



# UL 1478

## STANDARD FOR SAFETY

### Fire Pump Relief Valves

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UL Standard for Safety for Fire Pump Relief Valves, UL 1478

Fifth Edition, Dated March 17, 2023

### **Summary of Topics**

***This new edition of ANSI/UL 1478 dated March 17, 2023 includes editorial revisions to align with UL Standards & Engagement's style manual: Titles of referenced publications were added in a new section, the Components section was updated, reference standard titles were removed from the body, and some spelling and grammar changes were made.***

The requirements are substantially in accordance with Proposal(s) on this subject dated December 30, 2022.

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MARCH 17, 2023



ANSI/UL 1478-2023

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**UL 1478**

**Standard for Fire Pump Relief Valves**

First Edition – August, 1980  
Second Edition – April, 1989  
Third Edition – July, 1995  
Fourth Edition – May, 2004

**Fifth Edition**

**March 17, 2023**

This ANSI/UL Standard for Safety consists of the Fifth Edition.

The most recent designation of ANSI/UL 1478 as an American National Standard (ANSI) occurred on March 17, 2023. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, and Title Page.

Comments or proposals for revisions on any part of the Standard may be submitted to ULSE at any time. Proposals should be submitted via a Proposal Request in ULSE's Collaborative Standards Development System (CSDS) at <https://csds.ul.com>.

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## INTRODUCTION

### 1 Scope

1.1 These requirements cover direct acting (spring loaded) and pilot operated fire pump relief valves of nominal 3/4 inch (19.05 mm) size and larger, intended for use in water supply systems for fire protection service.

1.2 Requirements for the installation and use of these valves are included in the Standard for the Installation of Stationary Pumps for Fire Protection, NFPA 20.

### 2 Components

2.1 A component of a product covered by this Standard shall:

- a) Comply with the requirements for that component as specified in this Standard;
- b) Be used in accordance with its rating(s) established for the intended conditions of use; and
- c) Be used within its established use limitations or conditions of acceptability.

2.2 A component of a product covered by this Standard is not required to comply with a specific component requirement that:

- a) Involves a feature or characteristic not required in the application of the component in the product;
- b) Is superseded by a requirement in this Standard; or
- c) Is separately investigated when forming part of another component, provided the component is used within its established ratings and limitations.

2.3 Specific components are incomplete in construction features or restricted in performance capabilities. Such components are intended for use only under limited conditions, such as certain temperatures not exceeding specified limits, and shall be used only under those specific conditions.

### 3 Units of Measurements

3.1 Values stated without parentheses are the requirement. Values in parentheses are explanatory or approximate information.

### 4 Referenced Publications

4.1 Any undated reference to a code or standard appearing in the requirements of this standard shall be interpreted as referring to the latest edition of that code or standard.

4.2 The following publications are referenced in this Standard:

ASME B1.20.1, *Pipe Threads, General Purpose, Inch*

ASME B1.20.3, *Dryseal Pipe Threads, Inch*

ASME B16.1, *Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250*

NFPA 20, *Installation of Stationary Pumps for Fire Protection*

UL 157, *Gaskets and Seals*

## 5 Glossary

- 5.1 For the purpose of this standard, the following definitions apply.
- 5.2 MAIN VALVE – The part of the valve assembly that controls the flow of water.
- 5.3 MAXIMUM SET PRESSURE RATING – The maximum pressure at which the valve is intended to be set to relieve pressure from a water supply system.
- 5.4 PILOT VALVE – The part of the valve assembly that controls the operating of the main valve.
- 5.5 RESEAT PRESSURE – The internal pressure at which the relief valve is intended to prevent the flow of water.
- 5.6 SET PRESSURE – The internal pressure at which the main valve is intended to start to allow the flow of water.

## CONSTRUCTION

### 6 Sizes

6.1 Valve sizes refer to the nominal diameter of the waterway through the end connections and to the nominal pipe trade size for which the end connections are intended. The diameter of the waterway through the seat of a valve may be reduced below that of the waterway through the end connections.

### 7 Maximum Set Pressure Rating

7.1 A valve shall be constructed for a maximum set pressure rating of 175 psi (1200 kPa) or higher.

### 8 Bodies and Bonnets

8.1 A valve body casting of the globe or angle pattern shall be smooth, free from porosity, scale, lumps, cracks, blisters, sand holes, and defects of any nature which may impair its intended operation. A casting shall not be plugged or filled, but impregnation to remove porosity, using material insoluble to the liquid handled, is acceptable.

8.2 The dimensions of a flange, flange pipe joint, and threaded body opening shall comply with the requirements of the following standards:

- a) ASME B1.20.1;
- b) ASME B1.20.3; and
- c) ASME B16.1

8.3 The bolting of pressure-holding castings shall be such that the maximum stress on any bolt will not exceed one-fourth the elastic limit of the material. The load on the bolts is to be computed on the basis of the valve's maximum set pressure rating. The area of application of pressure is to be calculated as follows:

- a) If a full-face gasket is used, the area of force application is that area extending out to a line defined by the inner edge of the bolts; or
- b) If an "O" ring seal or ring gasket is used, the area of force application is that area extending out to the center line of the "O" ring or gasket.

## 9 Materials

9.1 A part that bears against, rotates within, or slides on stationary parts, and that must be free to move during valve operation, shall be made of compatible corrosion-resistant materials, or shall be fitted with bushings, inserts, or other parts made of these corrosion-resistant materials at those points where freedom of motion is required.

9.2 An interior bolt or screw shall be made of bronze or other corrosion-resistant material.

9.3 An internal spring used in a fire pump relief valve shall be made of material having corrosion resistance equivalent to that of phosphor bronze and shall not be susceptible to stress corrosion.

## 10 Valve Mechanisms

10.1 An internal working part which may be removed during intended maintenance shall be removable without damaging the valve and without requiring the use of special tools.

10.2 A valve part that is disassembled in field servicing shall be of a form that permits its accurate reassembly.

10.3 All parts within the valve shall be secured so they will resist separation in intended use.

10.4 A diaphragm-operated valve shall incorporate a check valve or equivalent in the trim to prevent air from entering the diaphragm chamber.

10.5 A diaphragm-operated valve shall have a pressure gauge to determine the pressure in the diaphragm chamber. A tapped opening of not less than 1/4-inch pipe size in the valve cover shall be used to accommodate the pressure gauge.

10.6 If an orifice with a diameter less than 3/16 inch (4.8 mm) is used in the trim or operation of a valve, a screen or strainer with corrosion resistance equivalent to brass shall be provided. The total area of the openings in the screen or strainer shall be not less than 20 times the cross-sectional area of the opening that the screen or strainer is intended to protect. The largest dimension of the screen or strainer openings shall not exceed 1/32-inch (0.8-mm) less than the diameter of the protected orifice.

## 11 Clearances

11.1 Clearances shall be provided between working parts, and between working and stationary parts, so that corrosion or deposits of foreign matter within an assembly does not result in sluggish action or otherwise impaired operation of the valve.

11.2 The clearance between a valve disc or a part attached thereto and the inside walls of iron body castings in every position of the valve disc, 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.

## PERFORMANCE

### 12 General

12.1 Representative samples of each size fire pump relief valve shall be subjected to the tests described in these requirements.

12.2 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.

### 13 Metallic Materials

13.1 Specimen 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 requirements specified in [20.1\(a\)](#).

### 14 Elastomeric Parts (Except Gaskets) Test

14.1 An elastomeric part used to provide a seal shall have the following properties when tested as specified in UL 157:

- a) For silicone rubber (having poly-organo-siloxane as its constituent characteristic), a minimum tensile strength of 500 psi (3.4 MPa) and a minimum ultimate elongation of 100 %;
- b) For natural rubber and synthetic rubber other than silicone rubber, a minimum tensile strength of 1500 psi (10.3 MPa) and minimum ultimate elongation of 150 %; or a minimum tensile strength of 2200 psi (15.2 MPa) and a minimum ultimate elongation of 100 %; and
- c) Those properties relating to maximum tensile set; minimum tensile strength and elongation after oven aging; and hardness after oven aging, all as specified in UL 157. The maximum service temperature used to determine the oven time and temperature for oven aging is considered to be 60 °C (140 °F).

14.2 UL 157 provides for the testing of either finished elastomeric parts or sheet or slab material. Sheet or slab material is to be tested when the elastomeric parts are O-rings having diameters of less than 1 inch (25.4 mm). The material tested is to be the same as that used in the product, regardless of whether finished elastomeric parts or sheet or slab material is tested.

### 15 Leakage Test

15.1 A fire pump relief valve shall withstand for 1 minute without leakage an internal hydrostatic pressure equal to 90 % of the set pressure.

15.2 The valve is to be tested for leakage at both the minimum and maximum set pressure limits.

### 16 Hydrostatic Strength Test

16.1 An assembled valve including the main valve, pilot valve, and trim shall withstand, for 1 minute without rupture, an internal hydrostatic pressure equal to 280 % of the maximum set pressure rating of the valve.