect performance of intended purpose when tested per 4.6.15.

3.5.16 Inner Tube Adhesion

There shall be no evidence of lifting or separation of the inner tube from the silicone outer lining when subjected to the compression loads of 4.6.16.

NOTE: Shearing or tearing of the silicone outer lining is permitted as a result of the compressive loading applied by the serrated tool.

3.6 Identification of Hose Assembly

Hose assemblies shall have permanent identification marking on a permanent stainless steel or plastic band, not more than 1.0 inch wide, or on the end fitting. The characters shall be a minimum of 0.064 inch high. The band shall be so designed as to remain tight on the hose to prevent relative movement and resultant chafing and be of sufficient strength to prevent removal by hand. After band installation, a 2.0 inch length of clear polyolefin, per AS1073, shall be heat shrunk to a tight fit over the band. Optional band material without the polyolefin is plastic (mylar, or equivalent). The identification marking shall show the following:

a. “Suitable for Drinking Water”

b. Manufacturer's name or trademark

c. Complete manufacturer's CAGE number and part number

d. Complete "AS" Standard number

e. Operating pressure 125 psi

f. Pressure test symbol PT

g. Date of hose assembly manufacture in terms of month and year

Items (f) and (g) may be permanently marked on one end fitting socket (collar).

3.7 Workmanship

The hose assembly shall be constructed and finished to produce a product free from all defects which would affect functioning in service. Particular attention shall be given to thoroughness of assembly, alignment of parts, protective finish, and removal of burrs and sharp edges.

3.7.1 Dimensions and Tolerances

All pertinent dimensions and tolerances, where interchangeability, operation, or performance of the hose assembly may be affected shall be as specified on the applicable standard or drawing.

3.7.2 Cleaning

All hose assemblies shall be clean for use in potable water systems. Cleaning methods may be in accordance with AS611 Class I, except drying temperature shall not exceed 250 °F, or equivalent.

4. QUALITY ASSURANCE PROVISIONS

4.1 Suppliers Responsibility

The supplier shall be responsible for performance of all quality assurance provisions and inspections specified herein. Accurate records of the testing shall be kept by the supplier and shall be available to the purchaser on request. The supplier's test data, subject to purchaser approval, shall be considered adequate for product qualification. The purchaser reserves the right to perform any of the inspections and tests set forth in this document to ensure conformance to this document.

4.1.1 Rejection and Retest

Rejected hose or hose assemblies shall not be submitted for reinspection without furnishing full particulars concerning the previous rejection and measures taken to overcome the defects.

4.1.2 Defects on Items Already Accepted

If the investigation of the rejection indicates that the defect or defects causing the rejection may exist in hose assemblies previously supplied to the purchaser, the supplier shall advise the purchaser of this condition, the method for identifying these parts, and the recommended corrective action or disposition of the defective parts.

4.2 Purchaser's Responsibility

The purchaser shall establish adequate inspection procedures to ensure that all requirements of this document are met. Emphasis shall be placed on the following aspects:

a. Dimensional conformance

b. Material, finish, and workmanship

c. Marking

d. Pressure test

4.3 Classification of Inspections

The examining and testing of the hose assemblies are classified as follows:

a. Qualification inspections

b. Quality conformance inspections

4.4 Qualification Inspections

The qualification inspections outlined herein are intended to qualify a manufacturer's hose construction and end fitting attachment method only. The configuration of the outlet ports shall be as described on the standard drawing. A number shall be assigned for each attachment method and hose construction used for qualification. The attachment method and hose shall be fully described in the test report by design standard drawings. All other end connections shall also be considered qualified, provided the hose and hose attachment method have not been altered.

4.4.1 Test Specimens

Seven hose assemblies of each hose size shall be used for qualifying performance of the manufacturer's product. For flareless end fitting configurations, the Table 6 standard "AS series" hose assemblies shall be used for qualifying hose assemblies to this document.

TABLE 6 - TEST SPECIMEN CONFIGURATIONS

Specimen	Basic Part Number	Hose Assembly Size Code and Specimen - Number 04	Hose Assembly Size Code and Specimen - Number 06	Hose Assembly Size Code and Specimen - Number 08	Hose Assembly Size Code and Specimen - Number 10	Hose Assembly Size Code and Specimen - Number 12	Hose Assembly Size Code and Specimen - Number 16
1	AS4470	-04-0180	-06-0180	-08-0180	-10-0180	-12-0220	-16-0290
2	AS4471	-04-0180	-06-0180	-08-0180	-10-0180	-12-0220	-16-0290
3	AS4469	-04-0180	-06-0180	-08-0200	-10-0200	-12-0240	-16-0240
4	AS4469	-04-0180	-06-0180	-08-0200	-10-0200	-12-0240	-16-0240
5	AS4469	-04-0080	-06-0080	-08-0100	-10-0100	-12-0120	-16-0120
6	AS4469	-04-0080	-06-0080	-08-0100	-10-0100	-12-0120	-16-0120
7	AS4474	E0700-000	G0700-000	H0700-000	J0700-000	K0700-000	M0700-000

4.4.2 Test Schedule and Sequence

The test specimens shall be subjected to qualification tests in the order indicated in Table 7.

TABLE 7 - TEST SCHEDULE AND SEQUENCE

Test Title	Paragraph Number	Specimen Numbers /1/ 1	Specimen Numbers /1/ 2	Specimen Numbers /1/ 3	Specimen Numbers /1/ 4	Specimen Numbers /1/ 5	Specimen Numbers /1/ 6	Specimen Numbers /1/ 7
1. Examination of Product	4.6.1	X	X	X	X	X	X	X
2. Proof Pressure Test	4.6.2	X	X	X	X	X	X	X
3. Length and Diameter Change Test	4.6.3	X	X					
4. Repeated Freeze Test	4.6.4			X	X			
5. Bend Radius Test	4.6.5	X	X					
6. Proof Pressure Test	4.6.2	X	X	X	X			
7. Hose Droop Test	4.6.6							X
8. Vacuum Test	4.6.7	X	X					
9. Tensile Test	4.6.8			X	X			
10. Repeated Torque Test	4.6.9					X	X	X
11. Proof Pressure Test	4.6.2	X	X			X	X	X
12. Chlorine and Detergent Test	4.6.10	X	X					
13. Odor and Taste Test /3/	4.6.11			X	X			
14. Burst Test	4.6.12	X	X			X	X	X
15. Flammability Test /2/	4.6.13							
16. Water Absorption Test /2/	4.6.14							
17. Fungus Test /2/	4.6.15							
18. Adhesion Test /2/	4.6.16							

/1/ See Table 6 for hose end fitting configuration and length.
/2/ Bulk hose or specimen cut from hose assembly, lengths as specified by applicable test procedure.
/3/ Test needed in one size only.

4.5 Quality Conformance Inspections

Quality conformance inspections shall consist of the following:

a. Individual tests

b. Periodic control tests

4.5.1 Individual Tests (Functional Tests)

Individual tests shall be in accordance with ARP9013 and applicable slash sheet(s) with an acceptance number zero.

NOTE: ARP9013 allows for the use of a variety of statistical methods for product acceptance, including ANSI/ASQ Z1.4, Squeglia C=0 tables, continuous sampling for lot size = 1 applications, and SPC, each with appropriate controls as documented in the various ARP9013 slash-numbered documents.

a. Examination of product.

Each production hose assembly lot shall be examined for workmanship, overall length, hose OD, end fitting configuration, fitting orientation and marking as a minimum, using a minimum Initial Reliability Requirement (IRR) of 98% and a sample size in accordance with Table 8.

TABLE 8 – 98% IRR MINIMUM SAMPLE SIZES

Lot Size up to 25	All
26 – 52	25
53 – 57	26
58 – 63	27
64 – 74	28
75 – 104	29
105 – 126	30
127 – 181	31
182 – 303	32
304 – 693	33
694 or Larger	34

b. Proof pressure test per 4.6.2.

Each production hose assembly (100%) shall be proof pressure tested per 4.6.2 except test duration shall be 30 seconds minimum.

4.5.2 Periodic Control Tests

The following tests shall be performed on three hose assemblies per size selected at random from a production run. Periodic testing shall be performed every 2 years on each size of hose. If production is limited or does not have suitable hose assemblies for periodic testing, production orders shall be issued for the test hose assemblies.

a. Proof pressure test per 4.6.2 (all hose assemblies)

b. Repeated freeze test per 4.6.4 (one hose assembly)

c. Bend radius test per 4.6.5 (one hose assembly)

d. Tensile test per 4.6.8 (one hose assembly)

e. Adhesion test per 4.6.16 (one hose sample from each hose lot)

4.6 Test Methods

4.6.1 Examination of Product

All test specimens, as shown in Table 7, shall be carefully examined to determine dimensional and material compliance with the applicable hose assembly standards or drawing.

4.6.2 Proof Pressure Test

All test specimens, as shown in Table 7, shall be subjected to a proof pressure test at room temperature with clean potable water or the option of air while immersed under water to a proof pressure of 250 psi. Pressure shall be maintained for 5 minutes (see 3.5.2).

4.6.3 Hose Length and Diameter Change Test

Test specimens 1 and 2, as shown in Table 7, shall be placed in a straight, unpressurized position. A standard 10 inch ± 0.015 inch length shall be marked off on each hose and the actual gage length recorded. The hose diameter shall be measured at least in three places randomly selected along the 10 inch length and the measurements averaged. The hose assemblies shall then be pressurized to operating pressure and the diameter and gage length measurements again taken in the same location as the first measurement while pressurized (see 3.5.3).