BS 5682:2015

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Dimensions of probes and terminal units for medical gas supply systems – Requirements

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Contents

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 8, an inside back cover and a back cover.

Foreword

Publishing information

This British Standard is published by BSI Standards Limited, under licence from The British Standards Institution, and came into effect on 30 June 2015. It was prepared by Subcommittee CH/121/6, *Medical gas supply systems*, under the authority of Technical Committee CH/121, *Anaesthetic and respiratory equipment*. A list of organizations represented on this committee can be obtained on request to its secretary.

Supersession

This British Standard supersedes BS 5682:1998, which is withdrawn.

Information about this document

This is a full revision of the standard, which takes account of product development and changes in products since the last edition. Its principal changes are:

a) introduction of dimensions for probes and terminal outlets for helium/oxygen mixtures;

b) specifications for the dimensions of the terminal outlets for all specified medical gases.

Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its requirements are expressed in sentences in which the principal auxiliary verb is "shall".

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Requirements in this standard are drafted in accordance with *Rules for the structure and drafting of UK standards*, subclause **J.1.1**, which states, "Requirements should be expressed using wording such as: 'When tested as described in Annex A, the product shall ...'". This means that only those products that are capable of passing the specified test will be deemed to conform to this standard.

Contractual and legal considerations

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

Compliance with a British Standard cannot confer immunity from legal obligations

1 Scope

This British Standard specifies dimensions for probes and terminal units for the supply of medical gases (including vacuum).

It is applicable to probes and terminal units for the following medical gases:

- oxygen;
- nitrous oxide;
- oxygen/nitrous oxide mixture;
- medical air 400 kPa;
- medical air 700 kPa and above;
- helium/oxygen mixture; and
- vacuum.

This standard does not include specifications for probes and terminal units for:

- nitrogen for driving surgical tools;
- carbon dioxide; or
- oxygen 93.

2 Normative references

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

BS EN ISO 18082, *Anaesthetic and respiratory equipment – Dimensions of non-interchangeable screw-threaded (NIST) low-pressure connectors for medical gases*

BS EN ISO 5359, *Anaesthetic and respiratory equipment – Low-pressure hose assemblies for use with medical gases*

BS EN ISO 6506-1, *Metallic materials – Brinell hardness test – Test method*

BS EN ISO 9170-1:2008, *Terminal units for medical gas pipeline systems – Terminal units for use with compressed medical gases and vacuum*

ISO 32, *Gas cylinders for medical use – Marking for identification of content*

3 Terms and definitions

For the purposes of this British Standard, the terms and definitions given in BS EN ISO 9170-1 and the following apply.

3.1 direct probe
integral part of a medical device that connects to a terminal unit

3.2 probe
gas-specific male component designed for acceptance by and retention in the socket of a terminal unit

[SOURCE: BS EN 9170-1:2008, **3.11**]

3.3 probe insert
portion of a probe pushed into and secured within the bore (lumen) of the hose

NOTE Probe inserts are also known as probe tails or probe spigots.

3.4 remote probe
part of a hose assembly that connects to a terminal unit

3.5 terminal unit
outlet assembly (inlet for vacuum) of a medical gas supply system at which the operator makes connections and disconnections

[SOURCE: BS EN ISO 9170-1:2008, **3.15**]

4 General requirements

The safety, materials, design and construction of the probes and terminal units shall be in accordance with BS EN ISO 9170-1.

5 Probes

5.1 The probes shall conform to the dimensions detailed in Figure 1, and Table 1. The shoulder of the probe-indexing collar shall have a diameter no greater than diameter A and shall not extend beyond 46 mm from the tip of the probe.

NOTE The restriction on the distance from the tip of the probe to the shoulder of the probe indexing collar is to allow access to the mechanism for releasing the probe from the terminal unit when installed.

5.2 Remote probes shall be provided with a probe insert to suit the appropriate hose as specified in BS EN ISO 5359.

5.3 Direct probes shall be either an integral part of a medical device, not intended to be dismantled by the user, or shall incorporate the body of the appropriate non-interchangeable screw-threaded (NIST) connector as specified in BS EN ISO 18082.

5.4 The coupling between a direct probe and a medical device shall permit access to the probe release mechanism on the terminal units.

*NOTE See note to **5.1**.*

5.5 With the exception of the locating slot, the gas-specific indexing collar of the Probe shall be a fully formed annulus.

5.6 The gas-specific indexing collar and probe shall be machined or formed from a single piece in order to maintain the concentricity of the component, i.e. the collar shall not be comprised of a separately manufactured component.

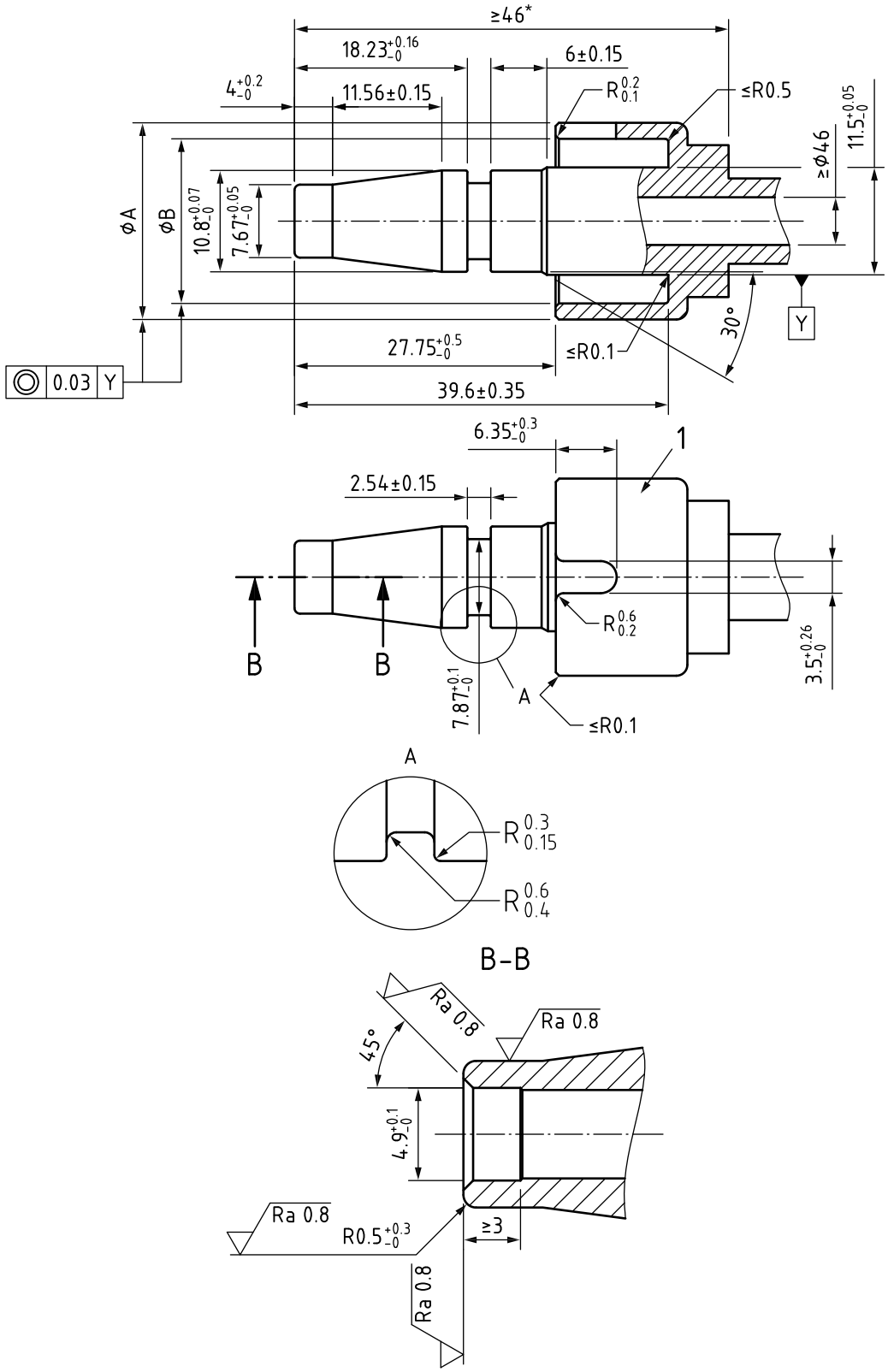
5.7 The material used for probes shall have a minimum hardness value of 120 HBW 2.5/62.5 when tested in accordance with BS EN ISO 6506-1.

NOTE 1 The mechanical properties of the probes are specified to minimize the risk of cross-connection in conditions of normal use and reasonably foreseeable misuse.

NOTE 2 Hardness equivalence tables are provided in BS EN ISO 6506-4.

NOTE 3 Stainless steels and nickel or chromium plated brasses are considered suitable hardwearing materials for probes.

Figure 1 **Probe dimensions**



NOTE 1 All dimensions in millimetres

NOTE 2 Surface finish Ra 1.6 unless otherwise specified.

NOTE 3 Tolerances on angular dimensions ±1° unless otherwise specified

Figure 1 **Probe dimensions**

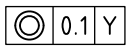
NOTE 4 All diameters  *unless otherwise stated.*

Table 1 **Diameters of indexing collars and identification symbols of probes**

Service	Identification symbol	Diameter A mm	Diameter B mm
Helium/oxygen mixture (O_2 content < 30%)	He/O_2	19.80 to 19.90	16.62 to 16.72
Oxygen	O_2	20.57 to 20.67	17.40 to 17.50
Not Allocated	N/A	21.38 to 21.48	18.20 to 18.30
Medical air	Air 800	22.18 to 22.28	19.00 to 19.10
Oxygen/nitrous oxide mixture 50%/50% (V/V)	O_2/N_2O	22.99 to 23.09	19.79 to 19.89
Nitrous oxide	N_2O	23.75 to 23.85	20.57 to 20.67
Vacuum	Vac	24.56 to 24.66	21.39 to 21.49
Medical air, 400 kPa	Air	25.35 to 25.45	22.16 to 22.26

6 Terminal units

6.1 Terminal units shall meet the requirements of BS EN ISO 9170-1.

6.2 Each gas-specific terminal unit shall accept only the specified probe. No other probe shall be retained by the terminal unit or open the terminal unit check valve.

6.3 Compliance with gas specificity shall be checked by attempting to connect gas-specific probes (for all other medical gases listed in Table 1) to the terminal unit under the following conditions:

a) pressurized to 4 bar(g) (with no evidence of gas flow);

b) at temperatures of -20 °C, +23 °C and +60 °C (±2 °C);

c) at an applied axial force of 1 000 N (±10 N);

d) repeated 10 times.

NOTE Where polymer materials are used, consideration should be given to the possible effects of moisture absorption relevant to mechanical properties of the polymer.

6.4 Terminal unit index ring dimensions shall conform to Figure 2 and Table 2. The diameters forming the terminal unit indexing annulus shall be continuous with no cut outs.

6.5 Terminal units designed for use with medical devices fitted with a direct probe shall include a non-removable anti-swivel device to locate the probe locating slot and maintain the vertical orientation of the device directly attached to the probe. In all other circumstances the anti-swivel device shall be excluded.

NOTE 1 The anti-swivel device may be fitted after the terminal unit has been installed.

NOTE 2 Devices, such as flow meters, that plug directly into static terminal outlets (e.g. medical supply units) need to be in a specified orientation to work correctly. They also incorporate a direct probe, which has a locating slot that corresponds with a locating pin in the terminal unit to prevent the device from rotating. This means of preventing rotation is unnecessary in terminal outlets for any gases that do not require a flow device or that are not mounted vertically, as in ceiling pendants and booms and where only remote probes are used. Hence the option to not install the pins.

6.6 The terminal unit indexing annulus shall be manufactured from a material with mechanical properties to meet the requirements of the force test (see **6.2**).

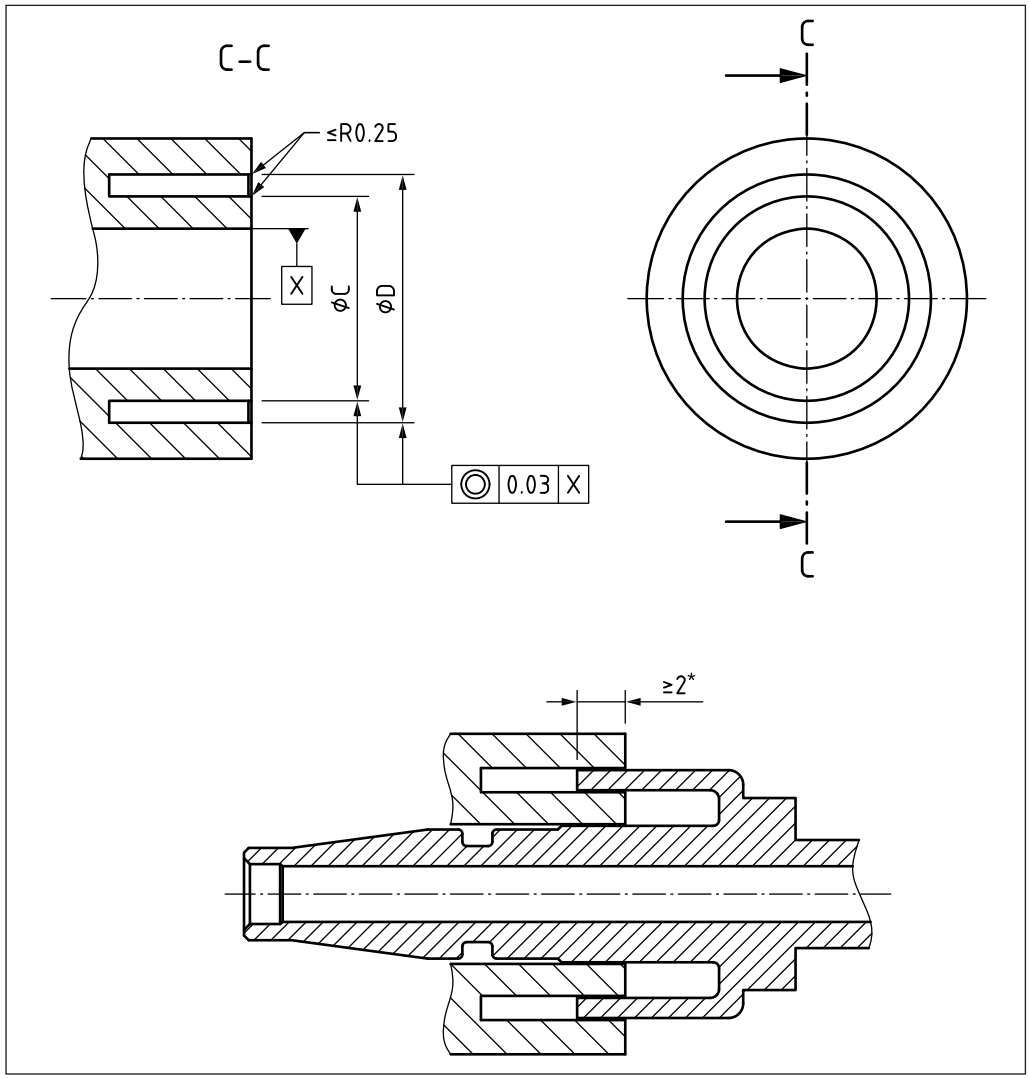
6.7 The probe retaining mechanism shall not lock before the indexing collar reaches the minimum engagement length of 2 mm. The check valve shall not open before the index collar begins engagement. Diameter C and D shall remain within the tolerance for the full depth of the probe insertion that the terminal unit socket design allows.

NOTE If the two outer faces formed by the annulus are not coplanar, the 2 mm minimum engagement is measured from the face nearer to the check valve.

Table 2 **Diameters of indexing rings and identification symbols of terminal units**

Service	**Identification symbol**	**Diameter C mm**	**Diameter D mm**
Helium/oxygen mixture (O_2 content < 30%)	He/O_2	16.27 to 16.57	19.95 to 20.25
Oxygen	O_2	17.05 to 17.35	20.72 to 21.02
Not allocated	N/A	17.85 to 18.15	21.53 to 21.83
Medical air, 700 kPa and above	Air-800	18.65 to 18.95	22.33 to 22.63
Oxygen/nitrous oxide mixture 50%/50% (V/V)	O_2/N_2O	19.44 to 19.74	23.14 to 23.44
Nitrous oxide	N_2O	20.22 to 20.52	23.90 to 24.20
Vacuum	Vac	21.04 to 21.34	24.71 to 25.01
Medical air, 400 kPa	Air	21.81 to 22.11	25.50 to 25.80

Figure 2 **Terminal unit indexing ring dimensions**



7 Marking and colour-coding

7.1 Marking

Probes and terminal units shall be marked in accordance with BS EN ISO 9170-1. Probe indexing collars shall be permanently and legibly marked with the number and date of this British Standard, i.e. BS 5682:2015. [1)]

7.2 Colour coding

Colour coding (if used) shall be in accordance with Table 3. Materials for colour coding shall be permanent (e.g. vitreous enamel). Paints shall not be used for colour coding.

[1)] Marking BS 5682:2015 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 this British Standard. The accuracy of the claim is solely the claimant's responsibility. Such a declaration is not to be confused with third-party certification of conformity.

Table 3 **Symbols and colour coding for probes and terminal units**

Service	Identification symbol	Colour	RAL number	RAL designation
Helium/oxygen mixture (O_2 content < 30%)	He/O_2	Brown/ white	8008/9010	Olive brown/pure white
Oxygen	O_2	White	9010	Pure white
Nitrous oxide	N_2O	Blue	5010	Gentian blue
Oxygen/nitrous oxide mixture 50%/50% (V/V)	O_2/N_2O	Blue/white	5010/9010	Gentian blue/pure white
Medical air, 400 kPa	Air	Black/ white	9005/9010	Jet black/pure white
Medical air, 700 kPa and above	Air-800	Black/ white	9005/9010	Jet black/pure white
Vacuum	Vac	Yellow	1018	Zinc yellow

[A] In accordance with ISO 32 (except vacuum)
[B] The colours specified are in accordance with the register RAL 840 HR, obtainable from: RAL, Sieburger Strasse 39, D-53757 Sankt Augustin, Germany

Bibliography

BS EN ISO 6506-4, *Metallic materials – Brinell hardness test – Test method*

RAL 840 HR, *Cylinder identification colour coding and identification* obtainable from:

RAL, Siegburger Strasse 39, D-53757 Sankt Augustin, Germany

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