



Standard Specification for Interchangeable Taper-Ground Joints¹

This standard is issued under the fixed designation E676; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This specification covers designations, dimensions, and tolerances for only the ground surfaces of interchangeable taper-ground joints for laboratory and industrial equipment in full-length, medium-length, short-length, and international-length (ISO K-6 series) grindings.

NOTE 1—The dimensions pertaining to full-length, medium-length, and short-length joints, other than for the tolerance on length of grind, were taken directly from the now obsolete Commercial Standard CS 21.

NOTE 2—Tolerances on the diameters of the international-length joints do not agree with those given in ISO Recommendation R 383. These tolerances have been established to agree with those of CS 21 in order to prevent the negative projection (large end of inner joint being smaller than large end of outer joint) permitted by ISO.

NOTE 3—Although glass is the most commonly used material for ground joints, other materials may be used as specified. Taper-ground joints constructed from glass should be of suitable chemical and thermal properties in accordance with Specification E438. Joints should be as free as possible of visible defects and conform to Specification E671.

1.2 The following precautionary caveat pertains only to the Test Method portion, Section 4, of this specification. *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:²

- E438 Specification for Glasses in Laboratory Apparatus
- E671 Specification for Maximum Permissible Thermal Residual Stress in Annealed Glass Laboratory Apparatus
- E920 Specification for Commercially Packaged Laboratory Apparatus
- E921 Specification for Export Packaged Laboratory Apparatus

¹ This specification is under the jurisdiction of ASTM Committee E41 on Laboratory Apparatus and is the direct responsibility of Subcommittee E41.01 on Apparatus.

Current edition approved Nov. 1, 2012. Published November 2012. Originally approved in 1979. Last previous edition approved in 2007 as E676 – 02(2007). DOI: 10.1520/E0676-02R12.

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

E1133 Practice for Performance Testing of Packaged Laboratory Apparatus for United States Government Procurements

E1157 Specification for Sampling and Testing of Reusable Laboratory Glassware

2.2 U.S. Department of Commerce Standard:

CS 21 Interchangeable Taper-Ground Joints, Stopcocks, Stoppers, and Spherical-Ground Joints³

2.3 ISO Standard:

R 383 Interchangeable Conical Ground Glass Joints⁴

3. Requirements

3.1 Designations, dimensions, and tolerances shall be as shown in Fig. 1 and in Table 1, Table 2, Table 3, and Table 4.

3.2 *Surface Finish*—The roughness average (R_a) of the ground surface shall not exceed 1 μm (40 μin).

3.3 *Taper*—All taper-ground joints shall have a taper of 1 ± 0.006 mm of diameter per 10 mm of length (1 to 10).

3.4 *Leakage*—Using the leak test apparatus illustrated in Fig. 2, or one functionally similar to it, with the average differential pressure during the test kept above 600 mm Hg, the leak rate calculated from the test data (see 4.9) shall not exceed 0.05 torr-litres/s (or Pa-litres/s) when the inner and outer joints are assembled dry.

4. Test Method

4.1 Clean both joints to be tested with distilled water, and then dry them with a clean paper towel. Next, wipe the ground zones with a clean chamois to remove any remaining particles.

4.2 Tightly close the unground end of the joint to be connected to the manometer system, using a rubber stopper containing a concentric hole (or rubber tubing, depending upon the joint size under test) sized to fit snugly on the manometer connection, and mount the joint on the connection in an upright position.

4.3 Firmly plug the unground end of the other type of joint with a solid rubber stopper.

³ *Discontinued 1979*—U.S. Department of Commerce, Washington, DC 20234.

⁴ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

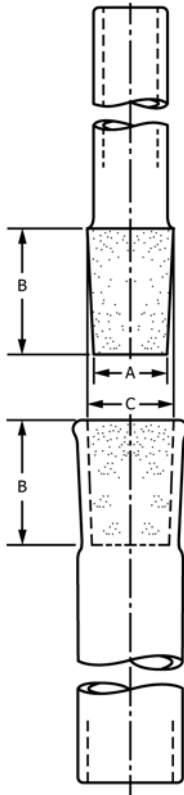


FIG. 1 Taper-Ground Joint

TABLE 1 Full-Length Taper-Ground Joints

Joint Size Designation	A Approximate Diameter at Small End, mm	B Approximate Length of Ground Zone, mm ^A	C Diameter at Large End of Ground Zone, mm ^B
7/25	5.0	25	7.5
10/30	7.0	30	10.0
12/30	9.5	30	12.5
14/35	11.0	35	14.5
19/38	15.0	38	18.8
24/40	20.0	40	24.0
29/42	25.0	42	29.2
34/45	30.0	45	34.5
40/50	35.0	50	40.0
45/50	40.0	50	45.0
50/50	45.0	50	50.0
55/50	50.0	50	55.0
60/50	55.0	50	60.0
71/60	65.0	60	71.0
103/60	97.0	60	103.0

TABLE 2 Medium-Length Taper-Ground Joints

Joint Size Designation	A Approximate Diameter at Small End, mm	B Approximate Length of Ground Zone, mm ^A	C Diameter at Large End of Ground Zone ^B
5/12	3.8	12	5.0
7/15	6.0	15	7.5
10/18	8.2	18	10.0
12/18	10.7	18	12.5
14/20	12.5	20	14.5
19/22	16.6	22	18.8
24/25	21.5	25	24.0
29/26	26.6	26	29.2
34/28	31.7	28	34.5
40/35	36.5	35	40.0

^A A tolerance of ±1.5 mm is allowed on both inner and outer members.

^B A tolerance of + 0.15 mm is allowed on inner members, and a tolerance of - 0.15 mm on outer members.

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4.4 Carefully mate the ground surfaces of the joints without exerting any pressure on them.

4.5 Gently apply a 225-g weight on the upper joint for seating pressure, then rotate the upper joint 90° and remove the weight.

4.6 After ensuring that the stopcock to the vacuum pump is in the closed position, turn on the pump and adjust the stopcock to the pump so that the mercury in the manometer rises to a

level such that the average differential pressure will remain above 600 mm at the conclusion of the test.

4.7 Air leakage is now allowed to occur through the mated joints for a timed interval, and the change in differential pressure is noted.

4.8 Repeat 4.1 through 4.7 once, ensuring in 4.5 that the upper joint is rotated 90 deg from its position in the first test.

4.9 Compute the leak rate in torr litres per second or pascal litres per second as follows:

$$\text{Leak rate} = \frac{\Delta \times V}{T} \quad (1)$$



TABLE 3 Short-Length Taper-Ground Joints

Joint Size Designation	A Approximate Diameter at Small End, mm	B Approximate Length of Ground Zone, mm ^A	C Diameter at Large End of Ground Zone, mm ^B
5/8	4.2	8	5.0
7/10	6.5	10	7.5
10/7	9.3	7	10.0
10/10	9.0	10	10.0
12/10	11.5	10	12.5
14/10	13.5	10	14.5
19/10	17.8	10	18.8
24/12	22.8	12	24.0
29/12	28.0	12	29.2
34/12	33.3	12	34.5
40/12	38.8	12	40.0
45/12	43.8	12	45.0
50/12	48.8	12	50.0
55/12	53.8	12	55.0
60/12	58.8	12	60.0
71/15	69.5	15	71.0

^A A tolerance of ± 1.5 mm is allowed on both inner and outer members.

^B A tolerance of + 0.15 mm is allowed on inner members, and a tolerance of – 0.15 mm on outer members.

where:

ΔP = maximum change in differential pressure noted in test, mmHg or Pa,

V = total evacuated volume, including manometer tubing, connections, flask, and joints, litres, and

T = time of test, s.

5. Sampling and Testing

5.1 For sampling and testing refer to Specification E1157.

6. Product Marking

6.1 Interchangeable taper-ground joints conforming to this specification may be marked on both members with

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indicating standard taper, the size designation, and the trade-

TABLE 4 International-Length Taper-Ground Joints

Joint Size Designation	A Approximate Diameter at Small End, mm	B Approximate Length of Ground Zone, mm ^A	C Diameter at Large End of Ground Zone, mm ^B
5/13	3.7	13	5.0
7/16	5.9	16	7.5
10/19	8.1	19	10.0
12/21	10.4	21	12.5
14/23	12.2	23	14.5
19/26	16.2	26	18.8
21/28	18.7	28	21.5
24/29	21.1	29	24.0
29/32	26.0	32	29.2
34/35	31.0	35	34.5
40/38	36.2	38	40.0
45/40	41.0	40	45.0
50/42	45.8	42	50.0
60/46	55.4	46	60.0
71/51	65.9	51	71.0
85/55	79.5	55	85.0
100/60	94.0	60	100.0

^A A tolerance of ± 1.5 mm is allowed on both inner and outer members.

^B A tolerance of + 0.15 mm is allowed on inner members, and a tolerance of – 0.15 mm on outer members.

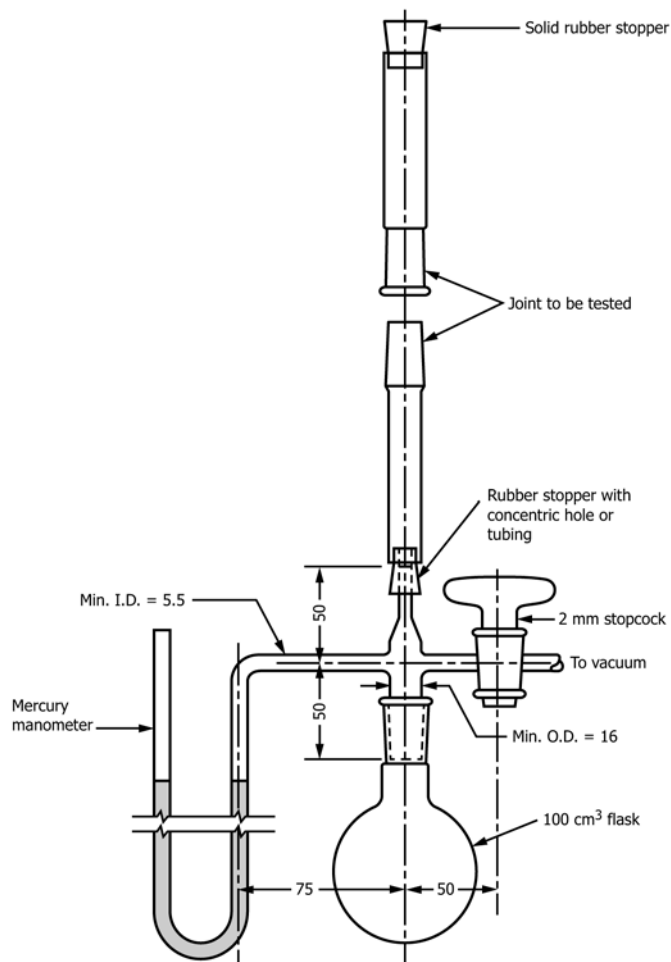
mark of the manufacturer or distributor. This symbol is the manufacturer's assurance to purchasers that the item identified by the symbol is a standard interchangeable size and type, and is manufactured within the tolerances permitted by this specification. It shall not be used on joints, nor in advertising descriptions of joints, of any size or type other than those described in this specification.

7. Packaging

7.1 For packaging select from Specification E920, E921, or Practice E1133.

8. Keywords

8.1 ground; joints



NOTE 1—Evacuated volume of manometer tubing, connections, and flask shall be 100 to 150 cm³. Joint volume shall be added for leak rate calculation.

NOTE 2—Leak rate of apparatus shall not exceed 5 % of that of joint being tested.

NOTE 3—Dimensions are in millimetres approximate, except for minimum diameters.

FIG. 2 Apparatus for Leak Test

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