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Plugs and flanges for steel drums

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Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee as the result of proposal for revision of Japanese Industrial Standard submitted by Japan Steel Drum Association (JSDA)/Japanese Standards Association (JSA) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law applicable to the case of revision by the provision of Article 14.

Consequently **JIS Z 1604**:1995 is replaced with this Standard.

This revision has been made based on **ISO 15750-3**:2002 *Packaging—Steel drums—Part 3: Inserted flange-type closure systems* for the purposes of making it easier to compare this Standard with International Standard; to prepare Japanese Industrial Standard conforming with International Standard; and to propose a draft of an International Standard which is based on Japanese Industrial Standard.

Attention is drawn to the possibility that some parts of this Standard may conflict with a patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have technical properties. The relevant Minister and the Japanese Industrial Standards Committee are not responsible for identifying the patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have the said technical properties.

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Plugs and flanges for steel drums

Introduction This Japanese Industrial Standard has been prepared based on the first edition of **ISO 15750-3** *Packaging—Steel drums—Part 3: Inserted flange-type closure systems* published in 2002 with some modifications of the technical contents.

The portions given sidelines or dotted underlines are the matters not stated in the original International Standard. A list of modifications with the explanations is given in Annex 2 (informative).

1 Scope This Standard specifies the inserted flange-type closure for steel drums.

NOTE : The International Standard corresponding to this Standard is as follows.

In addition, symbols which denote the degree of correspondence in the contents between the relevant International Standard and **JIS** are **IDT** (identical), **MOD** (modified), and **NEQ** (not equivalent) according to **ISO/IEC Guide 21**.

ISO 15750-3:2002 *Packaging—Steel drums—Part 3: Inserted flange-type closure systems* (MOD)

2 Normative references The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. The most recent editions of the standards (including amendments) indicated below shall be applied.

JIS B 0202 *Parallel pipe threads*

NOTE : **ISO 228-1**:1994 *Pipe threads where pressure-tight joints are not made on the threads—Part 1: Dimensions, tolerances and designation* is equivalent to the said standard.

JIS B 0254 *Screw thread limit gauges for parallel pipe*

NOTE : **ISO 228-2**:1980 *Pipe threads where pressure-tight joints are not made on the threads—Part 2: Verification by means of limit gauges* is equivalent to the said standard.

JIS G 3115 *Steel plates for pressure vessels for intermediate temperature service*

JIS G 3131 *Hot-rolled mild steel plates, sheets and strips*

NOTE : **ISO 3573**:1999 *Hot-rolled carbon steel sheet of commercial and drawing qualities* is equivalent to the said standard.

JIS G 3141 *Cold-reduced carbon steel sheets and strips*

NOTE : **ISO 3574**:1999 *Cold-reduced carbon steel sheet of commercial and drawing qualities* is equivalent to the said standard.

JIS G 3303 *Tinplate and blackplate*

JIS G 3313 *Electrolytic zinc-coated steel sheets and coils*

NOTE : **ISO 5002**:1999 *Hot-rolled and cold-reduced electrolytic zinc-coated carbon steel sheet of commercial and drawing qualities* is equivalent to the said standard.

JIS G 3315 Chromium plated tin free steel

JIS G 7121 Cold-reduced electrolytic tinplate

NOTE : **ISO 11949**:1995 *Cold-reduced electrolytic tinplate* is identical with the said standard.

JIS G 7122 Cold-reduced electrolytic chromium/chromium oxide-coated steel

NOTE : **ISO 11950**:1995 *Cold-reduced electrolytic chromium/chromium oxide-coated steel* is identical with the said standard.

JIS H 2201 Zinc alloy ingots for die casting

NOTE : **ISO 301**:1981 *Zinc alloy ingots intended for castings* is equivalent to the said standard.

JIS H 4000 Aluminium and aluminium alloy sheets, strips and plates

JIS H 5301 Zinc alloys die castings

JIS K 6200 Rubber—Vocabulary

JIS K 6900 Plastics—Vocabulary

JIS Z 1600 Open head steel drums

JIS Z 1601 Tight head steel drums

3 Terms and definitions For the purposes of this Standard, the definitions given in **JIS Z 1600** and **JIS Z 1601**, and the following definitions apply.

3.1 closure comprised of flange and plug

Furthermore, it comprises the closure system for a steel drum by adding any options such as capseal, etc. to the closure. The closure is classified into two types of G 2 (large) and G $\frac{3}{4}$ (small) according to size, and classified into steel closure, thermoplastic closure and zinc-alloy die cast closure according to materials.

3.2 inserted flange-type closure mechanical fixed steel insert with threads, closable with plugs made of steel, other metals or synthetic materials such as plastics, ensuring a leaktight closing in drums

3.3 elastomer macromolecular material which returns rapidly to its initial dimensions and shape after substantial deformation by a weak stress and release of the stress (see **JIS K 6200**)

3.4 thermoplastics plastics that are capable of being repeatedly softened by heating and hardened by cooling through a temperature range characteristic of the plastics and, in the softened state, of being repeatedly shaped by flow into articles by moulding, extrusion or forming (see **JIS K 6900**)

4 Dimensions, materials and finish

4.1 Nominal pitch diameter and pitch of the thread of closures The nominal pitch diameter and the pitch of the thread of closures G 2 and G $\frac{3}{4}$ shall conform to **JIS B 0202** or Annex 1.

4.2 Dimensions and materials of closures The dimensions and materials of the closure systems shall conform to relevant Annexes for the closure type.

- Annex A: Octagonal base closure system (Type A closure)
- Annex B: Serrated base closure system (Type B closure)
- Annex C: Octagonal (G 2)/hexagonal (G ¾) base closure system (Type C closure)

4.3 Finish of closures The internal and external finish of closures shall be agreed between the purchaser and the supplier when the special specification is required according to the usage environment of steel drums and the properties of the content which is put in steel drums.

5 Design and construction

5.1 Flanges The construction of the flange shall be such that the flange can be pressed into the top plate and airtightness can be ensured.

5.2 Plugs The construction of the plug shall be such that the plug has claws or the like for closing in the circular sump and the plug can be inserted into and removed from the flange by means of a simple tool for rotating the plug such as a wrench. Furthermore, the joint with the tool for rotating the plug shall be free of backlash when the tool is inserted and the tool shall have the proper dimensions so that the joint does not become too tight. Examples of closing jigs are shown in Annex D.

NOTE : For recommended closing torques, see Annex E.

5.3 Capseal and overseal Caps seals and overseals, when fitted, shall be the manual or pneumatic crimping type, and shall have provisions for customs sealing and evidence of tampering, if required.

Caps seals/overseals shall be so designed that they can be removed by means of a simple tool.

5.4 Label ring and protection ring Label rings and protection rings shall be designed so that, when fitted, they can be mechanically inserted simultaneously with the flanges. Label rings shall have provisions for customs sealing.

NOTE : Label rings and protection rings can provide adequate reinforcement for the flange insertion and can protect the drum stock neck against corrosion.

6 Quality, test and inspection

6.1 Appearance The closure shall be free from detrimental defects such as crack, distortion, wrinkle, flaw and rust on its surface, and shall conform to the requirements when the visual inspection is made at a proper frequency.

6.2 Quality of zinc-alloy die cast plug The quality of the zinc-alloy die cast plug shall conform to the requirements for chemical composition specified in JIS H 5301.

6.3 Test of screw thread portion The closure shall fit GO gauge specified in **JIS B 0254** or the gauge specified in Annex 1.

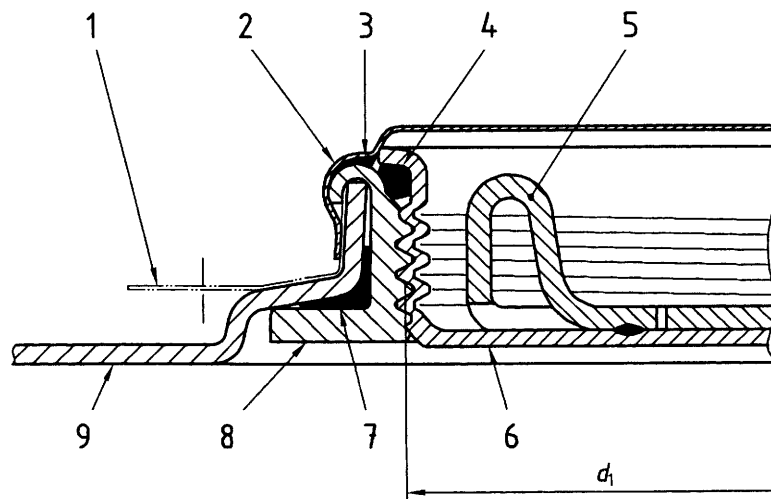
6.4 Airtightness of plug When the plug is inserted into a drum or a test apparatus simulating it, and soap water is coated in the gap between the plug in the outer surface side of drum and the closure flange with compressed air of 250 kPa fed in the inner surface side of drum, air leakage shall not be detected. The holding time of compressed air shall be 5 min.

7 Marking The manufacturer's name or its abbreviation shall be marked on the closure.

Annex A (normative)

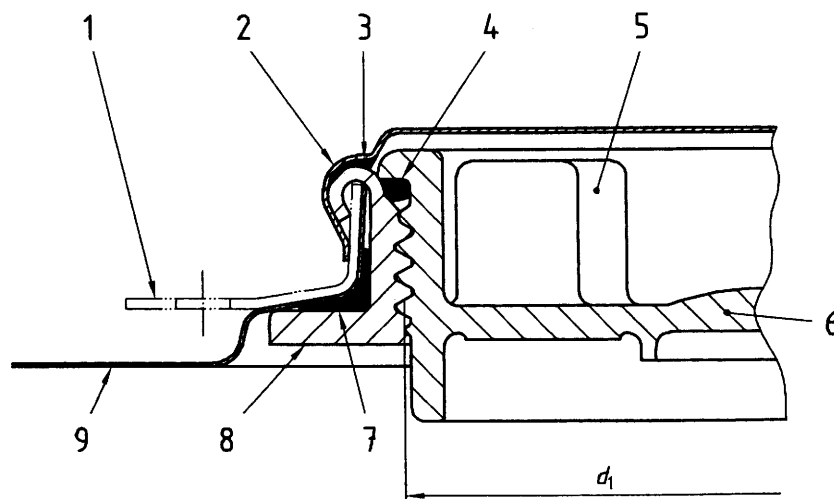
Octagonal base closure system (Type A closure)

1 Structure of closure Examples of the octagonal base closure structure are shown in Annex A figure 1 and Annex A figure 2.



- | | |
|---|---------------------------|
| 1 Label ring and protection ring (optional) | 6 Plug |
| 2 Capsel | 7 Elastomer flange gasket |
| 3 Gasket | 8 Flange |
| 4 Plug gasket | 9 Steel drum |
| 5 Claw (wrenching insert) | |

Annex A Figure 1 Closure of heavy-gauge steel drum

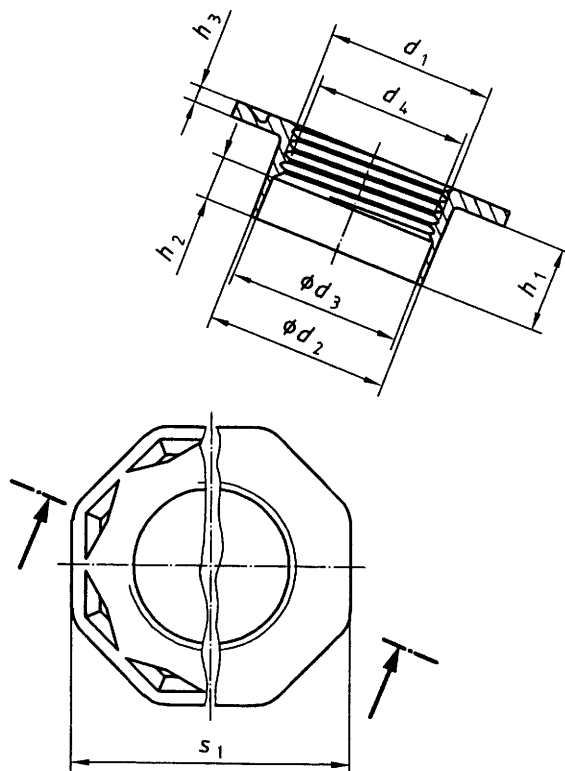


- | | |
|------------------------------|---------------------------|
| 1 Label ring/protection ring | 6 Plug |
| 2 Capsel | 7 Elastomer flange gasket |
| 3 Gasket | 8 Flange |
| 4 Plug gasket | 9 Steel drum |
| 5 Claw (wrenching insert) | |

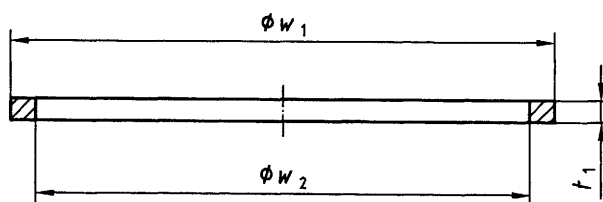
Annex A Figure 2 Closure of light-gauge steel drum

2 Flange and elastomer flange gasket

2.1 Dimensions Examples of the flange and the elastomer flange gasket are shown in Annex A figure 3 and Annex A figure 4. Dimensions shall be as shown in Annex A table 1.



Annex A Figure 3 Flange



Annex A Figure 4 Elastomer flange gasket

Annex A Table 1 Flange and elastomer flange gasket

Unit: mm

Thread	Nominal pitch diameter	Flange dimensions							Elastomer flange gasket dimensions
	d_1	ϕd_2 ± 0.3	ϕd_3 ± 0.3	d_4 ± 0.3	h_1 ± 0.5	h_2 ± 0.5	h_3 ± 0.4	s_1 ± 0.3	$\phi w_1 \times \phi w_2 \times t_1$ $\pm 1.0 \times \pm 1.0 \times \pm 0.5$
G $\frac{3}{4}$	(a)	29.0	27.2	24.5	12.9	7.2	2.7	43.7	32 × 27.2 × 2.6
G 2	(a)	62.4	60.4	57.1	15.8	7.9	2.8	77.9	67 × 60.5 × 2.6

Note (a) Shall conform to **JIS B 0202**.

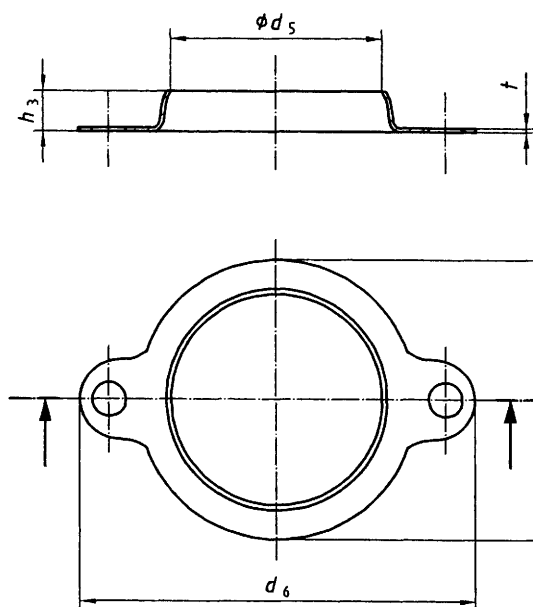
2.2 Material and configuration Flanges shall be made from either mild steel specified in **JIS G 3131** or **JIS G 3141**, or other materials suitable for their usage environment and contents.

Elastomer other than those shown in Annex A figure 4 and Annex A table 1 shall be agreed between the purchaser and the supplier.

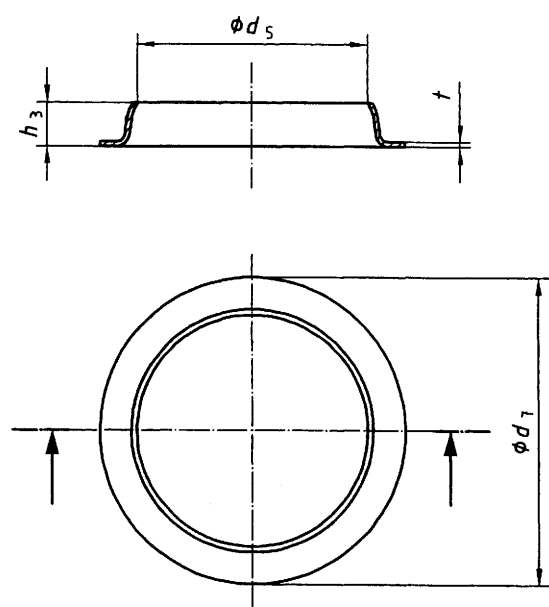
Selection and combination of flanges and gaskets shall be agreed between the purchaser and the supplier.

3 Label ring and protection ring

3.1 Dimensions Examples of the label ring and the protection ring are shown in Annex A figure 5 and Annex A figure 6. Dimensions shall be as shown in Annex A table 2.



Annex A Figure 5 Label ring



Annex A Figure 6 Protection ring

Annex A Table 2 Label ring and protection ring

Unit: mm

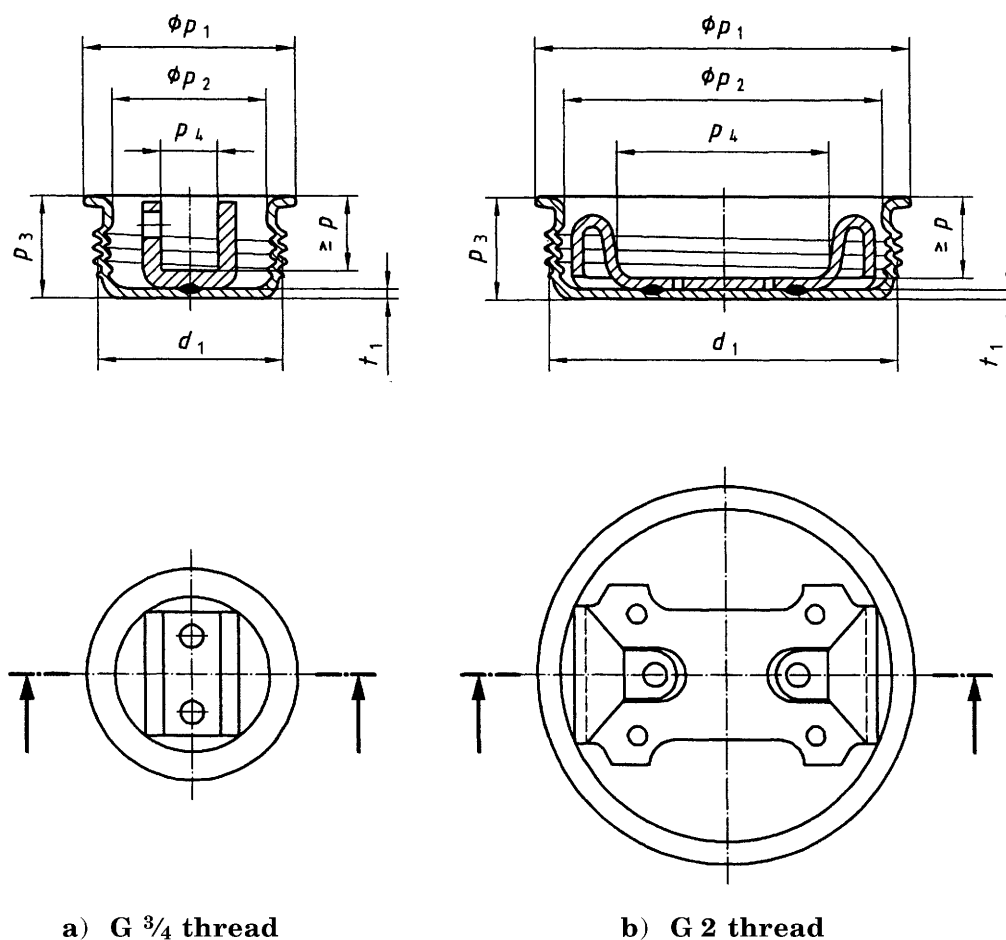
Thickness of top plate material X	Thread	Dimensions of label ring and protection ring				Thickness of label ring and protection ring
		ϕd_5 ± 0.4	d_6 ± 0.4	ϕd_7 ± 0.4	h_3 ± 0.4	t
Light-gauge $0.5 \leq X < 0.8$	G $\frac{3}{4}$	29.7	54.0	41.0	6.4	0.8
	G 2	62.3	98.5	74.5	8.4	
Medium-gauge $0.8 \leq X < 1.5$	G $\frac{3}{4}$	31.0	58.5	41.0	5.4	0.3 ^(a)
	G 2	63.5	99.5	74.5	8.2	
Heavy-gauge $1.5 \leq X < 2.0$	G $\frac{3}{4}$	31.3	58.5	41.0	5.7	0.3 ^(a)
	G 2	65.7	99.5	74.5	7.3	
Note ^(a) The use of the label ring and the protection ring is optional for medium-gauge and heavy-gauge top plate material.						

3.2 Material and configuration Label rings and protection rings shall be made from either mild steel specified in **JIS G 3313** or other materials suitable for their usage environment and contents.

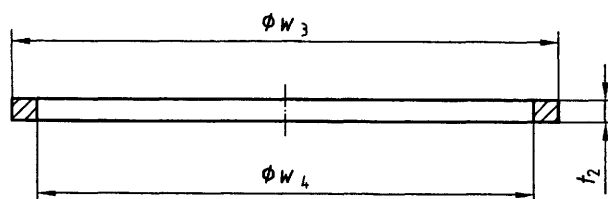
Selection and combination of label rings and protection rings shall be agreed between the purchaser and the supplier.

4 Steel plug and elastomer or thermoplastics plug gasket

4.1 Dimensions Examples of the steel plug and the elastomer or thermoplastics plug gasket are shown in Annex A figure 7 and Annex A figure 8. Dimensions shall be as shown in Annex A table 3.



Annex A Figure 7 Steel plug



Annex A Figure 8 Elastomer plug gasket

Annex A Table 3 Steel plug and elastomer plug gasket

Unit: mm

Thread	Nominal pitch diameter	Steel plug dimensions						Elastomer plug gasket dimensions
	d_1	ϕp_1 ± 0.5	ϕp_2 ± 0.7	p_3 ± 0.7	$p_4^{(b)}$ ± 1.5	$p^{(c)}$ min.	t_1 ± 0.2	$\phi w_3 \times \phi w_4 \times t_2$ $\pm 1.0 \times \pm 1.0 \times \pm 0.5$
G $\frac{3}{4}$	(^a)	28.1	20.5	13.7	8.5	8.5	1.2	25.5 × 20.3 × 2.4
G 2	(^a)	61.2	53.6	15.5	33.5	11.5	1.2	56.0 × 50.5 × 2.7
Notes (^a) Shall conform to JIS B 0202 . (^b) Dimension p_4 for G 2 shall be measured at a position 2 mm above the top of the flat part of the claw (wrenching insert). (^c) Dimension p shall be measured from the top of the plug to the top of the flat part of the claw (wrenching insert).								

4.2 Material and configuration Plugs shall be made from either mild steel specified in **JIS G 3131** or **JIS G 3141**, or other materials suitable for their usage environment and contents. The position of the claw (wrenching insert) shall be not more than 0.5 mm out of centre.

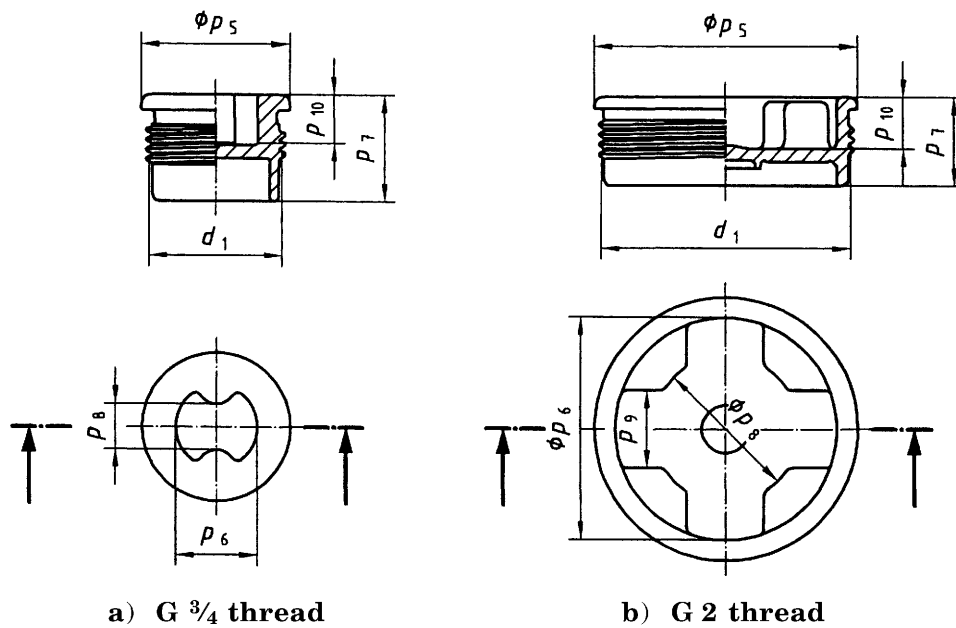
Plug gaskets should generally be made from elastomer. Thermoplastics materials or other materials are also acceptable, however, such a case shall be agreed between the purchaser and the supplier.

Elastomer gaskets other than those shown in Annex A figure 8 and Annex A table 3 shall be agreed between the purchaser and the supplier.

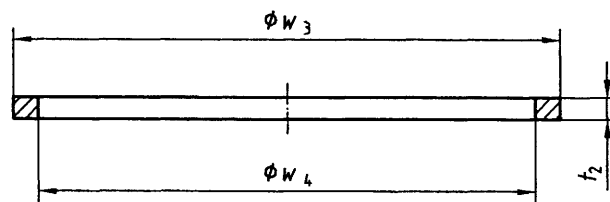
Selection and combination of plugs and gaskets shall be agreed between the purchaser and the supplier.

5 Plastic plug and elastomer plug gasket

5.1 Dimensions Examples of the plastic plug and the elastomer plug gasket are shown in Annex A figure 9 and Annex A figure 10. Dimensions shall be as shown in Annex A table 4.



Annex A Figure 9 Plastic plug



Annex A Figure 10 Elastomer plug gasket

Annex A Table 4 Plastic plug and elastomer plug gasket

Unit: mm

Thread	Nominal pitch diameter	Plastic plug dimensions						Elastomer plug gasket dimensions
	d_1	ϕp_5 ± 0.4	p_6 ± 0.4	p_7 ± 0.4	p_8 ± 0.4	p_9 ± 0.4	p_{10} ± 0.4	$\phi w_3 \times \phi w_4 \times t_2$ $\pm 1.0 \times \pm 1.0 \times \pm 0.5$
G $\frac{3}{4}$	(a)	27.9	17.3	20.0	8.5	(b)	9.5	25.5 $\times$ 20.3 $\times$ 2.4
G 2	(a)	61.1	51.5	20.5	34.0	18.0	12.0	56.0 $\times$ 50.5 $\times$ 2.7
Notes (a) Shall conform to JIS B 0202.								
(b) Not applicable.								

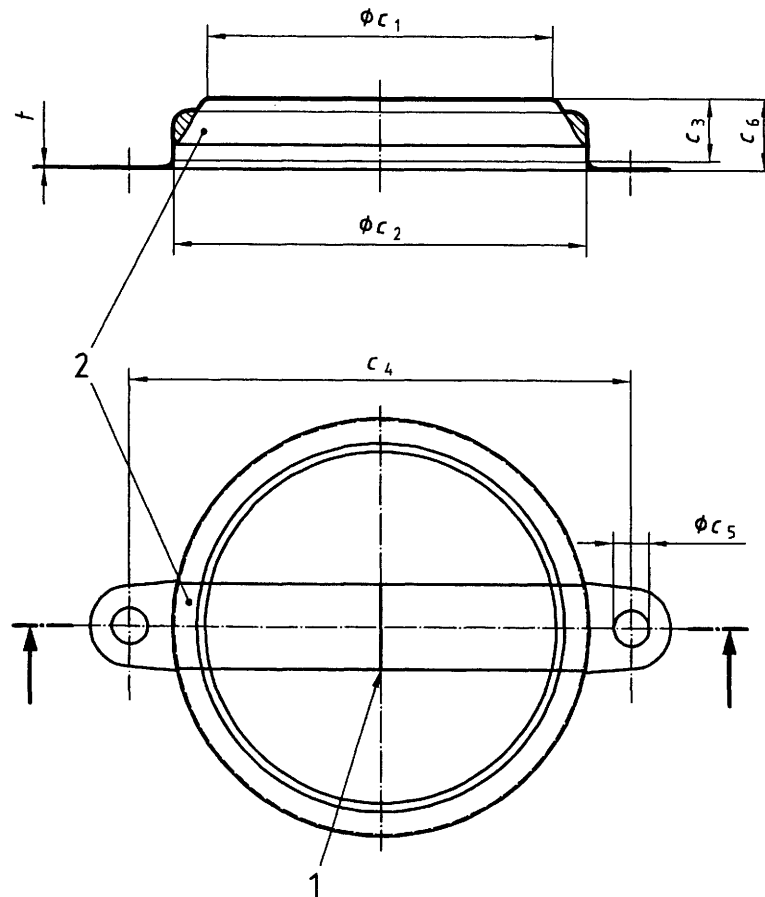
5.2 Material and configuration Plugs shall be made from copolymer of polypropylene. Other materials shall be agreed between the purchaser and the supplier.

Plug gaskets should generally be made from elastomer. Thermoplastics materials or other materials are also acceptable, however, such a case shall be agreed between the purchaser and the supplier.

Selection and combination of the plugs and gaskets shall be agreed between the purchaser and the supplier.

6 Capseal

6.1 Dimensions An example of the capseal is shown in Annex A figure 11. Dimensions shall be as shown in Annex A table 5.



- 1 Scored lines
- 2 Flowed-in gasket

Annex A Figure 11 Capsel

Annex A Table 5 Capsel

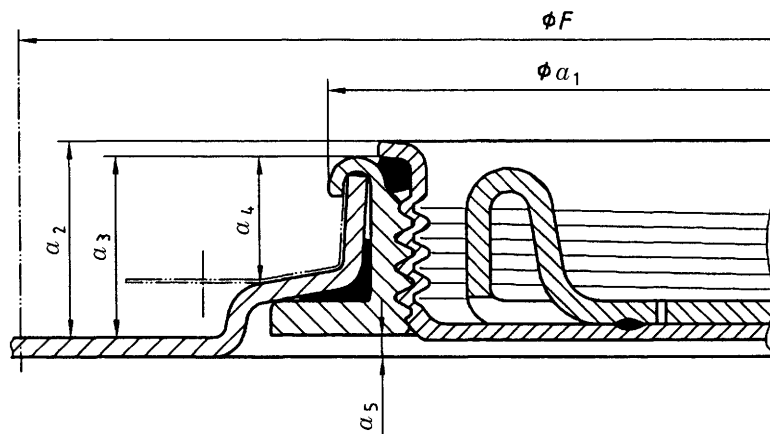
Unit: mm

Thread	Capsel dimensions						Capsel thickness
	ϕc_1 ± 0.4	ϕc_2 ± 0.4	c_3 ± 0.4	c_4 ± 0.4	ϕc_5 ± 0.2	c_6 ± 0.7	t ± 0.05
G $\frac{3}{4}$	29.0	35.1	8.9	43.0	3.5	9.9	0.35
G 2	62.4	69.8	11.2	85.0	4.8	12.2	0.35
NOTE: Printing of the capseal (if required) shall be agreed between the purchaser and the supplier.							

6.2 Material and configuration Capsels shall be made from low-carbon sheet steel specified in **JIS G 7121** or **JIS G 7122**, or other materials suitable for their usage environment and contents.

Selection of the capsels shall be agreed between the purchaser and the supplier.

7 Closure without capseal An example of the closure without capseal is shown in Annex A figure 12. Dimensions shall be as shown in Annex A table 6.



NOTE : **JIS Z 1600** and **JIS Z 1601** require that the closure does not protrude above the drum chime.

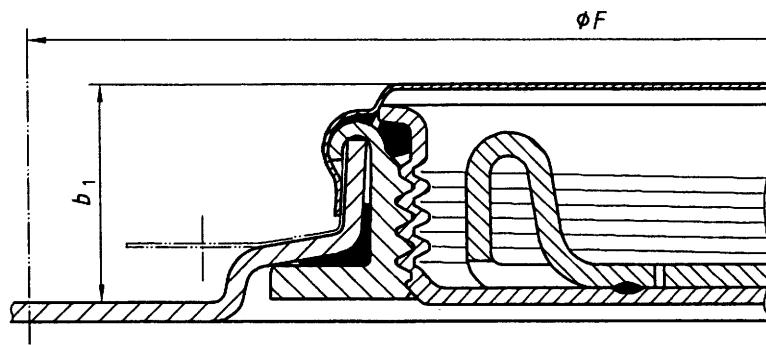
Annex A Figure 12 Closure without capseal

Annex A Table 6 Closure without capseal

Unit: mm

Thread	Closure dimensions					Minimum free space required around closure for capseal application tools
	ϕa_1 ± 0.5	a_2 ± 0.5	a_3 ± 0.5	a_4 ± 0.5	a_5 (^a)	ϕF
G $\frac{3}{4}$	33.9	11.7	11.2	6.6	>0	90
G 2	68.4	14.5	13.6	9.4	>0	110
NOTE: The recommendation of the supplier of the closures on insertion of the flanges should be followed if it deviates from the above.						
Note (^a) Not applicable.						

8 Closure with capseal An example of the closure with capseal is shown in Annex A figure 13. Dimensions shall be as shown in Annex A table 7.



NOTE : **JIS Z 1600** and **JIS Z 1601** require that the closure does not protrude above the drum chime.

Annex A Figure 13 Closure with capseal

Annex A Table 7 Closure with capseal

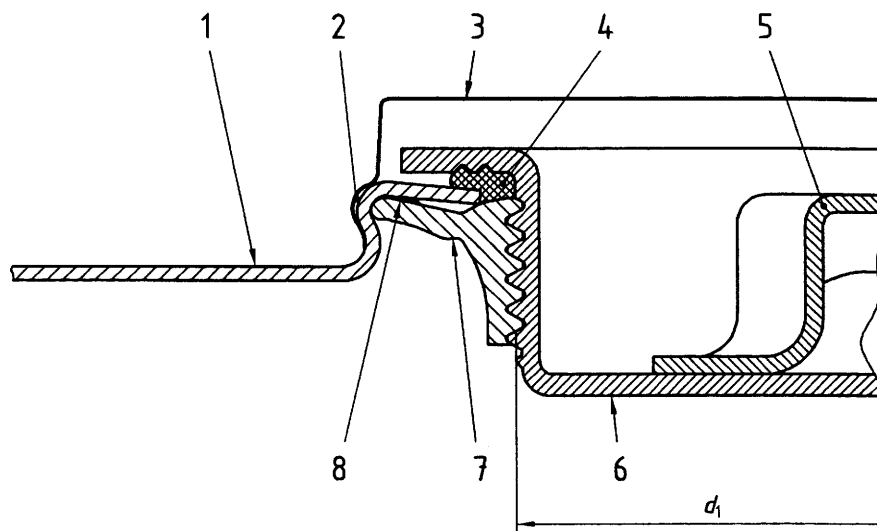
Unit: mm

Thread	Dimensions of closure	Minimum free space required around closure for capseal application tools
	b_1 ± 0.5	ϕF
G $\frac{3}{4}$	14.1	90
G 2	17.3	110
NOTE: The recommendation of the supplier of the closures on insertion of the flanges should be followed if it deviates from the above.		

Annex B (normative)

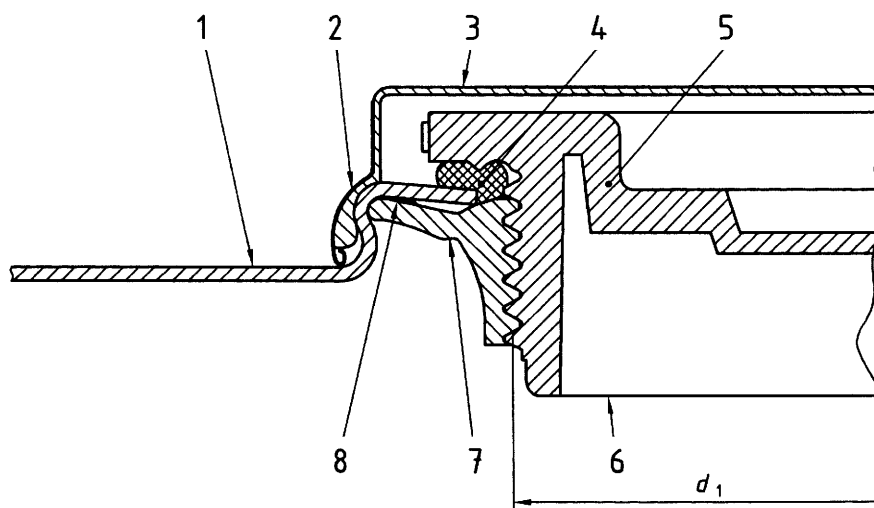
Serrated base closure system (Type B closure)

1 Structure of closure Examples of the serrated base closure structure are shown in Annex B figure 1 and Annex B figure 2.



- | | |
|--------------|---------------------------|
| 1 Steel drum | 5 Claw (wrenching insert) |
| 2 Compound | 6 Steel plug |
| 3 Overseal | 7 Flange |
| 4 Gasket | 8 Compound |

Annex B Figure 1 Closure of steel drum (steel plug)

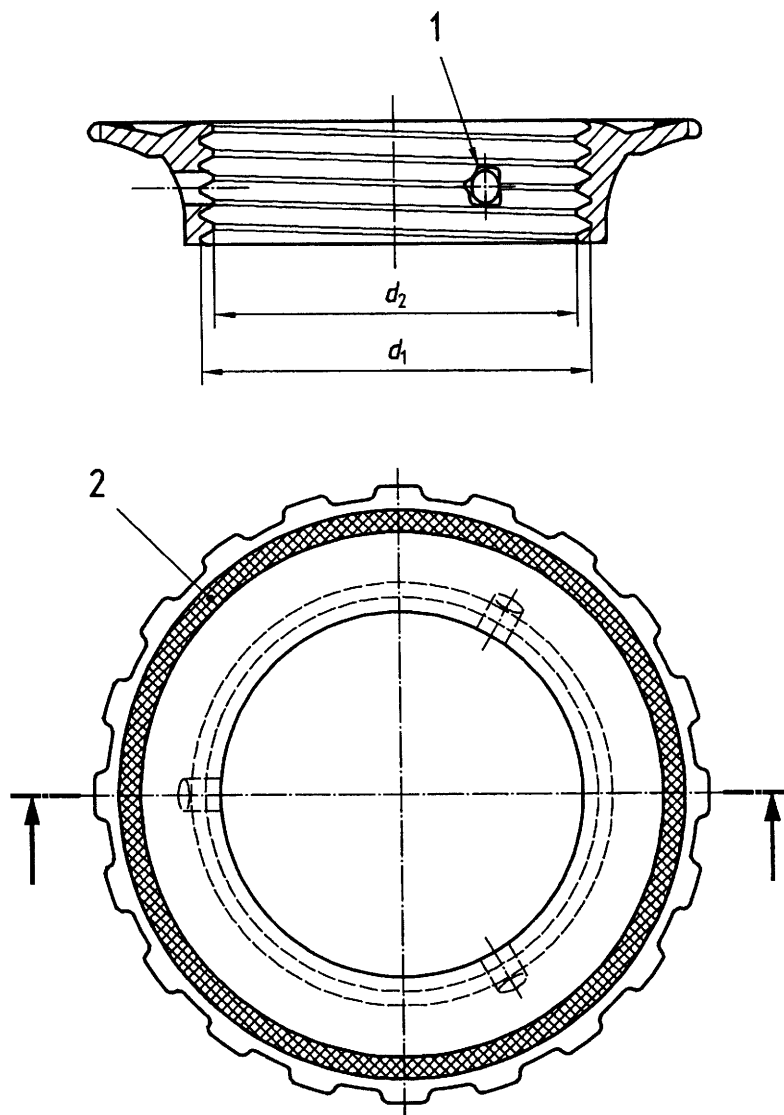


- | | |
|-----------------------|------------------|
| 1 Steel drum | 5 Wrenching part |
| 2 Metallic ring | 6 Plastic plug |
| 3 Overseal (plastics) | 7 Flange |
| 4 Gasket | 8 Compound |

Annex B Figure 2 Closure of steel drum (plastic plug)

2 Flange and sealing features

2.1 Dimensions An example of the flange is shown in Annex B figure 3. Dimensions shall be as shown in Annex B table 1.



- 1 Drain hole
- 2 Compound

Annex B Figure 3 Flange

Annex B Table 1 Flange

Unit: mm

Thread	Nominal pitch diameter	Flange dimensions
	d_1	d_2 ± 0.3
G $\frac{3}{4}$	(a)	24.5
G 2	(a)	57.1
Note (a) Shall conform to JIS B 0202 as inserted condition.		