UL 1478

STANDARD FOR SAFETY

Fire Pump Relief Valves

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

Fourth Edition, Dated May 13, 2004

Summary of Topics

This revision to ANSI/UL 1478 is being issued to reflect the reaffirmation of ANSI approval of the Standard. No technical changes have been made to the document.

Text that has been changed in any manner or impacted by UL's electronic publishing system is marked with a vertical line in the margin. Changes in requirements are marked with a vertical line in the margin and are followed by an effective date note indicating the date of publication or the date on which the changed requirement becomes effective.

The revised requirements are substantially in accordance with Proposal(s) on this subject dated February 23, 2018.

No Text on This Page

MAY 13, 2004
(Title Page Reprinted: April 12, 2018)

UL 1478

Standard for Fire Pump Relief Valves

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

Fourth Edition

May 13, 2004

This ANSI/UL Standard for Safety consists of the Fourth Edition including revisions through April 12, 2018.

The most recent designation of ANSI/UL 1478 as a Reaffirmed American National Standard (ANS) occurred on April 12, 2018. 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 UL at any time. Proposals should be submitted via a Proposal Request in UL's On-Line Collaborative Standards Development System (CSDS) at https://csds.ul.com.

No Text on This Page

CONTENTS

INTRODUCTION

1 Scope 4
2 Components 4
3 Units of Measurements 4
4 Undated References 5
5 Glossary 5

CONSTRUCTION

6 Sizes 5
7 Maximum Set Pressure Rating 5
8 Bodies and Bonnets 5
9 Materials 6
10 Valve Mechanisms 6
11 Clearances 7

PERFORMANCE

12 General 7
13 Metallic Materials 7
14 Elastomeric Parts (Except Gaskets) Test 7
15 Leakage Test 8
16 Hydrostatic Strength Test 8
17 Operation and Reseat Test 8
18 Flow Capacity Test 8
19 Cycling Test 9

MANUFACTURING AND PRODUCTION TESTS

20 General 9

MARKINGS

21 General 10

INSTRUCTIONS

22 Installation Instructions and Capacity Data 11

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 Centrifugal Fire Pumps, NFPA 20.

2 Components

2.1 Except as indicated in 2.2, a component of a product covered by this standard shall comply with the requirements for that component.

2.2 A component is not required to comply with a specific requirement that:

a) Involves a feature or characteristic not required in the application of the component in the product covered by this standard, or

b) Is superseded by a requirement in this standard.

2.3 A component shall be used in accordance with its rating established for the intended conditions of use.

2.4 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 Undated References

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.

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) Pipe Threads, General Purpose (Inch) – ANSI/ASME B1.20.1;

b) Dry Seal Pipe Threads (Inch) – ANSI/ASME B1.20.3; and

c) Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800 – ANSI/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.

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 the Standard for Gaskets and Seals, 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 percent.

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 percent; or a minimum tensile strength of 2200 psi (15.2 MPa) and a minimum ultimate elongation of 100 percent.

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 The Standard for Gaskets and Seals, 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 percent 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 percent of the maximum set pressure rating of the valve.

17 Operation and Reseat Test

17.1 The pressures at which the main valve opens, when the valve is adjusted to a minimum of four different pressure settings encompassing its entire set pressure range, shall be not less than the set pressure nor more than 105 percent of the set pressure.

17.2 After the valve has opened, the pressure is to be increased until approximately 125 percent of the set pressure or the maximum flow as specified in Table 18.1 is attained. The pressure then is to be slowly decreased until the valve reseats. The reseat pressure shall be a minimum of 90 percent of the set pressure. The procedure is to be repeated four additional times for a total of 5 cycles at each setting.

18 Flow Capacity Test

18.1 For set pressures of 100 psig (0.69 kPa) and higher, the value of flow specified in Table 18.1 shall require an inlet pressure at the valve no greater than 125 percent of the set pressure.

Exception: If the valve is tested with a flow capacity less than the values specified in Table 18.1, the valve shall be marked to indicate the maximum flow intended for use. See 21.5 for marking requirements.

Table 18.1
Flow capacity for fire pump relief valves

Flow capacity		Relief valve size	
GPM	(L/s)	Inches	(mm)
25	(1.58)	3/4	(19.05)
50	(3.15)	1-1/4	(31.75)
100	(6.30)	1-1/2	(38.1)
250	(15.75)	2	(50.8)
300	(18.90)	2-1/2	(63.5)
500	(31.50)	3	(76.2)
1000	(63.00)	4	(101.6)
2500	(157.50)	6	(152.4)
5000	(315.00)	8	(203.2)

18.2 The valve is to be installed in its intended position in a test piping system that is equipped with a calibrated nozzle or other equivalent means by which selected flow rates can be established. The valve is to be set at various selected pressures throughout its set pressure range. The inlet pressure required to produce the specified flow is to be observed by means of a Bourdon-type pressure gauge or other equivalent means.

19 Cycling Test

19.1 A valve incorporating a spring mechanism shall cycle 500 times through its intended travel distance without malfunction.

19.2 A valve incorporating a diaphragm shall cycle 10 times at 200 percent of its maximum set pressure rating without malfunction.

MANUFACTURING AND PRODUCTION TESTS

20 General

20.1 To verify compliance with these requirements in production, the manufacturer shall provide the necessary control, inspection, and tests. The program shall include at least the following:

a) The manufacturer shall demonstrate that each heat or run of cast material meets the minimum physical property requirements of the applicable ASTM specification. The applicable specification shall be the latest edition of the specification covering the class and grade of the materials used in the samples subjected to the initial product evaluation. Compliance with this requirement shall be demonstrated by conducting either the tensile bar or deflection bar test, or by maintaining a record of vendor certification of these tests.

b) As an alternative to (a) above, sample valve bodies may be subjected to an internal hydrostatic pressure tests as specified in 16.1. If this method is used, the test shall be conducted at least once every year, or on one sample out of every 1000 valve bodies made, whichever gives the greatest number of tests in 1 year.

c) Each valve shall be tested for operation. The valve is to be set at a predetermined pressure. The pressure is to be slowly increased until the valve opens. The valve shall open at a pressure not less than the set pressure nor more than 105 percent of the set pressure.

d) Each valve shall be factory-tested for seat leakage. The seat leakage test is to be conducted hydrostatically at a pressure of 90 percent of the maximum set pressure rating. There shall be no leakage through the body, or past the seat, and no distortion of the valve.

e) Each main valve and pilot valve shall be tested for body leakage. The body leakage test is to be conducted hydrostatically at 200 percent of the valve's maximum set pressure rating. There shall be no leakage through the body or bonnet or distortion of the valve.