



**CSA
Group**

ASME A112.18.6-2017/CSA B125.6-17

Flexible water connectors



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Preface

This is the second edition of ASME A112.18.6/CSA B125.6, *Flexible water connectors*. It supersedes the previous edition published in 2009.

The following changes appear in this edition:

- a) updated reference to the latest edition of NSF 61;
- b) revised working temperatures;
- c) new low lead requirements;
- d) updated fill valve thread requirements; and
- e) updated ice maker pressure drop requirements.

This Standard is considered suitable for use for conformity assessment within the stated scope of the Standard.

This Standard was prepared by the ASME/CSA Joint Harmonization Task Group on Plumbing Fittings, under the jurisdiction of ASME Standards Committee on Plumbing Materials and Equipment and the CSA Technical Committee on Plumbing Fittings. The CSA Technical Committee operates under the jurisdiction of the CSA Strategic Steering Committee on Water Management Products, Materials, and Systems. This Standard has been formally approved by the ASME Standards Committee and the CSA Technical Committee. This Standard was approved as an American National Standard by the American National Standards Institute on June 19, 2017.

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ASME A112.18.6-2017/CSA B125.6-17

Flexible water connectors

1 Scope

1.1

This Standard covers flexible water connectors for use in water supply systems under

- a) continuous pressure in accessible locations; and
- b) intermittent pressure in recreational vehicles only.

1.2

In this Standard, “shall” is used to express a requirement, i.e., a provision that the user is obliged to satisfy in order to comply with the standard; “should” is used to express a recommendation or that which is advised but not required; and “may” is used to express an option or that which is permissible within the limits of the Standard.

Notes accompanying clauses do not include requirements or alternative requirements; the purpose of a note accompanying a clause is to separate from the text explanatory or informative material.

Notes to tables and figures are considered part of the table or figure and may be written as requirements.

Annexes are designated normative (mandatory) or informative (non-mandatory) to define their application.

1.3

SI units are the units of record in Canada. In this Standard, the yard/pound units are shown in parentheses. The values stated in each measurement system are equivalent in application; however, each system is to be used independently. Combining values from the two measurement systems can result in non-conformance with this Standard.

All references to gallons are to U.S. gallons.

For information on the conversion criteria used in this Standard, see Annex B.

2 Reference publications

This Standard refers to the following publications, and where such reference is made, it shall be to the edition listed below, including all amendments published thereto.

ASME (The American Society of Mechanical Engineers)

A112.19.5-2005

Trim for Water-Closet Bowls, Tanks, and Urinals

B1.1-2003 (R2008)

Unified Inch Screw Threads (UN and UNR Thread Form)

B1.20.1-1983 (R2006)
Pipe Threads, General Purpose, Inch

B1.20.3-1976 (R2003)
Dryseal Pipe Threads, Inch

B1.20.7-1991 (R2003)
Hose Coupling Screw Threads, Inch

B16.18-2001 (R2005)
Cast Copper Alloy Solder Joint Pressure Fittings

B16.22-2001 (R2005)
Wrought Copper and Copper Alloy Solder Joint Pressure Fittings

B16.26-2006
Cast Copper Alloy Fittings for Flared Copper Tubes

ASME (The American Society of Mechanical Engineers)/CSA Group

ASME A112.18.1-2012/CSA B125.1-12
Plumbing supply fittings

ASSE (American Society of Sanitary Engineering)/ASME (The American Society of Mechanical Engineers)/CSA Group

ASSE 1002-2015/ASME A112.1002-2015/CSA B125.12-15
Anti-siphon fill valves for water closet tanks

ASSE (American Society of Sanitary Engineering)

1061-2006
Performance Requirements for Removable and Non-Removable Push-Fit Fittings

ASTM International (American Society for Testing and Materials)

D6284-09
Standard Test Method for Rubber Property — Effect of Aqueous Solutions with Available Chlorine and Chloramine

ANSI (American National Standards Institute)/ISA (Instrumentation, Systems, and Automation Society)

75.02-1996
Control Valve Capacity Test Procedures

NSF International/ANSI (American National Standards Institute)

61-2015
Drinking Water System Components — Health Effects

NSF/ANSI 372-2016
Drinking Water System Components — Lead content

SAE International (Society of Automotive Engineers)

J512 (1997)

*Automotive Tube Fittings***3 Definitions and abbreviations****3.1 Definitions**

The following definitions shall apply in this Standard:

Accessible — readily serviceable or readily replaceable.

Flexible water connector (flexible connector) — a non-rigid tube or hose with end connections used for connecting a water supply to a fixture, fitting, or appliance.

Push-fit fitting — a mechanical fitting that joins pipes or tubes and achieves a seal by pushing the mating pipe or tube into the fitting by hand. The fitting can be removable or non-removable.

3.2 Abbreviations

The following abbreviations shall apply in this Standard:

NPT — National Pipe Taper

NPTF — National Pipe Taper Fuel and Oil

UNS — Unified National Special

4 General requirements

Note: *The provisions of this Standard are not intended to prevent the use of alternative materials or manufacturing methods for products that meet the intent of this Standard.*

4.1 Toxicity and lead content**4.1.1**

Flexible connectors used for delivery of drinking water shall comply with the applicable requirements of NSF/ANSI 61.

4.1.2

Solder and fluxes shall not exceed 0.2% lead content by mass. Metal alloys shall not exceed 3.7% lead content by mass.

4.1.3

Flexible connectors intended to convey or dispense water for human consumption through drinking or cooking shall not contain a weighted average lead content in excess of 0.25% when evaluated in accordance with the test method specified in NSF/ANSI 372.

4.2 Materials

Note: *Annex A provides information on the effects of aqueous chloramine on elastomers.*

4.2.1

Copper alloy components shall contain at least 56% copper.

4.2.2

Stainless steel components in contact with water shall be made from 300 or 400 series stainless steel. Ferrous steel parts not in contact with water shall be protected by a coating that complies with Clause 4.3.

4.3 Coatings

Coatings shall be tested in accordance with and meet the requirements of Clause 5.2 of ASME A112.18.1/CSA B125.1.

4.4 Connections

4.4.1 General

Connections shall comply with the performance requirements of this Standard (see Clause 5) and, as applicable, Clauses 4.4.2 to 4.4.7.

4.4.2 Pipe threads

NPT or NPTF threads shall comply with the L1 gauge requirements of ASME B1.20.1 or ASME B1.20.3 using a tolerance of ± 1 turn. Other pipe threads shall comply with ASME B1.20.1.

4.4.3 Hose end threads

Hose end threads shall

- a) be compatible with hose end threads that comply with ASME B1.20.7; and
- b) comply with the requirements of this Standard.

4.4.4 Fill valve threads

Fill valve threads shall comply with ASSE 1002/ASME A112.1002/CSA B125.12, except that fill valve threads may be Class 2B.

4.4.5 Solder connections

The length and diameter of the joint section of a solder joint end for connection to copper tube or copper tube fittings shall be as specified in ASME B16.18 or ASME B16.22. Flexible connectors for soldering to the water distribution system shall not contain soldered assemblies.

4.4.6 Flare connections

Flare connections shall

- a) be compatible with flare connections that comply with ASME B16.26; and
- b) comply with the requirements of this Standard.

4.4.7 Compression connections

Compression connections shall

- a) be compatible with compression connections that comply with SAE J512; and
- b) comply with the requirements of this Standard.

4.4.8 Push-fit fittings

Connections achieved by push-fit fittings shall comply with ASSE 1061 and the applicable requirements of this Standard.

4.4.9 Alternate connections

Alternate connections shall meet the performance requirements of this Standard.

4.5 Water heater flexible connectors

Metallic water heater flexible connectors shall be made of

- a) 300 series stainless steel with a minimum wall thickness of 0.25 mm (0.010 in); or
- b) copper with a minimum wall thickness of 0.7 mm (0.026 in).

4.6 Working pressure

Flexible connectors shall function at

- a) supply pressures between 140 and 860 kPa (20 and 125 psi); and
- b) intermittent impulse pressures not exceeding 1240 kPa (180 psi).

4.7 Working temperature

Flexible connectors

- a) intended for hot and cold water applications shall function at supply temperatures between 4 and 71°C (40 and 160°F) and shall withstand water at 85 °C (185°F) for 0.5 h without failure of the pressure envelope; or
- b) intended only for cold water applications shall function at supply temperatures between 4 and 43 °C (40 and 110 °F) and shall withstand water at 52 °C (125°F) for 0.5 h without failure of the pressure envelope.

5 Performance requirements and test methods

5.1 General

5.1.1

A specimen representing each combination of nominal diameter, connection type, and material shall be tested.

5.1.2

Separate specimens shall be used for each test specified in this Standard.

5.2 Intermittent impulse pressure test

5.2.1 Performance

Flexible connectors shall withstand intermittent impulse pressures not exceeding 1280 kPa (185 psi) when tested in accordance with Clause 5.2.2. In addition, on completion of such testing, the flexible connectors shall not leak when tested in accordance with the blocked outlet procedure specified in Clause 5.3.1.3 of ASME A112.18.1/CSA B125.1.

5.2.2 Procedure

The intermittent impulse pressure test shall be conducted as follows:

- a) Supply water to the specimen in such a manner that the flowing pressure upstream of the specimen does not exceed 517 kPa (75 psi) and the flow rate is 7.6 ± 1.9 L/min (2.0 ± 0.5 gpm), at the following temperatures:
 - i) 82 ± 3 °C (180 ± 5 °F) for flexible connectors intended for hot and cold water applications; and
 - ii) 49 ± 3 °C (120 ± 5 °F) for flexible connectors intended only for cold water applications.
- b) For each cycle, stop the flow and increase the pressure from 517 kPa (75 psi) to 1240 ± 35 kPa (180 ± 5 psi).
- c) Cycle the specimen for 100 000 cycles at a minimum of 7 cycles/min at the following rates:
 - i) 3 ± 1 s at 517 kPa (75 psi) maximum; and
 - ii) 3 ± 1 s at 1240 ± 35 kPa (180 ± 5 psi) maximum.

5.3 Burst pressure test

5.3.1 Performance

Flexible connectors shall not leak when subjected to the hydrostatic burst pressure test specified in Clause 5.3.2.

5.3.2 Procedure

The burst pressure test shall be conducted as follows:

- a) Fill the specimen with water.
- b) For flexible connectors intended
 - i) for hot and cold water applications, submerge the specimen in water at 82 ± 3 °C (180 ± 5 °F) for 30 min. Alternatively, if the medium is air, condition the specimen for 60 min at ambient laboratory conditions while flowing water at 82 ± 3 °C (180 ± 5 °F) through it; or
 - ii) only for cold water applications, submerge the specimen in water at 49 ± 3 °C (120 ± 5 °F) for 30 min. Alternatively, if the medium is air, condition the specimen for 60 min at ambient laboratory conditions while flowing water at 49 ± 3 °C (120 ± 5 °F) through it.
- c) Pressurize the specimen at 1724 ± 35 kPa (250 ± 5 psi).
- d) Hold the specimen at the temperature and pressure specified in Items b) and c) for 30 min.
- e) Remove the specimen from the water, if applicable.
- f) Inspect the specimen for leaks while it is still being subjected to the test pressure.

5.4 Pressure drop test

5.4.1 Performance

The pressure drop across the specimen shall not exceed the applicable value specified in Table 1 when it is tested in accordance with Clause 5.4.3. This requirement shall not apply to flexible connectors that are an integral part of a faucet that complies with ASME A112.8.1/CSA B125.1.

5.4.2 Set-up

The test assembly shall be set up in accordance with Part 4 of ANSI/ISA-75.02. The test specimen shall consist of a flexible water connector bent 180° around a mandrel of the applicable size specified in Table 1.

5.4.3 Procedure

The pressure drop test shall be conducted as follows:

- a) Supply water at the applicable flow rate specified in Table 1 for at least 30 s.
- b) At the end of the 30 s, measure the pressure drop across the specimen.

5.5 Torque test

Flexible connectors shall not leak or otherwise fail when tested in accordance with Clause 5.3.4.2 of ASME A112.18.1/CSA B125.1.

6 Markings

6.1

Except as specified in Clause 6.2, flexible connectors shall be permanently marked with the manufacturer's recognized name, trademark, or other mark.

6.2

Flexible connectors that are not permanently marked with the manufacturer's recognized name, trademark, or other mark shall be permanently marked with the recognized name, trademark, or other mark of the customer for whom the connector was manufactured.

6.3

Flexible connectors marked in accordance with Clause 6.1 may also be marked with the name, trademark, or other mark of the customer for whom the connector was manufactured, by placing a permanent mark or non-permanent label or tag on the connector.

6.4

6.4.1

In addition to meeting the requirements of Clause 6.1 or 6.2, flexible connectors shall be marked "For use with water in accessible locations only".* This requirement shall be met by placing a permanent mark or non-permanent label or tag on the connector.

* The equivalent French wording is "Pour utilisation avec de l'eau dans les endroits accessibles seulement".

6.4.2

The requirement in Clause 6.4.1 shall not apply to flexible connectors that are an integral part of a faucet that complies with ASME A112.8.1/CSA B125.1.

6.4.3

In addition to meeting the requirements of Clause 6.1 or 6.2, flexible connectors intended only for cold water applications shall be permanently marked "Only for use with cold water".*

* The equivalent French wording is "Pour utilisation avec eau froide seulement".

6.4.4

The requirement specified in Clause 6.4.3 shall not apply to flexible connectors that are an integral part of a fixture fitting that complies with ASME A112.8.1/CSA B125.1.

Table 1
Maximum pressure drop for flexible connectors
 (See Clause 5.4.)

Application	Typical nominal sizes	Mandrel size, mm (in)	Flow rate, L/m (gpm)	Maximum pressure drop, kPa (psi)
Clothes washer	3/4 in hose thread	127.0 (5.0)	15.1 (4.0)	172.4 (25.0)
Faucet or dishwasher	3/8 to 1/2 in OD tube	127.0 (5.0)	7.6 (2.0)	103.4 (15.0)
Fill valve	3/8 to 1/2 in OD tube	127.0 (5.0)	7.6 (2.0)	69.0 (10.0)
General connector	NPS-1	304.8 (12.0)	94.6 (25.0)	13.8 (2.0)
	NPS-1-1/4	381.0 (15.0)	113.6 (30.0)	13.8 (2.0)
	NPS-1-1/2	457.2 (18.0)	113.6 (30.0)	13.8 (2.0)
	NPS-2	609.6 (24.0)	151.4 (40.0)	13.8 (2.0)
Icemaker	1/4 in OD tube	127.0 (5.0)	1.9 (0.5)	110.3 (16.0)
Water heater	5/8 to 7/8 in OD tube or NPS-3/4 pipe	127.0 (5.0)	37.9 (10.0)	27.6 (4.0)

Notes:

- 1) Tolerances on mandrel sizes shall be $\pm 5\%$.
- 2) Tolerances for flow rates shall be -0% , $+5\%$.

Annex A (informative)

Exposure to aqueous chloramine

Note: *This Annex is not a mandatory part of this Standard.*

A.1 General

Accelerated life-cycle testing and anecdotal evidence have shown that exposure to aqueous chloramine can have deleterious effects on some elastomers used for flexible connectors. ASTM D6284 can be useful in evaluating the chloramine resistance of elastomers.

Annex B (informative)

Unit conversion and rounding criteria

Note: *This Annex is not a mandatory part of this Standard.*

B.1

The following conversion rules are used in this Standard:

- a) Zeros to the left of the first non-zero digit are not significant.
- b) If the number is greater than 1, all zeros to the right of the decimal point are significant.
- c) In multiplication and division, the original number with the smallest number of significant digits determines the number of significant digits in the product or quotient.
- d) If an exact constant is used (e.g., 3 ft = 1 yd), it does not affect the number of significant digits in the calculated value.
- e) If inexact constants are used (e.g., $\pi = 3.1416$), the constant with at least one more significant digit than the smallest number of significant digits in the original data is used.

B.2

The following rounding rules are used in this Standard:

- a) The digits that follow the last significant digit are dropped if the first digit is less than 5.
- b) If the first digit dropped is greater than 5, the preceding digit is increased by 1.
- c) If the first digit dropped is 5 and there are non-zero digits following the 5, the preceding digit is increased by 1.
- d) If the first digit dropped is 5 and there are only zeros following the 5, the digit is rounded to the even number (e.g., for three significant digits, 1.655000 becomes 1.66, 1.625000 becomes 1.62).
- e) For maximums and minimums, rounding is performed within the range of the maximum and minimum values in a way that does not violate the original limits.



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