SLOVENSKI STANDARD
SIST ISO 385-1:1995

01-avgust-1995

Laboratorijska steklovina - Birete - 1. del: Splošne zahteve

Laboratory glassware -- Burettes -- Part 1: General requirements

Verrerie de laboratoire -- Burettes -- Partie 1: Spécifications générales

Ta slovenski standard je istoveten z: **ISO 385-1:1984**

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 385-1:1995 **en**

International Standard 385/1

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

Laboratory glassware — Burettes — Part 1 : General requirements

Verrerie de laboratoire — Burettes — Partie 1 : Spécifications générales

First edition — 1984-10-15

UDC 542.3 : 531.73/.75 **Ref. No. ISO 385/1-1984 (E)**

Descriptors : laboratory equipment, laboratory glassware, burettes, classifications, specifications, dimensions.

Price based on 8 pages
Preisgruppe E

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.

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. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 385/1 was prepared by Technical Committee ISO/TC 48, *Laboratory glassware and related apparatus.*

It cancels and replaces ISO Recommendation R 385-1964, of which it constitutes a technical revision.

Printed in Switzerland

Laboratory glassware — Burettes — Part 1 : General requirements

1 Scope and field of application

This part of ISO 385 provides general requirements for an internationally acceptable series of burettes, adequate for general laboratory purposes.

The details specified are in conformity with ISO 384.

NOTE — Particular requirements for different types of burette are specified in ISO 385/2 and ISO 385/3.

2 References

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

ISO 385/2, *Laboratory glassware — Burettes — Part 2 : Burettes for which no waiting time is specified.*

ISO 385/3, *Laboratory glassware — Burettes — Part 3 : Burettes for which a waiting time of* 30 s *is specified.*

ISO 4787, *Laboratory glassware — Volumetric glassware — Methods for use and testing of capacity.*

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 the 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 burette is intended to deliver its nominal volume (nominal capacity) shall be 20 °C.

NOTE — When the burette 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 Volumetric accuracy

There shall be two classes of accuracy :

— class A for the higher grade;

— class B for the lower grade.

In neither class shall the limit of volumetric error exceed the smallest scale division.

5 Types of burette

The following two types of burette are specified :

— type I burettes, for which no waiting time is specified, Class A and Class B (see ISO 385/2);

— type II burettes, for which a waiting time is specified, Class A only (see ISO 385/3).

6 Limits of volumetric error

6.1 Errors in the delivered volume shall not exceed the limits given in table 1. These limits represent the maximum permitted error at any point and also the maximum permissible difference between the errors at any two points.

Table 1 — Capacities, sub-divisions and limits of error

Nominal capacity ml	Smallest scale division ml	Limits of error Class A ml	Limits of error Class B ml
1	0,01	± 0,01	± 0,02
2	0,01	± 0,01	± 0,02
5	0,02	± 0,01	± 0,02
10	0,02	± 0,02	± 0,05
10	0,05	± 0,02	± 0,05
25	0,05	± 0,03	± 0,05
25	0,1	± 0,05	± 0,1
50	0,1	± 0,05	± 0,1
100	0,2	± 0,1	± 0,2

NOTE — If burettes are required with nominal capacities and/or sub-divisions other than those listed in this table, it is recommended that they shall conform with the essential requirements of this part of ISO 385.

6.2 The relationship between limits of error and capacity for class A burettes is given in annex A.

6.3 The relationship between limits of error and the meniscus diameter for class A burettes is given in annex B.

7 Construction

7.1 Material

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

7.2 Dimensions

Burettes shall comply with the dimensional requirements shown in table 2.

Table 2 — Dimensions

Nominal capacity ml	Smallest scale division ml	Scale length min. mm	Scale length max. mm	Overall length[1] max. mm
1	0,01	150	200	575
2	0,01	200	250	650
5	0,02	500	600	800
10	0,02	500	600	820
10	0,05	250	450	570
25	0,05	500	600	820
25	0,1	300	450	620
50	0,1	500	600	820
100	0,2	550	650	870

Distance of zero line from top of burette :	min. 50 mm
Distance of lowest graduation line from top of stopcock :	min. 50 mm
Length of tube of uniform bore below lowest graduation line :	min. 20 mm
Distance of end of jet from underside of stopcock :	min. 50 mm

1) Of burettes not provided with a filling device.

7.3 Top of burette

The top of each burette, if not provided with a filling device, shall be smoothly finished with a strengthening flange or bead, and shall be at right angles to the axis of the burettes. Burettes with sub-divisions of 0,05 ml or less, if not fitted with a filling stopcock, should preferably be finished with a cylindrical cup at the top. Larger diameter burettes may be fitted with a funnel top for special purposes.

The length of tube of uniform bore between the zero graduation line and the cup shall be at least 20 mm.

NOTE — The construction of a filling device, provided at the top of the burette, is outside the scope of this part of ISO 385.

It shall not, however, interfere with the accuracy requirements for the burettes.

7.4 Stopcocks and similar devices

7.4.1 Stopcocks shall be of good quality construction to allow smooth and precise control of outflow and to prevent a rate of leakage greater than that allowed by 7.5.

7.4.2 Stopcock and jet should form an integral part of all class A burettes with the jet joined to the stopcock barrel (see figure 3) or forming part of the stopcock key (see figure 4). Class B burettes should preferably have integral jets but, alternatively, may be fitted with other types of control.

7.4.3 Stopcocks of conventional pattern made entirely of glass shall have the barrel and key finely ground, preferably to a taper of 1/10, and shall comply with the appropriate national or international specifications for stopcocks.

7.4.4 Stopcocks of other designs whether of glass or suitable inert plastics material are allowed provided that they comply with the requirements of 7.4.1.

7.4.5 Suitable retaining devices for components of stopcocks are allowed.

7.5 Stopcock leakage

A stopcock of conventional design made entirely of glass or intended for use with grease shall be tested for leakage with the burette clamped in a vertical position, the stopcock free from grease, the barrel and key wetted with water, and the burette filled initially to the zero line with water. The rate of leakage, with the key in either of the fully shut-off positions, shall not exceed one scale sub-division in the case of class A burettes or two scale sub-divisions in the case of class B burettes, in 20 min.

Other all-glass stopcocks shall be subjected to similar tests with their component parts free from grease and wetted with water.

In addition to this test, a double-bore stopcock shall not show a rate of leakage greater than that given above when tested similarly, with the burette empty, the key of the stopcock in the normal delivery position and the filling tube connected to a suitable graduated tube filled with water to a level of 250 mm above the zero line of the burette.

If the stopcock is of such material that it is intended for use without grease, it shall be tested in a similar manner. The rate of leakage shall not exceed one half of one scale sub-division in the case of class A burettes, or one scale sub-division in the case of class B burettes, in 50 min.

For all leakage tests, in order to ensure a sufficiently accurate determination, precautions shall be taken against large temperature changes (and evaporation) during the period of test.

NOTE — The leakage tests specified above are suitable for specification and referee purposes. For many other purposes, a quicker test may be necessary, in which case a vacuum leakage arrangement is suitable. Such a test is not suitable for specification purposes owing to the difficulty of standardizing all the conditions. Any particular quick test apparatus can be calibrated by the use of several burettes whose leakage rates have been determined by means of the leakage test specified above.

7.6 Delivery jet

The jet shall be made from thick-walled capillary tubing and, if it forms an integral part of the burette, shall have no cavity at the join likely to trap air bubbles.

The jet shall be solidly manufactured with a smooth and gradual taper without any sudden constriction at the orifice which could give rise to a turbulent outflow.

The end of the jet shall be finished by one of the following methods :

a) smoothly ground, square with the axis, slightly bevelled on the outside and fire-polished;

b) smoothly ground, square with the axis and slightly bevelled on the outside;

c) cut at right angles to the longitudinal axis and fire-polished.

NOTE — These methods are listed in order of preference.

A fire-polished finish reduces the danger of chipping in use, but should not result in constriction, as indicated in the first sentence of this sub-clause, or in undue stress, as indicated in 7.1.

7.7 Delivery time

The delivery time is defined as the time occupied by the descent of the water meniscus from the zero line to the lowest graduation line. The delivery time is determined with the stopcock fully open and with the jet not in contact with the side of the receiving vessel.

The delivery time determined in this way shall be within the specified limits. In the case of a detachable jet, the appropriate delivery time shall be maintained when the jet is in the position of normal use.

7.8 Waiting time

The waiting time, if specified, is defined as the period of time to be observed after the stopcock has been closed and before the final reading has been taken.

8 Graduation and figuring

8.1 Graduation lines

8.1.1 Graduation lines shall be clean, permanent and uniform lines of thickness not exceeding 0,3 mm.

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

8.2 Spacing of graduation lines

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

8.2.2 The limits on the spacing of graduation lines shall be such that the scale lengths are within the limits allowed in table 2.

8.3 Length of graduation lines

Graduation pattern I applies to class A burettes in accordance with ISO 385/2, graduation pattern III applies to class B burettes in accordance with ISO 385/2 and graduation pattern II preferably applies to burettes in accordance with ISO 385/3, but may also be used for class B burettes in accordance with ISO 385/2.

8.3.1 Graduation pattern I

8.3.1.1 The length of the short lines shall be approximately, but not less than, 50 % of the circumference of the burette.

8.3.1.2 The length of the medium lines shall be approximately 65 % of the circumference of the burette and shall extend symmetrically at each end beyond the end of the short lines.

8.3.1.3 The long lines shall extend completely round the circumference of the burette, but a gap, not exceeding 10 % of the circumference, is permissible.

8.3.2 Graduation pattern II

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

8.3.2.2 The medium lines shall be approximately 1,5 times as long as the short lines and shall extend symmetrically at each end beyond the end of the short lines.

8.3.2.3 The long lines shall extend completely round the circumference of the burette, but a gap, not exceeding 10 % of the circumference, is permissible.

8.3.3 Graduation pattern III

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

8.3.3.2 The medium lines shall be approximately 1,5 times as long as the short lines and shall extend symmetrically at each end beyond the ends of the short lines.

8.3.3.3 The long lines shall be not less than twice as long as the short lines and shall extend symmetrically at each end beyond the ends of the short and medium lines.

8.4 Sequence of graduation lines (see figure 1)

8.4.1 On burettes in which the volume equivalent of the smallest scale division is 0,01 ml or 0,1 ml :

a) every tenth graduation line shall be a long line;

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

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

8.4.2 On burettes in which the volume equivalent of the smallest scale division is 0,02 ml or 0,2 ml :

a) every fifth graduation line shall be a long line;

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

8.4.3 On burettes in which the volume equivalent of the smallest scale division is 0,05 ml :

a) every tenth graduation line shall be a long line;

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 or between consecutive medium and long lines.

8.5 Position of graduation lines (see figure 2)

8.5.1 On burettes graduated according to pattern I, the ends (preferably the right-hand end) of the short graduation lines shall lie on an imaginary vertical line down the centre of the front of the burette, the lines themselves should preferably extend to the left when the burette is viewed from the front in the position of normal use.

8.5.2 On burettes graduated according to pattern II or III, the mid-points of the short and medium graduation lines shall lie on an imaginary vertical line down the centre of the front of the burette, when the burette is viewed from the front in the position of normal use.

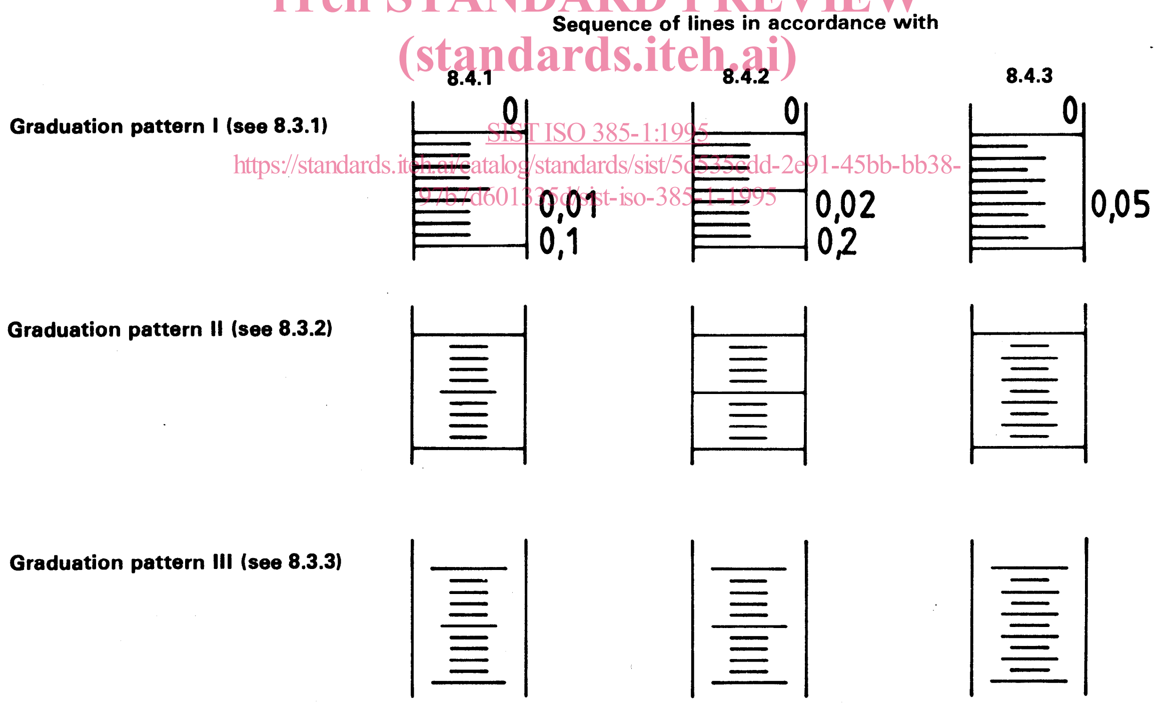
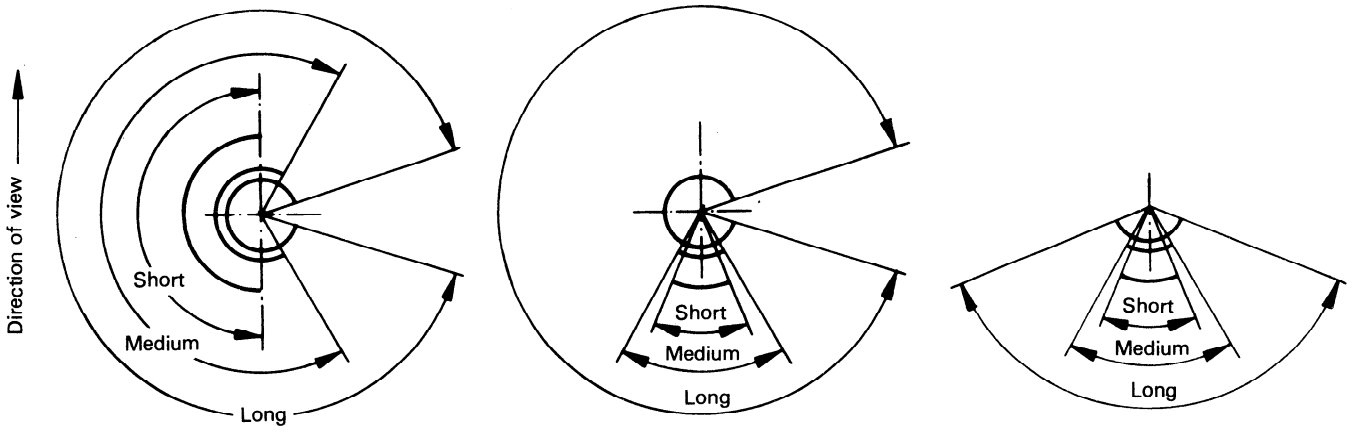


Figure 1 — Length and sequence of graduation lines



Graduation pattern I | Graduation pattern II | Graduation pattern III

Figure 2 — Position of graduation lines

8.6 Figuring of graduation lines

8.6.1 All burettes shall be figured downwards from zero at the top, at the intervals shown in table 3.

Table 3 — Figuring of graduation lines

Smallest scale division ml	0,01	0,02	0,05	0,1	0,2
Figured at every ml	0,1	0,2	0,5	1	2

8.6.2 Figures shall be placed immediately above the long lines to which they refer and slightly to the right of the end of the adjacent shorter lines. In the case of graduation pattern III, the figures may 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.

9 Setting of the meniscus

Setting of the meniscus shall be carried out using one of the two methods detailed below. In order to minimize possible errors, the same method of setting shall be used for both zero and end readings.

a) 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.

b) The meniscus shall be set so that the plane of the centre of the graduation line is horizontally tangential to the lowest point of the meniscus. The eye shall be raised towards the plane and shall observe the front and back portions of the line apparently meeting the lowest point simultaneously.

10 Inscriptions

10.1 The following inscriptions shall be marked on each burette :

a) the symbol "cm^3" or the symbol "ml" to indicate the unit in terms of which the burette is graduated;

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

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

c) the letters "Ex" to indicate that the burette has been adjusted to deliver its indicated capacity;

d) the inscription "A" or inscription "B" to indicate the class of accuracy for which the burette has been adjusted;

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

f) the waiting time, if specified, in the form : "Ex + 30 s".

10.2 The following additional inscriptions shall be marked on class A burettes intended for official verification or certification if required by legal metrology; they should preferably be marked on other class A burettes and may also be used, if desired, on class B burettes :

a) on burettes, the jet of which forms part of the stopcock key (see figure 4), an identification number which shall be marked on the burette tube and repeated on the handle of the stopcock;

NOTE — In the case of burettes, the jet of which is joined to the stopcock barrel, such identification is unnecessary, because the delivery time cannot be influenced by the stopcock bore.

b) the delivery time, in seconds;