SLOVENSKI STANDARD
SIST ISO 4788:1995

01-avgust-1995

Laboratorijska steklovina - Graduirani merilni valji

Laboratory glassware -- Graduated measuring cylinders

Verrerie de laboratoire -- Éprouvettes graduées cylindriques

Ta slovenski standard je istoveten z: **ISO 4788:1980**

ICS:

17.060	Merjenje prostornine, mase, gostote, viskoznosti	Measurement of volume, mass, density, viscosity
71.040.20	Laboratorijska posoda in aparati	Laboratory ware and related apparatus

SIST ISO 4788:1995 **en**

International Standard 4788

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

Laboratory glassware — Graduated measuring cylinders

Verrerie de laboratoire — Éprouvettes graduées cylindriques

First edition — 1980-02-01

UDC 542.3 **Ref. No. ISO 4788-1980 (E)**

Descriptors : glassware, laboratory glassware, measuring cylinders, specifications, capacity, dimensions.

Price based on 6 pages

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 4788 was developed by Technical Committee ISO/TC 48, *Laboratory glassware and related apparatus*, and was circulated to the member bodies in October 1978.

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

Australia	India	Romania
Austria	Israel	South Africa, Rep. of
Bulgaria	Italy	Spain
Canada	Korea, Rep. of	United Kingdom
Czechoslovakia	Mexico	USSR
France	Netherlands	
Germany, F. R.	Poland	

No member body expressed disapproval of the document.

Printed in Switzerland

Laboratory glassware — Graduated measuring cylinders

1 Scope and field of application

This International Standard specifies requirements for an internationally acceptable series of cylinders, with a graduated scale and either a pouring spout or a stopper, adequate for general laboratory purposes.

The details specified are in conformity with ISO 384.

2 References

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

ISO 384, *Laboratory glassware — Principles of design and construction of volumetric glassware.*

ISO 4794, *Laboratory glassware — Pipettes — Methods for assessing the chemical resistance of enamels used for colour coding.*

3 Basis of adjustment

3.1 Unit of volume

The unit of volume shall 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 cubic centimetre (cm^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 cylinder is intended to contain its nominal volume (nominal capacity), shall be 20 °C.

NOTE — If the cylinder is required for use in a country which has adopted a standard reference temperature of 27 °C (the alternative recommended in ISO 384 for tropical use), this value shall be substituted for 20 °C.

4 Class of accuracy

One class of accuracy only is specified, the accuracy being lower than that associated with items of volumetric glassware intended for analytical use.

5 Types

Cylinders shall be provided either with a pouring spout (see figure 1), or with a ground neck (see figure 2) and a suitably fitting stopper.

6 Series of capacities

The series of capacities of graduated measuring cylinders shall be as shown in table 1.

NOTE — If capacities of cylinders other than those listed in table 1 are required, it is recommended that they conform to the essential requirements of this International Standard.

Table 1 — Series of capacities, divisions and tolerances

Nominal capacity	Smallest scale division	Maximum permitted error	Maximum capacity corresponding to lowest graduation line
ml	ml	ml	ml
5	0,1	± 0,1	0,5
10	0,2	± 0,2	1
25	0,5	± 0,5	2,5
50	1	± 1	5
100	1	± 1	10
250	2	± 2	20
500	5	± 5	50
1 000	10	± 10	100
2 000	20	± 20	200

7 Definition of capacity

The capacity corresponding to any graduation line shall be defined as the volume of water at 20 °C, expressed in millilitres, contained by the cylinder at 20 °C when filled to that graduation line.

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

When checking the capacity of a cylinder, the meniscus shall be set so that the plane of the upper edge of the graduation line is horizontally tangential to the lowest point of the meniscus, the line of sight being in the same plane.

8 Accuracy

Errors in capacity shall not exceed the maximum permitted errors shown in table 1.

These errors represent the maximum permissible error at any point and also the maximum permissible difference between the errors at any two points.

9 Construction

9.1 Material

The cylinders shall be constructed of glass of suitable chemical and thermal properties, shall be as free as possible from visible defects and shall be reasonably free from internal stress.

9.2 Wall thickness

The cylinders shall be sufficiently robust in construction to withstand normal usage and the wall thickness shall show no gross departure from uniformity.

9.3 Stability

The cylinders shall stand vertically without rocking or spinning when placed on a level surface. They shall not topple when placed empty (without stopper, if provided) on a surface inclined at an angle of 15° to the horizontal.

9.4 Base

The base shall be of glass, or a suitable plastics material, and may be either circular or of other suitable form provided the cylinder satisfies the requirements of 9.3.

9.5 Rim and spout

9.5.1 The rim of the cylinder shall be fire-polished and shall lie in a plane at right angles to the axis of the cylinder.

9.5.2 The spout of a spouted cylinder shall be so formed as to enable the contents of the cylinder to be poured out in a narrow stream without spilling or running down the outside of the cylinder.

9.6 Neck and stopper

On a stoppered cylinder, the neck shall be ground to a suitable socket size preferably selected from ISO 383.

A well fitting stopper of glass or suitable inert plastics material shall be supplied.

9.7 Dimensions

The cylinders shall comply with the dimensional requirements shown in table 2.

Table 2 — Dimensions

Capacity	Internal height to highest graduation line min.	Overall height* max.	Distance from highest graduation line to top of cylinder or base of neck min.
ml	mm	mm	mm
5	55	115	20
10	65	140	20
25	85	170	25
50	110	200	30
100	145	260	35
250	200	335	40
500	250	390	45
1 000	310	470	50
2 000	380	570	50

* In the case of a stoppered cylinder, the "overall height" shall be considered to be height to the base of the neck (see figure 2).

10 Graduation and figuring

10.1 Graduation lines

10.1.1 Graduation lines shall be clean, permanent uniform lines of thickness not exceeding :

0,3 mm for cylinders of nominal capacity 5 and 10 ml;

0,4 mm for cylinders of nominal capacity 25, 50, 100 and 250 ml;

0,5 mm for cylinders of nominal capacity 500, 1 000 and 2 000 ml.

10.1.2 All graduation lines shall lie in planes at right angles to the longitudinal axis of the cylinder.

10.1.3 Graduation lines may be omitted from the bottom portion of the cylinder, but the ungraduated capacity shall not exceed the maximum value specified in table 1.

10.2 Spacing of graduation lines

There shall be no evident irregularity in the spacing of the graduation lines.

10.3 Length of graduation lines

10.3.1 The length of the short lines shall be not less than 10 % and not more than 20 % of the circumference.

10.3.2 The length of the medium lines shall be approximately 1,5 times the length of the short lines and they shall extend symmetrically at each end beyond the ends of the short lines.

10.3.3 The length of the long lines shall be not less than twice the length of the short lines and they shall either extend symmetrically at each end beyond the ends of the short lines or, if they extend almost completely round the circumference of the cylinder, they shall be so disposed that the gaps in them are situated vertically above one another and at one side of the cylinder when it is viewed from the front in the position of normal use.

10.4 Sequence of graduation lines

10.4.1 On cylinders of capacities 5 ml, 50 ml, 100 ml and 1 000 ml :

a) every tenth graduation line shall be a long line, reading the scale from the top;

b) there shall be a medium line midway between two consecutive long lines;

c) there should be four short lines between consecutive medium and long lines.

10.4.2 On cylinders of capacities 10 ml, 250 ml and 2 000 ml :

a) every fifth graduation line shall be a long line, reading the scale from the top;

b) there shall be four short lines between two consecutive long lines.

10.4.3 On cylinders of capacities 25 ml and 500 ml :

a) every tenth graduation line shall be a long line, reading the scale from the top;

b) there shall be four medium lines equally spaced between two consecutive long lines;

c) there shall be one short line between two consecutive medium lines and between consecutive medium and long lines.

10.5 Position of graduation lines

The graduation lines shall form a vertical scale on the cylinder. On a spouted cylinder the spout shall be to the left when the cylinder is positioned with the scale facing the viewer, as shown in figure 1.

10.6 Figuring of graduation lines

Graduation lines shall be figured as illustrated in figures 3 and 4 and in accordance with the following principles.

10.6.1 On a cylinder of 250 ml capacity, alternate long lines shall be figured from 20 to 240 with an additional figure 250; alternatively, alternate long lines shall be figured from 30 to 250 ml. On cylinders of 10 ml and 2 000 ml capacity, alternate long lines shall be figured.

10.6.2 On all cylinders except those of 10 ml, 250 ml and 2 000 ml capacity, every long line shall be figured.

10.6.3 The scheme of figuring shall be such that the figure representing the nominal capacity refers to the highest graduation line.

10.6.4 Figures shall be placed immediately above the long lines to which they refer and slightly to the right of the adjacent shorter lines. The figures shall alternatively be placed slightly to the right of the end of the line to which they refer in such a way that an extension of the line would bisect them.

11 Inscriptions

The following inscription shall be permanently marked on all cylinders :

a) the symbol "cm^3" or the symbol "ml" to indicate the unit of volume (see note to 3.1);

b) the inscription "20 °C" to indicate the standard reference temperature;

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

c) the letters "In" to indicate that the cylinder has been adjusted to contain its indicated capacity;

d) the maker's and/or vendor's name or mark;

e) in the case of a cylinder with a standard interchangeable stopper, the size number of the joint, marked on both the cylinder and the stopper.

It is recommended that, in the case of cylinders with non-interchangeable stoppers, an identification number should be marked on both the cylinder and the stopper.

12 Visibility of graduation lines, figures and inscriptions

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

12.2 All graduation lines, figures and inscriptions shall be clearly visible and permanent.

12.3 The durability of graduation lines and inscriptions should be tested by the methods described in ISO 4794.

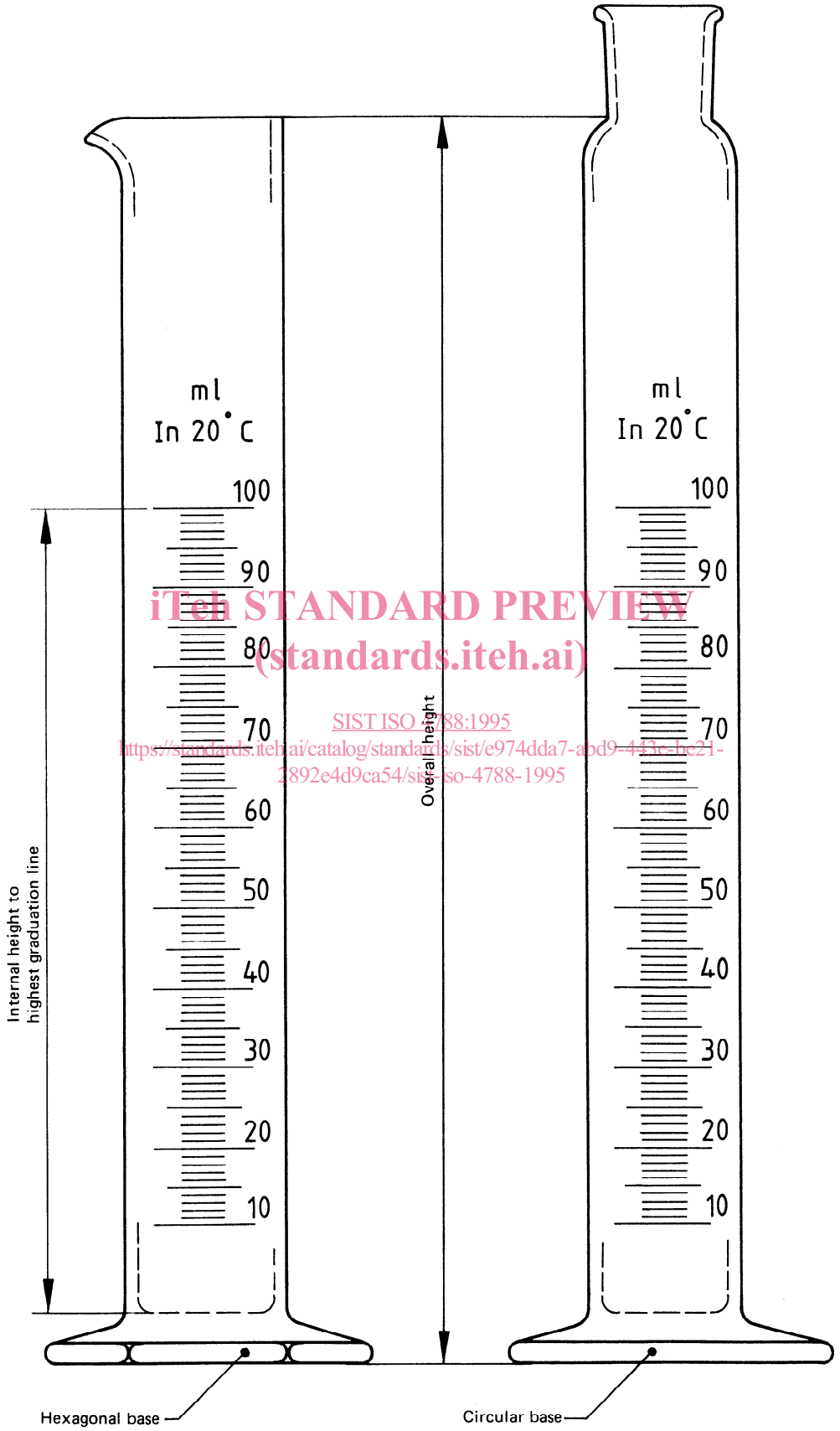
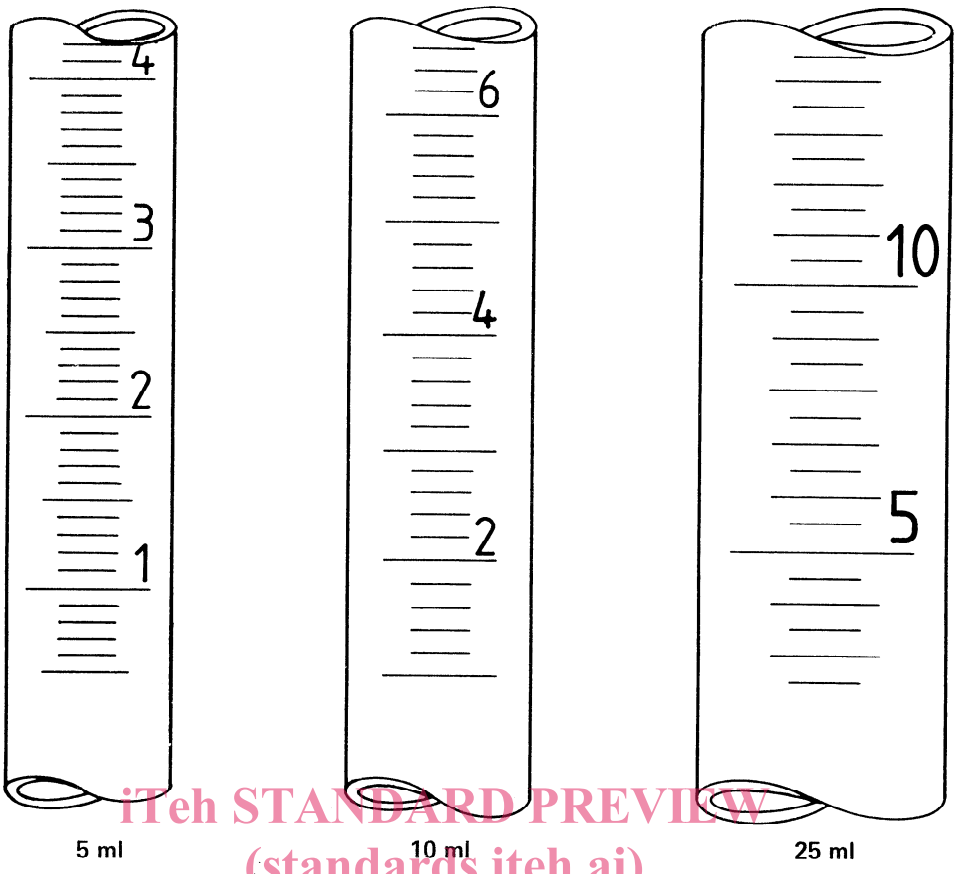


Figure 1 — General appearance of spouted measuring cylinder shown with integral base of hexagonal form

Figure 2 — General appearance of stoppered measuring cylinder shown with integral base of circular form



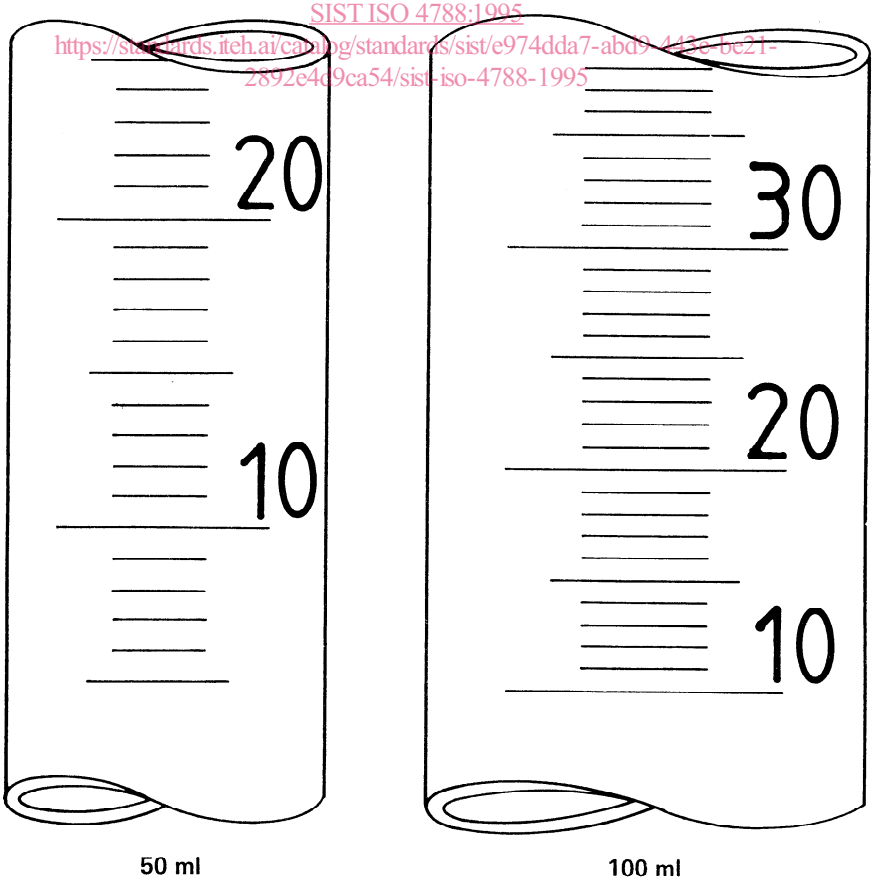


Figure 3 — Scales of measuring cylinders of capacity 5 to 100 ml