INTERNATIONAL STANDARD 383

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

Laboratory glassware — Interchangeable conical ground joints

Verrerie de laboratoire — Assemblages coniques rodés interchangeables

First edition — 1976-08-01

UDC 542.231.7 **Ref. No. ISO 383-1976 (E)**

Descriptors : laboratory glassware, joints (junctions), conical components, specifications, interchangeability.

Price based on 5 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.

Prior to 1972, the results of the work of the Technical Committees were published as ISO Recommendations; these documents are now in the process of being transformed into International Standards. As part of this process, Technical Committee ISO/TC 48 has reviewed ISO Recommendation R 383 and found it technically suitable for transformation. International Standard ISO 383 therefore replaces ISO Recommendation R 383-1964 to which it is technically identical.

ISO Recommendation R 383 was approved by the Member Bodies of the following countries :

Australia	Germany	Romania
Austria	Greece	Spain
Belgium	India	Sweden
Canada	Israel	United Kingdom
Chile	Japan	U.S.A.
Colombia	Netherlands	U.S.S.R.
Czechoslovakia	New Zealand	
France	Poland	

The Member Body of the following country expressed disapproval of the Recommendation on technical gorunds :

Italy*

* Subsequently, this Member Body approved the Recommendation.

No Member Body disapproved the transformation of ISO/R 383 into an International Standard.

Printed in Switzerland

Laboratory glassware — Interchangeable conical ground joints

0 INTRODUCTION

The purpose of this International Standard is to ensure interchangeability between standard conical ground glass joints, irrespective of where they are manufactured. In order to achieve interchangeability, it is necessary that each of the following requirements be adequately specified, including appropriate tolerances :

a) taper;

b) large end diameter;

c) length of ground zone;

d) surface finish.

The nominal dimensions listed below are based on the series of joints already widely used in many countries; in particular, the series of large end diameters represents the nearest acceptable compromise to the R 40/3 series of preferred numbers (5, 3, ..., 100) laid down in ISO 3, *Preferred numbers — Series of preferred numbers.*

From the practical point of view, and especially because of the difficulty of carrying out precise measurements on the ground portions of the finished joints, it is desirable to apply a gauging system which allows rapid checking of the essential dimensions. The definition of these dimensions in clause 6 is an integral part of this International Standard, but the system of gauging described in annex A, while it has been proved in practice as fully satisfactory, is not the only one which can be applied for the purpose.

The leakage test described in annex B is one which is commonly used for testing joints, but its inclusion in this International Standard is not intended to preclude the use of other tests which may be found more convenient for particular purposes. Attention is specifically drawn to the method of pneumatic gauging.[1]

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies the essential geometric requirements for interchangeability in relation to four series of conical ground glass joints for laboratory use.

2 REFERENCE

ISO/R 468, *Surface roughness.*

3 TAPER

The taper of the joints shall be such as to give one increment on diameter for ten increments on axial length, with a tolerance of ± 0,006 on the diameter increment, i.e. a taper of (1,00 ± 0,006)/10.

NOTE — Actual manufacturing techniques normally result in a tighter tolerance than that given above, but owing to the lack of experimental evidence it is not yet possible to reduce the specified value.

4 LARGE END DIAMETERS

The following series of large end diameters shall be adopted :

5 — 7,5 — 10 — 12,5 — 14,5 — 18,8 — 21,5 — 24 — 29,2 — 34,5 — 40 — 45 — 50 — 60 — 71 — 85 — 100 mm

5 LENGTH OF GROUND ZONE

The length of the ground zone l, in millimetres, is calculated using the formula

$$l = k\sqrt{d}$$

where

k is a constant;

d is the large end diameter, in millimetres.

1) This method is described in *Laboratory practice*, March 1958, Vol. 7, No. 3, "Pneumatic gauging applied to standard ground glass joints", by I.C.P. Smith.

The calculated length is rounded off to the nearest whole number.

The four series of joints listed in table 1 are obtained by using the values, 2, 4, 6 and 8 for the constant k.

$k6$ is the preferred series.

TABLE 1 — **Series of joints**

Dimensions in millimetres

Large end diameter	Length of ground zone			
	$k2$ series	$k4$ series	$k6$ series	$k8$ series
5		9	13	18
7,5		11	16	22
10		13	19	25
12,5		14	21	28
14,5		15	23	30
18,8	9	17	26	35
21,5		19	28	37
24	10	20	29	39
29,2	11	22	32	43
34,5	12	23	35	47
40	13		38	
45	13		40	
50	14		42	
60			46	
71			51	
85			55	
100			60	

6 TOLERANCES ON DIAMETER AND LENGTH

The diameter and length of the ground zone shall be such that, when it is placed with its axis in the plane of the dimensional frame shown in figure 1, it fits in such a way that the upper and lower edges of the ground surface fall within the zones of height h_1 and h_2 respectively, the values of d, l, h_1 and h_2 for any particular joint size being taken from table 2. For special purposes, the ground surface may extend beyond these limits, provided that the zone of length l is always included within this ground portion.

A system of gauging suitable for finding out whether joints fall within these limits is described in annex A.

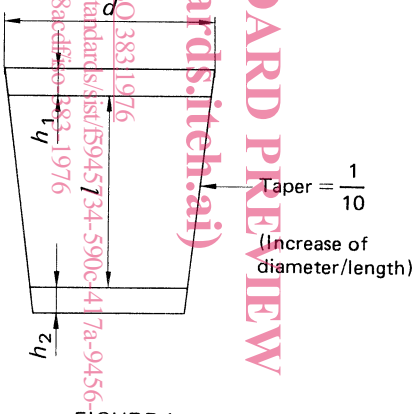

FIGURE 1

TABLE 2 — **Dimensions and tolerances**
(see clause 6 and figure 1)

Dimensions in millimetres

Nominal diameter of joint	d	$k2$ series			$k4$ series			$k6$ series			$k8$ series		
		l*	h_1**	h_2**	l*	h_1**	h_2**	l*	h_1**	h_2**	l*	h_1**	h_2**
5	5,1 ± 0,008				8	2	2	12	2	2	17	2,5	2
7,5	7,6 ± 0,008				10	2	2	15	2	2	21	2,5	2
10	10,1 ± 0,008				12	2	2	18	2	2	24	2,5	2
12,5	12,6 ± 0,010				13	2	2	20	2	2	27	2,5	2
14,5	14,6 ± 0,010				14	2	2	22	2	2	29	2,5	2
18,8	18,9 ± 0,015	8	2,5	2	16	2	2	25	2	2	34	2,5	2
21,5	21,6 ± 0,015				18	2	2	27	2	2	36	2,5	2
24	24,1 ± 0,015	9	2,5	2	19	2	2	28	2	2	38	2,5	2
29,5	29,3 ± 0,015	10	2,5	2	21	2	2	31	2	2	40	2,5	3,5
34,5	34,6 ± 0,015	11	2,5	2	22	2	2	34	2	2	43	2,5	3,5
40	40,1 ± 0,015	11	2,5	2,5				37	2	2			
45	45,1 ± 0,015	11	2,5	2,5				39	2	2			
50	50,1 ± 0,015	12	2,5	2,5				41	2	3			
60	60,1 ± 0,015							45	2	3			
71	71,1 ± 0,020							50	2	3			
85	85,1 ± 0,020							54	2	3			
100	100,1 ± 0,020							59	2	3			

* Tolerance on $l = \pm 0{,}015$.

** Tolerance on h_1 and $h_2 = \pm 0{,}010$.

7 SURFACE FINISH

The centre-line-average height of the ground surface shall not exceed 1 μm and should preferably be less than 0,5 μm.

NOTE – The "centre-line-average height" of the ground surface is the average value R_a of the roughness as defined in ISO/R 468.

8 DESIGNATION

For convenience of reference to joints complying with the geometric requirements of this International Standard, the use is recommended of a designation consisting of the following dimensions, expressed in millimetres :

– large end diameter of the joint (7,5 – 12,5 – 14,5 – 18,8 – 21,5 – 29,2 – 34,5 being rounded to 7 – 12 – 14 – 19 – 21 – 29 – 34 respectively), and

– length of ground zone,

separated by an oblique or horizontal stroke,

Example : 19/26 or $\frac{19}{26}$

ANNEX A

SUITABLE GAUGING SYSTEM FOR DIAMETER AND LENGTH OF CONICAL JOINTS

The suggested gauges are made of hardened steel or other suitable material. The gauges for sockets are conical plugs with a step at each end, and the gauges for cones are conical rings with a step at each end; they are shown in figures 2 and 3. The cone semi-angle of each gauge is $2° 51' 45'' \pm 15''$. (The sine of the specified angle is 0,049 94 ± 0,000 07.)

A separate gauge is required for each size of cone or socket, the gauge dimensions being given in table 2. When a socket or cone is fitted to its appropriate gauge, it should rest in such a position that the upper and lower ends of the ground zone lie wholly within the steps of height h_1 and h_2 respectively. For special purposes, the ground surface may extend beyond the outer extremity of the step at the smaller end, provided that it also extends to at least the inner extremity of the step at the larger end.

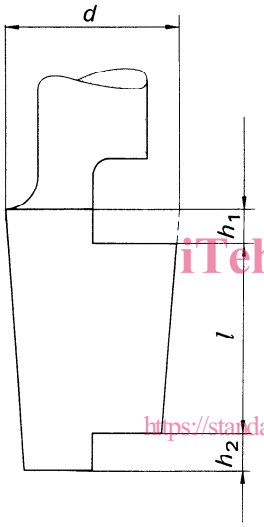

FIGURE 2 — **Gauge for sockets**

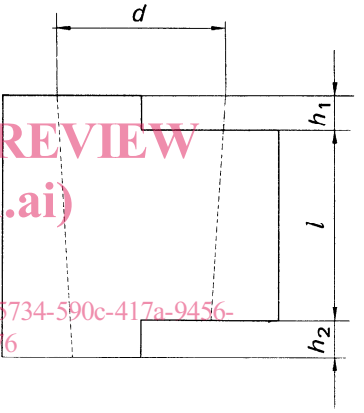

FIGURE 3 — **Gauge for cones**

ANNEX B

LEAKAGE TEST FOR CONICAL JOINTS

The leakage test is carried out on dry joints by observing the rate of increase in pressure in a previously evacuated system in communication with the atmosphere via the leaking joint. A suitable apparatus is used, as illustrated in figure 4, the details not being essential, provided that the total capacity of the system is approximately 1,5 l. It is essential to render all joints in the testing apparatus leak-proof and to check the apparatus before coupling in the joint to be tested. Any leakage found during checking must be negligible in comparison with the leakage measured during the test.

The degree of cleanliness of the ground surface is a vital factor affecting the rate of leakage. The components are first rubbed with a cloth soaked in a suitable solvent, for example cyclohexane, then dipped in the solvent and allowed to dry. Any particles adhering to the surfaces are removed with a camel's-hair brush. The components are then placed in turn in a vertical position in the apparatus and the system evacuated. No pressure, other than that exerted by the atmosphere, is applied to the joint.

When the mercury gauge reading is above 380 mm, the stopcock is closed and after 1 min the scale reading is noted. After a further 5 min, the scale reading is noted again.

Having equalized the pressures inside and outside the system, the component is turned on its axis through 90° and the test is then repeated.

NOTE – It has been found that when cones and sockets complying with the geometric requirements are tested under the above conditions, the rise in pressure in the system does not exceed 10 mm of mercury over a period of 5 min, the total capacity being 1,5 l. For total capacities differing slightly from 1,5 l, the corresponding maximum pressure rise is in inverse proportion to the capacity.

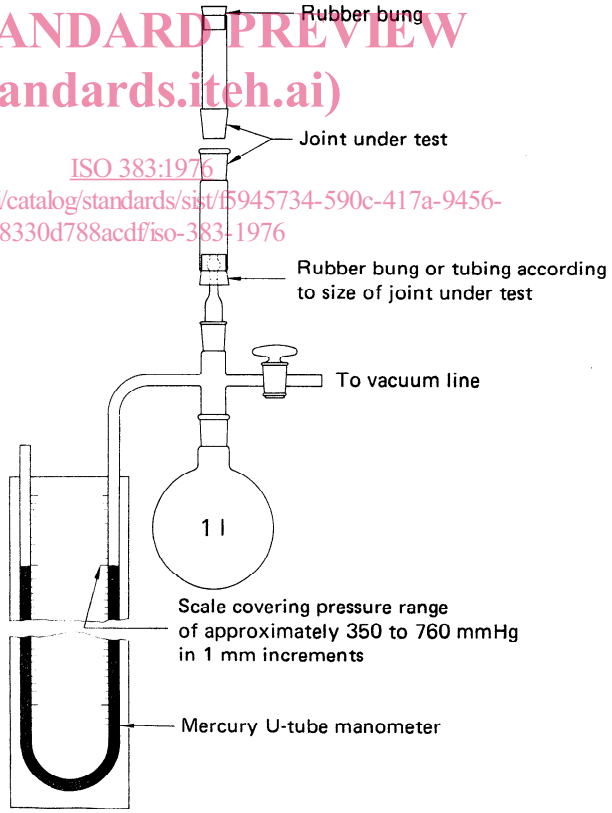

FIGURE 4 – **Suitable apparatus for leakage test on conical joints**

This page intentionally left blank