

JIS

JAPANESE INDUSTRIAL STANDARD

Glass Apparatus for Chemical Analysis

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In the event of any doubt arising,
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JAPANESE INDUSTRIAL STANDARD
Glass Apparatus for Chemical Analysis

J I S
R 3503-1987

1. Scope

This Japanese Industrial Standard specifies the glass apparatus for chemical analysis, hereinafter referred to as the "glass apparatus".

2. Classification

The glass apparatus shall be classified as given in Table 1 according to shape.

Applicable Standards:

JIS K 2254-Testing Method for Distillation of Petroleum Products

JIS K 2270-Testing Method for Carbon Residue of Crude Oil and Petroleum Products (Conradson Method)

JIS R 3502-Testing Method of Glass Apparatus for Chemical Analysis

JIS R 3646-Interchangeable Conical Ground Glass Joints (Full Length)

JIS R 3647-Interchangeable Conical Ground Glass Joints (Medium Length)

JIS R 3648-Interchangeable Conical Ground Glass Joints (Short Length)

JIS R 3650-Interchangeable Conical Ground Glass Joints for Narrow Mouth Bottle

Corresponding International Standards:

ISO 383-Laboratory glassware-Interchangeable conical ground joints

ISO 384-Laboratory glassware-Principles of design and construction of volumetric glassware

ISO 1773-Laboratory glassware-Boiling flasks (narrow-necked)

ISO 4799-Laboratory glassware-Condensers

ISO 4800-Laboratory glassware-Separating funnels and dropping funnels

Table 1

Classifi- cation	Name	No. of Fig.
Beaker	Beaker	1
	Tall beaker	2
	Conical beaker	3
Flask	Round-bottom flask	4
	Interchangeable ground joint short necked round-bottom flask	5
	Interchangeable ground joint round-bottom flask	6
	Flat-bottom flask	7
	Erlenmeyer flask	8
	Interchangeable ground joint Erlenmeyer flask	9
	Egg-apple type flask	10
	Interchangeable ground joint egg-apple type flask	11
	Kjeldahl flask	12
	Interchangeable ground joint Kjeldahl flask	13
	Side-arm flask	14
	Engler flask	15
	Claisen flask	16
	Three-mouthed round-bottom flask	17
	Interchangeable ground joint three-mouthed round-bottom flask	18-1
	Interchangeable ground joint three-mouthed round-bottom flask	18-2
	Interchangeable ground joint iodine flask Type A	19-1
	Interchangeable ground joint iodine flask Type B	19-2
Dish	Round-bottom evaporating dish	20
	Flat-bottom evaporating dish	21
	Crystallizing dish	22
	Petri dish	23
Test tube	Test tube	24
Funnel	Funnel	25
	Long-leg funnel	26
	Thick-matter funnel	27
	Thick-wall separating funnel	28
	Separating funnel	29
	Squibb type separating funnel	30
Bottle	Wide-mouthed bottle with ground stopper	31
	Narrow-mouthed bottle with ground stopper	32
	Under-mouthed bottle with ground stopper	33
	Suction filter bottle	34
Desiccator	Desiccator	35
	Upper-mouthed desiccator	36

Table 1 (Continued)

Classifi- cation	Name	No. of Fig.
Condenser	Liebig condenser	37
	Interchangeable ground joint Liebig condenser	38
	Allihn condenser	39
	Interchangeable ground joint Allihn condenser	40
	Coiled condenser	41
	Interchangeable ground joint coiled condenser	42
	Dimroth condenser	43
	Interchangeable ground joint Dimroth condenser	44
Gas apparatus	Kipp's gas generator	45
	Interchangeable ground joint bottle for gas washing	46
	Interchangeable ground joint gas washing bottle	47
	Interchangeable ground joint gas washing bottle with filter plate	48
	Interchangeable ground joint U tube	49
	Gas-drying tower	50
Weighing bottle	Flat-type weighing bottle	51
	Cylinder-type weighing bottle	52
Pycnometer	Gay-Lussac type pycnometer	53
	Gay-Lussac type pycnometer with thermometer	54
	Wardon type pycnometer	55
	Herbert type pycnometer	56
Filter	Sintered-glass filter plate	57
	Crucible type sintered-glass filter	58
	Büchner funnel type sintered-glass filter	59
	Funnel type sintered-glass filter	60
Others	Adapter	61
	Interchangeable upper ground joint adapter	62
	Interchangeable both-end ground joint adapter	63
	One-way cock	64
	Interchangeable ground joint Soxhlet extractor	65
	Interchangeable ground joint "J" type connecting tube	66
	Interchangeable ground joint K type connecting tube	67
	Interchangeable ground joint suction filtering flask	68
	Interchangeable ground joint gas drying tower	69
	Interchangeable ground joint linear tube type connecting tube	70
	Interchangeable ground joint reducing pressure linear type connecting tube	71
	Interchangeable ground joint Kjeldahl type trap sphere	72
	Interchangeable ground joint "C" type connecting tube	73
	Interchangeable ground joint Y type connecting tube	74
	Interchangeable ground joint gas blowing-in tube	75

Table 1 (Continued)

Classifi- cation	Name	No. of Fig.
Others	Interchangeable ground joint exhaust gas tube	76
	Interchangeable ground joint bend type connecting tube	77
	Interchangeable ground joint pressure reducing connecting tube	78
	Interchangeable ground joint pressure reducing connecting tube (double branched tube)	79
	Cylinder type dropping funnel	80
	Interchangeable ground joint cylinder type dropping funnel	81
	Interchangeable ground joint separating funnel	82
	Interchangeable ground joint Squibb type separating funnel	83

3. Grades

The grades of glass apparatuses shall be divided according to heat-resistant temperature and alkali elution amount. Their abbreviated mark shall be as follows:

- (1) Hard Grade 1 JR-1
- (2) Hard Grade 2 JR-2
- (3) Normal quality JR-3

4. Quality

The quality of glass apparatus shall be in accordance with Table 2.

Table 2

Quality item	Grade		Normal quality
	Grade 1	Grade 2	
Heat resistant temperature °C	250	180	70
Alkali elution amount mg	0.05 max.	0.1 max.	2.5 max.
Wall-thickness arrangement	To be averaged.		
Shape	To be correct and to be free from cracks.		
Function	To be capable of satisfy the purposes of use sufficiently.		
Substrate	To be free from mixing of non-melt and foreign matters. To be transparent excepting the special substrate.		
Ground joint	To be gas tight or water tight.		
Strain	Interference zone due to strain inspector ⁽¹⁾ does not appear remarkably.		

Note (1) The strain inspector is the apparatus to find strains of glass and to observe. After polarizing light by polarization plate or suitable reflecting plate and passing through glass to be tested, strains are inspected by observing according to polarization plate or an apparatus substitutional thereto.

5. Nominal Capacity or Dimensions and Shape, Dimensions of Each Part, and Mass

The nominal capacity or dimensions and shape, dimensions of each part, and mass shall be in accordance with Figs. 1 to 83.

However, the numerical values in the figures and those shown in parentheses in dimension symbol are informative reference value.

- Remarks 1. The taper of ground joint part shall be 1/10. The angle of generators of circular cone measured in a cross section containing axial line shall be 5°43'30".
2. The permissible deviation of taper shall be ± 0.006 mm for length 10 mm.
3. Taper dimension of ground joint part shall, as a rule, be as follows:

JIS R 3646
JIS R 3647
JIS R 3648
JIS R 3650

Further, symbol ∇ shown in figures indicates interchangeable conical ground joint.

6. Test Methods

The test methods of glass apparatus shall be in accordance with JIS R 3502.

7. Inspection

The inspection of glass apparatus shall be carried out on the following items:

- (1) Shape, dimensions, capacity and mass shall comply with the quality specified in 5.
- (2) Arrangement of wall thickness, shape, function, substrate, ground joint and strain shall comply with the quality specified in 4.
- (3) Heat resistant temperature and alkali elution amount shall be subjected to the tests of 6. and, comply with the quality specified in 4.

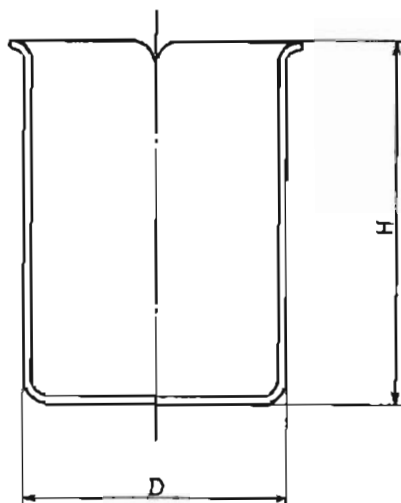
8. Marking

The glass apparatuses or their packages shall be marked with the following items:

- (1) Name or its mark
- (2) Grade or its mark
- (3) Manufacturer's name or its mark

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Fig. 1. Beaker

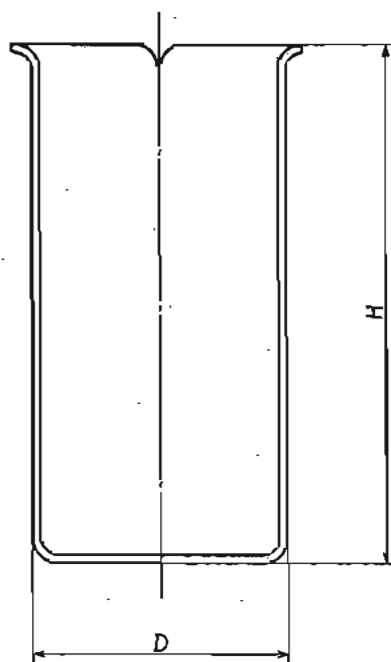


Unit: mm

Nominal capacity (ml)	50	100	200	300	500	1 000	2 000	3 000	5 000
Outer diameter of shell D	46 ± 1	55 ± 1	67 ± 1	78 ± 1	90 ± 2	110 ± 2	135 ± 3	153 ± 3	180 ± 5
Height (H)	60 ± 2	70 ± 2	89 ± 2	103 ± 2	120 ± 3	150 ± 3	200 ± 3	225 ± 3	275 ± 5
Lowest mass (g)	22	28	50	75	100	180	350	500	945

- Remarks 1. The mouth shape shall be that with a lip and attached with spill mouth.
2. The capacity marking and spaces for memory shall be applied with sand mark or baking.
3. Beakers shall be designated by the name and nominal capacity.
- Example: beaker 200 ml

Fig. 2. Tall Beaker



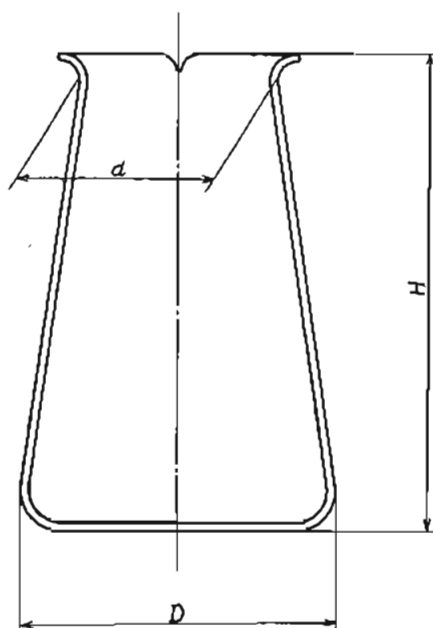
Unit: mm

Nominal capacity (ml)	50	100	200	300	500
Outer diameter of shell D	41 ± 1	50 ± 1	60 ± 1	66 ± 1	77 ± 2
Height (H)	72 ± 2	88 ± 2	110 ± 2	135 ± 2	152 ± 3
Lowest mass (g)	38	51	70	85	120

- Remarks 1. The mouth shape shall be that with a lip and attached with spill mouth.
2. The capacity marking and spaces for memory shall be applied with sand mark or baking.
3. Tall beakers shall be designated by the name and nominal capacity.

Example: tall beaker 300 ml

Fig. 3. Conical Beaker



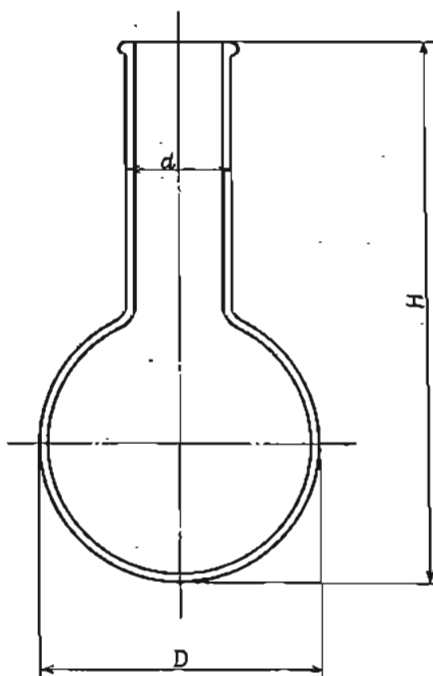
Unit: mm

Nominal capacity (ml)	50	100	200	300	500
Outer diameter of shell D	50 ± 2	59 ± 2	73 ± 2	84 ± 2	97 ± 2
Outer diameter of upper part (d)	32 ± 2	38 ± 2	43 ± 2	47 ± 2	55 ± 2
Height (H)	70 ± 3	92 ± 3	110 ± 3	132 ± 3	143 ± 3
Lowest mass (g)	22	28	40	70	90

- Remarks 1. The mouth shape shall be that with a lip and attached with spill mouth.
2. The capacity marking and spaces for memory shall be applied with sand mark or baking.
3. Conical beakers shall be designated by the name and nominal capacity.

Example: conical beaker 300 ml

Fig. 4. Round-Bottom Flask



Unit: mm

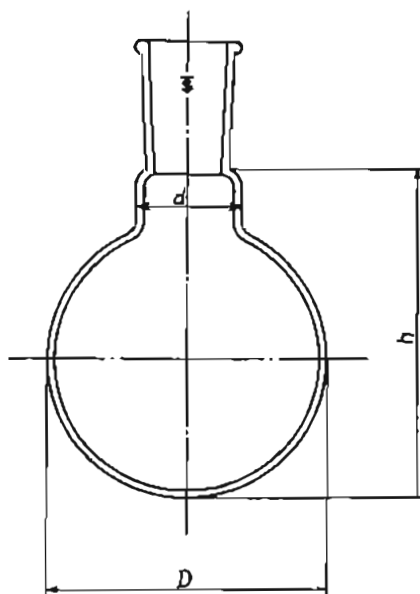
Nominal capacity (ml)	50	100	200	300	500	1 000	2 000	3 000
Outer diameter of sphere D	53 ± 3	65 ± 3	80 ± 3	93 ± 3	108 ± 3	135 ± 4	170 ± 4	200 ± 4
Height (H)	105 ± 3	126 ± 3	155 ± 3	180 ± 3	210 ± 3	260 ± 3	325 ± 3	370 ± 3
Outer diameter of neck (d)	20 ± 1	20 ± 1	25 ± 1	28 ± 1	28 ± 1	34 ± 2	38 ± 2	40 ± 2
Rubber stopper (No.)	4	4	7	8	8	11	12	13
Lowest mass (g)	20	29	45	62	90	150	300	380

- Remarks 1. The mouth shape shall be that with a lip.
2. The capacity marking and spaces for memory shall be applied with sand mark or baking.
3. Round-bottom flasks shall be designated by the name and nominal capacity.

Example: round-bottom flasks 50 ml

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Fig. 5. Interchangeable Ground Joint Short Necked Round-Bottom Flask



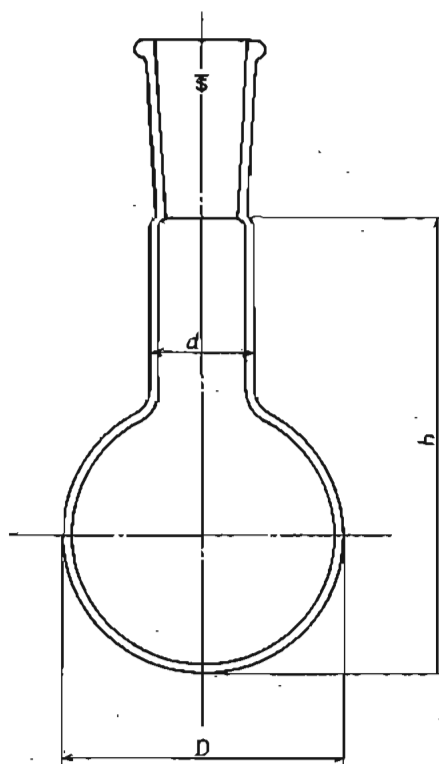
Unit: mm

Nominal capacity (ml)	50	100	200	300	500	1 000	2 000	3 000
Outer diameter of sphere D	53 ± 3	65 ± 3	80 ± 3	93 ± 3	108 ± 3	135 ± 4	170 ± 4	200 ± 4
Height (h)	70 ± 3	90 ± 3	110 ± 3	120 ± 3	145 ± 3	185 ± 3	220 ± 3	260 ± 3
Outer diameter of neck (d)	28 ± 1	28 ± 1	28 ± 1	28 ± 1	28 ± 1	34 ± 2	38 ± 2	40 ± 2
Symbol of ground joint	∇ 24/40	∇ 24/40	∇ 24/40	∇ 24/40	∇ 24/40	∇ 29/42	∇ 29/42	∇ 29/42

- Remarks 1. The interchangeable ground joint given in the table shall, as a rule, be used, but that of approximate Standard dimensions may be used.
2. Outer diameter of neck may be changed according to the symbol of interchangeable ground joint.
3. The capacity marking, space for memory, and symbol of interchangeable ground joint ∇ shall be applied with sand mark or baking.
4. Interchangeable ground joint short necked round-bottom flasks shall be designated by the name, nominal capacity and symbol for interchangeable ground joint.

Example: interchangeable ground joint short necked round-bottom flask 500 ml ∇ 24/40.

Fig. 6. Interchangeable Ground Joint Round-Bottom Flask



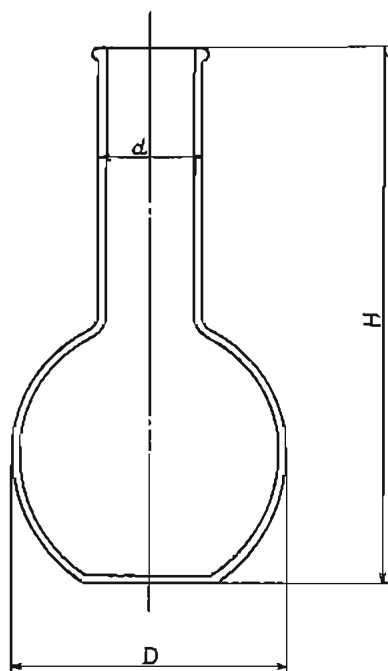
Unit: mm

Nominal capacity (ml)	50	100	200	300	500	1 000	2 000	3 000
Outer diameter of sphere D	53 ± 3	65 ± 3	80 ± 3	93 ± 3	108 ± 3	135 ± 4	170 ± 4	200 ± 4
Height (h)	90 ± 3	110 ± 3	130 ± 3	140 ± 3	165 ± 3	215 ± 3	250 ± 3	290 ± 3
Outer diameter of neck (d)	28 ± 1	28 ± 1	28 ± 1	28 ± 1	28 ± 1	34 ± 2	38 ± 2	40 ± 2
Symbol of ground joint ㏈	㏈ 24/40	㏈ 24/40	㏈ 24/40	㏈ 24/40	㏈ 24/40	㏈ 29/42	㏈ 29/42	㏈ 29/42

- Remarks 1. The interchangeable ground joint given in the table shall, as a rule, be used, but that of approximate Standard dimensions may be used.
2. Outer diameter of neck may be changed according to the symbol of interchangeable ground joint.
3. The capacity marking, space for memory, and symbol of interchangeable ground joint ㏈ shall be applied with sand mark or baking.
4. Interchangeable ground joint round-bottom flasks shall be designated by the name, nominal capacity and symbol of interchangeable ground joint.

Example: interchangeable ground joint round-bottom flask
500 ml ㏈ 24/40

Fig. 7. Flat-Bottom Flask



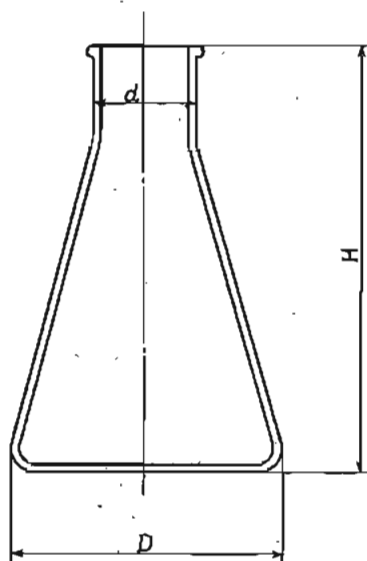
Unit: mm

Nominal capacity (ml)	50	100	200	300	500	1 000	2 000	3 000
Outer diameter of sphere D	53 ± 1	65 ± 1	80 ± 1	93 ± 2	108 ± 2	135 ± 2	170 ± 2	200 ± 3
Height (H)	105 ± 3	126 ± 3	155 ± 3	180 ± 3	210 ± 3	260 ± 3	325 ± 3	370 ± 3
Outer diameter of neck (d)	20 ± 1	20 ± 1	25 ± 1	28 ± 1	28 ± 1	34 ± 2	38 ± 2	40 ± 2
Rubber stopper (No.)	4	4	7	8	8	11	12	13
Lowest mass (g)	20	29	45	62	90	150	300	380

- Remarks 1. The mouth shape shall be that with a lip.
2. The capacity marking and spaces for memory shall be applied with sand mark or baking.
3. Flat-bottom flasks shall be designated by the name and nominal capacity.

Example: flat-bottom flask 50 ml

Fig. 8. Erlenmeyer Flask



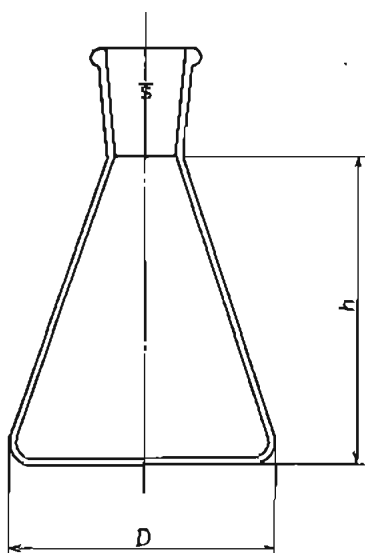
Unit: mm

Nominal capacity (ml)	50	100	200	300	500	1 000	2 000	3 000
Outer diameter of shell (D)	52 ± 3	64 ± 3	80 ± 3	90 ± 3	108 ± 3	133 ± 3	172 ± 3	190 ± 5
Height (H)	82 ± 3	102 ± 3	127 ± 3	148 ± 3	170 ± 3	215 ± 3	270 ± 3	290 ± 3
Outer diameter of neck (d)	20 ± 1	23 ± 1	28 ± 1	30 ± 1	32 ± 2	42 ± 2	43 ± 2	50 ± 2
Rubber stopper (No.)	4	6	8	9	10	13	14	17
Lowest mass (g)	18	22	45	80	100	160	320	400

- Remarks 1. The mouth shape shall be that with a lip.
2. The capacity marking and spaces for memory shall be applied with sand mark or baking.
3. Erlenmeyer flasks shall be designated by the name and nominal capacity.

Example: Erlenmeyer flask 50 ml

Fig. 9. Interchangeable Ground Joint Erlenmeyer Flask



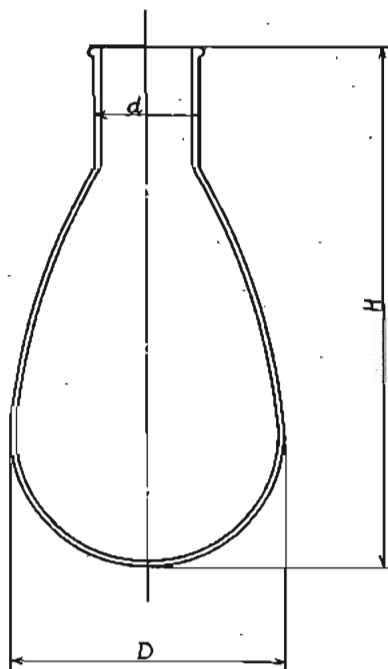
Unit: mm

Nominal capacity (ml)	50	100	200	300	500	1 000	2 000	3 000
Outer diameter of shell D	52 ± 3	64 ± 3	80 ± 3	90 ± 3	108 ± 3	133 ± 3	172 ± 3	190 ± 5
Height (h)	59 ± 3	79 ± 3	105 ± 3	121 ± 3	151 ± 3	190 ± 3	260 ± 3	300 ± 3
Symbol of ground joint	⌘ 19/38	⌘ 19/38	⌘ 19/38	⌘ 19/38	⌘ 19/38	⌘ 24/40	⌘ 24/40	⌘ 24/40

- Remarks 1. The interchangeable ground joint given in the table shall, as a rule, be used, but that of approximate Standard dimensions may be used.
2. The capacity marking, space for memory, and symbol of interchangeable ground joint ⌘ shall be applied with sand mark or baking.
3. Interchangeable ground joint Erlenmeyer flasks shall be designated by the name, nominal capacity and symbol of interchangeable ground joint.

Example: interchangeable ground joint Erlenmeyer flask
500 ml ⌘ 19/38

Fig. 10. Egg-Apple Type Flask

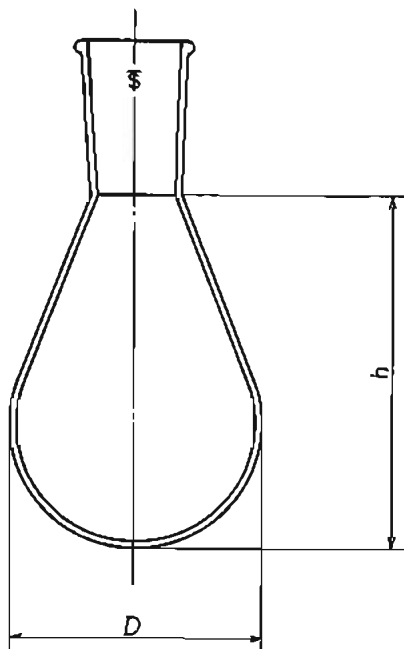


Unit: mm

Nominal capacity (ml)	100	200	300	500	1 000	2 000
Outer diameter of shell (D)	63 ± 3	76 ± 3	85 ± 3	100 ± 3	133 ± 3	167 ± 3
Height (H)	120 ± 3	150 ± 3	175 ± 3	200 ± 3	250 ± 3	280 ± 3
Outer diameter of neck (d)	25 ± 1	28 ± 1	34 ± 2	38 ± 2	43 ± 2	43 ± 2
Rubber stopper (No.)	7	8	11	12	14	14
Lowest mass (g)	30	45	62	100	186	320

- Remarks 1. The mouth shape shall be that with a lip.
2. The capacity marking and spaces for memory shall be applied with sand mark or baking.
3. Egg-apple type flasks shall be designated by the name and nominal capacity.
- Example: egg-apple type flask 100 ml

Fig. 11. Interchangeable Ground Joint Egg-Apple Type Flask



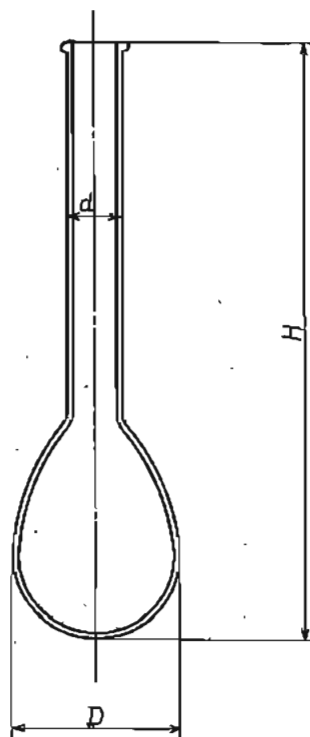
Unit: mm

Nominal capacity (ml)	50	100	200	300	500	1 000	2 000
Outer diameter of shell D	50 ± 3	63 ± 3	76 ± 3	85 ± 3	100 ± 3	133 ± 3	167 ± 3
Height (h)	65 ± 3	90 ± 3	120 ± 3	140 ± 3	165 ± 3	210 ± 3	240 ± 3
Symbol of ground joint §	§ 24/40	§ 24/40	§ 24/40	§ 24/40	§ 24/40	§ 29/42	§ 29/42

- Remarks 1. The interchangeable ground joint given in the table shall, as a rule, be used, but that of approximate Standard dimensions may be used.
2. The capacity marking, space for memory, and symbol of interchangeable ground joint § shall be applied with sand mark or baking.
3. Interchangeable ground joint egg-apple type flasks shall be designated by the name, nominal capacity and symbol of interchangeable ground joint.

Example: interchangeable ground joint egg-apple type flask
300 ml § 24/40

Fig. 12. Kjeldahl Flask



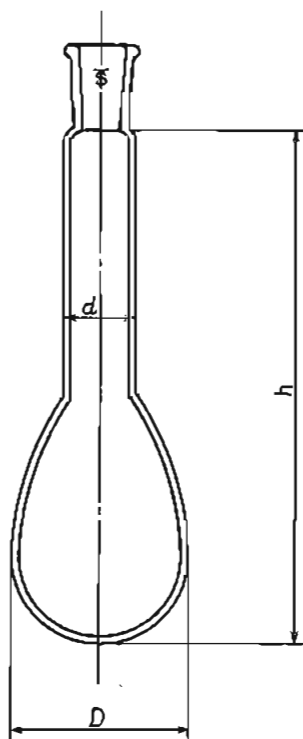
Unit: mm

Nominal capacity (ml)	50	100	200	300	500	1 000
Outer diameter of shell (D)	50 ± 3	63 ± 3	76 ± 3	85 ± 3	100 ± 3	133 ± 3
Height (H)	180 ± 3	225 ± 3	290 ± 3	330 ± 3	370 ± 3	420 ± 3
Outer diameter of neck (d)	20 ± 1	20 ± 1	25 ± 1	28 ± 1	28 ± 1	34 ± 2
Rubber stopper (No.)	4	4	7	8	8	11
Lowest mass (g)	40	50	70	90	140	230

- Remarks 1. The mouth shape shall be that with a lip.
2. The capacity marking and spaces for memory shall be applied with sand mark or baking.
3. Kjeldahl flasks shall be designated by the name and nominal capacity.

Example: Kjeldahl flask 50 ml

Fig. 13. Interchangeable Ground Joint Kjeldahl Flask



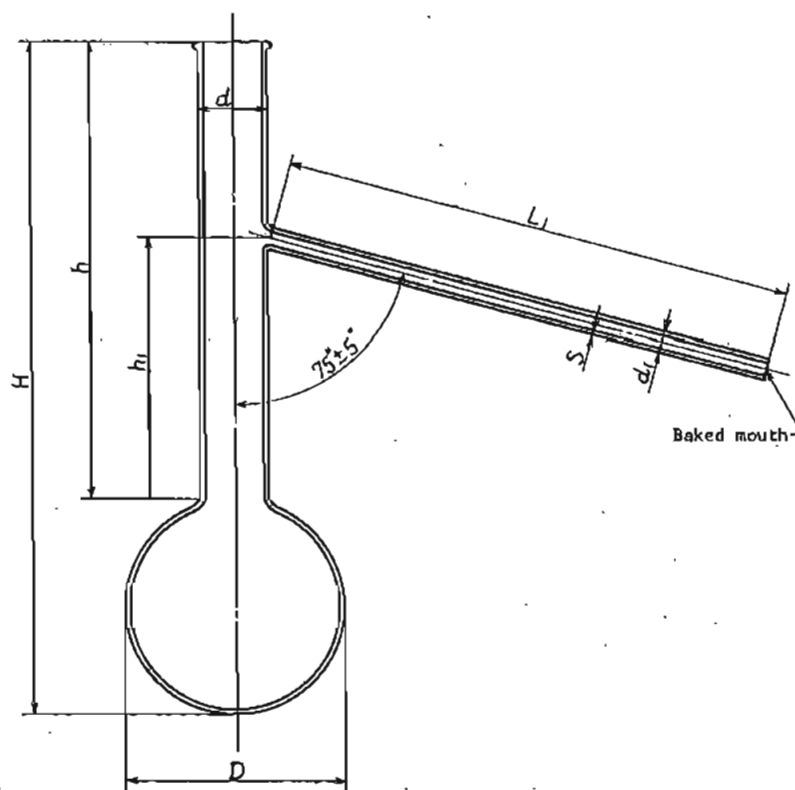
Unit: mm

Nominal capacity (ml)	50	100	200	300	500	1 000
Outer diameter of shell D	50 ± 3	63 ± 3	76 ± 3	85 ± 3	100 ± 3	133 ± 3
Height (h)	142 ± 3	187 ± 3	250 ± 3	290 ± 3	330 ± 3	378 ± 3
Symbol of ground joint	19/38	19/38	24/40	24/40	24/40	29/42
Outer diameter of neck (d)	22 ± 2	22 ± 2	28 ± 2	28 ± 2	28 ± 2	32 ± 2

- Remarks 1. The interchangeable ground joint given in the table shall, as a rule, be used, but that of approximate Standard dimensions may be used.
2. Outer diameter of neck may be changed according to the symbol of interchangeable ground joint.
3. The capacity marking, space for memory, and symbol of interchangeable ground joint shall be applied with sand mark or baking.
4. Interchangeable ground joint Kjeldahl flasks shall be designated by the name, nominal capacity and symbol of interchangeable ground joint.

Example: interchangeable ground joint Kjeldahl flask
300 ml 24/40

Fig. 14. Side-Arm Flask



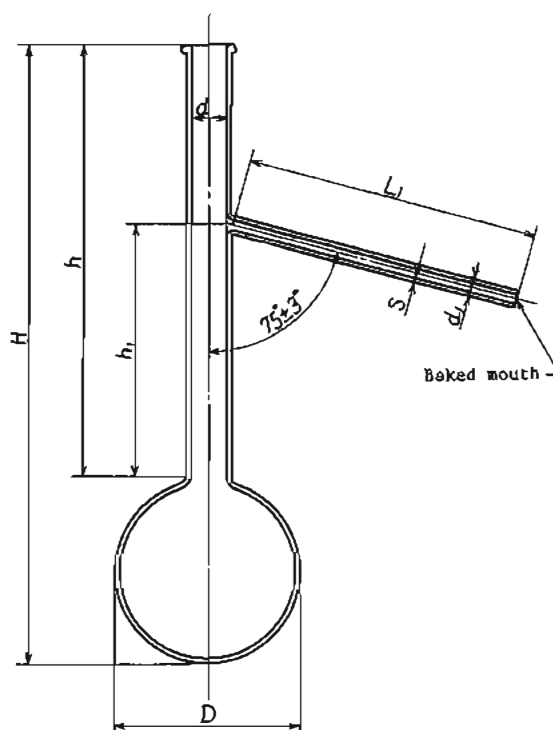
Unit: mm

Nominal capacity (ml)		100	200	300	500	1 000	2 000
Outer diameter of sphere D		65 ± 3	80 ± 3	93 ± 3	108 ± 3	135 ± 4	170 ± 4
Height (H)		198 ± 3	240 ± 3	280 ± 3	315 ± 3	380 ± 3	450 ± 3
Main tube	Outer diameter (d)	20 ± 1	25 ± 1	28 ± 1	28 ± 1	35 ± 1	38 ± 1
	Height (h)	133	160	187	207	245	280
Side-arm tube	Outer diameter (d_1)	6 ± 0.3	6 ± 0.3	7 ± 0.3	8 ± 0.4	9 ± 0.4	10 ± 0.4
	Thickness (S)	1.2 ± 0.1	1.2 ± 0.1	1.2 ± 0.1	1.2 ± 0.1	1.2 ± 0.1	1.2 ± 0.1
	Height h_1	67 ± 2	80 ± 2	94 ± 2	104 ± 2	123 ± 2	140 ± 2
	Length L_1	150 ± 3	180 ± 3	220 ± 3	250 ± 3	270 ± 3	290 ± 3
Rubber stopper (No.)		4	7	8	8	11	12
Lowest mass (g)		45	80	100	135	225	385

- Remarks 1. The mouth shape shall be that with a lip.
2. The capacity marking and spaces for memory shall be applied with sand mark or baking.
3. Side-arm flasks shall be designated by the name and nominal capacity.

Example: side-arm flask 100 ml

Fig. 15. Engler Flask

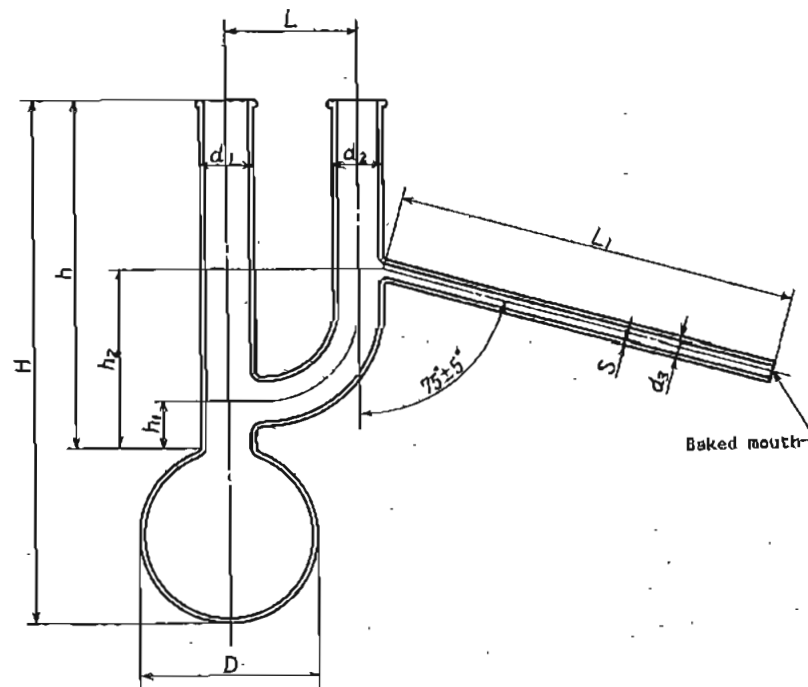


Unit: mm

Nominal capacity (ml)		125	200
Outer diameter of sphere D		68 ± 2	85.7 ± 2
Height (H)		214 ± 3	215 ± 3
Main tube	Inner diameter d	17 ± 1	15 ± 1
	Height h	146 ± 2	129.3 ± 2
Side-arm tube	Outer diameter d_1	7 ± 0.5	6 ± 0.5
	Thickness S	1 ± 0.15	1 ± 0.2
	Height h_1	69 ± 2	64.3 ± 2
	Length L_1	100 ± 3	100 ± 3

- Remarks 1. The mouth shape shall be that with a lip.
2. Engler flasks shall be designated by the name and nominal capacity.
Example: Engler flask 125 ml
3. Refer to JIS K 2254 and JIS K 2270.

Fig. 16. Claisen Flask

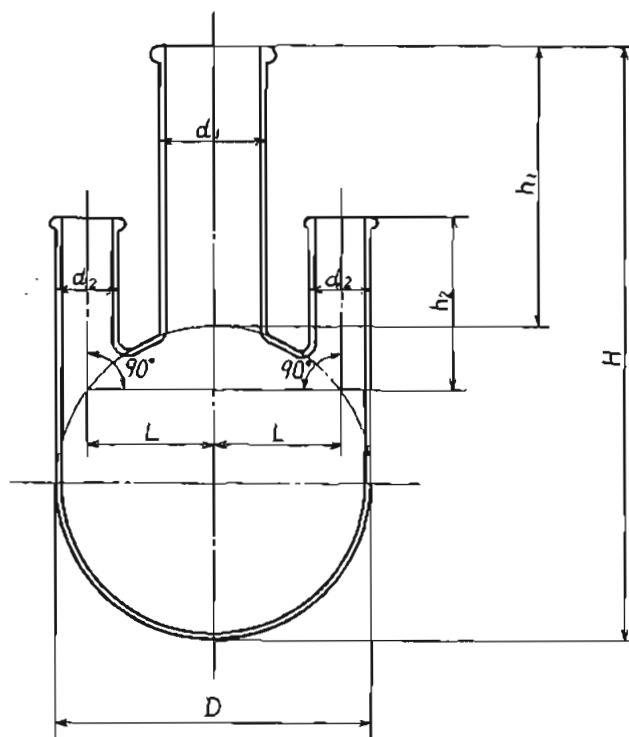


Unit: mm

Nominal capacity (ml)		100	200	300	500	1 000	2 000
Outer diameter of sphere D		65 ± 3	80 ± 3	93 ± 3	108 ± 3	135 ± 4	170 ± 4
Height (H)		198 ± 3	240 ± 3	280 ± 3	315 ± 3	380 ± 3	450 ± 3
Central distance between main tube and side tube L		49 ± 3	54 ± 3	58 ± 3	58 ± 3	62 ± 3	65 ± 3
Main tube	Outer diameter (d_1)	20 ± 1	25 ± 1	28 ± 1	28 ± 1	35 ± 1	38 ± 1
	Height h	133 ± 2	160 ± 2	187 ± 2	207 ± 2	245 ± 2	280 ± 2
Side tube	Outer diameter (d_2)	20 ± 1	25 ± 1	28 ± 1	28 ± 1	35 ± 1	38 ± 1
	Height h_1	17 ± 2	23 ± 2	23 ± 2	23 ± 2	28 ± 2	32 ± 2
Side-arm tube	Outer diameter (d_3)	6 ± 0.3	6 ± 0.3	7 ± 0.3	8 ± 0.4	9 ± 0.4	10 ± 0.4
	Thickness (S)	1.2 ± 0.1	1.2 ± 0.1	1.2 ± 0.1	1.2 ± 0.1	1.2 ± 0.1	1.2 ± 0.1
	Height h_2	67 ± 2	80 ± 2	94 ± 2	104 ± 2	123 ± 2	140 ± 2
	Length L_1	150 ± 3	180 ± 3	220 ± 3	250 ± 3	270 ± 3	290 ± 3
Rubber stopper (No.)		4	7	8	8	11	12
Lowest mass (g)		70	110	150	190	300	440

- Remarks 1. The mouth shape shall be that with a lip.
2. The capacity marking and spaces for memory shall be applied with sand mark or baking.
3. Claisen flasks shall be designated by the name and nominal capacity.
- Example: Claisen flask 100 ml

Fig. 17. Three-Mouthed Round-Bottom Flask



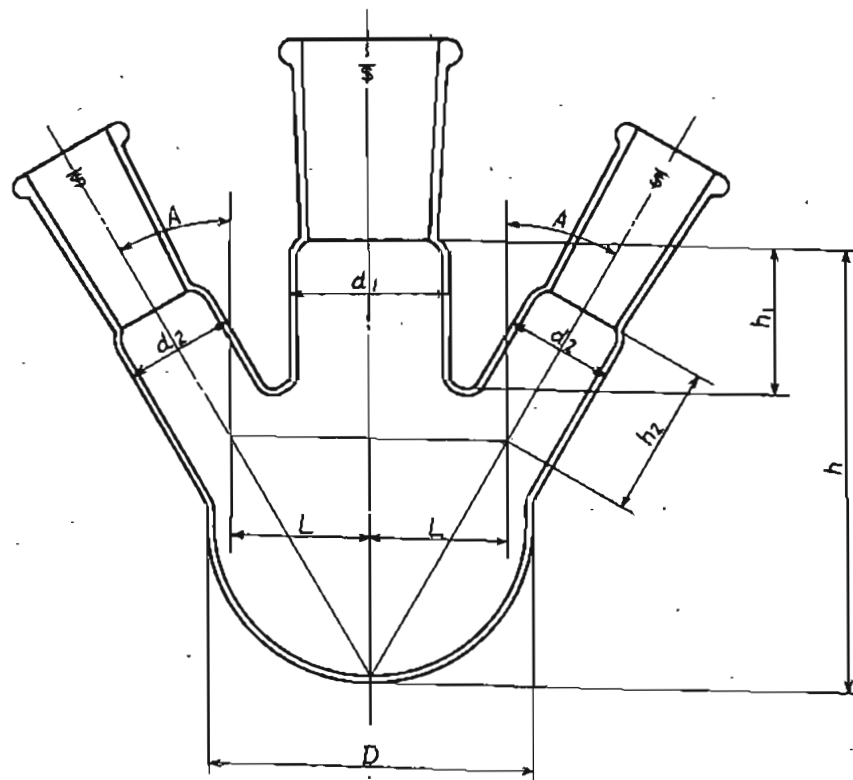
Unit: mm

Nominal capacity (ml)		50	100	200	300	500	1 000	2 000	3 000
Outer diameter of sphere D		53 ± 3	65 ± 3	80 ± 3	93 ± 3	108 ± 3	135 ± 4	170 ± 4	200 ± 4
Height (H)		100 ± 5	125 ± 5	150 ± 5	175 ± 5	200 ± 5	235 ± 5	285 ± 5	340 ± 5
Central distance between main tube and side tube (L)		22	28	32	37	43	55	70	80
Main tube	Outer diameter (d_1)	20 ± 1	28 ± 1	31 ± 1	36 ± 2	40 ± 2	46 ± 2	58 ± 2	60 ± 2
	Height (h_1)	47	60	70	82	92	100	110	140
Side tube	Outer diameter (d_2)	14 ± 1	14 ± 1	17 ± 1	20 ± 1	20 ± 1	25 ± 1	28 ± 1	32 ± 2
	Height (h_2)	30	36	41	45	53	58	72	85
Rubber stopper (No.)	Main tube	4	8	10	12	14	16	20	21
	Side tube	1	1	2	4	4	7	8	10

- Remarks 1. The mouth shape shall be that with a lip.
2. The capacity marking and spaces for memory shall be applied with sand mark or baking.
3. The side tube may be attached with an angle not in parallel to the main tube.
4. Three-mouthed round-bottom flasks shall be designated by the name and nominal capacity.

Example: three-mouthed round-bottom flask 50 ml

Fig. 18-1. Interchangeable Ground Joint Three-Mouthed Round-Bottom Flask



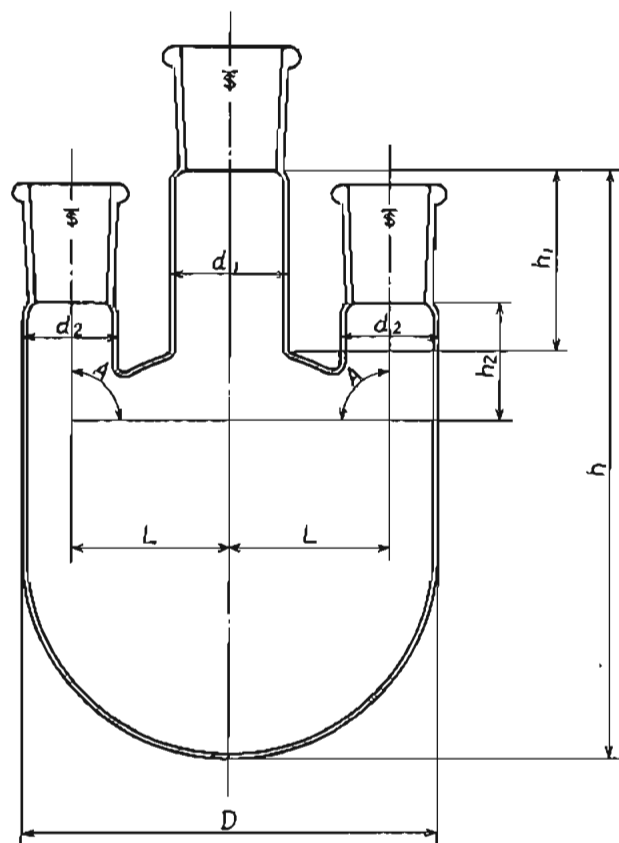
Unit: mm

Nominal capacity (ml)		50	100	200	300
Outer diameter of sphere D		53 ± 3	65 ± 3	80 ± 3	93 ± 3
Height (h)		83 ± 5	95 ± 1	110 ± 1	123 ± 5
Central distance between main tube and side tube (L)		23 ± 2	28 ± 2	35 ± 2	40 ± 2
Main tube	Outer diameter (d_1)	32 ± 1	32 ± 1	32 ± 1	32 ± 1
	Height (h_1)	30 ± 2	30 ± 2	30 ± 2	30 ± 2
	Symbol of ground joint ∇	$\nabla 29/42$	$\nabla 29/42$	$\nabla 29/42$	$\nabla 29/42$
Side tube	Outer diameter (d_2)	22 ± 1	22 ± 1	22 ± 1	22 ± 1
	Height (h_2)	32 ± 2	32 ± 2	32 ± 2	32 ± 2
	Symbol of ground joint ∇	$\nabla 19/38$	$\nabla 19/38$	$\nabla 19/38$	$\nabla 19/38$
	Attaching angle (A)	30°	30°	30°	30°

- Remarks 1. The interchangeable ground joint given in the table shall, as a rule, be used, but that of approximate Standard dimensions may be used.
2. The outer diameters of main tube and side tube may be changed according to the symbol of interchangeable ground joint.
3. The capacity marking, space for memory, and symbol of interchangeable ground joint ∇ shall be applied with sand mark or baking.
4. Interchangeable ground joint three-mouthed round-bottom flasks shall be designated by the name, capacity and symbol of ground joint.

Example: interchangeable ground joint three-mouthed round-bottom flask 300 ml
main tube $\nabla 29/42$ side tube $\nabla 19/38$

Fig. 18-2. Interchangeable Ground Joint Three-Mouthed Round-Bottom Flask



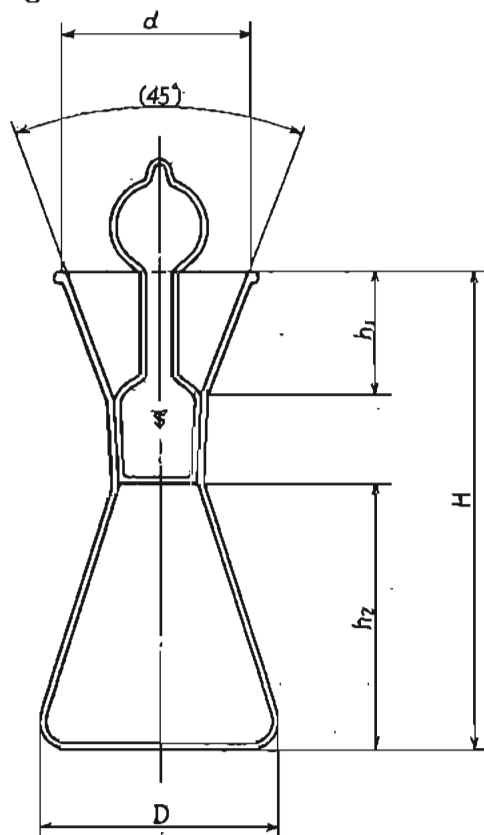
Unit: mm

Nominal capacity (ml)		500	1 000	2 000	3 000
Outer diameter of sphere D		108 ± 3	135 ± 4	170 ± 4	200 ± 4
Height (h)		163 ± 5	190 ± 5	240 ± 5	270 ± 5
Central distance between main tube and side tube (L)		42 ± 1	55 ± 1	70 ± 1	85 ± 1
Main tube	Outer diameter (d_1)	38 ± 1	38 ± 1	48 ± 1	48 ± 1
	Height (h_1)	55 ± 2	55 ± 2	70 ± 2	70 ± 2
	Symbol of ground joint ㄟ	$\text{ㄟ } 34/45$	$\text{ㄟ } 34/45$	$\text{ㄟ } 45/50$	$\text{ㄟ } 45/50$
Side tube	Outer diameter (d_2)	22 ± 1	22 ± 1	28 ± 1	28 ± 1
	Height (h_2)	42 ± 2	42 ± 2	50 ± 2	50 ± 2
	Symbol of ground joint ㄟ	$\text{ㄟ } 19/38$	$\text{ㄟ } 19/38$	$\text{ㄟ } 24/40$	$\text{ㄟ } 24/40$
Attaching angle (A)		90°	90°	90°	90°

- Remarks 1. The interchangeable ground joint given in the table shall, as a rule, be used, but that of approximate Standard dimensions may be used.
2. The outer diameters of main tube and side tube may be changed according to the symbol of interchangeable ground joint.
3. The capacity marking, space for memory, and symbol of interchangeable ground joint ㄟ shall be applied with sand mark or baking.
4. Interchangeable ground joint three-mouthed round-bottom flasks shall be designated by the name, capacity and symbol of ground joint.

Example: interchangeable ground joint three-mouthed round-bottom flask 2000 ml
main tube $\text{ㄟ } 45/50$ side tube $\text{ㄟ } 24/40$

Fig. 19-1. Interchangeable Ground Joint Iodine Flask Type A



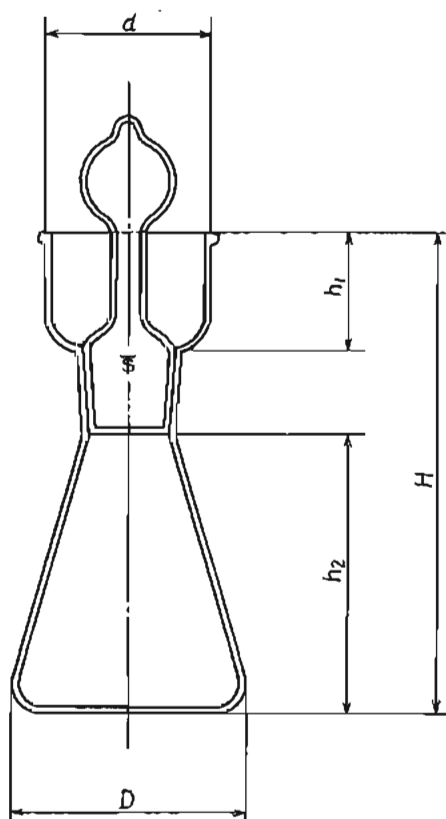
Unit: mm

Nominal capacity (ml)		100	300	500
Outer diameter of shell D		64 ± 3	90 ± 3	108 ± 3
Height (H)		130 ± 3	175 ± 4	211 ± 5
Receiving part	Outer diameter (d)	50 ± 2	50 ± 2	55 ± 2
	Height (h_1)	25 ± 2	25 ± 2	28 ± 2
Height of flask part h_2		79 ± 3	121 ± 3	151 ± 3
Symbol of ground joint		∇ 24/29	∇ 24/29	∇ 29/32

- Remarks 1. The capacity shall be approximately 80 % of the capacity up to the lower end of neck.
2. The mouth shape shall be that with a lip.
3. The capacity marking, spaces for memory and symbol of interchangeable ground joint ∇ shall be applied with sand mark or baking.
4. The stopper shall be hollow or filled.
5. The ground joint of stopper shall be water tight.
6. Interchangeable ground joint iodine flask Type A shall be designated by the name and nominal capacity.

Example: interchangeable ground joint
iodine flask Type A 100 ml

Fig. 19-2. Interchangeable Ground Joint Iodine Flask Type B



Unit: mm

Nominal capacity (ml)		100	300	500
Outer diameter of shell D		64 ± 3	90 ± 3	108 ± 3
Height (H)		130 ± 3	175 ± 4	211 ± 5
Receiving part	Outer diameter (d)	50 ± 2	50 ± 2	55 ± 2
	Height (h_1)	25 ± 2	25 ± 2	28 ± 2
Height of flask part h_2		79 ± 3	121 ± 3	151 ± 3
Symbol of ground joint		⌘ 24/29	⌘ 24/29	⌘ 29/32

- Remarks 1. The capacity shall be approximately 80 % of the capacity up to the lower end of neck.
2. The mouth shape shall be that with a lip.
3. The capacity marking, spaces for memory and symbol of interchangeable ground joint ⌘ shall be applied with sand mark or baking.
4. The stopper shall be hollow or filled.
5. The ground joint of stopper shall be water tight.
6. Interchangeable ground joint iodine flask Type B shall be designated by the name and nominal capacity.

Example: interchangeable ground joint
iodine flask Type B 100 ml