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BRITISH STANDARD

BS 6755-1: 1986

Testing of valves —

Part 1: Specification for production pressure testing requirements

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Foreword

This Part of BS 6755 has been prepared under the direction of the Piping Systems Components Standards Committee. BS 6755 is published in two Parts:

— *Part 1: Specification for production pressure testing requirements;*

— *Part 2:*[1] *Specification for fire type-testing requirements.*

This Part of BS 6755 will supersede BS 5146-1 and BS 5146-2 and is related to ISO 5208-1982, published by the International Organization for Standardization (ISO), but is not equivalent in technical content. The main differences are as follows.

a) Pressure test requirements specified in BS 5146-1 have been included in this Part of BS 6755 which are not specified in ISO 5208.

b) More details of the test methods are given in this Part of BS 6755.

c) Maximum allowable leakage rates for the seat and back seat tests are designated differently to ISO 5208 and BS 5146-2 and therefore a table of equivalent leakage rates is given in appendix A.

d) The minimum durations for pressure tests do not necessarily comply with ISO 5208; the actual test durations are given in the valve product standards.

e) For guidance, a table of test durations is given in appendix B and may be used where an appropriate valve product standard does not exist or where test times are not specified in a standard.

f) For comparison and information, a table of equivalent sizes of valves having different ends is given in appendix C.

This Part of BS 6755 establishes the basic requirements and methods for the production pressure testing of valves. It revises the production pressure testing requirements specified in BS 5146-1:1974 and BS 5146-2:1984 both of which will eventually be superseded by this Part of BS 6755 and will be withdrawn. In the meantime valves should be tested, as appropriate, in accordance with either:

1) i) BS 5146-1:1974;

   ii) BS 5146-2:1984;

   iii) the requirements in the relevant valve product standard;

or

2) this Part of BS 6755.

It is the intention to refer to this Part of BS 6755 for production pressure testing in all the valve product standards listed in this foreword and this will be achieved either by revisions to existing standards or by amendments published to existing standards. It is expected that all valves will be required to be production pressure tested in accordance with this Part of BS 6755 within a date of 2 years of publication of this standard. Within this period BS 5146-2:1984 will be withdrawn and the production pressure testing requirements specified in BS 5146-1:1974 will be deleted together with clauses covering inspection requirements.

[1] In preparation

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It is intended that this Part of BS 6755 be used in conjunction with the appropriate valve product standard when specified wholly or in part only by the valve product standard or with a valve application standard, e.g. BS 759-1, when applicable. In particular, it applies when specified by any one of the following valve product standards:

BS 1414	BS 5153	BS 5159	BS 6364
BS 1868	BS 5154	BS 5160	
BS 1873	BS 5155	BS 5163	
BS 5150	BS 5156	BS 5351	
BS 5151	BS 5157	BS 5352	
BS 5152	BS 5158	BS 5353	

This Part of BS 6755 gives general test requirements: specific test requirements, such as test durations and permissible leakage rates, are or will be included in the valve product standards. In addition, it may be used for the pressure testing of valves not covered by product standards.

Throughout this standard all pressures specified are gauge pressures (in bar[2)]).

It has been assumed in the drafting of this Part of BS 6755 that the execution of its provisions is entrusted to appropriately qualified and experienced people because it calls for procedures that may be injurious to health if adequate precautions are not taken. It refers only to technical suitability and does not absolve the user from legal obligations relating to health and safety at any stage. This refers, in particular, to pneumatic testing (see **D.2** and **D.5**) and attention is drawn to Guidance Note GS4, "Safety in pressure testing", produced by the Health and Safety Executive and published by HMSO.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 10, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

[2)] 1 bar = 10^5 N/m^2 = 10^5 Pa.

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Section 1. General

1 Scope

This Part of BS 6755 specifies production pressure testing requirements and describes in appendix D tests to confirm the pressure-containing capability of the shell of a valve under pressure, and tests verifying the degree of tightness and pressure-retaining capability of the valve seat(s) and/or closure mechanism.

Where requirements in a valve product standard differ from those given in this standard then the requirements of the product standard apply.

NOTE The titles of the publications referred to in this standard are listed on the inside back cover.

2 Definitions

For the purposes of this Part of BS 6755 the following definitions apply.

2.1
test pressure

the internal pressure to which the valve under test is subjected

2.2
nominal size (DN)

a numerical designation of size which is common to all components in a piping system other than components designated by outside diameters or by thread size. It is a convenient round number for reference purposes and is only loosely related to manufacturing dimensions

NOTE 1 Nominal size is designated by the letters DN followed by the appropriate reference number.
NOTE 2 This definition is identical to that given in ISO 6708.
NOTE 3 A table of equivalent sizes for valves having flanged ends, threaded ends, weld ends and capillary or compression ends is given in appendix C.

2.3
nominal pressure (PN)

a numerical designation which is a convenient rounded number for reference purposes

all equipment of the same nominal size (DN) designated by the same PN number shall have compatible mating dimensions

NOTE 1 The maximum permissible working pressure depends on materials, design and working temperatures, and should be selected from the tables of pressure/temperature ratings given in the appropriate standards.
NOTE 2 Nominal pressure is designated by the letters PN followed by the appropriate reference number.
NOTE 3 This definition is identical to that given in ISO 7268.

2.4
seat rating

the maximum permissible differential pressure (in bar) at 20 °C, across the seat

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Section 2. Performance

3 General

When tested in accordance with appendix D, the valve shall comply with clauses **4** to **7**, as appropriate.

4 Pressure-containing capability of valve shell

4.1 When tested in accordance with **D.6**, the valve shall comply with **4.2** or **4.3**, as appropriate, and **4.4**, where applicable.

4.2 When the test fluid is a liquid there shall be no visually detectable leakage.

Unless otherwise specified in the appropriate valve product standard, seepage from stuffing boxes and other stem sealing mechanisms is permissible at the shell test pressure provided that there is no visually detectable leakage when the pressure is reduced to the seat test pressure.

CAUTION. Attention is drawn to the fact that if the gland of a valve is tightened whilst the pressure in the valve is higher than the seat test pressure, this practice could lead to unsafe conditions.

4.3 When the test fluid is a gas:

a) if the valve is immersed in clean water, the upper surface of the valve shell shall not be more than 50 mm below the surface of the water and there shall be no bubbles breaking the surface of the water;

b) if the valve is coated with a leak detection fluid, there shall be no continuous formation of bubbles.

4.4 When tested in accordance with **D.6.3**, diaphragm valves with sealed bonnets shall show no visually detectable leakage.

5 Butterfly valve disk strength

When tested in accordance with **D.7**, there shall be no visible evidence of structural damage to the disk or of leakage through the disk during the test duration.

NOTE Leakage past the disk edge is not a cause for deeming that the valve does not comply with this Part of BS 6755.

6 Seat leakage

When tested in accordance with **D.8**, the maximum permissible seat test leakage rate shall be one of the rates given in Table 1, the particular leakage rate(s) being given in the valve product standard.

7 Back seat leakage

When tested in accordance with **D.9**, the maximum permissible back seat test leakage rate shall be one of the rates given in Table 2, the particular leakage rate(s) being specified in the valve product standard (see also note 3 to Table 2).

8 Test certificate

Where a test certificate is issued it shall:

a) contain a statement by the manufacturer confirming that the valves have been tested in accordance with this Part of BS 6755 and as required by the product standard and comply with this Part of BS 6755;

b) state the actual pressures and fluid used in the tests.

NOTE When a test certificate is required this should be requested on the enquiry and/or order for the valves.

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Table 1 — Maximum permissible seat test leakage rates

Test	Rate A	Rate B	Rate C	Rate D
		mm^3/s	mm^3/s	mm^3/s
Hydrostatic test	No visually detectable leakage for the duration of the test time as given in the appropriate valve product standard or appendix B, as appropriate	0.01 × DN	0.03 × DN	0.1 × DN
Pneumatic test	No visually detectable leakage for the duration of the test time as given in the appropriate valve product standard or appendix B, as appropriate	0.3 × DN	3.00 × DN	30 × DN

NOTE 1 Equivalent leakage rates for ISO 5208 and BS 5146-2 are given in appendix A.
NOTE 2 No visually detectable leakage may be demonstrated during a pneumatic test in accordance with **4.3**.
NOTE 3 The leakage rates only apply when discharging to ambient conditions.
NOTE 4 No visual leakage is accepted as being within the requirements of rates A, B, C and D.
NOTE 5 See note to Table 5 for large size Class rated valves.

Table 2 — Maximum permissible back seat test leakage rates

Test	Rate A	Rate B	Rate C	Rate D
	mm^3/s	mm^3/s	mm^3/s	mm^3/s
Hydrostatic test	0.03 × DN	0.03 × DN	0.03 × DN	0.1 × DN
Pneumatic test	3.00 × DN	3.00 × DN	3.00 × DN	30 × DN

NOTE 1 The rate or rates of each test leakage for each valve type are specified in the appropriate valve product standard.
NOTE 2 The leakage rates only apply when discharging to ambient conditions.
NOTE 3 No visual leakage is accepted as being within the requirements of rates A, B, C and D.
NOTE 4 See note to Table 5 for large size Class rated valves.

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Appendix A Equivalent leakage rates

Equivalent leakage rates for this Part of BS 6755, BS 5146-2 and ISO 5208 are given in Table 3.

Table 3 — Equivalent leakage rates

This Part of BS 6755[a]	BS 5146-2	ISO 5208
A	3	3
B	2	2
C	1A	—
D	1	1

[a] See Table 1.

Appendix B Test durations

Table 4, which is for guidance only, may be used where an appropriate valve product standard does not exist or where test times are not specified in a standard. In those cases where the appropriate valve product standard specifies different minimum test durations than those given in Table 4, the requirement of that valve product standard applies.

Table 4 — Test durations

Nominal valve size DN	Minimum test durations: hydrostatic or pneumatic			
	Shell test	Seat test		Back seat test
		Metal seated	Elastomeric or polymeric seated	
	s	s	s	s
Up to and including DN 50	15	15	15	10
DN 65 up to and including DN 200	60	30	15	15
DN 250 up to and including DN 450	180	60	30	20
DN 500 and greater	180	120	60	30

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Appendix C Equivalent sizes of valves having flanged ends, threaded ends, weld ends and capillary or compression ends

Equivalent sizes of valves having flanged ends, threaded ends, welded ends and capillary or compression ends complying with BS 864-2 and BS 864-3 and BS 2051-1 are given in Table 5.

Appendix D Pressure tests

D.1 Apparatus

D.1.1 *General*

The test apparatus shall be of such a design that it does not subject the valve to externally applied stress affecting the results of the tests.

D.1.2 *Specific apparatus*

D.1.2.1 *Industrial pressure gauges*, complying with the requirements for accuracy of BS 1780 and having a full scale reading of not more than 4 times and not less than 1.5 times the test pressure. Pressure gauges shall be checked for calibration and adjusted if necessary at intervals not exceeding 6 months and the results shall be recorded.

NOTE Guidance on measurement and calibration systems can be found in BS 5781-1 and BS 5781-2.

When equipment such as volume loss devices or digital pressure indicators are used, the manufacturer shall be capable of demonstrating the equivalence of the test system with the requirements of this Part of BS 6755.

Table 5 — Equivalent sizes of valves

Type of valve ends				
Flanged, threaded or weld ends		Capillary or compression ends		
PN rated valves excluding threaded end valves	Class rated and threaded[a] end valves	BS 864-2	BS 864-3	BS 2051-1
DN		mm		mm
—	1/4	8	—	—
10	3/8	10 and 12	3/8	10 and 12
15	1/2	15 and 18	1/2	15, 16 and 18
20	3/4	22	3/4	20 and 22
25	1	28	1	26 and 28
32	1 1/4	35	1 1/4	30 and 35
40	1 1/2	42	1 1/2	38 and 42
50	2	54	2	—
65	2 1/2	67	—	—
80	3	—	—	—
100	4	—	—	—
125	5	—	—	—
150	6	—	—	—
200	8	—	—	—
250	10	—	—	—
300	12	—	—	—
350	14	—	—	—
400	16	—	—	—
45O	18	—	—	—
500	20	—	—	—
600	24	—	—	—

NOTE For Class rated valves above size 24, the nominal bore size of the valve should be converted into millimetres and this value should be used instead of "DN" when calculating leakage rates in Table 1 and Table 2.

[a] Threaded end valves can also be PN rated.

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D.2 Test fluid

The test fluid used for applying the test pressure shall be one of the following.

a) Liquid: water, treated with a corrosion inhibitor when necessary, or other liquid whose viscosity at ambient temperature is equal to, or less than, that of water, or kerosene.

NOTE 1 Unless otherwise specified on the enquiry and/or order for the valve, water will be used as the test fluid.

NOTE 2 Attention is drawn to the need to control the chloride content of test water in contact with austenitic stainless steel valves. If a purchaser requires a particular limit on the chloride content of the test water, this should be stated on the enquiry and/or order for the valve.

or

b) Gas: air or inert gas.

WARNING. Pneumatic pressure testing is potentially a much more dangerous operation than hydrostatic pressure testing. Attention is drawn to the following.

1) The adequacy of protection for personnel carrying out the testing in the event of failure of a valve, connection or equipment during the test.

2) The extent of the test area cleared for safety purposes.

Attention is drawn to the fact that if the gas pressure is reduced to the valve under test from high pressure storage, its temperature will fall. The test arrangement should be such that the gas entering the valve does not lower the temperature so as to affect the validity of the test.

D.3 General conditions of test

The following general conditions of test shall apply.

a) Valves and connections shall be purged of air when testing with a liquid.

b) To avoid the risk of freezing when the test medium is water the minimum temperature of the water, valve or ambient air during the test shall be not less than 7 °C.

c) No valve undergoing pressure testing shall be subject to any form of shock loading.

d) Valves shall not be painted or coated before shell pressure tests are completed. Pressure containing components shall not be impregnated for the purpose of preventing leakage.

NOTE This does not preclude the use of surface treatments to prevent corrosion during manufacture and storage.

Internal linings or coatings that form a design feature of the valve are permitted.

D.4 Test pressures

D.4.1 *Shell test*

For the shell test the test pressures shall be as follows.

a) The hydrostatic shell test pressure shall be 1.5 times the maximum permissible working pressure at 20 °C[3)].

NOTE For weld end valves which are designed solely for elevated temperature duties where the concept of a maximum permissible working pressure at 20 °C may not be appropriate, the test pressure requirements given in **26.2.1.3** of BS 759-1:1984 may be applied.

b) The pneumatic shell test pressure shall be 6 bar to 7 bar.

D.4.2 *Butterfly valve disk strength test*

The hydrostatic disk test pressure shall be 1.5 times the maximum permissible working pressure at 20 °C[3)].

D.4.3 *Seat test and back seat test*

For the seat test and the back seat test the test pressures shall be as follows.

a) The hydrostatic seat and back seat test pressure shall be 1.1 times the maximum permissible working pressure at 20 °C[3)].

b) The pneumatic seat and back seat test pressure shall be 6 bar to 7 bar.

The following limitations shall apply.

1) Valves with a seat rating less than the maximum permissible working pressure at 20 °C shall be seat tested at a pressure of 1.1 times[3)] the maximum seat rating, or subject to a maximum of 6 bar pneumatic.

2) Valves which have obturators and/or actuating devices that would be damaged if the seat test pressure required by a) or b) were applied, shall be seat tested at a pressure of 1.1 times[3)] the maximum operating differential pressure, or subject to a maximum of 6 bar pneumatic.

[3)] The actual test pressure may be rounded to the next higher 1 bar increment.

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D.5 Applicability of pneumatic tests

The applicability of the 6 bar pneumatic tests shall be as specified in the valve product standards, subject to the following.

a) The pneumatic shell test performed as an alternative to the hydrostatic shell test shall be limited to sizes up to and including DN 50[4)] for all pressure ratings up to and including PN 40 and up to and including Class 300.

However, before a pneumatic test is undertaken, the manufacturer shall have previously subjected a production sample of the valve model and size to a hydrostatic shell test to a pressure at least 2.25 times the maximum permissible working pressure without any leakage or permanent deformation of any component.

b) The pneumatic seat test performed as an alternative to the hydrostatic seat test shall be limited to:

1) sizes up to and including DN 80 for all pressure ratings;

2) sizes above DN 80 and up to and including DN 200 for pressure ratings up to and including PN 40 and up to and including Class 300.

However, before a pneumatic test is undertaken, the manufacturer shall have previously subjected a production sample of the valve model and size to a hydrostatic seat test to the pressure specified in **D.4.3**.

c) Where a pneumatic seat test is the only seat test specified in a valve product standard or is performed as an additional test to the hydrostatic seat test, there shall be no limit to any size or pressure rating.

d) Where appropriate, the manufacturer shall additionally carry out a low-pressure pneumatic test on the seats for valves intended for low differential pressure or vacuum service.

NOTE Where this test is required, it should be requested on the enquiry and/or order for the valve and the test pressure should be stated.

e) Where both a hydrostatic and pneumatic seat test is to be carried out, the hydrostatic seat test shall always be satisfactorily completed before attempting to prove the valve by the pneumatic seat test.

D.6 Shell test

D.6.1 *Principle*

The shell test assesses the pressure containing capability of the valve shell including the packing chamber.

D.6.2 *Procedure*

For all types of valve, except where the design or service conditions preclude it, carry out the following.

a) Blank off the ends of the assembled valve.

b) Ensure that the obturator is positioned such that the body cavity, if any, is fully pressurized with test fluid.

c) Apply the test pressure specified in **D.4.1** and maintain the pressure for the period specified in the appropriate valve product standard (see appendix B).

If, however, the design or service conditions of the valve precludes the hydrostatic testing of the assembled valve at the pressure detailed in c), then it is permissible to test, before assembly, the pressure-containing components at this pressure, and to test the assembled valve at a pressure equal to that for the seat test (see **D.4.3**).

D.6.3 *Sealed bonnet test for diaphragm valves*

For the sealed bonnet test, fit a slave diaphragm, which is a diaphragm with its centre removed, into the test valve. Test the valve in accordance with **D.6.2**, both the sealed bonnet and the body being tested together for the minimum duration specified in BS 5156. Check that the leakage rate complies with **4.4**.

Remove the slave diaphragm and replace it with the diaphragm required for the complete valve assembly. Test this complete valve in accordance with **D.6.2**.

D.7 Butterfly valve disk strength test

D.7.1 *Principle*

The valve disk strength test assesses the structural integrity of the butterfly valve disk.

D.7.2 *Conditions of test*

The side of the disk to which the pressure is applied shall be the direction in which the disk is weaker.

NOTE This direction is determined by the manufacturer, based on type testing on the disk in both directions.

[4)] DN designations refer to valves having flanged ends. A table of equivalent sizes for valves having threaded ends and capillary or compression ends is given in appendix C.

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D.7.3 ***Procedure***

Close the valve in the normal manner, and apply the test pressure specified in **D.4.2** to one side of the disk with the other side open to atmosphere, and maintain the pressure for the period specified in BS 5155.

D.8 Seat test

D.8.1 ***Principle***

The seat leakage test assesses the sealing capability of the valve seat(s) in the direction(s) for which the valve is designed.

D.8.2 ***Conditions of test***

Any valve designed for use as a unidirectional flow valve, other than check valves or globe stop and check valves, shall be tested in the specified flow direction only.

D.8.3 ***Procedure***

NOTE If the seat test is a pneumatic test where the valve is immersed in clean water, the valve should be so mounted to allow the free release of any bubbles from the valve seat area and so that bubbles are readily observable.

D.8.3.1 *Preparation.* Using a clean dry cloth wipe the seats clean and free from oil or grease except for valves in which a lubricant or sealing compound is the primary means of sealing. However, if necessary to prevent galling, it is permissible to coat the seats with a film of oil of viscosity not greater than that of kerosene.

Use the appropriate procedure for the specific types of valves as given in **D.8.3.2** to **D.8.3.7**.

D.8.3.2 *Gate valves, ball valves and plug valves*

NOTE 1 The procedure described in **D.8.3.2** may not ensure pressurization of the intergate space of double seated valves to the seat test pressure. Where such pressurization is a requirement of the valve product standard, or is required by the purchaser of valves, it may be necessary to reverse the sequence of items b) and c) of the procedure.

For gate valves, ball valves and plug valves, carry out the following.

a) Fill the valve including the bonnet cavity, if appropriate, with the test fluid.

b) Move the obturator to the closed position.

c) Apply the test pressure specified in **D.4.3** successively to each side of the closed valve, and maintain the pressure for the period specified in the appropriate valve product standard (see appendix B).

NOTE 2 Valves which incorporate a double block and bleed design feature need to have the bleed plug removed prior to the test in order to prove the double block and bleed capability.

NOTE 3 Valves with independent double seating (such as two-piece obturator or double-seated valves) may be tested by applying the test pressure between the seats and checking each side of the closed valve.

d) Check the leakage rate.

NOTE 4 Soft seated (i.e. elastomeric or polymeric seated) ball valves subjected to a hydrostatic seat test pressure may have a reduced performance capability in some subsequent services at low differential pressures. If a high pressure seat test is specified and is to be carried out before a low-pressure pneumatic seat test, it may be necessary to allow time for the seat material to recover.

NOTE 5 With plug valves relying on a sealing compound to effect a seal it is permitted to charge with sealing compound prior to testing.

D.8.3.3 *Globe valves (including angle globe types and Y types*). For globe valves, carry out the following.

a) Fill the upstream valve cavity with the test fluid.

b) Move the obturator to the closed position.

c) Apply the test pressure specified in **D.4.3** in the direction to unseat the obturator, and maintain the pressure for the period specified in the appropriate valve product standard (see appendix B).

d) Check the leakage rate.

D.8.3.4 *Diaphragm valves*. For diaphragm valves, carry out the following.

a) Fill the valve with the test fluid.

b) Move the obturator to the closed position.

c) Apply the test pressure specified in **D.4.3** to the obturator in the direction producing the most adverse sealing condition, and maintain the pressure for the period specified in BS 5156.

NOTE Diaphragm valves with symmetrical seating may be tested in either direction.

d) Check the leakage rate.

D.8.3.5 *Butterfly valves*. For butterfly valves, carry out the following.

a) Fill the valve with the test fluid.

b) Move the obturator to the closed position.

c) Apply the test pressure specified in **D.4.3** to the disk in the more adverse direction, and maintain the pressure for the period specified in BS 5155. Test double disk valves either in both directions with the body vent plug removed, or test by introducing the test pressure between the disks via the body vent plug and measuring leakage either side of the disk.

NOTE Valves with symmetrical seating may be tested in either direction.

d) Check the leakage rate.

D.8.3.6 *Check valves*. For check valves, carry out the following.

a) Fill the downstream side of the valve, including the bonnet cavity if appropriate, with the test fluid.

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b) Apply the pressure specified in **D.4.3** in the direction tending to close the obturator, and maintain the pressure for the period specified in the appropriate valve product standard (see appendix B).

NOTE When specified in the valve product standard, an additional hydrostatic seat test at 25 % of the test pressure specified in **D.4.3** in the direction tending to close the obturator is required as a part of the seat test procedure. This additional test is for the same test duration as the main hydrostatic seat test.

c) Check the leakage rate.

D.8.3.7 *Globe stop and check valves.* For globe stop and check valves the test shall be in two parts.

a) To test the seat integrity of the valve as a stop valve, carry out the following.

1) Fill the upstream valve cavity with test fluid.

2) Move the obturator to the closed position.

3) Apply the test pressure specified in **D.4.3** in the direction to unseat the obturator, and maintain the pressure for the period specified in the appropriate valve product standard (see appendix B).

4) Check the leakage rate.

b) To test the seat integrity of the valve as a check valve, carry out the following.

1) Depressurize the upstream valve cavity and raise the stem clear of the obturator.

2) Fill the downstream side of the valve, including the bonnet cavity if appropriate, with the test fluid.

3) Apply the pressure specified in **D.4.3** in the direction tending to close the obturator, and maintain the pressure for the period specified in the appropriate valve product standard (see appendix B).

NOTE When specified in the valve product standard, an additional hydrostatic seat test at 25 % of the test pressure specified in **D.4.3**, in the direction tending to close the obturator, is required as part of the seat test procedure. This additional test is for the same test duration as the main hydrostatic seat.

4) Check the leakage rate.

D.9 Back seat test

D.9.1 *Principle*

The back seat test assesses the ability of the back seat to limit leakage from the stuffing box in the event of leakage past the stuffing box packing.

WARNING. Unless specified otherwise in the valve product standard, a back seat is not intended to have a pressure integrity such that it is safe to remove and replace the stuffing box packing whilst a valve is under pressure.

D.9.2 *Conditions of test*

Valves, the design of which includes pressure energized gland seals, such as "O" rings, shall not have these fitted prior to the back seat test.

D.9.3 *Procedure*

NOTE It may be convenient to carry out the back seat test in conjunction with, and immediately subsequent to, the shell test. Attention is drawn to the fact that the test pressure for a back seat test (see **D.4.3**) is equal to that for a seat test and NOT that for a shell test (see **D.4.1**).

The procedure for the back seat test shall be as follows.

a) Blank off the ends of the valve.

b) Operate the valve so that the back seat is in contact with its mating seat.

c) Slacken the gland so that the stuffing box packing is not under compression.

d) Fill the valve with the test fluid.

e) Apply a test pressure equal to the seat pressure test specified in **D.4.3**, and maintain the pressure for the period specified in the appropriate valve product standard (see appendix B).

f) Check the leakage rate, ensuring that the stuffing box packing is still not under compression.

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Publications referred to

BS 759, *Specification for valves, gauges and other safety fittings for application to boilers and to piping installations for and in connection with boilers.*

BS 759-1, *Specification for valves, mountings and fittings.*

BS 864, *Capillary and compression tube fittings of copper and copper alloy.*

BS 864-2, *Specification for capillary and compression fittings for copper tubes.*

BS 864-3, *Compression fittings for polyethylene pipes.*

BS 1414, *Steel wedge gate valves (flanged and butt-welding ends) for the petroleum, petrochemical and allied industries*[5)].

BS 1780, *Specification for bourdon tube pressure and vacuum gauges.*

BS 1868, *Steel check valves (flanged and butt-welding ends) for the petroleum, petrochemical and allied industries*[5)].

BS 1873, *Steel globe and globe stop and check valves (flanged and butt-welding ends) for the petroleum, petrochemical and allied industries*[5)].

BS 2051, *Tubes and pipe fittings for engineering purposes.*

BS 2051-1, *Copper and copper alloy capillary and compression tube fittings for engineering purposes.*

BS 5146, *Inspection and test of valves.*

BS 5146-1, *Steel valves for the petroleum, petrochemical and allied industries*[5)].

BS 5146-2, *Specification for pressure testing requirements of general purpose valves.*

BS 5150, *Cast iron wedge and double disk gate valves for general purposes*[5)].

BS 5151, *Cast iron gate (parallel slide) valves for general purposes*[5)].

BS 5152, *Cast iron globe and globe stop and check valves for general purposes*[5)].

BS 5153, *Cast iron check valves for general purposes*[5)].

BS 5154, *Copper alloy globe, globe stop and check, check and gate valves for general purposes*[5)].

BS 5155, *Specification for butterfly valves.*

BS 5156, *Specification for diaphragm valves.*

BS 5157, *Steel gate (parallel slide) valves for general purposes*[5)].

BS 5158, *Cast iron and carbon steel plug valves for general purposes*[5)].

BS 5159, *Cast iron and carbon steel ball valves for general purposes*[5)].

BS 5160, *Specification for flanged steel globe valves, globe stop and check valves for general purposes.*

BS 5163, *Double flanged cast iron wedge gate valves for waterworks purposes*[5)].

BS 5351, *Specification for steel ball valves for the petroleum, petrochemical and allied industries*[5)].

BS 5352, *Specification for steel wedge gate, globe and check valves 50 mm and smaller for the petroleum, petrochemical and allied industries*[5)].

BS 5353, *Specification for plug valves*[5)].

BS 5781, *Measurement and calibration systems.*

BS 5781-1, *Specification for system requirements.*

BS 5781-2, *Guide to the use of BS 5781-1 "Specification of system requirements".*

BS 6364, *Specification for valves for cryogenic service*[5)].

BS 6755, *Testing of valves.*

BS 6755-2, *Specification for fire type-testing requirements*[5)6)].

ISO 5208, *Industrial valves — Pressure testing for valves.*

ISO 6708, *Pipe components — Definition of nominal size.*

ISO 7268, *Pipe components — Definition of nominal pressure.*

HSE Guidance Note GS4. Safety in pressure testing[5)7)]

[5)] Referred to in the foreword only.

[6)] In preparation.

[7)] Published by HMSO.

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