

# Fire Test for Quarter-turn Valves and Valves Equipped with Nonmetallic Seats

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## **Introduction**

This standard covers the requirements and method for evaluating the performance of valves when they are exposed to defined fire conditions. The performance requirements establish limits of acceptability of a valve, regardless of size or pressure rating. The burn period has been established to represent the maximum time required to extinguish most fires. Fires of longer duration are considered to be of major magnitude with consequences greater than those anticipated in the test. The test pressure during the burn is set at 0.2 MPa (30 psig) for nonmetallic seated valves rated Class 150 and Class 300 to better simulate the conditions that would be expected in a process plant when a fire is detected and pumps are shut down. In this case, the source of pressure in the system is the hydrostatic head resulting from liquid levels in towers and vessels. This situation is approximated by this lower test pressure.

In production facilities, valves are typically of a higher rating and the pressure source is not easily reduced when a fire is detected. Therefore, for all other valves, the test pressure during the burn is set at a higher value to better simulate the expected service conditions in these facilities. Use of this standard assumes that the execution of its provisions is entrusted to appropriately qualified and experienced personnel because it calls for procedures that may be injurious to health if adequate precautions are not taken. This standard refers only to technical suitability and does not absolve the user from legal obligations relating to health and safety at any stage of the procedure.

# Fire Test for Quarter-turn Valves and Valves Equipped with Nonmetallic Seats

## 1 Scope

This standard specifies fire type-testing requirements and a fire type-test method for confirming the pressure-containing capability of quarter-turn valves and other valves with nonmetallic seating under pressure during and after the fire test. It does not cover the testing requirements for valve actuators other than manually operated gear boxes or similar mechanisms when these form part of the normal valve assembly. Other types of valve actuators (e.g. electrical, pneumatic, or hydraulic) may need special protection to operate in the environment considered in this valve test, and the fire testing of such actuators is outside the scope of this standard.

NOTE For the purposes of this standard, the terms “fire type-test” and “fire test” are synonymous.

## 2 Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

API Standard 598, *Valve Inspection and Testing*

IEC 60584-2, *Thermocouples: Tolerance Values of the Thermoelectric Voltages*

## 3 Terms and Definitions

For the purposes of this document, the following terms and definitions apply.

### 3.1

#### **asymmetric seated valve**

Valve with an internal construction that has no plane of symmetry perpendicular to the axis of the body ends.

NOTE This is a valve with a single seat offset from the shaft centerline.

### 3.2

#### **Class**

An alphanumeric designation that is used for reference purposes related to valve pressure-temperature capability, taking into account valve material mechanical properties and valve dimensional characteristics. It comprises the letters Class followed by a dimensionless whole number. The number following the letters Class does not represent a measurable value and is not used for calculation purposes except where specified in this standard. The allowable pressure for a valve having a Class number depends on the valve material and its application temperature and is to be found in tables of pressure-temperature ratings.

### 3.3

#### **DN**

An alphanumeric designation of size that is common for components used in a piping system, used for reference purposes, comprising the letters DN followed by a dimensionless number indirectly related to the physical size of the bore or outside diameter of the end connection, as appropriate. The dimensionless number following DN does not represent a measurable value and is not used for calculation purposes except where specified in this standard.

### 3.4

#### **NPS**

An alphanumeric designation of size that is common for components used in a piping system, used for reference purposes, comprising the letters NPS followed by a dimensionless number indirectly related to the physical size

of the bore or outside diameter of the end connection, as appropriate. The dimensionless number may be used as a valve size identifier without the prefix NPS. The dimensionless size identification number does not represent a measurable value and is not used for calculation purposes.

### 3.5

#### **symmetric seated valve**

Valve with an internal construction that has a plane of symmetry perpendicular to the axis of the body ends.

NOTE This is a valve where both seat sealing elements are identical.

## 4 Test Conditions

### 4.1 Direction and Conditions for Valves to Be Tested

**4.1.1** Symmetric seated valves intended by the manufacturer for bidirectional installation shall be tested in one direction only.

**4.1.2** Asymmetric seated valves intended by the manufacturer for bidirectional installation shall be tested by carrying out the burn test procedure twice, once in each direction of the potential installation. The same valve may be refurbished and re-tested, or another, identical, valve may be tested in the other direction.

**4.1.3** Valves intended solely for unidirectional installation shall be clearly and permanently marked as such and shall be tested in the stated direction of installation.

**4.1.4** If the valve being tested is fitted with a gearbox or other such manual device, then only that particular assembly shall qualify. If a valve can be supplied with or without a gearbox, testing with a gearbox fitted shall qualify valves without a gearbox but not the converse. Grease may be removed from a gearbox prior to testing for safety purposes.

**4.1.5** Valves (and gearboxes) shall not be protected with insulation material of any form during testing, except where such protection is part of the design of the component(s).

**4.1.6** Prior to initiating the test, inspection requirements and testing by the valve manufacturer shall have been completed on the valve in accordance with API Standard 598 or applicable production testing.

### 4.2 Pressure Relief Provision

If the valve under test incorporates a pressure relief device as part of its standard design and if this device activates during the fire test, then the test shall be continued and any leakage to atmosphere from the device shall be measured and counted as external leakage. If the design is such that the device vents to the downstream side of the valve, then any leakage shall be counted as through-seat leakage (see 5.6.12 and 5.6.14). However, the test shall be stopped if the system pressure relief device described in 5.3.2.8 activates.

## 5 Fire Test Method

### 5.1 General Warning

Fire testing of valves is potentially hazardous, and it is essential that the safety of personnel be given prime consideration. Given the nature of the fire test and the possibility of weaknesses in the design of the test valve and test equipment, hazardous rupture of the pressure boundary could occur. Adequate shields in the area of the test enclosure and other appropriate means for the protection of personnel are necessary.

### 5.2 Principle

A closed valve completely filled with water under pressure is completely enveloped in flames with an environmental temperature in the region of the valve of 750 °C to 1000 °C (1400 °F to 1800 °F) for a period of 30



minutes. The objective is to completely envelop the valve in flames to ensure that the seat and sealing areas are exposed to the high burn temperature. The intensity of the heat input shall be monitored using thermocouples and calorimeter cubes as specified in 5.6.9 and 5.6.10. During this period, the internal and external leakage is recorded. After cooldown from the fire test, the valve is tested to assess the pressure-containing capability of the valve shell, seats, and seals.

## 5.3 Apparatus

### 5.3.1 General

The test equipment shall not subject the valve to externally applied stress affecting the results of the test. Schematic diagrams of recommended systems for fire type-testing of valves are given in Figure 1. Potential pipework-to-valve end connection joint leakage is not evaluated as part of the test and is not included in the allowable external leakage (see 6.3 and 6.6). For the purposes of this test, it may be necessary to modify these joints to eliminate leakage. The test equipment shall be designed so that if the nominal diameter of the pipework situated immediately upstream of the test valve is larger than DN 25 or one-half the DN of the test valve, the pipework shall be enveloped in flames for a minimum distance of 150 mm (6 in.) from the test valve. The diameter of the upstream pipework shall be sufficient to deliver a flow rate in excess of the maximum allowable leak rate for the size of the valve being tested. The pipework downstream of the test valve shall be at least DN 15 and shall be inclined so that the downstream side is fully drained. The flame source shall be at least 150 mm (6 in.) minimum away from the valve or any calorimeters and should have sufficient capacity to completely envelop the valve in flames. The enclosure containing the valve shall provide a horizontal clearance of a minimum of 150 mm (6 in.) between any part of the test valve and the enclosure, and the height of the enclosure above the top of the test valve shall be a minimum of 150 mm (6 in.).

### 5.3.2 Specific Apparatus

**5.3.2.1 Vapor trap** to minimize the cooling effect of the upstream liquid. See Figure 1, (8).

**5.3.2.2 Industrial pressure measurement devices** having a full-scale reading of between 1.5 and 4 times the pressure being measured. The accuracy of each test device used at any point on the scale shall be within 3 % of its maximum scale value for readings taken both up and down the scale with either increasing or decreasing pressure. See Figure 1, (7) (14).

**5.3.2.3 Calorimeter cubes** made of carbon steel in accordance with the design and dimensions shown in Figure 2, with a thermocouple of the accuracy specified in 5.3.2.4, located in the center of each cube. Calorimeter cubes shall be scale free before exposure to the fire environment.

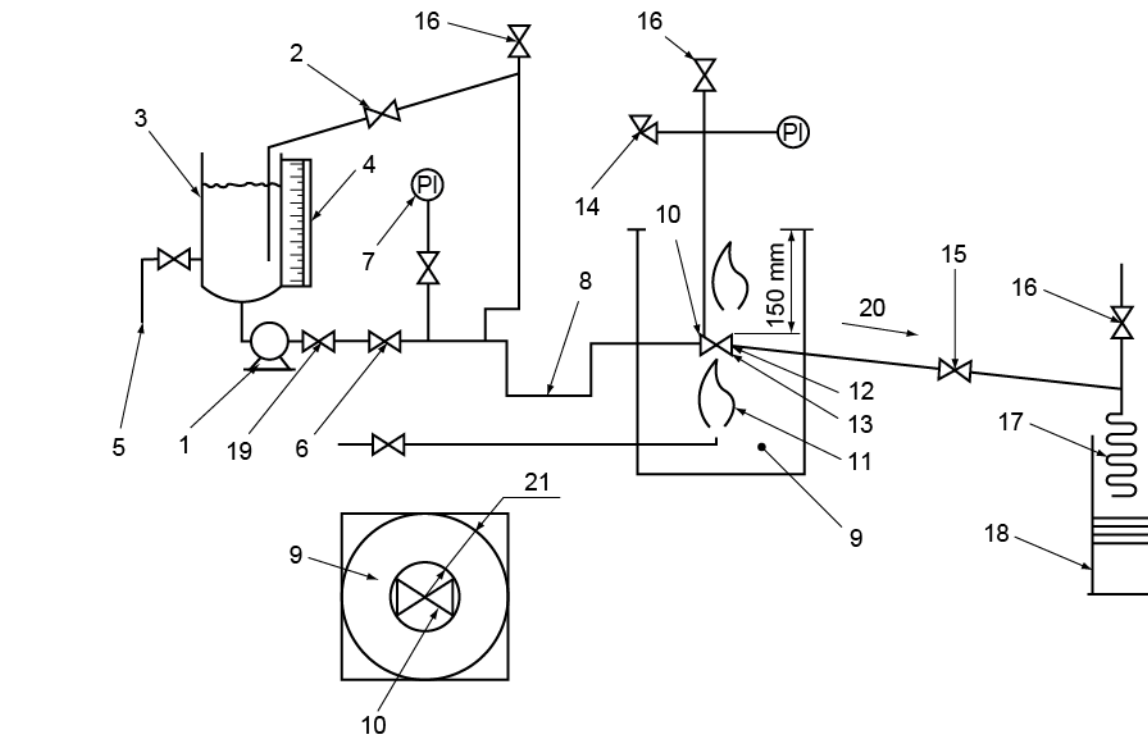
**5.3.2.4 Flame environment and valve body thermocouples** of an accuracy at least equal to tolerance class 2 for type B or tolerance class 3 for other types as specified in IEC 60584-2. See Figure 1, (13).

**5.3.2.5 Containers** of a size suitable for collecting the water leaked from the valve under test. See Figure 1, (18).

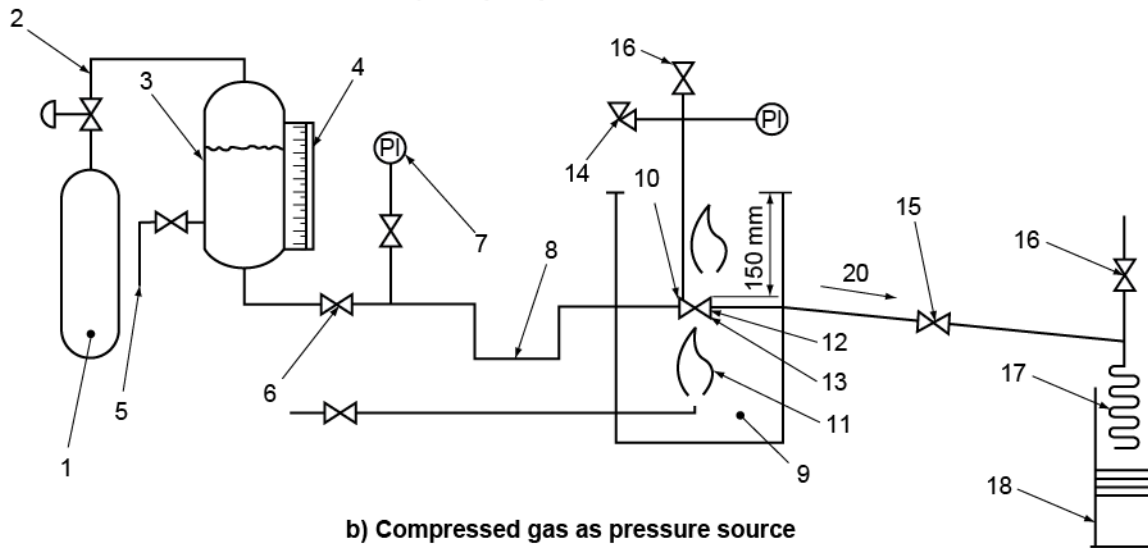
**5.3.2.6 Calibrated sight gauge** or device for measuring the water used during the test. See Figure 1, (4).

**5.3.2.7 Calibrated device for measuring the leakage water** collected during the test.

**5.3.2.8 Pressure relief provision**, incorporated in the system, consisting of a pressure relief valve to relieve the test valve center cavity pressure to the atmosphere, to protect against potential rupture of the valve if it is designed such that liquid can be trapped in the cavity. See Figure 1, (14). The pressure relief valve setting shall be either a) that determined by the valve manufacturer from data obtained by hydrostatic pressure testing of valves of the same size and type as the fire-tested valve or b) when pressure test data are not available, a setting not greater than 1.5 times the maximum allowable working pressure at 20 °C (70 °F). The maximum allowable working pressure depends on materials, design, and working temperatures and is to be selected from the tables of pressure-temperature ratings given in the appropriate standards such as ASME B16.34.



a) Pump as pressure source

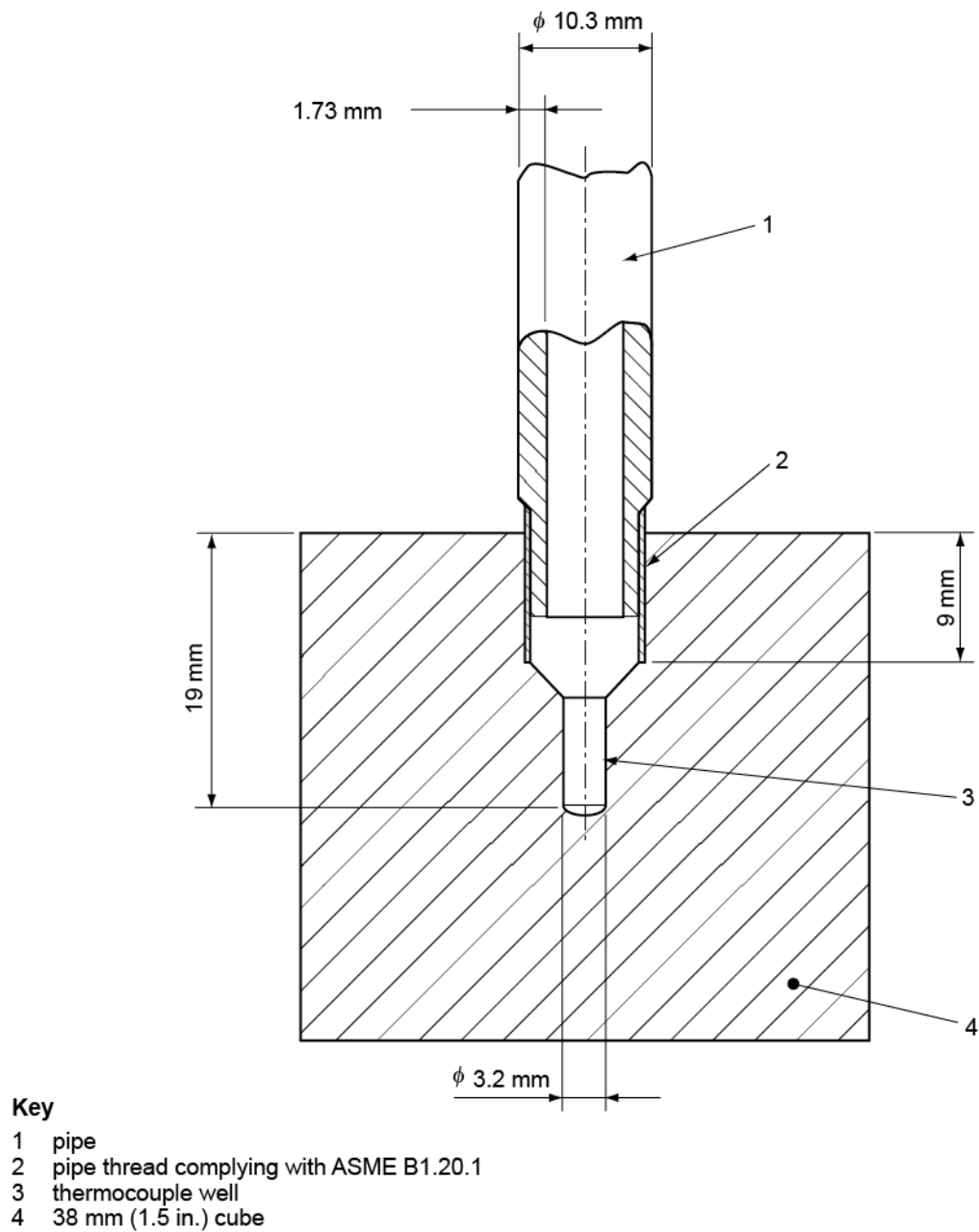


b) Compressed gas as pressure source

**Key**

- |                                 |   |                              |
|---------------------------------|---|------------------------------|
| 1 pressure source               | 8 piping arranged to provide vapor trap (see 5.3.2)                             | 15 shut-off valve            |
| 2 pressure regulator and relief | 9 enclosure for test  | 16 vent valve                |
| 3 vessel for water              | 10 test valve mounted horizontally with stem in horizontal position (see 5.6.1) | 17 condenser                 |
| 4 calibrated sight gauge        | 11 fuel gas supply and burners  | 18 container (see 5.3.2)     |
| 5 water supply                  | 12 calorimeter cubes (see 5.3.2)  | 19 check valve               |
| 6 shut-off valve                | 13 flame environment and body thermocouples (see 5.3.2)                         | 20 slope                     |
| 7 pressure gauge                | 14 pressure gauge and relief valve (see 5.3.2)                                  | 21 clearance: 150 mm (6 in.) |

**Figure 1—Recommended Systems**



**Figure 2—Calorimeter Cube Design and Dimensions**

#### 5.4 Test Fluid

The test fluid used shall be water.

#### 5.5 Test Fuel

The test fuel shall be gaseous.

#### 5.6 Procedure

NOTE The numbered items in parentheses refer to the apparatus of Figure 1.

**5.6.1** Mount the test valve in the test apparatus so that the stem and bore of the valve are in the horizontal position. Mount a valve that operates in only one direction (unidirectional) in their normal operating position. Locate the flame environment, body thermocouples, and calorimeter cubes in the positions shown in Figures 3 and 4, as appropriate. For nonmetallic seated valves up to DN 100 or NPS 4 and pressure ratings up to Class 300, use two flame environment thermocouples and two body thermocouples and calorimeter cubes as shown in Figure 3. For all other valves, use two flame environment thermocouples and two calorimeter cubes as shown in Figure 4. For valves DN 200 or NPS 8 and larger, use the third calorimeter cubes as shown in Figure 4.

**5.6.2** With the test valve in the partially open position, open the water supply valve (5), the shut-off valve (6), the vent valves (16), and the shut-off valve (15) to flood the system and purge the air. When the system is completely filled with water, close the shut-off valve (15), the vent valves (16), and the water supply valve (5). Pressurize the system with water to a test pressure of 1.4 times the maximum allowable working pressure at 20 °C (70 °F)—the actual test pressure may be rounded up to the next highest bar<sup>1</sup>. Check for leaks in the test apparatus and eliminate as necessary. Release the pressure, close the test valve, and open the shut-off valve (15).

**5.6.3** If the valve under test is of the upstream sealing type, determine the volume of water that is trapped between the upstream seat seal and the downstream seat seal when the valve is closed. Record this volume. It is assumed that, during the fire type-test, this volume of water will flow through the valve and pass the downstream seat seal to be collected in the container (18). Since this volume has not actually leaked through the upstream seat seal, it is deducted from the total volume collected in the downstream container when determining the through-seat leakage (see 5.6.11).

**5.6.4** Pressurize the system to one or the other of the following pressures, as appropriate:

- a) for nonmetallic seated valves rated Class 150 and Class 300, the low test pressure at 0.2 MPa (30 psig);
- b) for all other valves, the high test pressure at 75 % of the maximum permissible seat working pressure at 20 °C (70 °F). Maintain this test pressure during the burn and cool-down periods, momentary pressure losses of up to 50 % of the test pressure being permitted provided that the pressure recovers within 2 minutes and the cumulative duration is less than 2 minutes.

**5.6.5** Record the reading on the calibrated sight gauge or device (4). Empty the container (18).

**5.6.6** Adjust the test system, excluding the test valve, during the test period to maintain the temperatures and pressures required.

**5.6.7** Open the fuel supply, establish a fire, and monitor the flame environment temperature throughout the burn period of 30 minutes, +5, -0 minutes. Check that the average temperature of the two flame environment thermocouples (13) reaches 750 °C (1400 °F) within 2 minutes from the start of the burn period, i.e. from ignition of the burners. Maintain the average temperature between 750 °C and 1000 °C (1400 °F to 1800 °F), with no reading less than 700 °C (1300 °F) for the remainder of the burn period of 30 minutes.

**5.6.8** If cavity pressure exceeds the stated manufacturer's allowable pressure, the test shall end and be reported as an invalid test.

**5.6.9** The average temperature of the calorimeter cubes shall be 650 °C (1200 °F) within 15 minutes of starting the burn period. For the remainder of the burn period, maintain the minimum average temperature of 650 °C (1200 °F), with no temperature falling to less than 560 °C (1000 °F). For valves subjected to the low-pressure test (see 5.6.4), the body thermocouple shall maintain 590 °C (1100 °F) for at least 5 minutes and the bonnet thermocouple shall maintain 650 °C (1200 °F) for at least 15 minutes of the burn period. The burn period may be extended by up to 5 minutes in order to achieve this requirement.

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<sup>1</sup>1 bar = 0.1 MPa = 10<sup>5</sup> Pa = 14.5 psig; 1 MPa = 1 N/mm<sup>2</sup>

**5.6.10** Record instrument readings (7), (12), (13), (14) every 30 seconds during the burn period. Thermocouples should be numbered, and individual records of temperature shall be recorded.

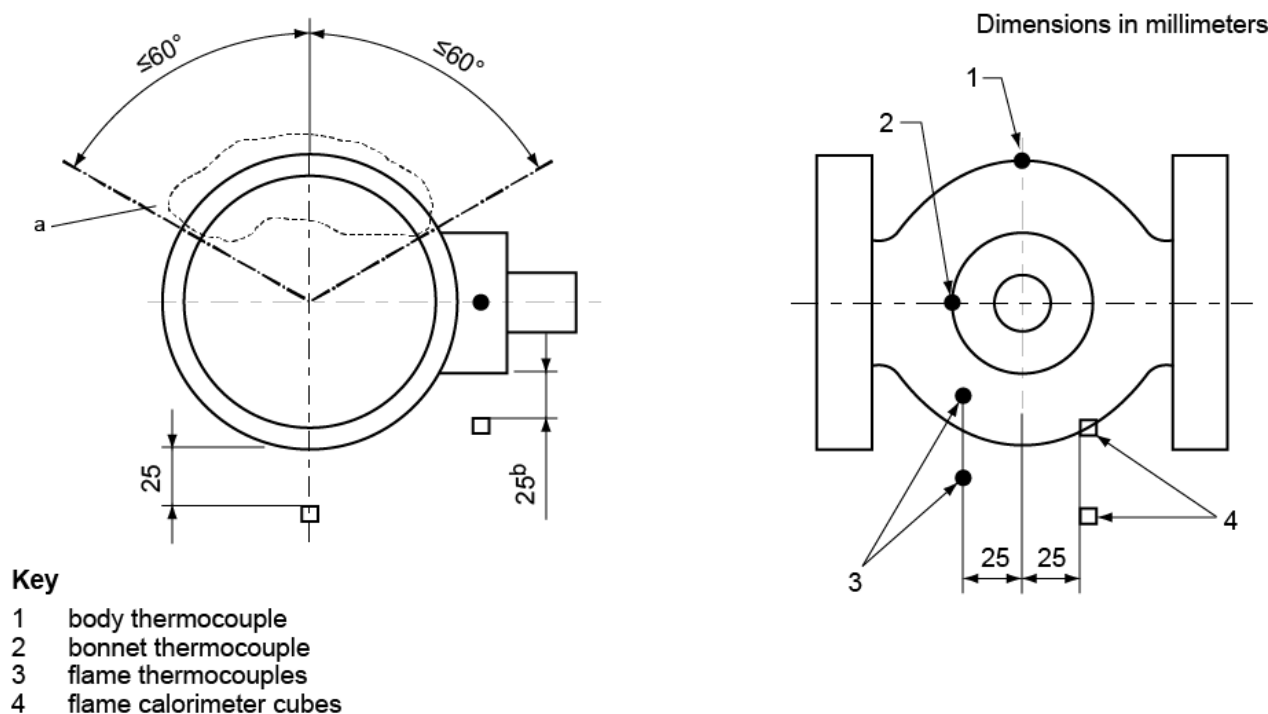
**5.6.11** At the end of the burn period (30 minutes, +5, -0 minutes), shut off the fuel supply.

**5.6.12** Immediately determine the amount of water collected in the container (18) and establish the total through-seat leakage during the burn period. If the test valve is an upstream sealing type (see 5.6.3), deduct the volume of water trapped between the upstream seat seal and the downstream seat seal. Continue collecting water in the container (18) for use in establishing the external leakage rate of the test valve during the burn and cool-down periods.

**5.6.13** Within 5 minutes of extinguishing the fire, force-cool the test valve with water so that its external surface temperature remains below 100 °C (212 °F); the time for cooling shall not exceed 10 minutes. Record the time taken to force-cool the external surface of the valve below 100 °C (212 °F).

**Warning—The internal parts of the valve could remain at significantly higher temperatures than the external surface of the valve.**

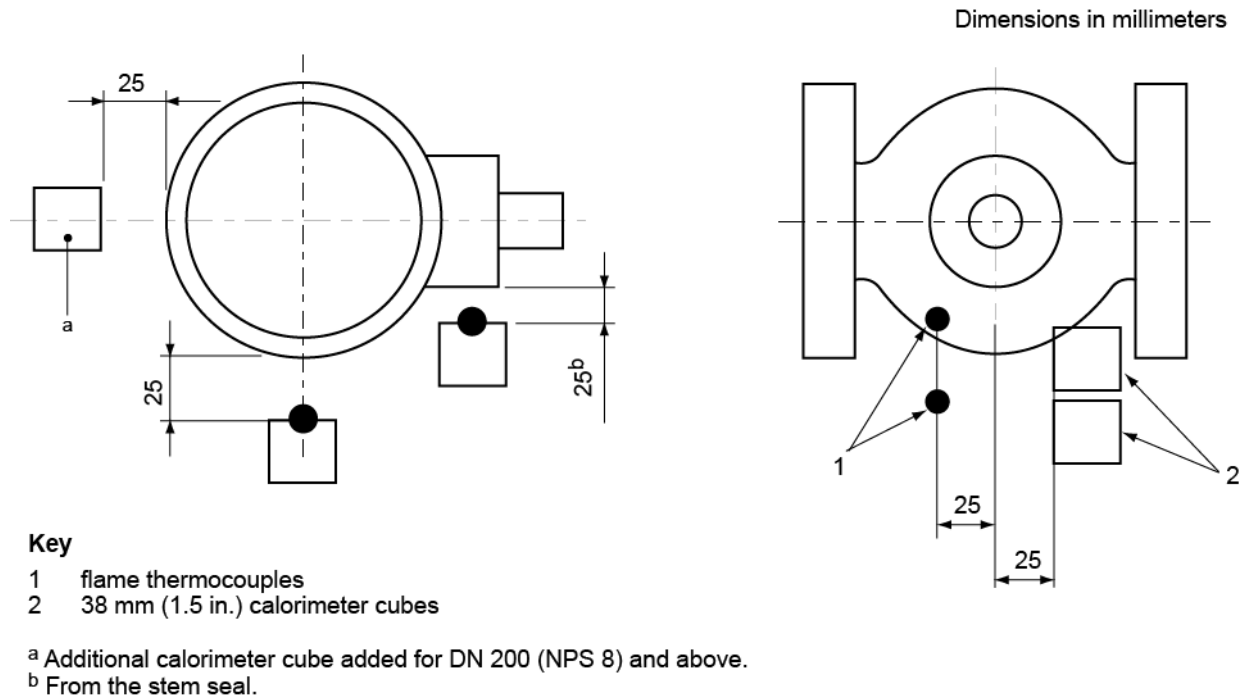
**5.6.14** Check and adjust the test pressure in accordance with 5.6.4. Record the readings on the sight gauge (4) and determine the quantity of water in the container (18). Record any leakage through the external pressure relief device if fitted as part of the standard design. The figures are used to calculate the total external leakage throughout the burn and cool-down periods.



<sup>a</sup> The body thermocouple is installed in this area. When installed, the body and bonnet thermocouples are recessed into the valve body/bonnet a distance of  $\frac{1}{2}$  the thickness of the wall or 13 mm (0.5 in.), whichever is the lesser.

<sup>b</sup> From the stem seal.

**Figure 3—Location of Temperature Measurement Sensors—Nonmetallic Seated Valves up to DN 100, NPS 4, Class 150 and Class 300**



**Figure 4—Location of Temperature Measurement Sensors for All Other Valves (Nonmetallic Seated Valves Larger Than DN 100, NPS 4, Class 150 and Class 300, and All Valve Sizes Class 300)**

**5.6.15** For valves Class 600 and lower, decrease or stabilize the pressure to the low test pressure at 0.2 MPa (30 psig) and measure the through-seat leakage over a 5-minute period.

**5.6.16** Increase or stabilize the test pressure to the high test pressure, close the shut-off valve (15), and operate the test valve against the test pressure to the fully open position.

**5.6.17** Stabilize the pressure to the high test pressure and measure the external leakage over a 5-minute period.

## 6 Performance

### 6.1 General

Valves tested in accordance with 5 shall be in accordance with 6.2 to 6.7.

### 6.2 Through-seat Leakage During Burn Period

For the low-pressure test, the average through-seat leakage at low test pressure during the burn period (see 5.6.11) shall not exceed the value given in Table 1. For the high-pressure test, the average through-seat leakage at high test pressure during the burn period (see 5.6.11) shall not exceed the value given in Table 1.

### 6.3 External Leakage During Burn and Cool-down Periods

For the low-pressure test, the average external leakage, not including through-seat leakage, during the burn and cool-down periods (see 5.6.13) shall not exceed the value given in Table 1. For the high-pressure test the average external leakage, not including through-seat leakage, during the burn and cool-down periods (see 5.6.13) shall not exceed the value given in Table 1.

## 6.4 Low-pressure Test Through-seat Leakage After Cooldown

The maximum through-seat leakage shall not exceed the value given in Table 1.

## 6.5 Operability

After the completion of fire testing, the operability of the valve shall be checked. While the valve is in the closed position, the full test pressure (5.6.4) shall be applied against the closure member. The valve shall be cycled from the fully closed to the fully open position using the operator fitted to the test valve. Due to the temperature of the test, high pressures within the valve may be at a level that may compromise the pressure boundary integrity. Extension handles are allowed to protect the operating personnel from risks associated with potential loss of containment during the valve operation. The use of extension handles shall not result in an applied torque that is higher than that available from the fitted operator.

## 6.6 External Leakage Following Operational Test

The average external leakage of the valve in the open position at the high test pressure (see 5.6.16) shall not exceed the value given in Table 1.

**Table 1—Maximum Leak Rates**

All leakage in mL/min

DN	NPS	Through-seat Leakage			External Leakage		
		During Burn (See 5.6.11 and 6.2)		After Cooldown (See 5.6.15 and 6.4)	During Burn and Cooldown (See 5.6.13 and 6.3)		After Operational Test (See 5.6.17 and 6.6)
		Low Test Pressure	High Test Pressure	Low Test Pressure	Low Test Pressure	High Test Pressure	High Test Pressure
8	1/4	32	128	13	8	32	8
10	3/8	40	160	16	10	40	10
15	1/2	60	240	24	15	60	15
20	3/4	80	320	32	20	80	20
25	1	100	400	40	25	100	25
32	1 1/4	128	512	51	32	128	32
40	1 1/2	160	640	64	40	160	40
50	2	200	800	80	50	200	50
65	2 1/2	260	1040	104	65	260	65
80	3	320	1280	128	80	320	80
100	4	400	1600	160	100	400	100
125	5	500	2000	200	125	500	125
150	6	600	2400	240	150	600	150
200	8	800	3200	320	200	800	200
>200	>8	800	3200	320	200	800	200

NOTE External leakage does not include potential leakage from the pipework-to-valve end connection (see 5.3.1).

## 6.7 Test Report

The test report shall include the following information:

- a) date of fire type-test;
- b) place at which the fire type-test was conducted;
- c) specification used for the fire type-test (including date of publication and applicable amendments);
- d) valve manufacturer's name and address;
- e) statement that the fire-tested valve has passed all the required hydrostatic, air type and production pressure tests required by the standard to which the valve was manufactured (manufacturer's statement may be accepted);
- f) full description of the valve tested, including nominal size, pressure rating designation, type (e.g. gate), weight, whether reduced or full bore, material of body/bonnet, trim material, and manufacturer's reference number;
- g) markings on the valve and their locations, including manufacturer's nameplate date (if fitted);
- h) manufacturer's sectional drawing of the valve and a detailed parts list, including materials, of all valve components tested, identified in the text by identification number (drawing number), and revision and date of issue of documents;
- i) statement as to whether or not a gear box is fitted to the test valve and, if fitted, the type, manufacturer's name, model number, and mechanical advantage;
- j) test pressure during burn and cooldown;
- k) time of test start, i.e. of ignition of burners;
- l) temperature recorded at start and at 30-second intervals throughout duration of test, with individual records for each thermocouple;
- m) through-seat leakage during burn period (see 6.2);
- n) external leakage during burn and cool-down periods (see 6.3);
- o) time required for valve to cool to 100 °C;
- p) through-seat leakage (low-pressure test) for valves Class 600 and lower;
- q) statement as to whether or not the test valve unseated and moved to the fully open position (see 6.5);
- r) external leakage in the open position (see 6.6);
- s) whether the valve is asymmetric and intended for bidirectional installation—test results in both directions;
- t) observations made during the course of the test that may have bearing on the results provided;
- u) declaration as to whether or not the test valve complied with the requirements of this standard;
- v) indication on the cover sheet or table of contents of the report of the total number of pages contained in the document (including drawings), with each page being numbered, e.g. 1/12, 2/12;



- w) name and affiliation of individuals witnessing the fire test;
- x) manufacturer's reported maximum allowable body cavity pressure.

## 7 Qualification of Other Valves by Representative Size, Pressure Rating, and Materials of Construction

### 7.1 General

Instead of testing each nominal size and nominal pressure rating of a given valve design, all valves of the same basic design (type, model, and/or configuration), as the test valve, may be deemed to have been fire-tested, subject to the following limitations.

- a) A test valve may be used to qualify valves larger than the test valve but not exceeding twice the nominal size of the test valve (see 7.3). A size DN 200 or NPS 8 test valve qualifies all larger sizes. If the minimum size of a given range of valves is greater than DN 200 or NPS 8, then the minimum size of the range shall be tested to qualify all sizes.
- b) A DN 50 (NPS 2) valve may be used to qualify all smaller sizes of valve of the same types. If the maximum size of a given range of valves is smaller than DN 50 or NPS 2, then the maximum size of the range shall be tested to qualify all sizes.
- c) A test valve may be used to qualify valves with higher Class ratings but not exceeding twice the Class rating of the test valve, except as shown in Tables 3 and 4.
- d) A reduced bore (or Venturi pattern) test valve may be used to qualify a smaller nominal size full bore (or regular pattern) valve when the components associated with the obturator, seat seals, and stem are identical in design and size. In such a case, the permissible average leakage rates are those applicable to the full bore (or regular pattern) valve.
- e) The type of valve body ends is not considered by this standard. However, the mass of the valve is determined in part by the body end type. For qualification to the present standard, and providing that all other qualification criteria have been met, valves with ends different to those of the test valve may also qualify provided that their mass is greater than that of the test valve or their mass is not less than 75 % of that of the test valve.

### 7.2 Materials of Construction

**7.2.1** For the purposes of product compliance certification or type testing systems, the materials of construction of the pressure-retaining envelope of the valve shall be deemed to qualify other materials of construction within the generic classifications below:

- ferritic,
- austenitic,
- duplex.

**7.2.3** If a range of valves is covered by testing of ferritic test valves then the type-testing coverage may be extended to cover austenitic or duplex materials by carrying out a further test on **a single valve of each material**. For product lines NPS 2 and below, the valve shall be of the maximum size of the product range. For those where the product line extends to larger sizes, the valve shall be equal to or greater than the median size in the ferritic testing. Other materials of construction of the pressure-retaining envelope of the valve require full testing of representative size and pressure ratings as specified in 7.3 and 7.4.

**7.2.4** Alloy steel bolting (e.g. B7, L7) used as part of the valve's pressure-retaining envelope may be used to qualify austenitic steel bolting but not vice versa.

**7.2.5** Any change in nonmetallic materials with respect to the seat-to-closure member seal, seat-to-body seal, stem seal, and body joint seal require a re-qualification. Filled PTFE, however, may qualify non-filled PTFE and vice versa.

### 7.3 Qualification of Valves by Nominal Size

The valves of other nominal sizes that may be deemed to have been fire type-tested relative to the actual valve tested are given in Tables 2 and 3.

### 7.4 Qualification of Valves by Pressure Rating

The valves of other Classes that may be deemed to have been fire type-tested relative to the actual valve tested are given in Table 4.

**Table 2—Other Valves Qualified by DN**

Size of Valve to Be Tested DN	Other Valve Sizes Qualified DN
50	50 and below; 65; 80; 100
65	65; 80; 100; 125
80	80; 100; 125; 150
100	100; 125; 150; 200
125	125; 150; 200; 250
150	150; 200; 250; 300
200	200 and larger

**Table 3—Other Valves Qualified by NPS**

Size of Valve to Be Tested NPS	Other Valve Sizes Qualified NPS
2	2 and below; 2 <sup>1</sup> / <sub>2</sub> ; 3; 4
2 <sup>1</sup> / <sub>2</sub>	2 <sup>1</sup> / <sub>2</sub> ; 3; 4; 5
3	3; 4; 5; 6
4	4; 5; 6; 8
5	5; 6; 8; 10
6	6; 8; 10; 12
8	8 and larger

**Table 4—Other Valves Qualified by Class**

<b>Valve Tested Class Rating</b>	<b>Other Valves Qualified</b>
	<b>Class Rating</b>
150	150; 300
300	300; 400; 600
400	400; 600; 800
600	600; 800; 900
800	800; 900; 1500
900	900; 1500
1500	1500; 2500
2500	2500

## Bibliography

The following codes and standards are not referenced directly in this standard. Familiarity with these documents may be useful as they provide additional information pertaining to this standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

- [1] API Recommended Practice 591, *User Acceptance of Refinery Valves*
- [2] API Specification 6D/ISO 14313, *Pipeline Valves*
- [3] API Standard 599, *Metal Plug Valves—Flanged, Threaded, and Welding Ends*
- [4] API Standard 608, *Metal Ball Valves—Flanged, Threaded, and Welding Ends*
- [5] API Standard 609, *Butterfly Valves: Double Flanged, Lug- and Wafer-Type*
- [6] ASME B1.20.1, *Pipe Threads, General Purpose (Inch)*
- [7] ASME B16.34, *Valves—Flanged, Threaded, and Welding End*





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