

ISO

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

ISO RECOMMENDATION R 1042

ONE-MARK VOLUMETRIC FLASKS

1st EDITION

April 1969

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Printed in Switzerland

Also issued in French and Russian. Copies to be obtained through the national standards organizations.

BRIEF HISTORY

The ISO Recommendation R 1042, *One-mark volumetric flasks*, was drawn up by Technical Committee ISO/TC 48, *Laboratory glassware and related apparatus*, the Secretariat of which is held by the British Standards Institution (BSI).

Work on this question led to the adoption of a Draft ISO Recommendation.

In December 1963, this Draft ISO Recommendation (No. 697) was circulated to all the ISO Member Bodies for enquiry. It was approved, subject to a few modifications of an editorial nature, by the following Member Bodies:

Argentina	Greece	Spain
Australia	Hungary	Switzerland
Austria	India	Turkey
Belgium	Israel	U.A.R.
Brazil	Italy	United Kingdom
Canada	Japan	U.S.A.
Chile	Korea, Rep. of	U.S.S.R.
Colombia	Netherlands	Yugoslavia
Czechoslovakia	New Zealand	
France	Poland	

No Member Body opposed the approval of the Draft.

The Draft ISO Recommendation was then submitted by correspondence to the ISO Council, which decided, in April 1969, to accept it as an ISO RECOMMENDATION.

ONE-MARK VOLUMETRIC FLASKS

1. SCOPE

This ISO Recommendation specifies requirements for an internationally acceptable series of one-mark volumetric flasks, suitable for general laboratory purposes.

The details specified are in conformity with ISO Recommendation R 384, *Principles of construction and adjustment of volumetric glassware*.

2. BASIS OF ADJUSTMENT

2.1 Unit of volume

The unit of volume should be the cubic centimetre (cm^3), for which the name millilitre (ml) may be used.

NOTE. — The term millilitre (ml) is commonly used as a special name for the cubic centimetre (cm^3), in accordance with a decision of the twelfth Conférence Générale des Poids et Mesures. The term millilitre is acceptable, in general, for references in ISO Recommendations to capacities of volumetric glassware and it is used, in particular, in the present text.

2.2 Reference temperature

The standard reference temperature, i.e. the temperature at which the volumetric flask is intended to contain its nominal volume (nominal capacity), should be 20 °C.

NOTE. — When the flask is required for use in a country which has adopted a standard reference temperature of 27° C, this value should be substituted for 20° C.

3. CLASSES OF ACCURACY

Two classes of accuracy are specified:

- Class A for the higher grade,
- Class B for the lower grade.

4. SERIES OF CAPACITIES

The series of capacities of one-mark volumetric flasks is as follows:

5, 10, 25, 50, 100, 200, 250, 500, 1000 and 2000 ml.

All these flasks may be finished with a plain neck or be provided with a stopper.

NOTE. — If volumetric flasks are required of capacities other than those listed above, it is recommended that they should conform, as far as possible, to the essential requirements of this ISO Recommendation.

5. DEFINITION OF CAPACITY

The capacity of a volumetric flask is defined as the volume of water at 20 °C, expressed in millilitres, contained by the flask at 20 °C, when filled to the graduation line.

NOTE. — Where, exceptionally, the reference temperature is 27 °C, this value should be substituted for 20 °C.

Setting the meniscus should be performed by one of the two methods detailed below:

- (a) The meniscus is set so that the plane of the top edge of the graduation line is horizontally tangential to the lowest point of the meniscus, the line of sight being in the same plane.
- (b) The meniscus is set so that the plane of the centre of the graduation line is horizontally tangential to the lowest point of the meniscus. The eye is raised towards the plane and observes the front and back portions of the line apparently meeting the lowest point of the meniscus simultaneously.

6. ACCURACY

The capacity of the flask should not differ from the nominal capacity by more than the maximum permitted errors shown in Table 1.

TABLE 1 — Maximum permitted errors on capacity

Values in millilitres

Nominal capacity	Maximum permitted errors	
	Class A	Class B
5	±0.025	±0.05
10	±0.025	±0.05
25	±0.04	±0.08
50	±0.06	±0.12
100	±0.10	±0.20
200	±0.15	±0.30
250	±0.15	±0.30
500	±0.25	±0.50
1000	±0.40	±0.80
2000	±0.60	±1.20

7. CONSTRUCTION

7.1 Material

Volumetric flasks should be constructed of glass of suitable chemical and thermal properties, should be as free as possible from visible defects and should be reasonably free from internal strain.

7.2 Wall thickness

Volumetric flasks should be sufficiently robust in construction to withstand normal usage, and the wall thickness should show no gross departures from uniformity.

7.3 Shape

The body of the flask should preferably be pear-shaped, as shown in the Figure, so as to provide a large base on which the flask should stand with its axis vertical without rocking or spinning. Flasks of capacity 25 ml and larger should not topple, when placed empty (without stopper) on a surface inclined at an angle of 15° to the horizontal. Flasks of capacity below 25 ml should not topple, when similarly tested at an angle of 10° to the horizontal.

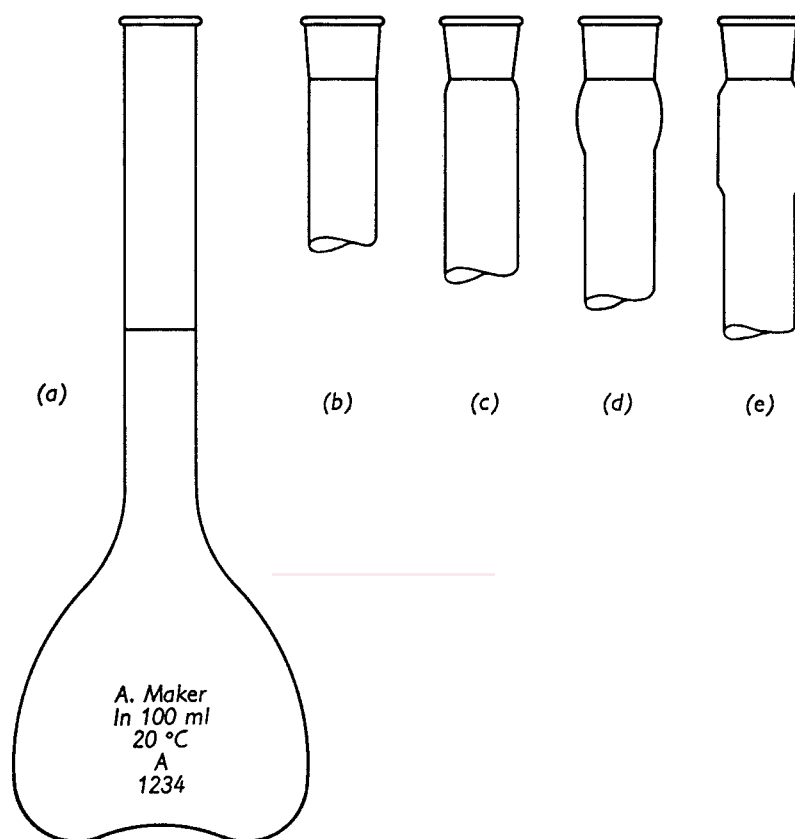


FIGURE — One-mark volumetric flask with alternative forms of neck

7.4 Neck

The neck of the flask, excluding the socket and bulge if present, should be approximately cylindrical and there should be no undue variation in internal diameter or wall thickness. The axis of the neck should be perpendicular to the plane of the base of the flask. The top of the neck of a plain neck flask should be finished with a strengthening flange, as shown in the Figure (a). Other forms of neck suitable for stoppers are shown in (b), (c), (d) and (e) on the Figure. Such a neck should be ground, preferably to a suitable socket size complying with the provisions of ISO Recommendation R 383, *Interchangeable conical ground glass joints*, and should be selected, preferably, from the *k4* series.

7.5 Stopper

The stopper, if provided, should be a good fit in the flask neck and may be of glass, solid or hollow blown, or of a suitably inert plastics material.

7.6 Dimensions

Volumetric flasks should comply with the dimensions shown in Table 2, these dimensions being considered to be essential for accuracy and convenience in use. The recommended dimensions listed in Table 3 are only approximate and provide guidance as they have proved satisfactory in use. The graduation line should be placed in the lower two-thirds of the neck of the flask, and should not be less than the stated minimum distance from any point at which the neck begins to change in diameter.

TABLE 2 — Essential dimensions

Dimensions in millimetres

Nominal capacity	Internal diameter of neck at graduation line	Minimum distance of graduation line from any point of change of internal diameter of neck
ml	Class A and Class B	Classes A and B
5	6 — 8	5
10	6 — 8	5
25	8 — 10	5
50	10 — 12	10
100	12 — 14	10
200	14 — 17	10
250	14 — 17	10
500	17 — 21	15
1000	21 — 25	15
2000	25 — 30	15

TABLE 3 — Recommended dimensions

Dimensions in millimetres

Nominal capacity	Overall height (without stopper)	Bulb diameter	Base diameter
ml			
5	70	22	15
10	90	27	18
25	110	40	25
50	140	50	35
100	170	60	40
200	210	75	50
250	220	80	55
500	260	100	70
1000	300	125	85
2000	370	160	110

8. GRADUATION LINE

The graduation line should be a clean, permanent, uniform line, of thickness not exceeding 0.4 mm, completely encircling the neck of the flask and lying in a plane parallel to the base of the flask.

9. INSCRIPTIONS

9.1 The following inscriptions should be permanently marked on each volumetric flask:

- (a) A number indicating the nominal capacity.
- (b) The symbol "cm³" or the symbol "ml" to indicate the unit of volume (see Note to clause 2.1).

NOTE. — The 1000 and 2000 ml flasks may, if desired, be inscribed in terms of the litre in place of the millilitre.

- (c) The inscription '20 °C' to indicate the standard reference temperature.

NOTE. — Where, exceptionally, the reference temperature is 27 °C, this value should be substituted for 20 °C.

- (d) A suitable abbreviation to indicate that the flask has been adjusted to contain its indicated capacity. In order to obviate language difficulties, it is recommended that the letters 'In' should be used for this purpose.
- (e) The letter 'A' or (where considered necessary) 'B' to indicate the class of accuracy of the volumetric flask.
- (f) The maker's or vendor's name or mark.
- (g) In the case of a flask with an interchangeable stopper, the size number of the joint should be marked on the flask neck and on the stopper.

9.2 An identification number should be permanently marked on each Class A volumetric flask intended for official verification or certification; it should preferably be marked on other Class A flasks and may also be used, if desired, on Class B flasks. In the case of a flask with a non-interchangeable glass stopper, this number should also be marked on the stopper.

10. VISIBILITY OF GRADUATION LINE, FIGURES AND INSCRIPTIONS

10.1 All figures and inscriptions should be of such size and form as to be clearly legible under normal conditions of use.

10.2 The graduation line, the figures and the inscriptions should be clearly visible and permanent.