भारतीय मानक
Indian Standard

IS 5165 : 2017
ISO 383 : 1976

प्रयोगशाला ग्लासवेयर — अंतरविनिमेय शंकवाकार ग्राउंड जोड़

(पहला पुनरीक्षण)

Laboratory Glassware — Interchangeable Conical Ground Joints

(First Revision)

ICS: 71.040.20

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NATIONAL FOREWORD

This Indian Standard (First Revision) which is identical with ISO 383 : 1976 'Laboratory glassware — Interchangeable conical ground joints' issued by the International Organization for Standardization (ISO) was adopted by the Bureau of Indian Standards on the recommendation of the Glass, Glassware and Laboratoryware Sectional Committee and approval of the Chemical Division Council.

To ensure interchangeability between conical ground-glass joints, irrespective of where they are made, it is necessary that their requirements such as taper, large end diameter, length of ground zone and surface finish, including appropriate tolerances, be adequately specified. These aspects were well taken care of in the original standard published in 1969 by prescribing the nominal dimensions of joints already widely used then in many countries.

Considering the importance of following uniform practices globally, the committee felt the need of revising this standard and also felt that it would be more convenient to prepare this standard by adoption of ISO 383 on dual number basis. In this revision the title of this standard has been modified in line with ISO standard.

The text of ISO standard has been approved as suitable for publication as an Indian Standard without deviations. Certain conventions are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

a) Wherever the words 'International Standard' appears referring to this standard, they should be read as 'Indian Standard'.
b) Comma (,) has been used as a decimal marker, while in Indian Standards the current practice is to use a point (.) as the decimal marker.

In this adopted standard, reference appears to certain International Standards where the standard atmospheric conditions to be observed are stipulated which are not applicable to tropical/subtropical countries. The applicable standard atmospheric conditions for Indian conditions are 27 ± 2°C and 65 ± 5 percent relative humidity and shall be observed while using this standard.

In this adopted standard, reference appears to the following International Standard for which Indian Standard also exists. The corresponding Indian Standard, which is to be substituted in its place, is listed below along with its degree of equivalence, for the edition indicated:

International Standard	*Corresponding Indian Standard*	*Degree of Equivalence*
ISO 3 Preferred numbers — Series of preferred numbers	IS 1076 (Part 1) : 1985/ISO 3 Preferred numbers — Part 1: Series of preferred numbers (*second revision*)	Identical

This standard also makes a reference to the Packing and BIS Certification Marking and the testing and inspection clause of the product, details of which are given in National Annex A.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated expressing the result of a test, shall be rounded off in accordance with IS 2: 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

LABORATORY GLASSWARE — INTERCHANGEABLE CONICAL GROUND JOINTS

(First Revision)

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.

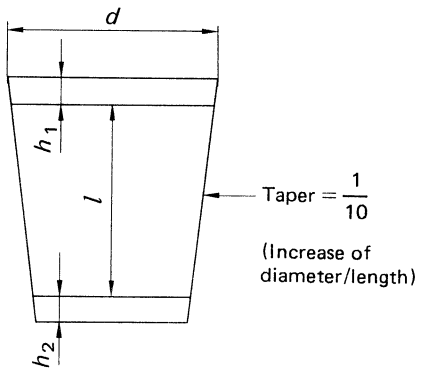

FIGURE 1

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.

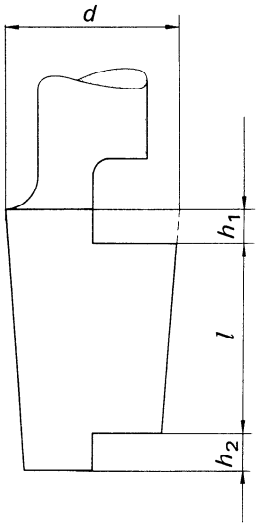

FIGURE 2 – **Gauge for sockets**

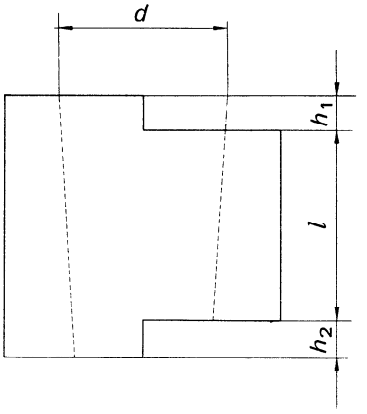

FIGURE 3 – **Gauge for cones**

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.

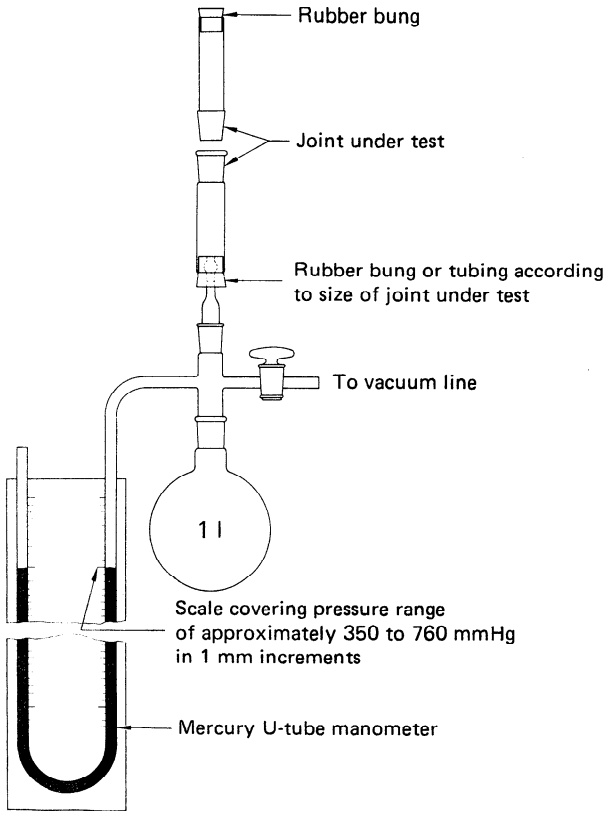

FIGURE 4 – **Suitable apparatus for leakage test on conical joints**

NATIONAL ANNEX A

(*National Foreword*)

A-1 PACKING

Joints shall be packed as agreed to between the purchaser and the supplier. For this purpose reference may also be made to IS 6945.

A-2 MARKING

A-2.1 Each cone and each socket shall have permanently and legibly marked on it as near as convenient to the ground portion:

a) The size designation of joint (*see* **8**);
b) Manufacturer's name or recognized trade mark, if any; and
c) Batch/Lot Number.

These inscriptions shall be employed whether the cones and sockets form integral parts of an apparatus or supplied as individual items. When joints form parts of other apparatus it is to be understood that this marking relates to the joint only and it should, therefore, be so placed as to be directly associated with the joint.

A-2.2 BIS Certification Marking

The product may also be marked with the Standard Mark.

A-2.2.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act,* 1986 and the Rules and Regulations made thereunder. The details of conditions under which the license for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

A-3 SAMPLING, TESTING AND INSPECTION OF GROUND JOINTS

A-3.1 Sampling and testing

A-3.1.1 Lot — All the joints in a single consignment produced under similar conditions of the same designation shall be put together to constitute a lot.

A-3.1.1.1 In order to ascertain the conformity of the lot to the requirements of this specification, samples shall be tested from each lot separately.

A-3.1.2 The number of joints to be chosen from the lot shall depend upon the size of the lot and shall be in accordance with Table 1 of IS 4426.

A-3.1.3 The joints shall be selected from the lot at random and in order to ensure the randomness of selection, procedures given in IS 4905 may be followed.

A-3.2 Number of Tests

All these samples drawn in **A-3.1.2** shall be tested for construction, dimensions and leakage test (*see* **5**).

A-3.3 Criteria for conformity

A-3.3.1 Any of the joints so selected shall be considered as defective if it fails to satisfy any of these requirements. The lot shall be considered as conforming to these requirements if the number of defective joints found is less than or equal to the corresponding acceptance number as in col **5** of Table 1 of IS 4426. If the number of defectives is greater than or equal to the rejection number as in col **6** of Table 1 of IS 4426, the lot shall be deemed as not conforming to these requirements. If the number of defectives is greater than the acceptance number but less than the rejection number, a second sample of the size equivalent to that of the first shall be taken to determine the conformity or otherwise of the lot. The number of defectives found in the first and second samples shall be combined and if the combined number of defectives is less than or equal to the corresponding acceptance number, as in col **5** of Table 1 of IS 4426, the lot shall be declared as conforming to the requirement, otherwise not.

A-3.3.2 The lot shall be declared as conforming to this standard, if it satisfies **A-3.3.1**.

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act*, 1986 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards : Monthly Additions'.

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Amendments Issued Since Publication

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