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Group**

**ASME A112.4.14-2017/  
CSA B125.14-17**

# **Manually operated valves for use in plumbing systems**





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# Preface

This is the first edition of ASME A112.4.14/CSA B125.14, *Manually operated shutoff valves for use in plumbing systems*. This Standard replaces ASME A112.4.14-2004, *Manually operated, quarter-turn shutoff valves for use in plumbing systems*.

This Standard is considered suitable for use with conformity assessment within its stated scope.

This Standard was prepared by the ASME/CSA Harmonization Task Group on Plumbing Fixtures, under the jurisdiction of the ASME A112 Standards Committee on Plumbing Materials and Equipment and the CSA Technical Committee on Plumbing Fixtures. The CSA Technical Committee operates under the jurisdiction of the CSA Strategic Steering Committee on Construction and Civil Infrastructure. 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 1, 2017.

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  - d) rationale for the change.



# ***ASME A112.4.14-2017/CSA B125.14-17***

## ***Manually operated valves for use in plumbing systems***

### **1 Scope**

#### **1.1**

This Standard specifies requirements for manually operated valves, also known as supply line stops, in sizes NPS 4 and smaller.

#### **1.2**

Valves covered by this Standard are intended for

- a) installation as water shutoff valves between the meter and the supply stop; and
- b) service at temperatures between 5 °C (40 °F) and 71 °C (160 °F), with an allowable working pressure rating not less than 862 kPa (125 psi).

#### **1.3**

This Standard does not apply to hose end valves or endpoint devices as defined in Section 9 of NSF/ANSI 61.

#### **1.4**

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.

#### **1.5**

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 [A](#).

## 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)/CSA Group**

ASME A112.18.1-2012/CSA B125.1-2012

*Plumbing supply fittings*

### **ASME (The American Society of Mechanical Engineers)**

B1.1-2003 (R2008)

*Unified Inch Screw Threads, (UN and UNR Thread Form)*

B1.20.1-2013

*Pipe Threads, General Purpose, Inch*

B16.18-2012

*Cast Copper Alloy Solder Joint Pressure Fittings*

B16.22-2013

*Wrought Copper and Copper Alloy Solder Joint Pressure Fittings*

B16.26-2013

*Cast Copper Alloy Fittings for Flared Copper Tubes*

B16.51-2013

*Copper and Copper Alloy Press-Connect Pressure Fittings*

### **CSA Group**

B242-05 (R2016)

*Groove-and shoulder-type mechanical pipe couplings*

CSA B137.5-17

*Crosslinked polyethylene (PEX) tubing systems for pressure applications*

CSA B137.6-17

*Chlorinated polyvinylchloride (CPVC) pipe, tubing, and fittings for hot- and cold-water distribution systems*

### **ASSE (American Society of Sanitary Engineering)**

1061-2015

*Performance Requirements for Push-Fit Fittings*

### **ASTM International (American Society for Testing and Materials)**

D1599-2014e1

*Standard Test Method for Resistance to Short-Time Hydraulic Pressure of Plastic Pipe, Tubing, and Fittings*

D1784-2011

*Standard with Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chlorinated) (CPVC) Compounds*

D2466-2015

*Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40*

D2467-2015

*Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80*

D2846-2014

*Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Hot- and Cold- Water Distribution Systems*

E29-2013

*Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications*

F439-2013

*Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80*

F1498-2008(2012)e1

*Standard Specification for Metallic Mechanical Fittings for Use on Outside Diameter Controlled Thermoplastic Gas Distribution Pipe and Tubing*

F1970-2012e1

*Standard Specification for Special Engineered Fittings, Appurtenances or Valves for use in Poly (Vinyl Chloride) (PVC) and Chlorinated Poly (Vinyl Chlorinated) (CPVC) Systems*

**AWWA (American Water Works Association)**

C606-2015

*Grooved and Shouldered Joints*

**NSF International**

NSF/ANSI 61-2016

*Drinking Water System Components — Health Effects*

NSF/ANSI 359-2016

*Valves for Crosslinked Polyethylene (PEX) Water Distribution Tubing Systems*

NSF/ANSI 372-2016

*Drinking Water System Components — Lead content*

**ISA (The International Society of Automation)**

ISA/ANSI 75.01.01-2012 (IEC 60534-2-1 MOD)

*Industrial-Process Control Valves — Part 2-1: Flow capacity — Sizing equations for fluid flow under installed conditions*



## 3 Definitions and abbreviations

### 3.1 Definitions

The following definitions shall apply in this Standard:

**Fine control valve** — a valve designed to accurately and precisely adjust the flow of water (e.g., needle valve).

**Flow coefficient ( $C_v$ )** — flow coefficient is a relative measure of a valve's efficiency at allowing fluid flow. Numerically  $C_v$  is equal to the number of gallons of water at 60 °F that will flow through the valve in 1 minute when the pressure differential across the valve is 1 psi.

**Note:** See definition of **Flow factor**.

**Flow factor ( $K_v$ )** — the flow rate, measured in cubic meters per hour, of water at 16 °C with a pressure drop across the valve of 100kPa.

**Note:** The flow factor is the metric equivalent to the flow coefficient ( $C_v$ ) and it is used in Europe and Asia

**Supply line stop** — a valve used to control the flow of water in a distribution system, except a supply stop.

**Supply stop** — a valve that is placed immediately upstream of a terminal fitting to shut off the water supply to the terminal fitting so that it can be serviced or replaced.

**Valve** — a fitting with a movable part that regulates the flow of water through one or more passages.

### 3.2 Abbreviations

The following abbreviations shall apply in this Standard:

CPVC = chlorinated polyvinylchloride

$C_v$  = flow coefficient

$K_v$  = flow factor

NPS = nominal pipe size

PEX = crosslinked polyethylene

PVC = polyvinylchloride

## 4 Design requirements

### 4.1 Rated pressure and temperatures

Valves shall be designed for temperatures between 5 °C (40 °F) and 71 °C (160 °F), with an allowable working pressure rating not less than 862 kPa (125 psi).

### 4.2 End connections

#### 4.2.1 Taper pipe threads

Metallic taper pipe threads shall be in accordance with ASME B1.20.1. Plastic taper pipe threads shall be in accordance with ASTM F1498.

### 4.2.2 Solder joints

The dimensions of solder joint ends for connection to copper tubes or fittings (other than factory-assembled parts) shall comply with ASME B16.18 or ASME B16.22, as applicable.

### 4.2.3 Solvent cement connections

Socket ends for solvent-cement connection to PVC or CPVC pipe or tube shall be in accordance with

- a) ASTM D2466 or ASTM D2467 for connections to PVC pipe; and
- b) ASTM D2846, ASTM F439 or CSA B137.6 for connections to CPVC pipe.

### 4.2.4 PEX connections

Valves for connection to PEX water distribution systems tubing shall be in accordance with the applicable requirements in Clause 5 of NSF/ANSI 359 or Clause 5 of CSA B137.5.

### 4.2.5 Flared connections

Flared connections to copper tube shall be in accordance with ASME B16.26. The screw thread dimensions of flared and ball sleeve (compression) tube fittings shall comply with ASME B1.1.

### 4.2.6 Grooved ends

Grooved end connections shall be in accordance with AWWA C606 or CSA B242.

### 4.2.7 Push-fit fittings

Connections achieved by push-fit fittings shall comply with ASSE 1061.

### 4.2.8 Press-connect fittings

Ends of press-connect fittings shall be in accordance with ASME B16.51.

### 4.2.9 Other connections

Connection methods not specified herein shall be in accordance with a nationally or internationally recognized standard.

## 4.3 Materials

### 4.3.1 General

The requirements in Clauses 4.3.2 to 4.3.5 pertain to materials used in valve body, bonnet, end pieces, pressure-containing parts, and wetted operating parts.

### 4.3.2 Copper alloys

Copper alloys shall have a copper content of at least 58% by weight.

### 4.3.3 Ferrous alloys

Ferrous alloys shall be stainless steel 300 or 400 series.

### 4.3.4 Polymeric materials

#### 4.3.4.1

PEX compounds shall be suitable for use within the rated temperature range.



#### 4.3.4.2

PVC compounds used for pressure containing parts shall comply with cell classification 12454, 13354, 11443, or 14333, as specified in ASTM D1784.

#### 4.3.4.3

CPVC compounds used for pressure containing parts shall comply with cell classification 23447, as specified in ASTM D1784.

#### 4.3.5 Alternate materials

Alternate materials shall comply with national or international standards for which mechanical and chemical data are available.

### 4.4 Toxicity and lead content

#### 4.4.1

Valves intended for potable use shall comply with the applicable requirements of NSF/ANSI 61.

#### 4.4.2

Solders and fluxes in contact with potable water shall not exceed, by mass, 0.2% lead content. Metal alloys in contact with potable water shall not exceed 8% lead content.

#### 4.4.3

Valves 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 in NSF/ANSI 372.

### 4.5 Stem design

The valve shall be designed so that the stem-seal alone does not retain the stem to prevent the removal of the stem while the valve is under pressure.

## 5 Performance requirements and test procedures

### 5.1 Burst pressure

#### 5.1.1 Performance requirements

When tested in accordance with Clause 5.1.2 or 5.1.3, the valve shall show no signs of leakage, permanent distortion, or failure of the pressure envelope.

#### 5.1.2 Test procedure

The test specimen shall withstand a hydrostatic burst pressure of 3450 kPa (500 psi) at a temperature of  $23 \pm 2$  °C ( $73 \pm 4$  °F) for 1 min. The pressure shall be applied to the inlet with the outlet blocked and the valve open.

#### 5.1.3 Alternate test procedure

Valves rated in excess of 71 °C (160 °F) and 862 kPa (125 psi) shall be tested in accordance with ASTM D1599 at a temperature of  $23 \text{ °C} \pm 2 \text{ °C}$  ( $73 \text{ °F} \pm 4 \text{ °F}$ ). The burst pressure shall not be less than three

times the manufacturer's maximum rated pressure at that temperature. A second test specimen shall be tested in accordance with ASTM D1599 at a temperature of  $82\text{ °C} \pm 2.0\text{ °C}$  ( $180.0\text{ °F} \pm 4\text{ °F}$ ) or the manufacturer's maximum rated temperature, whichever is greater. The burst pressure for the second valve shall not be less than two times the manufacturer's rated pressure at the test temperature.

## 5.2 Hydrostatic test

### 5.2.1 Performance requirements

When tested in accordance with Clause 5.2.2, the valve exterior shall show no visible leakage. Leakage through the stem packing shall not be cause for rejection as long as a packing gland adjustment stops the leakage.

### 5.2.2 Test procedure

The hydrostatic test shall be conducted as follows:

- a) Metallic valves shall be tested at two times its marked pressure rating for 1 min. The test fluid shall be water and its temperature shall be  $60 \pm 2.0\text{ °C}$  ( $140 \pm 4\text{ °F}$ ). The valve shall be in the open position during the test to ensure full pressurization of the valve.
- b) Polymeric valves shall be tested in accordance with Section 8.2 of ASTM F1970.

## 5.3 Static and dynamic seals

### 5.3.1 Performance requirements

When tested in accordance with Clause 5.3.2, the valve seals shall not leak or otherwise fail.

### 5.3.2 Test procedure

The valve seals shall be tested in accordance with the applicable requirements in Clauses 5.3.1.2 to 5.3.1.4 of ASME A112.18.1/CSA B125.1.

## 5.4 Cycle test

### 5.4.1 Performance requirements

When tested in accordance with Clause 5.4.2, the valves shall continue to function as they did before the life cycle and shall not leak.

### 5.4.2 Test procedure

A test specimen shall withstand 2,000 cycles of operation from the fully-opened to the fully-closed position at its maximum rated temperature not less than  $65 \pm 5\text{ °C}$  ( $150 \pm 10\text{ °F}$ ). Water at a flowing pressure of  $345 \pm 35\text{ kPa}$  ( $50 \pm 5\text{ psi}$ ) and a supply pressure of  $550\text{ kPa}$  ( $80\text{ psi}$ ) maximum (valve closed) shall be supplied to the valve throughout the test. An opening downstream of the valve shall be restricted to a flow of approximately  $9.5\text{ L/min}$  ( $2.5\text{ gpm}$ ) during the open portion of the test.

## 5.5 Flow test

### 5.5.1 Performance requirements

The valves shall meet the minimum flow rates specified in Table 1 or shall have a flow factor ( $K_v$ ) [flow coefficient ( $C_v$ )] factor equal to or greater than the values specified in Table 1.



Valves that are designed to also serve as a fine flow control devices may have flow rates (or  $K_v$  ( $C_v$ )) lower than those specified in Table 1, provided that the packaging specifies the rated flow rate at 140 kPa (20 psi) or  $K_v$  ( $C_v$ ) for the product.

### 5.5.2 Test procedure

The valves shall be tested in accordance with the applicable requirements of Clause 5.4 of ASME A112.18.1/CSA B125.1 or the  $K_v$  ( $C_v$ ) factor shall be determined in accordance with ISA/ANSI 75.01.01.

## 5.6 Operating requirements

### 5.6.1 Performance requirements

When closed, valves shall not leak when tested for 5 min in accordance with Clause 5.6.2.

### 5.6.2 Test procedure

For manually operated valves or operating controls, except for accessible designs, the torque or force required to open, operate, and close a manually activated valve or operating control shall not exceed the applicable operating torque or linear force specified in Table 2 when tested at temperatures and pressures specified in Clause 5.3.1.4 of ASME A112.18.1/CSA B125.1.

## 5.7 Resistance to installation loading

### 5.7.1 Performance requirements

Connections intended to seal water shall not crack, strip, or leak in accordance with Clause 5.7.2.

### 5.7.2 Test procedure

Valves shall be tested in accordance with Clause 5.7.2 of ASME A112.18.1/CSA B125.1.

## 6 Markings

### 6.1 General

#### 6.1.1

Valves covered by and complying with this Standard shall be marked with

- a) the manufacturer's name or trademark, or private labeler's name or trademark;
- b) the maximum working pressure-temperature for which the valve is designed;
- c) the size of the valve; and
- d) for unidirectional valves, the direction of flow.

#### 6.1.2

The marking shall be accomplished by use of a permanent mark or by placing a permanent label on the valve.

### 6.2 Packaging

Packaging shall be marked with

- a) the model number;

- b) the rated flow rate in L/min (gpm) at 140 kPa (20 psi) or  $K_v$  ( $C_v$ ) value, for fine flow control devices only; and
- c) the manufacturer's recognized name, trademark, or other mark; or
- d) in the case of private labelling, the name, trademark or other mark of the customer for whom the valve was manufactured, as well as the model number.

**Table 1**  
**Minimum flow rates**  
(See Clause 5.5.)

NPS	Min flow, L/min (gpm)	$K_v$ ( $C_v$ )
3/8	20 (5.3)	5 (6)
1/2	36 (10)	9 (10)
3/4	68 (18)	15 (17)
1	118 (30)	23 (27)
1-1/4	200 (50)	39 (45)
1-1/2	325 (85)	56 (65)
2	550 (145)	87 (100)
2-1/2	850 (225)	123 (142)
3	1150 (300)	151 (172)
3-1/2	1500 (400)	190 (220)
4	1900 (500)	225 (260)

**Note:** For determining compliance with this Table, observed or calculated values should be rounded to the nearest unit in accordance with ASTM E29.

**Table 2**  
**Operating requirements**  
(See Clause 5.6.)

Valve	Linear force, N (lbf)	Operating torque, N•m (lbf•in)
NPS-1/2 or smaller	67 (15)	1.7 (15)
Larger than NPS-1/2	110 (25)	2.8 (25)

**Note:** The specified torques and forces apply to the opening operation of the valves.

## *Annex A (informative)*

### ***Unit conversion and rounding criteria***

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

#### **A.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.

#### **A.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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