

ISO

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

ISO RECOMMENDATION

R 383

INTERCHANGEABLE CONICAL GROUND GLASS JOINTS

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BRIEF HISTORY

The ISO Recommendation R 383, *Interchangeable Conical Ground Glass Joints*, was drawn up by Technical Committee ISO/TC 48, *Laboratory Glassware and Related Apparatus*, the Secretariat of which is held by the British Standards Institution (BSI).

Work on this question by the Technical Committee began in 1950 and led, in 1960, to the adoption of a Draft ISO Recommendation.

In April 1960, this Draft ISO Recommendation (No. 346) was circulated to all the ISO Member Bodies for enquiry. It was approved, subject to a few modifications of an editorial nature, by the following Member Bodies :

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	

One Member Body opposed the approval of the Draft :

Italy.

The Draft ISO Recommendation was then submitted by correspondence to the ISO Council, which decided, in September 1964, to accept it as an ISO RECOMMENDATION.

INTERCHANGEABLE CONICAL GROUND GLASS JOINTS

INTRODUCTION

The purpose of this ISO Recommendation 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 should 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 Recommendation R 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 section 5 is an integral part of this ISO Recommendation, 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 ISO Recommendation 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. SCOPE

This ISO Recommendation covers the essential geometric requirements for interchangeability in relation to four series of conical ground glass joints for laboratory use.

2. TAPER

The taper of the joints should 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 $(1.00 \pm 0.006)/10$.

* 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.

3. LARGE END DIAMETERS

The following series of large end diameters should 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.

4. LENGTH OF GROUND ZONE

The length of the ground zone (*l*), in millimetres, should be calculated from the formula

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

where *k* = a constant,
d = large end diameter, expressed in millimetres,
the calculated length being 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*.

TABLE 1. — Series of joints
Dimensions in millimetres

Large end diameter	Length of ground zone				Large end diameter	Length of ground zone			
	<i>k</i> 2 series	<i>k</i> 4 series	<i>k</i> 6 series	<i>k</i> 8 series		<i>k</i> 2 series	<i>k</i> 4 series	<i>k</i> 6 series	<i>k</i> 8 series
5		9	13	18	34.5	12	23	35	47
7.5		11	16	22	40	13		38	
10		13	19	25	45	13		40	
12.5		14	21	28	50	14		42	
14.5		15	23	30	60			46	
18.8	9	17	26	35	71			51	
21.5		19	28	37	85			55	
24	10	20	29	39	100			60	
29.2	11	22	32	43					

5. TOLERANCES ON DIAMETER AND LENGTH

The diameter and length of the ground zone should 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.

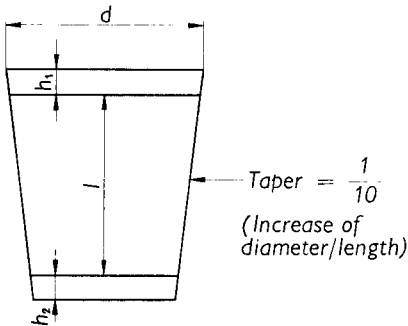


FIG. 1

TABLE 2. — Dimensions and tolerances

(see section 5 and Fig. 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 "				10	"	"	15	"	"	21	"	"
10	10.1 "				12	"	"	18	"	"	24	"	"
12.5	12.6 ± 0.010				13	"	"	20	"	"	27	"	"
14.5	14.6 "				14	"	"	22	"	"	29	"	"
18.8	18.9 ± 0.015	8	2.5	2	16	"	"	25	"	"	34	"	"
21.5	21.6 "				18	"	"	27	"	"	36	"	"
24	24.1 "	9	"	"	19	"	"	28	"	"	38	"	"
29.2	29.3 "	10	"	"	21	"	"	31	"	"	40	"	3.5
34.5	34.6 "	11	"	"	22	"	"	34	"	"	43	"	"
40	40.1 "	11	"	2.5				37	"	"			
45	45.1 "	11	"	"				39	"	"			
50	50.1 "	12	"	"				41	"	3			
60	60.1 "							45	"	"			
71	71.1 ± 0.020							50	"	"			
85	85.1 "							54	"	"			
100	100.1 "							59	"	"			

* Tolerance on $l = \pm 0.015$.** Tolerance on h_1 and $h_2 = \pm 0.010$.

6. SURFACE FINISH

The centre-line-average height of the ground surface should not exceed $1 \mu\text{m}$ and should preferably be less than $0.5 \mu\text{m}$.

NOTE. — The "centre-line-average height" of the ground surface is the average value R_a of the roughness as defined in ISO Recommendation R 468, *Surface Roughness*.*

7. DESIGNATION

For convenience of reference to joints complying with the geometric requirements of this ISO Recommendation, 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 and 34.5
being rounded to 7 - 12 - 14 - 19 - 21 - 29 and 34 respectively)

length of ground zone,

separated by an oblique or horizontal stroke,

e.g. 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 $2^{\circ} 51' 45'' \pm 15''$. (The sine of the specified angle is $0.049\ 94 \pm 0.000\ 07$).

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.

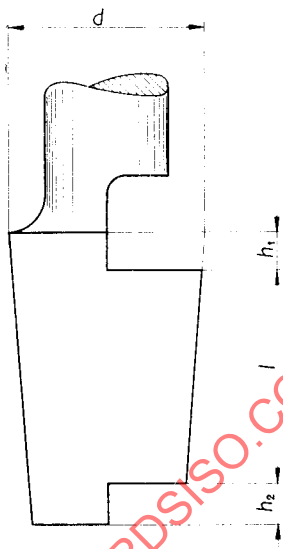


FIG. 2. — Gauge for sockets

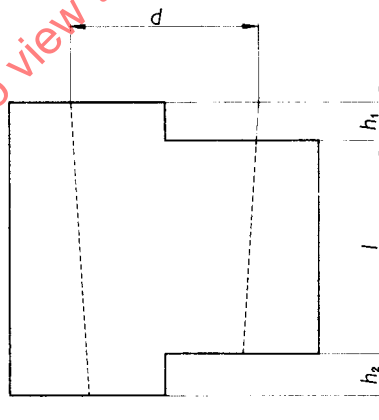


FIG. 3. — Gauge for cones