BRITISH STANDARD

BS 1560-3.1: 1989

Incorporating Amendment Nos. 1 and 2

Circular flanges for pipes, valves and fittings (Class designated) —

Part 3: Steel, cast iron and copper alloy flanges —

Section 3.1 Specification for steel flanges

UDC 621.643.4 – 034.14:669.13:669.35:621.643.411.412.8:001.4:006.3/.8

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Piping Systems Components Standards Policy Committee (PSE/-) to Technical Committee PSE/15, upon which the following bodies were represented:

British Chemical Engineering Contractors' Association
British Compressed Gases Association
British Fluid Power Association
British Foundry Association
British Gas plc
British Malleable Tube Fittings' Association
British Maritime Technology
British Non-ferrous Metals Federation
British Pump Manufacturers' Association
British Steel Industry
British Valve and Actuator Manufacturers' Association Ltd.
Combustion Engineering Association
Copper Development Association
Department of Trade and Industry (National Engineering Laboratory)
Ductile Iron Producers' Association
Electricity Supply Industry in England and Wales
Energy Industries Council
Engineering Equipment and Materials Users' Association
GAMBICA (BEAMA Ltd.)
High Pressure Pipework Consultative Committee
Institution of Gas Engineers
Institution of Mechanical Engineers
Institution of Production Engineers
Institution of Water and Environmental Management (IWEM)
Water Authorities Association

This British Standard, having been prepared under the direction of the Piping Systems Components Standards Policy Committee, was published under the authority of the Board of BSI and comes into effect on 30 June 1989

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The following BSI references relate to the work on this standard:
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Amendments issued since publication

Amd. No.	Date of issue	Comments
7557	June 1993	
8593	July 1995	Indicated by a sideline in the margin

Contents

Foreword

This Section of BS 1560 has been prepared under the direction of the Piping Systems Components Standards Policy Committee and constitutes the first revision of BS 1560-2:1970. BS 1560-2 will be withdrawn 12 months after the publication of this Section of BS 1560. For PN designated steel flanges, reference should be made to BS 4504-3.1.

It was originally intended that BS 1560-2:1970 would be superseded by a British Standard technically equivalent (or identical) to an International Standard for a single series of flanges when finalized by ISO[1)]/TC 5/SC 10, Metallic flanges and their joints. However, the International Standard has not been finalized but this revision of BS 1560-2:1970 incorporates the principles of the international work.

To align with the format of ISO 7005, BS 1560-3 will be published in three Sections.

— *Section 3.1: Specification for steel flanges*;

— *Section 3.2: Specification for cast iron flanges*[2)];

— *Section 3.3: Specification for copper alloy and composite flanges*.

BS 1560-2:1970 was based on American standard ANSI B16.5 published by the American National Standards Institute, and, until such time as ISO 7005-1[2)], Steel flanges is published, and BS 1560 is further revised, this Part of BS 1560 continues to specify steel flanges that are interchangeable with flanges made to ANSI B16.5.

In ANSI B16.5 some dimensions are rounded decimal inches; however, in Section of BS 1560, all metric dimensions have been calculated from the original ANSI B16.5 fractional inch sizes.

The flanges specified in this Section of BS 1560 are intended to be interchangeable with, but not necessarily identical in every detail to, steel flanges manufactured to BS 1560-2:1970.

This Section of BS 1560 differs from BS 1560-2:1970 for the content covering the steel flange requirements in the following respects.

a) In this Section of BS 1560 the descriptions of the various types of flanges have been augmented with code numbers. The code numbers adopted are based on the type numbers specified in ISO 7005-1.

b) Plate flanges for welding, for Class 150 designations only, are included for the first time.

c) The $3^1/_2$ in nominal size has been omitted.

d) Class 400 flanges have been omitted.

e) The pressure/temperature ratings are based on ANSI B16.5 and it should be noted that there are some differences to the ratings given in BS 1560-2:1970.

f) Materials specified have been revised, new materials added and reference is made to comparable ASTM[3)] materials. Generally, the range of materials corresponds to those given in ISO 7005-1.

g) All flange dimensions are within approximately 0.5 mm of the proposed International Standard and ANSI B16.5 metric dimensions so the flange dimensions of BS 1560-2:1970 generally have been retained. Inch dimensions have been retained for bolt holes to accommodate inch dimensioned bolts.

h) Due to minor differences in the dimensions of ring joint facings between BS 1560-2:1970, ANSI B16.5 and ISO 7005-1, the ring joint dimensions in this Section of BS 1560 have been re-calculated from the ANSI fractional inch sizes.

[1)] International Organization for Standardization.

[2)] In preparation.

[3)] American Society for Testing and Materials.

i) Tolerances have been compiled from requirements given in BS 1560-2:1970 and ISO 7005-1.

j) Requirements for the surface finish of flange faces have been given in greater detail.

k) The small spigot and recess flange facings (previously designated as small male and small female) and small tongue and groove facings have been omitted from this Section of BS 1560 since no requirements exist nationally. Therefore throughout this Section of BS 1560 reference is made to spigot/recess facings which correspond to the previously designated large male and large female and to tongue and groove facings which correspond to the previously designated large tongue and groove.

l) Spot facing or back facing complies with ISO 7005-1.

m) The marking of flanges is basically in accordance with the principles of ISO 7005-1 but limitations on the methods are included.

n) For threaded flanges, BS 21 thread form is specified in addition to ANSI/ASME B1.20.1 and API 5B.

o) Appendix A lists information that should be supplied by the purchaser when ordering flanges.

p) Guidance notes and recommendations contained in BS 1560-2:1970 and similar notes in ISO 7005-1 have been included in Appendix B. Appendix B is not intended to be exhaustive.

q) Since BS 1560-2:1970 was published the lengths of stud bolts and headed bolts have been increased by $^1/_4$ inch in ANSI B16.5 in many cases. These revised lengths have been incorporated in this Section of BS 1560 (see Appendix D). Furthermore, since bolt sizes are expressed in inches in this Section of BS 1560, it has been agreed that it is more logical to express the lengths of bolts in inches also.

r) For information, pipe dimensions for flanges are given in Appendix F. The nominal size of a flange is the same as the corresponding nominal pipe size.

s) Details of minimum hub radius after back facing are included.

t) This Section of BS 1560 specifies inch bolting only and the use of metric bolting is outside the scope of this Section of BS 1560. Appendix G gives the proposed metric bolt sizes to be used in lieu of the inch sizes specified, together with appropriate warnings.

u) The specification of gasket types, materials and dimensions previously contained in BS 1560-2:1970 have been omitted from this Section of BS 1560.

Dimensions of gaskets for use with steel flanges to BS 1560-3.1 are specified in the following British Standards.

BS 3381, *Specification for spiral-wound gaskets for use with steel flanges to BS 1560.*

BS 7076, *Dimensions of gaskets for flanges to BS 1560 — Part 1 Specification for non-metallic flat gaskets — Part 2 Specification for metallic ring-joint gaskets — Part 3 Specification for non-metallic envelope gaskets — Part 4 Specification for corrugated, flat or grooved metallic and filled metallic gaskets.*

For comparison purposes, the descriptions of flanges used in this Section of BS 1560 are compared with the descriptions given in Appendix H of BS 1560-2:1970.

Assessed capability. Users of this Section of BS 1560 are advised to consider the desirability of assessment and registration of a supplier's quality systems against the appropriate Part of BS 5750 by a third party certification body.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i to vi, pages 1 to 48, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

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1 Scope

This Section of BS 1560 specifies requirements for Class designated circular steel flanges of Class 150 to Class 2500 and in nominal sizes up to 24 in of the type given in Table 1.

Table 1 — Types of steel flange

Code no.[a]	Description
101	Plate flange for welding
105	Blank flange
111	Weld-neck flange
112	Hubbed slip-on flange for welding
113	Hubbed threaded flange
114	Hubbed socket-weld flange
115	Loose hubbed flange for lapped pipe end[b]
121	Integral flange

NOTE Flanges and facings may be designated by code number and facing letter or by description as given in Figure 1 and Figure 2 respectively.
[a] Code numbers have been made non-consecutive to permit possible future additions.
[b] Sometimes referred to in industry as lapped flange.

This Section of BS 1560 specifies types of steel flanges and their facings, dimensions, tolerances, threading, bolt sizes, flange face surface finish, marking, materials for bolting and flange materials together with associated pressure/temperature ratings.

The weld end preparation of weld-neck (code 111) flanges (see **7.4**) and the routine inspection and testing of flanges are outside the scope of this Section of BS 1560 but some guidance on maximum test pressure is given in Appendix B.

NOTE 1 To assist purchasers Appendix A lists information which should be supplied when ordering flanges.
NOTE 2 The titles of publications referred to in this standard are listed on the inside back cover.

2 Ranges of nominal sizes

The ranges of nominal sizes from $^1/_2$ to 24 applicable to each flange type and for each Class designation shall be as given in Table 2.

3 Class designations and pressure/temperature ratings

3.1 Class designations

The range of Class designations shall be as follows:

Class 150;
Class 300;
Class 600;
Class 900;
Class 1500;
Class 2500.

3.2 Pressure/temperature ratings

The pressure/temperature ratings of the flanges manufactured from the materials specified in Table 3 shall be as given in Table 16 to Table 21 for applicable materials and shall be the maximum allowable non-shock working gauge pressure at the temperature shown.

NOTE 1 Linear interpolation is permitted for intermediate temperatures. The relevant pressures and temperatures are those of the fluid in the pipework system.
NOTE 2 The rating of flanges is not necessarily the rating of the whole pipework system. Gasket materials can also impose limitations on the pressure/temperature rating of a flanged joint and the gasket manufacturer should be consulted when selecting the material of the gasket.

3.3 Rating of flanged joints

If two flanges in a flanged joint do not have the same pressure/temperature rating, the maximum permissible working pressure of the joint at any temperature shall not exceed the lower of the two pressure ratings.

4 Materials

4.1 Flange materials

Flanges shall be manufactured from materials selected from Table 3 except that codes 111, 112, 113, 114 and 115 flanges shall be manufactured from a forging or casting.

NOTE 1 The materials specified in Table 3 are tabulated in groups having common pressure/temperature ratings as given in Table 16 to Table 21.
NOTE 2 The purchaser should state in the enquiry and/or order if a certificate is required for the flange material (see Appendix A).

4.2 Requirements governing the use of ASTM materials

4.2.1 *General*. Flanges manufactured from materials conforming to ASTM specifications shall comply with the following additional requirements.

a) For material to ASTM A105;

1) when specified all forgings shall be normalized;

2) subclauses **4.2.2.1**, **4.2.2.2** and **4.2.2.3** shall apply.

b) For material to ASTM A182;

1) the carbon content, by ladle analysis, of grades F304L and F316L shall not exceed 0.030 %;

2) subclause **4.2.2.3** shall apply.

c) For material to ASTM A350;

subclauses **4.2.2.1** and **4.2.2.2** shall apply only to carbon manganese steels (grades LF1 and LF2).

Subclause **4.2.2.3** shall apply to carbon manganese and low-alloy steels (grade LF1, LF2 and LF3).

d) For material to ASTM A387;

1) when specified, all flanges and flanged fittings shall be supplied in the normalized and tempered condition;

2) subclause **4.2.2.3** shall apply.

NOTE The purchaser should state any specific requirements for the heat treatment condition on the enquiry and/or order (see Appendix A).

4.2.2 ***Carbon manganese and low alloy steels***

4.2.2.1 The carbon content by ladle analysis of the materials specified in **4.2.1** shall not exceed 0.23 % for plate and 0.25 % for forgings.

4.2.2.2 The carbon equivalent (CE_1) by ladle analysis of the materials specified in **4.2.1** shall not exceed 0.42

where:

$$CE_1 = C + \frac{Mn}{6}$$

The manufacturer shall ensure on a basis of regular production checks that the carbon equivalent (CE_2) by ladle analysis does not exceed 0.45 where:

$$CE_2 = C + \frac{Mn}{6} + \frac{Cr + Mo + V}{5} + \frac{Cu + Ni}{15}$$

4.2.2.3 The actual tensile strength of the steel of any component shall not exceed the minimum required by the relevant specification by more than 150 N/mm^2.

4.2.3 *Chromium-molybdenum steels.* [Applicable to material groups 1.9, 1.10, 1.13 and 1.14 (see Table 3).] For chromium-molybdenum steels the contents of carbon and residual elements shall be restricted as follows.

a) *Carbon content:*

steels with less than 2 % Cr (nominal):

0.17 % max. (plate)

0.20 % max. (forgings and castings)

steels with more than 2 % Cr (nominal):

0.15 % max. (plate)

0.15 % max. (forgings and castings)

b) *Residual elements:*

Copper	0.30 % max.
Nickel	0.40 % max.
Tungsten	0.10 % max.
Tin	0.03 % max.

4.3 Non-metallic materials

For flanges which are lined, or otherwise coated, with non-metallic materials and if the non-metallic materials come, or are likely to come, into contact with potable water then these materials shall comply with BS 6920-1.

NOTE Users should be aware that thread sealants or lubricants, for example, should also comply with BS 6920-1 if used in potable water applications.

5 Bolting

5.1 Materials, dimensions and finish for bolting shall comply with BS 1768, BS 1769 or BS 4882.

NOTE Where Class 150 or Class 300 steel flanges are bolted to cast iron flanges, the specified minimum yield strength of the bolt material should not exceed 240 N/mm^2.

5.2 Studbolts shall comply with BS 4882 except that the form shown in Figure 3 (b) of BS 4882 shall only apply to studbolts of materials other than alloy steel.

5.3 Bolt diameters shall be as given in Table 9 to Table 14. Appendix C gives a method for determining the recommended bolt length for lapped-type joints.

Appendix D gives recommended bolt lengths for flanges other than lapped-type.

6 Repairs

Repairs by welding shall be permitted unless otherwise prohibited by the applicable material standard, or product standard in the case of integral flanges, and shall comply with BS 2633, BS 4570 or BS 5135 as appropriate.

NOTE The welding procedure should be such as to produce a weld having characteristics in accordance with the parent material.

Flanges should be heat treated after repair by welding when the material specification requires such treatment.

7 Dimensions

7.1 Flange dimensions

Dimensions [except for dimension *G* (see note 4)] for each type of flange, other than reducing flanges for each Class designation shall be as given in Table 9 to Table 14, as qualified by clause **9** and the notes to Table 9 to Table 14, if appropriate.

NOTE 1 For reducing flanges see **7.5**.

NOTE 2 It is incumbent upon the purchaser to specify in the enquiry and/or order if dimensions of flanges are to be affected by clause **9** and/or the notes to Table 9 to Table 14.

NOTE 3 A summary of the various types of flanges specified showing the nominal sizes applicable to each type and Class designation is given in Table 2.

NOTE 4 The centre portion of the face of a blank flange (code 105) need not be machined, provided that the diameter of the unmachined portion does not exceed the recommended shoulder diameter, *G*, given in Table 9 to Table 14.

7.2 Hubs

The hubs of slip-on flanges for welding (code 112), threaded flanges (code 113), socket-weld flanges (code 114) and loose flanges for lapped pipe end (code 115) shall be either:

a) parallel; or

b) have a draft angle of not more than 7° on the outside surface for forging or casting purposes.

7.3 Threaded flanges

7.3.1 The threads of hubbed threaded flanges (code 113) shall be taper or parallel complying with BS 21, or taper complying with ANSI/ASME B1.20.1 or API Std.5B.

NOTE ANSI/ASME B1.20.1 threads will be supplied unless the purchaser specifies otherwise (see Appendix A).

7.3.2 Threads shall extend to the flange face and shall be concentric with the axis of the flange. Misalignment shall not exceed 5 mm/m.

Class 150 flanges shall be manufactured without a counterbore, but to protect the threads, the threads shall be chamfered to the major diameter of the thread at the back of the flange at an angle between 40° and 50° with the axis of the thread. The chamfer shall be concentric with the thread, and shall be included in the measurement of the thread length provided that the chamfer does not exceed one pitch in length.

Class 300, 600, 900, 1500 and 2500 flanges shall be provided with a counterbore as indicated in Table 10 to Table 14, and the thread shall be chamfered to an angle between 40° and 50° 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.

7.3.3 Gauging shall comply with BS 21, ANSI/ASME B1.20.1 or API Std.5B, as appropriate.

7.4 Weld-neck flanges

For weld-neck flanges (code 111) the thickness of the hub at the welding end shall never be less than 87.5 % of the nominal thickness of the pipe to which the flange is attached (see Appendix A).

NOTE The weld end preparation of weld-neck flanges is outside the scope of this Section of BS 1560. However, Appendix E gives details of various weld end preparations and it is incumbent upon the purchaser to specify a particular weld end preparation, if required. The weld end preparation shown in Figure 16(a) or Figure 16(b) is the type of preparation normally supplied.

7.5 Reducing flanges (flanges of reduced bore)

7.5.1 *General.* Flange bolt holes, outside diameters, thickness and the facings of reducing flanges shall be the same as those of the normal flange of the size from which the reduction is being made.

7.5.2 ***Hub dimensions***

7.5.2.1 *Threaded and slip-on flanges.* The hub dimensions of hubbed threaded (code 113) and slip-on flanges for welding (code 112) shall be at least as large as those of the normal flange of the size to which the reduction is being made. It shall be permitted for the hub to be omitted in certain reducing flanges (see Figure 3).

7.5.2.2 *Weld-neck flanges.* The hub dimensions of weld-neck flanges (code 111) having a reduced bore shall be the same as those of the normal flange of the size to which the reduction is being made.

7.6 Bolt holes

Bolt holes shall be equally spaced on the pitch circle diameter, and in the case of integral flanges, shall be positioned off-centre.

8 Flange facings

8.1 Range of facings

The range of flange facings and flange face designations are given in Figure 2. Dimensions of facings shall be as given in Figure 4, Figure 5, Figure 6 and Figure 7 and Table 5 and Table 6.

8.2 Facing dimensions for other than lapped-type joints

NOTE Facing dimensions for other than lapped-type flange joints apply to flange facings of the 1.6 mm and 6.4 mm high raised face types, the spigot/recess type and tongue/groove type and the ring-joint type (see Figure 4 and Figure 5).

Flanges with recess or groove facing or ring-joint groove shall be either raised face or flat face (see Appendix A and Appendix B).

8.3 Facing dimensions for lapped-type joints

Facings for lapped-type joints (see Figure 6) shall be one of the following types (see Appendix A):

a) raised face (type B),

b) tongue/groove (types C and D);

c) spigot/recess (types E and F);

d) ring-joint (type J).

The facings shall comply with **8.1**. The dimension *t*, indicated in Figure 6, shall be not less than the minimum thickness of the barrel of the stub-end, except that in the case of a spigot or tongue facing the dimension *t* shall be not less than 6.4 mm.

Stub-ends for lapped-type joints shall comply with BS 1640 or ANSI B16.9, as appropriate.

8.4 Flange thickness

In no case, regardless of the type of facing and the tolerances permitted, shall the thickness of a flange be reduced at any point in order to provide adequate height for the facing or adequate depth for the groove.

For Class 150 and Class 300 flanges the 1.6 mm raised face is included in the flange thickness and the heights of other types of faces or depth of groove shall be additional to and shall not reduce the minimum thickness of these flanges (see Figure 4).

8.5 Facing finishes

8.5.1 All flange jointing faces shall be machine finished and, when compared by visual or tactile means with reference specimens, shall comply with the values given in Table 7 and Table 8.

NOTE 1 It is not intended that instrument measurements be taken on the faces themselves and the R_a and R_z values as defined in BS 1134 relate to the reference specimens.

NOTE 2 Requirements for special coatings or finishes should be stated in the enquiry and/or order so that an appropriate allowance may be incorporated in the machining of any relevant mating dimensions (see Appendix A).

8.5.2 Flat face, raised face and spigot/recess facings types A, B, E and F shall be machined to comply with Table 7.

8.5.3 For tongue and groove and ring-joint facings types C, D and J, the gasket contact surfaces shall be machined to produce a surface finish complying with Table 8.

9 Spot facing or back facing of flanges

Any spot facing or back facing shall not reduce the flange thickness to less than the thickness specified. When spot facing is used the diameter shall be large enough to accommodate the outside diameter of the equivalent normal series of washers complying with BS 3410 for the inch bolt size being fitted. The bearing surfaces for the bolting shall be parallel to the flange face within the limits given in Table 15.

When a flange is back faced a minimum fillet radius at the hub, as shown in Figure 14, shall be maintained as given in Table 22.

10 Tolerances

Flanges shall comply with the tolerances specified in Table 15.

11 Marking

11.1 Flanges other than integral flanges (see also **11.5**)

All flanges other than integral flanges shall be marked as follows:

a) the number of this British Standard, i.e. BS 1560[4)];

b) flange code number, e.g. 112;

c) Class designation, e.g. 300;

d) nominal size (inch), e.g.4. Both sizes shall be included for reducing flanges, e.g. 4/3;

e) material designation using the material group, British Standard grade of material or identification symbols given in Table 3;

f) manufacturer's name or trade mark;

g) cast number or melt identification or suitable quality control number traceable to the cast number;

h) thread identification (see **11.2**).

Example. BS 1560/111 – 150 – 2 – 1.2 – XXX – 12345.

11.2 Thread identification

Threaded flanges shall be marked to indicate the type of thread used. Flanges with threads to BS 21 shall be marked Rc or Rp as appropriate followed by the nominal size of the thread, e.g. Rc $^3/_4$. Flanges with threads to ANSI/ASME B1.20.1 shall be marked with the nominal size of thread, number of threads per inch and the letters NPT, e.g. $^3/_4$-14 NPT. Flanges with threads to API Std 5B shall be marked with API.

11.3 Ring groove number

Flanges grooved for standard ring-joints shall be marked with the letter R and the corresponding ring groove number (see Table 6).

11.4 Stamping

When steel stamps are used, the marking shall be positioned on the rim of the flange.

NOTE Care should be taken to ensure that steel stamp markings are not liable to cause cracks in the flange material.

11.5 Omission of markings

If a flange is too small to enable all the markings required in **11.1** to be marked on the flange, then it is permitted to omit some of the markings. The order in which the markings are omitted shall be as follows:

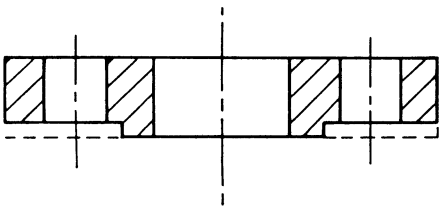
a) size;

b) thread type and designation;

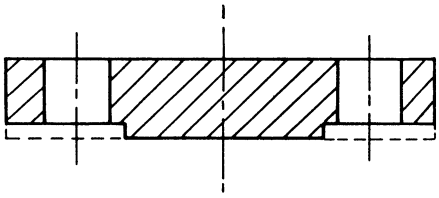
c) Class designation;

d) manufacturer's name or trade mark.

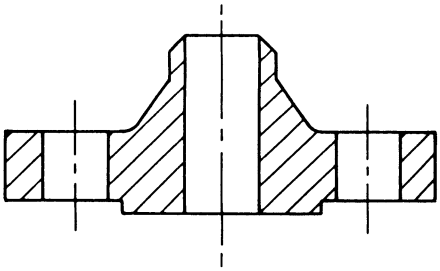
[4)] Marking BS 1560, together with the flange code number, on or in relation to a product represents a manufacturer's declaration of conformity, ie a claim by or on behalf of the manufacturer that the product meets the requirements of this Section of BS 1560. The accuracy of the claim is therefore solely the responsibility of the person making the claim. Such a declaration is not to be confused with third party certification of conformity, which may also be desirable.



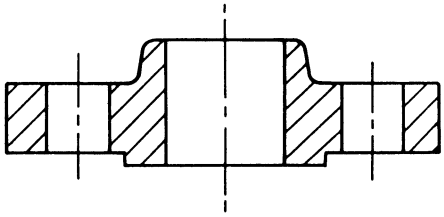
Code 101
Plate flange for welding



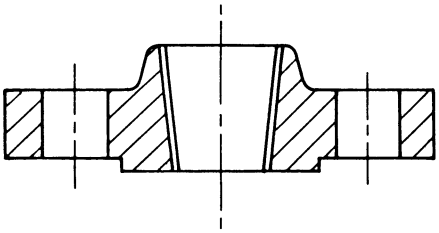
Code 105
Blank flange



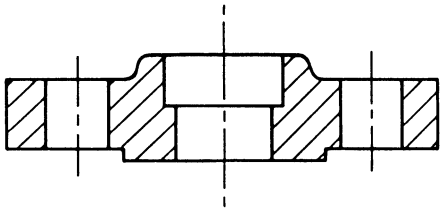
Code 111
Weld-neck flange



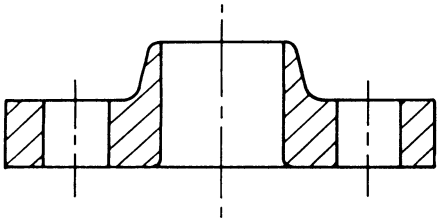
Code 112
Hubbed slip-on flange for welding



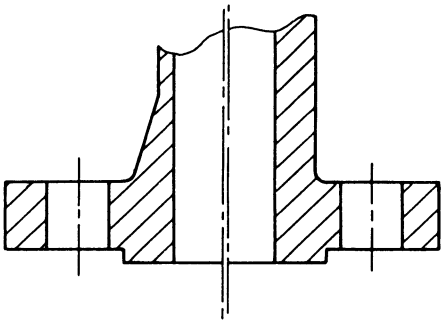
Code 113
Hubbed threaded flange



Code 114
Hubbed socket weld flange



Code 115
Loose hubbed flange for lapped pipe end

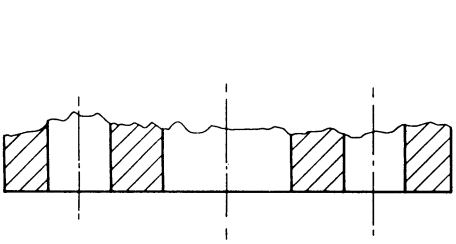


Code 121
Integral flange

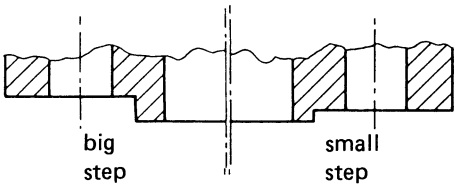
NOTE These sketches are diagrammatic only.

NOTE 1 Codes 101 and 105 comprise flanges that do not incorporate a hub or weld-neck.
NOTE 2 Codes 111 to 115 comprise flanges incorporating a hub or weld-neck and manufactured from forgings or castings.
NOTE 3 Code 121 is an integral part of some other equipment or component.
NOTE 4 Flanges may be designated by code numbers or by descriptions.

Figure 1 — Flange codes

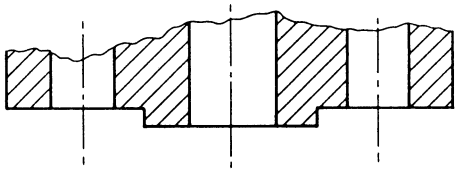


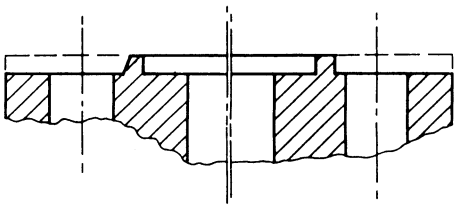
Type A
Flat face



Type B
Raised face

Type E
Spigot

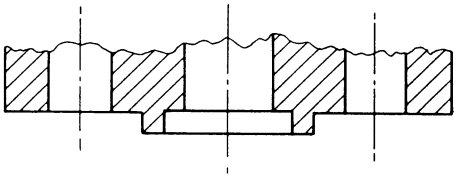


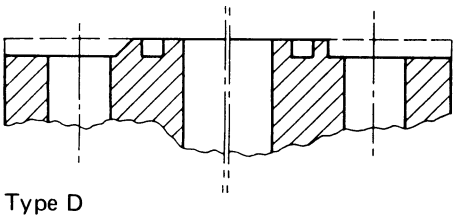


Type F
Recess

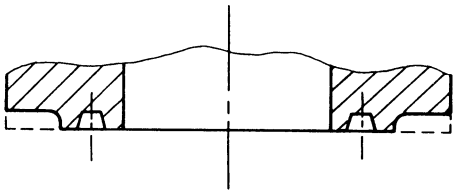
NOTE 1 When provided with a 6.4 mm raised face, type B is identical to type E.

Type C
Tongue





Type D
Groove

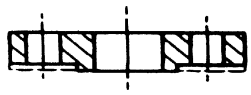
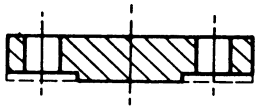
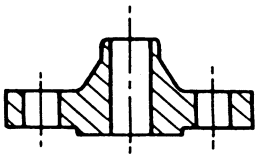
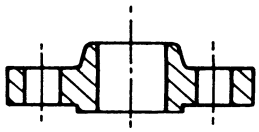
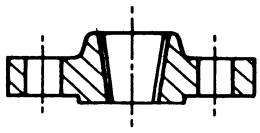
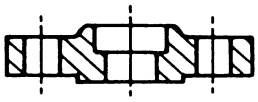
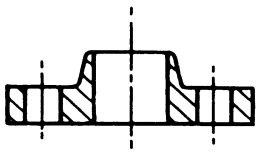
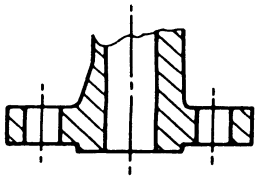


Type J
Ring-joint

NOTE 2 Sketches designated A, B, C, D, E, F and J illustrate the various types of flange facings which may be used in conjunction with the flanges shown in Figure 1.
NOTE 3 Facings may be designated by type letters or by descriptions.

Figure 2 — Facings of types A to F and J

Table 2 — Synoptic table

Flange	Code number	(DN) in	(15)	(20)	(25)	(32)	(40)	(50)	(65)	(80)	(100)	(125)	(150)	(200)	(250)	(300)	(350)	(400)	(450)	(500)	(600)
		Class designation	1/2	3/4	1	1 1/2 [a]	1 1/2	2	2 1/2 [a]	3	4	5 [a]	6	8	10	12	14	16	18	20	24
 Plate	101																				
		150	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
 Blank	105	150	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
		300	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
		600	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
		900	Use Class 1500							×	×	×	×	×	×	×	×	×	×	×	×
		1500	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
		2500	×	×	×	×	×	×	×	×	×	×	×	×	×	×					
 Weld-neck	111	150	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
		300	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
		600	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
		900	Use Class 1500							×	×	×	×	×	×	×	×	×	×	×	×
		1500	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
		2500	×	×	×	×	×	×	×	×	×	×	×	×	×	×					
 Hubbed slip-on	112	150	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
		300	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
		600	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
		900	Use Class 1500							×	×	×	×	×	×	×	×	×	×	×	×
		1500	×	×	×	×	×	×	×												
 Hubbed threaded	113	150	×	×	×	×	×	×	×	×	×	×	×								
		300	×	×	×	×	×	×	×	×	×	×	×								
		600	×	×	×	×	×	×	×	×	×	×	×								
		900	Use Class 1500							×	×	×	×								
		1500	×	×	×	×	×	×	×	×	×	×	×								
		2500	×	×	×	×	×	×	×	×	×	×	×								
 Hubbed socket-weld	114	150	×	×	×	×	×	×	×	×											
		300	×	×	×	×	×	×	×	×											
		600	×	×	×	×	×	×	×	×											
		1500	×	×	×	×	×	×	×												
 Loose hubbed for lapped pipe end	115	150	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
		300	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
		600	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
		900	Use Class 1500							×	×	×	×	×	×	×	×	×	×	×	×
		1500	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
		2500	×	×	×	×	×	×	×	×	×	×	×	×	×	×					
 Integral	121	150	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
		300	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
		600	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
		900	Use Class 1500							×	×	×	×	×	×	×	×	×	×	×	×
		1500	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
		2500	×	×	×	×	×	×	×	×	×	×	×	×	×	×					

[a] These sizes should be avoided in new constructions.

Table 3 — Material

Material	Plate				Forgings				Castings				Material group (see note 5)
	ASTM standards	British Standard (see note 1)	Identification symbol	Elevated temperature service (see item in note 3)	ASTM standards	British Standard (see note 1)	Identification symbol	Elevated temperature service (see item in note 3)	ASTM standards	British Standard (see note 1)	Identification symbol	Elevated temperature service (see item in note 3)	
Carbon steel	A515 grade 70	BS 1501-1 164-400	515-70	1,6	A105	BS 1503-164-490	A105	1,7	A216 grade WCB	BS 1504-161 Gr 480	WCB	1,7	1.1
	A516 grade 70		516-70	1,6	A350 grade LF2		LF2	4					
	A537 Class 1		537 C1	4									
									A216 grade WCC		WCC	1,7	1.2
									A352 grade LCC		LCC	4	
$2^1/_2$ % nickel steel	A203 grade B		203 B	1,7					A352 grade LC2		LC2	4	1.2
$3^1/_2$ % nickel steel	A203 grade E		203 E	1,7	A350 grade LF3		LF3	4	A352 grade LC3		LC3	4	1.2
Carbon steel	A515 grade 65	BS 1501-1 151-430	515-65	1,7					A352 grade LCB	BS 1504-161 Gr 480	LCB	1	1.3
	A516 grade 65	BS 1501-1 161-430	516-65	1,6									
	A515 grade 60		515-60	1,7	A350 grade LF1		LF1	4					1.4
	A516 grade 60		516-60	1,6									
Carbon $^1/_2$ % molybdenum steel	A204 grade B		204 B	2,7					A352 grade LC1		LC1	4	1.5
	A204 grade A		204 A	2,7	A182 grade F1		F1	2,7	A217 grade WC1	BS 1504-245	WC1	2,7	
1 % chromium $^1/_2$ % molybdenum steel					A182 grade F12	BS 1503-620-440[a]	F12	3,10					1.9
$1^1/_4$ % chromium $^1/_2$ % molybdenum steel	A387-11 Cl.2	BS 1501-2 621	11CI2	3, 10	A182 grade F11	BS 1503-621-460	F11	3, 10	A217 grade WC6	BS 1504-621	WC6	8, 10	1.9
$2^1/_4$ % chromium 1 % molybdenum steel	A387-22 Cl.2	BS 1501-2 622-515	22CI2	3, 10	A182 grade F22	BS 1503 622-490	F22	3, 10	A217 grade WC9	BS 1504-622	WC9	8, 10	1.10
5 % chromium $^1/_2$ % molybdenum steel					A182 grade F5a	BS 1503-625-590	F5a		A217 grade C5	BS 1504-625	C5		1.13
9 % chromium 1 % molybdenum steel					A182 grade F9		F9		A217 grade C12	BS 1504-629	C12		1.14
Austenitic-chromium-nickel steel	A240 grade 304	BS 1501-3 304S15[b]	304	11	A182 grade F304	BS 1503 304S31[b]	F304	11	A351 grade CF8	BS 1504 304C15[b]	CF8	11	2.1
	A240 grade 304H	BS 1501-3 304S49[b]	304H	11	A182 grade F304H	BS 1503 304S51[b]	F304H	11					
Austenitic-chromium-nickel-molybdenum steel	A240 grade 316	BS 1501-3 316S16[b]	316	12	A182 grade F316	BS 1503 316S31	F316	12	A351 grade CF8M	BS 1504 316C16[b]	CF8M	12	2.2
	A240 grade 316H	BS 1501-3 316S49[b]	316H	12	A182 grade F316H	BS 1503 316S51	F316H	12					
Austenitic-chromium-nickel (low carbon) steel	A240 grade 304L	BS 1501-3 304S12[c]	304L	5	A182 grade F304L	BS 1503 304S11[c]	F304L	5					2.3
Austenitic-chromium-nickel-molybdenum (low carbon) steel	A240 grade 316L	BS 1501-3 316S12[c]	316L	6	A182 grade F316L	BS 1503 316S11	F316L	6					2.3
Austenitic-chromium-nickel (titanium stabilized) steel	A240 grade 321	BS 1501-3 321S12[b]	321	7	A182 grade F321	BS 1503 321S31[b]	F321	7					2.4
	A240 grade 321H		321H		A182 grade F321H		F321H						
Austenitic-chromium-nickel (niobium stabilized) steel	A240 grade 347	BS 1501-3 347S171	347	7	A182 grade F347	BS 1503 347S31[b]	F347	7	A351 grade CF8C	BS 1504 347C17[b]	CF8C		2.5
	A240 grade 347H	BS 1501-3 347S49t	347H		A182 grade F347H	BS 1503 347S51[b]	F347H						
Austenitic-chromium-nickel (25/12 and 23/12 types)	A240 grade 309S	BS 1449-2 309S24[b]	309S						A351 grade CH8		CH8		2.6
									A351 grade CH20		CH20		
Austenitic-chromium-nickel (25/20 type)	A240 grade 310S	BS 1501-3 301S24[b]	310S	9	A182 grade F310	BS 1503 310S31[b]	F310	9	A351 grade CK20		CK20		2.7

[a] R_e min 275 N/m^2
[b] 0.2 % proof stress 205 N/mm^2 min.
[c] 0.2 % proof stress 175 N/mm^2 min.

Notes to Table 3

NOTE 1 When selecting materials for flanges the strength requirements (R_e min 275 N/mm², 0.2 % proof stress 205 N/mm² min, 0.2 % proof stress 175 N/mm² min) should be given, as appropriate, on the enquiry and/or order for the flanges (see Appendix A).

NOTE 2 For some materials listed under British Standards, testing requirements are more stringent than the comparable ASTM materials and the purchaser is advised to specify any special requirements for the material in the enquiry and/or order for flanges (see Appendix A).

NOTE 3 Design and construction standards, e.g. BS 5500 and ANSI B 31.3 differ in requirements for maximum allowable service temperature and may impose lower temperatures than those given below.

1) Not recommended for use above 425 °C.
2) Not recommended for use above 455 °C.
3) Not recommended for use above 590 °C.
4) Not to be used over 340 °C.
5) Not to be used over 425 °C.
6) Not to be used over 455 °C.
7) Not to be used over 540 °C.
8) Not to be used over 590 °C.
9) At service temperatures of 565 °C and above the grain size should not be finer than ASTM6.
10) Consideration should be given to the possibility of excessive oxidation (scaling) at temperatures above 565 °C.
11) The effects of carbide precipitation should be considered in the case of welded construction or use at temperatures above 480 °C.
12) The effects of sigma phase formation should be considered at temperatures above 535 °C.

For carbon and carbon-molybdenum steels [notes 1), 2), 4), 6) and 7)] the limitation of the upper temperature is intended to avoid risk of graphitization of the carbides and, also at the higher temperatures, covers the effects of oxidation and reduction in strength.

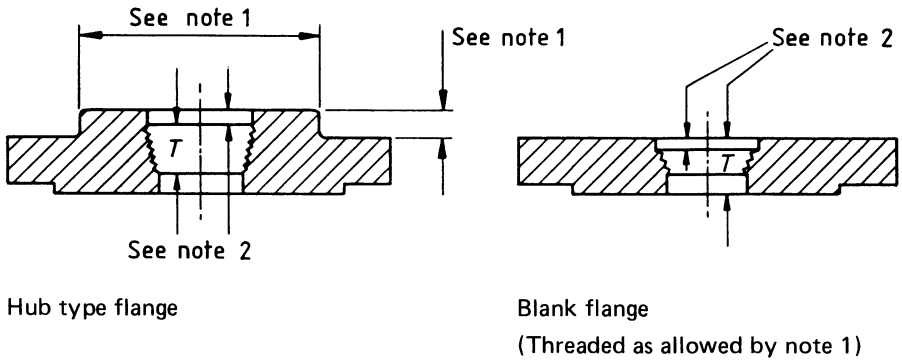
For chromium-molybdenum ferritic steels [notes 3), 8) and 10)] the limitation of the upper temperature takes account of the effects of oxidation and reduced strength (creep resistance).

For austenitic steels where the material specification states only a maximum for carbon content, e.g. C 0.08 % max, and the proposed service is at temperatures above 540 °C then the steel used should have a carbon content of 0.04 % to 0.08 %.

NOTE 4 Low temperature service [applicable to low temperature (LT) steels and austenitic chromium-nickel steels]. Design and construction standards require fracture toughness properties to be determined, usually by Charpy impact testing, on steels for low temperature service. Requirements differ according to the standard and purchasers should state their requirements on the enquiry and/or order for the flanges (see Appendix A).

The LT steels (carbon and nickel steels) included in this Section of BS 1560 have Charpy impact test requirements specified in the relevant standard for the materials. In the case of austenitic stainless steels it is not usual to require Charpy impact tests for services above – 200 °C.

NOTE 5 Material groups are those given in ANSI B16.5.



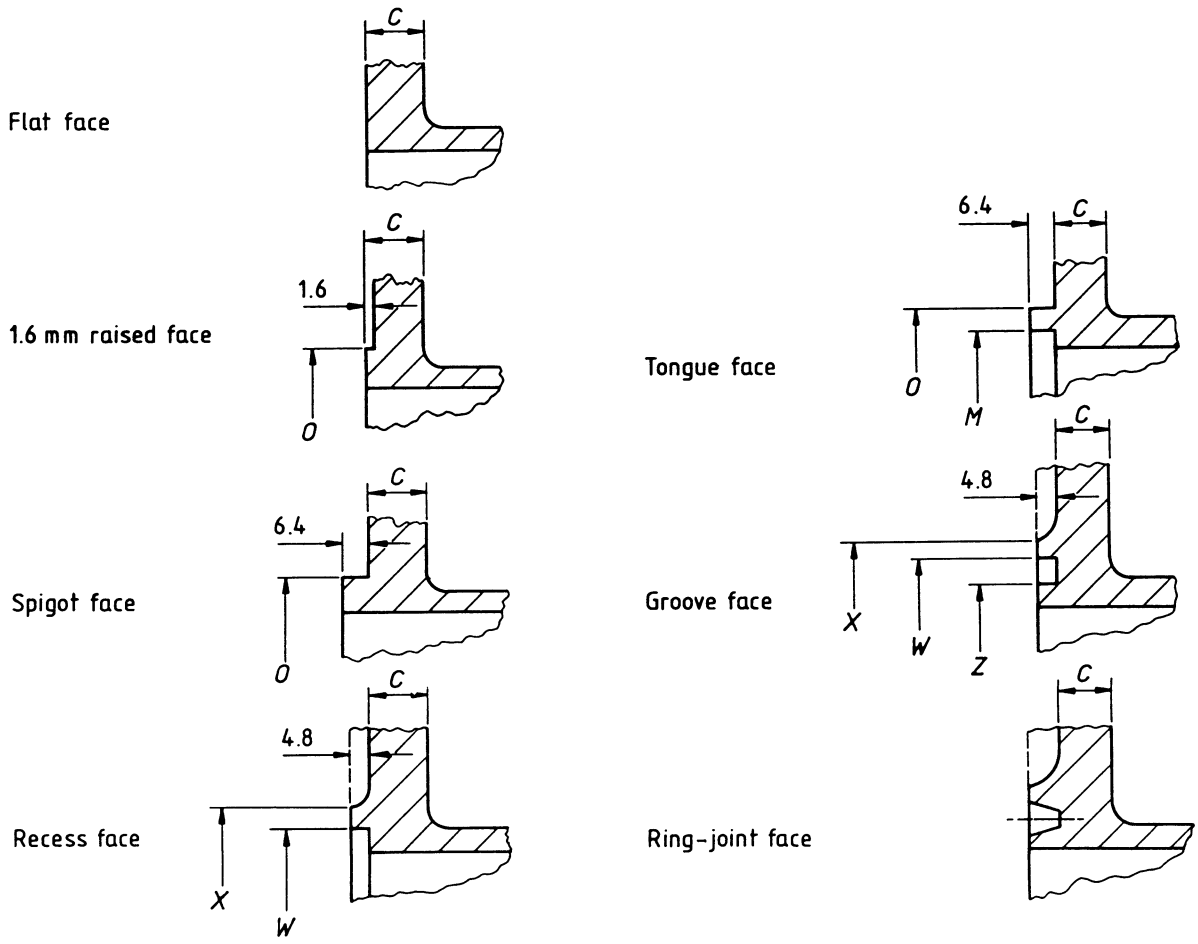
NOTE 1 A hub is required if the nominal size of the reduced bore is equal to or greater than the size given in Table 4 against the nominal pipe size appropriate to the outside diameter of the flange. Otherwise a blank flange suitably tapped may be used.
The nominal pipe size appropriate to a flange of a given outside diameter and pressure class may be found by reference to the table of standard flanges of the same pressure class (see Table 9 to Table 14).
NOTE 2 The threading and counterbore, etc., should comply with **7.3**.

Figure 3 — Reducing threaded flanges Classes 150 to 2500 (see Table 4)

Table 4 — Reducing threaded flanges
Classes 150 to 2500

Nominal pipe size appropriate to the diameter of the flange		**Smallest nominal size of reduces bore requiring hub** (see note 1 to Figure 3)
in	DN	in
1	25	$^1/_2$
[a]$1^1/_4$	32	$^1/_2$
$1^1/_2$	40	$^1/_2$
2	50	1
[a]$2^1/_2$	65	$1^1/_4$
3	80	$1^1/_4$
4	100	$1^1/_2$
[a]5	125	$1^1/_2$
6	150	$2^1/_2$
8	200	3
10	250	4
12	300	4
14	350	4
16	400	4
18	450	4
20	500	4
24	600	4

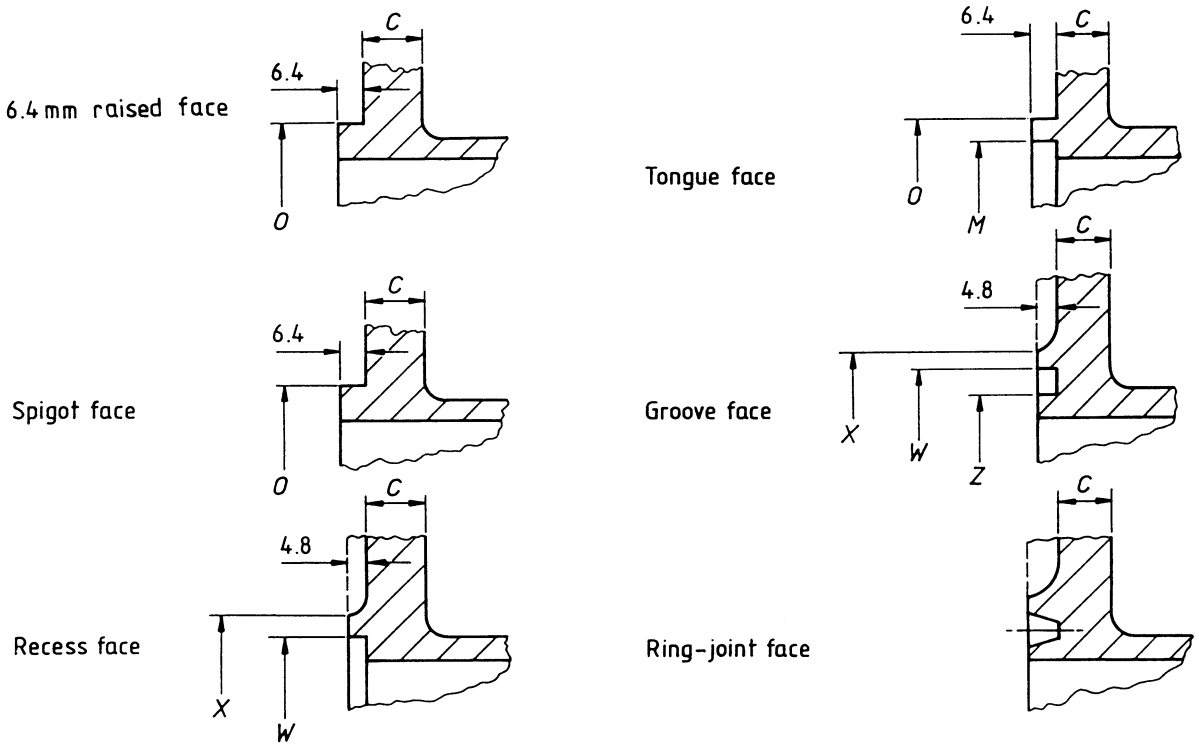
NOTE This table should be read in conjunction with **7.5.2.1**.
[a] The use of these sizes should be avoided in new constructions.



All dimensions are in millimetres.

NOTE 1 For dimensions ***X, O, M, W, Z*** and other details for facings other than ring-joint, see Table 5, **8.2** and clause **10**.
NOTE 2 For other dimensions and details of ring-joint facings, see Table 6, **8.2** and clause **10**.
NOTE 3 *C* is the minimum flange thickness (see Table 9 and Table 10).
NOTE 4 Dotted lines indicate full-face; for permissible applications see **8.2**.
NOTE 5 Spigot/recess and tongue/groove faces are not applicable to Class 150 because of potential dimensional conflicts.

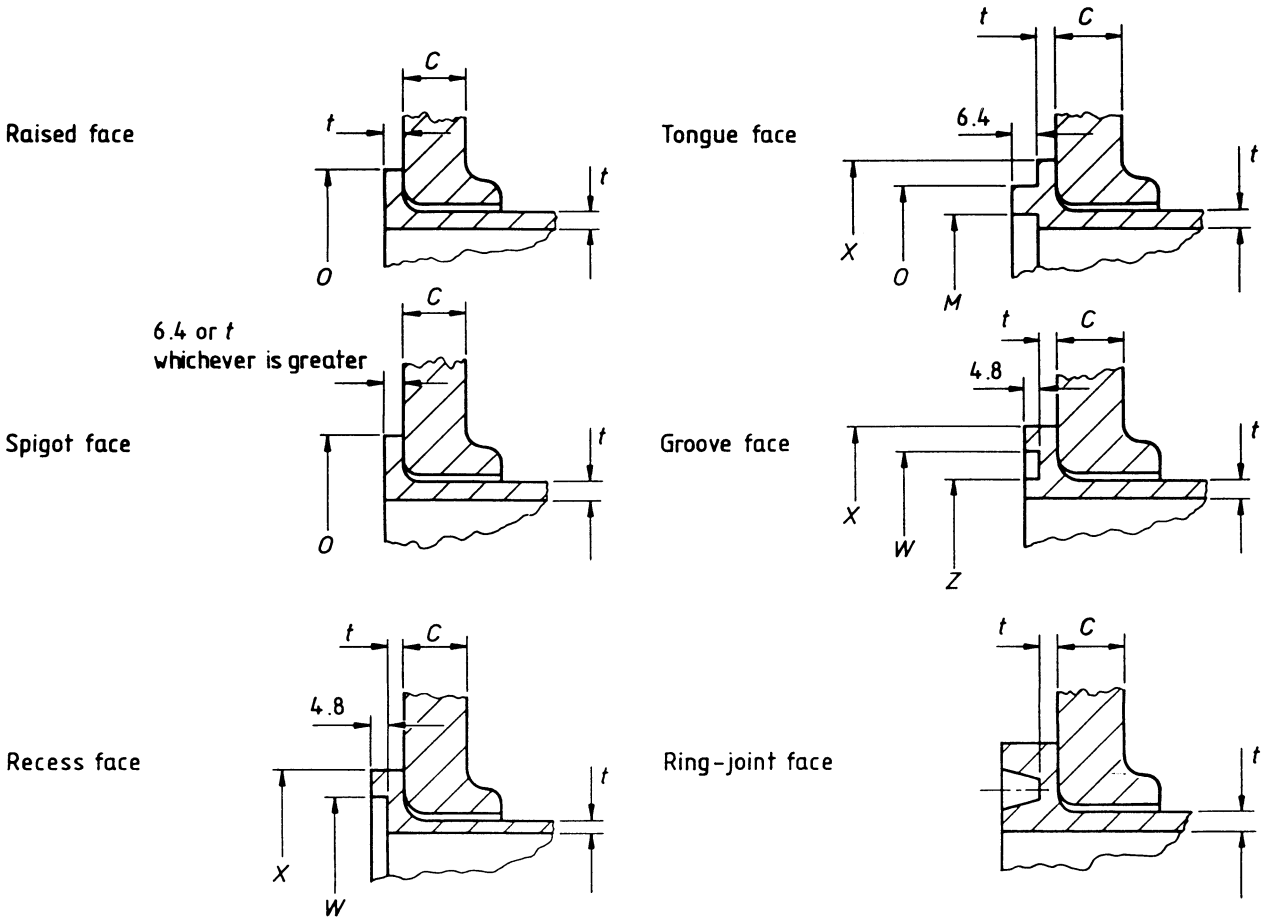
Figure 4 — Flange facings, Classes 150 and 300 only, for other than lapped-type joints



All dimensions are in millimetres.

NOTE 1 For dimensions ***X, O, M, W, Z*** and other details for facings other than ring-joint, see Table 5, **8.2** and clause **10**.
NOTE 2 For other dimensions and details of ring-joint facings, see Table 6, **8.2** and clause **10**.
NOTE 3 *C* is the minimum flange thickness (see Table 11, Table 12, Table 13 and Table 14).
NOTE 4 Dotted lines indicate full-face; for permissible applications see **8.2**.

Figure 5 — Flange facings, Classes 600 to 2500, for other than lapped-type joints



NOTE 1 For dimensions ***X, O, M, W, Z*** and other details for facings other than ring-joint, see Table 5, **8.3** and clause **10**.
NOTE 2 For other dimensions and details of ring-joint facings, see Table 6, **8.3** and clause **10**.
NOTE 3 *C* is the minimum flange thickness (see Table 9, Table 10, Table 11, Table 12, Table 13 and Table 14).
NOTE 4 *t* = thickness of barrel of stub-end (see **8.3** and BS 1640).

Figure 6 — Facings for lapped-type joints

Table 5 — Facing dimensions for flanges other than ring-joint, Classes 150 to 2500

Nominal pipe size		Outside diameter of raised face, spigot (see note 3)	Inside diameter of tongue	Outside diameter of recess (see note 3)	Inside diameter of recess	Height of raised face		Depth of recess or groove	Minimum outside diameter of raised portion of recess or groove (see notes 3 and 4)
						Classes 150 and 300 (see note 5)	Classes 600 to 2500 (see note 6)		
		O	*M*	*W*	*Z*				*X*
in	DN	mm	mm	mm	mm	mm	mm	mm	mm
$^1/_2$	15	34.9	25.4	36.5	23.8	1.6	6.4	4.8	46.0
$^3/_4$	20	42.9	33.3	44.4	31.7	1.6	6.4	4.8	54.0
1	25	50.8	38.1	52.4	36.5	1.6	6.4	4.8	62.0
[a]1 $^1/_4$	32	63.5	47.6	65.1	46.0	1.6	6.4	4.8	75.0
1 $^1/_2$	40	73.0	54.0	74.6	52.4	1.6	6.4	4.8	84.0
2	50	92.1	73.0	93.7	71.4	1.6	6.4	4.8	103.0
[a]2 $^1/_2$	65	104.8	85.7	106.4	84.1	1.6	6.4	4.8	116.0
3	80	127.0	107.9	128.6	106.4	1.6	6.4	4.8	138.0
4	100	157.2	131.8	158.8	130.2	1.6	6.4	4.8	168.0
[a]5	125	185.7	160.3	187.3	158.7	1.6	6.4	4.8	197.0
6	150	215.9	190.5	217.5	188.9	1.6	6.4	4.8	227.0
8	200	269.9	238.1	271.5	236.5	1.6	6.4	4.8	281.0
10	250	323.8	285.7	325.4	284.1	1.6	6.4	4.8	335.0
12	300	381.0	342.9	382.6	341.3	1.6	6.4	4.8	392.0
14	350	412.7	374.6	414.3	373.1	1.6	6.4	4.8	424.0
16	400	469.9	425.4	471.5	423.9	1.6	6.4	4.8	481.0
18	450	533.4	488.9	535.0	487.4	1.6	6.4	4.8	545.0
20	500	584.2	533.4	585.8	531.8	1.6	6.4	4.8	595.0
24	600	692.1	641.3	693.7	639.8	1.6	6.4	4.8	703.0

NOTE 1 This table should be read in conjunction with **8.2**, **8.3** and Figure 4, Figure 5 and Figure 6.
NOTE 2 For ring-joint facing dimensions see Table 6.
NOTE 3 Spigot/recess and tongue/groove facings are not applicable to Class 150 because of potential dimensional conflicts.
NOTE 4 A flange with a recess facing may be supplied with the outside diameter of the raised portion to dimension *X* above as appropriate, or full faced.
NOTE 5 Raised face height is included in the flange thickness.
NOTE 6 Raised face height is additional to the minimum flange thickness.
NOTE 7 For tolerances see Table 15.

[a] The use of these sizes should be avoided in new constructions.

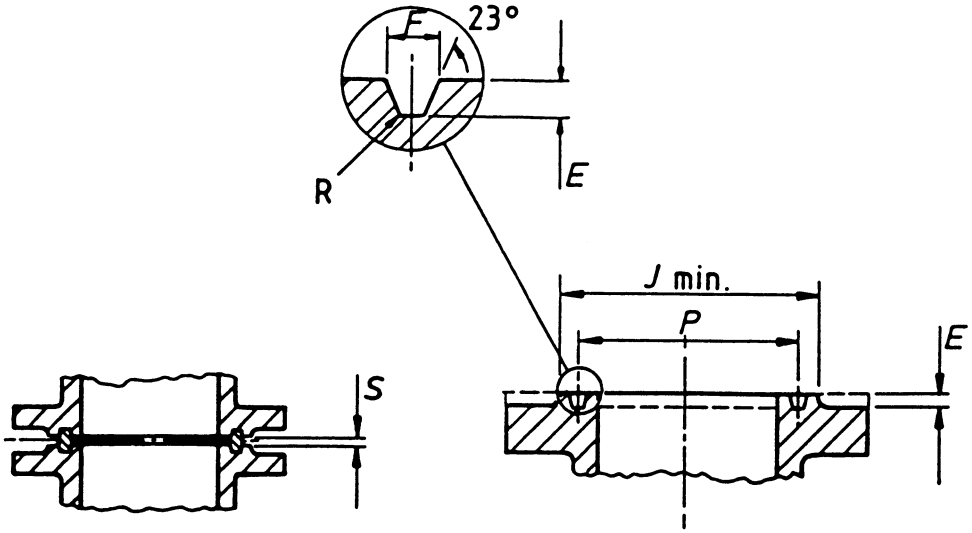


Figure 7 — Dimensions of ring-joint facings (all Classes) (see Table 6)

Table 6 — Dimensions of ring–joint facings (all Classes) (see Figure 7)

Pipe nominal size												Groove number	Groove dimensions				Diameter of raised portion, J min.					Approximate distance between flanges S, when ring is compressed					
Class 150		Class 300		Class 600		Class 900		Class 1500		Class 2500			Pitch dia.	Depth	Width	Radius at bottom	Class 150	Class 300 and Class 600	Class 900	Class 1500	Class 2500	Class 150	Class 300	Class 600	Class 900	Class 1500	Class 2500
in	DN	in	DN	in	DN	in	DN	in	DN	in	DN		P	E	F	$R_{max.}$											
													mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
—	—	1/2	15	1/2	15	—	—	—	—	—	—	R 11	34.13	5.56	7.14	0.8	—	50.8	—	—	—	—	3	3	—	—	—
—	—	—	—	—	—	—	—	1/2	15	—	—	R 12	39.69	6.35	8.73	0.8	—	—	—	60.3	—	—	—	—	—	4	—
—	—	3/4	20	3/4	20	—	—	—	—	1/2	15	R 13	42.86	6.35	8.73	0.8	—	63.5	—	—	65.1	—	4	4	—	—	4
—	—	—	—	—	—	—	—	3/4	20	—	—	R 14	44.45	6.35	8.73	0.8	—	—	—	66.7	—	—	—	—	—	4	—
1	25	—	—	—	—	—	—	—	—	—	—	R 15	47.63	6.35	8.73	0.8	63.5	—	—	—	—	4	—	—	—	—	—
—	—	1	25	1	25	—	—	1	25	3/4	20	R 16	50.80	6.35	8.73	0.8	—	69.8	—	71.4	73.0	—	4	4	—	4	4
1 1/4	32	—	—	—	—	—	—	—	—	—	—	R 17	57.15	6.35	8.73	0.8	73.0	—	—	—	—	4	—	—	—	—	—
—	—	1 1/4	32	1 1/4	32	—	—	1 1/4	32	1	25	R 18	60.33	6.35	8.73	0.8	—	79.4	—	81.0	82.5	—	4	4	—	4	4
1 1/2	40	—	—	—	—	—	—	—	—	—	—	R 19	65.09	6.35	8.73	0.8	82.6	—	—	—	—	4	—	—	—	—	—
—	—	1 1/2	40	1 1/2	40	—	—	1 1/2	40	—	—	R 20	68.26	6.35	8.73	0.8	—	90.5	—	92.1	—	—	4	4	—	4	—
—	—	—	—	—	—	—	—	—	—	1 1/4	32	R 21	72.23	7.94	11.91	0.8	—	—	—	—	101.6	—	—	—	—	—	3
2	50	—	—	—	—	—	—	—	—	—	—	R 22	82.55	6.35	8.73	0.8	101.6	—	—	—	—	4	—	—	—	—	—
—	—	2	50	2	50	—	—	—	—	1 1/2	40	R23	82.55	7.94	11.91	0.8	—	108.0	—	—	114.3	—	6	5	—	—	3
—	—	—	—	—	—	—	—	2	50	—	—	R 24	95.25	7.94	11.91	0.8	—	—	—	123.8	—	—	—	—	—	3	—
2 1/2	65	—	—	—	—	—	—	—	—	—	—	R 25	101.60	6.35	8.73	0.8	120.6	—	—	—	—	4	—	—	—	—	—
—	—	2 1/2	65	2 1/2	65	—	—	—	—	2	50	R 26	101.60	7.94	11.91	0.8	—	127	—	—	133.4	—	6	5	—	—	3
—	—	—	—	—	—	—	—	2 1/2	65	—	—	R 27	107.95	7.94	11.91	0.8	—	—	—	136.5	—	—	—	—	—	3	—
—	—	—	—	—	—	—	—	—	—	2 1/2	65	R 28	111.13	9.52	13.49	1.6	—	—	—	—	149.2	—	—	—	—	—	3
3	80	—	—	—	—	—	—	—	—	—	—	R 29	114.30	6.35	8.73	0.8	133.4	—	—	—	—	4	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	R 30	117.48	7.94	11.91	0.8	—	—	—	—	—	—	—	—	—	—	—
—	—	3	80	3	80	3	80	—	—	—	—	R 31	123.83	7.94	11.91	0.8	—	146.0	155.6	—	—	—	6	5	4	—	—
—	—	—	—	—	—	—	—	—	—	3	80	R 32	127.00	9.52	13.49	1.6	—	—	—	—	168.3	—	—	—	—	—	3
—	—	—	—	—	—	—	—	—	—	—	—	R 33	131.76	6.35	8.73	0.8	154.0	—	—	—	—	4	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	R 34	131.76	7.94	11.91	0.8	—	158.8	—	—	—	—	6	5	—	—	—
—	—	—	—	—	—	—	—	3	80	—	—	R 35	136.53	7.94	11.91	0.8	—	—	—	168.3	—	—	—	—	—	3	—
4	100	—	—	—	—	—	—	—	—	—	—	R 36	149.23	6.35	8.73	0.8	171.4	—	—	—	—	4	—	—	—	—	—
—	—	4	100	4	100	4	100	—	—	—	—	R 37	149.23	7.94	11.91	0.8	—	174.6	181.0	—	—	—	6	5	4	—	—
—	—	—	—	—	—	—	—	—	—	4	100	R 38	157.16	11.11	16.67	0.8	—	—	—	—	203.2	—	—	—	—	—	4
—	—	—	—	—	—	—	—	4	100	—	—	R 39	161.93	7.94	11.91	0.8	—	—	—	193.7	—	—	—	—	—	3	—
5	125	—	—	—	—	—	—	—	—	—	—	R 40	171.45	6.35	8.73	0.8	193.7	—	—	—	—	4	—	—	—	—	—

NOTE Tolerances are given in Table 15.

Table 6 — Dimensions of ring–joint facings (all Classes) (see Figure 7)

Pipe nominal size												Groove number	Groove dimensions				Diameter of raised portion, *J* min.					Approximate distance between flanges *S*, when ring is compressed					
Class 150		Class 300		Class 600		Class 900		Class 1500		Class 2500			Pitch dia.	Depth	Width	Radius at bottom	Class 150	Class 300 and Class 600	Class 900	Class 1500	Class 2500	Class 150	Class 300	Class 600	Class 900	Class 1500	Class 2500
in	DN	in	DN	in	DN	in	DN	in	DN	in	DN		*P*	*E*	*F*	$R_{max.}$											
													mm	mm	mm	mm	mm	mm	mm.	mm	mm	mm	mm	mm	mm	mm	mm
—	—	5	125	5	125	5	125	—	—	—	—	R 41	180.98	7.94	11.91	0.8	—	209.6	215.9	—	—	—	6	5	4	—	—
—	—	—	—	—	—	—	—	—	—	5	125	R 42	190.50	12.70	19.84	1.6	—	—	—	—	241.3	—	—	—	—	—	4
6	150	—	—	—	—	—	—	—	—	—	—	R 43	193.68	6.35	8.73	0.8	219.1	—	—	—	—	4	—	—	—	—	—
—	—	—	—	—	—	—	—	5	125	—	—	R 44	193.68	7.94	11.91	0.8	—	—	—	228.6	—	—	—	—	—	3	—
—	—	6	150	6	150	6	150	—	—	—	—	R 45	211.14	7.94	11.91	0.8	—	241.3	241.3	—	—	—	6	5	4	—	—
—	—	—	—	—	—	—	—	6	150	—	—	R 46	211.14	9.53	13.49	1.6	—	—	—	247.6	—	—	—	—	—	3	—
—	—	—	—	—	—	—	—	—	—	6	150	R 47	228.60	12.70	19.84	1.6	—	—	—	—	279.4	—	—	—	—	—	4
8	200	—	—	—	—	—	—	—	—	—	—	R 48	247.65	6.35	8.73	0.8	273.0	—	—	—	—	4	—	—	—	—	—
—	—	8	200	8	200	8	200	—	—	—	—	R 49	269.88	7.94	11.91	0.8	—	301.6	308.0	—	—	—	6	5	4	—	—
—	—	—	—	—	—	—	—	8	200	—	—	R 50	269.88	11.11	16.67	1.6	—	—	—	317.5	—	—	—	—	—	4	—
—	—	—	—	—	—	—	—	—	—	8	200	R 51	279.40	14.29	23.02	1.6	—	—	—	—	339.7	—	—	—	—	—	5
10	250	—	—	—	—	—	—	—	—	—	—	R 52	304.80	6.35	8.73	0.8	330.2	—	—	—	—	4	—	—	—	—	—
—	—	10	250	10	250	10	250	—	—	—	—	R 53	323.85	7.94	11.91	0.8	—	355.6	362.0	—	—	—	6	5	4	—	—
—	—	—	—	—	—	—	—	10	250	—	—	R 54	323.85	11.11	16.67	1.6	—	—	—	371.5	—	—	—	—	—	4	—
—	—	—	—	—	—	—	—	—	—	10	250	R 55	342.90	17.46	30.16	2.4	—	—	—	—	425.4	—	—	—	—	—	6
12	300	—	—	—	—	—	—	—	—	—	—	R 56	381.00	6.35	8.73	0.8	406.4	—	—	—	—	4	—	—	—	—	—
—	—	12	300	12	300	12	300	—	—	—	—	R 57	381.00	7.94	11.91	0.8	—	412.8	419.1	—	—	—	6	5	4	—	—
—	—	—	—	—	—	—	—	—	—	—	—	R 58	381.00	14.29	23.02	1.6	—	—	—	438.1	—	—	—	—	—	5	—
14	350	—	—	—	—	—	—	—	—	—	—	R 59	396.88	6.35	8.73	0.8	425.4	—	—	—	—	3	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	12	300	R 60	406.40	17.46	33.34	2.4	—	—	—	—	495.3	—	—	—	—	—	8
—	—	14	350	14	350	—	—	—	—	—	—	R 61	419.10	7.94	11.91	0.8	—	457.2	—	—	—	—	6	5	—	—	—
—	—	—	—	—	—	14	350	—	—	—	—	R 62	419.10	11.11	16.67	1.6	—	—	466.7	—	—	—	—	—	4	—	—
—	—	—	—	—	—	—	—	14	350	—	—	R 63	419.10	15.88	26.99	2.4	—	—	—	488.9	—	—	—	—	—	6	—
16	400	—	—	—	—	—	—	—	—	—	—	R 64	454.03	6.35	8.73	0.8	482.6	—	—	—	—	3	—	—	—	—	—
—	—	16	400	16	400	—	—	—	—	—	—	R 65	469.90	7.94	11.91	0.8	—	508.0	—	—	—	—	6	5	—	—	—
—	—	—	—	—	—	16	400	—	—	—	—	R 66	469.90	11.11	16.67	1.6	—	—	523.9	—	—	—	—	—	4	—	—
—	—	—	—	—	—	—	—	16	400	—	—	R 67	469.90	17.46	30.16	2.4	—	—	—	546.1	—	—	—	—	—	8	—
18	450	—	—	—	—	—	—	—	—	—	—	R 68	517.53	6.35	8.73	0.8	546.1	—	—	—	—	3	—	—	—	—	—
—	—	18	450	18	450	—	—	—	—	—	—	R 69	533.40	7.94	11.91	0.8	—	574.7	—	—	—	—	6	5	—	—	—
—	—	—	—	—	—	18	450	—	—	—	—	R 70	533.40	12.70	19.84	1.6	—	—	593.7	—	—	—	—	—	5	—	—

Table 6 — Dimensions of ring–joint facings (all Classes) (see Figure 7)

Pipe nominal size												Groove number	Groove dimensions				Diameter of raised portion, J min.					Approximate distance between flanges S, when ring is compressed					
Class 150		Class 300		Class 600		Class 900		Class 1500		Class 2500			Pitch dia.	Depth	Width	Radius at bottom	Class 150	Class 300 and Class 600	Class 900	Class 1500	Class 2500	Class 150	Class 300	Class 600	Class 900	Class 1500	Class 2500
in	DN	in	DN	in	DN	in	DN	in	DN	in	DN		P	E	F	$R_{max.}$											
													mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
—	—	—	—	—	—	—	—	18	450	—	—	R 71	533.40	17.46	30.16	2.4	—	—	—	612.8	—	—	—	—	—	8	—
20	500	—	—	—	—	—	—	—	—	—	—	R 72	558.80	6.35	8.73	0.8	596.9	—	—	—	—	3	—	—	—	—	—
—	—	20	500	20	500	—	—	—	—	—	—	R 73	584.20	9.53	13.49	1.6	—	635.0	—	—	—	—	6	5	—	—	—
—	—	—	—	—	—	20	500	—	—	—	—	R 74	584.20	12.70	19.84	1.6	—	—	647.7	—	—	—	—	—	5	—	—
—	—	—	—	—	—	—	—	20	500	—	—	R 75	584.20	17.46	33.34	2.4	—	—	—	673.1	—	—	—	—	—	10	—
24	600	—	—	—	—	—	—	—	—	—	—	R 76	673.10	6.35	8.73	0.8	711.2	—	—	—	—	3	—	—	—	—	—
—	—	24	600	24	600	—	—	—	—	—	—	R 77	692.15	11.11	16.67	1.6	—	749.3	—	—	—	—	6	6	—	—	—
—	—	—	—	—	—	24	600	—	—	—	—	R 78	692.15	15.88	26.99	2.4	—	—	771.5	—	—	—	—	—	6	—	—
—	—	—	—	—	—	—	—	24	600	—	—	R 79	692.15	20.64	36.51	2.4	—	—	—	793.8	—	—	—	—	—	11	—

NOTE 1 For ring-joints with lapped flanges in Class 300 and 600, ring and groove number R 30 are used instead of R 31.
NOTE 2 For facing requirements for lapped joints, see **8.3** and Figure 6.
NOTE 3 Height of raised portion is equal to the depth of groove E but is not subject to the tolerance for E. The former full face contour may be used.
NOTE 4 For sizes $^1/_2$ in (DN 15) to $2^1/_2$ in (DN 65) Class 1500 flanges are used instead of Class 900.

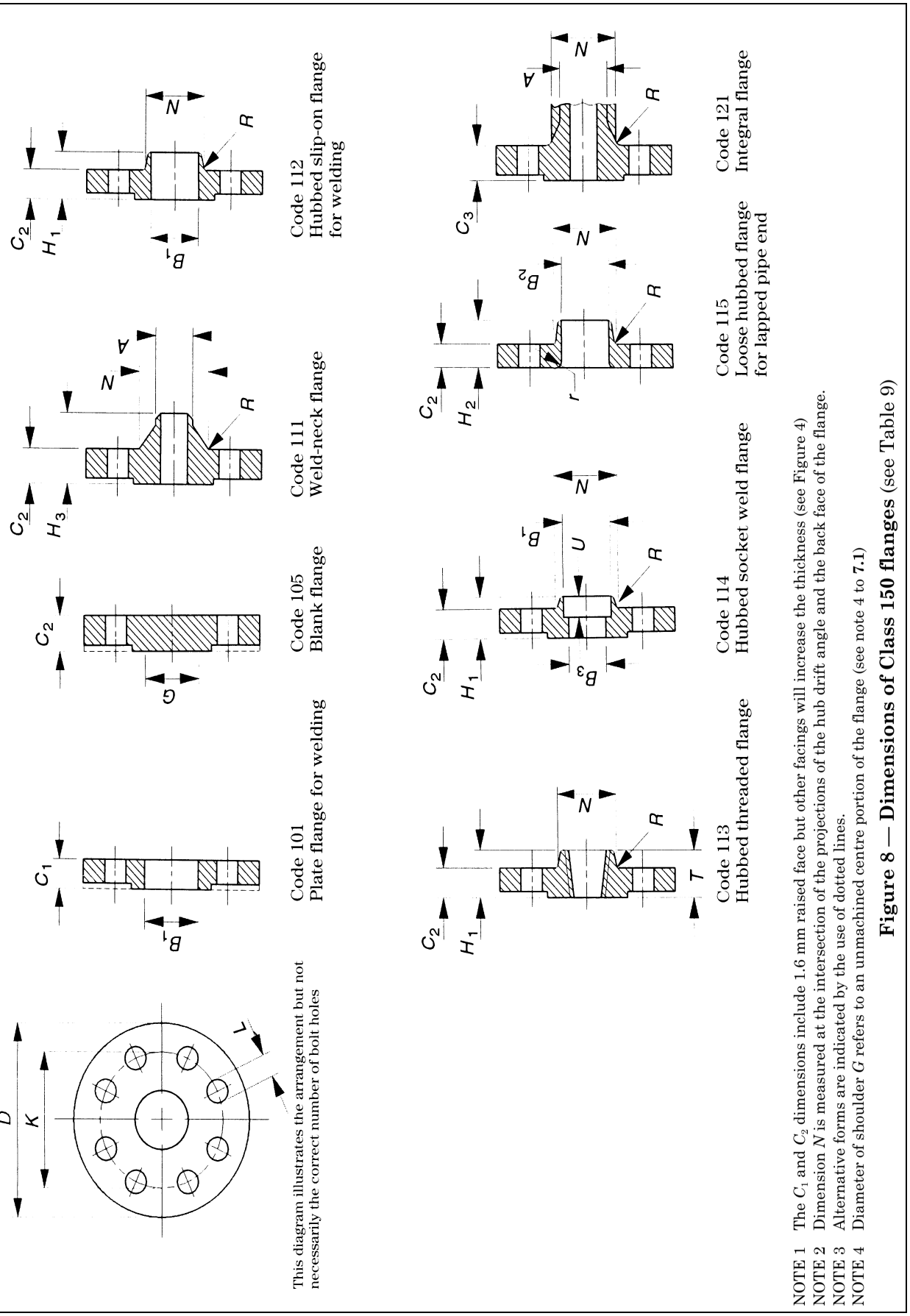
Table 7 — Surface finish for facings A, B, E and F

Flange rating	Method of machining	Approximate depth of serration	Approximate radius of tool nose	Approximate pitch of serration	R_z		R_a	
					min.	max.	min.	max.
		mm	mm	mm	µm	µm	µm	µm
Class 150 to Class 2500 inclusive	Turning	0.05	1.6	0.8	12.5	50	3.2	12.5
	Other than turning	—	—	—	12.5	25	3.2	6.3

NOTE 1 R_a and R_z are defined in BS 1134.
NOTE 2 Turning includes any method of machine operation producing either serrated concentric or serrated spiral grooves.
NOTE 3 For certain applications, e.g. for searching media such as low temperature gases and for flanges of Class 900 and above, it may be necessary to stipulate closer control on the surface finish.

Table 8 — Surface finish for facings C, D and J

Facing	R_z		R_a	
	min.	max.	min.	max.
	µm	µm	µm	µm
Tongue and groove	3.2	12.5	0.8	3.2
Ring-joint groove (including side walls)	1.6	6.3	0.4	1.6



NOTE 1 The C_1 and C_2 dimensions include 1.6 mm raised face but other facings will increase the thickness (see Figure 4)

NOTE 2 Dimension N is measured at the intersection of the projections of the hub drift angle and the back face of the flange.

NOTE 3 Alternative forms are indicated by the use of dotted lines.

NOTE 4 Diameter of shoulder G refers to an unmachined centre portion of the flange (see note 4 to 7.1)

Figure 8 — Dimensions of Class 150 flanges (see Table 9)

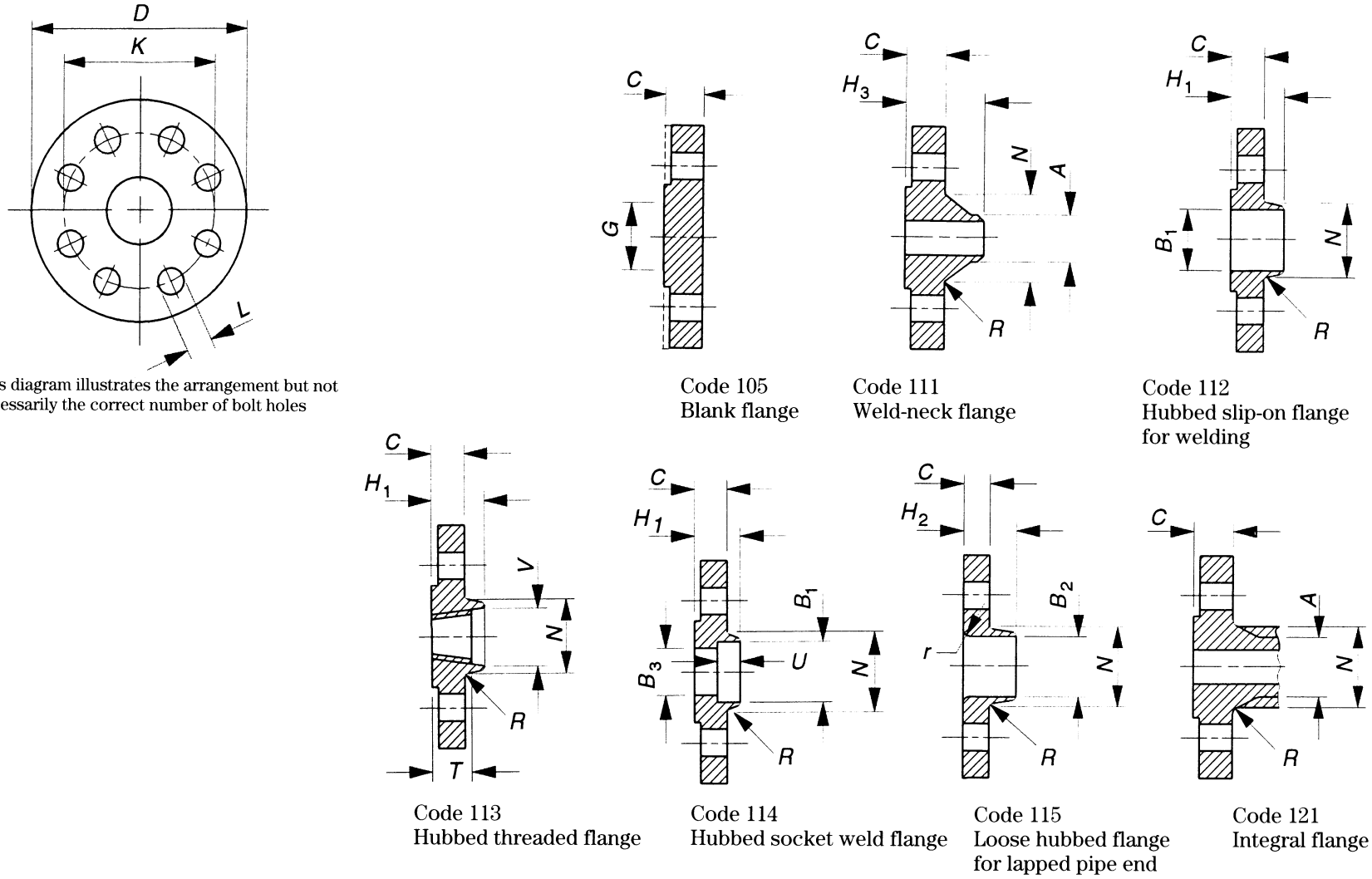
Table 9 — Dimensions of Class 150 flanges (see Figure 8)

Nominal size		Outside diameter of flange	Mating dimensions				Flange thickness			Hub diameter	Hub diameter at weld end	Length through hub			Minimum thread length of threaded flange	Bore			Corner radius of bore of lapped flange and pipe	Depth of socket	Shoulder diameter	Hub radius
			Diameter of bolt circle	Diameter of bolt holes	Number of bolts	Nominal diameter of bolts						Threaded; slip-on; socket weld	Lapped	Weld neck		Plate; slip-on; socket weld	Lapped	Weld neck socket weld				
		D	K	L			C_1	C_2	C_3	N	A	H_1	H_2	H_3	T	B_1	B_2	B_3	r	U	G	R min.
Codes affected		101, 105, 111, 112, 113, 114, 115, 121					101	105, 113, 111, 114, 112, 115	121	111, 112, 113, 114, 115, 121	111, 121	112, 113, 114	115	111	113	101, 112, 114	115	111, 114	115	114	105	111, 114, 112, 115, 113, 121
in	DN	mm	mm	in (mm)		in	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
1/2	15	89	60.3	5/8 (15.9)	4	1/2	12.0	11.1	11.1	30	21.3	15.9	15.9	47.6	15.9	22.4	23.0		3.0	9.5	—	3
3/4	20	98	69.8	5/8 (15.9)	4	1/2	14.0	12.7	11.1	38	26.7	15.9	15.9	52.4	15.9	27.7	28.0		3.0	11.0	—	3
1	25	108	79.4	5/8 (15.9)	4	1/2	16.0	14.3	11.1	49	33.4	17.5	17.5	55.6	17.5	34.5	35.0		3.0	12.5	—	3
[a] 1 1/4	32	117	88.9	5/8 (15.9)	4	1/2	18.0	15.9	12.7	59	42.2	20.6	20.6	57.2	20.6	43.2	43.5		5.0	14.5	—	3
1 1/2	40	127	98.4	5/8 (15.9)	4	1/2	19.0	17.5	14.3	65	48.3	22.2	22.2	61.9	22.2	49.5	50.0		6.5	16.0	—	3
2	50	152	120.6	3/4 (19.0)	4	5/8	21.0	19.0	15.9	78	60.3	25.4	25.4	63.5	25.4	62.0	62.5		8.0	17.5	—	3
[a] 2 1/2	65	178	139.7	3/4 (19.0)	4	5/8	24.0	22.2	17.5	90	73.0	28.6	28.6	69.9	28.6	74.7	75.5	To be supplied by purchaser	8.0	19.0	38	3
3	80	190	152.4	3/4 (19.0)	4	5/8	26.0	23.8	19.0	108	88.9	30.2	30.2	69.9	30.2	90.7	91.5		9.5	20.5	51	3
4	100	229	190.5	3/4 (19.0)	8	5/8	27.0	23.8	23.8	135	114.3	33.3	33.3	76.2	33.3	116.1	117.0		11.0	—	76	3
[a] 5	125	254	215.9	7/8 (22.2)	8	3/4	28.0	23.8	23.8	164	141.3	36.5	36.5	88.9	36.5	143.8	145.0		11.0	—	102	6.5
6	150	279	241.3	7/8 (22.2)	8	3/4	31.0	25.4	25.4	192	168.3	39.7	39.7	88.9	39.7	170.7	171.0		12.5	—	127	6.5
8	200	343	298.4	7/8 (22.2)	8	3/4	34.0	28.6	28.6	246	219.1	44.5	44.5	101.6	—	221.5	222.0		12.5	—	200	6.5
10	250	406	362.0	1 (25.4)	12	7/8	38.0	30.2	30.2	305	273.0	49.2	49.2	101.6	—	276.4	277.0		12.5	—	225	6.5
12	300	483	431.8	1 (25.4)	12	7/8	42.0	31.8	31.8	365	323.9	55.6	55.6	114.3	—	327.2	328.0		12.5	—	279	9,5
14	350	533	476.2	1 1/8 (28.6)	12	1	43.0	34.9	34.9	400	355.6	57.2	79.4	127.0	—	359.2	360.0		12.5	—	311	9.5
16	400	597	539.8	1 1/8 (28.6)	16	1	48.0	36.5	36.5	457	406.4	63.5	87.3	127.0	—	410.5	411.0		12.5	—	362	9.5
18	450	635	577.8	1 1/4 (31.8)	16	1 1/8	56.0	39.7	39.7	505	457.2	68.3	96.8	139.7	—	461.8	462.0		12.5	—	413	9.5
20	500	698	635.0	1 1/4 (31.8)	20	1 1/8	59.0	42.9	42.9	559	508.0	73.0	103.2	144.5	—	513.1	514.0		12.5	—	463	9.5
24	600	813	749.3	1 3/8 (34.9)	20	1 1/4	62.0	47.6	47.6	664	609.6	82.6	111.1	152.4	—	616.0	616.0		12.5	—	565	9.5

NOTE 1 For facing dimensions see Table 5.

NOTE 2 See notes following Table 14.

[a] The use of these sizes should be avoided in new constructions.



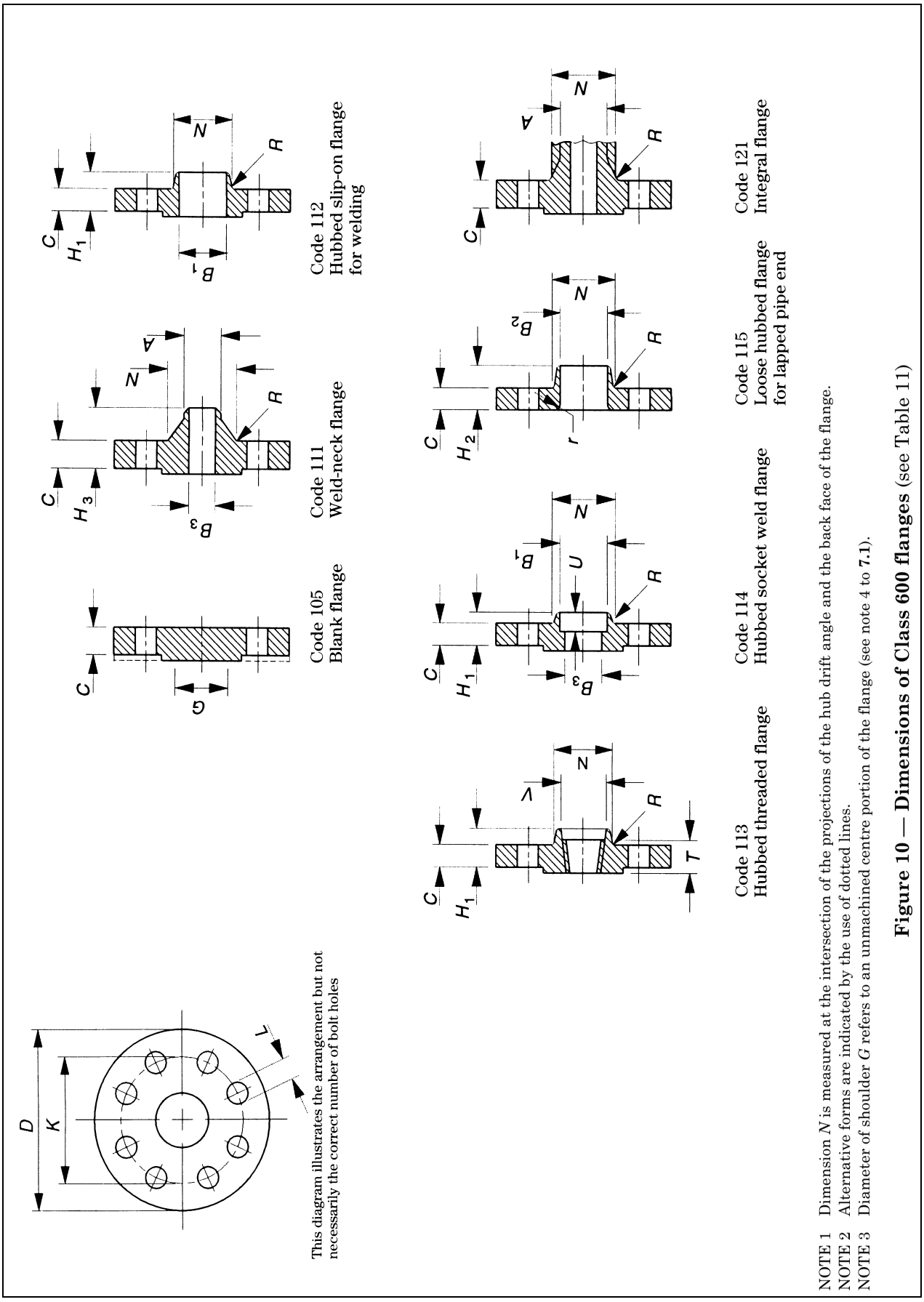
NOTE 1 The *C* dimension includes 1.6 mm raised face but other facings will increase the thickness (see Figure 4).
NOTE 2 Dimensions *N* is measured at the intersection of the projections of the hub drift angle and the back face of the flange.
NOTE 3 Alternative forms are indicated by the use of dotted lines.
NOTE 4 Diameter of shoulder *G* refers to an unmachined centre portion of the flange (see note 4 to **7.1**).

Figure 9 — Dimensions of Class 300 flanges (see Table 10)

Table 10 — Dimensions of Class 300 flanges (see Figure 9)

Nominal size		Outside diameter of flange	Mating dimensions				Flange thickness	Hub diameter	Hub diameter at weld end	Length through hub			Minimum thread length of threaded flange	Bore			Corner radius of bore of lapped flange and pipe	Depth of socket	Minimum diameter of counter-bore threaded flange	Shoulder diameter	Hub radius
			Diameter of bolt circle	Diameter of bolt holes	Number of bolts	Nominal diameter of bolts				Threaded; slip-on; socket weld	Lapped	Weld neck		Slip-on; socket weld	Lapped	Weld neck socket weld					
		D	*K*	*L*			*C*	*N*	*A*	H_1	H_2	H_3	*T*	B_1	B_2	B_3	*r*	*U*	*V*	*G*	*R* min.
Codes affected		105, 111, 112, 113, 114, 115, 121					105, 111, 112, 113, 114, 115, 121	111, 112, 113, 114, 115, 121	111, 121	112, 113, 114	115	111	113	112, 114	115	111, 114	115	114	113	105	111, 114, 112, 115, 113, 121
in	DN	mm	mm	in (mm)		in	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
$^1/_2$	15	95	66.7	$^5/_8$ (15.9)	4	$^1/_2$	14.3	38	21.3	22.2	22.2	52.4	16	22.4	23.0		3.0	9.5	23.5	—	3
$^3/_4$	20	117	82.6	$^3/_4$ (19.0)	4	$^5/_8$	15.9	48	26.7	25.4	25.4	57.2	16	27.7	28.0		3.0	11.0	29.0	—	3
1	25	124	88.9	$^3/_4$ (19.0)	4	$^5/_8$	17.5	54	33.4	27.0	27.0	61.9	17	34.5	35.0		3.0	12.5	36.0	—	3
[a] 1 $^1/_4$	32	133	98.4	$^3/_4$ (19.0)	4	$^5/_8$	19.0	64	42.2	27.0	27.0	65.1	21	43.2	43.5		5.0	14.5	44.5	—	3
1 $^1/_2$	40	156	114.3	$^7/_8$ (22.2)	4	$^3/_4$	20.6	70	48.3	30.2	30.2	68.3	22	49.5	50.0		6.5	16.0	50.5	—	3
2	50	165	127.0	$^3/_4$ (19.0)	8	$^5/_8$	22.2	84	60.3	33.3	33.3	69.9	29	62.0	62.5		8.0	17.5	63.5	—	3
[a] 2 $^1/_2$	65	190	149.2	$^7/_8$ (22.2)	8	$^3/_4$	25.4	100	73.0	38.1	38.1	76.2	32	74.7	75.5	To be supplied by purchaser	8.0	19.0	76.0	38	3
3	80	210	168.3	$^7/_8$ (22.2)	8	$^3/_4$	28.6	117	88.9	42.9	42.9	79.4	32	90.7	91.5		9.5	20.5	92.0	51	3
4	100	254	200.0	$^7/_8$ (22.2)	8	$^3/_4$	31.8	146	114.3	47.6	47.6	85.7	37	116.1	117.0		9.5	—	118.0	76	3
[a] 5	125	279	235.0	$^7/_8$ (22.2)	8	$^3/_4$	34.9	178	141.3	50.8	50.8	98.4	43	143.8	145.0		11.0	—	145.0	102	6.5
6	150	318	269.9	$^7/_8$ (22.2)	12	$^3/_4$	36.5	206	168.3	52.4	52.4	98.4	46	170.7	171.0		12.5	—	171.0	127	6.5
8	200	381	330.2	1 (25.4)	12	$^7/_8$	41.3	260	219.1	61.9	61.9	111.1	—	221.5	222.0		12.5	—	—	200	6.5
10	250	444	387.4	1 $^1/_8$ (28.6)	16	1	47.6	321	273.0	66.8	95.3	117.5	—	276.4	277.0		12.5	—	—	225	6.5
12	300	521	450.8	1 $^1/_4$ (31.8)	16	1 $^1/_8$	50.8	375	323.9	73.0	101.6	130.2	—	327.2	328.0		12.5	—	—	279	9.5
14	350	584	514.4	1 $^1/_4$ (31.8)	20	1 $^1/_8$	54.0	425	355.6	76.2	111.1	142.9	—	359.2	360.0		12.5	—	—	311	9.5
16	400	648	571.5	1 $^3/_8$ (34.9)	20	1 $^1/_4$	57.2	483	406.4	82.6	120.7	146.1	—	410.5	411.0		12.5	—	—	362	9.5
18	450	711	628.6	1 $^3/_8$ (34.9)	24	1 $^1/_4$	60.3	533	457.2	88.9	130.2	158.8	—	461.8	462.0		12.5	—	—	406	9.5
20	500	775	685.8	1 $^3/_8$ (34.9)	24	1 $^1/_4$	63.5	587	508.0	95.3	139.7	162.0	—	513.1	514.0		12.5	—	—	457	9.5
24	600	914	812.8	1 $^5/_8$ (41.3)	24	1 $^1/_2$	69.8	702	609.6	106.4	152.4	168.3	—	616.0	616.0		12.5	—	—	559	9.5

NOTE 1 For facing dimensions see Table 5.
NOTE 2 See notes following Table 14.
[a] The use of these sizes should be avoided in new constructions.



NOTE 1 Dimension N is measured at the intersection of the projections of the hub drift angle and the back face of the flange.
NOTE 2 Alternative forms are indicated by the use of dotted lines.
NOTE 3 Diameter of shoulder G refers to an unmachined centre portion of the flange (see note 4 to 7.1).

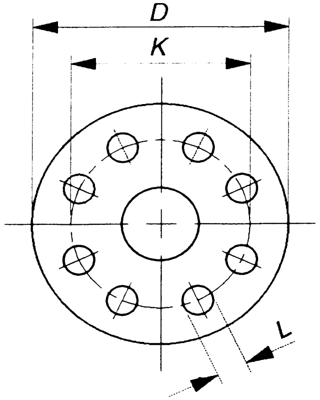
Figure 10 — Dimensions of Class 600 flanges (see Table 11)

Table 11 — Dimensions of Class 600 flanges (see Figure 10)

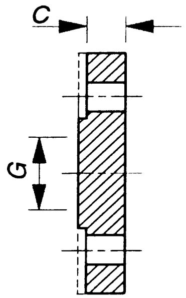
Nominal size		Outside diameter of flange	Mating dimensions				Flange thickness	Hub diameter	Hub diameter at weld end	Length through hub			Minimum thread length of threaded flange	Bore			Corner radius of bore of lapped flange and pipe	Depth of socket	Minimum diameter of counter-bore threaded flange	Shoulder diameter	Hub radius
			Diameter of bolt circle	Diameter of bolt holes	Number of bolts	Nominal diameter of bolts				Threaded; slip-on; socket weld	Lapped	Weld neck		Slip-on; socket weld	Lapped	Weld neck socket weld					
		D	*K*	*L*			*C*	*N*	*A*	H_1	H_2	H_3	*T*	B_1	B_2	B_3	*r*	*U*	*V*	*G*	*R* min.
Codes affected		105, 111, 112, 113, 114, 115, 121					105, 111, 112, 113, 114, 115, 121	111, 112, 113, 114, 115, 121	111, 121	112, 113, 114	115	111	113	112, 114	115	111, 114	115	114	113	105	111, 114, 112, 115, 113, 121
in	DN	mm	mm	in (mm)		in	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
1/2	15	95	66.7	5/8 (15.9)	4	1/2	14.3	38	21.3	22.2	22.2	52.4	16	22.4	23.0		3.0	9.5	23.5	—	3
3/4	20	117	82.6	3/4 (19.0)	4	5/8	15.9	48	26.7	25.4	25.4	57.2	16	27.7	28.0		3.0	11.0	29.0	—	3
1	25	124	88.9	3/4 (19.0)	4	5/8	17.5	54	33.4	27.0	27.0	61.9	17	34.5	35.0		3.0	12.5	36.0	—	3
[a] 1 1/4	32	133	98.4	3/4 (19.0)	4	5/8	20.6	64	42.2	28.6	28.6	66.8	21	43.2	43.5		5.0	14.5	44.5	—	3
1 1/2	40	156	114.3	7/8 (22.2)	4	3/4	22.2	70	48.3	31.8	31.8	69.9	22	49.5	50.0		6.5	16.0	50.5	—	3
2	50	165	127.0	3/4 (19.0)	8	5/8	25.4	84	60.3	36.5	36.5	73.0	29	62.0	62.5		8.0	17.5	63.5	—	3
[a] 2 1/2	65	190	149.2	7/8 (22.2)	8	3/4	28.6	100	73.0	41.3	41.3	79.4	32	74.7	75.5		8.0	19.0	76.0	38	3
3	80	210	168.3	7/8 (22.2)	8	3/4	31.8	117	88.9	46.0	46.0	82.6	35	90.7	91.5		9.5	20.5	92.0	51	3
4	100	273	215.9	1 (25.4)	8	7/8	38.1	152	114.3	54.0	54.0	101.6	41	116.1	117.0		11.0	—	118.0	76	3
[a] 5	125	330	266.7	1 1/8 (28.6)	8	1	44.4	189	141.3	60.3	60.3	114.3	48	143.8	145.0		11.0	—	145.0	102	6.5
6	150	356	292.1	1 1/8 (28.6)	12	1	47.6	222	168.3	66.8	66.8	117.5	51	170.7	171.0		12.5	—	171.0	127	6.5
8	200	419	349.2	1 1/4 (31.8)	12	1 1/8	55.6	273	219.1	76.2	76.2	133.4	—	221.5	222.0		12.5	—	—	175	6.5
10	250	508	431.8	1 3/8 (34.9)	16	1 1/4	63.5	343	273.0	85.7	111.1	152.4	—	276.4	277.0		12.5	—	—	222	6.5
12	300	559	489.0	1 3/8 (34.9)	20	1 1/4	66.7	400	323.9	92.1	117.5	155.6	—	327.2	328.0		12.5	—	—	273	11
14	350	603	527.0	1 1/2 (38.1)	20	1 3/8	69.8	432	355.6	93.7	127.0	165.1	—	359.2	360.0		12.5	—	—	302	11
16	400	686	603.2	1 5/8 (41.3)	20	1 1/2	76.2	495	406.4	106.4	139.7	177.8	—	410.5	411.0		12.5	—	—	349	11
18	450	743	654.0	1 3/4 (44.4)	20	1 5/8	82.6	546	457.2	117.5	151.4	184.2	—	461.8	462.0		12.5	—	—	394	11
20	500	813	723.9	1 3/4 (44.4)	24	1 5/8	88.9	610	508.0	127.0	165.1	190.5	—	513.1	514.0		12.5	—	—	438	11
24	600	940	838.2	2 (50.8)	24	1 7/8	101.6	718	609.6	139.7	184.2	203.2	—	616.0	616.0		12.5	—	—	533	11

To be supplied by purchaser

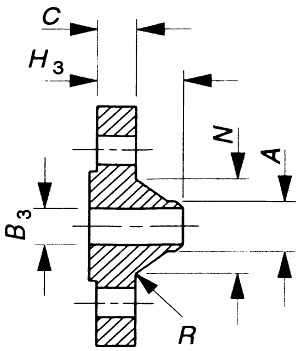
NOTE 1 For facing dimensions see Table 5.
NOTE 2 See notes following Table 14.
[a] The use of these sizes should be avoided in new constructions.



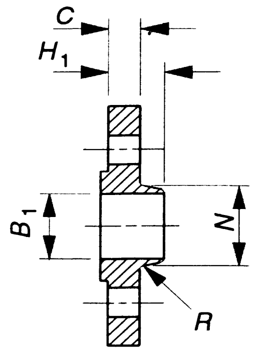
This diagram illustrates the arrangement but not necessarily the correct number of bolt holes



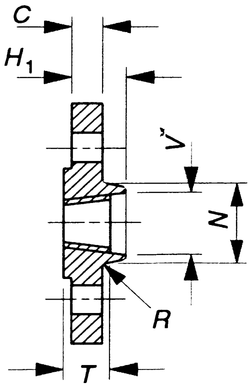
Code 105
Blank flange



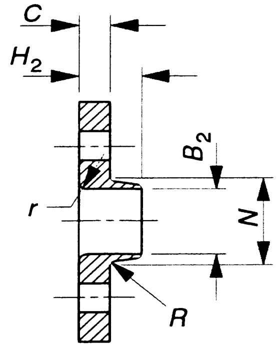
Code 111
Weld-neck flange



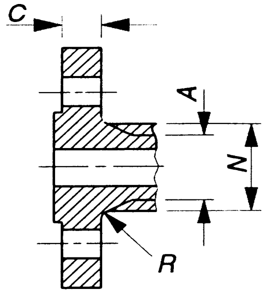
Code 112
Hubbed slip-on flange for welding



Code 113
Hubbed threaded flange



Code 115
Loose hubbed flange for lapped pipe end



Code 121
Integral flange

NOTE 1 Dimension *N* is measured at the intersection of the projections of the hub drift angle and the back face of the flange.
NOTE 2 Alternative forms are indicated by the use of dotted lines.
NOTE 3 Diameter of shoulder *G* refers to an unmachined centre portion of the flange (see note 4 to **7.1**)

Figure 11 — Dimensions of Class 900 flanges (see Table 12)

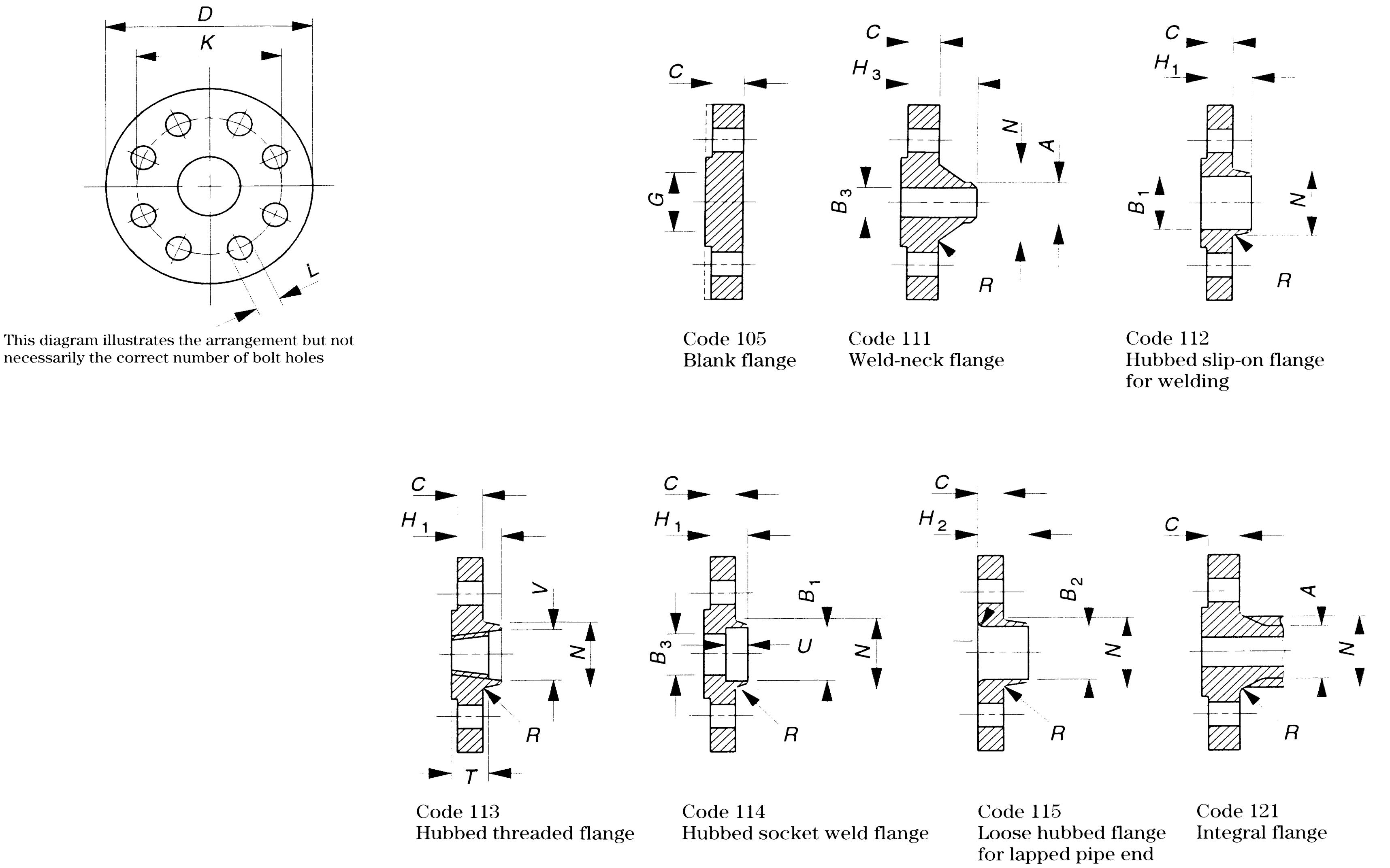
Table 12 — Dimensions of Class 900 flanges (see Figure 11)

Nominal size		Outside diameter of flange	Mating dimensions				Flange thickness	Hub diameter	Hub diameter at weld end	Length through hub			Minimum thread length of threaded flange	Bore			Corner radius of bore of lapped flange and pipe	Minimum diameter of counter-bore threaded flange	Shoulder diameter	Hub radius
			Diameter of bolt circle	Diameter of bolt holes	Number of bolts	Nominal diameter of bolts				Threaded; slip-on	Lapped	Weld neck		Slip-on	Lapped	Weld neck				
		D	*K*	*L*			*C*	*N*	*A*	H_1	H_2	H_3	*T*	B_1	B_2	B_3	*r*	*V*	*G*	*R* min.
Codes affected		105, 111, 112, 113, 115, 121					105, 111, 112, 113, 115, 121	111, 112, 113, 115, 121	111, 121	112, 113	115	111	113	112	115	111	115	113	105	111, 115, 112, 121, 113
in	DN																			
$^1/_2$	15																			
$^3/_4$	20																			
1	25																			
[a] 1 $^1/_4$	32	For these sizes Class 1500 flanges are used																		
1 $^1/_2$	40																			
2	50																			
[a] 2 $^1/_2$	65	mm	mm	in (mm)		in	mm	mm	mm	mm	mm	mm	mm	mm	mm		mm	mm	mm	mm
3	80	241	190.5	1 (25.4)	8	$^7/_8$	38.1	127	88.9	54.0	54.0	101.6	41	90.7	91.5		9.5	92	48	3
4	100	292	235.0	1 $^1/_4$ (31.8)	8	1 $^1/_8$	44.4	159	114.3	69.9	69.9	114.3	48	116.1	117.0		11.0	118	73	5
[a] 5	125	349	279.4	1 $^3/_8$ (34.9)	8	1 $^1/_4$	50.8	190	141.3	79.4	79.4	127.0	54	143.8	145.0		11.0	145	95	6.5
6	150	381	317.5	1 $^1/_4$ (31.8)	12	1 $^1/_8$	55.6	235	168.3	85.7	85.7	139.7	57	170.7	171.0		12.5	171	121	6.5
8	200	470	393.7	1 $^1/_2$ (38.1)	12	1 $^3/_8$	63.5	298	219.1	101.6	114.3	162.0	—	221.5	222.0		12.5	—	165	6.5
10	250	546	469.9	1 $^1/_2$ (38.1)	16	1 $^3/_8$	69.8	368	273.0	108.0	127.0	184.2	—	276.4	277.0		12.5	—	213	6.5
12	300	610	533.4	1 $^1/_2$ (38.1)	20	1 $^3/_8$	79.4	419	323.9	117.5	142.9	200.0	—	327.2	328.0		12.5	—	267	9.5
14	350	641	558.8	1 $^5/_8$ (41.3)	20	1 $^1/_2$	85.7	451	355.6	130.2	155.6	212.8	—	359.2	360.0		12.5	—	286	11
16	400	705	616.0	1 $^3/_4$ (44.4)	20	1 $^5/_8$	88.9	508	406.4	133.4	165.1	215.9	—	410.5	411.0		12.5	—	381	11
18	450	787	685.8	2 (50.8)	20	1 $^7/_8$	101.6	565	457.2	152.4	190.5	228.6	—	461.8	462.0	To be supplied by purchaser	12.5	—	419	11
20	500	857	749.3	2 $^1/_8$ (54.0)	20	2	108.0	622	508.0	158.8	209.6	247.7	—	513.1	514.0		12.5	—	451	11
24	600	1 041	901.7	2 $^5/_8$ (66.7)	20	2 $^1/_2$	139.7	749	609.6	203.2	266.7	292.1	—	616.0	616.0		12.5	—	508	11

NOTE 1 For facing dimensions see Table 5.

NOTE 2 See notes following Table 14.

[a] The use of these sizes should be avoided in new constructions.



NOTE 1 Dimension *N* is measured at the intersection of the projections of the hub drift angle and the back face of the flange.

NOTE 2 Alternative forms are indicated by the use of dotted lines.

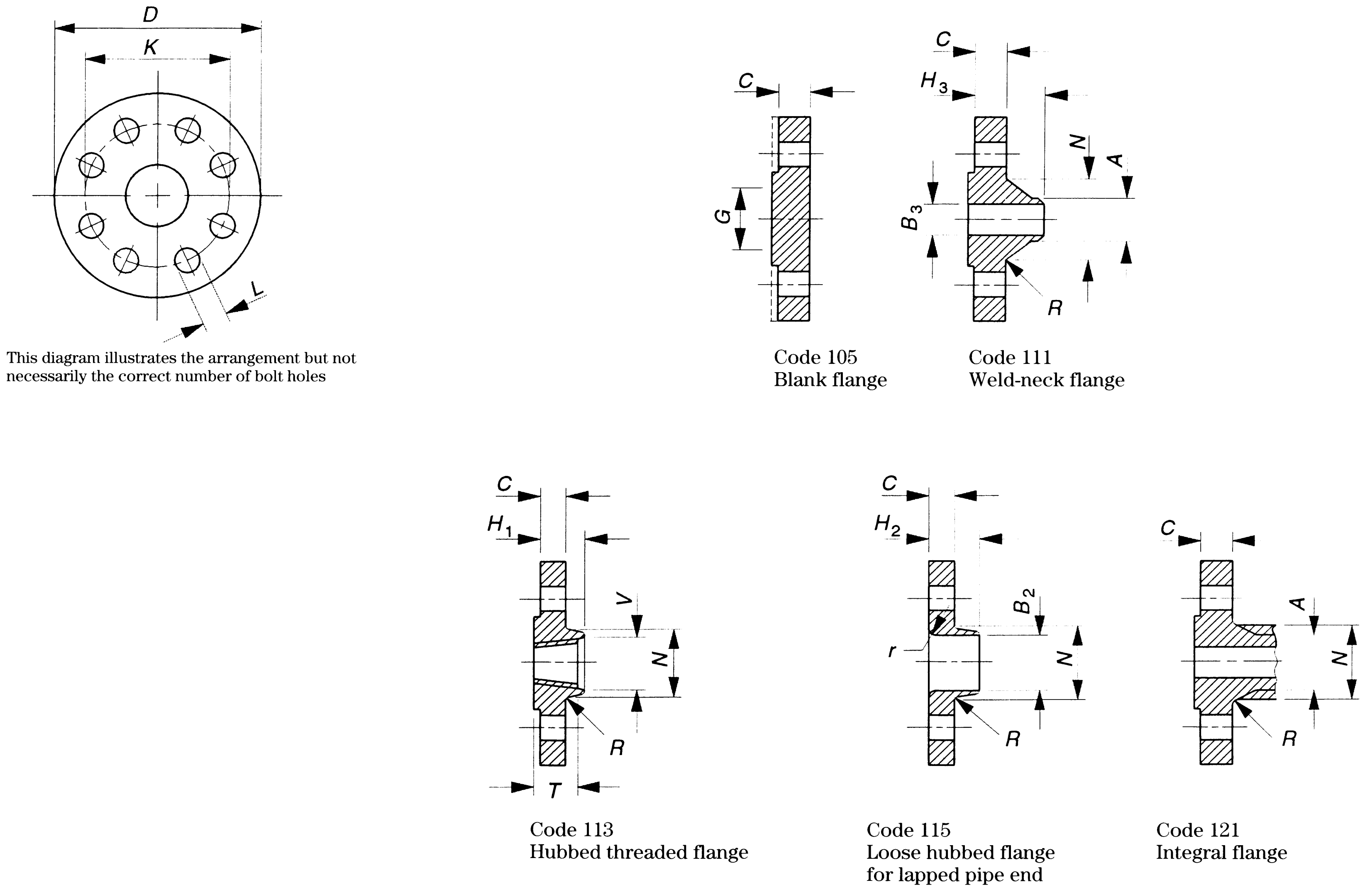
NOTE 3 Diameter of shoulder *G* refers to an unmachined centre portion of the flange (see note 4 to **7.1**)

Figure 12 — Dimensions of Class 1500 flanges (see Table 13)

Table 13 — Dimensions of Class 1500 flanges (see Figure 12)

Nominal size		Outside diameter of flange	Mating dimensions: Diameter of bolt circle	Mating dimensions: Diameter of bolt holes	Mating dimensions: Number of bolts	Mating dimensions: Nominal diameter of bolts	Flange thickness	Hub diameter	Hub diameter at weld end	Length through hub: Threaded; slip-on; socket weld	Length through hub: Lapped	Length through hub: Weld neck	Minimum thread length of threaded flange	Bore: Slip-on; socket weld	Bore: Lapped	Bore: Weld neck: socket weld	Corner radius of bore of lapped flange and pipe	Depth of socket	Minimum diameter of counter-bore threaded flange	Shoulder diameter	Hub radius
		D	*K*	*L*			*C*	*N*	*A*	H_1	H_2	H_3	*T*	B_1	B_2	B_3	*r*	*U*	*V*	*G*	*R* min.
Codes affected		105, 111, 112, 113, 114, 115, 121					105, 111, 112, 113, 114, 115, 121	111, 112, 113, 114, 115, 121	111, 121	112, 113, 114	115	111	113	112, 114	115	111, 114	115	114	105	105	111, 114, 112, 115, 113, 121
in	DN	mm	mm	in (mm)		in	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
1/2	15	121	82.6	7/8 (22.2)	4	3/4	22.2	38	21.3	31.8	31.8	60.3	22	22.4	23.0		3.0	9.5	23.5	—	5
3/4	20	130	88.9	7/8 (22.2)	4	3/4	25.4	44	26.7	34.9	34.9	69.9	25	27.7	28.0		3.0	11.0	29.0	—	5
1	25	149	101.6	1 (25.4)	4	7/8	28.6	52	33.4	41.3	41.3	73.0	29	34.5	35.0		3.0	12.5	36.0	—	5
[a] 1 1/4	32	159	111.1	1 (25.4)	4	7/8	28.6	64	42.2	41.3	41.3	73.0	30	43.2	43.5		5.0	14.5	44.5	—	5
1 1/2	40	178	123.8	1 1/8 (28.6)	4	1	31.8	70	48.3	44.5	44.5	82.6	32	49.5	50.0		6.5	16.0	50.5	—	5
2	50	216	165.1	1 (25.4)	8	7/8	38.1	105	60.3	57.2	57.2	101.6	38	62.0	62.5		8.0	17.5	63.5	—	5
[a] 2 1/2	65	244	190.5	1 1/8 (28.6)	8	1	41.3	124	73.0	63.5	63.5	104.8	48	74.7	75.0	To be supplied by purchaser	8.0	19.0	76.0	32	5
3	80	267	203.2	1 1/4 (31.8)	8	1 1/8	47.6	133	88.9	73.0	73.0	117.5	51	—	91.5		9.5	—	92.0	44	5
4	100	311	241.3	1 3/8 (34.9)	8	1 1/4	54.0	162	114.3	90.5	90.5	123.8	57	—	117.0		11.0	—	118.0	66	5
[a] 5	125	375	292.1	1 5/8 (41.3)	8	1 1/2	73.0	197	141.3	104.8	104.8	155.6	64	—	145.0		11.0	—	145.0	86	6.5
6	150	394	317.5	1 1/2 (38.1)	12	1 3/8	82.6	229	168.3	119.1	119.1	171.5	70	—	171.0		12.5	—	171.0	111	6.5
8	200	483	393.7	1 3/4 (44.4)	12	1 5/8	92.1	292	219.1	142.9	142.9	212.7	—	—	222.0		12.5	—	—	152	6.5
10	250	584	482.6	2 (50.8)	12	1 7/8	108.0	368.	273.0	158.8	177.8	254.0	—	—	277.0		12.5	—	—	197	9.5
12	300	673	571.5	2 1/8 (54.0)	16	2	123.8	451	323.9	181.0	219.1	282.6	—	—	328.0		12.5	—	—	238	11
14	350	749	635.0	2 3/8 (60.3)	16	2 1/4	133.4	495	355.6	—	241.3	298.5	—	—	360.0		12.5	—	—	263	11
16	400	826	704.8	2 5/8 (66.7)	16	2 1/2	146.1	552	406.4	—	260.4	311.2	—	—	411.0		12.5	—	—	305	11
18	450	914	774.7	2 7/8 {73.0)	16	2 3/4	161.9	597	457.2	—	276.2	327.0	—	—	462.0		12.5	—	—	346	11
20	500	984	831.8	3 1/8 (79.4)	16	3	178.0	641	508.0	—	292.1	355.6	—	—	514.0		12.5	—	—	390	11
24	600	1 168	990.6	3 5/8 (92.0)	16	3 1/2	203.0	762	609.6	—	330.2	406.4	—	—	616.0		12.5	—	—	473	11

NOTE 1 For facing dimensions see Table 5.
NOTE 2 See notes following Table 14.
[a] The use of these sizes should be avoided in new constructions.



NOTE 1 Dimension N is measured at the intersection of the projections of the hub drift angle and the back face of the flange.
NOTE 2 Alternative forms are indicated by the use of dotted lines.
NOTE 3 Diameter of shoulder G refers to an unmachined centre portion of the flange (see note 4 to **7.1**)

Figure 13 — Dimensions of Class 2500 flanges (see Table 14)

Table 14 — Dimensions of Class 2500 flanges (see Figure 13)

Nominal size		Outside diameter of flange	Mating dimensions				Flange thickness	Hub diameter	Hub diameter at weld end	Length through hub			Minimum thread length of threaded flange	Bore		Corner radius of bore of lapped flange and pipe	Minimum diameter of counter-bore threaded flange	Shoulder diameter	Hub radius
			Diameter of bolt circle	Diameter of bolt holes	Number of bolts	Nominal diameter of bolts				Threaded	Lapped	Weld neck		Lapped	Weld neck				
		D	K	L			C	N	A	H_1	H_2	H_3	T	B_2	B_3	r	V	G	R min.
Codes affected		105, 111, 113, 115, 121					105, 111, 113, 115, 121	111, 113, 115, 121	111, 121	113	115	111	113	115	111	115	113	105	111, 115, 113, 121
in	DN	mm	mm	in (mm)		in	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
$^1/_2$	15	133	88.9	$^7/_8$ (22.2)	4	$^3/_4$	30.2	43	21.3	39.7	39.7	73.0	29	23.0		3.0	23.5	—	5
$^3/_4$	20	140	95.2	$^7/_8$ (22.2)	4	$^3/_4$	31.7	51	26.7	42.9	42.9	79.4	32	28.0		3.0	29.0	—	5
1	25	159	107.9	1 (25.4)	4	$^7/_8$	34.9	57	33.4	47.6	47.6	88.9	35	35.0		3.0	35.0	—	5
[a]1 $^1/_4$	32	184	130.2	1 $^1/_8$ (28.6)	4	1	38.1	73	42.2	52.4	52.4	95.3	38	43.5		5.0	44.5	—	5
1 $^1/_2$	40	203	146.0	1 $^1/_4$ (31.8)	4	1 $^1/_8$	44.4	79	48.3	60.3	60.3	111.1	44	50.0		6.5	50.5	—	9.5
2	50	235	171.4	1 $^1/_8$ (28.6)	8	1	50.8	95	60.3	69.9	69.9	127.0	51	62.5		8.0	63.5	—	9.5
[a]2 $^1/_2$	65	267	196.8	1 $^1/_4$ (31.8)	8	1 $^1/_8$	57.1	114	73.0	79.4	79.4	142.9	57	75.5		8.0	76.0	22	9.5
3	80	305	228.6	1 $^3/_8$ (34.9)	8	1 $^1/_4$	66.7	133	88.9	92.1	92.1	168.3	64	91.5		9.5	92.0	32	9.5
4	100	356	273.0	1 $^5/_8$ (41.3)	8	1 $^1/_2$	76.2	165	114.3	108.0	108.0	190.5	70	117.0		11.0	118.0	48	9.5
[a]5	125	419	323.8	1 $^7/_8$ (47.6)	8	1 $^3/_4$	92.1	203	141.3	130.2	130.2	228.6	76	145.0	To be supplied purchaser	11.0	145.0	67	9.5
6	150	483	368.3	2 $^1/_8$ (54.0)	8	2	108.0	235	168.3	152.4	152.4	273.1	83	171.0		12.5	171.0	86	15.5
8	200	552	438.1	2 $^1/_8$ (54.0)	12	2	127.0	305	219.1	—	177.8	317.5	—	222.0		12.5	—	96	15.5
10	250	673	539.7	2 $^5/_8$ (66.7)	12	2 $^1/_2$	165.1	375	273.0	—	228.6	419.1	—	277.0		12.5	—	159	15.5
12	300	762	619.1	2 $^7/_8$ (73.0)	12	2 $^3/_4$	184.1	441	323.9	—	254.0	463.6	—	328.0		12.5	—	193	15.5

NOTE 1 For facing dimensions see Table 5.
NOTE 2 See notes following Table 14.
[a] The use of these sizes should be avoided in new constructions.

Notes to flanges dimension Table 9 to Table 14

NOTE 1 For tolerances see clause **10** and Table 15.

NOTE 2 For facings see Figure 4, Figure 5 and Figure 6, Table 5 and Table 6 and clause **8**.

NOTE 3 For spot facing see clause **9**.

NOTE 4 For reducing threaded, slip-on and weld neck flanges see **7.5**.

NOTE 5 For threads in threaded flanges see **7.3**.

NOTE 6 When Class 150 and Class 300 flanges are required with flat face, either the full thickness or thickness with raised face removed may be supplied. Users are reminded that removing the raised face will mean that the thickness and length through the hub will no longer comply with this Section of BS 1560 (see **8.4**).

NOTE 7 The bore sizes of integral (code 121) flanges are usually equal to the nominal size of the pipe, value or fitting to which they form a part and the actual bore sizes are usually given in the appropriate standard(s) for the pipe, valve or fitting.

Table 15 — Tolerances

Dimension	Flange code	Tolerance	Size
		mm	in
Hub diameter at weld end *A*	111, 121	+2.4 –0.8	≤ 5
		+4.0 –0.8	> 5
Bore diameter B_1, B_2	101, 112, 114, 115	+0.8 –0	≤ 10
		+1.6 –0	> 10
Bore diameter B_3	111, 114	± 0.8	≤ 10
		± 1.6	> 10 ≤ 16
		+3.2 –1.6	> 16
Length through hub H_1, H_2, H_3	111, 112, 113, 114, 115	± 1.6	≤ 10
		± 3.2	> 10
Flange thickness *C*	All codes	+3.2 –0	≤ 18
		+4.8 –0	> 18
Outside diameter of raised face *O*	All codes 1.6 mm raised face	± 0.8	All sizes
	6.4 mm raised face	± 0.4	
Facing dimensions *M, Q, W, Y* and *Z*	All codes (facing types C, D, E and F)	± 0.4	All sizes
Ring-joint depth *E*	All codes (facing type J)	+0.4 –0	All sizes
Ring-joint width *F*		± 0.2	
Ring-joint pitch *P*		± 0.13	
23° angle		± 1/2°	
Diameter of bolt circle *K*	All codes	± 1.6	All sizes
Centre-to-centre of adjacent bolt holes	All codes	± 0.8	All sizes
Eccentricity of machined facing diameters	All codes	0.8	≤ 2 1/2
		1.6	> 2 1/2
Parallelism between bolting bearing surfaces and flange jointing face	All codes	1°	All sizes

Table 16 — Class 150: pressure/temperature ratings

Temperature				Material groups														
°F		°C		1.1	1.2	1.3	1.4	1.5	1.9	1.10	1.13	1.14	2.1	2.2	2.3	2.4	2.5	2.6	2.7
				Maximum permissible working pressure															
				bar[a]	bar	bar	bar	bar	bar	bar	bar	bar	bar	bar	bar	bar	bar	bar	bar
Up to		Up to																	
100		**38**		**19.7**	**20.0**	**18.3**	**16.2**	**18.3**	**20.0**	**20.0**	**20.0**	**20.0**	**19.0**	**19.0**	**15.9**	**19.0**	**19.0**	**17.9**	**17.9**
	122		50	19.3	19.5	18.0	15.9	18.2	19.5	19.5	19.5	19.5	18.4	18.4	15.3	18.4	18.5	17.5	17.5
200		**93**		**17.9**	**17.9**	**17.2**	**14.8**	**17.9**	**17.9**	**17.9**	**17.9**	**17.9**	**16.2**	**16.5**	**13.4**	**16.2**	**16.9**	**15.9**	**15.9**
	212		100	17.7	17.7	17.1	14.8	17.7	17.7	17.7	17.7	17.7	16.0	16.3	13.3	16.0	16.7	15.8	15.8
300		**149**		**15.9**	**15.9**	**15.9**	**14.5**	**15.9**	**15.9**	**15.9**	**15.9**	**15.9**	**14.1**	**14.8**	**12.1**	**14.5**	**15.5**	**15.2**	**15.2**
	302		150	15.8	15.8	15.8	14.5	15.8	15.8	15.8	15.8	15.8	14.1	14.8	12.0	14.5	15.5	15.1	15.1
	392		200	14.0	14.0	14.0	13.8	14.0	14.0	14.0	14.0	14.0	12.5	13.6	11.1	13.2	13.9	13.9	13.9
400		**204**		**13.8**	**13.8**	**13.8**	**13.8**	**13.8**	**13.8**	**13.8**	**13.8**	**13.8**	**12.4**	**13.4**	**11.0**	**13.1**	**13.8**	**13.8**	**13.8**
	482		250	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	11.8	12.0	10.2	12.0	12.1	12.1	12.1
500		**260**		**11.7**	**11.7**	**11.7**	**11.7**	**11.7**	**11.7**	**11.7**	**11.7**	**11.7**	**11.7**	**11.7**	**10.0**	**11.7**	**11.7**	**11.7**	**11.7**
	572		300	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	9.7	10.2	10.2	10.2	10.2
600		**316**		**9.7**	**9.7**	**9.7**	**9.7**	**9.7**	**9.7**	**9.7**	**9.7**	**9.7**	**9.7**	**9.7**	**9.7**	**9.7**	**9.7**	**9.7**	**9.7**
650		**343**		**8.6**	**8.6**	**8.6**	**8.6**	**8.6**	**8.6**	**8.6**	**8.6**	**8.6**	**8.6**	**8.6**	**8.6**	**8.6**	**8.6**	**8.6**	**8.6**
	662		350	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4
700		**371**		**7.6**	**7.6**	**7.6**	**7.6**	**7.6**	**7.6**	**7.6**	**7.6**	**7.6**	**7.6**	**7.6**	**7.6**	**7.6**	**7.6**	**7.6**	**7.6**
	707		375	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4
750		**399**		**6.6**	**6.6**	**6.6**	**6.6**	**6.6**	**6.6**	**6.6**	**6.6**	**6.6**	**6.6**	**6.6**	**6.6**	**6.6**	**6.6**	**6.6**	**6.6**
	752		400	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
	797		425	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6
800		**427**		**5.5**	**5.5**	**5.5**	**5.5**	**5.5**	**5.5**	**5.5**	**5.5**	**5.5**	**5.5**	**5.5**	**5.5**	**5.5**	**5.5**	**5.5**	**5.5**
	842		450	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
850		**454**		**4.5**	**4.5**	**4.5**	**4.5**	**4.5**	**4.5**	**4.5**	**4.5**	**4.5**	**4.5**	**4.5**	**4.5**	**4.5**	**4.5**	**4.5**	**4.5**
	887		475	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	—	3.7	3.7	3.7	3.7
900		**482**		**3.4**	**3.4**	**3.4**	**3.4**	**3.4**	**3.4**	**3.4**	**3.4**	**3.4**	**3.4**	**3.4**	—	**3.4**	**3.4**	**3.4**	**3.4**
	932		500	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	—	2.8	2.8	2.8	2.8
950		**510**		**2.4**	**2.4**	**2.4**	**2.4**	**2.4**	**2.4**	**2.4**	**2.4**	**2.4**	**2.4**	**2.4**	—	**2.4**	**2.4**	**2.4**	**2.4**
	977		525	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	—	1.8	1.8	1.8	1.8
1 000		**538**		**1.4**	**1.4**	**1.4**	**1.4**	**1.4**	**1.4**	**1.4**	**1.4**	**1.4**	**1.4**	**1.4**	—	**1.4**	**1.4**	**1.4**	**1.4**

NOTE 1 For limitations of temperature for individual materials see notes to Table 3.

NOTE 2 Pressures and temperatures shown in bold type are conversions from ratings given in ANSI B16.5:1981; intermediate values shown in lighter type have been obtained by linear interpolation. For other intermediate values it is recommended that they are obtained by linear interpolation using the original ANSI B16.5 figures shown in bold type.

NOTE 3 Temperature conversions from degrees fahrenheit to degrees celsius have been rounded to the nearest whole degree; pressure conversions from lbf/in^2 to bar have used a conversion factor from BS 350-1 of 1 lbf/in^2 = 0.0689476 bar and have been rounded to the nearest 0.1 bar.

[a] 1 bar = 10^5N/m^2 = 10^5 Pa.

Table 17 — Class 300: pressure/temperature ratings

Temperature				Material groups														
°F		°C		1.1	1.2	1.3	1.4	1.5	1.9	1.10	1.13	1.14	2.1	2.2	2.3	2.4	2.5	2.6	2.7
				Maximum permissible working pressure														
				bar[a]	bar	bar	bar	bar	bar	bar	bar	bar	bar	bar	bar	bar	bar	bar	bar
Up to		Up to																
100		**38**		**51.0**	**51.7**	**47.9**	**42.7**	**47.9**	**51.7**	**51.7**	**51.7**	**51.7**	**49.6**	**49.6**	**41.4**	**49.6**	**49.6**	**46.2**	**46.2**
	122		50	50.0	51.7	47.3	41.8	47.7	51.1	51.2	51.7	51.7	47.8	48.1	39.9	48.0	48.4	45.2	45.2
200		**93**		**46.5**	**51.7**	**45.2**	**38.6**	**46.9**	**49.0**	**49.3**	**51.7**	**51.7**	**41.4**	**42.7**	**34.8**	**42.1**	**43.8**	**41.7**	**41.7**
	212		100	46.4	51.5	45.0	38.5	46.7	48.7	49.0	51.5	51.5	40.8	42.3	34.4	41.5	43.4	41.4	41.4
300		**149**		**45.2**	**50.3**	**44.1**	**44.8**	**45.2**	**46.5**	**46.5**	**50.3**	**50.3**	**36.5**	**38.6**	**31.4**	**37.6**	**40.7**	**39.3**	**39.3**
	302		150	45.1	50.3	44.1	37.9	45.1	46.5	46.5	50.3	50.3	36.5	38.5	31.3	37.5	40.6	39.3	39.3
	392		200	43.9	48.7	42.9	36.7	44.2	45.6	45.0	48.7	48.7	32.7	35.8	28.8	34.4	38.5	37.1	37.1
400		**204**		**43.8**	**48.6**	**42.7**	**36.5**	**44.1**	**45.5**	**44.8**	**48.6**	**48.6**	**32.4**	**35.5**	**28.6**	**34.1**	**38.3**	**36.9**	**36.9**
	482		250	41.8	46.3	40.8	34.8	43.0	44.4	44.3	46.3	46.3	30.4	33.5	26.6	32.2	36.3	35.2	35.2
500		**260**		**41.4**	**45.9**	**40.3**	**34.5**	**42.7**	**44.1**	**44.1**	**45.9**	**45.9**	**30.0**	**33.1**	**26.2**	**31.7**	**35.9**	**34.8**	**34.8**
	572		300	38.9	42.9	37.9	32.2	42.0	42.4	42.4	42.9	42.9	29.0	31.6	25.2	30.5	34.4	33.6	33.6
600		**316**		**37.9**	**41.7**	**36.9**	**31.4**	**41.7**	**41.7**	**41.7**	**41.7**	**41.7**	**28.6**	**31.0**	**24.8**	**30.0**	**33.8**	**33.1**	**33.1**
650		**343**		**36.9**	**40.7**	**36.2**	**31.0**	**40.7**	**40.7**	**40.7**	**40.7**	**40.7**	**28.3**	**30.7**	**24.1**	**29.6**	**33.1**	**32.1**	**32.1**
	662		350	36.9	40.3	36.1	31.0	40.3	40.3	40.3	40.3	40.3	28.2	30.4	24.0	29.5	32.9	31.9	31.9
700		**371**		**36.9**	**39.3**	**35.9**	**31.0**	**39.3**	**39.3**	**39.3**	**39.3**	**39.3**	**27.9**	**29.6**	**23.8**	**29.0**	**32.4**	**31.4**	**31.4**
	707		375	36.6	38.7	35.4	31.0	38.9	38.9	38.9	38.9	38.9	27.9	29.6	23.7	28.9	32.3	31.3	31.3
750		**399**		**34.8**	**34.8**	**32.8**	**30.7**	**36.5**	**36.5**	**36.5**	**36.5**	**36.5**	**27.6**	**29.3**	**23.1**	**28.6**	**31.7**	**30.7**	**30.7**
	752		400	34.6	34.6	32.5	30.5	36.5	36.5	36.5	36.5	36.5	27.6	29.3	23.1	28.6	31.7	30.7	30.7
	797		425	28.7	28.7	27.2	25.8	35.2	35.2	35.2	34.6	35.2	27.3	28.7	22.8	28.6	31.4	30.0	30.0
800		**427**		**28.3**	**28.3**	**26.9**	**25.5**	**35.2**	**35.2**	**35.2**	**34.5**	**35.2**	**27.2**	**28.6**	**22.8**	**28.6**	**31.4**	**30.0**	**30.0**
	842		450	20.2	20.2	19.9	19.7	33.7	33.7	33.7	31.0	33.7	26.9	28.0	22.2	28.3	30.8	29.4	29.4
850		**454**		**18.6**	**18.6**	**18.6**	**18.6**	**33.4**	**33.4**	**33.4**	**30.3**	**33.4**	**26.9**	**27.9**	**22.1**	**28.3**	**30.7**	**29.3**	**29.3**
	887		475	13.5	13.5	13.5	13.5	31.7	31.7	31.7	26.0	31.7	26.6	27.4	—	28.0	29.9	28.8	28.8
900		**482**		**11.7**	**11.7**	**11.7**	**11.7**	**31.0**	**31.0**	**31.0**	**24.5**	**31.0**	**26.5**	**27.2**	**—**	**27.9**	**29.6**	**28.6**	**28.6**
	932		500	8.9	8.9	8.9	8.9	23.5	27.9	27.9	20.3	27.5	26.1	26.8	—	27.0	27.7	27.3	27.3
950		**510**		**7.2**	**7.2**	**7.2**	**7.2**	**19.3**	**26.2**	**26.2**	**17.9**	**25.5**	**25.9**	**26.5**	**—**	**26.5**	**26.5**	**26.5**	**26.5**
	977		525	5.2	5.2	5.2	5.2	15.0	20.4	20.8	15.3	22.5	24.0	25.8	—	25.4	25.8	24.7	25.2
1 000		**538**		**3.4**	**3.4**	**3.4**	**3.4**	**11.4**	**15.5**	**18.6**	**13.1**	**20.0**	**22.4**	**25.2**	**—**	**24.5**	**25.2**	**23.1**	**24.1**
	1 022		550	—	—	—	—	—	12.9	15.7	11.6	17.0	22.0	25.0	—	24.2	25.0	21.7	23.7
1 050		**566**		**—**	**—**	**—**	**—**	**—**	**9.7**	**13.8**	**9.7**	**13.1**	**21.4**	**24.8**	**—**	**23.8**	**24.8**	**20.0**	**23.1**
	1 067		575	—	—	—	—	—	8.6	9.5	8.8	11.3	20.2	24.0	—	22.7	24.0	18.5	22.0
1 100		**593**		**—**	**—**	**—**	**—**	**—**	**6.6**	**7.9**	**7.2**	**7.9**	**17.9**	**22.4**	**—**	**20.7**	**22.4**	**15.5**	**20.0**
	1 112		600	—	—	—	—	—	5.8	7.8	6.7	7.3	16.9	21.6	—	19.6	21.6	14.6	19.3
1 150		**621**		**—**	**—**	**—**	**—**	**—**	**3.4**	**7.2**	**4.8**	**5.2**	**13.4**	**19.0**	**—**	**16.2**	**19.0**	**11.7**	**16.9**
	1 157		625	—	—	—	—	—	3.3	6.8	4.6	4.9	13.1	18.3	—	15.7	17.9	11.3	16.5
1 200		**649**		**—**	**—**	**—**	**—**	**—**	**2.4**	**3.8**	**3.1**	**3.4**	**10.7**	**14.1**	**—**	**12.4**	**11.7**	**9.0**	**14.1**
	1 202		650	—	—	—	—	—	—	—	—	—	10.6	14.1	—	12.3	11.6	8.2	14.0
	1 247		675	—	—	—	—	—	—	—	—	—	7.8	12.5	—	9.8	8.8	7.0	11.2
1 250		**677**		**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**7.6**	**12.4**	**—**	**9.7**	**8.6**	**6.9**	**11.0**
	1 292		700	—	—	—	—	—	—	—	—	—	6.1	10.1	—	7.6	6.9	5.7	8.7
1 300		**704**		**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**5.9**	**9.7**	**—**	**7.2**	**6.6**	**5.5**	**8.3**
	1 337		725	—	—	—	—	—	—	—	—	—	4.6	7.9	—	6.0	5.3	4.5	6.2
1 350		**732**		**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**4.1**	**7.2**	**—**	**5.5**	**4.8**	**4.1**	**5.5**
	1 382		750	—	—	—	—	—	—	—	—	—	3.7	5.9	—	4.6	3.9	3.5	4.4
1 400		**760**		**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**3.4**	**5.2**	**—**	**4.1**	**3.4**	**3.1**	**3.8**
	1 427		775	—	—	—	—	—	—	—	—	—	2.9	4.6	—	3.8	3.1	2.5	3.2
1 450		**788**		**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**2.4**	**4.1**	**—**	**3.4**	**2.8**	**2.1**	**2.8**
	1 472		800	—	—	—	—	—	—	—	—	—	2.1	3.5	—	3.1	2.6	1.9	2.3
1 500		**816**		**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**1.7**	**2.8**	**—**	**2.8**	**2.4**	**1.7**	**1.7**

NOTE 1 For limitations of temperature for individual materials see notes to Table 3.

NOTE 2 Pressures and temperatures shown in bold type are conversions from ratings given in ANSI B16.5:1981; intermediate values shown in lighter type have been obtained by linear interpolation. For other intermediate values it is recommended that they are obtained by linear interpolation using the original ANSI B16.5 figures shown in bold type.

NOTE 3 Temperature conversions from degrees fahrenheit to degrees celsius have been rounded to the nearest whole degree; pressure conversions from lbf/in^2 to bar have used a conversion factor from BS 350-1 of 1 lbf/in^2 = 0.0689476 bar and have been rounded to the nearest 0.1 bar.

[a] 1 bar = 10^5 N/m^2 = 10^5 Pa.

Table 18 — Class 600: pressure/temperature ratings

Temperature				Material groups														
°F		°C		1.1	1.2	1.3	1.4	1.5	1.9	1.10	1.13	1.14	2.1	2.2	2.3	2.4	2.5	2.6	2.7
				Maximum permissible working pressure														
				bar[a]	bar	bar	bar	bar	bar	bar	bar	bar	bar	bar	bar	bar	bar	bar	bar
Up to		Up to																
100		**38**		**102.0**	**103.4**	**95.8**	**85.2**	**95.8**	**103.4**	**103.4**	**103.4**	**103.4**	**99.3**	**99.3**	**82.7**	**99.3**	**99.3**	**92.7**	**92.7**
	122		50	100.1	103.4	94.7	83.5	95.4	102.3	102.4	103.4	103.4	95.6	96.3	79.2	95.9	96.7	90.7	90.7
200		**93**		**93.1**	**103.4**	**90.7**	**77.6**	**93.8**	**98.3**	**98.6**	**103.4**	**103.4**	**82.7**	**85.5**	**70.0**	**84.1**	**87.6**	**83.4**	**83.4**
	212		100	92.8	103.0	90.3	77.3	93.3	97.6	98.0	102.4	102.4	81.5	84.5	69.1	83.0	86.8	82.8	82.8
300		**149**		**90.7**	**100.3**	**87.9**	**75.5**	**90.0**	**92.7**	**93.4**	**100.3**	**100.3**	**72.7**	**77.2**	**62.7**	**75.2**	**81.0**	**78.6**	**78.6**
	302		150	90.6	100.3	87.9	75.4	89.9	92.7	93.3	100.3	100.3	72.6	77.1	62.6	75.0	80.9	78.5	78.5
	392		200	87.8	97.5	85.4	73.3	88.4	90.8	89.6	97.5	97.5	65.4	71.5	57.4	68.8	76.9	73.8	73.8
400		**204**		**87.6**	**97.2**	**85.2**	**73.1**	**88.3**	**90.7**	**89.3**	**97.2**	**97.2**	**64.8**	**71.0**	**56.9**	**68.3**	**76.5**	**73.4**	**73.4**
	482		250	83.6	92.7	81.2	69.4	86.3	89.0	88.4	92.7	92.7	61.1	66.8	53.5	64.0	72.3	70.3	70.3
500		**260**		**82.7**	**91.7**	**80.3**	**68.6**	**85.8**	**88.6**	**88.3**	**91.7**	**91.7**	**60.3**	**65.8**	**52.7**	**63.1**	**71.4**	**69.6**	**69.6**
	572		300	77.5	85.6	75.4	64.6	84.1	84.9	84.8	85.7	85.7	58.1	63.4	50.5	61.1	68.9	66.9	66.9
600		**316**		**75.5**	**83.4**	**73.4**	**63.1**	**83.4**	**83.4**	**83.4**	**83.4**	**83.4**	**57.2**	**62.4**	**49.6**	**60.3**	**67.9**	**65.8**	**65.8**
650		**343**		**74.1**	**81.0**	**72.1**	**61.7**	**81.0**	**81.0**	**81.0**	**81.0**	**81.0**	**56.2**	**61.4**	**48.3**	**59.0**	**66.2**	**64.1**	**64.1**
	662		350	74.0	80.4	71.9	61.7	80.4	80.4	80.4	80.4	80.4	56.0	60.9	48.0	58.7	65.8	63.8	63.8
700		**371**		**73.4**	**78.3**	**71.4**	**61.7**	**78.3**	**78.3**	**78.3**	**78.3**	**78.3**	**55.5**	**59.6**	**47.2**	**57.9**	**64.5**	**62.7**	**62.7**
	707		375	72.9	77.0	70.5	61.6	77.6	77.6	77.6	77.6	77.6	55.4	59.4	47.1	57.8	64.3	62.6	62.6
750		**399**		**69.6**	**69.6**	**65.2**	**61.0**	**73.4**	**73.4**	**73.4**	**73.4**	**73.4**	**54.8**	**58.3**	**46.2**	**57.2**	**63.4**	**61.7**	**61.7**
	752		400	69.1	69.1	64.7	60.6	73.3	73.3	73.3	73.2	73.3	54.8	58.2	46.2	57.2	63.4	61.6	61.6
	797		425	57.6	57.6	54.5	51.6	70.2	70.2	70.2	68.9	70.2	54.5	57.3	45.5	56.9	62.8	60.1	60.1
800		**427**		**56.9**	**56.9**	**53.8**	**51.0**	**70.0**	**70.0**	**70.0**	**68.6**	**70.0**	**54.5**	**57.2**	**45.5**	**56.9**	**62.7**	**60.0**	**60.0**
	842		450	40.1	40.1	39.6	39.1	67.8	67.8	67.8	61.9	67.8	53.9	56.1	44.6	56.3	61.6	58.8	58.8
850		**454**		**36.9**	**36.9**	**36.9**	**36.9**	**67.2**	**67.2**	**67.2**	**60.7**	**67.2**	**53.8**	**55.8**	**44.5**	**56.2**	**61.4**	**58.6**	**58.6**
	887		475	27.2	27.2	27.2	27.2	63.4	63.4	63.4	51.7	63.4	53.3	54.8	—	55.9	60.1	57.6	57.6
900		**482**		**23.8**	**23.8**	**23.8**	**23.8**	**62.1**	**62.1**	**62.1**	**48.6**	**62.1**	**53.1**	**54.5**	—	**55.8**	**59.6**	**57.2**	**57.2**
	932		500	17.6	17.6	17.6	17.6	47.0	55.7	55.7	40.4	55.0	52.2	53.8	—	54.3	55.7	54.8	54.8
950		**510**		**14.1**	**14.1**	**14.1**	**14.1**	**38.6**	**52.1**	**52.1**	**35.9**	**51.0**	**51.7**	**53.4**	—	**53.4**	**53.4**	**53.4**	**53.4**
	977		525	10.4	10.4	10.4	10.4	30.0	40.5	43.9	30.8	45.3	47.8	51.6	—	51.2	51.6	49.5	50.6
1 000		**538**		**7.2**	**7.2**	**7.2**	**7.2**	**22.8**	**30.7**	**36.9**	**26.5**	**40.3**	**44.5**	**50.0**	—	**49.3**	**50.0**	**46.2**	**48.3**
	1 022		550	—	—	—	—	—	25.5	32.8	23.4	34.1	43.7	49.8	—	48.7	49.8	43.6	47.2
1 050		**566**		—	—	—	—	—	**19.0**	**27.6**	**19.3**	**26.2**	**42.7**	**49.6**	—	**47.9**	**49.6**	**40.3**	**45.9**
	1 067		575	—	—	—	—	—	17.0	23.5	17.5	22.6	40.3	47.9	—	45.8	47.9	37.1	44.0
1 100		**593**		—	—	—	—	—	**13.1**	**15.5**	**14.1**	**15.5**	**35.5**	**44.5**	—	**41.7**	**44.5**	**30.7**	**40.3**
	1 112		600	—	—	—	—	—	11.7	15.2	13.1	14.3	33.4	42.9	—	39.6	42.9	29.0	38.8
1 150		**621**		—	—	—	—	—	**7.2**	**14.1**	**9.7**	**10.3**	**26.9**	**37.9**	—	**32.8**	**37.9**	**23.8**	**34.1**
	1 157		625	—	—	—	—	—	6.9	13.2	9.2	9.9	26.1	36.6	—	31.7	35.9	23.0	33.3
1 200		**649**		—	—	—	—	—	**4.8**	**7.6**	**6.2**	**7.2**	**21.4**	**28.3**	—	**25.2**	**23.8**	**17.9**	**28.3**
	1 202		650	—	—	—	—	—	—	—	—	—	21.1	28.1	—	24.9	23.5	17.8	28.0
	1 247		675	—	—	—	—	—	—	—	—	—	15.5	25.4	—	19.7	17.3	14.0	22.8
1 250		**677**		—	—	—	—	—	—	—	—	—	**15.2**	**25.2**	—	**19.3**	**16.9**	**13.8**	**22.4**
	1 292		700	—	—	—	—	—	—	—	—	—	12.0	20.0	—	15.3	13.4	11.5	17.5
1 300		**704**		—	—	—	—	—	—	—	—	—	**11.4**	**19.0**	—	**14.5**	**12.8**	**11.0**	**16.5**
	1 337		725	—	—	—	—	—	—	—	—	—	9.3	15.4	—	12.2	10.2	8.7	12.5
1 350		**732**		—	—	—	—	—	—	—	—	—	**8.6**	**14.1**	—	**11.4**	**9.3**	**7.9**	**11.0**
	1 382		750	—	—	—	—	—	—	—	—	—	7.1	11.7	—	9.6	8.0	6.8	8.8
1 400		**760**		—	—	—	—	—	—	—	—	—	**6.2**	**10.3**	—	**8.6**	**7.2**	**6.2**	**7.6**
	1 427		775	—	—	—	—	—	—	—	—	—	5.5	9.0	—	7.5	6.3	5.1	6.3
1 450		**788**		—	—	—	—	—	—	—	—	—	**4.8**	**7.9**	—	**6.6**	**5.5**	**4.1**	**5.2**
	1 472		800	—	—	—	—	—	—	—	—	—	4.2	7.0	—	5.9	5.2	3.8	4.4
1 500		**816**		—	—	—	—	—	—	—	—	—	**3.4**	**5.9**	—	**5.2**	**4.8**	**3.4**	**3.4**

NOTE 1 For limitations of temperature for individual materials see notes to Table 3.

NOTE 2 Pressures and temperatures shown in bold type are conversions from ratings given in ANSI B16.5:1981; intermediate values shown in lighter type have been obtained by linear interpolation. For other intermediate values it is recommended that they are obtained by linear interpolation using the original ANSI B16.5 figures shown in bold type.

NOTE 3 Temperature conversions from degrees fahrenheit to degrees celsius have been rounded to the nearest whole degree; pressure conversions from lbf/in^2 to have used a conversion factor from BS 350-1 of 1 lbf/in^2 = 0.0689476 bar and have been rounded to the nearest 0.1 bar.

[a] 1 bar = 10^5 N/m^2= 10^5 Pa.

Table 19 — Class 900: pressure/temperature ratings

Temperature				Material groups														
°F		°C		1.1	1.2	1.3	1.4	1.5	1.9	1.10	1.13	1.14	2.1	2.2	2.3	2.4	2.5	2.6	2.7
				Maximum permissible working pressure														
				bar[a]	bar	bar	bar	bar	bar	bar	bar	bar	bar	bar	bar	bar	bar	bar	bar
Up to		Up to																
100		**38**		**153.1**	**155.1**	**143.8**	**127.6**	**143.8**	**155.1**	**155.1**	**155.1**	**155.1**	**148.9**	**148.9**	**124.1**	**148.9**	**148.9**	**138.9**	**138.9**
	122		50	150.1	155.1	142.0	125.1	143.0	153.4	153.6	155.1	155.1	143.5	144.4	119.9	143.9	145.1	135.9	135.9
200		**93**		**139.6**	**155.1**	**135.8**	**116.2**	**140.3**	**147.2**	**148.2**	**155.1**	**155.1**	**124.1**	**128.2**	**104.8**	**126.2**	**131.7**	**125.1**	**125.1**
	212		100	139.2	154.6	135.4	115.8	139.6	146.3	147.2	154.6	154.6	122.3	128.0	103.5	124.6	130.5	124.2	124.2
300		**149**		**135.8**	**150.7**	**132.0**	**113.1**	**134.8**	**139.3**	**140.0**	**150.7**	**150.7**	**109.3**	**115.8**	**93.8**	**112.7**	**121.7**	**117.6**	**117.6**
	302		150	135.7	150.6	131.9	113.0	134.7	139.2	139.8	150.6	150.6	109.0	115.6	93.6	112.5	121.6	117.4	117.4
	392		200	131.4	146.2	127.9	109.6	132.6	136.4	134.6	146.2	146.2	98.2	107.0	86.2	103.2	115.3	110.9	110.9
400		**204**		**131.0**	**145.8**	**127.6**	**109.3**	**132.4**	**136.2**	**134.1**	**145.8**	**145.8**	**97.2**	**106.2**	**85.5**	**102.4**	**114.8**	**110.3**	**110.3**
	482		250	125.1	139.0	121.6	104.2	129.3	133.3	132.7	139.0	139.0	91.6	100.2	80.1	96.2	108.6	105.2	105.2
500		**260**		**123.8**	**137.6**	**120.3**	**103.1**	**128.6**	**132.7**	**132.4**	**137.6**	**137.6**	**90.3**	**98.9**	**78.9**	**94.8**	**107.2**	**104.1**	**104.1**
	572		300	116.1	128.6	113.1	96.9	126.1	127.3	127.2	128.6	128.6	87.1	95.0	75.7	91.6	103.2	100.4	100.4
600		**316**		**113.1**	**125.1**	**110.3**	**94.5**	**125.1**	**125.1**	**125.1**	**125.1**	**125.1**	**85.8**	**93.4**	**74.5**	**90.3**	**101.7**	**98.9**	**98.9**
650		**343**		**111.0**	**121.7**	**108.2**	**92.7**	**121.7**	**121.7**	**121.7**	**121.7**	**121.7**	**84.5**	**91.7**	**72.4**	**88.3**	**99.3**	**96.2**	**96.2**
	662		350	110.8	120.7	108.0	92.7	120.7	120.7	120.7	120.7	120.7	84.2	91.1	72.1	87.9	98.7	95.8	95.8
700		**371**		**110.3**	**117.6**	**107.2**	**92.7**	**117.6**	**117.6**	**117.6**	**117.6**	**117.6**	**83.4**	**89.3**	**71.0**	**86.9**	**96.9**	**94.5**	**94.5**
	707		375	109.4	115.7	105.9	92.5	116.5	116.5	116.5	116.5	116.5	83.3	89.0	70.8	86.7	96.7	94.2	94.2
750		**399**		**104.1**	**104.1**	**97.9**	**91.4**	**110.0**	**110.0**	**110.0**	**110.0**	**110.0**	**82.4**	**87.6**	**69.6**	**85.8**	**95.5**	**92.4**	**92.4**
	752		400	103.4	103.4	97.2	90.8	109.8	109.8	109.8	109.7	109.8	82.4	87.5	69.6	85.8	95.5	92.3	92.3
	797		425	86.3	86.3	82.0	77.4	105.4	105.4	105.4	103.2	105.4	81.4	85.9	68.0	85.5	94.5	90.1	90.1
800		**427**		**85.2**	**85.2**	**81.0**	**76.5**	**105.1**	**105.1**	**105.1**	**102.7**	**105.1**	**81.4**	**85.8**	**67.9**	**85.5**	**94.5**	**90.0**	**90.0**
	842		450	60.2	60.2	59.6	58.9	101.4	101.4	101.4	92.6	101.4	80.5	84.1	66.8	84.6	92.1	88.2	88.2
850		**454**		**55.5**	**55.5**	**55.5**	**55.5**	**100.7**	**100.7**	**100.7**	**90.7**	**100.7**	**80.3**	**83.8**	**66.5**	**84.5**	**91.7**	**87.9**	**87.9**
	887		475	40.7	40.7	40.7	40.7	95.1	95.1	95.1	77.7	95.1	79.6	82.0	—	84.0	89.9	86.4	86.4
900		**482**		**35.5**	**35.5**	**35.5**	**35.5**	**93.1**	**93.1**	**93.1**	**73.1**	**93.1**	**79.3**	**81.4**	**—**	**83.8**	**89.3**	**85.8**	**85.8**
	932		500	26.5	26.5	26.5	26.5	70.8	90.4	90.4	60.7	82.5	78.2	80.5	—	81.3	83.3	82.1	82.1
950		**510**		**21.4**	**21.4**	**21.4**	**21.4**	**58.3**	**77.9**	**77.9**	**53.8**	**76.5**	**77.6**	**80.0**	**—**	**80.0**	**80.0**	**80.0**	**80.0**
	977		525	15.6	15.6	15.6	15.6	45.2	60.8	65.8	46.1	67.8	71.6	77.4	—	76.6	77.4	74.4	75.9
1 000		**538**		**10.7**	**10.7**	**10.7**	**10.7**	**34.1**	**46.2**	**55.5**	**39.6**	**60.3**	**66.5**	**75.2**	**—**	**73.8**	**75.2**	**69.6**	**72.4**
	1 022		550	—	—	—	—	—	38.3	49.1	34.9	50.9	65.3	74.8	—	72.9	74.8	65.5	70.9
1 050		**566**		**—**	**—**	**—**	**—**	**—**	**28.3**	**41.0**	**29.0**	**39.0**	**63.8**	**74.5**	**—**	**71.7**	**74.5**	**60.3**	**68.9**
	1 067		575	—	—	—	—	—	25.5	35.0	26.4	33.7	60.1	71.8	—	68.5	71.8	55.5	66.0
1 100		**593**		**—**	**—**	**—**	**—**	**—**	**20.0**	**23.4**	**21.4**	**23.4**	**53.1**	**66.5**	**—**	**62.4**	**66.5**	**46.2**	**60.3**
	1 112		600	—	—	—	—	—	17.8	22.9	19.6	21.5	50.0	64.2	—	59.2	64.2	43.6	58.1
1 150		**621**		**—**	**—**	**—**	**—**	**—**	**10.7**	**21.4**	**14.1**	**15.5**	**40.3**	**56.9**	**—**	**49.0**	**56.9**	**35.5**	**51.0**
	1 157		625	—	—	—	—	—	10.2	20.0	13.5	14.8	39.2	54.9	—	47.4	53.2	34.3	49.9
1 200		**649**		**—**	**—**	**—**	**—**	**—**	**7.2**	**11.4**	**9.3**	**10.7**	**32.1**	**42.7**	**—**	**37.6**	**35.5**	**26.9**	**42.7**
	1 202		650	—	—	—	—	—	—	—	—	—	31.7	42.5	—	37.2	35.1	26.6	42.4
	1 247		675	—	—	—	—	—	—	—	—	—	23.3	37.9	—	29.5	26.1	21.1	34.0
1 250		**677**		**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**22.8**	**37.6**	**—**	**29.0**	**25.5**	**20.7**	**33.4**
	1 292		700	—	—	—	—	—	—	—	—	—	17.8	29.8	—	23.2	20.3	16.9	26.2
1 300		**704**		**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**16.9**	**28.3**	**—**	**22.1**	**19.3**	**16.2**	**24.8**
	1 337		725	—	—	—	—	—	—	—	—	—	13.8	23.2	—	18.2	15.5	13.1	18.4
1 350		**732**		**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**12.8**	**21.4**	**—**	**16.9**	**14.1**	**12.1**	**16.2**
	1 382		750	—	—	—	—	—	—	—	—	—	11.0	17.6	—	14.2	11.9	10.3	13.1
1 400		**760**		**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**10.0**	**15.5**	**—**	**12.8**	**10.7**	**9.3**	**11.4**
	1 427		775	—	—	—	—	—	—	—	—	—	8.5	13.7	—	11.3	9.6	7.8	9.5
1 450		**788**		**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**7.2**	**12.1**	**—**	**10.0**	**8.6**	**6.6**	**7.9**
	1 472		800	—	—	—	—	—	—	—	—	—	6.2	10.5	—	9.1	8.0	5.8	6.6
1 500		**816**		**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**4.8**	**8.6**	**—**	**7.9**	**7.2**	**4.8**	**4.8**

NOTE 1 For limitations of temperature for individual materials see notes to Table 3.

NOTE 2 Pressures and temperatures shown in bold type are conversions from ratings given in ANSI B16.5:1981; intermediate values shown in lighter type have been obtained by linear interpolation. For other intermediate values it is recommended that they are obtained by linear interpolation using the original ANSI B16.5 figures shown in bold type.

NOTE 3 Temperature conversions from degrees fahrenheit to degrees celsius have been rounded to the nearest whole degree; pressure conversions from lbf/in^2 to bar have used a conversion factor from BS 350-1 of 1 lbf/in^2 = 0.0689476 bar and have been rounded to the nearest 0.1 bar.

[a] 1 bar = 10^5 N/m^2 = 10^5 Pa.

Table 20 — Class 1500: pressure/temperature ratings

Temperature				Material groups														
°F		°C		1.1	1.2	1.3	1.4	1.5	1.9	1.10	1.13	1.14	2.1	2.2	2.3	2.4	2.5	2.6	2.7
				Maximum permissible working pressure														
				bar[a]	bar	bar	bar	bar	bar	bar	bar	bar	bar	bar	bar	bar	bar	bar	bar
Up to		Up to																
100		**38**		**255.5**	**258.6**	**239.2**	**212.7**	**239.2**	**258.6**	**258.6**	**258.6**	**258.6**	**248.2**	**248.2**	**248.2**	**248.2**	**248.2**	**231.7**	**231.7**
	122		50	250.4	258.6	236.4	208.5	238.1	255.7	256.0	258.6	258.6	239.1	240.6	199.7	239.9	241.8	226.6	226.6
200		**93**		**232.7**	**258.6**	**226.1**	**193.7**	**234.1**	**245.5**	**246.8**	**258.6**	**258.6**	**206.8**	**213.4**	**174.4**	**210.3**	**219.3**	**208.6**	**208.6**
	212		100	231.9	257.6	225.4	193.1	233.0	243.8	245.2	257.6	257.6	203.9	210.9	172.3	204.6	217.3	207.1	207.1
300		**149**		**226.1**	**251.0**	**219.9**	**188.6**	**224.8**	**232.0**	**233.4**	**251.0**	**251.0**	**182.0**	**192.7**	**156.5**	**187.9**	**202.7**	**196.2**	**196.2**
	302		150	226.0	250.8	219.8	188.4	224.7	231.9	233.2	250.8	250.8	181.6	192.4	156.2	187.2	202.5	195.9	195.9
	392		200	219.2	244.0	213.3	182.9	221.0	227.3	224.2	244.0	244.0	163.6	178.4	143.5	171.7	191.9	184.7	184.7
400		**204**		**218.6**	**243.4**	**212.7**	**182.4**	**220.6**	**226.8**	**223.4**	**243.4**	**243.4**	**162.0**	**177.2**	**142.4**	**170.3**	**191.0**	**183.7**	**183.7**
	482		250	208.7	231.8	202.8	173.6	215.3	222.3	221.1	231.8	231.8	152.7	167.0	133.6	160.1	180.8	175.5	175.5
500		**260**		**206.5**	**229.3**	**200.6**	**171.7**	**214.1**	**221.3**	**220.6**	**229.3**	**229.3**	**150.7**	**164.8**	**131.7**	**157.9**	**178.6**	**173.7**	**173.7**
	572		300	193.6	214.4	188.5	161.5	210.1	212.1	211.9	214.4	214.4	145.2	158.1	126.2	152.7	172.1	167.3	167.3
600		**316**		**188.6**	**208.6**	**183.7**	**157.5**	**208.6**	**208.6**	**208.6**	**208.6**	**208.6**	**143.1**	**155.5**	**124.1**	**150.7**	**169.6**	**164.8**	**164.8**
650		**343**		**185.1**	**202.7**	**180.3**	**154.8**	**202.7**	**202.7**	**202.7**	**202.7**	**202.7**	**140.7**	**153.1**	**120.7**	**147.2**	**165.5**	**160.6**	**160.6**
	662		350	184.8	201.1	179.9	154.8	201.1	201.1	201.1	201.1	201.1	140.2	152.1	120.1	146.6	164.5	159.8	159.8
700		**371**		**183.7**	**195.8**	**178.6**	**154.8**	**195.8**	**195.8**	**195.8**	**195.8**	**195.8**	**138.9**	**148.9**	**118.2**	**144.8**	**161.3**	**157.2**	**157.2**
	707		375	182.3	192.7	176.4	154.4	194.1	194.1	194.1	194.1	194.1	138.7	148.4	117.9	144.5	161.0	156.7	156.7
750		**399**		**173.7**	**173.7**	**163.1**	**152.4**	**183.4**	**183.4**	**183.4**	**183.4**	**183.4**	**137.2**	**145.5**	**115.8**	**143.1**	**159.0**	**153.8**	**153.8**
	752		400	172.5	172.5	161.9	151.4	183.1	183.1	183.1	182.9	183.1	137.2	145.4	115.7	143.0	158.9	153.6	153.6
	797		425	143.9	143.9	136.5	129.0	175.6	175.6	175.6	172.1	175.6	135.9	143.2	113.6	142.4	157.3	149.9	149.9
800		**427**		**142.0**	**142.0**	**134.8**	**127.6**	**175.1**	**175.1**	**175.1**	**171.3**	**175.1**	**135.8**	**143.1**	**113.4**	**142.4**	**157.2**	**149.6**	**149.6**
	842		450	100.3	100.3	99.2	98.0	169.0	169.0	169.0	154.5	169.0	134.4	140.5	111.4	140.9	153.7	147.0	147.0
850		**454**		**92.4**	**92.4**	**92.4**	**92.4**	**167.9**	**167.9**	**167.9**	**151.3**	**167.9**	**134.1**	**140.0**	**111.0**	**140.7**	**153.1**	**146.5**	**146.5**
	887		475	67.9	67.9	67.9	67.9	158.2	158.2	158.2	129.4	158.2	132.8	136.9	—	140.1	150.0	144.0	144.0
900		**482**		**59.3**	**59.3**	**59.3**	**59.3**	**154.8**	**154.8**	**154.8**	**121.7**	**154.8**	**132.4**	**135.8**	**—**	**140.0**	**148.9**	**143.1**	**143.1**
	932		500	44.1	44.1	44.1	44.1	117.7	138.9	138.9	101.4	137.4	130.2	134.1	—	135.6	138.8	136.7	136.7
950		**510**		**35.5**	**35.5**	**35.5**	**35.5**	**96.9**	**130.0**	**130.0**	**90.0**	**127.6**	**128.9**	**133.1**	**—**	**133.1**	**133.1**	**133.1**	**133.1**
	977		525	26.0	26.0	26.0	26.0	75.3	101.3	109.7	77.1	113.0	119.3	129.0	—	127.7	129.0	123.8	126.4
1 000		**538**		**17.9**	**17.9**	**17.9**	**17.9**	**56.9**	**76.9**	**92.4**	**66.2**	**100.7**	**111.0**	**125.5**	**—**	**123.1**	**125.5**	**115.8**	**120.7**
	1 022		550	—	—	—	—	—	63.8	81.9	58.5	85.0	109.0	124.9	—	121.4	124.9	109.2	118.1
1 050		**566**		**—**	**—**	**—**	**—**	**—**	**47.2**	**68.6**	**48.6**	**65.2**	**106.5**	**124.1**	**—**	**119.3**	**124.1**	**100.7**	**114.8**
	1 067		575	—	—	—	—	—	42.4	58.5	44.2	56.2	100.4	119.7	—	114.1	119.7	92.6	110.0
1 100		**593**		**—**	**—**	**—**	**—**	**—**	**33.1**	**39.0**	**35.5**	**39.0**	**88.6**	**111.0**	**—**	**104.1**	**111.0**	**76.9**	**100.7**
	1 112		600	—	—	—	—	—	29.5	38.1	32.7	35.9	83.6	107.0	—	98.7	107.0	72.7	96.9
1 150		**621**		**—**	**—**	**—**	**—**	**—**	**17.9**	**35.5**	**23.8**	**26.2**	**67.6**	**94.5**	**—**	**81.7**	**94.5**	**59.3**	**85.2**
	1 157		625	—	—	—	—	—	17.1	33.2	22.6	25.0	65.5	91.2	—	79.0	89.5	57.3	83.2
1 200		**649**		**—**	**—**	**—**	**—**	**—**	**11.7**	**19.0**	**15.5**	**17.9**	**53.1**	**71.0**	**—**	**62.7**	**59.0**	**44.8**	**71.0**
	1 202		650	—	—	—	—	—	—	—	—	—	52.5	70.7	—	62.2	58.3	44.4	70.4
	1 247		675	—	—	—	—	—	—	—	—	—	38.8	63.2	—	49.5	43.4	34.8	56.4
1 250		**677**		**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**37.9**	**62.7**	**—**	**48.6**	**42.4**	**34.1**	**55.5**
	1 292		700	—	—	—	—	—	—	—	—	—	29.8	49.7	—	38.5	33.7	28.3	43.6
1 300		**704**		**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**28.3**	**47.2**	**—**	**36.5**	**32.1**	**27.2**	**41.4**
	1 337		725	—	—	—	—	—	—	—	—	—	23.2	38.6	—	30.4	25.9	21.9	30.9
1 350		**732**		**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**21.4**	**35.5**	**—**	**28.3**	**23.8**	**20.0**	**27.2**
	1 382		750	—	—	—	—	—	—	—	—	—	18.3	29.6	—	23.9	19.8	17.1	21.9
1 400		**760**		**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**16.5**	**26.2**	**—**	**21.4**	**17.6**	**15.5**	**19.0**
	1 427		775	—	—	—	—	—	—	—	—	—	13.9	22.8	—	18.8	15.7	12.9	15.8
1 450		**788**		**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**11.7**	**20.0**	**—**	**16.5**	**14.1**	**10.7**	**13.1**
	1 472		800	—	—	—	—	—	—	—	—	—	10.2	17.4	—	15.0	13.1	9.6	11.0
1 500		**816**		**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**8.3**	**14.1**	**—**	**13.1**	**11.7**	**8.3**	**8.3**

NOTE 1 For limitations of temperature for individual materials see notes to Table 3.

NOTE 2 Pressures and temperatures shown in bold type are conversions from ratings given in ANSI B16.5:1981; intermediate values shown in lighter type have been obtained by linear interpolation. For other intermediate values it is recommended that they are obtained by linear interpolation using the original ANSI B16.5 figures shown in bold type.

NOTE 3 Temperature conversions from degrees fahrenheit to degrees celsius have been rounded to the nearest whole degree; pressure conversions from lbf/in^2 to bar have used a conversion factor from BS 350-1 of 1 lbf/in^2 = 0.0689476 bar and have been rounded to the nearest 0.1 bar.

[a] 1 bar = 10^5 N/m^2 = 10^5 Pa.

Table 21 — Class 2500: pressure/temperature ratings

Temperature				Material groups														
°F		°C		1.1	1.2	1.3	1.4	1.5	1.9	1.10	1.13	1.14	2.1	2.2	2.3	2.4	2.5	2.6	2.7
				Maximum permissible working pressure														
				bar[a]	bar	bar	bar	bar	bar	bar	bar	bar	bar	bar	bar	bar	bar	bar	bar
Up to		Up to																
100		**38**		**425.4**	**430.9**	**398.9**	**354.7**	**398.9**	**430.9**	**430.9**	**430.9**	**430.9**	**413.7**	**413.7**	**344.7**	**413.7**	**413.7**	**386.1**	**386.1**
	122		50	417.1	430.9	394.1	347.7	397.0	426.1	426.6	430.9	430.9	398.5	400.9	332.9	403.0	403.1	377.6	377.6
200		**93**		**387.8**	**430.9**	**377.1**	**322.7**	**390.2**	**408.9**	**411.3**	**430.9**	**430.9**	**344.7**	**355.8**	**291.0**	**350.3**	**365.4**	**347.5**	**347.5**
	212		100	386.5	429.4	375.9	321.7	388.4	406.2	408.6	429.4	429.4	339.8	351.6	287.3	345.8	362.1	345.0	345.0
300		**149**		**377.1**	**418.5**	**366.5**	**314.4**	**374.7**	**386.5**	**388.9**	**418.5**	**418.5**	**303.4**	**321.3**	**260.6**	**313.0**	**337.8**	**326.8**	**326.8**
	302		150	376.9	418.2	366.2	314.2	374.6	386.3	388.5	418.2	418.2	302.7	320.8	260.2	312.4	337.5	326.4	326.4
	352		200	365.1	406.5	355.7	304.6	368.1	378.8	373.6	406.5	406.5	272.9	297.2	239.1	286.4	320.1	307.8	307.8
400		**204**		**364.0**	**405.4**	**354.7**	**303.7**	**367.5**	**378.2**	**372.3**	**405.4**	**405.4**	**270.3**	**295.1**	**237.2**	**284.1**	**318.5**	**306.1**	**306.1**
	482		250	347.6	386.2	338.1	289.3	359.0	370.5	368.4	386.2	386.2	254.4	278.1	222.5	267.1	301.6	292.6	292.6
500		**260**		**344.0**	**382.0**	**334.4**	**286.1**	**357.1**	**368.9**	**367.5**	**382.0**	**382.0**	**251.0**	**274.4**	**219.3**	**263.4**	**297.9**	**289.6**	**289.6**
	572		300	322.7	357.1	314.0	269.0	350.2	353.5	353.1	357.1	357.1	242.0	263.5	210.3	254.4	286.9	278.7	278.7
600		**316**		**314.4**	**347.5**	**306.1**	**262.3**	**347.5**	**347.5**	**347.5**	**347.5**	**347.5**	**238.6**	**259.2**	**206.8**	**251.0**	**282.7**	**274.4**	**274.4**
650		**343**		**308.5**	**338.2**	**300.3**	**257.9**	**338.2**	**338.2**	**338.2**	**338.2**	**338.2**	**234.4**	**255.1**	**201.3**	**245.5**	**275.8**	**267.5**	**267.5**
	662		350	308.0	335.3	299.7	257.9	335.3	335.3	335.3	335.3	335.3	233.8	253.5	200.3	244.5	274.1	266.2	266.2
700		**371**		**306.1**	**326.1**	**297.9**	**257.9**	**326.1**	**326.1**	**326.1**	**326.1**	**326.1**	**231.7**	**248.2**	**197.2**	**241.3**	**268.9**	**262.0**	**262.0**
	707		375	303.8	321.0	294.2	257.3	323.2	323.2	323.2	323.2	323.2	231.3	247.4	196.6	240.9	268.3	261.2	261.2
750		**399**		**289.6**	**289.6**	**272.0**	**254.1**	**305.4**	**305.4**	**305.4**	**305.4**	**305.4**	**228.9**	**242.7**	**193.1**	**238.6**	**264.8**	**256.6**	**256.5**
	752		400	287.5	287.5	270.1	252.4	318.7	318.7	318.7	304.7	318.7	228.8	242.5	192.9	238.5	264.6	256.2	256.2
	797		425	239.7	239.7	227.6	215.2	292.5	292.5	292.5	287.0	292.5	226.3	238.8	189.2	237.3	262.2	250.0	250.0
800		**427**		**236.5**	**236.5**	**224.8**	**212.7**	**291.6**	**291.6**	**291.6**	**285.8**	**291.6**	**226.1**	**238.6**	**188.9**	**237.2**	**262.0**	**249.6**	**249.6**
	842		450	167.0	167.0	165.1	163.2	281.8	281.8	281.8	257.7	281.8	223.8	233.9	185.4	234.9	256.2	245.0	245.0
850		**454**		**153.8**	**153.8**	**153.8**	**153.8**	**279.9**	**279.9**	**279.9**	**252.3**	**279.9**	**223.4**	**233.0**	**184.8**	**234.4**	**255.1**	**244.1**	**244.1**
	887		475	112.9	112.9	112.9	112.9	263.9	263.9	263.9	215.9	263.9	221.3	227.9	—	233.4	250.0	240.0	240.0
900		**482**		**98.6**	**98.6**	**98.6**	**98.6**	**258.2**	**258.2**	**258.2**	**203.1**	**258.2**	**220.6**	**226.1**	**—**	**233.0**	**248.2**	**238.6**	**238.6**
	932		500	73.4	73.4	73.4	73.4	196.4	231.7	231.7	168.9	229.1	217.1	223.5	—	226.0	231.4	228.0	228.0
950		**510**		**59.3**	**59.3**	**59.3**	**59.3**	**161.7**	**216.8**	**216.8**	**149.6**	**212.7**	**215.1**	**222.0**	**—**	**222.0**	**222.0**	**222.0**	**222.0**
	977		525	43.3	43.3	43.3	43.3	125.4	169.0	182.8	128.4	188.3	198.9	214.9	—	212.7	214.9	206.4	210.7
1 000		**538**		**29.6**	**29.6**	**29.6**	**29.6**	**94.5**	**128.2**	**153.8**	**110.3**	**167.5**	**185.1**	**208.9**	**—**	**204.8**	**208.9**	**193.1**	**201.0**
	1 022		550	—	—	—	—	—	106.6	136.5	97.3	141.5	181.6	208.0	—	202.2	208.0	181.8	196.6
1 050		**566**		**—**	**—**	**—**	**—**	**—**	**78.9**	**114.5**	**80.7**	**108.2**	**177.2**	**206.8**	**—**	**198.9**	**206.8**	**167.5**	**191.0**
	1 067		575	—	—	—	—	—	70.9	97.7	73.4	93.6	167.2	199.5	—	190.2	199.5	154.2	183.0
1 100		**593**		**—**	**—**	**—**	**—**	**—**	**55.2**	**65.2**	**59.3**	**65.2**	**147.9**	**185.1**	**—**	**173.4**	**185.1**	**128.2**	**167.5**
	1 112		600	—	—	—	—	—	49.0	63.7	54.5	59.9	139.4	178.5	—	164.4	178.5	121.1	161.4
1 150		**621**		**—**	**—**	**—**	**—**	**—**	**29.6**	**59.3**	**39.3**	**43.4**	**112.4**	**157.5**	**—**	**135.8**	**157.5**	**98.6**	**142.0**
	1 157		625	—	—	—	—	—	28.2	55.4	37.4	41.5	109.1	152.0	—	131.4	149.3	95.3	138.7
1 200		**649**		**—**	**—**	**—**	**—**	**—**	**19.7**	**31.7**	**25.5**	**29.6**	**88.6**	**118.2**	**—**	**104.5**	**98.6**	**74.8**	**118.2**
	1 202		650	—	—	—	—	—	—	—	—	—	87.6	117.7	—	103.5	97.5	74.1	117.2
	1 247		675	—	—	—	—	—	—	—	—	—	64.6	105.3	—	82.1	72.7	58.3	94.3
1 250		**677**		**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**63.1**	**104.5**	**—**	**80.7**	**71.0**	**57.2**	**92.7**
	1 292		700	—	—	—	—	—	—	—	—	—	49.8	83.0	—	64.2	56.0	47.4	72.8
1 300		**704**		**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**47.2**	**78.9**	**—**	**61.0**	**53.1**	**45.5**	**68.9**
	1 337		725	—	—	—	—	—	—	—	—	—	38.6	64.4	—	50.8	42.9	36.6	51.6
1 350		**732**		**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**35.5**	**59.3**	**—**	**47.2**	**39.3**	**33.4**	**45.5**
	1 382		750	—	—	—	—	—	—	—	—	—	30.4	49.1	—	39.7	33.1	28.4	36.7
1 400		**760**		**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**27.6**	**43.4**	**—**	**35.5**	**29.6**	**25.5**	**31.7**
	1 427		775	—	—	—	—	—	—	—	—	—	23.3	38.0	—	31.2	26.5	21.4	26.3
1 450		**788**		**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**19.7**	**33.4**	**—**	**27.6**	**23.8**	**17.9**	**21.7**
	1 472		800	—	—	—	—	—	—	—	—	—	17.1	29.2	—	25.0	22.0	16.1	18.2
1 500		**816**		**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**13.8**	**23.8**	**—**	**21.7**	**19.7**	**13.8**	**13.8**

NOTE 1 For limitations of temperature for individual materials see notes to Table 3.

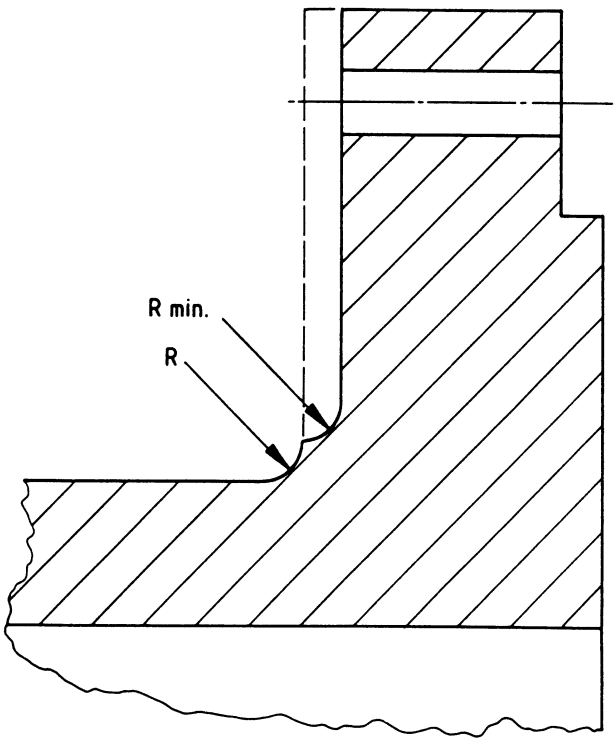
NOTE 2 Pressures and temperatures shown in bold type are conversions from ratings given in ANSI B16.5:1981, intermediate values shown in lighter type have been obtained by linear interpolation. For other intermediate values it is recommended that they are obtained by linear interpolation using the original ANSI B16.5 figures shown in bold type.

NOTE 3 Temperature conversions from degrees fahrenheit to degrees celsius have been rounded to the nearest whole degree; pressure conversions from lbf/in^2 to bar have used a conversion factor from BS 350-1 of 1 lbf/in^2 = 0.0689476 bar and have been rounded to the nearest 0.1 bar.

[a] 1 bar = 10^5 N/m^2 = 10^5 Pa.

Table 22 — Minimum fillet radius at the hub after back facing

Flange size	R_{min}
	mm
Up to and including DN 50	2
Over DN 50 and up to and including DN 200	3
Over DN 200	5



NOTE For dimensions of R see Table 9 to Table 14.

Figure 14 — Minimum fillet radius at the hub after back facing

Appendix A Information to be supplied by the purchaser

The following information should be supplied by the purchaser when making an enquiry or placing an order for flanges complying with this Section of BS 1560.

a) Number and Section of this British Standard.

b) Flange type, by description or code number (see clause **1** and Figure 1 and Figure 2).

c) Type of facing, by description or letter (see clause **1**).

d) Size in inches (see clause **2**).

e) Class designation (see **3.1**).

f) Material (see clause **4** and Table 3) minimum strength requirements, if appropriate (see note 1 to Table 3) and Charpy impact test requirements, if appropriate (see note 4 to Table 3). Whether a certificate is required for the flange material (see **4.1**).

g) Internal thread designation (see **7.3**).

h) Weld end preparation required (see **7.4**).

i) Any requirements for special finishes required (see **8.5.1**).

j) External diameter and thickness of pipe where necessary (see **7.4**).

k) Bore of weld-neck and socket-weld flanges (see Table 9, Table 10, Table 11, Table 12, Table 13 and Table 14).

l) Specific requirements for heat treatment condition (see **4.2.1**).

m) Whether raised or flat faced flanges are required (see **8.2**).

n) Whether flange is required for low temperature service (see note 4 to Table 3).

Appendix B Application and installation

NOTE The information in this appendix is advisory only and it is not intended to be exhaustive.

B.1 The satisfactory operation of flanged joints depends upon the use of gaskets of appropriate materials and dimensions. The purchaser should consult with the gasket manufacturer.

B.2 Application at all temperatures should take into consideration the risk of leakage due to forces and moments developed in the connecting pipe, fitting, valve or other component.

B.3 At temperatures in the creep range, gradual relaxation of flanged joints may progressively reduce bolt loads and the tightness of the gaskets.

B.4 At low temperatures some of the materials specified undergo a sufficient decrease in impact resistance that they cannot safely sustain sudden changes of stress or temperature (see note 3 to Table 3).

B.5 When a type B raised face is removed from a steel flange which is to be bolted to cast iron or copper alloy flanges, the thickness of such a steel flange is equal to the thickness specified in the appropriate table or, if a 1.6 mm raised face has to be removed to obtain the flat face, it is equal to the thickness specified less 1.6 mm. Where a 1.6 mm raised face has to be removed to obtain a flat face, the length through the hub will no longer comply with this Section of BS 1560 and on Class 150 and Class 300 flanges the flange thickness will no longer comply with this Section of BS 1560.

B.6 Limitations may be placed on threaded flanges due to the nature of any thread sealant used. Also it may be advantageous for an extra length of thread to be specified on the pipe to ensure that the pipe end comes close to the face of the flange.

B.7 Flanges may be required to be pressure tested after attachment of a pipe or other equipment or when forming an integral part of such equipment. The test pressure is then dependent on the requirements of the appropriate standard or code of practice in accordance with which the equipment has been fabricated or manufactured. Any test pressure should not exceed 1.5 times the allowable pressure at 20 °C rounded off to the next higher 1 bar increment.

Appendix C Determination of bolt lengths for lapped-type joints

C.1 Determination of studbolt lengths for lapped-type joints or other than ring-joint type, all Classes

To determine the lengths of studbolts required for various types of lapped joint, the additions given in Table 23 should be made to the appropriate basic dimensions given in Appendix D.

C.2 Determination of studbolt lengths for lapped-type joints of the ring-joint type

C.2.1 *Classes 150 and 300.* Add the thickness *t*, in Figure 6, of each lap included in the joints to the appropriate studbolt dimensions obtained from Table 23.

C.2.2 *Classes 600 and upwards.* Add the thickness *t*, in Figure 6, of each lap included in the joints to the appropriate studbolt dimensions obtained from Table 23.

C.3 Determination of headed bolt lengths for all types and Classes of lapped-type joint

The length of a headed bolt for any of the facing combinations in **C.1** and **C.2**, is equal to the length of the appropriate studbolt plus 3.2 mm minus the nominal bolt size.

Table 23 — Determination of studbolt lengths for lapped-type joints

Type of lapped joint	Addition to basic dimension
Lapped raised face to lapped raised face	Add thickness *t*, in Figure 6, of both laps
Lapped spigot to lapped recess	Add thickness *t*, in Figure 6, of spigot lap or 6.4 mm, whichever is the greater, plus thickness *t*, in Figure 4, of recess lap
Lapped tongue to lapped groove	Add thickness *t*, in Figure 6, of tongue lap plus thickness *t*, in Figure 4, of groove lap plus 6.4 mm
Lapped raised face to 1.6 mm raised face of flange (Classes 150 and 300)	Add thickness *t*, in Figure 6, of one lap
Lapped raised face to 6.4 mm on flange (all Classes)	Add thickness *t*, in Figure 6, of one lap plus 6.4 mm
Lapped spigot to recess on flange	Add thickness *t*, in Figure 6, of spigot lap or 6.4 mm whichever is the greater
Lapped recess to spigot on flange	Add thickness *t*, in Figure 6, of recess lap plus 6.4 mm
Lapped tongue to groove on flange	Add thickness *t*, in Figure 6, of tongue lap plus 6.4 mm
Lapped groove to tongue on flange	Add thickness *t*, in Figure 6, of groove lap plus 6.4 mm

Appendix D Recommended bolt lengths for flanges other than lapped-type

Bolt lengths for flanges other than lapped-type are given in Table 24.

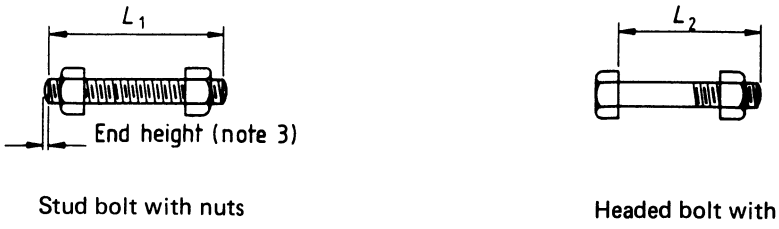


Figure 15 — Bolting for flanges, Class 150 to Class 2500 (see Table 24)

Table 24 — Bolting for flanges, Class 150 to 2500 (see Figure 15)

Nominal size		Class 150				Class 300				Class 600				Class 900				Class 1500				Class 2500			
		Length studbolts L_1 (see note 3)			Length headed bolts L_2 (see note 2)	Length studbolts L_1 (see note 3)			Length headed bolts L_2 (see note 3)	Length studbolts L_1 (see note 3)				Length studbolts L_1 (see note 3)				Length studbolts L_1 (see note 3)				Length studbolts L_1 (see note 3)			
		1.6 mm raised face	Ring-joint	Lapped joints (basic dimensions only) (see note 2)	1.6 mm raised face	1.6 mm raised face	Ring-joint	Lapped joints (basic dimensions only) (see note 2)	1.6 mm raised face	6.4 mm raised face	Ring-joint	Spigot and recess also tongue and groove	Lapped joints (basic dimensions only) (see note 2)	6.4 mm raised face	Ring-joint	Spigot and recess also tongue and groove	Lapped joints (basic dimensions only) (see note 2)	6.4 mm raised face	Ring-joint	Spigot and recess also tongue and groove	Lapped joints (basic dimensions only) (see note 2)	6.4 mm raised face	Ring-joint	Spigot and recess also tongue and groove	Lapped joints (basic dimensions only) (see note 2)
in	DN	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in	in
1/2	15	2 1/4	—	2 1/4	2	2 1/2	3	2 1/2	2 1/4	3	3	2 3/4	2 1/2					4 1/4	4 1/4	4	3 3/4	4 1/4	4 3/4	4 1/2	3 3/4
3/4	20	2 1/2	—	2 1/2	2	3	3 1/2	3	2 1/2	3 1/2	3 1/2	3 1/4	3					4 1/2	4 1/2	4 1/4	4	5	5	4 3/4	4 1/2
1	25	2 1/2	3	2 1/2	2 1/4	3	3 1/2	3	2 1/2	3 1/2	3 1/2	3 1/4	3					5	5	4 3/4	4 1/2	5 1/2	5 1/2	5 1/4	5
[a] 1 1/4	32	2 3/4	3 1/4	2 3/4	2 1/4	3 1/4	3 3/4	3 1/4	2 3/4	3 3/4	3 3/4	3 1/2	3 1/4	For these sizes Class 1500 dimensions are used				5	5	4 3/4	4 1/2	6	6	5 3/4	5 1/2
1 1/2	40	2 3/4	3 1/4	2 3/4	2 1/2	3 1/2	4	3 1/2	3	4 1/4	4 1/4	4	3 3/4					5 1/2	5 1/2	5 1/4	5	6 3/4	6 3/4	6 1/2	6 1/4
2	50	3 1/4	3 3/4	3 1/4	2 3/4	3 1/2	4	3 1/2	3	4 1/4	4 1/4	4	3 3/4					5 3/4	5 3/4	5 1/2	5 1/4	7	7	6 3/4	6 1/2
[a] 2 1/2	65	3 1/2	4	3 1/2	3	4	4 1/2	4	3 1/4	4 3/4	4 3/4	4 1/2	4 1/4					6 1/4	6 1/4	6	5 3/4	7 3/4	8	7 1/2	7 1/4
3	80	3 1/2	4	3 1/2	3	4 1/4	4 3/4	4 1/4	3 1/2	5	5	4 3/4	4 1/2	5 3/4	5 3/4	5 1/2	5 1/4	7	7	6 3/4	6 1/2	8 3/4	9	8 1/2	8 1/4
4	100	3 1/2	4	3 1/2	3	4 1/2	5	4 1/2	3 3/4	5 3/4	5 3/4	5 1/2	5 1/4	6 3/4	6 3/4	6 1/2	6 1/4	7 3/4	7 3/4	7 1/2	7 1/4	10	10 1/4	9 3/4	9 1/2
[a] 5	125	3 3/4	4 1/4	3 3/4	3 1/4	4 3/4	5 1/4	4 3/4	4 1/4	6 1/2	6 1/2	6 1/4	6	7 1/2	7 1/2	7 1/4	7	9 3/4	9 3/4	9 1/2	9 1/4	11 3/4	12 1/4	11 1/2	11 1/4
6	150	4	4 1/2	4	3 1/4	4 3/4	5 1/2	4 3/4	4 1/4	6 3/4	6 3/4	6 1/2	6 1/4	7 1/2	7 3/4	7 1/4	7	10 1/4	10 1/2	10	9 3/4	13 1/2	14	13 1/4	13
8	200	4 1/4	4 3/4	4 1/4	3 1/2	5 1/2	6	5 1/2	4 3/4	7 1/2	7 3/4	7 1/4	7	8 3/4	8 3/4	8 1/2	8 1/4	11 1/2	12 3/4	11 1/4	11	15	15 1/2	14 3/4	14 1/2
10	250	4 1/2	5	4 1/2	4	6 1/4	6 3/4	6 1/4	5 1/2	8 1/2	8 1/2	8 1/4	8	9 1/4	9 1/4	9	8 3/4	13 1/4	13 1/2	13	12 3/4	19 1/4	20	19	18 3/4
12	300	4 3/4	5 1/4	4 3/4	4	6 3/4	7 1/4	6 3/4	5 3/4	8 3/4	8 3/4	8 1/2	8 1/4	10	10	9 3/4	9 1/2	14 3/4	15 1/4	14 1/2	14 1/4	21 1/4	22	21	20 3/4
14	350	5 1/4	5 3/4	5 1/4	4 1/2	7	7 1/2	7	6 1/4	9 1/4	9 1/4	9	8 3/4	10 3/4	11	10 1/2	10 1/4	16	16 3/4	15 3/4	15 1/2				
16	400	5 1/4	5 3/4	5 1/4	4 1/2	7 1/2	8	7 1/2	6 1/2	10	10	9 3/4	9 1/2	11 1/4	11 1/2	11	10 3/4	17 1/2	18 1/2	17 1/4	17	—	—	—	—
18	450	5 3/4	6 1/4	5 3/4	5	7 3/4	8 1/4	7 3/4	6 3/4	10 3/4	10 3/4	10 1/2	10 1/4	12 3/4	13 1/4	12 1/2	12 1/4	19 1/2	20 3/4	19 1/4	19	—	—	—	—
20	500	6 1/4	6 3/4	6 1/4	5 1/2	8	8 3/4	8	7 1/4	11 1/4	11 1/2	11	10 3/4	13 3/4	14 1/4	13 1/2	13 1/4	21 1/4	22 1/4	21	20 3/4	—	—	—	—
24	600	6 3/4	7 1/4	6 3/4	6	9	10	9	8	13	13 1/4	12 3/4	12 1/2	17 1/4	18	17	16 3/4	24 1/4	25 1/2	24	23 3/4	—	—	—	—

NOTE 1 This table should be read in conjunction with Table 9 to Table 14.

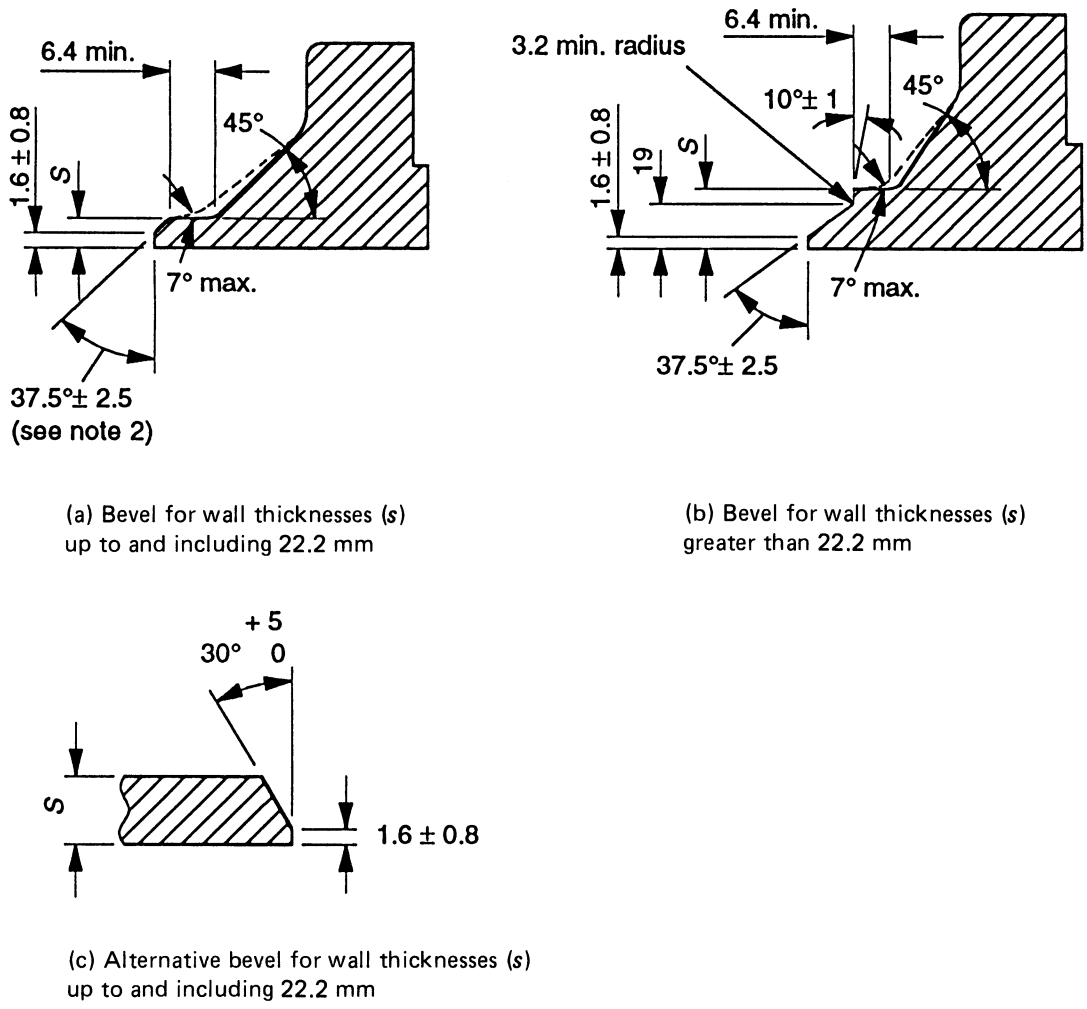
NOTE 2 For determination of studbolt and headed bolt lengths for lapped-type joints see Appendix C.

NOTE 3 The ends of all studbolts should be rounded or chamfered. Studbolt lengths do not include the heights of these ends.

[a] The use of these sizes should be avoided in new constructions.

Appendix E Recommendations for weld ends of weld-neck flanges

Recommendations for welding neck flange ends of wall thickness up to 22.2 mm (inclusive) and greater than 22.2 mm are given in Figure 16.



(a) Bevel for wall thicknesses (*s*) up to and including 22.2 mm

(b) Bevel for wall thicknesses (*s*) greater than 22.2 mm

(c) Alternative bevel for wall thicknesses (*s*) up to and including 22.2 mm

Linear dimensions are in millimetres.

NOTE 1 For flanges required to connect with ferritic steel pipe of nominal wall thickness less than 4.8 mm the welding ends should be finished to a slight chamfer or be square, at the option of the manufacturer.

NOTE 2 For flanges required to connect to austenitic stainless steel pipe of nominal wall thickness 3.2 mm or less, the welding ends should be finished to a slight chamfer.

NOTE 3 For dimensions of weld-neck flanges see Table 9–Table 14.

Figure 16 — Recommended bevel angles for welding

Appendix F Dimensions of seamless and welded steel pipes

Dimensions of seamless and welded steel pipes which are given in BS 1600-2 are reproduced in Table 25 for information only.

Table 25 — Dimensions of seamless and welded steel pipe

Nominal pipe size	Outside diameter	Nominal wall thickness																
		Schedule 5S[a]	Schedule 10S[a]	Schedule 10	Schedule 20	Schedule 30	Schedule 40S[a]	Standard wall	Schedule 40	Schedule 60	Schedule 80S[a]	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
1/2	21.3	1.65	2.11	—	—	—	2.77	2.77	2.77	—	3.73	3.73	3.73	—	—	—	4.78	7.47[b]
3/4	26.7	1.65	2.11	—	—	—	2.87	2.87	2.87	—	3.91	3.91	3.91	—	—	—	5.56	7.82[b]
1	33.4	1.65	2.77	—	—	—	3.38	3.38	3.38	—	4.55	4.55	4.55	—	—	—	6.35	9.09[b]
1 1/4[c]	42.2	1.65	2.77	—	—	—	3.56	3.56	3.56	—	4.85	4.85	4.85	—	—	—	6.35	9.70[b]
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[b]
2	60.3	1.65	2.77	—	—	—	3.91	3.91	3.91	—	5.54	5.54	5.54	—	—	—	8.74	11.07[b]
2 1/2[c]	73.0	2.11	3.05	—	—	—	5.16	5.16	5.16	—	7.01	7.01	7.01	—	—	—	9.52	14.02[b]
3	88.9	2.11	3.05	—	—	—	5.49	5.49	5.49	—	7.62	7.62	7.62	—	—	—	11.13	15.24[b]
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[b]
5[c]	141.3	2.77	3.40	—	—	—	6.55	6.55	6.55	—	9.52	9.52	9.52	—	12.70	—	15.88	19.05[b]
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[b]
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[b]
10	273.0	3.40	4.19	—	6.35	7.80	9.27	9.27	9.27	12.70	12.70	12.70	15.09	18.26	21.44	25.40	28.58	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[b]	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[b]	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[b]	14.27	19.05	—	12.70[b]	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	15.08	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[b]	30.96	38.89	46.02	52.39	59.54	—

NOTE 1 Dimensions in this table are based on ANSI/ASME B36.10 M and ANSI/ASME B36.19.

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

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

[b] Except when marked b, Standard, Extra Strong and Double Extra Strong wall thickness have pipe of corresponding wall thickness listed under one of the schedule numbers.

[c] The use of these sizes should be avoided in new constructions.

Appendix G Use of metric bolting in lieu of inch bolting

G.1 General

If users prefer or require to use metric bolting in lieu of the inch bolting specified in this Section of BS 1560, **G.3** gives the comparable metric bolt sizes that have been agreed in ISO/TC 5/SC 10 in the preparation of ISO 7005.

G.2 Gaskets

WARNING. Users should note that the centring of an inside bolt circle gasket in an assembled flange joint will be affected when using metric bolting. It should be noted that bolt hole clearances may be reduced or increased. Reduction of bolt hole clearances may prevent the use of inch dimensioned metal gaskets, and an increase in bolt hole clearances could mean that the gasket will protrude into the bore of the flange or that the sealing element of a spiral wound gasket will over-ride the raised face. It is essential that great care be taken to ensure that gaskets are centred properly; this applies particularly to the spiral wound gaskets which incorporate a centring ring where the user has to ensure the sealing element is correctly located on the flange face.

However, with care, and dependant on the tolerances which have been used it may be possible to fit the normal inch dimensioned gasket when using metric bolting in existing inch drilled holes.

G.3 Comparable sizes

If metric bolting is to be used the comparable inch and metric sizes are as given in Table 26.

Table 26 — Nominal bolt diameters

Inch	Metric
$^1/_2$	M14
$^5/_8$	M16
$^3/_4$	M20
$^7/_8$	M24
1	M27
$1^1/_8$	M30
$1^1/_4$	M33
$1^3/_8$	M36
$1^1/_2$	M39
$1^5/_8$	M42
$1^3/_4$	M45
$1^7/_8$	M48
2	M52
$2^1/_4$	M56
$2^1/_2$	M64
$2^3/_4$	M70
3	M76
$3^1/_2$	M90

G.4 Inch/metric bolt comparisons

To enable users to ascertain precisely the differences in the two systems, Table 27 is given for reference.

Up to and including size M45, coarse series bolts complying with BS 3643-1 should be used. In sizes M48 and larger the equivalent metric studbolts should use the constant 4 mm pitch series in place of the imperial 8 threads per inch series.

Table 27 — Inch/metric bolt comparisons

Bolt diameter				Bolt hole diameter		Clearances
Inch bolting		Metric	Difference	Inch hole		Metric bolt in an inch hole
in	mm	mm	mm	in	mm	mm
$^{1}/_{2}$	12.70	M14	+ 1.30	$^{5}/_{8}$	15.88	1.88
$^{5}/_{8}$	15.88	M16	+ 0.12	$^{3}/_{4}$	19.05	3.05
$^{3}/_{4}$	19.05	M20	+ 0.95	$^{7}/_{8}$	22.23	2.23
$^{7}/_{8}$	22.23	M24	+ 1.77	1	25.40	1.40
1	25.40	M27	+ 1.60	$1^{1}/_{8}$	28.58	1.58
$1^{1}/_{8}$	28.58	M30	+ 1.42	$1^{1}/_{4}$	31.75	1.75
$1^{1}/_{4}$	31.75	M33	+ 1.25	$1^{3}/_{8}$	34.93	1.93
$1^{3}/_{8}$	34.93	M36	+ 1.07	$1^{1}/_{2}$	38.10	2.10
$1^{1}/_{2}$	38.10	M39	+ 0.90	$1^{5}/_{8}$	41.28	2.28
$1^{5}/_{8}$	41.28	M42	+ 0.72	$1^{3}/_{4}$	44.45	2.45
$1^{3}/_{4}$	44.45	M45	+ 0.55	$1^{7}/_{8}$	47.63	2.63
$1^{7}/_{8}$	47.63	M48	+ 0.37	2	50.80	2.80
2	50.80	M52	+ 1.20	$2^{1}/_{8}$	53.98	1.98
$2^{1}/_{4}$	57.15	M56	– 1.15	$2^{3}/_{8}$	60.33	3.33
$2^{1}/_{2}$	63.50	M64	+ 0.50	$2^{5}/_{8}$	66.68	2.68
$2^{3}/_{4}$	69.85	M70	+ 0.15	$2^{7}/_{8}$	73.03	3.03
3	76.20	M76	– 0.20	$3^{3}/_{8}$	79.38	3.38
$3^{1}/_{2}$	88.90	M90	+ 0.10	$3^{5}/_{8}$	92.08	2.08

Appendix H Comparison of flange descriptions in BS 1560-2:1970 with descriptions used in this Section of BS 1560

Descriptions of flanges used in this Section of BS 1560 are compared with descriptions given in BS 1560-2:1970 in Table 28.

Table 28 — Steel flange descriptions and code numbers specified in BS 1560-3.1:1989 and BS 1560-2:1970

Code number in BS 1560-3.1:1989	Description of flange	
	In BS 1560-3.1:1989	In BS 1560-2:1970
101	Plate flange for welding	—
105	Blank flange	Blank (blind) flange
111	Weld-neck flange	Welding-neck flange
112	Hubbed slip-on flange for welding	Slip-on welding flange
113	Hubbed threaded flange	Screwed flange
114	Hubbed socket weld flange	Socket-welded flange
115	Loose hubbed flange for lapped pipe end	Lapped flange
121	Integral flange	Integral flange

blank

Publications referred to

BS 21, *Specification for pipe threads for tubes and fittings where pressure-tight joints are made on the threads (metric dimensions).*

BS 350, *Conversion factors and tables.*

BS 350-1, *Basis of tables. Conversion factors.*

BS 1134, *Method for the assessment of surface finish.*

BS 1134-1, *Method and instrumentation.*

BS 1501, *Steels for fired and unfired pressure vessels: plates.*

BS 1501-1, *Specification for carbon and carbon manganese steels.*

BS 1501-2, *Alloy steels: Imperial units.*

BS 1501-3, *Corrosion and heat resisting steels. Imperial units.*

BS 1503, *Specification for steel forgings (including semi-finished forged products) for pressure purposes.*

BS 1504, *Specification for steel castings for pressure purposes.*

BS 1600, *Specification for dimensions of steel pipe for the petroleum industry.*

BS 1640, *Specification for steel butt-welding pipe fittings for the petroleum industry.*

BS 1768, *Specification for unified precision hexagon bolts, screws and nuts (UNC and UNF threads). Normal series.*

BS 1769, *Specification. Unified black hexagon bolts, screws and nuts (UNC and UNF threads). Heavy series.*

BS 2633, *Specification for Class 1 arc welding of ferritic steel pipework for carrying fluids.*

BS 3351, *Specification for piping systems for petroleum refineries and petrochemical plants.*

BS 3381, *Specification for metallic spiral-wound gaskets for use with flanges to BS 1560-1 and BS 1560-2*[5)].

BS 3410, *Specification for metal washers for general engineering purposes.*

BS 3643, *ISO metric screw threads.*

BS 3643-1, *Principles and basic data.*

BS 4504, *Circular flanges for pipes, valves and fittings (PN designated).*

BS 4504-3, *Specification for steel, cast iron and copper alloy flanges.*

BS 4570, *Specification for fusion welding of steel castings.*

BS 4882, *Specification for bolting for flanges and pressure containing purposes.*

BS 5135, *Specification for arc welding of carbon and carbon manganese steels.*

BS 5500, *Specification for unfired fusion welded pressure vessels.*

BS 6920, *Suitability of non-metallic products for use in contact with water intended for human consumption with regard to their effect on the quality of the water.*

BS 6920-1, *Specification.*

BS 7076, *Dimensions of gaskets for flanges to BS 1560.*

BS 7076-1, *Specification for non-metallic flat gaskets*[5)].

BS 7076-2, *Specification for metallic ring-joint gaskets for use with steel flanges*[5)].

BS 7076-3, *Specification for non-metallic envelope gaskets*[5)].

BS 7076-4, *Specification for corrugated, flat or grooved metallic and filled metallic gaskets for use with steel flanges*[5)].

ANSI/ASME B1.20.1, *Pipe threads, general purpose (inch).*

ANSI B16.5, *Pipe flanges and flanged fittings.*

ANSI B16.9, *Factory-made wrought steel butt welding fittings.*

ANSI B31.3, *Chemical plant and petroleum refinery piping.*

ANSI/ASME B36.10 M, *Welded and seamless wrought steel pipe.*

ANSI/ASME B36.19 M, *Stainless steel pipe.*

API Std. 5B, *Threading, gauging and thread inspection of casing, tubing and line pipe threads.*

ASTM A105, *Specification for forgings, carbon steel, for piping components.*

[5)] Referred to in foreword only.

ASTM A182, *Specification for forged or rolled alloy-steel pipe flanges, forged fittings, and valves and parts for high-temperature service.*

ASTM A203, *Specification for pressure vessel plates, alloy steel, nickel.*

ASTM A204, *Specification for pressure vessel plates, alloy steel, molybdenum.*

ASTM A216, *Specification for carbon-steel castings suitable for fusion welding for high-temperature service.*

ASTM A217, *Specification for martensitic stainless steel and alloy steel castings for pressure-containing parts suitable for high-temperature service.*

ASTM A240, *Specification for heat resisting chromium and chromium-nickel stainless steel plate, sheet, and strip for pressure vessels.*

ASTM A350, *Specification for forgings, carbon and low alloy steel, requiring notch toughness testing for piping components.*

ASTM A351, *Specification for austenitic steel castings for high-temperature service.*

ASTM A352, *Specification for ferritic and martensitic steel castings for pressure-containing parts suitable for low-temperature service.*

ASTM A387, *Specification for pressure vessel plates, chromium-molybdenum alloy steel.*

ASTM A515, *Specification for pressure vessel plates, carbon steel, for intermediate and higher-temperature service.*

ASTM A516, *Specification for pressure vessel plates, carbon steel, for moderate and lower-temperature service.*

ASTM A537, *Pressure vessel plates, heat-treated, carbon-manganese-silicon steel.*

ISO 7005, *Metallic flanges.*

ISO 7005-1, *Steel flanges.*

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