# INTERNATIONAL STANDARD 384

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION · МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ · ORGANISATION INTERNATIONALE DE NORMALISATION

# Laboratory glassware — Principles of design and construction of volumetric glassware

*Verrerie de laboratoire — Principes de conception et de construction de la verrerie volumétrique*

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**Descriptors** : laboratory equipment, laboratory glassware, volumetric measurement, specifications, calibrating, verifying, precision, equipment specifications, graduations, marking.

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

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

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|---|---|---|
| Australia | Hungary | South Africa, Rep. of |
| Austria | India | Spain |
| Belgium | Israel | Turkey |
| Canada | Italy | United Kingdom |
| Chile | Mexico | U.S.A. |
| Czechoslovakia | Netherlands | U.S.S.R. |
| France | Poland | |
| Germany | Romania | |

No member body expressed disapproval of the document.

This International Standard cancels and replaces ISO Recommendation R 384-1964, of which it constitutes a technical revision.





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## 1 SCOPE AND FIELD OF APPLICATION

This International Standard sets out principles for drawing up specifications for articles of volumetric glassware.

## 2 REFERENCES

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

ISO 1769, *Laboratory glassware — Pipettes — Colour coding.*

ISO 4791/II, *Laboratory glassware — Vocabulary — Part II.*[1)]

## 3 UNIT OF VOLUME, AND REFERENCE TEMPERATURE

### 3.1 Unit of volume

The unit of volume shall be the cubic centimetre ($cm^3$) or, in special cases, the cubic decimetre ($dm^3$) or cubic millimetre ($mm^3$).

NOTE — The term millilitre (ml) is commonly used as a special name for the cubic centimetre ($cm^3$) and, similarly the litre (l) for the cubic decimetre ($dm^3$) and the microlitre ($\mu l$) for the cubic millimetre ($mm^3$), in accordance with the International System of units (SI).

### 3.2 Reference temperature

The standard reference temperature, i.e. the temperature at which the article of volumetric glassware is intended to contain or deliver its nominal volume (nominal capacity), shall be 20 °C.

NOTE — When it is necessary in tropical countries to work at an ambient temperature considerably above 20 °C, and these countries do not wish to use the standard reference temperature of 20 °C, it is recommended that they adopt a temperature of 27 °C.

## 4 VOLUMETRIC ACCURACY

**4.1** In a specification where two classes of accuracy are required,

— the higher grade shall be designated "class A";

— the lower grade shall be designated "class B".

**4.2** Limits of volumetric error shall be specified for each type of article having regard to the method and purpose of use and the class of accuracy.

**4.3** The numerical values of limits of volumetric error for articles of volumetric glassware for general purposes shall be chosen from the series 10 — 12 — 15 — 20 — 25 — 30 — 40 — 50 — 60 — 80, or a suitable decimal multiple thereof.[2)]

**4.4** The limits of volumetric error specified for a series of sizes of an article should provide a reasonably uniform progression in relation to capacity when plotted on a logarithmic graph, as shown in annex A. Such a graph should be included as an annex to all specifications in which a series of three or more sizes of an article is specified.

**4.5** Where two classes of accuracy are specified, then the limits of volumetric error permitted for class B should, in general, be approximately twice those permitted for class A.

**4.6** For all articles having a scale, the maximum permitted volumetric error for either class of accuracy shall not exceed the volume equivalent of the smallest scale division.

1) In preparation.

2) This is the R'' 10 series of preferred numbers and has been adopted because decimal sub-multiples of some of the unrounded numbers, for example 31,5, would appear to imply a degree of precision which is not intended and which could not be measured in practice.