LeKe Piping

STEEL PIPE FLANGES

STEEL PIPE FLANGES DIMENSIONS, RATINGS AND REQUIREMENTS

JIS B 2220:2012

Flange types, pressure-temperature ratings, dimensions, inspection and annex data

- 5K / 10K / 16K
- 20K / 30K
- 40K / 63K
- GASKET FACES
- WELDING FLANGES
- CALCULATED MASSES

Technical reference prepared for product and project requirement review.

Confirm final material, dimensions, testing and documentation before ordering.

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Technical data navigation

Use the index below to open the corresponding technical section.

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REFERENCE NOTE

Source dimensional values and footnotes are retained. Confirm the applicable material, grade, schedule and project specification before ordering.

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REFERENCE NOTE

Source dimensional values and footnotes are retained. Confirm the applicable material, grade, schedule and project specification before ordering.

Steel pipe flanges

Introduction

This Japanese Industrial Standard was established in 1984 and has gone through six revisions up to the present. The last revision was made in 2004, and the revision at this time is intended to correpond to the revisions of the related standards and expansion of the product scope which have occurred since the last revision.

No corresponding International Standard has been established at this point.

1 Scope

This Standard specifies steel pipe flanges (hereafter referred to as "flanges") of nominal sizes 10 A to 1 500 A for nominal pressures 5 K, 10K, 10K light type, 16K, 20K, 30K, 40K and 63K which are used to join parts for piping, such as steel pipes and valves used for ordinary piping [1], pressure piping [2], high pressure piping [3], high temperature piping [4], alloy steel piping [5] and stainless steel piping [6] for steam, air, gas, water, oil, etc.

This Standard is also applicable to flanges which are integral with the piping part, and constituting a part thereof (hereafter referred to as the "integral flanges").

NOTE 1: The outside diameters of **JIS** steel pipes are shown in Annex B.

NOTE 2: All the pressure values indicated in this Standard are of the gauge pressure.

Notes [1] Piping using carbon steel pipes for ordinary piping of **JIS G 3452** and arc welded carbon steel pipes of **JIS G 3457**.

[2] Piping using carbon steel pipes for pressure service of **JIS G 3454**.

[3] Piping using carbon steel pipes for high pressure service of **JIS G 3455**.

[4] Piping using carbon steel pipes for high temperature service of **JIS G 3456**.

[5] Piping using alloy steel pipes of **JIS G 3458**.

[6] Piping using stainless steel pipes of **JIS G 3459** and large diameter welded stainless steel pipes of **JIS G 3468**.

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) listed below shall be applied.

JIS B 0151 *Iron and steel pipe fittings–Vocabulary*

JIS B 0203 *Taper pipe threads*

JIS B 0601 *Geometrical Product Specifications (GPS)–Surface texture: Profile method–Terms, definitions and surface texture parameters*

JIS B 0621 *Definitions and designations of geometrical deviations*

JIS B 1180 *Hexagon head bolts and hexagon head screws*

JIS B 1181 *Hexagon nuts and hexagon thin nuts*

JIS B 1256 *Plain washers*

JIS G 0404 *Steel and steel products–General technical delivery requirements*

JIS G 3101 *Rolled steels for general structure*

JIS G 3201 *Carbon steel forgings for general use*

JIS G 3202 *Carbon steel forgings for pressure vessels*

JIS G 3203 *Alloy steel forgings for pressure vessels for high-temperature service*

JIS G 3214 *Stainless steel forgings for pressure vessels*

JIS G 4051 *Carbon steels for machine structural use*

JIS G 4304 *Hot-rolled stainless steel plate, sheet and strip*

JIS G 4305 *Cold-rolled stainless steel plate, sheet and strip*

JIS G 5101 *Carbon steel castings*

JIS G 5121 *Corrosion-resistant cast steels for general applications*

JIS G 5151 *Steel castings for high temperature and high pressure service*

JIS H 0401 *Test methods for hot dip galvanized coatings*

JIS H 2107 *Zinc ingots*

JIS H 8610 *Electroplated coatings of zinc on iron or steel*

JIS Z 2241 *Metallic materials–Tensile testing–Method of test at room temperature*

JIS Z 2320-1 *Non-destructive testing–Magnetic particle testing–Part 1: General principles*

JIS Z 2343-1 *Non-destructive testing–Penetrant testing–Part 1: General principles–Method for liquid penetrant testing and classification of the penetrant indication*

JIS Z 3001-1 *Welding and allied processes–Vocabulary–Part 1: General*

JIS Z 3001-2 *Welding and allied processes–Vocabulary–Part 2: Welding processes*

JIS Z 3121 *Methods of tensile test for butt welded joints*

JIS Z 3122 *Methods of bend test for butt welded joint*

3 Terms and definitions

For the purposes of this Standard, the terms and definitions given in **JIS B 0151**, **JIS Z 3001-1** and **JIS Z 3001-2** apply.

4 Classification of flanges and their designations

Classification of flanges and their designations shall be based on their shapes as shown in table 1.

The types of slip-on welding flanges (hubbed flanges) (SOH) for nominal pressure 20K and 30K shall be as shown in table 2.

5 Classification of gasket faces and their designations

Classification of gasket faces and their designations shall be as shown in table 3.

Male-female face gasket (MF) indicates a combination of male seat (MF-M) and female seat (MF-F) and a tongue and groove (TG) indicates a combination of tongue seat (TG-T) and a groove seat (TG-G).

Table 1 Classification of flanges and their designations

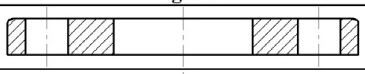
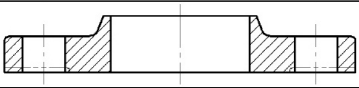
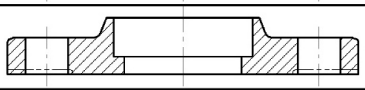
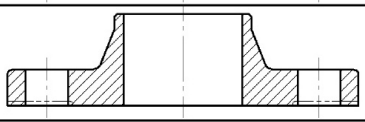
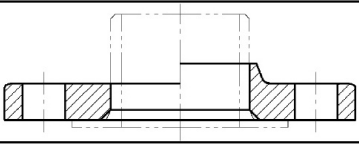
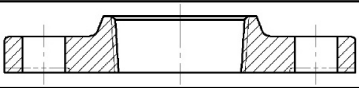
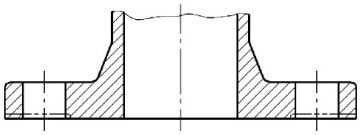
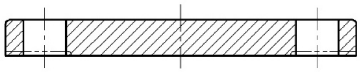
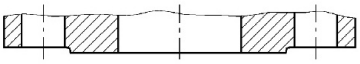
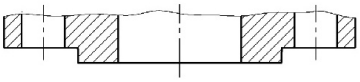
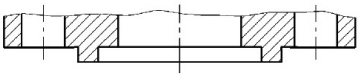
Classification of flange		Designation	Figure
Welding flange	Slip-on welding flange (plate flange)	SOP	
	Slip-on welding flange (hubbed flange)	SOH	
	Socket welding flange	SW	
	Welding neck flange	WN	
Lap joint flange		LJ	
Threaded flange		TR	
Integral flange		IT	
Blank flange		BL	

Table 2 Types of slip-on welding flanges (hubbed flanges)(SOH) for nominal pressure 20K and 30K

Classification of flange	Type	Figure
Slip-on welding flange (hubbed flange)	Type A	
	Type B	
	Type C	

Table 3 Classification of gasket faces and their designations

Classification of gasket face		Designation		Figure
Full face		FF		
Raised face		RF		
Male-female face	Male seat	MF	MF-M	
	Female seat		MF-F	
Tongue and groove	Tongue seat	TG	TG-T	
	Groove seat		TG-G	

6 Designation of flanges according to zinc coating

Designation according to the presence of zinc coating shall be as given in table 4.

Table 4 Designation according to the presence of zinc coating

Designation	Definitions
Black flange	Flanges not given zinc coating
White flange (ZN)	Flanges given hot-dip zinc coating or electroplated zinc coating

7 Performance

7.1 Mechanical properties

The mechanical properties of flanges, when tested by **17.5**, shall satisfy the mechanical properties specified in the material standards as shown in table 5.

S 20 C of **JIS G 4051** shall be 400 N/mm^2 or over in tensile strength, and S 25 C shall be 440 N/mm^2 or over in tensile strength.

7.2 Soundness

7.2.1 Liquid penetrant testing

Cast steel flanges shall, when tested by **17.1**, satisfy the requirements for the soundness in liquid penetrant testing specified in standards for individual steel castings.

7.2.2 Magnetic particle testing

Cast steel flanges shall, when tested by **17.2**, satisfy the requirements for the soundness in magnetic particle testing specified in standards for individual steel castings.

7.2.3 Ultrasonic testing

Forged steel and cast steel flanges shall, when tested by **17.3**, satisfy the requirements for the soundness in ultrasonic testing specified in standards for individual steel forgings and steel castings.

For forged steel of S 20 C and S 25 C of **JIS G 4051**, the specification of **JIS G 3201** shall apply.

8 Materials

Materials of the flanges shall be the ones given in table 5 or those at least equivalent thereto in both the mechanical properties and corrosion resistance. Materials of welding flanges shall be suitable for welding.

NOTE: ASTM materials known to be equivalent or superior to the materials given in table 5 are shown in table 6 for reference.

Table 5 Materials

Classification of material	Rolled steels		Steel forgings		Steel castings		Material group No.
	Standard number	Symbol of material	Standard number	Symbol of material	Standard number	Symbol of material	
Carbon steel	**JIS G 3101** **JIS G 4051**	SS 400 [a] S 20 C [b]	**JIS G 3201** **JIS G 3202** **JIS G 4051**	SF 390A [a] SFVC 1 S 20 C [b]	**JIS G 5101** **JIS G 5151**	SC 410 SCPH 1	001
	JIS G 4051	S 25 C [b]	**JIS G 3201** **JIS G 4051**	SF 440A [a] S 25 C [b]	**JIS G 5101**	SC 480	002
	—	—	**JIS G 3202**	SFVC 2A	**JIS G 5151**	SCPH 2	003a
Low alloy steel	—	—	**JIS G 3203**	SFVA F1	**JIS G 5151**	SCPH 11	013a
	—	—	**JIS G 3203**	SFVA F11A	**JIS G 5151**	SCPH 21	015a
Stainless steel	**JIS G 4304** **JIS G 4305**	SUS 304 SUS 304	**JIS G 3214**	SUS F304	**JIS G 5121**	SCS 13A	021a
	—	—	—	—	**JIS G 5121**	SCS 19A	021b
	JIS G 4304 **JIS G 4305**	SUS 316 SUS 316	**JIS G 3214**	SUS F316	**JIS G 5121**	SCS 14A	022a
	—	—	—	—	**JIS G 5121**	SCS 16A	022b
	JIS G 4304 **JIS G 4305**	SUS 304L SUS 304L	**JIS G 3214**	SUS F304L	—	—	023a
	JIS G 4304 **JIS G 4305**	SUS 316L SUS 316L	**JIS G 3214**	SUS F316L	—	—	023b

Notes [a] SS 400 of **JIS G 3101** and SF 390A and SF 440A of **JIS G 3201** shall be those with a maximum carbon content of 0.35 %.

[b] The inspection of S 20 C and S 25 C of **JIS G 4051** shall be conducted according to **JIS G 0404**, and the tensile strength of S 20 C shall be 400 N/mm² or over and that of S 25 C, 440 N/mm² or over.

Table 6 ASTM materials (informative)

Classification of material	Rolled steels		Steel forgings		Steel castings		Material group No.
	Standard number	Symbol of material	Standard number	Symbol of material	Standard number	Symbol of material	
Carbon steel	**A 515** **A 516** **A 537**	70 70 CL1	**A 105** **A 350**	— LF2	**A 216**	WCB	1.1
Low alloy steel	**A 204** **A 204**	A B	**A 182**	F1	**A 217** **A 352**	WC1 LC1	1.5
	A 387	11 CL2	**A 182** **A 182**	F11 CL2 F12 CL2	**A 217**	WC6	1.9
Stainless steel	**A 240** **A 240**	304 304H	**A 182** **A 182**	F304 F304H	**A 351** **A 351**	CF3 CF8	2.1
	A 240 **A 240** **A 240**	316 316H 317	**A 182** **A 182**	F316 F316H	**A 351** **A 351** **A 351**	CF3M CF8M CG8M	2.2
	A 240 **A 240**	304L 316L	**A 182** **A 182**	F304L F316L	—	—	2.3

NOTE: For standards shown in this table, see Annex G.

9 Relationship between fluid temperature and maximum working pressure

The relationship between fluid temperature and maximum working pressure (hereafter referred to as "pressure-temperature rating") shall be as given in table 11. The

light flange for nominal pressure 10K shall generally be used for steady flow at a temperature of 120 °C or less and a pressure of 0.7 MPa or less.

The working temperature for white flanges shall be maximum 300 °C.

10 Nominal size of flange and application of pressure-temperature rating

The nominal sizes of flanges, and application of the pressure-temperature rating to each classification and nominal size of flanges shall be as given in table 12. However, the nominal sizes of light flanges for nominal pressure 10K shall be as given in table 7 regardless of its temperature-pressure rating.

Table 7 Nominal sizes of light flanges for nominal pressure 10K

Nominal pressure	Classification of flange	Nominal size A																		
		10	15	20	25	32	40	50	65	80	90	100	125	150	175	200	225	250	300	350	400
10K light type	SOP	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	–
	SOH	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	○

11 Combination of flanges and gasket faces

The combination of flanges and gasket faces shall be as given in table 8.

Table 8 Combination of flanges and gasket faces

Flange		Gasket face			
Nominal pressure	Type	FF	RF	MF	TG
5K	SOP, SOH, SW, TR, BL	○	–	–	–
	WN, IT	○	○	–	–
10K	SOP, SOH, SW, TR, BL	○	–	○	○
	WN, IT	○	○	○	○
10K light type	SOP, SOH	○	–	–	–
16K	SOH, SW, TR, BL	○	–	○	○
	WN, IT	○	○	○	○
20K	SOH, SW, TR, WN, IT, BL	–	○	○	○
30K	SOH, WN, IT, BL	–	○	○	○
40K	WN, BL	–	○	○	○
63K	WN, BL	–	○	○	○
NOTE: Flange type LJ has no gasket face.					

12 Dimensions

12.1 Dimensions of gasket faces

The dimensions of gasket faces of the flange shall be as given in table 13.

NOTE: The dimensions of the small raised face are shown in Annex C.

12.2 Dimensions of flanges

The dimensions of flanges for each nominal pressure shall be as given in tables 14 to 21.

NOTE 1 The values of the inside diameter of the integral flange (IT) (d) and the diameter of larger side of hub (b) and radius of fillet (r) given in table 14, table 15, and tables 17 to 19 are informative.

For inside diameter (d), see **JIS B 2001**.

NOTE 2 The details of welds of welding flange are shown in Annex D.

NOTE 3 The pressure-temperature rating and basic dimensions of flanges for nominal pressure 2K are shown in Annex E

NOTE 4 The calculated masses of the flange are shown in Annex F.

12.3 Integral flanges (IT)

When applying other values than given in table 14, table 15 and tables 17 to 19 for inside diameter (d), the diameter of larger side of hub (b) and radius of fillet (r) of integral flange (IT), the flange strength shall be checked.

12.4 Thread

The thread of threaded flange (TR) shall be in accordance with **JIS B 0203**.

12.5 Dimensional tolerances

The dimensional tolerances for flanges shall be as specified in table 22.

Perpendicularity of the axis line of the thread of threaded flange (TR) to the gasket face shall be within 0.9 mm per 100 mm of the axis line.

Perpendicularity shall be in accordance with **5.8** of **JIS B 0621**.

13 Appearance

The flanges shall be free from any cracks or flaws detrimental to use.

14 Surface finishing

14.1 Gasket face

The gasket faces of the flanges shall be finished in accordance with table 9. Gasket faces of full face (FF), raised face (RF), and male-female face (MF) shall be finished by turning with a round-end tool. The turning condition for obtaining surface roughness of *Ra* 3.2 μm and *Ra* 6.3 μm shall be as given in table 10.

The gasket face may be finished by other method upon agreement between the inter-

ested parties.

Table 9 Finishing of gasket face

Unit: μm

Gasket face	*Ra* a)
Full face (FF)	3.2 to 6.3
Raised face (RF)	3.2 to 6.3
Male-female face (MF) (Male seat and female seat)	3.2 or under
Tongue and groove (TG) (Tongue seat and groove seat)	3.2 or under
Note a) The values of *Ra* are in accordance with the definitions of **JIS B 0601**.	

Table 10 Turning condition for gasket face

Ra	Turning condition	
	Radius of blade edge	Pitch of serration
μm	mm	mm
3.2	0.8	0.25 to 0.30
	1.6	0.36 to 0.42
6.3	0.8	0.35 to 0.42
	1.6	0.52 to 0.60

14.2 Welds

Welds of welding flange and a steel pipe shall be machined smooth and finished to *Ra* 12.5 μm or better. However, for the welds of the back side of slip-on welding flange (plate flange) (SOP) and a steel pipe need not be finished.

14.3 Facing given hot-dip zinc coating

The inside diameter surface of flanges which is given hot-dip zinc coating [excluding the smaller inside diameter of socket welding flanges (SW) and the inside diameter of welding neck flanges (WN)] may be grinded or machined to remove the coating as required.

15 Zinc coating

Zinc coating shall be as follows.

a) Flanges given hot-dip zinc coating shall not attain the final point in a cupric sulphate test specified in **17.4**, after being subjected to 5 cycles of immersion.

b) The electroplated zinc coating shall be of Grade 2 as specified in **JIS H 8610** or at least equivalent thereto in corrosion resistance.

16 Manufacturing method

16.1 Flange

Flanges shall be manufactured by forging in accordance with the method in **a)** or by casting in accordance with the method in **b)**, and then performing the required machining (see clause **14**).

Slip-on welding flange (plate flange) (SOP) and lap joint flange (LJ) without hub may

be manufactured by forming in accordance with the method in **c)** or **d)** and then performing the required machining (see clause **14**).

Blank flange (BL) may be manufactured by forming in accordance with the method in **c)** and then performing the required machining (see clause **14**).

a) Hot-forging from a steel ingot or billet. In this case, a heat treatment specified in the relevant individual forgings standard shall be applied.

b) Casting using appropriate melting and casting equipment. In this case, a heat treatment specified in the relevant individual castings standard shall be applied.

c) Press-work punching, gas cutting, plasma arc cutting, etc. of a steel sheet. Where the gas or plasma arc cutting is applied, the cut surface of the flange shall be eliminated at least 2 mm by machining.

d) Flash welding as specified in Annex A.

16.2 Zinc coating

Zinc coating, when it is applied to the flange, shall be as follows.

a) Zinc coating shall be applied after machining. In the case of applying hot-dip zinc coating, however, in which case the coating on the inside diameter surface or welding area, etc. are to be removed after coating, coating may be applied based on estimation of the required working allowances.

b) Flanges shall be coated after cleaning by means of sandblasting, pickling and the like.

c) Zinc materials used for the hot-dip coating shall be distilled zinc specified in **JIS H 2107** or zinc ingots at least equivalent thereto in quality.

17 Test methods

17.1 Liquid penetrant testing

The liquid penetrant test shall be performed as specified in the individual steel castings standards.

17.2 Magnetic particle testing

The magnetic particle test shall be performed as specified in the individual steel casting standards.

17.3 Ultrasonic testing

The ultrasonic test shall be performed as specified in the individual steel forgings or steel castings standards. For steel forgings of S 20 C and S 25 C of **JIS G 4051**, specification of **JIS G 3201** shall be applied.

17.4 Cupric sulfate testing

The cupric sulfate test on hot-dip zinc coatings shall be performed as specified in clause **6** in **JIS H 0401**.

17.5 Material testing

The material test shall be performed as specified in the individual material standards.

For materials of S 20 C and S 25 C of **JIS G 4051**, specification of **JIS G 0404** shall be applied.

18 Inspection

18.1 Dimensional inspection

The dimensions of flanges shall be inspected by direct measurements, limit gauging or other means, and shall meet the requirements of clause **12**.

18.2 Appearance inspection

The appearance of flanges shall be inspected visually and shall meet the requirements of clause **13**.

18.3 Surface finish inspection

Finishing of gasket face shall be judged by visual or tactile inspection, comparing with the reference sample agreeing with the value of finishing roughness *Ra* specified in table 9, and shall satisfy the requirements of table 9.

Surface finishing of welding portion of welding flange and steel pipe shall be inspected visually and shall satisfy the specification of **14.2**.

18.4 Inspection by liquid penetrant testing

The liquid penetrant test on cast steel flanges shall be carried out as specified in **17.1**, and the result shall meet the requirements of **7.2.1**.

18.5 Inspection by magnetic particle testing

The magnetic particle test on cast steel flanges shall be carried out as specified in **17.2**, and the result shall meet the requirements of **7.2.2**.

18.6 Inspection by ultrasonic testing

The ultrasonic test on cast steel flanges and forged steel flanges shall be carried out as specified in **17.3**, and the result shall meet the requirements of **7.2.3**.

18.7 Hot-dip zinc coating inspection

The hot-dip zinc coating of the flanges shall be tested as specified in **17.4**, and the result shall meet the requirements of **15 a)**.

18.8 Material inspection

The material of the flanges shall be tested as specified in **17.5** unless otherwise specified by the purchaser and the result shall meet the requirements of **7.1**.

18.9 Acceptance inspection

The acceptance inspection of the flange shall be performed on the following inspection items. In this inspection, the sampling plan for the lot inspection shall be subject to the agreement between the interested parties.

a) Dimensional inspection

b) Appearance inspection

c) Surface finish inspection

d) Inspection by liquid penetrant testing of cast steel flanges (as required by the purchaser)

e) Inspection by magnetic particle testing of cast steel flanges (as required by the purchaser)

f) Inspection by ultrasonic testing of forged steel or cast steel flanges (as required by the purchaser)

g) Material inspection

19 Designation of products

Flange products, except integral flanges (IT), shall be designated by the number of this Standard or title of this Standard, designation or classification of flange, designation or classification of gasket face [7], nominal pressure, nominal size and symbol of material.

In the case of the white flange, classification according to the presence of zinc coating (ZN) shall be appended.

Further, the following shall be appended where appropriate.

a) (L) denoting the light type, for a light type flange for nominal pressure 10K.

b) (H) denoting a product with alternative dimensions, for welding neck flanges (WN) for nominal pressures 5K and 10K with alternative dimensions.

c) (A) denoting Type A, (B) denoting Type B, or (C) denoting Type C, for slip-on welding flanges (SOH) for nominal pressures 20K and 30K.

Example 1 **JIS B 2220** SOP FF ZN 5K 300A SS 400

or steel pipe flange, slip-on welding flange (plate flange), full face, white flange, 5K, 450A and SF 390A

Example 2 **JIS B 2220** LJ 5K 450A SF 390A

or steel pipe flange, lap joint flange, 5K, 450A and SF 390A.

Example 3 **JIS B 2220** TR FF 10K 80A SCS 13A

or steel pipe flange, threaded flange, full face, 10K, 80A and SCS 13A.

Example 4 **JIS B 2220** WN RF 10K H 1000A SFVC 1

or steel pipe flange, welding neck flange, raised face, 10K, and product with alternative dimensions, 1000A and SFVC 1.

Example 5 **JIS B 2220** SOP FF 10K L 150A S 20 C

or steel pipe flange, slip-on welding flange (plate flange), full

face, 10K, light flange, 150A and S 20 C.

Example 6 **JIS B 2220** BL FF 16K 200A S 25 C

or steel pipe flange, blank flange, full face, 16K, 200A and S 25 C.

Example 7 **JIS B 2220** SOH RF 20K A 50A SUS F316L

or steel pipe flange, slip-on welding flange (hubbed flange), raised face, 20K, Type A, 50A and SUS F316L.

Example 8 **JIS B 2220** SOH MF-M 30K C 65A SFVC 2A

or steel pipe flange, slip-on welding flange (hubbed flange), male seat, 30K, Type C, 65A and SFVC 2A.

Example 9 **JIS B 2220** WN TG-G 40K 100A SFVA F1

or steel pipe flange, welding neck flange, groove seat, 40K, 100A and SFVA F1.

Note [7] In lap joint flange (LJ), there are no gasket faces.

20 Marking

Flanges, except for integral flange (IT), shall be marked with the following information on the periphery surface by such an indelible means as stamping, die marking, electrolytic etching or spraying.

a) Nominal pressure, nominal size and symbol of material. However, symbol of the nominal size, A, may be omitted.

The following shall be marked after the nominal pressure.

1) Symbol L for the light flange for nominal pressure 10K

2) Symbol H for welding neck flanges (WN) for nominal pressures 5K and 10K with alternative dimensions

3) Distinction of Type A (A), Type B (B) and Type C (C) for slip-on welding flanges (SOH) for nominal pressures 20K and 30K

Example 1 5K 300 SS 400

Example 2 5K 450A SF 390A

Example 3 10K 80 SCS 13A

Example 4 10K H 1000A SFVC 1

Example 5 10K L 150 S 20 C

Example 6 16K 200A S 25 C

Example 7 20K A 50 SUS F316L

Example 8 30K C 65A SFVC 2A

Example 9 40K 100 SFVA F1

b) Melting or casting number, or an appropriate quality control number traceable to the melting or the casting number

c) Manufacturer's name, its abbreviation or trademark

d) Other necessary information, not confusable with those specified in **a)** to **c)**

21 Instructions for proper use

21.1 Use of full face type gasket

For full face type (FF) slip-on welding flange (plate flange) (SOP) and blank flange (BL) for nominal pressure 5 K that are of nominal sizes 400 A or over as shown in table 14, and for full face type (FF) slip-on welding flange (plate flange) (SOP) and blank flange (BL) for nominal pressure 10K that are of nominal size 250A or over as shown in table 15, it is preferable to apply full face type gasket instead of ring gasket to avoid excessive bending moment on flange.

21.2 Hexagon bolt as specified in the main text of JIS B 1180 and hexagon nut as specified in the main text of JIS B 1181

When the combination of hexagon bolt as specified in the main text of **JIS B 1180** and hexagon nut as specified in the main text of **JIS B 1181**, or hexagon nut as specified in the main text of **JIS B 1181** is used for the flange coupling, those of Class A or B should be used, and a normal series-product grade A flat washer with nominal size of thread M24 or under and of hardness class 200HV (hardness class 300HV when the yield point or 0.2 % proof stress of bolt at the normal temperature exceeds 640 N/mm^2) specified in **JIS B 1256** should be used.

Table 11 Pressure-temperature rating

Unit: MPa

Nominal pressure	Material group No.		Division	Maximum working pressure					
				Fluid temperature (°C)					
	Specified material	Reference material		T_L to 120	220	300	350	400	425
5K	001, 002, 003a	1.1	I	0.7	0.6	0.5	—	—	—
			II	0.5	0.5	0.5	—	—	—
			III	0.5	—	—	—	—	—
	021a, 021b, 022a, 022b	2.1, 2.2	I	0.7	0.6	0.5	—	—	—
			II	0.5	0.5	0.5	—	—	—
			III	0.5	—	—	—	—	—
	023a, 023b	2.3	I	0.7	0.6	0.5	—	—	—
			II	0.5	0.5	0.5	—	—	—
			III	0.5	—	—	—	—	—
10K	001, 002, 003a	1.1	I	1.4	1.2	1.0	—	—	—
			II	1.0	1.0	1.0	—	—	—
			III	1.0	—	—	—	—	—
	021a, 021b, 022a, 022b	2.1, 2.2	I	1.4	1.2	1.0	—	—	—
			II	1.0	1.0	0.9	—	—	—
			III	1.0	—	—	—	—	—
	023a, 023b	2.3	I	1.4	1.2	1.0	—	—	—
			II	1.0	0.9	0.8	—	—	—
			III	1.0	—	—	—	—	—
16K	002, 003a	1.1	I	2.7	2.5	2.3	2.1	1.8 [a)]	1.6 [a)]
			II	1.6	1.6	1.6	—	—	—
			III	1.6	—	—	—	—	—
	021a, 021b, 022a, 022b	2.1, 2.2	I	2.7	2.5	2.3	2.1	1.8	1.6
			II	1.6	1.6	1.6	1.6	1.5	1.5
			III	1.6	—	—	—	—	—
	023a, 023b	2.3	I	2.7	2.5	2.3	2.1	1.8	1.6
			II	1.6	1.6	1.5	1.4	1.3	1.3
			III	1.6	—	—	—	—	—
20K	002, 003a	1.1	I	3.4	3.1	2.9	2.6	2.3 [a)]	2.0 [a)]
			II	2.0	2.0	2.0	—	—	—
	021a, 021b, 022a, 022b	2.1, 2.2	I	3.4	3.1	2.9	2.6	2.3	2.0
			II	2.0	2.0	2.0	2.0	1.9	1.9
			III	2.0	—	—	—	—	—
	023a, 023b	2.3	I	3.4	3.1	2.9	2.6	2.3	2.0
			II	2.0	2.0	1.9	1.7	1.7	1.7
			III	2.0	—	—	—	—	—

NOTE 1 For the pressure-temperature rating of light flange for nominal pressure 10K, see clause **9**.

NOTE 2 For the specified materials in the column of material group No., see table 5, and for the reference materials, see table 6.

NOTE 3 The pressure-temperature rating of Division II is given greater restriction than that of Division I, and rating of Division III is given further restriction than Division II, and each of these divisions shall be applied as given in table 12, according to the classification and nominal size of flanges.

NOTE 4 T_L is a minimum working temperature which is equal to or below the normal temperature. The minimum working temperature lower than the normal temperature shall be subject to the agreement between the interested parties.

NOTE 5 Maximum working pressure in between the values shown in the table shall be obtained by the proportional interpolation method.

Note [a)] Not applicable to **JIS G 5101** SC 480 of material group 002, and **ASTM A 537** CL1 of material group 1.1.

Table 11 (concluded)

Unit: MPa

Nominal pressure	Material group No.		Division	Maximum working pressure										
				Fluid temperature (°C)										
	Specified material	Reference material		T_L to 120	220	300	350	400	425	450	475	490	500	510
30K	002, 003a	1.1	I	5.1	4.6	4.3	3.9	3.4 [a]	3.0 [a]	—	—	—	—	—
	013a	1.5	I	5.1	4.6	4.3	3.9	3.8 [b]	3.6 [b]	3.4 [b]	3.0 [b]	—	—	—
	015a	1.9	I	5.1	4.6	4.3	3.9	3.8	3.6	3.4	3.2	3.0	—	—
	021a, 021b, 022a, 022b	2.1, 2.2	I	5.1	4.6	4.3	3.9	3.8	3.6	3.4 [c]	3.2 [c] [d]	3.0 [c] [d]	—	—
			II	3.9	3.6	3.4	3.0	2.5	2.3	2.3 [c]	2.3 [c] [d]	2.3 [c] [d]	—	—
	023a, 023b	2.3	I	5.1	4.6	4.3	3.9	3.8	3.6	3.4 [e]	—	—	—	—
			II	3.5	3.0	2.9	2.6	2.1	2.0	2.0 [e]	—	—	—	—
40K	002, 003a	1.1	I	6.8	6.2	5.7	5.2	4.6 [a]	4.0 [a]	—	—	—	—	—
	013a	1.5	I	6.8	6.2	5.7	5.2	5.1 [b]	4.8 [b]	4.5 [b]	4.0 [b]	—	—	—
	015a	1.9	I	6.8	6.2	5.7	5.2	5.1	4.8	4.5	4.2	4.0	3.8	3.6
			II	6.8	6.2	5.7	5.2	5.1	4.8	4.5	4.2	4.0	3.1	2.7
	021a, 021b, 022a, 022b	2.1, 2.2	I	6.8	6.2	5.7	5.2	5.1	4.8	4.5 [c]	4.2 [c] [d]	4.0 [c] [d]	3.8 [c] [d]	3.6 [c] [d]
			II	5.2	4.8	4.5	4.1	3.4	3.1	3.1 [c]	3.1 [c] [d]	3.1 [c] [d]	3.0 [c] [d]	3.0 [c] [d]
	023a, 023b	2.3	I	6.8	6.2	5.7	5.2	5.1	4.8	4.5 [e]	—	—	—	—
			II	4.9	4.0	3.9	3.5	2.9	2.7	2.7 [e]	—	—	—	—
63K	002, 003a	1.1	I	10.7	9.7	9.0	8.1	7.2 [a]	6.3 [a]	—	—	—	—	—
	013a	1.5	I	10.7	9.7	9.0	8.1	8.0 [b]	7.6 [b]	7.1 [b]	6.3 [b]	—	—	—
	015a	1.9	I	10.7	9.7	9.0	8.1	8.0	7.6	7.1	6.6	6.3	5.9	5.6
			II	10.7	9.7	9.0	8.1	8.0	7.6	7.1	6.6	6.3	4.6	4.0
	021a, 021b, 022a, 022b	2.1, 2.2	I	10.7	9.7	9.0	8.1	8.0	7.6	7.1 [c]	6.6 [c] [d]	6.3 [c] [d]	5.9 [c] [d]	5.6 [c] [d]
			II	8.1	7.1	6.7	6.2	5.1	4.7	4.6 [c]	4.6 [c] [d]	4.6 [c] [d]	4.5 [c] [d]	4.5 [c] [d]
	023a, 023b	2.3	I	10.7	9.7	9.0	8.1	7.2	6.6	6.4 [e]	—	—	—	—
			II	7.4	6.0	5.8	5.2	4.3	4.0	4.0 [e]	—	—	—	—

NOTE 2 For the specified materials in the column of material group No., see table 5, and for the reference materials, see table 6.

NOTE 3 The pressure-temperature rating of Division II is given greater restriction than that of Division I, and rating of Division III is given further restriction than Division II, and each of these divisions shall be applied as given in table 12, according to the classification and nominal size of flanges.

NOTE 4 T_L is a minimum working temperature which is equal to or below the normal temperature. The minimum working temperature lower than the normal temperature shall be subject to the agreement between the interested parties.

NOTE 5 Maximum working pressure in between the values shown in the table shall be obtained by the proportional interpolation method.

Notes [a] Not applicable to SC 480 of **JIS G 5101** of material group 002, or to CL1 of **ASTM A 537** of material group 1.1.

[b] Not applicable to LC1 of **ASTM A 352** of the material group 1.5.

[c] Not applicable to CF3 of **ASTM A 351** of the material groups 021b and 2.1.

[d] Not applicable to CF3M of **ASTM A 351** of the material groups 022b and 2.2.

[e] Not applicable to 304L of **ASTM A 240** of the material groups 023a and 2.3, or to F304L of **ASTM A 182**.

Table 12 Nominal sizes of flanges and application of pressure-temperature rating

Nominal pressure		5K																					
Material group No.		001, 002, 003a								021a, 021b, 022a, 022b							023a, 023b						
		1.1								2.1, 2.2							2.3						
Classification of flange		SOP	SOH	SW	LJ	TR	WN	IT	BL	SOP	SOH	SW	TR	WN	IT	BL	SOP	SOH	SW	TR	WN	IT	BL
Nominal size A	10	I	–	I	–	I	I	I	I	I	–	I	I	I	I	I	I	–	I	I	I	I	I
	15	I	–	I	I	I	I	I	I	I	–	I	I	I	I	I	I	–	I	I	I	I	I
	20	I	–	I	I	I	I	I	I	I	–	I	I	I	I	I	I	–	I	I	I	I	I
	25	I	–	I	I	I	I	I	I	I	–	I	I	I	I	I	I	–	I	I	I	I	I
	32	I	–	I	I	I	I	I	I	I	–	I	I	I	I	I	I	–	I	I	I	I	I
	40	I	–	I	I	I	I	I	I	I	–	I	I	I	I	I	I	–	I	I	I	I	I
	50	I	–	I	I	I	I	I	I	I	–	I	I	I	I	I	I	–	I	I	I	I	I
	65	I	–	I	I	I	I	I	I	I	–	I	I	I	I	I	I	–	I	I	I	I	I
	80	I	–	I	I	I	I	I	I	I	–	I	I	I	I	I	I	–	I	I	I	I	I
	90	I	–	–	I	–	I	I	I	I	–	–	–	I	I	I	I	–	–	–	I	I	I
	100	I	–	–	I	I	I	I	I	I	–	–	I	I	I	I	I	–	–	I	I	I	I
	125	I	–	–	I	I	I	I	I	I	–	–	I	I	I	I	I	–	–	I	I	I	I
	150	I	–	–	I	I	I	I	I	I	–	–	I	I	I	I	I	–	–	I	I	I	I
	175	I	–	–	–	–	I	I	I	I	–	–	–	I	I	I	I	–	–	–	I	I	I
	200	I	–	–	I	–	I	I	I	I	–	–	–	I	I	I	I	–	–	–	I	I	I
	225	I	–	–	–	–	I	I	I	I	–	–	–	I	I	I	I	–	–	–	I	I	I
	250	I	–	–	I	–	I	I	I	I	–	–	–	I	I	I	I	–	–	–	I	I	I
	300	I	–	–	I	–	I	I	I	I	–	–	–	I	I	I	I	–	–	–	I	I	I
	350	I	–	–	I	–	I	I	I	I	–	–	–	I	I	I	I	–	–	–	I	I	I
	400	I	–	–	I	–	I	I	I	I	–	–	–	I	I	I	I	–	–	–	I	I	I
	450	I	I	–	I	–	I	I	I	I	I	–	–	I	I	I	I	I	–	–	I	I	I
	500	I	I	–	I	–	I	I	I	I	I	–	–	I	I	I	I	I	–	–	I	I	II
	550	I	I	–	I	–	I	I	I	I	I	–	–	I	I	I	I	I	–	–	I	I	III
	600	I	I	–	I	–	I	I	II	I	I	–	–	I	I	II	I	I	–	–	I	I	III
	650	I	I	–	–	–	I	I	II	I	I	–	–	I	I	II	I	I	–	–	I	I	III
	700	I	I	–	–	–	I	I	II	I	I	–	–	I	I	II	I	I	–	–	I	I	III
	750	I	I	–	–	–	I	I	II	I	I	–	–	I	I	II	I	I	–	–	I	I	III
	800	I	I	–	–	–	I	I	II	I	I	–	–	I	I	II	I	I	–	–	I	I	III
	850	I	I	–	–	–	I	I	II	I	I	–	–	I	I	II	I	I	–	–	I	I	III
	900	I	I	–	–	–	I	I	II	I	I	–	–	I	I	III	I	I	–	–	I	I	III
	1000	I	I	–	–	–	I	I	II	I	I	–	–	I	I	III	I	I	–	–	I	I	III
	1100	I	I	–	–	–	I	I	II	I	I	–	–	I	I	III	I	I	–	–	I	I	III
	1200	I	I	–	–	–	I	I	II	I	I	–	–	I	I	III	I	I	–	–	I	I	III
	1350	I	I	–	–	–	I	I	II	I	I	–	–	I	I	III	II	II	–	–	I	I	III
	1500	I	I	–	–	–	I	I	II	I	I	–	–	I	I	III	II	II	–	–	I	I	III

NOTE 1 The upper column in the column of "Material group No." shows the specified materials and the lower column, the reference materials. For these materials, see table 5 and table 6, respectively.

NOTE 2 For the classification of flanges, see table 1.

NOTE 3 For the pressure-temperature rating symbols I, II and III, see table 11.

Table 12 (continued)

Nominal pressure		10K																				
Material group No.		001, 002, 003a								021a, 021b, 022a, 022b							023a, 023b					
		1.1								2.1, 2.2							2.3					
Classification of flange		SOP	SOH	SW	LJ	TR	WN	IT	BL	SOP	SOH	SW	TR	WN	IT	BL	SOP	SOH	SW	TR	WN	IT	BL
Nominal size A	10	I	—	I	—	I	I	I	I	I	—	I	I	I	I	I	I	—	I	I	I	I	I
	15	I	—	I	I	I	I	I	I	I	—	I	I	I	I	I	I	—	I	I	I	I	I
	20	I	—	I	I	I	I	I	I	I	—	I	I	I	I	I	I	—	I	I	I	I	I
	25	I	—	I	I	I	I	I	I	I	—	I	I	I	I	I	I	—	I	I	I	I	I
	32	I	—	I	I	I	I	I	I	I	—	I	I	I	I	I	I	—	I	I	I	I	I
	40	I	—	I	I	I	I	I	I	I	—	I	I	I	I	I	I	—	I	I	I	I	I
	50	I	—	I	I	I	I	I	I	I	—	I	I	I	I	I	I	—	I	I	I	I	I
	65	I	—	I	I	I	I	I	I	I	—	I	I	I	I	I	I	—	I	I	I	I	I
	80	I	—	I	I	I	I	I	I	I	—	I	I	I	I	I	I	—	I	I	I	I	I
	90	I	—	—	I	—	I	I	I	I	—	—	—	I	I	I	I	—	—	—	I	I	I
	100	I	—	—	I	I	I	I	I	I	—	—	I	I	I	I	I	—	—	I	I	I	I
	125	I	—	—	I	I	I	I	I	I	—	—	I	I	I	I	I	—	—	I	I	I	I
	150	I	—	—	I	I	I	I	I	I	—	—	I	I	I	I	I	—	—	I	I	I	I
	175	I	—	—	—	—	I	I	I	I	—	—	—	I	I	I	I	—	—	—	I	I	I
	200	I	—	—	I	—	I	I	I	I	—	—	—	I	I	I	I	—	—	—	I	I	I
	225	I	—	—	—	—	I	I	I	I	—	—	—	I	I	I	I	—	—	—	I	I	I
	250	I	I	—	I	—	I	I	I	I	I	—	—	I	I	I	I	I	—	—	I	I	I
	300	I	I	—	I	—	I	I	I	I	I	—	—	I	I	I	I	I	—	—	I	I	I
	350	I	I	—	I	—	I	I	I	I	I	—	—	I	I	I	I	I	—	—	I	I	I
	400	I	I	—	I	—	I	I	I	I	I	—	—	I	I	I	I	I	—	—	I	I	II
	450	I	I	—	I	—	I	I	I	I	I	—	—	I	I	I	I	I	—	—	I	I	II
	500	I	I	—	I	—	I	I	II	I	I	—	—	I	I	II	I	I	—	—	I	I	III
	550	I	I	—	I	—	I	I	II	I	I	—	—	I	I	II	I	I	—	—	I	I	III
	600	I	I	—	I	—	I	I	II	I	I	—	—	I	I	II	II	II	—	—	I	I	III
	650	I	I	—	—	—	I	I	II	I	I	—	—	I	I	II	II	II	—	—	I	I	III
	700	I	I	—	—	—	I	I	II	I	I	—	—	I	I	II	II	II	—	—	I	I	III
	750	I	I	—	—	—	I	I	II	I	I	—	—	I	I	II	II	II	—	—	I	I	III
	800	I	I	—	—	—	I	I	II	II	II	—	—	I	I	III	II	II	—	—	I	I	III
	850	I	I	—	—	—	I	I	II	II	II	—	—	I	I	III	II	II	—	—	II	II	III
	900	I	I	—	—	—	I	I	II	II	II	—	—	I	I	III	II	II	—	—	II	II	III
	1000	I	I	—	—	—	I	I	II	II	II	—	—	I	I	III	II	II	—	—	II	II	III
	1100	II	I	—	—	—	I	I	II	II	II	—	—	I	I	III	II	II	—	—	II	II	III
	1200	II	I	—	—	—	I	I	II	II	II	—	—	I	I	III	III	II	—	—	II	II	III
	1350	II	I	—	—	—	I	I	II	II	II	—	—	I	I	III	III	II	—	—	II	II	III
	1500	II	I	—	—	—	I	I	II	II	II	—	—	I	I	III	III	II	—	—	II	II	III

NOTE 1 The upper column in the column of "Material group No." shows the specified materials and the lower column, the reference materials. For these materials, see table 5 and table 6, respectively.

NOTE 2 For the classification of flanges, see table 1.

NOTE 3 For the pressure-temperature rating symbols I, II and III, see table 11.

NOTE 4 For the nominal size of the light flanges for nominal pressure 10K, see table 7.

Table 12 (continued)

Nominal pressure		16K																	
Material group No.		002, 003a							021a, 021b, 022a, 022b						023a, 023b						
		1.1							2.1, 2.2						2.3						
Classification of flange		SOH	SW	LJ	TR	WN	IT	BL	SOH	SW	TR	WN	IT	BL	SOH	SW	TR	WN	IT	BL
Nominal size A	10	I	I	—	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
	15	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
	20	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
	25	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
	32	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
	40	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
	50	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
	65	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
	80	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
	90	I	—	I	—	I	I	I	I	—	—	I	I	I	I	—	—	I	I	I
	100	I	—	I	I	I	I	I	I	—	I	I	I	I	I	—	I	I	I	I
	125	I	—	I	I	I	I	I	I	—	I	I	I	I	I	—	I	I	I	I
	150	I	—	I	I	I	I	I	I	—	I	I	I	I	I	—	I	I	I	I
	200	I	—	I	—	I	I	I	I	—	—	I	I	I	I	—	—	I	I	I
	250	I	—	I	—	I	I	I	I	—	—	I	I	II	II	—	—	II	II	II
	300	I	—	I	—	I	I	I	I	—	—	I	I	II	II	—	—	II	II	II
	350	I	—	I	—	I	I	I	I	—	—	I	I	II	II	—	—	II	II	II
	400	I	—	I	—	I	I	I	I	—	—	I	I	II	II	—	—	II	II	II
	450	I	—	I	—	I	I	I	II	—	—	I	I	II	II	—	—	II	II	III
	500	I	—	I	—	I	I	II	II	—	—	I	I	III	II	—	—	II	II	III
	550	I	—	I	—	I	I	II	II	—	—	I	I	III	II	—	—	II	II	III
	600	I	—	I	—	I	I	II	II	—	—	I	I	III	II	—	—	II	II	III

NOTE 1 The upper column in the column of "Material group No." shows the specified materials and the lower column, the reference materials. For these materials, see table 5 and table 6, respectively.

NOTE 2 For classification of flanges, see table 1.

NOTE 3 For the pressure-temperature rating symbols I, II and III, see table 11.

Table 12 (continued)

Nominal pressure		20K																	
Material group No.		002, 003a							021a, 021b, 022a, 022b						023a, 023b						
		1.1							2.1, 2.2						2.3						
Classification of flange		SOH	SW	LJ	TR	WN	IT	BL	SOH	SW	TR	WN	IT	BL	SOH	SW	TR	WN	IT	BL
Nominal size A	10	I	I	—	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
	15	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
	20	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
	25	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
	32	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
	40	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
	50	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
	65	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
	80	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
	90	I	—	I	—	I	I	I	I	—	—	I	I	I	I	—	—	I	I	I
	100	I	—	I	I	I	I	I	I	—	I	I	I	I	I	—	I	I	I	I
	125	I	—	I	I	I	I	I	I	—	I	I	I	I	I	—	I	I	I	I
	150	I	—	I	I	I	I	I	I	—	I	I	I	I	II	—	I	I	I	I
	200	I	—	I	–	I	I	I	I	—	—	I	I	I	II	—	–	I	I	I
	250	I	—	I	–	I	I	I	II	—	—	I	I	I	II	—	–	I	I	II
	300	I	—	I	—	I	I	I	II	—	—	I	I	II	II	—	—	I	I	II
	350	I	—	I	—	I	I	I	II	—	—	I	I	II	II	—	—	I	I	II
	400	I	—	I	—	I	I	I	II	—	—	I	I	II	II	—	—	I	I	II
	450	I	—	I	—	I	I	I	II	—	—	I	I	II	II	—	—	I	I	II
	500	I	—	I	—	I	I	I	II	—	—	I	I	II	II	—	—	I	I	II
	550	I	—	I	—	I	I	II	II	—	—	I	I	III	II	—	—	I	I	III
	600	I	—	I	—	I	I	II	II	—	—	I	I	III	II	—	—	I	I	III

NOTE 1 The upper column in the column of "Material group No." shows the specified materials and the lower column, the reference materials. For these materials, see table 5 and table 6, respectively.

NOTE 2 For classification of flanges, see table 1.

NOTE 3 For the pressure-temperature rating symbols I, II and III, see table 11.

Table 12 (continued)

Nominal pressure		30K																		
Material group No.		002,003a				013a				015a				021a, 021b, 022a 022b				023a, 023b			
		1.1				1.5				1.9				2.1, 2.2				2.3			
Classification of flange		SOH	WN	IT	BL	SOH	WN	IT	BL	SOH	WN	IT	BL	SOH	WN	IT	BL	SOH	WN	IT	BL
Nominal size A	10	I	–	–	I	I	–	–	I	I	–	–	I	I	–	–	I	I	–	–	I
	15	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
	20	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
	25	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
	32	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
	40	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
	50	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	II
	65	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	II
	80	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	II
	90	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	II
	100	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	II
	125	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	II
	150	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	II	II	I	I	II
	200	I	I	I	I	I	I	I	I	I	I	I	I	II	I	I	II	II	I	I	II
	250	I	I	I	I	I	I	I	I	I	I	I	I	II	I	I	II	II	I	I	II
	300	I	I	I	I	I	I	I	I	I	I	I	I	II	I	I	II	II	I	I	II
	350	I	I	I	I	I	I	I	I	I	I	I	I	II	I	I	II	II	I	I	II
	400	I	I	I	I	I	I	I	I	I	I	I	I	II	I	I	II	II	I	I	II

NOTE 1 The upper column of the column of "Material group No." shows the specified materials and the lower column, the reference materials. For these materials, see table 5 and table 6, respectively.

NOTE 2 For classification of flanges, see table 1.

NOTE 3 For the pressure-temperature rating symbols I, II and III, see table 11.

Table 12 (concluded)

Nominal pressure		40K										63K									
Material group No.		002, 003a		013a		015a		021a, 021b, 022a, 022b		023a, 023b		002, 003a		013a		015a		021a, 021b, 022a, 022b		023a, 023b	
		1.1		1.5		1.9		2.1, 2.2		2.3		1.1		1.5		1.9		2.1, 2.2		2.3	
Classification of flange		WN	BL	WN	BL	WN	BL	WN	BL	WN	BL	WN	BL	WN	BL	WN	BL	WN	BL	WN	BL
Nominal size A	15	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
	20	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
	25	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
	32	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
	40	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
	50	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
	65	I	I	I	I	I	I	I	I	I	II	I	I	I	I	I	I	I	II	I	II
	80	I	I	I	I	I	I	I	I	I	II	I	I	I	I	I	I	I	II	I	II
	90	I	I	I	I	I	I	I	I	I	II	I	I	I	I	I	I	I	II	I	II
	100	I	I	I	I	I	I	I	I	I	II	I	I	I	I	I	II	I	II	I	II
	125	I	I	I	I	I	I	I	II	I	II	I	I	I	I	I	II	I	II	I	II
	150	I	I	I	I	I	II	I	II	I	II	I	I	I	I	I	II	I	II	I	II
	200	I	I	I	I	I	II	I	II	I	II	I	I	I	I	I	II	I	II	I	II
	250	I	I	I	I	I	II	I	II	I	II	I	I	I	I	I	II	I	II	I	II
	300	I	I	I	I	I	II	I	II	I	II	I	I	I	I	I	II	I	II	I	II
	350	I	I	I	I	I	II	I	II	I	II	I	I	I	I	I	II	I	II	I	II
	400	I	I	I	I	I	II	I	II	I	II	I	I	I	I	I	II	I	II	I	II

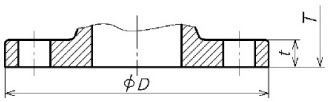
NOTE 1 The upper column in the column of "Material group No." shows the specified materials and the lower column, the reference materials. For these materials, see table 5 and table 6, respectively.

NOTE 2 For classification of flanges, see table 1.

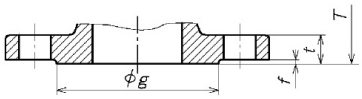
NOTE 3 For the pressure-temperature rating symbols I, II and III, see table 11.

Table 13 Dimensions of gasket face

Unit: mm



Full face (FF)



Raised face (RF)

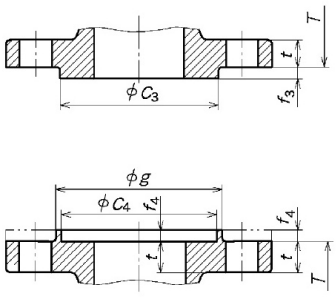
Nominal size	Raised face (RF)									
	Nominal pressure									
	5K		10K		16K, 20K		30K		40K, 63K	
A	*g*	*f*	*g*	*f*	*g*	*f*	*g*	*f*	*g*	*f*
10	39	1	46	1	46	1	52	1	52	1
15	44	1	51	1	51	1	55	1	55	1
20	49	1	56	1	56	1	60	1	60	1
25	59	1	67	1	67	1	70	1	70	1
32	70	2	76	2	76	2	80	2	80	2
40	75	2	81	2	81	2	90	2	90	2
50	85	2	96	2	96	2	105	2	105	2
65	110	2	116	2	116	2	130	2	130	2
80	121	2	126	2	132	2	140	2	140	2
90	131	2	136	2	145	2	150	2	150	2
100	141	2	151	2	160	2	160	2	165	2
125	176	2	182	2	195	2	195	2	200	2
150	206	2	212	2	230	2	235	2	240	2
175	232	2	237	2	—	—	—	—	—	—
200	252	2	262	2	275	2	280	2	290	2
225	277	2	282	2	—	—	—	—	—	—
250	317	2	324	2	345	2	345	2	355	2
300	360	3	368	3	395	3	405	3	410	3
350	403	3	413	3	440	3	450	3	455	3
400	463	3	475	3	495	3	510	3	515	3
450	523	3	530	3	560	3	—	—	—	—
500	573	3	585	3	615	3	—	—	—	—
550	630	3	640	3	670	3	—	—	—	—
600	680	3	690	3	720	3	—	—	—	—
650	735	3	740	3	—	—	—	—	—	—
700	785	3	800	3	—	—	—	—	—	—
750	840	3	855	3	—	—	—	—	—	—
800	890	3	905	3	—	—	—	—	—	—
850	940	3	955	3	—	—	—	—	—	—
900	990	3	1 005	3	—	—	—	—	—	—
1 000	1 090	3	1 110	3	—	—	—	—	—	—
1 100	1 200	3	1 220	3	—	—	—	—	—	—
1 200	1 305	3	1 325	3	—	—	—	—	—	—
1 350	1 460	3	1 480	3	—	—	—	—	—	—
1 500	1 615	3	1 635	3	—	—	—	—	—	—

NOTE 1 Dimension *D* of full face (FF) shall conform to the outside diameter *D* of the flange of tables 14 to 17.

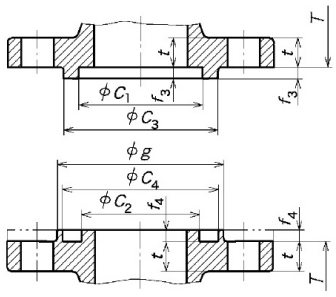
NOTE 2 The thickness of the flange *t* and total length of the flange *T* shall conform to tables 14 to 21.

Table 13 (concluded)

Unit: mm



Male-female face (MF)



Tongue and groove (TG)

Nominal size	Male-female face (MF) [a]				Tongue and groove (TG) [a]					
	Male seat (MF-M)		Female seat (MF-F) [b]		Tongue seat (TG-T)			Groove seat (TG-G) [b]		
A	C_3 [c]	f_3	C_4 [c]	f_4	C_1 [c]	C_3 [c]	f_3	C_2 [c]	C_4 [c]	f_4
10	38	6	39	5	28	38	6	27	39	5
15	42	6	43	5	32	42	6	31	43	5
20	50	6	51	5	38	50	6	37	51	5
25	60	6	61	5	45	60	6	44	61	5
32	70	6	71	5	55	70	6	54	71	5
40	75	6	76	5	60	75	6	59	76	5
50	90	6	91	5	70	90	6	69	91	5
65	110	6	111	5	90	110	6	89	111	5
80	120	6	121	5	100	120	6	99	121	5
90	130	6	131	5	110	130	6	109	131	5
100	145	6	146	5	125	145	6	124	146	5
125	175	6	176	5	150	175	6	149	176	5
150	215 (212)	6	216 (213)	5	190 (187)	215 (212)	6	189 (186)	216 (213)	5
175	—	—	—	—	—	—	—	—	—	—
200	260	6	261	5	230	260	6	229	261	5
225	—	—	—	—	—	—	—	—	—	—
250	325	6	326	5	295	325	6	294	326	5
300	375 (370)	6	376 (371)	5	340	375 (370)	6	339	376 (371)	5
350	415	6	416	5	380	415	6	379	416	5
400	475	6	476	5	440	475	6	439	476	5
450	523	6	524	5	483	523	6	482	524	5
500	575	6	576	5	535	575	6	534	576	5
550	625	6	626	5	585	625	6	584	626	5
600	675	6	676	5	635	675	6	634	676	5
650	727	6	728	5	682	727	6	681	728	5
700	777	6	778	5	732	777	6	731	778	5
750	832	6	833	5	787	832	6	786	833	5
800	882	6	883	5	837	882	6	836	883	5
850	934	6	935	5	889	934	6	888	935	5
900	987	6	988	5	937	987	6	936	988	5
1 000	1 092	6	1 094	5	1 042	1 092	6	1 040	1 094	5
1 100	1 192	6	1 194	5	1 142	1 192	6	1 140	1 194	5
1 200	1 292	6	1 294	5	1 237	1 292	6	1 235	1 294	5
1 350	1 442	6	1 444	5	1 387	1 442	6	1 385	1 444	5
1 500	1 592	6	1 594	5	1 537	1 592	6	1 535	1 594	5

NOTE 2 The thickness of the flange t and total length of the flange T shall conform to tables 14 to 21.

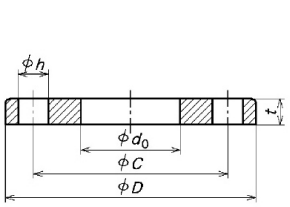
Notes [a] Male-female face (MF) and tongue and groove (TG) shall not be applied for flanges for nominal pressure 5K and light flanges for nominal pressure 10K.

[b] Dimension g of female seat (MF-F) and groove seat (TG-G) shall be in accordance with dimension g of raised face seat (RF). However, for those for nominal pressure 10K, the shape as shown by an imaginary line in the figures shall apply.

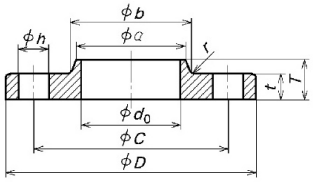
[c] The dimensions in parentheses shall be applied only to the flanges for nominal pressure 10K.

Table 14 Dimensions of flanges for nominal pressure 5K

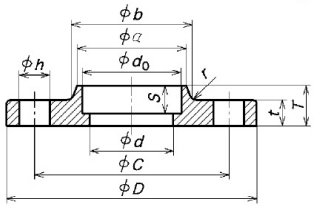
Unit: mm



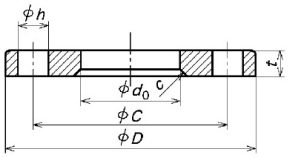
SOP of nominal size 10A to 1500A



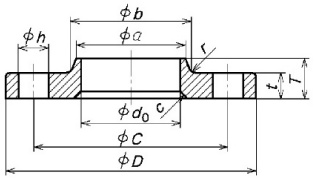
SOH of nominal size 450A to 1500A



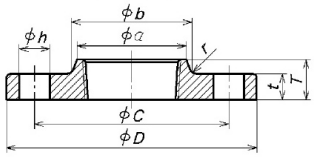
SW of nominal size 10A to 80A



LJ of nominal size 15A to 400A



LJ of nominal size 450A to 600A



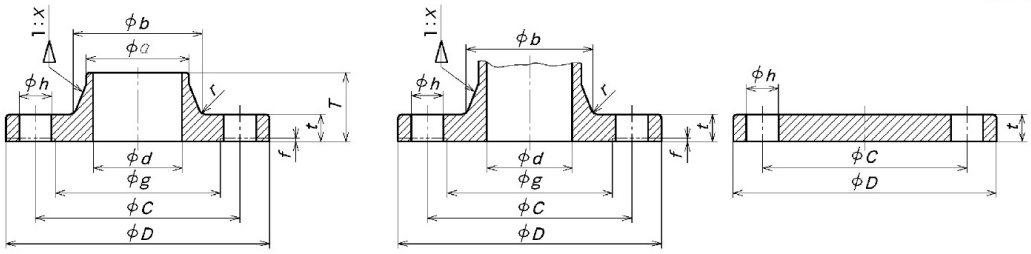
TR of nominal size 10A to 150A

Nominal size	Joined dimension					Inside diameter				Depth of socket	Nominal designation of thread	Raised face	
	Outside diameter of flange	Diameter of bolt hole centre circle	Diameter of bolt hole	Number of bolts	Nominal designation of thread of bolt				(Informative)			Diameter	Height
	D	*C*	*h*			*d*0	*d*0	*d* a)	*d*	*S*		*g*	*f*
A	SOP, SOH, SW, LJ, TR, WN, IT, BL					SOP, SOH, SW	LJ	SW, WN	IT	SW	TR	WN, IT	
10	75	55	12	4	M10	17.8	—	12.7	10	10	Rc 3/8	39	1
15	80	60	12	4	M10	22.2	23.4	16.1	15	10	Rc 1/2	44	1
20	85	65	12	4	M10	27.7	28.9	21.6	20	13	Rc 3/4	49	1
25	95	75	12	4	M10	34.5	35.6	27.6	25	13	Rc 1	59	1
32	115	90	15	4	M12	43.2	44.3	35.7	32	13	Rc 1 1/4	70	2
40	120	95	15	4	M12	49.1	50.4	41.6	40	13	Rc 1 1/2	75	2
50	130	105	15	4	M12	61.1	62.7	52.9	50	16	Rc 2	85	2
65	155	130	15	4	M12	77.1	78.7	67.9	65	16	Rc 2 1/2	110	2
80	180	145	19	4	M16	90.0	91.6	80.7	80	16	Rc 3	121	2
90	190	155	19	4	M16	102.6	104.1	93.2	90	—	—	131	2
100	200	165	19	8	M16	115.4	116.9	105.3	100	—	Rc 4	141	2
125	235	200	19	8	M16	141.2	143.0	130.8	125	—	Rc 5	176	2
150	265	230	19	8	M16	166.6	168.4	155.2	150	—	Rc 6	206	2
175	300	260	23	8	M20	192.1	—	180.1	175	—	—	232	2
200	320	280	23	8	M20	218.0	219.5	204.7	200	—	—	252	2
225	345	305	23	12	M20	243.7	—	229.4	225	—	—	277	2
250	385	345	23	12	M20	269.5	271.7	254.2	250	—	—	317	2
300	430	390	23	12	M20	321.0	322.8	304.7	300	—	—	360	3
350	480	435	25	12	M22	358.1	360.2	339.8	340	—	—	403	3
400	540	495	25	16	M22	409	411.2	390.6	400	—	—	463	3
450	605	555	25	16	M22	460	462.3	441.4	450	—	—	523	3
500	655	605	25	20	M22	511	514.4	492.2	500	—	—	573	3
550	720	665	27	20	M24	562	565.2	543.0	550	—	—	630	3
600	770	715	27	20	M24	613	616.0	593.8	600	—	—	680	3
650	825	770	27	24	M24	664	—	644.6	650	—	—	735	3
700	875	820	27	24	M24	715	—	695.4	700	—	—	785	3
750	945	880	33	24	M30	766	—	746.2	750	—	—	840	3
800	995	930	33	24	M30	817	—	797.0	800	—	—	890	3
850	1 045	980	33	24	M30	868	—	847.8	850	—	—	940	3
900	1 095	1 030	33	24	M30	919	—	898.6	900	—	—	990	3
1 000	1 195	1 130	33	28	M30	1 021	—	1 000.2	1 000	—	—	1 090	3
1 100	1 305	1 240	33	28	M30	1 122	—	1 098.6	1 100	—	—	1 200	3
1 200	1 420	1 350	33	32	M30	1 224	—	1 200.2	1 200	—	—	1 305	3
1 350	1 575	1 505	33	32	M30	1 376	—	1 346.2	1 350	—	—	1 460	3
1 500	1 730	1 660	33	36	M30	1 529	—	1 498.6	1 500	—	—	1 615	3

Note a) Adjustment shall be made according to the inside diameter of the steel pipes to be joined with.

Table 14 (concluded)

Unit: mm



WN of nominal size 10A to 1500A

IT of nominal size 10A to 1500A

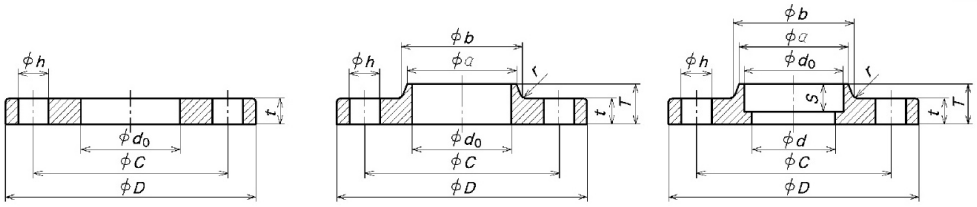
BL of nominal size 10A to 1500A

Nominal size	Thickness of flange		Diameter of hub Small diameter side		Diameter of hub Large diameter side		Taper of hub		Total length of flange		Chamfering [c]	Radius of fillet		Alternative dimensions of WN [d]	
														Thickness of flange	Taper of hub
	t	t	a	a	b	b [b]	x	Min. x	T	T	c	r	r [b]	t	x
A	Except for BL	BL	SOH, SW, LJ, TR	WN	SOH, SW, LJ, TR	WN, IT	WN	IT	SOH, SW, LJ, TR	WN	LJ	SOH, SW, LJ, TR	WN, IT	WN	
10	9	9	23	17.3	26	26	1.25	1.25	13	24	—	4	4	—	—
15	9	9	27	21.7	30	31	1.25	1.25	13	25	3	4	4	—	—
20	10	10	33	27.2	36	38	1.25	1.25	15	28	3	4	4	—	—
25	10	10	41	34.0	44	46	1.25	1.25	17	30	3	4	4	—	—
32	12	12	50	42.7	53	55	1.25	1.25	19	33	4	4	4	—	—
40	12	12	56	48.6	60	62	1.25	1.25	20	34	4	4	4	—	—
50	14	14	69	60.5	73	73	1.25	1.25	24	36	4	4	4	—	—
65	14	14	86	76.3	91	91	1.25	1.25	27	39	5	4	4	—	—
80	14	14	99	89.1	105	105	1.25	1.25	30	41	5	4	4	—	—
90	14	14	—	101.6	—	117	1.25	1.25	—	41	5	—	4	—	—
100	16	16	127	114.3	130	128	1.25	1.25	36	41	5	4	4	—	—
125	16	16	154	139.8	161	156	1.25	1.25	40	43	6	4	4	—	—
150	18	18	182	165.2	189	184	1.25	1.25	40	49	6	4	4	—	—
175	18	18	—	190.7	—	209	1.25	1.25	—	49	—	—	4	—	—
200	20	20	—	216.3	—	235	1.25	1.25	—	53	6	—	4	—	—
225	20	20	—	241.8	—	261	1.25	1.25	—	54	—	—	4	—	—
250	22	22	—	267.4	—	290	1.25	1.25	—	61	6	—	4	—	—
300	22	22	—	318.5	—	342	1.25	1.25	—	62	9	—	4	—	—
350	24	24	—	355.6	—	385	1.25	1.25	—	73	9	—	4	—	—
400	24	24	—	406.4	—	438	1.25	1.25	—	76	9	—	4	—	—
450	24	24	495	457.2	500	491	1.25	1.25	40	79	9	5	5	—	—
500	24	24	546	508.0	552	541	1.25	1.25	40	79	9	5	5	—	—
550	26	26	597	558.8	603	593	1.25	1.25	42	81	9	5	5	—	—
600	26	26	648	609.6	654	643	1.25	1.25	44	81	9	5	5	—	—
650	26	28	702	660.4	708	698	1.25	1.25	48	85	—	5	5	—	—
700	26	30	751	711.2	758	748	1.5	1.5	48	94	—	5	5	36	1.25
750	28	32	802	762.0	810	802	1.5	1.5	52	100	—	5	5	38	1.25
800	28	34	854	812.8	862	852	1.5	1.5	52	100	—	5	5	38	1.25
850	28	36	904	863.6	912	902	1.75	1.75	54	108	—	5	5	38	1.5
900	30	36	956	914.4	964	952	1.75	1.75	56	108	—	5	5	40	1.5
1 000	32	40	1 058	1 016.0	1 066	1 052	2	2	60	116	—	5	5	50	1.5
1 100	32	44	1 158	1 117.6	1 170	1 162	2	2	71	136	—	7	8	56	1.5
1 200	34	48	1 260	1 219.2	1 272	1 272	2	2	77	155	—	7	8	62	1.5
1 350	34	54	1 414	1 371.6	1 426	1 427	2	2	80	164	—	7	8	62	1.5
1 500	36	58	1 568	1 524.0	1 580	1 582	2	2	86	172	—	7	10	66	1.5

Notes
[b] For IT flanges, the values shown for this dimension are informative.
[c] This may be rounded off with the dimension c as a radius.
[d] These dimensions may be applied upon agreement between the interested parties.

Table 15 Dimensions of flanges for nominal pressure 10K

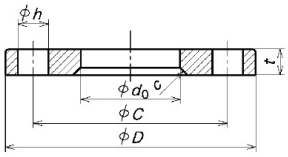
Unit: mm



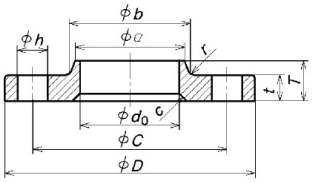
SOP of nominal size 10A to 1500A

SOH of nominal size 250A to 1500A

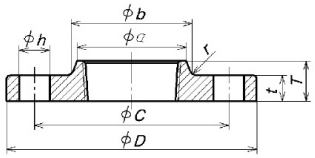
SW of nominal size 10A to 80A



LJ of nominal size 15A to 200A



LJ of nominal size 250A to 600A



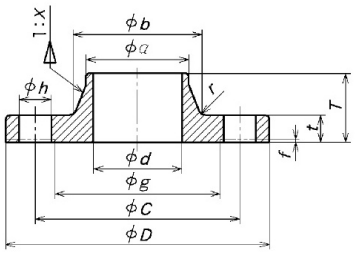
TR of nominal size 10A to 150A

Nominal size	Joined dimension					Inside diameter				Depth of socket	Nominal designation of thread	Raised face	
	Outside diameter of flange	Diameter of bolt hole centre circle	Diameter of bolt hole	Number of bolts	Nominal designation of thread of bolt				(Informative)			Diameter	Height
	D	*C*	*h*			d_0	d_0	d [a]	*d*	*S*		*g*	*f*
	SOP, SOH, SW, LJ, TR, WN, IT, BL					SOP, SOH, SW	LJ	SW, WN	IT	SW	TR	WN, IT	
A													
10	90	65	15	4	M12	17.8	—	12.7	10	10	Rc 3/8	46	1
15	95	70	15	4	M12	22.2	23.4	16.1	15	10	Rc 1/2	51	1
20	100	75	15	4	M12	27.7	28.9	21.6	20	13	Rc 3/4	56	1
25	125	90	19	4	M16	34.5	35.6	27.6	25	13	Rc 1	67	1
32	135	100	19	4	M16	43.2	44.3	35.7	32	13	Rc 1 1/4	76	2
40	140	105	19	4	M16	49.1	50.4	41.6	40	13	Rc 1 1/2	81	2
50	155	120	19	4	M16	61.1	62.7	52.9	50	16	Rc 2	96	2
65	175	140	19	4	M16	77.1	78.7	67.9	65	16	Rc 2 1/2	116	2
80	185	150	19	8	M16	90.0	91.6	80.7	80	16	Rc 3	126	2
90	195	160	19	8	M16	102.6	104.1	93.2	90	—	—	136	2
100	210	175	19	8	M16	115.4	116.9	105.3	100	—	Rc 4	151	2
125	250	210	23	8	M20	141.2	143.0	130.8	125	—	Rc 5	182	2
150	280	240	23	8	M20	166.6	168.4	155.2	150	—	Rc 6	212	2
175	305	265	23	12	M20	192.1	—	180.1	175	—	—	237	2
200	330	290	23	12	M20	218.0	219.5	204.7	200	—	—	262	2
225	350	310	23	12	M20	243.7	—	229.4	225	—	—	282	2
250	400	355	25	12	M22	269.5	271.7	254.2	250	—	—	324	2
300	445	400	25	16	M22	321.0	322.8	304.7	300	—	—	368	3
350	490	445	25	16	M22	358.1	360.2	339.8	340	—	—	413	3
400	560	510	27	16	M24	409	411.2	390.6	400	—	—	475	3
450	620	565	27	20	M24	460	462.3	441.4	450	—	—	530	3
500	675	620	27	20	M24	511	514.4	492.2	500	—	—	585	3
550	745	680	33	20	M30	562	565.2	543.0	550	—	—	640	3
600	795	730	33	24	M30	613	616.0	593.8	600	—	—	690	3
650	845	780	33	24	M30	664	—	644.6	650	—	—	740	3
700	905	840	33	24	M30	715	—	695.4	700	—	—	800	3
750	970	900	33	24	M30	766	—	746.2	750	—	—	855	3
800	1 020	950	33	28	M30	817	—	797.0	800	—	—	905	3
850	1 070	1 000	33	28	M30	868	—	847.8	850	—	—	955	3
900	1 120	1 050	33	28	M30	919	—	898.6	900	—	—	1 005	3
1 000	1 235	1 160	39	28	M36	1 021	—	1 000.2	1 000	—	—	1 110	3
1 100	1 345	1 270	39	28	M36	1 122	—	1 098.6	1 100	—	—	1 220	3
1 200	1 465	1 380	39	32	M36	1 224	—	1 200.2	1 200	—	—	1 325	3
1 350	1 630	1 540	45	36	M42	1 376	—	1 346.2	1 350	—	—	1 480	3
1 500	1 795	1 700	45	40	M42	1 529	—	1 498.6	1 500	—	—	1 635	3

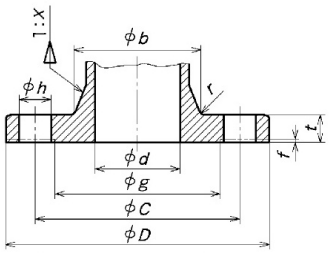
Note [a] Adjustment shall be made according to the inside diameter of the steel pipes to be joined with.

Table 15 (concluded)

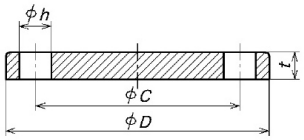
Unit: mm



WN of nominal size 10A to 1500A



IT of nominal size 10A to 1500A



BL of nominal size 10A to 1500A

Nominal size	Thickness of flange		Diameter of hub Small diameter side		Diameter of hub Large diameter side		Taper of hub		Total length of flange		Chamfering [c]	Radius of fillet		Alternative dimensions of WN [d]	
								Min.						Thickness of flange	Taper of hub
	t	t	a	a	b	b [b]	x	x	T	T	c	r	r [b]	t	x
A	Except for BL	BL	SOH, SW, LJ, TR	WN	SOH, SW, LJ, TR	WN, IT	WN	IT	SOH, SW, LJ, TR	WN	LJ	SOH, SW, LJ, TR	WN, IT	WN	
10	12	12	23	17.3	26	28	1.25	1.25	16	29	—	4	4	—	—
15	12	12	27	21.7	30	33	1.25	1.25	16	31	3	4	4	—	—
20	14	14	33	27.2	36	38	1.25	1.25	20	32	3	4	4	—	—
25	14	14	41	34.0	44	47	1.25	1.25	20	36	3	4	4	—	—
32	16	16	50	42.7	53	56	1.25	1.25	22	38	4	4	4	—	—
40	16	16	56	48.6	60	62	1.25	1.25	24	38	4	4	4	—	—
50	16	16	69	60.5	73	75	1.25	1.25	24	40	4	4	4	—	—
65	18	18	86	76.3	91	92	1.25	1.25	27	44	5	4	4	—	—
80	18	18	99	89.1	105	105	1.25	1.25	30	45	5	4	5	—	—
90	18	18	—	101.6	—	117	1.25	1.25	—	45	5	—	5	—	—
100	18	18	127	114.3	130	130	1.25	1.25	36	45	5	4	5	—	—
125	20	20	154	139.8	161	156	1.25	1.25	40	47	6	4	5	—	—
150	22	22	182	165.2	189	184	1.25	1.25	40	53	6	4	5	—	—
175	22	22	—	190.7	—	210	1.25	1.25	—	55	—	—	5	—	—
200	22	22	—	216.3	—	238	1.25	1.25	—	58	6	—	5	—	—
225	22	22	—	241.8	—	261	1.25	1.25	—	58	—	—	5	—	—
250	24	24	288	267.4	292	292	1.25	1.25	36	65	6	6	6	—	—
300	24	24	340	318.5	346	345	1.25	1.25	38	68	9	6	6	—	—
350	26	26	380	355.6	386	388	1.25	1.25	42	79	9	6	6	—	—
400	28	28	436	406.4	442	442	1.25	1.25	44	85	9	6	6	—	—
450	30	30	496	457.2	502	495	1.25	1.25	48	90	9	6	6	—	—
500	30	30	548	508.0	554	546	1.5	1.5	48	99	9	6	6	40	1.25
550	32	34	604	558.8	610	597	1.75	1.75	52	111	9	6	6	42	1.5
600	32	36	656	609.6	662	648	1.75	1.75	52	112	9	6	6	42	1.5
650	34	38	706	660.4	712	700	1.75	1.75	56	116	—	6	6	44	1.5
700	34	40	762	711.2	770	754	2	2	58	132	—	6	6	56	1.5
750	36	44	816	762.0	824	807	2	2	62	139	—	6	6	60	1.5
800	36	46	868	812.8	876	858	2	2	64	139	—	6	6	60	1.5
850	36	48	920	863.6	928	908	2	2	66	139	—	6	6	60	1.5
900	38	50	971	914.4	979	959	2	2	70	140	—	6	6	62	1.5
1 000	40	56	1 073	1 016.0	1 081	1 065	2	2	74	151	—	6	6	66	1.5
1 100	42	62	1 175	1 117.6	1 185	1 174	2	2	95	170	—	8	10	72	1.5
1 200	44	66	1 278	1 219.2	1 290	1 281	2	2	101	182	—	8	10	76	1.5
1 350	48	74	1 432	1 371.6	1 450	1 438	2	2	110	200	—	8	10	82	1.5
1 500	50	82	1 585	1 524.0	1 605	1 598	2	2	123	218	—	8	12	88	1.5

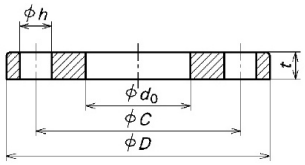
Notes [b] For IT flanges, the values shown for this dimension are informative.

[c] This may be rounded off with the dimension c as a radius.

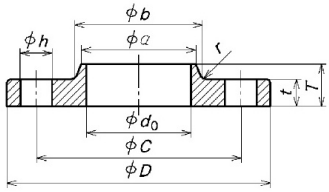
[d] These dimensions may be applied upon agreement between the interested parties.

Table 16 Dimensions of light flanges for nominal pressure 10K

Unit: mm



SOP of nominal size 10A to 350A

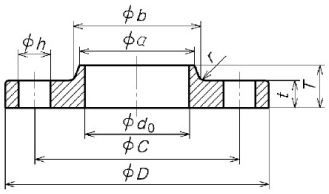


SOH of nominal size 400A

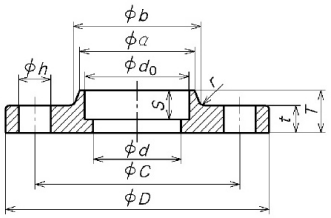
Nominal size	Joined dimension					Inside diameter	Thickness of flange	Diameter of hub		Total length of flange	Radius of fillet
	Outside diameter of flange	Diameter of bolt hole centre circle	Diameter of bolt hole	Number of bolts	Nominal designation of thread of bolt						
	D	*C*	*h*			d_0	*t*	*a*	*b*	*T*	*r*
A	SOP, SOH					SOP, SOH	SOP, SOH	SOH		SOH	SOH
10	90	65	12	4	M10	17.8	9	–	–	–	–
15	95	70	12	4	M10	22.2	9	–	–	–	–
20	100	75	12	4	M10	27.7	10	–	–	–	–
25	125	90	15	4	M12	34.5	12	–	–	–	–
32	135	100	15	4	M12	43.2	12	–	–	–	–
40	140	105	15	4	M12	49.1	12	–	–	–	–
50	155	120	15	4	M12	61.1	14	–	–	–	–
65	175	140	15	4	M12	77.1	14	–	–	–	–
80	185	150	15	8	M12	90.0	14	–	–	–	–
90	195	160	15	8	M12	102.6	14	–	–	–	–
100	210	175	15	8	M12	115.4	16	–	–	–	–
125	250	210	19	8	M16	141.2	18	–	–	–	–
150	280	240	19	8	M16	166.6	18	–	–	–	–
175	305	265	19	12	M16	192.1	20	–	–	–	–
200	330	290	19	12	M16	218.0	20	–	–	–	–
225	350	310	19	12	M16	243.7	20	–	–	–	–
250	400	355	23	12	M20	269.5	22	–	–	–	–
300	445	400	23	16	M20	321.0	22	–	–	–	–
350	490	445	23	16	M20	358.1	24	–	–	–	–
400	560	510	25	16	M22	409	24	436	442	36	5

Table 17 Dimensions of flanges for nominal pressure 16K

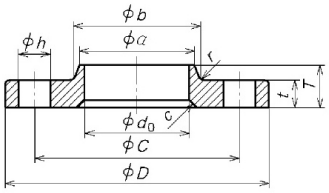
Unit: mm



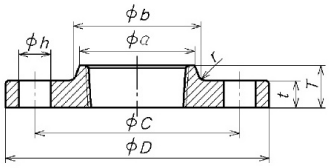
SOH of nominal size 10A to 600A



SW of nominal size 10A to 80A



LJ of nominal size 15A to 600A



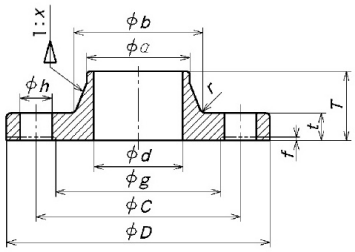
TR of nominal size 10A to 150A

Nominal size	Joined dimension					Inside diameter				Depth of socket	Nominal designation of thread	Raised face	
	Outside diameter of flange	Diameter of bolt hole centre circle	Diameter of bolt hole	Number of bolts	Nominal designation of thread of bolt				(Informative)			Diameter	Height
	D	*C*	*h*			d_0	d_0	$d^{a)}$	*d*	*S*		*g*	*f*
A	SOH, SW, LJ, TR, WN, IT, BL					SOH, SW	LJ	SW, WN	IT	SW	TR	WN, IT	
10	90	65	15	4	M12	17.8	—	12.7	10	10	Rc 3/8	46	1
15	95	70	15	4	M12	22.2	23.4	16.1	15	10	Rc 1/2	51	1
20	100	75	15	4	M12	27.7	28.9	21.4	20	13	Rc 3/4	56	1
25	125	90	19	4	M16	34.5	35.6	27.2	25	13	Rc 1	67	1
32	135	100	19	4	M16	43.2	44.3	35.5	32	13	Rc 1 1/4	76	2
40	140	105	19	4	M16	49.1	50.4	41.2	40	13	Rc 1 1/2	81	2
50	155	120	19	8	M16	61.1	62.7	52.7	50	16	Rc 2	96	2
65	175	140	19	8	M16	77.1	78.7	65.9	65	16	Rc 2 1/2	116	2
80	200	160	23	8	M20	90.0	91.6	78.1	80	16	Rc 3	132	2
90	210	170	23	8	M20	102.6	104.1	90.2	90	—	—	145	2
100	225	185	23	8	M20	115.4	116.9	102.3	100	—	Rc 4	160	2
125	270	225	25	8	M22	141.2	143.0	126.6	125	—	Rc 5	195	2
150	305	260	25	12	M22	166.6	168.4	151.0	150	—	Rc 6	230	2
200	350	305	25	12	M22	218.0	219.5	199.9	200	—	—	275	2
250	430	380	27	12	M24	269.5	271.7	248.8	250	—	—	345	2
300	480	430	27	16	M24	321.0	322.8	297.9	300	—	—	395	3
350	540	480	33	16	M30×3	358.1	360.2	333.4	335	—	—	440	3
400	605	540	33	16	M30×3	409	411.2	381.0	380	—	—	495	3
450	675	605	33	20	M30×3	460	462.3	431.8	430	—	—	560	3
500	730	660	33	20	M30×3	511	514.4	482.6	480	—	—	615	3
550	795	720	39	20	M36×3	562	565.2	533.4	530	—	—	670	3
600	845	770	39	24	M36×3	613	616.0	584.2	580	—	—	720	3

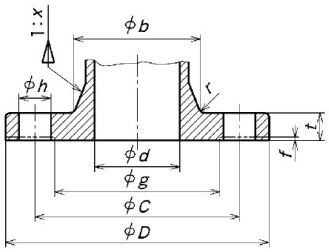
Note a) Adjustment shall be made according to the inside diameter of the steel pipes to be joined with.

Table 17 (concluded)

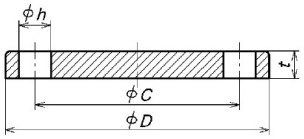
Unit: mm



WN of nominal size 10A to 600A



IT of nominal size 10A to 600A



BL of nominal size 10A to 600A

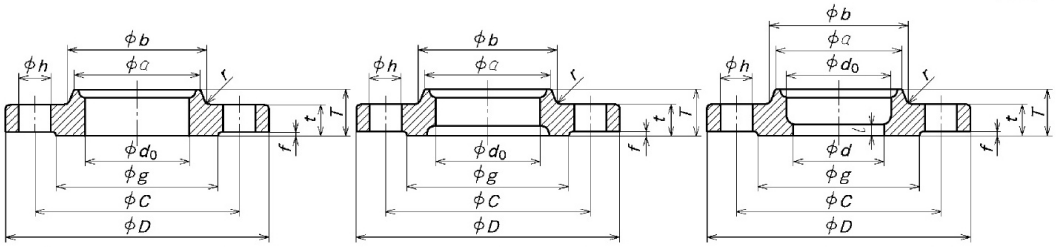
Nominal size	Thickness of flange	Diameter of hub Small diameter side		Diameter of hub Large diameter side		Taper of hub		Total length of flange			Chamfering [c]	Radius of fillet
							Min.					
	t	*a*	*a*	*b*	*b* [b]	*x*	*x*	*T*	*T*	*T*	*c*	*r* [b]
A	SOH, SW, LJ, TR, WN, IT, BL	SOH, SW, LJ, TR	WN	SOH, SW, LJ, TR	WN, IT	WN	IT	SOH, SW, LJ	TR	WN	LJ	SOH, SW, LJ, TR, WN, IT
10	12	26	17.3	28	29	1.25	1.25	16	16	31	—	4
15	12	30	21.7	32	34	1.25	1.25	16	16	32	3	4
20	14	38	27.2	42	39	1.25	1.25	20	20	34	3	4
25	14	46	34.0	50	47	1.25	1.25	20	20	36	3	4
32	16	56	42.7	60	56	1.25	1.25	22	22	39	4	5
40	16	62	48.6	66	62	1.25	1.25	24	24	39	4	5
50	16	76	60.5	80	75	1.25	1.25	24	24	40	4	5
65	18	94	76.3	98	92	1.25	1.25	26	27	46	5	5
80	20	108	89.1	112	105	1.25	1.25	28	30	49	5	6
90	20	120	101.6	124	118	1.25	1.25	30	—	50	5	6
100	22	134	114.3	138	134	1.25	1.25	34	36	56	5	6
125	22	164	139.8	170	162	1.25	1.25	34	40	60	6	6
150	24	196	165.2	202	192	1.25	1.25	38	40	69	6	6
200	26	244	216.3	252	244	1.25	1.25	40	—	73	6	6
250	28	304	267.4	312	298	1.25	1.25	44	—	81	6	6
300	30	354	318.5	364	352	1.25	1.25	48	—	88	9	8
350	34	398	355.6	408	398	1.25	1.25	52	—	104	9	8
400	38	446	406.4	456	452	1.25	1.25	60	—	115	9	10
450	40	504	457.2	514	510	1.25	1.25	64	—	126	9	10
500	42	558	508.0	568	561	1.25	1.25	68	—	128	9	10
550	44	612	558.8	622	616	1.25	1.25	70	—	135	9	10
600	46	666	609.6	676	670	1.25	1.25	74	—	141	9	10

Notes [b] For IT flanges, the values shown for this dimension are informative.

[c] This may be rounded off with the dimension *c* as a radius.

Table 18 Dimensions of flanges for nominal pressure 20K

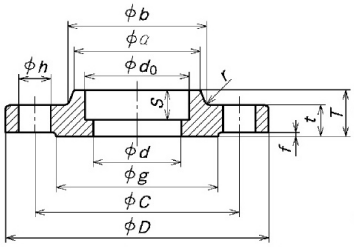
Unit: mm



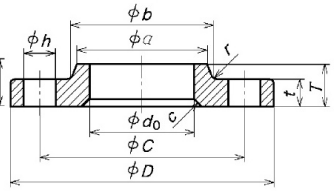
SOH Type A of nominal size 10A to 600A

SOH Type B of nominal size 10A to 50A

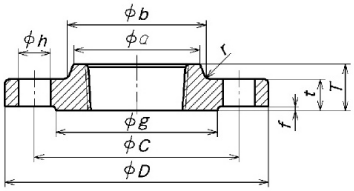
SOH Type C of nominal size 65A to 600A



SW of nominal size 10A to 80A



LJ of nominal size 15A to 600A



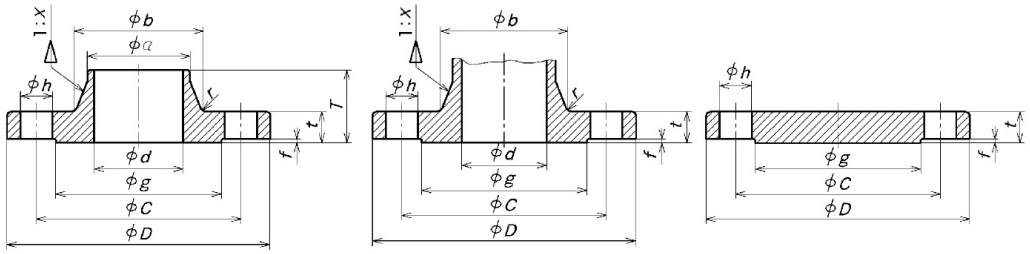
TR of nominal size 10A to 150A

Nominal size	Joined dimension					Inside diameter				Depth of socket	Nominal designation of thread	Raised face	
	Outside diameter of flange	Diameter of bolt hole centre circle	Diameter of bolt hole	Number of bolts	Nominal designation of thread of bolt				(Informative)			Diameter	Height
	D	*C*	*h*			d_0	d_0	d [a]	*d*	*S*		*g*	*f*
A	SOH, SW, LJ, TR, WN, IT, BL					SOH, SW	LJ	SOH, SW, WN	IT	SW	TR	SOH, SW, TR, WN, IT, BL	
10	90	65	15	4	M12	17.8	—	12.7	10	10	Rc 3/8	46	1
15	95	70	15	4	M12	22.2	23.4	16.1	15	10	Rc 1/2	51	1
20	100	75	15	4	M12	27.7	28.9	21.4	20	13	Rc 3/4	56	1
25	125	90	19	4	M16	34.5	35.6	27.2	25	13	Rc 1	67	1
32	135	100	19	4	M16	43.2	44.3	35.5	32	13	Rc 1 1/4	76	2
40	140	105	19	4	M16	49.1	50.4	41.2	40	13	Rc 1 1/2	81	2
50	155	120	19	8	M16	61.1	62.7	52.7	50	16	Rc 2	96	2
65	175	140	19	8	M16	77.1	78.7	65.9	65	16	Rc 2 1/2	116	2
80	200	160	23	8	M20	90.0	91.6	78.1	80	16	Rc 3	132	2
90	210	170	23	8	M20	102.6	104.1	90.2	90	—	—	145	2
100	225	185	23	8	M20	115.4	116.9	102.3	100	—	Rc 4	160	2
125	270	225	25	8	M22	141.2	143.0	126.6	125	—	Rc 5	195	2
150	305	260	25	12	M22	166.6	168.4	151.0	150	—	Rc 6	230	2
200	350	305	25	12	M22	218.0	219.5	199.9	200	—	—	275	2
250	430	380	27	12	M24	269.5	271.7	248.8	250	—	—	345	2
300	480	430	27	16	M24	321.0	322.8	297.9	300	—	—	395	3
350	540	480	33	16	M30×3	358.1	360.2	333.4	335	—	—	440	3
400	605	540	33	16	M30×3	409	411.2	381.0	380	—	—	495	3
450	675	605	33	20	M30×3	460	462.3	431.8	430	—	—	560	3
500	730	660	33	20	M30×3	511	514.4	482.6	480	—	—	615	3
550	795	720	39	20	M36×3	562	565.2	533.4	530	—	—	670	3
600	845	770	39	24	M36×3	613	616.0	584.2	580	—	—	720	3

Note [a] Adjustment shall be made according to the inside diameter of the steel pipes to be joined with.

Table 18 (concluded)

Unit: mm



WN of nominal size 10A to 600A IT of nominal size 10A to 600A BL of nominal size 10A to 600A

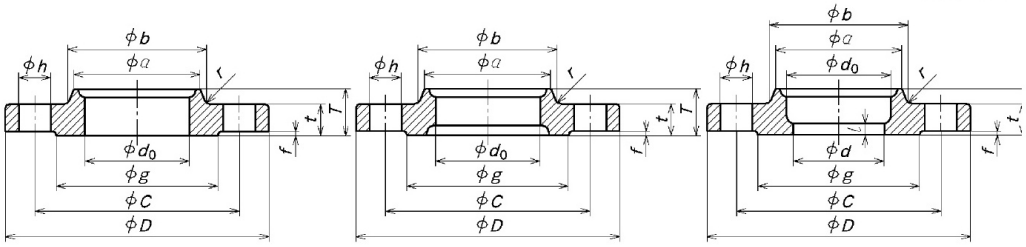
Nominal size	Thickness of flange	Diameter of hub Small diameter side		Diameter of hub Large diameter side		Taper of hub		Total length of flange		Chamfering [c]	Radius of fillet	Stopper
							Min.					
	t	*a*	*a*	*b*	*b* [b]	*x*	*x*	*T*	*T*	*c*	*r* [b]	*l*
A	SOH, SW, LJ, TR, WN, IT, BL	SOH, SW, LJ, TR	WN	SOH, SW, LJ, TR	WN, IT	WN	IT	SOH, SW, LJ, TR	WN	LJ	SOH, SW, LJ, TR, WN, IT	SOH Type C
10	14	30	17.3	32	29	1.25	1.25	20	33	—	4	—
15	14	34	21.7	36	34	1.25	1.25	20	34	3	4	—
20	16	40	27.2	42	39	1.25	1.25	22	36	3	4	—
25	16	48	34.0	50	47	1.25	1.25	24	38	3	4	—
32	18	56	42.7	60	56	1.25	1.25	26	41	4	5	—
40	18	62	48.6	66	62	1.25	1.25	26	41	4	5	—
50	18	76	60.5	80	75	1.25	1.25	26	42	4	5	—
65	20	100	76.3	104	92	1.25	1.25	30	48	5	5	6
80	22	113	89.1	117	105	1.25	1.25	34	51	5	6	6
90	24	126	101.6	130	118	1.25	1.25	36	54	5	6	6
100	24	138	114.3	142	134	1.25	1.25	36	58	5	6	6
125	26	166	139.8	172	162	1.25	1.25	40	64	6	6	6
150	28	196	165.2	202	192	1.25	1.25	42	73	6	6	6
200	30	244	216.3	252	244	1.25	1.25	46	77	6	6	6
250	34	304	267.4	312	298	1.25	1.25	52	87	6	6	6
300	36	354	318.5	364	352	1.25	1.25	56	94	9	8	6
350	40	398	355.6	408	398	1.25	1.25	62	110	9	8	6
400	46	446	406.4	456	452	1.25	1.25	70	123	9	10	7
450	48	504	457.2	514	510	1.25	1.25	78	134	9	10	7
500	50	558	508.0	568	561	1.25	1.25	84	136	9	10	7
550	52	612	558.8	622	616	1.25	1.25	90	143	9	10	7
600	54	666	609.6	676	670	1.25	1.25	96	149	9	10	7

Notes [b] For IT flanges, the values shown for this dimension are informative.

[c] This may be rounded off with the dimension *c* as a radius.

Table 19 Dimensions of flanges for nominal pressure 30K

Unit: mm



SOH Type A of nominal size 10A to 400A

SOH Type B of nominal size 10A to 50A

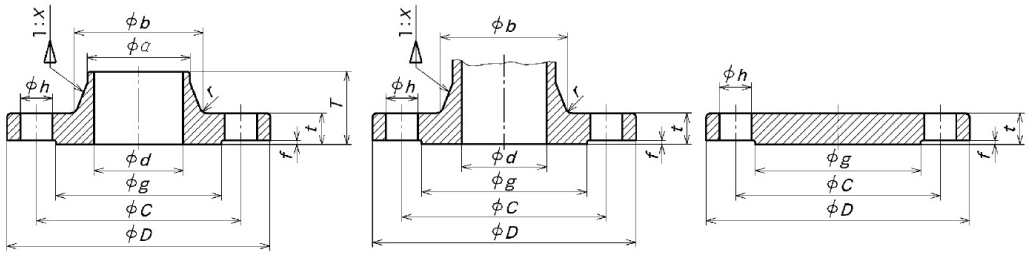
SOH Type C of nominal size 65A to 400A

Nominal size	Joined dimension					Inside diameter			Raised face	
	Outside diameter of flange	Diameter of bolt hole centre circle	Diameter of bolt hole	Number of bolts	Nominal designation of thread of bolt			(Informative)	Diameter	Height
	D	*C*	*h*			d_0	d [a]	*d*	*g*	*f*
A	SOH, WN, IT, BL					SOH	SOH, WN	IT	SOH, WN, IT, BL	
10	110	75	19	4	M16	17.8	12.7	—	52	1
15	115	80	19	4	M16	22.2	16.1	15	55	1
20	120	85	19	4	M16	27.7	21.4	20	60	1
25	130	95	19	4	M16	34.5	27.2	25	70	1
32	140	105	19	4	M16	43.2	35.5	32	80	2
40	160	120	23	4	M20	49.1	41.2	40	90	2
50	165	130	19	8	M16	61.1	52.7	50	105	2
65	200	160	23	8	M20	77.1	65.9	65	130	2
80	210	170	23	8	M20	90.0	78.1	80	140	2
90	230	185	25	8	M22	102.6	90.2	90	150	2
100	240	195	25	8	M22	115.4	102.3	100	160	2
125	275	230	25	8	M22	141.2	126.6	125	195	2
150	325	275	27	12	M24	166.6	151.0	150	235	2
200	370	320	27	12	M24	218.0	199.9	200	280	2
250	450	390	33	12	M30×3	269.5	248.8	250	345	2
300	515	450	33	16	M30×3	321.0	297.9	300	405	3
350	560	495	33	16	M30×3	358.1	333.4	335	450	3
400	630	560	39	16	M36×3	409	381.0	380	510	3

Note [a] Adjustment shall be made according to the inside diameter of the steel pipes to be joined with.

Table 19 (concluded)

Unit: mm



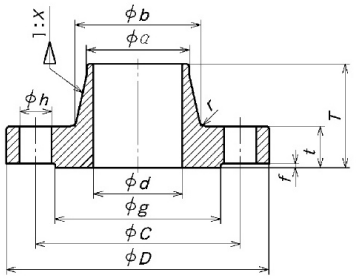
WN of nominal size 15A to 400A IT of nominal size 15A to 400A BL of nominal size 10A to 400A

Nominal size	Thickness of flange	Diameter of hub Small diameter side		Diameter of hub Large diameter side		Taper of hub		Total length of flange		Radius of fillet		Stopper
							Min.					
	t	*a*	*a*	*b*	*b* [b)]	*x*	*x*	*T*	*T*	*r*	*r* [b)]	*l*
A	SOH, WN, IT, BL	SOH	WN	SOH	WN, IT	WN	IT	SOH	WN	SOH	WN, IT	SOH Type C
10	16	30	—	34	—	—	—	24	—	4	—	—
15	18	36	21.7	40	40	1.25	1.25	26	45	5	6	—
20	18	42	27.2	46	44	1.25	1.25	28	45	5	6	—
25	20	50	34.0	54	52	1.25	1.25	30	48	5	6	—
32	22	60	42.7	64	62	1.25	1.25	32	52	6	6	—
40	22	66	48.6	70	70	1.25	1.25	34	54	6	6	—
50	22	82	60.5	86	84	1.25	1.25	36	57	6	8	—
65	26	102	76.3	106	104	1.25	1.25	40	69	8	8	6
80	28	115	89.1	121	118	1.25	1.25	44	73	8	8	6
90	30	128	101.6	134	130	1.25	1.25	46	74	8	8	6
100	32	141	114.3	147	142	1.25	1.25	48	76	8	8	6
125	36	166	139.8	172	172	1.25	1.25	54	86	8	10	6
150	38	196	165.2	204	202	1.25	1.25	58	95	8	10	6
200	42	248	216.3	256	254	1.25	1.25	64	102	8	10	6
250	48	306	267.4	314	312	1.25	1.25	72	118	10	12	6
300	52	360	318.5	370	366	1.25	1.25	78	127	10	15	6
350	54	402	355.6	412	406	1.25	1.25	84	134	12	15	6
400	60	456	406.4	468	462	1.25	1.25	92	149	15	20	7

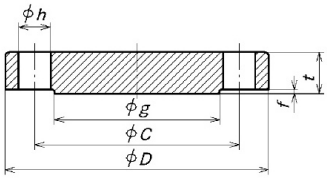
Note [b)] For IT flanges, the values shown for this dimension are informative.

Table 20 Dimensions of flanges for nominal pressure 40K

Unit: mm



WN of nominal size 15A to 400A



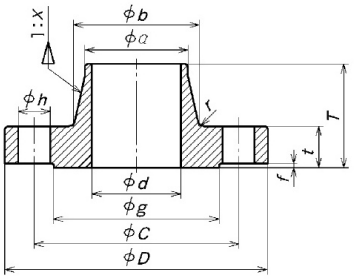
BL of nominal size 15A to 400A

Nominal size	Joined dimension					Inside diameter	Raised face		Thickness of flange	Diameter of hub		Taper of hub	Total length of flange	Radius of fillet
	Outside diameter of flange	Diameter of bolt hole centre circle	Diameter of bolt hole	Number of bolts	Nominal designation of thread of bolt		Diameter	Height		Small diameter side	Large diameter side			
	D	*C*	*h*			*d* [a]	*g*	*f*	*t*	*a*	*b*	*x*	*T*	*r*
A	WN, BL					WN	WN, BL		WN, BL	WN	WN	WN	WN	WN
15	115	80	19	4	M16	16.1	55	1	20	21.7	40	1.25	48	6
20	120	85	19	4	M16	21.4	60	1	20	27.2	45	1.25	48	6
25	130	95	19	4	M16	27.2	70	1	22	34.0	54	1.25	53	6
32	140	105	19	4	M16	35.5	80	2	24	42.7	62	1.25	54	6
40	160	120	23	4	M20	41.2	90	2	24	48.6	72	1.25	59	6
50	165	130	19	8	M16	52.7	105	2	26	60.5	87	1.25	65	8
65	200	160	23	8	M20	65.9	130	2	30	76.3	108	1.25	78	8
80	210	170	23	8	M20	78.1	140	2	32	89.1	119	1.25	78	8
90	230	185	25	8	M22	90.2	150	2	34	101.6	130	1.25	79	8
100	250	205	25	8	M22	102.3	165	2	36	114.3	146	1.25	85	8
125	300	250	27	8	M24	126.6	200	2	40	139.8	186	1.25	108	10
150	355	295	33	12	M30×3	151.0	240	2	44	165.2	215	1.25	117	10
200	405	345	33	12	M30×3	199.9	290	2	50	216.3	270	1.25	130	10
250	475	410	33	12	M30×3	248.8	355	2	56	267.4	333	1.25	152	12
300	540	470	39	16	M36×3	297.9	410	3	60	318.5	380	1.25	153	15
350	585	515	39	16	M36×3	333.4	455	3	64	355.6	425	1.25	168	15
400	645	570	39	16	M36×3	381.0	515	3	70	406.4	466	1.25	168	20

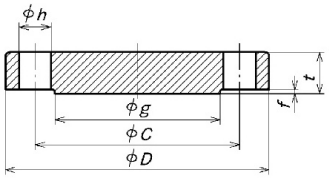
Note [a] Adjustment shall be made according to the inside diameter of the steel pipes to be joined with.

Table 21 Dimensions of flanges for nominal pressure 63K

Unit: mm



WN of nominal size 15A to 400A



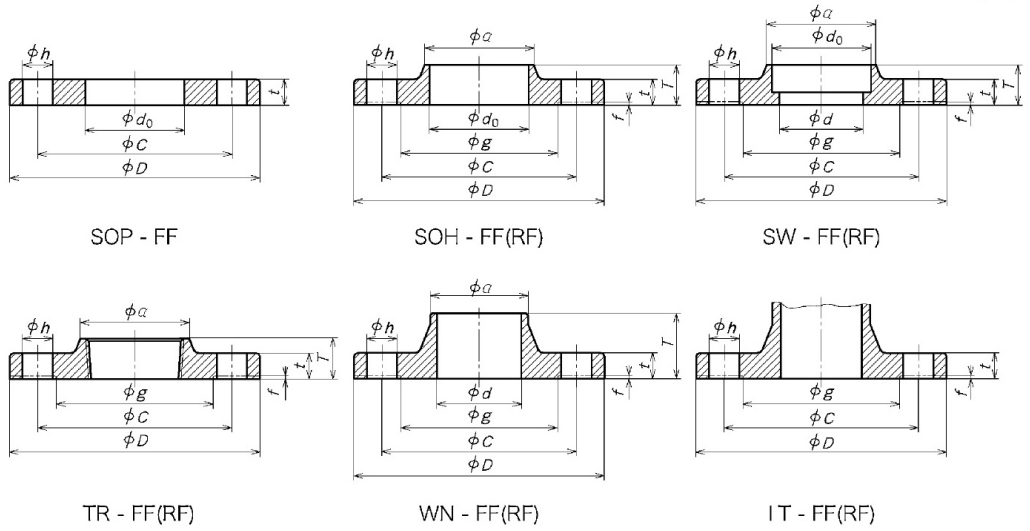
BL of nominal size 15A to 400A

Nominal size	Joined dimension					Inside diameter	Raised face		Thickness of flange	Diameter of hub		Taper of hub	Total length of flange	Radius of fillet
	Outside diameter of flange	Diameter of bolt hole centre circle	Diameter of bolt hole	Number of bolts	Nominal designation of thread of bolt		Diameter	Height		Small diameter side	Large diameter side			
	D	*C*	*h*			*d* [a]	*g*	*f*	*t*	*a*	*b*	*x*	*T*	*r*
A	WN, BL					WN	WN, BL		WN, BL	WN	WN	WN	WN	WN
15	120	85	19	4	M16	14.3	55	1	23	21.7	42	1.25	57	6
20	135	95	23	4	M20	19.4	60	1	25	27.2	46	1.25	57	6
25	140	100	23	4	M20	25.0	70	1	27	34.0	55	1.25	61	6
32	150	110	23	4	M20	32.9	80	2	30	42.7	60	1.25	61	6
40	175	130	25	4	M22	38.4	90	2	32	48.6	75	1.25	73	6
50	185	145	23	8	M20	49.5	105	2	34	60.5	92	1.25	82	8
65	220	175	25	8	M22	62.3	130	2	38	76.3	118	1.25	101	8
80	230	185	25	8	M22	73.9	140	2	40	89.1	130	1.25	103	8
90	255	205	27	8	M24	85.4	150	2	42	101.6	140	1.25	103	8
100	270	220	27	8	M24	97.1	165	2	44	114.3	154	1.25	107	8
125	325	265	33	8	M30×3	120.8	200	2	50	139.8	190	1.25	127	10
150	365	305	33	12	M30×3	143.2	240	2	54	165.2	230	1.25	152	10
200	425	360	33	12	M30×3	190.9	290	2	60	216.3	280	1.25	159	10
250	500	430	39	12	M36×3	237.2	355	2	68	267.4	346	1.25	189	12
300	560	485	39	16	M36×3	283.7	410	3	77	318.5	395	1.25	199	15
350	615	530	45	16	M42×3	317.6	455	3	81	355.6	429	1.25	202	15
400	680	590	45	16	M42×3	363.6	515	3	89	406.4	479	1.25	212	20

Note [a] Adjustment shall be made according to the inside diameter of the steel pipes to be joined with.

Table 22 Dimensional tolerance on flange

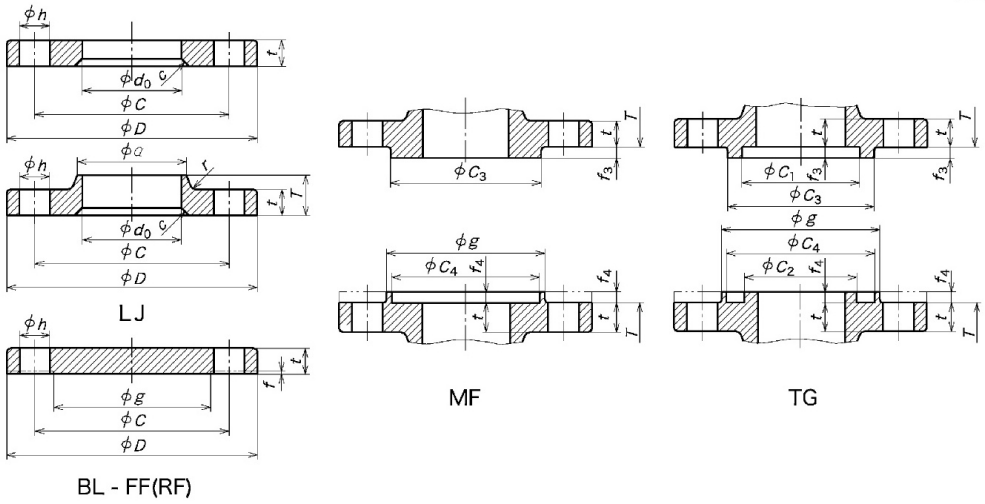
Unit: mm



Name of dimension	Classification of flange	Gasket face	Dimensional division	Dimensional tolerance
Outside diameter of flange D	Except IT	—	600 or under	±1.5
			Over 600	±3
	IT	—	1 000 or under	+ Not specified −2
			Over 1 000	+ Not specified −3
Diameter of bolt hole centre circle C	All	—	950 or under	±0.8
			Over 950	±1.5
Eccentricity of bolt hole centre circle with respect to the inside diameter	All	—	—	Within 0.8
Pitch of bolt hole	All	—	—	±0.8
Diameter of bolt hole h	All	—	—	±0.5
Inside diameter d_0	SOP, SOH, SW, LJ	—	400 or under	+1 0
			Over 400 up to and incl. 600	+1.5 0
			Over 600 up to and incl. 800	+2 0
			Over 800 up to and incl. 1 000	+2.5 0
			Over 1 000	+3 0
Inside diameter d	SW, WN	—	100 or under	0 −0.5
			Over 100 up to and incl. 400	0 −1
			Over 400 up to and incl. 600	0 −1.5
			Over 600 up to and incl. 800	0 −2
			Over 800 up to and incl. 1 000	0 −2.5
			Over 1 000	0 −3
Diameter of gasket face g	SOH, SW, TR, WN, IT, BL	RF, MF, TG	700 or under	±0.8
			Over 700	±1.5
Diameter of gasket face C_1, C_2, C_3, C_4	Except LJ	MF, TG	500 or under	±0.3
			Over 500 up to and incl. 1 000	±0.35
			Over 1 000 up to and incl. 1 500	±0.4
			Over 1 500	±0.5
Height of gasket face f_2, f_1	Except LJ	MF, TG	—	±0.2

Table 22 (concluded)

Unit: mm



Name of dimension	Classification of flange	Gasket face	Dimensional division	Dimensional tolerance
Thickness of flange t a) b)	Except LJ	FF, MF, TG	20 or under	+1.5 0
			Over 20 up to and incl. 50	+2 0
			Over 50	+3 0
	LJ	—	20 or under	+1.5 0
			Over 20 up to and incl. 50	+2 0
			Over 50	+3 0
Thickness of flange $t-f$ a) b)	SOH, SW, TR, WN, IT, BL	RF	20 or under	+1.5 0
			Over 20 up to and incl. 50	+2 0
			Over 50	+3 0
Diameter of hub Small diameter side a	SOH, SW, LJ, TR, WN	—	220 or under	+2 0
			Over 220 up to and incl. 650	+4 0
			Over 650	+8 0
Total length of flange T	SOH, SW, LJ, TR	—	—	±2
	WN	—	200 or under	+2 0
			Over 200	+3 0
Chamfering c	LJ	—	6 or under	+0.8 0
			Over 6	+1.6 0
Inclination of bolt・nut face with respect to gasket face	Except LJ	All	—	Within 1 degree

Notes a) The tolerance on thickness of integral flanges (IT) of piping parts of which the dimension between flange facings is limited to a specific value may be twice the specified value.

b) For flanges to be given spot facing, the thickness of the spot facing is provided with the minus side tolerance of up to 70 % of the specified thickness tolerance.

Annex A (normative)
Flanges processed by flash butt welding

A.1 Scope

This Annex specifies flanges processed by flash butt welding (hereafter referred to as "flash-butt-welding flange").

A.2 Definition

For the purposes of this Annex, the following term and definition apply.

A.2.1 weld

portion of the flash-butt-welding flange where flash welding has been applied

A.3 Appearance

The welds before removing the burrs shall have smooth surface, and shall be free from defects detrimental to practical use such as misalignment of joint faces.

A.4 Liquid penetrant and magnetic particle testing

There shall be no cracks on the weld, no die burn or incomplete upset which may adversely affect the strength, service and the like.

A.5 Tensile strength

The tensile strength of welds shall be equal to or greater than the minimum tensile strength required in the standard for the base metal. Tensile strength when the base metals are S 20 C or S 25 C of **JIS G 4051** shall be subject to agreement between the interested parties.

A.6 Bending

When bent, the welds shall be free from defects exceeding 3 mm in length on its surface.

A.7 Manufacturing method

Flash-butt-welding flange shall be manufactured from a steel sheet or steel strip by bending and flash welding. After the completion of the flash welding, stress relief annealing shall be applied at a temperature suitable for the material. For stainless steel, a solution treatment suitable for the material shall be applied.

A.8 Test methods

Welds shall be tested by the following methods.

a) **Liquid penetrant testing** Liquid penetrant testing shall be performed in accor-

dance with clause 8 of JIS Z 2343-1, by an appropriate test method.

b) **Magnetic particle testing** The magnetic particle testing shall be performed in accordance with clause 6 of JIS Z 2320-1, by an appropriate test method.

c) **Tensile test** For the tensile test, No. 1 test piece or No. 1A test piece defined in clause 3 of JIS Z 3121 shall be prepared and tested in accordance with JIS Z 2241.

The width of test piece (W) shall be 25 mm irrespective of the thickness (t) of the product.

d) **Bending test** For the bending test, a bending test piece or a root bending test piece specified in clause 4 of JIS Z 3122 shall be prepared and tested in accordance with clause 5 of JIS Z 3122.

The thickness of the tested plate (T) shall be the thickness of the test piece (t). If the tester is not capable of bending the test piece due to lack of capacity, the plate may be cut to appropriate thickness by means of a thin saw, and test may be carried out on each of the cut pieces.

A.9 Process confirmation testing

To ensure that the process of manufacturing is appropriate, the test piece shall be prepared and the tensile test and the bending test shall be performed prior to manufacturing. Tensile strength of welds shall be tested according to **A.8 c)** and the result shall meet the requirements of clause **A.5**. The bending of welds shall be tested according to **A.8 d)**, and the result shall meet the requirements of clause **A.6**.

A.10 Inspection

A.10.1 Inspection of welds

The inspection of welds shall be as given in the following.

a) **Appearance** Appearance shall be inspected visually and shall meet the requirements of clause **A.3**.

b) **Liquid penetrant testing** Liquid penetrant testing shall be performed according to **A.8 a)** and the result shall meet the requirements of clause **A.4**.

c) **Magnetic particle testing** Magnetic particle testing shall be performed according to **A.8 b)** and the result shall meet the requirements of clause **A.4**.

A.10.2 Acceptance inspection

The acceptance inspection of the flash-butt-welding flange shall be performed, as required by the purchaser, on the following items. In this case, the sampling plan for the lot inspection shall be subject to agreement between the interested parties.

a) Appearance

b) Liquid penetrant testing

c) Magnetic particle testing

A.11 Marking

On the periphery surface of the flash-butt-welding flange, symbol W shall be marked by such an indelible means as stamping, die marking, electrolytic etching, and spraying after the symbols of material.

Example: 5K 300A SS 400 W

Annex B (informative)
Outside diameter of steel pipes

Outside diameter of steel pipes with which flanges are joined are shown in table B.1.

Table B.1 Outside diameter of steel pipes

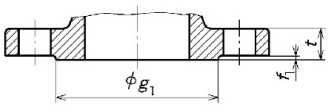
Standard number	Nominal size A	Outside diameter mm
JIS G 3452 JIS G 3454 JIS G 3455 JIS G 3456 JIS G 3457 JIS G 3458 JIS G 3459 JIS G 3468	10	17.3
	15	21.7
	20	27.2
	25	34.0
	32	42.7
	40	48.6
	50	60.5
	65	76.3
	80	89.1
	90	101.6
	100	114.3
	125	139.8
	150	165.2
	175	190.7
	200	216.3
	225	241.8
	250	267.4
	300	318.5
	350	355.6
	400	406.4
	450	457.2
	500	508.0
	550	558.8
	600	609.6
	650	660.4
	700	711.2
	750	762.0
	800	812.8
	850	863.6
	900	914.4
	1 000	1 016.0
	1 100	1 117.6
	1 200	1 219.2
	1 350	1 371.6
	1 500	1 524.0

Annex C (informative)
Small raised face

Dimensions of the small raised face of gasket faces are shown in table C.1.

Table C.1 Dimensions of small raised faces

Unit: mm

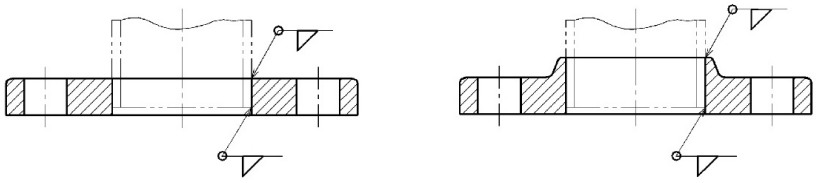


Nominal size A	Small raised face	
	g_1	f_1
10	35	1
15	42	1
20	50	1
25	60	1
32	68	2
40	75	2
50	90	2
65	105	2
80	120	2
90	130	2
100	145	2
125	170	2
150	205	2
200	260	2
250	315	2
300	375	3
350	415	3
400	465	3
NOTE: The thickness of the flange t shall be as given in tables 17 to 21.		

Annex D (informative)
Details of welds of welding flange

D.1 Details of welds of SOP and SOH flanges for nominal pressures 5K to 16K

Details of welds of SOP and SOH flanges for nominal pressures 5K to 16K are shown in figure D.1.



SOP SOH

NOTE: The welding symbols are in accordance with **JIS Z 3021**.

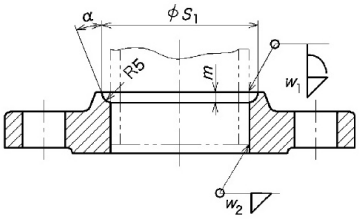
Figure D.1 Details of welds

D.2 Details of welds of SOH flanges for nominal pressures 20K and 30K

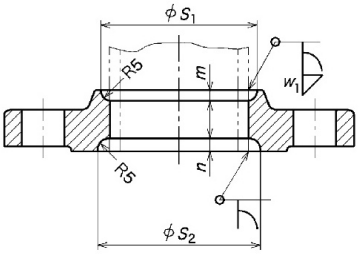
Details of welds of SOH flanges for nominal pressures 20K and 30K are shown in table D.1 and table D.2, respectively.

Table D.1 Details of welds of SOH flanges for nominal pressure 20K

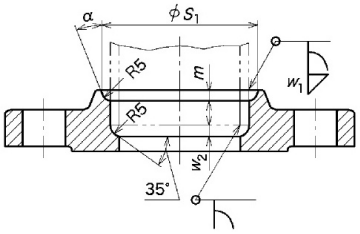
Unit: mm



SOH Type A of nominal size 10 A to 600A



SOH Type B of nominal size 10 A to 50A



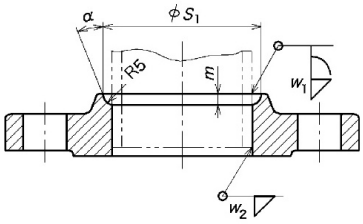
SOH Type C of nominal size 65 A to 600A

Nominal size A	S_1	S_2	m	n	α	Leg length of welds	
						w_1	w_2
10	27	27	4	4	—	4	3
15	31	31	4	4	—	4	3
20	37	37	4	4	—	5	3.5
25	44	44	4	4.5	—	6	4
32	52	53	4	5	—	6	4
40	58	59	4	5.5	—	6	4
50	70	72	4	5.5	—	6.5	4
65	94	—	6	—	20°	8	6
80	107	—	6	—	20°	8	6
90	120	—	6	—	20°	9	6
100	132	—	6	—	20°	9	7
125	160	—	7	—	30°	10	7
150	186	—	8	—	30°	10	8
200	237	—	9	—	30°	11	9
250	290	—	10	—	30°	12	10
300	345	—	11	—	30°	13	11
350	384	—	12	—	35°	14	12
400	437	—	13	—	35°	15	12
450	490	—	15	—	35°	16	14
500	544	—	16	—	35°	16	14
550	595	—	16	—	35°	18	16
600	646	—	18	—	35°	18	16

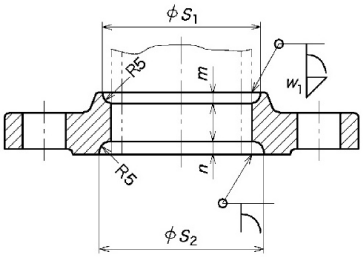
NOTE: The welding symbols are in accordance with **JIS Z 3021**.

Table D.2 Details of welds of SOH flanges for nominal pressure 30K

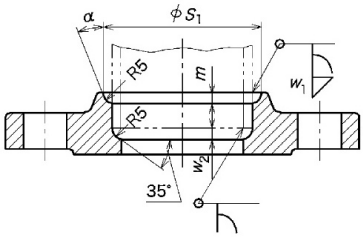
Unit: mm



SOH Type A of nominal size 10 A to 400A



SOH Type B of nominal size 10 A to 50A



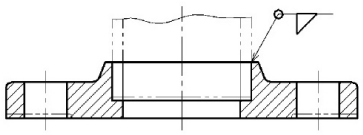
SOH Type C of nominal size 65 A to 400A

Nominal size A	S_1	S_2	m	n	a	Leg length of welds	
						w_1	w_2
10	27	27	4	4	—	4	3
15	31	40	4	5	—	4	3
20	37	44	5	5	—	5	3.5
25	44	52	6	5	—	6	4
32	52	60	6	5	—	6	4
40	58	66	6	5	—	6	4
50	70	78	6.5	5	—	6.5	4
65	96	—	9.5	—	20°	10	6
80	109	—	9.5	—	20°	10	6
90	122	—	9.5	—	20°	10.5	6
100	135	—	9.5	—	20°	10.5	7
125	160	—	9.5	—	20°	10.5	7
150	186	—	9.5	—	20°	10.5	8
200	237	—	9.5	—	20°	11	9
250	290	—	10	—	20°	12	10
300	345	—	12	—	30°	13	11
350	383	—	13	—	30°	14	12
400	435	—	14	—	30°	15	13

NOTE: The welding symbols are in accordance with **JIS Z 3021**.

D.3 Details of welds of SW flange

Details of welds of the SW flange are shown in figure D.2.



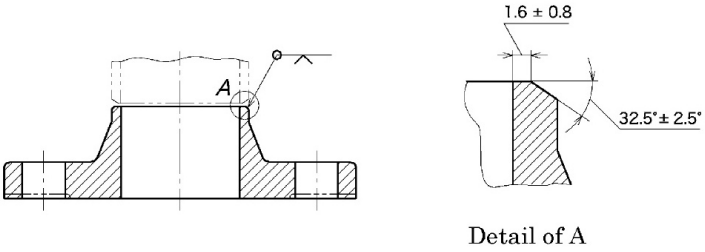
NOTE: The welding symbols are in accordance with **JIS Z 3021**.

Figure D.2 Details of welds

D.4 Details of welds of WN flange

Details of welds of the WN flange are shown in figure D.3.

Unit: mm



Detail of A

NOTE: The welding symbols are in accordance with **JIS Z 3021**.

Figure D.3 Details of welds

Annex E (informative)
Flanges for nominal pressure 2K

E.1 Presure-temperature rating

Pressure-temperature rating for flanges for nominal pressure 2K is shown in table E.1.

Table E.1 Pressure-temperature rating

Unit: MPa

Nominal pressure	Material group No.	Maximum working pressure	
		Fluid temperature °C	
		T_A to 120	220
2K	001, 002, 003a	0.3	0.2

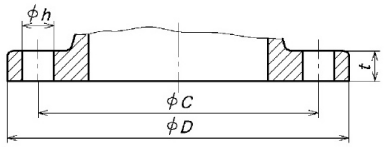
NOTE 1 For the material group numbers, see table 5.
NOTE 2 T_A indicates the normal temperature.
NOTE 3 Maxiumum working pressure in between the values shown in the table shall be obtained by the proportional interpolation method.

E.2 Basic size

Basic sizes of flanges for nominal pressure 2K are shown in table E.2.

Table E.2 Basic sizes of flanges for nominal pressure 2K

Unit: mm



Nominal size A	Joined dimension					Thickness of flange
	Outside diameter of flange D	Diameter of bolt hole centre circle C	Diameter of bolt hole h	Number of bolts	Nominal designarion of thread of bolt	t
450	605	555	23	16	M20	22
500	655	605	23	20	M20	22
550	720	665	25	20	M22	24
600	770	715	25	20	M22	24
650	825	770	25	24	M22	24
700	875	820	25	24	M22	24
750	945	880	27	24	M24	24
800	995	930	27	24	M24	24
850	1 045	980	27	24	M24	24
900	1 095	1 030	27	24	M24	24
1 000	1 195	1 130	27	28	M24	26
1 100	1 305	1 240	27	28	M24	26
1 200	1 420	1 350	27	32	M24	26
1 350	1 575	1 505	27	32	M24	26
1 500	1 730	1 660	27	36	M24	28

Annex F (informative)
Calculated masses of flanges

Calculated masses of flanges based on their nominal pressure, classification (excluding IT flange) and nominal size are shown in tables F.1 to F.3.

Table F.1 Masses of flanges (nominal pressures 5K, 10K and 10K light type)

Unit: kg

Nominal size	Nominal pressure																	
	5K								10K								10K light type	
	SOP	SOH	SW	LJ	TR	WN		BL	SOP	SOH	SW	LJ	TR	WN		BL	SOP	SOH
A							H								H			
10	0.26	–	0.27	–	0.28	0.30	–	0.28	0.51	–	0.52	–	0.52	0.55	–	0.53	0.42	–
15	0.30	–	0.31	0.29	0.31	0.35	–	0.32	0.56	–	0.58	0.56	0.58	0.63	–	0.60	0.45	–
20	0.36	–	0.38	0.36	0.39	0.44	–	0.41	0.72	–	0.75	0.71	0.75	0.80	–	0.79	0.54	–
25	0.45	–	0.48	0.44	0.50	0.56	–	0.52	1.12	–	1.16	1.11	1.17	1.26	–	1.22	1.00	–
32	0.77	–	0.83	0.76	0.84	0.94	–	0.91	1.47	–	1.53	1.45	1.54	1.67	–	1.66	1.14	–
40	0.82	–	0.90	0.80	0.91	1.03	–	1.00	1.55	–	1.65	1.53	1.65	1.78	–	1.79	1.20	–
50	1.06	–	1.19	1.03	1.20	1.33	–	1.38	1.86	–	1.97	1.83	1.99	2.18	–	2.23	1.68	–
65	1.48	–	1.72	1.44	1.74	1.92	–	2.00	2.58	–	2.77	2.53	2.79	3.07	–	3.24	2.05	–
80	1.97	–	2.34	1.92	2.35	2.53	–	2.67	2.58	–	2.89	2.52	2.90	3.17	–	3.48	2.10	–
90	2.08	–	–	2.02	–	2.70	–	2.99	2.73	–	–	2.66	–	3.40	–	3.90	2.21	–
100	2.35	–	–	2.28	2.99	3.04	–	3.66	3.10	–	–	3.02	3.70	3.89	–	4.57	2.86	–
125	3.20	–	–	3.08	4.29	4.17	–	5.16	4.73	–	–	4.60	5.70	5.77	–	7.18	4.40	–
150	4.39	–	–	4.25	5.74	5.87	–	7.47	6.30	–	–	6.14	7.48	7.86	–	10.1	5.30	–
175	5.42	–	–	–	–	7.16	–	9.52	6.75	–	–	–	–	8.70	–	11.8	6.39	–
200	6.24	–	–	6.06	–	8.50	–	12.1	7.46	–	–	7.28	–	10.1	–	13.9	7.04	–
225	6.57	–	–	–	–	9.30	–	13.9	7.70	–	–	–	–	10.6	–	15.8	7.35	–
250	9.39	–	–	9.11	–	13.2	–	19.2	11.8	12.7	–	12.3	–	16.0	–	22.6	11.1	–
300	10.2	–	–	9.76	–	15.1	–	24.2	12.6	13.8	–	13.2	–	18.1	–	27.8	12.0	–
350	14.0	–	–	13.4	–	21.6	–	33.0	16.3	18.2	–	17.4	–	24.8	–	36.9	14.2	–
400	16.9	–	–	16.2	–	26.2	–	41.7	23.2	25.8	–	24.8	–	34.2	–	52.1	–	22.1
450	21.4	24.9	–	23.9	–	32.7	–	52.7	29.3	33.4	–	32.3	–	42.7	–	68.4	–	–
500	23.0	27.0	–	25.6	–	35.4	–	61.6	33.3	38.0	–	36.4	–	50.3	60.4	81.6	–	–
550	30.1	34.5	–	33.0	–	44.4	–	80.8	42.9	49.4	–	47.7	–	64.4	76.7	112	–	–
600	32.5	37.8	–	36.2	–	47.8	–	92.7	45.4	52.6	–	50.8	–	69.1	82.1	134	–	–
650	35.6	43.2	–	–	–	54.3	–	114	51.8	60.2	–	–	–	78.7	92.6	161	–	–
700	38.0	45.8	–	–	–	60.6	74.0	138	59.0	70.2	–	–	–	94.5	129	196	–	–
750	48.4	57.7	–	–	–	75.4	91.1	171	72.8	86.5	–	–	–	114	158	248	–	–
800	51.2	61.3	–	–	–	79.5	96.3	202	76.0	92.0	–	–	–	120	166	286	–	–
850	53.9	65.3	–	–	–	87.0	105	237	80.1	98.7	–	–	–	126	175	330	–	–
900	60.7	73.1	–	–	–	95.2	114	260	88.9	110	–	–	–	138	190	377	–	–
1000	70.1	84.8	–	–	–	111	147	345	109	133	–	–	–	171	236	512	–	–
1100	81.6	105	–	–	–	146	202	454	131	175	–	–	–	222	307	675	–	–
1200	101	129	–	–	–	190	265	586	163	215	–	–	–	275	381	854	–	–
1350	116	151	–	–	–	240	324	814	204	274	–	–	–	368	496	1 180	–	–
1500	137	180	–	–	–	284	385	1 060	248	340	–	–	–	459	624	1 590	–	–

NOTE 1 Calculation of mass is made by taking the steel density as 7.85 g/cm^3.
NOTE 2 Calculation is aimed at obtaining the mass of full face (FF) flange.
NOTE 3 The symbol H indicates the alternative dimensions for WN flanges. See tables 14 and 15.

Table F.2 Masses of flanges (nominal pressures 16K and 20K)

Unit: kg

Nominal size	Nominal pressure													
	16K						20K							
	SOH	SW	LJ	TR	WN	BL	SOH			SW	LJ	TR	WN	BL
A							A	B	C					
10	0.52	0.53	–	0.53	0.56	0.53	0.58	0.58	–	0.60	–	0.60	0.61	0.59
15	0.58	0.58	0.57	0.59	0.64	0.60	0.65	0.64	–	0.67	0.68	0.67	0.70	0.67
20	0.75	0.76	0.74	0.77	0.81	0.79	0.81	0.80	–	0.84	0.84	0.84	0.88	0.86
25	1.16	1.18	1.15	1.19	1.27	1.22	1.27	1.26	–	1.31	1.33	1.32	1.37	1.34
32	1.53	1.56	1.50	1.57	1.67	1.66	1.58	1.57	–	1.64	1.70	1.64	1.73	1.73
40	1.64	1.68	1.61	1.69	1.79	1.79	1.68	1.66	–	1.74	1.80	1.74	1.85	1.87
50	1.83	1.88	1.79	1.90	2.05	2.09	1.89	1.86	–	1.96	2.00	1.97	2.12	2.20
65	2.58	2.68	2.51	2.71	3.00	3.08	2.73	–	2.81	2.92	2.89	2.91	3.11	3.24
80	3.61	3.76	3.53	3.81	4.16	4.41	3.85	–	3.95	4.13	4.04	4.08	4.30	4.63
90	3.89	–	3.80	–	4.53	4.92	4.47	–	4.59	–	4.67	–	5.08	5.67
100	4.87	–	4.76	5.18	5.76	6.29	5.03	–	5.18	–	5.24	5.35	5.95	6.61
125	7.09	–	6.92	7.76	8.39	9.21	7.94	–	8.15	–	8.24	8.44	9.31	10.5
150	9.57	–	9.35	10.2	11.5	12.7	10.4	–	10.7	–	10.8	11.1	12.6	14.4
200	12.0	–	11.8	–	15.3	18.4	13.1	–	13.6	–	13.6	–	16.6	20.8
250	20.1	–	19.6	–	24.8	30.4	23.1	–	23.8	–	23.7	–	28.3	36.2
300	24.3	–	23.6	–	31.3	40.5	27.2	–	28.1	–	28.1	–	34.9	47.4
350	34.4	–	33.5	–	45.7	57.5	38.4	–	39.5	–	39.7	–	50.2	66.1
400	47.4	–	46.3	–	63.6	81.7	53.9	–	55.5	–	55.6	–	71.7	97.0
450	61.8	–	60.5	–	82.8	107	71.0	–	72.9	–	73.1	–	92.8	126
500	73.7	–	71.7	–	96.3	132	84.6	–	86.7	–	86.5	–	108	155
550	87.9	–	85.8	–	116	163	102	–	104	–	104	–	128	190
600	98.4	–	96.1	–	130	192	115	–	117	–	117	–	144	223

NOTE 1 Calculation of mass is made by taking the steel density as 7.85 g/cm³.
NOTE 2 For flanges for nominal pressure 16K, the calculation is aimed at obtaining the mass of full face (FF) flange, and for nominal pressure 20K, the mass of raised face (RF) flange.
NOTE 3 Symbols A, B and C indicate Type A, Type B and Type C of SOH flange, respectively. See table 18.

Table F.3 Masses of flanges (nominal pressures 30K, 40K and 63K)

Unit: kg

Nominal size	Nominal pressure								
	30K					40K		63K	
	SOH			WN	BL	WN	BL	WN	BL
A	A	B	C						
10	1.00	1.00	–	–	1.00	–	–	–	–
15	1.24	1.22	–	1.33	1.25	1.47	1.40	1.89	1.78
20	1.36	1.34	–	1.45	1.38	1.61	1.54	2.51	2.41
25	1.77	1.75	–	1.92	1.84	2.14	2.03	2.98	2.83
32	2.17	2.15	–	2.39	2.32	2.60	2.54	3.65	3.60
40	2.82	2.79	–	3.09	3.00	3.41	3.29	5.54	5.30
50	2.89	2.86	–	3.24	3.14	3.88	3.74	6.43	6.05
65	4.88	–	4.96	5.70	5.50	6.68	6.38	10.9	9.84
80	5.70	–	5.80	6.72	6.63	7.61	7.62	12.4	11.5
90	7.13	–	7.25	8.31	8.55	9.31	9.73	15.4	14.9
100	8.01	–	8.16	9.40	10.0	11.8	12.4	18.1	17.7
125	11.6	–	11.9	14.0	15.3	20.3	20.2	30.0	29.2
150	17.0	–	17.3	20.2	22.2	29.2	30.0	42.4	39.2
200	22.2	–	22.6	27.2	32.6	41.9	45.7	61.0	61.0
250	36.8	–	37.5	45.2	55.2	66.1	72.3	97.3	95.9
300	49.1	–	50.0	61.0	77.9	81.2	97.0	128	135
350	60.4	–	61.5	74.5	96.9	103	123	154	170
400	82.0	–	83.7	103	136	127	167	202	233

NOTE 1 Calculation of mass is made by taking the steel density as 7.85 g/cm³.
NOTE 2 Calculation is aimed at obtaining the mass of raised face (RF) flange.
NOTE 3 Symbols A, B and C indicate Type A, Type B and Type C of SOH flange, respectively. See table 19.

Annex G (informative)
Bibliography

G.1 Related standards

JIS B 1082 *Stress area and bearing area for threaded fasteners*

JIS B 1217 *Bolting for use with pipe flanges*

JIS B 2001 *Nominal size and bore of valves*

JIS B 2251 *Bolt tighting procedure for pressure boundary flanged joint assembly*

JIS B 2404 *Dimensions of gaskets for use with pipe flanges*

JIS G 3452 *Carbon steel pipes for ordinary piping*

JIS G 3454 *Carbon steel pipes for pressure service*

JIS G 3455 *Carbon steel pipes for high pressure service*

JIS G 3456 *Carbon steel pipes for high temperature service*

JIS G 3457 *Arc welded carbon steel pipes*

JIS G 3458 *Alloy steel pipes*

JIS G 3459 *Stainless steel pipes*

JIS G 3468 *Large diameter welded stainless steel pipes*

JIS Z 3021 *Welding and allied processes–Symbolic representation*

G.2 ASTM materials shown in table 6

ASTM A 105 *Carbon Steel Forgings for Piping Applications*

ASTM A 182 *Forged or Rolled Alloy and Stainless Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service*

ASTM A 204 *Pressure Vessel Plates, Alloy Steel, Molybdenum*

ASTM A 216 *Steel Castings, Carbon, Suitable for Fusion Welding, for High-Temperature Service*

ASTM A 217 *Steel Castings, Martensitic Stainless and Alloy, for Pressure-Containing Parts, Suitable for High-Temperature Service*

ASTM A 240 *Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications*

ASTM A 350 *Carbon and Low-Alloy Steel Forgings, Requiring Notch Toughness Testing for Piping Components*

ASTM A 351 *Castings, Austenitic, for Pressure-Containing Parts*

ASTM A 352 *Steel Castings, Ferritic and Martensitic, for Pressure-Containing Parts,*

	Suitable for Low-Temperature Service
ASTM A 387	*Pressure Vessel Plates, Alloy Steel, Chromium-Molybdenum*
ASTM A 515	*Pressure Vessel Plates, Carbon Steel, for Intermediate- and Higher-Temperature Service*
ASTM A 516	*Pressure Vessel Plates, Carbon Steel, for Moderate- and Lower-Temperature Service*
ASTM A 537	*Pressure Vessel Plates, Heat-Treated, Carbon-Manganese-Silicon Steel*

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