ASME A112.4.14-2004

Manually Operated, Quarter-Turn Shutoff Valves for Use in Plumbing Systems

AN AMERICAN NATIONAL STANDARD

The American Society of Mechanical Engineers

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Three Park Avenue • New York, NY 10016

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ASME issues written replies to inquiries concerning interpretations of technical aspects of this Standard. Interpretations are published on the ASME Web site under the Committee Pages at http://www.asme.org/codes/ as they are issued.

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FOREWORD

In 2001, the American Society of Mechanical Engineers received a request for the development of a standard for ball valves that would normally be used in residential hot and cold water plumbing systems. This request was approved by the ASME A112 Standards Committee and assigned to a new project team (PT 4.14).

The IAPMO IGC 157 entitled "Ball Valves" was used as the base document for this Standard. While in development, the ASME project team broadened the title and scope to cover "quarter turn shutoff valves."

This Standard was developed with the hope that due consideration should be given for adoption of these provisions by model, state, and local codes.

Suggestions for improvement of this Standard will be welcomed. They should be sent to The American Society of Mechanical Engineers; Attn: Secretary, A112 Standards Committee; Three Park Avenue; New York, NY 10016-5990.

This Standard was approved as an American National Standard on May 25, 2004.

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General. ASME Standards are developed and maintained with the intent to represent the consensus of concerned interests. As such, users of this Standard may interact with the Committee by requesting interpretations, proposing revisions, and attending Committee meetings. Correspondence should be addressed to:

Secretary, A112 Standards Committee
The American Society of Mechanical Engineers
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Proposing Revisions. Revisions are made periodically to the Standard to incorporate changes that appear necessary or desirable, as demonstrated by the experience gained from the application of the Standard. Approved revisions will be published periodically.

The Committee welcomes proposals for revisions to this Standard. Such proposals should be as specific as possible, citing the edition, the paragraph number(s), the proposed wording, and a detailed description of the reasons for the proposal, including any pertinent documentation. When appropriate, proposals should be submitted using the A112 Project Initiation Request Form.

Interpretations. Upon request, the A112 Committee will render an interpretation of any requirement of the Standard. Interpretations can only be rendered in response to a written request sent to the Secretary of the A112 Standards Committee.

The request for interpretation should be clear and unambiguous. It is further recommended that the inquirer submit his/her request in the following format:

Subject:	Cite the applicable paragraph number(s) and the topic of the inquiry.
Edition:	Cite the applicable edition of the Standard for which the interpretation is being requested.
Question:	Phrase the question as a request for an interpretation of a specific requirement suitable for general understanding and use, not as a request for an approval of a proprietary design or situation. The inquirer may also include any plans or drawings that are necessary to explain the question; however, they should not contain proprietary names or information.

Requests that are not in this format will be rewritten in this format by the Committee prior to being answered, which may inadvertently change the intent of the original request.

ASME procedures provide for reconsideration of any interpretation when or if additional information that might affect an interpretation is available. Further, persons aggrieved by an interpretation may appeal to the cognizant ASME Committee or Subcommittee. ASME does not "approve," "certify," "rate," or "endorse" any item, construction, proprietary device, or activity.

Attending Committee Meetings. The A112 Standards Committee schedules meetings as needed, which are open to the public. Persons wishing to attend any meeting should contact the Secretary of the A112 Standards Committee. The A112 home page contains information on future meeting dates and locations.

MANUALLY OPERATED, QUARTER-TURN SHUTOFF VALVES FOR USE IN PLUMBING SYSTEMS

1 GENERAL

1.1 Scope

This Standard establishes requirements for manually operated, quarter-turn valves in nominal sizes (NPS) ≤ 2. These valves are intended for indoor installation as potable water shutoff valves between the meter and the supply stop. Valves governed by this Standard are intended for service at temperatures between 34°F (1°C) and 180°F (82°C), with an allowable working pressure rating not less than 125 psi (862 kPa).

1.2 Limitations

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

1.3 Units of Measurement

The values stated in either U.S. customary units or the International System of Units (SI) are to be regarded separately as standard. The values stated in each system are not exact equivalents; therefore, each system must be used independently of the other. Combining values from the two systems may result in non-conformance with the Standard. All pressures, unless otherwise specified, are gauge pressures. For the purpose of determining conformance with this Standard, the convention for "rounding off" shall be as defined in ASTM E29.

1.4 References

The following is a list of publications referenced in this Standard.

ASME B1.20.1, Pipe Threads (Excluding Dryseal)

ASME B16.18, Cast Copper Alloy Solder Joint Pressure Fittings

ASME B16.22, Wrought Copper and Copper Alloy Solder Joint Pressure Fittings

ASME B16.26, Cast Copper Alloy Fittings for Flared Copper Tubes

Publisher: The American Society of Mechanical Engineers (ASME), Three Park Avenue, New York, NY 10016-5990; Order Department: 22 Law Drive, Box 2300, Fairfield, NJ 07007-2300

ASTM B16, Free-Cutting Brass Rod, Bar, and Shapes for Use in Screw Machines

ASTM B62, Composition Bronze or Ounce Metal Castings

ASTM B124, Copper and Copper Alloy Forging Rod, Bar, and Shapes

ASTM B371, Copper-Zinc-Silicon Alloy Rod

ASTM B584, Copper Alloy Sand Castings for General Applications

ASTM D2846, Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Hot- and Cold-Water Distribution Systems

ASTM E29, Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

ASTM F439, Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80

ASTM F876, Crosslinked Polyethylene (PEX) Tubing

ASTM F877, Crosslinked Polyethylene (PEX) Plastic Hot- and Cold-Water Distribution Systems

ASTM F1498, Taper Pipe Threads 60° for Thermoplastic Pipe and Fittings

ASTM F1807, Metal Insert Fittings Utilizing a Copper Crimp Ring for SDR9 Cross-linked Polyethylene (PEX) Tubing

ASTM F1960, Cold Expansion Fittings with PEX Reinforcing Rings for Use with Cross-linked Polyethylene (PEX) Tubing

ASTM F1970, Special Engineered Fittings, Appurtenances or Valves for use in Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) System

ASTM F2159, Plastic Insert Fittings Utilizing a Copper Crimp Ring for SDR9 Cross-linked Polyethylene (PEX) Tubing

Publisher: The American Society for Testing and Materials (ASTM), 100 Barr Harbor Drive, West Conshohocken, PA 19428.

ANSI/ISA 75.01.01, Flow Equations for Sizing Control Valves

Publisher: Instrument Society of America (ISA), 67 Alexander Drive, Research Triangle Park, NC 27709.

NSF/ANSI 61, Drinking Water System Components – Health Effects

Publisher: NSF International, 789 North Dixboro Road, Ann Arbor, MI 48113.

2 GENERAL CONSTRUCTION AND ASSEMBLY

2.1 General

Samples for testing to this Standard shall be randomly selected from a lot of production representative samples.

2.2 End Connections

2.2.1 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.

2.2.2 Solder Connections. Solder-cup ends for copper tube connection shall be in accordance with ANSI B16.18 or ASME B16.22.

2.2.3 Solvent Cement Connections. Socket ends for solvent-cement connection to PVC or CPVC pipe or tube shall be in accordance with ASTM D2466 (PVC and CPVC), ASTM D2467 (PVC), ASTM D2846 and ASTM F439 (CPVC).

2.2.4 PEX Barbs Connection. Metallic barb-ends for connection to PEX tubing shall be in accordance with ASTM F1807. Plastic barb-ends for connection to PEX tubing shall be in accordance with ASTM F2159 or ASTM F1960.

2.2.5 Flared Connection. Flared connections to copper tube shall be in accordance with ASME B16.26.

2.2.6 Grooved End. Grooved end connections shall be in accordance with AWWA C606.

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

2.3 Operation

The valve shall require $\frac{1}{4}$ turn from the fully closed position to the fully opened position, or from the fully opened position to the fully closed position. The valve shall be constructed so that the operator can visually determine that the valve is in the opened or closed position. When the valve is in the closed position, the operating lever or flow indicator shall be perpendicular to the longitudinal axis of the valve. The stem flats or indicator on the top of the stem shall indicate that the valve is in the opened or closed position when the operating device has been removed.

3 MATERIALS

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

3.1 Copper Alloys

Copper alloys shall be minimum 58% copper and meet one of the following specifications:

ASTM B62 (C83600)
ASTM B584 (C84400)
ASTM B124 (C37000)
ASTM B16 (C36000)
ASTM B371 (C69430)
UNS C89831
UNS C89833
UNS C89837
UNS C89510
UNS C89520
ISO Cu Zn40 Pb2 CW617N
ISO Cu Zn36 Pb2 As CW602N
ISO Cu Zn39 Pb3 CW614N

3.2 Ferrous Alloys

Ferrous alloys shall be a 300 series stainless steel.

3.3 Polymeric Materials

(a) PEX cross-linked polyethylene shall conform to ASTM F876 or ASTM F877.

(b) Chlorinated polyvinyl chloride (CPVC) material used for pressure containing parts shall conform to ASTM D1784, Classification 23447.

3.4 Alternate Materials

Alternate equivalent materials used shall conform to national or international standards for which mechanical and chemical data are available. Metallic alloys with an excess of 8% lead shall not be used in contact with potable water.

3.5 Flux and Solders

Flux and solders containing more than 0.2% lead shall not be used in contact with potable water.

4 DESIGN REQUIREMENTS

4.1 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.

4.2 Temperature, Pressure Rating

Metallic valves shall have a minimum pressure rating of 125 psi (862 kPa) and the minimum temperature rating shall be 140°F (60°C) for continuous use and 180°F (82°C) for intermittent use.

4.3 Temperature and Pressure Rating

Polymeric valves shall have a minimum pressure rating of 125 psi (862 kPa) and the minimum temperature rating shall be 140°F (60°C) for continuous use and 100 psi (689 kPa) at 180°F (82°C) for intermittent use.

5 QUALIFICATION TESTING

5.1 Hydrostatic Test

(a) Metallic Valves. The test valve shall be given a hydrostatic test at a pressure of two times its marked pressure rating. The test fluid shall be water. The test fluid temperature shall be 140°F (60°C). The duration of the test shall be 1 min.

The ball or disc shall be in such a position during the shell test as to ensure full pressurization of the valve.

(b) Polymeric Valves. Polymeric valves shall be hydrostatically tested to ASTM F1970, para. 8.2.

5.1.1 Performance Criteria. 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 Seat Test

5.2.1 Procedure. Following the shell test, the test valve shall be given a seat test. The test shall be a hydrostatic test at not less than 125 psi at 140°F (60°C) or the maximum rated pressure and temperature of the valve. The test pressure shall be applied successively on each side of the closed valve for duration of not less than 1 min.

Valves marked as one-way valves require a seat test only in the direction of the flow.

5.2.2 Performance Criteria There shall be no visible evidence of leakage through the disc or ball nor leakage past the seat.

5.3 Cycle Test

5.3.1 Procedure. A production sample valve shall withstand 1,000 cycles of operation from the fully opened to the fully closed position at its continuous rated temperature not less than 140°F (60°C). The test is to be conducted with a hydrostatic pressure-differential applied across the closed disc/ball equal to the rated working pressure. Restrict an opening downstream of the valve to a flow of approximately 2.5 gpm (9.5 L/min) during the open portion of the test.

5.3.2 Performance Criteria. After the cycling test, the valve shall comply with the seat test (para. 5.2). The valve assembly shall show no signs of visible damage.

5.4 Flow Test

5.4.1 Procedure. With the valve in the full open position, a flow test shall be conducted to determine the Cv of the valve as specified in ANSI/ISA 75.01.01.

5.4.2 Performance Criteria. The valve shall have a Cv factor equal to or greater than the following table:

Nominal Pipe Size	Cv
1/8	1.5
1/4	3
3/8	6
1/2	10
3/4	17
1	27
1 1/4	25
1 1/2	65
2	100

5.5 Potable Water Compatibility Test

The valve shall comply with NSF/ANSI 61, section 8.

6 MARKINGS

(a) The required markings shall be legible and readily visible. They shall be applied by such means as embossing, etching, silk screening on handle, or equivalent means.

(b) The manufacturer's name or trademark, or private labeler's name or trademark shall be shown.

(c) The marking shall indicate the maximum working pressure-temperature for which the valve is designed.

(d) The size shall be shown on the valve.

(e) For unidirectional valves, the direction of flow shall be shown on the valve.

ASME STANDARDS RELATED TO PLUMBING

Air Gaps in Plumbing Systems (For Plumbing Fixtures and Water-Connected Receptors) A112.1.2-2004
Air Gap Fittings for Use With Plumbing Fixtures, Appliances, and Appurtenances A112.1.3-2000
Performance Standard and Installation Procedures for Stainless Steel Drainage Systems for
Sanitary, Storm, and Chemical Applications, Above and Below Ground A112.3.1-1993
Macerating Toilet Systems and Related Components A112.3.4-2000
Water Heater Relief Valve Drain Tubes . . . . . A112.4.1-1993(R2002)
Water Closet Personal Hygiene Devices A112.4.2-2003
Plastic Fittings for Connecting Water Closets to the Sanitary Drainage System A112.4.3-1999
Point of Use and Branch Water Submetering Systems A112.4.7-2002
Manually Operated, Quarter-Turn Shutoff Valves for Use in Plumbing Systems A112.4.14-2004
Floor-Affixed Supports for Off-the-Floor Plumbing Fixtures for Public Use . . . . . A112.6.1M-1997(R2002)
Framing-Affixed Supports for Off-the-Floor Water Closets With Concealed Tanks A112.6.2-2000
Floor and Trench Drains A112.6.3-2001
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Hydraulic Performance Requirements for Water Closets and Urinals A112.19.6-1995
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Spa, Hot Tub, and Wading Pool Suction Systems A112.19.17-2002
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Qualification of Installers of Firestop Systems and Devices for Piping Systems A112.20.2-2004
Floor Drains . . . . . A112.21.1M-1991(R1998)
Roof Drains A112.21.2M-1983
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