

Gas Industry Standard

GIS/V7-3:2022

Specification for

Distribution valves

Part 3: Brass bodied manually operated ball and taper plug valves not exceeding 5 bar maximum operating pressures



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Foreword

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Mandatory and non-mandatory requirements

For the purposes of a GIS the following auxiliary verbs have the meanings indicated:

can	indicates a physical possibility;
may	indicates an option that is not mandatory;
shall	indicates a GIS requirement;
should	indicates best practice and is the preferred option. If an alternative method is used then a suitable and sufficient risk assessment needs to be completed to show that the alternative method delivers the same, or better, level of protection.

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Brief history	
GIS/RF 1 Gas industry general specification for brass fittings	April 1975
QAC/82/1 Part A Product Specification for brass fittings	May 1986
PRS 1 Issue 1 Product Specification for brass fittings	April 1990
PRS 1 Issue 2 Product Specification for brass fittings	May 1995
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1 Scope

This Gas Industry Standard specifies requirements for the construction, performance and safety of brass-bodied manually operated ball valves and open-bottomed taper plug valves in the $\frac{3}{4}$ " to 2" diameter range and their associated sealing caps. It also details the test methods and marking requirements.

It applies to metallic valves for domestic and commercial installations inside or outside of buildings but not for directly buried installations. These valves are used on the distribution gas supply network for purposes such as emergency controls, gas emergency security valves (service riser inlet & lateral isolation valves) and gas service pipe terminations.

Valve sizes covered by this standard are shown in Table 1 along with their maximum operating pressure and required connections. Sealing caps are covered in Tables 9 and 10.

The requirements herein may differ or be supplementary to the requirements of BS EN 331 (ball valves) and BS 1552 (plug valves) where deemed appropriate for the gas industry, e.g. using BS 21 (BS EN 10226), BS 746 or BS EN ISO 10806 threaded outlet connections.

All items herein are suitable for use with 1st, 2nd and 3rd family gases, the composition of which is given in BS EN 437 and at temperatures between -20°C to +60°C. All pressures quoted are gauge pressures.

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.

2 Normative references

Formal standards

- BS 21**, Specification for pipe threads for tubes and fittings where pressure-tight joints are made on the threads (metric dimensions).
- BS 746**, Fittings for installation of low pressure gas meters. Requirements and test methods.
- BS 1134**, Assessment of surface texture.
- BS 1552**, Specification for open bottomed taper plug valves for 1st, 2nd and 3rd family gases up to 200 mbar.
- BS 1574**, Specification for split pins (inch series).
- BS 3643-2**, ISO metric screw threads. Specification for selected limits of size.
- BS 4800**, Schedule of paint colours for building purposes.
- BS EN 331**, Manually operated ball valves and closed bottom taper plug valves for gas installations in buildings.
- BS EN 377**, Lubricants for applications in appliances and associated controls using combustible gases except those designed for use in industrial processes.
- BS EN 437**, Test gases. Test pressures. Appliance categories.
- BS EN 751-1**, Sealing materials for metallic threaded joint in contact with 1st, 2nd and 3rd family gases and hot water. Anaerobic sealing compounds.
- BS EN 751-2**, Sealing materials for metallic threaded joint in contact with 1st, 2nd and 3rd family gases and hot water. Non-hardening jointing compounds.
- BS EN 751-3**, Sealing materials for metallic threaded joint in contact with 1st, 2nd and 3rd family gases and hot water. Unsintered PTFE tapes.
- BS EN 1563**, Founding. Spheroidal graphite cast irons.
- BS EN 1593**, Non-destructive testing. Leak testing. Bubble emission techniques.
- BS EN 1652**, Copper and copper alloys. Plate, sheet, strip and circles for general purposes.
- BS EN 1775**, Gas supply. Gas pipework for buildings. Maximum operating pressure less than or equal to 5 bar. Functional recommendations.
- BS EN 1976**, Copper and copper alloys. Cast unwrought copper products.
- BS EN 1982**, Copper and copper alloys. Ingots and castings.
- BS EN 10226**, Pipe threads where pressure tight joints are made on the threads.
- BS EN 10242**, Threaded pipe fittings in malleable cast iron.
- BS EN 12163**, Copper and copper alloys. Rod for general purpose.
- BS EN 12164**, Copper and copper alloys. Rod for free machining purposes
- BS EN 12165**, Copper and copper alloys. Wrought and unwrought forging stock.
- BS EN 12167**, Copper and copper alloys. Profiles and bars for general purposes.
- BS EN 12168**, Copper and copper alloys. Hollow rod for free machining purposes.
- BS EN 12329**, Corrosion protection of metals. Electrodeposited coatings of zinc with supplementary treatment on iron or steel.
- BS EN 12420**, Copper and copper alloys. Forgings.
- BS EN 13501-1**, Fire classification of construction products and building elements. Classification using data from reaction to fire tests.
- BS EN 14324**, Brazing. Guidance on the application of brazed joints.
- BS EN 60730-1**, Automated electrical controls. General Requirements.
- BS EN ISO 196**, Wrought copper and copper alloys. Detection of residual stress. Mercury (I) nitrate test.
- BS EN ISO 2177**, Metallic coatings. Measurement of coating thickness. Coulometric method by anodic dissolution.
- BS EN ISO 6708**, Pipework components. Definition and selection of DN (nominal size).

BS EN ISO 9001, Quality management systems. Requirements.

BS EN ISO 9227, Corrosion tests in artificial atmospheres – Salt spray tests.

BS EN ISO 10806, Pipework. Fittings for corrugated metal hoses.

The Building Regulations, B3: Internal fire spread.

3 Definitions

For the purposes of this standard, the definitions given in BS EN 331 and BS 1552 shall be followed and summarised with some gas industry exceptions below:

3.1 Actuating mechanism or actuator

Part of the valve which actuates the obturator via the stem.

Note: This is often referred to as the lever or handle.

3.2 Cycling frequency

Number of working cycles, i.e. from the obturator's closed position to open position and back to closed position, in unit time.

3.3 DN (nominal size)

See BS EN ISO 6708.

3.4 Emergency control valve (ECV)

A valve for shutting off the supply of gas in an emergency, which is intended for use by a consumer of gas and is installed at the end of a service.

NOTE: A fuller definition of the ECV can be found in IGEM/G/1 Defining the end of the network.

3.5 External leak tightness

Leak-tightness of a gas-carrying compartment with respect to atmosphere.

3.6 Gas emergency security valve

Valve which can be turned off in an emergency but cannot be turned back on by unauthorised persons. That is, they require a special key or other resetting method by qualified personnel.

They are fitted in accordance with IGEM/G/5 Gas in multi-occupancy buildings and are known as service riser inlet isolation valves and service lateral isolation valves, and are fitted in addition to service isolation valve (fire valve in-ground) and emergency control valves (customer isolation at meter position).

3.7 Gas way

A passage in the valve through which the gas flows.

3.8 Internal leak-tightness

Leak-tightness between the inlet and outlet of the valve with the obturator in the closed position.

3.9 Intermediate pressure (IP)

Maximum operating pressure of the gas supply at the inlet to the valve which is not less than 2 bar but not in excess of 7 bar.

3.10 Joint

Means of joining elements of a gas installation

3.11 Low pressure (LP)

Gas supply at the inlet to the valve with a maximum operating pressure not exceeding 75 mbar.

3.12 Maximum operating pressure (MOP)

Maximum pressure to which a system is permitted to experience under normal operating conditions.

3.13 Mechanical joint

Joint in which gas tightness is achieved by compression with or without a seal

NOTE: - this joint can be disassembled and reassembled

3.14 Medium pressure (MP)

Gas supply at the inlet to the valve with a maximum operating pressure exceeding 75 mbar but not exceeding 2 bar.

3.15 Multi-part bonded fittings

Fitting where valve body is manufactured in parts and permanently bonded together by either brazing, screwed and belled out or screwed and machine tightened

3.16 Niting washer

This is a shaped washer limiting the rotation of the obturator to a predetermined angle (typically 180 degrees) and retained by the niting nut. Normally used on plug type valves,

3.17 Obturator

The moving part of the valve that effects opening and closing which shuts off the gas flow (e.g. ball or plug).

3.18 Open bottom taper plug valves

A valve with a taper plug type obturator with an open-bottomed body.

3.19 Operating torque

Torque to be applied to the manual actuating mechanism (i.e. lever or handle) to move the obturator from “on” to “off” position (opening valve) or vice-versa (closing valve).

3.20 Rated flow rates

Flow rate of air, under standard reference conditions (1013.25 mbar and 15°C) at a given pressure drop.

3.21 Stem

Mechanism that allows the obturator to be turned by the actuator (lever)

3.22 Stop mechanism

On ball valves these are fixed, non-adjustable stops to limit the end positions of the obturator rotation, i.e. valve “off” position on 180 degree rotation. On plug valves this is by the niting method as described in 3.17

3.23 Valves

Manually operated fitting that admits or closes the gas flow by movement of an obturator.

4 Valves and associated fittings covered by a British or European Standard

The requirements herein may differ or be supplementary to the requirements of BS EN 331 (ball valves) and BS 1552 (plug valves) where deemed appropriate for the gas industry, e.g. using BS 21 (BS EN 10226), BS 746 or BS EN ISO 10806 threaded outlet connections.

The materials, construction and performance testing used for these valves and their sealing caps shall conform to the appropriate standards shown in Table 1 with the exception of the use of body materials and other additional requirements stated in Clauses 5 and 6.

N.B. All valves shall be supplied with the valve fully assembled and the levers fitted ready for operational use with, as requested by purchaser, the lever being set in either the “on” or the “off” position.

Application	Size	Type	Required Valve Standard	Inlet Connection	Outlet Connection	Lever Colour and Material	High Temperature Resistance Requirements
MP ECV	3/4" x 19mm	Ball Valve	BS EN 331 Class MOP 5 Straight or Right Angled	BS 21 Female thread	BS EN ISO 10806 Male thread Cap: BS EN ISO 10806 Female thread	Amber BS 4800 08 C 35 Pressed Steel Handle	Not required as not installed inside buildings
	1" x 1" 1" x 2" 2" x 2"		BS EN 331 Class MOP 5 Straight		BS 21 Female thread		
LP ECV	3/4" to 1"	Ball Valve	BS EN 331 Class MOP 0.5 Straight	BS 21 Female thread	BS 746 Male tread Cap: BS 746 Female thread	Red BS 4800 04 E 53 Pressed Steel Handle	BS EN 1775 Annexe A Procedure A
	3/4" to 1"	Plug Valve	BS EN 1552 MOP 200 mbar				
	1 1/4" to 2"	Ball Valve	BS EN 331 Class MOP 0.5 Straight				
	1 1/4" to 2"	Plug Valve	BS EN 1552 MOP 200 mbar			Black heart malleable iron in grey	
Gas Emergency security valve	3/4" to 1" 1" to 1 1/2" 2"	Ball Valve	BS EN 331 Class MOP 0.5 Straight	BS 21 Female thread	BS 21 Female thread	Yellow BS 4800 10 E 53 Pressed Steel Handle	BS EN 1775 Annexe A Procedure A

Table 1 — Valve types, their uses, pressure ratings and thread types

NOTE: The high temperature resistance testing requirements for ball valves and plug valves has been amended to ensure a valve is operable and can be closed following a fire test as detailed in section 5.4.3 and 6.4.3 of this document.

5 Ball valves to BS EN 331 - Construction Requirements

5.1 Materials for ball valves

5.1.1 Any part in contact with the gas or the surrounding atmosphere shall be manufactured from corrosion-resistant materials or shall be suitably protected against corrosion. The corrosion protection for springs and other moving parts shall not be impaired by any movement.

5.1.2 Springs and other moving parts manufactured from non-corrosion resistant materials shall be suitably protected against corrosion and shall retain their protective coating despite any movement resulting from the operation of the valve. Split pins, set screws, nut/ thread arrangements for securing valve levers shall be zinc plated and chrome passivated. Split pins shall comply with the requirements of clause 6.2.10 of this document.

5.1.3 All ball valve materials, including any lubricants, shall withstand the mechanical, chemical and thermal stresses to which they may be subjected under normal working conditions and shall not produce any deposits that might impair performance.

5.1.4 The fitting shall be made from one of the following, appropriate to the method of manufacture:

- a) Brass for hot pressings: grade CW602N or CW617N to BS EN 12165 or BS EN 12420;
- b) Brass for casting: grade CC490K, CC491K, CC750S, CC754S or CC760S to BS EN 1982;
- c) Brass rod: grade CW602N, CW614N or CW617N to BS EN 12163, BS EN 12164, BS EN 12167 or BS EN 12168;
- d) Brass sheet and strip: grade CW508L to BS EN 1652;
- e) Copper: grade CR004A to BS EN 1976;
- f) Malleable cast iron; to BS EN 10242 with zinc coating to BS EN 10242.

5.1.5 All markings shall be clearly legible, durable and resistant to atmospheric conditions. Labels and their markings shall neither deteriorate nor lift off nor become unreadable by humidity and temperature. Self-adhesive labels shall be tested according to Annex A of BS EN 60730-1.

5.1.6 Elastomeric washers such as union washers of rubber/rubber-type materials exposed to gas shall conform to BS 746:2005. Dimensions of washers shall be to Table 6 of BS 746.

5.1.7 Lubricants shall conform to BS EN 377 containing a molybdenum content of at least 25% and be suitable for temperatures between -20C and +60C. Lubricants shall be used sparingly to prevent blocking of gas way and adverse effect on gas flows and pressures.

5.1.8 Anaerobic jointing compounds shall conform to BS EN 751-1.

5.1.9 Levers for ball valves shall be fitted with polyvinyl chloride tight-fitting sleeves (PVC sheath) and these shall be:

- a) Coloured red for low pressure valves (BS EN 331 Valve pressure class MOP 0.5). Colour shall be to BS 4800, Colour Reference 04 E 53.

- b) Coloured amber for medium pressure (BS EN 331 Valve pressure class MOP 5). Colour shall be to BS 4800, Colour Reference 08 C 35.
- c) Coloured yellow for Gas Emergency Security Valve (BS EN 331 Valve pressure class MOP 0.5). Colour shall be to BS 4800, Colour Reference 10 E 53.

NOTE - This requirement applies to valves fitted with levers and to loose levers for valves

5.1.10 Steel levers for valves shall be zinc plated and chrome passivated. The chromate conversion coating shall be trivalent, rather than hexavalent and meet the corrosion test requirements for the corresponding chromate conversion code in Table 2 of BS EN 12329. The thickness of the coating shall not be less than 8 µm at any position on the lever and the thickness requirement is deemed to be met if the coating conforms to the test in Annex A. Before plating levers shall be free from burrs and sharp edges, and the surfaces shall be clean and free from dirt, grease and rust. The plated lever shall be free from visible plating defects such as blisters, pits, roughness, cracks or un-plated areas and shall not be stained or discoloured and each lever shall be similar in colour. The colouring of the lever PVC sheath on ball valves shall be as indicated in 5.1.8. Levers shall be provided with a deflection (crank) to clear the outlet joint when turning the valve lever “off” or “on” (see Figure 1, Tables 2 and 3 following).

5.1.11 Brass fittings that have been formed by cold working shall be capable of satisfying the requirements of the residual stress test specified in BS EN ISO 196.

5.1.12 Rod components shall be sound without laminations and/ or inclusions and shall be smooth and well finished. Brazing and materials used for brazing shall conform to BS EN 14324.

5.1.13 Materials used in the valve shall not release any dangerous substances in excess of the maximum permitted levels in a relevant European Standard for the material or permitted in the national regulations of the UK.

5.2 Construction for ball valves

5.2.1 Valves shall be constructed so that they are maintenance free for a reasonable economic working life as agreed with purchaser and can be operated by means of a manual actuator such as a lever or handle.

5.2.2 Ball valves shall be designed so that, once installed, it is impossible to remove the obturator or stem or a seat or their associated sealing without damaging the valve or leaving clear signs of tampering on it.

5.2.3 All ball valve components shall be free from burrs and be clean (e.g. free from swarf and core sand) and shall be of sound manufacture. All valve components, when viewed with the naked eye corrected for normal vision, shall be free from sharp edges and corners which could cause damage, injury or incorrect operation.

5.2.4 Hot pressings (brass stampings) shall be sound and solid without laminations and shall be smooth and well finished. They shall have design dimensions and tolerances in

accordance with BS EN 12420. Unless otherwise specified in British Standards, the surface finish tolerance shall be 1.6 µm on sealing faces of washers and cone seatings.

5.2.5 The machining of fittings shall be of a fine finish and free from scores and surface defects which could result in leakage. This includes sealing surfaces, threads, gas ways and washer seatings. Machined parts shall meet requirements of BS 1134 to the following detail:

- a) A tolerance of ± 0.4 mm on basic dimensions;
- b) A concentricity tolerance of $\varnothing 0.4$ mm;
- c) A surface finish tolerance of 1.6 µm on sealing faces of washer seatings and cone seatings.
- d) Capability of operating smoothly and reliably at temperatures between -20 °C and $+60$ °C.

5.2.6 Seals for moving parts on ball valves which separate gas ways from the atmosphere, shall maintain their original leak-tightness without any manual adjustment.

5.2.7 Sealing on the obturator shall be constructed so that tightness is achieved by mechanical means and shall exclude the use for this purpose of all sealing materials such as liquids, pastes and tapes.

5.2.8 The connection seating of the valve body shall be machined square with the axis of the bore.

5.2.9 The tightness between different parts of the body shall be assured by mechanical means.

Additional products like glues, pastes, tapes, split pins, may be used in order to maintain the mechanical tightness. If glues, pastes, tapes are used they shall conform to BS EN 751-1, BS EN 751-2 and BS EN 751-3.

5.2.10 The wall thickness from any gasway to atmosphere, or to holes connected to atmosphere, shall not be less than 1mm. Holes for screws, pins, etc. which are used for the assembly of parts, and for mounting, shall not provide any leak path between gasways and the atmosphere.

5.2.11 Threaded inlet and outlet connections for valves with pressure tight joints made on the threads shall conform to the requirements of Table 1.

5.2.12 In the full "on" position, misalignment of the gasway in the obturator relative to the gasway in the body in all directions shall not exceed 0.40 mm for valves of sizes $\frac{3}{4}$ in and 1 in \times $\frac{3}{4}$ in, and 0.80 mm for larger valves.

5.2.13 Ball valves shall have flats provided on the inlet to enable an adjustable spanner or open ended spanner to be used to tighten or slacken when installing or dismantling the valve on pipework.

5.2.14 Steps in internal diameters shall be chamfered to assist the passage of rubber stoppers. For straight valves, the washer seating of the valve body shall be machined square with the axis of the bore.

5.2.15 The critical dimensions shall be as shown below in Table 2 for straight ball valves,

Table 3 for right angled ball valves and Table 4 for Gas Emergency Security valves. Figures 1 and 2 show examples of straight & right-angled ball valve used as an emergency control valve.

5.2.16 The ball valve shall meet the minimum gas flow rate given in Table 5.

5.2.17 Ball valves, when manufactured in parts and permanently bonded together (multi-part bonded fittings) shall be joined by one of the following methods and associated actions:

- a) Brazing in accordance with BS EN 14324.
- b) Screwed and belled out to a maximum of 0.25 mm, with the external thread of the inner component circumferentially coated with thread locking compound to BS EN 751-1 class H for at least the first complete thread prior to assembly.
- c) Screwed and machine tightened, with the external thread of the inner component circumferentially coated with thread locking compound to BS EN 751-1 class H for at least the first complete thread prior to assembly.
- d) In the case of b) or c) above, the component parts shall be degreased before application of the locking compound.
- e) The component parts shall not separate or unscrew when subjected to a torque applied in either direction. This requirement shall be deemed to be met by conformance with Annex B.

Nominal size of valve in Inches / Millimetres	Overall length of valve (A)	Centre line of body to top of obturator stem (B)	Height from topside of lever to centre line of valve including crank (D)	Height to underside of lever by stem from centre line (C)	Length of lever from centre line of obturator stem (E)
Tolerances	±1mm	Maximum	±5mm	±5mm	±3mm
3/4" / 19.05mm	65mm	40mm	40mm	28mm	89mm
1 x 3/4" / 25.4mm x 19.05mm	73mm	40mm	40mm	28mm	89mm
1 x 1" / 25.4mm x 25.4mm	90mm	46mm	46mm	32mm	89mm
1.1/4" / 31.75mm	101mm	58mm	55mm	42mm	120mm
1.1/2" / 38.1mm	115mm	65mm	75mm	50mm	140mm
2" / 50.8mm	138mm	73mm	83mm	58mm	140mm

Table 2 - Critical dimensions for straight emergency control ball valves

Dimension "F" is the lever securing nut to be M8 on ¾ and 1" valves and M10 on 1.1/4 to 2" and thread on both shall be to BS 3643-2.

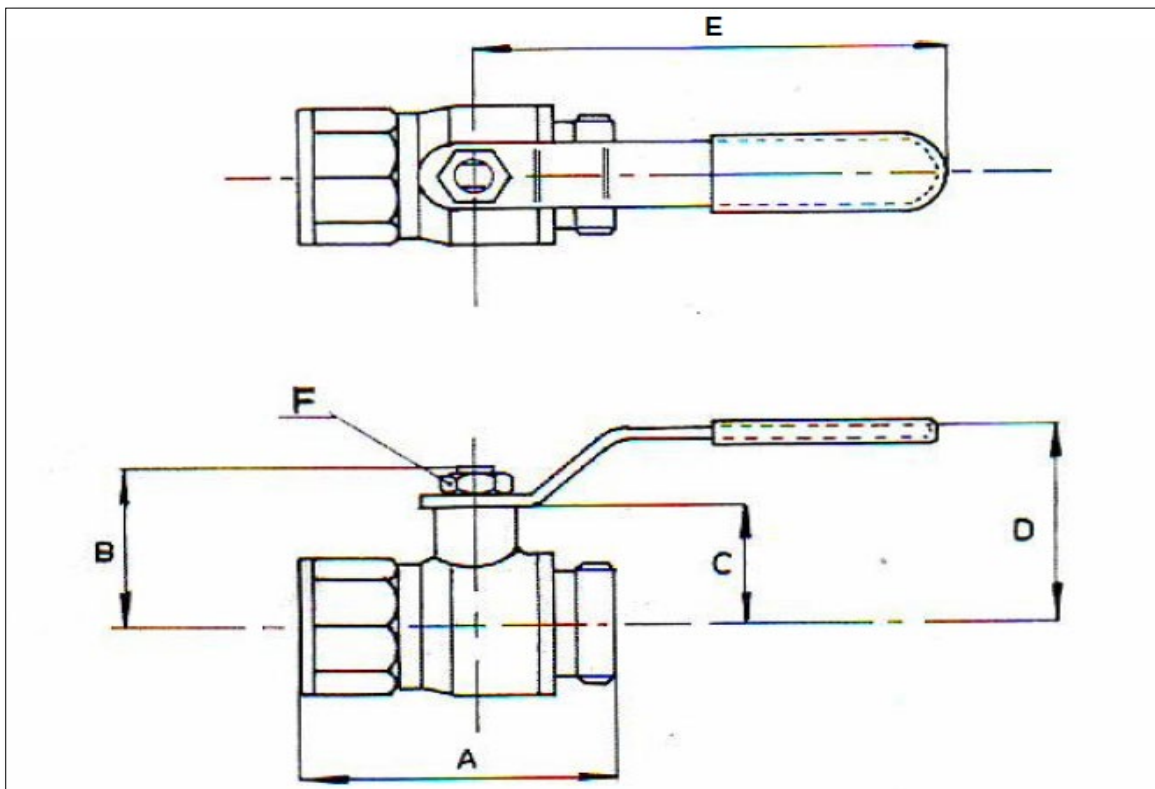
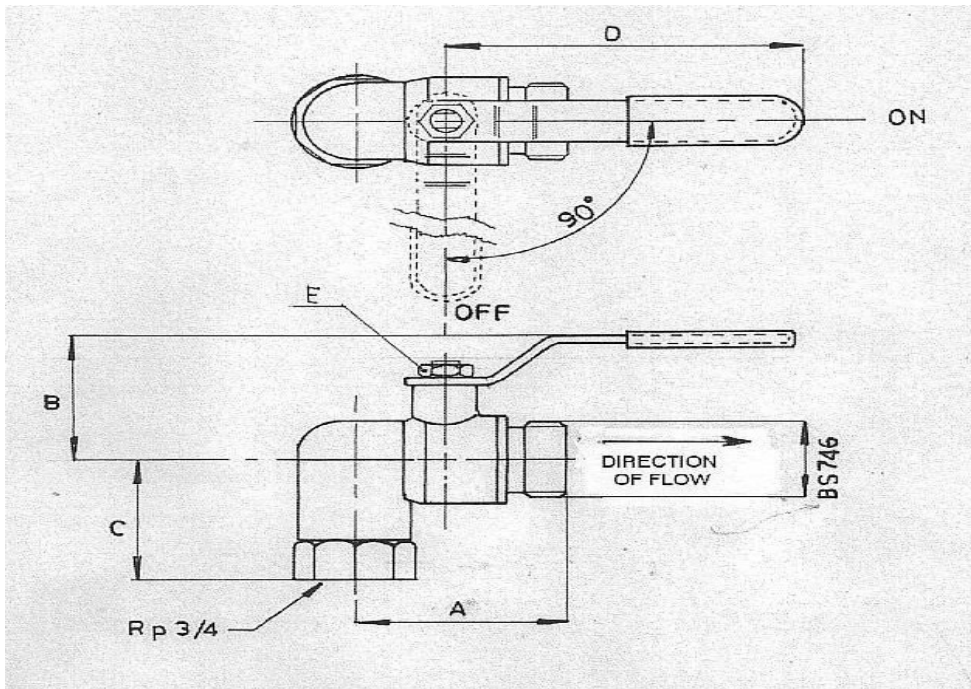


Figure 1 - Example of straight Emergency Control Ball Valve

Nominal size of valve in inches / millimetres	Length of valve from centre line to inlet to end of outlet (A)	Centre line of outlet to top of lever including crank (B)	Start of inlet to centre line (C)	Length of lever from centre line of obturator stem (D)
Tolerances	±1mm	±5mm	±1mm	±3mm
3/4" x 3/4" (19.05mm)	54mm	40mm	45mm	70mm
1" x 3/4" (25.4mm x 19.05mm)	54mm	40mm	45mm	70mm
1" x 1" (25.4mm x 25.4mm)	54mm	45mm	45mm	70mm

Table 3 - Critical dimensions for right-angled emergency control ball valves

Dimension "E" is the lever securing nut to be M8 and thread shall be to BS 3643-2.



N.B. The drawing shows a 90 degree rotation but current valves are to 180 degree rotation.

Figure 2 - Example of a right-angled emergency control valve

Nominal size of valve in inches / millimetres	Overall length of valve	Centre line of valve body to end of obturator stem	Height to topside of lever from centre line	Length of lever from centre line of obturator stem
Tolerances	±1mm	Maximum	±3mm	±1mm
3/4" / 19.05mm	69mm	40mm	62mm	120mm
1" / 25.4mm	83mm	40mm	66mm	120mm
1.1/2" / 38mm	102mm	50mm	89mm	160mm
2" / 50.8mm	124mm	54mm	97mm	160mm

Table 4 - Critical dimensions for Gas Emergency Security Valves

5.2.18 The Gas Emergency Security Valves are used on blocks of flats as either a Service Riser Inlet Isolation Valve or a Lateral Isolation Valve. These valves are designed for closing in emergency situations or for the maintenance of the service lateral/ riser.

5.2.19 They are fitted with a special mechanism so that once the valve is turned "off" it cannot be turned "on" again without resetting by a competent person using the Security Valve Key. Once turned "off", the special mechanism leaves the valve completely inoperable

to the casual user, that is, the handle will turn 90 degrees but does not affect either the “on” or “off” position of valve.

5.3 Operation of ball valves

5.3.1 Valves shall be capable of operating smoothly and reliably at temperatures between $-20\text{ }^{\circ}\text{C}$ and $+60\text{ }^{\circ}\text{C}$ up to their designed MOP for the valve class (see Table 1).

5.3.2 The valve shall be operated by a lever (actuator) on emergency control valves and on gas emergency security valves by either a hand-turn knob on $\frac{3}{4}$ ” diameter or a lever/knob arrangement on the 1” to 2” diameter range.

5.3.3 Where a lever is used, the “on” position shall be when the lever is parallel to the axis of the pipe. The “off” position should be approximately one quarter turn of the lever to the right or left and, where key moves in the vertical plane, the move to the “off” position shall be in a downwards direction. There shall be an indication how the control operates and when the gas is “off” or “on” by markings on the handle sheath and a raised or recessed line at top of the stem. The $\frac{3}{4}$ ” gas emergency security valve does not have a lever, markings on the hand-turn knob.

5.3.4. On emergency control valves, the rotation of lever from “off” to “off” shall be 180 degrees. On gas emergency security valves this shall be 90 degrees from “off” to “on”.

5.3.5 On valves the end positions “off” shall be limited by fixed, non-adjustable stops. The stop mechanism shall be independent of the lever (actuator) and the lever and stem shall be two separate pieces. The stop mechanism shall remain securely attached to the stem if the handle is removed.

5.3.6 The lever (actuator) shall be securely attached to the stem such as by a split pin or nut/ thread arrangement as described in Table 2. The lever shall be removable and replaceable by installers when required to isolate/ seal off gas supply and by the use of correct tools which are common and commercially available. The alignment of the lever attached to the head of stem shall be such as to permit the lever to be refitted by competent person and that the lever can only be fitted to match the obturator position (gasway) of either “on” or “off” as 5.3.3 above.

5.3.7 Only commercially available tools shall be required for joints assembled by installer.

5.3.8 Ball valves shall have an “on” and “off” indication in the form of a raised or recessed line in the head of the stem to indicate the position of the obturator (direction of the gasway). This line indication shall be visible whether the handle is fitted in position or has been temporarily removed. This indication shall be in addition to any “on” or “off” indication provided on lever or its sheath as the handle may have to be removed altogether for gas supply isolation. Any flash, line or lip on top of the square that is at right angles to the direction of gasway (e.g. resulting from forging or stamping) shall be removed to avoid any misinterpretation.

5.3.9 All valves shall be supplied with valve fully assembled and levers fitted ready for operational use with the lever being set in either the “on” or “off” position defined by purchaser.

5.3.10 Provision shall be made to incorporate a locking screw with a suitable non-removable lug on the body of straight and right-angled Emergency Control Valves for locking-off (wiring) the valve in the “off” position. The locking screw shall be independent of the lever and the lever securing nut. The hole size through the locking screw shall not be less than 2.5mm diameter. It shall only be possible to lock the valve in the off position.

5.4 Performance requirements for ball valves

5.4.1 Three samples for each size of valve shall be “type approval” tested in accordance with Table 7 of BS EN 331 apart from the following differences:

Durability marking test (see 5.4.7 of this document);

Surface finish test for steel levers shall follow Annex A of this document

For multi-part (bonded) fittings follow Annex B of this document for Torque Test.

- a) Gas tightness tests shall follow Annex C of this document and shall show no signs of leakage or any sign of defect when subjected to the test for internal or external leak tightness. This applies to both type approval and production tests.
- b) For valves with the inlet size different to the outlet size, the test value shall correspond to that for the smaller size.
- c) The torque required for the preliminary cycle shall not be greater than the values in Table 8. When tested in accordance with 7.4 of BS EN 331, the operating torque shall be within the limits given in Table 8 of this Gas Industry Standard.
- d) The stops in “on” or “off” shall withstand 1.5 times the maximum operating torque selected between ambient and low temperature torque, whichever is the higher.
- e) The minimum rated air flow rate for ball valves with a differential pressure of 1 mbar shall not be less than the value specified in Table 2 below and tested in accordance with Clause 7.3 of BS EN 331. The minimum bore of the valve shall grant at least a minimum gas flow as indicated in Table 5:

Valve nominal size in inches / millimetres	Rated flow rate in m ³ /h		
	Straight type ECVs	Right-angled type ECVs	Gas Emergency Security valve type
3/4" (19.05mm)	7	7	7
1 x 3/4" / (25.4mm x 19.05mm)	7.5	7.5	7.5
1" / (25.4mm)	15	15	15
1.1/4" / (31.75mm)	27	18	27
1.1/2" / (38.1mm)	40	28	40
2" / (50.8mm)	65	36	65

Table 5 - Minimum rated flow rates (ball valves)

5.4.2 The valve shall be suitable for minimum operating temperature of -20°C and maximum operating temperature of +60°C and any other temperature between those parameters.

5.4.3 Where high temperature resistance is indicated for the valve design in Table 1 then the valve shall comply with requirements of the Building Regulations, B3: Internal fire spread requirements and the test requirements of BS EN 1775 Annex A Procedure A:

Two valves shall be tested as follows:

- Ensure that the initial operating torque for each valve to be tested conforms to that declared by the manufacture.
- Subject one open valve and one closed valve to the test.
- Monitor the leakage during the test and, after cooling to room temperature, measure the total leakage at an internal air pressure of 50 mbar. After cooling to room temperature, close the open valve and measure the total leakage of each valve at an internal air pressure of 50 mbar.

5.4.4 Reaction to fire - valves in this standard are classified without further fire resistance testing as belonging to Class A.1 “No contribution to fire” as provided for in Commission Decision 96/603/EC and its Amendment 2000/605/EC. However, products which are subject to a coating containing more than 1.0% by weight or volume (whichever is the lower) of homogeneously distributed organic materials shall be tested and classified according to BS EN 13501-1.

5.4.5 The position of the lever shall not alter of its own accord whether falling to “off” or “on”.

5.4.6 The valves shall resist the stresses resulting from their installation and during service. They shall also meet the requirements for external and internal leak tightness and ease of operation given in Annex C and clause 5.4.1 (f).

5.4.7 Durability of marking is checked for compliance by inspection and by rubbing the marking by hand for 15 secs with a piece of cloth soaked with water and again for 15 secs with a piece of cloth soaked with petroleum spirit.

5.4.8 After all the “type approval” tests to this standard, the markings shall be easily legible, and it shall not be easily possible to remove markings or required labels or plates.

5.4.9 Production testing shall include the Annex C tests of internal and external leak tightness on every valve. Other production tests from clause 5.4.1 shall be random sampling as agreed with purchaser.

6 Plug valves to BS 1552 - Construction Requirements

6.1 Materials for plug valves

6.1.1 Any part in contact with the gas or surrounding atmosphere shall be manufactured from corrosion-resistant materials or shall be suitably protected against corrosion.

6.1.2 The corrosion protection for springs and other moving parts shall not be impaired by any movement resulting from operation of the valve.

6.1.3 Springs, split pins and moving parts shall be manufactured from non-corrosion resistant materials, shall be suitably protected against corrosion and shall retain their protective coating despite any movement resulting from the operation of the valve.

6.1.4 All plug valve materials, including any lubricants, shall withstand the mechanical, chemical and thermal stresses to which they may be subjected under normal working conditions and shall not produce any deposits that might impair performance.

The fitting shall be made from one of the following, appropriate to the method of manufacture:

- a) Brass for hot pressings: grade CW602N or CW617N to BS EN 12165 or BS EN 12420;
- b) Brass for casting: grade CC490K, CC491K, CC750S, CC754S or CC760S to BS EN 1982;
- c) Brass rod: grade CW602N, CW614N or CW617N to BS EN 12163, BS EN 12164, BS EN 12167 or BS EN 12168;
- d) Brass sheet and strip: grade CW508L to BS EN 1652;
- e) Copper: grade CR004A to BS EN 1976;
- f) Malleable cast iron; to BS EN 10242 with zinc coating to BS EN 10242.

6.1.5 The shell and obturator shall be made from a copper alloy excluding aluminium bronze.

6.1.6 All markings shall be clearly legible, durable and resistant to atmospheric conditions. Labels and their markings shall neither deteriorate nor lift off nor become unreadable by humidity and temperature. Self-adhesive labels shall be tested according to Annex A of BS EN 60730-1.

6.1.7 Elastomeric washers such as union washers of rubber/rubber-type materials exposed to gas shall conform to BS 746. Dimensions of washers shall be to Table 6 of BS 746.

6.1.8 Lubricants shall conform to BS EN 377 containing a minimum molybdenum content of at least 25% and be suitable for temperatures between -20C and +60C. Lubricants shall be used sparingly to prevent blocking of gas way and adverse effect on gas flows and pressures.

6.1.9 Brazing and materials used for brazing shall conform to BS EN 14324.

6.1.10 Steel levers for ¾" and 1" plug valves shall be zinc plated and chrome passivated. The chromate conversion coating shall be trivalent, rather than hexavalent and meet the corrosion test requirements for the corresponding chromate conversion code in Table 2 of

BS EN 12329:2000. The thickness of the coating shall not be less than 8 µm at any position on the lever and the thickness requirement is deemed to be met if the coating conforms to the test in Annex A.

Before plating levers shall be free from burrs and sharp edges, and the surfaces shall be clean and free from dirt, grease and rust. The plated lever shall be free from visible plating defects such as blisters, pits, roughness, cracks or un-plated areas and shall not be stained or discoloured and each lever shall be similar in colour.

Levers for 1.1/4", 1.1/2" and 2" diameter plug valves shall be cast from either blackheart malleable cast iron to meet the requirements of clause 5.1 of EN 10242:1995 with zinc coating to clause 5.2 of BS EN 10242 or Spheroidal graphite cast iron to meet the requirements of BS EN 1563. Refer to Figures 3, 4, 5 and 6 for examples of these levers.

Levers shall be provided with a crank to clear the outlet joint when turning the valve lever OFF or ON. Refer to Figures 3, 4, 5 and 6 for examples of the cranks.

6.1.11 Brass fittings that have been formed by cold working shall meet the requirements of the residual stress test specified in BS EN ISO 196.

6.1.12 Materials used in the valve shall not release any dangerous substances in excess of the maximum permitted levels in a relevant European Standard for the material or permitted in the national regulations of the UK.

6.2 Construction for plug valves

6.2.1 Valves shall be constructed so that they are maintenance free and can be operated by means of a manual actuator such as a lever or handle.

6.2.2 All plug valve components shall be free from burrs and be clean (e.g. free from swarf and core sand) and shall be of sound manufacture. All valve components, when viewed with the naked eye corrected for normal vision, shall be free from sharp edges and corners which could cause damage, injury or incorrect operation.

6.2.3 Hot pressings (brass stampings) shall be sound and solid without laminations and shall be smooth and well finished. They shall have design dimensions and tolerances in accordance with BS EN 12420. Unless otherwise specified in British Standards, the surface finish tolerance shall be 1.6 µm on sealing faces of washers and cone seatings.

6.2.4 The machining of fittings shall be of a fine finish and free from scores and surface defects which could result in leakage. This includes sealing surfaces, threads gas ways and washer seating's, etc. Machined parts shall meet requirements of BS 1134 to the following detail:

- a) A tolerance of ± 0.4 mm on basic dimensions;
- b) A concentricity tolerance of $\varnothing 0.4$ mm;
- c) A surface finish tolerance of 1.6 µm on sealing faces of washer seatings and cone seatings.
- d) Capability of operating smoothly and reliably at temperatures between -20 °C and $+60$ °C.

6.2.5 Seals for moving parts on plug valves which separate gasways from the atmosphere, shall maintain their original leak-tightness without any manual adjustment. The connection washer seating of the valve body shall be machined square with the axis of the bore.

6.2.6 The wall thickness from any gasway to atmosphere, or to holes connected to atmosphere, shall not be less than 1mm. Holes for screws, pins, etc. which are used for the assembly of parts, and for mounting, shall not provide any leak path between gasways and the atmosphere.

6.2.7 Threaded inlet and outlet connections for valves with pressure tight joints made on the threads shall conform to the requirements of Table 1 and the requirements of BS EN 10226-1.

6.2.8 In the full “on” position, misalignment of the gasway in the obturator relative to the gasway in the body in all directions shall not exceed 0.80 mm for plug valves.

6.2.9 Plug valves shall have flats provided on the inlet to enable an adjustable spanner or open ended spanner to be used to tighten or slacken when installing or dismantling the valve on pipework.

6.2.10 Split pins, set screws, nut/ thread arrangements for securing valve levers shall be zinc plated and chrome passivated. Split pins shall comply with the requirements of BS 1574 and the dimensions shall be as follows:

¾” and 1” plug valves - 5/32” diameter and 1-1/4” (37mm) long to below head ring

1-1/4” and 1-1/2” plug valves - 7/32” diameter and 2in (50mm) long to below head ring

2” plug valves - 7/32” diameter and 2-1/2” (63mm) long to below head ring

6.2.11 Plug valves shall have an “on” and “off” indication in the form of a raised or recessed line in the head of the obturator (top of the square) to indicate the direction of the gasway. Any flash, line or lip on top of the square that is at right angles to the direction of gasway (e.g. resulting from forging or stamping) shall be removed to avoid any misinterpretation.

6.2.12 To compensate for wear, the taper on the plug shall protrude beyond the taper in the body (see Fig. A.1 in BS 1552). The major diameter of the plug shall lie within the tapered bore of the body.

6.2.13 Lubricant shall be applied sparingly to the sealing surfaces to prevent blocking of gasways, and the moving parts shall be adjusted to give a smooth action without unevenness.

6.2.14 Niting washers shall be flat and the washer seating of the body shall be machined square with the axis of the bore. The niting washer, if punched, shall be free from undue stress such as would be liable to cause distortion or mechanical failure. With the niting washer fitted, there shall be no relative radial movement between the plug tenon and the niting washer.

NOTE: The moving parts should be adjusted to give a smooth action without any unevenness.

6.2.15 The screwed portion of the plug which projects beyond the nut securing the niting washer shall not be burred over. The nut shall be a spanner-tight fit over the whole length of the spigot and it shall not be possible to loosen the nut without the use of a tool.

6.2.16 The critical dimensions shall be as shown below in Table 6 for plug valves:

Nominal size of valve in inches / millimetres	Overall length of valve BS746 Outlet (A)	Centre line to end of obturator stem (taper plug) (B)	Height of lever square on obturator stem (taper plug) (C)	Length of lever from centre line of obturator stem (taper plug)	Distance of split pin hole from end of lever square (D)	Across flats of split pin hole (E)	Diameter of split pin hole (F)
Tolerance	±1 mm	Maximum	±1 mm	± 3mm	-0, +0.4mm	-0, +0.4mm	+0, +0.2mm
$\frac{3}{4}$ " (19.05mm)	65mm	37mm	13mm	115mm	6.5mm	15.5mm	4.7mm
1" (25.4mm)	78mm	42mm	13mm	115mm	6.5mm	15.5mm	4.7mm
1 x $\frac{3}{4}$ " (25.4mm x 19.05mm)	69mm	37mm	13mm	115mm	6.5mm	15.5mm	4.7mm
1.1/4" (31.75mm)	92mm	50mm	18mm	160mm	9.0mm	23.4mm	6.4mm
1.1/2" (38.1mm)	114mm	54mm	18mm	160mm	9.0mm	23.3mm	6.4mm
2" (50.8mm)	138mm	67mm	22mm	160mm	11mm	26.5mm	6.4mm

Table 6 - Critical dimensions for plug valves (refer to Figures 4, 5, 6 and 7 for examples)

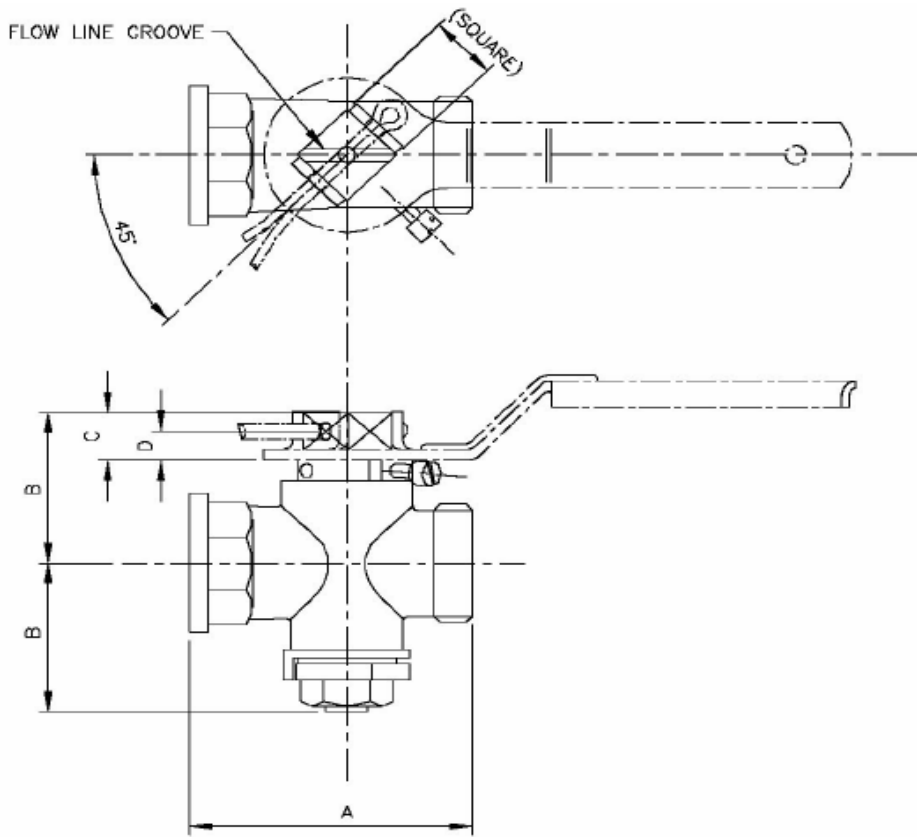


Figure 3 - Example of a 3/4" plug valve used as an emergency control valve
 N.B. the locking screw shown on drawing is no longer required.

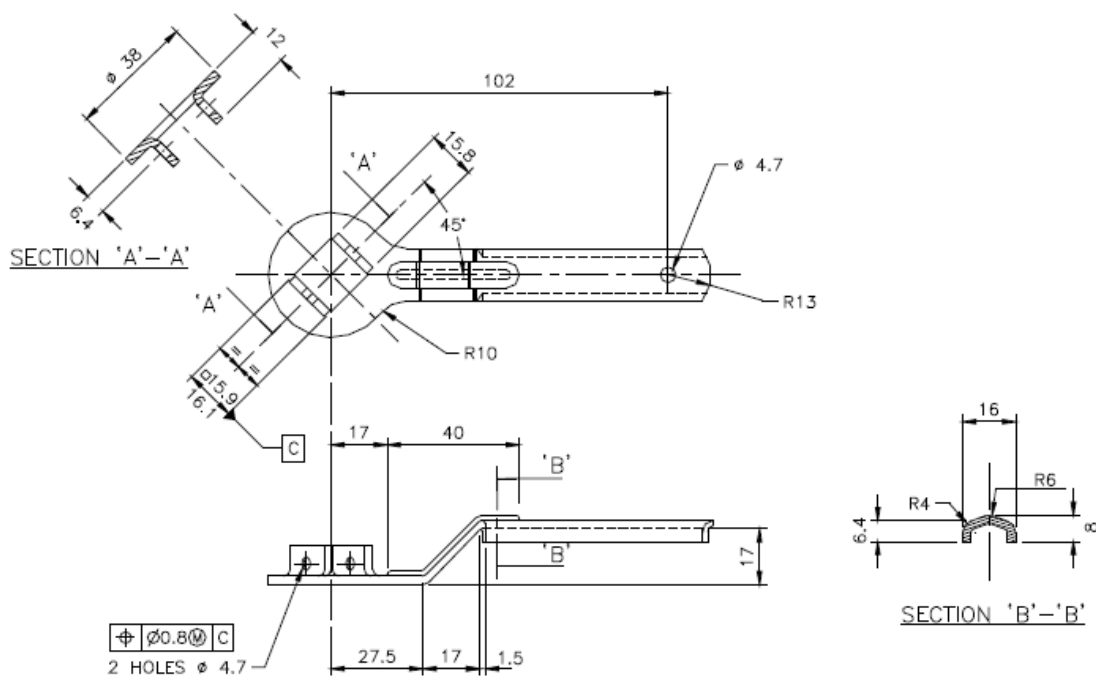


Figure 4 – Example of a Pressed Steel Handle for 3/4" and 1" plug valves

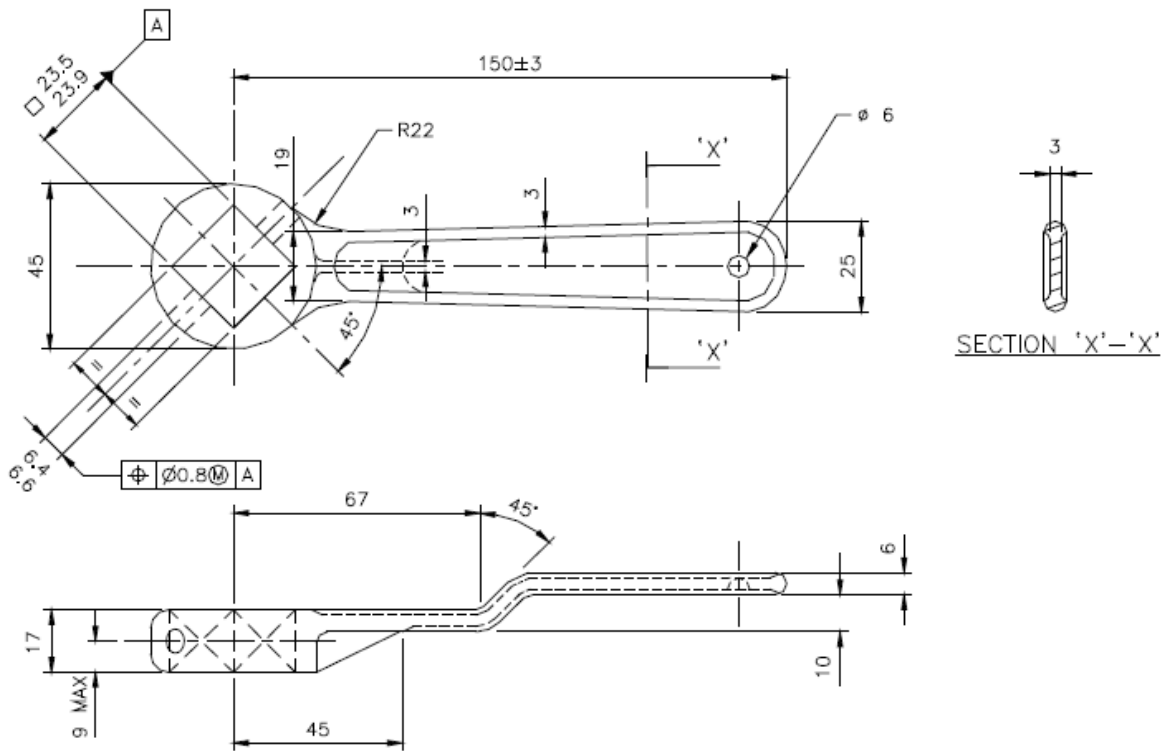


Figure 5 – Example of a blackheart malleable iron handle for 1-1/4” to 1-1/2” plug valves

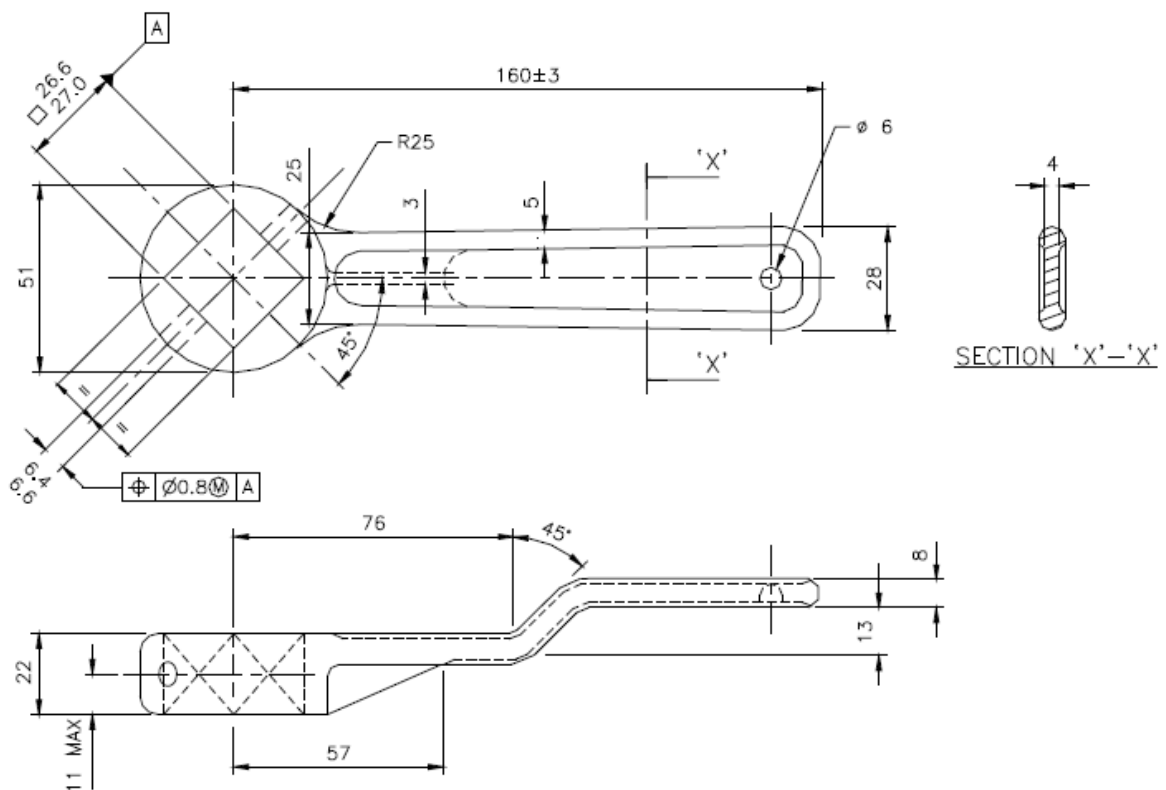


Figure 6 - Example of a blackheart malleable iron and spheroidal graphite handle for 2” plug valves

6.3 Operation of plug valves

6.3.1 Valves shall be capable of operating smoothly and reliably at temperatures between -20°C and $+60^{\circ}\text{C}$ up to the designed MOP for their valve class (see Table 1).

6.3.2 The “open” position of the valve shall be when the lever is parallel to the axis of the pipe. The “off” position should be approximately one quarter turn of the lever to the right or left and, where lever moves in the vertical plane, the move to the “off” position shall be in a downwards direction. There shall be an indication how the control operates and when the gas is “off” or “on” by a raised or recessed line at top of the stem.

The rotation of lever from “off” to “off” shall be 180 degrees.

6.3.3 The end “off” position shall limit rotation by a niting washer and retaining nut as described in 3.17 and 6.2.14. The niting mechanism shall be independent of the lever (actuator) and the lever and stem shall be two separate pieces. The stop mechanism shall be independent of the lever (actuator) and the lever and stem shall be two separate pieces. The stop mechanism shall remain securely attached to the stem if the handle is removed. The lever (actuator) end positions shall have the closure (plug) assembly rotation limited to 180 degrees by segments on the niting washer and these shall be fixed and non-adjustable.

6.3.4 The lever (actuator) shall be securely attached to the stem such as by a split pin or nut/ thread arrangement. The lever shall be removable and replaceable by installers when required to isolate/ seal off gas supply and by the use of correct tools which are common and commercially available. The alignment of the lever attached to the head of stem shall be such as to permit the lever to be refitted by competent person and that the lever can only be fitted to match the obturator position (gasway) of either “on” or “off” as 6.3.2 above.

6.3.5 Only commercially available tools shall be required for joints assembled by installer.

6.3.6 All valves shall be supplied with the valve fully assembled and the levers fitted ready for operational use, and by agreement with purchaser, with the lever being set in either the “on” or “off” position.

6.3.7 Provision shall be made to incorporate a locking screw with a suitable non-removable lug on the body of straight and right-angled Emergency Control Valves for locking-off (wiring) the valve in the “off” position. The locking screw shall be independent of the lever and the lever securing nut. The hole size through the locking screw shall not be less than 2.5mm diameter. It shall only be possible to lock the valve in the off position.

6.4 Performance requirements for plug valves

6.4.1 Three samples for each size of valve shall be “type approval” tested in accordance with BS 1552. The test sequence followed shall be in line with Annex B of BS 1552 apart from the following differences:

- a) Durability marking test (see 6.4.6 of this document);
- b) Surface finish test for steel levers shall follow Annex A of this document
- c) Gas tightness tests shall follow Annex C of this document and shall show no signs of leakage or any sign of defect when subjected to the test for internal or external leak tightness. This applies to both type approval and production tests.

- d) For valves with the inlet size different to the outlet size, the test value shall correspond to that for the smaller size.
- e) Immediately after the accelerated ageing test, the torque required to effect the initial operation from the open to the closed position shall not exceed the limits in Table 8.
- f) When tested in accordance with Annex B.9 of BS 1552 the operating torque shall be within the limits given in Table 8 of this Gas Industry Standard.
- g) The stops in the open or closed position shall withstand 1.5 times the maximum operating torque selected between ambient and low temperature torque, whichever is the higher.
- h) The minimum rated air flow rate for plug valves with a differential pressure of 1 mbar shall not be less than the value specified in Table 7 and tested in accordance with clause 9 of BS 1552. The minimum bore of the valve shall grant at least a minimum gas flow as indicated in Table 7:-

Valve nominal size (inches/millimetres)	Minimum flow rate (m ³ /h)
3/4" (19.05mm)	7
1" (25.4mm)	15
1 x 3/4" (25.4mm x 19.05mm)	7.5
1.1/4" (31.75mm)	22
1.1/2" (38.1mm)	30
2" (50.8mm)	45

Table 7 - Table of minimum rated flow rates for plug valves.

Valve diameters	Torque (Nm) at ambient temperature (maximum)
3/4" (19.05mm)	7 Nm
1" (25.4mm)	7 Nm
1 x 3/4" (25.4mm x 19.05mm)	14 Nm
1.1/4" (31.75mm)	14 Nm
1.1/2" (38.1mm)	14 Nm

Table 8 - Required operating torque limits for valves

6.4.2 The plug valve shall be suitable for minimum operating temperature of -200C and maximum operating temperature of +600C and any other temperature between those parameters.

6.4.3 Where high temperature resistance is indicated for the valve design in Table 1 then the valve shall comply with requirements of the Building Regulations, B3: Internal fire spread requirements and the test requirements of BS EN 1775 Annexe A Procedure A:

Two valves shall be tested as follows:

- Ensure that the initial operating torque for each valve to be tested conforms to that declared by the manufacture.

- Subject one open valve and one closed valve to the test.
- Monitor the leakage during the test and, after cooling to room temperature, measure the total leakage at an internal air pressure of 50 mbar. After cooling to room temperature, close the open valve and measure the total leakage of each valve at an internal air pressure of 50 mbar.

6.4.4 Reaction to fire - valves in this standard are classified without further fire resistance testing as belonging to Class A.1 “No contribution to fire” as provided for in Commission Decision 96/603/EC and its Amendment 2000/605/EC. However, products which are subject to a coating containing more than 1.0% by weight or volume (whichever is the lower) of homogeneously distributed organic materials shall be tested and classified according to BS EN 13501-1.

6.4.5 The position of the lever shall not alter of its own accord whether falling to “off” or “on”.

6.4.6 Durability of marking is checked for compliance by inspection and by rubbing the marking by hand for 15 secs with a piece of cloth soaked with water and again for 15 secs with a piece of cloth soaked with petroleum spirit.

6.4.7. After all the “type approval” tests to this standard, the markings shall be easily legible and it shall not be easily possible to remove markings or required labels or plates.

6.4.8 Production testing shall include the Annex C tests of internal and external leak tightness on every valve. Other production tests from clause 6.4.1 shall be random sampling as agreed with purchaser.

7 Sealing Caps for ball and plug valves

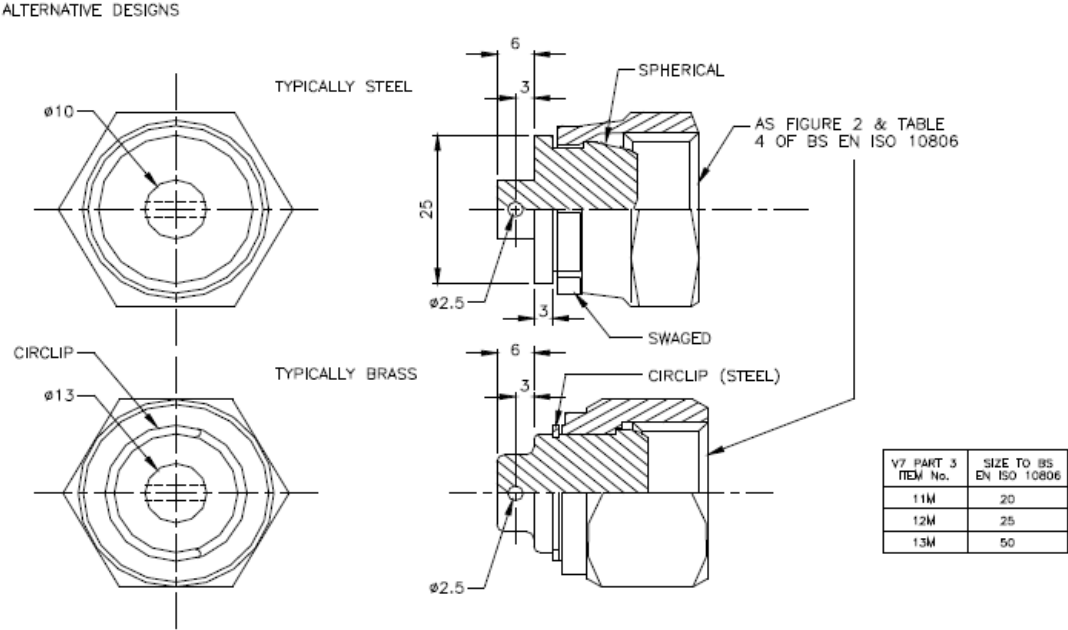


Figure 7 - Example of 19mm Sealing Cap for Medium Pressure Emergency Control Ball Valves

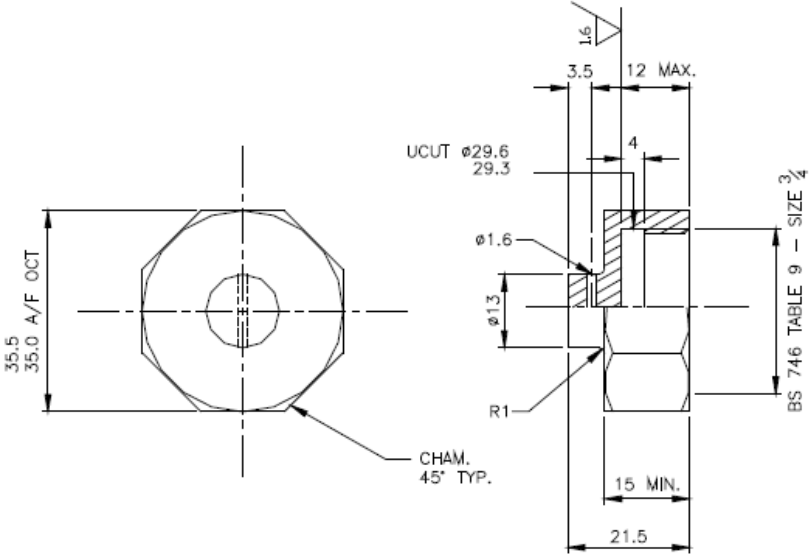


Figure 8 – Example of 3/4” Sealing Cap for Low Pressure Emergency Control Ball and Plug Valves

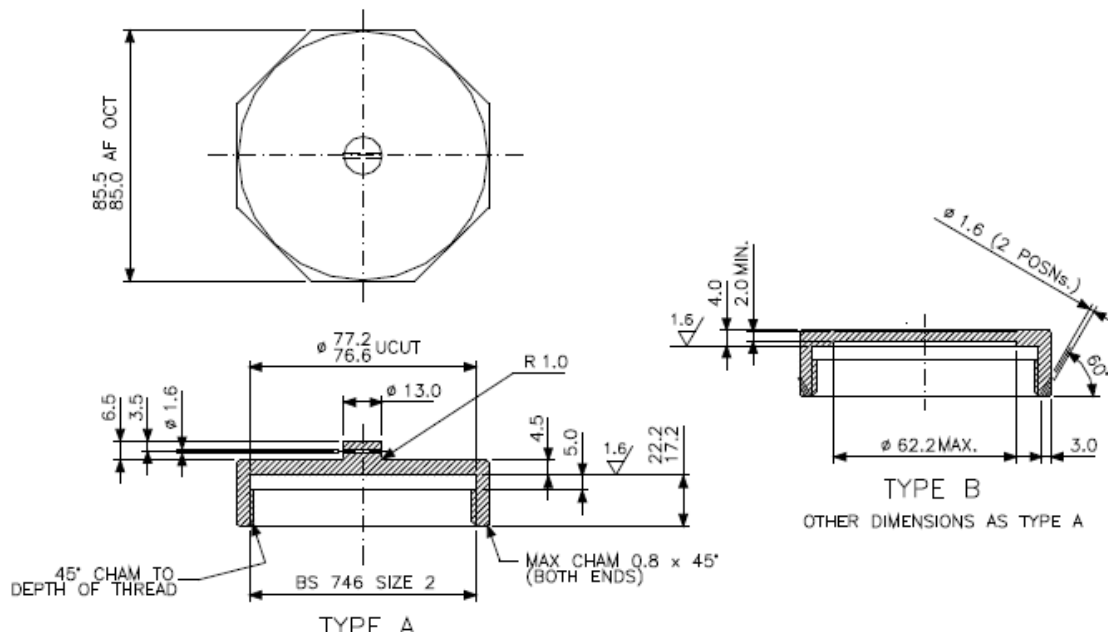


Figure 9 - Example of 2” Sealing Cap for Low Pressure Emergency Control Ball and Plug Valves

Nominal Diameter	Female Thread Octagonal-head	Octagonal-head dimensions
19mm MP EN ISO 10806 35 to 35.5mm A/F	EN ISO 10806	35 to 35.5mm A/F

Table 9 - Brass sealing caps for MP ECV (refer to example in Figure 7)

Nominal Diameter	Female Thread all to BS 746:2005	Octagonal-head dimensions
3/4” (19.05mm)	Table 9 of BS 746	35 to 35.5mm A/F
1” (25.4mm)	Table 9 of BS 746	42 to 42.5mm A/F
1.1/4” (31.75mm)	Table 9 of BS 746	51.5 to 52mm A/F
1.1/2” (38.1mm)	Table 9 of BS 746	65 to 65.5mm A/F
2” (50.8mm)	Table 9 of BS 746	85 to 85.5mm A/F

Table 10 - Brass sealing caps for LP ECVs (refer to examples in Figures 8 and 9)

8. Conformity, marking, installation instructions and packaging

8.1 Conformity

The conformity of a valve with the requirements of this standard and with the declared values (including classes) shall be demonstrated by both initial type testing (type approval) and a certificated quality management system for production control by the manufacturer (see Annex E for further guidance). The purchaser may require further assessment of “fitness-for-purpose” to ensure all risks covered before giving approval for product’s use, e.g. field trials, independent tests. A formalised quality management system is required to BS EN ISO 9001.

NOTE - for performance requirements see clause 5.4 for ball valves and clause 6.4 for plug valves.

8.2 Marking

The manufacturer shall provide information which permits the performance and traceability of the valve. The following information, at least, shall be durably marked on the assembled valve in a clearly visible position:

NOTE: Where valve parts are too small to put all the required markings on then abbreviated designations may be used, e.g. “V7-3”.

- a) The number and date of this standard, i.e GIS/V7-3:2022 ¹⁾;
- b) The name or trademark of the manufacturer or their appointed agent;
- c) Nominal size in DN, inches or millimetres, as appropriate (see Table 1);
- d) Cross reference for traceability such as production assembly date, batch number or casting date which may be encoded, for example, with a year and week number (not more than 1 month’s production per code change);
- e) Where authorized, the product conformity mark of a third party certification body, e.g. BSI Kitemark.

NOTE Attention is drawn to the advantages of using third party certification of conformance to a standard.

- f) The maximum operating pressure or pressure class, e.g. “MOP 0.5 bar“, “MOP 5 bar“;
- g) (For high temperature resistant valves) the symbol, “FR“;
- h) For levers on straight or right angled emergency control ball valves they shall show “MP GAS EMERGENCY CONTROL” or “LP GAS EMERGENCY CONTROL” as appropriate in letters not less than 2 mm high; The direction of “on” and “off” shall be shown on the amber coloured lever sheath (MP valves) and red sheath (LP valves);
- i) (For malleable iron levers on plug valves) the valve size, i.e. “1¼ & 1½” or “SIZE 2“, as appropriate, on the outside face of the lever (i.e. facing away from the valve).
- j) For Gas Emergency Security Valves, the words “Gas Emergency Security Valve” on lever sheath.

Markings shall be made in such a manner that they cause neither distortion nor affect gas tightness of the fittings/associated fittings.

NOTE: Where the marking locations are not specified in the relevant British Standard or in 8.1, suggested locations are on the body or spanner flats of valves/fittings or on the square drive of the obturator of valves.

¹⁾ Marking GIS/V7-3 :2022 on or in relation to a product represents a manufacturer’s declaration of conformity, i.e. a claim by or on behalf of the manufacturer that the product meets the requirements of the specification The

accuracy of the claim is therefore solely the responsibility of the person making the claim. Such a declaration is not to be confused with third party certification of conformity, which may also be desirable.

8.3 Installation and operating instructions

8.3.1 For all valves the installation and operating instructions shall be available, written in the official language acceptable to the country into which the valve will be delivered. All the necessary information regarding its safe installation and operation including, where required by valve type or design, any suggested ongoing maintenance work.

8.3.2 The instructions shall detail:-

(a) The method and procedure of how to install and operate a valve and how to verify its correct installation and operation.

(b) In addition, the instructions shall give the following information:-

- the trade name of the manufacturer of the product and place of manufacturing;
- identification number of the Notified body,
- GIS number of this standard;
- families of gas for which the assembly is designed;
- pressure class (MOP);
- temperature class (maximum and minimum operating temperature);
- information as to whether the valve is resistant to high temperature;

(c) The instructions shall also include the following warnings:

- any deterioration or destruction of any part of the valve shall result in the need to replace the complete valve and alterations to any part of the complete valve shall result in the valve no longer being in compliance with the performance requirements of this document;
- ensure that the valve allows an adequate flow rate for its intended use;
- all installations should be performed in accordance with existing local installation regulations and codes of practice where they exist;
- it is imperative to follow the installation instructions of the valve manufacturer including those for the correct position of the connection point for the valve.

NOTE - These instructions and warnings can be supplemented as required by drawings.

8.4 Handling, storage and packaging

8.4.1 The manufacturer shall have procedures providing safe methods of packaging and product handling and shall provide suitable storage areas preventing damage or deterioration.

8.4.2 All valves shall be supplied with the valve fully assembled and the levers fitted ready for operational use with as agreed with purchaser, the lever either set in the “on” or “off” position.

NOTE: Subject to agreement with the purchaser, valves and associated fittings may be supplied in transit packs or unit packs. Packaging materials shall not have any deterioration effect on the valves and associated fittings.

8.4.3 Transit packs (e.g. shrink wrapped on pallets) shall be strong enough to contain an agreed number of items or unit packs as agreed between supplier and purchaser, shall provide adequate protection against damage.

8.4.4 Unit packs (in the form of cartons) shall not weigh more than 18 kg. The number of items shall be subject to agreement between the supplier and the purchaser.

8.4.5 Transit packs shall show itemized contents and mass of pack, and unit packs (cartons) shall show item description, MOP, gas family, date code and number of items per pack. Both transit packs and unit packs shall be marked on outside of the packs with these requirements.

ANNEX A (NORMATIVE)

SURFACE FINISH TEST FOR STEEL LEVERS

A.1 Thickness of zinc coating test

A.1.1 Principle

Determine the thickness of the zinc coating on steel levers.

A.1.2 Apparatus

A.1.2.1 Coating thickness gauge, in accordance with requirements of BS EN ISO 2177.

A.1.2.2 Damp cloth, grease-free cloth and/ or absorbent paper.

A.1.2.3 Light magnesium oxide powder, or an organic solvent such as trichloroethylene.

A.1.2.4 Water supply or acetone solution, for rinsing and drying.

A.1.3 Test sample

A new sample shall be used for each test.

A.1.4 Procedure

The surface to be tested shall be free of any grease.

Remove grease by rubbing surface with damp cloth on which a light magnesium oxide has been sprinkled, or by treatment with an organic solvent.

Rinse the lever and dry with a grease-free cloth, absorbent paper or rinse with acetone and dry in air.

NOTE: For this test, it is not necessary to remove the chromate film from the surfaces to be tested.

Measure the coating thickness in accordance with BS EN ISO 2177.

A.1.5 Test results

The thickness of the coating shall not be less than 8 µm at any position on the lever.

A.2 Adhesion of zinc coating test

A.2.1 Principle

Determine the adhesion of the zinc coating on steel levers.

A.2.2 Apparatus

A.2.2.1 Burnishing implement, e.g. a copper disc used edgewise, and broadside.

A.2.2.2 Very mild abrasive, e.g. a paste of levigated alumina.

A.2.2.3 Damp cloth, grease-free cloth and/or absorbent paper.

A.2.3 Test sample

A new sample shall be used for each test.

A.2.4 Procedure

NOTE: More than one area may be tested if desired.

Before determination of adhesion, remove the chromate film from the test area on the lever using a very mild abrasive, e.g. a paste of levigated alumina.

Use burnishing implement on an area of not more than 6 cm² of the zinc plated lever, selected at the discretion of the tester.

Rub the area rapidly with the burnishing implement for 15 s.

Use sufficient pressure to burnish the zinc coating at every stroke, but not so great as to cut the coating.

A.2.5 Test results

The coating shall continue to adhere to the lever. (Poor adhesion will be shown by the appearance of a loose blister that grows as rubbing is continued. If, in addition, the quality of the zinc deposit is poor, the blister may crack and the coating will peel away from the lever.)

A.3 Adhesion of chromate film test

A.3.1 Principle

Determine the adhesion of the chromate film on the levers.

A.3.2 Apparatus

A.3.2.1 White paper, damp cloth, grease-free cloth and/ or absorbent paper. A.3.3 Test sample

A new sample shall be used for each test.

A.3.4 Procedure

Allow the chromate film to harden for 24 h before testing.

Select an area of the zinc plated and chrome passivated lever, and rub firmly with a fragment of white paper on the tip of the finger for 5 s.

A.3.5 Test results

The film shall continue to be adherent. (The appearance of anything more than the faintest stain on the paper or any indication that the treated surface has been rubbed through shall mean that the film is considered non-adherent.)

A.4 Chromate film corrosion resistance test

A.4.1 Principle

Determine the adhesion of the chromate film on the levers.

A.4.2 Apparatus

A.4.2.1 White paper, damp cloth, grease-free cloth and/ or absorbent paper. A.4.3 Test sample

A new sample shall be used for each test.

A.4.4 Procedure

Allow the chromate film to harden for 24 h before testing.

Subject the zinc plated and chrome passivated lever for 72 h to the neutral salt spray test specified in BS EN ISO 9227.

A.4.5 Test results

The chromate film shall not show formation of white corrosion products or localized pitting exceeding 1 % of the surface area.

ANNEX B (NORMATIVE)

TORQUE TEST ON MULTI-PART (BONDED) FITTINGS

B.1 Principle

This test is to ensure that the bonded parts of the multi-part fitting are assembled to the correct torque.

B.2 Apparatus

B.2.1 Torque wrench and sockets or machine/ equipment, to apply torque to range of fittings.

B.2.2 Hydrostatic test equipment.

B.2.3 Pneumatic test equipment.

B.2.4 Water tank for immersion of castings.

B.3 Test sample

A new sample shall be used for each test.

B.4 Procedure

Fittings shall be fully cured before testing.

If the fitting has different port sizes then apply the torque applicable to the smaller size.

Hold the part on one side of the joint securely while a torque is gradually applied to the part on the other side.

Repeat the test on another sample in the opposite direction.

B.5 Test results

When subjected to the torque specified in Table B.1 there shall be no damage to the fitting and no movement between the parts.

Port size	Valves: torque	Other fittings: torque
In	Nm	Nm
$\frac{3}{4}$	170	100
1	210	125
$1\frac{1}{4}$	270	160
$1\frac{1}{2}$	340	200
2	420	250

Table B.1 — Torque test values on multi-part bonded fittings

ANNEX C (NORMATIVE)

GAS TIGHTNESS TEST FOR VALVES AND SEALING CAPS

C.1 Principle

Determine the gas tightness of valves and sealing caps.

C.2 Apparatus

Examples of suitable test apparatus are given in Annex D and shall be of the “pressure loss” type. Please note that “volumetric” methods shall not be used.

C.3 Test sample

A new sample shall be used for each test. A minimum of three samples of each diameter size shall be used for type approval tests and every valve/ sealing cap on production tests.

C.4 Procedure

C.4.1 Test Pressures - for both type approval tests and production tests, subject the valve or sealing cap to an internal air pressure from the valve inlet side of at least:-

- 350mbar for all diameters of LP valves & Gas Emergency Security valves and LP sealing caps (see Table 1).
- 1.5 times the manufacturer’s stated design MOP for MP valves and MP sealing caps, e.g. 3.5 bar for a 2 bar valve (see Table 1).

C.4.2 External Leak Tightness (body test) - Valve and sealing caps shall be tested in each closed position and, with outlet sealed, the half-open position and sealing caps with tightened onto valve. There shall be no leakage apparent from body, stem or from the threaded side body between body and sleeve (e.g. where thread sealant or anaerobic binder has been applied).

Type Approval Test - three samples for each design and each size of valve or sealing cap shall be tested. The test duration shall be a minimum of 10 min after temperature stabilisation and there shall be no visible or measured leakage rate.

Production Tests - (i) test every valve and sealing cap for a minimum of 5 secs and (ii) sample test for 10 min as same as type approval test. Sampling shall be as agreed with purchaser such as 2 items every 2 hours of production or 2 samples up to 90 pieces, 3 up to 150, 5 up to 500, 8 up to 1200, 13 up to 10,000, 20 up to 35,000, etc. All samples must get through test, if one sample fails then test must be repeated for original number of samples.

C.4.3 Internal Leak Tightness (valves only) - This test shall follow the External Leak Tightness Test. Valve shall be tested in each closed position by pressurising with air from inlet side and checking that there is no leakage internally past obturator (ball or plug) to outlet side.

Type Approval Test - three samples for each design and each size of valve shall be tested. The test duration shall be a minimum of 10 min after temperature stabilisation and there shall be no visible or measured leakage rate.

Production Test - (i) test every valve for a minimum of 5 secs and (ii) sample test for 10 min as same as type approval test. Sampling methods shall be as shown in C.4.2 above.

NOTE: Examples of suitable test methods are given in Annex D. (In the case of dispute, any one of these reference methods, as appropriate, should be used.)

C.5 Test results

For both type approval testing and sample testing, valves, sealing caps and their joint(s) shall be sound, i.e. no leakage, and shall show no sign of any defect.

For 100% production testing (every valve) then a maximum of 15cc/hr leakage rate is allowed. This is to allow for equipment accuracy, measurement errors and apparent leakages mainly due to temperature variations.

ANNEX D (INFORMATIVE)

TEST METHODS FOR GAS TIGHTNESS

D.1 Bubble leak indicator test

D.1.1 Principle

Determine the gas tightness for fittings, suitable for use at operating pressures up to 75 mbar using a bubble leak indicator.

D.1.2 Apparatus

Bubble leak indicator, [see Figure D.2 and Figure D.3], to which is connected a constant air supply at the specified test pressure. Means of sealing the fitting outlet, where appropriate.

D.1.3 Procedure

Connect the bubble leak indicator to the fitting inlet and seal the fitting outlet. Supply air to the fitting, through the by-pass tap on the indicator, until the test pressure is reached and then open the taps to and from the glass tubes.

Shut the by-pass tap.

D.1.4 Test results

If, after 1 min from the time of shutting off the by-pass tap, no bubble passes through the indicator in the following 1 min, the fitting should be deemed to be sound.

NOTE: The validity of this test depends upon the temperatures and barometric pressure remaining constant throughout the test.

D.2 Underwater test

D.2.1 Principle

Determine the gas tightness using an underwater method.

D.2.2 Apparatus (see Figure D.1)

D.2.2.1 Air supply or pump, capable of supplying air up to the test pressure.

D.2.2.2 Valve A, to control the air supply.

D.2.2.3 Connection, for the fitting outlet(s) to outlet control valve B, where appropriate.

D.2.2.4 Water supply and water tank, with a drainage system and inspection window as required, capable of containing the fitting with sufficient room left to observe any leaks.

D.2.2.5 Mechanical means for holding the fitting underwater, with a minimum of contact with the fitting and the contact should not be detrimental to the fitting or affect the test.

D.2.2.6 Pressure gauge, on the downstream side of valve A.

D.2.2.7 Outlet valve B.

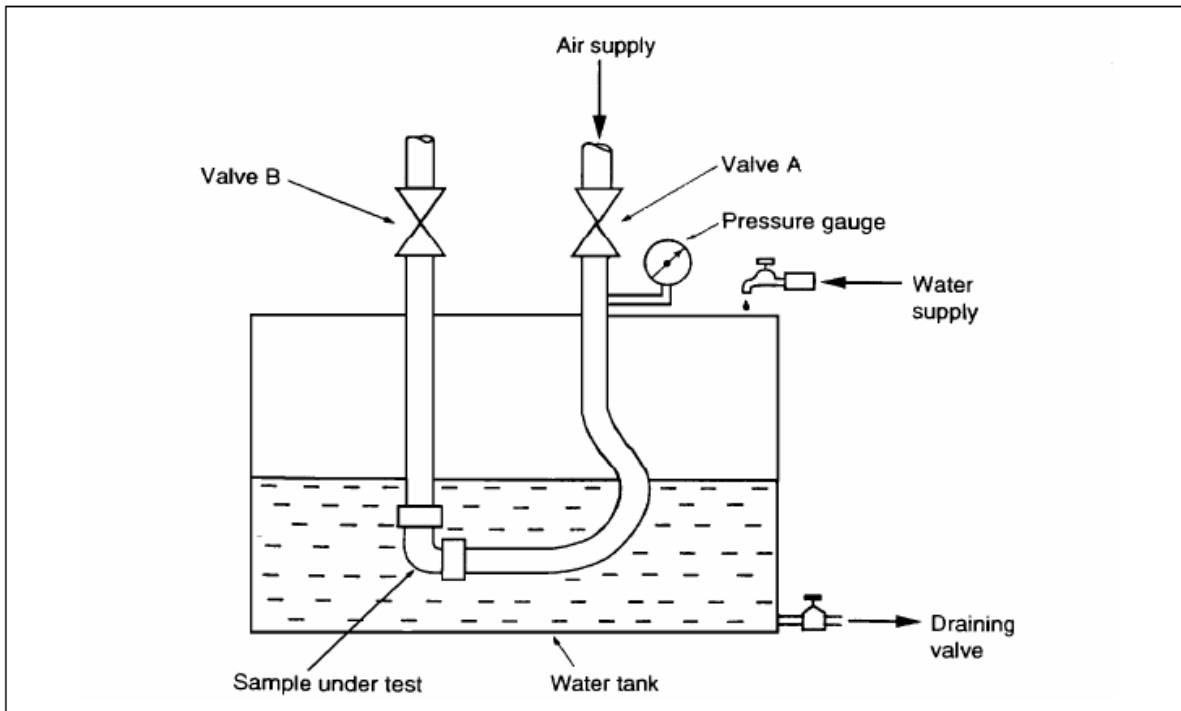


Figure D.1 — Gas tightness test apparatus for Underwater Test

D.2.3 Procedure

Connect the air supply to the fitting inlet through valve A and connect the outlet valve B to the fitting outlet.

Open valve B. Slowly open valve A. Close valve B and raise the pressure to the test pressure. Submerge the fitting in the tank.

Allow 1 min to elapse whilst dispersing trapped air and then observe for a further 1 min.

When the test is complete, close valve A and depressurize the fitting through valve(s) B.

D.2.4 Test results

If no air escapes from the fitting during the further 1 min, the fitting should be deemed to be gas-tight, i.e. no visible leakage.

NOTE: The validity of this test depends upon the temperatures and barometric pressure remaining constant throughout the test.

D.3 Electronic pressure gauge test

D.3.1 Principle

Determine the gas tightness for fittings, suitable for use between 75 mbar and 2 bar operating pressure using an electronic pressure gauge.

D.3.2 Apparatus

T-piece, with a tap in its inlet, to which is connected a constant air supply at the test pressure.

Electronic pressure gauge, connected to one of the T-piece outlets. Cap, suitable for sealing the fitting outlet, where appropriate.

D.3.3. Procedure

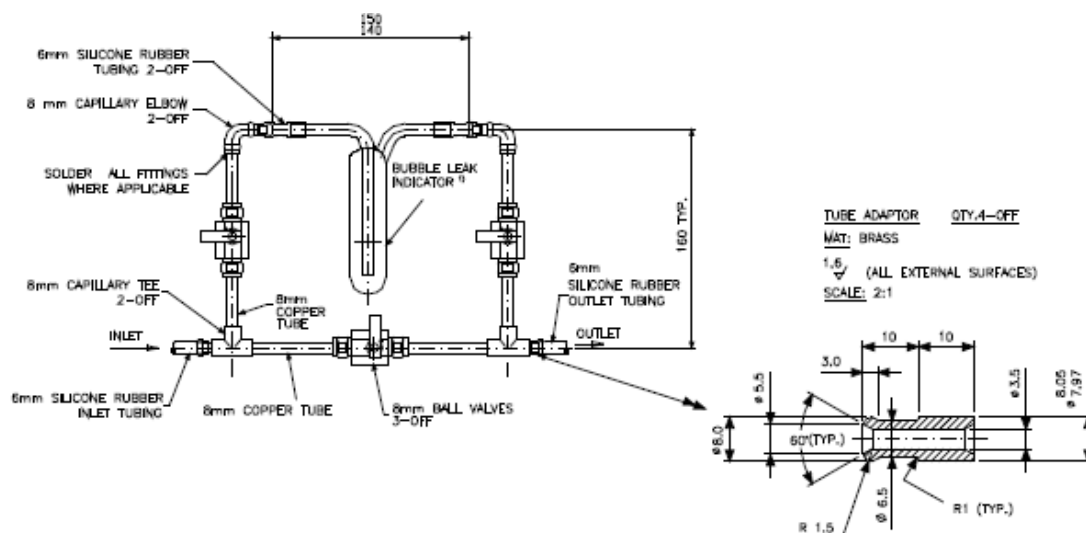
Connect the T-piece with the pressure gauge attached to the fitting inlet and seal the fitting outlet. Supply air to the fitting through the tap on the T-piece, until the test pressure is registered on the pressure gauge. Shut off the tap.

D.3.4 Test results

If, after a 1 min temperature stabilization period from the time of shutting off the tap, no fall in pressure is registered in the following 1 min, the fitting should be deemed to be gas tight.

D.3.5 Test validity

NOTE: The validity of this test depends upon the temperatures and barometric pressure remaining constant throughout the test.

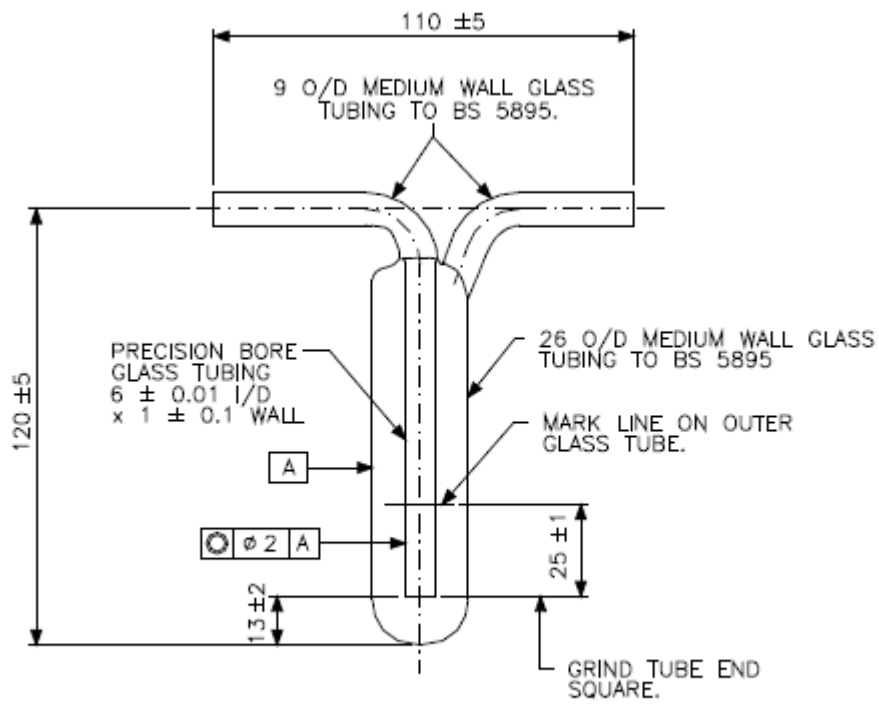


NOTE 1 The bubble leak indicator should be filled with distilled or de-ionized water to the marked line before the start of the test.

NOTE 2 The indicator should be vertical during use.

1) The bubble leak indicator shall conform to Figure D.3.

Figure D.2 — Bubble leak indicator assembly (for test pressures <500 mbar)



NOTE See also Figure D.2.

Figure D.3 — Bubble leak indicator (for test pressures <500 mbar)

ANNEX E (INFORMATIVE)

INITIAL TYPE TESTING AND QUALITY MANAGEMENT CONTROL

E.1 General requirements on conformity

The conformity of a valve with the requirements of this standard and with the declared values before the purchaser gives approval shall be demonstrated by:

- initial type testing (type approval testing)
- certificated quality management system for factory production control by the manufacturer, including product assessment and production tests.

For the purposes of testing, valves may be grouped into design ranges, where it is considered that the results for one or more characteristics from any one product within the range are representative for that same characteristics for all valves within that same design. The purchaser may require further assessment of “fitness-for-purpose” to ensure all the risks in the intended use have been covered before giving approval, e.g. field trials, independent tests.

NOTE: for performance requirements see clause 5.4 for ball valves and clause 6.4 for plug valves

E.2 Initial Type Testing (Type Approval)

An initial type test is the complete set of tests or other procedures, in respect of the Characteristics to be assessed, determining the performance of samples of the products representative of the product type.

Initial type testing shall be performed to show conformity with this standard for valves being put onto the market and:

- at the beginning of production of a new or modified valve design, the raw material or supplier of the components.
- at the beginning of a new or modified method of production.

In the case of type testing of valves for which initial type testing in accordance with this standard was already performed, type testing may be reduced:

- if it has been established that the performance characteristics compared with the already tested valves have not been affected or
- in accordance with the rules for families and/ or direct or extended application of test results

Where valve components are used whose characteristics have already been determined, by the component manufacturer, on the basis of conformity with other technical specifications, these characteristics need not be reassessed provided that the components' performance or method of assessment remain the same, that the characteristics of the component are suitable for the intended end use of the finished product, and insofar as the manufacturing process does not have a detrimental effect on the determined characteristics.

Products CE marked in accordance with appropriate harmonised European Standards may be presumed to meet the performance requirements contained within. Although this does not replace the responsibility of the valve manufacturer to ensure that the product as a whole is

correctly designed (where the manufacturer himself undertakes the design) and its components have the necessary performance values to meet the design.

Valves for initial type tests shall be chosen at random from a production lot, or in the absence of available lots, at the manufacturer's premises or from products on the market. Tests shall be performed according to the given test sequence and compliance criteria. The results of all type tests shall be recorded and held by the manufacturer for a period of at least 10 years.

E.3 Quality Management Control

A formalised quality management system is required to BS EN ISO 9001 and the manufacturer shall provide evidence of this certification by an accredited third party certification body. A copy of the manufacturer's quality manual, relevant quality plans and other related documents shall be provided on request.

E.3.1 Quality plans

The quality plans shall demonstrate that the items supplied conform to the requirements of this Gas Industry Standard. The manufacturer shall establish, document and maintain the quality plan for a factory production control system to ensure the products placed on the market conform to the declared performance characteristics. Any changes to the quality plan shall be agreed between purchaser and manufacturer before introduction.

The quality plan will provide a mechanism to tie existing generic quality system procedures to the specific requirements of this standard. The quality plan should indicate, either directly or by reference to appropriate procedures or other documents, how the required activities are to be carried out.

The format and the level of detail in the quality plan should suit the manufacturer's method of operation and the complexity of the activities to be performed. The quality plan should be as brief as possible and may be in the form of flow diagrams, a textual presentation or a mixture of both. The plan should indicate, either directly or by reference to appropriate procedures or other documents, how the required activities are to be carried out.

Where applicable, the quality plan shall include, but is not limited to, the following elements:

- a) Purpose - defining the specification and issue which is to be applied.
- b) Nominated contacts - for production quality (product manufacture), technical quality (design and performance) and service quality (matters arising from field use or returns).
- c) Design control - when, how, who validates/ controls design including reviews & tests.
- d) Control of bought-in material - quality of raw materials from suppliers/ sub-contractors.
- e) Control of parts manufacture - conformity of manufacture of in-house & bought-in parts.
- f) Control of sub-assembly - detail of control operations on sub-assemblies for product.
- g) Control of product assembly and test - test/ inspection procedures applied during/ after product assembly including any additional periodic tests to prevent performance drift.
- h) Inspection, measuring and test equipment - includes calibration and calibration status.
- i) Product audit - to ensure production remains in control e.g. sampling, tests, packaging.

- j) Non-conforming product - procedures, identification, segregation, corrective action.
- k) Statistical techniques - indicated in plan where specified.
- l) Control of packaging and delivery - suitability, delivery, characteristics not degraded.
- m) Product identification and traceability - affected products, scope, extent, identification.
- n) Quality records - key records, how controlled, how long retained, in which languages.
- o) Control of spare parts - where spare parts differ from those detailed previously.

E.3.2 Quality visits from purchaser or their representative

The supplier shall afford access and facilities to the purchaser's designated quality assurance personnel to visit production lines, quality audit areas, warehouses and other appropriate premises to check that the products or component parts conform to this specification and that the quality plan is being effectively operated.

The supplier shall make available on request, the appropriate quality records, drawings and other control documents.

E.3.3 Concession, variation or deviation for product

Application for a concession, variation or deviation shall be made through the purchaser informing them of the relevant details for consideration where the product differs from the specified requirements. The manufacturer shall ensure that they have the necessary approval for this before supplying the changed product.

This permission should only operate for a limited quantity or period, and on no account be allowed to extend to another contract without further application being made from the manufacturer. All efforts should be made to either update the standard/ specification or align the product with existing standard/ specification so that this permission expires as soon as possible.