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МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ

## **Metallic flanges —**

### **Part 2: Cast iron flanges**

*Brides métalliques —*

*Partie 2: Brides en fonte*

Reference number  
ISO 7005-2: 1988 (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 approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 7005-2 was prepared by Technical Committee ISO/TC 5, *Ferrous metal pipes and metallic fittings*.

This part of ISO 7005, together with parts 1 and 3, cancel and replace ISO 2084 : 1974, ISO 2229 : 1973 and ISO 2441 : 1975.

ISO 7005 will consist 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
- Part 4 : Aluminium and aluminium alloy flanges

Annexes A and B of this part of ISO 7005 are for information only.

## Introduction

Various flange systems based on differing design criteria have been in use throughout the world for many years. Given the increasing difficulties arising from such a situation, this International Standard has been based on a single series of metallic flanges. ISO 7005 will be published in four parts as follows:

Part 1: Steel flanges

Part 2: Cast iron flanges

Part 3: Copper alloy and composite flanges

Part 4: Aluminium and aluminium alloy flanges

This part of ISO 7005 is based on the American and European cast iron flange systems which have been combined to produce one International Standard with some changes to the dimensions specified in the two systems.

The materials specified in American (ANSI) standards and International Standards have been retained. Because, at this time, the International Standards for cast iron materials do not specify pressure/temperature ( $p/T$ ) ratings, the ratings for the materials specified have been based on those given in comparable national standards.

In the American system, flanges are designated by a Class rating but in this part of ISO 7005 the relevant Class ratings are designated by nominal pressure (PN) ratings. The equivalent designations are as follows:

Classes 125 and 150: ISO PN20

Classes 250 and 300: ISO PN50

The ratings used in the European system remain as ISO PN2,5, ISO PN6, ISO PN10, ISO PN16, ISO PN25 and ISO PN40.

ISO PN20 and ISO PN50 grey cast iron and ductile cast iron flanges are designed to be interchangeable with flanges to ANSI B16.1 (grey cast iron) and ANSI B16.42 (ductile cast iron). They are not identical but are deemed to comply with the dimensions specified in ANSI B16.1 and ANSI B16.42 as appropriate (see 2.7).

Flange details in all four parts of ISO 7005 are such that flanges having the same PN and nominal size (DN) values and compatible flange facings will mate together when using metric bolting. Tolerances on dimensions are given for guidance in annex A.

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

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

## Metallic flanges —

### Part 2: Cast iron flanges

#### Section 1: General

##### 1.1 Scope

This part of ISO 7005 for a single system of flanges specifies requirements for circular grey, malleable and ductile cast iron flanges in the following nominal pressure ratings:

Series 1*	Series 2*
ISO PN10	ISO PN2,5
ISO PN16	ISO PN6
ISO PN20	ISO PN25
ISO PN50	ISO PN40

This part of ISO 7005 specifies the types of flanges and their facings, dimensions, bolt sizes, surface finish of faces, marking, testing, inspection and materials together with associated pressure/temperature ratings.

##### NOTES

1 Attention is drawn to the need to refer to the pressure/temperature rating tables for the permissible working pressures, particularly for flanges of ISO PN20 and ISO PN50.

2 Dimensions of gaskets will be the subject of a future International Standard.

##### 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 listed below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 185 : 1988, *Classification of grey cast iron.*

ISO 887 : 1983, *Plain washers for metric bolts, screws and nuts — General plan.*

ISO 1083 : 1987, *Spheroidal graphite cast iron — Classification.*

ISO 2531 : 1986, *Ductile iron pipes, fittings and accessories for pressure pipelines.*

ISO 5922 : 1981, *Malleable cast iron.*

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

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

ASTM A 126 : 1984, *Gray iron castings for valves, flanges, and pipe fittings.*

ASTM A 395 : 1980, *Ferritic ductile iron pressure-retaining castings for use at elevated temperatures.*

##### 1.3 Definitions and designations

###### 1.3.1 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, apply.

NOTE — In this part of ISO 7005, nominal pressure is designated by the letters "ISO PN" followed by the appropriate reference number.

\* Series 1 ratings are the basic ratings; series 2 ratings have limited application.

**1.3.2 Designation of types and facings**

Figure 1 illustrates flanges identified according to type.

05 — Blank flange

11 — Welding neck flange

12 — Hubbed slip-on flange for welding

13 — Hubbed threaded flange

14 — Hubbed socket welding flange

15 — Loose hubbed flange for lapped pipe end

21 — Integral flange

Figure 2 illustrates facing types (type A and type B) which are used where applicable in conjunction with flanges shown in figure 1.

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## Section 2: General requirements

### 2.1 Pressure/temperature ( $p/T$ ) ratings

#### 2.1.1 General

The pressure/temperature ratings of the flanges manufactured from the materials specified in table 14 shall be the maximum allowable non-shock working pressures at the temperatures given in tables 15 (grey cast iron), 16 and 17 (ductile cast iron) and 18 (malleable cast iron). Linear interpolation is permitted for intermediate temperatures.

NOTE — The rating of a flange is not necessarily the rating of the whole pipework system.

#### 2.1.2 Rating of flanged joints

Where two flanges in a flanged joint do not have the same pressure/temperature rating, the rating of the joint at any temperature shall 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 the same as that of the contained fluid. Use of a pressure rating corresponding to a temperature other than that of the contained fluid is the responsibility of the user, subject to the requirements of any applicable code or regulation.
- 2 Application of the ratings given in this part of ISO 7005 to flange joints should take into consideration the risk of leakage due to forces and moments developed in the connecting pipework.
- 3 Owing to the nature of any thread sealant used, additional limitations may be placed on a threaded flange.
- 4 These notes on service considerations are not intended to be exhaustive.

### 2.2 Materials

#### 2.2.1 Range of materials

Flanges shall be manufactured from the materials specified in table 14.

#### NOTES

- 1 It is the responsibility of each national standards organization to determine which are the national materials equivalent to materials specified in this part of ISO 7005.
- 2 Where there is an appropriate application standard, it is the responsibility of the purchaser to ensure compliance with the requirements of that standard.

#### 2.2.2 Gaskets

The various types, dimensions and materials used for gaskets are not within the scope of this part of ISO 7005.

### 2.2.3 Bolting

#### NOTES

- 1 Bolting materials are not within the scope of this part of ISO 7005 but materials for bolting should be chosen by the user according to the pressure, flange material and the selected gasket so that the flanged joint remains tight under the expected operating conditions.
- 2 For joints comprising grey cast iron flanges with raised faces, and where grey cast iron flanges are bolted to flanges of other materials and either or both of the flanges have a raised face, it is recommended that bolting having a yield strength not exceeding 240 N/mm<sup>2</sup> should be used. If higher strength bolting is used, it is recommended that mating flanges should have flat faces and that full-face gaskets, which extend to the outside diameter of the flange, should be used.

### 2.3 Dimensions

#### 2.3.1 Range of nominal sizes

The range of nominal sizes applicable to each flange type and to each pressure rating shall be as specified in tables 2 to 4 as appropriate.

#### 2.3.2 Dimensional details

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

- table 6 for ISO PN2,5 flanges
- table 7 for ISO PN6 flanges
- table 8 for ISO PN10 flanges
- table 9 for ISO PN16 flanges
- table 10 for ISO PN20 flanges
- table 11 for ISO PN25 flanges
- table 12 for ISO PN40 flanges
- table 13 for ISO PN50 flanges

NOTE — Tolerances on dimensions are not specified in this part of ISO 7005 but guidance on the dimensions which should have tolerances and suggested tolerances are given in annex A.

#### 2.3.3 Attachment of welded and threaded flanges

NOTE — Details of attachment for welded and threaded flanges are not specified in this part of ISO 7005.

### 2.4 Joint facings

#### 2.4.1 Types of facings

The flange facings specified (flat face type A and raised face type B) are illustrated in figure 2; their raised face dimensions shall be as given in table 5.

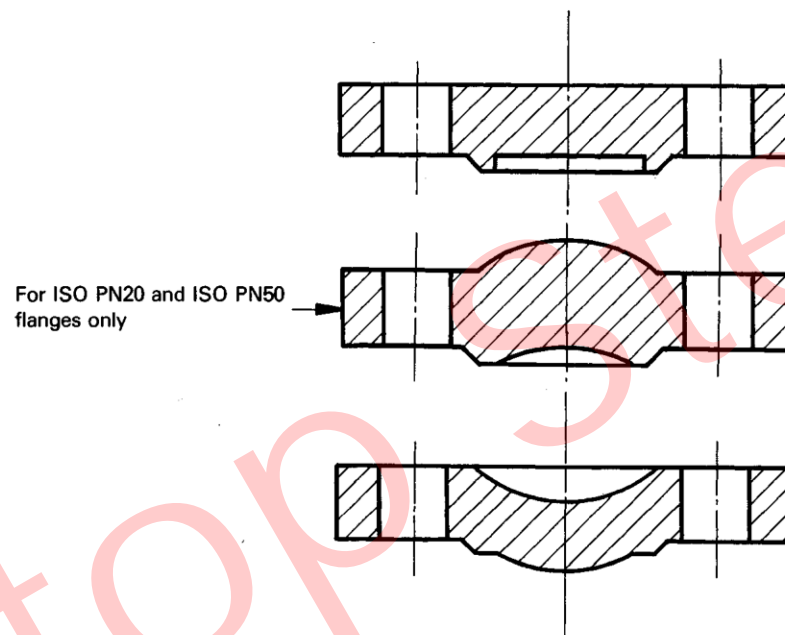
NOTE — The transition from the outside diameter of the raised face to the flange face is at the option of the manufacturer (i.e. either a radius or a chamfer may be used).

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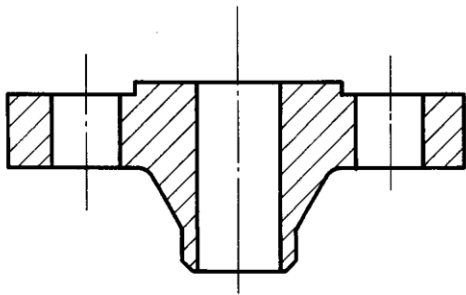
- b) nominal size — DN followed by the appropriate number (see 2.3.1);
- c) nominal pressure — ISO PN followed by the appropriate number (see 1.1);
- d) flange type number (see 1.3.2 and figure 1);
- e) facing type letter (see 1.3.2 and figure 2);
- f) material designation (see 2.2.1);
- g) for flange types 11, 12, 14 and 15, the external diameter and thickness of pipe to which the flange is to be attached (see note 3 to tables 6 to 13) when supplied loose, i.e. not as a component of some other fitting;
- h) type of thread for threaded flanges (type 13) when supplied loose, i.e. not as a component of some other fitting.



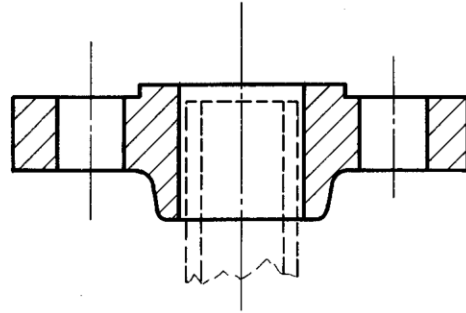
**Type 05**  
Blank flange

NOTE — See the note to 2.4.1 regarding the transition from the outside diameter of the raised face.

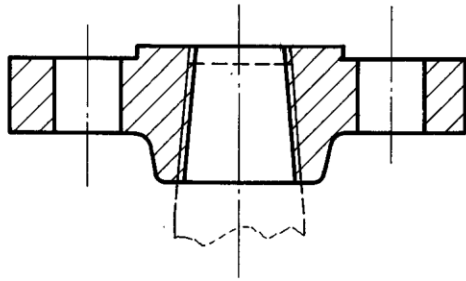
**Figure 1 — Types of flanges**



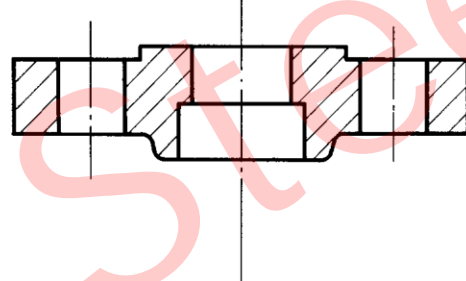
**Type 11**  
Welding neck flange



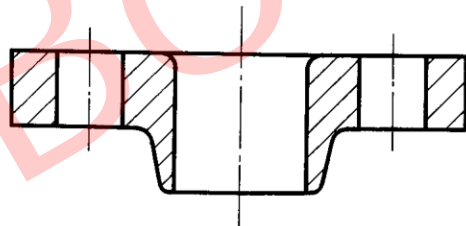
**Type 12**  
Hubbed slip-on flange for welding



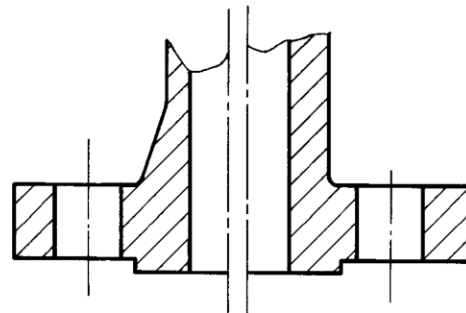
**Type 13**  
Hubbed threaded flange



**Type 14**  
Hubbed socket welding flange



**Type 15**  
Loose hubbed flange for lapped pipe end



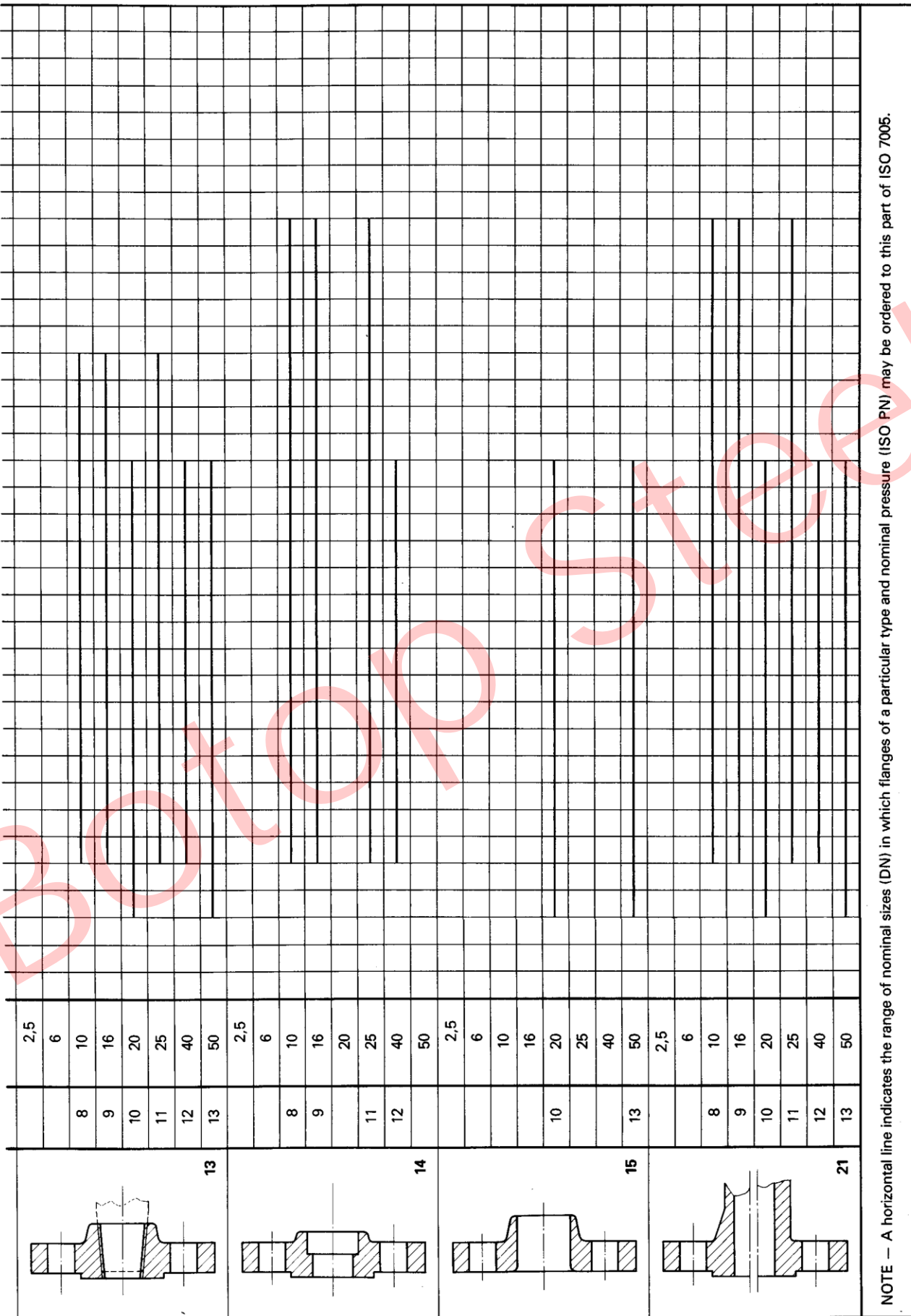
**Type 21**  
Integral flange

NOTE — See the note to 2.4.1 regarding the transition from the outside diameter of the raised face.

**Figure 1 — Types of flanges (concluded)**









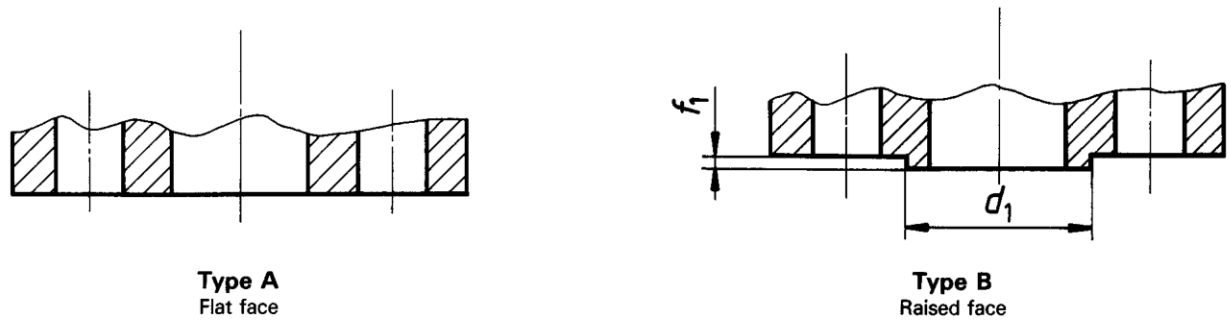


Figure 2 – Flange facing types A and B<sup>1)</sup>

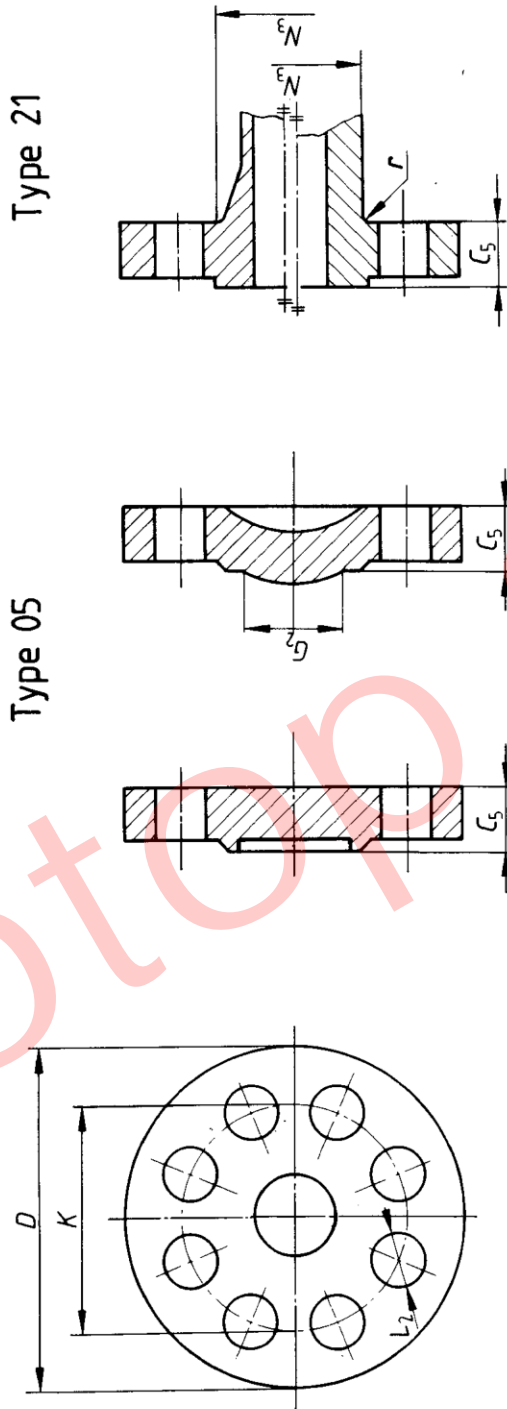
Table 5 – Dimensions for type B flange facings<sup>1)</sup>

Nominal size DN	ISO PN2,5		ISO PN6		ISO PN10		ISO PN16		ISO PN20		ISO PN25		ISO PN40		ISO PN50			
	$d_1$	$f_1$	$d_1$	$f_1$	$d_1$	$f_1$	$d_1$	$f_1$	$d_1$	$f_1$	$d_1$	$f_1$	$d_1$	$f_1$	Grey cast iron		Ductile cast iron	
															$d_1$	$f_1$	$d_1$	$f_1$
10			33	2	41	2	41	2			41	2	41	2				
15			38	2	46	2	46	2			46	2	46	2				
20			48	2	56	2	56	2			56	2	56	2				
25			58	3	65	3	65	3	51	2	65	3	65	3	68	2	51	2
32			69	3	76	3	76	3	64	2	76	3	76	3	78	2	64	2
40			78	3	84	3	84	3	73	2	84	3	84	3	90	2	73	2
50			88	3	99	3	99	3	92	2	99	3	99	3	106	2	92	2
65			108	3	118	3	118	3	105	2	118	3	118	3	125	2	105	2
80			124	3	132	3	132	3	127	2	132	3	132	3	144	2	127	2
100			144	3	156	3	156	3	157	2	156	3	156	3	176	2	157	2
125			174	3	184	3	184	3	186	2	184	3	184	3	211	2	186	2
150			199	3	211	3	211	3	216	2	211	3	211	3	246	2	216	2
200			254	3	266	3	266	3	270	2	274	3	284	3	303	2	270	2
250			309	3	319	3	319	3	324	2	330	3	345	3	357	2	324	2
300			363	4	370	4	370	4	381	2	389	4	409	4	418	2	381	2
350			413	4	429	4	429	4	413	2	448	4	465	4	481	2	413	2
400			463	4	480	4	480	4	470	2	503	4	535	4	535	2	470	2
450			518	4	530	4	548	4	533	2	548	4	560	4	592	2	533	2
500			568	4	582	4	609	4	584	2	609	4	615	4	649	2	584	2
600			667	5	682	5	720	5	692	2	720	5	735	5	770	2	692	2
700			772	5	794	5	794	5			820	5			945 <sup>2)</sup>	2		
800			878	5	901	5	901	5			928	5						
900			978	5	1 001	5	1 001	5			1 028	5						
1 000			1 078	5	1 112	5	1 112	5			1 140	5						
1 200	1 280	5	1 295	5	1 328	5	1 328	5			1 350	5						
1 400	1 480	5	1 510	5	1 530	5	1 530	5			1 560	5						
1 600	1 690	5	1 710	5	1 750	5	1 750	5			1 780	5						
1 800	1 890	5	1 918	5	1 950	5	1 950	5			1 985	5						
2 000	2 090	5	2 125	5	2 150	5	2 150	5			2 210	5						
2 200	2 295	6	2 335	6														
2 400	2 495	6	2 545	6														
2 600	2 695	6	2 750	6														
2 800	2 910	6	2 960	6														
3 000	3 110	6	3 160	6														
3 200	3 310	6	3 370	6														
3 400	3 510	6	3 580	6														
3 600	3 720	6	3 790	6														
3 800	3 920	6																
4 000	4 120	6																

1) See 2.4.2.

2) For ISO PN50 flanges, nominal size DN 750 is used instead of DN 700.

\*) For application see 2.4.2.



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

Refer to the column "number of bolts" in table 6 for the actual number.

NOTE — For facing dimensions, see table 5.



**Table 6 — Dimensions of ISO PN2,5 flanges**  
(See the notes at the end of this section.)

Dimensions in millimetres

Nominal size DN	Mating dimensions					Bolts		Flange thickness G <sub>1</sub> <sup>1)</sup>	Maximum diameter of shoulder G <sub>2</sub>	Neck diameter N <sub>3</sub>	Corner radii r
	Outside diameter of flange D	Diameter of bolt circle K	Diameter of bolt holes L <sub>2</sub>	Number	Nominal size	Flange type					
						05, 21	05, 21				
10 to 1 000	Use ISO PN6 dimensions										
1 200	1 375	1 320	30	32	M27	30	1 185	1 250	8		
1 400	1 575	1 520	30	36	M27	30	1 385	1 452	8		
1 600	1 790	1 730	30	40	M27	32	1 585	1 654	10		
1 800	1 990	1 930	30	44	M27	34	1 785	1 856	10		
2 000	2 190	2 130	30	48	M27	34	1 985	2 056	10		
2 200	2 405	2 340	33	52	M30	36	2 185	2 260	10		
2 400	2 605	2 540	33	56	M30	38	2 385	2 464	10		
2 600	2 805	2 740	33	60	M30	40	2 585	2 668	10		
2 800	3 030	2 960	36	64	M33	42	2 785	2 868	12		
3 000	3 230	3 160	36	68	M33	42	2 985	3 068	12		
3 200	3 430	3 360	36	72	M33	44	3 185	3 268	12		
3 400	3 630	3 560	36	76	M33	46	3 385	3 472	12		
3 600	3 840	3 770	36	80	M33	48	3 585	3 676	12		
3 800	4 045	3 970	39	80	M36	48	3 785	3 876	12		
4 000	4 245	4 170	39	84	M36	50	3 985	4 076	12		

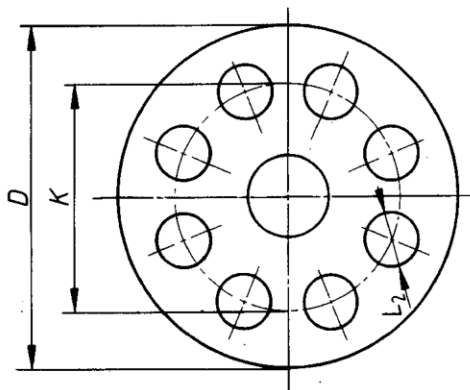
1) See table 14 for an explanation of the abbreviated cast iron designations.

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80	190	150	19	4	M16	18	18	110	6
100	210	170	19	4	M16	18	18	130	6
125	240	200	19	8	M16	20	20	160	6
150	265	225	19	8	M16	20	20	182	8
200	320	280	19	8	M16	22	22	238	8
250	375	335	19	12	M16	24	24	284	10
300	440	395	23	12	M20	24	24	342	10
350	490	445	23	12	M20	26	26	392	10
400	540	495	23	16	M20	28	28	442	10
450	595	550	23	16	M20	28	28	494	12
500	645	600	23	20	M20	30	30	544	12
600	755	705	26	20	M24	30	30	642	12
700	860	810	26	24	M24	32	32	746	12
800	975	920	31	24	M27	34	34	850	12
900	1 075	1 020	31	24	M27	36	36	950	12
1 000	1 175	1 120	31	28	M27	36	36	1 050	12
1 200	1 405	1 340	34	32	M30	40	40	1 264	12
1 400	1 630	1 560	37	36	M33	44	44	1 480	12
1 600	1 830	1 760	37	40	M33	48	48	1 680	12
1 800	2 045	1 970	40	44	M36	50	50	1 878	15
2 000	2 265	2 180	43	48	M39	54	54	2 082	15
2 200	2 475	2 390	43	52	M39	60	60	Manufacturer's option	15
2 400	2 685	2 600	43	56	M39	62	62		15
2 600	2 905	2 810	49	60	M45	64	64		15
2 800	3 115	3 020	49	64	M45	68	68		15
3 000	3 315	3 220	49	68	M45	70	70		15
3 200	3 525	3 430	49	72	M45	76	76		15
3 400	3 735	3 640	49	76	M45	80	80		15
3 600	3 970	3 860	56	80	M52	84	84		15

1) See table 14 for an explanation of the abbreviated cast iron designations.

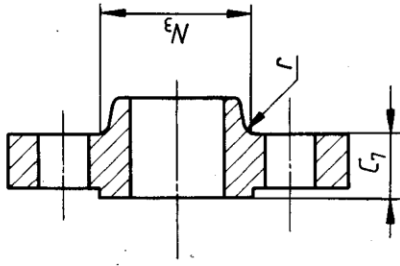


This diagram illustrates the arrangement but not necessarily the correct number of bolt holes.

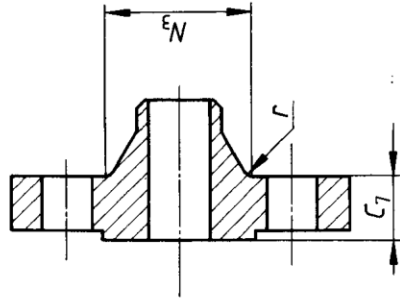
Refer to the column "number of bolts" in table 8 for the actual number.

NOTE — For facing dimensions, see table 5.

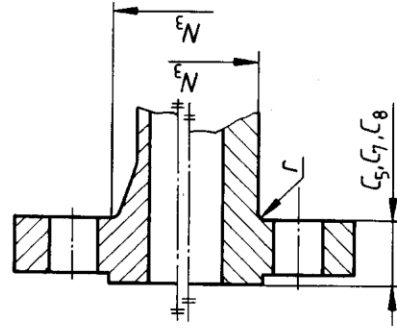
Type 12



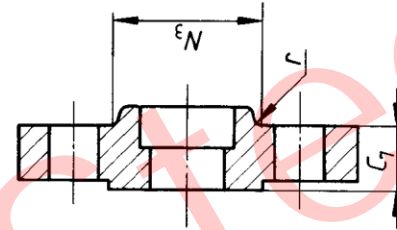
Type 11



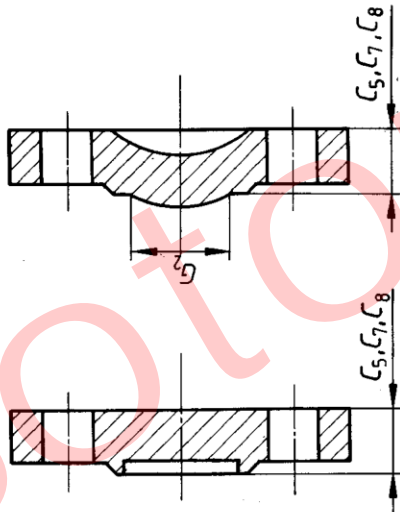
Type 21



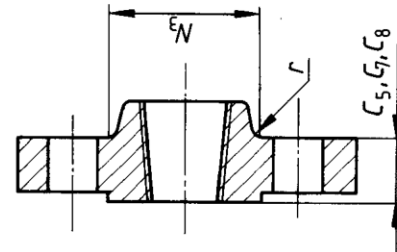
Type 14



Type 05



Type 13



**Table 8 — Dimensions of ISO PN10 flanges**  
(See the notes at the end of this section.)

Dimensions in millimetres

Nominal size DN	Mating dimensions				Flange thickness			Maximum diameter of shoulder of shoulder $G_2$	Neck diameter $N_3$	Corner radii $r$
	Outside diameter of flange $D$	Diameter of bolt circle $K$	Bolts		$G_1^{(1)}$ $C_5$	$D_1^{(1)}$ $C_7$	$M_1^{(1)}$ $C_8$			
			Diameter of bolt holes $L_2$	Number						
	05, 11, 12, 13, 14, 21				Flange type 05, 13, 21			05	11, 12, 13, 14, 21	11, 12, 13, 14, 21
10					14		14		28	3
15					14		14		32	3
20					16		16		40	4
25					16		16		50	4
32					18		18		60	5
40					18	19	18		70	5
50					20	19	20		84	5
65					20	19	20		104	6
80					22	19	20		120	6
100					24	19	22		140	6
125					26	19	22		170	6
150					26	19	24		190	8
200	340	295	23	8	26	20	24		246	8
250	395 <sup>2)</sup>	350	23	12	28	22	26		298	10
300	445 <sup>2)</sup>	400	23	12	28	24,5	26		348	10
350	505	460	23	16	30	24,5		325	408	10
400	565	515	28	16	32	24,5		375	456	10
450	615	565	28	20	32	25,5		425	502	12
500	670	620	28	20	34	26,5		475	559	12
600	780	725	31	20	36	30		575	658	12
700	895	840	31	24	40	32,5		675	772	12
800	1 015	950	34	24	44	35		775	876	12
900	1 115	1 050	34	28	46	37,5		875	976	12
1 000	1 230	1 160	37	28	50	40		975	1 080	12
1 200	1 455	1 380	40	32	56	45		1 175	1 292	12
1 400	1 675	1 590	43	36	62	46		1 375	1 496	12
1 600	1 915	1 820	49	40	68	49		1 575	1 712	12
1 800	2 115	2 020	49	44	70	52		1 775	1 910	15
2 000	2 325	2 230	49	48	74	55		1 975	2 120	15

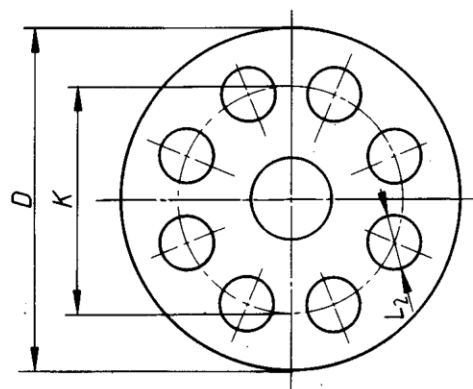
Use ISO PN16 dimensions

1) See table 14 for an explanation of the abbreviated cast iron designations.

2) For ductile iron pipes and fittings to ISO 2531 the outside diameters for the following flanges shall be:

— for DN 250,  $D = 400$  mm;

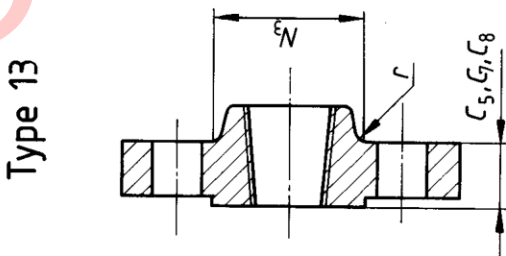
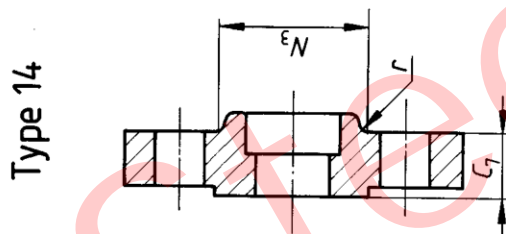
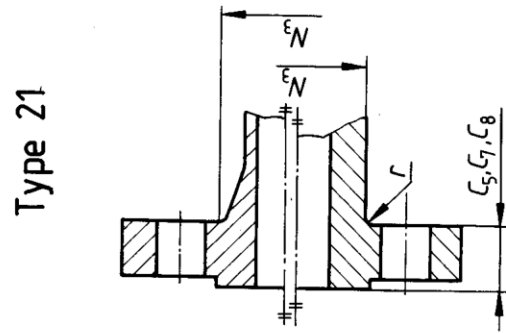
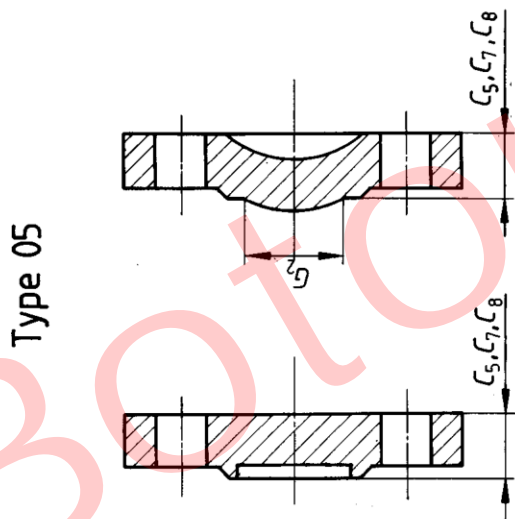
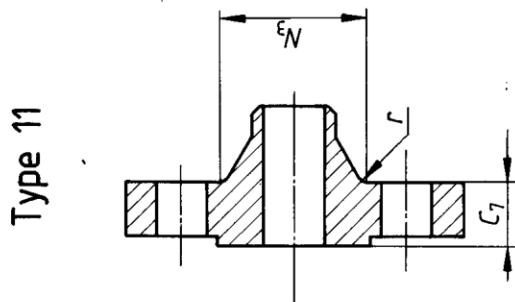
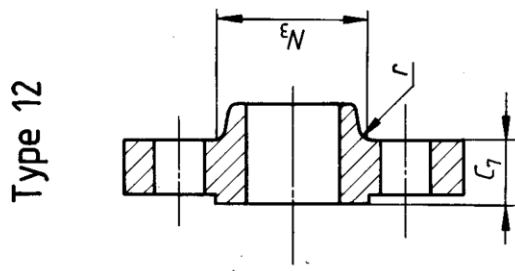
— for DN 300,  $D = 455$  mm.



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.

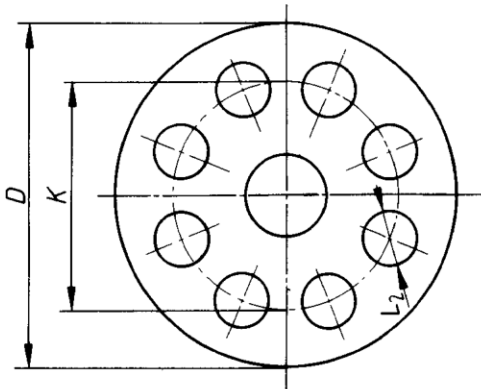
NOTE — For facing dimensions, see table 5.



Botop Steel

<https://www.botopsteelpipe.com>

Grey cast iron blank flanges are supplied flat up to DN 250 and dished or domed for DN 300 and greater. Ductile cast iron blank flanges are supplied flat up to DN 250 and optionally flat, dished or domed for DN 300 and greater. The raised face is permitted to be on either the concave or the convex side of dished blank flanges.

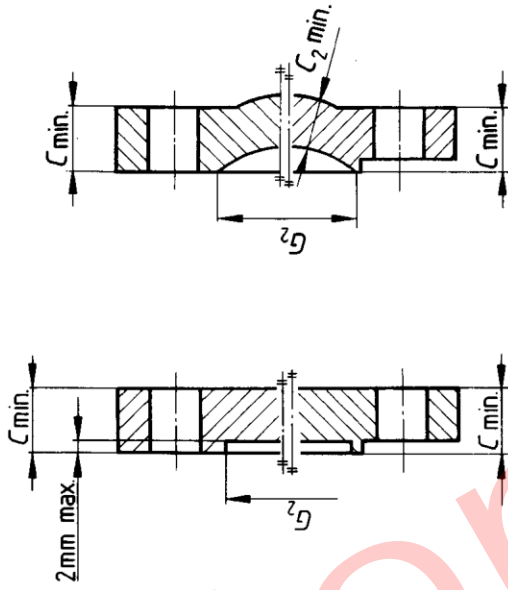


This diagram illustrates the arrangement but not necessarily the correct number of bolt holes.

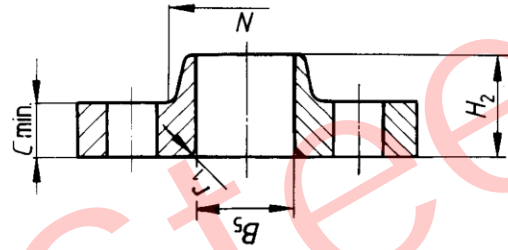
Refer to the column "number of bolts" in table 10 for the actual number.

NOTE — For facing dimensions, see table 5.

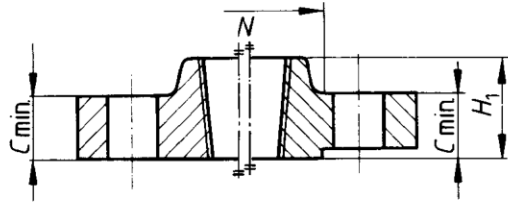
Type 05



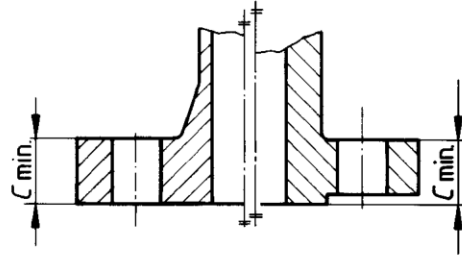
Type 15



Type 13



Type 21





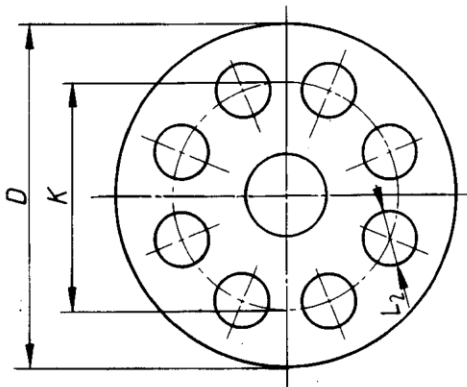
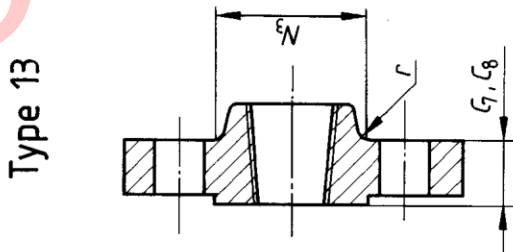
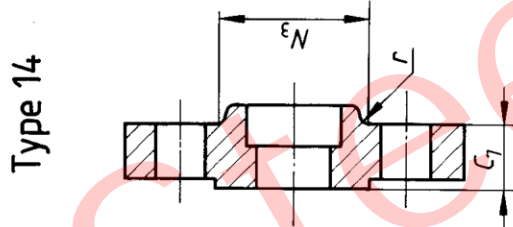
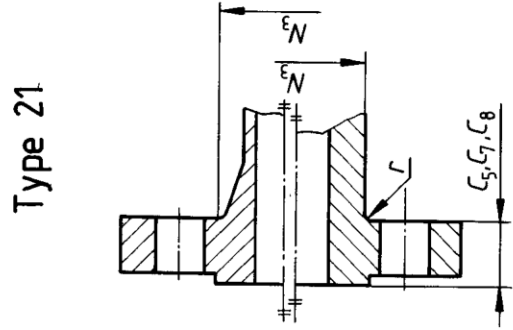
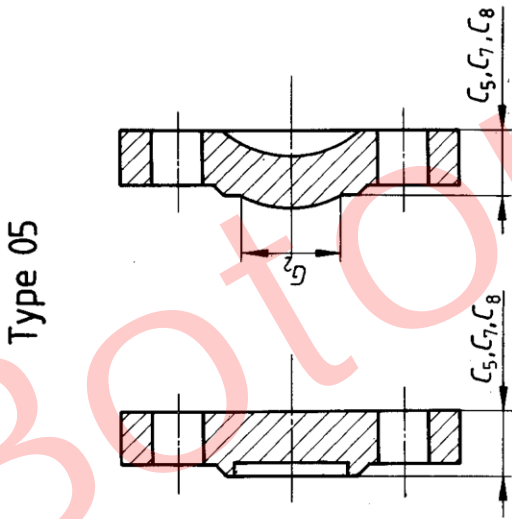
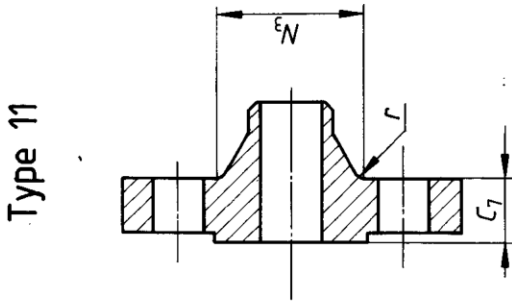
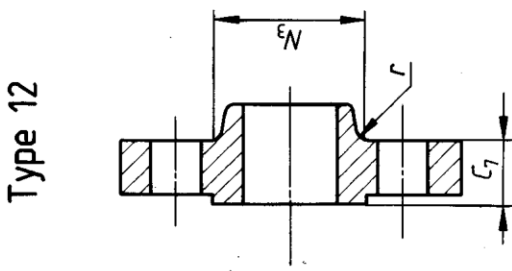
**Table 10 — Dimensions of ISO PN20 flanges**  
(See the notes at the end of this section.)

Dimensions in millimetres

Nominal size DN	Mating dimensions				Flange thickness min.			Hub diameter min.		Length of hub min.		Bore min. D <sub>1</sub> <sup>(1)</sup> B <sub>5</sub>	Corner radius D <sub>1</sub> <sup>(1)</sup> r <sub>1</sub>	Diameter of port, radius of dish G <sub>2</sub>	Thickness of dish min. C <sub>2</sub>
	Outside diameter of flange D	Diameter of bolt circle K	Diameter of bolt holes L <sub>2</sub>	Bolts Number	Nominal size	G <sub>1</sub> <sup>(1)</sup>	D <sub>1</sub> <sup>(1)</sup>	C	G <sub>1</sub> , D <sub>1</sub> <sup>(1)</sup>	N	G <sub>1</sub> , D <sub>1</sub> <sup>(1)</sup> H <sub>1</sub>				
												05, 13, 21	05, 13, 15	13	15
25	110	79,5	16	4	M14	11	14	11	50	18	18	35	4	25	05
32	120	89	16	4	M14	13	15,5	13	60	21	21	44	5	32	05
40	130	98,5	16	4	M14	14,5	17,5	14,5	65	22	22	50	6	38	05
50	155	120,5	18	4	M16	16	19	16	80	25	25	63	8	51	05
65	180	139,5	18	4	M16	17,5	22,5	17,5	90	28	28	76	8	64	05
80	190	152,5	18	4	M16	19	24	19	110	30	30	92	10	76	05
100	230	190,5	18	8	M16	24	24	24	135	33	33	117	11	102	05
125	255	216	22	8	M20	24	24	24	165	37	37	145	11	127	05
150	280	241,5	22	8	M20	25,5	25,5	25,5	190	40	40	172	13	152	05
200	345	298,5	22	8	M20	28,5	28,5	28,5	245	44	44	223	13	203	05
250	405	362	26	12	M24	30	30	30	305	49	49	278	13	254	05
300	485	432	26	12	M24	32	32	32	355	56	56	329	13	305	05
350	535	476	29,5	12	M27	35	35	35	390	57	79	360	13	356	05
400	600	540	29,5	16	M27	36,5	36,5	36,5	445	64	87	412	13	406	05
450	635	578	32,5	16	M30	39,5	39,5	39,5	500	68	97	463	13	457	05
500	700	635	32,5	20	M30	43	43	43	555	73	103	515	13	508	05
600	815	749,5	35,5	20	M33	48	48	48	660	83	111	616	13	610	05
750	985	914,5	35,5	28	M33	54 <sup>(2)</sup>								762	05
900	1 170	1 086	42	32	M39	60,5 <sup>(2)</sup>								914	05

1) See table 14 for an explanation of the abbreviated cast iron designations.

2) Applies to type 05 and type 21 flanges only.



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.

NOTE — For facing dimensions, see table 5.

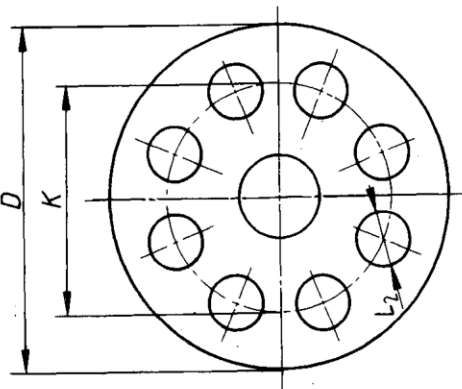
**Table 11 — Dimensions of ISO PN25 flanges**  
(See the notes at the end of this section.)

Dimensions in millimetres

Nominal size DN	Mating dimensions			Bolts		Flange thickness			Maximum diameter of shoulder of shoulder	Neck diameter	Corner radii
	Outside diameter of flange <i>D</i>	Diameter of bolt circle <i>K</i>	Diameter of bolt holes <i>L<sub>2</sub></i>	Number	Nominal size	<i>G</i> <sup>1)</sup>	<i>D</i> <sup>1)</sup>	<i>M</i> <sup>1)</sup>			
	Flange type										
	05, 11, 12, 13, 14, 21					05, 21	05, 11, 12, 13, 14, 21	05, 13, 21	05	11, 12, 13, 14, 21	11, 12, 13, 14, 21
10											
15											
20											
25											
32											
40											
50											
65											
80											
100	235	190	23	8	M20	28	19	24		142	6
125	270	220	28	8	M24	30	19	26		162	6
150	300	250	28	8	M24	34	20	28		192	8
200	360	310	28	12	M24	34	22	30		252	8
250	425	370	31	12	M27	36	24,5	32		304	10
300	485	430	31	16	M27	40	27,5	34		364	10
350	555	490	34	16	M30	44	30		325	418	10
400	620	550	37	16	M33	48	32		375	472	10
450	670	600	37	20	M33	50	34,5		425	520	12
500	730	660	37	20	M33	52	36,5		475	580	12
600	845	770	40	20	M36	56	42		575	684	12
700	960	875	43	24	M39		46,5		675	780	12
800	1 085	990	49	24	M45		51		775	882	12
900	1 185	1 090	49	28	M45		55,5		875	982	12
1 000	1 320	1 210	56	28	M52		60		975	1 086	12
1 200	1 530	1 420	56	32	M52		69		1 175	1 296	12
1 400	1 755	1 640	62	36	M56		74		1 375	1 508	12
1 600	1 975	1 860	62	40	M56		81		1 575	1 726	12
1 800	2 195	2 070	70	44	M64		88		1 775	1 920	15
2 000	2 425	2 300	70	48	M64		95		1 975	2 150	15

Use ISO PN40 dimensions

1) See table 14 for an explanation of the abbreviated cast iron designations.

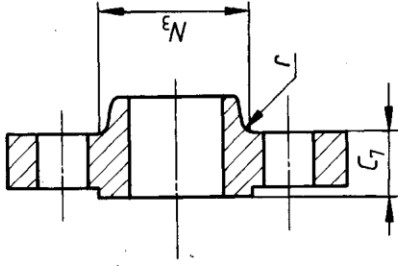


This diagram illustrates the arrangement but not necessarily the correct number of bolt holes.

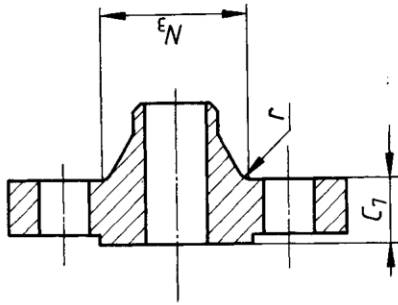
Refer to the column "number of bolts" in table 12 for the actual number.

NOTE — For facing dimensions, see table 5.

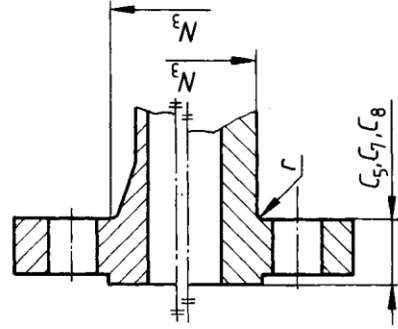
Type 12



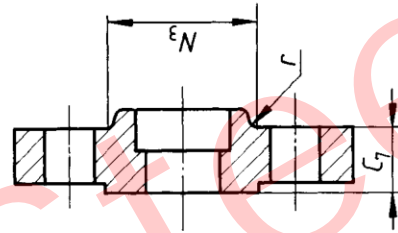
Type 11



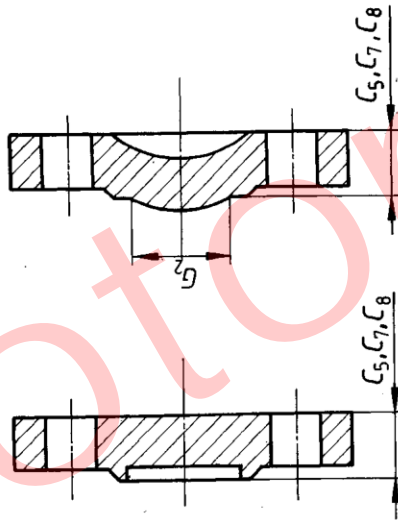
Type 21



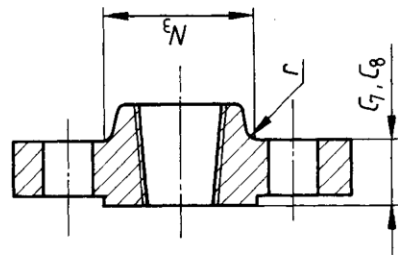
Type 14



Type 05



Type 13



**Table 12 — Dimensions of ISO PN40 flanges**  
(See the notes at the end of this section.)

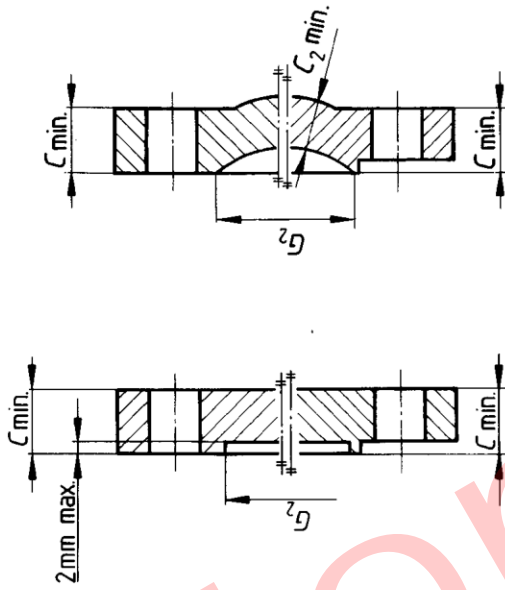
Dimensions in millimetres

Nominal size DN	Mating dimensions					Flange thickness				Maximum diameter of shoulder $G_2$	Neck diameter $N_3$	Corner radii $r$	
	Outside diameter of flange $D$	Diameter of bolt circle $K$	Diameter of bolt holes $L_2$	Bolts		$G_1^{(1)}$	$D_1^{(1)}$	$C_7$	$M_1^{(1)}$				$C_8$
				Number	Nominal size								
	05, 11, 12, 13, 14, 21					05, 11, 12, 13, 14, 21				05	11, 12, 13, 14, 21	11, 12, 13, 14, 21	
10	90	60	14	4	M12	16			14		28	3	
15	95	65	14	4	M12	16			14		32	3	
20	105	75	14	4	M12	18			16		40	4	
25	115	85	14	4	M12	18			16		50	4	
32	140	100	19	4	M16	20			18		60	5	
40	150	110	19	4	M16	20	19		18		70	5	
50	165	125	19	4	M16	22	19		20		84	5	
65	185	145	19	8	M16	24	19		22		104	6	
80	200	160	19	8	M16	26	19		24		120	6	
100	235	190	23	8	M20	28	19		24		142	6	
125	270	220	28	8	M24	30	23,5		26		162	6	
150	300	250	28	8	M24	34	26		28		192	8	
200	375	320	31	12	M27	40	30		34		254	8	
250	450	385	34	12	M30	46	34,5		38		312	10	
300	515	450	34	16	M30	50	39,5		42		378	10	
350	580	510	37	16	M33	54	44			325	432	10	
400	660	585	40	16	M36	62	48			375	498	10	
450	685	610	40	20	M36		49			425	522	12	
500	755	670	43	20	M39		52			475	576	12	
600	890	795	49	20	M45		58			575	686	12	

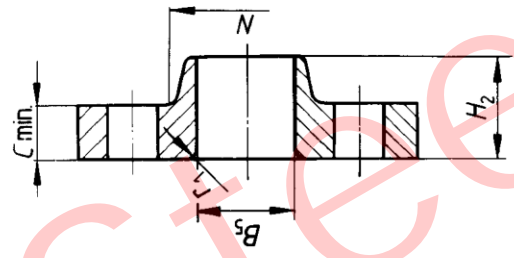
1) See table 14 for an explanation of the abbreviated cast iron designations.

Grey cast iron blank flanges are supplied flat up to DN 200 and dished or domed for DN 250 and greater. Ductile cast iron blank flanges are supplied flat up to DN 200 and optionally flat, dished or domed for DN 250 and greater. The raised face is permitted to be on either the concave or the convex side of dished blank flanges.

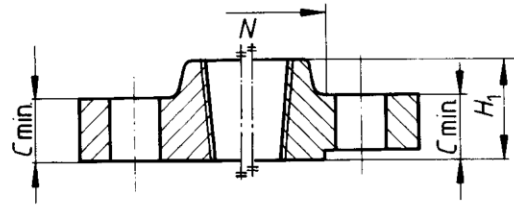
Type 05



Type 15



Type 13



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

Refer to the column 'number of bolts' in table 13 for the actual number.

NOTE — For facing dimensions, see table 5.

Type 21

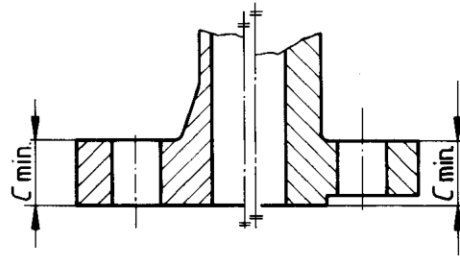


Table 13 — Dimensions of ISO PN50 flanges

(See the notes at the end of this section.)

Dimensions in millimetres

Nominal size DN	Mating dimensions					Flange thickness min. G <sub>1</sub> , D <sub>1</sub> <sup>(1)</sup> C	Hub diameter min.			Length of hub min.			Bore min. D <sub>1</sub> <sup>(1)</sup> B <sub>5</sub>	Corner radius D <sub>1</sub> <sup>(1)</sup> r <sub>1</sub>	Diameter of port, radius of dish G <sub>2</sub>	Thickness of dish min. C <sub>2</sub>		
	Outside diameter of flange D	Diameter of bolt circle K	Diameter of bolt holes L <sub>2</sub>	Bolts			G <sub>1</sub> <sup>(1)</sup>	D <sub>1</sub> <sup>(1)</sup>	N	G <sub>1</sub> <sup>(1)</sup>	D <sub>1</sub> <sup>(1)</sup>	H <sub>1</sub>					D <sub>1</sub> <sup>(1)</sup>	H <sub>2</sub>
				Number	Nominal size													
	05, 13, 15, 21						Flange type											
						05, 13, 15, 21	13	13, 15	13	13	13	15	15	15	05	05		
25	125	89	18	4	M16	17,5	55	55	22	27	27	27	35	5	25			
32	135	98,5	18	4	M16	19	65	65	25	27	27	27	44	5	32			
40	155	114,5	22	4	M20	20,5	70	70	28	30	30	30	50	6	38			
50	165	127	18	8	M16	22,5	85	85	32	33	33	33	63	8	51			
65	190	149,5	22	8	M20	25,5	100	100	36	38	38	38	76	8	64			
80	210	168	22	8	M20	28,5	120	120	40	43	43	43	92	10	76			
100	255	200	22	8	M20	32	145	145	44	48	48	48	117	11	102			
125	280	235	22	8	M20	35	180	180	48	51	51	51	145	11	127			
150	320	270	22	12	M20	36,5	205	205	49	52	52	52	172	13	152			
200	380	330	26	12	M24	41	260	260	56	62	62	62	223	13	203			
250	445	387,5	29,5	16	M27	48	320	320	60	67	67	67	278	13	254	23,8		
300	520	451	32,5	16	M30	51	375	375	65	73	73	73	329	13	305	25,4		
350	585	514,5	32,5	20	M30	54	415	425	68	76	76	76	360	13	337	28,4		
400	650	571,5	35,5	20	M33	57	470	485	73	83	83	83	412	13	387	31,8		
450	710	628,5	35,5	24	M33	60,5	535	535	89	89	89	89	463	13	432	35,1		
500	775	686	35,5	24	M33	63,5	590	590	95	95	95	95	515	13	483	38,1		
600	915	813	42	24	M39	70	705	705	106	106	106	106	616	13	584	41,1		
750	1 095	997	48	28	M45	76 <sup>(2)</sup>									737	50,8		

1) See table 14 for an explanation of the abbreviated cast iron designations.

2) For type 05 and type 21 grey cast iron flanges only.

### Notes to tables 6 to 13

- 1 All ISO PNs: For dimensions  $d_1$  and  $f_1$ , see table 5.
- 2 ISO PN2,5, ISO PN6, ISO PN10, ISO PN16, ISO PN25 and ISO PN40: The ductile, grey and malleable cast iron flange thicknesses specified are :
  - $C_5$ , grey cast iron thicknesses to DIN 2530, DIN 2531, DIN 2532, DIN 2533, DIN 2534 and DIN 2535;
  - $C_7$ , ductile cast iron thicknesses to ISO 2531;
  - $C_8$ , malleable cast iron thicknesses equal to  $C_3$  dimension for steel type 21 flanges given in ISO 7005-1.
- 3 Pipe dimensions affect the bore of the flange, and the external diameter and thickness of pipe which is to be joined to the flange should be specified where appropriate. The bore sizes of integral (type 21) flanges on valves and fittings to which they form a part may be given in the appropriate standard for the component.
- 4 For bolts to ISO 261 used in conjunction with ISO PN20 and ISO PN50 flanges :
  - for sizes up to and including M45, use metric coarse series;
  - for sizes M48 and above, use a constant 4 mm pitch.



## Section 4: Materials and pressure/temperature ( $p/T$ ) ratings

### 4.1 Materials

Table 14 – Material applicable for each ISO PN

Material			Mechanical properties			ISO PN							
Type	Reference standard	Grade/Class	Minimum tensile strength $R_m$ min. N/mm <sup>2</sup>	Minimum elongation after fracture $A$ min. %	Minimum 0,2 % proof stress $R_{p0,2}$ min. N/mm <sup>2</sup>	2,5	6	10	16	20	25	40	50
Grey cast iron GI	ISO 185	200	200			x	x	x	x	x			x
	ISO 185	250	250			x	x	x	x	x	x	x	x
	ASTM A 126	A <sup>1)</sup>	145							x			x
	ASTM A 126	B	214							x			x
Ductile cast iron DI	ISO 1083	350-22	350	22	220			x	x	x	x	x	x
	ISO 2531	400-5	400	5	300			x	x	x	x	x	x
	ISO 1083	400-15	400	15	250			x	x	x	x	x	x
	ISO 1083	500-7	500	7	320			x	x	x	x	x	x
	ISO 1083	600-3	600	3	370			x	x	x	x	x	x
	ASTM A 395	414-18	414	18	276					x			x
Malleable cast iron MI	ISO 5922	B 32-12	320	12	190		x	x	x		x	x	
	ISO 5922	B 35-10	350	10	200		x	x	x		x	x	

1) Grey cast iron to ASTM A 126 Class A is limited to flanges of nominal size up to and including DN 300.

4.2 Pressure/temperature ratings

Table 15 – Pressure/temperature ratings for grey cast iron flanges

Nominal pressure ISO PN	Material		Temperature, °C							
	ISO	ASTM	- 10 to 65	120	150	180	200	230	250	300
2,5	185	—	2,5	2,5	2,3	2,1	2	1,9	1,8	1,5
6	185	—	6	6	5,4	5	4,8	4,4	4,2	3,6
10	185	—	10	10	9	8,4	8	7,4	7	6
16	185	—	16	16	14,4	13,4	12,8	11,8	11,2	9,6
20	( < DN 300)	A 126 Class A	12,1	10,3	9,6	8,6				
	( < DN 300)	A 126 Class B	13,8	12,1	11,4	10,3	9,8	8,6		
	(300 < DN < 600)	A 126 Class B	10,3	8,6	7,6	6,9				
	(600 < DN < 900)	A 126 Class B	10,3	5,9	3,4					
25	185 <sup>2)</sup>	—	25	25	22,5	21	20	18,5	17,5	15
40	185 <sup>2)</sup>	—	40	40	36	33,6	32	29,6	28	24
50	( < DN 300)	A 126 Class A	27,6	23,4	21,4	18,3	17,7			
	( < DN 300)	A 126 Class B	34,5	28,6	25,9	23,1	20,8	17,2		
	(300 < DN < 600)	A 126 Class B	20,7	17,9	16,6	15,2	14,1			
	(600 < DN < 750)	A 126 Class B	20,7	13,8	10,3	6,9				

1) 1 bar = 0,1 MPa  
2) ISO PN25 and ISO PN40 flanges manufactured in grey cast iron are limited to ISO 185 grade 250.

Table 16 – Pressure/temperature ratings for ductile cast iron flanges to ISO 2531 grade 400-5 and to ISO 1083 grades 500-7 and 600-3<sup>1)</sup>

Nominal pressure ISO PN	Temperature, °C					
	- 10 to 120	150	200	250	300	350
	Maximum permissible working pressure, bar <sup>2)</sup> (gauge)					
10	10	9,5	9	8	7	5,5
16	16	15,2	14,4	12,8	11,2	8,8
20	15,5	14,8	13,9	12,1	10,2	8,6
25	25	23,8	22,5	20	17,5	13,8
40	40	38	36	32	28	22
50	40,2	39	36	35	33	31

1) Ductile cast iron grade 600-3 flanges are limited to applications up to temperatures of 120 °C.  
2) 1 bar = 0,1 MPa

**Table 17 – Pressure/temperature ratings for ductile cast iron flanges to ISO 1083 grades 350-22 and 400-15 and ASTM A 395 Class 414-18**

Nominal pressure ISO PN	Temperature, °C						
	- 10 to 40	120	150	200	250	300	350
	Maximum permissible working pressure, bar <sup>1)</sup> (gauge)						
10	10	10	9,7	9,2	8,7	8	7
16	16	16	15,5	14,7	13,9	12,8	11,2
20	17,5	15,5	14,8	13,9	12,1	10,2	8,6
25	25	25	24,3	23	21,8	20	17,5
40	40	40	38,8	36,8	34,8	32	28
50	44	40,2	39	36	35	33	31

1) 1 bar = 0,1 MPa

**Table 18 – Pressure/temperature ratings for malleable cast iron flanges to ISO 5922**

Nominal pressure ISO PN	Temperature, °C					
	- 10 to 120	150	200	250	300	350
	Maximum permissible working pressure, bar <sup>1)</sup> (gauge)					
6	6	5,8	5,5	5,2	4,8	4,2
10	10	9,7	9,2	8,7	8	7
16	16	15,5	14,7	13,9	12,8	11,2
25	25	24,3	23	21,8	20	17,5
40	40	38,8	36,8	34,8	32	28

1) 1 bar = 0,1 MPa

**Annex A**  
(informative)

**Guidance on tolerances on dimensions**

This annex lists dimensions which should be given a tolerance and also gives suggested tolerances.

NOTE — ISO/TC 5/SC 10 Working Group 6 has been instructed to prepare a table of tolerances which become mandatory by revision or by amendment to this part of ISO 7005.

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Table A.1 — Tolerances on dimensions  
Dimensions and tolerances in millimetres

Dimensions for all types	Symbol	Designation	DN																																															
			10	15	20	25	32	40	50	66	80	100	125	150	200	250	300	350	400	450	500	600	700	800	900	1 000	1 200	1 400	1 600	1 800	2 000	2 200	2 400	2 600	2 800	3 000	3 200	3 400	3 600	3 800	4 000									
	<i>D</i>	Outside diameter	Not specified but the minimum shall provide a sufficient bearing area for the nut- or bolt-head																																															
	<i>d</i> <sub>1</sub>	Facing diameter	+4,5 -4	+5,5 -4,5	+6,5 -5	+8,5 -5,5	+10 -6																																											
	<i>f</i> <sub>1</sub>	Facing height	<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <th colspan="2">Height</th> <th>2</th><th>3</th><th>4</th><th>5</th><th>6</th> </tr> <tr> <td colspan="2">Tolerances</td> <td>+1 -1</td> <td>+1,5 -2</td> <td>+2 -3</td> <td>+2,5 -4</td> <td>+3 -5</td> </tr> </table>																																		Height		2	3	4	5	6	Tolerances		+1 -1	+1,5 -2	+2 -3	+2,5 -4	+3 -5
Height		2	3	4	5	6																																												
Tolerances		+1 -1	+1,5 -2	+2 -3	+2,5 -4	+3 -5																																												
	<i>b</i> <sup>1)</sup>	Flange thickness at edge	<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <th colspan="2">Thickness</th> <th>&lt; 25</th><th>26 to 40</th><th>41 to 55</th><th>56 to 70</th><th>&gt; 71</th> </tr> <tr> <td colspan="2">Tolerances</td> <td>± 4</td> <td>± 4,5</td> <td>± 5</td> <td>± 6</td> <td>± 7</td> </tr> </table>																																		Thickness		< 25	26 to 40	41 to 55	56 to 70	> 71	Tolerances		± 4	± 4,5	± 5	± 6	± 7
Thickness		< 25	26 to 40	41 to 55	56 to 70	> 71																																												
Tolerances		± 4	± 4,5	± 5	± 6	± 7																																												
	<i>L</i> <sub>2</sub>	Diameter of bolt holes	<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <th colspan="2">Diameter of bolt holes</th> <th>&lt; 20</th><th>&gt; 22</th> </tr> <tr> <td colspan="2">Tolerances</td> <td>+0,5 0</td> <td>+1 0</td> </tr> </table>																																		Diameter of bolt holes		< 20	> 22	Tolerances		+0,5 0	+1 0						
Diameter of bolt holes		< 20	> 22																																															
Tolerances		+0,5 0	+1 0																																															
	<i>K</i>	Diameter of bolt circle	<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <th colspan="2">Diameter of bolt circle for bolt size</th> <th>M10</th><th>M12 to M24</th><th>M27 to M45</th><th>M52</th><th>M56</th> </tr> <tr> <td colspan="2">Tolerances</td> <td>± 1</td> <td>± 1,5</td> <td>± 2</td> <td>± 3</td> <td>± 3,5</td> </tr> </table>																																		Diameter of bolt circle for bolt size		M10	M12 to M24	M27 to M45	M52	M56	Tolerances		± 1	± 1,5	± 2	± 3	± 3,5
Diameter of bolt circle for bolt size		M10	M12 to M24	M27 to M45	M52	M56																																												
Tolerances		± 1	± 1,5	± 2	± 3	± 3,5																																												
	—	Centre to centre of adjacent bolt holes	<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <th colspan="2">Centre to centre for bolt size</th> <th>M10</th><th>M12 to M24</th><th>M27 to M45</th><th>M52</th><th>M56</th> </tr> <tr> <td colspan="2">Tolerances</td> <td>± 0,5</td> <td>± 0,75</td> <td>± 1</td> <td>± 1,5</td> <td>± 1,75</td> </tr> </table>																																		Centre to centre for bolt size		M10	M12 to M24	M27 to M45	M52	M56	Tolerances		± 0,5	± 0,75	± 1	± 1,5	± 1,75
Centre to centre for bolt size		M10	M12 to M24	M27 to M45	M52	M56																																												
Tolerances		± 0,5	± 0,75	± 1	± 1,5	± 1,75																																												
	—	Parallelism of bolting surface with joint surface	2° max.																																															
	1) <i>b</i> = <i>c</i> - <i>f</i> <sub>1</sub>																																																	

**Annex B**  
(informative)

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1) To be published.

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