

INTERNATIONAL STANDARD

ISO 7005-1

First edition
1992-04-15

Metallic flanges —

Part 1: Steel flanges

*Brides métalliques —
Partie 1: Brides en acier*



Reference number
ISO 7005-1 : 1992 (E)

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 7005-1 was prepared by Technical Committee ISO/TC 5, *Ferrous metal pipes and metallic fittings*, Sub-Committee SC 10, *Metallic flanges and their joints*

This first edition of ISO 7005-1, together with ISO 7005-2 and ISO 7005-3, cancels and replaces ISO 2084 : 1974, ISO 2229 : 1973 and ISO 2441 : 1975, of which they constitute a technical revision.

ISO 7005 consists of the following parts, under the general title *Metallic flanges*:

- *Part 1: Steel flanges*
- *Part 2: Cast iron flanges*
- *Part 3: Copper alloy and composite flanges*

Annexes A and B form an integral part of this part of ISO 7005. Annexes C to G are for information only.

Introduction

Various flange systems based on differing design criteria have been in use throughout the world for many years. Recognizing the increasing difficulties arising from such a situation, representatives of ISO/TC 5, *Ferrous metal pipes and metallic fittings*, ISO/TC 67, *Materials and equipment for petroleum and natural gas industries*, and ISO/TC 153, *Valves*, established principles for the preparation of an International Standard for a single series of flanges.

This part of ISO 7005 is based on the American and European steel flange systems combined with some changes to the dimensions specified in the two systems. PN 20, PN 50, PN 110, PN 150, PN 260 and PN 420 steel flanges are designed to be interchangeable with flanges to American standards ANSI/ASME B16.5 and MSS SP44; they are not identical but are deemed to comply with dimensions specified in ANSI/ASME B16.5 and MSS SP44 as appropriate.

This part of ISO 7005 takes into account unpublished work of the European Committee for Standardization CEN/TC 74, *Flanges*, up to 1972 and the amendments that would have been necessary to ISO 2229 arising from the revision of ANSI/ASME B16.5 up to 1988 and MSS SP44 : 1985, plus amendments due to the changes in pressure designation. In the American system, flanges are designated by a Class rating, but these ratings have now been converted to nominal pressure (PN) designations. The equivalent PN designations are as follows:

| | |
|-------------|--------|
| Class 150: | PN 20 |
| Class 300: | PN 50 |
| Class 600: | PN 110 |
| Class 900: | PN 150 |
| Class 1500: | PN 260 |
| Class 2500: | PN 420 |

This part of ISO 7005 does not specify materials or pressure/temperature ratings of flanges, but guidance is given in annexes D and E on selected materials and pressure/temperature ratings of flanges (see note 10 to tables 8, 9, 10, 11, 13 and 14, page 46) using the materials listed. Annex D lists German (DIN) steels on which the European flange system is based and American (ASTM) steels on which the American flange system is based, together with international (ISO) steels given in published and draft International Standards. Users of this part of ISO 7005 may wish to use steels specified in national standards in preference to those given in annex D. Annex E gives the pressure/temperature ratings for certain flanges made using the materials given in annex D. (See E.1 and tables E.1 to E.4 for restrictions on the applicability of pressure/temperature ratings to flanges.)

Ultimately it is the intention that only ISO materials and pressure/temperature ratings of flanges made using ISO materials will be specified in this part of ISO 7005; this will be achieved in a revision and when work on standardizing the ISO materials and their elevated temperature properties has been completed.

Flange details in all three parts of ISO 7005 are such as that flanges having the same PN designations and nominal size (DN) designations and compatible flange facings will mate together.

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The method of specifying tolerances has been to combine the existing DIN and ANSI specified tolerances into one table (table 20).

To avoid possible confusion in giving descriptive names to flanges, all flanges are designated by a type number and flange facings by a letter.

Users of this part of ISO 7005 should satisfy themselves that the flanges comply with any statutory requirements.

It should be noted that, in general, flanges previously manufactured to ISO 2084, ISO 2229 and ISO 2441 will mate with flanges manufactured to ISO 7005.

Metallic flanges —

Part 1: Steel flanges

Section 1: General

1.1 Scope

This part of ISO 7005 for a single system of flanges specifies requirements for circular steel flanges in the following PN designations:

| Series 1 ¹⁾ | Series 2 ¹⁾ |
|------------------------|------------------------|
| PN 10 | PN 2,5 |
| PN 16 | PN 6 |
| PN 20 | PN 25 |
| PN 50 | PN 40 |
| PN 110 | |
| PN 150 | |
| PN 260 | |
| PN 420 | |

It specifies the types of steel flanges and their facings, dimensions, tolerances, threading, bolt sizes, flange face surface finish, marking, testing and inspection.

It does not specify pressure/temperature ratings or materials for steel flanges. However, annex D gives guidance on selected materials and annex E gives guidance on the pressure/temperature ratings for some flanges made from the materials listed in annex D.

This part of ISO 7005 does not apply to flanges made from bar stock by turning.

Nor does it apply to flanges of types 11, 12, 13, 14 and 15 made from plate material.

The various gasket types, dimensions, design characteristics and materials used are not within the scope of this part of ISO 7005.

NOTE — Dimensions of gaskets are given in ISO 7483

1.2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 7005. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 7005 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 7-1 : 1982, *Pipe threads where pressure-tight joints are made on the threads — Part 1: Designation, dimensions and tolerances*.

ISO 7-2 : 1982, *Pipe threads where pressure-tight joints are made on the threads — Part 2: Verification by means of limit gauges*.

ISO 261 : 1973, *ISO general purpose metric screw threads — General plan*.

ISO 887 : —¹⁾, *Plain washers for metric bolts, screws and nuts for general purposes — General plan*.

ISO 6708 : 1980, *Pipe components — Definition of nominal size*.

ISO 7268 : 1983, *Pipe components — Definition of nominal pressure*.

ISO 7483 : 1991, *Dimensions of gaskets for use with flanges to ISO 7005*.

ANSI/ASME B1.20.1 : 1983, *Pipe threads, general purpose (inch)*.

¹⁾ Series 1 flanges are the basic flanges; series 2 flanges may have a limited application in the future

1) To be published (Revision of ISO 887 : 1983)

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1.3 Definitions

For the purposes of this part of ISO 7005, the definitions of nominal size (DN) as given in ISO 6708, and nominal pressure (PN) as given in ISO 7268 and the following definition apply.

1.3.1 pipeline: Cross-country fluid transmission line, e.g. for oil or gas.

1.4 Designation of types, components and facings

Figures 1 to 4 illustrate flanges and flanged components grouped according to type and figure 5 illustrates facing types.

Figure 1: Flanges — Types 01 to 05 inclusive, comprising flanges generally manufactured from plate materials.

NOTE — Types 02 and 03 are identical; it is their ancillary components which differ (see figure 4).

Figure 2: Flanges — Types 11 to 15 inclusive, comprising flanges generally manufactured from forgings or castings.

Figure 3: Flange — Type 21 integral flange, as part of some other equipment or component.

Figure 4: Ancillary components for flanges — Types 32 to 34 inclusive, comprising parts or components for use with flange types 02, 03 and 04.

Figure 5: Facings — Types A to J inclusive, comprising the various types of flange facings which may be used where applicable in conjunction with the groups of flanges or flanged components in figures 1 to 4.

NOTE — Type numbers are not consecutive to permit possible future additions to any particular group

Section 2: General requirements

2.1 Pressure/temperature ratings

Guidance on pressure/temperature ratings of flanges forming the subject of this part of ISO 7005 is given in annex E for some flanges made from the materials listed in annex D.

2.2 Materials and bolting

2.2.1 Range of materials

Guidance on selected materials is given in annex D.

2.2.2 Gaskets

See the note in 1.1.

2.2.3 Bolting

The material of the bolting should be chosen by the user according to the pressure, temperature, flange material and the selected gasket so that the flanged joint remains tight under the expected operating conditions.

For PN 20, PN 50, PN 110, PN 150, PN 260 and PN 420 flanges up to and including bolt size M45, coarse series bolts to ISO 261 shall be used; from bolt size M48 upwards, the fine series having a uniform 4 mm pitch shall be used.

2.3 Repairs

2.3.1 Where not otherwise prohibited by the applicable material standard, repairs by welding are permitted when there is a proven method. All welding shall be in accordance with a written procedure.

2.3.2 Any filler rod used for weld repairs shall be such as to produce a weld having characteristics similar to those of the parent metal. Flanges shall be heat treated after repair welding when the material specification requires such treatment.

2.4 Dimensions

2.4.1 Range of nominal sizes

The range of nominal sizes applicable to each flange type and each nominal pressure shall be as specified in table 3.

2.4.2 Tables giving dimensions

Dimensions of flanges shall be in accordance with the following tables, as appropriate.

Tables 4, 5, 6 and 7: Dimensions of flange facings

Series 1 flanges

Table 10: Dimensions of PN 10 flanges

Table 11: Dimensions of PN 16 flanges

Table 12: Dimensions of PN 20 flanges

Table 15: Dimensions of PN 50 flanges

Table 16: Dimensions of PN 110 flanges

Table 17: Dimensions of PN 150 flanges

Table 18: Dimensions of PN 260 flanges

Table 19: Dimensions of PN 420 flanges

Series 2 flanges

Table 8: Dimensions of PN 2,5 flanges

Table 9: Dimensions of PN 6 flanges

Table 13: Dimensions of PN 25 flanges

Table 14: Dimensions of PN 40 flanges

2.4.3 Threads for threaded flanges

2.4.3.1 The threads shall be taper or parallel threads in accordance with ISO 7-1 or taper threads in accordance with ANSI/ASME B1.20.1 as appropriate.

NOTE -- Unless otherwise specified, parallel threads in accordance with ISO 7-1 will be supplied for flanges PN 2,5, PN 6, PN 10, PN 16, PN 25 and PN 40 and taper threads in accordance with ANSI/ASME B1.20.1 for flanges PN 20, PN 50, PN 110, PN 150, PN 260 and PN 420.

2.4.3.2 The threads shall be concentric with the axes of the flanges and variations in alignment shall not exceed 5 mm/m. Flanges up to and including PN 40 shall be manufactured without a counterbore. The threads shall be chamfered approximately to the major diameter of the threads at the back of the flanges at an angle of approximately 45° with the axes of the threads. The chamfers shall be concentric with the threads and permitted to be included in the measurement of the thread lengths provided that the chamfers do not exceed one pitch in length.

Flanges PN 50 and above shall be provided with a counterbore at the back. The threads shall be chamfered to the diameters of the counterbores at an angle of approximately 45° with the axes of the threads. The counterbores and chamfers shall be concentric with the threads.

2.4.3.3 Gauging shall be in accordance with ISO 7-2 or ANSI/ASME B1.20.1 as appropriate.

2.4.4 Hubs — General applications

2.4.4.1 The hub of threaded (type 13), slip-on (type 12), socket weld (type 14) and lapped (type 15) flanges shall be cylindrical or alternatively shall have a draft of not more than 7° on the outside surface for forging or casting purposes. For the limiting profile of weld neck hubs, see annex A.

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2.4.4.2 The hub dimensions of threaded (type 13) and slip-on (type 12) flanges having a reduced bore shall be at least as large as those of the standard flange of the size to which the reduction is being made. For welding neck (type 11) flanges having a reduced bore, the hub dimensions shall be the same as those of the standard flange of the size to which the reduction is being made.

2.4.5 Hubs — Pipeline applications

2.4.5.1 The hub diameter and wall thickness at the welding end shall be determined as specified in 2.4.5.1.1 to 2.4.5.1.3 as appropriate.

2.4.5.1.1 When the minimum yield strength of the hub portion of any flange or its representative test specimen is the same as that of the mating pipe, the minimum thickness at the welding end shall be the same as that of the mating pipe.

2.4.5.1.2 When the minimum yield strength of the hub portion of any flange or its representative test specimen is less than that specified for the pipe to be matched, the minimum thickness of the hub at the welding end shall be such that the product of its thickness times its yield strength (at the welding end) shall at least equal the product of the specified wall thickness and the minimum specified yield strength of the pipe to be matched.

2.4.5.1.3 When the hub thickness at the welding end is greater than the wall thickness of the adjoining pipe, the joint design shall be as shown in any of the three sketches in figure B 1.

2.4.5.2 The minimum hub outside diameter at the point of weld shall be determined by adding twice the minimum wall thickness determined in 2.4.5.1.1 or 2.4.5.1.2 to the bore specified by the customer.

2.4.5.3 For sizes DN 300 to DN 600, when the mechanical (minimum yield strength) properties of all sections of the flanges are equal to or higher than those of the pipe to be matched, the hub dimensions are permitted to be the same as those of the general flanges as indicated in annex A.

2.4.6 Welding end preparation

For welding type 11 flanges to pipe, the typical end preparation of the flange shall be as shown in annex A. When PN 20, PN 50, PN 110 and PN 150 flanges are used in pipeline applications the typical welding end preparations are as shown in annex C.

NOTE — Other welding end preparations agreed between manufacturer and purchaser do not invalidate compliance with this part of ISO 7005

2.5 Facings

2.5.1 Range of facings

The range of flange facings and flange face designations shall be as given in figure 5. Dimensions of facings according to the PN designation shall be in accordance with figures 6 and 7 and tables 4, 5, 6 and 7, as appropriate.

NOTES

- 1 For types B (as shown in figure 6 only), D, F, G and J the transition from the raised face diameter to the flange face is at the option of the manufacturer
- 2 For PN 20 and PN 50 to PN 420 there are large and small versions of C, D, E and F types of facing. In such cases two sets of dimensions have been given in the related tables. For small male and female joints care should be taken to ensure that the inside diameter of the pipe is small enough to permit sufficient bearing surface.
- 3 The type B raised face on steel flanges may be removed when bolted to cast iron or copper alloy flanges for designations up to and including PN 50 in order to provide full-face gasketing if such be required. On a flanged component or fitting this will reduce the thickness and the overall length accordingly.

2.5.2 Facing height/depth

For PN 2,5, PN 6, PN 10, PN 16, PN 25 and PN 40 flanges all facing heights shall be included in the minimum flange thickness and are measured from the face of the flange. The same requirement applies for PN 20 and PN 50 flanges when they have the (type B1) raised face. For PN 20, PN 50, PN 110, PN 150, PN 260 and PN 420 flanges with other facings, e.g. type B2, spigot and recess, tongue and groove, the height or depth shall be added to the minimum flange thickness. For PN 110 to PN 420 flanges all facings shall be added to the minimum flange thickness. Special requirements apply to ring-joint facings (see 2.5.3)

2.5.3 Ring-joint facings

The bottom of the ring-joint groove shall not encroach below the plane of the flange edge of the appropriate minimum thickness flange. Where the depth of the ring-type joint groove would violate this requirement, sufficient metal shall be added to the flange thickness or raised face height so that the bottom of the groove shall be in the same plane as the flange edge of a minimum thickness flange.

2.5.4 Lapped joints

For type 33 ancillary components for flanges, the finished height of the facing shall be not less than the pipe thickness used. If a tongue, groove or ring-joint face is required, the thickness of the lap remaining after machining the facing shall not be less than the specified thickness of the pipe used.

2.5.5 Surface finish of flanges

2.5.5.1 All flange jointing faces shall be finished in accordance with table 1 or table 2, as appropriate. The surface finishes of the faces shall be compared by visual or tactile means with reference specimens which conform to the R_a and R_z values given in tables 1 and 2.

Table 1 — Surface finish for facings types A, B and E/F (large)

| Method of machining | Approximate depth of serration mm | Approximate radius of tool nose mm | Approximate pitch of serration mm | $R_z^{1)}$ μm | | $R_a^{1)}$ μm | |
|-----------------------|-----------------------------------|------------------------------------|-----------------------------------|--------------------------|------|--------------------------|------|
| | | | | min. | max. | min. | max. |
| Turning ²⁾ | 0,05 | 1,6 | 0,8 | 12,5 | 50,0 | 3,2 | 12,5 |
| Other than turning | — | — | — | 12.5 | 25.0 | 3.2 | 6.3 |

1) R_a and R_z are defined in ISO 468

2) The term "turning" includes any method of machine operation producing either serrated concentric or serrated spiral grooves.

NOTE — For certain applications, e. g. for searching media such as low temperature gases, and for flanges of PN 150 and above, it may be necessary to stipulate closer control on the surface finish.

NOTES

- 1 It is not intended that instrument measurements are taken on the flange faces, and the R_a and R_z values as defined in ISO 468 relate to the reference specimens
- 2 Other finishes may be agreed between the manufacturer and purchaser

2.5.5.2 The dimensions given for facings (particularly tongue and groove types) in this part of ISO 7005 apply to flanges in the condition as delivered.

When special coatings or finishes are required this should be stated in the order so that an appropriate allowance may be incorporated in the machining of any relevant mating dimensions.

2.5.5.3 Flat face, raised face and large spigot/recess facings [i.e. types A, B and E/F (large)] shall be turned. Turning shall be carried out with a round-nosed tool in accordance with table 1.

2.5.5.4 For tongue/groove, small spigot/recess, "O"-ring recess/groove and ring-joint facings [i.e. types C/D, E/F (small), G/H and J] the gasket surfaces shall be machined in accordance with the values shown in table 2.

Table 2 — Surface finish values for facings types C/D, E/F (small), G/H and J

| Facing type | $R_z^{1)}$ μm | | $R_a^{1)}$ μm | |
|--|--------------------------|------|--------------------------|-----|
| | min | max | min | max |
| Tongue/groove (C/D) and small spigot/recess (E/F) | 3.2 | 12.5 | 0.8 | 3.2 |
| Ring-joint (J) (including side walls) and "O"-ring recess/groove (G/H) | 1.6 | 6.3 | 0.4 | 1.6 |

1) R_a and R_z are defined in ISO 468

2.6 Spot-facing or back-facing

Any spot-facing or back-facing required 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 ISO washers complying with ISO 887 for the metric bolt size being fitted. When a flange is back-faced, it is permissible for the fillet radius to be reduced but it shall not be eliminated entirely. The bearing surfaces for the bolting shall be parallel to the flange face within the limits shown in table 20.

When a flange is back-faced a minimum fillet radius at the hub, R_{min} (see figure 8), shall be maintained as given in table 21.

2.7 Tolerances

Flange dimensions shall comply with the tolerances specified in table 20.

2.8 Marking

2.8.1 Flanges other than integral flanges

Flanges other than integral flanges shall be marked with the following information:

- a) the number of this part of ISO 7005 (i.e. ISO 7005-1);
- b) the nominal size (DN) and the PN designation;
- c) the material designation (see 2.8.2);
- d) the manufacturer's name or trade-mark;
- e) the thread identification where appropriate (see 2.8.3);
- f) the heat (cast) number or suitable quality control number traceable to the heat number.

NOTES

- 1 Additionally, flange facing designations may be given (see also 2.8.4)
- 2 Where a flange is subsequently used to form an integral part of a component and the component has a lower pressure rating than that of the flange, the lower rating should be clearly marked on the component

2.8.2 Material designation

The material designation shall be as specified in 2.8.2.1, 2.8.2.2 and 2.8.2.3, as appropriate

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2.8.2.1 The material designation shall be the minimum information required to identify the material, e.g. the grade identification, preceded by the specification (standard) number where necessary.

EXAMPLES (for materials in tables D.1 and D.2)

- a) 16Mo3
- b) C26-52H
- c) X7 CrNiNb 18 10

2.8.2.2 For flanges of nominal size DN 300 and greater, manufactured specifically for pipeline applications, the material designation shall be the material group and grade identification number in accordance with table D.3.

EXAMPLE

4.A.250

2.8.2.3 For flanges manufactured in accordance with 2.4.5.1.2, the material designation shall comprise the material group and grade identification number for the flange and the strength grade of the pipe for which the flange has been made, presented as shown in the following example.

EXAMPLE

4.A.290/XXX

where XXX is the strength grade of the pipe, taken from the appropriate steel tube standard.

2.8.3 Identification of internally threaded flanges

Internally threaded flanges shall be marked to indicate the type of thread used.

Threads to ISO 7-1 shall be designated by the letter symbols Rc or Rp, as appropriate, in accordance with ISO 7-1 followed by the nominal size, e.g. Rc 3/4. Threads to ANSI/ASME B1.20.1 shall be designated by the nominal size, number of threads per inch and the letters NPT, e.g. 3/4-14NPT.

2.8.4 Groove number

Flanges grooved for standard ring-joints shall be marked with the letter "R" and the corresponding ring number.

2.8.5 Stamping

Where steel stamps are used, the marking shall be applied to the rim of the flange.

1) 1 bar = 10^5 Pa

2.9 Inspection and test

NOTES

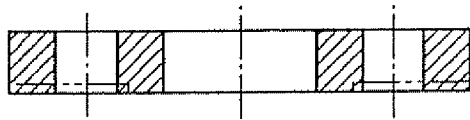
1 The PN 20, PN 50, PN 110, PN 150, PN 260 and PN 420 flanges specified are designed to be interchangeable with Class rated flanges to ANSI/ASME B16.5 and MSS SP44, but they are not identical in all respects; for inspection purposes, it is recommended that the dimensions of PN 20, PN 50, PN 110, PN 150, PN 260 and PN 420 flanges are deemed to comply with the dimensions specified in ANSI/ASME B16.5 or MSS SP44 as appropriate.

2 This part of ISO 7005 does not make provision for routine inspection or pressure testing of separate flanges. However, 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 manufactured. Any test pressures should not exceed 1.5 times the maximum allowable working pressure at 20 °C rounded off to the next higher 1 bar¹⁾ increment.

2.10 Information to be supplied by the purchaser

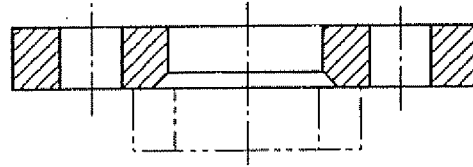
The following information should be supplied by the purchaser in the enquiry and/or order:

- a) the number of this part of ISO 7005 (i.e. ISO 7005-1);
- b) the nominal size — DN followed by the appropriate number (see 1.3);
- c) the PN designation — PN followed by the appropriate number (see 1.3);
- d) the flange type number (see 1.4), together with reference to the ancillary component type number if appropriate;
- e) the facing type letter (see 1.4);
- f) the material designation by reference to a national standard or International Standard and grade of steel (see 2.8.2), if appropriate;
- g) the internal thread designation (see 2.4.3);
- h) the external diameter and thickness of pipe;
- i) material certification requirements;
- j) details of special coatings (see 2.5.5.2);
- k) the neck thickness *S* where appropriate;
- l) the bore diameter *B* where appropriate;
- m) the bore diameter for welding neck (type 11) or socket weld (type 14) flanges, if different from those specified in this part of ISO 7005;
- n) for pipeline flanges, the mating pipe wall thickness and yield strength (see 2.4.5.1.3) and weld preparation (see annex B);
- o) the bolting material when bolts are ordered with the flange(s).



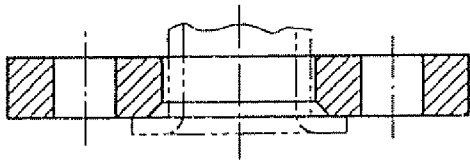
Type 01

Plate flange for welding



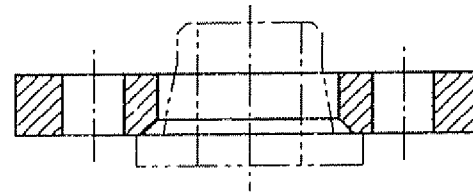
Type 02

Loose plate flange with weld-on plate collar
(see type 32)



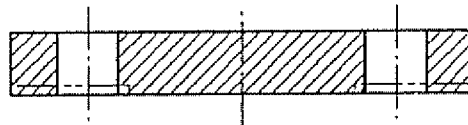
Type 03

Loose plate flange with lapped pipe end
(see type 33)



Type 04

Loose flange with welding neck collar
(see type 34)

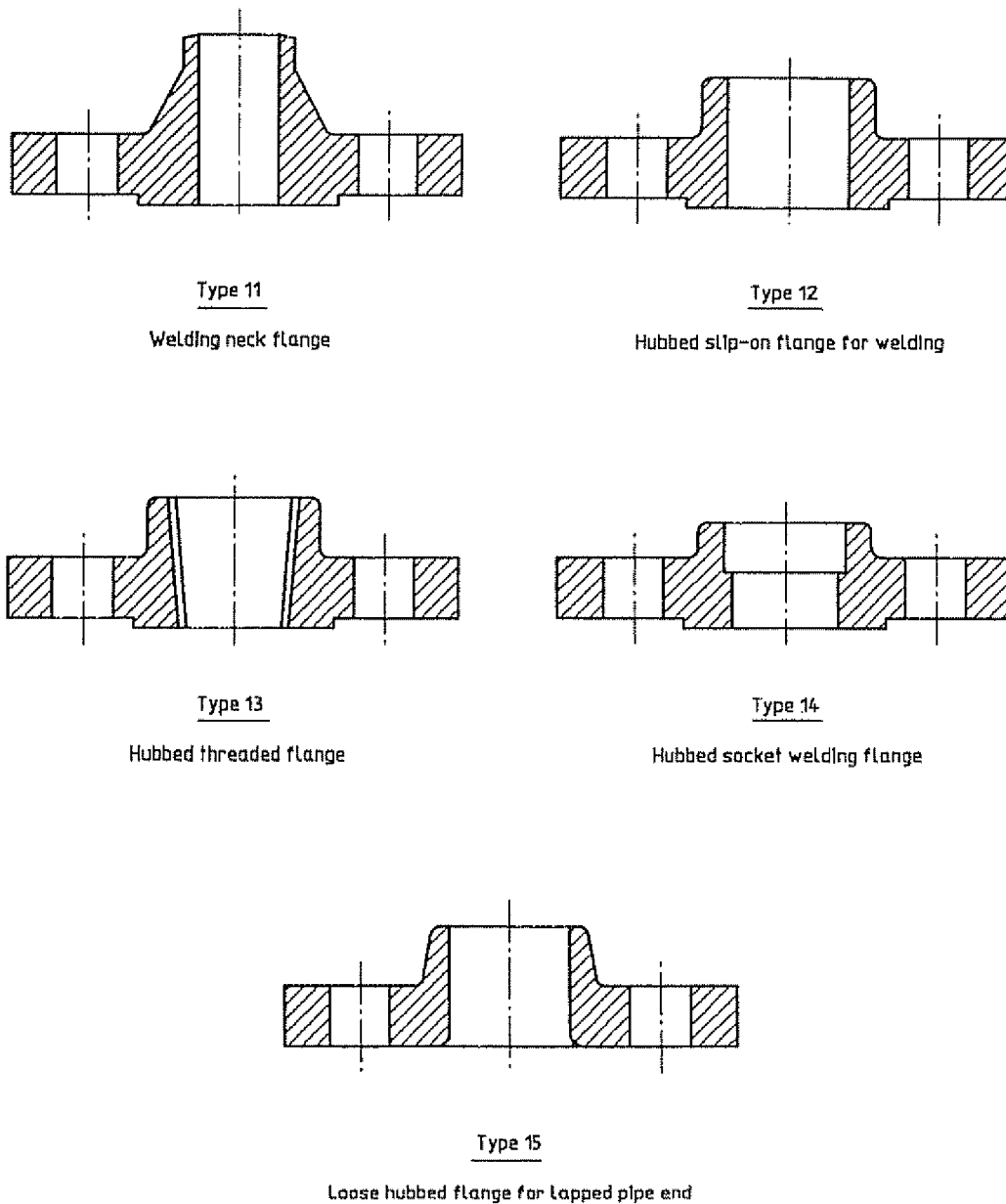


Type 05

Blank flange

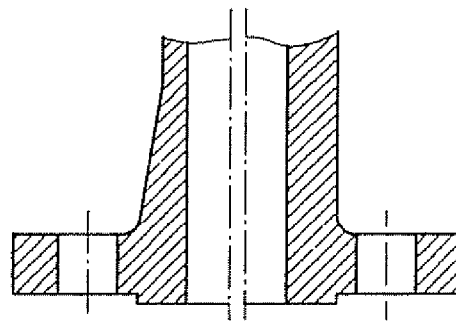
NOTE — These sketches are diagrammatic only

Figure 1 — Flanges — Types 01 to 05



NOTE – These sketches are diagrammatic only

Figure 2 – Flanges – Types 11 to 15

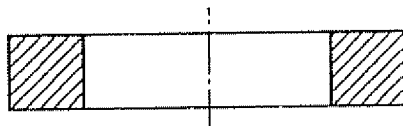


Type 21

Integral flange, showing alternative forms

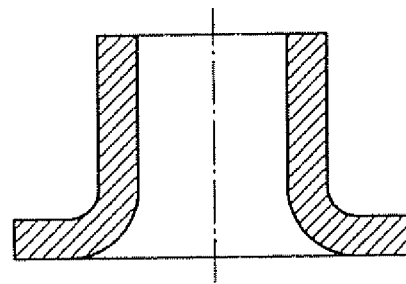
NOTE -- This sketch is diagrammatic only.

Figure 3 — Flange — Type 21



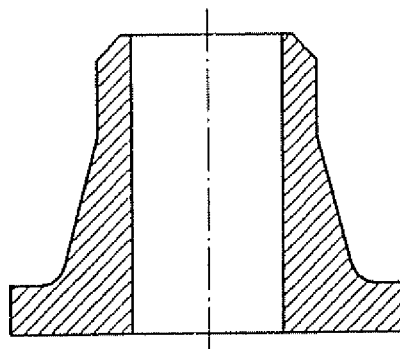
Type 32 ¹⁾

Weld-on plate collar



Type 33 ²⁾

Lapped pipe end



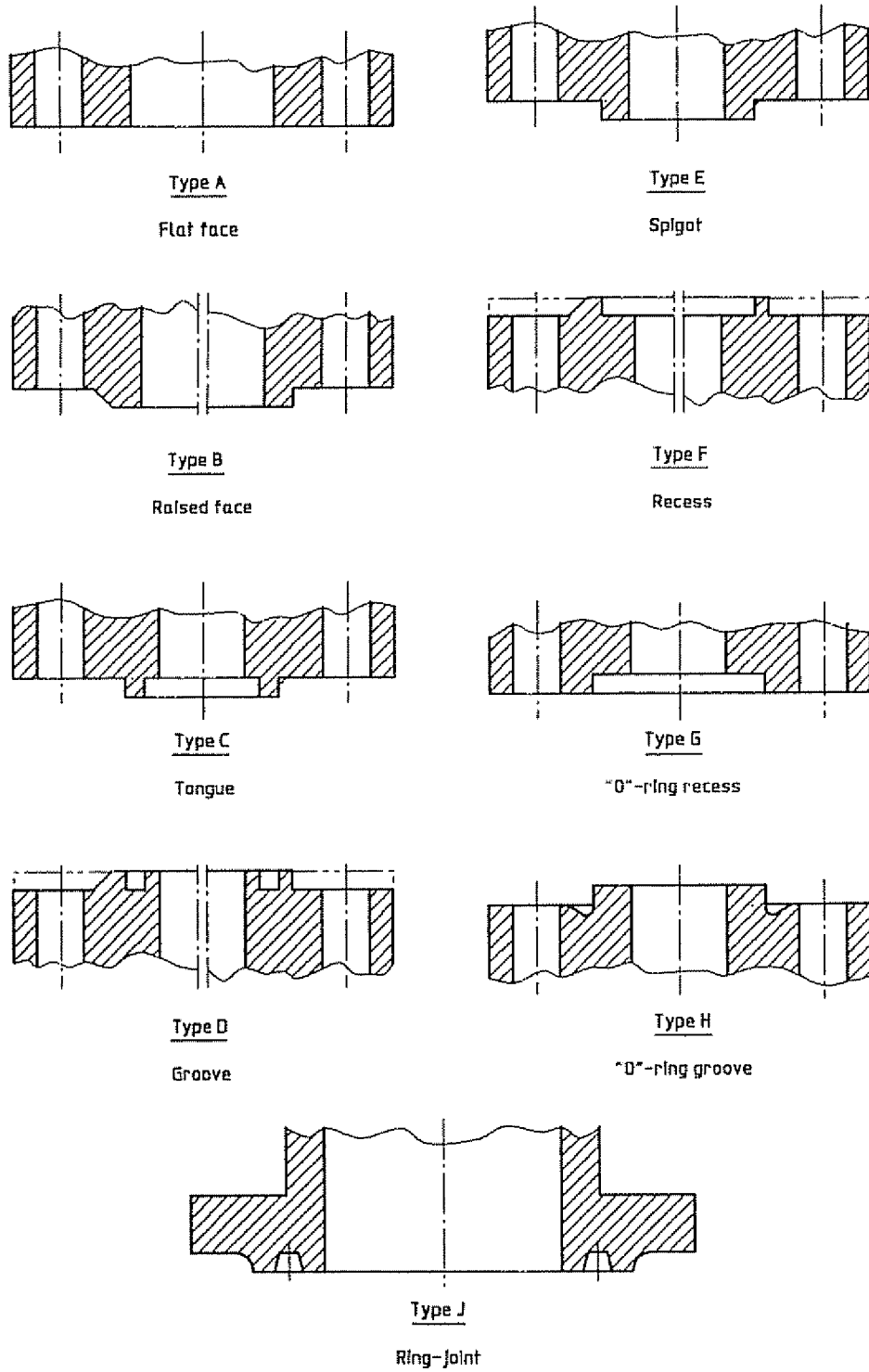
Type 34 ³⁾

Welding neck collar

NOTE — These sketches are diagrammatic only

- 1) Type 32 corresponds to type 02 flange
- 2) Type 33 corresponds to type 03 flange.
- 3) Type 34 corresponds to type 04 flange

Figure 4 — Ancillary components for flanges — Types 32 to 34



NOTE — These sketches are diagrammatic only.

Figure 5 — Illustration of flange facings (types A to J)

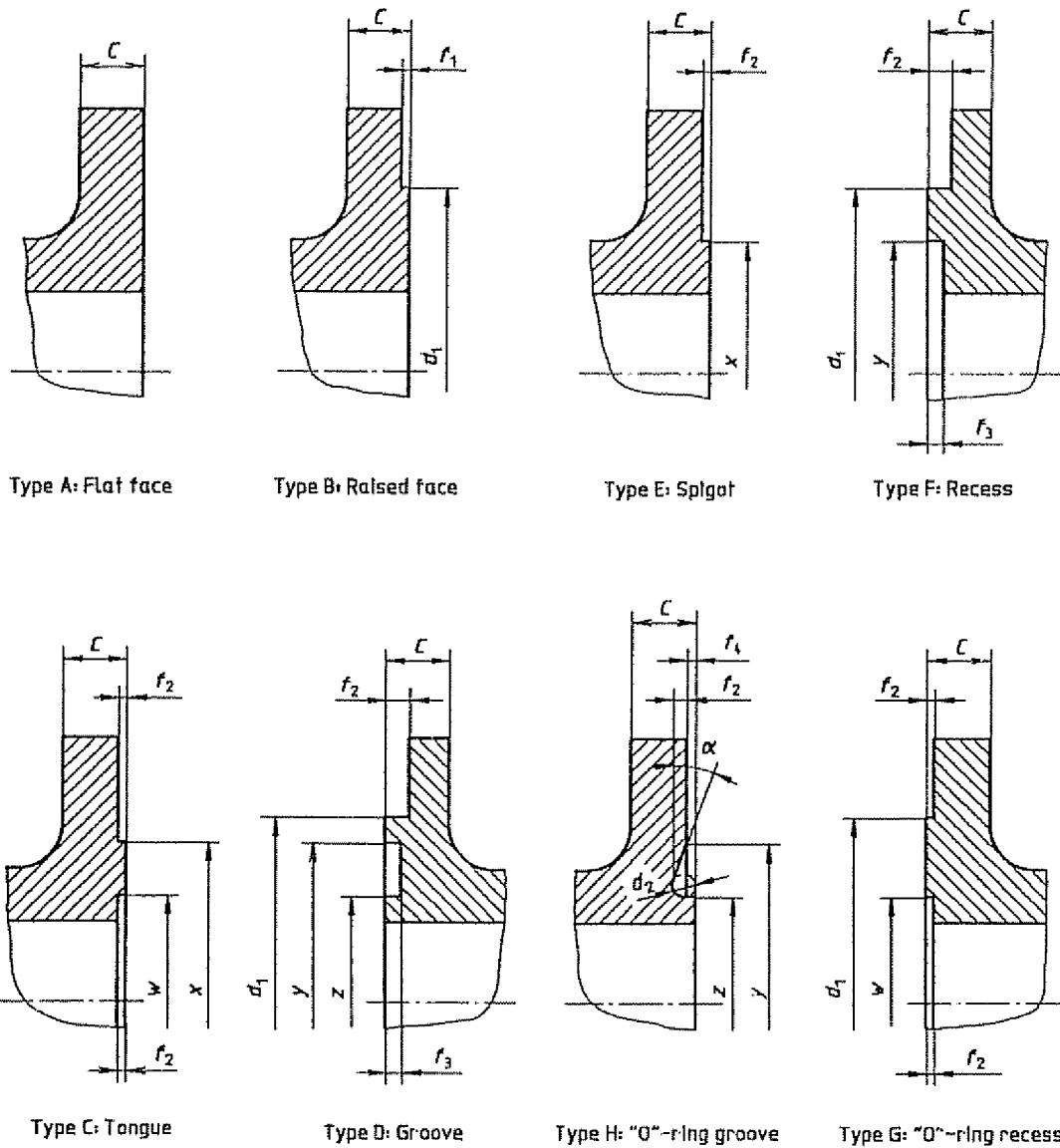


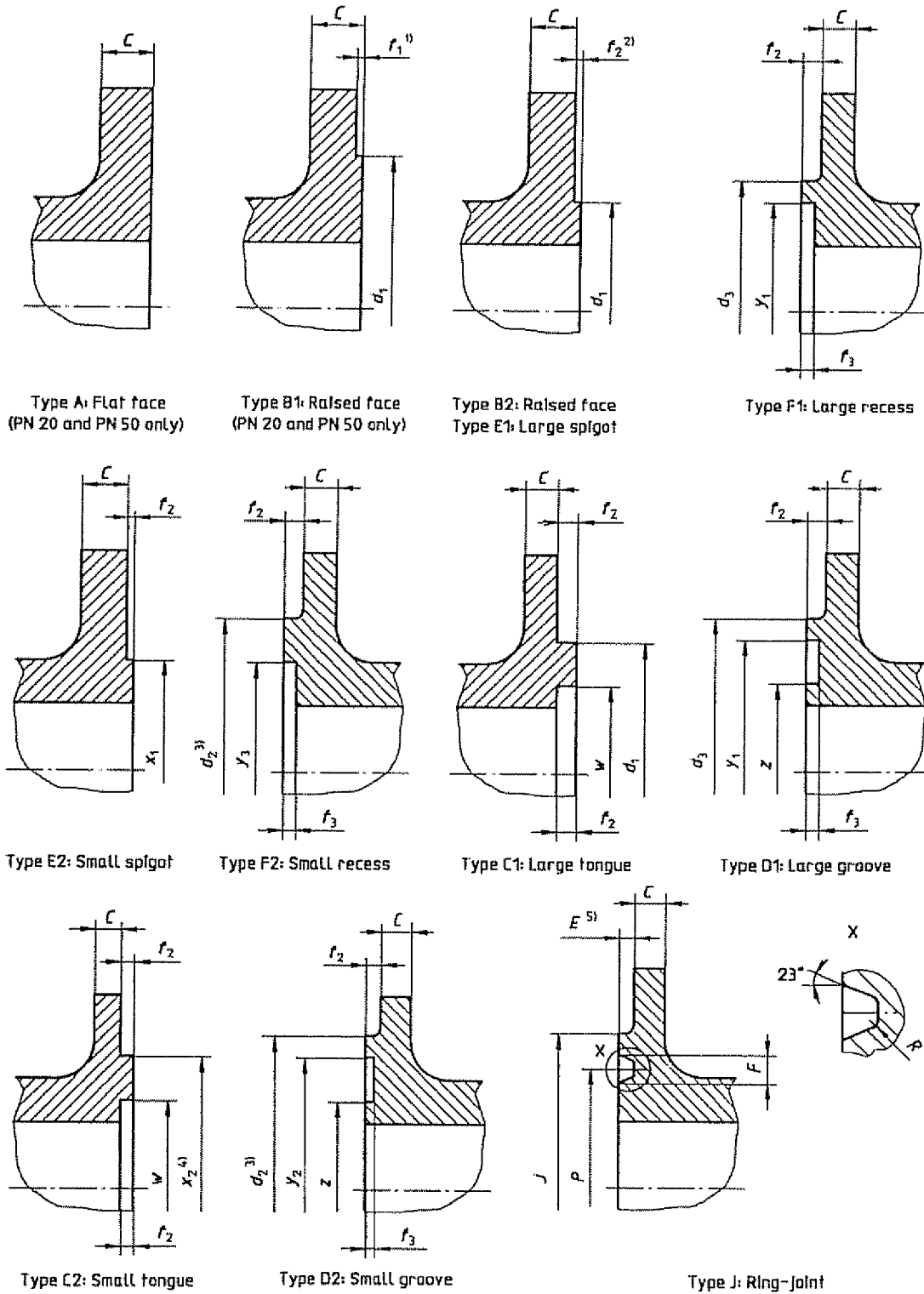
Figure 6 — PN 2.5, PN 6, PN 10, PN 16, PN 25 and PN 40 flange facing dimensions

Table 4 – Dimensions of flange facings for PN 2,5, PN 6, PN 10, PN 16, PN 25 and PN 40 (see figure 6)

Dimensions in millimetres

| Nominal size DN | d_1 | | | | | | f_1 | f_2 | f_3 | f_4 | w | x | y | z | α | d_2 |
|-----------------|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|-------|
| | PN 2,5 | PN 6 | PN 10 | PN 16 | PN 25 | PN 40 | | | | | | | | | | |
| 10 | | 33 | | | | 41 | | | | | 24 | 34 | 35 | 23 | — | |
| 15 | | 38 | | | | 46 | | | | | 29 | 39 | 40 | 28 | | |
| 20 | | 48 | | | | 56 | | | | | 36 | 50 | 51 | 35 | | |
| 25 | | 58 | | | | 65 | | | | | 43 | 57 | 58 | 42 | | |
| 32 | | 69 | | | | 76 | | 4 | 3 | 2 | 51 | 65 | 66 | 50 | | 5 |
| 40 | | 78 | | | | 84 | | | | | 61 | 75 | 76 | 60 | 41°16' | |
| 50 | | 88 | | | | 99 | | | | | 73 | 87 | 88 | 72 | | |
| 65 | | 108 | | | | 118 | | | | | 95 | 109 | 110 | 94 | | |
| 80 | | 124 | | | | 132 | | | | | 106 | 120 | 121 | 105 | | |
| 100 | | 144 | | | | 156 | | | | | 129 | 149 | 150 | 128 | | |
| 125 | | 174 | | | | 184 | | | | | 155 | 175 | 176 | 154 | | |
| 150 | | 199 | | | | 211 | | | | | 183 | 203 | 204 | 182 | | |
| 200 | | 254 | 266 | 266 | 274 | 284 | | 4.5 | 3.5 | 2.5 | 239 | 259 | 260 | 238 | 32°15' | 6 |
| 250 | | 309 | 319 | 319 | 330 | 345 | | | | | 292 | 312 | 313 | 291 | | |
| 300 | | 363 | 370 | 370 | 389 | 409 | | | | | 343 | 363 | 364 | 342 | | |
| 350 | Use PN 6 | 413 | 429 | 429 | 448 | 465 | | | | | 395 | 421 | 422 | 394 | | |
| 400 | | 463 | 480 | 480 | 503 | 535 | | | | | 447 | 473 | 474 | 446 | | |
| 450 | | 518 | 530 | 548 | 548 | 560 | | | | | 497 | 523 | 524 | 496 | | |
| 500 | | 568 | 582 | 609 | 609 | 615 | | | | | 549 | 575 | 576 | 548 | | |
| 600 | | 667 | 682 | 720 | 720 | 735 | | 5 | 4 | 3 | 649 | 675 | 676 | 648 | 27°24' | 7 |
| 700 | | 772 | 794 | 794 | 820 | — | | | | | 751 | 777 | 778 | 750 | | |
| 800 | | 878 | 901 | 901 | 928 | — | | | | | 856 | 882 | 883 | 855 | | |
| 900 | | 978 | 1 001 | 1 001 | 1 028 | — | | | | | 961 | 987 | 988 | 960 | | |
| 1 000 | | 1 078 | 1 112 | 1 112 | 1 140 | — | | | | | 1 062 | 1 092 | 1 094 | 1 060 | | |
| 1 200 | | 1 295 | 1 328 | 1 328 | 1 350 | — | 5 | | | | 1 262 | 1 292 | 1 294 | 1 260 | | |
| 1 400 | | 1 510 | 1 530 | 1 530 | 1 560 | — | | | | | 1 462 | 1 492 | 1 494 | 1 460 | | |
| 1 600 | | 1 710 | 1 750 | 1 750 | 1 780 | — | | 6 | 5 | 4 | 1 662 | 1 692 | 1 694 | 1 660 | 28°39' | 8 |
| 1 800 | | 1 918 | 1 950 | 1 950 | 1 985 | — | | | | | 1 862 | 1 892 | 1 894 | 1 860 | | |
| 2 000 | | 2 125 | 2 150 | 2 150 | 2 210 | — | | | | | 2 062 | 2 092 | 2 094 | 2 060 | | |
| 2 200 | 2 295 | 2 335 | 2 370 | — | — | — | | | | | | | | | | |
| 2 400 | 2 495 | 2 545 | 2 570 | — | — | — | | | | | | | | | | |
| 2 600 | 2 695 | 2 750 | 2 780 | — | — | — | | | | | | | | | | |
| 2 800 | 2 910 | 2 960 | 3 000 | — | — | — | | | | | | | | | | |
| 3 000 | 3 110 | 3 160 | 3 210 | — | — | — | | | | | | | | | | |
| 3 200 | 3 310 | 3 370 | — | — | — | — | 6 | — | — | — | — | — | — | — | — | — |
| 3 400 | 3 510 | 3 580 | — | — | — | — | | | | | | | | | | |
| 3 600 | 3 720 | 3 790 | — | — | — | — | | | | | | | | | | |
| 3 800 | 3 920 | — | — | — | — | — | | | | | | | | | | |
| 4 000 | 4 120 | — | — | — | — | — | | | | | | | | | | |

Vervielfältigt mit Erlaubnis der ISO International Organization for Standardization, erteilt durch DIN Deutsches Institut für Normung e. V., Genehmigungsnummer 001/2000.
 Vervielfältigungen jeder Art von urheberrechtlichen geschützten ISO-Normen bedürfen der Erlaubnis durch ISO, schriftlich einzuholen über die Rechtsabteilung des DIN Deutsches Institut für Normung e. V., Burggrafenstraße 6, 10787 Berlin.



- 1) f_1 applies to PN 20 and PN 50 and is included in flange thickness C .
- 2) f_2 applies to PN 110, PN 150, PN 260 and PN 420, and is additional to flange thickness C
- 3) d_2 is larger than d_1 for DN 15, DN 20, DN 25 and DN 32; otherwise d_2 is equal to d_1 .
- 4) x_2 is equal to d_1 for DN 15 and DN 20.
- 5) Height of raised portion E is equal to groove depth E but is not subject to tolerance (see 2.5.3).

Figure 7 — PN 20, PN 50, PN 110, PN 150, PN 260 and PN 420 flange facing dimensions

Table 5 – Dimensions of flange facings up to nominal size DN 900 for PN 20, PN 50, PN 110, PN 150, PN 260 and PN 420 (see figure 7)

Dimensions in millimetres

| Nominal size DN | Outside diameter | | | Inside diameter of large and small tongue <i>w</i> | Outside diameter | | | Inside diameter of large and small groove <i>z</i> | Height | | Depth of groove or recess <i>f₃</i> | Minimum outside diameter of raised portion <i>d₂</i> <i>d₃¹⁾</i> | | |
|--------------------|--|----------------------|----------------------|---|--|----------------------|----------------------|---|-----------------------------------|-----------------------------------|---|--|-------|----------------------|
| | Raised face. Large spigot ¹⁾ Large tongue ¹⁾ | Small spigot | Small tongue | | Large recess ¹⁾ Large groove ¹⁾ | Small recess | Small groove | | Raised face | Large and small spigot and tongue | | | | |
| | <i>d₁</i> | <i>x₁</i> | <i>x₂</i> | | <i>y₁</i> | <i>y₃</i> | <i>y₂</i> | | <i>f₁²⁾</i> | <i>f₂³⁾</i> | | | | <i>f₂</i> |
| 15 | 35 | 18,5 | 35 | 25,5 | 36,5 | 20 | 36,5 | 24 | 2 | 7 | 7 | 5 | 44 | 46 |
| 20 | 43 | 24 | 43 | 33,5 | 44,5 | 25,5 | 44,5 | 32 | 2 | 7 | 7 | 5 | 52 | 54 |
| 25 | 51 | 30,5 | 48 | 38 | 52,5 | 32 | 49,5 | 36,5 | 2 | 7 | 7 | 5 | 57 | 62 |
| 32 | 63,5 | 38 | 57 | 47,5 | 65 | 39,5 | 58,5 | 46 | 2 | 7 | 7 | 5 | 67 | 73 |
| 40 | 73 | 44,5 | 63,5 | 54 | 74,5 | 46 | 65 | 52,5 | 2 | 7 | 7 | 5 | 73 | 84 |
| 50 | 92 | 57,5 | 82,5 | 73 | 93,5 | 59 | 84 | 71,5 | 2 | 7 | 7 | 5 | 92 | 103 |
| 65 | 105 | 68,5 | 95,5 | 85,5 | 106,5 | 70 | 97 | 84 | 2 | 7 | 7 | 5 | 105 | 116 |
| 80 | 127 | 84 | 117,5 | 108 | 128,5 | 85,5 | 119 | 106,5 | 2 | 7 | 7 | 5 | 127 | 138 |
| 100 | 157,5 | 109,5 | 144,5 | 132 | 159 | 111 | 146 | 130,5 | 2 | 7 | 7 | 5 | 157,5 | 168 |
| 125 | 186 | 136,5 | 173 | 160,5 | 187,5 | 138 | 174,5 | 159 | 2 | 7 | 7 | 5 | 186 | 197 |
| 150 | 216 | 162 | 203,5 | 190,5 | 217,5 | 163,5 | 205 | 189 | 2 | 7 | 7 | 5 | 216 | 227 |
| 200 | 270 | 213 | 254 | 238 | 271,5 | 214,5 | 255,5 | 236,5 | 2 | 7 | 7 | 5 | 270 | 281 |
| 250 | 324 | 267 | 305 | 286 | 325,5 | 268,5 | 306,5 | 284,5 | 2 | 7 | 7 | 5 | 324 | 335 |
| 300 | 381 | 317,5 | 362 | 343 | 382,5 | 319 | 363,5 | 341,5 | 2 | 7 | 7 | 5 | 381 | 392 |
| 350 | 413 | 349,5 | 394 | 374,5 | 414,5 | 351 | 395,5 | 373 | 2 | 7 | 7 | 5 | 413 | 424 |
| 400 | 470 | 400 | 447,5 | 425,5 | 471,5 | 401,5 | 449 | 424 | 2 | 7 | 7 | 5 | 470 | 481 |
| 450 | 533,5 | 451 | 511,5 | 489 | 535 | 452,5 | 513 | 487,5 | 2 | 7 | 7 | 5 | 533,5 | 544 |
| 500 | 584,5 | 501,5 | 559 | 533,5 | 586 | 503 | 560,5 | 532 | 2 | 7 | 7 | 5 | 584,5 | 595 |
| 550 | 641 | | | | | | | | 2 | 7 | | | | |
| 600 | 692,5 | 603 | 667 | 641,5 | 694 | 605 | 668,5 | 640 | 2 | 7 | 7 | 5 | 692,5 | 703,5 |
| 650 | 749 | | | | | | | | 2 | 7 | | | | |
| 700 | 800 | | | | | | | | 2 | 7 | | | | |
| 750 | 857 | | | | | | | | 2 | 7 | | | | |
| 800 | 914 | | | | | | | | 2 | 7 | | | | |
| 850 | 965 | | | | | | | | 2 | 7 | | | | |
| 900 | 1 022 | | | | | | | | 2 | 7 | | | | |

1) Large spigot and recess faces and large tongue and groove are not applicable to PN 20 because of potential dimensional conflicts

2) *f₁* applies to PN 20 and PN 50. and is included in the minimum flange thickness

3) *f₂* applies to PN 110, PN 150, PN 260 and PN 420. and is additional to the minimum flange thickness

NOTE – For small spigot and recess joints care should be taken in the use of these dimensions to ensure that the inside diameter of the fitting or pipe is small enough to ensure sufficient bearing surfaces

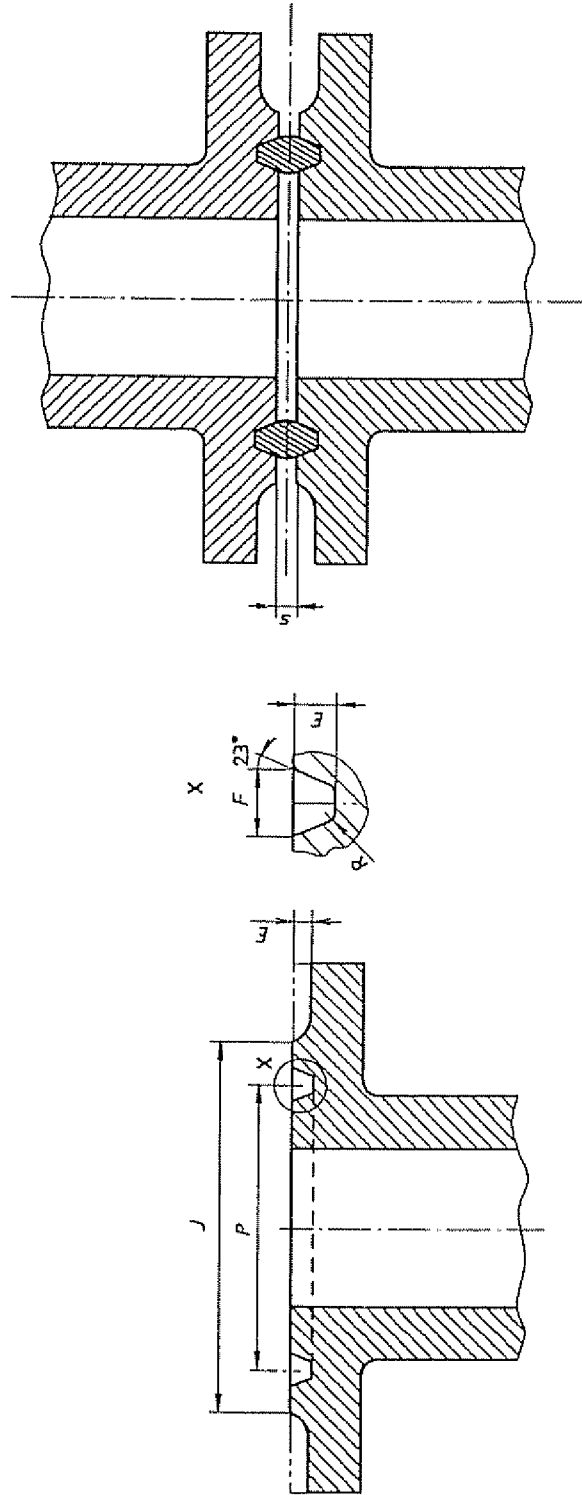
Table 6 – Dimensions of flange facings for nominal sizes DN 950 to DN 1 500 for PN 20, PN 50, PN 110 and PN 150

Dimensions in millimetres

| Nominal size DN | Outside diameter of raised face <i>d₁</i> | | | | Height of raised face | |
|--------------------|---|-------|--------|--------|-----------------------------------|-----------------------------------|
| | PN 20 | PN 50 | PN 110 | PN 150 | <i>f₁¹⁾</i> | <i>f₂²⁾</i> |
| 950 | 1 073 | 1 029 | 1 054 | 1 099 | 2 | 7 |
| 1 000 | 1 124 | 1 086 | 1 111 | 1 162 | 2 | 7 |
| 1 050 | 1 194 | 1 137 | 1 168 | 1 213 | 2 | 7 |
| 1 100 | 1 245 | 1 194 | 1 226 | 1 270 | 2 | 7 |
| 1 150 | 1 295 | 1 245 | 1 276 | 1 334 | 2 | 7 |
| 1 200 | 1 359 | 1 308 | 1 334 | 1 384 | 2 | 7 |
| 1 250 | 1 410 | 1 359 | 1 384 | | 2 | 7 |
| 1 300 | 1 460 | 1 410 | 1 435 | | 2 | 7 |
| 1 350 | 1 511 | 1 467 | 1 492 | | 2 | 7 |
| 1 400 | 1 575 | 1 518 | 1 543 | | 2 | 7 |
| 1 450 | 1 626 | 1 575 | 1 600 | | 2 | 7 |
| 1 500 | 1 676 | 1 625 | 1 657 | | 2 | 7 |

1) *f₁* applies to PN 20 and PN 50.

2) *f₂* applies to PN 110 and PN 150.



See table 7.

Table 7 — Dimensions of ring-joint facings 1), 2), 3), 4)

Dimensions in millimetres

| Pipe nominal size DN | | | | | Groove dimensions | | | | | Diameter of raised portion J min. | | | | | Approximate distance between flanges s | | | | | | | |
|----------------------|------------------|------------------|----------------------|--------|-------------------|---------------|-------------------------|---------------------------------|---------------|-----------------------------------|-------|------------------|--------|--------|--|-------|-------|--------|--------|--------|--------|---|
| PN 20 | PN 50 | PN 110 | PN 150 ⁵⁾ | PN 260 | PN 420 | Groove number | Pitch diameter P ± 0,13 | Depth ⁶⁾ E + 0,4 / 0 | Width F ± 0,2 | Radius at bottom R max. | PN 20 | PN 50 and PN 110 | PN 150 | PN 260 | PN 420 | PN 20 | PN 50 | PN 110 | PN 150 | PN 260 | PN 420 | |
| — | 15 | 15 | — | — | — | R11 | 34,14 | 5,56 | 7,14 | 0,8 | — | 51 | — | — | — | — | 3 | 3 | — | — | — | — |
| — | — | — | — | 15 | — | R12 | 39,67 | 6,35 | 8,74 | 0,8 | — | — | 60,5 | — | — | — | — | — | — | 4 | — | — |
| — | 20 | 20 | — | — | 15 | R13 | 42,88 | 6,35 | 8,74 | 0,8 | — | 63,5 | — | 65 | — | — | 4 | 4 | — | — | 4 | — |
| — | — | — | — | 20 | — | R14 | 44,45 | 6,35 | 8,74 | 0,8 | — | — | 66,5 | — | — | — | — | — | — | 4 | — | — |
| 25 | — | — | — | — | — | R15 | 47,62 | 6,35 | 8,74 | 0,8 | 63,5 | — | — | — | — | 4 | — | — | — | — | — | — |
| — | 25 | 25 | — | 25 | 20 | R16 | 50,8 | 6,35 | 8,74 | 0,8 | — | 70 | — | 71,5 | 73 | — | 4 | 4 | — | — | 4 | 4 |
| 32 | — | — | — | — | — | R17 | 57,15 | 6,35 | 8,74 | 0,8 | 73 | — | — | — | — | 4 | — | — | — | — | — | — |
| — | 32 | 32 | — | 32 | 25 | R18 | 60,32 | 6,35 | 8,74 | 0,8 | — | 79,5 | — | 81 | 82,5 | — | 4 | 4 | — | — | 4 | 4 |
| 40 | — | — | — | — | — | R19 | 65,07 | 6,35 | 8,74 | 0,8 | 82,5 | — | — | — | — | 4 | — | — | — | — | — | — |
| — | 40 | 40 | — | 40 | — | R20 | 68,28 | 6,35 | 8,74 | 0,8 | — | 90,5 | — | 92 | — | — | 4 | 4 | — | — | 4 | — |
| — | — | — | — | — | 32 | R21 | 72,24 | 7,92 | 11,91 | 0,8 | — | — | — | — | 102 | — | — | — | — | — | — | 3 |
| 50 | — | — | — | — | — | R22 | 82,55 | 6,35 | 8,74 | 0,8 | 102 | — | — | — | — | 4 | — | — | — | — | — | — |
| — | 50 | 50 | — | — | 40 | R23 | 82,55 | 7,92 | 11,91 | 0,8 | 108 | — | — | — | 114 | — | 6 | 5 | — | — | — | 3 |
| — | — | — | — | 50 | — | R24 | 95,25 | 7,92 | 11,91 | 0,8 | — | — | 124 | — | — | — | — | — | — | — | 3 | — |
| 65 | — | — | — | — | — | R25 | 101,6 | 6,35 | 8,74 | 0,8 | 121 | — | — | — | — | 4 | — | — | — | — | — | — |
| — | 65 | 65 | — | — | 50 | R26 | 101,6 | 7,92 | 11,91 | 0,8 | — | 127 | — | — | 133 | — | 6 | 5 | — | — | — | 3 |
| — | — | — | — | 65 | — | R27 | 107,95 | 7,92 | 11,91 | 0,8 | — | — | 137 | — | — | — | — | — | — | — | — | — |
| — | — | — | — | — | 65 | R28 | 111,12 | 9,52 | 13,49 | 1,5 | — | — | — | — | 149 | — | — | — | — | — | — | 3 |
| 80 | — | — | — | — | — | R29 | 114,3 | 6,35 | 8,74 | 0,8 | 133 | — | — | — | — | 4 | — | — | — | — | — | — |
| — | — | — | — | — | — | R30 | 117,48 | 7,92 | 11,91 | 0,8 | — | — | — | — | — | — | — | — | — | — | — | — |
| — | 80 ⁷⁾ | 80 ⁷⁾ | 80 | — | — | R31 | 123,82 | 7,92 | 11,91 | 0,8 | 146 | 156 | — | — | — | — | 6 | 5 | 4 | — | — | — |
| — | — | — | — | 80 | — | R32 | 127 | 9,52 | 13,49 | 1,5 | 154 | — | — | — | 168 | — | — | — | — | — | — | 3 |
| — | — | — | — | — | — | R33 | 131,78 | 6,35 | 8,74 | 0,8 | — | — | — | — | — | 4 | — | — | — | — | — | — |
| — | — | — | — | — | — | R34 | 131,78 | 7,92 | 11,91 | 0,8 | — | 159 | — | — | — | — | — | — | — | — | — | — |
| — | — | — | — | 80 | — | R35 | 136,52 | 7,92 | 11,91 | 0,8 | — | — | 168 | — | — | — | — | — | — | — | 3 | — |
| 100 | — | — | — | — | — | R36 | 149,22 | 6,35 | 8,74 | 0,8 | 171 | — | — | — | — | 4 | — | — | — | — | — | — |
| — | 100 | 100 | 100 | — | — | R37 | 149,22 | 7,92 | 11,91 | 0,8 | — | 175 | 181 | — | — | — | 6 | 5 | 4 | — | — | — |
| — | — | — | — | — | 100 | R38 | 157,18 | 11,13 | 16,66 | 1,5 | — | — | — | — | 203 | — | — | — | — | — | — | 4 |
| — | — | — | — | — | — | R39 | 161,92 | 7,92 | 11,91 | 0,8 | — | — | 194 | — | — | — | — | — | — | — | 3 | — |
| 125 | — | — | — | — | — | R40 | 171,45 | 6,35 | 8,74 | 0,8 | 194 | — | — | — | — | 4 | — | — | — | — | — | — |
| — | 125 | 125 | 125 | — | — | R41 | 180,98 | 7,92 | 11,91 | 0,8 | — | 210 | 216 | — | — | — | 6 | 5 | 4 | — | — | — |
| — | — | — | — | — | 125 | R42 | 190,5 | 12,7 | 19,84 | 1,5 | — | — | — | — | 241 | — | — | — | — | — | — | 4 |
| 150 | — | — | — | — | — | R43 | 193,68 | 6,35 | 8,74 | 0,8 | 219 | — | — | — | — | 4 | — | — | — | — | — | — |
| — | — | — | — | 125 | — | R44 | 193,68 | 7,92 | 11,91 | 0,8 | — | — | 229 | — | — | — | — | — | — | — | 3 | — |
| — | 150 | 150 | 150 | — | — | R45 | 211,12 | 7,92 | 11,91 | 0,8 | — | 241 | 241 | — | — | — | 6 | 5 | 4 | — | — | — |

Table 7 (continued)

| Pipe nominal size DN | | | | | | Groove dimensions | | | | Diameter of raised portion J | | | | | Approximate distance between flanges s | | | | | | | | |
|----------------------|-------|--------|-----------------------|--------|--------|-------------------|----------------------------|--------------------------------------|------------------|------------------------------|-------|------------------|--------|--------|--|-------|-------|--------|--------|--------|--------|---|---|
| PN 20 | PN 50 | PN 110 | PN 150 ⁽⁵⁾ | PN 250 | PN 420 | Groove number | Pitch diameter P ± 0,13 | Depth ⁽⁶⁾ E + 0,4 0 | Width F ± 0,2 | Radius at bottom R max. | PN 20 | PN 50 and PN 110 | PN 150 | PN 250 | PN 420 | PN 20 | PN 50 | PN 110 | PN 150 | PN 250 | PN 420 | | |
| — | — | — | — | 150 | — | R46 | 211,12 | 9,52 | 13,49 | 1,5 | — | — | — | 248 | — | — | — | — | — | — | — | — | — |
| — | — | — | — | — | 150 | R47 | 228,6 | 12,7 | 19,84 | 1,5 | — | — | — | — | 279 | — | — | — | — | — | — | — | — |
| 200 | — | — | — | — | — | R48 | 247,65 | 6,35 | 8,74 | 0,8 | 273 | — | — | — | — | 4 | — | — | — | — | — | — | — |
| — | 200 | — | — | — | — | R49 | 269,88 | 7,92 | 11,91 | 0,8 | — | 302 | 308 | — | — | — | — | — | — | — | — | — | — |
| — | — | — | — | 200 | — | R50 | 269,88 | 11,13 | 16,66 | 1,5 | — | — | — | 318 | — | — | — | — | — | — | — | — | — |
| — | — | — | — | — | 200 | R51 | 279,4 | 14,27 | 23,01 | 1,5 | — | — | — | — | 340 | — | — | — | — | — | — | — | — |
| 250 | — | — | — | — | — | R52 | 304,8 | 6,35 | 8,74 | 0,8 | 330 | — | — | — | — | 4 | — | — | — | — | — | — | — |
| — | 250 | — | — | — | — | R53 | 323,85 | 7,92 | 11,91 | 0,8 | — | 356 | 362 | — | — | — | — | — | — | — | — | — | — |
| — | — | — | — | — | 250 | R54 | 323,85 | 11,13 | 16,66 | 1,5 | — | — | — | 371 | — | — | — | — | — | — | — | — | — |
| — | — | — | — | — | — | R55 | 342,9 | 17,48 | 30,18 | 2,4 | — | — | — | — | 425 | — | — | — | — | — | — | — | — |
| 300 | — | — | — | — | — | R56 | 381 | 6,35 | 8,74 | 0,8 | 406 | — | — | — | — | 4 | — | — | — | — | — | — | — |
| — | 300 | — | — | — | — | R57 | 381 | 7,92 | 11,91 | 0,8 | — | 413 | 419 | — | — | — | — | — | — | — | — | — | — |
| — | — | — | — | — | 300 | R58 | 381 | 14,27 | 23,01 | 1,5 | — | — | — | 438 | — | — | — | — | — | — | — | — | — |
| — | — | — | — | — | — | R59 | 396,88 | 6,35 | 8,74 | 0,8 | 425 | — | — | — | — | 3 | — | — | — | — | — | — | — |
| 350 | — | — | — | — | — | R60 | 406,4 | 17,48 | 33,32 | 2,4 | — | — | — | — | 495 | — | — | — | — | — | — | — | — |
| — | — | — | — | — | — | R61 | 419,1 | 7,92 | 11,91 | 0,8 | — | 457 | — | — | — | — | — | — | — | — | — | — | — |
| — | 350 | — | — | — | — | R62 | 419,1 | 11,13 | 16,66 | 1,5 | — | — | 467 | — | — | — | — | — | — | — | — | — | — |
| — | — | — | — | — | 350 | R63 | 419,1 | 15,88 | 26,97 | 2,4 | — | — | — | 489 | — | — | — | — | — | — | — | — | — |
| — | — | — | — | — | — | R64 | 454,02 | 6,35 | 8,74 | 0,8 | 483 | — | — | — | — | — | — | — | — | — | — | — | — |
| 400 | — | — | — | — | — | R65 | 469,9 | 7,92 | 11,91 | 0,8 | — | 508 | — | — | — | — | — | — | — | — | — | — | — |
| — | 400 | — | — | — | — | R66 | 469,9 | 11,13 | 16,66 | 1,5 | — | — | — | — | — | — | — | — | — | — | — | — | — |
| — | — | — | — | — | 400 | R67 | 469,9 | 17,48 | 30,18 | 2,4 | — | — | — | 524 | — | — | — | — | — | — | — | — | — |
| — | — | — | — | 400 | — | R68 | 517,52 | 6,35 | 8,74 | 0,8 | 546 | — | — | — | — | — | — | — | — | — | — | — | — |
| 450 | — | — | — | — | — | R69 | 533,4 | 7,92 | 11,91 | 0,8 | — | 575 | — | — | — | — | — | — | — | — | — | — | — |
| — | 450 | — | — | — | — | R70 | 533,4 | 12,7 | 19,84 | 1,5 | — | — | — | 594 | — | — | — | — | — | — | — | — | — |
| — | — | — | — | — | 450 | R71 | 533,4 | 17,48 | 30,18 | 2,4 | — | — | — | — | — | — | — | — | — | — | — | — | — |
| — | — | — | — | — | 450 | R72 | 558,8 | 6,35 | 8,74 | 0,8 | 597 | — | — | — | — | — | — | — | — | — | — | — | — |
| 500 | — | — | — | — | — | R73 | 584,2 | 9,52 | 13,49 | 1,5 | — | 635 | — | — | — | — | — | — | — | — | — | — | — |
| — | — | — | — | — | — | R74 | 584,2 | 12,7 | 19,84 | 1,5 | — | — | — | — | — | — | — | — | — | — | — | — | — |
| — | — | — | — | — | 500 | R75 | 584,2 | 17,48 | 33,32 | 2,4 | — | — | — | — | — | — | — | — | — | — | — | — | — |
| — | — | — | — | — | — | R76 | 673,1 | 6,35 | 8,74 | 0,8 | 711 | — | — | — | — | — | — | — | — | — | — | — | — |
| 600 | — | — | — | — | — | R77 | 692,15 | 11,13 | 16,66 | 1,5 | — | 749 | — | — | — | — | — | — | — | — | — | — | — |
| — | 600 | — | — | — | — | R78 | 692,15 | 15,88 | 26,97 | 2,4 | — | — | — | — | — | — | — | — | — | — | — | — | — |
| — | — | — | — | — | 600 | R79 | 692,15 | 20,62 | 36,53 | 2,4 | — | — | — | — | — | — | — | — | — | — | — | — | — |
| — | — | — | — | — | 600 | | | | | | | | | 794 | | | | | | | | | |

Table 7 (concluded) Dimensions in millimetres

| Pipe nominal size DN | | | | | Groove dimensions | | | | Diameter of raised portion J | | | | | Approximate distance between flanges s | | | | | | | | |
|----------------------|-------|--------|----------------------|--------|-------------------|---------------|--------------------------------|--------------------------------------|------------------------------|----------------------------|-------|------------------|--------|--|--------|-------|-------|--------|--------|--------|--------|---|
| PN 20 | PN 50 | PN 110 | PN 150 ⁵⁾ | PN 250 | PN 420 | Groove number | Pitch diameter P $\pm 0,13$ | Depth ⁶⁾ E $+0,4$ 0 | Width F $\pm 0,2$ | Radius at bottom R max. | PN 20 | PN 50 and PN 110 | PN 150 | PN 250 | PN 420 | PN 20 | PN 50 | PN 110 | PN 150 | PN 250 | PN 420 | |
| 650 | 650 | 650 | 650 | 650 | 650 | R93 | 749,3 | 12,7 | 19,85 | 2 | 810 | — | — | — | — | — | 6 | — | — | — | — | — |
| 700 | 700 | 700 | 700 | 700 | 700 | R94 | 800,1 | 12,7 | 19,85 | 2 | 860 | — | — | — | — | — | 6 | — | — | — | — | — |
| 750 | 750 | 750 | 750 | 750 | 750 | R95 | 857,25 | 12,7 | 19,85 | 2 | 918 | — | — | — | — | — | 6 | — | — | — | — | — |
| 800 | 800 | 800 | 800 | 800 | 800 | R96 | 914,4 | 14,3 | 23 | 2 | 984 | — | — | — | — | — | 7 | — | — | — | — | — |
| 850 | 850 | 850 | 850 | 850 | 850 | R97 | 965,2 | 14,3 | 23 | 2 | 1035 | — | — | — | — | — | 7 | — | — | — | — | — |
| 900 | 900 | 900 | 900 | 900 | 900 | R98 | 1022,35 | 14,3 | 23 | 2 | 1092 | — | — | — | — | — | 7 | — | — | — | — | — |
| — | — | — | 900 | — | — | R99 | 1022,35 | 14,3 | 23 | 2 | 1092 | — | — | — | — | — | — | — | — | — | — | — |
| — | — | — | 900 | — | — | R100 | 1022,35 | 20,64 | 36,51 | 2 | — | 1067 | — | — | — | — | — | — | — | — | — | — |
| — | — | — | — | — | — | R101 | 800,1 | 17,46 | 33,34 | 2 | — | 889 | — | — | — | — | — | — | — | — | — | — |
| — | — | — | — | — | — | R102 | 857,25 | 17,46 | 33,34 | 2 | — | 946 | — | — | — | — | — | — | — | — | — | — |
| — | — | — | — | — | — | R103 | 914,4 | 17,46 | 33,34 | 2 | — | 1003 | — | — | — | — | — | — | — | — | — | — |
| — | — | — | — | — | — | R104 | 965,2 | 20,64 | 36,51 | 2 | — | 1067 | — | — | — | — | — | — | — | — | — | — |
| — | — | — | — | — | — | R105 | 1022,35 | 20,64 | 36,51 | 2 | — | 1124 | — | — | — | — | — | — | — | — | — | — |

1) For facing requirements for flanges and flanged fittings, see figure 6.

2) For facing requirements for lapped joints, see 2.5.4 and figure 6.

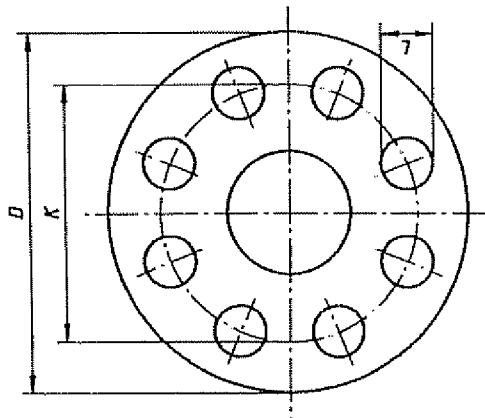
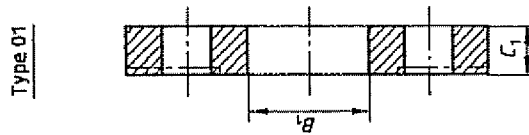
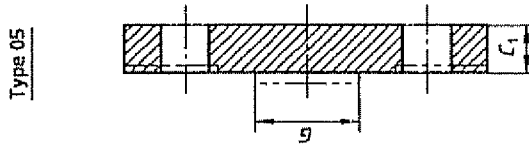
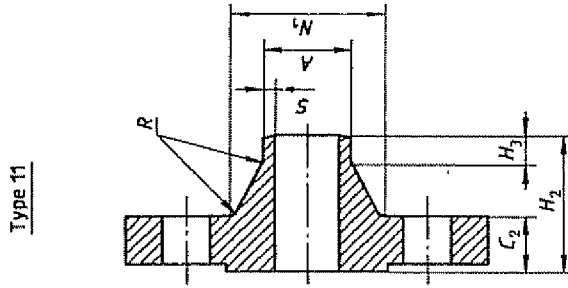
3) For ring dimensions, see ISO 7483.

4) See 2.8 for marking requirements.

5) Use PN 260 in sizes DN 15 to DN 65 for PN 150.

6) 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.

7) For ring joints with lapped flanges in PN 50 and PN 110, ring and groove number R30 are used instead of R31.

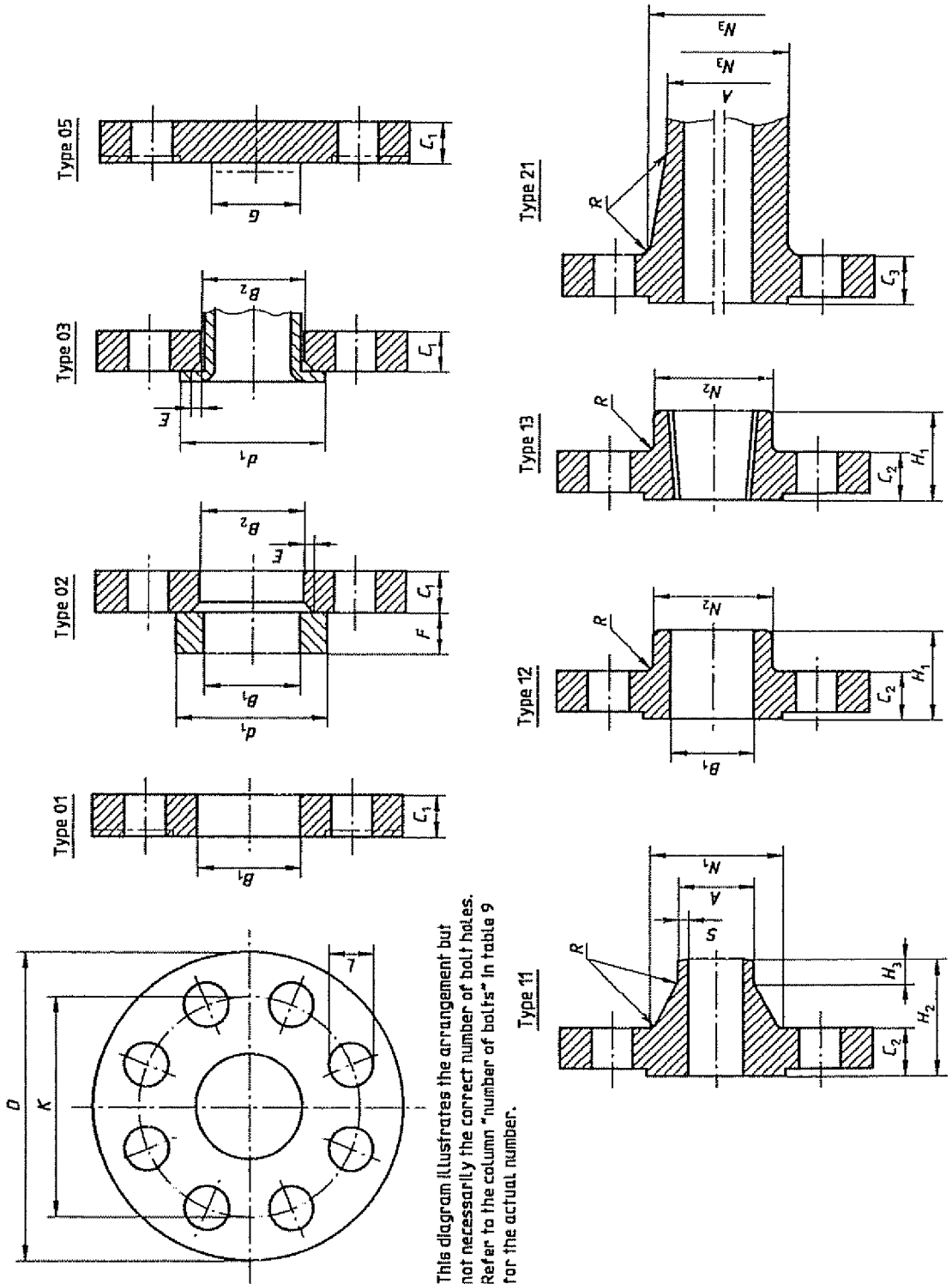


This diagram illustrates the arrangement but not necessarily the correct number of bolt holes. Refer to the column "number of bolts" in table 8 for the actual number.

Table 8 — Dimensions of PN 2,5 flanges
(See the notes on page 46.)

| Nominal size DN | Mating dimensions | | | | | Outside diameter of neck A | Bore diameter B ₁ | Flange type | | | Shoulder diameter G | Length of hub | | Neck diameter N ₁ | Corner radius R | Neck thickness (see note 6) S | Nominal size DN |
|--------------------|---------------------------------|------------------------------|-----------------------------|--------|--------------|-------------------------------|---------------------------------|----------------|----------------|----------------|------------------------|----------------|-------|---------------------------------|--------------------|----------------------------------|--------------------|
| | Outside diameter of flange D | Diameter of bolt circle K | Diameter of bolt holes L | Bolts | | | | C ₁ | C ₂ | H ₂ | | H ₃ | | | | | |
| | | | | Number | Nominal size | | | | | | | | | | | | |
| 10 to 600 | | | 01, 05, 11 | | | 11 | 01 | 01, 05 | 11 | 05 | 11 | 11 | 11 | 11 | 11 | 10 to 600 | |
| | | | | | | | | Use PN 6 | | | | | | | | | |
| 700 | 860 | 810 | 26 | 24 | M24 | 711 | | 36 | 26 | — | 70 | 16 | 740 | 12 | | 700 | |
| 800 | 975 | 920 | 29,5 | 24 | M27 | 813 | | 38 | 26 | — | 70 | 16 | 842 | 12 | | 800 | |
| 900 | 1 075 | 1 020 | 29,5 | 24 | M27 | 914 | | 40 | 26 | — | 70 | 16 | 942 | 12 | | 900 | |
| 1 000 | 1 175 | 1 120 | 29,5 | 28 | M27 | 1 016 | | 42 | 26 | — | 70 | 16 | 1 045 | 12 | | 1 000 | |
| 1 200 | 1 375 | 1 320 | 29,5 | 32 | M27 | 1 220 | | 44 | 26 | — | 70 | 16 | 1 245 | 16 | | 1 200 | |
| 1 400 | 1 575 | 1 520 | 29,5 | 36 | M27 | 1 420 | | 48 | 26 | — | 70 | 16 | 1 445 | 16 | | 1 400 | |
| 1 600 | 1 790 | 1 730 | 29,5 | 40 | M27 | 1 620 | | 51 | 26 | — | 80 | 20 | 1 645 | 16 | | 1 600 | |
| 1 800 | 1 990 | 1 930 | 29,5 | 44 | M27 | 1 820 | | 54 | 26 | — | 80 | 20 | 1 845 | 16 | | 1 800 | |
| 2 000 | 2 190 | 2 130 | 29,5 | 48 | M27 | 2 020 | | 58 | 26 | — | 80 | 22 | 2 045 | 16 | | 2 000 | |
| 2 200 | 2 405 | 2 340 | 32,5 | 52 | M30 | 2 220 | | — | 28 | — | 90 | 25 | 2 248 | 18 | | 2 200 | |
| 2 400 | 2 605 | 2 540 | 32,5 | 56 | M30 | 2 420 | | — | 28 | — | 90 | 25 | 2 448 | 18 | | 2 400 | |
| 2 600 | 2 805 | 2 740 | 32,5 | 60 | M30 | 2 620 | | — | 28 | — | 90 | 25 | 2 648 | 18 | | 2 600 | |
| 2 800 | 3 030 | 2 960 | 35,5 | 64 | M33 | 2 820 | | — | 30 | — | 90 | 25 | 2 848 | 18 | | 2 800 | |
| 3 000 | 3 230 | 3 160 | 35,5 | 68 | M33 | 3 020 | | — | 30 | — | 90 | 25 | 3 050 | 18 | | 3 000 | |
| 3 200 | 3 430 | 3 360 | 35,5 | 72 | M33 | 3 220 | | — | 30 | — | 90 | 25 | 3 250 | 20 | | 3 200 | |
| 3 400 | 3 630 | 3 560 | 35,5 | 76 | M33 | 3 420 | | — | 32 | — | 95 | 28 | 3 450 | 20 | | 3 400 | |
| 3 600 | 3 840 | 3 770 | 35,5 | 80 | M33 | 3 620 | | — | 32 | — | 100 | 28 | 3 652 | 20 | | 3 600 | |
| 3 800 | 4 045 | 3 970 | 39 | 80 | M36 | 3 820 | | — | 34 | — | 100 | 28 | 3 852 | 20 | | 3 800 | |
| 4 000 | 4 245 | 4 170 | 39 | 84 | M36 | 4 020 | | — | 34 | — | 100 | 28 | 4 052 | 20 | | 4 000 | |

NOTE — For facing dimensions, see table 4.



This diagram illustrates the arrangement but not necessarily the correct number of bolt holes. Refer to the column "number of bolts" in table 9 for the actual number.

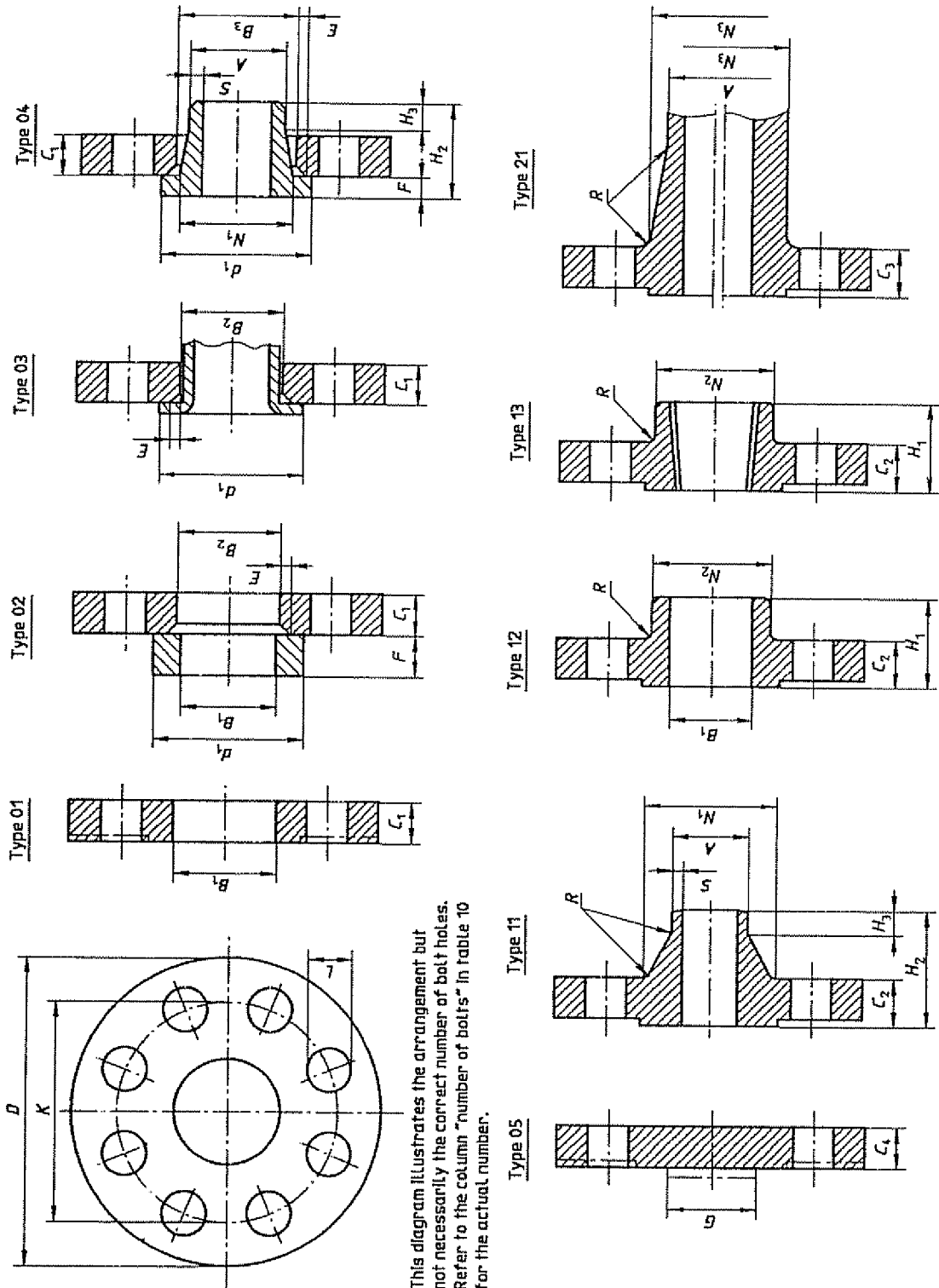
Table 9 — Dimensions of PN 6 flanges
(See the notes on page 46.)

Dimensions in millimetres

| Nominal size DN | Mating dimensions | | | | | Outside diameter of neck A | Bore diameter | | Flange thickness | | | Chamfer E | Collar thickness F | Shoulder diameter G | Length of hub | | | Neck diameter | | | Corner radius R | Neck thickness (see note 6) S | Nominal size DN | | | |
|--------------------|---|-----------------------------|-----------------------------|-----------------|-----------------------|-------------------------------|------------------|-----------|------------------|------------------|------------------|--------------|-----------------------|------------------------|---------------|-----|-----------|---------------|-------------------|-----------|--------------------|-------------------------------------|--------------------|----------------|----------------|----------------|
| | Outside diameter of flange circle D | Diameter of bolt holes K | Diameter of bolt holes L | Number of bolts | Nominal size of bolts | | 01, 02, 12 | 02, 03 | 01, 05, 11, 21 | | | | | | 02, 03 | 05 | 12, 13 | 11 | 11, 12, 13, 21 | 12, 13 | | | | N ₁ | N ₂ | N ₃ |
| | | | | | | | | | 11, 21 | 01, 02, 03 | 11, 12, 13 | | | | | | | | | | | | | | | |
| 10 | 75 | 50 | 11 | 4 | M10 | 17,2 | 18 | 21 | 12 | 12 | 3 | 10 | — | — | 20 | 28 | 6 | 26 | 25 | 20 | 3 | 1,6 | 10 | | | |
| 15 | 80 | 55 | 11 | 4 | M10 | 21,3 | 22 | 25 | 12 | 12 | 3 | 10 | — | — | 20 | 30 | 6 | 30 | 30 | 26 | 3 | 1,8 | 15 | | | |
| 20 | 90 | 65 | 11 | 4 | M10 | 26,9 | 27,5 | 31 | 14 | 14 | 4 | 10 | — | — | 24 | 32 | 6 | 38 | 40 | 34 | 4 | 1,8 | 20 | | | |
| 25 | 100 | 75 | 11 | 4 | M10 | 33,7 | 34,5 | 38 | 14 | 14 | 4 | 10 | — | — | 24 | 35 | 6 | 42 | 50 | 44 | 4 | 2 | 25 | | | |
| 32 | 120 | 90 | 14 | 4 | M12 | 42,4 | 43,5 | 46 | 16 | 16 | 5 | 10 | — | — | 26 | 35 | 6 | 55 | 60 | 54 | 5 | 2,3 | 32 | | | |
| 40 | 130 | 100 | 14 | 4 | M12 | 48,3 | 49,5 | 53 | 16 | 16 | 5 | 10 | — | — | 26 | 38 | 7 | 62 | 70 | 64 | 5 | 2,3 | 40 | | | |
| 50 | 140 | 110 | 14 | 4 | M12 | 60,3 | 61,5 | 65 | 16 | 16 | 6 | 12 | — | — | 28 | 38 | 8 | 74 | 80 | 74 | 5 | 2,3 | 50 | | | |
| 65 | 160 | 130 | 14 | 4 | M16 | 76,1 | 77,5 | 81 | 16 | 16 | 6 | 12 | 55 | 55 | 32 | 38 | 9 | 88 | 100 | 94 | 6 | 2,6 | 65 | | | |
| 80 | 190 | 150 | 18 | 4 | M16 | 88,9 | 90,5 | 94 | 18 | 18 | 6 | 12 | 70 | 70 | 34 | 42 | 10 | 102 | 110 | 110 | 6 | 2,9 | 80 | | | |
| 100 | 210 | 170 | 18 | 4 | M16 | 114,3 | 116 | 120 | 18 | 18 | 6 | 14 | 90 | 90 | 40 | 45 | 10 | 130 | 130 | 130 | 6 | 3,2 | 100 | | | |
| 125 | 240 | 200 | 18 | 8 | M16 | 139,7 | 141,5 | 145 | 20 | 20 | 6 | 14 | 115 | 115 | 44 | 44 | 10 | 155 | 160 | 160 | 6 | 3,6 | 125 | | | |
| 150 | 265 | 225 | 18 | 8 | M16 | 168,3 | 170,5 | 174 | 20 | 20 | 6 | 14 | 140 | 140 | 44 | 48 | 12 | 184 | 185 | 182 | 8 | 4 | 150 | | | |
| 200 | 320 | 280 | 22 | 8 | M20 | 219,1 | 221,5 | 226 | 22 | 22 | 8 | 16 | 190 | 190 | — | 55 | 15 | 236 | 240 | 238 | 8 | 4,5 | 200 | | | |
| 250 | 375 | 335 | 22 | 12 | M20 | 273 | 276,5 | 281 | 24 | 24 | 8 | 18 | 235 | 235 | — | 60 | 15 | 290 | 295 | 284 | 10 | 5 | 250 | | | |
| 300 | 440 | 395 | 22 | 12 | M20 | 323,9 | 327,5 | 333 | 24 | 24 | 8 | 18 | 285 | 285 | — | 62 | 15 | 342 | 355 | 342 | 10 | 5,6 | 300 | | | |
| 350 | 490 | 445 | 22 | 12 | M20 | 365,6 | 369,5 | 375 | 26 | 24 | 8 | 18 | 325 | 325 | — | 62 | 15 | 385 | — | 392 | 10 | 5,6 | 350 | | | |
| 400 | 540 | 495 | 22 | 16 | M20 | 406,4 | 411 | 416 | 28 | 24 | 8 | 20 | 375 | 375 | — | 65 | 15 | 438 | — | 442 | 10 | 6,3 | 400 | | | |
| 450 | 595 | 550 | 22 | 16 | M20 | 457 | 462 | 467 | 30 | 24 | 8 | 20 | 425 | 425 | — | 65 | 15 | 492 | — | 494 | 12 | 6,3 | 450 | | | |
| 500 | 645 | 600 | 22 | 20 | M20 | 508 | 513,5 | 519 | 32 | 26 | 8 | 22 | 475 | 475 | — | 68 | 15 | 538 | — | 544 | 12 | 6,3 | 500 | | | |
| 600 | 755 | 705 | 26 | 20 | M24 | 610 | 616,5 | 622 | 36 | 30 | 8 | 22 | 575 | 575 | — | 70 | 16 | 640 | — | 642 | 12 | 6,3 | 600 | | | |
| 700 | 860 | 810 | 26 | 24 | M24 | 711 | — | — | 40 ¹⁾ | 40 | — | — | — | — | — | 70 | 16 | 740 | — | 746 | 12 | — | 700 | | | |
| 800 | 975 | 920 | 29,5 | 24 | M27 | 813 | — | — | 44 ¹⁾ | 44 | — | — | — | — | — | 70 | 16 | 842 | — | 850 | 12 | — | 800 | | | |
| 900 | 1 075 | 1 020 | 29,5 | 24 | M27 | 914 | — | — | 48 ¹⁾ | 48 | — | — | — | — | — | 70 | 16 | 942 | — | 950 | 12 | — | 900 | | | |
| 1 000 | 1 175 | 1 120 | 29,5 | 28 | M27 | 1 016 | — | — | 52 ¹⁾ | 52 | — | — | — | — | — | 70 | 16 | 1 045 | — | 1 050 | 12 | — | 1 000 | | | |
| 1 200 | 1 405 | 1 340 | 32,5 | 32 | M30 | 1 220 | — | — | 60 ¹⁾ | 60 | — | — | — | — | — | 90 | 20 | 1 248 | — | 1 264 | 12 | — | 1 200 | | | |
| 1 400 | 1 630 | 1 560 | 35,5 | 36 | M33 | 1 420 | — | — | 68 ¹⁾ | 68 | — | — | — | — | — | 90 | 20 | 1 452 | — | 1 480 | 12 | — | 1 400 | | | |
| 1 600 | 1 830 | 1 760 | 35,5 | 40 | M33 | 1 620 | — | — | 76 ¹⁾ | 76 | — | — | — | — | — | 90 | 20 | 1 655 | — | 1 680 | 12 | — | 1 600 | | | |
| 1 800 | 2 045 | 1 970 | 39 | 44 | M36 | 1 820 | — | — | 84 ¹⁾ | 84 | — | — | — | — | — | 100 | 20 | 1 855 | — | 1 878 | 15 | — | 1 800 | | | |
| 2 000 | 2 265 | 2 180 | 42 | 48 | M39 | 2 020 | — | — | 92 ¹⁾ | 92 | — | — | — | — | — | 110 | 25 | 2 058 | — | 2 082 | 15 | — | 2 000 | | | |
| 2 200 | 2 475 | 2 390 | 42 | 52 | M39 | 2 220 | — | — | — | — | — | — | — | — | — | 115 | 25 | 2 260 | — | — | 15 | — | 2 200 | | | |
| 2 400 | 2 685 | 2 600 | 42 | 56 | M39 | 2 420 | — | — | — | — | — | — | — | — | — | 125 | 25 | 2 462 | — | — | 15 | — | 2 400 | | | |
| 2 600 | 2 905 | 2 810 | 48 | 60 | M45 | 2 620 | — | — | — | — | — | — | — | — | — | 130 | 25 | 2 665 | — | — | 15 | — | 2 600 | | | |
| 2 800 | 3 115 | 3 020 | 48 | 64 | M45 | 2 820 | — | — | — | — | — | — | — | — | — | 135 | 30 | 2 865 | — | — | 15 | — | 2 800 | | | |
| 3 000 | 3 315 | 3 220 | 48 | 68 | M45 | 3 020 | — | — | — | — | — | — | — | — | — | 140 | 30 | 3 068 | — | — | 15 | — | 3 000 | | | |
| 3 200 | 3 525 | 3 430 | 48 | 72 | M45 | 3 220 | — | — | — | — | — | — | — | — | — | 150 | 30 | 3 272 | — | — | 15 | — | 3 200 | | | |
| 3 400 | 3 735 | 3 640 | 48 | 76 | M45 | 3 420 | — | — | — | — | — | — | — | — | — | 160 | 35 | 3 475 | — | — | 15 | — | 3 400 | | | |
| 3 600 | 3 970 | 3 860 | 55 | 80 | M52 | 3 620 | — | — | — | — | — | — | — | — | — | 165 | 35 | 3 678 | — | — | 15 | — | 3 600 | | | |

1) For type 01 flanges only.

NOTE — For d_1 and facing dimensions, see table 4.

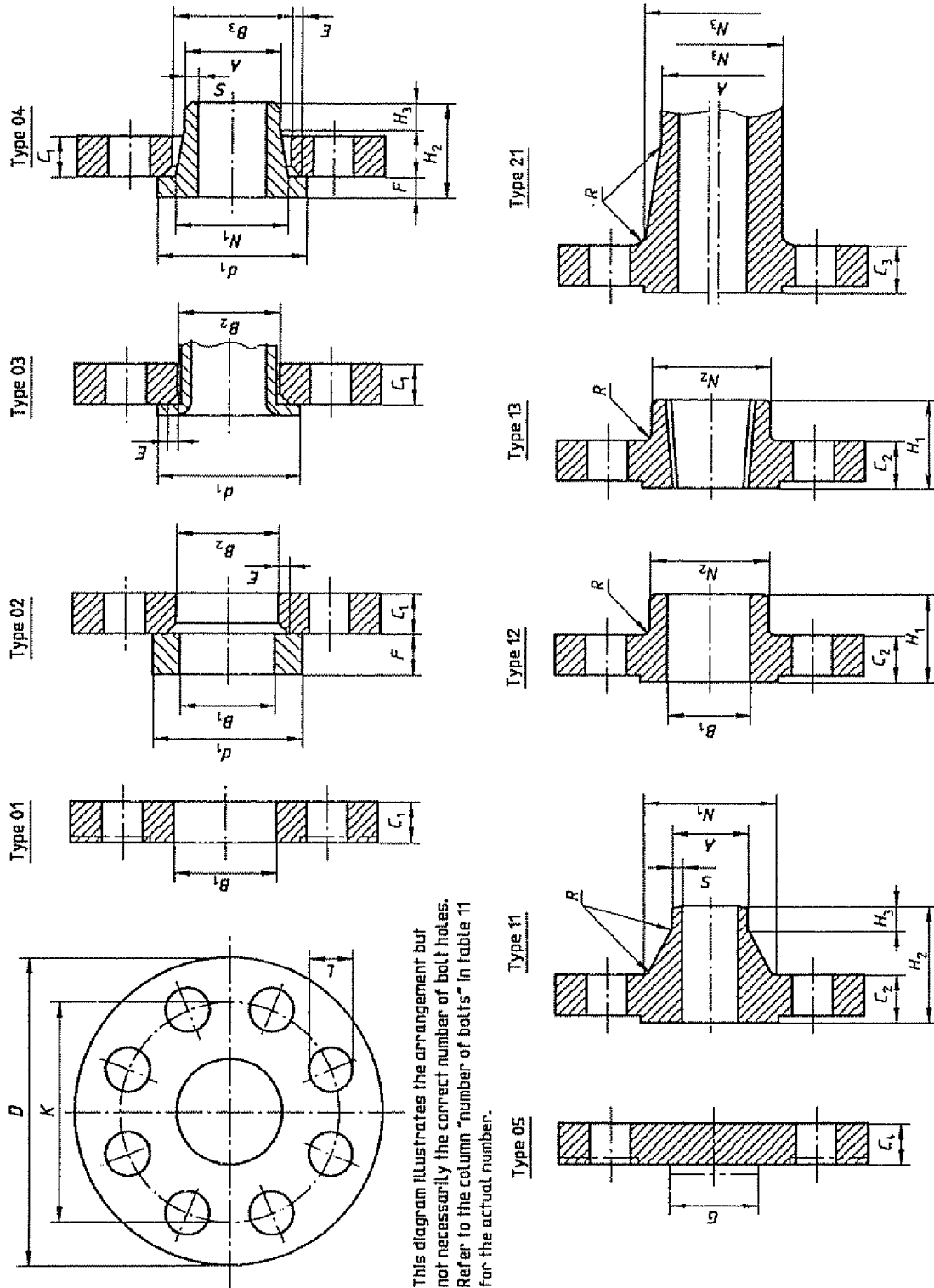


This diagram illustrates the arrangement but not necessarily the correct number of bolt holes. Refer to the column "number of bolts" in table 10 for the actual number.

Table 10 — Dimensions of PN 10 flanges
(See the notes on page 46.)

| Nominal size DN | Mating dimensions | | | | | | Dimensions in millimetres | | | | | | | | | | | | | | | | | | | | | | | | |
|--------------------|----------------------------|-------|-------------------------|------|------------------------|----|---------------------------|----------------|----------------|----------------|------------------|----------------|----------------|----------------|------------|--------|------------------|----------------|-------------------|----------------|----------------|----------------|----------------|----------------|--------|-------|---------------|--|----------------|--|--------------|
| | Outside diameter of flange | | Diameter of bolt circle | | Diameter of bolt holes | | Number of bolts | | Bore diameter | | Flange thickness | | | | Chamfer | | Collar thickness | | Shoulder diameter | | Length of hub | | | Neck diameter | | | Corner radius | | Neck thickness | | Nominal size |
| | D | K | L | K | L | N | N | b ₁ | b ₂ | b ₃ | C ₁ | C ₂ | C ₃ | C ₄ | E | F | G | H ₁ | H ₂ | H ₃ | N ₁ | N ₂ | N ₃ | R | S | S | DN | | | | |
| 10 | 340 | 295 | 22 | 22 | 22 | 8 | M20 | 221,5 | 226 | 240 | 02 | 04 | 01, 11, 21 | 05 | 02, 03, 04 | 02, 04 | 05 | 12 | 04, 04 | 04 | 12 | 12 | 21 | 11, 12, 13, 21 | 04, 11 | 6,3 | 200 | | | | |
| 15 | 395 | 350 | 22 | 22 | 22 | 12 | M20 | 276,5 | 281 | 294 | 03 | 04 | 02, 12, 03, 13 | 26 | 8 | 22 | 235 | 46 | 68 | 11 | 234 | 246 | 298 | 10 | 6,3 | 250 | | | | | |
| 20 | 445 | 400 | 22 | 22 | 22 | 12 | M20 | 327,5 | 333 | 348 | 04 | 04 | 04 | 28 | 8 | 22 | 285 | 46 | 68 | 11 | 342 | 350 | 348 | 10 | 7,1 | 300 | | | | | |
| 25 | 505 | 460 | 22 | 22 | 22 | 16 | M20 | 359,5 | 365 | 400 | 03 | 04 | 04 | 30 | 8 | 22 | 325 | 53 | 68 | 16 | 390 | 400 | 408 | 10 | 8 | 350 | | | | | |
| 32 | 565 | 515 | 26 | 26 | 26 | 16 | M24 | 411 | 416 | 450 | 03 | 04 | 04 | 32 | 8 | 24 | 375 | 57 | 72 | 16 | 440 | 456 | 456 | 10 | 8,8 | 400 | | | | | |
| 40 | 615 | 565 | 26 | 26 | 26 | 20 | M24 | 462 | 467 | 498 | 04 | 04 | 04 | 35 | 8 | 24 | 425 | 63 | 72 | 16 | 488 | 502 | 502 | 12 | 10 | 450 | | | | | |
| 50 | 670 | 620 | 26 | 26 | 26 | 20 | M24 | 513,5 | 519 | 550 | 04 | 04 | 04 | 38 | 8 | 26 | 475 | 67 | 75 | 16 | 540 | 559 | 559 | 12 | 11 | 500 | | | | | |
| 60 | 780 | 725 | 29,5 | 29,5 | 29,5 | 20 | M27 | 616,5 | 622 | 650 | 04 | 04 | 04 | 42 | 8 | 26 | 575 | 75 | 80 | 18 | 640 | 658 | 658 | 12 | 12,5 | 600 | | | | | |
| 70 | 895 | 840 | 29,5 | 29,5 | 29,5 | 24 | M27 | 711 | 711 | 711 | 04 | 04 | 04 | 48 | 8 | — | 670 | — | 80 | 18 | 746 | — | 772 | 12 | — | 700 | | | | | |
| 800 | 1 015 | 950 | 32,5 | 32,5 | 32,5 | 24 | M30 | — | — | — | — | — | — | 42 | — | — | 770 | — | 90 | 18 | 848 | — | 876 | 12 | — | 800 | | | | | |
| 900 | 1 115 | 1 050 | 32,5 | 32,5 | 32,5 | 28 | M30 | — | — | — | — | — | — | 46 | — | — | 860 | — | 95 | 20 | 948 | — | 976 | 12 | — | 900 | | | | | |
| 1 000 | 1 230 | 1 160 | 35,5 | 35,5 | 35,5 | 28 | M33 | — | — | — | — | — | — | 52 | — | — | 960 | — | 95 | 20 | 1 050 | — | 1 080 | 12 | — | 1 000 | | | | | |
| 1 200 | 1 455 | 1 380 | 39 | 39 | 39 | 32 | M36 | 1 220 | — | — | — | — | — | 60 | — | — | — | — | 115 | 25 | 1 256 | — | 1 292 | 12 | — | 1 200 | | | | | |
| 1 400 | 1 675 | 1 590 | 42 | 42 | 42 | 36 | M39 | 1 420 | — | — | — | — | — | 66 | — | — | — | — | 120 | 25 | 1 460 | — | 1 496 | 12 | — | 1 400 | | | | | |
| 1 600 | 1 915 | 1 820 | 48 | 48 | 48 | 40 | M45 | 1 620 | — | — | — | — | — | 72 | — | — | — | — | 130 | 25 | 1 666 | — | 1 712 | 12 | — | 1 600 | | | | | |
| 1 800 | 2 115 | 2 020 | 48 | 48 | 48 | 44 | M45 | 1 820 | — | — | — | — | — | 80 | — | — | — | — | 140 | 30 | 1 866 | — | 1 910 | 15 | — | 1 800 | | | | | |
| 2 000 | 2 325 | 2 230 | 48 | 48 | 48 | 48 | M45 | 2 020 | — | — | — | — | — | 86 | — | — | — | — | 150 | 30 | 2 070 | — | 2 120 | 15 | — | 2 000 | | | | | |
| 2 200 | 2 550 | 2 440 | 55 | 55 | 55 | 52 | M52 | 2 220 | — | — | — | — | — | 98 | — | — | — | — | 160 | 35 | 2 275 | — | — | 18 | — | 2 200 | | | | | |
| 2 400 | 2 760 | 2 650 | 55 | 55 | 55 | 56 | M52 | 2 420 | — | — | — | — | — | 108 | — | — | — | — | 170 | 35 | 2 478 | — | — | 18 | — | 2 400 | | | | | |
| 2 600 | 2 960 | 2 850 | 55 | 55 | 55 | 60 | M52 | 2 620 | — | — | — | — | — | 118 | — | — | — | — | 180 | 40 | 2 680 | — | — | 18 | — | 2 600 | | | | | |
| 2 800 | 3 180 | 3 070 | 55 | 55 | 55 | 64 | M52 | 2 820 | — | — | — | — | — | 130 | — | — | — | — | 190 | 40 | 2 882 | — | — | 18 | — | 2 800 | | | | | |
| 3 000 | 3 405 | 3 290 | 60 | 60 | 60 | 68 | M56 | 3 020 | — | — | — | — | — | 145 | — | — | — | — | 200 | 45 | 3 085 | — | — | 18 | — | 3 000 | | | | | |

NOTE — For d₁ and facing dimensions, see table 4.



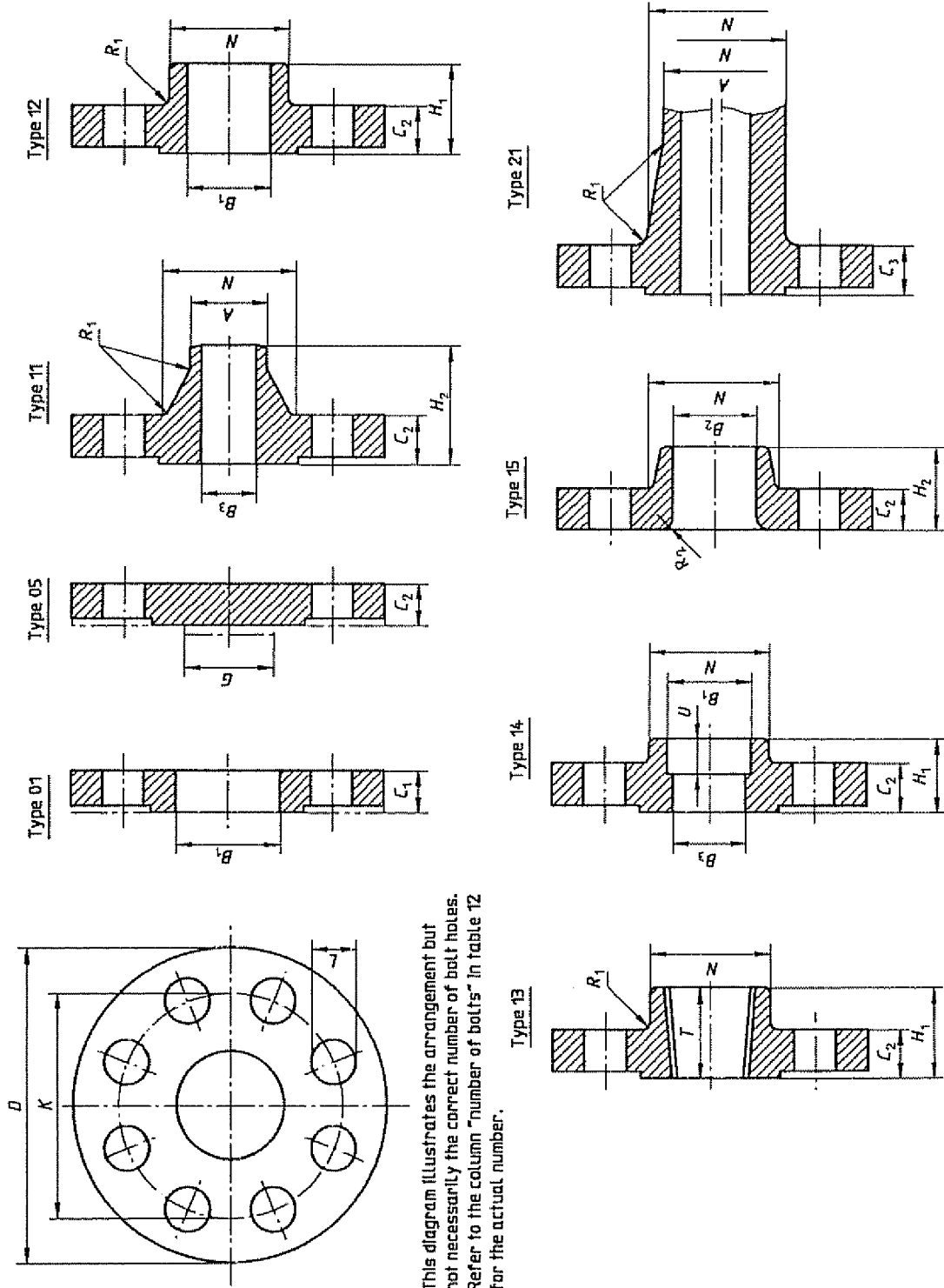
This diagram illustrates the arrangement but not necessarily the correct number of bolt holes. Refer to the column "number of bolts" in table 11 for the actual number.

Table 11 — Dimensions of PN 16 flanges
(See the notes on page 46.)

| Nominal size DN | Mating dimensions | | | | | Outside diameter of neck A | Bore diameter | | | | Flange thickness | | | | Chamfer E | Collar thickness F | Shoulder diameter G | Length of hub | | | Neck diameter | | | Corner radius R | Neck thickness (see note 6) S | Nominal size DN | | | | | | |
|--------------------|---------------------------------|------------------------------|-----------------------------|--------|--------------|-------------------------------|----------------|----------------|----------------|------------------|------------------|----------------|----------------|----|--------------|-----------------------|------------------------|---------------|----|-------|----------------|----------------|----------------|--------------------|-------------------------------------|--------------------|----------------|----------------|----------------|-------------------|---------------|--------|
| | Outside diameter of flange D | Diameter of bolt circle K | Diameter of bolt holes L | Bolts | | | B ₁ | B ₂ | B ₃ | C ₁ | C ₂ | C ₃ | C ₄ | 02 | | | | 03 | 04 | 05 | H ₁ | H ₂ | H ₃ | | | | N ₁ | N ₂ | N ₃ | 11, 12, 13, 21 | 12, 13, 11 | 04, 11 |
| | | | | Number | Nominal size | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | 04, 11, 21 | | | | | | | | | | | | | | | | | | | 10 | | | | | | | |
| 15 | | | | | | | | | | | | | | | | | | | | | | | | | 15 | | | | | | | |
| 20 | | | | | | | | | | | | | | | | | | | | | | | | | 20 | | | | | | | |
| 25 | | | | | | | | | | | | | | | | | | | | | | | | | 25 | | | | | | | |
| 32 | | | | | | | | | | | | | | | | | | | | | | | | | 32 | | | | | | | |
| 40 | | | | | | | | | | | | | | | | | | | | | | | | | 40 | | | | | | | |
| 50 | | | | | | | | | | | | | | | | | | | | | | | | | 50 | | | | | | | |
| 65 | 185 | 145 | 18 | 18 | 8 | M16 | 77,5 | 81 | 96 | 20 | 20 | 20 | 20 | 6 | 16 | 55 | 32 | 45 | 10 | 92 | 104 | 104 | 6 | 2,9 | 65 | | | | | | | |
| 80 | 200 | 160 | 18 | 18 | 8 | M16 | 90,5 | 94 | 114 | 20 | 20 | 20 | 20 | 6 | 16 | 70 | 34 | 50 | 10 | 110 | 118 | 120 | 6 | 3,2 | 80 | | | | | | | |
| 100 | 220 | 180 | 18 | 18 | 8 | M16 | 116 | 120 | 134 | 22 | 22 | 22 | 22 | 6 | 18 | 90 | 40 | 52 | 12 | 130 | 140 | 140 | 6 | 3,6 | 100 | | | | | | | |
| 125 | 250 | 210 | 18 | 18 | 8 | M16 | 141,5 | 145 | 162 | 22 | 22 | 22 | 22 | 6 | 18 | 115 | 44 | 55 | 12 | 158 | 168 | 170 | 6 | 4 | 125 | | | | | | | |
| 150 | 285 | 240 | 22 | 22 | 8 | M20 | 168,3 | 174 | 188 | 24 | 24 | 24 | 24 | 6 | 20 | 140 | 44 | 55 | 12 | 184 | 195 | 190 | 8 | 4,5 | 150 | | | | | | | |
| 200 | 340 | 295 | 22 | 22 | 12 | M20 | 221,5 | 226 | 240 | 26 | 24 | 24 | 24 | 6 | 20 | 190 | 44 | 62 | 16 | 234 | 246 | 246 | 8 | 6,3 | 200 | | | | | | | |
| 250 | 405 | 355 | 26 | 26 | 12 | M24 | 276,5 | 281 | 294 | 28 | 26 | 26 | 26 | 8 | 22 | 235 | 46 | 70 | 16 | 288 | 298 | 296 | 10 | 6,3 | 250 | | | | | | | |
| 300 | 460 | 410 | 26 | 26 | 12 | M24 | 327,5 | 333 | 348 | 32 | 28 | 28 | 28 | 8 | 24 | 285 | 53 | 78 | 16 | 342 | 350 | 350 | 10 | 7,1 | 300 | | | | | | | |
| 350 | 520 | 470 | 26 | 26 | 16 | M24 | 359 | 365 | 400 | 35 | 30 | 30 | 30 | 8 | 26 | 325 | 57 | 82 | 16 | 390 | 400 | 410 | 10 | 8 | 350 | | | | | | | |
| 400 | 580 | 525 | 29,5 | 29,5 | 16 | M27 | 411 | 416 | 454 | 38 | 32 | 32 | 32 | 8 | 28 | 375 | 63 | 85 | 16 | 444 | 456 | 458 | 10 | 8,8 | 400 | | | | | | | |
| 450 | 640 | 585 | 29,5 | 29,5 | 20 | M27 | 457 | 462 | 500 | 42 | 40 | 40 | 40 | 8 | 30 | 425 | 68 | 87 | 16 | 490 | 502 | 516 | 12 | 10 | 450 | | | | | | | |
| 500 | 715 | 650 | 32,5 | 32,5 | 20 | M30 | 513,5 | 510 | 556 | 46 | 44 | 44 | 44 | 8 | 32 | 475 | 73 | 90 | 16 | 546 | 559 | 576 | 12 | 11 | 500 | | | | | | | |
| 600 | 840 | 770 | 35,5 | 35,5 | 20 | M33 | 616,5 | 622 | 660 | 52 | 54 | 54 | 54 | 8 | 32 | 575 | 83 | 95 | 18 | 650 | 658 | 690 | 12 | 12,5 | 600 | | | | | | | |
| 700 | 910 | 840 | 35,5 | 35,5 | 24 | M33 | — | — | — | 60 ¹⁾ | 38 | 40 | 48 | — | — | 670 | — | 100 | 18 | 750 | — | 760 | 12 | — | 700 | | | | | | | |
| 800 | 1 025 | 950 | 39 | 39 | 24 | M36 | 813 | — | — | 68 ¹⁾ | 38 | 42 | 52 | — | — | 770 | — | 105 | 20 | 848 | — | 862 | 12 | — | 800 | | | | | | | |
| 900 | 1 125 | 1 050 | 39 | 39 | 28 | M36 | 914 | — | — | 76 ¹⁾ | 40 | 44 | 58 | — | — | 860 | — | 110 | 20 | 948 | — | 962 | 12 | — | 900 | | | | | | | |
| 1 000 | 1 255 | 1 170 | 42 | 42 | 28 | M39 | 1 016 | — | — | 84 ¹⁾ | 42 | 46 | 64 | — | — | 960 | — | 120 | 22 | 1 056 | — | 1 076 | 12 | — | 1 000 | | | | | | | |
| 1 200 | 1 485 | 1 390 | 48 | 48 | 32 | M45 | 1 220 | — | — | 98 ¹⁾ | 48 | 52 | 76 | — | — | 1 160 | — | 130 | 30 | 1 260 | — | 1 282 | 12 | — | 1 200 | | | | | | | |
| 1 400 | 1 685 | 1 590 | 48 | 48 | 36 | M45 | 1 420 | — | — | — | — | 52 | 58 | — | — | — | — | 145 | 30 | 1 465 | — | 1 482 | 12 | — | 1 400 | | | | | | | |
| 1 600 | 1 930 | 1 820 | 55 | 55 | 40 | M52 | 1 620 | — | — | — | — | 58 | 64 | — | — | — | — | 160 | 35 | 1 668 | — | 1 696 | 12 | — | 1 600 | | | | | | | |
| 1 800 | 2 130 | 2 020 | 55 | 55 | 44 | M52 | 1 820 | — | — | — | — | — | — | — | — | — | — | 170 | 35 | 1 870 | — | 1 896 | 15 | — | 1 800 | | | | | | | |
| 2 000 | 2 345 | 2 230 | 60 | 60 | 48 | M56 | 2 020 | — | — | — | — | — | — | — | — | — | — | 190 | 40 | 2 072 | — | 2 100 | 15 | — | 2 000 | | | | | | | |

1) For type 01 flanges only.

NOTE — For d_1 and facing dimensions, see table 4.



This diagram illustrates the arrangement but not necessarily the correct number of bolt holes. Refer to the column "number of bolts" in table 12 for the actual number.

Table 12 — Dimensions of PN 20 flanges

(See the notes on page 46.)

Dimensions in millimetres

| Nominal size DN | Mating dimensions | | | | Outside diameter of neck (see note 7) | Bore diameter (see note 8) | | | Flange thickness (see note 9) | | | Shoulder diameter | Length of hub | | Neck diameter | Corner radius | | Minimum thread length of threaded flange (see note 5) | Depth of socket | Nominal size DN | | | | | | |
|--|----------------------------|-------------------------|------------------------|-----------------|---------------------------------------|----------------------------|-------|----------------|-------------------------------|----------------|----------------|-------------------|----------------|----------------|---------------|---------------|----------------|---|-----------------|--------------------|----------------|-------|----------------|----------------|---|---|
| | Outside diameter of flange | Diameter of bolt circle | Diameter of bolt holes | Number of bolts | | Nominal size | A | B ₁ | B ₂ | B ₃ | C ₁ | | C ₂ | C ₃ | | G | H ₁ | | | | H ₂ | N | R ₁ | R ₂ | T | U |
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15 | 90 | 60,5 | 16 | 4 | M14 | 21,5 | 22 | 23 | 16 | 12, 13, 14 | 11,5 | — | — | 16 | 16 | 48 | 30 | — | — | 16 | 10 | 15 | | | | |
| 20 | 100 | 70 | 16 | 4 | M14 | 26,5 | 28 | 28 | 21 | 11 | 13 | — | — | 16 | 16 | 52 | 38 | — | — | 16 | 11 | 20 | | | | |
| 25 | 110 | 79,5 | 16 | 4 | M14 | 33,5 | 34,5 | 35 | 26,5 | 12, 13, 14, 15 | 14,5 | 11,5 | — | 17 | 17 | 56 | 49 | — | — | 17 | 13 | 25 | | | | |
| 32 | 120 | 89 | 16 | 4 | M14 | 42 | 43,5 | 43,5 | 35 | 18 | 16 | 13 | — | 21 | 21 | 57 | 59 | — | — | 21 | 14 | 32 | | | | |
| 40 | 130 | 98,5 | 16 | 4 | M14 | 48,5 | 49,5 | 50 | 41 | 19 | 17,5 | 14,5 | — | 22 | 22 | 62 | 65 | — | — | 22 | 16 | 40 | | | | |
| 50 | 150 | 120,5 | 18 | 4 | M16 | 60,5 | 62 | 62,5 | 52,5 | 21 | 19,5 | 16 | — | 25 | 25 | 64 | 78 | — | — | 25 | 17 | 50 | | | | |
| 65 | 180 | 139,5 | 18 | 4 | M16 | 73 | 74,5 | 75,5 | 62,5 | 24 | 22,5 | 17,5 | — | 28 | 29 | 70 | 90 | — | — | 29 | 19 | 65 | | | | |
| 80 | 190 | 152,5 | 18 | 4 | M16 | 89 | 90,5 | 91,5 | 78 | 26 | 24 | 19,5 | — | 30 | 30 | 76 | 108 | — | — | 30 | 21 | 80 | | | | |
| 100 | 230 | 190,5 | 18 | 8 | M16 | 114,5 | 116 | 117 | 102,5 | 27 | 24 | 24 | — | 33 | 33 | 89 | 135 | — | — | 33 | — | 100 | | | | |
| 125 | 255 | 216 | 22 | 8 | M20 | 141,5 | 143,5 | 144,5 | 128 | 28 | 24 | 24 | — | 36 | 36 | 99 | 164 | — | — | 36 | — | 125 | | | | |
| 150 | 280 | 241,5 | 22 | 8 | M20 | 168,5 | 170,5 | 171,5 | 154 | 31 | 25,5 | 25,5 | — | 40 | 40 | 111 | 192 | — | — | 40 | — | 150 | | | | |
| 200 | 345 | 298,5 | 22 | 8 | M20 | 219 | 221,5 | 222 | 202,5 | 34 | 29 | 29 | — | 44 | 45 | 127 | 246 | — | — | 44 | — | 200 | | | | |
| 250 | 405 | 362 | 26 | 12 | M24 | 273 | 276 | 277,5 | 254,5 | 38 | 30,5 | 30,5 | — | 49 | 49 | 144 | 305 | — | — | 49 | — | 250 | | | | |
| 300 | 485 | 432 | 26 | 12 | M24 | 324 | 327 | 328 | 305 | 42 | 32 | 32 | — | 56 | 56 | 156 | 365 | — | — | 56 | — | 300 | | | | |
| 350 | 535 | 476 | 29,5 | 12 | M27 | 355,5 | 359 | 360 | 328 | 43 | 35 | 35 | — | 64 | 64 | 172 | 400 | — | — | 64 | — | 350 | | | | |
| 400 | 600 | 540 | 29,5 | 16 | M27 | 406,5 | 410,5 | 411 | 359 | 48 | 37 | 37 | — | 87 | 87 | 192 | 457 | — | — | 87 | — | 400 | | | | |
| 450 | 635 | 578 | 32,5 | 16 | M30 | 457 | 462 | 462,5 | 410,5 | 52 | 40 | 40 | — | 103 | 103 | 216 | 505 | — | — | 103 | — | 450 | | | | |
| 500 | 700 | 635 | 32,5 | 20 | M30 | 508 | 513 | 514,5 | 462,5 | 56 | 43 | 43 | — | 127 | 127 | 240 | 559 | — | — | 127 | — | 500 | | | | |
| 550 | 750 | 692 | 35,5 | 20 | M33 | — | — | — | — | 56 | 46 | — | — | 145 | 145 | 270 | 610 | — | — | 145 | — | 550 | | | | |
| 600 | 815 | 749,5 | 35,5 | 20 | M33 | 609,5 | 616 | 616 | — | 62 | 48 | 48 | — | 152 | 152 | 285 | 664 | — | — | 152 | — | 600 | | | | |
| Flange type | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Flange types affected for DN 650 and above are types 05 and 11 only. | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 650 | 870 | 806 | 35,5 | 24 | M33 | — | — | — | — | — | 68,5 | — | — | — | — | 121 | 675 | — | — | — | — | 650 | | | | |
| 700 | 925 | 863 | 35,5 | 28 | M33 | — | — | — | — | — | 71,5 | — | — | — | — | 125 | 725 | — | — | — | — | 700 | | | | |
| 750 | 985 | 914 | 35,5 | 28 | M33 | — | — | — | — | — | 74,5 | — | — | — | — | 137 | 780 | — | — | — | — | 750 | | | | |
| 800 | 1 060 | 978 | 42 | 28 | M39 | — | — | — | — | — | 81 | — | — | — | — | 144 | 830 | — | — | — | — | 800 | | | | |
| 850 | 1 110 | 1 029 | 42 | 32 | M39 | — | — | — | — | — | 82,5 | — | — | — | — | 149 | 880 | — | — | — | — | 850 | | | | |
| 900 | 1 170 | 1 086 | 42 | 32 | M39 | — | — | — | — | — | 90,5 | — | — | — | — | 157 | 935 | — | — | — | — | 900 | | | | |
| 950 | 1 240 | 1 150 | 42 | 32 | M39 | — | — | — | — | — | 87,5 | — | — | — | — | 157 | 990 | — | — | — | — | 950 | | | | |
| 1 000 | 1 290 | 1 200 | 42 | 36 | M39 | — | — | — | — | — | 90,5 | — | — | — | — | 164 | 1 040 | — | — | — | — | 1 000 | | | | |
| 1 050 | 1 345 | 1 257 | 42 | 36 | M39 | — | — | — | — | — | 97,5 | — | — | — | — | 171 | 1 090 | — | — | — | — | 1 050 | | | | |
| 1 100 | 1 405 | 1 314 | 42 | 40 | M39 | — | — | — | — | — | 102 | — | — | — | — | 178 | 1 145 | — | — | — | — | 1 100 | | | | |
| 1 150 | 1 455 | 1 365 | 42 | 40 | M39 | — | — | — | — | — | 103 | — | — | — | — | 186 | 1 195 | — | — | — | — | 1 150 | | | | |
| 1 200 | 1 510 | 1 422 | 42 | 44 | M45 | — | — | — | — | — | 108 | — | — | — | — | 192 | 1 250 | — | — | — | — | 1 200 | | | | |
| 1 300 | 1 570 | 1 480 | 48 | 44 | M45 | — | — | — | — | — | 111 | — | — | — | — | 203 | 1 300 | — | — | — | — | 1 300 | | | | |
| 1 350 | 1 685 | 1 594 | 48 | 44 | M45 | — | — | — | — | — | 116 | — | — | — | — | 210 | 1 355 | — | — | — | — | 1 350 | | | | |
| 1 400 | 1 745 | 1 651 | 48 | 48 | M45 | — | — | — | — | — | 121 | — | — | — | — | 216 | 1 405 | — | — | — | — | 1 400 | | | | |
| 1 450 | 1 805 | 1 708 | 48 | 48 | M45 | — | — | — | — | — | 124 | — | — | — | — | 229 | 1 455 | — | — | — | — | 1 450 | | | | |
| 1 500 | 1 855 | 1 759 | 48 | 52 | M45 | — | — | — | — | — | 129 | — | — | — | — | 235 | 1 510 | — | — | — | — | 1 500 | | | | |

NOTE — For facing dimensions, see tables 5, 6 and 7.

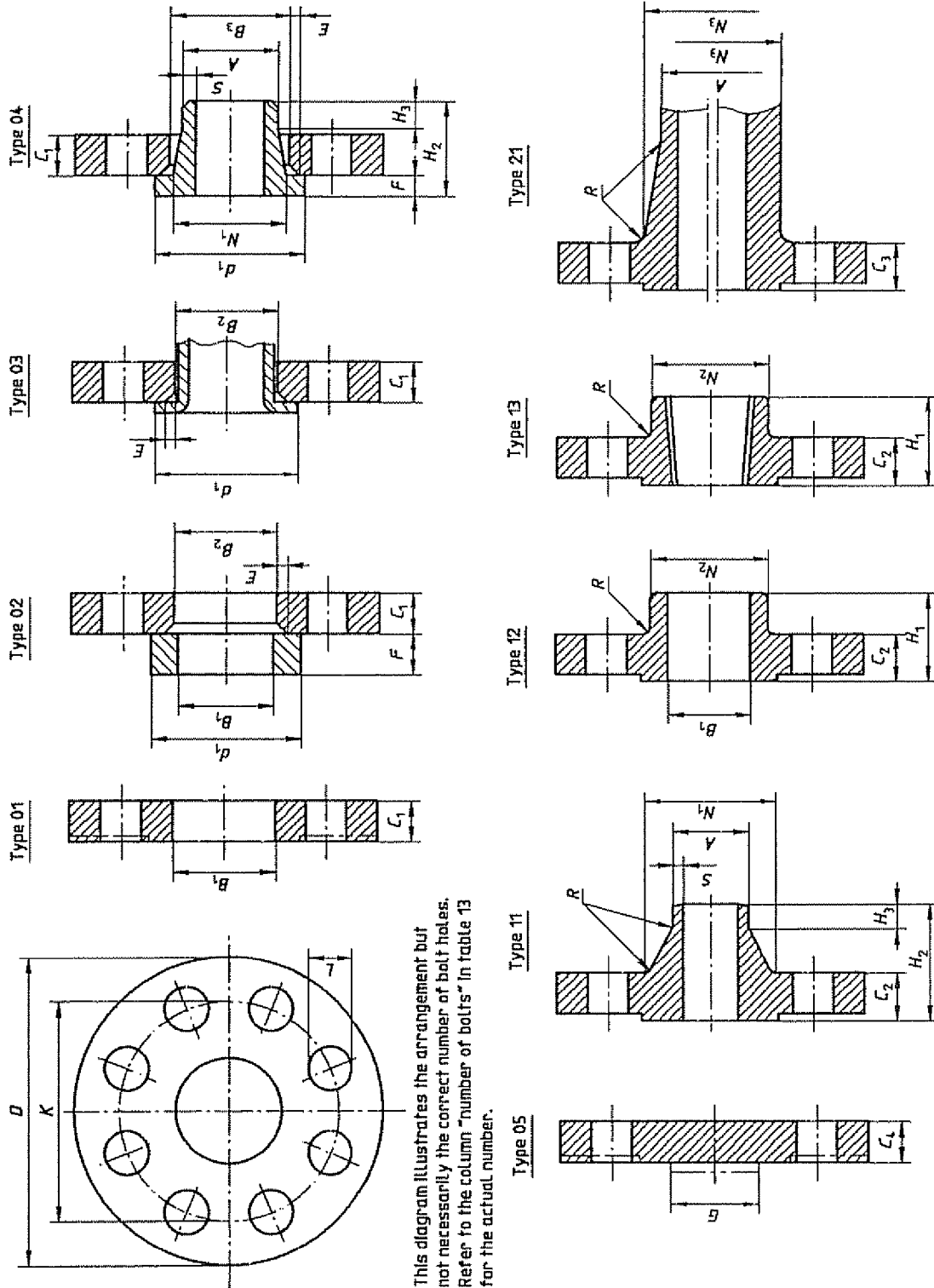


Table 13 — Dimensions of PN 25 flanges
 (See the notes on page 46.)

| Nominal size DN | Mating dimensions | | | | | Outside diameter of neck A | Bore diameter | | | | Flange thickness | | | | Chamfer E | Collar thickness F | Shoulder diameter G | Length of hub | | | Neck diameter | | | Corner radius R | Neck thickness (see note 6) S | Nominal size DN | | | | |
|--------------------|---------------------------------|------------------------------|-----------------------------|-----------------|--------------|-------------------------------|----------------|----------------|----------------|----------------|------------------|----------------|----------------|----|--------------|-----------------------|------------------------|---------------|-------|----------------|----------------|----------------|----------------|--------------------|-------------------------------------|--------------------|----------------|----------------|-------------------|--------|
| | Outside diameter of flange D | Diameter of bolt circle K | Diameter of bolt holes L | Number of bolts | Nominal size | | B ₁ | B ₂ | B ₃ | C ₁ | C ₂ | C ₃ | C ₄ | E | | | | F | G | H ₁ | H ₂ | H ₃ | N ₁ | | | | N ₂ | N ₃ | 11, 12, 13, 21 | 04, 11 |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | 360 | 310 | 26 | 12 | M24 | 221.5 | 226 | 250 | 32 | 30 | 30 | 30 | 6 | 26 | 190 | 52 | 80 | 16 | 244 | 256 | 252 | 8 | 6,3 | 200 | | | | | | |
| 15 | 425 | 370 | 29.5 | 12 | M27 | 276.5 | 281 | 302 | 35 | 32 | 32 | 32 | 8 | 26 | 235 | 60 | 88 | 18 | 296 | 310 | 304 | 10 | 6,3 | 250 | | | | | | |
| 20 | 485 | 430 | 29.5 | 16 | M27 | 327.5 | 333 | 356 | 38 | 34 | 34 | 34 | 8 | 28 | 285 | 67 | 92 | 18 | 350 | 364 | 364 | 10 | 7,1 | 300 | | | | | | |
| 25 | 555 | 490 | 32.5 | 16 | M30 | 359.5 | 365 | 408 | 42 | 38 | 38 | 38 | 8 | 32 | 325 | 72 | 100 | 20 | 398 | 418 | 418 | 10 | 8 | 350 | | | | | | |
| 32 | 620 | 550 | 35.5 | 16 | M33 | 411 | 416 | 462 | 46 | 40 | 40 | 40 | 8 | 34 | 375 | 78 | 110 | 20 | 452 | 472 | 472 | 10 | 8,8 | 400 | | | | | | |
| 40 | 670 | 600 | 35.5 | 20 | M33 | 462 | 467 | 510 | 50 | 46 | 46 | 46 | 8 | 36 | 425 | 84 | 110 | 20 | 500 | 520 | 520 | 12 | 10 | 450 | | | | | | |
| 50 | 730 | 660 | 35.5 | 20 | M33 | 513.5 | 519 | 568 | 56 | 48 | 48 | 48 | 8 | 38 | 475 | 90 | 125 | 20 | 558 | 580 | 580 | 12 | 11 | 500 | | | | | | |
| 60 | 845 | 770 | 39 | 20 | M36 | 616.5 | 622 | 670 | 68 | 58 | 58 | 58 | 8 | 40 | 575 | 100 | 125 | 20 | 660 | 684 | 684 | 12 | 12,5 | 600 | | | | | | |
| 70 | 960 | 875 | 42 | 24 | M39 | — | — | — | — | 46 | 50 | — | — | — | — | — | — | — | 760 | 760 | 780 | 12 | — | 700 | | | | | | |
| 800 | 1 085 | 990 | 48 | 24 | M45 | — | — | — | — | — | — | — | — | — | — | — | — | — | 864 | — | 882 | 12 | — | 800 | | | | | | |
| 900 | 1 185 | 1 090 | 48 | 28 | M45 | — | — | — | — | — | — | — | — | — | — | — | — | — | 968 | — | 982 | 12 | — | 900 | | | | | | |
| 1 000 | 1 320 | 1 210 | 55 | 28 | M52 | — | — | — | — | — | — | — | — | — | — | — | — | — | 1 070 | — | 1 086 | 12 | — | 1 000 | | | | | | |
| 1 200 | 1 530 | 1 420 | 55 | 32 | M52 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 1 296 | 12 | — | 1 200 | | | | | | |
| 1 400 | 1 755 | 1 640 | 60 | 36 | M56 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 1 508 | 12 | — | 1 400 | | | | | | |
| 1 600 | 1 975 | 1 860 | 60 | 40 | M56 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 1 726 | 12 | — | 1 600 | | | | | | |
| 1 800 | 2 195 | 2 070 | 68 | 44 | M64 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 1 920 | 15 | — | 1 800 | | | | | | |
| 2 000 | 2 425 | 2 300 | 68 | 48 | M64 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 2 150 | 15 | — | 2 000 | | | | | | |

Use PN 40

NOTE — For d_1 and facing dimensions, see table 4.

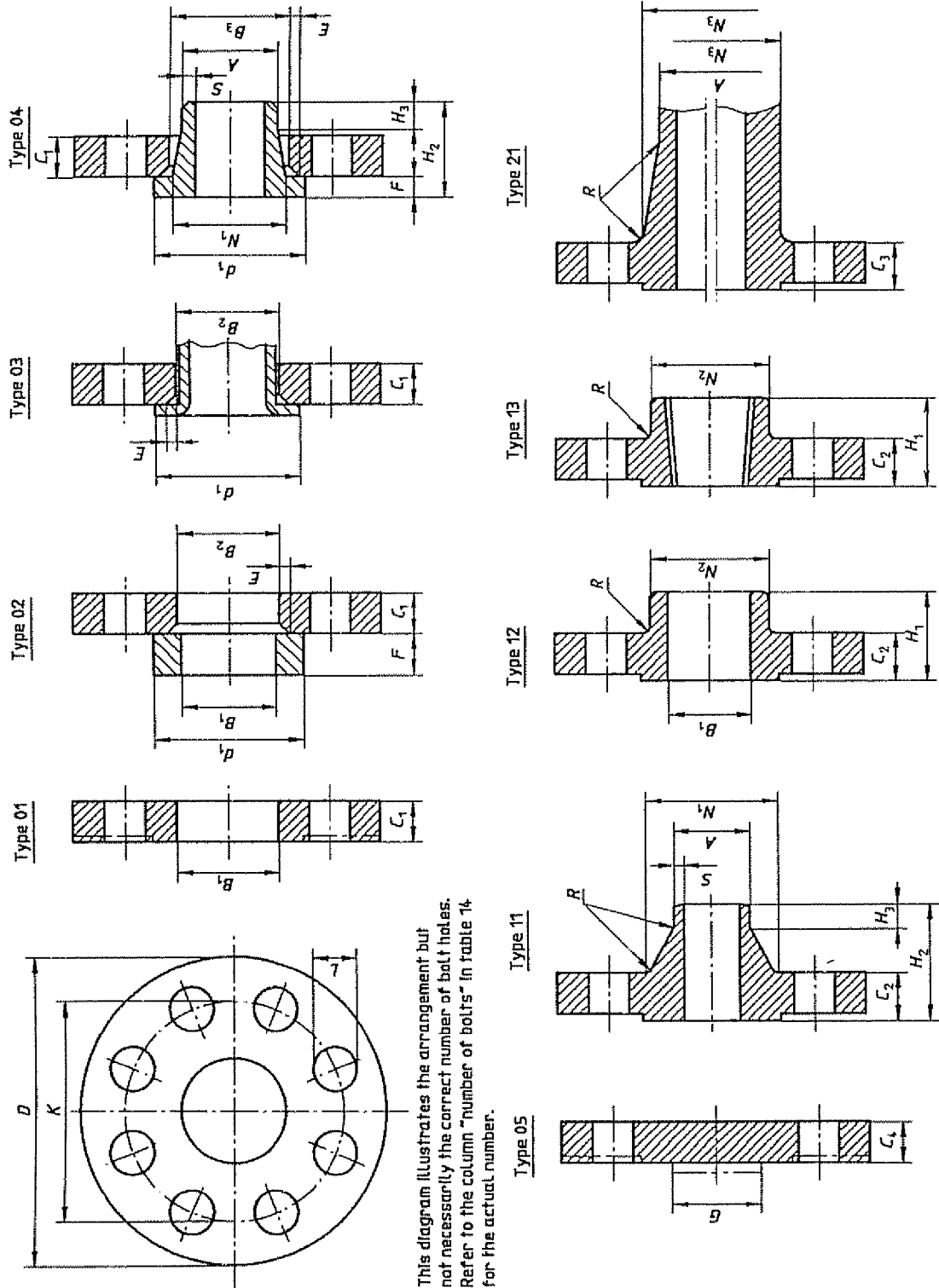
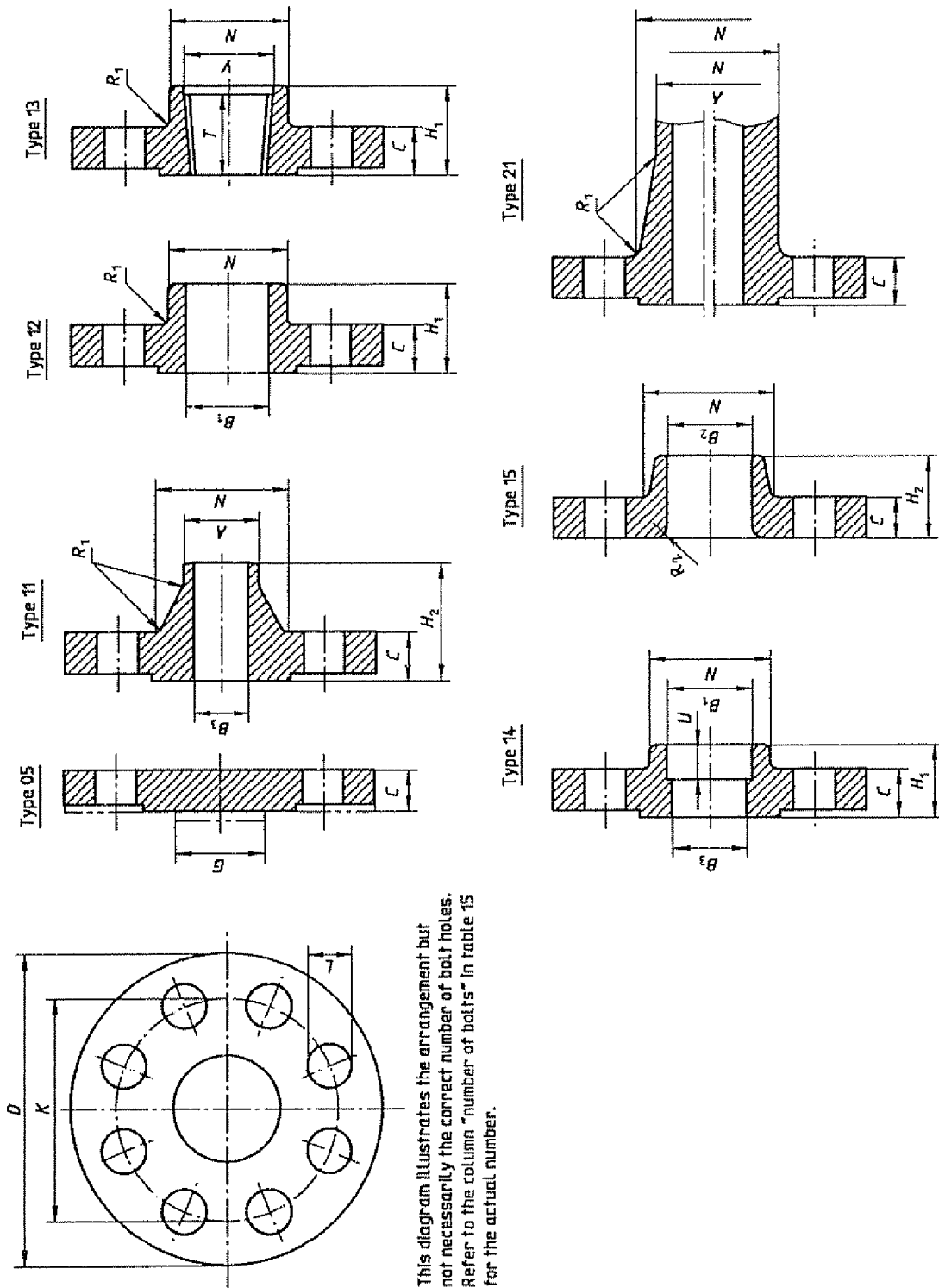


Table 14 — Dimensions of PN 40 flanges
(See the notes on page 46.)

| Nominal size DN | Mating dimensions | | | | | | Dimensions in millimetres | | | | | | | | | | | | | | | | | | |
|--------------------|--|-------------------------------------|------------------------------------|-----------------|--------------------|--------------------------|------------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|---------|------------------|-------------------|-----------------------|----------|----------|---------------|-----------------------|-----------------------|---------------|---|--------------------|-----------------------|
| | Outside diameter of flange <i>D</i> | Diameter of bolt circle <i>K</i> | Diameter of bolt holes <i>L</i> | Number of bolts | Bolts nominal size | Outside diameter of neck | Bore diameter | | | Flange thickness | | | Chamfer | Collar thickness | Shoulder diameter | Length of hub | | | Neck diameter | | | Corner radius | Neck thickness (see note 6) <i>S</i> | Nominal size DN | |
| | | | | | | | <i>B</i> ₁ | <i>B</i> ₂ | <i>B</i> ₃ | <i>C</i> ₁ | <i>C</i> ₂ | <i>C</i> ₃ | | | | <i>C</i> ₄ | <i>E</i> | <i>F</i> | <i>G</i> | <i>H</i> ₁ | <i>H</i> ₂ | | | | <i>H</i> ₃ |
| | | | | | | | 01, 02, 03, 04, 05, 11, 12, 13, 21 | 01, 02, 03, 04 | 02, 03 | 04 | 01, 11, 21, 05 | 02, 03, 04 | 05 | 12, 13 | 04, 11 | 04, 11 | 12, 13 | 04, 11 | 12, 13 | 04, 11 | 11, 12, 13, 21 | 04, 11 | | | |
| 10 | 90 | 60 | 14 | 4 | M12 | 17,2 | 18 | 21 | 31 | 14 | 14 | 3 | 12 | 22 | 35 | 6 | 28 | 30 | 28 | 3 | 3 | 2,3 | 10 | | |
| 15 | 95 | 65 | 14 | 4 | M12 | 21,3 | 22 | 25 | 35 | 14 | 14 | 3 | 12 | 22 | 38 | 6 | 32 | 35 | 32 | 3 | 3 | 3,2 | 15 | | |
| 20 | 105 | 75 | 14 | 4 | M12 | 26,9 | 27,5 | 31 | 42 | 16 | 16 | 4 | 14 | 26 | 40 | 6 | 40 | 45 | 40 | 4 | 4 | 3,2 | 20 | | |
| 25 | 115 | 85 | 14 | 4 | M12 | 33,7 | 34,5 | 38 | 49 | 16 | 16 | 4 | 14 | 28 | 40 | 6 | 46 | 52 | 50 | 4 | 4 | 3,2 | 25 | | |
| 32 | 140 | 100 | 18 | 4 | M16 | 42,4 | 43,5 | 47 | 59 | 18 | 18 | 5 | 14 | 30 | 42 | 6 | 56 | 60 | 60 | 5 | 5 | 3,6 | 32 | | |
| 40 | 150 | 110 | 18 | 4 | M16 | 48,3 | 49,5 | 53 | 67 | 18 | 18 | 5 | 14 | 32 | 45 | 7 | 64 | 70 | 70 | 5 | 5 | 3,6 | 40 | | |
| 50 | 165 | 125 | 18 | 4 | M16 | 60,3 | 61,5 | 65 | 77 | 20 | 20 | 5 | 16 | 34 | 48 | 8 | 74 | 84 | 84 | 5 | 5 | 4 | 50 | | |
| 65 | 185 | 145 | 18 | 8 | M16 | 76,1 | 77,5 | 81 | 96 | 22 | 22 | 6 | 16 | 38 | 52 | 10 | 92 | 104 | 104 | 6 | 6 | 5 | 65 | | |
| 80 | 200 | 160 | 18 | 8 | M16 | 88,9 | 90,5 | 94 | 114 | 24 | 24 | 6 | 18 | 40 | 58 | 12 | 110 | 118 | 120 | 6 | 6 | 5,6 | 80 | | |
| 100 | 235 | 190 | 22 | 8 | M20 | 114,3 | 116 | 120 | 138 | 26 | 24 | 6 | 20 | 44 | 65 | 12 | 134 | 145 | 142 | 6 | 6 | 6,3 | 100 | | |
| 125 | 270 | 220 | 26 | 8 | M24 | 139,7 | 141,5 | 145 | 166 | 28 | 26 | 6 | 22 | 48 | 68 | 12 | 162 | 170 | 162 | 6 | 6 | 6,3 | 125 | | |
| 150 | 300 | 250 | 26 | 8 | M24 | 168,3 | 170,5 | 174 | 194 | 30 | 28 | 6 | 24 | 52 | 75 | 12 | 190 | 200 | 192 | 8 | 8 | 7,1 | 150 | | |
| 200 | 375 | 320 | 29,5 | 12 | M27 | 219,1 | 221,5 | 226 | 250 | 36 | 34 | 6 | 28 | — | 88 | 16 | 244 | — | 254 | 8 | 8 | 8 | 200 | | |
| 250 | 450 | 385 | 32,5 | 12 | M30 | 273 | 276,5 | 281 | 312 | 42 | 38 | 8 | 30 | — | 105 | 18 | 306 | — | 312 | 10 | 10 | 10 | 250 | | |
| 300 | 515 | 450 | 32,5 | 16 | M30 | 323,9 | 327,5 | 333 | 368 | 48 | 42 | 8 | 34 | — | 115 | 18 | 362 | — | 378 | 10 | 10 | 10 | 300 | | |
| 350 | 580 | 510 | 35,5 | 16 | M33 | 355,6 | 359,5 | 365 | 418 | 55 | 46 | 8 | 36 | — | 125 | 20 | 408 | — | 432 | 10 | 10 | 11 | 350 | | |
| 400 | 660 | 585 | 39 | 16 | M36 | 406,4 | 411 | 416 | 472 | 60 | 50 | 8 | 42 | — | 135 | 20 | 462 | — | 498 | 10 | 10 | 12,5 | 400 | | |
| 450 | 685 | 610 | 39 | 20 | M36 | 457 | 462 | 467 | 510 | 66 | 57 | 8 | 46 | — | 135 | 20 | 500 | — | 522 | 12 | 12 | 14,2 | 450 | | |
| 500 | 755 | 670 | 42 | 20 | M39 | 508 | 513,5 | 519 | 572 | 72 | 57 | 8 | 50 | — | 140 | 20 | 562 | — | 576 | 12 | 12 | 16 | 500 | | |
| 600 | 890 | 795 | 48 | 20 | M45 | 610 | 616,5 | 622 | 676 | 84 | 72 | 8 | 54 | — | 150 | 20 | 666 | — | 696 | 12 | 12 | 17,5 | 600 | | |

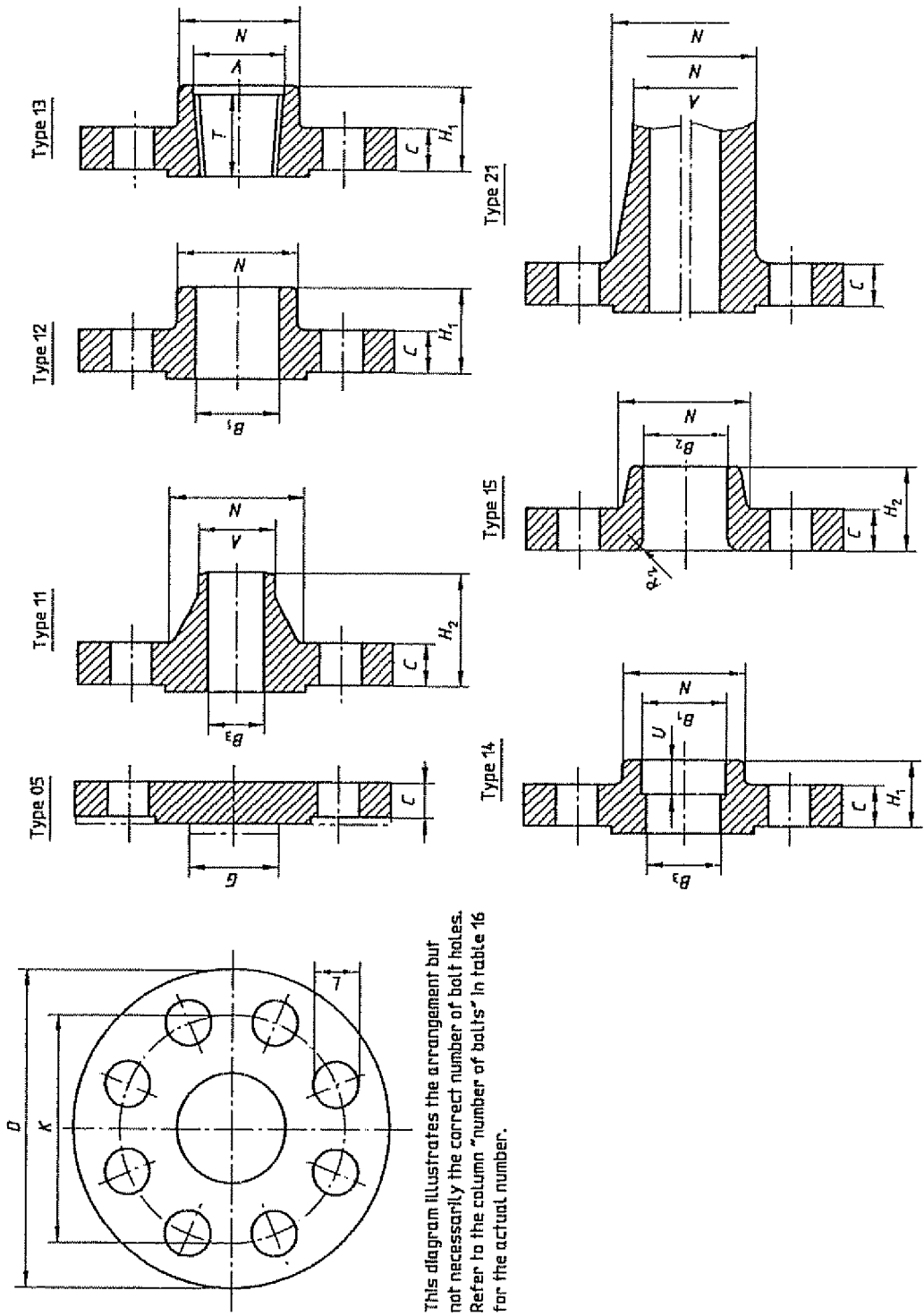
NOTE — For *d*₁ and facing dimensions, see table 4.



This diagram illustrates the arrangement but not necessarily the correct number of bolt holes. Refer to the column "number of bolts" in table 15 for the actual number.

| Nominal size DN | Mating dimensions | | | | Outside diameter of neck (see note 7) | Bore diameter (see note 8) | | | Flange thickness (see note 9) | Shoulder diameter G | Length of hub | | | Neck diameter N | Corner radius | | Minimum thread length of threaded flange (see note 5) T | Depth of socket U | Minimum diameter of counter-bore threaded flange V | Nominal size DN | | | | | | | |
|--|---------------------------------|------------------------------|-----------------------------|---------------------------------|---------------------------------------|----------------------------|----------------|----------------|-------------------------------|------------------------|----------------|-----|----------------|--------------------|----------------|------------------------------------|--|----------------------|---|--------------------|----------------|----------------|-------------------|----|----|----|----|
| | Outside diameter of flange D | Diameter of bolt circle K | Diameter of bolt holes L | Number Bolts Nominal size | | A | B ₁ | B ₂ | | | B ₃ | C | H ₁ | | H ₂ | H ₁ , H ₂ | | | | | R ₁ | R ₂ | 11, 12, 13, 21 | 15 | 13 | 14 | 13 |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15 | 95 | 66,5 | 16 | 4 | 21,5 | 22 | 23 | 16 | 14,5 | — | 22 | 22 | 38 | — | — | 16 | 10 | 24 | 15 | | | | | | | | |
| 20 | 120 | 82,5 | 18 | 4 | 26,5 | 28 | 28 | 21 | 16 | — | 25 | 25 | 48 | — | — | 16 | 11 | 29 | 20 | | | | | | | | |
| 25 | 125 | 89 | 18 | 4 | 33,5 | 34,5 | 35 | 26,5 | 17,5 | — | 27 | 27 | 54 | — | — | 18 | 13 | 36 | 25 | | | | | | | | |
| 32 | 135 | 98,5 | 18 | 4 | 42 | 43,5 | 43,5 | 35 | 19,5 | — | 30 | 27 | 64 | — | — | 21 | 14 | 45 | 32 | | | | | | | | |
| 40 | 155 | 114,5 | 22 | 4 | 48,5 | 49,5 | 50 | 41 | 21 | — | 30 | 30 | 70 | — | — | 22 | 16 | 51 | 40 | | | | | | | | |
| 50 | 165 | 127 | 18 | 8 | 60,5 | 62,5 | 62,5 | 52,5 | 22,5 | — | 33 | 33 | 84 | — | — | 29 | 17 | 64 | 50 | | | | | | | | |
| 65 | 190 | 149 | 22 | 8 | 73 | 74,5 | 75,5 | 62,5 | 25,5 | — | 38 | 38 | 100 | — | — | 32 | 19 | 76 | 65 | | | | | | | | |
| 80 | 210 | 168,5 | 22 | 8 | 89 | 90,5 | 91,5 | 78 | 29 | — | 43 | 43 | 118 | — | — | 37 | 21 | 92 | 80 | | | | | | | | |
| 100 | 255 | 200 | 22 | 8 | 114,5 | 116 | 117 | 102,5 | 32 | — | 48 | 48 | 146 | — | — | 43 | — | 118 | 100 | | | | | | | | |
| 125 | 280 | 235 | 22 | 8 | 141,5 | 143,5 | 144,5 | 128 | 35 | — | 51 | 51 | 178 | — | — | 46 | — | 146,5 | 125 | | | | | | | | |
| 150 | 320 | 270 | 22 | 12 | 168,5 | 170,5 | 171,5 | 154 | 37 | — | 52 | 52 | 206 | — | — | 51 | — | 171,5 | 150 | | | | | | | | |
| 200 | 380 | 330 | 26 | 16 | 219 | 221,5 | 222 | 202,5 | 41,5 | — | 62 | 62 | 260 | — | — | 56 | — | 222,5 | 200 | | | | | | | | |
| 250 | 445 | 387,5 | 29,5 | 16 | 273 | 276 | 277,5 | 254,5 | 48 | — | 73 | 73 | 321 | — | — | 61 | — | 276,5 | 250 | | | | | | | | |
| 300 | 520 | 451 | 32,5 | 16 | 324 | 327 | 328 | 305 | 51 | — | 102 | 102 | 375 | — | — | 64 | — | 329 | 300 | | | | | | | | |
| 350 | 585 | 514,5 | 35,5 | 20 | 355,5 | 359 | 360 | — | 54 | — | 111 | 111 | 426 | — | — | 68 | — | 360,5 | 350 | | | | | | | | |
| 400 | 650 | 571,5 | 35,5 | 20 | 406,5 | 410,5 | 411 | — | 57,5 | — | 86 | 86 | 483 | — | — | 70 | — | 411 | 400 | | | | | | | | |
| 450 | 710 | 628,5 | 35,5 | 24 | 457 | 462 | 462,5 | — | 60,5 | — | 89 | 89 | 533 | — | — | 73 | — | 462 | 450 | | | | | | | | |
| 500 | 775 | 686 | 35,5 | 24 | 508 | 513 | 514,5 | — | 63,5 | — | 95 | 95 | 587 | — | — | 77 | — | 513 | 500 | | | | | | | | |
| 550 | 840 | 743 | 42 | 24 | 559 | 564 | — | — | 66,5 | — | 104 | 104 | 640 | — | — | 83 | — | 559 | 550 | | | | | | | | |
| 600 | 915 | 813 | 42 | 24 | 609,5 | 616 | — | — | 70 | — | 152 | 152 | 702 | — | — | 83 | — | 614,5 | 600 | | | | | | | | |
| Flange type | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 05, 11, 12, 13, 14, 15, 21 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Flange types affected for DN 650 and above are types 05 and 11 only. | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 650 | 970 | 876 | 45 | 28 | — | — | — | — | 84 | — | — | — | 184 | — | — | — | — | — | — | 650 | | | | | | | |
| 700 | 1 035 | 940 | 45 | 28 | — | — | — | — | 79,5 | — | — | — | 197 | — | — | — | — | — | — | 700 | | | | | | | |
| 750 | 1 090 | 997 | 48 | 28 | — | — | — | — | 90,5 | — | — | — | 210 | — | — | — | — | — | — | 750 | | | | | | | |
| 800 | 1 150 | 1 054 | 51 | 28 | — | — | — | — | 95 | — | — | — | 222 | — | — | — | — | — | — | 800 | | | | | | | |
| 850 | 1 205 | 1 105 | 51 | 28 | — | — | — | — | 100 | — | — | — | 232 | — | — | — | — | — | — | 850 | | | | | | | |
| 900 | 1 270 | 1 168 | 55 | 32 | — | — | — | — | 105 | — | — | — | 241 | — | — | — | — | — | — | 900 | | | | | | | |
| 950 | 1 340 | 1 261 | 55 | 32 | — | — | — | — | 111 | — | — | — | 241 | — | — | — | — | — | — | 950 | | | | | | | |
| 1 000 | 1 410 | 1 354 | 55 | 32 | — | — | — | — | 108 | — | — | — | 181 | — | — | — | — | — | — | 1 000 | | | | | | | |
| 1 050 | 1 480 | 1 449 | 55 | 32 | — | — | — | — | 114 | — | — | — | 194 | — | — | — | — | — | — | 1 050 | | | | | | | |
| 1 100 | 1 550 | 1 524 | 55 | 32 | — | — | — | — | 119 | — | — | — | 200 | — | — | — | — | — | — | 1 100 | | | | | | | |
| 1 150 | 1 620 | 1 599 | 55 | 32 | — | — | — | — | 124 | — | — | — | 206 | — | — | — | — | — | — | 1 150 | | | | | | | |
| 1 200 | 1 690 | 1 674 | 55 | 32 | — | — | — | — | 129 | — | — | — | 216 | — | — | — | — | — | — | 1 200 | | | | | | | |
| 1 250 | 1 760 | 1 745 | 55 | 32 | — | — | — | — | 133 | — | — | — | 224 | — | — | — | — | — | — | 1 250 | | | | | | | |
| 1 300 | 1 830 | 1 815 | 55 | 32 | — | — | — | — | 144 | — | — | — | 238 | — | — | — | — | — | — | 1 300 | | | | | | | |
| 1 350 | 1 900 | 1 885 | 60 | 28 | — | — | — | — | 152 | — | — | — | 252 | — | — | — | — | — | — | 1 350 | | | | | | | |
| 1 400 | 1 970 | 1 955 | 60 | 28 | — | — | — | — | 154 | — | — | — | 260 | — | — | — | — | — | — | 1 400 | | | | | | | |
| 1 450 | 2 040 | 2 025 | 60 | 32 | — | — | — | — | 159 | — | — | — | 267 | — | — | — | — | — | — | 1 450 | | | | | | | |
| 1 500 | 2 110 | 2 095 | 60 | 32 | — | — | — | — | 164 | — | — | — | 273 | — | — | — | — | — | — | 1 500 | | | | | | | |

NOTE — For facing dimensions, see tables 5, 6 and 7.



This diagram illustrates the arrangement but not necessarily the correct number of bolt holes. Refer to the column "number of bolts" in table 16 for the actual number.

Table 16 — Dimensions of PN 10 flanges

(See the notes on page 46.)

Dimensions in millimetres

| Nominal size | Mating dimensions | | | | | Outside diameter of neck (see note 7) | Bore diameter | | | Flange thickness | Shoulder diameter | Length of hub | | | | Neck diameter (see note 9) | Lap radius (at pipe end) | Minimum thread length of threaded flange (see note 5) | Depth of socket | Minimum diameter of counter-bore threaded flange | Nominal size | | | | | | |
|--|----------------------------|-------------------------|------------------------|--------|--------------|---------------------------------------|---------------|-------|-------|------------------|-------------------|---------------|-----|-------|-------|----------------------------|--------------------------|---|-----------------|--|--------------|-----|-------|-----|-----|-----|----|
| | Outside diameter of flange | Diameter of bolt circle | Diameter of bolt holes | Bolts | | | B_1 | B_2 | B_3 | | | C | G | H_1 | H_2 | | | | | | | N | R_2 | T | U | V | DN |
| | | | | Number | Nominal size | | | | | | | | | | | | | | | | | | | | | | |
| DN | D | K | L | | | | | | | | | | | | | | | | | | | | | | | | |
| Flange type | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15 | 95 | 66,5 | 16 | 4 | M14 | 21,5 | 22 | 23 | — | 14,5 | — | 22 | 22 | 22 | 52 | 38 | 3 | 16 | 10 | 24 | 15 | | | | | | |
| 20 | 120 | 82,5 | 18 | 4 | M16 | 26,5 | 28 | 28 | — | 16 | — | 25 | 25 | 25 | 57 | 48 | 3 | 16 | 11 | 29 | 15 | | | | | | |
| 25 | 125 | 89 | 18 | 4 | M16 | 36,5 | 34,5 | 35 | — | 17,5 | — | 27 | 27 | 27 | 62 | 54 | 3 | 18 | 13 | 36 | 15 | | | | | | |
| 32 | 135 | 98,5 | 18 | 4 | M16 | 42 | 43,5 | 43,5 | — | 21 | — | 29 | 29 | 29 | 67 | 64 | 5 | 21 | 14 | 45 | 15 | | | | | | |
| 40 | 155 | 114,5 | 22 | 4 | M20 | 48,5 | 49,5 | 50 | — | 22,5 | — | 32 | 32 | 32 | 70 | 70 | 6 | 22 | 16 | 51 | 15 | | | | | | |
| 50 | 165 | 127 | 18 | 8 | M16 | 60,5 | 62 | 62,5 | — | 25,5 | — | 37 | 37 | 37 | 73 | 84 | 8 | 29 | 17 | 64 | 15 | | | | | | |
| 65 | 190 | 149 | 22 | 8 | M20 | 73 | 74,5 | 75,5 | — | 29 | — | 41 | 41 | 41 | 79 | 100 | 8 | 32 | 19 | 76,5 | 15 | | | | | | |
| 80 | 210 | 168,5 | 22 | 8 | M20 | 89 | 90,5 | 91,5 | — | 32 | — | 46 | 46 | 46 | 83 | 117 | 10 | 35 | 21 | 92,5 | 15 | | | | | | |
| 100 | 275 | 216 | 26 | 8 | M24 | 114,5 | 116 | 117 | — | 38,5 | — | 54 | 54 | 54 | 102 | 152 | 11 | 41 | — | 118 | 15 | | | | | | |
| 125 | 330 | 267 | 29,5 | 8 | M27 | 141,5 | 143,5 | 145 | — | 44,5 | — | 60 | 60 | 60 | 114 | 189 | 11 | 48 | — | 145 | 15 | | | | | | |
| 150 | 355 | 292 | 29,5 | 12 | M30 | 168,5 | 171 | 171,5 | — | 55,5 | — | 67 | 67 | 67 | 117 | 222 | 13 | 51 | — | 171,5 | 15 | | | | | | |
| 200 | 420 | 349 | 32,5 | 12 | M33 | 219 | 221,5 | 222 | — | 67 | — | 76 | 76 | 76 | 133 | 273 | 13 | 57 | — | 222,5 | 15 | | | | | | |
| 250 | 510 | 432 | 35,5 | 16 | M33 | 276 | 277,5 | 277,5 | — | 83 | — | 86 | 86 | 86 | 152 | 343 | 13 | 65 | — | 276,5 | 15 | | | | | | |
| 300 | 560 | 489 | 35,5 | 20 | M33 | 324 | 327 | 328 | — | 70 | — | 92 | 92 | 92 | 166 | 400 | 13 | 70 | — | 329 | 15 | | | | | | |
| 350 | 605 | 527 | 39 | 20 | M36 | 355,5 | 359 | 360 | — | 70 | — | 94 | 94 | 94 | 165 | 432 | 13 | 73 | — | 360,5 | 15 | | | | | | |
| 400 | 685 | 603 | 42 | 20 | M39 | 406,5 | 410,5 | 411 | — | 76,5 | — | 106 | 106 | 106 | 178 | 495 | 13 | 78 | — | 411,5 | 15 | | | | | | |
| 450 | 745 | 654 | 45 | 20 | M42 | 457 | 462 | 462,5 | — | 83 | — | 117 | 117 | 117 | 184 | 546 | 13 | 79 | — | 462,5 | 15 | | | | | | |
| 500 | 815 | 724 | 45 | 24 | M42 | 509 | 513 | 514,5 | — | 95 | — | 127 | 127 | 127 | 190 | 610 | 13 | 82 | — | 513 | 15 | | | | | | |
| 550 | 870 | 778 | 48 | 24 | M45 | 559 | — | — | — | 102 | — | 140 | 140 | 140 | 203 | 718 | — | — | — | — | 15 | | | | | | |
| 600 | 940 | 838 | 51 | 24 | M48 | 609,5 | 616 | 616 | — | 102 | — | 140 | 140 | 140 | 203 | 718 | — | — | — | — | 15 | | | | | | |
| Flange types affected for DN 650 and above are types 05 and 11 only. | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 650 | 1 015 | 914 | 51 | 28 | M48 | — | — | — | — | 125 | — | — | — | — | 222 | 750 | — | — | — | — | 650 | | | | | | |
| 700 | 1 075 | 965 | 55 | 28 | M52 | — | — | — | — | 132 | — | — | — | — | 235 | 805 | — | — | — | — | 700 | | | | | | |
| 750 | 1 130 | 1 022 | 55 | 28 | M52 | — | — | — | — | 140 | — | — | — | — | 248 | 860 | — | — | — | — | 750 | | | | | | |
| 800 | 1 195 | 1 080 | 60 | 28 | M56 | — | — | — | — | 148 | — | — | — | — | 260 | 920 | — | — | — | — | 800 | | | | | | |
| 850 | 1 245 | 1 130 | 60 | 28 | M56 | — | — | — | — | 154 | — | — | — | — | 270 | 975 | — | — | — | — | 850 | | | | | | |
| 900 | 1 315 | 1 194 | 68 | 28 | M64 | — | — | — | — | 162 | — | — | — | — | 283 | 1 030 | — | — | — | — | 900 | | | | | | |
| 950 | 1 375 | 1 262 | 60 | 28 | M56 | — | — | — | — | 166 | — | — | — | — | 283 | 1 030 | — | — | — | — | 950 | | | | | | |
| 1 000 | 1 440 | 1 328 | 68 | 32 | M64 | — | — | — | — | 162 | — | — | — | — | 254 | 1 020 | — | — | — | — | 1 000 | | | | | | |
| 1 050 | 1 500 | 1 391 | 68 | 32 | M64 | — | — | — | — | 162 | — | — | — | — | 264 | 1 075 | — | — | — | — | 1 050 | | | | | | |
| 1 100 | 1 560 | 1 455 | 74 | 32 | M70 | — | — | — | — | 171 | — | — | — | — | 279 | 1 125 | — | — | — | — | 1 100 | | | | | | |
| 1 150 | 1 620 | 1 512 | 74 | 32 | M70 | — | — | — | — | 178 | — | — | — | — | 289 | 1 180 | — | — | — | — | 1 150 | | | | | | |
| 1 200 | 1 680 | 1 575 | 80 | 32 | M76 | — | — | — | — | 185 | — | — | — | — | 300 | 1 235 | — | — | — | — | 1 200 | | | | | | |
| 1 250 | 1 740 | 1 640 | 80 | 32 | M76 | — | — | — | — | 195 | — | — | — | — | 316 | 1 290 | — | — | — | — | 1 250 | | | | | | |
| 1 300 | 1 800 | 1 705 | 80 | 32 | M82 | — | — | — | — | 203 | — | — | — | — | 329 | 1 345 | — | — | — | — | 1 300 | | | | | | |
| 1 350 | 1 860 | 1 770 | 86 | 32 | M82 | — | — | — | — | 210 | — | — | — | — | 337 | 1 395 | — | — | — | — | 1 350 | | | | | | |
| 1 400 | 1 920 | 1 835 | 86 | 32 | M82 | — | — | — | — | 217 | — | — | — | — | 349 | 1 450 | — | — | — | — | 1 400 | | | | | | |
| 1 450 | 1 985 | 1 900 | 86 | 32 | M82 | — | — | — | — | 225 | — | — | — | — | 362 | 1 500 | — | — | — | — | 1 450 | | | | | | |
| 1 500 | 2 050 | 1 965 | 94 | 28 | M90 | — | — | — | — | 232 | — | — | — | — | 370 | 1 555 | — | — | — | — | 1 500 | | | | | | |
| 1 500 | 1 995 | 1 822 | 94 | 28 | M90 | — | — | — | — | 243 | — | — | — | — | 389 | 1 610 | — | — | — | — | 1 500 | | | | | | |

NOTE — For facing dimensions, see tables 5, 6 and 7.

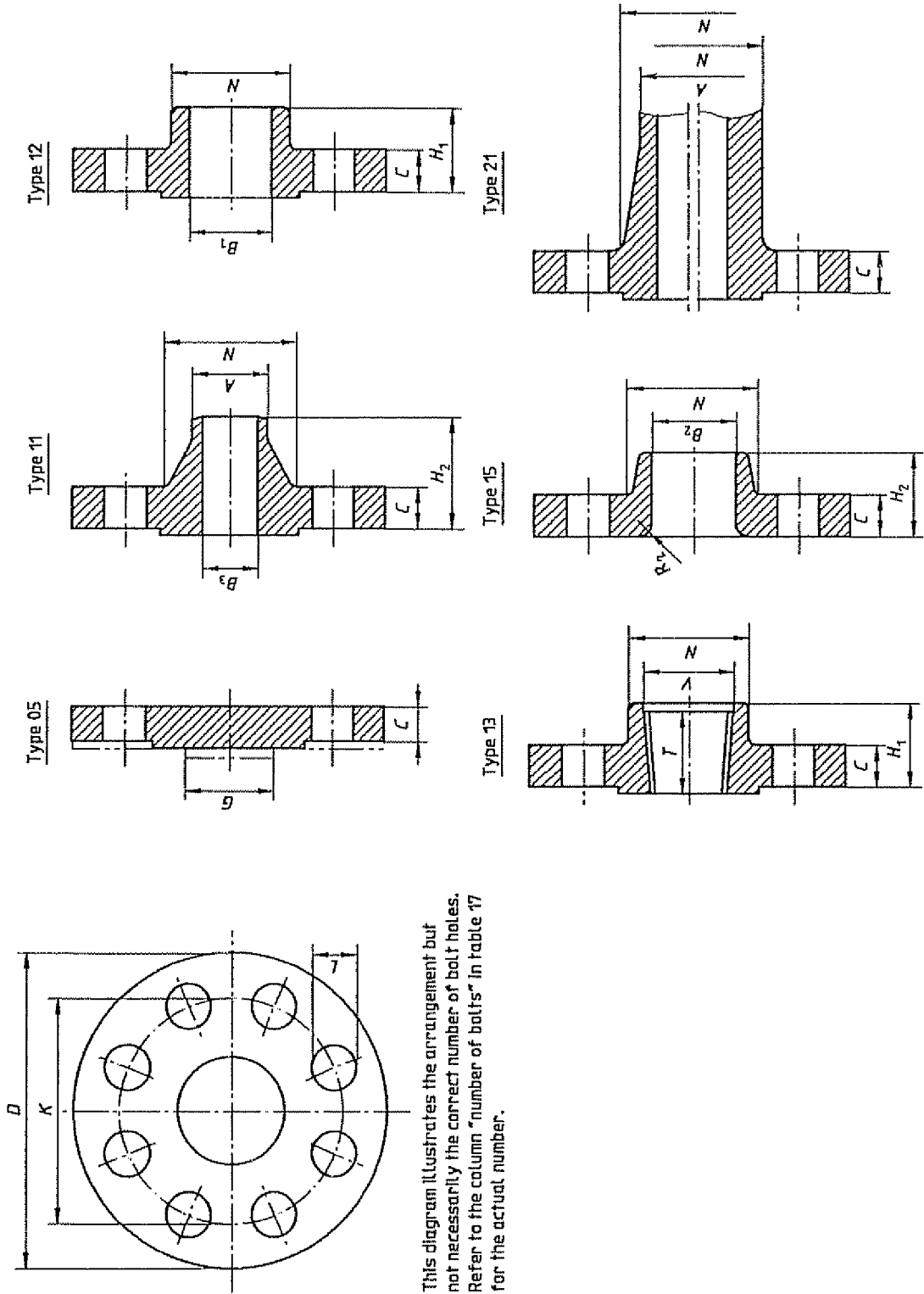


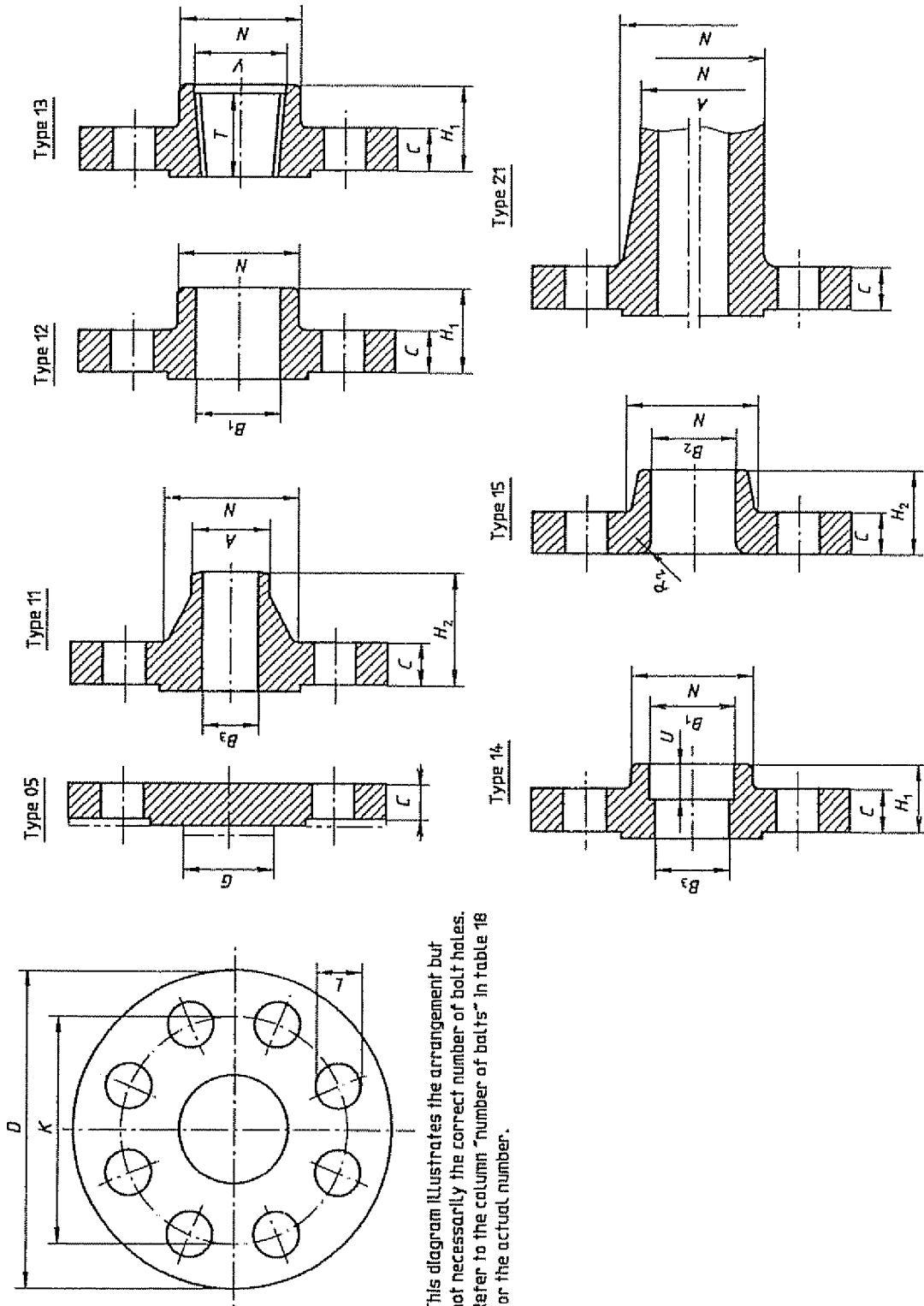
Table 17 — Dimensions of PN 150 flanges
(See the notes on page 46.)

Dimensions in millimetres

| Nominal size | Mating dimensions | | | | Outside diameter of neck (see note 7) | Bore diameter (see note 8) | | | Flange thickness | Shoulder diameter | Length of hub | | | Neck diameter | Lap radius (at pipe end) | Minimum thread length of threaded flange (see note 5) | Minimum diameter of counter-bored threaded flange | Nominal size |
|--------------|----------------------------|-------------------------|------------------------|-----------------|---------------------------------------|----------------------------|--------------|-------------|------------------------|-------------------|---------------|-------|--------------------|---------------|--------------------------|---|---|--------------|
| | Outside diameter of flange | Diameter of bolt circle | Diameter of bolt holes | Number of bolts | | Number | Nominal size | b_1 | | | b_2 | b_3 | H_1 | | | | | |
| DN | D | K | L | | A | 12 | 15 | 11 | C | G | 12, 13 | 15 | 11, 12, 13, 15, 21 | | | | | DN |
| | | | 05, 11, 12, 13, 15, 21 | | 11, 21 | | | Flange type | 05, 11, 12, 13, 15, 21 | 05 | | | | | | | | |
| | | | | | | | | Use PN 260 | | | | | | | | | | |
| 15 | 240 | 190,5 | 26 | 8 | 89 | 90,5 | 91,5 | — | 38,5 | 48 | 54 | 54 | 127 | 10 | 42 | 92 | | 15 |
| 20 | 290 | 235 | 32,5 | 8 | 114,5 | 116 | 117 | — | 44,5 | 73 | 70 | 70 | 159 | 11 | 48 | 118 | | 13 |
| 25 | 350 | 279,5 | 35,5 | 8 | 141,5 | 143,5 | 144,5 | — | 51 | 95 | 79 | 79 | 190 | 11 | 54 | 144,5 | | 13 |
| 32 | 380 | 317,5 | 32,5 | 12 | 168,5 | 170,5 | 171,5 | — | 56 | 121 | 86 | 86 | 235 | 13 | 57 | 171,5 | | 13 |
| 40 | 470 | 393,5 | 39 | 12 | 219 | 221,5 | 222,5 | — | 63,5 | 165 | 102 | 114 | 298 | 13 | 64 | 222,5 | | 13 |
| 50 | 545 | 470 | 39 | 16 | 273 | 276 | 277,5 | — | 70 | 213 | 108 | 127 | 368 | 13 | 71 | 276,5 | | 13 |
| 65 | 640 | 533,5 | 39 | 20 | 324 | 327 | 328 | — | 79,5 | 257 | 117 | 143 | 419 | 13 | 76 | 329 | | 13 |
| 80 | 610 | 533,5 | 42 | 20 | 355,5 | 359 | 360 | — | 86 | 286 | 130 | 156 | 451 | 13 | 83 | 360,5 | | 13 |
| 100 | 640 | 559 | 45 | 20 | 406,5 | 410,5 | 411 | — | 89 | 381 | 133 | 165 | 508 | 13 | 86 | 411,5 | | 13 |
| 125 | 705 | 616 | 51 | 20 | 457 | 462 | 462,5 | — | 102 | 419 | 152 | 191 | 565 | 13 | 89 | 462 | | 13 |
| 150 | 785 | 696 | 55 | 20 | 508 | 513 | 514,5 | — | 108 | 451 | 159 | 210 | 672 | 13 | 92 | 513 | | 13 |
| 200 | 855 | 749,5 | 55 | 20 | 508 | 513 | 514,5 | — | 140 | 508 | 203 | 232 | 749 | 13 | 102 | 614,5 | | 13 |
| 250 | 1 040 | 901,5 | 68 | 20 | 609,5 | 616 | 616 | — | | | | | | | | | | 13 |
| 300 | | | | | | | | | | | | | | | | | | |
| 350 | | | | | | | | | | | | | | | | | | |
| 400 | | | | | | | | | | | | | | | | | | |
| 450 | | | | | | | | | | | | | | | | | | |
| 500 | | | | | | | | | | | | | | | | | | |
| 600 | | | | | | | | | | | | | | | | | | |
| 650 | 1 085 | 952 | 74 | 20 | — | — | — | — | 160 | — | — | — | 286 | — | — | — | — | 650 |
| 700 | 1 165 | 1 022 | 80 | 20 | — | — | — | — | 171 | — | — | — | 298 | — | — | — | — | 700 |
| 750 | 1 230 | 1 086 | 80 | 20 | — | — | — | — | 183 | — | — | — | 311 | — | — | — | — | 750 |
| 800 | 1 315 | 1 156 | 86 | 20 | — | — | — | — | 194 | — | — | — | 330 | — | — | — | — | 800 |
| 850 | 1 395 | 1 226 | 86 | 20 | — | — | — | — | 205 | — | — | — | 349 | — | — | — | — | 850 |
| 900 | 1 460 | 1 289 | 94 | 20 | — | — | — | — | 214 | — | — | — | 362 | — | — | — | — | 900 |
| 950 | 1 460 | 1 289 | 94 | 20 | — | — | — | — | 216 | — | — | — | 352 | — | — | — | — | 950 |
| 1 000 | 1 510 | 1 340 | 94 | 24 | — | — | — | — | 224 | — | — | — | 364 | — | — | — | — | 1 000 |
| 1 050 | 1 560 | 1 391 | 94 | 24 | — | — | — | — | 232 | — | — | — | 371 | — | — | — | — | 1 050 |
| 1 100 | 1 650 | 1 464 | 99 | 24 | — | — | — | — | 243 | — | — | — | 391 | — | — | — | — | 1 100 |
| 1 150 | 1 735 | 1 537 | 105 | 24 | — | — | — | — | 256 | — | — | — | 411 | — | — | — | — | 1 150 |
| 1 200 | 1 785 | 1 588 | 105 | 24 | — | — | — | — | 264 | — | — | — | 419 | — | — | — | — | 1 200 |

Flange types affected for DN 650 and above are types 05 and 11 only.

NOTE — For facing dimensions, see tables 5, 6 and 7.

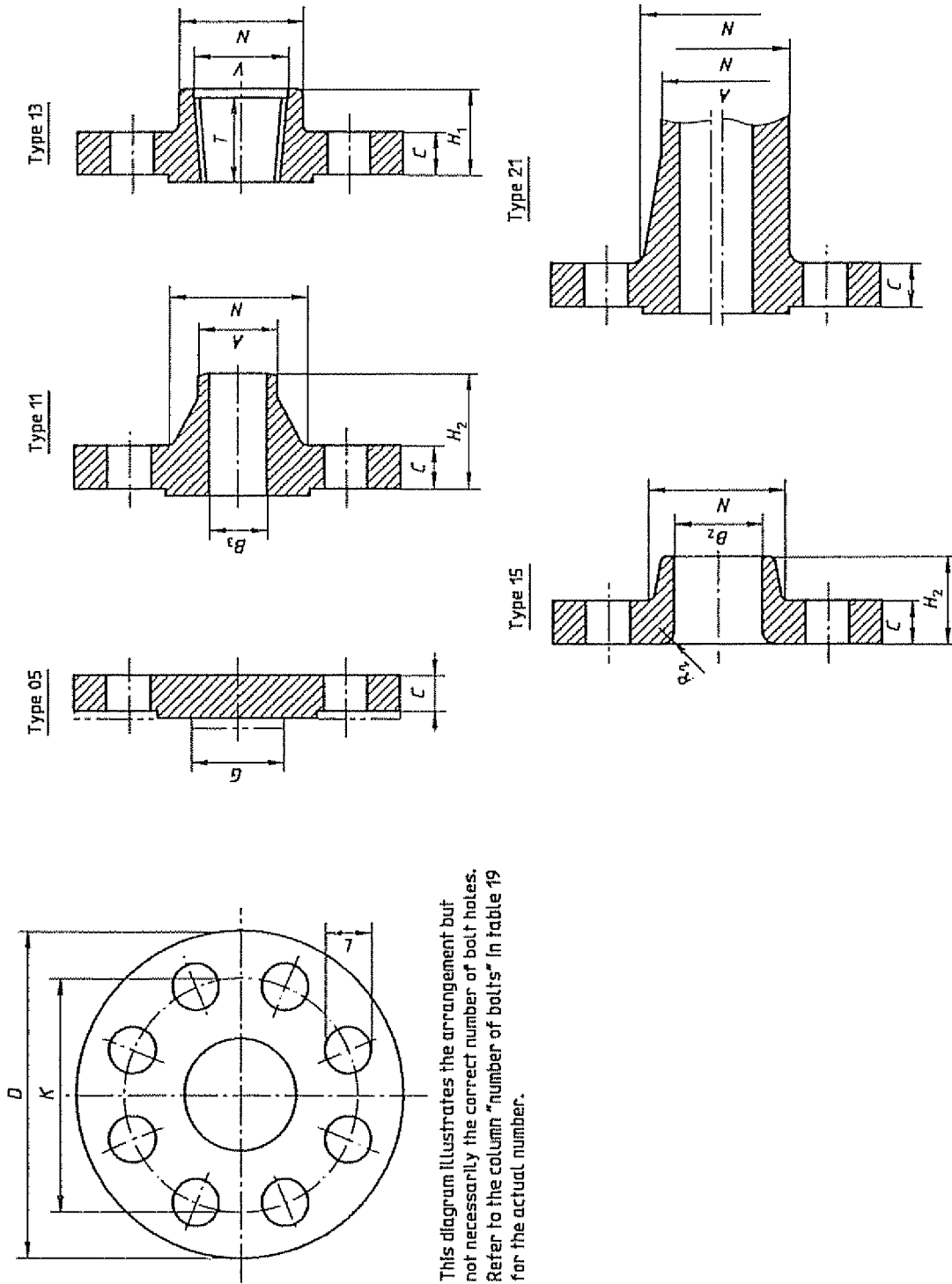


This diagram illustrates the arrangement but not necessarily the correct number of bolt holes. Refer to the column "number of bolts" in table 18 for the actual number.

Table 18 — Dimensions of PN 260 flanges
(See the notes on page 46.)

| Nominal size DN | Mating dimensions | | | | Outside diameter of neck (see note 7) | Bore diameter (see note 8) | | Flange thickness C | Shoulder diameter G | Length of hub | | Neck diameter N | Lap radius (at pipe end) R ₂ | Minimum thread length of threaded flange (see note 5) T | Depth of socket U | Minimum diameter of counter-bore threaded flange V | Nominal size DN | | | | | | | | | |
|--------------------|-------------------|-------|------|--------|--|-------------------------------|------|-----------------------|------------------------|----------------|----------------|--------------------|---|---|----------------------|---|--------------------|----------------|----------------|----------------|----|------------|----|----|----|----|
| | D | K | L | Number | | Nominal size | A | | | B ₁ | B ₂ | | | | | | | B ₃ | H ₁ | H ₂ | 11 | 12, 13, 14 | 15 | 13 | 14 | 13 |
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15 | 120 | 82,5 | 22 | 4 | M20 | 21,5 | 22 | 23 | — | 22,5 | — | — | — | — | — | — | — | 15 | | | | | | | | |
| 20 | 130 | 89 | 22 | 4 | M20 | 26,5 | 28 | 28 | — | 25,5 | — | — | — | — | — | — | — | 20 | | | | | | | | |
| 25 | 150 | 101,5 | 26 | 4 | M24 | 33,5 | 34,5 | 35 | — | 29 | — | — | — | — | — | — | — | 25 | | | | | | | | |
| 32 | 160 | 111 | 26 | 4 | M24 | 42 | 43,5 | 43,5 | — | 29 | — | — | — | — | — | — | — | 32 | | | | | | | | |
| 40 | 180 | 124 | 29,5 | 4 | M27 | 48,5 | 49,5 | 50 | — | 32 | — | — | — | — | — | — | — | 40 | | | | | | | | |
| 50 | 215 | 165 | 26 | 8 | M24 | 60,5 | 62 | 62,5 | — | 38,5 | — | — | — | — | — | — | — | 50 | | | | | | | | |
| 65 | 245 | 190,5 | 29,5 | 8 | M27 | 73 | 74,5 | 75,5 | — | 41,5 | — | — | — | — | — | — | — | 65 | | | | | | | | |
| 80 | 265 | 203 | 32,5 | 8 | M30 | 89 | — | 91,5 | — | 48 | — | — | — | — | — | — | — | 80 | | | | | | | | |
| 100 | 310 | 241,5 | 35,5 | 8 | M33 | 114,5 | — | 117 | — | 54 | — | — | — | — | — | — | — | 100 | | | | | | | | |
| 125 | 375 | 292 | 42 | 8 | M33 | 141,5 | — | 144,5 | — | 73,5 | — | — | — | — | — | — | — | 125 | | | | | | | | |
| 150 | 395 | 317,5 | 39 | 12 | M36 | 168,5 | — | 171,5 | — | 83 | — | — | — | — | — | — | — | 150 | | | | | | | | |
| 200 | 485 | 393,5 | 45 | 12 | M42 | 219 | — | 222 | — | 92 | — | — | — | — | — | — | — | 200 | | | | | | | | |
| 250 | 585 | 482,5 | 51 | 12 | M48 | 273 | — | 277,5 | — | 108 | — | — | — | — | — | — | — | 250 | | | | | | | | |
| 300 | 675 | 571,5 | 55 | 16 | M52 | 324 | — | 328 | — | 124 | — | — | — | — | — | — | — | 300 | | | | | | | | |
| 350 | 750 | 635 | 60 | 16 | M56 | 355,5 | — | 360 | — | 133,5 | — | — | — | — | — | — | — | 350 | | | | | | | | |
| 400 | 825 | 705 | 68 | 16 | M64 | 406,5 | — | 411 | — | 146,5 | — | — | — | — | — | — | — | 400 | | | | | | | | |
| 450 | 915 | 774,5 | 74 | 16 | M70 | 457 | — | 462,5 | — | 162 | — | — | — | — | — | — | — | 450 | | | | | | | | |
| 500 | 985 | 832 | 80 | 16 | M76 | 508 | — | 514,5 | — | 178 | — | — | — | — | — | — | — | 500 | | | | | | | | |
| 600 | 1 170 | 990,5 | 94 | 16 | M90 | 609,5 | — | 616 | — | 203,5 | — | — | — | — | — | — | — | 600 | | | | | | | | |

NOTE — For facing dimensions, see tables 5 and 7.



This diagram illustrates the arrangement but not necessarily the correct number of bolt holes. Refer to the column "number of bolts" in table 19 for the actual number.

Table 19 — Dimensions of PN 420 flanges
(See the notes on page 46.)

| Nominal size DN | Mating dimensions | | | | Outside diameter of neck (see note 7) | Bore diameter (see note 8) | | Flange thickness | Shoulder diameter | Length of hub | | Neck diameter | Lap radius (at pipe end) | Minimum thread length of threaded flange (see note 5) | Minimum diameter of counter-bore threaded flange | Nominal size | | | | | | | | | | |
|--------------------|----------------------------|-------------------------|------------------------|--------|---------------------------------------|----------------------------|--------------|------------------|-------------------|---------------|----------------|---------------|--------------------------|---|--|--------------|----------------|-------|-----|----------------|----------------|---|----------------|---|---|----|
| | Outside diameter of flange | Diameter of bolt circle | Diameter of bolt holes | Number | | Bolts | Nominal size | | | A | B ₂ | | | | | | B ₃ | C | G | H ₁ | H ₂ | N | R ₂ | T | V | DN |
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15 | 135 | 89 | 22 | 4 | M20 | 21,5 | 23 | — | — | 30,5 | — | 40 | 40 | 73 | 43 | 3 | 29 | 24 | 15 | | | | | | | |
| 20 | 140 | 95 | 22 | 4 | M20 | 26,5 | 28,5 | — | — | 32 | — | 43 | 43 | 79 | 51 | 3 | 32 | 29 | 20 | | | | | | | |
| 25 | 160 | 108 | 26 | 4 | M24 | 33,5 | 35 | — | — | 35 | — | 48 | 48 | 89 | 57 | 3 | 35 | 36 | 25 | | | | | | | |
| 32 | 185 | 130 | 29,5 | 4 | M27 | 42 | 43,5 | — | — | 38,5 | — | 52 | 52 | 95 | 73 | 5 | 38 | 44,5 | 32 | | | | | | | |
| 40 | 205 | 146 | 32,5 | 4 | M30 | 48,5 | 50 | — | — | 44,5 | — | 60 | 60 | 111 | 79 | 6 | 44 | 50,5 | 40 | | | | | | | |
| 50 | 235 | 171,5 | 29,5 | 8 | M27 | 60,5 | 62,5 | — | — | 51 | — | 70 | 70 | 127 | 95 | 8 | 51 | 63,5 | 50 | | | | | | | |
| 65 | 265 | 197 | 32,5 | 8 | M30 | 73 | 75,5 | — | — | 57,5 | — | 79 | 79 | 143 | 114 | 8 | 57 | 76,5 | 65 | | | | | | | |
| 80 | 305 | 228,5 | 35,5 | 8 | M33 | 89 | 91,5 | — | — | 67 | — | 92 | 92 | 168 | 133 | 10 | 64 | 92,5 | 80 | | | | | | | |
| 100 | 355 | 273 | 42 | 8 | M39 | 114,5 | 117 | — | — | 76,5 | — | 108 | 108 | 190 | 165 | 11 | 70 | 118 | 100 | | | | | | | |
| 125 | 420 | 324 | 48 | 8 | M45 | 141,5 | 144,5 | — | — | 92,5 | — | 130 | 130 | 229 | 203 | 11 | 77 | 144,5 | 125 | | | | | | | |
| 150 | 485 | 368,5 | 55 | 8 | M52 | 168,5 | 171,5 | — | — | 108 | — | 152 | 152 | 273 | 235 | 13 | 83 | 171,5 | 150 | | | | | | | |
| 200 | 550 | 438 | 55 | 12 | M52 | 219 | 222 | — | — | 127 | — | 178 | 178 | 317 | 305 | 13 | 96 | 222,5 | 200 | | | | | | | |
| 250 | 675 | 593,5 | 68 | 12 | M64 | 273 | 277,5 | — | — | 165,5 | — | 229 | 229 | 419 | 375 | 13 | 108 | 276,5 | 250 | | | | | | | |
| 300 | 780 | 619 | 74 | 12 | M70 | 324 | 328 | — | — | 184,5 | — | 254 | 254 | 464 | 441 | 13 | 121 | 329,5 | 300 | | | | | | | |

NOTE — For facing dimensions, see tables 5 and 7.

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Notes to tables 8, 9, 10, 11, 13 and 14

- 1 For tolerances, see 2.7 and section 4
 - 2 For facings, see 2.5, figure 6 and table 4.
 - 3 For spot-facing, see 2.6.
 - 4 For reducing threaded, slip-on and weld neck flanges, see 2.4.4.2.
 - 5 For threads in threaded flanges, see 2.4.3.
 - 6 The neck thickness dimension S is applicable to the majority of flanges, but for sizes above DN 600 or for flanges to be used with other pipe wall thicknesses, the neck thickness is subject to agreement between the manufacturer and purchaser
 - 7 The neck diameter N_3 is the theoretical maximum which will permit the use of ISO ring spanners or the fitting, if required, of the normal series of ISO washers (ISO 887) without some form of additional machining such as spot-facing (see 2.6). The washer, if used, may theoretically overlap slightly the corner radius but in practice it is deemed that there is sufficient space to fit the washer satisfactorily.
 - 8 The bore diameter B in sizes generally above DN 600 should be specified by the purchaser
- The bore for a welding neck (type 11) or a socket weld (type 14) flange should be specified by the purchaser if required to differ from the dimensions given in tables 8 to 11, 13 and 14
- 9 In respect of threaded flanges, the outside diameters of DN 65, DN 125 and DN 150 pipes should be as shown in the following table.

Dimensions in millimetres

| Nominal size DN | Outside diameter | |
|--------------------|------------------------|----------------------------------|
| | threaded to ISO 7-1 | threaded to ANSI/ASME B1.20.1 |
| 65 | 76,1 | 73 |
| 125 | 139,7 | 141,3 |
| 150 | 165,1 | 168,3 |

- 10 Up to and including nominal size DN 600, the flanges have been recalculated recently according to the relevant German (DIN) calculation method. For this reason it was necessary to increase certain flange thicknesses. Above nominal size DN 600, flange thicknesses remain as they were, but the previous pressure/temperature ratings are no longer applicable (see E 1)

Notes to tables 12, 15, 16, 17, 18 and 19

- 1 For tolerances, see 2.7 and section 4
- 2 For facings, see 2.5, figure 7 and tables 5, 6 and 7.
- 3 For spot-facing, see 2.6
- 4 For reducing threaded, slip-on and weld neck flanges, see 2.4.4.2
- 5 For threads in threaded flanges, see 2.4.3
- 6 Blank flanges may be with or without hubs at the manufacturer's option
- 7 For welding of unequal wall thicknesses, see the acceptable bevel designs in annex B
- 8 Dimensions for B_3 correspond to the inside diameter of the pipe as given in ANSI/ASME B36.10 for Standard Wall pipe. The thickness of Standard Wall is the same as Schedule 40 in sizes DN 250 and smaller. Tolerances in table 20 apply
- 9 When PN 20 and PN 50 flanges are required with flat face, either the full thickness or the thickness with the raised face removed may be furnished. Users are reminded that removing the raised face will make the length through the hub non-standard. See 2.5.2
- 10 The bore for a welding neck (type 11) or a socket weld (type 14) flange should be specified by the purchaser if required to differ from the dimensions given in tables 12 and 15 to 19
- 11 In respect of threaded flanges, the outside diameters of DN 65, DN 125 and DN 150 pipes should be as shown in the following table

Dimensions in millimetres

| Nominal size DN | Outside diameter | |
|--------------------|------------------------|----------------------------------|
| | threaded to ISO 7-1 | threaded to ANSI/ASME B1.20.1 |
| 65 | 76,1 | 73 |
| 125 | 139,7 | 141,3 |
| 150 | 165,1 | 168,3 |

- 12 Attention is drawn to D 4 and annex F for DN 300 and above for pipeline applications
- 13 The R_1 dimension only applies to DN 300 and above for flanges used in pipeline applications
- 14 Welding end diameters A_1 given are for general application and not for pipeline applications

Section 4: Tolerances

Table 20 — Tolerances

Dimensions in millimetres

| Dimension | PN | Flange type | Tolerance | Size range |
|---|-------------------------------|---|-----------------------|-----------------------------------|
| Bore diameter B_1, B_2, B_3 | All | 11, 14 ¹⁾ , 33 | +0,5 -1,0 | < DN 125 |
| | | | +1,0 -1,5 | DN 150 up to and including DN 300 |
| | | Other than 11, 14 ¹⁾ and 33 | ±2 | > DN 350 |
| | | | +1 0 | < DN 125 |
| Flange thickness C_1, C_2, C_3 | All | All (machined on both faces) | +2 0 | thickness < 18 |
| | | | +3 0 | 18 < thickness < 50 |
| | | All (machined on front face only) | +4 0 | thickness > 50 |
| | | | +3,5 0 | thickness < 18 |
| Length through hub H | All | 11 | +5,5 0 | 18 < thickness < 50 |
| | | | +9 0 | thickness > 50 |
| | | | ±1,5 | < DN 250 |
| | | | ±3 | DN 300 up to and including DN 600 |
| Outside diameter of neck A | All | 04, 11 | ±4,5 | > DN 650 |
| | | | +2,5 -1,0 | < DN 150 |
| | | | +4 -1 | DN 200 up to and including DN 600 |
| Facing diameter d_1 | 2,5, 6, 10, 16, 25, 40 | All | +5,5 -1,5 | > DN 650 |
| | | | +2 -1 | < DN 250 |
| | 20, 50, 110, 150, 260, 420 | | +3 -1 | > DN 300 |
| | | | $f_1 = 2$ $f_1 = 7$ | |
| Facing height f_1 | All | All | ±1 ±0,5 | < DN 600 |
| | | | ±2 ±1 | > DN 650 |
| Facing diameters x_1, x_2, y_1, y_2, y_3 | All | All | 1 min | All |
| w, y | All | All | ±0,5 0 | < DN 600 |
| x, z | All | All | 0 -0,5 | < DN 600 |
| Diameter of bolt circle K | All | All | ±1 | bolt sizes M10 to M24 |
| | | | ±1,25 | bolt sizes M27 to M33 |
| | | | ±1,5 | bolt sizes M36 to M52 |
| | | | ±2 | bolt sizes M56 to M95 |
| | | | ±2,5 | bolt sizes M100 |

Table 20 (concluded)

Dimensions in millimetres

| Dimension | PN | Flange type | Tolerance | Size range |
|---|-----|-------------|-----------|-----------------------------------|
| Centre-to-centre of adjacent bolt holes | All | All | ± 0,5 | bolt sizes M14 to M24 |
| | | | ± 0,625 | bolt sizes M27 to M33 |
| | | | ± 0,75 | bolt sizes M36 to M52 |
| | | | ± 1 | bolt sizes M56 to M95 |
| | | | ± 1,25 | bolt sizes M100 |
| Eccentricity of machined facing diameters | All | All | 0,5 | < DN 65 |
| | | | 1 | DN 80 up to and including DN 150 |
| | | | 2 | DN 200 up to and including DN 500 |
| | | | 3 | > DN 600 |

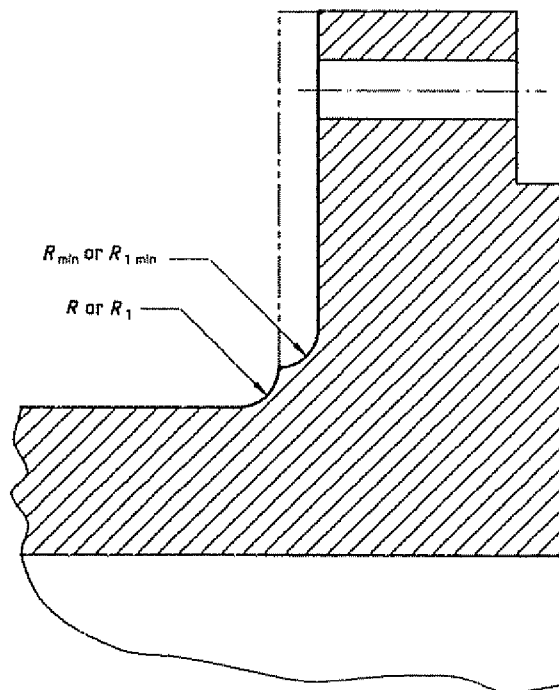
Bolting bearing faces shall be parallel with the flange gasket surface within 1°.

1) Small bore only.

Table 21 — Minimum hub radius after back-facing

Dimensions in millimetres

| Flange nominal size | R_{min} and R_{1min} |
|---|--------------------------|
| Up to and including DN 50 | 2 |
| Over DN 50 and up to and including DN 200 | 3 |
| Over DN 200 | 5 |



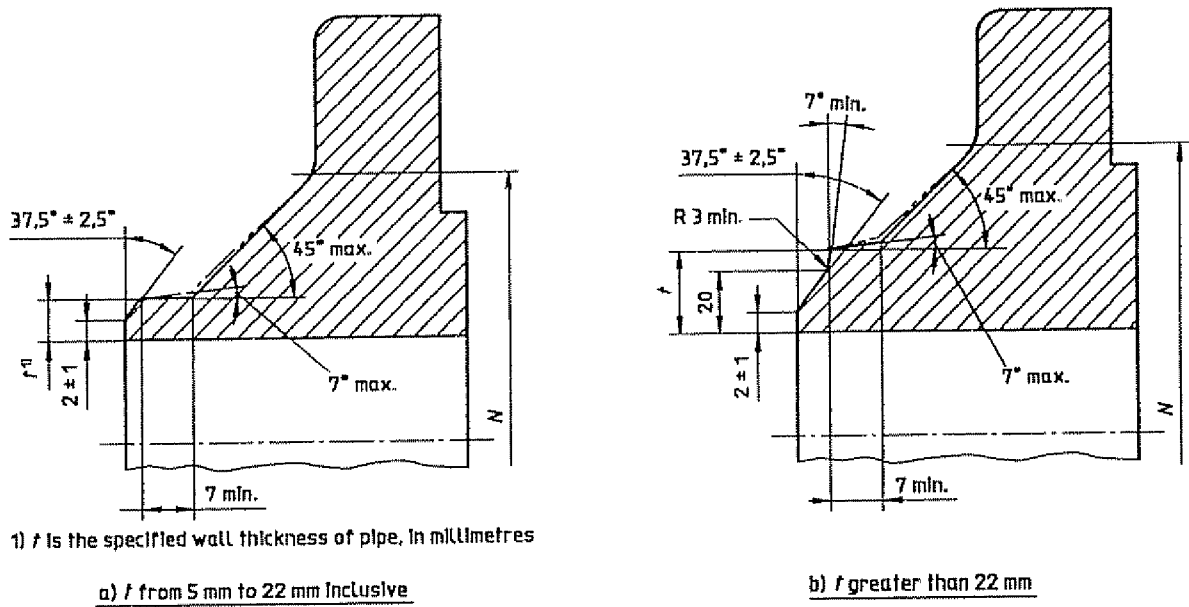
NOTE — For dimensions of R and R_1 , see tables 8 to 19

Figure 8 — Minimum hub radius after back-facing

Annex A
(normative)

Bevel for specified wall thicknesses from 5 mm to 22 mm inclusive and greater than 22 mm

Dimensions in millimetres



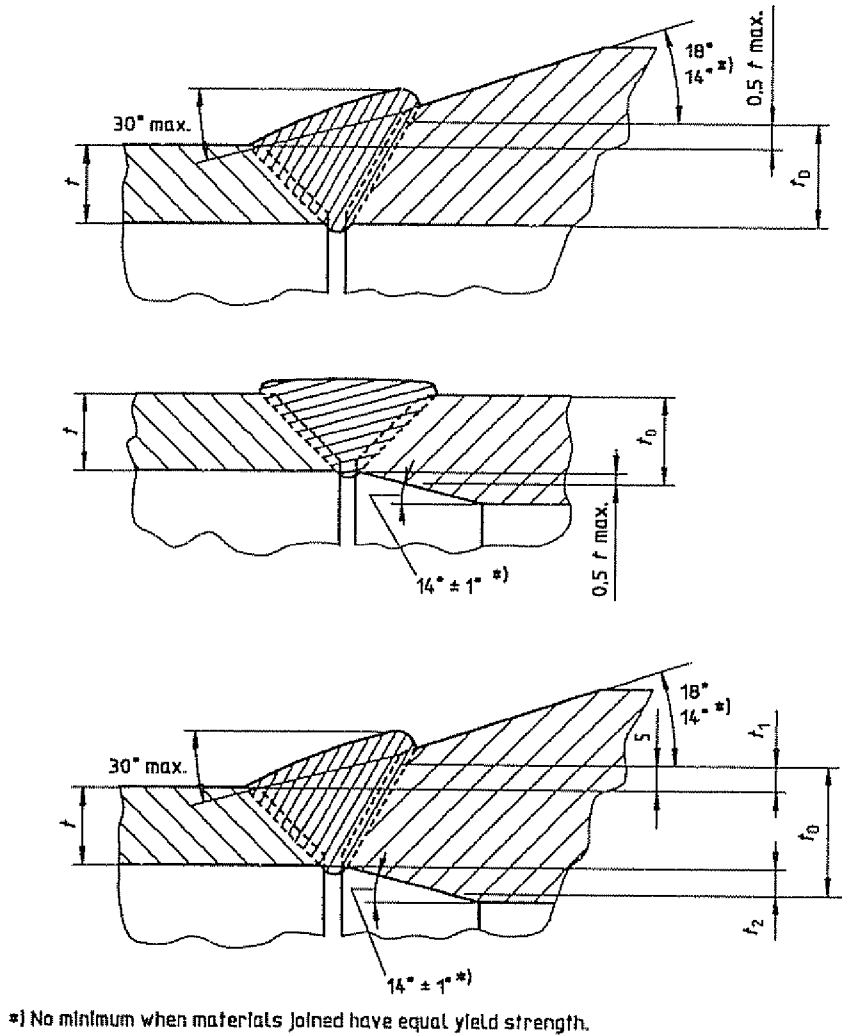
NOTES

- 1 See 2 4 4 1, 2 4 5 3 and 2 4 6
- 2 For flanges required to connect with ferritic steel pipe of nominal wall thickness less than 4.8 mm the welding ends shall be finished to a slight chamfer or shall be square, at the option of the manufacturer.
For flanges required to connect with austenitic stainless steel pipe of nominal wall thickness 3.2 mm or less, the welding ends shall be finished to a slight chamfer.
- 3 When flanges covered by this part of ISO 7005 are intended for service with light-wall high-strength pipe, the thickness of the hub at the bevel may be greater than that of the pipe to which the flange is joined. Under these conditions a single taper hub may be provided and the outside diameter of the hub at the base (dimension N) may be modified
- 4 For dimensions of welding-neck thickness (type 11), see the tables in section 3

Figure A.1 — Bevel for specified wall thicknesses t

Annex B (normative)

Acceptable bevel designs for unequal wall thicknesses (pipeline applications)



NOTE – None of the dimensions t_1 , t_2 or $t_1 + t_2$ shall exceed $0,5t$

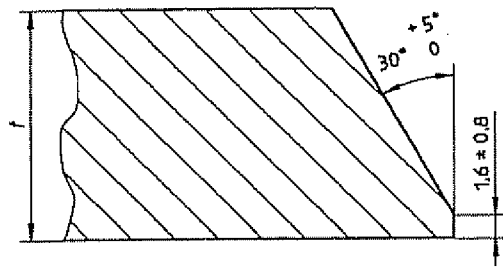
Figure B.1 – Acceptable bevel designs for unequal wall thicknesses

When the minimum specified yield strengths of the sections to be joined are unequal, the deposited weld metal shall have mechanical properties at least equal to those of the section having the higher strength, and the minimum thickness t_D shall equal at least t times the ratio of the minimum specified yield strength of the pipe and of the flange, but shall not exceed $1,5 t$.

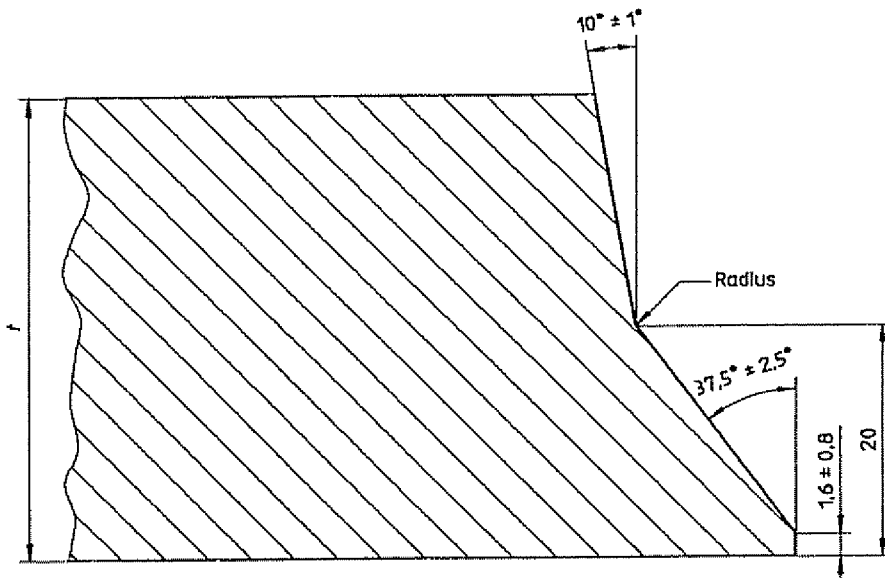
Annex C
(informative)

Recommended bevel for equal wall thicknesses t at the end of the flange hub from 5 mm to 22 mm inclusive and greater than 22 mm (pipeline applications)

Dimensions in millimetres



a) t from 5 mm to 22 mm inclusive (pipeline applications)



b) t greater than 22 mm (pipeline applications)

Figure C.1 – Recommended bevel for equal wall thicknesses t at the end of the flange hub

Annex D (informative)

Guidance on flange materials

D.1 General

When work started on this part of ISO 7005 it was decided to refer to the German and American steels which were used for the manufacture of the European and American steel flanges on which this part of ISO 7005 is based. Since then a number of ISO standards have been published, or are in preparation, which specify steels suitable for the manufacture of flanges. However, the complete suite of ISO standards has yet to be published, and therefore the materials specified in this annex are given for guidance only and users are entitled to select other steels from national standards in preference, as deemed necessary. Moreover, if specifying steels not given in this part of ISO 7005, users of this part of ISO 7005 have the responsibility to ensure that the steels are suitable for the PN designations given. In a future edition of this part of ISO 7005, steels from ISO standards only will be specified.

Guidance on pressure/temperature ratings for certain flanges made from the materials given in this annex is given in annex E.

D.2 Range of materials

Except for pipeline flanges, flanges specified in this part of ISO 7005 may be manufactured from materials selected from tables D.1 and D.2.

NOTE — See also 1.1

When PN 20, PN 50, PN 110 and PN 150 flanges are specified for pipeline applications, materials may be selected from table D.3.

D.3 Material groupings

Materials in this part of ISO 7005 are identified by a basic material reference.

NOTES

1 Several materials have been placed in any one group with the provision that they give a compatible rating for the flanged joint (i.e. materials likely to be used together are capable of maintaining the same rating). In this respect the characteristics of any material in a given group are compatible with the rating for that group. Consequently, ratings for some materials are conservative (see also annex E).

2 The specifications may not be equivalent in all details and therefore may not be equally suitable for all applications.

D.4 Materials for PN 20, PN 50, PN 110 and PN 150 flanges types 05 and 11 for nominal sizes DN 300 and larger for pipeline applications

The steel used in the manufacture of PN 20, PN 50, PN 110 and PN 150 flanges types 05 and 11 for nominal sizes DN 300 and larger for pipeline applications given in table D.3 should be selected by the manufacturer to meet the following recommendations.

D.4.1 The 4.A.330 and higher grades of steel for PN 110 and PN 150 flanges should be killed steel.

D.4.2 The steel used should be suitable for field welding to other flanges, fittings or pipe manufactured to the appropriate International Standards.

D.4.3 The steel used should have a maximum carbon content of 0,35 % (*m/m*) and a carbon equivalent (C.E.) computed using the following equation:

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

which should not exceed 0,50, based on check analysis. If the carbon equivalent exceeds 0,50, the acceptance of the flanges should be based on agreement between the purchaser and the manufacturer.

The choice and use of alloying elements, combined with the elements within the limits given above to give the required tensile properties prescribed in D.4.4, should be made by the flange manufacturer and included and reported in the ladle or check analyses to identify the type of steel.

D.4.4 The steel used should have tensile properties conforming to the requirements given in table D.3 and be capable of meeting the flange manufacturer's design conditions as given in annex F.

The test specimens should be taken from the forgings or, at the manufacturer's option, from the billets or forging bars used to manufacture the finished product, provided that such a test specimen has undergone substantially the same forming and the equivalent heat treatment as the finished flange. The dimensions of the test specimen should be such as to reflect

adequately the heat treatment properties of the hub of the flange. Specimens should be obtained from the midwall of the thinnest section of the hub of the flange or 19 mm from the surface of the test specimen. The orientation of specimens taken from a flange should be longitudinal. If a separate test bar is used, it should be heat treated in a heat treat batch with the flanges it represents.

D.4.5 The 4.A.290 and higher grades of steel for PN 20, PN 50, PN 110 and PN 150 flanges and the 4.A.250 grade of steel for PN 110 and PN 150 flanges should be normalized or quenched and tempered.

NOTE — It is recognized that the cooling rate in a quenching operation may be slower in the thicker ring section of the flange than in the thinner hub section. Hence, the increase in yield strength due to the quenching operations may be less in the ring section than in the hub section. This factor is accounted for in D 4.6

D.4.6 The flange ring should have sufficient pressure capacity for the service based on its strength in the normalized condition. This capacity should be substantiated by design calculations using the allowable design stresses as given in annex F of this part of ISO 7005.

Table D.1 — Basic properties and reference standards for materials used for PN 2.5, PN 6, PN 10, PN 16, PN 25 and PN 40 flanges

| Description | Group | DIN steel | | ISO steel | | |
|-------------|-------|--------------------------------|--------------------------------------|--------------------------|------------------------|---|
| | | Limiting thickness mm | Original DIN standard and grade | Limiting thickness mm | ISO standard and grade | Service temperature ¹⁾ °C |
| Casting | 1E0 | — | DIN 1681 GS-38,3 | — | ISO 3755 200-400W | — |
| Forging | | < 16 > 16 < 40 > 40 < 63 | DIN 17100 RS1 37-2 | < 63 | ISO 2604-1 F8 | - 10 to 300 |
| Plate | | < 16 > 16 < 40 > 40 < 63 | DIN 17100 RS1 37-2 | < 63 | ISO 630 Fe 360B | - 10 to 300 |
| Forging | 2E0 | 60 — — | DIN 2528 C 16 B C 21 C 22 3 | — | ISO 2604-1 F9 | - 10 to 360 |
| Plate | | < 16 > 16 < 40 > 40 < 60 | DIN 17155 | < 60 | ISO 9328-2 PH 235 | - 10 to 480 |
| Casting | 3E0 | — | DIN 17245 GS-C25 | — | ISO 4991 C23-45AH | — |
| Forging | | < 100 | DIN 17243 C 22 8 | < 100 | ISO 2604-1 F13 | - 10 to 420 |
| Plate | | > 16 < 40 | DIN 17155 H11 | < 60 | ISO 9328-2 PH 265 | - 10 to 480 |
| Casting | 4E0 | — | DIN 17245 GS-22 Mo4 | — | ISO 4991 C28H | — |
| Forging | | < 16 > 16 < 40 > 40 < 60 | DIN 17175 15 Mo 3 | < 60 | ISO 2604-1 F26 | - 10 to 530 |
| Plate | | < 16 > 16 < 40 > 40 < 60 | DIN 17155 15 Mo 3 | < 60 | ISO 9328-2 16 Mo 3 | - 10 to 530 |
| | | — | DIN 2528 16 Mo 5 | — | — | — |

Table D.1 (continued)

| Description | Group | DIN steel | | ISO steel | | |
|-------------|-------|--------------------------------|---------------------------------------|--------------------------|-------------------------------|--|
| | | Limiting thickness mm | Original DIN standard and grade | Limiting thickness mm | ISO standard and grade | Service temperature ¹⁾ °C |
| Casting | 5E0 | — | DIN 17245 GS-17 CrMo 5 5 | — | ISO 4991 C32H | — |
| Forging | | < 60 | DIN 17243 13 CrMo 4 4 | < 60 | ISO 2604-1 F32 | -10 to 570 |
| Plate | | < 16 > 16 < 40 > 40 < 60 | DIN 17155 13 CrMo 4 4 | < 60 | ISO 9328-2 14 CrMo 4 5 | -10 to 570 |
| Casting | 6E0 | — | DIN 17245 GS-18 CrMo 9 10 | — | ISO 4991 C34BH | — |
| Forging | | — | DIN 17243 10 CrMo 9 10 | — | ISO 2604-1 F34 | -10 to 600 |
| Plate | | < 16 > 16 < 40 > 40 < 60 | DIN 17155 10 CrMo 9 10 | — | ISO 9328-2 13 CrMo 9 10 T1 | — |
| Casting | 7E1 | 30 | DIN 17245 GS-10 Ni 19 | < 35 | ISO 4991 C43L | — |
| | 7E1 | 35 | DIN 17245 GS-10 Ni 14 | | | |
| Forging | 7E1 | — | DIN 17280 10 Ni 14 | — | — | — |
| | 7E0 | — | DIN 17102 TStE 315 | — | — | — |
| | 7E0 | — | DIN 17102 TStE 355 | — | — | — |
| | 7E1 | — | DIN 17102 TStE 380 | — | ISO 2604-1 F44 | — |
| | 7E1 | — | DIN 17102 TStE 420 | — | — | — |
| | 7E2 | — | DIN 17280 X 8 Ni 9 | — | ISO 2604-1 F45 | — |
| | 7E1 | — | DIN 17280 12 Ni 19 | — | — | — |
| Plate | 7E1 | — | DIN 17280 10 Ni 14 | — | — | — |
| | 7E0 | — | DIN 17102 TStE 315 | — | ISO 9328-4 P 315 TN | — |
| | 7E0 | — | DIN 17102 TStE 355 | — | ISO 9328-4 P 355 TN | — |
| | 7E1 | — | DIN 17102 TStE 380 | — | ISO 9328-4 PL 390 TN | — |
| | 7E1 | — | DIN 17102 TStE 420 | — | ISO 9328-4 PL 420 TN | — |
| | 7E2 | — | DIN 17280 X 8 Ni 9 | — | ISO 9328-3 X 8 Ni 9 | — |
| | 7E1 | — | DIN 17280 12 Ni 19 | — | ISO 9328-3 12 Ni 14 G2 | — |

Table D.1 (continued)

| Description | Group | DIN steel | | ISO steel | | | |
|-------------|-------|--------------------------------|---|------------------------------------|---|--|-------------|
| | | Limiting thickness mm | Original DIN standard and grade | Limiting thickness mm | ISO standard and grade | Service temperature ¹⁾ °C | |
| Forging | 8E0 | — | DIN 17102 WStE 255 | — | — | — | |
| | 8E1 | — | WStE 285 | — | — | — | |
| | 8E2 | — | WStE 315 | — | — | — | |
| | 8E3 | — | WStE 355 | — | — | — | |
| Plate | 8E0 | — | DIN 17102 WStE 255 | — | ISO 9328-4 P 255 TN | — | |
| | 8E1 | — | WStE 285 | — | P 285 TN | — | |
| | 8E2 | — | WStE 315 | — | P 315 TN | — | |
| | 8E3 | — | WStE 355 | — | P 355 TN | — | |
| Casting | 9E0 | — | DIN 17245 G-X 22 CrMoV 12 1 | — | ISO 4991 C40H | — | |
| Forging | | < 16 > 16 < 40 > 40 < 60 | DIN 17175 X 20 CrMoV 12 1 | 60 | ISO 2604-1 F40 | — | |
| Casting | | — | — | — | ISO 4991 C46 | — | |
| Forging | 10E0 | — | DIN 17440 X 2 CrNi 19 11 X 2 CrNiN 18 10 | — | ISO 2604-1 F46 | — | |
| | | — | — | — | — | — | |
| | | — | DIN 17440 X 2 CrNi 19 11 X 2 CrNiN 18 10 | — | — ISO 9328-5 X 2 CrNi 18 10 | — - 196 to 550 | |
| Casting | 11E0 | — | DIN 17445 G-X 6 CrNi 18 9 | — | ISO 4991 C47 | — | |
| | | — | DIN 17440 X 5 CrNi 18 10 | — | ISO 2604-1 F47 | - 196 to 550 | |
| | | — | DIN 17440 X 5 CrNi 18 9 | — | ISO 9328-5 X 5 CrNi 18 9 | - 196 to 550 | |
| Casting | 12E0 | — | DIN 17445 G-X 5 CrNiNb 18 9 | — | ISO 4991 C50 | — | |
| | | — | DIN 17440 X 6 CrNiTi 18 10 | — | ISO 2604-1 F53 | - 196 to 550 | |
| | | — | DIN 17440 X 6 CrNiNb 18 10 X 6 CrNiTi 18 10 X 6 CrNiNb 18 10 | — — — | ISO 2604-1 F50 ISO 9328-5 X 6 CrNiTi 18 10 X 6 CrNiNb 18 10 | — - 196 to 550 — | |
| Casting | 13E0 | — | DIN 17445 G-X 3 CrMoN 17 13 5 | — | ISO 4991 C57 C612C | — — | |
| | | — | DIN 17440 X 2 CrNiMo 17 13 2 | — | ISO 2604-1 F59 | - 60 to 550 | |
| | Plate | 13E0 | — | DIN 17440 X 2 CrNiMo 17 13 2 | — | ISO 9328-5 X 2 CrNiMo 17 12 | - 60 to 550 |
| | | 13E1 | — | X 2 CrNiMoN 17 12 2 | — | X 2 CrNiMoN 17 12 | — |
| | | 13E1 | — | X 2 CrNiMoN 17 12 2 | — | — | — |

Table D.1 (concluded)

| Description | Group | DIN steel | | ISO steel | | |
|-------------|-------|--------------------------|--|--------------------------|--|--|
| | | Limiting thickness mm | Original DIN standard and grade | Limiting thickness mm | ISO standard and grade | Service temperature ¹⁾ °C |
| Casting | 14E0 | — | DIN 17445 G-X 6 CrNiMo 18 10 | — | ISO 4991 C60 C61 | — |
| Forging | | — | DIN 17440 X 5 CrNiMo 17 12 2 | — | ISO 2604-1 F62 | -60 to 550 |
| Plate | | — | DIN 17440 X 5 CrNiMo 17 12 2 | — | ISO 9328-5 X 5 CrNiMo 17 12 | -60 to 550 |
| Casting | 15E0 | — | DIN 17445 G-X 5 CrNiMoNb 18 10 | — | ISO 4991 C60Nb | — |
| Forging | | — | DIN 17440 X 6 CrNiMoTi 17 12 2 X 10 CrNi 18 10 | — | ISO 2604-1 F66 | -60 to 550 |
| Plate | | — | DIN 17440 X 6 CrNiMoTi 17 12 2 X 10 CrNiMoNb 18 10 | — | ISO 9328-5 X 6 CrNiMoTi 17 12 X 6 CrNiMoNb 17 12 | — |
| Forging | 16E0 | — | SEW 470 X 7 CrNi 23 14 | — | ISO 4955 H14 | — |
| Forging | 17E0 | — | SEW 470 X 15 CrNiSi 25 20 | — | ISO 4955 H15 | — |
| | | — | — | X 12 CrNi 25 21 | — | H16 |

1) The upper limiting value indicates that prolonged use above the given temperature is not recommended.

NOTE — The mechanical properties given in the standards referred to should be regarded as the minimum values for which the pressure/temperature ratings given in annex E are valid.

Table D.2 – Reference standards for materials used for PN 20, PN 50, PN 110, PN 150, PN 260 and PN 420 flanges

| Material group | Description | ASTM specification and grade | Remarks | ISO standard and grade | Limiting thickness mm | Remarks |
|----------------|-------------|---|--------------------------------------|---|---------------------------------|----------------------------|
| 1A1 | Casting | ASTM A216 WCB | 1), 2) | ISO 4991 C26 – 52H | — | 1), 2) |
| | Forging | ASTM A105 ASTM A350 LF2 | 1), 2) 3) | ISO 2604-1 F22 F13 F18 | < 63 < 63 > 63 < 250 | 1), 2) 3) 3) |
| | Plate | ASTM A515 70 ASTM A516 70 ASTM A537 CL1 | 1), 2) 1), 4) 3) | ISO 9328-2 PH290 PH315 PH355 | < 60 > 60 < 100 < 100 | 1), 4) 1), 4) 3) |
| 1A2 | Casting | ASTM A216 WCC ASTM A352 LC2 LC3 LCC | 1), 2) 3) 3) 3) | ISO 4991 C26 – 52H, N (+T) C26 – 52L C43L | — — — | 1), 2) 3) 3) |
| | Forging | ASTM A350 LF3 | 3) | ISO 2604-1 F44 | < 250 | 3) |
| | Plate | ASTM A203 B E | 1), 2) 1), 2) | ISO 9328-3 12 Ni 14 G1 | < 50 | 1), 2) |
| 1A3 | Casting | ASTM A352 LCB | 1) | ISO 4991 C23 – 46BL | — | 1) |
| | Plate | ASTM A203 A D ASTM A515 65 ASTM A516 65 | 1), 2) 1), 2) 1), 2) 1), 4) | ISO 9328-2 PH290 PH315 ISO 9328-3 12 Ni 14 G1 | < 100 > 100 < 50 | 1), 4) 1), 4) 1), 2) |
| 1A4 | Forging | ASTM A350 LF1 | 3) | ISO 2604-1 F9 | < 250 | 3) |
| | Plate | ASTM A515 60 ASTM A516 60 | 1), 2) 1), 4) | ISO 9328-2 PH235 PH265 PH290 | < 40 > 40 < 60 > 60 < 150 | 1), 4) 1), 4) 1), 4) |
| 1A5 | Casting | ASTM A217 WC1 ASTM A325 LC1 | 2), 5) 3) | ISO 4991 C28H | — | 2), 5) |
| | Forging | ASTM A182 F1 | 2), 5) | ISO 2604-1 F28 | — | 2), 5) |
| | Plate | ASTM A204 A B | 2), 5) 2), 5) | ISO 9328-2 16 Mo 3 | < 60 | 2), 5) |

Table D.2 (continued)

| Material group | Description | ASTM specification and grade | Remarks | ISO standard and grade | Limiting thickness mm | Remarks |
|----------------|-------------|---------------------------------|--------------|---|-----------------------|----------------------|
| 1A7 | Casting | ASTM A217 WC4 WC5 | 2) 6) | — | — | — |
| | Forging | ASTM A182 F2 | 2) | — | — | — |
| | Plate | ASTM A204 C | 4) | — | — | — |
| 1A9 | Casting | ASTM A217 WC6 | 7) | ISO 4991 C32H | — | 7) |
| | Forging | ASTM A182 F11 F12 | 8) 8) | — | — | — |
| | Plate | ASTM A387 11 CL2 | 8) | — | — | — |
| 1A10 | Casting | ASTM A217 WC9 | 7) | ISO 4991 C34AH | — | 7) |
| | Forging | ASTM A182 F22 | 7) | ISO 2604-1 F34Q | — | 8) |
| | Plate | ASTM A387 22 CL2 | 8) | ISO 9328-2 13 CrMo 9 10 T2 | < 100 | 8) |
| 1A13 | Casting | ASTM A217 C5 | — | ISO 4991 C37H | — | — |
| | Forging | ASTM A182 F5 F5a | — — | ISO 2604-1 F37 | — | — |
| 1A14 | Casting | ASTM A217 C12 | — | ISO 4991 C38H | — | — |
| | Forging | ASTM A182 F9 | — | — | — | — |
| 2A1 | Casting | ASTM A351 CF8 CF3 | — 9) | ISO 4991 C46 C47 | — — | 9) — |
| | Forging | ASTM A182 F304 F304H | — — | ISO 2604-1 F49 | — | — |
| | Plate | ASTM A240 304 304H | — 9) | ISO 9328-5 X 5 CrNi 18 9 | — | — |
| 2A2 | Casting | ASTM A351 CF8M CF3M | — 4) | ISO 4991 C57 C61LC C60 C61 | — — — — | 4) 4) 4) 4) |
| | Forging | ASTM A182 F316 F316H | — — | ISO 2604-1 F62 F64 | — — | — — |
| | Plate | ASTM A240 316 317 316H | — — 4) | ISO 9328-5 X 5 CrNiMo 17 12 — X 7 CrNiMo 17 12 | — — — | — — 4) |

Table D.2 (concluded)

| Material group | Description | ASTM specification and grade | Remarks | ISO standard and grade | Limiting thickness mm | Remarks |
|----------------|-------------|---|----------------------|--|-----------------------|----------------------|
| 2A3 | Forging | ASTM A182 F304L F316L | 9) 4) | ISO 2604-1 F46 F59 | -- -- | -- -- |
| | Plate | ASTM A240 304L 316L | 9) 4) | ISO 9328-5 X 2 CrNi 18 10 X 2 CrNiMo 17 12 X 2 CrNiMo 17 13 | -- -- -- | 9) 4) 4) |
| 2A4 | Forging | ASTM A182 F321 F321H | 2) -- | ISO 2604-1 F53 F54B) | -- -- | 2) -- |
| | Plate | ASTM A240 321 321H | 2) -- | ISO 9328-5 X 6 CrNiTi 18 10 X 7 CrNiTi 18 10 | -- -- | 2) -- |
| 2A5 | Forging | ASTM A182 F347 F347H F348 F348H | 2) -- 2) -- | ISO 2604-1 F50 F51 -- -- | -- -- -- -- | 2) -- -- -- |
| | Plate | ASTM A240 347 347H 348 348H | 2) -- 2) -- | ISO 9328-5 X 6 CrNiNb 18 10 X 7 CrNiNb 18 10 -- -- | -- -- -- -- | 2) -- -- -- |
| 2A6 | Casting | ASTM A351 CH8 CH20 | -- -- | -- -- | -- -- | -- -- |
| | Plate | ASTM A240 309S | -- | ISO 4955 H14 | -- | -- |
| 2A7 | Casting | ASTM A351 CK20 | -- | -- | -- | -- |
| | Forging | ASTM A182 F310 | 10) | ISO 2604-1 F68 | -- | 10) |
| | Plate | ASTM A240 310S | 10) | ISO 4955 H15 | -- | 10) |

- 1) Permissible but not recommended for prolonged use above about 425 °C.
- 2) Not to be used over 540 °C
- 3) Not to be used over 345 °C.
- 4) Not to be used over 455 °C.
- 5) Permissible but not recommended for prolonged use above about 455 °C
- 6) Not to be used over 565 °C
- 7) Not to be used over 590 °C.
- 8) Permissible but not recommended for prolonged use above about 590 °C.
- 9) Not to be used over 425 °C.
- 10) For service temperature 565 °C and above, should be used only when assurance is provided that grain size is not finer than ASTM No 6

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Table D.3 — Materials applicable to tables 12, 15, 16 and 17 covering PN 20, PN 50, PN 110 and PN 150 flanges types 05 and 11 in the size range DN 300 and larger for pipeline applications¹⁾

| Material group and grade identification number | Yield point min N/mm ² | Tensile strength min N/mm ² | Minimum elongation on a length L_0 of 50,8 mm % |
|--|--------------------------------------|---|--|
| 4.A.250 | 250 | 410 | 20 |
| 4.A.290 | 290 | 410 | 20 |
| 4.A.315 | 315 | 410 | 20 |
| 4.A.330 | 330 | 430 | 20 |
| 4.A.345 | 345 | 440 | 20 |
| 4.A.360 | 360 | 460 | 20 |
| 4.A.385 | 385 | 470 | 20 |
| 4.A.415 | 415 | 520 | 20 |
| 4.A.450 | 450 | 530 | 18 |
| 4.A.485 | 485 | 550 | 18 |

1) See also D.4.

D.5 Reference documents

ISO 630 : 1980, *Structural steels.*

ISO 2604-1 : 1975, *Steel products for pressure purposes — Quality requirements — Part 1: Forgings.*

ISO 3755 : 1991, *Cast carbon steels for general engineering purposes.*

ISO 4955 : 1983, *Heat-resisting steels and alloys.*

ISO 4991 : —¹⁾, *Steel castings for pressure purposes.*

ISO 9328-1 : 1991, *Steel plates and strips for pressure purposes — Technical delivery conditions — Part 1: General requirements.*

ISO 9328-2 : 1991, *Steel plates and strips for pressure purposes — Technical delivery conditions — Part 2: Unalloyed and low-alloyed steels with specified room temperature and elevated temperature properties.*

ISO 9328-3 : 1991, *Steel plates and strips for pressure purposes — Technical delivery conditions — Part 3: Nickel-alloyed steels with specified low temperature properties.*

ISO 9328-4 : 1991, *Steel plates and strips for pressure purposes — Technical delivery conditions — Part 4: Weldable fine grain steels with high proof stress supplied in the normalized or quenched and tempered condition.*

ISO 9328-5 : 1991, *Steel plates and strips for pressure purposes — Technical delivery conditions — Part 5: Austenitic steels.*

ASTM A 105/A105M-87a, *Specification for Forgings, Carbon Steel, for Piping Components.*

ASTM A 182/A182M-88, *Specification for Forged or Rolled Alloy-Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service.*

ASTM A 203/A203M-82(1988), *Specification for Pressure Vessel Plates, Alloy Steel, Nickel.*

ASTM A 204/A204M-88, *Specification for Pressure Vessel Plates, Alloy Steel, Molybdenum.*

ASTM A 216/A216M-84b, *Specification for Steel Castings, Carbon Suitable for Fusion Welding for High-Temperature Service.*

ASTM A 217/A217M-87, *Specification for Steel Castings, Martensitic Stainless and Alloy, for Pressure-Containing Parts Suitable for High-Temperature Service.*

ASTM A 240-88a, *Specification for Heat-Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels.*

ASTM A 325-88a, *Specification for High-Strength Bolts for Structural Steel Joints.*

ASTM A 350/A350M-87a, *Specification for Forgings, Carbon and Low-Alloy Steel, Requiring Notch Toughness Testing for Piping Components*

ASTM A 351/A351M-88, *Specification for Steel Castings, Austenitic, for High-Temperature Service.*

ASTM A 352/A352M-88, *Specification for Steel Castings, Ferritic and Martensitic, for Pressure-Containing Parts Suitable for Low-Temperature Service*

1) To be published

ASTM A 387/A387M-88, *Specification for Pressure Vessel Plates, Alloy Steel, Chromium-Molybdenum*.

ASTM A 515/A515M-82(1987), *Specification for Pressure Vessel Plates, Carbon Steel, for Intermediate- and Higher-Temperature Service*.

ASTM A 516/A516M-86, *Specification for Pressure Vessel Plates, Carbon Steel, for Moderate- and Lower-Temperature Service*.

ASTM A 537/A537M-86, *Specification for Pressure Vessel Plates, Heat-treated, Carbon-Manganese-Silicon Steel*.

DIN 1681 : 1985, *Cast steels for general engineering purposes*.

DIN 2528 : 1987, *Flanges; steel flanges ready for use; materials*.

DIN 17100 : 1980, *Steels for general structural purposes; quality standard*.

DIN 17102 : 1983, *Weldable normalized fine grain structural steels; technical delivery conditions for plate strip, wide flats, sections and bars*.

DIN 17155 : 1983, *Creep resistant steel plate and strip; technical delivery conditions*.

DIN 17175 : 1979, *Seamless tubes of heat-resistant steels; technical conditions of delivery*.

DIN 17243 : 1987, *Weldable heat resisting steel forgings and rolled or forged steel bars; technical delivery conditions*.

DIN 17245 : 1987, *Ferritic steel castings with elevated temperature properties; technical delivery conditions*.

DIN 17280 : 1985, *Steels with low temperature toughness; technical delivery conditions for plate, sheet, strip, wide flats, sections, bars and forgings*.

DIN 17440 : 1985, *Stainless steels; technical delivery conditions for plate and sheet, hot rolled strip, wire rod, drawn wire, steel bars, forgings and semi-finished products*.

DIN 17445 : 1984, *Stainless steel castings; technical delivery conditions*.

SEW 470 : 1976, *Heat resisting wrought steels*.

Annex E (informative)

Guidance on pressure/temperature ratings

E.1 General

The pressure/temperature ratings given in this annex apply only to certain flanges made using the materials listed in annex D.

Where given, the pressure/temperature ratings of the materials specified are maximum allowable non-shock working pressures (expressed as gauge pressure in bar) at the temperatures given in the respective tables for the applicable material. Linear interpolation is permitted for intermediate temperatures

The ratings of the flange materials are given in the following tables.

Tables E.1 to E.4 — Pressure/temperature ratings for PN 2,5, PN 6, PN 10, PN 16, PN 25 and PN 40 for the material groups given in table D.1 and valid only for flanges of types 05, 11, 12, 13 and 21 in nominal sizes up to and including DN 600.

For all flanges of types 01, 02, 03 and 04 and for types 05, 11, 12, 13 and 21 having nominal sizes greater than DN 600, pressure/temperature ratings applied are the responsibility of the user.

For austenitic stainless steels, pressure/temperature ratings are based on a reference stress of 205 N/mm² for the 0,2 % proof stress and a reference stress of 225 N/mm² for the 1 % proof stress, the rating being given in tables E.3 and E.4 respectively. Two tables of pressure/temperature ratings for austenitic stainless steels are given because some codes of practice for the design of flanged equipment use the 0,2 % proof stress value and others use the 1 % proof stress value.

Tables E.5 to E.21 — Pressure/temperature ratings for PN 20, PN 50, PN 110, PN 150, PN 260 and PN 420 for the material groups given in table D.2. The ratings are in accordance with the standard ratings for flanged and butt weld end fittings specified in ANSI/ASME B16.5.

Table E.22 — Pressure/temperature ratings for PN 20, PN 50, PN 110 and PN 150 for the material groups given in table D.3 for use in pipeline applications in the size range DN 300 and larger for types 05 and 11 only.

NOTE — There is not yet in existence a common internationally accepted procedure to evaluate pressure/temperature ratings for flanges. Before introducing tables E 1 to E 22 into national standards, it should be checked whether they comply with the relevant national codes and regulations

E.2 Rating of flanged joints

If two flanges in a flanged joint do not have the same pressure/temperature rating, the rating of the joint at any temperature should not exceed the lower of the two flange ratings at that temperature.

NOTES

- 1 The temperature shown for a corresponding pressure rating is considered to be that of the contained fluid. The use of a pressure rating corresponding to a temperature other than that of the contained fluid is the responsibility of the user and is subject to the requirements of any applicable code or regulation.
- 2 Application of the ratings in this part of ISO 7005 to flanged joints should take into consideration the risk of leakage due to forces and moments developed in the connecting pipework.
- 3 At temperatures in the creep range, gradual relaxation of flanged joints may progressively reduce bolt loads and the tightness of the joint.
- 4 At low temperatures some of the materials listed in the rating tables undergo a sufficient decrease in impact resistance that they cannot safely sustain sudden changes in stress or temperature.
- 5 Owing to the nature of any thread sealant used, additional limitations may be placed on a threaded flange
- 6 These notes on service conditions are not intended to be exhaustive

Table E.1 – Pressure/temperature (P/T) ratings¹⁾ for flanges made using material groups 1E0 to 6E0

| PN | Material group | Temperature (°C) | | | | | | | | | | | | | |
|-----|----------------|--|------|------|------|------|------|------|------|------|------|------|------|------|------|
| | | 0 to 120 | 150 | 200 | 250 | 300 | 350 | 400 | 425 | 450 | 475 | 500 | 510 | 520 | 530 |
| | | Maximum non-shock working pressure (bar) | | | | | | | | | | | | | |
| 2.5 | 1E0 | 2,5 | 2,25 | 2 | 1,75 | 1,5 | | | | | | | | | |
| | 2E0 | 2,5 | 2,25 | 2 | 1,75 | 1,5 | 1,25 | 0,88 | | | | | | | |
| | 3E0 | 2,5 | 2,45 | 2,25 | 2 | 1,75 | 1,38 | 1,13 | | | | | | | |
| 6 | 1E0 | 6 | 5,4 | 4,8 | 4,2 | 3,6 | | | | | | | | | |
| | 2E0 | 6 | 5,4 | 4,8 | 4,2 | 3,6 | 3 | 2,1 | | | | | | | |
| | 3E0 | 6 | 5,9 | 5,7 | 5,4 | 4,8 | 4,2 | 3,3 | 2,7 | | | | | | |
| 10 | 1E0 | 10 | 9 | 8 | 7 | 6 | | | | | | | | | |
| | 2E0 | 10 | 9 | 8 | 7 | 6 | 5 | 3,5 | | | | | | | |
| | 3E0 | 10 | 9,8 | 9,5 | 9 | 8 | 7 | 5,5 | 4,5 | | | | | | |
| | 4E0 | 10 | 10 | 10 | 10 | 8,7 | 7,8 | 7,4 | 7,2 | 7 | | | | | |
| 16 | 1E0 | 16 | 14,4 | 12,8 | 11,2 | 9,6 | | | | | | | | | |
| | 2E0 | 16 | 14,4 | 12,8 | 11,2 | 9,6 | 8 | 5,6 | | | | | | | |
| | 3E0 | 16 | 15,7 | 15,2 | 14,4 | 12,8 | 11,2 | 8,8 | 7,2 | | | | | | |
| | 4E0 | 16 | 16 | 16 | 16 | 13,9 | 12,5 | 11,8 | 11,5 | 11,5 | | | | | |
| | 5E0 | 16 | 16 | 16 | 16 | 16 | 15,2 | 14,6 | 14,2 | 13,9 | 13,1 | 11,8 | 9,9 | 7,8 | 6,1 |
| 25 | 1E0 | 25 | 22,5 | 20 | 17,5 | 15 | | | | | | | | | |
| | 2E0 | 25 | 22,5 | 20 | 17,5 | 15 | 12,5 | 8,8 | | | | | | | |
| | 3E0 | 25 | 24,5 | 23,8 | 22,5 | 20 | 17,5 | 13,8 | 11,3 | | | | | | |
| | 4E0 | 25 | 25 | 25 | 25 | 21,8 | 19,5 | 18,5 | 18 | 17,5 | | | | | |
| | 5E0 | 25 | 25 | 25 | 25 | 25 | 23,8 | 22,8 | 22,3 | 21,8 | 20,5 | 18,5 | 15,5 | 12,3 | 9,5 |
| | 6E0 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 22,8 | 22,3 | 21,8 | 20 | 13,8 | 12,5 | 11 |
| 40 | 1E0 | 40 | 36 | 32 | 28 | 24 | | | | | | | | | |
| | 2E0 | 40 | 36 | 32 | 28 | 24 | 20 | 14 | | | | | | | |
| | 3E0 | 40 | 39,2 | 38 | 36 | 32 | 28 | 22 | 18 | | | | | | |
| | 4E0 | 40 | 40 | 40 | 40 | 34,8 | 31,2 | 29,6 | 28,8 | 28 | | | | | |
| | 5E0 | 40 | 40 | 40 | 40 | 40 | 38 | 36,4 | 35,6 | 34,8 | 32,8 | 29,6 | 24,8 | 19,6 | 15,2 |
| | 6E0 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 36,4 | 35,6 | 34,8 | 32 | 22 | 20 | 17,6 |

1) Pressure/temperature ratings of flanges PN 2,5, PN 6, PN 10, PN 16, PN 25 and PN 40 are valid only for flanges of types 05, 11, 12, 13 and 21 having nominal sizes up to and including DN 600

Table E.2 — Pressure/temperature (P/T) ratings¹⁾ for flanges made using material groups 7E0 to 9E0

| PN | Material group | Temperature (°C) | | | | | | | | | | |
|--|----------------|------------------|------|------|------|------|------|------|------|------|------|------|
| | | < 20 | 100 | 150 | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 550 |
| Maximum non-shock working pressure (bar) | | | | | | | | | | | | |
| 2,5 | 7E0 | 3,5 | 2,44 | 2,27 | 2 | 1,82 | 1,56 | | | | | |
| | 7E1 | 3,94 | 2,72 | 2,5 | 2,28 | 2,11 | 1,89 | | | | | |
| | 7E2 | 5,44 | 4,11 | 3,91 | 3,72 | 3,5 | 3,33 | | | | | |
| | 8E0 | 2,39 | 2,18 | 1,97 | 1,86 | 1,63 | 1,31 | 1,09 | 0,98 | | | |
| | 8E1 | 2,72 | 2,51 | 2,29 | 2,07 | 1,86 | 1,52 | 1,31 | 1,09 | | | |
| | 8E2 | 3,06 | 2,72 | 2,51 | 2,29 | 2,07 | 1,74 | 1,52 | 1,31 | | | |
| | 8E3 | 3,5 | 3,06 | 2,83 | 2,61 | 2,4 | 2,18 | 1,97 | 1,63 | | | |
| | 9E0 | 5,44 | 5,12 | 4,94 | 4,78 | 4,61 | 4,33 | 4,22 | 4 | 3,67 | 2,87 | 1,48 |
| 6 | 7E0 | 8,4 | 5,9 | 5,4 | 4,8 | 4,4 | 3,8 | | | | | |
| | 7E1 | 9,5 | 6,5 | 6 | 5,5 | 5,1 | 4,5 | | | | | |
| | 7E2 | 13,1 | 9,9 | 9,4 | 8,9 | 8,4 | 8 | | | | | |
| | 8E0 | 5,7 | 5,2 | 4,7 | 4,5 | 3,9 | 3,1 | 2,6 | 2,3 | | | |
| | 8E1 | 6,5 | 6 | 5,5 | 5 | 4,5 | 3,7 | 3,1 | 2,6 | | | |
| | 8E2 | 7,3 | 6,5 | 6 | 5,5 | 5 | 4,2 | 3,7 | 3,1 | | | |
| | 8E3 | 8,4 | 7,3 | 6,8 | 6,3 | 5,8 | 5,2 | 4,7 | 3,9 | | | |
| | 9E0 | 13,1 | 12,3 | 11,9 | 11,5 | 11,1 | 10,4 | 10,1 | 9,6 | 8,8 | 6,9 | 3,5 |
| 10 | 7E0 | 14 | 9,8 | 9,1 | 8 | 7,3 | 6,3 | | | | | |
| | 7E1 | 15,8 | 10,9 | 10 | 9,1 | 8,4 | 7,6 | | | | | |
| | 7E2 | 21,8 | 16,4 | 15,6 | 14,9 | 14 | 13,3 | | | | | |
| | 8E0 | 9,6 | 8,7 | 7,9 | 7,4 | 6,5 | 5,2 | 4,4 | 3,9 | | | |
| | 8E1 | 10,9 | 10 | 9,2 | 8,3 | 7,4 | 6,1 | 5,2 | 4,4 | | | |
| | 8E2 | 12,2 | 10,9 | 10 | 9,2 | 8,3 | 7 | 6,1 | 5,2 | | | |
| | 8E3 | 14 | 12,2 | 11,3 | 10,4 | 9,6 | 8,7 | 7,9 | 6,5 | | | |
| | 9E0 | 21,8 | 20,5 | 19,8 | 19,1 | 18,4 | 17,3 | 16,9 | 16 | 14,7 | 11,5 | 5,9 |
| 16 | 7E0 | 22,4 | 15,6 | 14,5 | 12,8 | 11,7 | 10 | | | | | |
| | 7E1 | 25,2 | 17,4 | 16 | 14,6 | 13,5 | 12,1 | | | | | |
| | 7E2 | 34,8 | 26,3 | 25 | 23,8 | 22,4 | 21,3 | | | | | |
| | 8E0 | 15,3 | 13,9 | 12,6 | 11,9 | 10,5 | 8,4 | 7 | 6,3 | | | |
| | 8E1 | 17,4 | 16,1 | 14,6 | 13,2 | 11,9 | 9,7 | 8,4 | 7 | | | |
| | 8E2 | 19,6 | 17,4 | 16,1 | 14,6 | 13,2 | 11,2 | 9,7 | 8,4 | | | |
| | 8E3 | 22,4 | 19,6 | 18,1 | 16,7 | 15,4 | 13,9 | 12,6 | 10,5 | | | |
| | 9E0 | 34,8 | 32,8 | 31,6 | 30,6 | 29,5 | 27,7 | 27 | 25,6 | 23,5 | 18,3 | 9,5 |
| 25 | 7E0 | 35 | 24,4 | 22,7 | 20 | 18,2 | 15,7 | | | | | |
| | 7E1 | 39,4 | 27,2 | 25 | 22,8 | 21,1 | 18,9 | | | | | |
| | 7E2 | 54,4 | 41,1 | 39,1 | 37,2 | 35 | 33,3 | | | | | |
| | 8E0 | 23,9 | 21,8 | 19,7 | 18,6 | 16,3 | 13,1 | 10,9 | 9,8 | | | |
| | 8E1 | 27,2 | 25,1 | 22,9 | 20,7 | 18,6 | 15,2 | 13,1 | 10,9 | | | |
| | 8E2 | 30,6 | 27,2 | 25,1 | 22,9 | 20,7 | 17,4 | 15,2 | 13,1 | | | |
| | 8E3 | 35 | 30,6 | 28,3 | 26,1 | 24 | 21,8 | 19,7 | 16,3 | | | |
| | 9E0 | 54,4 | 51,2 | 49,4 | 47,8 | 46,1 | 43,3 | 42,2 | 40 | 36,7 | 28,7 | 14,8 |
| 40 | 7E0 | 56 | 39,1 | 36,3 | 32 | 29,2 | 25,1 | | | | | |
| | 7E1 | 63,1 | 43,6 | 40 | 36,4 | 33,8 | 30,2 | | | | | |
| | 7E2 | 87,1 | 65,8 | 62,6 | 59,6 | 56,3 | 53,3 | | | | | |
| | 8E0 | 38,2 | 34,8 | 31,5 | 29,7 | 26,1 | 21 | 17,4 | 15,6 | | | |
| | 8E1 | 43,6 | 40,2 | 36,6 | 33,1 | 29,7 | 24,4 | 21 | 17,4 | | | |
| | 8E2 | 48,9 | 43,6 | 40,2 | 36,6 | 33,1 | 27,9 | 24,4 | 21 | | | |
| | 8E3 | 56 | 51,2 | 47,8 | 44,4 | 41,0 | 37,6 | 34,2 | 30,8 | | | |
| | 9E0 | 87,1 | 81,9 | 79,1 | 76,4 | 73,8 | 69,3 | 67,6 | 64 | 58,7 | 45,9 | 23,6 |

1) Pressure/temperature ratings of flanges PN 2,5, PN 6, PN 10, PN 16, PN 25 and PN 40 are valid for flanges of types 05, 11, 12, 13 and 21 having nominal sizes up to and including DN 600.

Table E.3 – Pressure/temperature (P/T) ratings¹⁾ for flanges made using austenitic stainless steels (based on 0,2 % proof stress²⁾), material groups 10E0 to 15E0

| PN | Material group | Temperature (°C) | | | | | | | | | | |
|-----|----------------|--|------|------|------|------|------|------|------|------|------|------|
| | | < 20 | 50 | 100 | 150 | 200 | 250 | 300 | 350 | 400 | 450 | 500 |
| | | Maximum non-shock working pressure (bar) | | | | | | | | | | |
| 2,5 | 10E0 | 2 | 1,8 | 1,63 | 1,47 | 1,31 | 1,2 | 1,11 | 1,04 | 0,99 | 0,94 | 0,9 |
| | 10E1 | 3 | 2,72 | 2,28 | 1,94 | 1,74 | 1,61 | 1,51 | 1,44 | 1,39 | 1,34 | 1,32 |
| | 11E0 | 2,17 | 1,97 | 1,74 | 1,58 | 1,41 | 1,31 | 1,22 | 1,16 | 1,09 | 1,06 | 1,02 |
| | 12E0 | 2,22 | 2,11 | 1,96 | 1,86 | 1,74 | 1,63 | 1,51 | 1,44 | 1,39 | 1,34 | 1,32 |
| | 13E0 | 2,11 | 2,02 | 1,84 | 1,69 | 1,52 | 1,41 | 1,31 | 1,26 | 1,2 | 1,14 | 1,11 |
| | 13E1 | 3,11 | 2,78 | 2,34 | 2,06 | 1,86 | 1,72 | 1,61 | 1,56 | 1,5 | 1,46 | 1,43 |
| | 14E0 | 2,28 | 2,18 | 1,97 | 1,8 | 1,63 | 1,52 | 1,41 | 1,33 | 1,28 | 1,24 | 1,22 |
| | 15E0 | 2,33 | 2,24 | 2,06 | 1,97 | 1,86 | 1,74 | 1,61 | 1,56 | 1,5 | 1,46 | 1,43 |
| 6 | 10E0 | 4,8 | 4,3 | 3,9 | 3,5 | 3,1 | 2,9 | 2,7 | 2,5 | 2,4 | 2,3 | 2,2 |
| | 10E1 | 7,2 | 6,5 | 5,5 | 4,7 | 4,2 | 3,9 | 3,6 | 3,5 | 3,3 | 3,2 | 3,2 |
| | 11E0 | 5,2 | 4,7 | 4,2 | 3,8 | 3,4 | 3,1 | 2,9 | 2,8 | 2,6 | 2,5 | 2,5 |
| | 12E0 | 5,3 | 5,1 | 4,7 | 4,5 | 4,2 | 3,9 | 3,6 | 3,5 | 3,3 | 3,2 | 3,2 |
| | 13E0 | 5,1 | 4,9 | 4,4 | 4,1 | 3,7 | 3,4 | 3,1 | 3 | 2,9 | 2,7 | 2,7 |
| | 13E1 | 7,5 | 6,7 | 5,6 | 4,9 | 4,5 | 4,1 | 3,9 | 3,7 | 3,6 | 3,5 | 3,4 |
| | 14E0 | 5,5 | 5,2 | 4,7 | 4,3 | 3,9 | 3,7 | 3,4 | 3,2 | 3,1 | 3 | 2,9 |
| | 15E0 | 5,6 | 5,4 | 4,9 | 4,7 | 4,5 | 4,2 | 3,9 | 3,7 | 3,6 | 3,5 | 3,4 |
| 10 | 10E0 | 8 | 7,2 | 6,5 | 5,9 | 5,2 | 4,8 | 4,4 | 4,2 | 4 | 3,8 | 3,6 |
| | 10E1 | 12 | 10,9 | 9,1 | 7,8 | 7 | 6,4 | 6 | 5,8 | 5,6 | 5,4 | 5,3 |
| | 11E0 | 8,7 | 7,9 | 7 | 6,3 | 5,6 | 5,2 | 4,9 | 4,6 | 4,4 | 4,2 | 4,1 |
| | 12E0 | 8,9 | 8,4 | 7,8 | 7,4 | 7 | 6,5 | 6 | 5,8 | 5,6 | 5,4 | 5,3 |
| | 13E0 | 8,4 | 8,1 | 7,4 | 6,8 | 6,1 | 5,6 | 5,2 | 5 | 4,8 | 4,6 | 4,4 |
| | 13E1 | 12,4 | 11,1 | 9,4 | 8,2 | 7,4 | 6,9 | 6,4 | 6,2 | 6 | 5,8 | 5,7 |
| | 14E0 | 9,1 | 8,7 | 7,9 | 7,2 | 6,5 | 6,1 | 5,6 | 5,3 | 5,1 | 5 | 4,9 |
| | 15E0 | 9,3 | 9 | 8,2 | 7,9 | 7,4 | 7 | 6,4 | 6,2 | 6 | 5,8 | 5,7 |
| 16 | 10E0 | 12,8 | 11,5 | 10,5 | 9,4 | 8,4 | 7,7 | 7,1 | 6,7 | 6,3 | 6 | 5,8 |
| | 10E1 | 19,2 | 17,4 | 14,6 | 12,4 | 11,2 | 10,3 | 9,7 | 9,2 | 8,9 | 8,6 | 8,5 |
| | 11E0 | 13,9 | 12,6 | 11,2 | 10,1 | 9 | 8,4 | 7,8 | 7,4 | 7 | 6,8 | 6,5 |
| | 12E0 | 14,2 | 13,5 | 12,5 | 11,9 | 11,2 | 10,5 | 9,7 | 9,2 | 8,9 | 8,6 | 8,5 |
| | 13E0 | 13,5 | 12,9 | 11,8 | 10,8 | 9,7 | 9 | 8,4 | 8 | 7,7 | 7,3 | 7,1 |
| | 13E1 | 19,9 | 17,8 | 15 | 13,2 | 11,9 | 11 | 10,3 | 10 | 9,6 | 9,3 | 9,2 |
| | 14E0 | 14,6 | 13,9 | 12,6 | 11,5 | 10,5 | 9,7 | 9 | 8,5 | 8,2 | 8 | 7,8 |
| | 15E0 | 14,9 | 14,4 | 13,2 | 12,6 | 11,9 | 11,2 | 10,3 | 10 | 9,6 | 9,3 | 9,2 |
| 25 | 10E0 | 20 | 18 | 16,3 | 14,7 | 13,1 | 12 | 11,1 | 10,4 | 9,9 | 9,4 | 9 |
| | 10E1 | 30 | 27,2 | 22,8 | 19,4 | 17,4 | 16,1 | 15,1 | 14,4 | 13,9 | 13,4 | 13,2 |
| | 11E0 | 21,7 | 19,7 | 17,4 | 15,8 | 14,1 | 13,1 | 12,2 | 11,6 | 10,9 | 10,6 | 10,2 |
| | 12E0 | 22,2 | 21,1 | 19,6 | 18,6 | 17,4 | 16,3 | 15,1 | 14,4 | 13,9 | 13,4 | 13,2 |
| | 13E0 | 21,1 | 20,2 | 18,4 | 16,9 | 15,2 | 14,1 | 13,1 | 12,6 | 12 | 11,4 | 11,1 |
| | 13E1 | 31,1 | 27,8 | 23,4 | 20,6 | 18,6 | 17,2 | 16,1 | 15,6 | 15 | 14,6 | 14,3 |
| | 14E0 | 22,8 | 21,8 | 19,7 | 18 | 16,3 | 15,2 | 14,1 | 13,3 | 12,8 | 12,4 | 12,2 |
| | 15E0 | 23,3 | 22,4 | 20,6 | 19,7 | 18,6 | 17,4 | 16,1 | 15,6 | 15 | 14,6 | 14,3 |
| 40 | 10E0 | 32 | 28,8 | 26,1 | 23,5 | 21 | 19,2 | 17,8 | 16,7 | 15,8 | 15 | 14,4 |
| | 10E1 | 48 | 43,6 | 36,4 | 31,1 | 27,9 | 25,8 | 24,2 | 23,1 | 22,2 | 21,5 | 21,2 |
| | 11E0 | 34,7 | 31,5 | 27,9 | 25,2 | 22,6 | 21 | 19,6 | 18,5 | 17,4 | 16,9 | 16,4 |
| | 12E0 | 35,6 | 33,8 | 31,3 | 29,7 | 27,9 | 26,1 | 24,2 | 23,1 | 22,2 | 21,5 | 21,2 |
| | 13E0 | 33,8 | 32,4 | 29,5 | 27 | 24,4 | 22,6 | 21 | 20,1 | 19,2 | 18,3 | 17,8 |
| | 13E1 | 49,8 | 44,4 | 37,5 | 32,9 | 29,7 | 27,6 | 25,8 | 24,9 | 24 | 23,3 | 22,9 |
| | 14E0 | 36,4 | 34,8 | 31,5 | 28,8 | 26,1 | 24,4 | 22,6 | 21,3 | 20,4 | 19,9 | 19,6 |
| | 15E0 | 37,3 | 35,9 | 32,9 | 31,5 | 29,7 | 27,9 | 25,8 | 24,9 | 24 | 23,3 | 22,9 |

1) Pressure/temperature ratings of flanges PN 2.5. PN 6. PN 10. PN 16. PN 25 and PN 40 are valid only for flanges of types 05. 11. 12. 13 and 21 having nominal sizes up to and including DN 600.

2) Based on a reference stress of 205 N/mm²

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Table E.4 — Pressure/temperature (P/T) ratings¹⁾ for flanges made using austenitic stainless steels (based on 1 % proof stress²⁾), material groups 10E0 to 15E0

| PN | Material group | Temperature (°C) | | | | | | | | | | |
|-----|----------------|--|------|------|------|------|------|------|------|------|------|------|
| | | < 20 | 50 | 100 | 150 | 200 | 250 | 300 | 350 | 400 | 450 | 500 |
| | | Maximum non-shock working pressure (bar) | | | | | | | | | | |
| 2,5 | 10E0 | 2,39 | 2,23 | 2,01 | 1,8 | 1,63 | 1,52 | 1,41 | 1,34 | 1,29 | 1,24 | 1,21 |
| | 10E1 | 3,39 | 3,11 | 2,67 | 2,33 | 2,08 | 1,94 | 1,85 | 1,79 | 1,73 | 1,69 | 1,66 |
| | 11E0 | 2,56 | 2,34 | 2,12 | 1,91 | 1,74 | 1,61 | 1,5 | 1,43 | 1,39 | 1,36 | 1,33 |
| | 12E0 | 2,61 | 2,47 | 2,31 | 2,17 | 2,06 | 1,94 | 1,86 | 1,79 | 1,73 | 1,69 | 1,66 |
| | 13E0 | 2,5 | 2,41 | 2,21 | 2,01 | 1,86 | 1,74 | 1,61 | 1,54 | 1,5 | 1,44 | 1,42 |
| | 13E1 | 3,5 | 3,16 | 2,73 | 2,42 | 2,2 | 2,03 | 1,94 | 1,88 | 1,82 | 1,78 | 1,76 |
| | 14E0 | 2,67 | 2,56 | 2,34 | 2,12 | 1,97 | 1,86 | 1,73 | 1,67 | 1,6 | 1,57 | 1,54 |
| | 15E0 | 2,72 | 2,6 | 2,42 | 2,29 | 2,18 | 2,07 | 1,94 | 1,88 | 1,82 | 1,78 | 1,76 |
| 6 | 10E0 | 5,7 | 5,4 | 4,8 | 4,3 | 3,9 | 3,7 | 3,4 | 3,2 | 3,1 | 3 | 2,9 |
| | 10E1 | 8,1 | 7,5 | 6,4 | 5,6 | 5 | 4,7 | 4,5 | 4,3 | 4,2 | 4,1 | 4 |
| | 11E0 | 6,1 | 5,6 | 5,1 | 4,6 | 4,2 | 3,9 | 3,6 | 3,4 | 3,3 | 3,3 | 3,2 |
| | 12E0 | 6,3 | 5,9 | 5,5 | 5,2 | 4,9 | 4,7 | 4,5 | 4,3 | 4,2 | 4,1 | 4 |
| | 13E0 | 6 | 5,8 | 5,3 | 4,8 | 4,5 | 4,2 | 3,9 | 3,7 | 3,6 | 3,5 | 3,4 |
| | 13E1 | 8,4 | 7,6 | 6,6 | 5,8 | 5,3 | 4,9 | 4,7 | 4,5 | 4,4 | 4,3 | 4,2 |
| | 14E0 | 6,4 | 6,1 | 5,6 | 5,1 | 4,7 | 4,5 | 4,2 | 4 | 3,8 | 3,8 | 3,7 |
| | 15E0 | 6,5 | 6,2 | 5,8 | 5,5 | 5,2 | 5 | 4,7 | 4,5 | 4,4 | 4,3 | 4,2 |
| 10 | 10E0 | 9,6 | 8,9 | 8 | 7,2 | 6,5 | 6,1 | 5,6 | 5,4 | 5,2 | 5 | 4,8 |
| | 10E1 | 13,6 | 12,4 | 10,7 | 9,3 | 8,3 | 7,8 | 7,4 | 7,2 | 6,9 | 6,8 | 6,6 |
| | 11E0 | 10,2 | 9,4 | 8,5 | 7,6 | 7 | 6,4 | 6 | 5,7 | 5,6 | 5,4 | 5,3 |
| | 12E0 | 10,4 | 9,9 | 9,2 | 8,7 | 8,2 | 7,8 | 7,4 | 7,2 | 6,9 | 6,8 | 6,6 |
| | 13E0 | 10 | 9,6 | 8,8 | 8 | 7,4 | 7 | 6,4 | 6,2 | 6 | 5,8 | 5,7 |
| | 13E1 | 14 | 12,6 | 10,9 | 9,7 | 8,8 | 8,1 | 7,8 | 7,5 | 7,3 | 7,1 | 7 |
| | 14E0 | 10,7 | 10,2 | 9,4 | 8,5 | 7,9 | 7,4 | 6,9 | 6,7 | 6,4 | 6,3 | 6,2 |
| | 15E0 | 10,9 | 10,4 | 9,7 | 9,2 | 8,7 | 8,3 | 7,8 | 7,5 | 7,3 | 7,1 | 7 |
| 16 | 10E0 | 15,3 | 14,3 | 12,9 | 11,5 | 10,5 | 9,7 | 9 | 8,6 | 8,2 | 8 | 7,8 |
| | 10E1 | 21,7 | 19,9 | 17,1 | 14,9 | 13,3 | 12,4 | 11,9 | 11,4 | 11,1 | 10,8 | 10,6 |
| | 11E0 | 16,4 | 15 | 13,6 | 12,2 | 11,2 | 10,3 | 9,6 | 9,2 | 8,9 | 8,7 | 8,5 |
| | 12E0 | 16,7 | 15,8 | 14,8 | 13,9 | 13,2 | 12,4 | 11,9 | 11,4 | 11,1 | 10,8 | 10,6 |
| | 13E0 | 16 | 15,4 | 14,2 | 12,9 | 11,9 | 11,2 | 10,3 | 9,9 | 9,6 | 9,2 | 9,1 |
| | 13E1 | 22,4 | 20,2 | 17,5 | 15,5 | 14,1 | 13 | 12,4 | 12 | 11,7 | 11,4 | 11,2 |
| | 14E0 | 17,1 | 16,4 | 15 | 13,6 | 12,6 | 11,9 | 11,1 | 10,7 | 10,2 | 10 | 9,9 |
| | 15E0 | 17,4 | 16,6 | 15,5 | 14,6 | 13,9 | 13,2 | 12,4 | 12 | 11,7 | 11,4 | 11,2 |
| 25 | 10E0 | 23,9 | 22,3 | 20,1 | 18 | 16,3 | 15,2 | 14,1 | 13,4 | 12,9 | 12,4 | 12,1 |
| | 10E1 | 33,9 | 31,1 | 26,7 | 23,3 | 20,8 | 19,4 | 18,5 | 17,9 | 17,3 | 16,9 | 16,6 |
| | 11E0 | 25,6 | 23,4 | 21,2 | 19,1 | 17,4 | 16,1 | 15 | 14,3 | 13,9 | 13,6 | 13,3 |
| | 12E0 | 26,1 | 24,7 | 23,1 | 21,7 | 20,6 | 19,4 | 18,6 | 17,9 | 17,3 | 16,9 | 16,6 |
| | 13E0 | 25 | 24,1 | 22,1 | 20,1 | 18,6 | 17,4 | 16,1 | 15,4 | 15 | 14,4 | 14,2 |
| | 13E1 | 35 | 31,6 | 27,3 | 24,2 | 22 | 20,3 | 19,4 | 18,8 | 18,2 | 17,8 | 17,6 |
| | 14E0 | 26,7 | 25,6 | 23,4 | 21,2 | 19,7 | 18,6 | 17,3 | 16,7 | 16 | 15,7 | 15,4 |
| | 15E0 | 27,2 | 26 | 24,2 | 22,9 | 21,8 | 20,7 | 19,4 | 18,8 | 18,2 | 17,8 | 17,6 |
| 40 | 10E0 | 38,2 | 35,7 | 32,2 | 28,8 | 26,1 | 24,4 | 22,6 | 21,5 | 20,6 | 19,9 | 19,4 |
| | 10E1 | 54,2 | 49,8 | 42,7 | 37,3 | 33,2 | 31,1 | 29,7 | 28,6 | 27,7 | 27 | 26,5 |
| | 11E0 | 40,9 | 37,5 | 34 | 30,6 | 27,9 | 25,8 | 24 | 22,9 | 22,2 | 21,7 | 21,3 |
| | 12E0 | 41,8 | 39,5 | 37 | 34,7 | 32,9 | 31,1 | 29,7 | 28,6 | 27,7 | 27 | 26,5 |
| | 13E0 | 40 | 38,6 | 35,4 | 32,2 | 29,7 | 27,9 | 25,8 | 24,7 | 24 | 23,1 | 22,8 |
| | 13E1 | 56 | 50,5 | 43,7 | 38,8 | 35,2 | 32,5 | 31,1 | 30 | 29,2 | 28,4 | 28,1 |
| | 14E0 | 42,7 | 40,9 | 37,5 | 34 | 31,5 | 29,7 | 27,7 | 26,7 | 25,6 | 25,1 | 24,7 |
| | 15E0 | 43,6 | 41,6 | 38,8 | 36,6 | 34,8 | 33,1 | 31,1 | 30 | 29,2 | 28,4 | 28,1 |

1) Pressure/temperature ratings of flanges PN 2,5, PN 6, PN 10, PN 16, PN 25 and PN 40 are valid only for flanges of types 05, 11, 12, 13 and 21 having nominal sizes up to and including DN 600

2) Based on a reference stress of 225 N/mm².

Table E.5 — Pressure/temperature (P/T) ratings for flanges made using group 1A1 materials

| Temperature (°C) | Maximum non-shock working pressure (bar) | | | | | |
|------------------|--|-------|--------|--------|--------|--------|
| | PN 20 | PN 50 | PN 110 | PN 150 | PN 260 | PN 420 |
| -29 to 38 | 19,6 | 51,1 | 102,1 | 153,2 | 255,3 | 425,5 |
| 50 | 19,2 | 50,1 | 100,2 | 150,2 | 250,4 | 417,3 |
| 100 | 17,7 | 46,4 | 92,8 | 139,1 | 231,9 | 386,5 |
| 150 | 15,8 | 45,2 | 90,5 | 135,7 | 226,1 | 376,9 |
| 200 | 14 | 43,8 | 87,6 | 131,5 | 219,1 | 365,2 |
| 250 | 12,1 | 41,7 | 83,4 | 125,2 | 208,6 | 347,7 |
| 300 | 10,2 | 38,7 | 77,5 | 116,2 | 193,7 | 322,8 |
| 350 | 8,4 | 37 | 73,9 | 110,9 | 184,8 | 308 |
| 375 | 7,4 | 36,5 | 72,9 | 109,4 | 182,3 | 303,9 |
| 400 | 6,5 | 34,5 | 69 | 103,5 | 172,5 | 287,5 |
| 425 | 5,6 | 28,8 | 57,5 | 86,3 | 143,8 | 239,6 |
| 450 | 4,7 | 20 | 40,1 | 60,1 | 100,2 | 166,9 |
| 475 | 3,7 | 13,5 | 27,1 | 40,6 | 67,7 | 112,9 |
| 500 | 2,8 | 8,8 | 17,6 | 26,4 | 44 | 73,3 |
| 525 | 1,9 | 5,2 | 10,4 | 15,5 | 25,9 | 43,2 |
| 540 | 1,3 | 3,3 | 6,5 | 9,8 | 16,3 | 27,2 |

NOTE — Consult table D 2 and the notes to table D 2 for limitations on use

Table E.6 — Pressure/temperature (P/T) ratings for flanges made using group 1A2 materials

| Temperature (°C) | Maximum non-shock working pressure (bar) | | | | | |
|------------------|--|-------|--------|--------|--------|--------|
| | PN 20 | PN 50 | PN 110 | PN 150 | PN 260 | PN 420 |
| -29 to 38 | 20 | 51,7 | 103,4 | 155,2 | 258,6 | 431 |
| 50 | 19,2 | 51,7 | 103,4 | 155,2 | 258,6 | 431 |
| 100 | 17,7 | 51,5 | 103,1 | 154,6 | 257,7 | 429,5 |
| 150 | 15,8 | 50,2 | 100,4 | 150,6 | 251 | 418,3 |
| 200 | 14 | 48,8 | 97,6 | 146,4 | 243,9 | 406,6 |
| 250 | 12,1 | 46,3 | 92,7 | 139 | 231,7 | 386,1 |
| 300 | 10,2 | 42,4 | 84,9 | 127,3 | 212,1 | 353,5 |
| 350 | 8,4 | 40,2 | 80,5 | 120,7 | 201,2 | 335,3 |
| 375 | 7,4 | 38,8 | 77,6 | 116,4 | 194 | 323,4 |
| 400 | 6,5 | 34,5 | 69 | 103,5 | 172,5 | 287,5 |
| 425 | 5,6 | 28,8 | 57,5 | 86,3 | 143,8 | 239,6 |
| 450 | 4,7 | 20 | 40,1 | 60,1 | 100,2 | 166,9 |
| 475 | 3,7 | 13,5 | 27,1 | 40,6 | 67,7 | 112,9 |
| 500 | 2,8 | 8,8 | 17,6 | 26,4 | 44 | 73,3 |
| 525 | 1,9 | 5,2 | 10,4 | 15,5 | 25,9 | 43,2 |
| 540 | 1,3 | 3,3 | 6,5 | 9,8 | 16,3 | 27,2 |

NOTE — Consult table D 2 and the notes to table D 2 for limitations on use

Table E.7 — Pressure/temperature (P/T) ratings for flanges made using group 1A3 materials

| Temperature (°C) | Maximum non-shock working pressure (bar) | | | | | |
|------------------|--|-------|--------|--------|--------|--------|
| | PN 20 | PN 50 | PN 110 | PN 150 | PN 260 | PN 420 |
| -29 to 38 | 18,4 | 47,9 | 95,7 | 143,6 | 239,4 | 398,9 |
| 50 | 18,1 | 47,3 | 94,6 | 141,9 | 236,5 | 394,2 |
| 100 | 17,3 | 45,1 | 90,2 | 135,3 | 225,5 | 375,9 |
| 150 | 15,8 | 44 | 87,9 | 131,9 | 219,8 | 366,3 |
| 200 | 14 | 42,7 | 85,4 | 128 | 213,4 | 355,6 |
| 250 | 12,1 | 40,6 | 81,2 | 121,8 | 202,9 | 338,2 |
| 300 | 10,2 | 37,7 | 75,4 | 113,1 | 188,5 | 314,2 |
| 350 | 8,4 | 36 | 71,9 | 107,9 | 179,8 | 299,7 |
| 375 | 7,4 | 35,3 | 70,6 | 105,9 | 176,6 | 294,3 |
| 400 | 6,5 | 32,4 | 64,8 | 97,2 | 162 | 270 |
| 425 | 5,6 | 27,3 | 54,6 | 81,9 | 136,5 | 227,5 |
| 450 | 4,7 | 19,8 | 39,6 | 59,4 | 99 | 165 |
| 475 | 3,7 | 13,5 | 27,1 | 40,6 | 67,7 | 112,9 |
| 500 | 2,8 | 8,8 | 17,6 | 26,4 | 44 | 73,3 |
| 525 | 1,9 | 5,2 | 10,4 | 15,5 | 25,9 | 43,2 |
| 540 | 1,3 | 3,3 | 6,5 | 9,8 | 16,3 | 27,2 |

NOTE — Consult table D.2 and the notes to table D.2 for limitations on use.

Table E.8 — Pressure/temperature (P/T) ratings for flanges made using group 1A4 materials

| Temperature (°C) | Maximum non-shock working pressure (bar) | | | | | |
|------------------|--|-------|--------|--------|--------|--------|
| | PN 20 | PN 50 | PN 110 | PN 150 | PN 260 | PN 420 |
| -29 to 38 | 16,3 | 42,5 | 85,1 | 127,6 | 212,7 | 354,6 |
| 50 | 16 | 41,7 | 83,4 | 125,2 | 208,6 | 347,7 |
| 100 | 14,8 | 38,6 | 77,2 | 115,8 | 193,1 | 321,8 |
| 150 | 14,5 | 37,7 | 75,4 | 113,1 | 188,6 | 314,3 |
| 200 | 14 | 36,6 | 73,1 | 109,7 | 182,8 | 304,7 |
| 250 | 12,1 | 34,7 | 69,4 | 104,1 | 173,6 | 289,3 |
| 300 | 10,2 | 32,3 | 64,6 | 96,9 | 161,5 | 269,1 |
| 350 | 8,4 | 30,9 | 61,9 | 92,8 | 154,6 | 257,7 |
| 375 | 7,4 | 30,9 | 61,7 | 92,6 | 154,3 | 275,2 |
| 400 | 6,5 | 30,3 | 60,6 | 90,9 | 151,5 | 252,5 |
| 425 | 5,6 | 25,8 | 51,6 | 77,4 | 128,9 | 214,9 |
| 450 | 4,7 | 19,6 | 39,2 | 58,7 | 97,9 | 163,2 |
| 475 | 3,7 | 13,5 | 27,1 | 40,6 | 67,7 | 112,9 |
| 500 | 2,8 | 8,8 | 17,6 | 26,4 | 44 | 73,3 |
| 525 | 1,9 | 5,2 | 10,4 | 15,5 | 25,9 | 43,2 |
| 540 | 1,3 | 3,3 | 6,5 | 9,8 | 16,3 | 27,2 |

NOTE — Consult table D.2 and the notes to table D.2 for limitations on use.

Table E.9 — Pressure/temperature (P/T) ratings for flanges made using group 1A5 materials

| Temperature (°C) | Maximum non-shock working pressure (bar) | | | | | |
|------------------|--|-------|--------|--------|--------|--------|
| | PN 20 | PN 50 | PN 110 | PN 150 | PN 260 | PN 420 |
| – 29 to 38 | 18,4 | 47,9 | 95,8 | 143,6 | 239,4 | 399 |
| 50 | 18,3 | 47,6 | 95,3 | 142,9 | 238,2 | 397,1 |
| 100 | 17,7 | 46,6 | 93,2 | 139,8 | 233 | 388,3 |
| 150 | 15,8 | 45 | 89,9 | 134,9 | 224,8 | 374,6 |
| 200 | 14 | 44,2 | 88,4 | 132,6 | 221 | 368,3 |
| 250 | 12,1 | 43,1 | 86,2 | 129,2 | 215,4 | 359 |
| 300 | 10,2 | 42 | 84,1 | 126,1 | 210,1 | 350,2 |
| 350 | 8,4 | 40,2 | 80,5 | 120,7 | 201,2 | 335,3 |
| 375 | 7,4 | 38,8 | 77,6 | 116,4 | 194 | 323,4 |
| 400 | 6,5 | 36,6 | 73,2 | 109,8 | 182,9 | 304,9 |
| 425 | 5,6 | 35,1 | 70,2 | 105,3 | 175,5 | 292,5 |
| 450 | 4,7 | 33,8 | 67,6 | 101,4 | 169 | 218,7 |
| 475 | 3,7 | 31,7 | 63,3 | 95 | 158,3 | 263,8 |
| 500 | 2,8 | 24,1 | 48,1 | 72,2 | 120,3 | 200,6 |
| 525 | 1,9 | 15 | 30,1 | 45,1 | 75,2 | 125,4 |
| 540 | 1,3 | 10,7 | 21,4 | 32,1 | 53,5 | 89,2 |

NOTE — Consult table D 2 and the notes to table D 2 for limitations on use

Table E.10 — Pressure/temperature (P/T) ratings for flanges made using group 1A7 materials

| Temperature (°C) | Maximum non-shock working pressure (bar) | | | | | |
|------------------|--|-------|--------|--------|--------|--------|
| | PN 20 | PN 50 | PN 110 | PN 150 | PN 260 | PN 420 |
| – 29 to 38 | 20 | 51,7 | 103,4 | 155,2 | 258,6 | 431 |
| 50 | 19,2 | 51,7 | 103,4 | 155,2 | 258,6 | 431 |
| 100 | 17,7 | 51,5 | 103,1 | 154,6 | 257,7 | 429,5 |
| 150 | 15,8 | 50,2 | 100,4 | 150,6 | 251 | 418,3 |
| 200 | 14 | 48,8 | 97,6 | 146,4 | 243,9 | 406,6 |
| 250 | 12,1 | 46,3 | 92,7 | 139 | 231,7 | 386,1 |
| 300 | 10,2 | 42,4 | 84,9 | 127,3 | 212,1 | 353,5 |
| 350 | 8,4 | 40,2 | 80,5 | 120,7 | 201,2 | 335,3 |
| 375 | 7,4 | 38,8 | 77,6 | 116,4 | 194 | 323,4 |
| 400 | 6,5 | 36,6 | 73,2 | 109,8 | 182,9 | 304,9 |
| 425 | 5,6 | 35,1 | 70,2 | 105,3 | 175,5 | 292,5 |
| 450 | 4,7 | 33,8 | 67,6 | 101,4 | 169 | 281,7 |
| 475 | 3,7 | 31,7 | 63,3 | 95 | 158,3 | 263,8 |
| 500 | 2,8 | 27,1 | 54,1 | 81,2 | 135,3 | 225,4 |
| 525 | 1,9 | 18,8 | 37,6 | 56,4 | 94 | 156,6 |
| 550 | 1,3 ¹⁾ | 13,9 | 27,9 | 41,8 | 69,7 | 116,1 |
| 575 | — | 12,4 | 24,9 | 37,3 | 62,2 | 103,7 |

1) The maximum non-shock working pressure is 1.3 bar at 540 °C for PN 20.

NOTE — Consult table D 2 and the notes to table D 2 for limitations on use.

Table E.11 — Pressure/temperature (P/T) ratings for flanges made using group 1A9 materials

| Temperature (°C) | Maximum non-shock working pressure (bar) | | | | | |
|------------------|--|-------|--------|--------|--------|--------|
| | PN 20 | PN 50 | PN 110 | PN 150 | PN 260 | PN 420 |
| - 29 to 38 | 20 | 51,7 | 103,4 | 155,2 | 258,6 | 431 |
| 50 | 19,2 | 51,1 | 102,3 | 153,4 | 255,7 | 426,2 |
| 100 | 17,7 | 48,8 | 97,5 | 146,3 | 243,8 | 406,4 |
| 150 | 15,8 | 46,4 | 92,7 | 139,1 | 231,9 | 386,4 |
| 200 | 14 | 45,5 | 91 | 136,4 | 227,4 | 379 |
| 250 | 12,1 | 44,5 | 88,9 | 133,4 | 222,3 | 370,6 |
| 300 | 10,2 | 42,4 | 84,9 | 127,3 | 212,1 | 353,5 |
| 350 | 8,4 | 40,2 | 80,5 | 120,7 | 201,2 | 335,3 |
| 375 | 7,4 | 38,8 | 77,6 | 116,4 | 194 | 323,4 |
| 400 | 6,5 | 36,6 | 73,2 | 109,8 | 182,9 | 304,9 |
| 425 | 5,6 | 35,1 | 70,2 | 105,3 | 175,5 | 292,5 |
| 450 | 4,7 | 33,8 | 67,6 | 101,4 | 169 | 281,7 |
| 475 | 3,7 | 31,7 | 63,3 | 95 | 158,3 | 263,8 |
| 500 | 2,8 | 27,8 | 55,6 | 83,4 | 139 | 231,6 |
| 525 | 1,9 | 20,3 | 40,5 | 60,8 | 101,3 | 168,9 |
| 550 | 1,3 ¹⁾ | 12,8 | 25,5 | 38,3 | 63,8 | 106,4 |
| 575 | — | 8,5 | 17 | 25,5 | 42,5 | 70,8 |
| 600 | — | 5,9 | 11,8 | 17,6 | 29,4 | 49 |
| 625 | — | 3,4 | 6,8 | 10,1 | 16,9 | 28,2 |
| 650 | — | 2,3 | 4,6 | 7 | 11,6 | 19,3 |

1) The maximum non-shock working pressure is 1,3 bar at 540 °C for PN 20.

NOTE — Consult table D.2 and the notes to table D.2 for limitations on use.

Table E.12 — Pressure/temperature (P/T) ratings for flanges made using group 1A10 materials

| Temperature (°C) | Maximum non-shock working pressure (bar) | | | | | |
|------------------|--|-------|--------|--------|--------|--------|
| | PN 20 | PN 50 | PN 110 | PN 150 | PN 260 | PN 420 |
| - 29 to 38 | 20 | 51,7 | 103,4 | 155,2 | 258,6 | 431 |
| 50 | 19,2 | 51,2 | 102,4 | 153,6 | 256 | 426,7 |
| 100 | 17,7 | 49 | 98,1 | 147,1 | 245,2 | 408,7 |
| 150 | 15,8 | 46,6 | 93,3 | 139,9 | 233,2 | 388,6 |
| 200 | 14 | 44,8 | 89,7 | 134,5 | 224,2 | 373,7 |
| 250 | 12,1 | 44,2 | 88,4 | 132,7 | 221,1 | 368,5 |
| 300 | 10,2 | 42,4 | 84,9 | 127,3 | 212,1 | 353,5 |
| 350 | 8,4 | 40,2 | 80,5 | 120,7 | 201,2 | 335,3 |
| 375 | 7,4 | 38,8 | 77,6 | 116,4 | 194 | 323,4 |
| 400 | 6,5 | 36,6 | 73,2 | 109,8 | 182,9 | 304,9 |
| 425 | 5,6 | 35,1 | 70,2 | 105,3 | 175,5 | 292,5 |
| 450 | 4,7 | 33,8 | 67,6 | 101,4 | 169 | 281,7 |
| 475 | 3,7 | 31,7 | 63,3 | 95 | 158,3 | 263,8 |
| 500 | 2,8 | 27,8 | 55,6 | 83,4 | 139 | 231,6 |
| 525 | 1,9 | 21,9 | 43,8 | 65,8 | 109,6 | 182,7 |
| 550 | 1,3 ¹⁾ | 16,4 | 32,7 | 49,1 | 81,8 | 136,4 |
| 575 | — | 11,7 | 23,4 | 35,1 | 58,5 | 97,5 |
| 600 | — | 7,6 | 15,3 | 22,9 | 38,2 | 63,6 |
| 625 | — | 6,6 | 13,3 | 19,9 | 33,2 | 55,3 |
| 650 | — | 3,7 | 7,3 | 11 | 18,3 | 30,4 |

1) The maximum non-shock working pressure is 1,3 bar at 540 °C for PN 20.

Table E.13 — Pressure/temperature (P/T) ratings for flanges made using group 1A13 materials

| Temperature (°C) | Maximum non-shock working pressure (bar) | | | | | |
|------------------|--|-------|--------|--------|--------|--------|
| | PN 20 | PN 50 | PN 110 | PN 150 | PN 260 | PN 420 |
| -29 to 38 | 20 | 51,7 | 103,4 | 155,2 | 258,6 | 431 |
| 50 | 19,2 | 51,7 | 103,4 | 155,2 | 258,6 | 431 |
| 100 | 17,7 | 51,5 | 103,1 | 154,6 | 257,7 | 429,5 |
| 150 | 15,8 | 50,2 | 100,4 | 150,6 | 251 | 418,3 |
| 200 | 14 | 48,8 | 97,6 | 146,4 | 243,9 | 406,6 |
| 250 | 12,1 | 46,3 | 92,7 | 139 | 231,7 | 386,1 |
| 300 | 10,2 | 42,4 | 84,9 | 127,3 | 212,1 | 353,5 |
| 350 | 8,4 | 40,2 | 80,5 | 120,7 | 201,2 | 335,3 |
| 375 | 7,4 | 38,8 | 77,6 | 116,4 | 194 | 323,4 |
| 400 | 6,5 | 36,6 | 73,2 | 109,8 | 182,9 | 304,9 |
| 425 | 5,6 | 34,5 | 69 | 103,5 | 172,5 | 287,5 |
| 450 | 4,7 | 30,9 | 61,8 | 92,7 | 154,5 | 257,6 |
| 475 | 3,7 | 25,9 | 51,8 | 77,7 | 129,5 | 215,8 |
| 500 | 2,8 | 20,3 | 40,5 | 60,8 | 101,3 | 168,9 |
| 525 | 1,9 | 15,4 | 30,8 | 46,3 | 77,1 | 128,5 |
| 550 | 1,3 ¹⁾ | 11,7 | 23,4 | 35 | 58,4 | 97,3 |
| 575 | — | 8,8 | 17,6 | 26,4 | 44,1 | 73,4 |
| 600 | — | 6,5 | 13,1 | 19,6 | 32,6 | 54,4 |
| 625 | — | 4,5 | 9 | 13,5 | 22,5 | 37,5 |
| 650 | — | 3 | 6 | 9 | 15 | 25,1 |

1) The maximum non-shock working pressure is 1,3 bar at 540 °C for PN 20

Table E.14 — Pressure/temperature (P/T) ratings for flanges made using group 1A14 materials

| Temperature (°C) | Maximum non-shock working pressure (bar) | | | | | |
|------------------|--|-------|--------|--------|--------|--------|
| | PN 20 | PN 50 | PN 110 | PN 150 | PN 260 | PN 420 |
| -29 to 38 | 20 | 51,7 | 103,4 | 155,2 | 258,6 | 431 |
| 50 | 19,2 | 51,7 | 103,4 | 155,2 | 258,6 | 431 |
| 100 | 17,7 | 51,5 | 103,1 | 154,6 | 257,7 | 429,5 |
| 150 | 15,8 | 50,2 | 100,4 | 150,6 | 251 | 418,3 |
| 200 | 14 | 48,8 | 97,6 | 146,4 | 243,9 | 406,6 |
| 250 | 12,1 | 46,3 | 92,7 | 139 | 231,7 | 386,1 |
| 300 | 10,2 | 42,4 | 84,9 | 127,3 | 212,1 | 353,5 |
| 350 | 8,4 | 40,2 | 80,5 | 120,7 | 201,2 | 335,3 |
| 375 | 7,4 | 38,8 | 77,6 | 116,4 | 194 | 323,4 |
| 400 | 6,5 | 36,6 | 73,2 | 109,8 | 182,9 | 304,9 |
| 425 | 5,6 | 35,1 | 70,2 | 105,3 | 175,5 | 292,5 |
| 450 | 4,7 | 33,8 | 67,6 | 101,4 | 169 | 281,7 |
| 475 | 3,7 | 31,7 | 63,3 | 95 | 158,3 | 263,8 |
| 500 | 2,8 | 27,5 | 55 | 82,5 | 137,5 | 229,1 |
| 525 | 1,9 | 22,6 | 45,2 | 67,8 | 113 | 188,3 |
| 550 | 1,3 ¹⁾ | 17 | 34 | 50,9 | 84,9 | 141,5 |
| 575 | — | 11,2 | 22,5 | 33,7 | 56,2 | 93,6 |
| 600 | — | 7,2 | 14,4 | 21,5 | 35,9 | 59,8 |
| 625 | — | 5 | 9,9 | 14,9 | 24,9 | 41,4 |
| 650 | — | 3,5 | 7 | 10,4 | 17,4 | 29 |

1) The maximum non-shock working pressure is 1,3 bar at 540 °C for PN 20

NOTE — Consult table D 2 and the notes to table D 2 for limitations on use.

Table E.15 – Pressure/temperature (P/T) ratings for flanges made using group 2A1 materials

| Temperature (°C) | Maximum non-shock working pressure (bar) | | | | | |
|------------------|--|-------|--------|--------|--------|--------|
| | PN 20 | PN 50 | PN 110 | PN 150 | PN 260 | PN 420 |
| -29 to 38 | 19 | 49,6 | 99,3 | 148,9 | 248,2 | 413,6 |
| 50 | 18,4 | 47,8 | 95,7 | 143,5 | 239,2 | 398,6 |
| 100 | 15,7 | 40,9 | 81,8 | 122,6 | 204,4 | 340,7 |
| 150 | 13,9 | 36,3 | 72,7 | 109 | 181,7 | 302,8 |
| 200 | 12,6 | 32,8 | 65,5 | 98,3 | 163,8 | 273 |
| 250 | 11,7 | 30,5 | 61,1 | 91,6 | 152,7 | 254,5 |
| 300 | 10,2 | 29,1 | 58,1 | 87,2 | 145,3 | 242,1 |
| 350 | 8,4 | 28,1 | 56,1 | 84,2 | 140,3 | 233,8 |
| 375 | 7,4 | 27,8 | 55,5 | 83,3 | 138,8 | 231,3 |
| 400 | 6,5 | 27,5 | 54,9 | 82,4 | 137,3 | 228,9 |
| 425 | 5,6 | 27,2 | 54,3 | 81,5 | 135,8 | 226,4 |
| 450 | 4,7 | 26,9 | 53,7 | 80,6 | 134,3 | 223,9 |
| 475 | 3,7 | 26,6 | 53,1 | 79,7 | 132,8 | 221,4 |
| 500 | 2,8 | 26,1 | 52,1 | 78,2 | 130,3 | 217,2 |
| 525 | 1,9 | 23,9 | 47,8 | 71,6 | 119,4 | 199 |
| 550 | 1,3 ¹⁾ | 21,8 | 43,6 | 65,4 | 109,1 | 181,8 |
| 575 | — | 20,1 | 40,1 | 60,2 | 100,4 | 167,3 |
| 600 | — | 16,7 | 33,4 | 50,1 | 83,6 | 139,3 |
| 625 | — | 13,1 | 26,2 | 39,2 | 65,4 | 109 |
| 650 | — | 10,5 | 21 | 31,6 | 52,6 | 87,6 |
| 675 | — | 7,8 | 15,5 | 23,3 | 38,8 | 64,6 |
| 700 | — | 6 | 12 | 17,9 | 29,9 | 49,8 |
| 725 | — | 4,6 | 9,3 | 13,9 | 23,1 | 38,5 |
| 750 | — | 3,7 | 7,3 | 11 | 18,3 | 30,4 |
| 775 | — | 2,8 | 5,6 | 8,4 | 14 | 23,3 |
| 800 | — | 2,1 | 4,1 | 6,2 | 10,3 | 17,1 |

1) The maximum non-shock working pressure is 1,3 bar at 540 °C for PN 20

NOTE – Consult table D.2 and the notes to table D.2 for limitations on use.

Table E.16 — Pressure/temperature (P/T) ratings for flanges made using group 2A2 materials

| Temperature (°C) | Maximum non-shock working pressure (bar) | | | | | |
|------------------|--|-------|--------|--------|--------|--------|
| | PN 20 | PN 50 | PN 110 | PN 150 | PN 260 | PN 420 |
| -29 to 38 | 19 | 49,6 | 99,3 | 148,9 | 248,2 | 413,6 |
| 50 | 18,4 | 48,1 | 96,3 | 144,4 | 240,6 | 401 |
| 100 | 16,2 | 42,2 | 84,4 | 126,6 | 211 | 351,7 |
| 150 | 14,8 | 38,5 | 77 | 115,5 | 192,5 | 320,9 |
| 200 | 13,7 | 35,7 | 71,3 | 107 | 178,4 | 297,3 |
| 250 | 12,1 | 33,4 | 66,8 | 100,2 | 166,9 | 278,2 |
| 300 | 10,2 | 31,6 | 63,3 | 94,9 | 158,1 | 263,6 |
| 350 | 8,4 | 30,4 | 60,8 | 91,3 | 152,1 | 253,8 |
| 375 | 7,4 | 29,7 | 59,4 | 89,1 | 148,5 | 247,5 |
| 400 | 6,5 | 29,1 | 58,2 | 87,3 | 145,6 | 242,6 |
| 425 | 5,6 | 28,7 | 57,3 | 86 | 143,3 | 238,9 |
| 450 | 4,7 | 28,1 | 56,2 | 84,2 | 140,4 | 234 |
| 475 | 3,7 | 27,4 | 54,7 | 82,1 | 136,8 | 228 |
| 500 | 2,8 | 26,8 | 53,7 | 80,5 | 134,1 | 223,6 |
| 525 | 1,9 | 25,8 | 51,6 | 77,4 | 129 | 214,9 |
| 550 | 1,3 ¹⁾ | 25 | 49,9 | 74,9 | 124,8 | 208 |
| 575 | — | 24,1 | 48,2 | 72,3 | 120,5 | 200,8 |
| 600 | — | 21,4 | 42,9 | 64,3 | 107,2 | 178,6 |
| 625 | — | 18,3 | 36,5 | 54,8 | 91,3 | 152,1 |
| 650 | — | 14,1 | 28,2 | 42,4 | 70,6 | 117,7 |
| 675 | — | 12,6 | 25,3 | 37,9 | 63,2 | 105,3 |
| 700 | — | 9,9 | 19,9 | 29,8 | 49,7 | 82,9 |
| 725 | — | 7,7 | 15,4 | 23,1 | 38,5 | 64,2 |
| 750 | — | 5,9 | 11 | 17,6 | 29,4 | 49 |
| 775 | — | 4,6 | 9,1 | 13,7 | 22,8 | 38 |
| 800 | — | 3,5 | 7 | 10,5 | 17,5 | 29,2 |

1) The maximum non-shock working pressure is 1,3 bar at 540 °C for PN 20.

NOTE — Consult table D.2 and the notes to table D.2 for limitations on use.

Table E.17 — Pressure/temperature (P/T) ratings for flanges made using group 2A3 materials

| Temperature (°C) | Maximum non-shock working pressure (bar) | | | | | |
|------------------|--|-------|--------|--------|--------|--------|
| | PN 20 | PN 50 | PN 110 | PN 150 | PN 260 | PN 420 |
| -29 to 38 | 15,9 | 41,4 | 82,7 | 124,1 | 206,8 | 344,6 |
| 50 | 15,3 | 40 | 79,9 | 119,9 | 199,8 | 333 |
| 100 | 13,2 | 34,5 | 69 | 103,5 | 172,4 | 287,4 |
| 150 | 12 | 31,2 | 62,5 | 93,7 | 156,1 | 260,2 |
| 200 | 11 | 28,7 | 57,4 | 86,1 | 143,5 | 239,1 |
| 250 | 10,2 | 26,7 | 53,4 | 80,1 | 133,5 | 222,5 |
| 300 | 9,7 | 25,2 | 50,5 | 75,7 | 126,2 | 210,4 |
| 350 | 8,4 | 24 | 48,1 | 72,1 | 120,2 | 200,4 |
| 375 | 7,4 | 23,6 | 47,2 | 70,8 | 118 | 196,7 |
| 400 | 6,5 | 23,2 | 46,3 | 69,5 | 115,8 | 192,9 |
| 425 | 5,6 | 22,7 | 45,4 | 68,1 | 113,5 | 189,2 |
| 450 | 4,7 | 22,3 | 44,5 | 66,8 | 111,3 | 185,5 |

NOTE — Consult table D.2 and the notes to table D.2 for limitations on use.

Table E.18 — Pressure/temperature (P/T) ratings for flanges made using group 2A4 materials

| Temperature (°C) | Maximum non-shock working pressure (bar) | | | | | |
|------------------|--|-------|--------|--------|--------|--------|
| | PN 20 | PN 50 | PN 110 | PN 150 | PN 260 | PN 420 |
| -29 to 38 | 19 | 49,6 | 99,3 | 148,9 | 248,2 | 413,6 |
| 50 | 18,4 | 48 | 96 | 143,9 | 239,9 | 399,8 |
| 100 | 15,9 | 41,5 | 83 | 124,5 | 207,5 | 345,9 |
| 150 | 14,4 | 37,5 | 75 | 112,5 | 187,5 | 312,5 |
| 200 | 13,2 | 34,4 | 68,7 | 103,1 | 171,9 | 286,5 |
| 250 | 12,1 | 32,1 | 64,1 | 96,2 | 160,3 | 267,2 |
| 300 | 10,2 | 30,5 | 61,1 | 91,6 | 152,7 | 254,5 |
| 350 | 8,4 | 29,3 | 58,7 | 88 | 146,7 | 244,5 |
| 375 | 7,4 | 28,9 | 57,8 | 86,8 | 144,6 | 241 |
| 400 | 6,5 | 28,6 | 57,3 | 85,9 | 143,1 | 238,6 |
| 425 | 5,6 | 28,5 | 57 | 85,4 | 142,4 | 237,3 |
| 450 | 4,7 | 28,2 | 56,4 | 84,6 | 141 | 234,9 |
| 475 | 3,7 | 28 | 56 | 84 | 140,1 | 233,5 |
| 500 | 2,8 | 27,8 | 55,6 | 83,4 | 139 | 231,6 |
| 525 | 1,9 | 25,8 | 51,6 | 77,4 | 129 | 214,9 |
| 550 | 1,3 ¹⁾ | 25 | 49,9 | 74,9 | 124,8 | 208 |
| 575 | — | 22,8 | 45,6 | 68,4 | 113,9 | 189,9 |
| 600 | — | 19,8 | 39,6 | 59,4 | 99 | 165,1 |
| 625 | — | 15,8 | 31,6 | 47,4 | 79 | 131,6 |
| 650 | — | 12,5 | 25 | 37,4 | 62,4 | 104 |
| 675 | — | 9,8 | 19,7 | 29,5 | 49,2 | 81,9 |
| 700 | — | 7,7 | 15,4 | 23 | 38,4 | 64 |
| 725 | — | 6,2 | 12,4 | 18,6 | 31 | 51,6 |
| 750 | — | 4,8 | 9,6 | 14,4 | 24 | 40 |
| 775 | — | 3,8 | 7,5 | 11,3 | 18,8 | 31,3 |
| 800 | — | 3 | 6,1 | 9,1 | 15,2 | 25,2 |

1) The maximum non-shock working pressure is 1,3 bar at 540 °C for PN 20.

NOTE — Consult table D 2 and the notes to table D.2 for limitations on use.

Table E.19 – Pressure/temperature (P/T) ratings for flanges made using group 2A5 materials

| Temperature (°C) | Maximum non-shock working pressure (bar) | | | | | |
|------------------|--|-------|--------|--------|--------|--------|
| | PN 20 | PN 50 | PN 110 | PN 150 | PN 250 | PN 420 |
| -29 to 38 | 19 | 49,6 | 99,3 | 148,9 | 248,2 | 413,6 |
| 50 | 18,5 | 48,4 | 96,8 | 145,1 | 241,9 | 403,2 |
| 100 | 16,7 | 43,5 | 86,9 | 130,4 | 217,3 | 362,2 |
| 150 | 15,5 | 40,5 | 81 | 121,5 | 202,5 | 337,5 |
| 200 | 14 | 38,4 | 76,8 | 115,3 | 192,1 | 320,2 |
| 250 | 12,1 | 36,2 | 72,4 | 108,6 | 181 | 301,7 |
| 300 | 10,2 | 34,4 | 68,9 | 103,3 | 172,2 | 287 |
| 350 | 8,4 | 32,9 | 65,8 | 98,7 | 164,5 | 274,2 |
| 375 | 7,4 | 32,2 | 64,4 | 96,6 | 161 | 268,4 |
| 400 | 6,5 | 31,8 | 63,5 | 95,3 | 158,8 | 264,7 |
| 425 | 5,6 | 31,5 | 62,9 | 94,4 | 157,3 | 262,2 |
| 450 | 4,7 | 30,8 | 61,5 | 92,3 | 153,8 | 256,3 |
| 475 | 3,7 | 30 | 60 | 90 | 150 | 250,1 |
| 500 | 2,8 | 27,8 | 55,6 | 83,4 | 139 | 231,6 |
| 525 | 1,9 | 25,8 | 51,6 | 77,4 | 129 | 214,9 |
| 550 | 1,3 ¹⁾ | 25 | 49,9 | 74,9 | 124,8 | 208 |
| 575 | — | 24,1 | 48,2 | 72,3 | 120,5 | 200,8 |
| 600 | — | 21,4 | 42,9 | 64,3 | 107,2 | 178,6 |
| 625 | — | 17,8 | 35,6 | 53,4 | 89 | 148,3 |
| 650 | — | 11,6 | 23,2 | 34,7 | 57,9 | 96,5 |
| 675 | — | 8,7 | 17,3 | 26 | 43,3 | 72,1 |
| 700 | — | 6,7 | 13,5 | 20,2 | 33,7 | 56,1 |
| 725 | — | 5,3 | 10,5 | 15,8 | 26,4 | 43,9 |
| 750 | — | 4 | 8 | 12,1 | 20,1 | 33,5 |
| 775 | — | 3,2 | 6,3 | 9,5 | 15,8 | 26,4 |
| 800 | — | 2,6 | 5,2 | 7,5 | 13,1 | 21,9 |

1) The maximum non-shock working pressure is 1,3 bar at 540 °C for PN 20.

NOTE – Consult table D.2 and the notes to table D.2 for limitations on use.

Table E.20 — Pressure/temperature (P/T) ratings for flanges made using group 2A6 materials

| Temperature (°C) | Maximum non-shock working pressure (bar) | | | | | |
|------------------|--|-------|--------|--------|--------|--------|
| | PN 20 | PN 50 | PN 110 | PN 150 | PN 260 | PN 420 |
| - 29 to 38 | 17,8 | 46,3 | 92,7 | 139 | 231,6 | 386,1 |
| 50 | 17,4 | 45,3 | 90,7 | 136 | 226,9 | 377,7 |
| 100 | 15,9 | 41,4 | 82,8 | 124,2 | 207,1 | 345,1 |
| 150 | 15 | 39,2 | 78,4 | 117,5 | 195,9 | 326,5 |
| 200 | 14 | 36,9 | 73,9 | 110,8 | 184,7 | 307,9 |
| 250 | 12,1 | 35,1 | 70,2 | 105,3 | 175,6 | 292,6 |
| 300 | 10,2 | 33,4 | 66,9 | 100,3 | 167,2 | 278,7 |
| 350 | 8,4 | 32 | 63,9 | 95,9 | 159,8 | 266,3 |
| 375 | 7,4 | 31,4 | 62,7 | 94,1 | 156,8 | 261,3 |
| 400 | 6,5 | 30,8 | 61,5 | 92,3 | 153,8 | 256,3 |
| 425 | 5,6 | 30 | 60 | 90 | 150 | 250,1 |
| 450 | 4,7 | 29,4 | 58,8 | 88,2 | 147 | 245 |
| 475 | 3,7 | 28,8 | 57,6 | 86,4 | 144 | 240,1 |
| 500 | 2,8 | 27,8 | 55,6 | 83,4 | 139 | 231,6 |
| 525 | 1,9 | 25,4 | 50,8 | 76,1 | 126,9 | 211,5 |
| 550 | 1,3 ¹⁾ | 21,8 | 43,6 | 65,5 | 109,1 | 181,8 |
| 575 | — | 18,5 | 37 | 55,5 | 92,4 | 154,1 |
| 600 | — | 14,5 | 29 | 43,5 | 72,6 | 121 |
| 625 | — | 11,4 | 22,8 | 34,3 | 57,1 | 95,2 |
| 650 | — | 8 | 16 | 24 | 40 | 66,7 |
| 675 | — | 7 | 14 | 21 | 34,9 | 58,2 |
| 700 | — | 5,7 | 11,3 | 17 | 28,3 | 47,2 |
| 725 | — | 4,4 | 8,8 | 13,2 | 21,9 | 36,6 |
| 750 | — | 3,4 | 6,8 | 10,2 | 17,1 | 28,4 |
| 775 | — | 2,6 | 5,1 | 7,7 | 12,8 | 21,4 |
| 800 | — | 1,9 | 3,8 | 5,8 | 9,6 | 16 |

1) The maximum non-shock working pressure is 1,3 bar at 540 °C for PN 20.

Table E.21 — Pressure/temperature (P/T) ratings for flanges made using group 2A7 materials

| Temperature (°C) | Maximum non-shock working pressure (bar) | | | | | |
|------------------|--|-------|--------|--------|--------|--------|
| | PN 20 | PN 50 | PN 110 | PN 150 | PN 260 | PN 420 |
| - 29 to 38 | 17,8 | 46,3 | 92,7 | 139 | 231,6 | 386,1 |
| 50 | 17,4 | 45,3 | 90,7 | 136 | 226,6 | 377,7 |
| 100 | 15,9 | 41,4 | 82,8 | 124,2 | 207,1 | 345,1 |
| 150 | 15 | 39,2 | 78,4 | 117,5 | 195,9 | 326,5 |
| 200 | 14 | 36,9 | 73,9 | 110,8 | 184,7 | 307,9 |
| 250 | 12,1 | 35,1 | 70,2 | 105,3 | 175,6 | 292,6 |
| 300 | 10,2 | 33,4 | 66,9 | 100,3 | 167,2 | 278,7 |
| 350 | 8,4 | 32 | 63,9 | 95,9 | 159,8 | 266,3 |
| 375 | 7,4 | 31,4 | 62,7 | 94,1 | 156,8 | 261,3 |
| 400 | 6,5 | 30,8 | 61,5 | 92,3 | 153,8 | 256,3 |
| 425 | 5,6 | 30 | 60 | 90 | 150 | 250,1 |
| 450 | 4,7 | 29,4 | 58,8 | 88,2 | 147 | 245 |
| 475 | 3,7 | 28,8 | 57,6 | 86,4 | 144 | 240,1 |
| 500 | 2,8 | 27,8 | 55,6 | 83,4 | 139 | 231,6 |
| 525 | 1,9 | 25,8 | 51,6 | 77,4 | 129 | 214,9 |
| 550 | 1,3 ¹⁾ | 23,6 | 47,2 | 70,8 | 118 | 196,7 |
| 575 | — | 22 | 43,9 | 65,9 | 109,9 | 183,1 |
| 600 | — | 19,4 | 38,7 | 58,1 | 96,8 | 161,3 |
| 625 | — | 16,6 | 33,3 | 49,9 | 83,1 | 138,6 |
| 650 | — | 14,1 | 28,1 | 42,2 | 70,3 | 117,2 |
| 675 | — | 11,3 | 22,6 | 33,9 | 56,5 | 94,1 |
| 700 | — | 8,7 | 17,5 | 26,2 | 43,6 | 72,7 |
| 725 | — | 6,2 | 12,4 | 18,5 | 30,9 | 51,5 |
| 750 | — | 4,4 | 8,8 | 13,1 | 21,9 | 36,5 |
| 775 | — | 3,1 | 6,3 | 9,4 | 15,7 | 26,2 |
| 800 | — | 2,2 | 4,4 | 6,6 | 10,9 | 18,2 |

1) The maximum non-shock working pressure is 1,3 bar at 540 °C for PN 20.

Table E.22 — Pressure/temperature (P/T) ratings for pipeline flanges

| Temperature (°C) | Maximum non-shock working pressure (bar (gauge)) | | | |
|------------------|--|-------|--------|--------|
| | PN 20 | PN 50 | PN 110 | PN 150 |
| - 30 to 120 | 19,6 | 51,1 | 102,1 | 153,2 |
| 150 | 19 | 49,3 | 98,6 | 147,9 |
| 175 | 18,3 | 47,6 | 95,1 | 142,7 |
| 200 | 17,6 | 45,9 | 91,7 | 137,9 |
| 230 | 17 | 44,1 | 88,6 | 132,7 |

Annex F (informative)

Design criteria (pipeline applications)

F.1 For PN 50, PN 110 and PN 150 flanges, the slope and the outside diameter of the hub at the base are designed for welding ends having the same yield strength and thickness as those of the mating pipe. The wall thickness of the intended mating pipe was based on API 5LX-52 with a 0,68 design factor for the DN 650 to DN 900 sizes, and API 5LX-65 with a 0,72 design factor for the DN 950 to DN 1500 sizes. When the manufacturer of the DN 650 to DN 900 sizes elects to utilize the alternative permitted in 2.4.5.1.2 or when the mating pipe has a minimum specified yield strength exceeding 448 N/mm², it will be necessary to recalculate the design in accordance with the requirements of 2.4.5.1.2.

F.2 The design of the DN 950 and larger sizes of the PN 50 and higher class of welding neck flanges is based on the flange

material having a minimum specified yield strength of at least 290 N/mm² in a ring section of the flange and a minimum yield strength at the welding end at least equal to that specified for the mating pipe. When the yield strength of the welding end of the flange is less than specified, compensation in accordance with 2.4.5.1.2 may be made, but the hub slope and diameter at the larger end have to be preserved.

F.3 The design of all sizes is based on the use of heat-treated carbon steel bolt studs for PN 20 flanges and alloy steel bolt studs for PN 50, PN 110 and PN 150 flanges.

Annex G (informative)

Bibliography

- 1) ISO 468: 1982, *Surface roughness — Parameters, their values and general rules for specifying requirements.*
- 2) ANSI/ASME B16.5: 1988, *Pipe flanges and flanged fittings.*
- 3) ANSI/ASME B36.10M: 1985, *Welded and seamless wrought steel pipe.*
- 4) API 5LX-52, *Specification for high-test line pipe.*
- 5) API 5LX-65, *Specification for high-test line pipe.*
- 6) MSS SP44, *Steel pipe line flanges.*

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Descriptors : metal tubes, pipe joints, steel products, pipe flanges, specifications, dimensions, marking.

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