

**SPECIFICATION  
FOR  
WORKING STANDARDS  
OF  
CAPACITY  
GLASS VOLUMETRIC FLASKS**

In accordance with the provisions of section 5(5) of the Weights and Measures Act 1985, the Secretary of State hereby approves the material and form of working standards of capacity conforming with this specification.

The appendices hereto are published for guidance only and do not form part of the specification.

This specification supersedes all earlier dated documents. Equipment conforming to previous specifications may continue to be used.

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## SPECIFICATION FOR WORKING STANDARDS OF CAPACITY

**Note:** Flasks made to BS 1792: 1982 and OIML IR 4 comply with this specification in so far as they relate.

### NOMINAL CAPACITIES

1 A working standard capacity measure shall have a nominal capacity as specified in Table 1.

### DEFINITION OF CAPACITY

2 The capacity of a flask is the volume of water it contains at 20 °C when the lowest part of the meniscus is tangential to the top of the graduation line, the flask being on a horizontal surface.

### MATERIAL

3 Flasks shall be made of good quality clear glass substantially free from visible defects and internal strain. There shall be no distortion in the vicinity of the graduation lines.

4 The flask shall be sufficiently robust in construction to withstand normal usage, and the wall shall not show any substantial variations in thickness.

5 The body shall have a wide base on which the flask shall stand vertically without rocking or spinning when placed on a flat horizontal surface.

6 A flask shall not topple when placed empty on a surface inclined at 10 ° to the horizontal.

7 The neck of the flask within the gauging length shall be cylindrical without undue variation in internal diameter or wall thickness. The top of the neck shall have a conical funnel and/or pouring lip.

### GRADUATION LINES

8 The lines shall be clearly visible, permanent, of uniform thickness not exceeding 0.4 mm, and lie in a plane parallel to the base of the flask.

9 Lines representing the nominal capacity and the upper and lower limits of capacity which the flask is intended to measure shall completely encircle the neck and shall be numbered. Other graduation lines shall be shorter in length and need not be numbered.

## INSCRIPTIONS

10 The following inscriptions shall appear on all flasks:

The nominal capacity (e.g. 1 litre)  
20 °C  
“IN” to indicate that the flask is to contain  
A serial number

The following inscriptions may also appear on flasks:

The name of the local authority  
The name or mark of the manufacturer or vendor

## LIMITS OF ERROR AND TESTING

11 The permissible limits of error in the volume of water contained by the measure at 20 °C shall not exceed the amount specified in Regulations made under section 5 of the Weights and Measures Act 1985, as shown in Table 1.

12 The testing requirements for volumetric glassware are that in the first year of use equipment must be tested within twelve months of use and in subsequent years within twenty-four months of use. This regime allows a more relaxed reverification period than previously required whilst maintaining a safeguard against non-compliance due to rapid initial ageing.

TABLE 1

Capacity		Internal diameter of neck	Minimum distance of a line from any expansion of the neck	Limits of error $\pm$ ml
Metric	Imperial			
5 ml 10 ml		6 – 12 mm	5 mm	0.2 ml 0.2 ml
20 ml 25 ml 35 ml		8 – 15 mm	5 mm	0.2 ml 0.2 ml 0.2 ml
50 ml 70 ml 100 ml		8 – 15 mm	10 mm	0.3 ml 0.4 ml 0.4 ml
125 ml 150 ml 175 ml		14 – 17 mm	10 mm	0.5 ml 0.6 ml 0.7 ml
200 ml 250 ml	$\frac{1}{3}$ pint $\frac{1}{2}$ pint	14 – 20 mm	10 mm	0.8 ml 0.8 ml 0.8 ml
500 ml	$\frac{2}{3}$ pint 1 pint	17 – 21 mm	15 mm	1.0 ml 1.0 ml
1 litre	2 pints	21 – 25 mm		2.0 ml
2 litres 2.5 litres	4 pints	25 – 30 mm		2.0 ml 2.0 ml 2.5 ml
5 litres	8 pints	30 – 40 mm	20 mm	5.0 ml 5.0 ml
10 litres		40 – 50 mm		10.0 ml

## APPENDIX A

## NOTES ON TESTING VOLUMETRIC GLASSWARE

Volumetric glassware may be tested either volumetrically or gravimetrically.

In both cases the flask shall be calibrated in the as used condition by filling, emptying and allowing to drain for 60 seconds.

(a) **Volumetric method**

Deliver water from an appropriate local standard into the working standard. No corrections are necessary if both measures and the water have been allowed to stabilise to a common temperature.

(b) **Gravimetric method**

- (i) Weigh empty, but wetted, flask on a balance or weighing machine of suitable accuracy.
- (ii) Fill with water of known density to just above line.
- (iii) Remove water until bottom of meniscus is tangential to top of line.
- (iv) Weigh flask full of water.
- (v) Take temperature of water.
- (vi) Calculate weight of water (iv-i).
- (vii) Calculate volume, making corrections for density of water, expansion of measure and buoyancy.

Both methods involve judging the meniscus to a line. To do this accurately:

- (i) View horizontally in the plane of the line.
- (ii) View against a white background.
- (iii) Secure a strip of black paper round the neck of the flask not more than 1 mm below the level of the setting.

References: ISO/DIS 4787  
BS 1797:1987

**APPENDIX B****NECK DIAMETERS**

The diameter of the neck of a flask determines the magnification and sensitivity of the measuring flask.

BS 1792 and OIML IR 4 specify neck diameters which are appropriate for one mark flasks. When a flask has to be used to determine a trade tolerance, the specified diameters sometimes lead to a rather long neck.

If the convention is adopted that the length of neck which represents the verification tolerance shall be twice the neck diameter, the following figures result:

**TABLE 2**

Tolerance of volume ( $\pm$ ) ml	1	2	2.5	3	3.5	4	5	10	12	25	50
Neck diameter (mm)	11	14	15	16	17	17	19	23	25	32	40

Table 1 embraces both these sizes and the BS/OIML sizes so that standard flasks may be used if this is considered to be advantageous. It must be realised that a smaller diameter neck will need to be longer.

The figures in Table 2 are less than those specified in SWMs 259, 264 and 269. Where practicable existing flasks may be marked with new lines and may continue to be used. It must be realised that a larger diameter neck will result in lower sensitivity.