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Underwriters Laboratories Inc. (UL)
333 Pfingsten Road
Northbrook, IL 60062-2096

UL Standard for Safety
for
Check Valves for Fire-Protection Service, UL 312

Eighth Edition, Dated June 2, 1993

Revisions: This Standard contains revisions through and including September 9, 1996.

The revisions dated September 9, 1996 include a reprinted title page (page 1) for this Standard.

As indicated on the title page (page 1), this UL Standard for Safety has been adopted by the Department of Defense.

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The requirements in this Standard are now in effect, except for those paragraphs, sections, tables, figures, and/or other elements of the Standard having future effective dates as indicated in the note following the affected item. The prior text for requirements that have been revised and that have a future effective date are located after the Standard, and are preceded by a "SUPERSEDED REQUIREMENTS" notice.

New product submittals made prior to a specified future effective date will be judged under all of the requirements in this Standard including those requirements with a specified future effective date, unless the applicant specifically requests that the product be judged under the current requirements. However, if the applicant elects this option, it should be noted that compliance with all the requirements in this Standard will be required as a condition of continued Listing, Classification and Follow-Up Services after the effective date, and understanding of this should be signified in writing.

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This Standard consists of pages dated as shown in the following checklist:

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(Title Page Reprinted: September 9, 1996)



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UL 312

Standard for

Check Valves for Fire-Protection Service

First Edition – March, 1931

Second Edition – September, 1951

Third Edition – November, 1964

Fourth Edition – May, 1973

Fifth Edition – May, 1975

Sixth Edition – April, 1980

Seventh Edition – December, 1988

Eighth Edition

June 2, 1993

Approval as an American National Standard (ANSI) covers the numbered paragraphs on pages dated June 2, 1993 and February 17, 1994. These pages should not be discarded when revised or additional pages are issued if it is desired to retain the ANSI approved text.

An effective date included as a note immediately following certain requirements is one established by Underwriters Laboratories Inc.

Approved as ANSI/UL 312-1989, June 12, 1989

Approved as ANSI/UL 312-1996, July 16, 1996

The Department of Defense (DoD) has adopted UL 312 on August 10, 1989. The publication of revised pages or a new edition of this standard will not invalidate the DoD adoption.

Revisions of this standard will be made by issuing revised or additional pages bearing their date of issue. A UL Standard is current only if it incorporates the most recently adopted revisions, all of which are itemized on the transmittal notice that accompanies the latest set of revised requirements.

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**Underwriters Laboratories Inc.®**A not-for-profit organization dedicated to public safety
and committed to quality service**February 17, 1994****Revision pages for****Standard for****Check Valves for Fire-Protection Service****UL 312, Eighth Edition**

Attached to this transmittal notice is a revision of the Eighth edition of UL 312.

A CHANGE ON A PAGE DATED FEBRUARY 17, 1994 IS INDICATED BY A SMALL PRINT NOTE
FOLLOWING THE AFFECTED ITEM, PRECEDED AND FOLLOWED BY AN ASTERISK.

THESE NEW AND REVISED REQUIREMENTS ARE NOW IN EFFECT.

The new and revised requirements are substantially in accordance with UL's bulletin on this subject dated
July 16, 1993. The bulletin is now obsolete and may be discarded.

Revised and/or additional pages may be issued from time to time.

With the inclusion of the accompanying material, the standard consists of pages dated as shown in the
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(1 – 06/02/93 – 02/17/94)

10 Seats

10.1 The seating surfaces of a valve shall be constructed to resist leakage. See Leakage Test, Section 18.

10.2 A metal-to-metal valve-seating surface shall be of bronze or equally or more corrosion-resistant material and shall have sufficient width of surface contact to withstand compression stresses, and damage due to pipe scale or foreign matter carried by the water. The seating surface of a metal clapper ring shall be at least 1/8 inch (3.2 mm) wider than the surface of the body seat ring.

10.3 A seating surface that is contacted by a resilient material shall be made of metallic material having corrosion resistance at least equivalent to brass, bronze, ni-resist, or ductile iron having a nickel plating at least 0.003 inch (0.08 mm) thick; or nonmetallic material complying with the requirements specified in Nonmetallic Materials Test, Section 16.

10.4 A seating surface that is contacted by a rubber or other resilient material shall be made of, or faced with, a material to which the clapper facing will not adhere. See Adhesion Test for Resilient Seat Materials, Section 17.

10.5 A rubber seat shall be clamped, mechanically secured, bonded, or vulcanized to the valve body or disc.

10.6 The seating surface of a clapper having a flat resilient facing shall overhang the surface of the seat ring on the inside by not less than 1/4 inch (6.4 mm) and on the outside by not less than 1/8 inch (3.2 mm).

10.7 The diameter of the cross section of an "O" ring used as a seating surface shall be at least 1/4 inch (6.4 mm) less in width than the width of its mating seating surface.

10.8 The face of a metal seat ring in the body shall be at least 1/8 inch (3.2 mm) above adjacent portions of the body casting.

10.9 A flat resilient clapper facing shall be clamped in place with a solid clamping ring having an outside diameter at least 1 inch (25.4 mm) greater than the diameter of the circle circumscribing the stud(s) used to secure the ring at its inner edge of the centerline of the bolt circle if bolts are used. A clapper in contact with a flat resilient clapper facing shall have a finished surface. The clamping ring shall be bronze or equivalently corrosion-resistant material. The clamping ring shall be constructed and arranged so that it does not interfere with the valve seat and shall come to a stop against a shoulder. After assembly of the facing and clamping ring on the check, the assembly shall be pinned or locked in position.

10.10 An "O" ring facing shall be recessed or similarly restrained for at least two-thirds of its cross sectional area. With the clapper in the closed position, the "O" ring shall be centered on the seating surface.

10.11 A screw or other part used to hold a clapper facing clamping ring in place shall be bronze or equivalently corrosion-resistant material.

11 Nonmetallic Materials

Section 11 deleted February 17, 1994

12 Clearances

12.1 Clearances shall be provided between working parts and between working and stationary parts so that corrosion or deposits of foreign matter within an assembly will not cause a valve to be sluggish in action or inoperative.

12.2 The clearance between a clapper or a part attached thereto and the inside walls of the body in every position of the clapper, except fully open, shall be not less than 1/2 inch (12.7 mm). This clearance shall be not less than 1/4 inch (6.4 mm) for valves having bodies of bronze or equivalently corrosion-resistant material.

12.3 A diametrical clearance of not less than 1/4 inch (6.4 mm) shall be provided so that there is no contact between inner edges of a seat ring and metal parts of a clapper assembly, such as rubber ring retainers, when the valve is in the closed position.

12.4 The clearance between hinge pins and their bearings shall be not less than 0.005 inch (0.13 mm).

12.5 End clearance shall be provided between a clapper arm bearing and its cooperating side bearing surface.

12.6 The clearance between the clapper in a wafer check valve installed in accordance with the manufacturer's specifications and the inside wall of Schedule 40 steel pipe of the same nominal size as the valve shall be not less than 3/8 inch (9.5 mm) in any clapper position except fully open.

PERFORMANCE

13 General

13.1 Representative samples of each size check valve shall be subjected to the tests described in Sections 14 – 21. Test bars of metal used in castings and additional samples of parts constructed of nonmetallic materials, such as valve seat discs, are required for physical tests.

14 Metallic Materials Tests

14.1 Sample bars of metals used shall be prepared from the same heat or run of metal used in the bodies and covers of valve samples submitted for investigation and test. The specimen bars shall comply with the minimum physical property requirements of the applicable ASTM or nationally recognized specifications.

15 Spring Cycling Test

15.1 A spring used in a valve mechanism shall operate as intended for 50,000 cycles of operation.

15.2 A valve employing a spring is to be placed in the horizontal position. The valve clapper is to be cycled by rotating the clapper from the seated position to 45 degrees from the seated position and then returning the clapper to the seated position by applying a force to the clapper. The valve is to be subjected to 50,000 cycles of operation at a rate not exceeding 6 cycles per minute, in order to verify compliance with the requirements in 15.1.

15.3 A spring used in a valve mechanism shall operate as intended for 50,000 cycles of operation produced by rotating the clapper off of the seat to a 45-degree angle and returning it to the closed position. The tests are to be conducted at a rate not exceeding 6 cycles per minute, where each cycle consists of the 45-degree rotation followed by return to the closed position.

16 Nonmetallic Materials Test

16.1 General

16.1.1 A plastic or other nonmetallic part, other than elastomeric parts such as clapper facings and "O" rings, shall comply with the requirements of 16.2.1 – 16.2.4.

16.1.1 revised February 17, 1994

16.1.2 Elastomeric parts, except gaskets, of each size and type used in the various assemblies shall comply with the requirements in 16.4.1 and 16.4.2.

16.1.2 revised February 17, 1994

16.2 Plastic parts

16.2.1 Following air-oven aging for 180 days at 121°C (250°F), there shall be no warping, creeping, or other signs of deterioration of a plastic component that may preclude the intended operation of the valve. There shall be no cracking of any plastic component. A valve with aged plastic components shall demonstrate acceptable performance when subjected to the Leakage Test, Section 18.

16.2.2 A complete valve assembly, including the plastic parts, and sample plastic components to be aged are to be supported in a full-draft, circulating-air oven that has been preheated at full draft, to $121 \pm 1^\circ\text{C}$ ($250 \pm 1.8^\circ\text{F}$). Elastomeric facings or "O" rings may be included or excluded at the manufacturer's option. The manner of support is to be such that the samples are prevented from touching one another or the sides of the oven. The samples are to be aged for 180 days at full draft and then allowed to cool in air at $23 \pm 2^\circ\text{C}$ ($73.4 \pm 3.6^\circ\text{F}$) for at least 24 hours before conducting any test or dimensional check. Prior to any tests, elastomeric parts complying with 16.4.1 are to be installed, if not included in the aging test. As used in this test, the term "full draft" refers to the air flow over the samples in the oven with the air inlet and outlets fully open. The oven used for accelerated aging is to be Type IIA as specified in the Standard Specification for Gravity-Convection and Forced-Ventilation Ovens, ASTM E145-68(1987).

16.2.2 revised February 17, 1994

16.2.3 If a plastic material cannot withstand the temperature indicated without softening, distortion, or deterioration, an air-oven aging test at a lower temperature, minimum 87°C (189°F), for a longer period of time may be used.

16.2.4 Following immersion in tap water at $87 \pm 2^\circ\text{C}$ ($189 \pm 3.6^\circ\text{F}$) for 180 days, there shall be no warping, creeping, or other signs of deterioration of a plastic component that may preclude the intended operation of the valve. There shall be no cracking of any plastic component. Valves with aged components shall demonstrate acceptable performance when subjected to the Leakage Test, Section 18.

16.3 Rubber parts (except gaskets)

Subsection 16.3 deleted February 17, 1994