British Standard

BRITISH STANDARD

BS 341-3:2002

Transportable gas container valves —

Part 3: Valve outlet connections

ICS 23.060.40

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by Technical Committee PVE/3, Gas containers, to Subcommittee PVE/3/1, Valve fittings for gas cylinders, upon which the following bodies were represented:

British Compressed Gases Association

Department of Health — Medical Devices Agency

Health and Safety Executive

Home Office

L P Gas Association

Ministry of Defence

Personal Safety Manufacturer's Association

Scuba Industries Trade Association Ltd.

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Contents

Foreword

This part of BS 341 has been prepared by Subcommittee PVE/3/1 on behalf of Technical Committee PVE/3 and along with BS EN 849, BS EN ISO 13340 and BS EN ISO 14246 partially supersedes BS 341-1:1991, which is declared obsolescent.

The 1991 version of BS 341-1 detailed all aspects of 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. The 1991 version has been progressively superseded by a series of standards originating in the European Committee for Standardization (CEN) (see Bibliography).

BS 341 *Transportable gas container valves* is published in four parts:

— *Part 1: Specification for industrial valves for working pressures up to and including 300 bar* (obsolescent);

— *Part 2: Valves with taper stems for use with breathing apparatus* (obsolescent);

— *Part 3: Valve outlet connections*;

— *Part 4: Pressure relief devices.*

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 27 and a back cover.

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1 Scope

This part of BS 341 specifies requirements for the selection and dimensions of outlet connections, for valves used with transportable gas cylinders manufactured for the conveyance and storage of permanent, liquefied and dissolved gases for industrial applications.

This part of BS 341 does not include requirements for the selection of valve outlets for liquefied petroleum gas (LPG), medical applications conforming to BS EN 850 or for ultra-high-purity gases used in the micro-electronics industry.

This part of BS 341 applies to outlets for valves limited to a charging pressure of 300 bar[1)] (developed pressures for particular gases might exceed this pressure).

A list of alternative outlets for the less commonly used gases imported into the United Kingdom is given in Annex A.

2 Normative references

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

BS 84:1956, *Specification for parallel screw threads of Whitworth form.*

BS 2779:1986, *Specification for pipe threads for tubes and fittings where pressure-tight joints are not made on the threads (metric dimensions).*

BS 3643-1:1981, *Specification for ISO metric screw threads — Part 1: Principles and basic data.*

BS 3643-2:1981, *ISO metric screw threads — Part 2: Specification for selected limits of size.*

BS 4500-4:1985, *ISO limits and fits — Part 4: Specification for system of cone (taper) fits for cones from C=1:3 to 1:500, lengths from 6 mm to 630 mm and diameters up to 500 mm* (ISO 5166:1982).

BS 4500-5:1988, *ISO limits and fits — Part 5: Specification for system of cone tolerances for conical work pieces from C=1:3 to 1:500 and lengths from 6 mm to 630 mm* (ISO 1947:1973).

BS EN 20286-1:1993, *ISO system of limits and fits — Part 1: Bases of tolerances, deviations and fits* (ISO 286-1:1988).

BS EN 20286-2:1993, *ISO system of limits and fits — Part 2: Tables of standard tolerance grades and limit deviations for holes and shafts* (ISO 286-2:1988).

BS EN 22768-1:1993, *General tolerances — Part 1: Tolerances for linear and angular dimensions without individual tolerance indications* (ISO 2768-1:1989).

BS EN ISO 7083:1995, *Technical drawings — Symbols for geometrical tolerancing — Proportions and dimensions* (BS 308-3.6:1995).

ISO 5145, *Cylinder valve outlets for gases and gas mixtures — Selection and dimensioning.*

DIN 477-1:1990, *Gas cylinder valves rated for test pressures up to 300 bar — Part 1: Types, sizes and outlets.*

1) 1 bar = 10^5 N/m^2 = 100 kPa.

3 Valve outlet connections for pressures up to 250 bar

3.1 Selection of outlets

Valve outlets and connectors for pressures up to 250 bar for transportable gas cylinders shall be selected in accordance with Table 1.

NOTE 1 Table 1 also gives alternative connections (see footnote [a] to Table 1) that are historically in service for containers with a maximum water capacity of 11.5 l. Although these alternative connections are listed for the particular gas with which they are used, the opportunity should be taken to remove them from service and replace them with the primary outlet connections given in Table 1.

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

NOTE 3 Some gases are not used in sufficient quantities to enable a standard outlet connection to be recommended. The gases are normally imported into the UK conveyed in containers having outlets applicable to the country of origin. An outlet connection conforming to a recognized National or International standard is acceptable for UK service, provided that safe provision is made for the user to ensure a sound connection (see Bibliography).

NOTE 4 For refrigerant gases and gas mixtures it is established practice to use right-handed threaded valve outlets for non-flammable gas mixtures having flammable components.

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 flammable components except for refrigerant gases. Non-flammable gases, or gas mixtures without flammable components, shall have valve outlets with right-hand threads.

3.2 Dimensions of outlets

Dimensions of outlets shall be in accordance with Figure 1 to Figure 14 as applicable. Tolerances not determined in Figure 1 to Figure 14 shall be in accordance with Clause **5**.

4 Valve outlet connections for pressures from 250 bar up to 300 bar

4.1 Selection of outlets

Valve outlets and connectors for pressures from 250 bar up to 300 bar for transportable gas cylinders shall be selected in accordance with Table 2.

4.2 Dimensions of outlets

Dimensions of outlets shall be in accordance with Figure 15. Tolerances not determined in Figure 15 shall be in accordance with Clause **5**.

5 Tolerances

Tolerances on valve outlets and connectors which are not determined in Figure 1 to Figure 15 shall be in accordance with the following British Standards as applicable.

BS 84:1956

BS 2779:1986

BS 3643-1:1981

BS 3643-2:1981

BS 4500-4:1985

BS 4500-5:1988

BS EN 20286-1:1993

BS EN 20286-2:1993

BS EN 22768-1:1993

BS EN ISO 7083:1995

The following conventions shall be adopted where machining tolerances are not specified on outlets 1 to 4, 6 to 8, 10, 11 and 13 to 18 (see Figure 1 to Figure 14).

a) Where there is one digit after the decimal point the tolerance shall be ±0.50 mm.

b) Where there are two digits after the decimal point the tolerance shall be ±0.050 mm.

Table 1 — Outlet connections for use with gases up to pressures of 250 bar

Gas (see Note 1)	**Outlet connection number** (see Notes 2 and 3)
Acetylene	2, 4, 18[a]
Air (R729)	3
Allene	4, 15[a]
Allylene: See Methylacetylene	
Ammonia (R717)	10
Argon	3
Arsine	4 (or 1 from DIN 477-1:1990)
Boron chloride: See Boron trichloride	
Boron fluoride: See Boron trifluoride	
Boron trichloride	6 (or 8 from DIN 477-1:1990)
Boron trifluoride	6 (or 8 from DIN 477-1:1990)
Bromine pentafluoride	6 (or 8 from DIN 477-1:1990)
Bromine trifluoride	6 (or 8 from DIN 477-1:1990)
Bromochlorodifluoromethane (R12B1)	6
Bromochloromethane	6
Bromoethylene: See Vinyl bromide	
Bromomethane: See Methyl bromide	
Bromotrifluoromethane (R13B1)	6
1,3-Butadiene	4, 15[a]
Butane (R600)	4
1-Butene	4
2-Butene	4
α-Butylene: See 1-Butene	
β-Butylene: See 2-Butene	
1-Butyne: See Ethylacetylene	
Carbon dioxide (R744)	8
Carbon monoxide	4
Carbon oxysulfide: See Carbonyl sulfide	
Carbon tetrafluoride: See Tetrafluoromethane	
Carbonyl chloride: See Phosgene	
Carbonyl fluoride	14
Carbonyl sulfide	15
Chlorine	6, 14[a]
Chlorine pentafluoride	6, 14 (or 8 from DIN 477-1:1990)
Chlorine trifluoride	6, 14 (or 8 from DIN 477-1:1990)
1-Chloro-1,1-difluoroethane (R142b)	7
Chlorodifluoromethane (R22)	6
Chloroethane: See Ethyl chloride	
Chloroethylene: See Vinyl chloride	
Chlorofluoromethane (R31)	4 or 7

Table 1 — Outlet connections for use with gases up to pressures of 250 bar *(continued)*

Gas (see Note 1)	Outlet connection number (see Notes 2 and 3)
Chloroheptafluorocyclobutane (RC317)	6
Chloromethane: See Methyl chloride	
Chloropentafluoroethane (R115)	6
1-Chloro-1,2,2,2-tetrafluoroethane (R124)	6
1-Chloro-2,2,2-trifluoroethane (R133a)	6
Chlorotrifluoroethylene (R1113)	6
Chlorotrifluoromethane (R13)	6
Cyanogen	4
Cyanogen chloride	6
Cyclobutane	4
Cyclopropane	4
Deuterium	4
Deuterium chloride	6 (or 8 from DIN 477-1:1990)
Deuterium fluoride	6 (or 8 from DIN 477-1:1990)
Deuterium selenide	4 (or 1 from DIN 477-1:1990)
Deuterium sulfide	15
Diborane	4 (or 1 from DIN 477-1:1990)
Dibromodifluoroethane	6
Dibromodifluoromethane (R12B2)	6
1,2-Dibromotetrafluoroethane (R114B2)	6
1,2-Dichlorodifluoroethylene	6
Dichlorodifluoromethane (R12)	6
1,2-Dichloroethylene (R1130)	4
Dichlorofluoromethane (R21)	6
1,2-Dichlorohexafluorocyclobutane (RC316)	6
Dichlorosilane	15 (or 5 from DIN 477-1:1990)
1,1-Dichlorotetrafluoroethane (R114a)	6
1,2-Dichlorotetrafluoroethane (R114)	6
2,2-Dichloro-1,1,1-trifluoroethane (R123)	6
Dicyane: See Cyanogen	
Difluorodibromoethane: See Dibromodifluoroethane	
Difluorodibromomethane: See Dibromodifluoromethane	
1,1-Difluoroethane (R152a)	7
Dimethylamine	11
Dimethyl ether	4
2,2-Dimethylpropane	4
Dinitrogen oxide: See Nitrous oxide	
Dinitrogen tetroxide: See Nitrogen dioxide	
Diphosgene	6, 14 (or 8 from DIN 477-1:1990)
Disilane	4 (or 1 from DIN 477-1:1990)

Table 1 — Outlet connections for use with gases up to pressures of 250 bar *(continued)*

Gas (see Note 1)	**Outlet connection number** (see Notes 2 and 3)
Epoxyethane: See Ethylene oxide	
Ethane (R170)	4
Ethene: See Ethylene	
Ethylacetylene	4
Ethylamine: See Monoethylamine	
Ethyl chloride (R160)	7, 17
Ethylene (R1150)	4
Ethylene dichloride: See 1,2-Dichloroethylene	
Ethylene oxide	7, 15[a]
Ethyl ether	4
Ethyl fluoride	7
Ethylidene fluoride: See 1,1-Difluoroethane	
Ethyl methyl ether: See Methyl ethyl ether	
Ethyne: See Acetylene	
Fluorine	6, 14 (or 8 from DIN 477-1:1990)
Fluoroethylene: See Vinyl fluoride	
Fluoroform (R23)	6
Fluoromethane: See Methyl fluoride	
Germane	4 (or 1 from DIN 477-1:1990)
Germanium tetrafluoride	6, 14 (or 8 from DIN 477-1:1990)
Helium	3
Hexafluoroethane (R116)	3 (or 6 from DIN 477-1:1990)
Hydriodic acid, anhydrous: See Hydrogen iodide	
Hydrobromic acid, anhydrous: See Hydrogen bromide	
Hydrochloric acid, anhydrous: See Hydrogen chloride	
Hydrocyanic acid, anhydrous: See Hydrogen cyanide	
Hydrofluoric acid, anhydrous: See Hydrogen fluoride	
Hydrogen	4
Hydrogen bromide	6, 14 (or 8 from DIN 477-1:1990)
Hydrogen chloride	6, 14[a] (or 8 from DIN 477-1:1990)
Hydrogen cyanide	15
Hydrogen fluoride	6 (or 8 from DIN 477-1:1990)
Hydrogen iodide	6, 14 (or 8 from DIN 477-1:1990)
Hydrogen selenide	15 (or 1 from DIN 477-1:1990)
Hydrogen sulfide	15
Iodine pentafluoride	6, 14 (or 8 from DIN 477-1:1990)
Isoamylene: See 3-Methyl-1-butene	
Isobutane (R601)	4
Isobutene: See Isobutylene	
Isobutylene	4

Table 1 — Outlet connections for use with gases up to pressures of 250 bar *(continued)*

Gas (see Note 1)	Outlet connection number (see Notes 2 and 3)
Isopropylethylene: See 3-Methyl-1-butene	
Krypton	3
Methane (R50)	4
Methanethiol: See Methyl mercaptan	
Methoxyethylene: See Vinyl methyl ether	
Methylacetylene	4
Methylamine: See Monomethylamine	
Methyl bromide	7[a]
3-Methyl-1-butene	4
Methyl chloride (R40)	7, 17[a]
Methyl ether: See Dimethyl ether	
Methyl ethyl ether	4
Methyl fluoride (R41)	4
Methyl iodide	7
Methyl mercaptan	7
2-Methylpropene: See Isobutylene	
Methyl vinyl ether: See Vinyl methyl ether	
Monochlorodifluoromethane: See Chlorodifluoromethane	
Monochloropentafluoroethane: See Chloropentafluoroethane	
Monochlorotetrafluoroethane: See 1-Chloro-1,2,2,2-tetrafluoroethane	
Monochlorotrifluoromethane: See Chlorotrifluoromethane	
Monoethylamine (R631)	11
Monomethylamine (R630)	11
Natural gas	4
Neon	3
Neopentane: See 2, 2-Dimethylpropane	
Nickel carbonyl	15
Nickel tetracarbonyl: See Nickel carbonyl	
Nitric oxide	14
Nitrogen	3
Nitrogen dioxide	14 (or 8 from DIN 477-1:1990)
Nitrogen peroxide: See Nitrogen dioxide	
Nitrogen tetroxide: See Nitrogen dioxide	
Nitrogen trifluoride	14 (or 8 from DIN 477-1:1990)
Nitrous oxide (R744a)	13
Octafluoropropane (R218)	6
Oxirane: See Ethylene oxide	
Oxygen	3
Pentachlorofluoroethane	6
Pentafluoroethane (R125)	6

Table 1 — Outlet connections for use with gases up to pressures of 250 bar *(continued)*

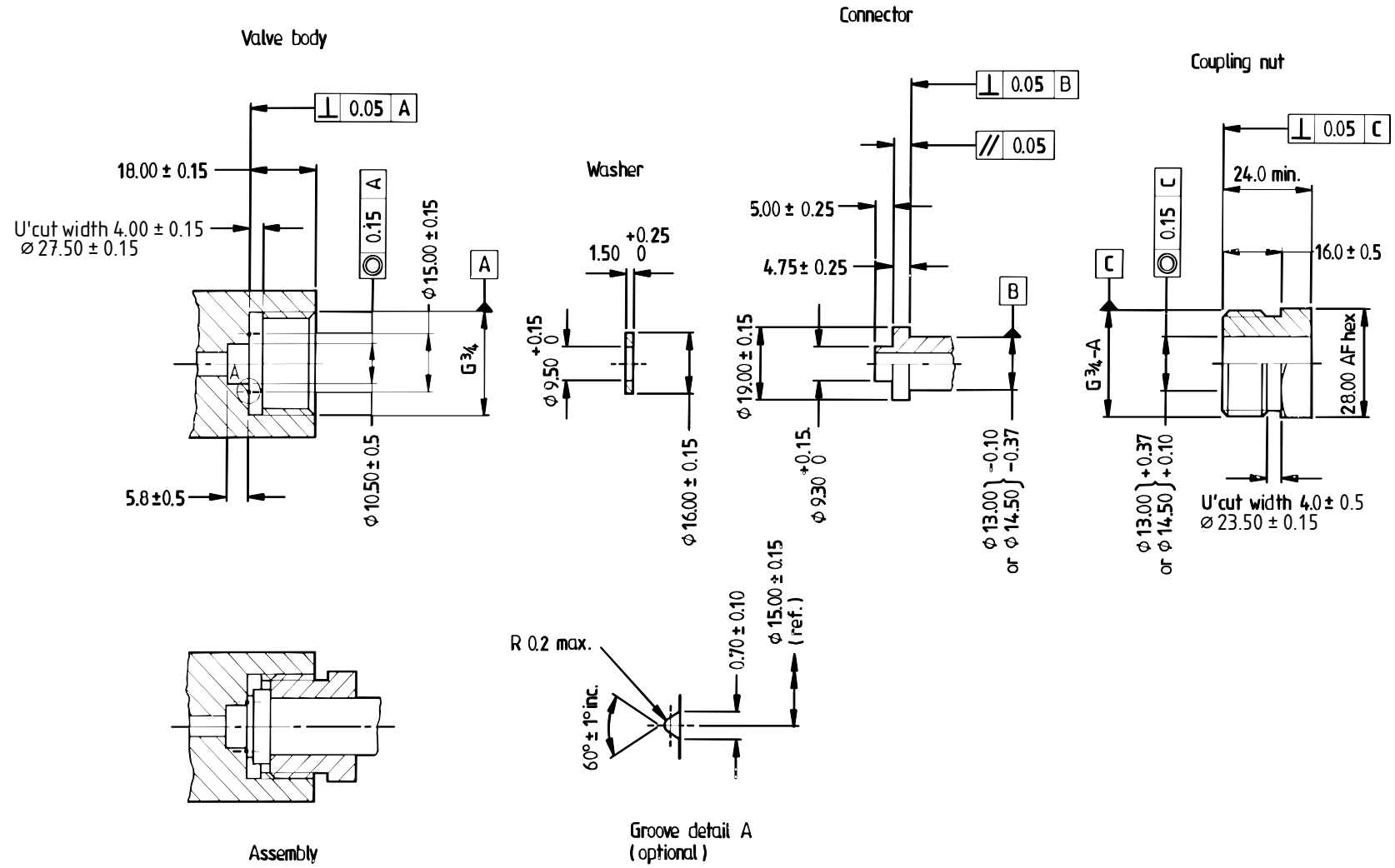
Gas (see Note 1)	Outlet connection number (see Notes 2 and 3)
Perfluorobutane	6
Perfluoro-2-butene	6
Perfluorocyclobutane: See Octafluorocyclobutane	
Perfluoroethane: See Hexafluoroethane	
Perfluoropropane: See Octafluoropropane	
Phosgene	6, 14[a] (or 8 from DIN 477-1:1990)
Phosphine	4 (or 1 from DIN 477-1:1990)
Phosphorous pentafluoride	6 (or 8 from DIN 477-1:1990)
Phosphorous trifluoride	6 (or 8 from DIN 477-1:1990)
Propadiene: See Allene	
Propane (R290)	4
Propene: See Propylene	
Propylene (R1270)	4
Propyne: See Methylacetylene	
Silane	4 (or 1 from DIN 477-1:1990)
Silicon tetrachloride	14
Silicon tetrafluoride	6, 14 (or 8 from DIN 477-1:1990)
Silicon tetrahydride: See Silane	
Stibine	4 (or 1 from DIN 477-1:1990)
Sulfur dioxide (R764)	10, 16
Sulfur hexafluoride	6[a]
Sulfur tetrafluoride	6 (or 8 from DIN 477-1:1990)
Sulfuryl fluoride	6 (or 8 from DIN 477-1:1990)
1,1,1,2-Tetrachlorodifluoroethane (R112a)	6
1,1,2,2-Tetrachlorodifluoroethane (R112)	6
1,1,2,2-Tetrafluoro-1-chloroethane	6
1,1,1,2-Tetrafluoroethane (R134a)	6
Tetrafluoroethylene (R1114)	6
Tetrafluorohydrazine	14
Tetrafluoromethane (R14)	3
Tetrafluorosilane: See Silicon tetrafluoride	
Tetramethylmethane: See 2,2-Dimethylpropane	
Trichlorofluoromethane (R11)	6
Trichloromonofluoromethane: See Trichlorofluoromethane	
Trichlorosilane	15 (or 5 from DIN 477-1:1990)
1,1,2-Trichlorotrifluoroethane (R113)	6
Trifluorobromomethane: See Bromotrifluoromethane	
Trifluorochloroethylene: See Chlorotrifluoroethylene	
1,1,1-Trifluoroethane (R143a)	4
Trifluoroethylene	4

Table 1 — Outlet connections for use with gases up to pressures of 250 bar *(concluded)*

Gas (see Note 1)	Outlet connection number (see Notes 2 and 3)
Trifluoromethane: See Fluoroform	
Trifluoromethyl chloride: See Chlorotrifluoromethane	
Trimethylamine	11
Trimethylene: See Cyclopropane	
Trimethylmethane: See Isobutane	
Vinyl bromide	7
Vinyl chloride (R1140)	7
Vinyl fluoride (R1141)	7
Vinylidene fluoride: See 1,1-Difluoroethylene	
Vinyl methyl ether	4
Xenon	3
NOTE 1 Other gases not listed in Table 1 are used within the UK. These are normally imported in containers having valve outlets conforming to CGA Standard V-1 [1] (see Annex A). NOTE 2 Figure 1 to Figure 14 detail the dimensions of the recommended outlet connections. NOTE 3 Except for a few applications, the number 2 outlet has largely been replaced by the number 4 outlet.	
[a] Intended for use with small capacity containers (see Note 1 to **3.1**).	

Table 2 — Outlet connections for use with gases for pressures from 250 bar up to 300 bar

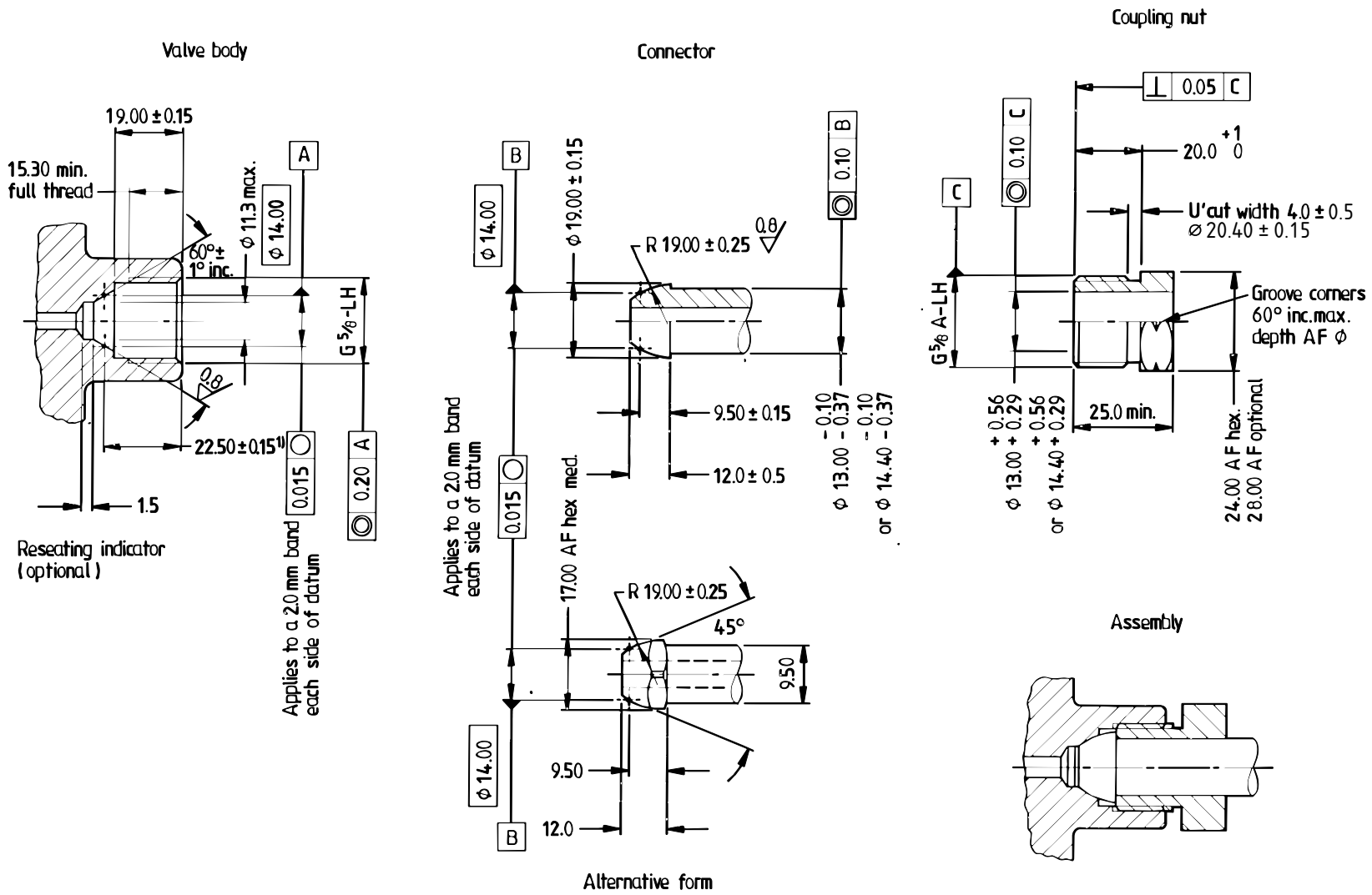
Gas	Outlet connection number	Thread[a]
Oxidizing gases and mixtures (including oxygen)	32	RH
Inert gases and mixtures	30	RH
Flammable gases and mixtures	38	LH
Air and synthetic air	31	RH
NOTE 1 These outlet connections and their numbers are identical to the "New European Valve Outlet Connection" system (referred to as NEVOC), as developed by the European Industrial Gases Association (EIGA) and as detailed in ISO 5145. NOTE 2 Figure 15 details the dimensions of the recommended outlet connections.		
[a] LH = Left hand and RH = Right hand.		



All linear dimensions are in millimetres

NOTE Fitting thread G¾ conforms to BS 2779.

Figure 1 — Dimensions and tolerances of outlet connections for pressures up to 250 bar — Outlet connection number 1



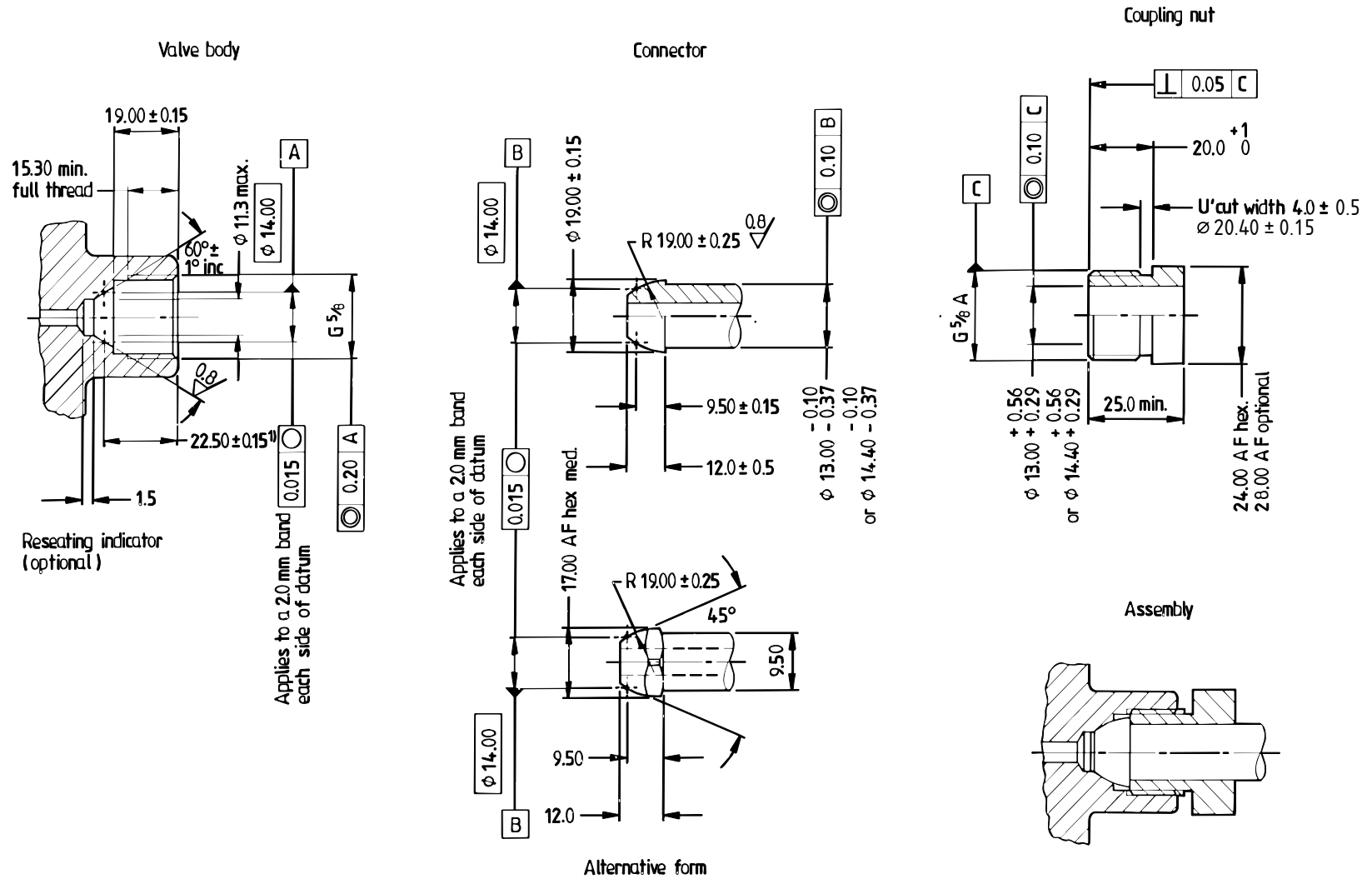
All linear dimensions are in millimetres

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

NOTE 1 Fitting thread G ⅝ conforms to BS 2779.

NOTE 2 These two connections are mechanically identical but outlet connection 2 historically had a hexagonal boss on the valve, which is now optional.

Figure 2 — Dimensions and tolerances of outlet connections for pressures up to 250 bar — Outlet connections 2 and 4

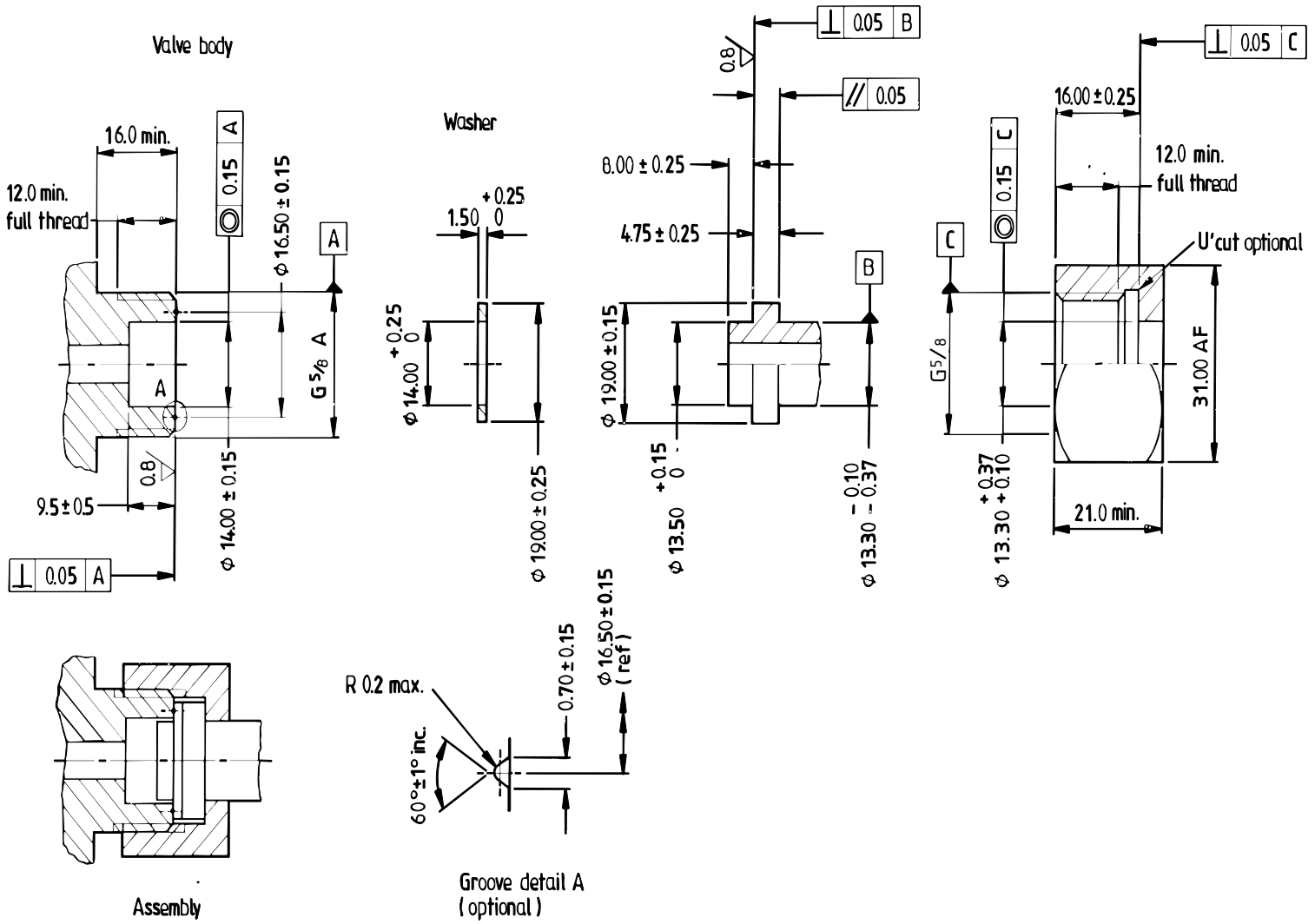


All linear dimensions are in millimetres

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

NOTE Fitting thread G ⅝ conforms to BS 2779.

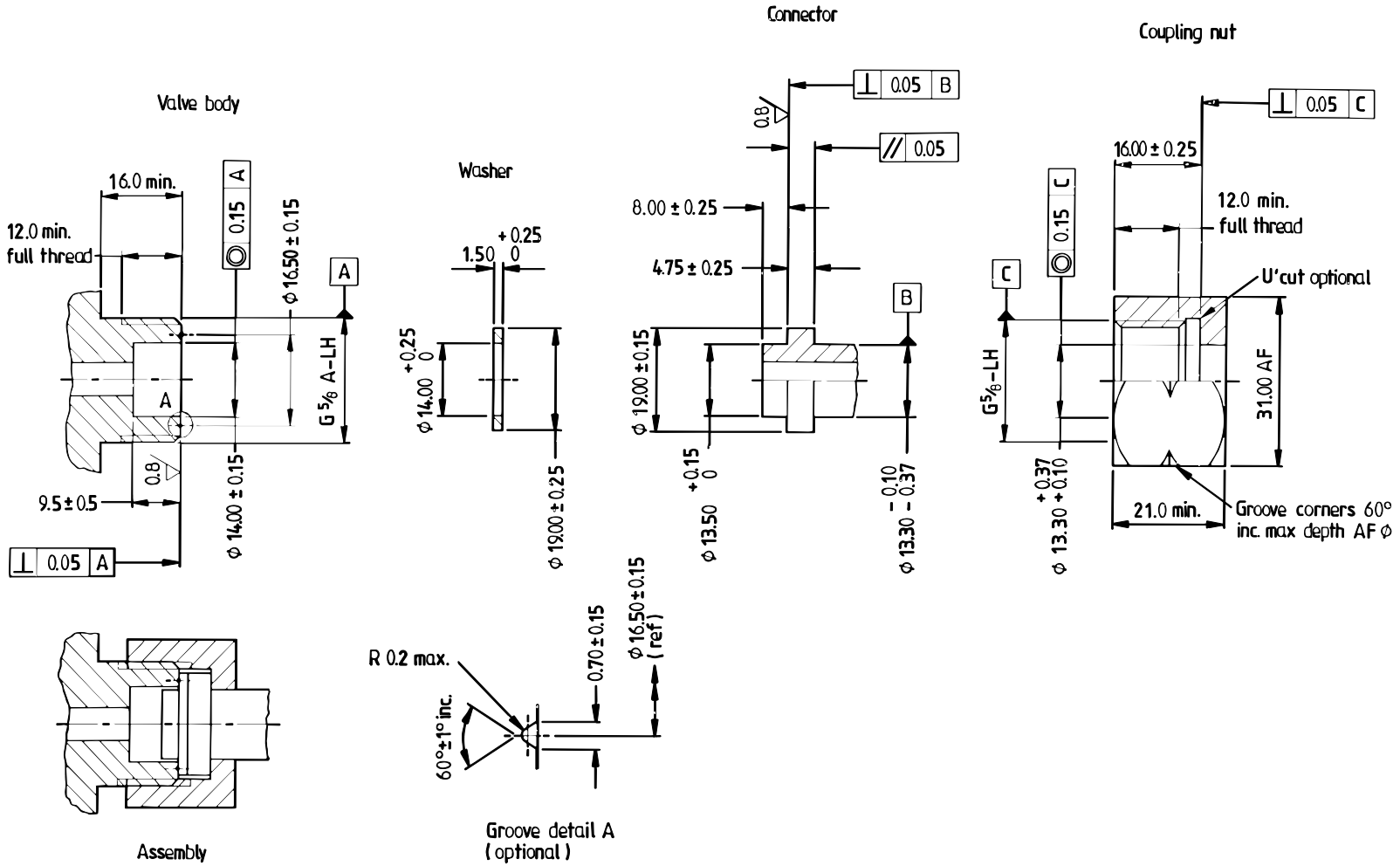
Figure 3 — Dimensions and tolerances of outlet connections for pressures up to 250 bar — Outlet connection 3



All linear dimensions are in millimetres

NOTE Fitting thread G ⅝ conforms to BS 2779.

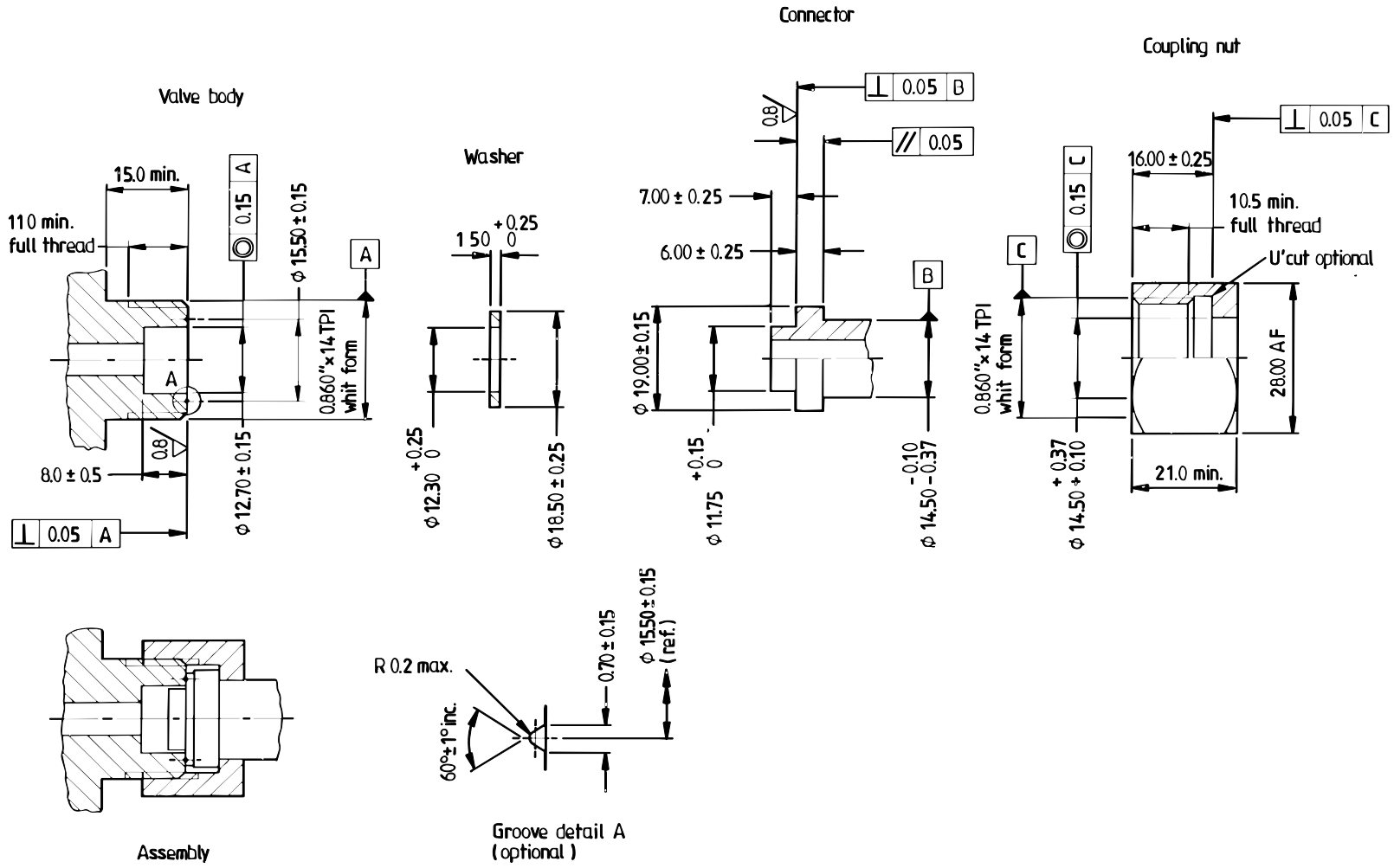
Figure 4 — Dimensions and tolerances of outlet connections for pressures up to 250 bar — Outlet connection 6



All linear dimensions are in millimetres

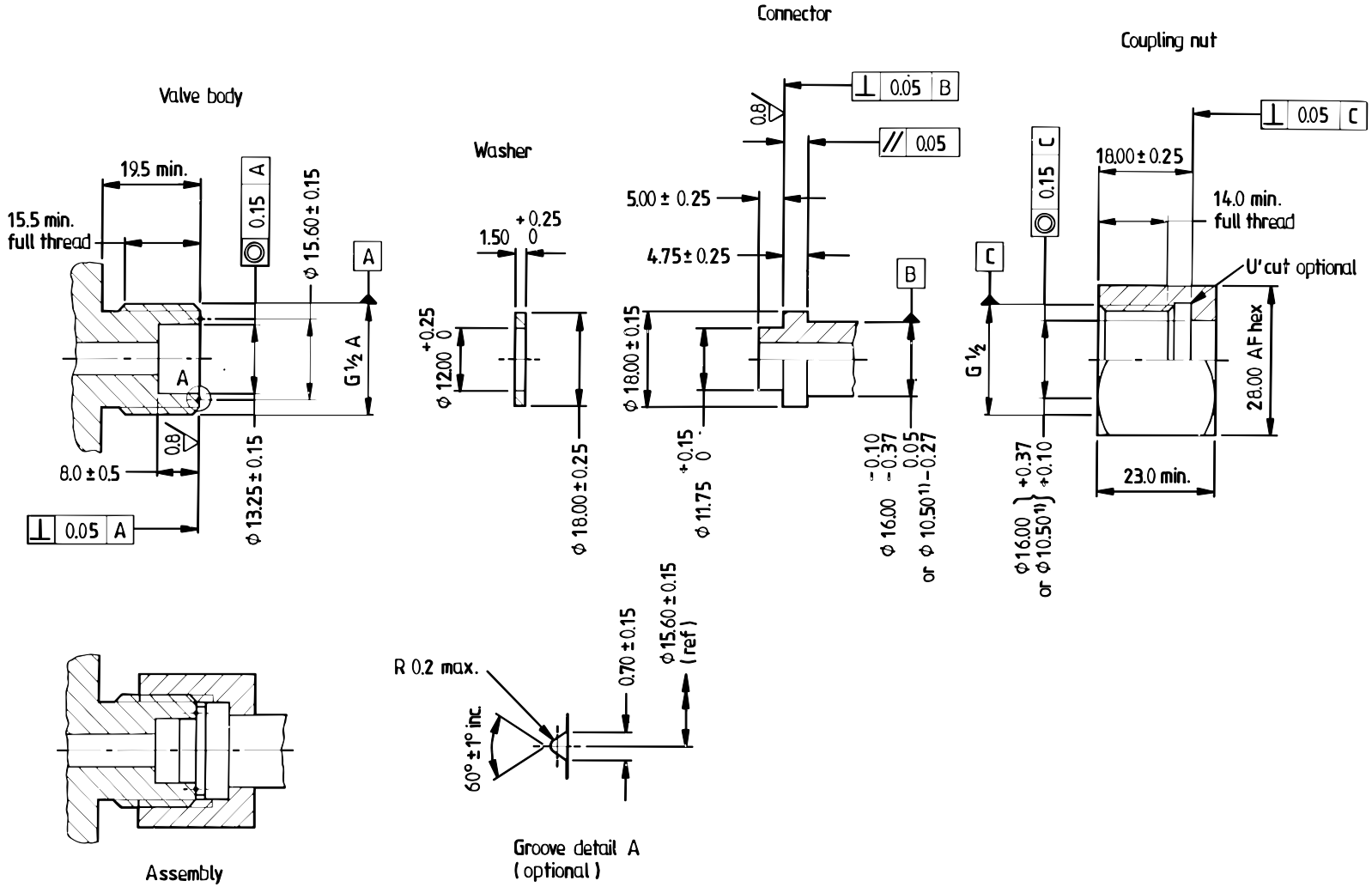
NOTE Fitting thread G ⅝ conforms to BS 2779.

Figure 5 — Dimensions and tolerances of outlet connections for pressures up to 250 bar — Outlet connection 7



All linear dimensions are in millimetres

Figure 6 — Dimensions and tolerances of outlet connections for pressures up to 250 bar — Outlet connection 8

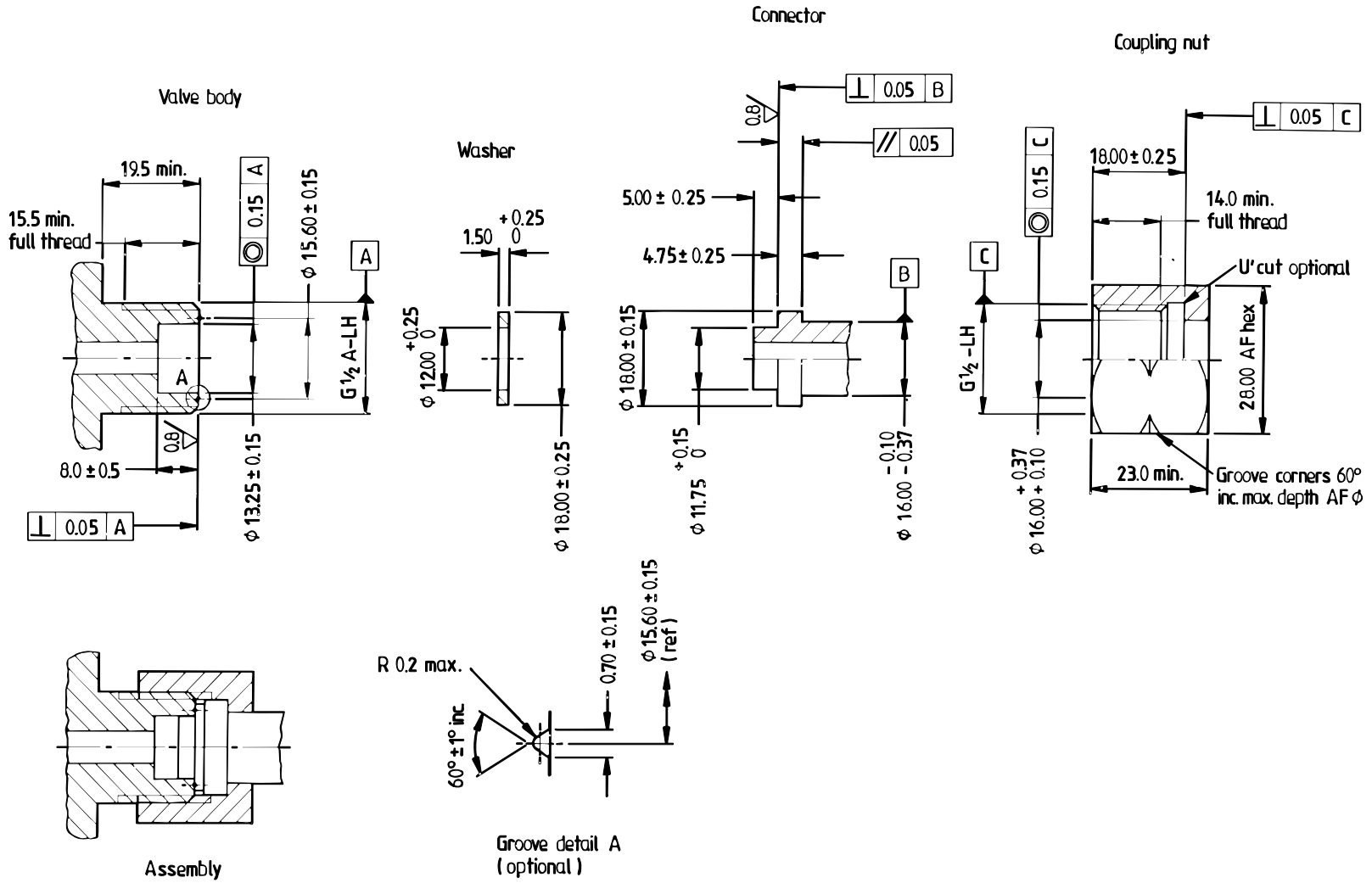


All linear dimensions are in millimetres

[1] ø10.50 replaces connection no. 12 in BS 341-1:1962.

NOTE Fitting thread G ½ conforms to BS 2779.

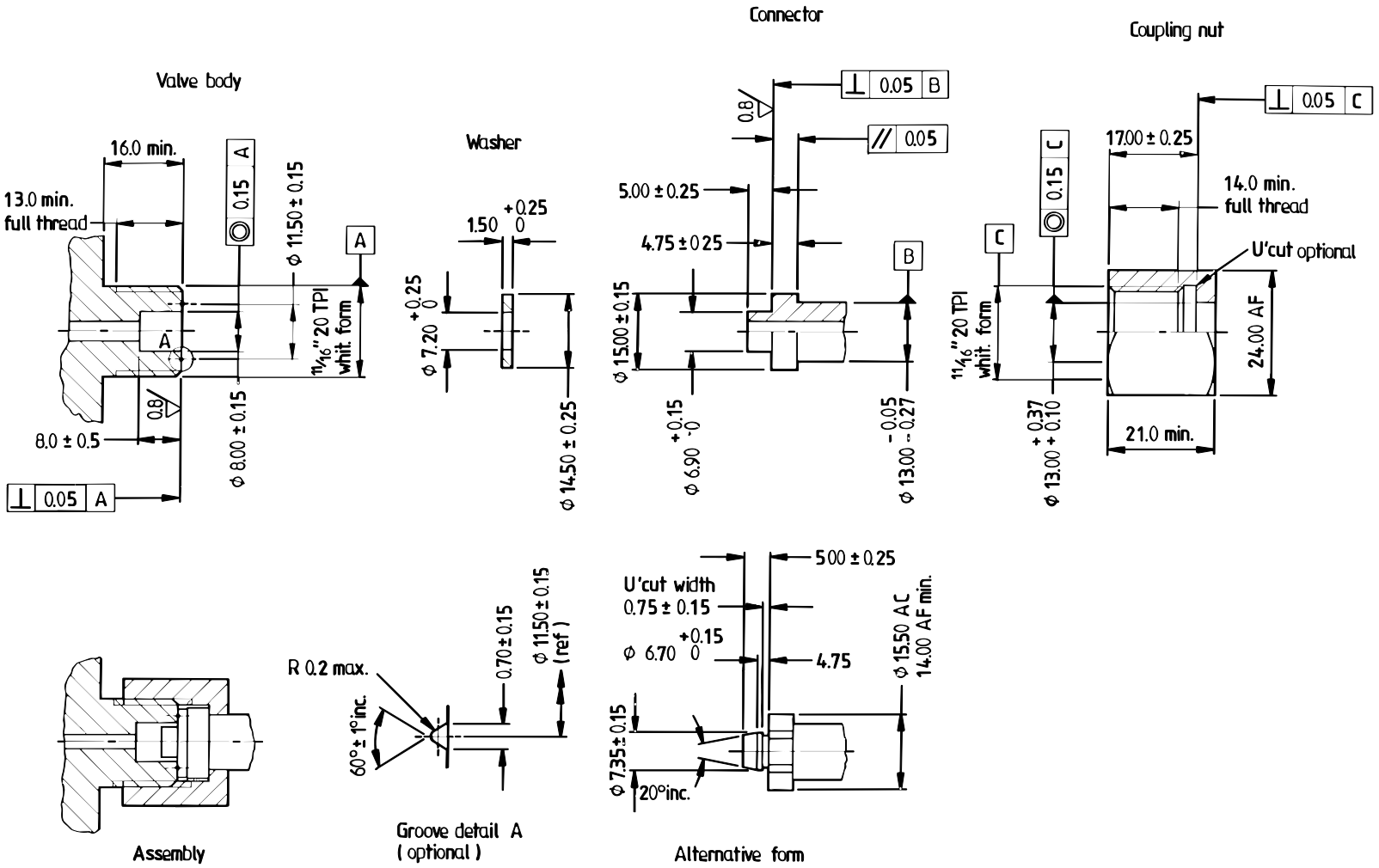
Figure 7 — Dimensions and tolerances of outlet connections for pressures up to 250 bar — Outlet connection 10



All linear dimensions are in millimetres

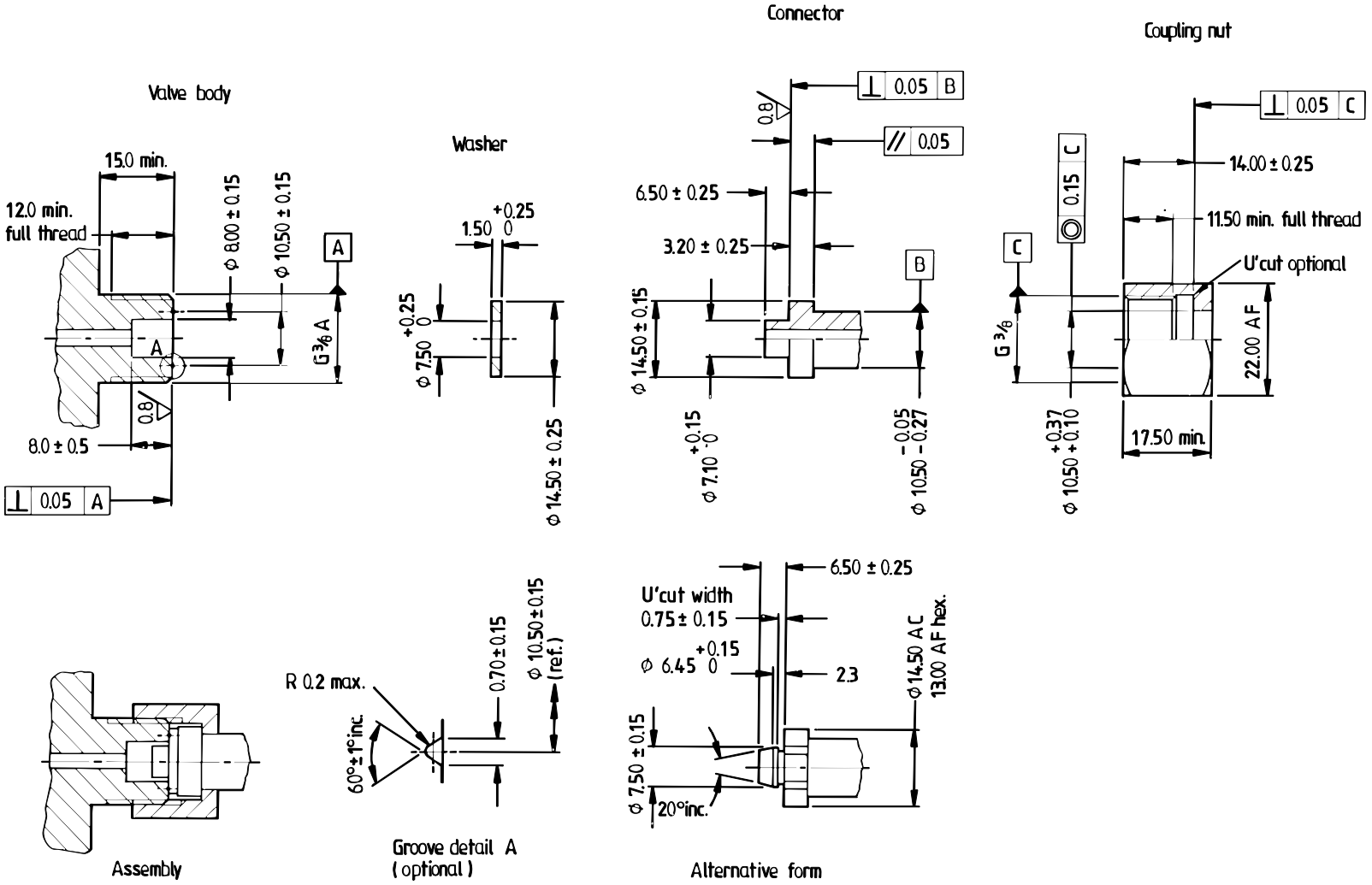
NOTE Fitting thread G ½ conforms to BS 2779.

Figure 8 — Dimensions and tolerances of outlet connections for pressures up to 250 bar — Outlet connection 11



All linear dimensions are in millimetres

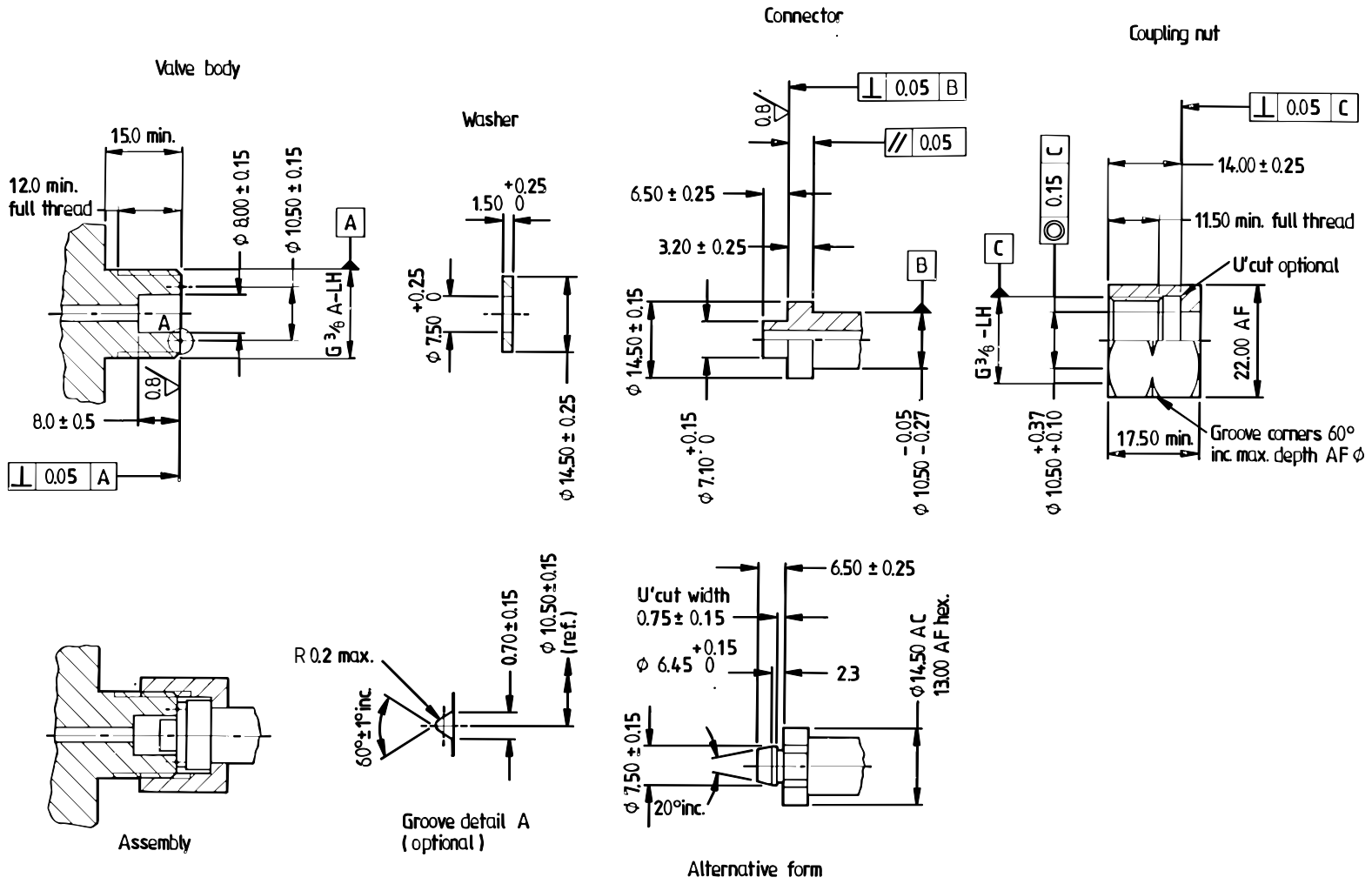
Figure 9 — Dimensions and tolerances of outlet connections for pressures up to 250 bar — Outlet connection 13



All linear dimensions are in millimetres

NOTE Fitting thread G ⅜ conforms to BS 2779.

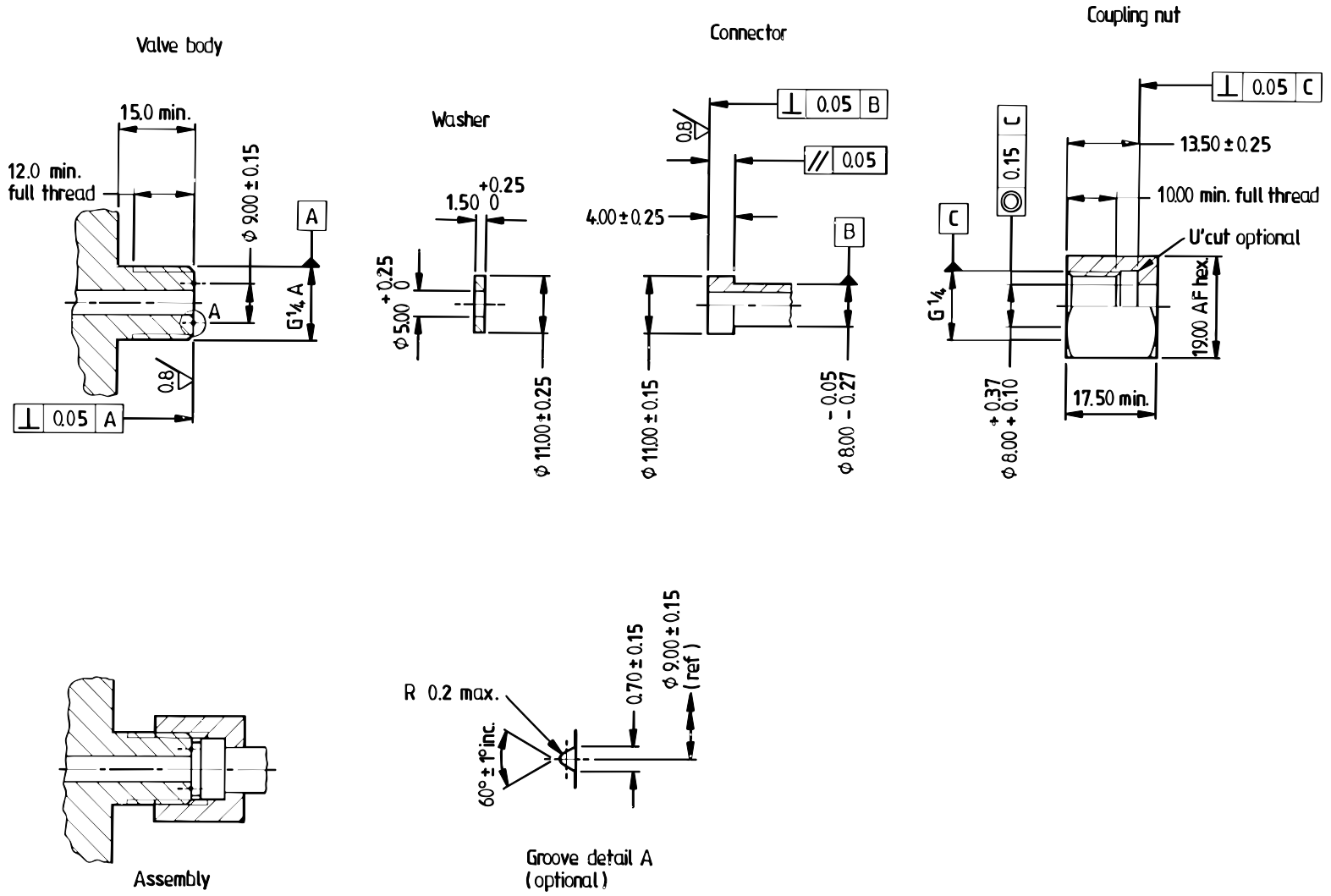
Figure 10 — Dimensions and tolerances of outlet connections for pressures up to 250 bar — Outlet connection 14



All linear dimensions are in millimetres

NOTE Fitting thread G ⅜ conforms to BS 2779.

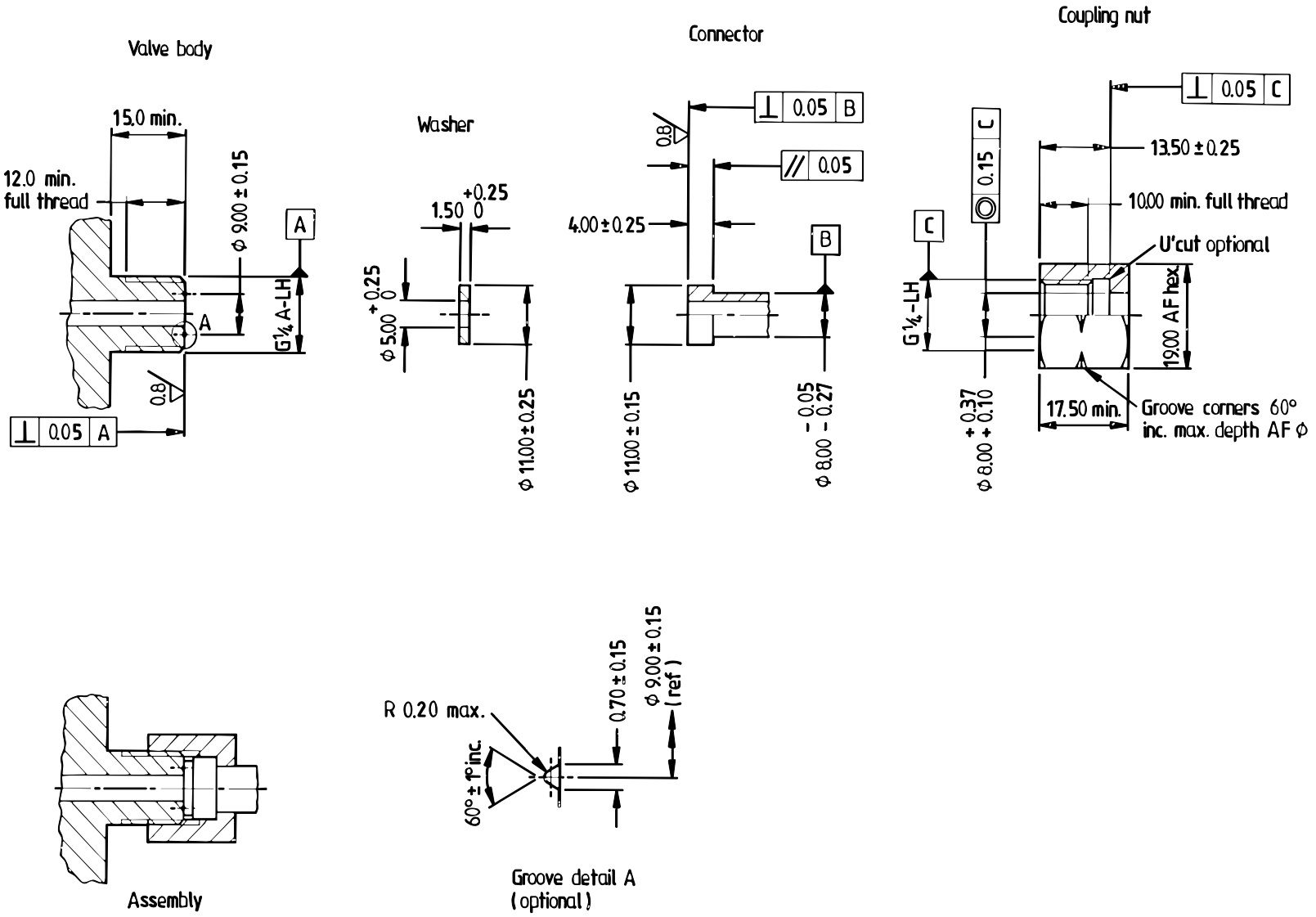
Figure 11 — Dimensions and tolerances of outlet connections for pressures up to 250 bar — Outlet connection 15



All linear dimensions are in millimetres

NOTE Fitting thread G ¼ conforms to BS 2779.

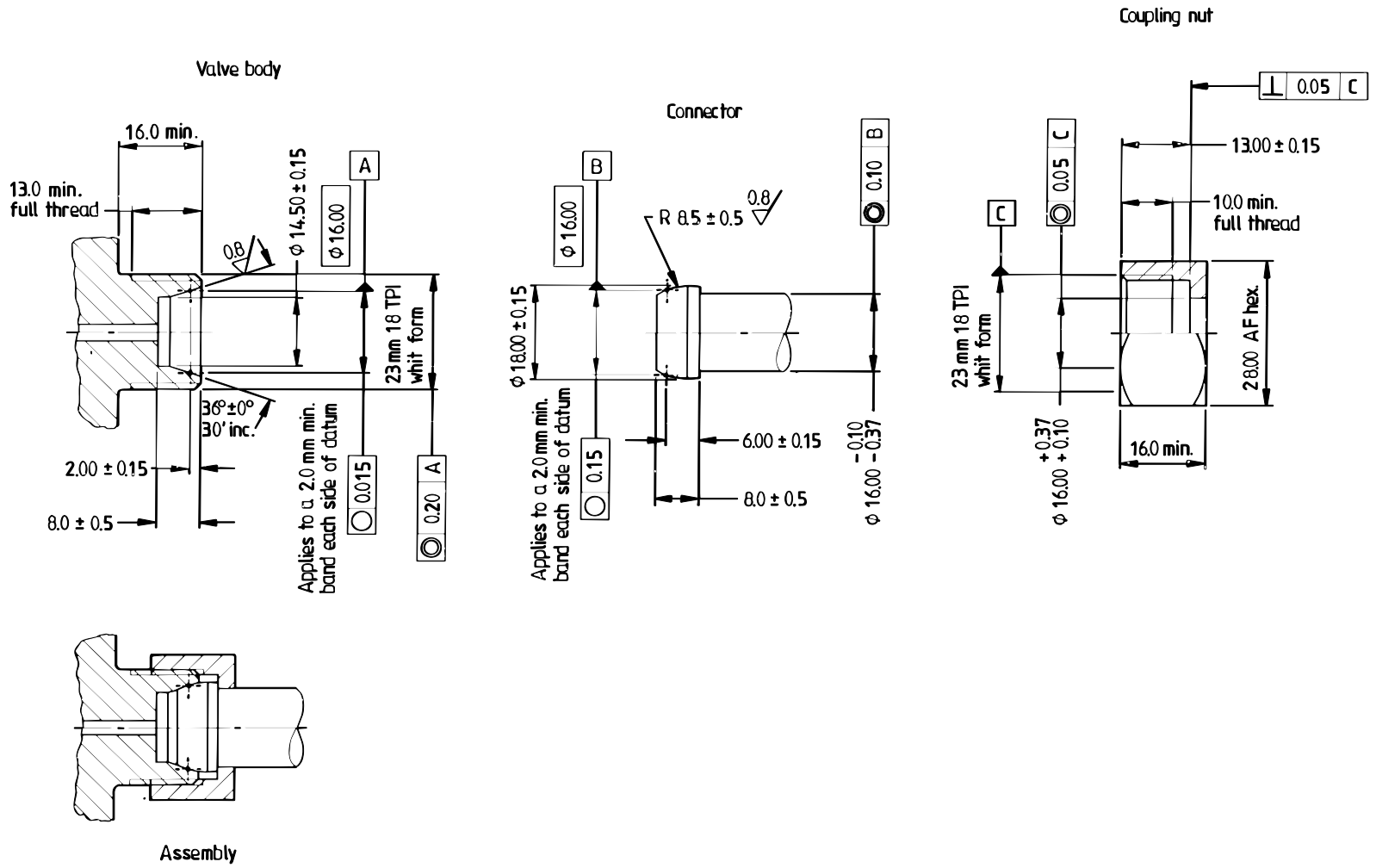
Figure 12 — Dimensions and tolerances of outlet connections for pressures up to 250 bar — Outlet connection 16



All linear dimensions are in millimetres

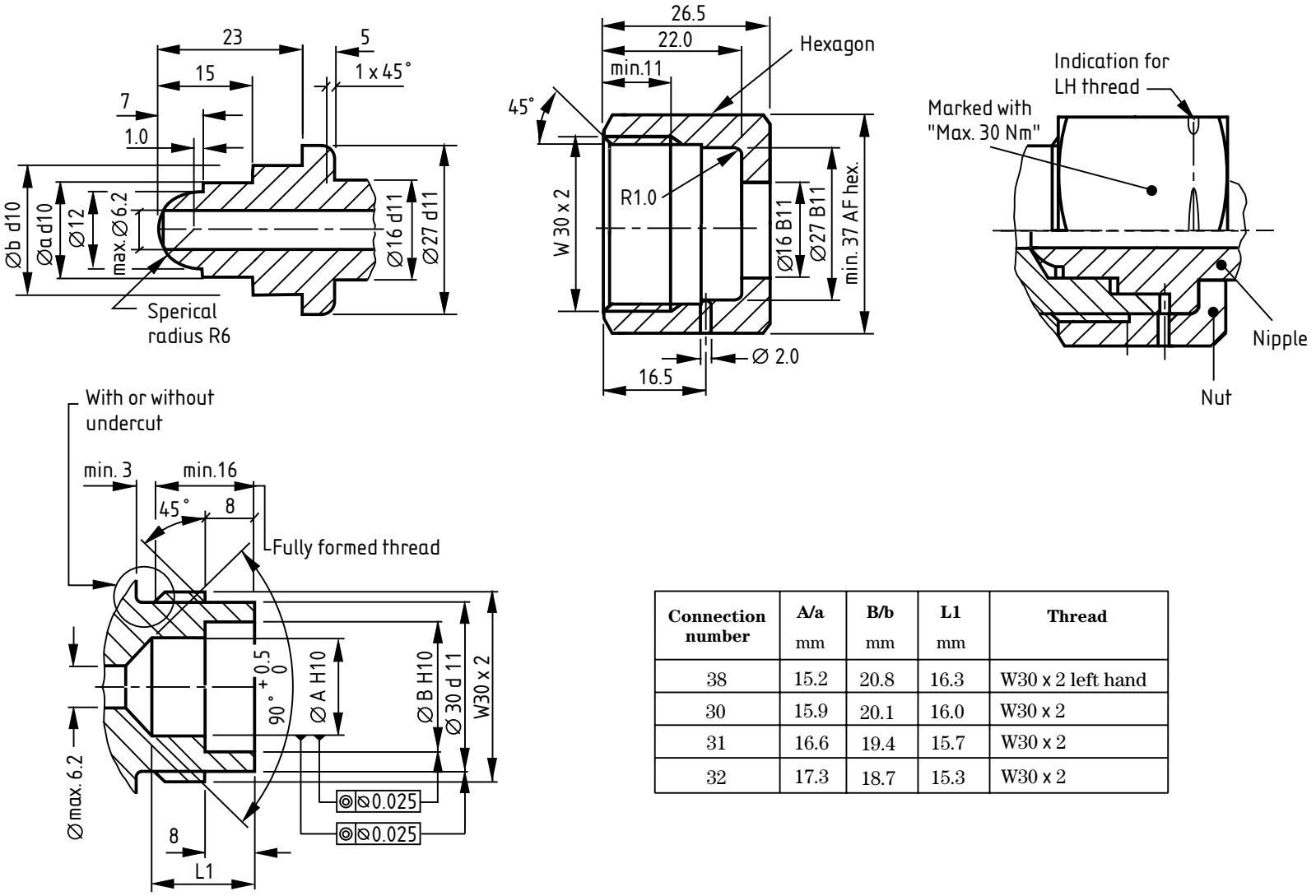
NOTE Fitting thread G ¼ conforms to BS 2779.

Figure 13 — Dimensions and tolerances of outlet connections for pressures up to 250 bar — Outlet connection 17



All linear dimensions are in millimetres

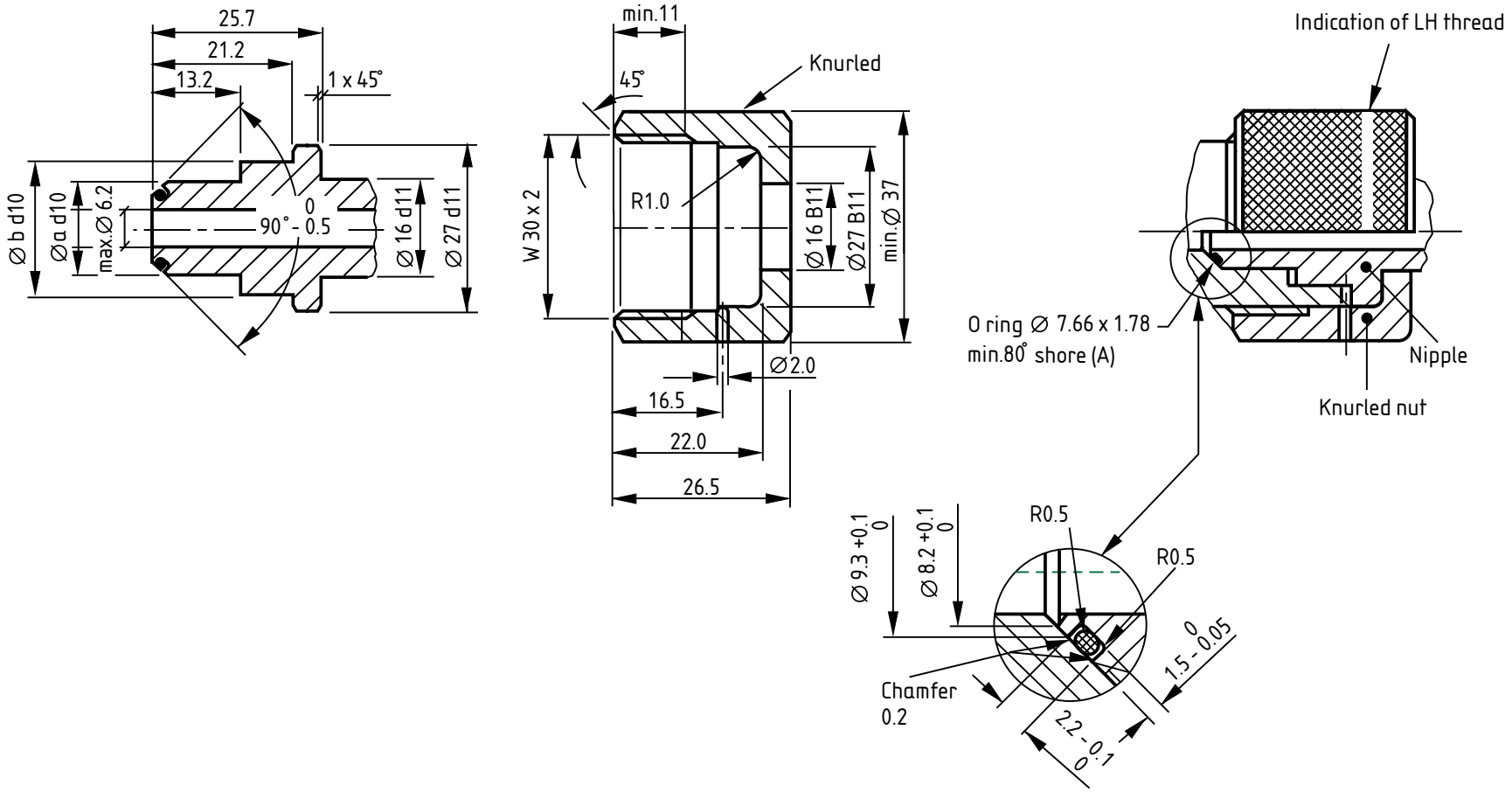
Figure 14 — Dimensions and tolerances of outlet connections for pressures up to 250 bar — Outlet connection 18



Connection number	A/a mm	B/b mm	L1 mm	Thread
38	15.2	20.8	16.3	W30 x 2 left hand
30	15.9	20.1	16.0	W30 x 2
31	16.6	19.4	15.7	W30 x 2
32	17.3	18.7	15.3	W30 x 2

All linear dimensions are in millimetres

Figure 15 — Dimensions and tolerances of outlet connections for pressures from 250 bar up to 300 bar



All linear dimensions are in millimetres

Figure 15 — Dimensions and tolerances of outlet connections for pressures from 250 bar up to 300 bar *(continued)*

Annex A (informative)
American (CGA) valve outlet connections used in the UK

Certain gases which can be conveyed in containers with outlets in accordance with this standard are sometimes conveyed in containers having valves with outlet connections that conform to CGA Standard V-1 [1].

The following connections are used with the gases listed. Reference should be made to the latest edition of CGA Standard V-1 for details of the connections.

a) Connection number 330:

— boron trifluoride;
— carbonyl sulfide;
— hydrogen bromide;
— hydrogen chloride;
— hydrogen sulfide;
— methyl mercaptan;
— phosphorous pentafluoride;
— silicon tetrafluoride;
— sulfur tetrafluoride.

b) Connection number 350:

— arsine;
— deuterium;
— ethane;
— silane.

c) Connection number 580:

— helium.

The Compressed Gas Association of America have agreed that reference may be made to the above three outlet connections when used for the conveyance of the gases listed in the United Kingdom.

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[2)] Standard in preparation.

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Other publications

[1] CGA V-1:1997, *American National, Canadian and Compressed Gas Association Standard; Compressed gas cylinder valve outlet and inlet connections.*[3)]

[3)] Obtainable from: The Compressed Gas Association Inc., 4221 Walney Road, 5th Floor, Chantilly, VA 20151-2923 USA.

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