
INTERNATIONAL STANDARD



4803

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Laboratory glassware — Borosilicate glass tubing

Verrerie de laboratoire — Tubes en verre borosilicaté

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[ISO 4803:1978](#)

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FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been set up has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 4803 was developed by Technical Committee ISO/TC 48, *Laboratory glassware and related apparatus*, and was circulated to the member bodies in October 1976.

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It has been approved by the member bodies of the following countries :

Australia	France	Netherlands
Austria	Germany	Poland
Belgium	Hungary	Romania
Canada	India	Turkey
Chile	Italy	United Kingdom
Czechoslovakia	Mexico	U.S.S.R.

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The member body of the following country expressed disapproval of the document on technical grounds :

U.S.A.

Laboratory glassware – Borosilicate glass tubing

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies requirements for an internationally acceptable range of borosilicate glass tubing for laboratory apparatus.

2 REFERENCES

ISO/R 719, *Determination of the hydrolytic resistance of glass grains at 98 °C.*

ISO 3585, *Glass plant, pipeline and fittings – Properties of borosilicate glass 3.3.*

3 DESIGNATION

Tubing shall be designated by type of glass, external diameter, wall thickness and name of manufacturer. The three categories of wall thickness specified shall be denoted as light, medium and heavy.

4 MATERIAL

4.1 General

Tubing shall be made from borosilicate glass complying with the requirements of ISO 3585. It shall be as free as possible from striae and other defects that may interfere with vision or service, and shall be reasonably free from internal strain.

4.2 Hydrolytic resistance

When the glass is tested in accordance with ISO/R 719, the amount of alkali extracted from the glass shall not be greater than $31 \mu\text{g}$ of $\text{Na}_2\text{O g}^{-1}$.

4.3 Thermal coefficient of expansion

The glass shall have a thermal coefficient of expansion of $(3,3 \pm 0,1) \times 10^{-6} \text{ K}^{-1}$ over a temperature range of 20 to 300 °C.

5 RANGE OF SIZES AND TOLERANCES

5.1 Diameter and wall thickness

Borosilicate glass tubing shall comply at all points with the dimensions and tolerances given in table 1.

5.2 Length

Tubing shall be supplied preferably in lengths of 1,5 m.

5.3 Straightness

All tubing shall be straight within the limits on bow given in table 2.

5.4 Ovality

At any cross-section of the tubing, the maximum and minimum external diameters shall not differ by more than 2 % of the nominal diameter.

5.5 Siding

The difference between the minimum and maximum wall thicknesses at any cross-section shall not exceed the following values :

- light wall tubing : 25 % of nominal wall thickness;
- medium and heavy wall tubing : 15 % of nominal wall thickness.

5.6 Conicity

The conicity of the tubing shall not exceed the tolerances on external diameter.

TABLE 1 – External diameter and wall thickness

Dimensions in millimetres

External diameter	Light wall thickness	Medium wall thickness	Heavy wall thickness
4,0 ± 0,4	0,8 ± 0,1		
5,0 ± 0,4	0,8 ± 0,1		
6,0 ± 0,4	1,0 ± 0,1	1,5 ± 0,2	
7,0 ± 0,4	1,0 ± 0,1	1,5 ± 0,2	
8,0 ± 0,4	1,0 ± 0,1	1,5 ± 0,2	
9,0 ± 0,4	1,0 ± 0,1	1,5 ± 0,2	
10,0 ± 0,4	1,0 ± 0,1	1,5 ± 0,2	2,2 ± 0,3
11,0 ± 0,4	1,0 ± 0,1	1,5 ± 0,2	2,2 ± 0,3
12,0 ± 0,4	1,0 ± 0,1	1,5 ± 0,2	2,2 ± 0,3
13,0 ± 0,4	1,0 ± 0,1	1,5 ± 0,2	2,2 ± 0,3
14,0 ± 0,4	1,0 ± 0,1	1,5 ± 0,2	2,2 ± 0,3
15,0 ± 0,4	1,2 ± 0,2	1,8 ± 0,2	2,5 ± 0,3
16,0 ± 0,4	1,2 ± 0,2	1,8 ± 0,2	2,5 ± 0,3
17,0 ± 0,4	1,2 ± 0,2	1,8 ± 0,2	2,5 ± 0,3
18,0 ± 0,4	1,2 ± 0,2	1,8 ± 0,2	2,5 ± 0,3
19,0 ± 0,4	1,2 ± 0,2	1,8 ± 0,2	2,5 ± 0,3
20,0 ± 0,5	1,2 ± 0,2	1,8 ± 0,2	2,5 ± 0,3
22,0 ± 0,5	1,2 ± 0,2	1,8 ± 0,2	2,5 ± 0,3
24,0 ± 0,5	1,2 ± 0,2	1,8 ± 0,2	2,5 ± 0,3
26,0 ± 0,5	1,4 ± 0,2	2,0 ± 0,2	2,8 ± 0,3
28,0 ± 0,5	1,4 ± 0,2	2,0 ± 0,2	2,8 ± 0,3
30,0 ± 0,8	1,4 ± 0,2	2,0 ± 0,2	2,8 ± 0,3
32,0 ± 0,8	1,4 ± 0,2	2,0 ± 0,2	2,8 ± 0,3
34,0 ± 0,8	1,4 ± 0,2	2,0 ± 0,2	2,8 ± 0,3
36,0 ± 0,8	1,4 ± 0,2	2,0 ± 0,2	2,8 ± 0,3
38,0 ± 0,8	1,4 ± 0,2	2,0 ± 0,2	2,8 ± 0,3
40,0 ± 1,0	1,6 ± 0,2	2,3 ± 0,3	3,2 ± 0,4
42,0 ± 1,0	1,6 ± 0,2	2,3 ± 0,3	3,2 ± 0,4
44,0 ± 1,0	1,6 ± 0,2	2,3 ± 0,3	3,2 ± 0,4
46,0 ± 1,0	1,6 ± 0,2	2,3 ± 0,3	3,2 ± 0,4
48,0 ± 1,0	1,6 ± 0,2	2,3 ± 0,3	3,2 ± 0,4

External diameter	Light wall thickness	Medium wall thickness	Heavy wall thickness
50,0 ± 1,0	1,8 ± 0,2	2,5 ± 0,3	3,5 ± 0,4
52,0 ± 1,0	1,8 ± 0,2	2,5 ± 0,3	3,5 ± 0,4
54,0 ± 1,0	1,8 ± 0,2	2,5 ± 0,3	3,5 ± 0,4
56,0 ± 1,0	1,8 ± 0,2	2,5 ± 0,3	3,5 ± 0,4
58,0 ± 1,0	1,8 ± 0,2	2,5 ± 0,3	3,5 ± 0,4
60,0 ± 1,5	2,2 ± 0,3	3,2 ± 0,4	4,2 ± 0,5
65,0 ± 1,5	2,2 ± 0,3	3,2 ± 0,4	4,2 ± 0,5
70,0 ± 1,5	2,2 ± 0,3	3,2 ± 0,4	4,2 ± 0,5
75,0 ± 1,5	2,2 ± 0,3	3,2 ± 0,4	4,2 ± 0,5
80,0 ± 1,8	2,5 ± 0,3	3,5 ± 0,4	5,0 ± 0,6
85,0 ± 1,8	2,5 ± 0,3	3,5 ± 0,4	5,0 ± 0,6
90,0 ± 1,8	2,5 ± 0,3	3,5 ± 0,4	5,0 ± 0,6
95,0 ± 1,8	2,5 ± 0,3	3,5 ± 0,4	5,0 ± 0,6
100,0 ± 1,8	2,5 ± 0,3	3,5 ± 0,4	5,0 ± 0,6

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TABLE 2 – Limits on bow

Values in millimetres

External diameter	Limits on bow at nominal length
Up to 6	0,9 %
7 to 10	0,7 %
Above 10	0,5 %