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Standard Specification for Laboratory Glass Separatory Funnels[1]

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INTRODUCTION

Separatory funnels are used in laboratories primarily for liquid extractions, and are intended to facilitate the separation of two immiscible liquids of different densities into separate layers. Some funnels are used to add reagent solution into a reaction vessel. They are, therefore, often provided with a tapered ground joint at the bottom of the delivery stem for joining to vessels having similarly tapered ground necks. They may also be provided with pressure equalizing side arms.

1. Scope

1.1 This specification provides standard dimensional requirements for glass separatory funnels for general laboratory 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

E675 Specification for Interchangeable Taper-Ground Stopcocks And Stoppers

E676 Specification for Interchangeable Taper-Ground Joints

E694 Specification for Laboratory Glass Volumetric Apparatus

E911 Specification for Glass Stopcocks with Polytetrafluoroethylene (PTFE) Plugs

3. Classification

3.1 Separatory funnels shall be in the following types and sizes:

3.1.1 *Type 1A*—Cylindrical shape with open top.

3.1.1.1 *Sizes*—60, 125, and 250 cm^3.

3.1.2 *Type 1B*—Cylindrical with stopper finish top.

3.1.2.1 *Sizes*—60, 125, 250, 500, and 1000 cm^3.

3.1.3 *Type 1C*—Cylindrical with stopper finish top, graduated.

3.1.3.1 *Sizes*—125, 250, 500, and 1000 cm^3.

3.1.4 *Type 2*—Globe shape with stopper finish top.

3.1.4.1 *Sizes*—60, 125, 250, 500, 1000, 2000, and 4000 cm^3.

3.1.5 *Type 3*—Globe shape, "French," with stopper finish top.

3.1.5.1 *Sizes*—125, 250, 500, and 1000 cm^3.

3.1.6 *Type 4*—Pear shape, Squibb, with stopper finish top.

3.1.6.1 *Sizes*—20, 60, 125, 250, 500, 1000, 2000, and 4000 cm^3.

NOTE 1—The term millilitre (mL) is commonly used as a special name for the cubic centimetre (cm^3) and similarly the litre (L) for 1000 cubic centimetres, in accordance with the International System of Units (SI).

4. Materials and Annealing

4.1 Separatory funnels shall be made of borosilicate glass conforming to the requirement of Type 1, Class A of Specification E438.

4.2 Maximum residual thermal stress shall be such as to conform to Specification E671.

5. Design

5.1 Type 1 cylindrical separatory funnels shall have straight sides and comply with the dimensions given in Table 1. (Type 1A stem length shall comply with Table 2.) See Fig. 1, Type 1A; 1B; and 1C.

5.2 Type 2 globe-shaped separatory funnels shall be roughly globular in shape and have dimensions complying with those given in Table 2. See Fig. 2, Type 2.

5.3 Type 3 separatory funnels shall be like Type 2, however, a straight-walled portion shall be between the globe and the stopcock assembly and shall meet the dimensions listed in Table 2, except for stem length which shall have a maximum length of 40 mm. See Fig. 2, Type 3.

[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.

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[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.

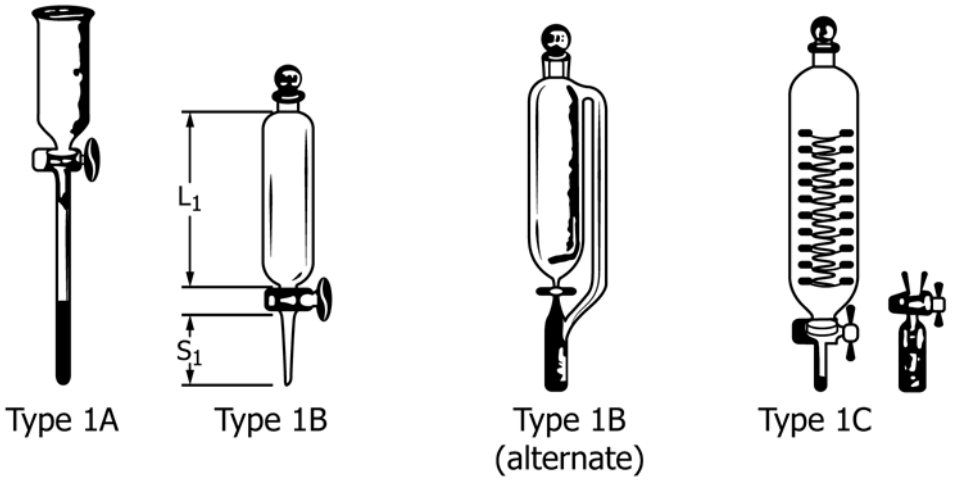

FIG. 1 Cylindrical Body Funnels

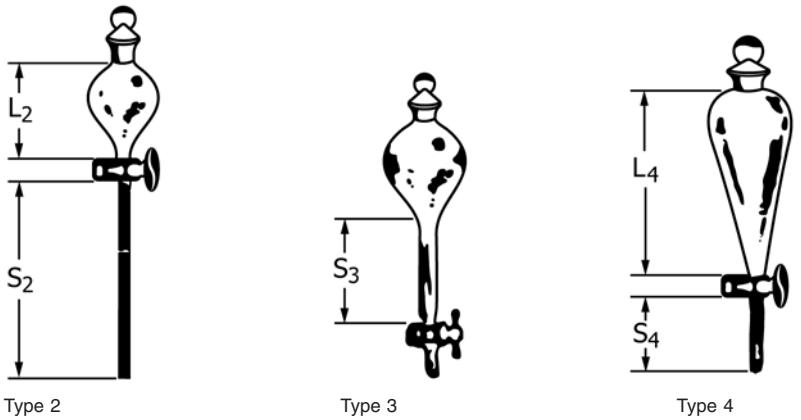

FIG. 2 Globe and Squibb-Pear Shaped Body Funnels

TABLE 1 Cylindrical Body Funnels

Nominal Capacity, mL	60	125	250	500	1000
Body height, max (mm) (see Fig. 1 "L_1 ")	135	200	225	290	390
Body diameter, max (mm)	34	44	53	67	79
Body wall thickness, min (mm)	0.8	0.8	0.9	0.9	1.3
Stem length, max (mm) (see Fig. 1 "S_1 ")	100	100	100	100	100
Stem diameter, max (mm)	12	12	12	12	12
Stem wall thickness min (mm)	1.5	1.5	1.5	1.5	1.5
Stopcock size	2	2	2	4	4
Stopper size	16	22	22	27	27
Stem taper-ground joint	14/20	24/40	24/40	24/40	...

5.4 Type 4 Squibb separatory funnels shall be pear-shaped or conical-shaped and meet the requirements of Table 3. See Fig. 2, Type 4.

5.5 Type 1 and 4 separatory funnels may be supplied with a taper-ground joint below the stopcock, (see Specification E676 and Fig. 1C. Type 1 funnels with this feature may also have pressure equalizing tubes placed at the back or opposite side of the funnel when it is in the position of normal use with the handle of the stopcock on the right. See Fig. 1B).

5.6 All types except Type 1A shall have stoppers or be taper-ground to receive stoppers in accordance with Specifications E675 or E676. Stoppers of suitable inert plastic material may be permitted as an alternative to glass but must also comply with Specification E675. All stoppers shall bear a size identification.

5.7 All types shall have stopcock assemblies. They shall be designed to permit smooth and precise control of outflow and to meet the permissible leakage rate requirements allowed in Specification E675. Stopcocks shall be made of glass or from suitable inert plastic material such as polytetrafluoroethylene (PTFE) and must comply with Specification E911, or form a seal by having PTFE plug ends butt against a constriction in the glass shell.

5.8 Delivery stems for Types 1B and C, 3, and 4 should have a bore wide enough to avoid formation of a liquid column, that could lead to unsatisfactory separation. Type 1A and Type 2 funnel stems shall conform to stem dimensions of Table 2. Stem tip shall be at an angle of 30 or 45°.

TABLE 2 Globe Shaped Body Funnels

Nominal Capacity, (mL)	30	60	125	250	500	1000	2000	4000
Body height, max (mm) (see Fig. 2 "L_2 ")	75	85	110	135	175	215	255	290
Body diameter, max (mm)	50	55	70	90	110	140	170	210
Body wall thickness, min (mm)	0.8	0.8	0.8	0.9	0.9	1.3	1.3	1.3
Straight wall length, max (mm) (Type 3 only) (see Fig. 2 "S_3 ")	110	130	130	130	135	140	165	...
Straight wall diameter, max (mm) (Type 3 only)	18	18	18	18	25	35	35	...
Stem length, max (mm)[A] (see Fig. 2" S_2 ")	180	180	180	180	180	180	135	135
Stem diameter, max (mm)	12	12	12	12	12	12	14	15
Stem wall thickness, min (mm)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Stopcock size	2	2	2	2	4	4	6	8
Stopper size	16	16	22	22	27	27	38	38

[A] Type 3 50 mm max.

TABLE 3 Squibb Pear Shaped Body Funnels

Nominal Capacity, (mL)	30	60	125	250	500	1000	2000	4000
Body height, max (mm) (see Fig. 2 "L_4 ")	85	140	160	200	225	255	340	480
Body diameter, max (mm)	45	60	65	80	105	125	155	210
Body wall thickness, min (mm)	0.8	0.8	0.8	0.9	0.9	1.0	1.3	1.3
Stem length, max (mm) (see Fig. 2 "S_4 ")	75	75	75	75	75	75	75	75
Stem diameter, max (mm)	12	12	12	12	12	12	14	15 or 19[A]
Stem wall thickness, min (mm)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Stopcock size	2	2	2	2 or 4	4	4	6	8 or 10[A]
Stopper size	9 or 13	16	22	22	27	27	38	38
Stem taper-ground joint	...	...	14/20, 19/22 or 24/40	24/40	24/40	24/40	...	...

6. Graduations

6.1 Type 1C separatory funnels shall have a graduated scale placed centrally about the vertical axis of the funnel when it is in position of normal use with the handle of the stopcock on the right. See Table 4 for specifications. (For graduation pattern and figuring see Specification E694.)

TABLE 4 Graduated Cylindrical Body Funnels

Nominal Capacity (mL)	50	100	125	250	500	1000
Subdivision (mL)	5	5	1	2 or 5	5	10
Numbered at least at every milli-litre	10	10	10	20 or 50	50	100

6.1.1 The graduation marks may be figured in ascending order or in both ascending and descending order.

6.1.2 Subdivision and numbering shall conform to Table 4.

7. Markings

7.1 Each separatory funnel shall be permanently marked with the name or known trademark of the manufacturer, or both, the nominal capacity, except for graduated cylindrical funnels, and the symbol cm^3 , mL, or L.

8. Keywords

8.1 funnels; glass; separatory