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Laboratory glassware — Vacuum-jacketed vessels for heat insulation

Verrerie de laboratoire — Récipients à double enveloppe à vide pour isolation thermique

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established 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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 48, *Laboratory equipment*.

Laboratory glassware — Vacuum-jacketed vessels for heat insulation

1 Scope

This International Standard recommends dimensions and specifies requirements and test methods for laboratory glassware manufactured from borosilicate glass 3.3 and provided with a vacuum jacket for thermal insulation. It covers Dewar vessels, vacuum-jacketed reaction vessels and vacuum-jacketed columns intended for laboratory use and laboratory related applications. Typical dimensions are given in Tables 1 to 5.

This International Standard does not apply to large scale production equipment and equipment operated with pressures of more than 0,1 bar above atmospheric pressure.

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.

ISO 383, *Laboratory glassware — Interchangeable conical ground joints*

ISO 641, *Laboratory glassware — Interchangeable spherical ground joints*

ISO 718, *Laboratory glassware — Thermal shock and thermal shock endurance — Test methods*

ISO 3585, *Borosilicate glass 3.3 — Properties*

ISO 4803, *Laboratory glassware — Borosilicate glass tubing*

ISO 4790, *Glass-to-glass sealings — Determination of stresses*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
Dewar flask
glass vessel with vacuum jacket for thermal insulation, designed for keeping substances at a controlled temperature within a range from -200 °C to +200 °C

Note 1 to entry: See 8.1 for restrictions on the use of Dewar flasks.

3.2
cryo vessel
vacuum jacketed vessel made of materials other than glass

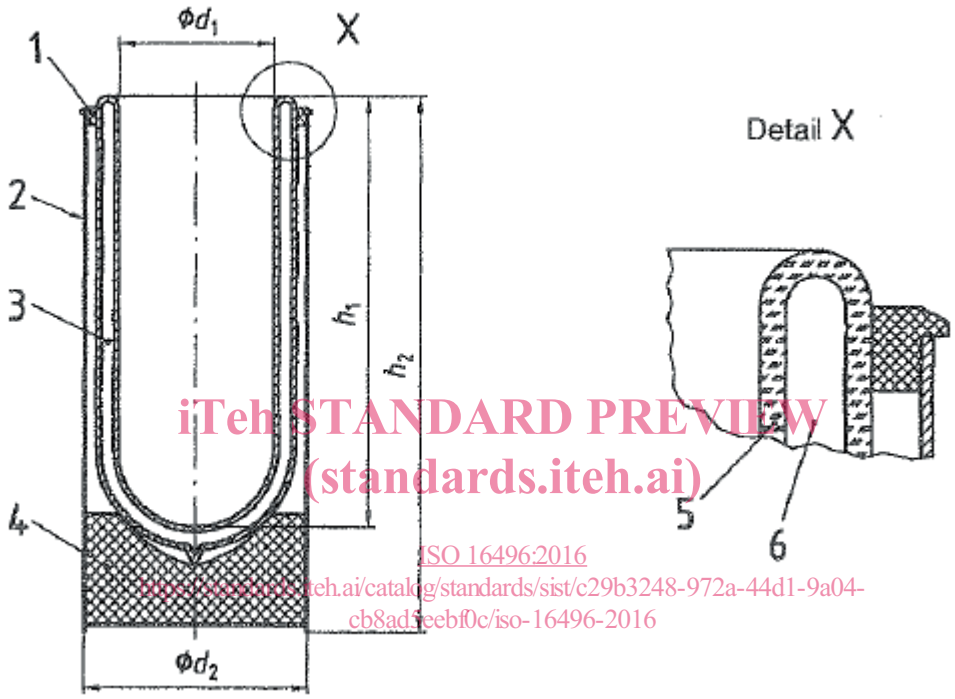
3.3
column
cylindrical vessel for the thermal separation of substances in a laboratory or pilot plant

4 Dimensions

The designs shown in Figures 1 to 5 are for illustrative purposes only. The dimensions given in Tables 1 to 5 are for guidance, other dimensions being permissible, provided the resulting capacities comply with the scope of this International Standard.

4.1 Dewar flasks

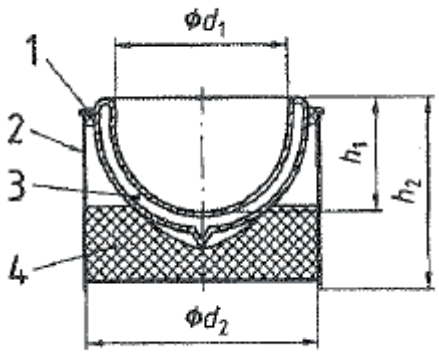
Dewar flasks may have a cylindrical, spherical or dished shape, as shown exemplarily in Figures 1 to 3. Other flask designs are permitted, e.g. flasks with flat bottom or rolled-on or integral flange.



Key

1 soft rubber spacer
2 protective housing
3 Dewar flask
4 plastic foam cushion
5 glass body
6 evacuated space

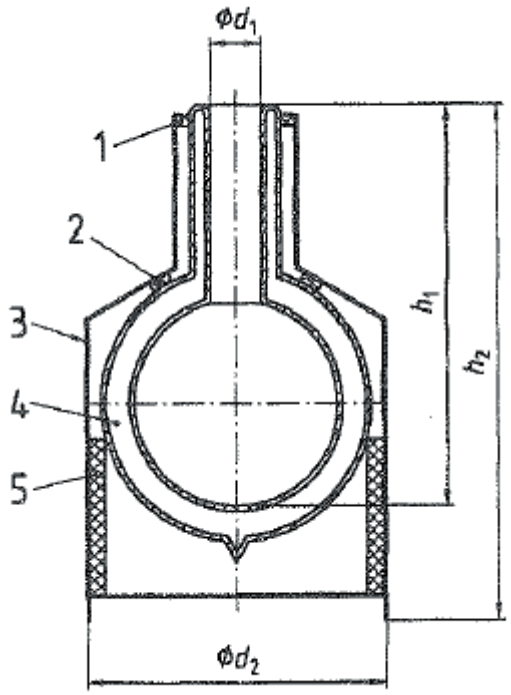
Figure 1 — Cylindrical Dewar flask



Key

1 soft rubber spacer
2 protective housing
3 Dewar flask
4 plastic foam cushion

Figure 2 — Dished Dewar flask



Key

1 soft rubber spacer
2 hard rubber spacer
3 protective housing
4 Dewar flask
5 plastic foam cushion

Figure 3 — Spherical Dewar flask

Table 1 — Dimensions of cylindrical Dewar flasks

Dimensions in millimetres

Nominal capacity	Internal diameter d_1		Internal height h_1		Housing diameter	Overall height
ml	Nominal size	Limit deviations	Nominal size	Limit deviations	d_2[a] ≈	h_2[a] ≈
200	40	±3	170	±3	66	220
500	57		210		82	265
800	67		240		90	300
1 000	77		235		106	300
1 000	100		150		128	190
1 500	90		245		125	305
1 500	100		240		130	300
2 000	90		340		125	395
2 000	100		290		130	350

[a] Dimensions d_2 and h_2 are intended as guideline values.

Table 1 *(continued)*

Nominal capacity ml	Internal diameter d_1		Internal height h_1		Housing diameter d_2[a] ≈	Overall height h_2[a] ≈
	Nominal size	Limit deviations	Nominal size	Limit deviations		
2 000	138	±4	170	±4	168	220
2 500	110		290		140	350
3 000	138		230		170	285
4 000	138		310		170	365
7 000	200	±5	270	±5	240	375
10 000	200		360		240	465
14 000	200		500		240	600
21 000	250	±6	480	±6	295	580
28 000	250		625		295	720
40 000	290		650		340	745

[a] Dimensions d_2 and h_2 are intended as guideline values.

Table 2 — Dimensions of dished Dewar flasks

Dimensions in millimetres

Nominal capacity ml	Internal diameter d_1 ≈	Internal height h_1 ≈	Housing diameter d_2 ≈	Overall height h_2 ≈
260	100	65	130	110
390	110	70	138	115
680	138	80	170	125
1 280	170	110	215	145
4 400	200	140	250	190
8 300	250	170	300	220

NOTE All dimensions are intended as guideline values.

Table 3 — Dimensions of spherical Dewar flasks

Dimensions in millimetres

Nominal capacity ml	Internal neck diameter d_1 ±2	Internal height h_1 ±4	Housing diameter d_2[a] ≈	Overall height h_2[a] ≈
1 000	30	230	175	295
3 000	60	305	225	375
5 000	60	350	260	425
10 000	65	380	330	475

[a] Dimensions d_2 and h_2 are intended as guideline values.

4.2 Reaction vessels

Optional features of reaction vessels include an outlet stopcock at the vessel's bottom, a heating/cooling jacket and a flat flange at the vessel's top.

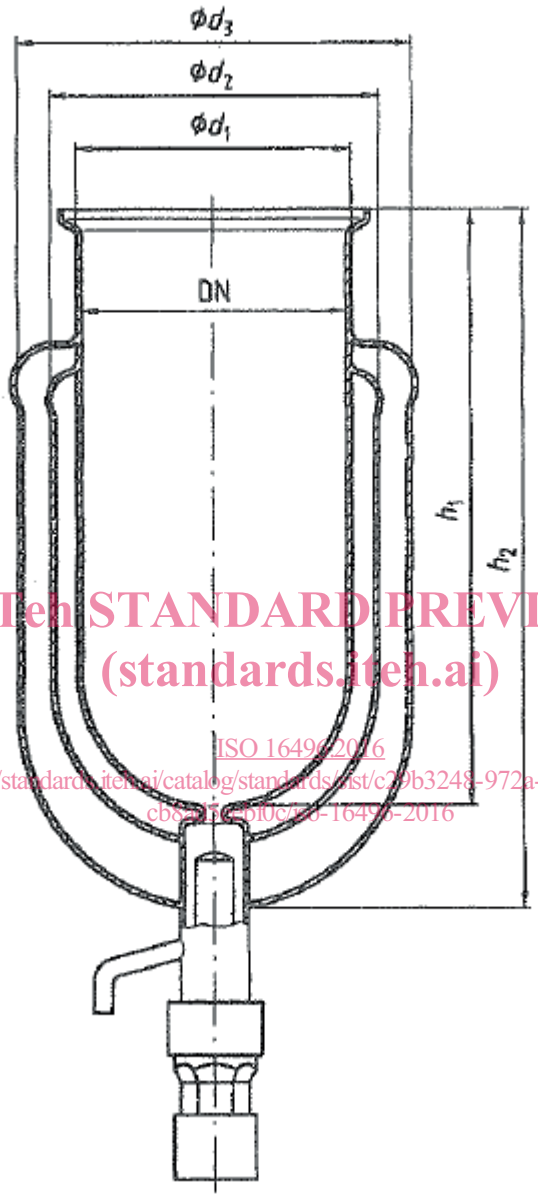


Figure 4 — Example for a reaction vessel with outlet stopcock, heating/cooling jacket and flat flange

4.3 Columns

Columns may be designed to be operated with or without an additional heating jacket. The design of column inlet and outlet connections is at the manufacturer's discretion (see 6.6).

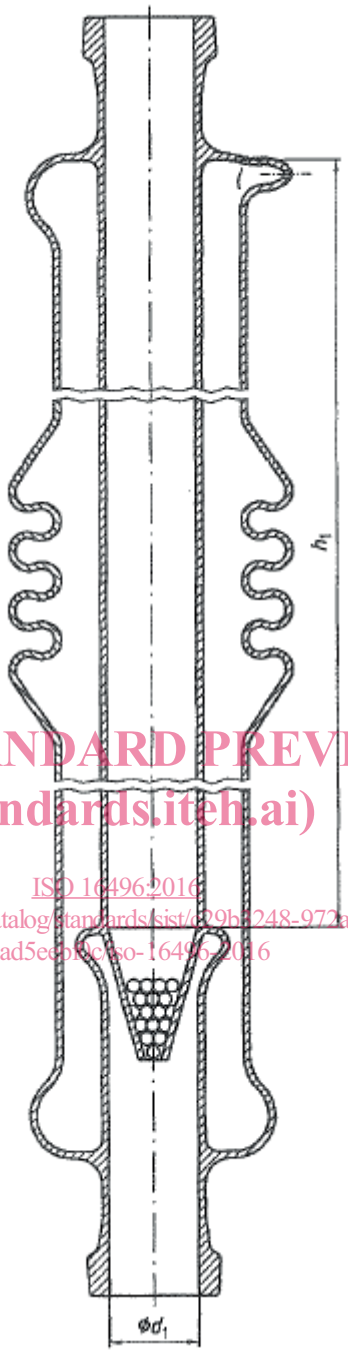


Figure 5 — Column