

METRIC STEEL PIPE FLANGES AND FLANGED FITTINGS

STEEL PIPE FLANGES AND FLANGED FITTINGS METRIC DIMENSIONS PART 2

BS 1560: Part 2:1970

Classes 150 to 2500 | Ratings, dimensions, bolting, facings and gaskets

CLASSES 150-2500

METRIC DIMENSIONS

RING-JOINT FACINGS

PRESSURE-TEMPERATURE RATINGS

DRILLING AND BOLTING

GASKET DIMENSIONS

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Technical data navigation

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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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BRITISH STANDARD SPECIFICATION FOR Circular flanges for pipes, valves and fittings (Class designated)

Part 2. Specification for steel pipe flanges (nominal sizes ½ in to 24 in) Metric dimensions

FOREWORD

This British Standard has been prepared under the authority of the Petroleum Equipment Industry Standards Committee. It is the metric version of the flanges of BS 1560, and is based on the agreements reached in ISO/TC 67/WG2. French Standards FD M87-300 to 340 and ANSI Std. B16.5-1968 have also been taken into account. Certain measurements, notably pipe sizes, bolt sizes and class designations, have not been converted into metric units, since the use of Imperial units in such cases follows established international practice in the petroleum industry.

This standard gives the service pressures permissible on the basis of stated grades of material and service temperature. Pending the completion of international agreement in ISO/TC 5/SC 10, Co-ordination of existing flange standards for pipeline systems, and having regard to the 1977 issue of ANSI B16.5, there may be advantages in applying the dimensional clauses of BS 1560 : Part 2 but adopting the pressure/temperature ratings of ANSI B16.5. BS 1560 : Part 2 will be completely reviewed at the earliest opportunity.

Obsolescent (by Amendment No. 2)

This British Standard has been declared obsolescent and is not recommended for use in new equipment but needs to be retained for a period of 12 months after the date of publication of BS 1560 : Section 3.1 which replaces this standard. At the end of the 12 months period it is the intention to withdraw this British Standard.

SPECIFICATION

1. GENERAL

1.1 SCOPE

This British Standard specifies requirements for cast and forged steel pipe flanges of the screwed, slip-on welding, socket-welding, lapped, blind and welding-neck types for use in the petroleum industry for oil, water, steam, air, gas and chemical services. The flange dimensions are also applicable to integral flanges, for example end flanges of valves.

The various types of flange are not necessarily applicable to all pressure and size ranges. Reference should be made to the appropriate tables for details.

Seven classes are provided for, namely:

Classes 150, 300, 400, 600, 900, 1500 and 2500, the numerals representing their respective primary service pressure ratings in pounds-force per square inch.

NOTE. This standard does not specify limitations on the use of various methods of attachment of flanges to pipe or other equipment. The adequacy for operating conditions of any method of attachment specified should be determined by the designer of the piping or equipment, who should consult the appropriate standards or codes.

1.2 PRESSURE RATINGS

The maximum service temperature at which it is permissible to use a flange of a given class, when subjected to its primary service pressure, depends on the type of steel from which it is made.

Tables PE-1 to PE-12 in Appendix A give the service pressures permissible, at various service temperatures, for flanges made from the different types of steel listed in 2.1. The steels to which each table applies are named in the heading, and each table is applicable to all of the 7 classes of flanges.

Primary service pressures are shown in the tables in bold type, the corresponding temperatures in the left hand column of any table being the maximum service temperatures permissible at these pressures.

It will be observed that a flange to this standard may be used at a service pressure higher than its primary

temperature, or at a pressure lower than its primary service pressure and at a higher corresponding service temperature. In this context 'service temperature' refers to the temperature of the fluid on the inside of the pressure-retaining component.

Where it is required to use the flanges in this standard at temperatures below - 30 °C reference should be made to BS 3351, 'Piping systems for the petroleum industry'.

1.3 FLANGE FACINGS AND GASKETS

The types of flange facings specified in this standard are defined in 3.3 and illustrated in Figs. 1 and 2.

The satisfactory operation, under the pressure-temperature ratings referred to in 1.2, of flanged joints employing any of these facings, depends on the use of gaskets of appropriate materials and dimensions.

For the facings defined, the following gaskets are recommended. The user is, however, responsible in all cases for the choice of gaskets suitable for the service required:

(1) *Ring-joint facings.* Ring-joint gaskets to ANSI Std. B16.20*. Dimensions of gaskets to this standard are given in Table 10.

(2) *Raised facings.*

(3) *Large and small male/female facings.*

(4) *Large and small tongue/groove facings.*

Group 1, Group 2 or Group 3 gaskets as defined in Appendix F.

1.4 NOMINAL SIZES

The nominal size of a flange shown in the tables is the same as the corresponding nominal pipe size. (See Appendix C.)

* American National Standards Institute Standard B16.20, 'Ring-joint gaskets and grooves for steel pipe flanges' (obtainable through

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1.5 DEFINITIONS

For the purposes of this British Standard, the following definitions apply. (See Fig. 1 and, where appropriate, Fig. 2.)

Flange edge. The reference plane, coincident with the front of a flange, from which the height of any type of flange facing and also the minimum flange thickness is measured.

Flange thickness. The distance from the flange edge to the back face of a flange or, if the bolt holes are spot-faced, from the flange edge to the spot-facing.

Flange facing. The profile of the connecting end of a flange. It is beyond the flange edge, except for a flange of Class 150 or 300 having a 1.6 mm high raised facing, in which case the raised facing is formed by cutting into the minimum flange thickness.

Contact surface. That part of a flange facing upon which the gasket is actually compressed. In the case of flanges of Classes 150 and 300 having 1.6 mm high raised facings, and in all classes having female and groove facings, the contact surface is coincident with the flange edge as defined above.

'Contact surface' is not applicable to ring-joint facings.

Full-faced. Applies only to female, groove, and ring-joint facings and defines the resultant profile when the raised portion of such facings is extended to the full diameter of the flange.

NOTE. In such cases the 'flange edge', as defined above, remains unchanged, being coincident with the 'contact surface' of female and groove type facings and with the bottom of the groove of ring-joint facings.

2. MATERIALS

2.1 MATERIALS FOR FLANGES

The flanges specified in this standard shall be either steel forgings or steel castings made to one of the following BS or ASTM specifications. When ordering, the purchaser shall specify the grade or grades of steel from which the flanges are to be made.

Steel	Forgings		Castings	
	British Standards	ASTM Standards*	British Standards	ASTM Standards*
Carbon	†BS 1503-161, Grade 28, Class A or B	A105, Grade I	§BS 1504-161, Grade B	A216, Grade WCB
	†BS 1503-161, Grade 32, Class A or B	A105, Grade II	—	—
	—	‡A181, Grades I or II	—	—
Carbon-molybdenum	—	A182, Grade F1	§BS 1504-240	A217, Grade WC1
1 % chromium, ¼ % molybdenum	†BS 1503-620	A182, Grade F12	—	—
1¼ % chromium ¼ % molybdenum	†BS 1503-621	A182, Grade F11	§BS 1504-621	A217, Grade WC6
2¼ % chromium 1 % molybdenum	†BS 1503-622	A182, Grade F22	§BS 1504-622	A217, Grade WC9
5 % chromium ¾ % molybdenum	†BS 1503-625	A182, Grade F6a	§BS 1504-625	A217, Grade C5
9 % chromium 1 % molybdenum	—	A182, Grade F9	§BS 1504-629	A217, Grade C12
Austenitic chromium nickel	†BS 1503-801	A182, Grade F304	§BS 1504-801	A351, Grade CF8
	—	A182, Grade F304H	—	—
Austenitic chromium-nickel (low carbon)	—	A182, Grade F304L	—	—
Austenitic chromium-nickel (titanium stabilized)	†BS 1503-821, Grade Ti	A182, Grade F321	—	—
	—	A182, Grade F321H	—	—
Austenitic chromium-nickel (niobium stabilized)	†BS 1503-821, Grade Nb	A182, Grade F347	§BS 1504-821, Grade Nb	A351, Grade CF8C
	—	A182, Grade F347H	—	—
Austenitic chromium-nickel-molybdenum	†BS 1503-845, Grade B	A182, Grade F316	§BS 1504-845, Grade B	—
	—	A182, Grade F316H	—	—
Austenitic chromium-nickel-molybdenum (low carbon)	—	A182, Grade F316L	—	—

* Book of ASTM Standards, Part 1, 'Steel piping, tubing and fittings'.

† BS 1503 : 1969, 'Steels for fired and unfired pressure vessels. Forgings'.

‡ Classes 150 and 300 only.

§ BS 1501-6 : (1958), 'Steels for use in the chemical, petroleum and allied industries'.

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2.2 BOLTING MATERIALS

All bolting material shall comply with BS 1750*.

For pressures and temperatures higher than 19 bar† and 260°C, bolts shall be of alloy steel in conformity with Part 1 of the above standard, and nuts shall be of carbon

or alloy steel in conformity with Part 2 thereof.

For pressures and temperatures up to and including 19 bar† and 260°C, carbon steel bolts and nuts complying with Part 3 of the above standard may be used.

3. DIMENSIONS**3.1 SIZES OF FLANGES**

Pipe flanges of the following nominal sizes are specified:
 $\frac{3}{4}$ 1 1 $\frac{1}{4}$ 1 $\frac{1}{2}$ 2 2 $\frac{1}{2}$ 3 3 $\frac{1}{2}$ 4 5 6 8 10 12 14 16 18
 20 and 24 inches.

NOTE. The 3 $\frac{1}{4}$ in size is not specified for Classes 900, 1500 and 2500.

Sizes over 12 in are not specified for Class 2500.

The use of sizes 1 $\frac{1}{4}$, 2 $\frac{1}{2}$, 3 $\frac{1}{2}$ and 5 in should be avoided where possible.

3.2 FLANGE DIMENSIONS

The dimensions of flanges of the various types and pressure classes included in this standard, other than the flange facing dimensions referred to in 3.3, shall be as specified in Tables 11, 13, 15, 17, 19, 21 and 23.

3.3 FACING DIMENSIONS FOR OTHER THAN LAPPED-TYPE JOINTS

This standard applies to flange facings of the 1.6 mm and 6.4 mm high raised types, the large and small male/female and large and small tongue/groove types and the ring-joint type. (See Fig. 1.) The 1.6 mm high raised facing is the regular type of facing for flanges of Classes 150 and 300, and the 6.4 mm high raised facing is the regular type of facing for flanges of Classes 400, 600, 900, 1500 and 2500.

When ordering flanges to this standard, the purchaser shall specify the type of facing to be provided.

Flange facings shall be machine finished overall and shall comply with the following requirements.

3.3.1 Raised facings. Raised facings shall be machined to the outside diameters listed in Table 2.

Gasket contact surfaces shall be finished as follows:

(1) *For nominal sizes 12 in and smaller.* A continuous spiral groove generated by a 1.6 mm radius round-nosed tool at a feed of approximately 0.8 mm per revolution.

(2) *For nominal sizes above 12 in.* A continuous spiral groove generated by a 3.2 mm radius round-nosed tool at a feed of approximately 1.2 mm per revolution.

If another type of finish is required this shall be specified by the purchaser in his order.

3.3.2 Male/female and tongue/groove facings. The dimensions of large and small male/female and large and small tongue/groove facings shall be as given in Table 2.

All contact surfaces shall be finished smooth, except that large male facings may, as an alternative, be finished as described in 3.3.1.

Female and groove facings may be full-faced at the option of the manufacturer unless otherwise specified by the purchaser. (See Table 2, Note 4.)

3.3.3 Ring-joint facings. The dimensions of ring-joint facings shall be as given in Tables 3 to 9. Dimensions of ring-joint gaskets, correlated by ring numbers, shall be as given in Table 10.

Ring grooves shall be machined true and concentric with the flanges. They shall be finished smooth and shall be free from ridges and chatter marks.

* BS 1750, 'Bolting for the petroleum industry'.

Ring-joint facings may be full-faced at the option of the manufacturer unless otherwise specified by the purchaser. (See the relevant Note in Tables 3 to 9.)

3.3.4 Minimum flange thickness. In no case, regardless of the type of facing and the tolerances permitted, shall the minimum thickness of a flange, as specified in this standard, be reduced at any point in order to provide adequate height for the facing or adequate depth for the groove, except for Classes 150 and 300 flanges with 1.6 mm raised facings, in which case this 1.6 mm shall be included in the specified minimum thickness of the flanges.

3.3.5 When a steel flange is required for bolting to a cast iron flange, the steel flange shall be plain (flat) faced. The thickness of such a flange shall be equal to the minimum thickness specified in the appropriate table or, if a 1.6 mm raised face has to be removed to obtain the plain (flat) face, equal to the minimum thickness specified less 1.6 mm.

NOTE. Where a 1.6 mm raised face has to be removed to obtain a plain (flat) face, the length through the hub of a flange will be non-standard.

3.4 FACING DIMENSIONS FOR LAPPED-TYPE JOINTS

Facings for lapped joints shall be one of the following types as specified by the purchaser (see Fig. 2):

- (1) Raised face.
- (2) Large male/female.
- (3) Large or small tongue/groove.
- (4) Ring-joint.

The facings shall comply with the requirements of 3.3. The dimension *t*, as indicated in Fig. 2, shall be not less than the minimum thickness of the barrel of the stub-end, except that in the case of a large male facing the dimension *t* shall be not less than 6.4 mm.

For details of the stub-ends required where lapped joints are used, reference should be made to BS 1640*.

3.5 TOLERANCES ON FLANGE FACINGS

The tolerance on the inside and outside diameters of all facings other than the ring-joint type is ± 0.4 mm.

The tolerances on ring-joint facings are given in Tables 3 to 9.

3.6 FLANGE BOLTING

For each class and size of flange included in this standard, the number of bolts, their size and the bolt circle diameter shall be as given in Tables 12, 14, 16, 18, 20, 22 and 24.

Bolt holes shall be evenly pitched around the bolt circle, and where flanges constitute the end connections of fabricated fittings, pipe bends, or the permanent connections of other pieces of equipment, the holes shall be pitched evenly off the centre lines.

All bolt holes shall be drilled 3.2 mm ($\frac{1}{8}$ in) larger in diameter than the nominal size of the respective bolts.

* BS 1640, 'Steel butt-welding pipe fittings for the petroleum

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3.7 SPOT-FACING AND BACK-FACING OF FLANGES

All cast and forged steel flanges need not be spot-faced or back-faced, provided the bearing surfaces for the nuts are parallel to the flange face within 1°. Any back-facing or spot-facing required to accomplish this shall not reduce the flange thickness to less than the minimum specified in this standard. The finished thickness may exceed the specified minimum by not more than 3.2 mm for any flange up to and including 18 in nominal size and by not more than 4.8 mm for any flange above 18 in nominal size.

The diameter of a spot-facing shall be not less than the dimension across the corners of the appropriate nut plus 3.2 mm. When a spot-facing cuts into the fillet of a flange its diameter shall not exceed the dimension across the corners of the nut by more than 4.8 mm.

When a flange is back-faced, the fillet may be reduced but shall not be eliminated entirely. A sharp corner at the junction of a flange and its hub shall not be permitted.

3.8 SCREWED FLANGES

Screwed flanges shall have dimensions in accordance with Tables 11, 13, 15, 17, 19, 21 and 23. The threads of screwed flanges shall conform to API Std. 5B* or ANSI B2.1†. Threads shall extend to the flange face in order to provide for the length of pipe thread specified in Appendix D. Threads shall be concentric with the axis of the flange. Variations in alignment shall not exceed 5 mm/m.

The hubs of the flanges shall be cylindrical or, alternatively, shall have a draft of not more than 7° on the outside surface for forging purposes.

Class 150 flanges shall be made without a counterbore, but to ensure easy entrance when making a joint and to protect the threads, the latter shall be chamfered, at the back of the flange, to an angle of approximately 45°. The chamfer shall be concentric with the thread, shall have a major diameter approximately equal to the major diameter of the thread, and shall be included in the measurement of the thread length.

Class 300, 400, 600, 900, 1500 and 2500 flanges shall be provided with a counterbore as indicated in the tables, and to ensure easy entrance when making a joint, the thread shall be chamfered to an angle of approximately 45° at the bottom of the counterbore. The chamfer shall be concentric with the thread and shall have a major diameter equal to that of the counterbore.

For reducing screwed flanges see 3.11.

The following are the tolerances on screwed flanges:

(1) On the counterbore diameter (dimension Q)

Nominal sizes 10 in and smaller	+ 0.8 mm — 0
Nominal sizes 12 in and larger	+ 1.6 mm — 0

(2) On the flange thickness (dimension C)

Nominal sizes 18 in and smaller	+ 3.2 mm — 0
Nominal sizes 20 in and larger	+ 4.8 mm — 0

* American Petroleum Institute Standards 5B, 'Threading, gauging and thread inspection of casing, tubing and line pipe threads', (obtainable through BSI).

† ANSI B2.1, 'Pipe threads (except Dryseal)' (obtainable through

3.9 SLIP ON WELDING, SOCKET-WELDING AND LAPPED-TYPE FLANGES

Slip-on welding, socket-welding and lapped-type flanges shall have dimensions in accordance with Tables 11, 13, 15, 17, 19, 21 and 23.

The hubs of the flanges shall be cylindrical or, alternatively, shall have a draft of not more than 7° on the outside surface for forging purposes.

The following are the tolerances on slip-on welding, socket-welding and lapped-type flanges:

(1) On the flange bore and socket diameter (dimension B)

Nominal sizes 10 in and smaller	+ 0.8 mm — 0
Nominal sizes 12 in and larger	+ 1.6 mm — 0

(2) On the flange thickness (dimension C)

Nominal sizes 18 in and smaller	+ 3.2 mm — 0
Nominal sizes 20 in and larger	+ 4.8 mm — 0

Stub-ends for use with lapped-type flanges are specified in BS 1640*, to which reference should be made.

3.10 WELDING-NECK FLANGES

Welding-neck flanges shall have dimensions in accordance with Tables 11, 13, 15, 17, 19, 21 and 23.

The welding ends of the hubs shall conform to the contours given in Fig. 3 and shall be cylindrical or, alternatively, shall have a draft of not more than 7° on the outside surface for forging purposes.

The following are the tolerances on welding-neck flanges:

(1) On the flange bore (dimension B)

Nominal sizes 10 in and smaller	± 0.8 mm
Nominal sizes 12 in to 18 in inclusive	± 1.6 mm
Nominal sizes 20 in and larger	+ 3.2 mm — 1.6 mm

(2) On the flange thickness (dimension C)

Nominal sizes 18 in and smaller	+ 3.2 mm — 0
Nominal sizes 20 in and larger	+ 4.8 mm — 0

(3) On the outside diameter of the welding end of the hub (dimension A)

Nominal sizes 5 in and smaller	+ 2.4 mm — 0.8 mm
Nominal sizes 6 in and larger	+ 4.0 mm — 0.8 mm

(4) On the overall length through the hub (dimension Y)

Nominal sizes 10 in and smaller	± 1.6 mm
Nominal sizes 12 in and larger	± 3.2 mm

Regardless of the tolerances specified under (1) and (3) above, the thickness of the welding end of a hub shall be not less than 87½ % of the nominal thickness of the pipe to which the flange is to be attached.

* BS 1640, 'Steel butt-welding pipe fittings for the petroleum

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3.11 CONCENTRIC REDUCING SCREWED FLANGES

A concentric reducing screwed flange shall be designated by the nominal size of the reduced bore, the outside diameter of the flange and the pressure class, e.g. 2 in $\times$ 318 mm—Class 300.

The facing and flange dimensions and the bolting of such a flange shall be the same as those applicable to a normal standard flange of the same outside diameter and pressure class.

The minimum effective thread length (T in Table 1) shall be at least equal to that of a normal standard flange of the same bore and pressure class, but the thread need not necessarily extend to the face of the flange as is required for a standard flange.

The hub dimensions shall be the same as those of a normal standard flange of the next size smaller in outside diameter in the same pressure class.

A hub need not be supplied where the reduced bore is small relative to the outside diameter of the flange, and Table 1 gives for each nominal size of standard flange the smallest nominal size of reduced bore for which a hub is required. Where reduced bores smaller than those given in Table 1 are required, blank (blind) flanges, with or without hub and suitably tapped, may be used.

Class 150 reducing screwed flanges need not be counter-bored but shall be chamfered as provided for in 3.8. Classes 300 and higher flanges, whether of the hub type or blank (blind) type, shall be counterbored as specified in 3.8 for corresponding normal standard flanges, except that the depth of counterbore shall be 6.4 mm for a tapping of 2 in nominal size or smaller and 9.5 mm for a tapping of 2½ in nominal size or larger. The tolerances applicable to normal standard flanges apply also to the reducing flanges.

3.12 CONCENTRIC REDUCING SLIP-ON WELDING AND SOCKET-WELDING FLANGES

A concentric reducing slip-on welding flange or a concentric reducing socket-welding flange shall be designated by the nominal size of the reduced bore, the outside diameter of the flange and the pressure class.

The facing and flange dimensions and the bolting of a

flange of either of these types shall be the same as those of a normal standard flange of the same outside diameter and pressure class. The hub dimensions shall be the same as those applicable to a normal standard flange of the next size smaller in outside diameter in the same pressure class. The dimensions of the reduced bore shall correspond in all respects with those of a normal standard flange of the same bore and pressure class.

The tolerances applicable to normal standard flanges also apply to the reducing flanges referred to in this clause.

3.13 CONCENTRIC REDUCING WELDING-NECK FLANGES

A concentric reducing welding-neck flange shall be designated by the nominal size of the reduced bore, the outside diameter of the flange and the pressure class.

The facing and flange dimensions and the bolting of such a flange shall be the same as those of a normal standard flange of the same outside diameter and pressure class. The hub dimensions and bore shall correspond in all respects with those applicable to a normal standard welding-neck flange of the same (reduced) bore and pressure class.

The tolerances applicable to normal standard welding-neck flanges also apply to the reducing flanges referred to in this clause.

3.14 BLANK (BLIND) FLANGES

Blank flanges shall have dimensions in accordance with Tables 11, 13, 15, 17, 19, 21 and 23. They may be supplied with or without hubs at the manufacturers' option.

When the centre part of the face of a blank flange is recessed, at no point shall the recess reduce the thickness of the flange below the minimum given in Tables 11, 13, 15, 17, 19, 21, and 23. The bottom of the recess need not be machined.

When the centre part of the face of a blank flange is raised, the raised part shall have a diameter at least 25 mm smaller than the diameter specified for the recess in Tables 11, 13, 15, 17, 19, 21, and 23. The raised part need not be machined.

4. TESTS**4.1 TESTING**

This standard does not make provision for the pressure testing of loose flanges. These may be tested after attachment to pipe or equipment. The test pressure will then

depend on the requirements of the appropriate standard or code to which the equipment has been fabricated.

Test pressures for integral flanges, for example end flanges of valves, shall be in accordance with those specified in the relevant British Standard.

5. INSPECTION**5.1 INSPECTION**

The purchaser or his representative shall have free access, at all reasonable times, to those parts of the manufacturer's works actually engaged upon his contract and shall be at liberty to inspect, at any stage of manufacture, the materials covered by such contract. He shall be at liberty to reject any material which does not comply with the requirements of this standard.

When the purchaser or his representative desires to witness the specified tests on the materials covered by his contract, the manufacturer shall notify him sufficiently in advance of the tests to enable him to be present.

5.2 REPAIR OF DEFECTS

Defects which do not impair the strength of the flanges may be welded by a procedure approved by the purchaser. They shall be cleaned out to sound metal before welding, and shall be submitted to the purchaser's inspector for approval in this condition, after which they may be welded if the purchaser so agrees. After welding, flanges shall be heat-treated, except that welds required only for finish and appearance need not be heat-treated, when this is approved by the purchaser. When the welding of defects is permitted, the welding rod shall be such as to produce a weld having characteristics similar to the parent metal.

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6. MARKING

6.1 MARKING

Each steel flange produced in conformity with this

standard shall be marked in accordance with the requirements of Appendix B.

7. PREPARATION AND DESPATCH

7.1 PREPARATION

After inspection, and before despatch, flanges shall if necessary, be dried and cleaned. Painting of finished flanges shall be optional to the manufacturer, unless otherwise specified by the purchaser.

Threaded and machined surfaces shall be well covered with an approved rust-inhibiting composition.

Exposed faces of flanges shall be protected over their entire surface with a suitable close-fitting protector securely attached at not less than 4 points. The type of protector

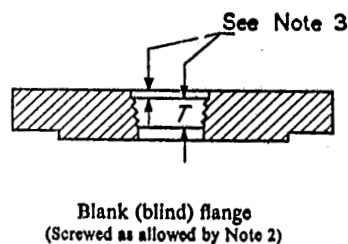
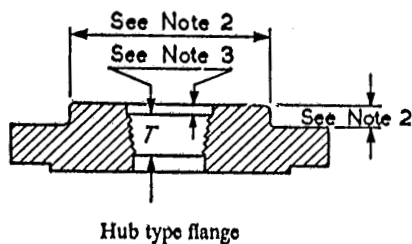
and method of attachment shall be approved by the purchaser.

7.2 DESPATCH

Flanges shall be bundled by bolting them together or securing them with wire of suitable strength passed through the bolt holes in such a manner that the flanges are paired and no flange facings remain exposed.

Other methods of preparation for despatch shall be subject to agreement between the purchaser and the manufacturer.

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TABLE 1. REDUCING SCREWED FLANGES,
CLASSES 150 TO 2500

Nominal pipe size appropriate to the diameter of the flange	Smallest nominal size of reduced bore requiring hub (see Note 2)
in	in
1	$\frac{1}{2}$
* $1\frac{1}{4}$	$\frac{1}{2}$
$1\frac{1}{2}$	$\frac{1}{2}$
2	1
* $2\frac{1}{2}$	$1\frac{1}{4}$
3	$1\frac{1}{4}$
* $3\frac{1}{2}$	$1\frac{1}{2}$
4	$1\frac{1}{2}$
*5	$1\frac{1}{2}$
6	$2\frac{1}{4}$
8	3
10	$3\frac{1}{4}$
12	$3\frac{1}{2}$
14	$3\frac{3}{4}$
16	4
18	4
20	4
24	4

NOTE 1. This table shall be read in conjunction with 3.11.

NOTE 2. A hub is required if the nominal size of the reduced bore is equal to or greater than the size given in the above table against the nominal pipe size appropriate to the outside diameter of the flange. Otherwise a blank (blind) flange suitably tapped may be used.

The nominal pipe size appropriate to a flange of a given outside diameter and pressure class may be found by reference to the table of standard flanges of the same pressure class. (See Tables 11, 13, 15, 17, 19, 21 and 23.)

Hub dimensions shall conform to the provisions of 3.11.

NOTE 3. The threading and counterbore, etc., shall conform to the provisions of 3.8 and 3.11.

* The use of these sizes should be avoided.

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TABLE 2. FACING DIMENSIONS FOR FLANGES OTHER THAN RING-JOINT, CLASSES 150 TO 2500
(See Notes 1 and 2)

1	2	3	4	5	6	7	8	9	10	11	12	13	14
Nominal pipe size	Outside diameter (see Note 3)			Inside diameter of large and small tongue (see Note 3)	Outside diameter of recess or groove (see Note 3)			Inside diameter of large and small groove (see Note 3)	Height		Depth of female or groove	Minimum outside diameter of raised portion (see Note 4)	
	Raised face, large male and large tongue (see Note 5)	Small male	Small tongue		Large female and large groove (see Note 5)	Small female	Small groove		Raised face, Classes 150 and 300	Raised face, Classes 400 to 2500 Large and small male and tongue, all classes (see Note 5)		Small female and small groove	Large female and large groove (see Note 5)
in	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
½	35	18.3	34.9	25.4	36.5	19.8	36.5	23.8	1.6	6.4	4.8	45.0	46.0
¾	43	23.8	42.9	33.3	44.4	25.4	44.4	31.7	1.6	6.4	4.8	52.0	54.0
1	51	30.2	47.6	38.1	52.4	31.7	49.2	36.5	1.6	6.4	4.8	57.0	62.0
*1¼	64	38.1	57.1	47.6	65.1	39.7	58.7	46.0	1.6	6.4	4.8	67.0	75.0
1½	73	44.4	63.5	54.0	74.6	46.0	65.1	52.4	1.6	6.4	4.8	73.0	84.0
2	92	57.1	82.5	73.0	93.7	58.7	84.1	71.4	1.6	6.4	4.8	92.0	103.0
*2½	105	68.3	95.2	85.7	106.4	69.8	96.8	84.1	1.6	6.4	4.8	105.0	116.0
3	127	84.1	117.5	107.9	128.6	85.7	119.1	106.4	1.6	6.4	4.8	127.0	138.0
*3½	140	96.8	130.2	120.6	141.3	98.4	131.8	119.1	1.6	6.4	4.8	140.0	151.0
4	157	109.5	144.5	131.8	158.8	111.1	146.0	130.2	1.6	6.4	4.8	157.0	168.0
*5	186	136.5	173.0	160.3	187.3	138.1	174.6	158.7	1.6	6.4	4.8	186.0	197.0
6	216	161.9	203.2	190.5	217.5	163.5	204.8	188.9	1.6	6.4	4.8	216.0	227.0
8	270	212.7	254.0	238.1	271.5	214.3	255.6	236.5	1.6	6.4	4.8	270.0	281.0
10	324	266.7	304.8	285.7	325.4	268.3	306.4	284.1	1.6	6.4	4.8	324.0	335.0
12	381	317.5	361.9	342.9	382.6	319.1	363.5	341.3	1.6	6.4	4.8	381.0	392.0
14	413	349.2	393.7	374.6	414.3	350.8	395.3	373.1	1.6	6.4	4.8	413.0	424.0
16	470	400.0	447.7	425.4	471.5	401.6	449.2	423.9	1.6	6.4	4.8	470.0	481.0
18	533	450.8	511.2	488.9	535.0	452.4	512.8	487.4	1.6	6.4	4.8	533.0	545.0
20	584	501.6	558.8	533.4	585.8	503.2	560.4	531.8	1.6	6.4	4.8	584.0	595.0
24	692	603.2	666.8	641.3	693.7	604.8	668.3	639.8	1.6	6.4	4.8	692.0	703.0

NOTE 1. This table shall be read in conjunction with 3.3, 3.4 and 3.5, and Figs. 1 and 2.

NOTE 2. For ring-joint facing dimensions see Tables 3 to 9.

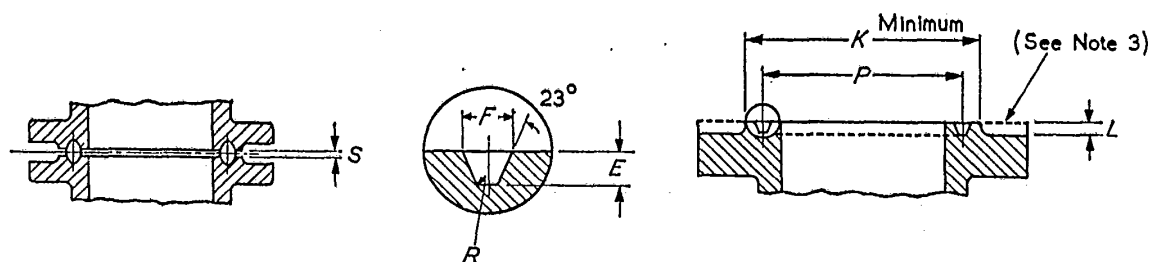
NOTE 3. For tolerances see 3.5.

NOTE 4. A flange with a large or small female or a large or small groove facing may be supplied with the outside diameter of the raised portion to dimensions *K* or *L* in Column 13 or 14 above as appropriate, or full faced, i.e. with the raised portion extending to the full diameter of the flange, at the option of the manufacturer, unless otherwise specified by the purchaser.

NOTE 5. Large male and female faces are not applicable to Class 150 because of potential dimensional conflicts.

* The use of these sizes should be avoided.

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TOLERANCES

On E (Depth) $+ 0.4$ mm
 $- 0$
 On F (Width) ± 0.2 mm
 On P (Pitch dia.) ± 0.13 mm
 On R (Radius at bottom) max.
 On 23° (Angle) $\pm \frac{1}{4}^\circ$

TABLE 3. DIMENSIONS OF RING-JOINT FACINGS, CLASS 150
 (See Note 1)

1	2	3	4	5	6	7	8
Nominal pipe size	Pitch diameter of groove P	Width of groove F	Depth of groove E Height of raised portion L (see Note 4) E and L	Diameter of raised portion (see Note 3) K	Radius at bottom of groove R	Ring number (see Table 10)	Approximate distance between flanges when ring is compressed (see Note 2) S
in	mm	mm	mm	mm	mm		mm
1	47.6	8.7	6.4	63.5	1.0	R.15	4.0
*1½	57.2	8.7	6.4	73.0	1.0	R.17	4.0
1½	65.1	8.7	6.4	82.6	1.0	R.19	4.0
2	82.6	8.7	6.4	101.6	1.0	R.22	4.0
*2½	101.6	8.7	6.4	120.6	1.0	R.25	4.0
3	114.3	8.7	6.4	133.4	1.0	R.29	4.0
*3½	131.8	8.7	6.4	154.0	1.0	R.33	4.0
4	149.2	8.7	6.4	171.4	1.0	R.36	4.0
*5	171.4	8.7	6.4	193.7	1.0	R.40	4.0
6	193.7	8.7	6.4	219.1	1.0	R.43	4.0
8	247.6	8.7	6.4	273.0	1.0	R.48	4.0
10	304.8	8.7	6.4	330.2	1.0	R.52	4.0
12	381.0	8.7	6.4	406.4	1.0	R.56	4.0
14	396.9	8.7	6.4	425.4	1.0	R.59	3.0
16	454.0	8.7	6.4	482.6	1.0	R.64	3.0
18	517.5	8.7	6.4	546.1	1.0	R.68	3.0
20	558.8	8.7	6.4	596.9	1.0	R.72	3.0
24	673.1	8.7	6.4	711.2	1.0	R.76	3.0

NOTE 1. This table shall be read in conjunction with 3.3 and 3.4, and Figs. 1 and 2.

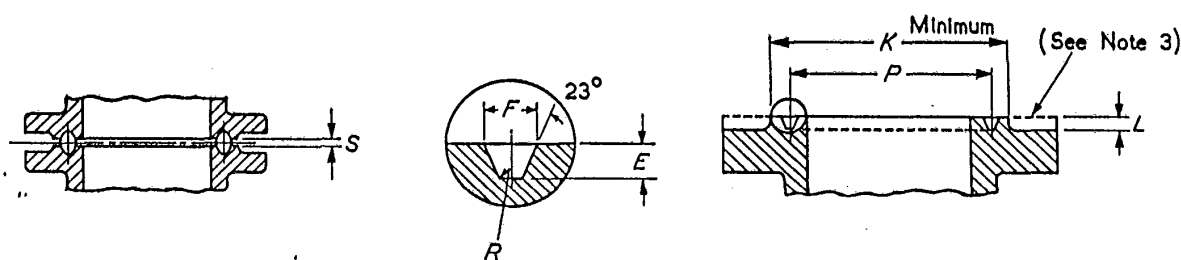
NOTE 2. When calculating the laying length of a pipe provided with ring-joints the appropriate dimension in Column 8 should be added to the overall length of the pipe.

NOTE 3. Raised portion or full-face may be supplied unless specified in the order. This does not apply to lapped joints.

NOTE 4. Height L is equal to depth E but not subject to the tolerance on E .

* The use of these sizes should be avoided.

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TOLERANCES

On E (Depth) $+ 0.4$ mm
 $- 0$
 On F (Width) ± 0.2 mm
 On P (Pitch dia.) ± 0.13 mm
 On R (Radius at bottom) max.
 On 23° (Angle) $\pm \frac{1}{4}^\circ$

TABLE 4. DIMENSIONS OF RING-JOINT FACINGS, CLASS 300

(See Note 1)

1	2	3	4	5	6	7	8
Nominal pipe size	Pitch diameter of groove P	Width of groove F	Depth of groove E Height of raised portion L (see Note 4) E and L	Diameter of raised portion (see Note 3) K	Radius at bottom of groove R	Ring number (see Note 5 and Table 10)	Approximate distance between flanges when ring is compressed (see Note 2) S
In	mm	mm	mm	mm	mm		mm
$\frac{1}{2}$	34.1	7.1	5.6	50.8	1.0	R.11	3.2
$\frac{3}{4}$	42.9	8.7	6.4	63.5	1.0	R.13	4.0
1	50.8	8.7	6.4	69.8	1.0	R.16	4.0
*1 $\frac{1}{4}$	60.3	8.7	6.4	79.4	1.0	R.18	4.0
1 $\frac{1}{2}$	68.3	8.7	6.4	90.5	1.0	R.20	4.0
2	82.6	11.9	7.9	108.0	1.0	R.23	5.6
*2 $\frac{1}{4}$	101.6	11.9	7.9	127.0	1.0	R.26	5.6
3	123.8†	11.9	7.9	146.0	1.0	R.31†	5.6
*3 $\frac{1}{4}$	131.8	11.9	7.9	158.8	1.0	R.34	5.6
4	149.2	11.9	7.9	174.6	1.0	R.37	5.6
*5	181.0	11.9	7.9	209.6	1.0	R.41	5.6
6	211.1	11.9	7.9	241.3	1.0	R.45	5.6
8	269.9	11.9	7.9	301.6	1.0	R.49	5.6
10	323.8	11.9	7.9	355.6	1.0	R.53	5.6
12	381.0	11.9	7.9	412.8	1.0	R.57	5.6
14	419.1	11.9	7.9	457.2	1.0	R.61	5.6
16	469.9	11.9	7.9	508.0	1.0	R.65	5.6
18	533.4	11.9	7.9	574.7	1.0	R.69	5.6
20	584.2	13.5	9.5	635.0	2.0	R.73	5.6
24	692.2	16.7	11.1	749.3	2.0	R.77	6.3

NOTE 1. This table shall be read in conjunction with 3.3 and 3.4, and Figs. 1 and 2.

NOTE 2. When calculating the laying length of a pipe provided with ring-joints the appropriate dimension in Column 8 should be added to the overall length of the pipe.

NOTE 3. Raised portion or full-face may be supplied unless specified in the order. This does not apply to lapped joints.

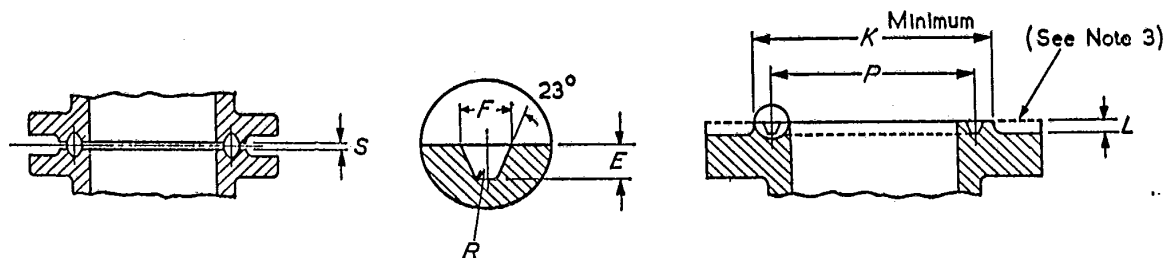
NOTE 4. Height L is equal to depth E but not subject to the tolerance on E .

NOTE 5. In the 3 in nominal pipe size, for ring-joints with lapped flanges, the pitch diameter of the ring shall be 117.5 mm instead of 123.8 mm and the ring number shall be R.30 instead of R.31.

* The use of these sizes should be avoided.

† See Note 5.

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TOLERANCES

- On E (Depth) $+ 0.4$ mm
 $- 0$
 On F (Width) ± 0.2 mm
 On P (Pitch dia.) ± 0.13 mm
 On R (Radius at bottom) max.
 On 23° (Angle) $\pm \frac{1}{2}^\circ$

TABLE 5. DIMENSIONS OF RING-JOINT FACINGS, CLASS 400
 (See Note 1)

1	2	3	4	5	6	7	8
Nominal pipe size	Pitch diameter of groove P	Width of groove F	Depth of groove E Height of raised portion L (see Note 4) E and L	Diameter of raised portion (see Note 3) K	Radius at bottom of groove R	Ring number (see Table 10)	Approximate distance between flanges when ring is compressed (see Note 2) S
in	mm	mm	mm	mm	mm		mm
$\frac{1}{8}$ $\frac{1}{4}$ 1 $*1\frac{1}{4}$ $1\frac{1}{2}$ 2 $*2\frac{1}{4}$ 3 $*3\frac{1}{4}$			For these sizes Class 600 flanges are used				
4	149.2	11.9	7.9	174.6	1.0	R.37	5.6
*5	181.0	11.9	7.9	209.6	1.0	R.41	5.6
6	211.1	11.9	7.9	241.3	1.0	R.45	5.6
8	269.9	11.9	7.9	301.6	1.0	R.49	5.6
10	323.8	11.9	7.9	355.6	1.0	R.53	5.6
12	381.0	11.9	7.9	412.8	1.0	R.57	5.6
14	419.9	11.9	7.9	457.2	1.0	R.61	5.6
16	469.9	11.9	7.9	508.0	1.0	R.65	5.6
18	533.4	11.9	7.9	574.7	1.0	R.69	5.6
20	584.2	13.5	9.5	635.0	2.0	R.73	5.6
24	692.2	16.7	11.1	749.3	2.0	R.77	6.3

NOTE 1. This table shall be read in conjunction with 3.3 and 3.4, and Figs. 1 and 2.

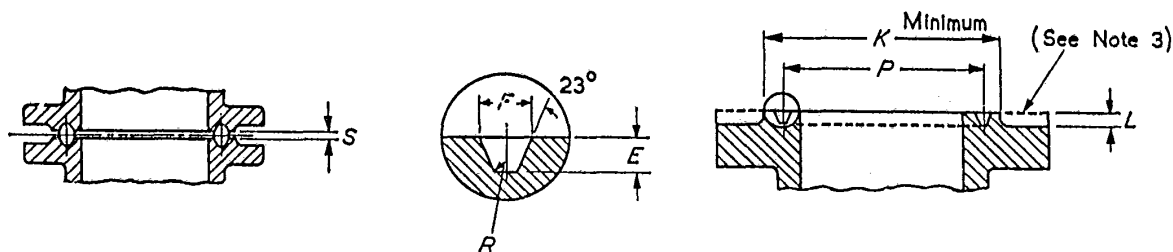
NOTE 2. When calculating the laying length of a pipe provided with ring-joints the appropriate dimension in Column 8 should be added to the overall length of the pipe.

NOTE 3. Raised portion or full-face may be supplied unless specified in the order. This does not apply to lapped joints.

NOTE 4. Height L is equal to depth E but not subject to the tolerance on E .

* The use of these sizes should be avoided.

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TOLERANCES

- On E (Depth) $+ 0.4$ mm
 $- 0$
 On F (Width) ± 0.2 mm
 On P (Pitch dia.) ± 0.13 mm
 On R (Radius at bottom) max.
 On 23° (Angle) $\pm \frac{1}{2}^\circ$

TABLE 6. DIMENSIONS OF RING-JOINT FACINGS, CLASS 600
 (See Note 1)

1	2	3	4	5	6	7	8
Nominal pipe size	Pitch diameter of groove P	Width of groove F	Depth of groove E Height of raised portion L (see Note 4) E and L	Diameter of raised portion (see Note 3) K	Radius at bottom of groove R	Ring number (see Note 5 and Table 10)	Approximate distance between flanges when ring is compressed (see Note 2) S
in	mm	mm	mm	mm	mm		mm
$\frac{1}{4}$	34.1	7.1	5.6	50.8	1.0	R.11	3.2
$\frac{3}{4}$	42.9	8.7	6.4	63.5	1.0	R.13	4.0
1	50.8	8.7	6.4	69.8	1.0	R.16	4.0
$1\frac{1}{4}$	60.3	8.7	6.4	79.4	1.0	R.18	4.0
$1\frac{3}{4}$	68.3	8.7	6.4	90.5	1.0	R.20	4.0
2	82.6	11.9	7.9	108.0	1.0	R.23	4.8
$2\frac{1}{2}$	101.6	11.9	7.9	127.0	1.0	R.26	4.8
3	123.8†	11.9	7.9	146.0	1.0	R.31†	4.8
$3\frac{1}{2}$	131.8	11.9	7.9	158.8	1.0	R.34	4.8
4	149.2	11.9	7.9	174.6	1.0	R.37	4.8
$\frac{5}{2}$	181.0	11.9	7.9	209.6	1.0	R.41	4.8
6	211.1	11.9	7.9	241.3	1.0	R.45	4.8
8	269.9	11.9	7.9	301.6	1.0	R.49	4.8
10	323.8	11.9	7.9	355.6	1.0	R.53	4.8
12	381.0	11.9	7.9	412.8	1.0	R.57	4.8
14	419.1	11.9	7.9	457.2	1.0	R.61	4.8
16	469.9	11.9	7.9	508.0	1.0	R.65	4.8
18	533.4	11.9	7.9	574.7	1.0	R.69	4.8
20	584.2	13.5	9.5	635.0	2.0	R.73	4.8
24	692.2	16.7	11.1	749.3	2.0	R.77	5.6

NOTE 1. This table shall be read in conjunction with 3.3 and 3.4, and Figs. 1 and 2.

NOTE 2. When calculating the laying length of a pipe provided with ring-joints the appropriate dimension in Column 8 should be added to the overall length of the pipe.

NOTE 3. Raised portion or full-face may be supplied unless specified in the order. This does not apply to lapped joints.

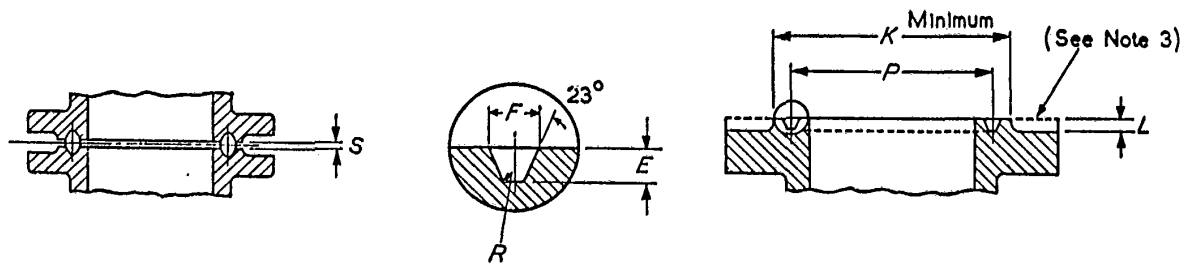
NOTE 4. Height L is equal to depth E but not subject to the tolerance on E .

NOTE 5. In the 3 in nominal pipe size, for ring-joints with lapped flanges, the pitch diameter of the ring shall be 117.5 mm instead of 123.8 mm and the ring number shall be R.30 instead of R.31.

*The use of these sizes should be avoided.

† See Note 5.

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TOLERANCES

- On E (Depth) ± 0.4 mm
 — 0
 On F (Width) ± 0.2 mm
 On P (Pitch dia.) ± 0.13 mm
 On R (Radius at bottom) max.
 On 23° (Angle) $\pm \frac{1}{4}^\circ$

TABLE 7. DIMENSIONS OF RING-JOINT FACINGS, CLASS 900
 (See Note 1)

1	2	3	4	5	6	7	8
Nominal pipe size	Pitch diameter of groove P	Width of groove F	Depth of groove E Height of raised portion L (see Note 4) E and L	Diameter of raised portion (see Note 3) K	Radius at bottom of groove R	Ring number (see Table 10)	Approximate distance between flanges when ring is compressed (see Note 2) S
in	mm	mm	mm	mm	mm		mm
$\frac{1}{4}$ $\frac{3}{4}$ 1 $1\frac{1}{4}$ $1\frac{1}{2}$ 2 $2\frac{1}{2}$			For these sizes Class 1500 flanges are used				
3	123.8	11.9	7.9	155.6	1.0	R.31	4.0
4	149.2	11.9	7.9	181.0	1.0	R.37	4.0
*5	181.0	11.9	7.9	215.9	1.0	R.41	4.0
6	211.1	11.9	7.9	241.3	1.0	R.45	4.0
8	269.9	11.9	7.9	308.0	1.0	R.49	4.0
10	323.8	11.9	7.9	362.0	1.0	R.53	4.0
12	381.0	11.9	7.9	419.1	1.0	R.57	4.0
14	419.1	16.7	11.1	466.7	2.0	R.62	4.0
16	469.9	16.7	11.1	523.9	2.0	R.66	4.0
18	533.4	19.8	12.7	593.7	2.0	R.70	4.8
20	584.2	19.8	12.7	647.7	2.0	R.74	4.8
24	692.2	27.0	15.9	771.5	2.0	R.78	5.6

NOTE 1. This table shall be read in conjunction with 3.3 and 3.4, and Figs. 1 and 2.

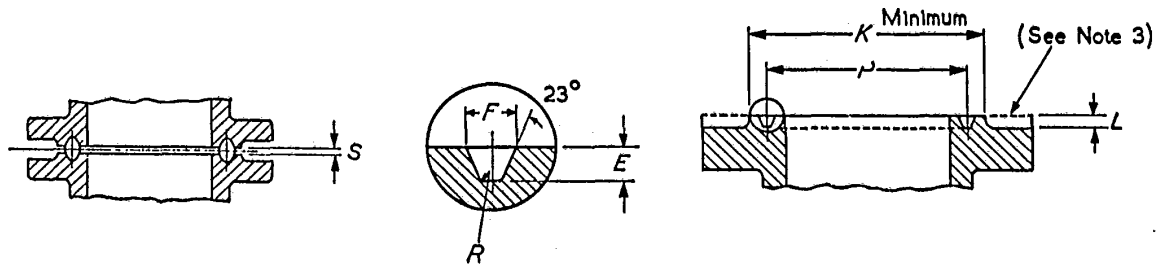
NOTE 2. When calculating the laying length of a pipe provided with ring-joints the appropriate dimension in Column 8 should be added to the overall length of the pipe.

NOTE 3. Raised portion or full-face may be supplied unless specified in the order. This does not apply to lapped joints.

NOTE 4. Height L is equal to depth E but not subject to the tolerance on E .

* The use of these sizes should be avoided.

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TOLERANCES

- On *E* (Depth) $+ 0.4 \text{ mm}$
 $- 0$
 On *F* (Width) $\pm 0.2 \text{ mm}$
 On *P* (Pitch dia.) $\pm 0.13 \text{ mm}$
 On *R* (Radius at bottom) max.
 On 23° (Angle) $\pm \frac{1}{4}^\circ$

TABLE 8. DIMENSIONS OF RING-JOINT FACINGS, CLASS 1500
 (See Note 1)

1	2	3	4	5	6	7	8
Nominal pipe size	Pitch diameter of groove <i>P</i>	Width of groove <i>F</i>	Depth of groove <i>E</i> Height of raised portion <i>L</i> (see Note 4) <i>E</i> and <i>L</i>	Diameter of raised portion (see Note 3) <i>K</i>	Radius at bottom of groove <i>R</i>	Ring number (see Table 10)	Approximate distance between flanges when ring is compressed (see Note 2) <i>S</i>
in	mm	mm	mm	mm	mm		mm
$\frac{1}{2}$	39.7	8.7	6.4	60.3	1.0	R.12	4.0
$\frac{3}{4}$	44.4	8.7	6.4	66.7	1.0	R.14	4.0
1	50.8	8.7	6.4	71.4	1.0	R.16	4.0
* $1\frac{1}{4}$	60.3	8.7	6.4	81.0	1.0	R.18	4.0
$1\frac{1}{2}$	68.2	8.7	6.4	92.1	1.0	R.20	4.0
2	95.2	11.9	7.9	123.8	1.0	R.24	3.2
* $2\frac{1}{2}$	108.0	11.9	7.9	136.5	1.0	R.27	3.2
3	136.5	11.9	7.9	168.3	1.0	R.35	3.2
4	161.9	11.9	7.9	193.7	1.0	R.39	3.2
*5	193.7	11.9	7.9	228.6	1.0	R.44	3.2
6	211.1	13.5	9.5	247.6	2.0	R.46	3.2
8	269.9	16.7	11.1	317.5	2.0	R.50	4.0
10	323.8	16.7	11.1	371.5	2.0	R.54	4.0
12	381.0	23.0	14.3	438.1	2.0	R.58	4.0
14	419.1	27.0	15.9	488.9	2.0	R.63	5.6
16	469.9	30.2	17.5	546.1	2.0	R.67	7.9
18	533.4	30.2	17.5	612.8	2.0	R.71	7.9
20	584.2	33.3	17.5	673.1	2.0	R.75	9.5
24	692.2	36.5	20.6	793.7	2.0	R.79	11.1

NOTE 1. This table shall be read in conjunction with 3.3 and 3.4, and Figs. 1 and 2.

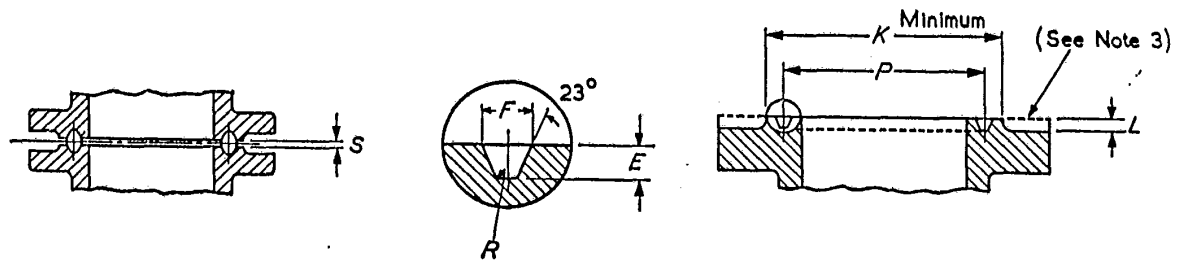
NOTE 2. When calculating the laying length of a pipe provided with ring-joints the appropriate dimension in Column 8 should be added to the overall length of the pipe.

NOTE 3. Raised portion or full-face may be supplied unless specified in the order. This does not apply to lapped joints.

NOTE 4. Height *L* is equal to depth *E* but not subject to the tolerance on *E*.

* The use of these sizes should be avoided.

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TOLERANCES

On E (Depth) $+ 0.4$ mm
 $- 0$
 On F (Width) ± 0.2 mm
 On P (Pitch dia.) ± 0.13 mm
 On R (Radius at bottom) max.
 On 23° (Angle) $\pm \frac{1}{4}^\circ$

TABLE 9. DIMENSIONS OF RING-JOINT FACINGS, CLASS 2500
 (See Note 1)

1	2	3	4	5	6	7	8
Nominal pipe size	Pitch diameter of groove P	Width of groove F	Depth of groove E Height of raised portion L (see Note 4) E and L	Diameter of raised portion (see Note 3) K	Radius at bottom of groove R	Ring number (see Table 10)	Approximate distance between flanges when ring is compressed (see Note 2) S
in	mm	mm	mm	mm	mm		mm
$\frac{1}{2}$	42.9	8.7	6.4	65.1	1.0	R.13	4.0
$\frac{3}{4}$	50.8	8.7	6.4	73.0	1.0	R.16	4.0
1	60.3	8.7	6.4	82.6	1.0	R.18	4.0
* $1\frac{1}{4}$	72.2	11.9	7.9	101.6	1.0	R.21	3.2
$1\frac{1}{2}$	82.6	11.9	7.9	114.3	1.0	R.23	3.2
2	101.6	11.9	7.9	133.4	1.0	R.26	3.2
* $2\frac{1}{2}$	111.1	13.5	9.5	149.2	2.0	R.28	3.2
3	127.0	13.5	9.5	168.3	2.0	R.32	3.2
4	157.2	16.7	11.1	203.2	2.0	R.38	4.0
*5	190.5	19.8	12.7	241.3	2.0	R.42	4.0
6	228.6	19.8	12.7	279.4	2.0	R.47	4.0
8	279.4	23.0	14.3	339.7	2.0	R.51	4.8
10	342.9	30.2	17.5	425.4	2.0	R.55	6.3
12	406.4	33.3	17.5	495.3	2.0	R.60	7.9

NOTE 1. This table shall be read in conjunction with 3.3 and 3.4, and Figs. 1 and 2.

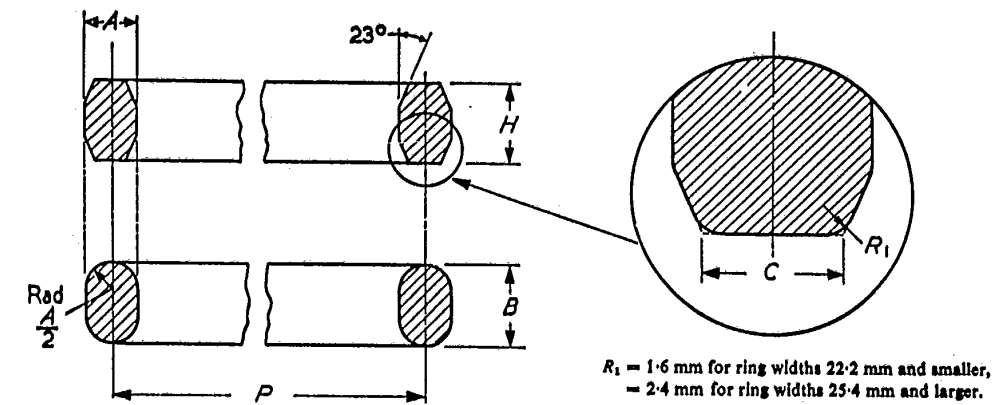
NOTE 2. When calculating the laying length of a pipe provided with ring-joints the appropriate dimension in Column 8 should be added to the overall length of the pipe.

NOTE 3. Raised portion or full-face may be supplied unless specified in the order. This does not apply to lapped joints.

NOTE 4. Height L is equal to depth E but not subject to the tolerance on E .

* The use of these sizes should be avoided.

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The presence of a small forging fin, located so that it does not prevent the ring from seating properly in the groove, is not objectionable.

TOLERANCES

P	(average pitch diameter of ring)	$\pm 0.18 \text{ mm}$
A	(width of ring)	$\pm 0.2 \text{ mm}$
B and H	(height of ring)	$\pm 0.4 \text{ mm}$
C	(width of flat of octagonal ring)	$\pm 0.2 \text{ mm}$
23°	(angle)	$\pm \frac{1}{2}^\circ$
R_1	(radius of ring)	$\pm 0.4 \text{ mm}$

* A plus tolerance of 1.2 mm for heights B and H is permitted provided the variation in the height of any given ring does not exceed 0.4 mm throughout its entire circumference.

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TABLE 10. NUMBERS AND DIMENSIONS OF RING-JOINT GASKETS

1	2	3	4	5	6	7	8	9	10	11	12
Ring number	Pitch diameter <i>P</i>	Width of ring <i>A</i>	Height of ring		Width on flat of octagonal rings <i>C</i>	Ring number	Pitch diameter <i>P</i>	Width of ring <i>A</i>	Height of ring		Width on flat of octagonal rings <i>C</i>
			Oval <i>B</i>	Octagonal <i>H</i>					Oval <i>B</i>	Octagonal <i>H</i>	
	mm	mm	mm	mm	mm		mm	mm	mm	mm	mm
R.11	34.1	6.4	11.1	9.5	4.3	R.46	211.1	12.7	19.0	17.5	8.7
R.12	39.7	7.9	14.3	12.7	5.2	R.47	228.6	19.0	25.4	23.8	12.3
R.13	42.9	7.9	14.3	12.7	5.2	R.48	247.6	7.9	14.3	12.7	5.2
R.14	44.4	7.9	14.3	12.7	5.2	R.49	269.9	11.1	17.5	15.9	7.7
R.15	47.6	7.9	14.3	12.7	5.2	R.50	269.9	15.9	22.2	20.6	10.5
R.16	50.8	7.9	14.3	12.7	5.2	R.51	279.4	22.2	28.6	27.0	14.8
R.17	57.2	7.9	14.3	12.7	5.2	R.52	304.8	7.9	14.3	12.7	5.2
R.18	60.3	7.9	14.3	12.7	5.2	R.53	323.8	11.1	17.5	15.9	7.7
R.19	65.1	7.9	14.3	12.7	5.2	R.54	323.8	15.9	22.2	20.6	10.5
R.20	68.3	7.9	14.3	12.7	5.2	R.55	342.9	28.6	36.5	34.9	19.8
R.21	72.2	11.1	17.5	15.9	7.7	R.56	381.0	7.9	14.3	12.7	5.2
R.22	82.6	7.9	14.3	12.7	5.2	R.57	381.0	11.1	17.5	15.9	7.7
R.23	82.6	11.1	17.5	15.9	7.7	R.58	381.0	22.2	28.6	27.0	14.8
R.24	95.2	11.1	17.5	15.9	7.7	R.59	396.9	7.9	14.3	12.7	5.2
R.25	101.6	7.9	14.3	12.7	5.2	R.60	406.4	31.8	39.7	38.1	22.3
R.26	101.6	11.1	17.5	15.9	7.7	R.61	419.1	11.1	17.5	15.9	7.7
R.27	108.0	11.1	17.5	15.9	7.7	R.62	419.1	15.9	22.2	20.6	10.5
R.28	111.1	12.7	19.0	17.5	8.7	R.63	419.1	25.4	33.3	31.8	17.3
R.29	114.3	7.9	14.3	12.7	5.2	R.64	454.0	7.9	14.3	12.7	5.2
R.30	117.5	11.1	17.5	15.9	7.7	R.65	469.9	11.1	17.5	15.9	7.7
R.31	123.8	11.1	17.5	15.9	7.7	R.66	469.9	15.9	22.2	20.6	10.5
R.32	127.0	12.7	19.0	17.5	8.7	R.67	469.9	28.6	36.5	34.9	19.8
R.33	131.8	7.9	14.3	12.7	5.2	R.68	517.5	7.9	14.3	12.7	5.2
R.34	131.8	11.1	17.5	15.9	7.7	R.69	533.4	11.1	17.5	15.9	7.7
R.35	136.5	11.1	17.5	15.9	7.7	R.70	533.4	19.0	25.4	23.8	12.3
R.36	149.2	7.9	14.3	12.7	5.2	R.71	533.4	28.6	36.5	34.9	19.8
R.37	149.2	11.1	17.5	15.9	7.7	R.72	558.8	7.9	14.3	12.7	5.2
R.38	157.2	15.9	22.2	20.6	10.5	R.73	584.2	12.7	19.0	17.5	8.7
R.39	161.9	11.1	17.5	15.9	7.7	R.74	584.2	19.1	25.4	23.8	12.3
R.40	171.4	7.9	14.3	12.7	5.2	R.75	584.2	31.8	39.7	38.1	22.3
R.41	181.0	11.1	17.5	15.9	7.7	R.76	673.1	7.9	14.3	12.7	5.2
R.42	190.5	19.0	25.4	23.8	12.3	R.77	692.2	15.9	22.2	20.6	10.5
R.43	193.7	7.9	14.3	12.7	5.2	R.78	692.2	25.4	33.3	31.8	17.3
R.44	193.7	11.1	17.5	15.9	7.7	R.79	692.2	34.9	44.4	41.3	24.8
R.45	211.1	11.1	17.5	15.9	7.7						

NOTE 1. When ordering ring-joint gaskets, the purchaser should specify octagonal or oval rings as desired. Either type of ring is suitable for use with flat-bottom grooves, which are standard in this standard. Oval rings are required for round bottom grooves, which are now discontinued.

NOTE 2. The dimensions incorporated in this table are identical with those for corresponding ring numbers in ANSI Std. B16.20, 'Ring-joint gaskets and grooves for steel pipe flanges'.

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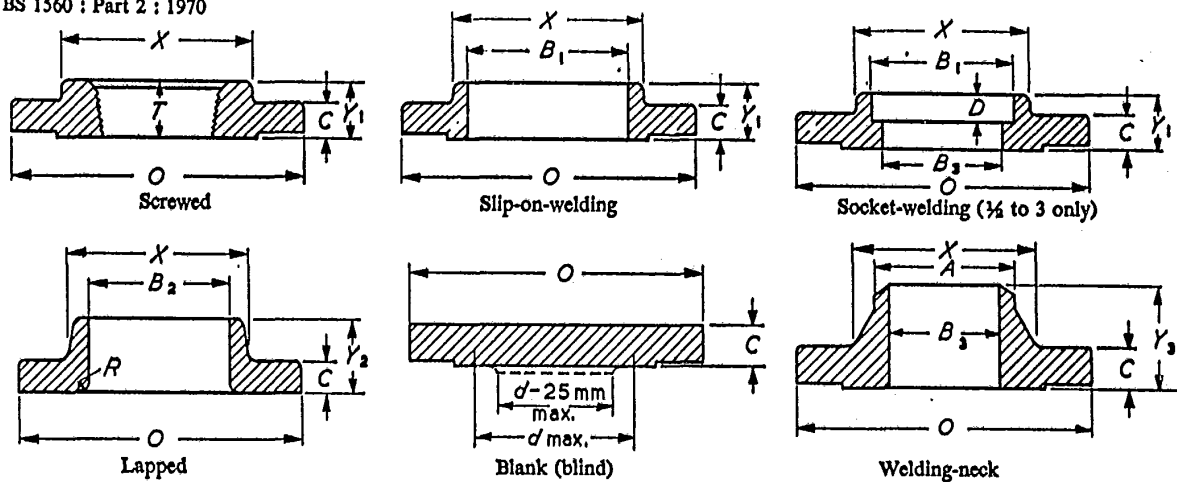


TABLE 11. DIMENSIONS OF FLANGES, CLASS 150

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Nominal pipe size	Outside diameter of flange	Thickness of flange (min.) (see Note 6)	Diameter of hub	Hub diameter beginning of chamfer welding-neck	Length through hub			Thread length	Bore			Corner radius of bore of lapped flange and pipe	Depth of socket	Diameter of recess blank (blind) flange (max.) (see Note 8)
					Screwed, slip-on and socket-welding	Lapped	Welding-neck		Slip-on and socket-welding (min.)	Lapped (min.)	Welding-neck and socket-welding (see Note 7)			
	O	C	X	A	Y_1	Y_2	Y_3	T	B_1	B_2	B_3	R	D	d
in	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
$\frac{1}{2}$	89	11.1	30	21.3	16	16	48	16	22.4	23.0	15.8	3.0	9.5	12.7
$\frac{3}{4}$	98	12.7	38	26.7	16	16	52	16	27.7	28.0	21.0	3.0	11.0	19.1
1	108	14.3 (11.1)	49	33.4	17	17	56	17	34.5	35.0	26.6	3.0	12.5	25.4
* $1\frac{1}{4}$	117	15.9 (12.7)	59	42.2	21	21	57	21	43.2	43.5	35.1	5.0	14.5	31.8
$1\frac{1}{2}$	127	17.5 (14.3)	65	48.3	22	22	62	22	49.5	50.0	40.9	6.5	16.0	38.1
2	152	19.0 (15.9)	78	60.3	25	25	64	25	62.0	62.5	52.5	8.0	17.5	50.8
* $2\frac{1}{2}$	178	22.2 (17.5)	90	73.0	29	29	70	29	74.7	75.5	62.7	8.0	19.0	63.5
3	190	23.8 (19.0)	108	88.9	30	30	70	30	90.7	91.5	77.9	9.5	20.5	76.2
* $3\frac{1}{2}$	216	23.8 (20.6)	122	101.6	32	32	71	32	103.4	104.0	90.1	9.5		88.9
4	229	23.8	135	114.3	33	33	76	33	116.1	117.0	102.3	11.0		101.6
*5	254	23.8	164	141.3	37	37	89	37	143.8	145.0	128.2	11.0		127.0
6	279	25.4	192	168.3	40	40	89	40	170.7	171.0	154.1	12.5		152.4
8	343	28.6	246	219.1	44	44	102	44	221.5	222.0	202.7	12.5		203.2
10	406	30.2	305	273.0	49	49	102	49	276.4	277.0	254.5	12.5		254.0
12	483	31.8	365	323.9	56	56	114	56	327.2	328.0	304.9	12.5		304.8
14	533	34.9	400	355.6	57	79	127	57	359.2	360.0	To be	12.5		336.6
16	597	36.5	457	406.4	64	87	127	64	410.5	411.0	spec-	12.5		387.4
18	635	39.7	505	457.2	68	97	140	68	461.8	462.0	ified by	12.5		438.2
20	698	42.9	559	508.0	73	103	144	73	513.1	514.0	pur-	12.5		489.0
24	813	47.6	664	609.6	83	111	152	83	616.0	616.0	chaser	12.5		590.6

NOTE 1. This table shall be read in conjunction with Section 3.

NOTE 2. For flange facing dimensions see Tables 2 and 3.

NOTE 3. For tolerances permitted on flange dimensions see 3.8 to 3.13.

NOTE 4. The figures at the head of this table, for flanges other than the lapped type, depict Class 150 flanges with 1.6 mm raised facings. The dimensions C and Y therefore include the height of the 1.6 mm facing. See 3.3.

NOTE 5. For particulars of reducing flanges see 3.11, 3.12 and 3.13, and Table 1.

NOTE 6. Figures in brackets apply to integral flanges only.

NOTE 7. The dimensions in Column 12 correspond to the inside diameters of standard wall pipe which for sizes 10 in and smaller are the same as Schedule 40 pipe (see Appendix C).

NOTE 8. The centre part of the face of blank (blind) flanges may be recessed or raised (see 3.14).

* The use of these sizes should be avoided.

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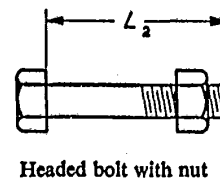
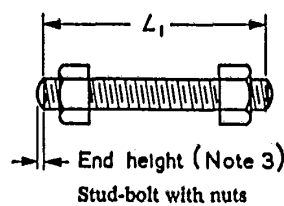
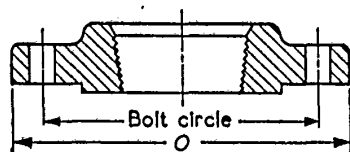


TABLE 12. DRILLING AND BOLTING FOR FLANGES, CLASS 150

1	2	3	4	5	6	7	8	9	10
Nominal pipe size	Outside diameter of flange <i>O</i>	Drilling				Length of stud-bolts L_1 (see Note 3)			Length of headed bolts L_2 (see Note 2)
		Diameter of bolt circle	Number of bolts	Diameter of bolts	Diameter of bolt holes	1-6 mm raised face	Ring-joint	Lapped joints (basic dimensions only) (see Note 2)	
in	mm	mm		in	in mm	mm	mm	mm	mm
$\frac{1}{4}$	89	60.3	4	$\frac{3}{8}$	$\frac{5}{8}$ (15.9)	57	—	57	44
$\frac{3}{8}$	98	69.8	4	$\frac{3}{8}$	$\frac{5}{8}$ (15.9)	57	—	57	51
1	108	79.4	4	$\frac{3}{8}$	$\frac{5}{8}$ (15.9)	64	76	64	51
* $1\frac{1}{4}$	117	88.9	4	$\frac{3}{8}$	$\frac{5}{8}$ (15.9)	64	76	64	57
$1\frac{1}{2}$	127	98.4	4	$\frac{3}{8}$	$\frac{5}{8}$ (15.9)	70	83	70	57
2	152	120.6	4	$\frac{5}{8}$	$\frac{3}{4}$ (19.0)	76	89	76	70
* $2\frac{1}{2}$	178	139.7	4	$\frac{5}{8}$	$\frac{3}{4}$ (19.0)	83	95	83	76
3	190	152.4	4	$\frac{5}{8}$	$\frac{3}{4}$ (19.0)	89	102	89	76
* $3\frac{1}{2}$	218	177.8	8	$\frac{5}{8}$	$\frac{3}{4}$ (19.0)	89	102	89	76
4	229	190.5	8	$\frac{5}{8}$	$\frac{3}{4}$ (19.0)	89	102	89	76
*5	254	215.9	8	$\frac{3}{4}$	$\frac{7}{8}$ (22.2)	95	108	95	83
6	279	241.3	8	$\frac{3}{4}$	$\frac{7}{8}$ (22.2)	95	108	95	83
8	343	298.4	8	$\frac{3}{4}$	$\frac{7}{8}$ (22.2)	102	114	102	89
10	406	362.0	12	$\frac{7}{8}$	1 (25.4)	114	127	114	95
12	483	431.8	12	$\frac{7}{8}$	1 (25.4)	114	127	114	102
14	533	476.2	12	1	$1\frac{1}{8}$ (28.6)	127	140	127	108
16	597	539.8	16	1	$1\frac{1}{8}$ (28.6)	133	146	133	114
18	635	577.8	16	$1\frac{1}{8}$	$1\frac{1}{4}$ (31.8)	146	159	146	121
20	698	635.0	20	$1\frac{1}{8}$	$1\frac{1}{4}$ (31.8)	152	165	152	133
24	813	749.3	20	$1\frac{1}{4}$	$1\frac{3}{4}$ (34.9)	171	184	171	146

NOTE 1. This table shall be read in conjunction with 3.6.

NOTE 2. For determination of stud-bolt and headed bolt lengths for lapped-type joints see Appendix E.

NOTE 3. The ends of all stud-bolts and headed bolts shall be rounded or chamfered. Stud-bolt lengths do not include the heights of these ends. Headed bolt lengths include end heights.

* The use of these sizes should be avoided.

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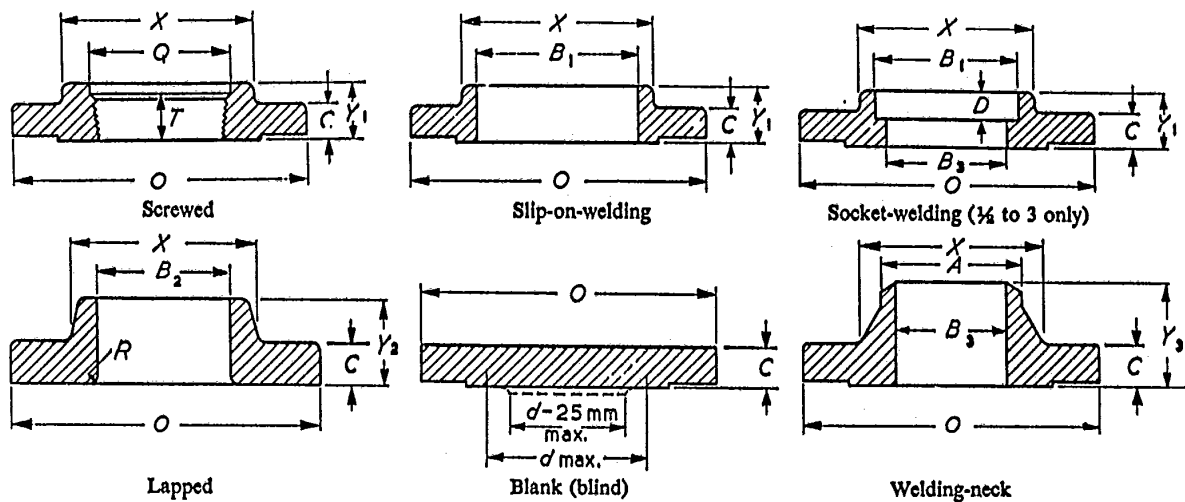


TABLE 13. DIMENSIONS OF FLANGES, CLASS 300

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Nominal pipe size	Outside diameter of flange	Thickness of flange (min.)	Diameter of hub	Hub diameter beginning of chamfer welding-neck	Length through hub			Thread length	Bore			Corner radius of bore of lapped flange and pipe	Counter-bore of lapped flange (min.)	Depth of socket	Diameter of recess blank (blind) flange (max.) (see Note 7)
					Screwed, slip-on and socket-welding	Lapped	Welding-neck		Slip-on and socket-welding (min.)	Lapped (min.)	Welding-neck and socket-welding (see Note 6)				
	O	C	X	A	Y ₁	Y ₂	Y ₃	T	B ₁	B ₂	B ₃	R	Q	D	d
in	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
½	95	14.3	38	21.3	22	22	52	16	22.4	23.0	15.8	3.0	23.5	9.5	12.7
¾	117	15.9	48	26.7	25	25	57	16	27.7	28.0	21.0	3.0	29.0	11.0	19.1
1	124	17.5	54	33.4	27	27	62	17	34.5	35.0	26.6	3.0	36.0	12.5	25.4
*1¼	133	19.0	64	42.2	27	27	65	21	43.2	43.5	35.1	5.0	44.5	14.5	31.8
1½	156	20.6	70	48.3	30	30	68	22	49.5	50.0	40.9	6.5	50.5	16.0	38.1
2	165	22.2	84	60.3	33	33	70	29	62.0	62.5	52.5	8.0	63.5	17.5	50.8
*2¾	190	25.4	100	73.0	38	38	76	32	74.7	75.5	62.7	8.0	76.0	19.0	63.5
3	210	28.6	117	88.9	43	43	79	32	90.7	91.5	77.9	9.5	92.0	20.5	76.2
*3¾	229	30.2	133	101.6	44	44	81	37	103.4	104.0	90.1	9.5	105.0		88.9
4	254	31.8	146	114.3	48	48	86	37	116.1	117.0	102.3	11.0	118.0		101.6
*5	279	34.9	178	141.3	51	51	98	43	143.8	145.0	128.2	11.0	145.0		127.0
6	318	36.5	206	168.3	52	52	98	46	170.7	171.0	154.1	12.5	171.0		152.4
8	381	41.3	260	219.1	62	62	111	51	221.5	222.0	202.7	12.5	222.0		203.2
10	444	47.6	321	273.0	67	95	117	56	276.4	277.0	254.5	12.5	276.0		254.0
12	521	50.8	375	323.9	73	102	130	60	327.2	328.0	304.9	12.5	329.0		304.8
14	584	54.0	425	355.6	76	111	143	64	359.2	360.0	To be specified by the purchaser	12.5	360.0		336.6
16	648	57.2	483	406.4	83	121	146	68	410.5	411.0		12.5	411.0		387.4
18	711	60.3	533	457.2	89	130	159	70	461.8	462.0		12.5	462.0		431.8
20	775	63.5	587	508.0	95	140	162	73	513.1	514.0		12.5	513.0		482.6
24	914	69.8	702	609.6	106	152	168	83	616.0	616.0		12.5	614.0		584.2

NOTE 1. This table shall be read in conjunction with Section 3.

NOTE 2. For flange facing dimensions, see Tables 2 and 4.

NOTE 3. For tolerances permitted on flange dimensions, see 3.8 to 3.13.

NOTE 4. The figures at the head of this table, for flanges other than the lapped type, depict Class 300 flanges with 1.6 mm raised facings. The dimensions C and Y therefore include the height of the 1.6 mm facing. See 3.3.

NOTE 5. For particulars of reducing flanges, see 3.11, 3.12 and 3.13, and Table 1.

NOTE 6. The dimensions in Column 12 correspond to the inside diameters of standard wall pipe which for sizes 10 in and smaller are the same as Schedule 40 pipe (see Appendix C).

NOTE 7. The centre part of the face of blank (blind) flanges may be recessed or raised (see 3.14).

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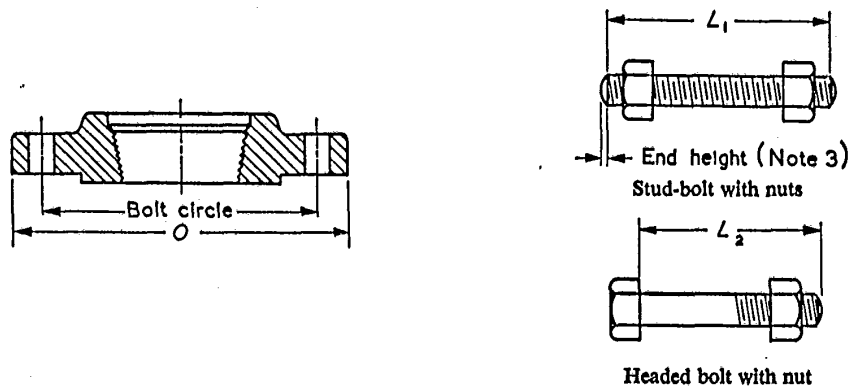


TABLE 14. DRILLING AND BOLTING FOR FLANGES, CLASS 300

1	2	3	4	5	6	7	8	9	10
Nominal pipe size	Outside diameter of flange <i>O</i>	Drilling				Length of stud-bolts L_1 (see Note 3)			Length of headed bolts L_2 (see Note 2)
		Diameter of bolt circle	Number of bolts	Diameter of bolts	Diameter of bolt holes	1.6 mm raised face	Ring-joint	Lapped joints (basic dimensions only) (see Note 2)	1.6 mm raised face
in	mm	mm		in	in mm	mm	mm	mm	mm
$\frac{3}{4}$	95	66.7	4	$\frac{3}{4}$	$\frac{3}{4}$ (15.9)	64	76	64	51
$\frac{1}{2}$	117	82.6	4	$\frac{1}{2}$	$\frac{3}{4}$ (19.0)	70	83	70	64
1	124	88.9	4	$\frac{1}{2}$	$\frac{3}{4}$ (19.0)	76	89	76	64
* $1\frac{1}{4}$	133	98.4	4	$\frac{1}{2}$	$\frac{3}{4}$ (19.0)	76	89	76	70
$1\frac{1}{2}$	156	114.3	4	$\frac{3}{4}$	$\frac{7}{8}$ (22.2)	89	102	89	76
2	165	127.0	8	$\frac{1}{2}$	$\frac{3}{4}$ (19.0)	83	102	83	76
* $2\frac{1}{2}$	190	149.2	8	$\frac{3}{4}$	$\frac{7}{8}$ (22.2)	95	114	95	83
3	210	168.3	8	$\frac{3}{4}$	$\frac{7}{8}$ (22.2)	102	121	102	89
* $3\frac{1}{2}$	229	184.2	8	$\frac{3}{4}$	$\frac{7}{8}$ (22.2)	108	127	108	95
4	254	200.0	8	$\frac{3}{4}$	$\frac{7}{8}$ (22.2)	108	127	108	95
*5	279	235.0	8	$\frac{3}{4}$	$\frac{7}{8}$ (22.2)	114	133	114	102
6	318	269.9	12	$\frac{3}{4}$	$\frac{7}{8}$ (22.2)	121	140	121	108
8	381	330.2	12	$\frac{1}{2}$	1 (25.4)	133	152	133	121
10	444	387.4	16	1	$1\frac{1}{8}$ (28.6)	152	171	152	133
12	521	450.8	16	$1\frac{1}{2}$	$1\frac{1}{4}$ (31.8)	165	184	165	146
14	584	514.4	20	$1\frac{1}{2}$	$1\frac{1}{4}$ (31.8)	171	190	171	152
16	648	571.5	20	$1\frac{1}{4}$	$1\frac{1}{2}$ (34.9)	184	203	184	165
18	711	628.6	24	$1\frac{1}{4}$	$1\frac{1}{2}$ (34.9)	190	210	190	171
20	775	685.8	24	$1\frac{1}{4}$	$1\frac{1}{2}$ (34.9)	203	222	203	178
24	914	812.8	24	$1\frac{1}{2}$	$1\frac{1}{2}$ (41.3)	229	254	229	197

NOTE 1. This table shall be read in conjunction with 3.6.

NOTE 2. For determination of stud-bolt and headed bolt lengths for lapped-type joints see Appendix E.

NOTE 3. The ends of all stud-bolts and headed bolts shall be rounded or chamfered. Stud-bolt lengths do not include the heights of these ends. Headed bolt lengths include end heights.

* The use of these sizes should be avoided.

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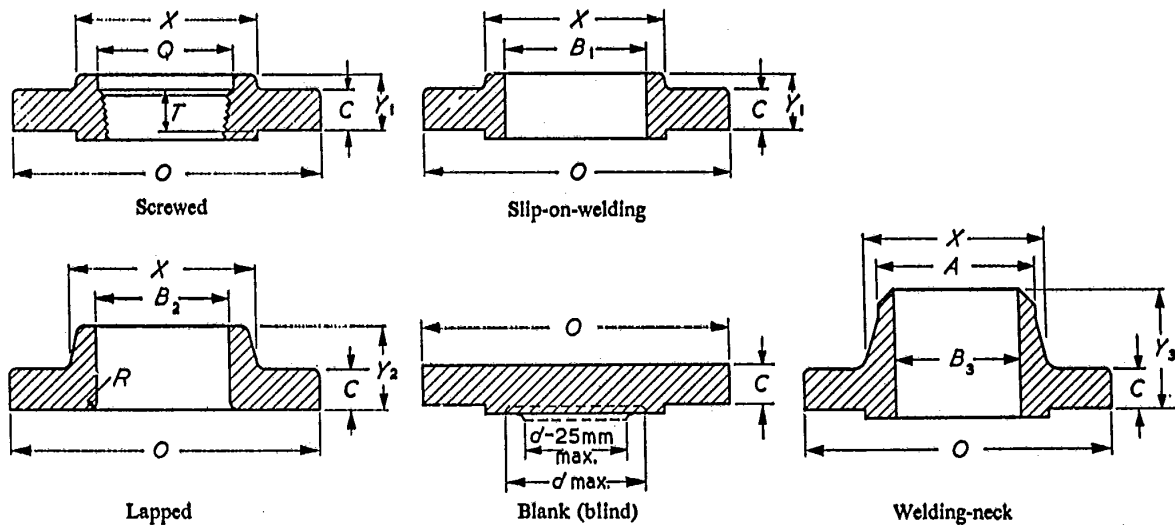


TABLE 15. DIMENSIONS OF FLANGES, CLASS 400

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Nominal pipe size	Outside diameter of flange	Thickness of flange (min.)	Diameter of hub	Hub diameter beginning of chamfer welding-neck	Length through hub			Thread length	Bore			Corner radius of bore of lapped flange and pipe	Counter-bore screwed flange (min.)	Diameter of recess blank (blind) flange (max.) (see Note 5)
					Screwed and slip-on	Lapped	Welding-neck		Slip-on (min.)	Lapped (min.)	Welding-neck			
	O	C	X	A	Y ₁	Y ₂	Y ₃	T	B ₁	B ₂	B ₃	R	Q	d
in	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
$\frac{3}{4}$ $\frac{1}{2}$ 1 $1\frac{1}{4}$ 2 $2\frac{1}{2}$ 3 $3\frac{1}{2}$														
For these sizes Class 600 flanges are used														
4	254	34.9	146	114.3	51	51	89	37	116.1	117		11.0	118	101.6
*5	279	38.1	178	141.2	54	54	102	43	143.8	145		11.0	145	127.0
6	318	41.3	206	168.4	57	57	103	46	170.7	171		12.5	171	152.4
8	381	47.6	260	219.2	68	68	117	51	221.5	222		12.5	222	203.2
10	444	54.0	321	273.0	73	102	124	56	276.4	277		12.5	276	254.0
12	521	57.2	375	323.9	79	108	137	60	327.2	328		12.5	329	304.8
14	584	60.3	425	355.6	84	117	149	64	359.2	360		12.5	360	333.4
16	648	63.5	483	406.4	94	127	152	68	410.5	411		12.5	411	381.0
18	711	66.7	533	457.2	98	137	165	70	461.8	462		12.5	462	431.8
20	775	69.8	587	508.0	102	146	168	73	513.1	514		12.5	513	479.4
24	914	76.2	702	609.6	114	159	175	83	616.0	616		12.5	614	574.7

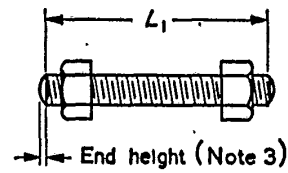
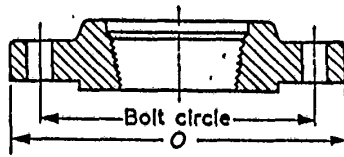
NOTE 1. This table shall be read in conjunction with Section 3.

NOTE 2. For flange facing dimensions see Tables 2 and 5.

NOTE 3. For tolerances permitted on flange dimensions see 3.8 to 3.13.

NOTE 4. For dimensions of industrial flanges see 3.11, 3.12 and 3.13, and Table 1.

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Stud-bolt with nuts

TABLE 16. DRILLING AND BOLTING FOR FLANGES, CLASS 400

1	2	3	4	5	6	7	8	9	10
Nominal pipe size	Outside diameter of flange O	Drilling				Length of stud-bolts L_1 (see Note 3)			
		Diameter of bolt circle	Number of bolts	Diameter of bolts	Diameter of bolt holes	6-4 mm raised face	Male and female also tongue and groove	Ring-joint	Lapped joints (basic dimensions only) (see Note 2)
in	mm	mm		in	in mm	mm	mm	mm	mm
$\frac{1}{8}$ $\frac{1}{4}$ 1 * $1\frac{1}{4}$ $1\frac{1}{2}$ 2 * $2\frac{1}{2}$ 3 $3\frac{1}{2}$									
For these sizes Class 600 flanges are used									
4	254	200.0	8	$\frac{7}{8}$	1 (25.4)	133	127	140	121
*5	279	235.0	8	$\frac{7}{8}$	1 (25.4)	140	133	146	127
6	318	269.9	12	$\frac{7}{8}$	1 (25.4)	146	140	152	133
8	381	330.2	12	1	$1\frac{1}{4}$ (28.6)	165	159	171	152
10	444	387.4	16	$1\frac{1}{4}$	$1\frac{1}{4}$ (31.8)	184	178	190	171
12	521	450.8	16	$1\frac{1}{4}$	$1\frac{1}{4}$ (34.9)	197	190	203	184
14	584	514.4	20	$1\frac{1}{4}$	$1\frac{3}{8}$ (34.9)	203	197	210	190
16	648	571.5	20	$1\frac{3}{8}$	$1\frac{3}{8}$ (38.1)	216	210	222	203
18	711	628.6	24	$1\frac{3}{8}$	$1\frac{3}{8}$ (38.1)	222	216	229	210
20	775	685.8	24	$1\frac{3}{8}$	$1\frac{3}{8}$ (41.3)	241	235	248	229
24	914	812.8	24	$1\frac{3}{8}$	$1\frac{3}{8}$ (47.6)	267	260	280	254

NOTE 1. This table shall be read in conjunction with 3.6.

NOTE 2. For determination of stud-bolt and headed bolt lengths for lapped-type joints see Appendix E.

NOTE 3. The ends of all stud-bolts shall be rounded or chamfered. Stud-bolt lengths do not include the heights of these ends.

* The use of these sizes should be avoided.

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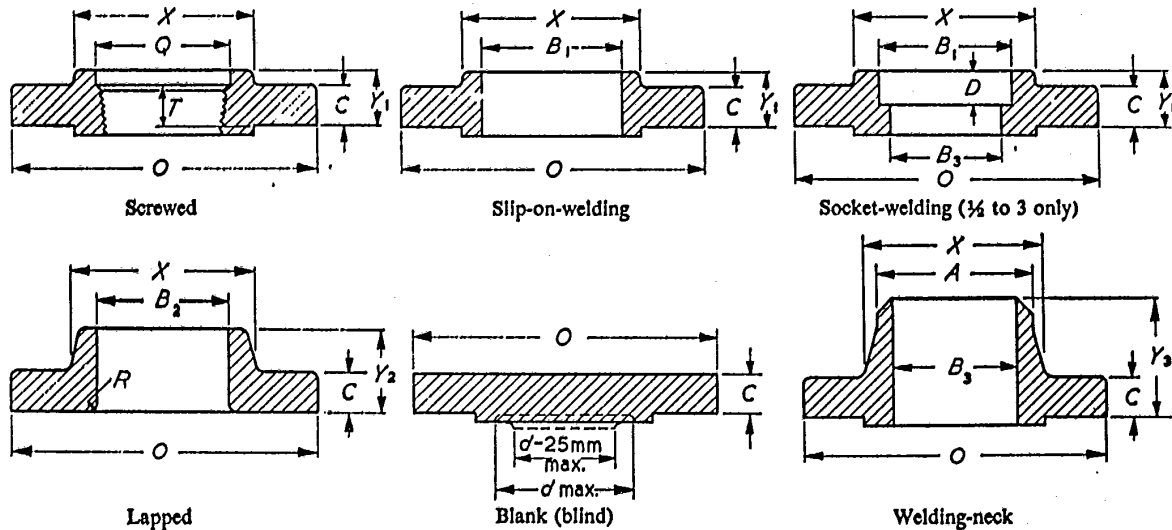


TABLE 17. DIMENSIONS OF FLANGES, CLASS 600

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Nominal pipe size	Outside diameter of flange <i>O</i>	Thickness of flange (min.) <i>C</i>	Diameter of hub <i>X</i>	Hub diameter beginning of chamfer welding-neck <i>A</i>	Length through hub			Thread length <i>T</i>	Bore			Corner radius of bore of lapped flange and pipe <i>R</i>	Counter-bore of flange (min.) <i>Q</i>	Depth of socket <i>D</i>	Diameter of recess blank (blind) flange (max.) (see Note 5) <i>d</i>
					Screwed, slip-on and socket-welding <i>Y₁</i>	Lapped <i>Y₂</i>	Welding-neck <i>Y₃</i>		Slip-on and socket-welding (min.) <i>B₁</i>	Lapped (min.) <i>B₂</i>	Welding-neck and socket-welding <i>B₃</i>				
in	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
1/2	95	14.3	38	21.3	22	22	52	16	22.4	23.0		3.0	23.5	9.5	12.7
3/4	117	15.9	48	26.7	25	25	57	16	27.7	28.0		3.0	29.0	11.0	19.1
1	124	17.5	54	33.4	27	27	62	17	34.5	35.0		3.0	36.0	12.5	25.4
*1 1/4	133	20.6	64	42.2	29	29	67	21	43.2	43.5		5.0	44.5	14.5	31.8
1 1/2	156	22.2	70	48.3	32	32	70	22	49.5	50.0		6.5	50.5	16.0	38.1
2	165	25.4	84	60.3	37	37	73	29	62.0	62.5		8.0	63.5	17.5	50.8
*2 1/2	190	28.6	100	73.0	41	41	79	32	74.7	75.5	To be specified by the purchaser	8.0	76.0	19.0	63.5
3	210	31.8	117	88.9	46	46	83	35	90.7	91.5		9.5	92.0	20.5	76.2
*3 1/2	229	34.9	133	101.6	49	49	86	40	103.4	104.0		9.5	105.0		88.9
4	273	38.1	152	114.3	54	54	102	41	116.1	117.0		11.0	118.0		101.6
*5	330	44.4	189	141.3	60	60	114	48	143.8	145.0		11.0	145.0		127.0
6	356	47.6	222	168.3	67	67	117	51	170.7	171.0		12.5	171.0		152.4
8	419	55.6	273	219.1	76	76	133	57	221.5	222.0		12.5	222.0		200.0
10	508	63.5	343	273.0	86	111	152	65	276.4	277.0		12.5	276.0		247.7
12	559	66.7	400	323.9	92	117	156	70	327.2	328.0		12.5	329.0		298.5
14	603	69.8	432	355.6	94	127	165	73	359.2	360.0		12.5	360.0		327.0
16	686	76.2	495	406.4	106	140	178	78	410.5	411.0		12.5	411.0		374.7
18	743	82.6	546	457.2	117	152	184	79	461.8	462.0		12.5	462.0		419.1
20	813	88.9	610	508.0	127	165	190	83	513.1	514.0		12.5	513.0		463.6
24	940	101.6	718	609.6	140	184	203	92	616.0	616.0		12.5	614.0		558.8

NOTE 1. This table shall be read in conjunction with Section 3.

NOTE 2. For flange facing dimensions, see Tables 2 and 6.

NOTE 3. For tolerances permitted on flange dimensions, see 3.8 to 3.13.

NOTE 4. For particulars of reducing flanges, see 3.11, 3.12 and 3.13, and Table 1.

NOTE 5. The centre part of the face of blank (blind) flanges may be recessed or raised (see 3.14)

* The use of these sizes should be avoided.

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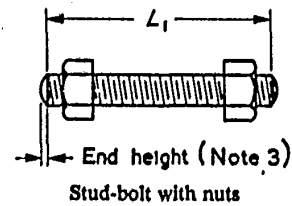
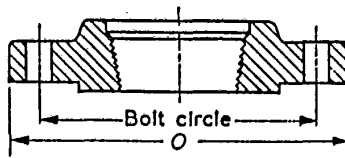


TABLE 18. DRILLING AND BOLTING FOR FLANGES, CLASS 600

1	2	3	4	5	6	7	8	9	10
Nominal pipe size	Outside diameter of flange O	Drilling				Length of stud-bolts L_1 (see Note 3)			
		Diameter of bolt circle	Number of bolts	Diameter of bolts	Diameter of bolt holes	6·4 mm raised face	Male and female also tongue and groove	Ring-joint	Lapped joints (basic dimensions only) (see Note 2)
in	mm	mm		in	in mm	mm	mm	mm	mm
$\frac{3}{4}$	95	66·7	4	$\frac{3}{4}$	$\frac{9}{16}$ (15·9)	76	70	76	64
$\frac{1}{2}$	117	82·6	4	$\frac{1}{2}$	$\frac{3}{4}$ (19·0)	83	76	83	70
1	124	88·9	4	$\frac{1}{2}$	$\frac{3}{4}$ (19·0)	89	83	89	76
* $1\frac{1}{4}$	133	98·4	4	$\frac{1}{2}$	$\frac{3}{4}$ (19·0)	95	89	95	83
$1\frac{1}{2}$	156	114·3	4	$\frac{3}{4}$	$\frac{7}{8}$ (22·2)	102	95	102	89
2	165	127·0	8	$\frac{1}{2}$	$\frac{3}{4}$ (19·0)	102	95	108	89
* $2\frac{1}{2}$	190	149·2	8	$\frac{1}{2}$	$\frac{7}{8}$ (22·2)	114	108	121	102
3	210	168·3	8	$\frac{3}{4}$	$\frac{7}{8}$ (22·2)	121	114	127	108
* $3\frac{1}{2}$	229	184·2	8	$\frac{7}{8}$	1 (25·4)	133	127	140	121
4	273	215·9	8	$\frac{7}{8}$	1 (25·4)	140	133	146	127
*5	330	266·7	8	1	$1\frac{1}{4}$ (28·6)	159	152	165	146
6	356	292·1	12	1	$1\frac{1}{4}$ (28·6)	165	159	171	152
8	419	349·2	12	$1\frac{1}{4}$	$1\frac{1}{4}$ (31·8)	190	184	197	178
10	508	431·8	16	$1\frac{1}{4}$	$1\frac{1}{4}$ (34·9)	210	203	216	197
12	559	489·0	20	$1\frac{1}{4}$	$1\frac{1}{4}$ (34·9)	216	210	222	203
14	603	527·0	20	$1\frac{1}{4}$	$1\frac{1}{4}$ (38·1)	229	222	235	216
16	686	603·2	20	$1\frac{1}{4}$	$1\frac{1}{4}$ (41·3)	248	241	254	235
18	743	654·0	20	$1\frac{1}{4}$	$1\frac{1}{4}$ (44·4)	267	260	273	254
20	813	723·9	24	$1\frac{1}{4}$	$1\frac{1}{4}$ (44·4)	286	279	292	273
24	940	838·2	24	$1\frac{1}{4}$	2 (50·8)	324	318	337	311

NOTE 1. This table shall be read in conjunction with 3.6.

NOTE 2. For determination of stud-bolt and headed bolt lengths for lapped-type joints see Appendix E.

NOTE 3. The ends of all stud-bolts shall be rounded or chamfered. Stud-bolt lengths do not include the heights of these ends.

* The use of these sizes should be avoided.

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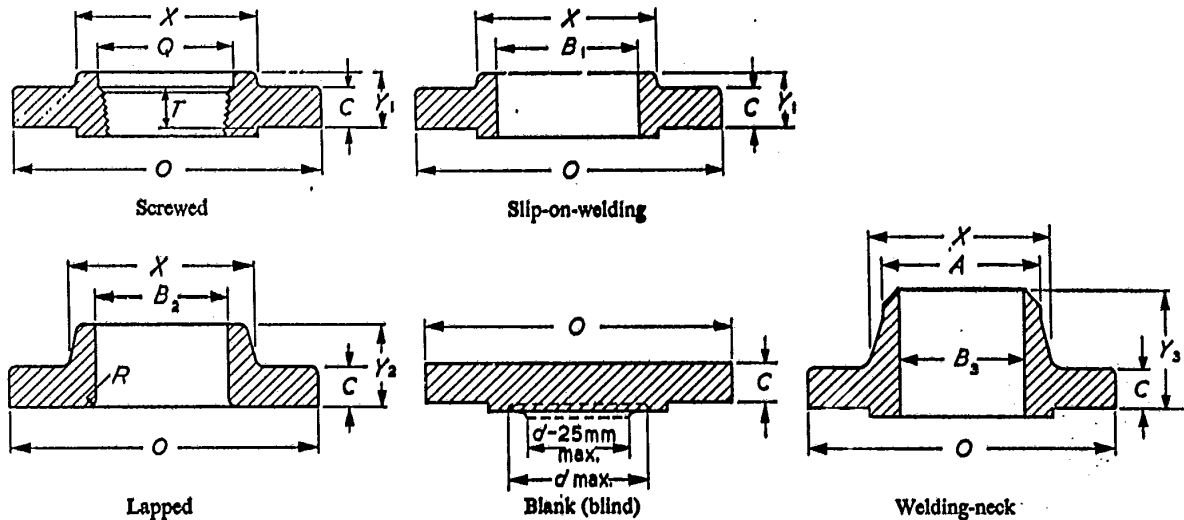


TABLE 19. DIMENSIONS OF FLANGES, CLASS 900

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Nominal pipe size	Outside diameter of flange	Thickness of flange (min.)	Dia- meter of hub	Hub dia- meter begin- ning of chamfer welding- neck	Length through hub			Thread length	Bore			Corner radius of bore of lapped flange and pipe	Counter- bore screwed flange (min.)	Dia- meter of recess blank (blind) flange (max.) (see Note 5)
					Screw- ed and slip-on	Lapped	Weld- ing-neck		Slip-on (min.)	Lapped (min.)	Weld- ing-neck			
	O	C	X	A	Y ₁	Y ₁	Y ₁	T	B ₁	B ₁	B ₂	R	Q	d
in	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
3/4														
1														
1 1/4														
1 1/2														
2														
2 1/2														
For these sizes Class 1500 flanges are used														
3	241	38.1	127	88.9	54	54	102	41	90.7	91.5		9.5	92	73.0
4	292	44.4	159	114.3	70	70	114	48	116.1	117.0		11.0	118	98.4
5	349	50.8	190	141.3	79	79	127	54	143.8	145.0	To be speci- fied by the pur- chaser	11.0	145	120.7
6	381	55.6	235	168.3	86	86	140	57	170.7	171.0		12.5	171	146.1
8	470	63.5	298	219.1	102	114	162	64	221.5	222.0		12.5	222	190.5
10	546	69.8	368	273.0	108	127	184	71	276.4	277.0		12.5	276	238.1
12	610	79.4	419	323.9	117	143	200	76	327.2	328.0		12.5	329	282.6
14	641	85.7	451	355.6	130	156	213	83	359.2	360.0		12.5	360	311.2
16	705	88.9	508	406.4	133	165	216	86	410.5	411.0		12.5	411	355.6
18	787	101.6	565	457.2	152	190	229	89	461.8	462.0		12.5	462	400.1
20	857	108.0	622	508.0	159	210	248	92	513.1	514.0		12.5	513	444.5
24	1041	139.7	749	609.6	203	267	292	102	616.0	616.0		12.5	614	533.4

NOTE 1. This table shall be read in conjunction with Section 3.

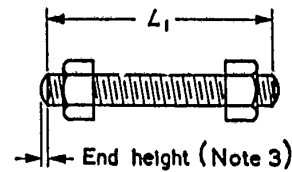
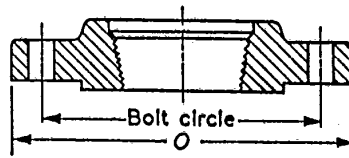
NOTE 2. For flange facing dimensions see Tables 2 and 7.

NOTE 3. For tolerances permitted on flange dimensions see 3.8 to 3.13.

NOTE 4. For particulars of reducing flanges see 3.11, 3.12 and 3.13, and Table 1.

NOTE 5. The centre part of the face of blank (blind) flanges may be recessed or raised (see 3.14).

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Stud-bolt with nuts

TABLE 20. DRILLING AND BOLTING FOR FLANGES, CLASS 900

1	2	3	4	5	6	7	8	9	10
Nominal pipe size	Outside diameter of flange O	Drilling				Length of stud-bolts L_1 (see Note 3)			
		Diameter of bolt circle	Number of bolts	Diameter of bolts	Diameter of bolt holes	6.4 mm raised face	Male and female also tongue and groove	Ring-joint	Lapped joints (basic dimensions only) (see Note 2)
in	mm	mm		in	in mm	mm	mm	mm	mm
$\frac{3}{4}$ $\frac{3}{4}$ 1 * $1\frac{1}{4}$ $1\frac{1}{2}$ 2 * $2\frac{1}{2}$									
For these sizes Class 1500 flanges are used									
3	241	190.5	8	$\frac{7}{8}$	1 (25.4)	140	133	146	127
4	292	235.0	8	$1\frac{1}{4}$	$1\frac{1}{4}$ (31.8)	165	159	171	152
*5	349	279.4	8	$1\frac{1}{4}$	$1\frac{3}{8}$ (34.9)	184	178	190	171
6	381	317.5	12	$1\frac{1}{2}$	$1\frac{1}{2}$ (31.8)	190	184	190	178
8	470	393.7	12	$1\frac{3}{8}$	$1\frac{1}{2}$ (38.1)	216	210	222	203
10	546	469.9	16	$1\frac{3}{8}$	$1\frac{1}{2}$ (38.1)	229	222	235	216
12	610	533.4	20	$1\frac{3}{8}$	$1\frac{1}{2}$ (38.1)	248	241	254	235
14	641	558.8	20	$1\frac{1}{2}$	$1\frac{3}{8}$ (41.3)	267	260	279	254
16	705	616.0	20	$1\frac{3}{8}$	$1\frac{3}{8}$ (44.4)	279	273	292	267
18	787	685.8	20	$1\frac{3}{8}$	2 (50.8)	324	318	337	311
20	857	749.3	20	2	$2\frac{1}{8}$ (54.0)	343	337	356	330
24	1041	901.7	20	$2\frac{1}{2}$	$2\frac{3}{8}$ (66.7)	432	425	457	419

NOTE 1. This table shall be read in conjunction with 3.6.

NOTE 2. For determination of stud-bolt and headed bolt lengths for lapped-type joints see Appendix E.

NOTE 3. The ends of all stud-bolts shall be rounded or chamfered. Stud-bolt lengths do not include the heights of these ends.

* The use of these sizes should be avoided.

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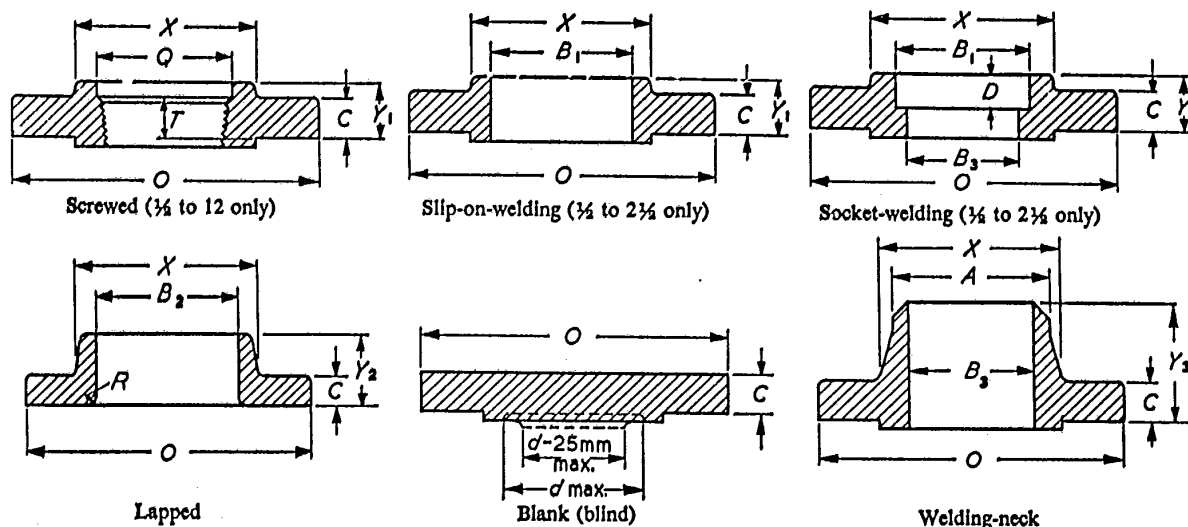


TABLE 21. DIMENSIONS OF FLANGES, CLASS 1500

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Nominal pipe size	Outside diameter of flange O	Thickness of flange (min.) C	Diameter of hub X	Hub diameter beginning of chamfer welding-neck A	Length through hub			Thread length T	Bore			Corner radius of bore of lapped flange and pipe R	Counter-bore screwed flange (min.) Q	Depth of socket D	Diameter of recess blank (blind) flange (max.) (see Note 5) d
					Screwed, slip-on and socket-welding Y ₁	Lapped Y ₁	Welding-neck Y ₁		Slip-on and socket-welding (min.) B ₁	Lapped (min.) B ₁	Welding-neck and socket-welding B ₁				
in	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
$\frac{1}{4}$	121	22.2	38	21.3	32	32	60	22	22.4	23.0		3.0	23.5	9.5	12.7
$\frac{3}{4}$	130	25.4	44	26.7	35	35	70	25	27.7	28.0		3.0	29.0	11.0	17.5
1	149	28.6	52	33.4	41	41	73	29	34.5	35.0		3.0	36.0	12.5	22.2
*1½	159	28.6	64	42.2	41	41	73	30	43.2	43.5		5.0	44.5	14.5	28.6
1½	178	31.8	70	48.3	44	44	83	32	49.5	50.0	To be specified by the purchaser	6.5	50.5	16.0	34.9
2	216	38.1	105	60.3	57	57	102	38	62.0	62.5		8.0	63.5	17.5	47.6
*2½	244	41.3	124	73.0	64	64	105	48	74.7	75.0		8.0	76.0	19.0	57.2
3	267	47.6	133	88.9	73	73	117	51		91.5		9.5	92.0		69.9
4	311	54.0	162	114.3	91	91	124	57		117.0		11.0	118.0		92.1
*5	375	73.0	197	141.3	105	105	156	64		145.0		11.0	145.0		111.1
6	394	82.6	229	168.3	119	119	171	70		171.0		12.5	171.0		136.5
8	483	92.1	292	219.1	143	143	213	76		222.0		12.5	222.0		177.8
10	584	108.0	368	273.0	159	178	254	84		277.0		12.5	276.0		222.3
12	673	123.8	451	323.9	181	219	283	92		328.0		12.5	329.0		263.5
14	749	133.4	495	358.6		241	298			360.0		12.5			288.9
16	826	146.1	552	406.4		260	311			411.0		12.5			330.2
18	914	161.9	597	457.2		276	327			462.0		12.5			371.5
20	984	178.0	641	508.0		292	356			514.0		12.5			415.9
24	1168	203.0	762	609.6		330	406			616.0		12.5			498.5

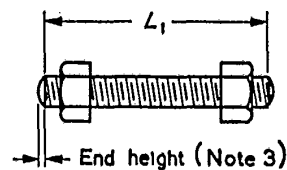
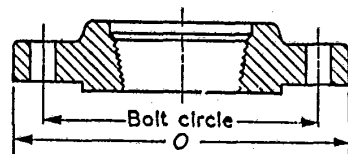
NOTE 1. This table shall be read in conjunction with Section 3.

NOTE 2. For flange facing dimensions, see Tables 2 and 8.

NOTE 3. For tolerances permitted on flange dimensions, see 3.8 to 3.13.

NOTE 4. For restrictions of reducing flanges, see 3.15, 3.16 and 3.17 and Table 1.

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Stud-bolt with nuts

TABLE 22. DRILLING AND BOLTING FOR FLANGES, CLASS 1500

1	2	3	4	5	6	7	8	9	10
Nominal pipe size	Outside diameter of flange <i>O</i>	Drilling				Length of stud-bolts <i>L</i> ₁ (see Note 3)			
		Diameter of bolt circle	Number of bolts	Diameter of bolts	Diameter of bolt holes	6·4 mm raised face	Male and female also tongue and groove	Ring-joint	Lapped joints (basic dimensions only) (see Note 2)
in	mm	mm		in	in mm	mm	mm	mm	mm
½	121	82·6	4	¾	¾ (22·2)	102	95	102	89
¾	130	88·9	4	¾	¾ (22·2)	108	102	108	95
1	149	101·6	4	¾	1 (25·4)	121	114	121	108
*1¼	159	111·1	4	¾	1 (25·4)	121	114	121	108
1½	178	123·8	4	1	1½ (28·6)	133	127	133	121
2	216	165·1	8	¾	1 (25·4)	140	133	146	127
*2½	244	190·5	8	1	1½ (28·6)	152	146	159	140
3	267	203·2	8	1½	1½ (31·8)	171	165	178	159
4	311	241·3	8	1½	1½ (34·9)	190	184	197	178
*5	375	292·1	8	1½	1½ (41·3)	241	235	248	229
6	394	317·5	12	1½	1½ (38·1)	254	248	260	241
8	483	393·7	12	1½	1½ (44·4)	286	279	298	273
10	584	482·6	12	1½	2 (50·8)	337	330	343	324
12	673	571·5	16	2	2½ (54·0)	375	368	387	362
14	749	635·0	16	2½	2½ (60·3)	406	400	425	394
16	826	704·8	16	2½	2½ (66·7)	444	438	470	432
18	914	774·7	16	2½	2½ (73·0)	489	483	514	476
20	984	831·8	16	3	3½ (79·4)	533	527	565	521
24	1168	990·6	16	3½	3½ (92·0)	610	603	648	597

NOTE 1. This table shall be read in conjunction with 3.6.

NOTE 2. For determination of stud-bolt and headed bolt lengths for lapped-type joints see Appendix E.

NOTE 3. The ends of all stud-bolts shall be rounded or chamfered. Stud-bolt lengths do not include the heights of these ends.

*The use of these sizes should be avoided.

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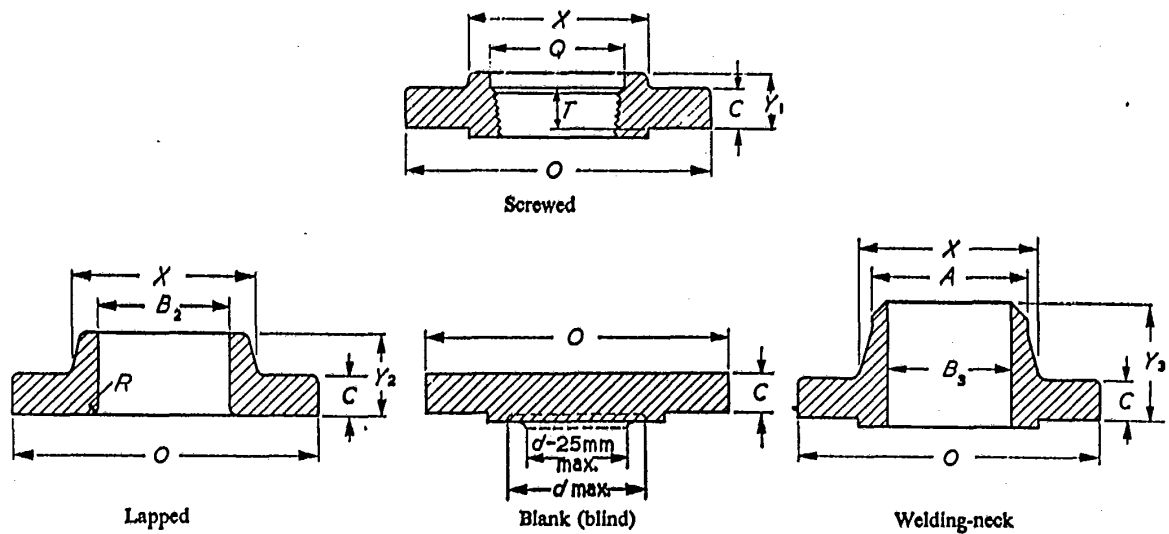


TABLE 23. DIMENSIONS OF FLANGES, CLASS 2500

1	2	3	4	5	6	7	8	9	10	11	12	13	14
Nominal pipe size	Outside diameter of flange	Thickness of flange (min.)	Dia- meter of hub	Hub diameter begin- ning of chamfer welding- neck	Length through hub			Thread length	Bore		Corner radius of bore of lapped flange and pipe	Counter- bore screwed flange (min.)	Dia- meter of recess blank (blind) flange (max.) (see Note 5)
					Screwed	Lapped	Welding- neck		Lapped (min.)	Welding- neck			
	O	C	X	A	Y ₁	Y ₂	Y ₃	T	B ₁	B ₂	R	Q	d
in	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
1/8	133	30.2	43	21.3	40	40	73	29	23.0		3.0	23.5	11.1
1/4	140	31.7	51	26.7	43	43	79	32	28.0		3.0	29.0	14.3
1	159	34.9	57	33.4	48	48	89	35	35.0		3.0	35.0	19.1
*1 1/4	184	38.1	73	42.2	52	52	95	38	43.5		5.0	44.5	25.4
1 1/2	203	44.4	79	48.3	60	60	111	44	50.0	To be specified by the pur- chaser	6.5	50.5	28.6
2	235	50.8	95	60.3	70	70	127	51	62.5		8.0	63.5	38.1
*2 1/4	267	57.1	114	73.0	79	79	143	57	75.5		8.0	76.0	47.6
3	305	66.7	133	88.9	92	92	168	64	91.5		9.5	92.0	57.2
4	356	76.2	165	114.3	108	108	190	70	117.0		11.0	118.0	73.0
*5	419	92.1	203	141.3	130	130	229	76	145.0		11.0	145.0	92.1
6	483	108.0	235	168.3	152	152	273	83	171.0		12.5	171.0	111.1
8	552	127.0	305	219.1	178	178	318	95	222.0		12.5	222.0	146.1
10	673	165.1	375	273.0	229	229	419	108	277.0		12.5	276.0	184.2
12	762	184.1	441	323.9	254	254	464	121	328.0		12.5	329.0	219.1

NOTE 1. This table shall be read in conjunction with Section 3.

NOTE 2. For flange facing dimensions see Tables 2 and 9.

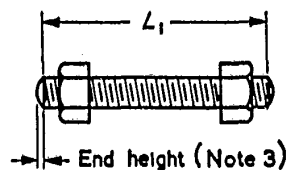
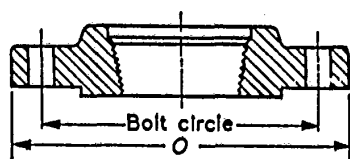
NOTE 3. For tolerances permitted on flange dimensions see 3.8 to 3.13.

NOTE 4. For particulars of reducing flanges see 3.11, 3.12 and 3.13, and Table 1.

NOTE 5. The centre part of the face of blank (blind) flanges may be recessed or raised (see 3.14).

* The use of these sizes should be avoided.

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Stud-bolt with nuts

TABLE 24. DRILLING AND BOLTING FOR FLANGES, CLASS 2500

1	2	3	4	5	6	7	8	9	10
Nominal pipe size	Outside diameter of flange O	Drilling				Length of stud-bolts L_1 (see Note 3)			
		Diameter of bolt circle	Number of bolts	Diameter of bolts	Diameter of bolt holes	6.4 mm raised face	Male and female also tongue and groove	Ring-joint	Lapped joints (basic dimensions only) (see Note 2)
in	mm	mm		in	in mm	mm	mm	mm	mm
$\frac{1}{8}$	133	88.9	4	$\frac{3}{8}$	$\frac{3}{8}$ (22.2)	121	114	121	108
$\frac{3}{8}$	140	95.2	4	$\frac{3}{8}$	$\frac{3}{8}$ (22.2)	121	114	121	108
1	159	107.9	4	$\frac{3}{8}$	1 (25.4)	133	127	133	121
* $1\frac{1}{4}$	184	130.2	4	1	$1\frac{1}{4}$ (28.6)	146	140	152	133
$1\frac{1}{2}$	203	146.0	4	$1\frac{1}{2}$	$1\frac{1}{2}$ (31.8)	165	159	171	152
2	235	171.4	8	1	$1\frac{1}{2}$ (28.6)	171	165	178	159
* $2\frac{1}{2}$	267	196.8	8	$1\frac{1}{2}$	$1\frac{1}{2}$ (31.8)	190	184	197	178
3	305	228.6	8	$1\frac{1}{2}$	$1\frac{1}{2}$ (34.9)	216	210	222	203
4	356	273.0	8	$1\frac{1}{2}$	$1\frac{1}{2}$ (41.3)	248	241	260	235
*5	419	323.8	8	$1\frac{3}{4}$	$1\frac{3}{4}$ (47.6)	292	286	311	279
6	483	368.3	8	2	$2\frac{1}{2}$ (54.0)	343	337	356	330
8	552	438.1	12	2	$2\frac{1}{2}$ (54.0)	381	375	394	368
10	673	539.7	12	$2\frac{1}{2}$	$2\frac{1}{2}$ (66.7)	483	476	508	470
12	762	619.1	12	$2\frac{3}{4}$	$2\frac{3}{4}$ (73.0)	533	527	559	521

NOTE 1. This table shall be read in conjunction with 3.6.

NOTE 2. For determination of stud-bolt and headed bolt lengths for lapped-type joints see Appendix E.

NOTE 3. The ends of all stud-bolts shall be rounded or chamfered. Stud-bolt lengths do not include the heights of these ends.

* The use of these sizes should be avoided.

BS 1

APPENDIX A

PRESSURE-TEMPERATURE RATINGS

NOTES ON TABLES *PE-1 TO *PE-12

A.1 Remarks on steels. The steels listed in the following tables are those appearing in 2.1.

Consideration should be given to the possibility of excessive oxidation (scaling) of the steels in the following tables:

PE-3	1 % chromium-	} at temperatures above 566 °C
	3/4 % molybdenum steel	
PE-4	1 1/4 % chromium-	
	3/4 % molybdenum steel	
PE-5	2 1/4 % chromium-	}
	1 % molybdenum steel	
PE-6	5 % chromium-3/4 % molybdenum steel at temperatures above 593 °C.	

The effects of carbide precipitation should be considered in the case of welded construction or use at temperatures above 482 °C of the steel in Table 1 austenitic chromium-nickel steel.

The effects of sigma formation should be considered when using the steel in Table PE-11—austenitic chromium-nickel-molybdenum steel—at temperatures above 5

A.2 General remarks. In the tables all pressures are in bar (gauge)†. Temperatures and pressures listed are maximum internal fluid temperatures and pressures.

For applications of ratings see 1.2.

* PE—Petroleum Equipment

† 1 bar = 10⁵ N/m²

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TABLE PE-1. PRESSURE-TEMPERATURE RATINGS FOR FLANGES

CARBON STEEL							
Forgings BS 1503-161, Grades 28 or 32, Class A or B							
ASTM A105, Grades I or II							
ASTM A181, Grades I or II, Classes 150 and 300 only							
Castings BS 1504-161, Grade B							
ASTM A216, Grade WCB							
1	2	3	4	5	6	7	8
Service temperature °C	Class						
	150	300	400	600	900	1500	2500
	Maximum non-shock service pressure ratings, bar*						
-30† to 38	19.0	49.6	66.1	99.2	149.0	248.3	413.8
50	18.3	49.4	65.6	98.5	148.4	246.7	411.3
75	17.3	48.7	64.8	97.4	146.3	243.5	406.1
100	16.3	48.0	64.0	96.0	144.5	240.2	400.6
125	15.4	47.5	63.3	94.9	142.6	237.8	396.2
150	14.5	46.8	62.6	94.0	141.3	235.0	392.0
175	13.5	46.5	62.1	93.1	140.0	233.1	388.4
200	12.6	46.0	61.5	91.9	138.5	230.6	383.8
225	11.7	45.1	60.5	90.4	135.9	226.0	377.1
250	10.7	43.7	58.5	87.8	131.7	219.2	368.0
260	10.3	—	—	—	—	—	—
275	10.0	41.8	56.0	83.5	125.5	209.3	349.1
300	9.4	39.6	53.0	79.0	119.0	198.1	330.6
325	8.7	37.4	49.8	74.5	112.0	186.8	310.9
350	8.1	34.8	46.7	69.3	104.9	174.4	290.0
375	7.5	32.1	43.4	63.8	96.6	158.0	267.7
400	6.9	29.1	39.4	58.2	87.8	145.8	243.6
425	6.4	25.5	34.4	51.0	77.3	128.2	212.5
450	5.8	21.4	28.8	42.7	64.6	107.6	178.2
454	—	20.7	27.6	41.3	62.1	103.4	172.4
475	5.1	16.8	22.4	33.4	50.7	84.2	140.3
500	4.0	12.4	16.2	24.6	37.2	61.7	103.3
525	3.4	8.1	10.8	16.0	24.1	40.3	67.2
540	2.6	5.5	7.6	11.0	16.5	28.2	45.9

Primary service pressures are shown in bold type.

* 1 bar = 10⁵ N/m².

† See 1.2.

NOTE. For titles of standards see 2.1.

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TABLE PE-2. PRESSURE-TEMPERATURE RATINGS FOR FLANGES

CARBON MOLYBDENUM STEEL							
Forgings ASTM A182, Grade F1							
Castings BS 1504-240							
ASTM A217, Grade WC1							
1	2	3	4	5	6	7	8
Service temperature °C	Class						
	150	300	400	600	900	1500	2500
	Maximum non-shock service pressure ratings, bar*						
—30† to 38	19.0	49.6	66.1	99.2	149.0	248.3	413.8
50	18.3	49.4	65.6	98.5	148.4	246.7	411.3
75	17.3	48.7	64.8	97.4	146.3	243.5	406.1
100	16.3	48.0	64.0	96.0	144.5	240.2	400.8
125	15.4	47.5	63.3	94.9	142.6	237.8	396.2
150	14.5	46.8	62.6	94.0	141.3	235.0	392.0
175	13.5	46.5	62.1	93.1	140.0	233.1	388.4
200	12.6	46.0	61.5	91.9	138.5	230.6	383.8
225	11.7	45.1	60.5	90.4	135.9	226.0	377.1
250	10.7	43.7	58.5	87.8	131.7	219.2	366.0
260	10.3	—	—	—	—	—	—
275	10.0	41.8	56.0	83.5	125.5	209.3	349.1
300	9.4	39.6	53.0	79.0	119.0	198.1	330.6
325	8.7	37.4	49.8	74.5	112.0	186.8	310.9
350	8.1	34.9	46.7	69.6	105.2	174.9	291.8
375	7.5	32.8	43.8	65.5	98.4	164.0	274.0
400	6.9	30.7	40.6	61.2	91.4	154.2	254.0
425	6.4	28.4	37.8	56.5	85.0	141.5	236.0
450	5.8	26.0	34.8	52.0	78.2	130.5	217.6
475	5.1	23.8	31.7	47.8	71.9	119.3	199.0
500	4.0	21.6	28.7	43.1	64.7	107.8	179.8
510	—	20.7	27.6	41.3	62.1	103.4	172.4
525	3.4	19.0	25.3	38.0	56.9	94.8	158.1

Primary service pressures are shown in bold type.

* 1 bar = 10⁵ N/m².

† See 1.2.

NOTE. For titles of standards see 2.1.

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TABLE PE-3. PRESSURE-TEMPERATURE RATINGS FOR FLANGES

1% CHROMIUM, ½% MOLYBDENUM STEEL							
Forgings BS 1503-620							
ASTM A182, Grade F12							
1	2	3	4	5	6	7	8
Service temperature °C	Class						
	150	300	400	600	900	1500	2500
	Maximum non-shock service pressure ratings, bar*						
—30† to 38	19.0	49.6	66.1	99.2	149.0	248.3	413.8
50	18.3	49.4	65.6	98.5	148.4	246.7	411.3
75	17.3	48.7	64.8	97.4	146.3	243.5	406.1
100	16.3	48.0	64.0	96.0	144.5	240.2	400.6
125	15.4	47.5	63.3	94.9	142.6	237.8	396.2
150	14.5	46.8	62.6	94.0	141.3	235.0	392.0
175	13.5	46.5	62.1	93.1	140.0	233.1	388.4
200	12.6	46.0	61.5	91.9	138.5	230.6	383.8
225	11.7	45.1	60.5	90.4	135.9	226.0	377.1
250	10.7	43.7	58.5	87.8	131.7	219.2	366.0
260	10.3	—	—	—	—	—	—
275	10.0	41.8	56.0	83.5	125.5	209.3	349.1
300	9.4	39.6	53.0	79.0	119.0	198.1	330.6
325	8.7	37.4	49.8	74.5	112.0	186.8	310.9
350	8.1	35.0	46.8	70.0	105.1	175.9	292.1
375	7.5	33.2	44.0	65.9	99.1	165.0	275.2
400	6.9	30.9	41.2	61.8	92.8	155.0	257.2
425	6.4	28.8	38.4	57.8	86.6	144.4	240.7
450	5.8	26.9	35.7	53.5	80.4	134.1	223.2
475	5.1	24.7	33.0	49.5	74.1	123.7	206.4
500	4.0	22.8	30.2	45.2	67.9	113.4	189.2
525	3.4	20.7	27.6	41.3	62.1	103.4	172.4
540	2.6	17.2	23.1	34.7	52.1	86.6	143.0
550	—	15.2	20.0	30.1	45.3	74.9	125.8
575	—	10.0	13.4	20.0	29.6	50.0	83.8
600	—	5.8	7.9	11.6	17.6	29.3	48.6
615	—	4.5	5.7	8.6	12.9	20.7	35.1
630	—	3.3	4.3	6.2	9.5	16.2	26.9
645	—	2.6	3.3	5.1	7.9	13.1	21.5

Primary service pressures are shown in bold type.

* 1 bar = 10⁵ N/m².

† See 1.2.

NOTE. For titles of standards see 2.1.

BS 1560 : Part 2 : 1970

TABLE PE-4. PRESSURE-TEMPERATURE RATINGS FOR FLANGES

1¼% CHROMIUM, ½% MOLYBDENUM STEEL							
Forgings BS1503-621							
ASTM A182, Grade F11							
Castings BS 1504-621							
ASTM A217, Grade WC6							
1	2	3	4	5	6	7	8
Service temperature °C	Class						
	150	300	400	600	900	1500	2500
	Maximum non-shock service pressure ratings, bar*						
—30† to 38	19.0	49.6	66.1	99.2	149.0	248.3	413.8
50	18.3	49.4	65.6	98.5	148.4	246.7	411.3
75	17.3	48.7	64.8	97.4	146.3	243.5	406.1
100	16.3	48.0	64.0	96.0	144.5	240.2	400.6
125	15.4	47.5	63.3	94.9	142.6	237.8	396.2
150	14.5	46.8	62.6	94.0	141.3	235.0	392.0
175	13.5	46.5	62.1	93.1	140.0	233.1	388.4
200	12.6	46.0	61.5	91.9	138.5	230.6	383.8
225	11.7	45.1	60.5	90.4	135.9	226.0	377.1
250	10.7	43.7	58.5	87.8	131.7	219.2	366.0
260	10.3	—	—	—	—	—	—
275	10.0	41.8	56.0	83.5	125.5	209.3	349.1
300	9.4	39.6	53.0	79.0	119.0	198.1	330.6
325	8.7	37.4	49.8	74.5	112.0	186.8	310.9
350	8.1	35.0	46.8	70.0	105.1	175.9	292.1
375	7.5	33.2	44.0	65.9	99.1	165.0	275.2
400	6.9	30.9	41.2	61.8	92.8	155.0	257.2
425	6.4	28.8	38.4	57.8	86.6	144.4	240.7
450	5.8	26.9	35.7	53.5	80.4	134.1	223.2
475	5.1	24.7	33.0	49.5	74.1	123.7	206.4
500	4.0	22.8	30.2	45.2	67.9	113.4	189.2
525	3.4	20.7	27.6	41.3	62.1	103.4	172.4
540	2.6	17.9	23.8	35.8	54.0	90.7	150.4
550	—	16.2	21.4	31.7	48.2	80.2	133.7
575	—	11.8	15.5	23.4	35.3	59.0	98.4
600	—	8.4	11.6	17.2	25.8	43.1	71.7
615	—	6.5	9.0	13.4	20.3	33.8	55.6
630	—	5.0	6.5	9.6	14.6	24.6	41.1
645	—	3.3	4.3	6.3	10.0	16.6	27.6

Primary service pressures are shown in bold type.

* 1 bar = 10⁵ N/m².

† See 1.2.

NOTE. For titles of standards see 2.1.

BS 1560 : Part 2 : 1970

TABLE PE-5. PRESSURE-TEMPERATURE RATINGS FOR FLANGES

2¼ % CHROMIUM, 1% MOLYBDENUM STEEL Forgings BS 1503-622 ASTM A182, Grade F22 Castings BS 1504-622 ASTM A217, Grade WC9							
1	2	3	4	5	6	7	8
Service temperature °C	Class						
	150	300	400	600	900	1500	2500
	Maximum non-shock service pressure ratings, bar*						
-30† to 38	19.0	49.6	66.1	99.2	149.0	248.3	413.8
50	18.3	49.4	65.6	98.5	148.4	246.7	411.3
75	17.3	48.7	64.8	97.4	146.3	243.5	406.1
100	16.3	48.0	64.0	96.0	144.5	240.2	400.6
125	15.4	47.5	63.3	94.9	142.6	237.8	396.2
150	14.5	46.8	62.6	94.0	141.3	235.0	392.0
175	13.5	46.5	62.1	93.1	140.0	233.1	388.4
200	12.6	46.0	61.5	91.9	138.5	230.6	383.8
225	11.7	45.1	60.5	90.4	135.9	226.0	377.1
250	10.7	43.7	58.5	87.8	131.7	219.2	366.0
260	10.3	—	—	—	—	—	—
275	10.0	41.8	56.0	83.5	125.5	209.3	349.1
300	9.4	39.6	53.0	79.0	119.0	198.1	330.6
325	8.7	37.4	49.8	74.5	112.0	186.8	310.9
350	8.1	35.0	46.8	70.0	105.1	175.9	292.1
375	7.5	33.2	44.0	65.9	99.1	165.0	275.2
400	6.9	30.9	41.2	61.8	92.8	155.0	257.2
425	6.4	28.8	38.4	57.8	86.6	144.4	240.7
450	5.8	26.9	35.7	53.5	80.4	134.1	223.2
475	5.1	24.7	33.0	49.5	74.1	123.7	206.4
500	4.0	22.8	30.2	45.2	67.9	113.4	189.2
525	3.4	20.7	27.6	41.3	62.1	103.4	172.4
540	2.6	17.9	23.9	35.0	53.8	90.6	150.0
550	—	16.4	21.7	32.6	48.9	81.8	136.6
575	—	12.3	16.5	25.0	37.2	61.9	103.4
600	—	9.3	12.3	18.4	27.6	46.2	77.6
615	—	7.9	10.2	15.2	23.2	38.4	63.9
630	—	6.2	8.3	12.6	19.0	31.9	52.7
645	—	4.3	6.7	10.0	15.2	25.8	42.2

Primary service pressures are shown in bold type.

* 1 bar = 10⁵ N/m².

† See 1.2.

NOTE. For titles of standards see 2.1.

BS 1560 : Part 2 : 1970

TABLE PE-6. PRESSURE-TEMPERATURE RATINGS FOR FLANGES

5% CHROMIUM, ½% MOLYBDENUM STEEL							
Forgings BS 1503-625 ASTM 182, Grade F5a Castings BS 1504-625 ASTM A217, Grade C5							
1	2	3	4	5	6	7	8
Service temperature °C	Class						
	150	300	400	600	900	1500	2500
	Maximum non-shock service pressure ratings, bar*						
–30† to 38	19.0	49.6	66.1	99.2	149.0	248.3	413.8
50	18.3	49.4	65.6	98.5	148.4	246.7	411.3
75	17.3	48.7	64.8	97.4	146.3	243.5	406.1
100	16.3	48.0	64.0	96.0	144.5	240.2	400.6
125	15.4	47.5	63.3	94.9	142.6	237.8	396.2
150	14.5	46.8	62.6	94.0	141.3	235.0	392.0
175	13.5	46.5	62.1	93.1	140.0	233.1	388.4
200	12.6	46.0	61.5	91.9	138.5	230.6	383.8
225	11.7	45.1	60.5	90.4	135.9	226.0	377.1
250	10.7	43.7	58.5	87.8	131.7	219.2	366.0
260	10.3	—	—	—	—	—	—
275	10.0	41.8	56.0	83.5	125.5	209.3	349.1
300	9.4	39.6	53.0	79.0	119.0	198.1	330.6
325	8.7	37.4	49.8	74.5	112.0	186.8	310.9
350	8.1	35.0	46.8	70.0	105.1	175.9	292.1
375	7.5	33.2	44.0	65.9	99.1	165.0	275.2
400	6.9	30.9	41.2	61.8	92.8	155.0	257.2
425	6.4	28.8	38.4	57.8	86.6	144.4	240.7
450	5.8	26.9	35.7	53.5	80.4	134.1	223.2
475	5.1	24.7	33.0	49.5	74.1	123.7	206.4
500	4.0	22.8	30.2	45.2	67.9	113.4	189.2
525	3.4	20.7	27.6	41.3	62.1	103.4	172.4
540	2.6	16.9	22.8	33.8	50.7	84.4	140.0
550	—	14.9	20.0	30.2	45.5	75.5	125.6
575	—	10.7	14.5	22.0	32.8	54.1	89.6
600	—	7.4	9.5	15.0	21.5	35.9	60.0
615	—	5.6	7.6	10.7	17.2	28.2	47.6
630	—	4.7	6.2	9.1	14.0	23.1	39.0
645	—	3.8	5.2	7.6	11.5	19.0	31.6

Primary service pressures are shown in bold type.

* 1 bar = 10⁵ N/m².

† See 1.2.

NOTE. For titles of standards see 2.1.

BS 1560 : Part 2 : 1970

TABLE PE-7. PRESSURE-TEMPERATURE RATINGS FOR FLANGES

9% CHROMIUM, 1% MOLYBDENUM STEEL							
Forgings ASTM A182, Grade F9							
Castings BS 1504-629							
ASTM A217, Grade C12							
1	2	3	4	5	6	7	8
Service temperature °C	Class						
	150	300	400	600	900	1500	2500
	Maximum non-shock service pressure ratings, bar*						
-30† to 38	19.0	49.6	66.1	99.2	149.0	248.3	413.8
50	18.3	49.4	65.6	98.5	148.4	246.7	411.3
75	17.3	48.7	64.8	97.4	146.3	243.5	406.1
100	16.3	48.0	64.0	96.0	144.5	240.2	400.6
125	15.4	47.5	63.3	94.9	142.6	237.8	396.2
150	14.5	46.8	62.6	94.0	141.3	235.0	392.0
175	13.5	46.5	62.1	93.1	140.0	233.1	388.4
200	12.6	46.0	61.5	91.9	138.5	230.6	383.8
225	11.7	45.1	60.5	90.4	135.9	226.0	377.1
250	10.7	43.7	58.5	87.8	131.7	219.2	366.0
260	10.3	—	—	—	—	—	—
275	10.0	41.8	56.0	83.5	125.5	209.3	349.1
300	9.4	39.6	53.0	79.0	119.0	198.1	330.6
325	8.7	37.4	49.8	74.5	112.0	186.8	310.9
350	8.1	35.0	46.8	70.0	105.1	175.9	292.1
375	7.5	33.2	44.0	65.9	99.1	165.0	275.2
400	6.9	30.9	41.2	61.8	92.8	155.0	257.2
425	6.4	28.8	38.4	57.8	86.6	144.4	240.7
450	5.8	26.9	35.7	53.5	80.4	134.1	223.2
475	5.1	24.7	33.0	49.5	74.1	123.7	206.4
500	4.0	22.8	30.2	45.2	67.9	113.4	189.2
510	3.8	21.7	29.0	43.8	65.5	109.3	182.0
525	3.4	20.7	27.6	41.3	62.1	103.4	172.4
540	2.6	19.7	26.5	39.8	58.6	98.0	163.0
550	—	17.1	22.8	33.8	51.0	85.4	141.1
575	—	11.2	14.8	22.4	33.3	55.5	92.8
600	—	7.2	9.5	14.2	21.9	36.0	59.9
615	—	5.8	7.6	11.6	17.5	28.6	47.4
630	—	4.8	6.2	9.2	14.1	23.2	38.8
645	—	3.8	5.1	7.6	11.6	18.8	31.5

Primary service pressures are shown in bold type.

* 1 bar = 10⁵ N/m².

† See 1.2.

NOTE. For titles of standards see 2.1.

BS 1560 : Part 2 : 1976

TABLE PE-8. PRESSURE-TEMPERATURE RATINGS FOR FLANGES

AUSTENITIC CHROMIUM-NICKEL STEEL							
Forgings BS 1503-801							
ASTM A182, Grades F304 and F304H							
Castings BS 1504-801							
ASTM A351, Grade CF8							
1	2	3	4	5	6	7	8
Service temperature °C	Class						
	150	300	400	600	900	1500	2500
	Maximum non-shock service pressure ratings, bar*						
-30† to 38	19.0	42.4	56.8	85.1	127.6	212.8	354.8
50	18.3	41.3	55.3	83.0	124.4	207.8	346.4
75	17.3	39.6	52.4	78.8	118.1	196.5	328.0
100	16.3	37.6	49.8	74.6	111.8	186.6	311.2
125	15.4	35.8	47.5	71.1	106.9	178.6	296.8
150	14.5	34.1	45.5	67.9	102.0	170.4	283.0
175	13.5	32.6	43.6	65.2	97.7	163.5	272.5
200	12.6	31.2	41.7	62.6	93.9	156.3	260.0
225	11.7	30.0	40.1	60.4	90.0	150.0	250.3
250	10.7	29.1	38.5	58.0	86.6	144.1	240.6
260	10.3	—	—	—	—	—	—
275	10.0	27.8	37.2	55.8	83.6	139.2	232.1
300	9.4	26.6	35.9	53.9	80.7	134.9	224.1
325	8.7	25.8	34.6	52.0	78.2	130.0	216.8
350	8.1	25.2	33.4	50.3	75.6	126.0	210.0
375	7.5	24.4	32.4	49.4	72.8	122.0	203.5
400	6.9	23.4	31.4	47.2	70.4	117.8	196.2
425	6.4	22.8	30.4	46.2	68.3	113.9	189.8
450	5.8	22.2	29.5	44.3	66.8	110.7	185.0
475	5.1	21.5	28.8	43.1	64.5	107.2	179.1
500	4.0	21.0	28.2	42.6	63.5	105.9	176.0
525	3.4	20.7	27.9	41.7	62.4	104.3	173.4
540	2.6	20.7	27.6	41.3	62.1	103.4	172.4
550	—	20.4	27.5	41.0	61.4	102.8	170.5
575	—	19.3	26.8	39.0	58.3	96.3	160.9
600	—	18.5	26.6	38.4	57.3	94.5	158.3
615	—	14.3	19.5	28.8	43.3	72.8	120.4
630	—	12.5	17.0	25.4	37.5	63.5	105.1
645	—	11.0	14.7	21.9	33.1	55.5	92.2
660	—	9.6	12.5	18.6	28.6	47.2	78.6
675	—	7.9	10.7	15.9	23.8	39.3	65.2
690	—	6.9	9.0	13.4	20.3	33.8	56.5
705	—	5.9	7.6	11.7	17.2	28.4	48.1
715	—	5.3	6.9	10.3	15.5	26.2	43.1
725	—	4.7	6.2	9.3	14.1	23.4	38.4
735	—	4.1	5.6	8.5	12.7	21.1	34.8
745	—	3.8	5.2	7.7	11.6	19.3	31.9
755	—	3.4	4.7	7.0	10.4	17.6	29.0
765	—	3.1	4.3	6.2	9.7	15.6	26.3
775	—	2.8	3.8	5.5	8.6	13.9	23.2
785	—	2.6	3.3	5.0	8.0	12.1	20.7
795	—	2.3	3.0	4.5	6.7	10.9	18.5
805	—	2.0	2.8	3.9	5.8	10.0	16.7
815	—	1.7	2.4	3.4	5.2	9.0	14.8

Primary service pressures are shown in bold type.

* 1 bar = 10⁵ N/m².

† See 1.2.

NOTE. For titles of standards see 2.1.

BS 1560 : Part 2 : 1970

TABLE PE-9. PRESSURE-TEMPERATURE RATINGS FOR FLANGES

AUSTENITIC CHROMIUM-NICKEL (LOW CARBON) STEEL Forgings ASTM A182, Grade F304L							
1	2	3	4	5	6	7	8
Service temperature °C	Class						
	150	300	400	600	900	1500	2500
	Maximum non-shock service pressure ratings, bar*						
— 30† to 38	19.0	35.5	47.2	71.0	106.5	177.2	295.5
50	18.3	35.4	47.1	70.7	106.0	176.2	294.0
75	17.3	35.0	46.7	70.1	105.0	174.2	291.5
100	16.3	34.4	45.7	68.4	103.4	172.1	285.5
125	15.4	31.7	42.6	63.7	95.2	159.0	265.5
150	14.5	29.5	39.6	59.1	89.0	148.0	247.0
175	13.5	27.4	36.8	55.0	82.5	137.5	229.0
200	12.6	25.3	34.0	50.8	75.9	126.9	211.0
225	11.7	23.7	31.8	47.5	71.5	119.1	196.0
250	10.7	22.6	30.1	45.0	67.7	113.0	188.5
260	10.3	—	—	—	—	—	—
275	10.0	21.6	28.6	43.1	64.6	106.0	179.0
300	9.4	21.0	28.0	42.0	63.0	105.0	174.7
316	—	20.7	27.6	41.3	62.1	103.4	172.4
325	8.7	20.4	23.3	41.6	61.4	102.2	170.1
350	8.1	19.7	26.4	39.4	59.1	98.6	164.5
375	7.5	19.2	25.8	38.5	57.8	96.2	160.8
400	6.9	19.0	25.2	37.5	56.5	94.0	157.0
425	6.4	18.3	24.5	36.9	55.1	92.2	153.3

Primary service pressures are shown in bold type.

* 1 bar = 10⁵ N/m².

† See 1.2.

NOTE: For titles of standard see 2.1.

BS 1560 : Part 2 : 1970

TABLE PE-10. PRESSURE-TEMPERATURE RATINGS FOR FLANGES

AUSTENITIC CHROMIUM-NICKEL (TITANIUM STABILIZED) STEEL							
Forgings BS 1503-821, Grade Ti							
ASTM A182, Grades F321 and F321H							
AUSTENITIC CHROMIUM-NICKEL (NIOBIUM STABILIZED) STEEL							
Forgings BS 1503-821, Grade Nb							
ASTM A182, Grades F347 and F347H							
Castings BS 1504-821, Grade Nb							
ASTM A351, Grade CF8C							
1	2	3	4	5	6	7	8
Service temperature °C	Class						
	150	300	400	600	900	1500	2500
	Maximum non-shock service pressure ratings, bar*						
-30† to 38	19.0	49.6	66.1	99.2	149.0	248.3	413.8
50	18.3	49.4	65.6	98.5	148.4	246.7	411.3
75	17.3	48.7	64.8	97.4	146.3	243.5	406.1
100	16.3	48.0	64.0	96.0	144.5	240.2	400.6
125	15.4	47.5	63.3	94.9	144.0	237.8	396.2
150	14.6	46.8	62.6	94.0	141.3	235.0	392.0
175	13.6	46.5	62.1	93.1	140.0	233.1	388.4
200	12.6	46.0	61.5	91.9	138.5	230.6	383.8
225	11.7	45.1	60.5	90.4	135.9	226.0	377.1
250	10.7	43.7	58.5	87.8	131.7	219.2	366.0
260	10.3	—	—	—	—	—	—
275	10.0	41.8	56.0	83.5	125.5	209.3	349.1
300	9.4	39.6	53.0	79.0	119.0	198.1	330.6
325	8.7	37.4	49.8	74.5	112.0	186.8	310.9
350	8.1	35.2	47.0	70.0	106.0	176.0	294.0
375	7.5	33.9	45.2	67.5	102.1	169.0	282.0
400	6.9	32.3	43.0	64.5	97.5	162.3	269.8
425	6.4	31.2	41.2	62.0	92.8	155.1	258.1
450	5.8	29.6	39.3	59.0	88.6	148.0	246.0
475	5.1	28.2	37.4	56.3	84.5	141.0	234.0
500	4.0	26.7	35.6	53.5	80.5	133.4	223.2
525	3.4	25.4	33.8	50.6	76.4	126.4	211.0
540	2.8	24.4	32.6	49.0	73.2	122.4	204.0
550	—	23.9	31.8	47.9	72.0	119.7	199.6
575	—	22.6	30.0	43.0	67.5	112.6	187.6
600	—	21.0	28.2	42.3	63.5	105.8	175.6
607	—	20.7	27.6	41.3	62.1	103.4	172.4
615	—	19.6	25.5	39.5	58.0	96.3	159.7
630	—	16.3	21.6	32.2	48.3	80.2	132.6
645	—	12.7	17.2	25.5	37.9	62.9	105.1
650	—	10.0	13.4	20.1	30.3	50.7	84.3
675	—	8.3	10.7	16.1	23.8	40.1	63.1
690	—	6.4	8.6	13.1	19.4	32.1	54.1
705	—	5.2	6.9	10.3	15.2	25.6	43.6
715	—	4.5	6.1	9.0	13.4	22.6	37.6
725	—	4.0	5.4	7.9	12.1	19.7	32.9
735	—	3.4	4.7	6.9	10.9	17.4	29.1
745	—	3.2	4.2	6.5	9.9	16.2	26.7
755	—	2.9	3.9	5.9	9.1	14.8	24.6
765	—	2.6	3.6	5.2	8.3	13.6	22.4
775	—	2.4	3.4	4.8	7.5	12.4	20.3
785	—	2.2	2.9	4.3	6.8	11.2	18.3
795	—	2.1	2.9	4.0	6.2	10.3	16.8
805	—	1.9	2.7	3.7	5.9	9.7	15.9
815	—	1.7	2.4	3.4	5.2	9.0	14.8

Primary service pressures are shown in bold type.

* 1 bar = 10⁵ N/m².

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TABLE PE-11. PRESSURE-TEMPERATURE RATINGS FOR FLANGES

AUSTENITIC CHROMIUM-NICKEL-MOLYBDENUM STEEL							
Forgings BS 1503-845, Grade B							
ASTM A182, Grades F316 and F316H							
Castings BS 1504-845, Grade B							
ASTM A351, Grade CF8M							
1	2	3	4	5	6	7	8
Service temperature °C	Class						
	150	300	400	600	900	1500	2500
	Maximum non-shock service pressure ratings, bar*						
-30† to 38	19.0	49.6	66.1	99.2	149.0	248.3	413.8
60	18.3	49.4	65.6	98.5	148.4	246.7	411.3
75	17.3	48.7	64.8	97.4	146.3	243.5	406.1
100	16.3	48.0	64.0	96.0	144.5	240.2	400.6
125	15.4	47.5	63.3	94.9	144.0	237.8	396.2
150	14.5	46.8	62.6	94.0	141.3	235.0	392.0
175	13.5	46.5	62.1	93.1	140.0	233.1	388.4
200	12.6	46.0	61.5	91.9	138.5	230.6	383.8
225	11.7	45.1	60.5	90.4	135.9	226.0	377.1
250	10.7	43.7	58.5	87.8	131.7	219.2	366.0
260	10.3	—	—	—	—	—	—
275	10.0	41.8	56.0	83.5	125.5	209.3	349.1
300	9.4	39.6	53.0	79.0	119.0	198.1	330.6
325	8.7	37.4	49.8	74.5	112.0	188.8	310.9
350	8.1	35.2	47.0	70.0	106.0	176.0	294.0
375	7.6	33.9	45.2	67.5	102.1	169.0	282.0
400	6.9	32.3	43.0	64.5	97.5	162.3	269.8
425	6.4	31.2	41.2	62.0	92.8	155.1	258.1
450	5.8	29.6	39.3	59.0	88.6	148.0	246.0
475	5.1	28.2	37.4	56.3	84.5	141.0	234.0
500	4.0	26.7	35.6	53.5	80.5	133.4	223.2
525	3.4	25.4	33.8	50.6	76.4	126.4	211.0
540	2.6	24.4	32.6	49.0	73.2	122.4	204.0
550	—	23.9	31.8	47.9	72.0	119.7	199.5
575	—	22.6	30.0	43.0	67.5	112.6	187.6
600	—	21.0	28.2	42.3	63.5	105.8	175.6
607	—	20.7	27.6	41.3	62.1	103.4	172.4
615	—	20.3	27.2	40.7	61.0	102.0	170.0
630	—	19.0	25.2	38.6	56.2	94.2	156.9
645	—	16.7	22.2	32.7	49.6	83.2	138.5
660	—	14.3	19.4	29.3	43.8	73.2	122.0
675	—	12.7	16.8	25.5	38.3	64.0	106.0
690	—	11.2	14.8	21.4	33.2	55.2	91.0
705	—	9.3	12.7	18.9	28.4	46.9	78.0
715	—	8.2	11.2	16.9	24.8	41.0	69.0
725	—	7.3	9.6	14.3	21.5	35.5	59.4
735	—	6.5	8.5	12.6	18.6	31.2	52.1
745	—	5.5	7.2	11.2	16.8	28.2	46.6
755	—	5.1	6.5	10.0	15.0	25.2	41.8
765	—	4.5	5.9	9.0	13.7	22.6	37.5
775	—	4.0	5.4	8.3	12.4	20.4	34.1
785	—	3.6	5.0	7.4	11.2	18.1	30.7
795	—	3.3	4.3	6.5	10.0	16.1	27.2
805	—	3.0	3.6	5.6	8.8	14.2	23.4
815	—	2.4	3.1	4.8	7.2	11.7	19.7

Primary service pressures are shown in bold type.

* 1 bar = 10⁵ N/m².

† See 1.2.

NOTE: See titles of standards for 2.1

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TABLE PE-12. PRESSURE-TEMPERATURE RATINGS FOR FLANGES

AUSTENITIC CHROMIUM-NICKEL-MOLYBDENUM (LOW CARBON) STEEL Forgings ASTM A182, Grade F316L							
1	2	3	4	5	6	7	8
Service temperature °C	Class						
	150	300	400	600	900	1500	2500
	Maximum non-shock service pressure ratings, bar*						
— 30† to 38	19.0	35.5	47.2	71.0	106.5	177.2	295.5
50	18.3	35.5	47.2	71.0	106.5	177.2	295.5
75	17.3	35.5	47.2	71.0	106.5	177.2	295.5
100	16.3	35.2	46.8	70.3	105.9	176.2	293.6
125	15.4	34.0	45.3	67.9	102.2	170.1	284.0
150	14.5	32.7	44.6	65.7	98.4	164.0	273.5
175	13.5	30.2	40.3	60.5	91.0	151.2	252.2
200	12.6	27.6	36.7	55.1	82.6	138.1	230.0
225	11.7	26.5	35.1	52.6	79.0	131.9	219.5
250	10.7	25.4	34.1	50.8	76.2	127.1	211.6
260	10.3	—	—	—	—	—	—
275	10.0	24.4	32.5	49.0	73.5	122.0	203.5
300	9.4	23.8	31.4	47.2	71.0	117.9	196.5
325	8.7	22.9	30.4	45.6	68.6	113.8	189.6
350	8.1	22.2	29.4	44.1	66.3	110.2	184.0
375	7.5	21.2	28.6	42.6	64.1	106.7	177.9
400	6.9	20.7	27.6	41.3	62.1	103.4	172.4
425	6.4	20.0	26.6	40.6	60.1	100.3	166.8
450	5.8	19.4	25.9	38.9	58.2	97.0	161.7

Primary service pressures are shown in bold type.

* 1 bar = 10⁵ N/m².

† See 1.2.

NOTE: For title of standard see 2.1.

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APPENDIX B

REQUIREMENTS FOR MARKING OF STEEL PIPE FLANGES

B.1 Manufacturer's name or trade mark. All flanges shall be marked with the manufacturer's name or trade mark.

B.2 Class rating. Every flange shall be marked with the numerals denoting its class rating (see 1.1).

Cold working and test pressure markings are prohibited unless specifically requested by the purchaser.

B.3 Materials identification

B.3.1 Carbon steel flanges shall be marked with the word 'steel'.

B.3.2 Alloy steel flanges shall be marked with the word 'steel' and with the appropriate standard symbol as indicated in Table 25.

The manufacturer may supplement the standard symbols with any desired trade designation provided that such markings cannot be confused with the standard symbols.

B.4 Melt identification. All cast steel flanges shall be marked with a melt number or melt identification except that this marking may be omitted from carbon steel castings unless specifically required by the purchaser.

B.5 Thread identification. When flanges are not screwed to API Std. 5B* or ANSI B2.1† they shall be marked to indicate the type of thread used. The marking shall be cast or stamped on the flanges.

B.6 Size designation. The size marking shall consist of numerals denoting the nominal pipe size in inches. Size markings may be omitted from reducing flanges.

B.7 Ring number. Flanges grooved for standard ring-joints and the rings to be used with them shall be marked with the letter 'R' and the corresponding ring numbers. These markings shall be placed on the edges of the flanges and on the outside surfaces of the rings. For ring numbers refer to Tables 3 to 10.

B.8 Omission of markings. On flanges of such size as will not permit of full markings, the markings may be omitted, with the approval of the purchaser, to the degree which conditions require in the following sequence:

- (1) Size.
- (2) Material:
 - a. Steel.
 - b. Alloy steel symbol.
- (3) Class rating.
- (4) Manufacturer's name or trade mark.

B.9 Where steel stamps are used for marking, care shall be taken to see that the marking is not deep enough to cause cracks.

* API Std. 5B, 'Threading, gauging and thread inspection of casing, tubing and line pipe threads' (obtainable through BSI).

† ANSI B2.1, 'Pipe threads (except Dryseal)' (obtainable through BSI).

TABLE 25. MATERIALS DESIGNATION

Alloy Steels	Forgings			Castings				
	BS	Specification	ASTM	Standard symbol	BS	Specification	ASTM	Standard symbol
Carbon molybdenum	—	A182, Grade F1	F1	BS 1504-240	A217, Grade WC1	WC1		
1 % chromium ¼ % molybdenum	BS 1503-620	A182, Grade F12	F12	—	—	—		
1¼ % chromium ¾ % molybdenum	BS 1503-621	A182, Grade F11	F11	BS 1504-621	A217, Grade WC6	WC6		
2¼ % chromium 1 % molybdenum	BS 1503-622	A182, Grade F22	F22	BS 1504-622	A217, Grade WC9	WC9		
5 % chromium ¾ % molybdenum	BS 1503-625	A182, Grade F5a	F5a	BS 1504-625	A217, Grade C5	C5		
9 % chromium 1 % molybdenum	—	A182, Grade F9	F9	BS 1504-629	A217, Grade C12	C12		
Austenitic chromium nickel	BS 1503-801	A182, Grade 304	F304	BS 1504-801	A351, Grade CF8	CF8		
	—	A182, Grade 304H	F304H	—	—	—		
Austenitic chromium nickel (low carbon)	—	A182, Grade F304L	F304L	—	—	—		
Austenitic chromium nickel (titanium stabilized)	BS 1503-821, Grade Ti	A182, Grade F321	F321	—	—	—		
	—	A182, Grade F321H	F321H	—	—	—		
Austenitic chromium nickel (niobium stabilized)	BS 1503-821, Grade Nb	A182, Grade F347	F347	BS 1504-821, Grade Nb	A351, Grade CF8C	CF8C		
	—	A182, Grade F347H	F347H	—	—	—		
Austenitic chromium-nickel-molybdenum	BS 1503-845, Grade B	A182, Grade F316	F316	BS 1504-845, Grade B	A351, Grade CF8M	CF8M		
	—	A182, Grade F316H	F316H	—	—	—		
Austenitic chromium-nickel-molybdenum (low carbon)	—	A182, Grade F316L	F316L	—	—	—		

APPENDIX C

TABLE 26. DIMENSIONS OF SEAMLESS AND WELDED STEEL PIPE (from BS 1600, Part 2*)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Nominal pipe size	Outside diameter	Nominal wall thickness																
		Schedule 5S†	Schedule 10S†	Schedule 10	Schedule 20	Schedule 30	Schedule 40S†	Standard wall	Schedule 40	Schedule 60	Schedule 80S†	Extra strong	Schedule 80	Schedule 100	Schedule 120	Schedule 140	Schedule 160	Double extra strong
in	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
1/4	10.3	—	1.24	—	—	—	1.73	1.73	1.73	—	2.41	2.41	2.41	—	—	—	—	—
1/4	13.7	—	1.65	—	—	—	2.24	2.24	2.24	—	3.02	3.02	3.02	—	—	—	—	—
3/8	17.1	—	1.65	—	—	—	2.31	2.31	2.31	—	3.20	3.20	3.20	—	—	—	—	—
1/2	21.3	1.65	2.11	—	—	—	2.77	2.77	2.77	—	3.73	3.73	3.73	—	—	—	4.78	7.47†
3/4	26.7	1.65	2.11	—	—	—	2.87	2.87	2.87	—	3.91	3.91	3.91	—	—	—	5.56	7.82†
1	33.4	1.65	2.77	—	—	—	3.38	3.38	3.38	—	4.55	4.55	4.55	—	—	—	6.35	9.09†
1 1/4	42.2	1.65	2.77	—	—	—	3.56	3.56	3.56	—	4.85	4.85	4.85	—	—	—	6.35	9.70†
1 1/2	48.3	1.65	2.77	—	—	—	3.68	3.68	3.68	—	5.08	5.08	5.08	—	—	—	7.14	10.16†
2	60.3	1.65	2.77	—	—	—	3.91	3.91	3.91	—	5.54	5.54	5.54	—	—	—	8.74	11.07†
2 1/4	73.0	2.11	3.05	—	—	—	5.16	5.16	5.16	—	7.01	7.01	7.01	—	—	—	9.52	14.02†
3	88.9	2.11	3.05	—	—	—	5.49	5.49	5.49	—	7.62	7.62	7.62	—	—	—	11.13	15.24†
3 1/2	101.6	2.11	3.05	—	—	—	5.74	5.74	5.74	—	8.08	8.08	8.08	—	—	—	—	—
4	114.3	2.11	3.05	—	—	—	6.02	6.02	6.02	—	8.56	8.56	8.56	—	11.13	—	13.49	17.12†
5	141.3	2.77	3.40	—	—	—	6.55	6.55	6.55	—	9.52	9.52	9.52	—	12.70	—	15.88	19.05†
6	168.3	2.77	3.40	—	—	—	7.11	7.11	7.11	—	10.97	10.97	10.97	—	14.27	—	18.26	21.95†
8	219.1	2.77	3.76	—	6.35	7.04	8.18	8.18	8.18	10.31	12.70	12.70	12.70	15.09	18.26	20.62	23.01	22.22†
10	273.0	3.40	4.19	—	6.35	7.80	9.27	9.27	9.27	12.70	12.70	12.70	12.70	15.09	18.26	21.44	25.40	25.40
12	323.9	3.96	4.57	—	6.35	8.38	9.52	9.52	10.31	14.27	12.70	12.70†	17.47	21.44	25.40	28.58	33.34	25.40
14	355.6	3.96	4.78	6.35	7.92	9.52	—	9.52	11.13	15.09	—	12.70†	19.05	23.82	27.79	31.75	35.71	—
16	406.4	4.19	4.78	6.35	7.92	9.52	—	9.52	12.70	16.64	—	12.70	21.44	26.19	30.96	36.52	40.49	—
18	457.2	4.19	4.78	6.35	7.92	11.13	—	9.52†	14.27	19.05	—	12.70†	23.82	29.36	34.92	39.69	45.24	—
20	508.0	4.78	5.54	6.35	9.52	12.70	—	9.52	15.09	20.62	—	12.70	26.19	32.54	38.10	44.45	50.01	—
22	558.8	4.78	5.54	6.35	9.52	12.70	—	9.52	15.88	22.22	—	12.70	28.58	34.92	41.28	47.62	53.98	—
24	609.6	5.54	6.35	6.35	9.52	14.27	—	9.52	17.48	24.61	—	12.70†	30.96	38.89	46.02	52.39	59.54	—
26	660.4	—	—	7.92	12.70	—	—	9.52†	—	—	—	12.70	—	—	—	—	—	—
28	711.2	—	—	7.92	12.70	15.88	—	9.52†	—	—	—	12.70	—	—	—	—	—	—
30	762.0	6.35	7.92	7.92	12.70	15.88	—	9.52†	—	—	—	12.70	—	—	—	—	—	—
32	812.8	—	—	7.92	12.70	15.88	—	9.52†	17.48	—	—	12.70	—	—	—	—	—	—
34	863.6	—	—	7.92	12.70	15.88	—	9.52†	17.48	—	—	12.70	—	—	—	—	—	—
36	914.4	—	—	7.92	12.70	15.88	—	9.52†	19.05	—	—	12.70	—	—	—	—	—	—

NOTE 1. Dimensions in this table are based on ANSI Std. B36.10 and ANSI Std. B36.19.

NOTE 2. For tolerances on outside diameter and wall thickness see appropriate specifications.

* BS 1600, 'Dimensions of steel pipe for the petroleum industry'.

† Schedules 5S, 10S, 40S and 80S apply to austenitic chromium-nickel steel pipe only.

‡ Except when marked ‡, 'Standard', 'Extra Strong' and 'Double Extra Strong' wall thicknesses have pipe of corresponding wall thickness listed under one of the schedule numbers.

§ The use of these sizes should be avoided. For nominal pipe sizes greater than 36 in see API Std. 5LS, 'Spiral-weld line pipe' (obtainable through BSI).

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APPENDIX D

THREADING OF PIPE FOR STANDARD STEEL FLANGES

(See 3.8)

This standard calls for thread lengths in the flanges in proportion to the thickness of the flange. This means that the thread lengths in the flanges intended for the higher pressure classes in a given size are longer than the thread lengths in the flanges intended for the lower pressure classes.

The length of the effective external taper thread to API Std. 5B and ANSI B2.1 provides a sufficient number of threads on the pipe to ensure a satisfactory joint with certain of these lower pressure classes and sizes of flanges (denoted in Table 27 by an asterisk).

Table 27 gives the additional length of effective thread required on pipe for those sizes and pressure classes of flanges where the standard effective pipe thread length is too short to bring the end of the pipe reasonably close to

the face of the flange when both parts are assembled by power.

As the threads in the flanges and on the pipe are gauged with a tolerance of one thread large and one thread small, there will naturally be some difference in distance between the end of the pipe and the face of the flange in the various assemblies for the different sizes and classes of flanges.

The additional lengths given in Table 27 are added to the small end of the standard pipe thread; the pitch diameter at the end of the external thread is therefore smaller than that of the standard pipe. In other words, the small end of the ring gauge will pass over the end of the pipe the number of threads or length in millimetres equal to the values given.

TABLE 27. ADDITIONAL LENGTH OF EFFECTIVE THREAD ON PIPE

Nominal pipe size	Classes 150, 300	Class 400	Class 600		Class 900		Class 1500		Class 2500	
	Number of threads	Number of threads	Number of threads	Additional length	Number of threads	Additional length	Number of threads	Additional length	Number of threads	Additional length
in				mm		mm		mm		mm
$\frac{3}{4}$	*	—	*	*	—	—	$3\frac{1}{2}$	6.4	7	12.7
$\frac{1}{2}$	*	—	*	*	—	—	5	6.4	7	12.7
1	*	—	*	*	—	—	5	11.0	$7\frac{1}{2}$	16.5
$1\frac{1}{4}$	*	—	*	*	—	—	5	11.0	$7\frac{1}{2}$	16.5
$1\frac{1}{2}$	*	—	*	*	—	—	5	11.0	$7\frac{1}{2}$	16.5
2	*	—	*	*	—	—	5	11.0	$7\frac{1}{2}$	16.5
$2\frac{1}{2}$	*	—	*	*	—	—	5	15.9	8	25.4
3	*	—	1	3.2	3	9.5	6	19.0	10	31.8
$3\frac{1}{2}$	*	—	1	3.2	—	—	—	—	—	—
4	*	*	$1\frac{1}{2}$	4.8	$3\frac{1}{2}$	11.1	$6\frac{1}{2}$	20.6	$10\frac{1}{2}$	33.3
$\dagger 5$	*	*	$1\frac{1}{2}$	4.8	$3\frac{1}{2}$	11.1	$6\frac{1}{2}$	20.6	$10\frac{1}{2}$	33.3
6	*	*	$1\frac{1}{2}$	4.8	$3\frac{1}{2}$	11.1	$7\frac{1}{2}$	23.8	$11\frac{1}{2}$	36.5
8	*	*	2	6.4	4	12.7	8	25.4	14	44.4
10	*	*	3	9.5	5	15.9	9	28.6	16	50.8
12	*	*	3	9.5	5	15.9	10	31.8	19	60.3
14	*	*	3	9.5	6	19.0	—	—	—	—
16	*	*	3	9.5	6	19.0	—	—	—	—
18	*	*	3	9.5	6	19.0	—	—	—	—
20	*	*	3	9.5	6	19.0	—	—	—	—
24	*	*	3	9.5	6	19.0	—	—	—	—

* Standard pipe thread is used for this size.

$\dagger$ The use of these sizes should be avoided.

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APPENDIX E

DETERMINATION OF BOLT LENGTHS FOR LAPPED JOINTS

E.1 Determination of stud-bolt lengths for lapped joints of other than ring-joint type, all classes. To determine the lengths of stud-bolts required for various types of lapped joint, the following additions should be made to the

appropriate basic dimensions given in Column 9 of Tables 12 and 14 and Column 10 of Tables 16, 18, 20, 22 and 24:

Type of lapped joint	Addition to basic dimension
(1) Lapped raised face to lapped raised face	Add thickness t , in Fig. 2, of both laps.
(2) Lapped male to lapped female	Add thickness t , in Fig. 2, of male lap or 6.4 mm, whichever is the greater, plus thickness t , in Fig. 2, of female lap.
(3) Lapped tongue to lapped groove	Add thickness t , in Fig. 2, of tongue lap plus thickness t , in Fig. 2, of groove lap plus 6.4 mm.
(4) Lapped raised face to 1.6 mm raised face on flange (Classes 150 and 300)	Add thickness t , in Fig. 2, of one lap.
(5) Lapped raised face to 6.4 mm raised face on flange (all classes)	Add thickness t , in Fig. 2, of one lap plus 6.4 mm.
(6) Lapped male to female on flange	Add thickness t , in Fig. 2, of male lap or 6.4 mm, whichever is the greater.
(7) Lapped female to male on flange	Add thickness t , in Fig. 2, of female lap plus 6.4 mm.
(8) Lapped tongue to groove on flange	Add thickness t , in Fig. 2, of tongue lap plus 6.4 mm.
(9) Lapped groove to tongue on flange	Add thickness t , in Fig. 2, of groove lap plus 6.4 mm.

E.2 Determination of stud-bolt lengths for lapped joints of the ring-joint type

E.2.1 Classes 150 and 300. Add the thickness t , in Fig. 2, of each lap included in the joints to the appropriate stud-bolt dimensions obtained from Column 8 of Tables 12 and 14.

E.2.2 Classes 400 and upwards. Add the thickness t , in Fig. 2, of each lap included in the joints to the appropriate

stud-bolt dimensions obtained from Column 9 of Tables 16, 18, 20, 22 and 24.

E.3 Determination of headed bolt lengths for all types and classes of lapped joint. The length of a headed bolt for any of the facing combinations in E.1 and E.2, is equal to the length of the appropriate stud-bolt plus 3.2 mm minus the nominal bolt size.

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APPENDIX F

RECOMMENDATIONS FOR THE CHOICE OF GASKETS FOR FLANGED JOINTS EMPLOYING RAISED, MALE/FEMALE AND TONGUE/GROOVE FLANGE FACINGS

The satisfactory operation, under the pressure-temperature ratings given in Tables PE-1 to PE-12, of a flanged joint employing raised, male/female or tongue/groove facings is dependent on the choice of a gasket which will be suitably stable under the bolt load applied to the joint.

The raised, male/female and tongue/groove facings specified in this standard together cover, for each nominal size of flange, 3 different contact widths, namely:

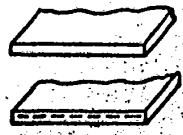
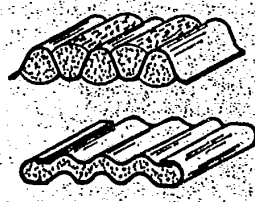
- (1) The raised face and the large male face width, both of which are the same.
- (2) The large tongue face width.

- (3) The small tongue face width minus 0.8 mm but not less than 4.8 mm.

Accordingly, under these recommendations, the range of suitable gasket types has been divided into Groups 1, 2 and 3, Group 1 containing the gasket types applicable when given a contact width not greater than that defined in (1), Group 2 the gaskets applicable when given a contact width not greater than that defined in (2), and Group 3 the gaskets applicable when given a contact width not greater than that defined in (3). The groups are as follows:

GROUP 1 GASKETS

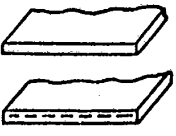
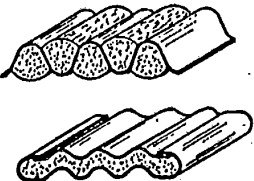
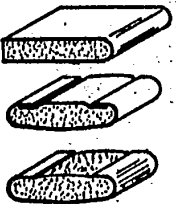
Gasket contact width for each nominal size to be made not greater than the width of the raised facing of the relevant slip-on welding flange, the inside diameter being taken as the outside diameter of the relevant pipe.

Group	Material	Typical sections
1	Non-metallic gaskets except those of compressed asbestos fibre less than 1.6 mm thick	
1	Edge-(spiral-) wound, asbestos filled gaskets made of carbon or stainless steel or nickel-copper alloy	
1	Corrugated metal gaskets, asbestos inserted or jacketed and asbestos filled, made of soft aluminium, soft copper or brass, iron or soft steel	
1	Corrugated metal gaskets made of soft aluminium, soft copper or brass	

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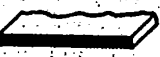
GROUP 2 GASKETS

Gasket contact width for each nominal size to be made not greater than the width of the relevant large tongue facing.

Group	Material	Typical sections
2	Compressed asbestos fibre gaskets 0.8 mm thick	
2	Corrugated metal gaskets, asbestos inserted or jacketed and asbestos filled, made of 5 % chromium steel, stainless steel or nickel-copper alloy	
2	Corrugated metal gaskets made of iron or soft steel, 5 % chromium steel, stainless steel or nickel-copper alloy	
2	Flat metal jacketed and asbestos filled gaskets made of soft aluminium, soft copper or brass, iron or soft steel, 5 % chromium steel, stainless steel or nickel-copper alloy	
2	Grooved metal gaskets made of soft aluminium, soft copper or brass, iron or soft steel, 5 % chromium steel, stainless steel or nickel-copper alloy	

GROUP 3 GASKETS

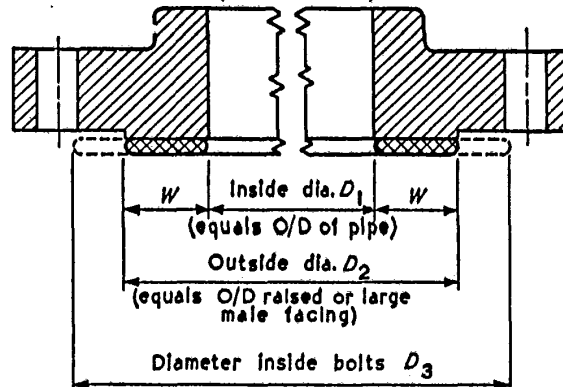
Gasket contact width for each nominal size to be made not greater than the width of the relevant small tongue facing minus 0.8 mm but not less than 4.8 mm.

Group	Material	Typical section
3	Solid, flat metal gaskets made of soft aluminium, soft copper or brass, iron or soft steel, 5 % chromium steel, stainless steel or nickel-copper alloy	

GASKET DIMENSIONS

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TABLE 28. GROUP 1 GASKETS
DIMENSIONS OF GASKETS FOR RAISED AND LARGE MALE/FEMALE FACINGS
 (See Notes 1 to 4)

Maximum contact width W = width of raised or large male facing

1	2	3	4	5	6	7	8	9	10	11
Nominal pipe size	Gasket contact width (max.) W	Gasket inside diameter (see Note 3) D_1	Gasket outside diameter D_2	Diameter inside bolts D_3 (see Note 2)						
				Class						
				150	300	400	600	900	1500	2500
in	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
$\frac{1}{2}$	6.5	21.5	35.0	47.5	54.0	54.0	54.0	63.5	63.5	70.0
$\frac{3}{4}$	8.0	27.0	43.0	57.0	66.5	66.5	66.5	70.0	70.0	76.0
1	8.5	33.5	51.0	66.5	73.0	73.0	73.0	79.5	79.5	85.5
*1 $\frac{1}{4}$	10.5	42.0	63.5	76.0	82.5	82.5	82.5	89.0	89.0	105.0
1 $\frac{1}{2}$	12.5	48.5	73.0	85.5	95.0	95.0	95.0	98.5	98.5	117.5
2	16.0	60.5	92.0	105.0	111.0	111.0	111.0	143.0	143.0	146.0
*2 $\frac{1}{2}$	16.0	73.0	105.0	124.0	130.0	130.0	130.0	165.0	165.0	168.5
3	19.0	89.0	127.0	136.5	149.0	149.0	149.0	168.5	174.5	197.0
*3 $\frac{1}{2}$	19.0	101.5	139.5	162.0	165.0	162.0	162.0	—	—	—
4	21.5	114.5	157.0	174.5	181.0	178.0	193.5	206.5	209.5	235.0
*5	22.0	141.5	185.5	197.0	216.0	212.5	241.5	247.5	254.0	279.5
6	24.0	168.5	216.0	222.0	251.0	247.5	266.5	289.0	282.5	317.5
8	25.5	219.0	270.0	279.5	308.0	305.0	320.5	359.0	352.5	387.5
10	25.5	273.0	324.0	339.5	362.0	359.0	400.0	435.0	435.0	476.0
12	28.5	324.0	381.0	409.5	422.5	419.0	457.0	498.5	520.5	549.5
14	28.5	355.5	412.5	451.0	486.0	482.5	492.0	520.5	578.0	—
16	31.5	406.5	470.0	514.5	540.0	536.5	565.0	574.5	641.5	—
18	38.0	457.0	533.5	549.5	597.0	593.5	613.0	638.0	705.0	—
20	38.0	508.0	584.0	606.5	654.0	647.5	682.5	698.5	755.5	—
24	41.5	609.5	692.0	717.5	774.5	768.5	790.5	838.0	901.5	—

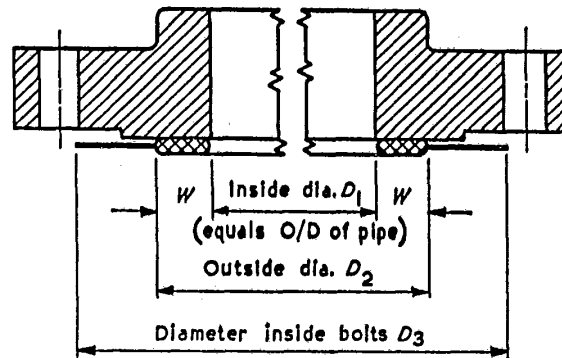
NOTE 1. Group 1 gaskets to dimensions D_1 and D_2 are only suitable for use with raised and large male/female facings.NOTE 2. Diameters D_3 are equal to flange bolt circle diameters less one bolt diameter and are for use where it is desired to extend the gaskets to the flange bolts or to provide centring rings. If required by the purchaser diameters D_3 may be made 3.2 mm less than indicated.

NOTE 3. If desired, the inside diameter of a Group 1 gasket to this table may be made equal to the pipe inside diameter or to the bore of an integral, welding-neck or socket-welding flange. The outside diameter of the gasket shall not, however, be reduced except as provided for in Note 4.

NOTE 4. Variations in diameters D_1 and D_2 , which tend to reduce bolt loads and flange moments by reducing the gasket contact width, may be made provided that due consideration is given to the stability of the gasket under high bolt loads. Such variations may be desirable in the case of edge-(spiral-) wound gaskets, in regard to which reference should be made to BS 3381, 'Metallic spiral-wound gaskets for the petroleum

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TABLE 29. GROUP 2 GASKETS
DIMENSIONS OF GASKETS FOR RAISED FACINGS
(See Notes 1 to 4)



Maximum contact width W = width of large tongue facing

1	2	3	4	5	6	7	8	9	10	11
Nominal pipe size	Gasket contact width (max.) W	Gasket inside diameter (see Note 3) D_1	Gasket outside diameter D_2	Diameter inside bolts D_3 (see Note 2)						
				Class						
				150	300	400	600	900	1500	2500
in	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
$\frac{1}{2}$	5.0	21.5	31.0	47.5	54.0	54.0	54.0	63.5	63.5	70.0
$\frac{3}{4}$	5.0	27.0	36.5	57.0	66.5	66.5	66.5	70.0	70.0	76.0
1	6.5	33.5	46.0	66.5	73.0	73.0	73.0	79.5	79.5	85.5
*1 $\frac{1}{4}$	8.0	42.0	58.0	76.0	82.5	82.5	82.5	89.0	89.0	105.0
1 $\frac{1}{2}$	9.5	48.5	67.5	85.5	95.0	95.0	95.0	98.5	98.5	117.5
2	9.5	60.5	79.5	105.0	111.0	111.0	111.0	143.0	143.0	146.0
*2 $\frac{1}{2}$	9.5	73.0	92.0	124.0	130.0	130.0	130.0	165.0	165.0	168.5
3	9.5	89.0	108.0	136.5	149.0	149.0	149.0	168.5	174.5	197.0
*3 $\frac{1}{2}$	9.5	101.5	120.5	162.0	165.0	162.0	162.0	—	—	—
4	12.5	114.5	139.5	174.5	181.0	178.0	193.5	206.5	209.5	235.0
*5	12.5	141.5	166.5	197.0	216.0	212.5	241.5	247.5	254.0	279.5
6	12.5	168.5	193.5	222.0	251.0	247.5	266.5	289.0	282.5	317.5
8	16.0	219.0	251.0	279.5	308.0	305.0	320.5	359.0	352.5	387.5
10	19.0	273.0	311.0	339.5	362.0	359.0	400.0	435.0	435.0	476.0
12	19.0	324.0	362.0	409.5	422.5	419.0	457.0	498.5	520.5	549.5
14	19.0	355.5	393.5	451.0	486.0	482.5	492.0	520.5	578.0	—
16	22.0	406.5	451.0	514.5	540.0	536.5	565.0	574.5	641.5	—
18	22.0	457.0	501.5	549.5	597.0	593.5	613.0	638.0	705.0	—
20	25.5	508.0	559.0	606.5	654.0	647.5	682.5	698.5	755.5	—
24	25.5	609.5	660.5	717.5	774.5	768.5	790.5	838.0	901.5	—

NOTE 1. Group 2 gaskets to dimensions D_1 and D_2 are suitable for use with raised facings where users prefer these narrow gaskets to be located close to the pipe bore, thus keeping the pressure area to a minimum and giving maximum flexibility to the flanged joint.

Dimensions D_1 and D_2 are not suitable for gaskets for large male/female and large tongue/groove facings (for dimensions of which reference should be made to Tables 28, 30 and 32).

NOTE 2. Diameters D_3 are equal to flange bolt circle diameters less one bolt diameter. They apply only where a gasket is provided with a centring device. If required by the purchaser diameters D_3 may be made 3.2 mm less than indicated.

NOTE 3. If desired, the inside diameter of a Group 2 gasket to this table may be made equal to the pipe inside diameter or to the bore of an integral, welding-neck or socket-welding flange. The gasket contact width shall, however, in no case exceed that shown in the table.

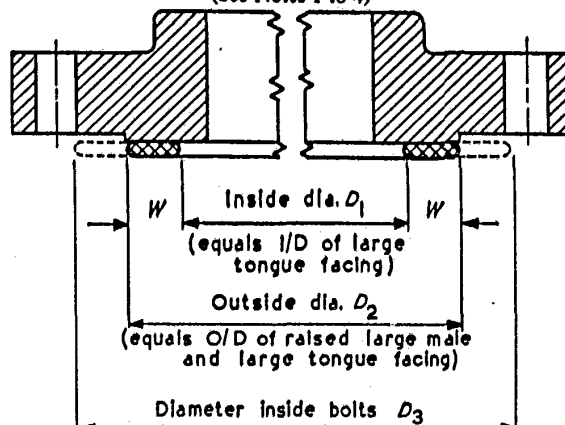
NOTE 4. Variations in diameters D_1 and D_2 , which tend to reduce bolt loads and flange moments by reducing the gasket contact width, may be made provided that due consideration is given to gasket stability under high bolt loads.

As a general rule the contact area of a non-metallic gasket should not be less than the total cross-sectional area of the relevant flange bolts.

• The use of these sizes should be avoided.

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TABLE 30. GROUP 2 GASKETS
DIMENSIONS OF GASKETS FOR RAISED, LARGE TONGUE/GROOVE AND
LARGE MALE/FEMALE FACINGS
(See Notes 1 to 4)

Maximum contact width W = width of large tongue facing

1	2	3	4	5	6	7	8	9	10	11
Nominal pipe size	Gasket contact width (max.) W	Gasket inside diameter D_1	Gasket outside diameter D_2	Diameter inside bolts D_3 (see Note 2)						
				Class						
				150	300	400	600	900	1500	2500
in	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
$\frac{1}{2}$	5.0	25.5	35.0	47.5	54.0	54.0	54.0	63.5	63.5	70.0
$\frac{3}{4}$	5.0	33.5	43.0	57.0	66.5	66.5	66.5	70.0	70.0	76.0
1	6.5	39.0	51.0	66.5	73.0	73.0	73.0	79.5	79.5	85.5
*1 $\frac{1}{4}$	8.0	47.5	63.5	76.0	82.5	82.5	82.5	89.0	89.0	105.0
1 $\frac{1}{2}$	9.5	54.0	73.0	85.5	95.0	95.0	95.0	98.5	98.5	117.5
2	9.5	73.0	92.0	105.0	111.0	111.0	111.0	143.0	143.0	146.0
*2 $\frac{1}{2}$	9.5	85.5	105.0	124.0	130.0	130.0	130.0	165.0	165.0	168.5
3	9.5	108.0	127.0	136.5	149.0	149.0	149.0	168.5	174.5	197.0
*3 $\frac{1}{2}$	9.5	120.5	139.5	162.0	165.0	162.0	162.0	—	—	—
4	12.5	132.0	157.0	174.5	181.0	178.0	193.5	206.5	209.5	235.0
*5	12.5	160.5	185.5	197.0	216.0	212.5	241.5	247.5	254.0	279.5
6	12.5	190.5	216.0	222.0	251.0	247.5	266.5	289.0	282.5	317.5
8	16.0	238.0	270.0	279.5	308.0	305.0	320.5	359.0	352.5	387.5
10	19.0	286.0	324.0	339.5	362.0	359.0	400.0	435.0	435.0	476.0
12	19.0	343.0	381.0	409.5	422.5	419.0	457.0	498.5	520.5	549.5
14	19.0	374.5	412.5	451.0	486.0	482.5	492.0	520.5	578.0	—
16	22.0	425.5	470.0	514.5	540.0	536.5	565.0	574.5	641.5	—
18	22.0	489.0	533.5	549.5	597.0	593.5	613.0	638.0	705.0	—
20	25.5	533.5	584.0	606.5	654.0	647.5	682.5	698.5	755.5	—
24	25.5	641.5	692.0	717.5	774.5	768.5	790.5	838.0	901.5	—

NOTE 1. Group 2 gaskets to dimensions D_1 and D_2 are suitable for use with raised facings as alternatives to gaskets to the dimensions given in Table 29. They are also suitable for use with large tongue/groove and large male/female facings.

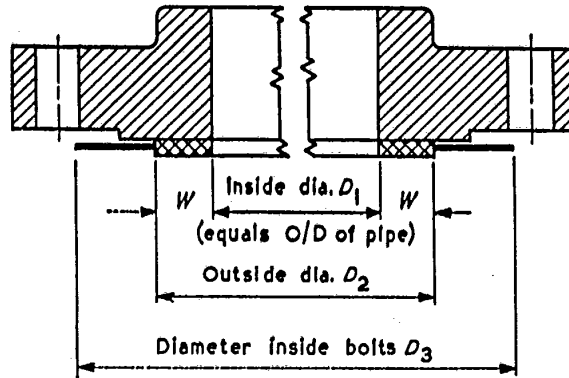
NOTE 2. Diameters D_3 are equal to flange bolt circle diameters less one bolt diameter. They apply only to gaskets for use with raised facings where it is desired to extend the gaskets to the flange bolts. If required by the purchaser diameters D_3 may be made 3.2 mm less than indicated.

NOTE 3. Where Group 2 gaskets to this table are required for large tongue/groove facings, no variation in the contact width W is permissible.

NOTE 4. For raised and large male/female facings variations in diameters D_1 and D_2 , which tend to reduce bolt loads and flange moments by reducing the gasket contact width, may be made provided that due consideration is given to gasket stability under high bolt loads.

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TABLE 31. GROUP 3 GASKETS
DIMENSIONS OF GASKETS FOR RAISED FACINGS
 (See Notes 1 and 3)



Maximum contact width W = width of small tongue facing minus 0.8 mm but not less than 4.8 mm

1	2	3	4	5	6	7	8	9	10	11
Nominal pipe size	Gasket contact width (max.) W	Gasket inside diameter D_1	Gasket outside diameter D_2	Diameter inside bolts D_3 (see Note 2)						
				Class						
				150	300	400	600	900	1500	2500
in	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
$\frac{1}{2}$	5.0	21.5	31.0	47.5	54.0	54.0	54.0	63.5	63.5	70.0
$\frac{3}{4}$	5.0	27.0	36.5	57.0	66.5	66.5	66.5	70.0	70.0	76.0
1	5.0	33.5	43.0	66.5	73.0	73.0	73.0	79.5	79.5	85.5
* $1\frac{1}{4}$	5.0	42.0	51.5	76.0	82.5	82.5	82.5	89.0	89.0	105.0
$1\frac{1}{2}$	5.0	48.5	58.0	85.5	95.0	95.0	95.0	98.5	98.5	117.5
2	5.0	60.5	70.0	105.0	111.0	111.0	111.0	143.0	143.0	146.0
* $2\frac{1}{2}$	5.0	73.0	82.5	124.0	130.0	130.0	130.0	165.0	165.0	168.5
3	5.0	89.0	98.5	136.5	149.0	149.0	149.0	168.5	174.5	197.0
* $3\frac{1}{2}$	5.0	101.5	111.0	162.0	165.0	162.0	162.0	—	—	—
4	5.5	114.5	125.5	174.5	181.0	178.0	193.5	206.5	209.5	235.0
*5	5.5	141.5	152.5	197.0	216.0	212.5	241.5	247.5	254.0	279.5
6	5.5	168.5	179.5	222.0	251.0	247.5	266.5	289.0	282.5	317.5
8	7.0	219.0	233.5	279.5	308.0	305.0	320.5	359.0	352.5	387.5
10	8.5	273.0	290.5	339.5	362.0	359.0	400.0	435.0	435.0	476.0
12	8.5	324.0	341.5	409.5	422.5	419.0	457.0	498.5	520.5	549.5
14	8.5	355.5	373.0	451.0	486.0	482.5	492.0	520.5	578.0	—
16	10.5	406.5	427.0	514.5	540.0	536.5	565.0	574.5	641.5	—
18	10.5	457.0	478.0	549.5	597.0	593.5	613.0	638.0	705.0	—
20	12.0	508.0	532.0	606.5	654.0	647.5	682.5	698.5	755.5	—
24	12.0	609.5	633.5	717.5	774.5	768.5	790.5	838.0	901.5	—

NOTE 1. Group 3 gaskets to dimensions D_1 and D_2 are suitable for use with raised facings where users prefer these narrow gaskets to be located close to the pipe bore, thus keeping the pressure area to a minimum and giving maximum flexibility to the flanged joint.

Dimensions D_1 and D_2 are not suitable for gaskets for large and small tongue/groove facings or for large male/female facings.

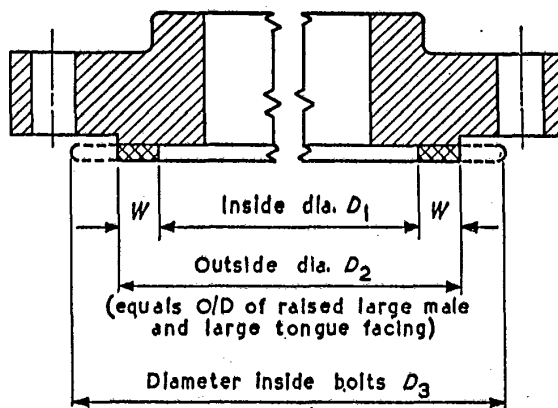
NOTE 2. Diameters D_3 are equal to flange bolt circle diameters less one bolt diameter. They apply only where a gasket is provided with a centring device. If required by the purchaser diameters D_3 may be made 3.2 mm less than indicated.

NOTE 3. If desired, the inside diameter of a Group 3 gasket to this table may be made equal to the pipe inside diameter or to the bore of an integral, welding-neck or socket-welding flange. The gasket contact width shall, however, in no case exceed that shown in the table.

* The use of these sizes should be avoided.

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TABLE 32. GROUP 3 GASKETS
DIMENSIONS OF GASKETS FOR RAISED, LARGE TONGUE/GROOVE AND
LARGE MALE/FEMALE FACINGS
(See Notes 1 and 2)



Maximum contact width W = width of small tongue facing minus 0.8 mm but not less than 4.8 mm

1	2	3	4	5	6	7	8	9	10	11
Nominal pipe size	Gasket contact width (max.) W	Gasket inside diameter D_1	Gasket outside diameter D_2	Diameter inside bolts D_3 (see Note 2)						
				Class						
				150	300	400	600	900	1500	2500
in	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
$\frac{1}{2}$	5.0	25.5	35.0	47.5	54.0	54.0	54.0	63.5	63.5	70.0
$\frac{3}{4}$	5.0	33.5	43.0	57.0	66.5	66.5	66.5	70.0	70.0	76.0
1	5.0	41.5	51.0	66.5	73.0	73.0	73.0	79.5	79.5	85.5
*1 $\frac{1}{2}$	5.0	54.0	63.5	76.0	82.5	82.5	82.5	89.0	89.0	105.0
1 $\frac{3}{4}$	5.0	63.5	73.0	85.5	95.0	95.0	95.0	98.5	98.5	117.5
2	5.0	82.5	92.0	105.0	111.0	111.0	111.0	143.0	143.0	146.0
*2 $\frac{1}{2}$	5.0	95.0	105.0	124.0	130.0	130.0	130.0	165.0	165.0	168.5
3	5.0	117.5	127.0	136.5	149.0	149.0	149.0	168.5	174.5	197.0
*3 $\frac{1}{2}$	5.0	130.0	139.5	162.0	165.0	162.0	162.0	—	—	—
4	5.5	146.0	157.0	174.5	181.0	178.0	193.5	206.5	209.5	235.0
*5	5.5	174.5	185.5	197.0	216.0	212.5	241.5	247.0	254.0	279.5
6	5.5	205.0	216.0	222.0	251.0	247.5	266.5	289.0	282.5	317.5
8	7.0	255.5	270.0	279.5	308.0	305.0	320.5	359.0	352.5	387.5
10	8.5	306.5	324.0	339.5	362.0	359.0	400.0	435.0	435.0	476.0
12	8.5	363.5	381.0	409.5	422.5	419.0	457.0	498.5	520.5	549.5
14	8.5	395.5	412.5	451.0	486.0	482.5	492.0	520.5	578.0	—
16	10.5	449.5	470.0	514.5	540.0	536.5	565.0	574.5	641.5	—
18	10.5	513.0	533.5	549.5	597.0	593.5	613.0	638.0	705.0	—
20	12.0	560.5	584.0	606.5	654.0	647.5	682.5	698.5	755.5	—
24	12.0	668.5	692.0	717.5	774.5	768.5	790.5	838.0	901.5	—

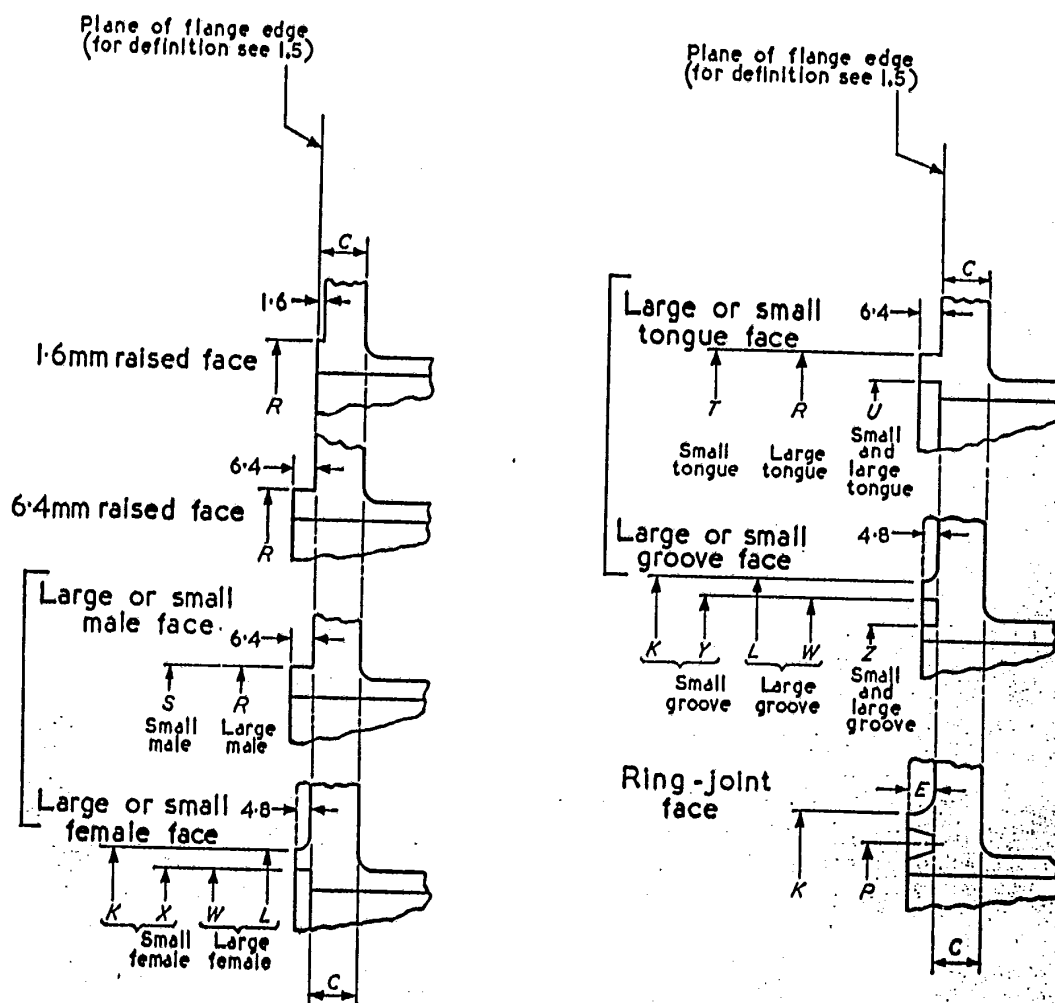
NOTE 1. Group 3 gaskets to dimensions D_1 and D_2 are suitable for use with raised facings as alternatives to gaskets to the dimensions given in Table 31. They are also suitable for use with large tongue/groove and large male/female facings.

Dimensions D_1 and D_2 are not suitable for gaskets for small tongue/groove facings.

NOTE 2. Diameters D_3 are equal to flange bolt circle diameters less one bolt diameter. They apply only to gaskets for use with raised facings where it is desired to extend the gaskets to the flange bolts. If required by the purchaser diameters D_3 may be made 3.2 mm less than indicated.

* The use of these sizes should be avoided.

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All dimensions in millimetres

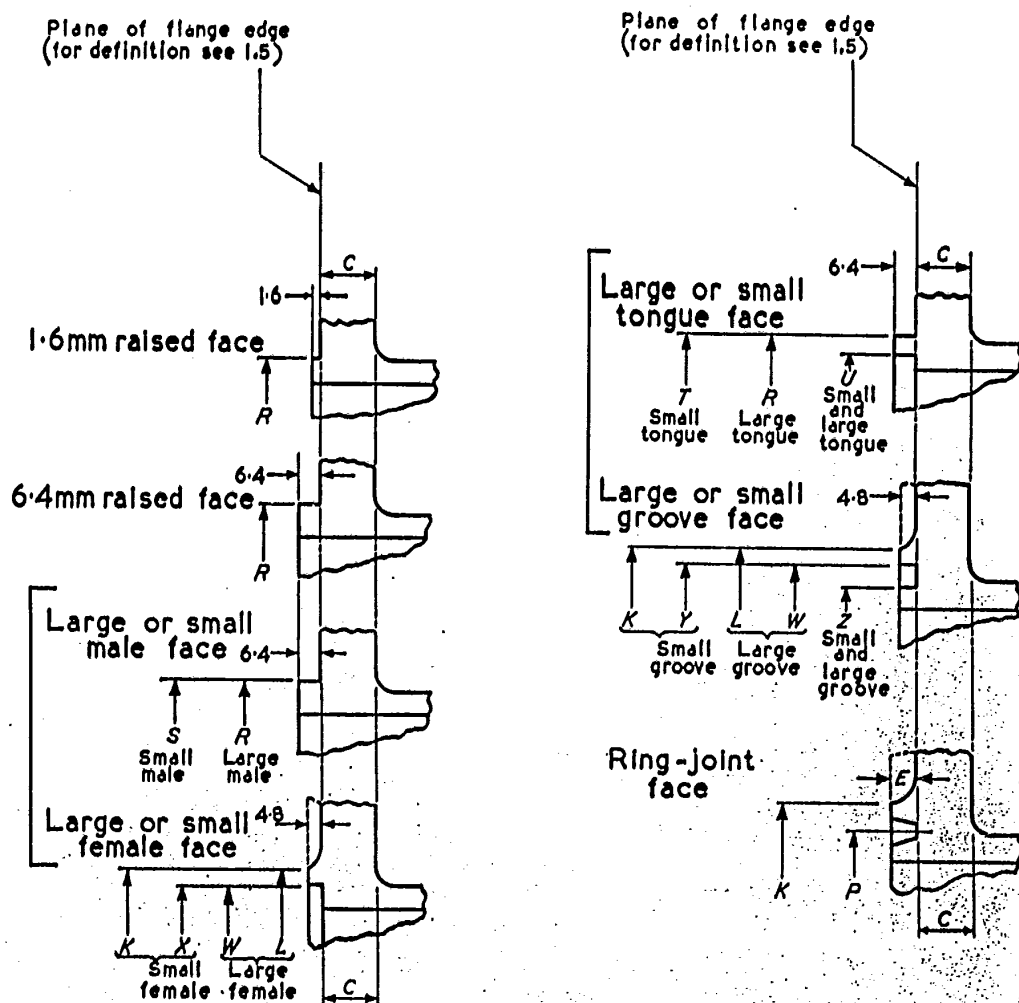
NOTE 1. For dimensions $K, L, R, S, T, U, W, X, Y, Z$ and other details for facings other than ring-joint, see Table 2 and 3.3 and 3.5.NOTE 2. For dimensions E, K, P and other details of ring-joint facings, see Tables 3 and 4 and 3.3 and 3.5.NOTE 3. C = Minimum flange thickness. See Tables 11 and 13 and Note 6 to Table 11 regarding the thickness of certain sizes of Class 150 integral flanges.

NOTE 4. Dotted lines indicate 'full-face'; for permissible applications, see 3.3.2 and 3.3.3.

NOTE 5. Large male and female faces are not applicable to Class 150 because of potential dimensional conflicts.

Fig. 1. Flange facings, Classes 150 and 300 only, for other than lapped-type joints

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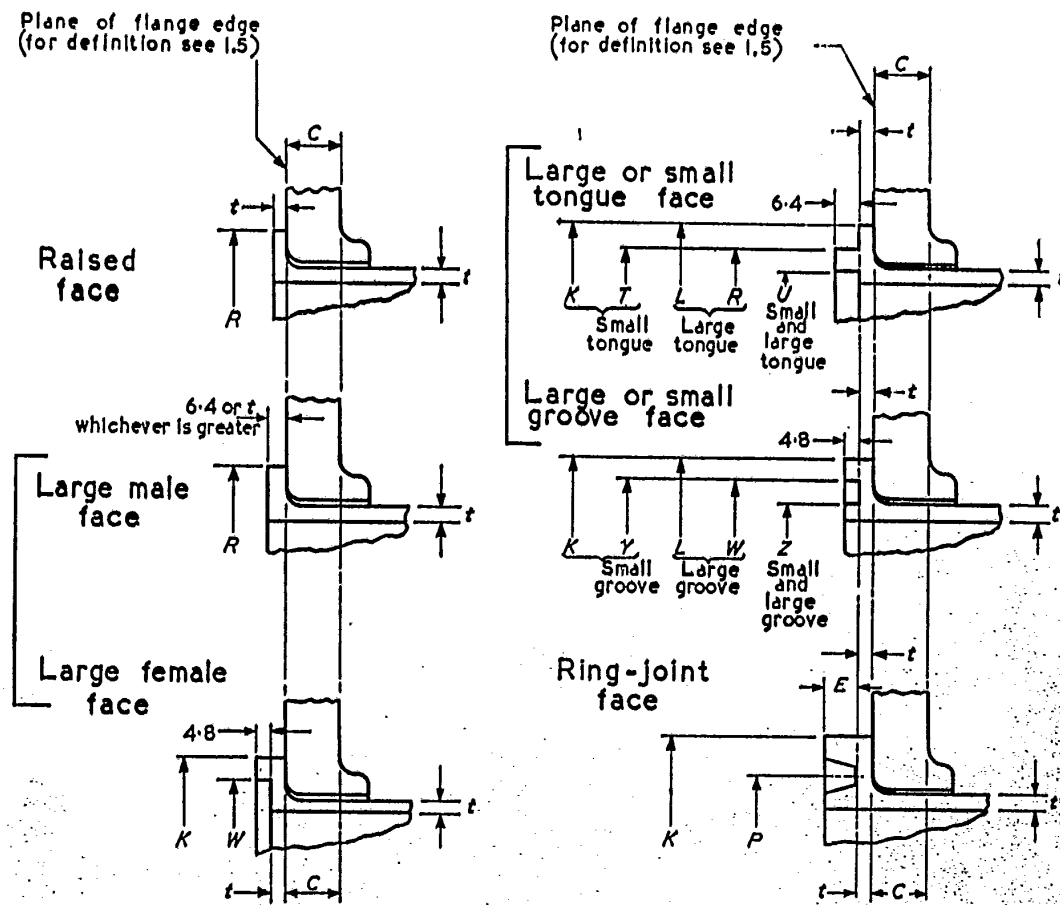
All dimensions in millimetres

NOTE 1. For dimensions $K, L, R, S, T, U, W, X, Y, Z$ and other details for facings other than ring-joint, see Table 2 and 3.3, and 3.5.NOTE 2. For dimensions E, K, P and other details of ring-joint facings, see Tables 5 to 9 and 3.3, and 3.5.NOTE 3. C = Minimum flange thickness. See Tables 15, 17, 19, 21 and 23.

NOTE 4. Dotted lines indicate 'full-face'; for permissible applications, see 3.3.2 and 3.3.3.

Fig. 1. (Continued) Flange facings, Classes 400 to 2500, for other than lapped-type joints

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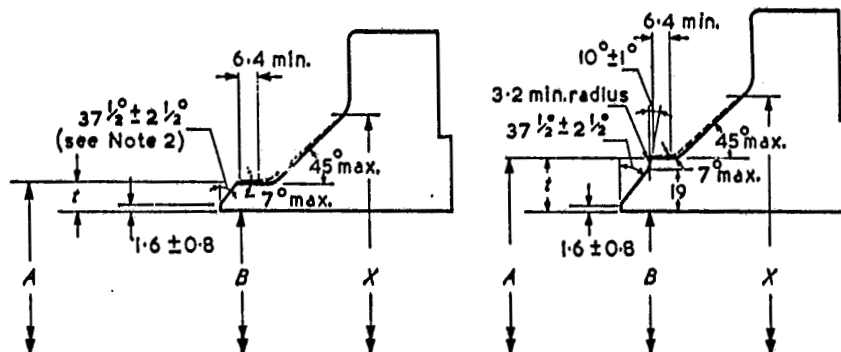


All dimensions in millimetres

NOTE 1. For dimensions K , L , R , T , U , W , Y , Z and other details for facings other than ring-joint, see Table 2 and 3.4 and 3.5.NOTE 2. For dimensions E , K , P and other details of ring-joint facings, see Tables 3 to 9 and 3.4 and 3.5.NOTE 3. C = Minimum flange thickness. See tables 11, 13, 15, 17, 19, 21 and 23.NOTE 4. t = Thickness of barrel of stub-end; see 3.4 and BS 1640, 'Steel butt-welding pipe fittings for the petroleum industry'.

Fig. 2. Facings for lapped-type joints

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All dimensions in millimetres

Fig. 3a. Bevel for pipe wall thicknesses (t) 4.8 mm up to and including 22.2 mm (see Note 2)Fig. 3b. Bevel for pipe wall thicknesses (t) greater than 22.2 mm

A = Nominal outside diameter of pipe
 B = Nominal inside diameter of pipe
 t = Nominal wall thickness of pipe

NOTE 1. These figures shall be read in conjunction with 3.10.

NOTE 2. For flanges required to connect with ferritic steel pipe of nominal wall thickness less than 4.8 mm the welding ends shall be finished to a slight chamfer or be square, at the option of the manufacturer.

For flanges required to connect with austenitic stainless steel pipe of nominal wall thickness 3.2 mm or less, the welding ends shall be finished to a slight chamfer.

NOTE 3. When flanges covered by this standard are intended for service with light wall, high strength pipe, the thickness of the hub at the bevel may be greater than that of the pipe to which the flange is joined. Under these conditions a single taper hub may be provided and the outside diameter of the hub at the base (dimension X) may be modified.

NOTE 4. For dimensions of welding-neck flanges see Tables 11, 13, 15, 17, 19, 21 and 23.

Fig. 3. Details of welding ends of welding-neck flanges

AMD 3331

Amendment Slip No. 1
published and effective from 31 July 1980
to BS 1560 : Part 2 : 1970

Steel pipe flanges and flanged fittings
(nominal sizes ½ in to 24 in)
for the petroleum industry
Part 2. Metric dimensions

Revised text

Page 2. References. Add the following as a further reference standard.
'ANSI B16.5 Steel pipe flanges and flanged fittings.'

Foreword. Add the following paragraph at the end of the foreword.

'This standard gives the service pressures permissible on the basis of stated grades of material and service temperature. Pending the completion of international agreement in ISO/TC 5/SC 10, Co-ordination of existing flange standards for pipeline systems, and having regard to the 1977 issue of ANSI B16.5, there may be advantages in applying the dimensional clauses of BS 1560 : Part 2 but adopting the pressure/temperature ratings of ANSI B16.5. BS 1560 : Part 2 will be comprehensively reviewed at the earliest opportunity.'

AMD 6018

Amendment No. 2
published and effective from 31 May 1989
to BS 1560 : Part 2 : 1970

Specification for steel pipe flanges
(Nominal sizes ½ in to 24 in)
for the petroleum industry
Part 2. Metric dimensions

Obsolescence and revised text

Title. On front cover, page 1 and page 5 delete the title and substitute the following in each case.

'Circular flanges for pipes, valves and fittings (Class designated)
Part 2. Specification for steel pipe flanges (nominal sizes ½ in to 24 in).
Metric dimensions'

Foreword (as amended by Amendment No. 1). At the end of the foreword insert the following new paragraph.

'Obsolescent (by Amendment No. 2)

This British Standard has been declared obsolescent and is not recommended for use in new equipment but needs to be retained for a period of 12 months after the date of publication of BS 1560 : Section 3.1 which replaces this standard. At the end of the 12 months period it is the intention to withdraw this British Standard.'

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