

Transportable gas container valves —

**Part 1: Specification for industrial
valves for working pressures up to and
including 300 bar**

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Pressure Vessel Standards Policy Committee (PVE/-) to Technical Committee PVE/3, upon which the following bodies were represented:

- Aluminium Extruders Association
- Aluminium Federation
- Associated Offices Technical Committee
- British Compressed Gases Association
- British Fire Consortium
- British Fire Protection Systems Association Ltd.
- British Railways Board
- British Soft Drinks Association Ltd.
- Chief and Assistant Chief Fire Officers' Association
- Department of Trade and Industry [Mechanical Engineering and Manufacturing Technology Division (Mmt)]
- Department of Trade and Industry (National Engineering Laboratory)
- Department of Trade and Industry (National Physical Laboratory)
- Department of Transport (Marine Directorate)
- Engineering Equipment and Materials Users' Association
- Fire Extinguishing Trades Association
- Health and Safety Executive
- Home Office
- Industrial Safety (Protective Equipment) Manufacturers' Association
- Institute of Refrigeration
- Institute of Chemical Engineers
- Liquefied Petroleum Gas Industry Technical Association (UK)
- Ministry of Defence

This British Standard, having been prepared under the direction of the Pressure Vessel Standards Policy Committee, was published under the authority of the Standards Board and comes into effect on 30 September 1991

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First published March 1931
Second edition April 1945
Third edition October 1962
Fourth edition September 1991

The following BSI references relate to the work on this standard:
Committee reference PVE/3
Draft for comment 88/77850 DC

ISBN 0 580 19748 4

Amendments issued since publication

Amd. No.	Date	Comments
7641	May 1993	Indicated by a sideline in the margin

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Foreword

This Part of BS 341 has been prepared under the direction of the Pressure Vessel Standards Policy Committee at the request of the Health and Safety Executive and supersedes BS 341-1:1962 and BS 341-2:1963, which are withdrawn. It details the design, manufacture and testing of valves fitted to containers used for the conveyance of permanent, liquefiable and dissolved gases, except those for liquefied petroleum gas (LPG) applications.

It has been revised to include the recommendations contained in the Report of the Home Office Gas Cylinders and Container Committee [1] (published in 1969).

This Part of BS 341 is restricted to monobloc valve bodies and fittings.

The opportunity has been taken to bring together into this Part of BS 341 the current requirements for container valves previously given in BS 341-1:1962 and BS 341-2:1963, covering the following:

- 1) material requirements, design, manufacture, inspection and testing of new valves;
- 2) dimensioning of valve stems and outlet connections;
- 3) periodic inspection, testing and maintenance of valves in service.

NOTE Additional requirements may be necessary to cover the design, manufacture and construction of valves fitted to containers for military use.

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 62, 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.

Section 1. General

1.1 Scope

This Part of BS 341 specifies requirements for the design, materials, manufacture and testing of new and refurbished valves together with the testing, periodic inspection and maintenance of valves in service, for use with refillable aluminium and steel containers manufactured for the suitable conveyance and storage of permanent, liquefiable and dissolved gases for industrial applications, but excluding valves with outlets conforming to BS 1319.

This Part of BS 341 applies to valves limited to a charging pressure (see **1.3.19**) of 300 bar¹⁾ (developed pressures for particular gases may exceed this pressure).

This Part of BS 341 also gives requirements for the design, manufacture, testing and installation of pressure relief devices, to protect containers up to 130 L capacity from excessive pressure, particularly when exposed to heat.

WARNING. It is essential that pressure relief devices should not be used with toxic gases.

Recommendations for the plating of copper alloy valves are given in Annex A and recommendations for the valving of containers are given in Annex B. A list of the alternative outlets for the less commonly used gases imported into the United Kingdom is given in Annex C.

This Part of BS 341 does not include requirements for the selection of valve outlets and materials for gas mixtures, valves for medical applications complying with BS 1319 and ultra-high-purity gases.

This part of BS 341 does not cover valves for liquefied petroleum gas (LPG).

1.2 References

1.2.1 Normative references

This Part of BS 341 incorporates, by reference, provisions from specific editions of other publications. These normative references are cited at the appropriate points in the text and the publications are listed on page 62. Subsequent amendments to, or revisions of, any of these publications apply to this Part of BS 341 only when incorporated in it by updating or revision.

1.2.2 Informative references

This Part of BS 341 refers to other publications that provide information or guidance. Editions of these publications current at the time of issue of this standard are listed on page 62, but reference should be made to the latest editions.

1.3 Definitions

For the purposes of this Part of BS 341, the following definitions apply.

1.3.1

valve body

the major valve component which includes an inlet and an outlet and, where applicable, a boss for a pressure relief device

1.3.2

spindle

the element of the valve which, when operated, directly or indirectly actuates the sealing member (seal) to an open or closed position

1.3.3

seating face

the fixed contact face in the valve body for completing the seal against gas flow

1.3.4

valve stem

the inlet connection fitted to the container

1.3.5

valve outlet

the service connection

1.3.6

container neck

the part of the container that has the threaded connection for the valve stem

1.3.7

dip (or syphon) tube

a tube fitted to the valve to allow withdrawal of liquefied gas without inversion of the container

1.3.8

goose neck eductor

a tube fitted to the valve stem to allow withdrawal of vapour or liquefied gas when the container is correctly positioned on its side

1.3.9

oversized valve

a valve having a larger than normal stem thread to suit an oversized container neck thread

1.3.10

vapour/liquid valve

a valve designed so that either vapour or liquid may be discharged without inverting the container

NOTE The valve may have separate vapour and liquid outlets or a common outlet.

¹⁾ bar = 10⁵ N/m² = 100 kPa.

**1.3.11
thread sealant**

a material applied to a taper thread to effect a gas tight joint. It fills the cavity remaining in the helix of mating threads

**1.3.12
pressure relief device**

a device designed to reduce the possibility of failure of a charged container from excessive pressure particularly when the container is exposed to heat

**1.3.13
pressure relief valve**

a pressure relief device that is in direct contact with the gas, and is designed to open and close within predetermined pressure limits

**1.3.14
bursting disc**

a pressure relief device consisting of a disc that is in direct contact with the gas and is designed to rupture between predetermined pressure limits

**1.3.15
fusible plug**

a device containing a material of low melting point which is in direct contact with the gas. It is intended to yield or melt within predetermined limits of temperature and permit the discharge of the contained gas

**1.3.16
start-to-discharge pressure**

the pressure at which the leakage rate from a pressure relief device first exceeds 10^{-3} torr L/s²⁾

**1.3.17
flow rating pressure**

the pressure at the inlet of a pressure relief device which is used for establishing its rated flow capacity

**1.3.18
rated flow capacity**

the capacity of a pressure relief device measured in cubic metres per minute of free air at the designed flow rating pressure

**1.3.19
charging pressure**

the settled pressure at a uniform temperature of 15 °C at full gas content

**1.3.20
specified bursting pressure**

the nominal pressure at which a bursting disc is designed to rupture

**1.3.21
maximum bursting pressure**

the specified bursting pressure plus the upper permitted design tolerance

**1.3.22
leak**

an unintended flow of gas or liquid in excess of 10^{-3} torr L/s

**1.3.23
ageing**

a change in a metal by which its structure recovers from an unstable condition produced by quenching or cold working

**1.3.24
stress relieving**

a process to reduce internal residual stresses in a metal by heating it to a suitable temperature for a stipulated period of time

**1.3.25
normalizing**

a process in which a carbon or alloy steel is heated to a temperature above its upper transformation temperature (known as the solution temperature) and subsequently cooled in still air

**1.3.26
quenching**

a process in which a material is heated to a temperature above its upper transformation temperature (known as the solution temperature) and then quenched in a suitable medium

**1.3.27
prototype test**

a test or series of tests directed towards approval of a design, conducted to determine whether an item is capable of meeting the requirements of the product specification

**1.3.28
proving tests**

tests carried out on representative samples of the first production run of valves to determine the rated flow capacity and other operating characteristics

**1.3.29
direct acting valve**

a valve in which the sealing member is downstream of the seating face and the gas pressure tends to open the valve

²⁾ 10^{-3} torr L/s² = 5 mbar L/h $\approx 133.3 \times 10^{-6}$ N m/s. An approximate indication of this leakage rate would be the formation of four 3.5 mm diameter or ten 2.5 mm diameter bubbles per minute.

1.3.30**indirect acting valve**

a valve in which the sealing member is upstream of the seating face and the gas pressure tends to close the valve

1.3.31**inspection gauge**

gauge used for the routine gauging of cylinder neck and valve stem thread. They are not for checking other gauges

1.3.32**check gauge**

a gauge for checking dimensional conformity of inspection gauges. They are not for gauging of cylinder neck and valve stem threads

1.3.33**single piece gauge**

an inspection gauge designed to contact the full length of taper thread. These gauges are plug or ring, smooth or threaded types

1.3.34**two piece gauges**

two inspection gauges to be used in combination, where one is designed to contact the large end of the taper cone and the other the small end. These sets of gauges are plug or ring, smooth or threaded types

1.4 Classification and types of valves**1.4.1 Classification**

Valves are classified as either direct acting valves (see 1.3.29) or indirect acting valves (see 1.3.30).

NOTE Direct acting valves are more commonly used than indirect acting valves. The usual modes of operation of direct acting valves are as follows:

- a) integral screw threaded spindle and sealing surface rotating on the seating face [see Figure 1 a)];
- b) screwed spindle independent from a non-rotating sealing surface [see Figure 1 b)].

Indirect acting valves are usually of the non-rotating sealing type (see Figure 2).

1.4.2 Valve types

NOTE Examples of methods of spindle sealing are as follows:

- a) adjustable gland packing [see Figure 1 a)];
- b) automatic gland seal packing [see Figure 1 b)];
- c) "O"-ring or moulded seal packing (see Figure 2);
- d) diaphragm seal (see Figure 3).

Valves shall be either:

- 1) handwheel operated (see Figure 1, Figure 2 and Figure 3);
- or
- 2) key operated (see Figure 4).

1.5 Classification of gases

For the purposes of this standard, gases are classified as permanent gases, liquefiable gases or dissolved acetylene.

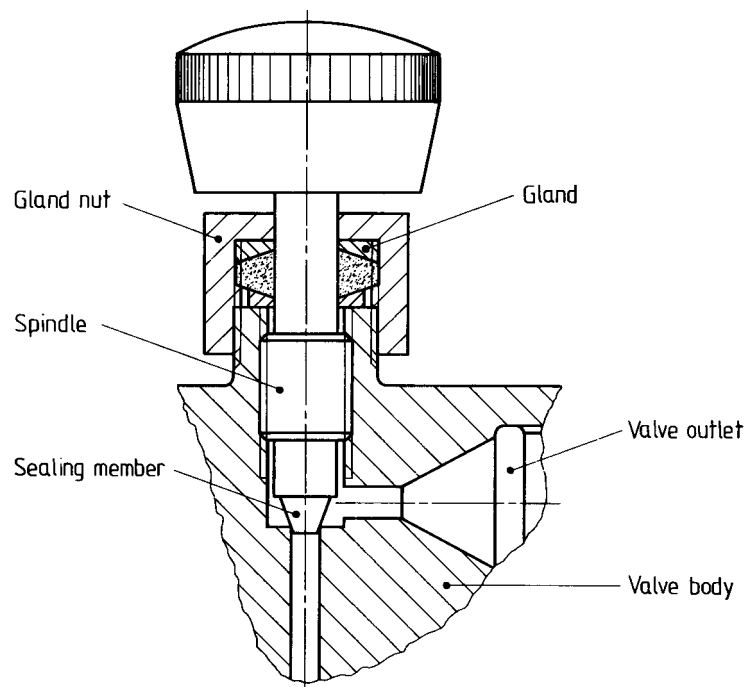
- a) *Permanent gases*: gases that have a critical temperature below $-10\text{ }^{\circ}\text{C}$.
- b) *Liquefiable gases*: gases that are liquefiable by pressure at $-10\text{ }^{\circ}\text{C}$ but which completely vaporize at $17.5\text{ }^{\circ}\text{C}$ at a pressure of not more than 1 013 mbar.

High pressure liquefiable gases are those having a critical temperature between $-10\text{ }^{\circ}\text{C}$ and $70\text{ }^{\circ}\text{C}$ inclusive.

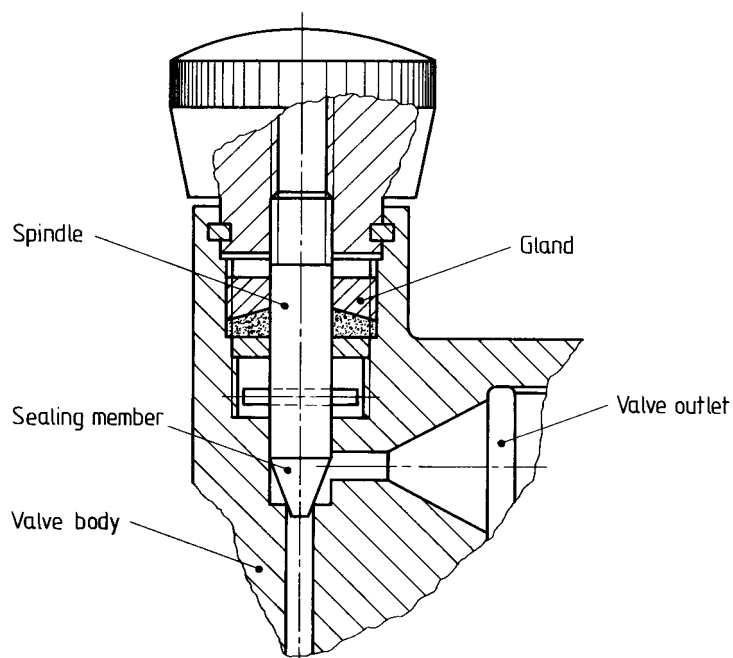
Low pressure liquefiable gases are those having a critical temperature above $70\text{ }^{\circ}\text{C}$.

Toxic substances that are liquids at a pressure of 1 013 mbar and a temperature of $0\text{ }^{\circ}\text{C}$ but which boil at or below $30\text{ }^{\circ}\text{C}$ at that pressure shall be treated as low pressure liquefiable gases.

- c) *Dissolved acetylene*: acetylene dissolved under pressure in a solvent contained in a porous substance at ambient temperature and that is released from the solvent without the application of heat.

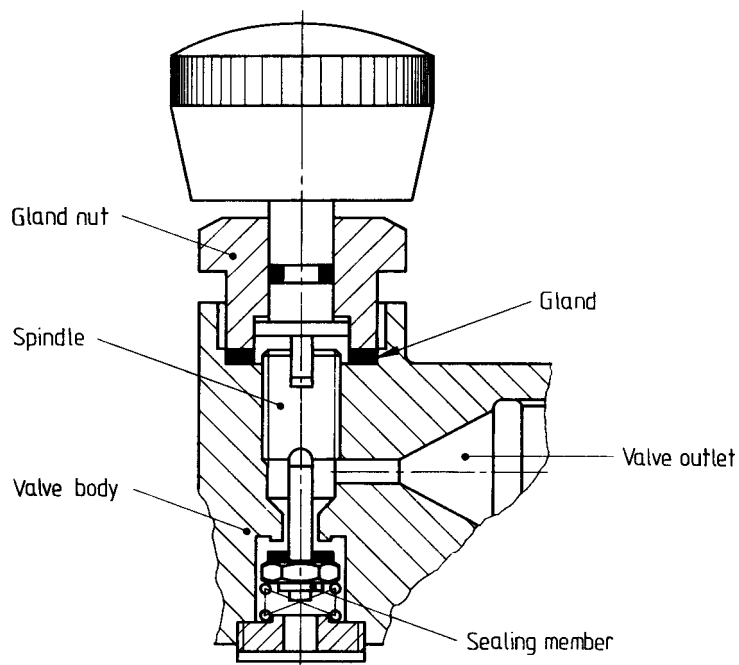


a) Direct acting valve with rotating sealing member



b) Direct acting valve with non-rotating sealing member

Figure 1 — Illustration of typical direct acting valves



NOTE The example is an indirect acting valve with non-rotating sealing member.

Figure 2 — Illustration of a typical indirect acting valve

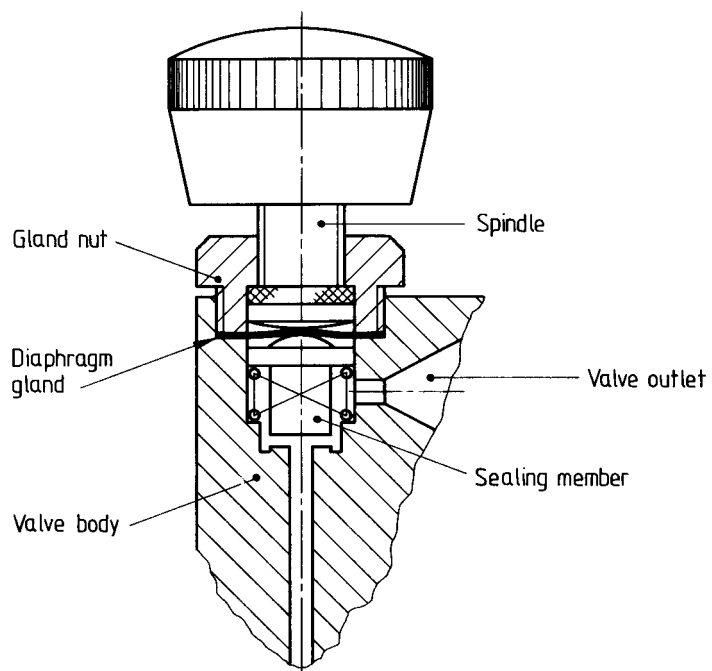
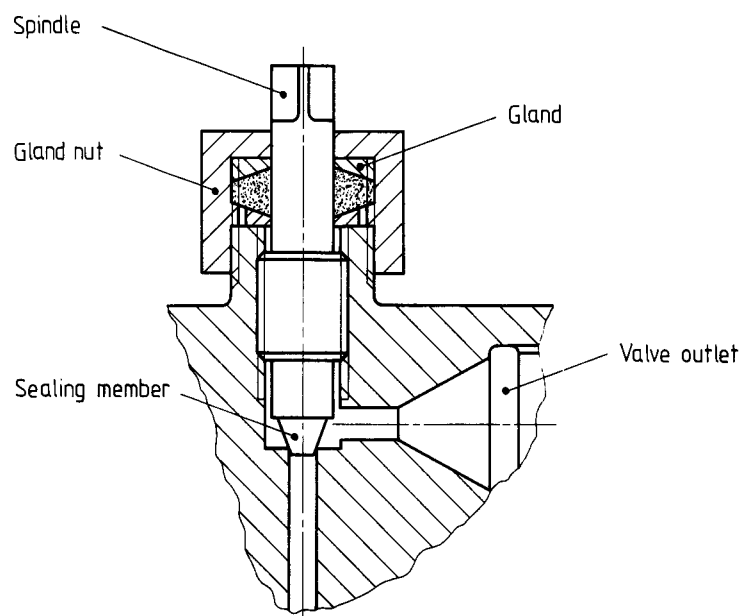
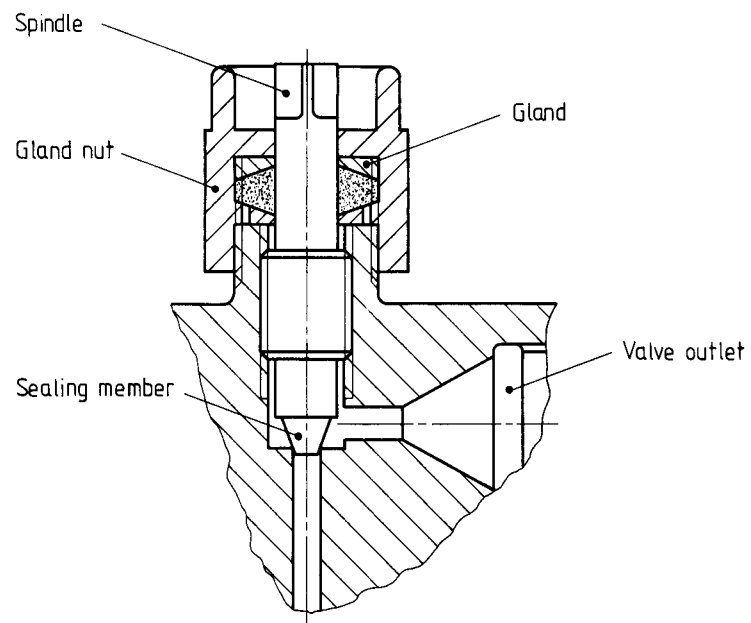


Figure 3 — Illustration of a typical valve with diaphragm gland



a) With unshrouded spindle



b) With shrouded spindle

Figure 4 — Illustrations of typical key operated valves

1.6 Information and requirements to be agreed and to be documented

1.6.1 Information to be supplied by the purchaser

The following information to be supplied by the purchaser shall be fully documented. Both the definitive requirements specified throughout the standard and the following documented items shall be satisfied before a claim of compliance with the standard can be made and verified:

- a) name(s) of gas(es) to be contained (see Table 1);
- b) service application including any adverse condition (see 3.1.15);
- c) outlet connection number in accordance with this standard (see Table 1);
- d) valve inlet working pressure at 15 °C, or developed pressure in the container at the appropriate reference temperature (see 3.1.1);
- e) container hydraulic test pressure (see 3.1.2);
- f) material of construction of container to which the valve is to be fitted (see 2.1);
- g) stem thread size and method of sealing (see 3.3);
- h) relief devices, if required, with nominal rated flow capacity (see 4.1);

- i) cleaning or decontamination standards required (see 5.5);
- j) external/internal finish required (see 5.4);
- k) details of optional markings required (see 7.1);
- l) details of any valve protection (see 7.2 and 3.1.16);
- m) details of lubrication for operating threads and seals (see 5.6).

1.6.2 Information to be supplied by the manufacturer

The manufacturer shall, on request, supply to the purchaser the following:

- a) a drawing showing the significant dimensions of the container valve (see note 3 to 3.2.1);
- b) details of all materials of construction (see Table 1);
- c) the valve body hydraulic test pressure (see 6.2.2);
- d) layout and details of stamped markings (see 7.1);
- e) test certificates (see 7.3);
- f) flow characteristics of valve when fully opened and discharging to atmosphere at an inlet pressure specified by the purchaser and at 15 °C as determined by prototype test and proving test (see 4.1).

Table 1 — Outlet connections and preferred materials for use with industrial gases

Gas (see note 1)	Valve body material (see notes 2 to 4)		Outlet connection number (see note 3)	Thread	Synonym
	Steel containers	Aluminium containers			
Acetylene (marine lighting use only)	B2	a	1	RH	Ethyne
Acetylene	B2	a	2 and 18 ^b	LH and RH	
Air	B2	B2	3	RH	
Ammonia ^c	CS1	CS1	10	RH	
Argon	B2	B2	3	RH	
Bromomethane ^{cd}	B2		6 and 16 ^b	RH	Methyl bromide
Buta-1,3-diene	B1	B1	2 and 15	LH	Butadiene ^b
Carbon dioxide	B1	B1	8	RH	
Carbon monoxide ^c	B2	B2	4	LH	
Chlorine ^{cd}	CS1		6 and 14 ^b	RH	
Chlorine trifluoride ^{cd}	CS1		6	RH	
Chloroethane	B2	a	7 and 17 ^b	LH	Ethyl chloride
Chloromethane ^{cd}	CS1		7 and 17 ^b	LH	Methyl chloride
Coal gas ^c	B2	B2	2	LH	
Cyanogen chloride ^c	CS1	a	6	RH	
Cyclopropane	B1	B1	2	LH	

Table 1 — Outlet connections and preferred materials for use with industrial gases

Gas (see note 1)	Valve body material (see notes 2 to 4)		Outlet connection number (see note 3)	Thread	Synonym
	Steel containers	Aluminium containers			
Nitrous oxide	B2	B2	13	RH	Dinitrogen oxide
1,2-epoxypropane	CS1	^a	4	LH	Propylene oxide
Ethylamine ^d	CS1		11	LH	Monoethylamine
Ethylene	B2	B2	2	LH	
Ethylene oxide ^c	B2	^a	7 and 15 ^b	LH	
Mixture 12 % ethylene oxide 88 % R12 ^c	B2	B2	6	RH	
Helium	B2	B2	3	RH	
Hydrogen	B2	B2	2	LH	
Hydrogen chloride ^c	CS1	^a	6 and 14 ^b	LH and RH	
Hydrogen cyanide ^c	CS1	CS1	14	RH	
Hydrogen fluoride ^{cd}	CS1		6	RH	
Hydrogen selenide ^c	ST1	ST1	2	LH	
Hydrogen sulphide ^c	CS1	CS1	15	LH	
Isobutane	B1	B1	2	LH	2-methyl propane
Krypton	B2	B2	3	RH	
Methane	B2	B2	2	LH	
Methylamine ^d	CS1		11	LH	Monomethylamine
2-methyl propene	B1	B1	2	LH	Isobutene
Neon	B2	B2	3	RH	
Nitric oxide ^c	CS1	ST1	14	RH	
Nitrogen	B2	B2	3	RH	
Oxygen	B2	B2	3	RH	
Perfluoropropane	B2	ST1	3	RH	
Phosgene ^c	CS1	^a	6 and 14 ^b	RH	Carbonyl dichloride
Phosphine ^c	B2	B2	4	LH	
Propene	B1	B1	4	LH	Propylene
Refrigerant 12	B2	B2	6	RH	
Refrigerant 12B1	B2	B2	6	RH	Bromochlorodifluoromethane
Refrigerant 13B1	B2	B2	6	RH	Bromotrifluoromethane
Refrigerant 14	B2	B2	3	RH	Tetrafluoromethane
Refrigerant 21	B2	B2	6	RH	Dichlorofluoromethane

Table 1 — Outlet connections and preferred materials for use with industrial gases

Gas (see note 1)	Valve body material (see notes 2 to 4)		Outlet connection number (see note 3)	Thread	Synonym
	Steel containers	Aluminium containers			
Refrigerant 22	B2	B2	6	RH	Chlorodifluoromethane
Refrigerant 23	B2	B2	6	RH	Fluroform
Refrigerant 133a	B2	B2	6	RH	2-chloro-1,1,1-trifluoroethane
Refrigerant 114	B2	B2	6	RH	1,2-dichlorotetrafluoroethane
Refrigerant 115	B2	B2	6	RH	Chloropentafluoroethane
Refrigerant 116	B2	B2	6	RH	Hexafluoroethane
Refrigerant 142b	B2	B2	7	LH	1-chloro-1,1-difluoroethane
Refrigerant 152a	B2	B2	7	LH	1,1-difluoroethane
Refrigerant 500	B2	B2	6	RH	73.8 % R12, 26.2 % R152a
Refrigerant 502	B2	B2	6	RH	48.8 % R22, 51.2 % R115
Refrigerant 503	B2	B2	6	RH	40.1 % R23, 59.9 % R13
Silane	B2	B2	3	RH	
Simulated town gas	B2	B2	2	LH	
Sulphur dioxide ^c	B2	B2	10 and 16 ^b	RH	
Sulphur hexafluoride	B2	B2	6	LH	
Town gas ^c	B2	B2	2	LH	
Trimethylamine ^d	CS1		11	RH	
Vinyl chloride	CS1	CS1	7	LH	Chloroethylene
Xenon	B2	B2	3	RH	

NOTE 1 If materials other than the preferred materials listed in Table 1 are used, they have to be compatible with the gas service specified (see 2.1).

NOTE 2 Other gases not listed in Table 1 are used within the UK. These are normally imported in containers having valve outlets applicable to the country of origin (see Annex C and Annex D).

NOTE 3 Figure 5 and Figure 6 detail the dimensions of the recommended outlet connections.

NOTE 4 The material codes referred to in this table are intended to be used for marking on the valve body.

^a Only dry gases (see BS 5045-3) may be put in aluminium containers. The Health and Safety Executive should be consulted with regard to the suitability of such gases being contained in aluminium containers and for the recommended material of construction of the valve body.

^b Intended for use with small capacity containers (see note 1 to 3.4).

^c Toxic gases.

^d Not to be used with aluminium containers, or valves.

Section 2. Material requirements

2.1 General

All materials used in the manufacture of valves, their fittings and their protective coatings shall be compatible with the gas service specified and with the material of construction of the container, as stated by the purchaser [see 1.6.1 f)].

NOTE 1 A list of preferred materials is given in Table 1. Subject to agreement between the manufacturer and purchaser an alternative material or grades of material may be used. The material supplier should provide test certificates showing the mechanical properties.

NOTE 2 In selecting an appropriate material for valve fittings, not only is it important to design for adequate strength and toughness in service but also consideration should be given to other modes of possible metallic failure, such as corrosion, stress corrosion or dezincification.

2.2 Pressure containing components

2.2.1 General

When preferred materials are used, they shall conform to the requirements of 2.2.2 to 2.2.5 as appropriate.

2.2.2 Carbon steels

CS1 carbon steel valve bodies shall be machined from forged carbon steel that has been normalized to grade 070M20 of BS 970-1:1983, except that the sulphur and phosphorus content of the material shall be within the range 0.025 % to 0.050 %

When Charpy V-notch impact tests are carried out in accordance with BS EN 10045-1:1990 on sample CS1 valve bodies selected in accordance with 1.10 of BS 970-1:1983, impact values of not less than 34 J shall be attained.

Sample CS1 valve bodies for macroscopic examination shall be prepared from the full cross section of the top end of the top billet and the bottom end of the bottom billet rolled from each ingot to be used in the manufacture of the valve body. The macrosections shall show the material to be sound and free from laps, large non-metallic inclusions or other harmful defects.

If any of the samples do not comply with the above, a retest shall be carried out in accordance with 1.16 of BS 970-1:1983.

2.2.3 Austenitic stainless steel

ST1 austenitic stainless steel valve bodies shall be machined from austenitic stainless steel conforming to grade 302S31 of BS 970-1:1983, except that the minimum 0.2 % proof stress shall be 196 N/mm² and the hardness value shall be within the range HB 140 to HB 143.

2.2.4 Copper alloys

B1 copper alloys shall be machined from leaded brass conforming to either designation CZ122 or designation CZ128 of BS 2872:1989 and BS 2874:1986. B2 copper alloy valve bodies shall be machined from leaded brass conforming to designation CZ115 of BS 2872:1989 and BS 2874:1986.

Test certificates of the “as supplied” material shall be obtained by the manufacturer to show that it conforms to either BS 2872:1989 or BS 2874:1986.

The copper alloy for dissolved acetylene container valves shall not form dangerous acetylides and the copper content shall not exceed 70 % (*m/m*). The valve manufacturing process shall not employ any process that will result in surface enrichment of copper.

NOTE B2 brass is not recommended for use in cylinders containing liquid carbon dioxide.

2.2.5 Aluminium alloys

Valve bodies shall be machined from either forgings conforming to BS 1472:1972 or extruded bar conforming to BS 1474:1987 or IAA6351 [2]. The lead content of the alloy shall be limited to a maximum of 30 p.p.m. (*m/m*) and the minimum elongation of forgings conforming to BS 1472:1972 shall be 6 % (*m/m*).

2.3 Protective finishes

Protective finishes used shall not adversely affect the valve performance or the materials of construction.

NOTE Suitable recommended protective finishes for copper alloy valves are described in Annex A.

Valves made from aluminium alloy shall be hard anodized in accordance with BS 5599:1978.

Allowance shall be made for the thickness of the protective finish on all machined surfaces and threads (see BS 919 and BS 3382 as applicable).

Section 3. Design

3.1 Design criteria

3.1.1 Valves shall be designed to operate under the extreme conditions of an environment which could cause a pressure rise in the container contents of up to the maximum developed pressure stated by the manufacturer [see 1.6.1 d)] as specified in BS 5355:1976.

3.1.2 Valve bodies shall be capable of withstanding the test pressure of any container to which they are fitted. In the case of valves to be used in containers for permanent gases the minimum test pressure shall be the container test pressure or 300 bar, whichever is the greater.

3.1.3 Materials of construction, including gaskets and seals, shall be compatible with each other, the gas to be contained and the design temperature and pressure range of the valve.

3.1.4 Gland assemblies shall be secured by a method that prevents loosening as a result of vibration or shock during conveyance or use. When a gland assembly is not locked, its security in service shall be satisfactorily demonstrated (see 6.1.1.5).

NOTE The conveyance test described in Annex E is a suitable method of satisfactorily demonstrating security.

3.1.5 Design and manufacture of valves shall be such that they do not leak during transit as a result of vibration or shock (see the conveyance test in Annex E and 6.1.1.5).

3.1.6 It shall not be possible to withdraw the spindle under normal service operating conditions.

3.1.7 When fitted, pressure relief devices shall conform to section 4 of this BS 341.

3.1.8 Dip (or syphon) tubes and any other internal device shall be secured in a manner that will prevent them from becoming loose or detached during transit (see Annex E) and use.

3.1.9 Handwheel or key operating torques shall not exceed those which are compatible with the materials of construction and valve design.

3.1.10 No spanner longer than 150 mm shall be required for manually fitting any item of equipment to a valve outlet.

3.1.11 The valve stem shall be of sufficient strength to withstand the valving torque (see 6.1.1.4 and Annex B).

3.1.12 Manufacturing tolerances of component parts shall be established to enable interchangeability between units of the same design.

3.1.13 All pressure containing parts fitted to the valve body shall be capable of withstanding the hydraulic test pressure (see 6.2.2) specified for the valve.

3.1.14 Diameters of main gas passages in valve stems shall be not larger than the values shown in Table 2.

Table 2 — Maximum diameter of valve stem gas passages

Stem thread size not exceeding:	Maximum diameter of hole through valve body stem	
	For pressures up to 34 bar	For pressures above 34 bar and up to 300 bar
mm	mm	mm
19.00	11.5	9.0
26.00	17.0	14.0
32.00	Not in use	18.0

NOTE In selecting a suitable diameter, consideration should be given to the strength required to withstand the valving torques, to general handling and to the problems resulting from a total fracture of the valve stem.

In the case of vapour/liquid valves with two passages through the stem, the sum of the hole areas shall not exceed 80 % of the area of the hole of maximum diameter for the relevant stem thread size shown in Table 2.

3.1.15 Seats and seals shall be capable of withstanding the effects of such repeated operations as are agreed between the manufacturer and purchaser [see 1.6.1 b)] and the sample test specified in 6.1.1.7.

3.1.16 Where the container does not have valve protection, and where the valve is not to be protected by the provision of a shroud, the valve shall be capable of withstanding an impact test [see 1.6.1 l) and 6.1.1.3].

NOTE BS 5045 specifies when valve protection for a container is necessary.

3.1.17 It shall not be possible for the valve gland nut to be loosened by turning the spindle under normal service operating conditions.

3.1.18 Where connections include a jointing washer, the material shall be compatible with the gas service and shall not creep or flow beyond design limits as agreed between the manufacturer and the purchaser.

3.2 Dimensions

3.2.1 Valve dimensions

The valve dimensions and connector bore diameters shall be determined by the application of the gas, the rate of flow required, the gas service pressure, the required mechanical strength of the connection and any other safety aspects (see note 1). Thread runouts and undercuts shall be in accordance with BS 1936-1:1952 or BS 1936-2:1991.

Dimensions shall be as shown in Figure 5.

NOTE 1 The ability of the connection and valve to withstand all mechanical pressure and thermal stresses under all anticipated service conditions is paramount.

NOTE 2 All valve stems, valve outlets and connections detailed in this BS 341 are compatible with those in the 1962 edition of BS 341-1. Connector shank diameters and nut bores are also interchangeable with existing equipment. The valve spindle details for key operated valves specified in this standard are compatible with those specified in BS 341-1:1962.

NOTE 3 This Part of BS 341 does not give detailed dimensions for the valves, but only those for the inlet and outlet connections that provide for interchangeability of equipment. Unspecified dimensions and machine finishes should be agreed by the purchaser and manufacturer.

Dimensions of valve stems shall conform to **3.3**.

3.2.2 Spindle ends for key operated valves

Spindle ends for key operated valves shall be made square and be either 7 mm or 9.5 mm across flats.

3.3 Valve stems

3.3.1 Tapered stems

Dimensions and manufacturing tolerances of the valve body tapered stem and container neck threads shall be as given in Figure 6.

NOTE 1 Annex F gives cross-references to inlet connections conforming to BS 341-1:1962.

NOTE 2 A is the diameter at the intersection of the cone and the end plane of the stem.

3.3.2 Oversized tapered stems

Where oversized dimensions for valve stem/container neck threads are specified, the datum diameters A, B, E and F given in Figure 6 shall be increased by 1.66 mm.

NOTE There are valves in service manufactured to BS 341:1962. Oversize threads for these valves are in accordance with BS 5430-1:1977.

3.3.3 Parallel stems

Detailed dimensions and manufacturing tolerances of the valve body parallel stem and container neck threads shall be as given in Figure 7.

3.3.4 Seals for parallel threaded stems

An adequate valve seal shall be used for parallel threaded stems.

NOTE 1 The preferred type is the "O"-ring seal.

NOTE 2 In selecting the material for the seal, consideration should be given to its compatibility with the gas service in which it will be used, the pressure to which it will be subjected and the conditions under which it will operate.

Detailed dimensions and manufacturing tolerances of "O"-ring seals shall be as given in Figure 7.

3.4 Valve outlets and connectors

Valve outlets and connectors shall be selected in accordance with Table 1. The dimensions and tolerances shall be in accordance with Figure 5.

NOTE 1 Table 1 lists alternative outlet connections [see footnote 2) to Table 1] that are currently in service for containers with a maximum capacity of 11.5 L. Although these connections are listed for the particular gas with which they are used, they should be taken out of service and replaced with the outlet connections given in Table 1.

NOTE 2 Annex C details outlet connections conforming to CGA Standard V-1-1977 [3]. These connections are used in limited numbers within the UK.

NOTE 3 For refrigerant gases it is established practice to use right-hand threaded valve outlets for non-flammable gas mixtures having flammable components.

The marking of outlet connections shall be in accordance with **7.1**.

Left-handed threads shall be indicated by "V" grooves machined in the nut.

(See outlets 3, 7, 11, 15 and 17 of Figure 5).

Container valves for gases or gas mixtures not listed in Table 1 shall have valve outlets with left hand threads for flammable gases or gas mixtures having a flammable component except for refrigerant gases. Non-flammable gases or gas mixtures without flammable components shall have valve outlets with right-hand threads.

3.5 Tolerances

Tolerances on stem threads, cylinder neck threads, valve outlets and connectors shall be in accordance with the following British Standards.

BS 84:1956 (obsolescent)

BS 308-3:1990

BS 2779:1973

BS 3643:1981

BS 4500-1.1:1991

BS 4500-1.2:1990

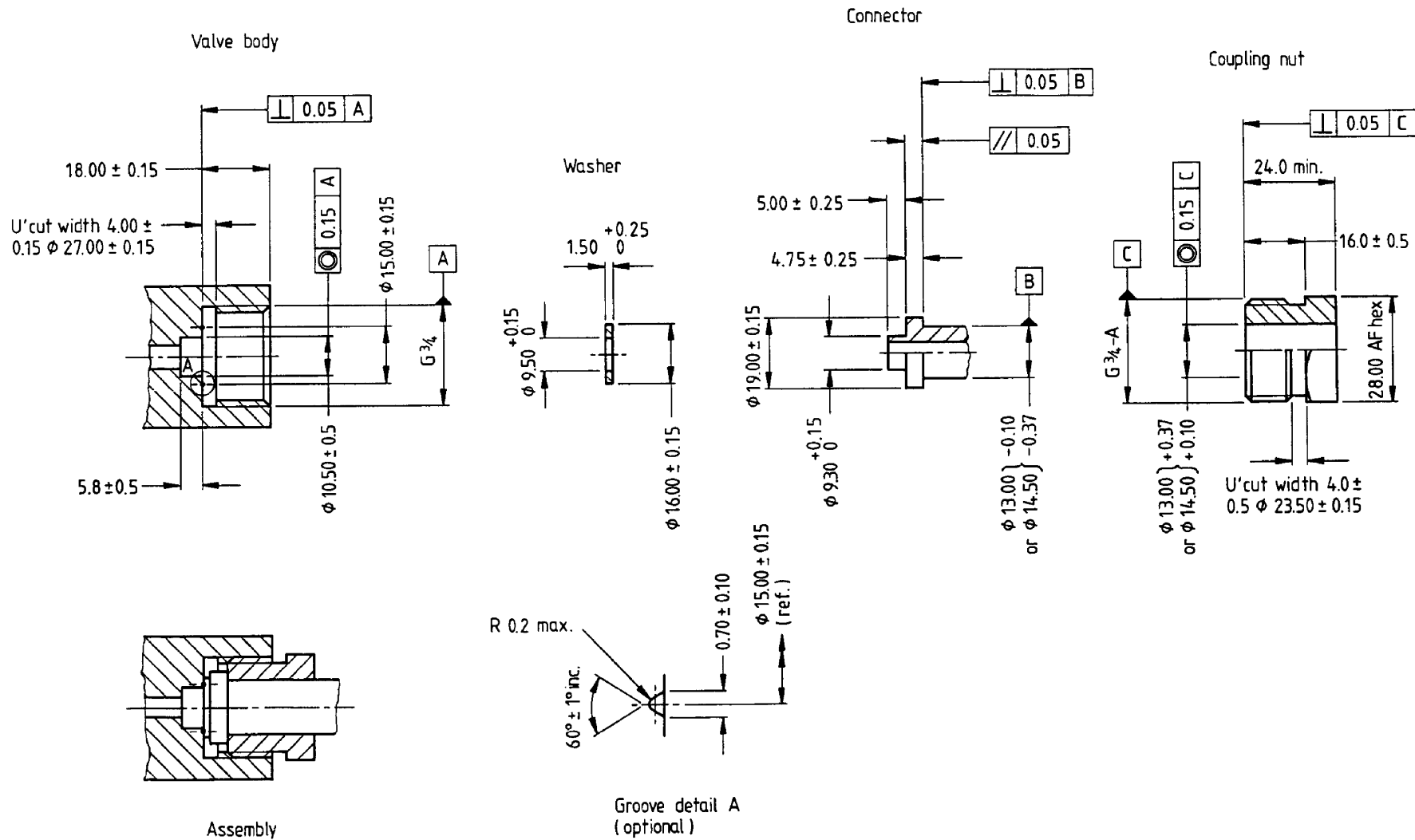
BS 4500-3:1973

BS 4500-4:1985

BS 4500-5:1988

The following conventions shall be adopted where machining tolerances are not specified on outlets 1 to 4, 5 to 8, 10, 11 and 13 to 18 (see Figure 5):

- where there is one digit after the decimal point the tolerance shall be ± 0.50 mm;
- where there are two digits after the decimal point the tolerance shall be ± 0.050 mm.

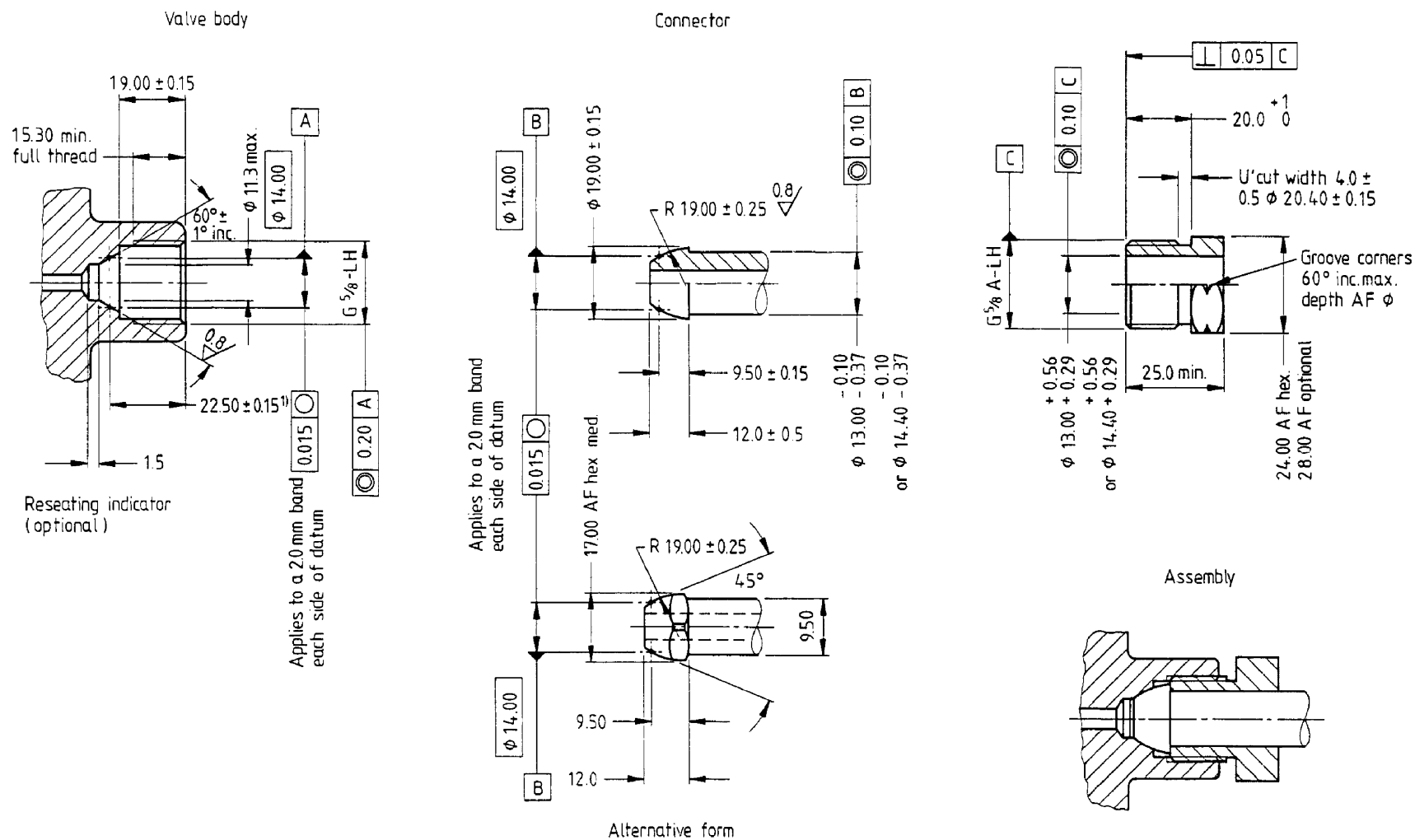


Linear dimensions are in millimetres.

NOTE Fitting thread G 3/4 conforms to BS 2779.

a) Outlet connection number 1

Figure 5 — Dimensions and tolerances of outlet connections



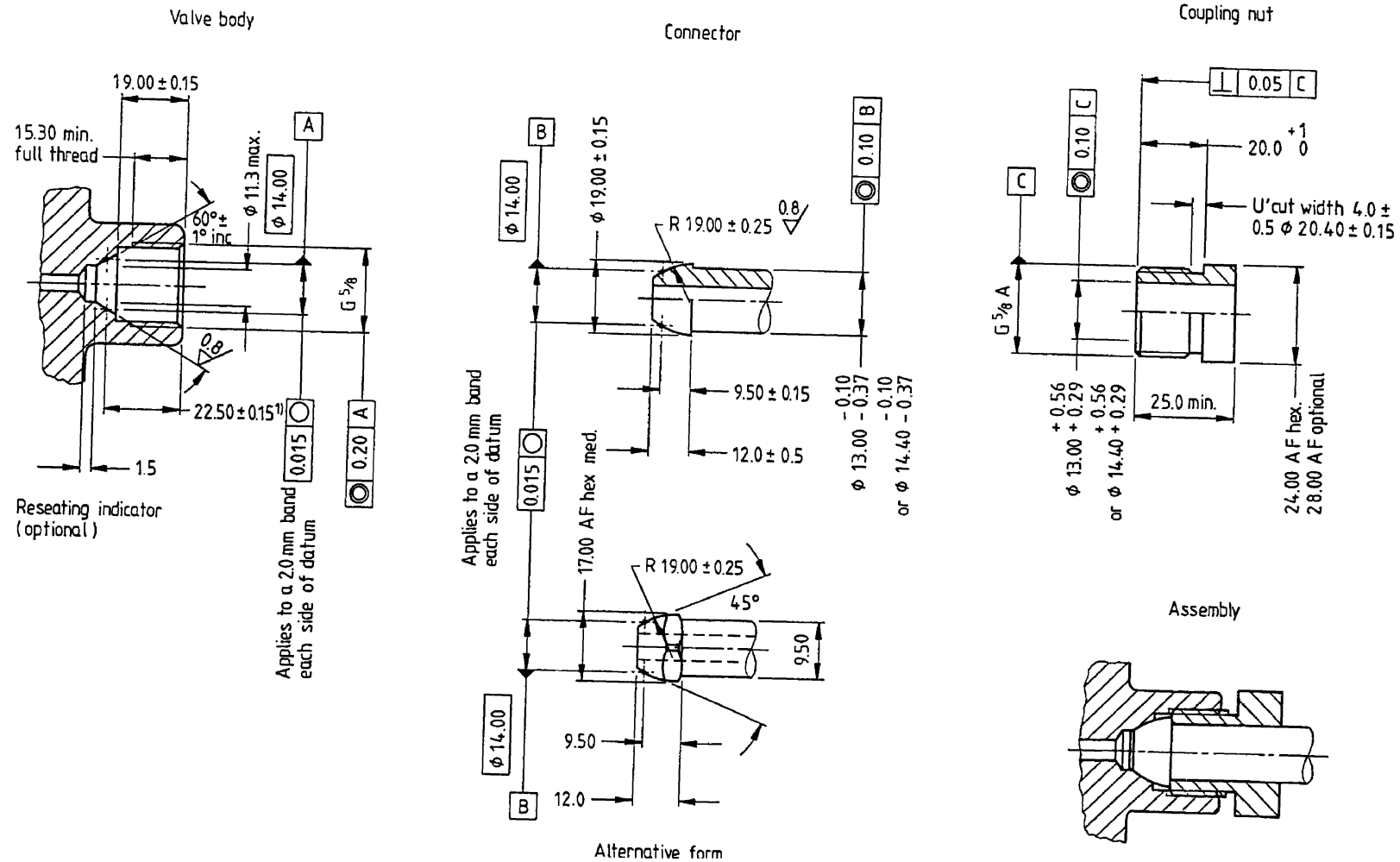
¹⁾ Cone datum dimension may be increased during routine valve servicing as damage occurs for cone sealing face: maximum permissible 23.00.

Linear dimensions are in millimetres.

NOTE Fitting thread G 5/8 conforms to BS 2779.

b) Outlet connection 2 and 4

Figure 5 — Dimensions and tolerances of outlet connections (continued)



¹⁾ Cone datum dimension may be increased during routine valve servicing as damage occurs for cone seating face: maximum permissible 23.00.

Linear dimensions are in millimetres.

NOTE Fitting thread G 5/8 conforms to BS 2779.

c) Outlet connection 3

Figure 5 — Dimensions and tolerances of outlet connections (continued)