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МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ

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## **Metallic flanges —**

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

*Brides métalliques —*

*Partie 2: Brides en fonte*

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Reference number  
ISO 7005-2:1988 (E)

## Contents

	Page
Foreword .....	iii
Introduction .....	iv
<b>Section 1: General</b> .....	<b>1</b>
1.1 Scope .....	1
1.2 Normative references .....	1
1.3 Definitions and designations .....	1
<b>Section 2: General requirements</b> .....	<b>3</b>
2.1 Pressure/temperature ( $p/T$ ) ratings .....	3
2.2 Materials .....	3
2.3 Dimensions .....	3
2.4 Joint facings .....	3
2.5 Spot-facing or back-facing .....	4
2.6 Marking .....	4
2.7 Inspection and test .....	4
2.8 Repairs .....	4
2.9 Information to be supplied by the purchaser .....	4
<b>Section 3: Dimensions</b> .....	<b>7</b>
<b>Section 4: Materials and pressure/temperature (<math>p/T</math>) ratings</b> .....	<b>29</b>
4.1 Materials .....	29
4.2 Pressure/temperature ratings .....	30
<b>Annexes</b>	
<b>A</b> Guidance on tolerances of dimensions .....	<b>32</b>
<b>B</b> Bibliography .....	<b>34</b>

## 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

- 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.
- 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).

**2.4.2 Application**

**2.4.2.1** ISO PN2,5, ISO PN6, ISO PN10, ISO PN16, ISO PN25 and ISO PN40 flanges made of grey cast iron and ductile cast iron shall have raised faces.

**2.4.2.2** ISO PN20 flanges made of grey cast iron shall have flat faces. ISO PN50 flanges made of grey cast iron shall have raised faces unless otherwise specified.

ISO PN20 and ISO PN50 flanges made of ductile cast iron shall have raised faces unless otherwise specified.

**2.4.2.3** Flanges made in malleable cast iron shall have either

- a) flat faces, or
- b) raised faces.

**2.4.3 Surface finish of flanges**

All flange jointing faces shall be finished in accordance with table 1. The faces shall be compared by visual or tactile means with reference specimens which conform with the  $R_a$  and  $R_z$  values given in table 1.

**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 : 1982, *Surface roughness — Parameters, their values and general rules for specifying requirements*, relate to the reference specimens.
- 2 Other finishes may be agreed between the manufacturer and purchaser.

**Table 1 — Numerical values of the surface finish parameters,  $R_a$  and  $R_z$ , of flange faces**

Values in micrometres

Manufacturing process	$R_a$	$R_z$
Turning <sup>1)</sup>	3,2 to 12,5	12,5 to 50
Other <sup>2)</sup>	3,2 to 6,3	12,5 to 25

1) "Turning" covers any method of machine operation producing either serrated concentric or serrated spiral grooves.  
 2) Processes other than turning are permissible provided that they give a surface finish in compliance with the  $R_a$  and  $R_z$  values specified.

**2.5 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 washers complying with ISO 887 for the 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 2°.

**2.6 Marking**

**2.6.1 Identification**

Flanges other than integral shall be clearly marked as follows :

- a) the nominal size (DN) and the nominal pressure rating (ISO PN);
- b) material designation;
- c) manufacturer's name or trade-mark.

**EXAMPLE**

**DN 300 ISO PN16 400-5 XXXX**

**NOTES**

- 1 Additionally, flange facing designations may be given.
- 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 and the lowest  $p/T$  rating will apply.

**2.6.2 Stamping**

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

**2.7 Inspection and test**

ISO PN20 and ISO PN50 flanges specified are designed to be interchangeable with, but not identical to, grey cast iron Class 125 and Class 250 flanges to ANSI B16.1 respectively and with ductile cast iron Class 150 and Class 300 flanges to ANSI B16.42 respectively.

**NOTES**

- 1 It is recommended that ISO PN20 and ISO PN50 flanges be accepted by inspectors as complying with the dimensions specified in ANSI B16.1 or ANSI B16.42 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 to 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.

**2.8 Repairs**

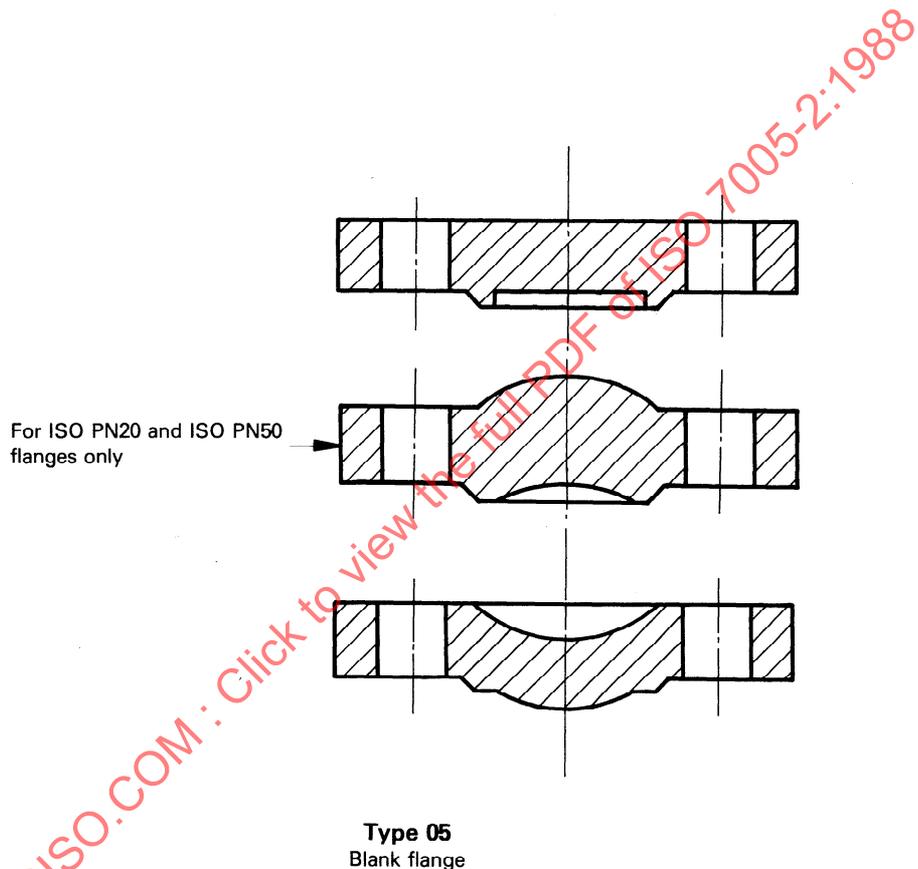
Where not otherwise prohibited by the applicable material standard or codes and regulations, repairs by welding are permitted for ductile cast iron. All welding repairs shall be carried out in accordance with a written procedure.

**2.9 Information to be supplied by the purchaser**

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

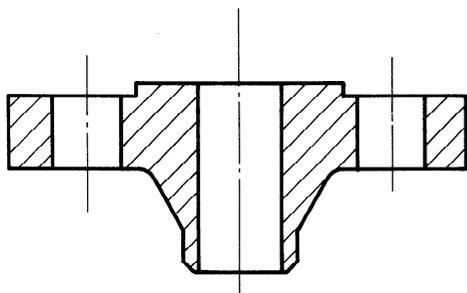
- a) number of this part of ISO 7005, i.e. ISO 7005-2;

- 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.

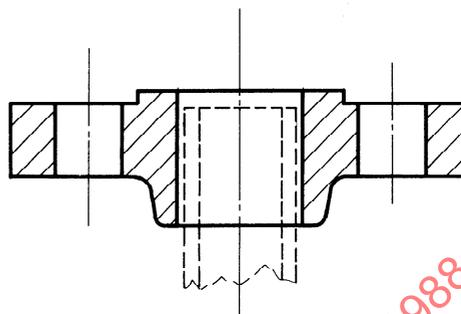


NOTE — See the note to 2.4.1 regarding the transition from the outside diameter of the raised face.

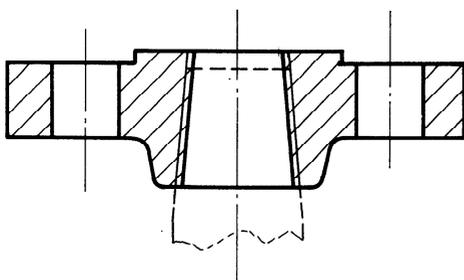
Figure 1 — Types of flanges



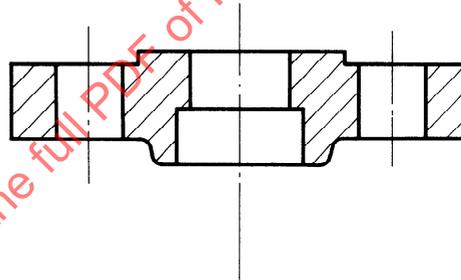
**Type 11**  
Welding neck flange



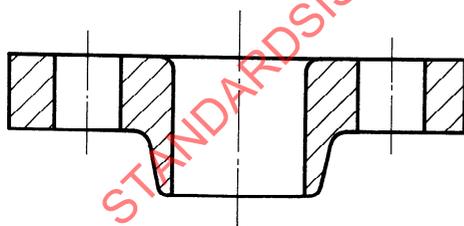
**Type 12**  
Hubbed slip-on flange for welding



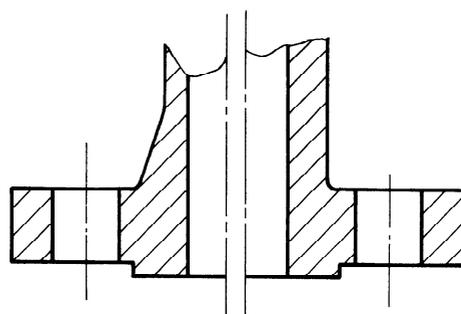
**Type 13**  
Hubbed threaded flange



**Type 14**  
Hubbed socket welding flange



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



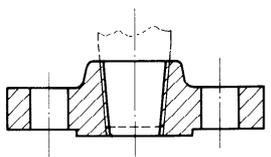
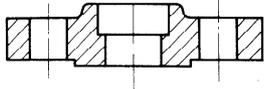
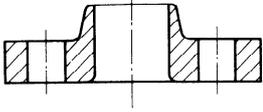
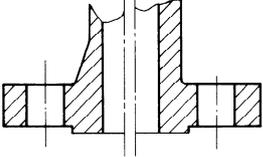
**Type 21**  
Integral flange

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)**





 <p style="text-align: center;"><b>13</b></p>		2,5	
		6	
	8	10	
	9	16	
	10	20	
	11	25	
	12	40	
	13	50	
 <p style="text-align: center;"><b>14</b></p>		2,5	
		6	
	8	10	
	9	16	
	11	25	
	12	40	
		50	
 <p style="text-align: center;"><b>15</b></p>		2,5	
		6	
		10	
	10	16	
		20	
		25	
		40	
	13	50	
 <p style="text-align: center;"><b>21</b></p>		2,5	
		6	
	8	10	
	9	16	
	10	20	
	11	25	
	12	40	
	13	50	

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NOTE — A horizontal line indicates the range of nominal sizes (DN) in which flanges of a particular type and nominal pressure (ISO PN) may be ordered to this part of ISO 7005.



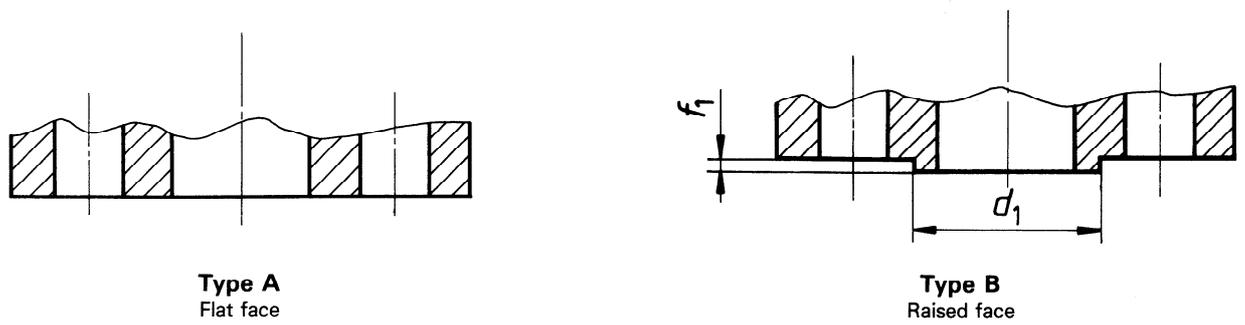


Figure 2 – Flange facing types A and B \*)

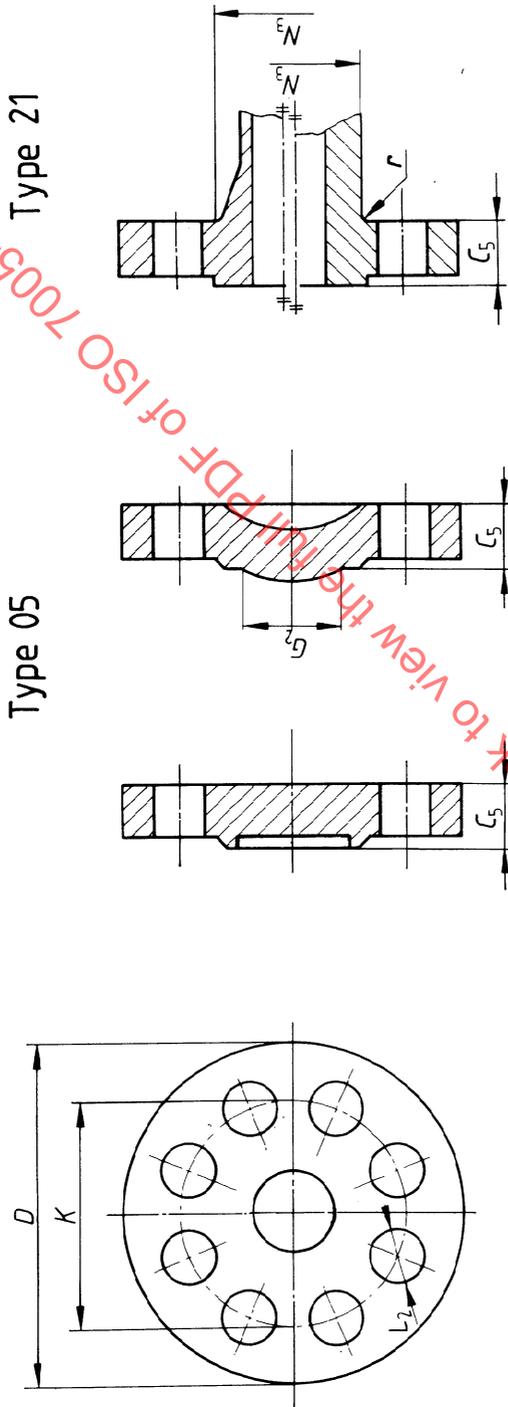
Table 5 – Dimensions for type B flange facings<sup>1)</sup>

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.

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

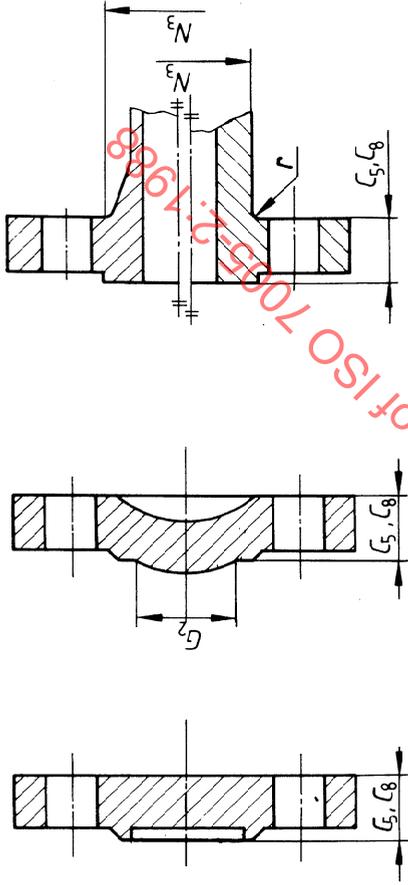
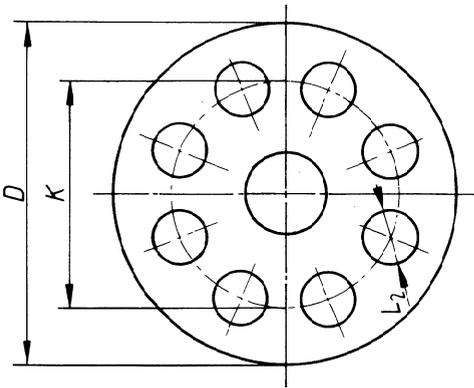
Dimensions in millimetres

Nominal size DN	Mating dimensions						Flange type				Neck diameter $N_3$	Corner radii $r$	
	Outside diameter of flange $D$	Diameter of bolt circle $K$	Diameter of bolt holes $L_2$	Bolts		Flange thickness $G_5$	Maximum diameter of shoulder $G_2$	05	21	05			21
				Number	Nominal size								
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.

Type 21

Type 05



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

Refer to the column "number of bolts" in table 7 for the actual number.

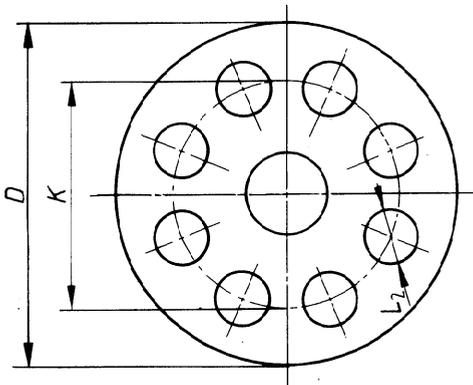
NOTE — For facing dimensions, see table 5.

**Table 7 — Dimensions of ISO PN6 flanges**  
(See the notes at the end of this section.)

Nominal size DN	Mating dimensions				Flange type			Dimensions in millimetres			
	Outside diameter of flange D	Diameter of bolt circle K	Diameter of bolt holes L <sub>2</sub>	Bolts Number	Bolts Nominal size	Flange thickness		Maximum diameter of shoulder C <sub>2</sub>	Neck diameter N <sub>3</sub>	Corner radii r	
						G <sup>1)</sup>	M <sup>1)</sup>				
						05, 21	05				
10	75	50	11	4	M10	12	12	05	21	21	
15	80	55	11	4	M10	12	12		20	3	
20	90	65	11	4	M10	14	14		26	3	
25	100	75	11	4	M10	14	14		34	4	
32	120	90	14	4	M12	16	16		44	4	
40	130	100	14	4	M12	16	16		54	5	
50	140	110	14	4	M12	16	16		64	5	
65	160	130	14	4	M12	16	16		74	5	
						16	16		94	6	

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	325	10
400	540	495	23	16	M20	28	28	375	10
450	595	550	23	16	M20	28	28	425	12
500	645	600	23	20	M20	30	30	475	12
600	755	705	26	20	M24	30	30	575	12
700	860	810	26	24	M24	32	32	675	12
800	975	920	31	24	M27	34	34	775	12
900	1 075	1 020	31	24	M27	36	36	875	12
1 000	1 175	1 120	31	28	M27	36	36	975	12
1 200	1 405	1 340	34	32	M30	40	40	1 175	12
1 400	1 630	1 560	37	36	M33	44	44	1 375	12
1 600	1 830	1 760	37	40	M33	48	48	1 575	12
1 800	2 045	1 970	40	44	M36	50	50	1 775	15
2 000	2 265	2 180	43	48	M39	54	54	1 975	15
2 200	2 475	2 390	43	52	M39	60	60	2 082	15
2 400	2 685	2 600	43	56	M39	62	62	Manufacturer's option	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	

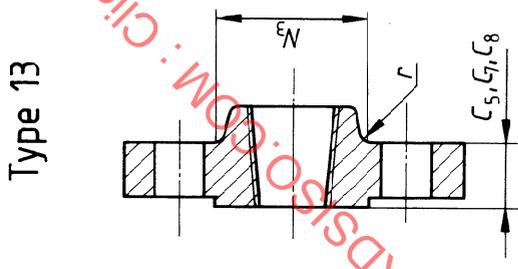
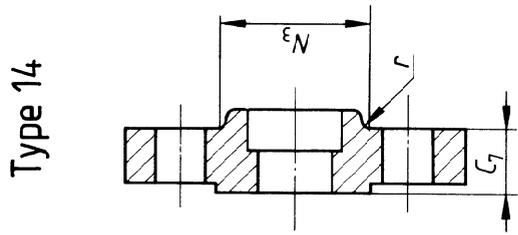
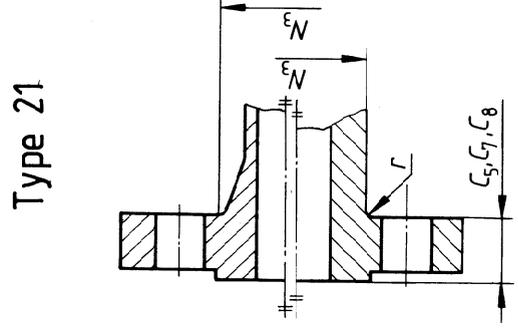
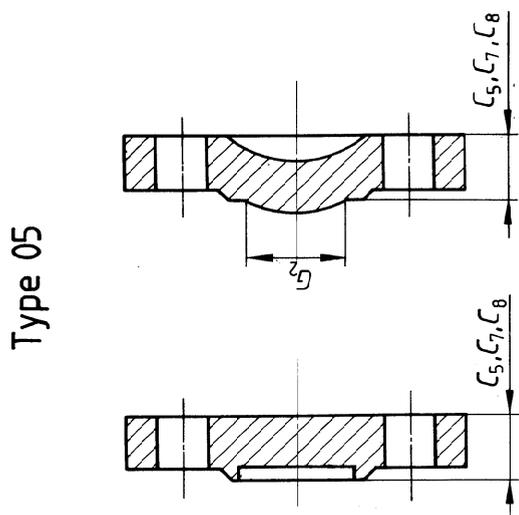
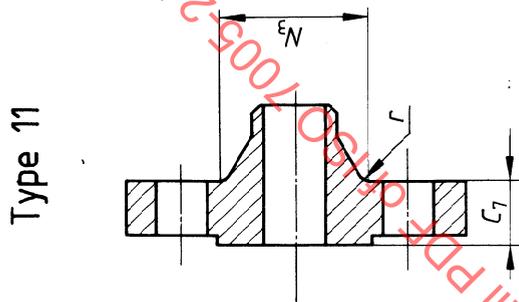
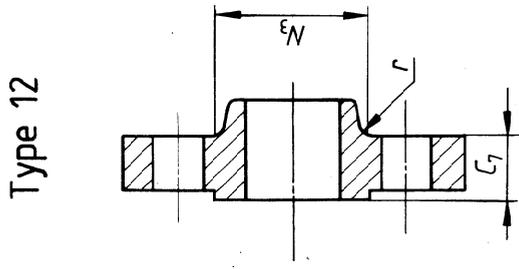
1) See table 14 for an explanation of the abbreviated cast iron designations.



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.



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**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 type 05, 11, 12, 13, 14, 21	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 Number		Nominal size	$G_1^{(1)}$ $C_5$	$D_1^{(1)}$ $C_7$				$M_1^{(1)}$ $C_8$
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	M20	20	24		246	8		
250	395 <sup>2)</sup>	350	23	12	M20	22	26		298	10		
300	445 <sup>2)</sup>	400	23	12	M20	24,5	26		348	10		
350	505	460	23	16	M20	24,5		325	408	10		
400	565	515	28	16	M24	24,5		375	456	10		
450	615	565	28	20	M24	25,5		425	502	12		
500	670	620	28	20	M24	26,5		475	559	12		
600	780	725	31	20	M27	30		575	658	12		
700	895	840	31	24	M27	32,5		675	772	12		
800	1 015	950	34	24	M30	35		775	876	12		
900	1 115	1 050	34	28	M30	37,5		875	976	12		
1 000	1 230	1 160	37	28	M33	40		975	1 080	12		
1 200	1 455	1 380	40	32	M36	45		1 175	1 292	12		
1 400	1 675	1 590	43	36	M39	46		1 375	1 496	12		
1 600	1 915	1 820	49	40	M45	49		1 575	1 712	12		
1 800	2 115	2 020	49	44	M45	52		1 775	1 910	15		
2 000	2 325	2 230	49	48	M45	55		1 975	2 120	15		

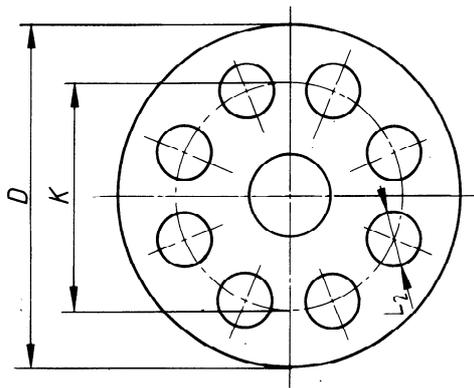
Use ISO PN16 dimensions

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

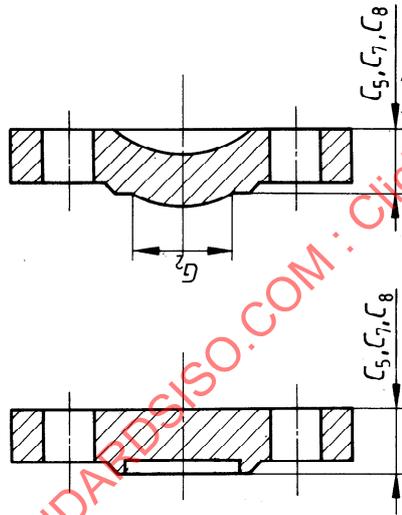
2) For ductile iron pipes and fittings to ISO 2531 the outside diameters for the following flanges shall be:

— for DN 250,  $D = 400$  mm;

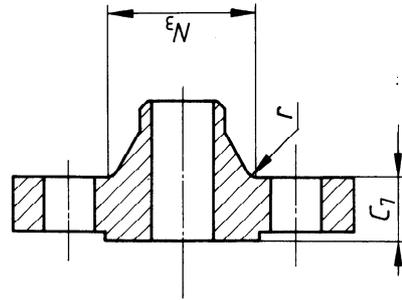
— for DN 300,  $D = 455$  mm.



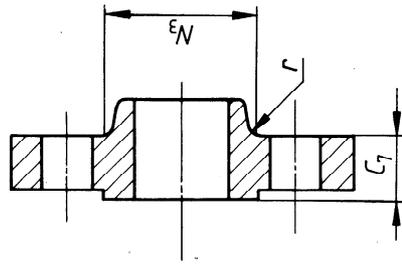
Type 05



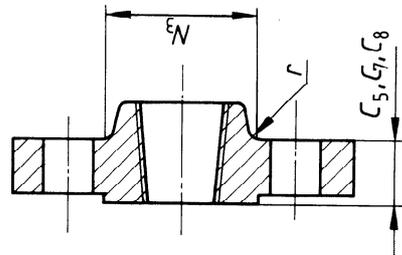
Type 11



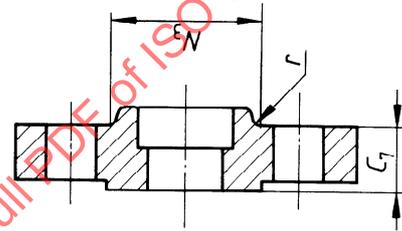
Type 12



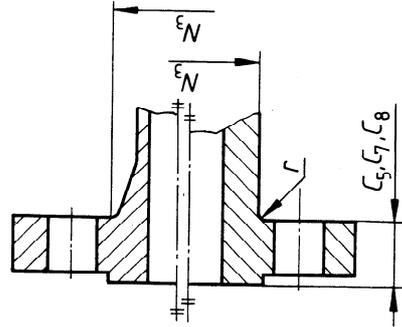
Type 13



Type 14



Type 21



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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.

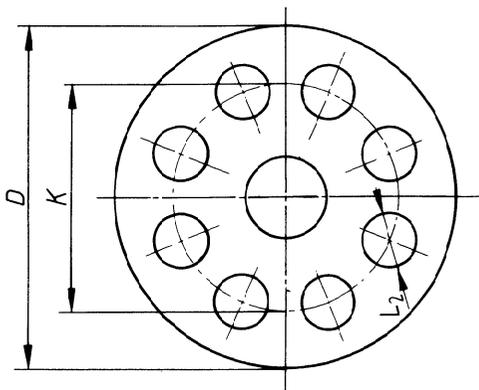
NOTE — For facing dimensions, see table 5.

**Table 9 — Dimensions of ISO PN16 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 Number	Nominal size	$G_1^{1)}$ $C_5$	$D_1^{1)}$ $C_7$			
10	Use ISO PN40 dimensions									
15										
20										
25										
32										
40										
50										
65										
80										
100										
125	185	145	19	4	M16	14	14	14	28	11, 12, 13, 14, 21
150	200	160	19	8	M16	14	14	14	32	11, 12, 13, 14, 21
200	220	180	19	8	M16	16	16	16	40	11, 12, 13, 14, 21
250	250	210	19	8	M16	16	16	16	50	11, 12, 13, 14, 21
300	285	240	23	8	M20	18	18	18	60	11, 12, 13, 14, 21
350	340	295	23	8	M20	18	19	18	70	11, 12, 13, 14, 21
400	405 <sup>2)</sup>	355	28	12	M24	20	19	20	84	11, 12, 13, 14, 21
450	460 <sup>2)</sup>	410	28	12	M24	20	19	20	104	11, 12, 13, 14, 21
500	520	470	28	16	M24	22	19	22	120	11, 12, 13, 14, 21
600	580	525	31	16	M27	24	19	22	140	11, 12, 13, 14, 21
700	640	585	31	20	M27	26	19	22	170	11, 12, 13, 14, 21
800	715	650	34	20	M30	26	19	24	190	11, 12, 13, 14, 21
900	840	770	37	20	M33	20	20	24	246	11, 12, 13, 14, 21
1 000	910	840	37	24	M33	32	20	24	296	11, 12, 13, 14, 21
1 200	1 025	950	40	24	M36	32	22	26	350	11, 12, 13, 14, 21
1 400	1 125	1 050	40	28	M36	36	22	26	325	11, 12, 13, 14, 21
1 600	1 255	1 170	43	28	M39	42	22	28	410	11, 12, 13, 14, 21
1 800	1 485	1 390	49	32	M45	48	22	28	458	11, 12, 13, 14, 21
2 000	1 685	1 590	49	36	M45	54	22	28	425	11, 12, 13, 14, 21
	1 930	1 820	56	40	M52	58	22	28	475	11, 12, 13, 14, 21
	2 130	2 020	56	44	M52	62	22	28	516	11, 12, 13, 14, 21
	2 345	2 230	62	48	M56	66	22	28	576	11, 12, 13, 14, 21
						66	22	28	690	11, 12, 13, 14, 21
						66	22	28	760	11, 12, 13, 14, 21
						66	22	28	862	11, 12, 13, 14, 21
						66	22	28	962	11, 12, 13, 14, 21
						66	22	28	1 076	11, 12, 13, 14, 21
						66	22	28	1 282	11, 12, 13, 14, 21
						66	22	28	1 482	11, 12, 13, 14, 21
						66	22	28	1 696	11, 12, 13, 14, 21
						66	22	28	1 896	11, 12, 13, 14, 21
						66	22	28	2 100	11, 12, 13, 14, 21

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.



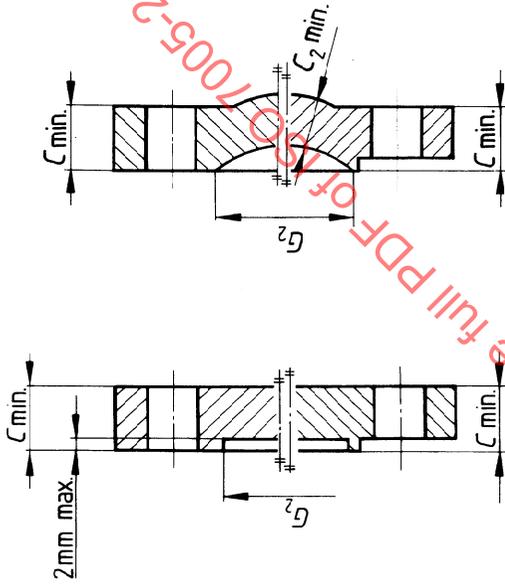
This diagram illustrates the arrangement but not necessarily the correct number of bolt holes.

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

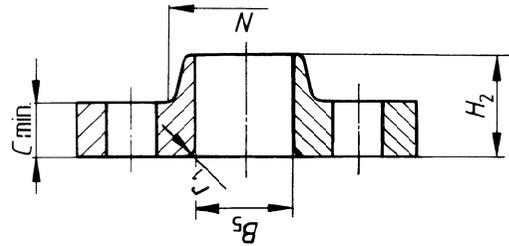
NOTE — For facing dimensions, see table 5.

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.

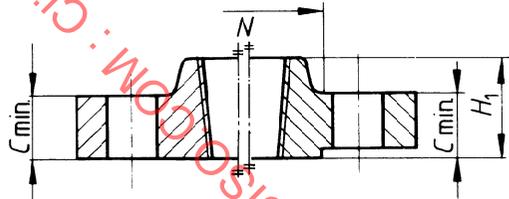
Type 05



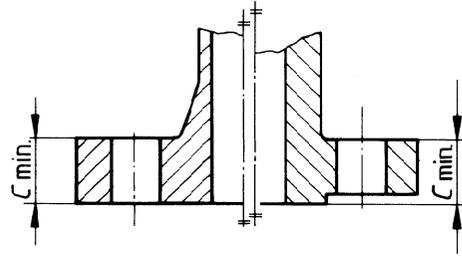
Type 15



Type 13



Type 21



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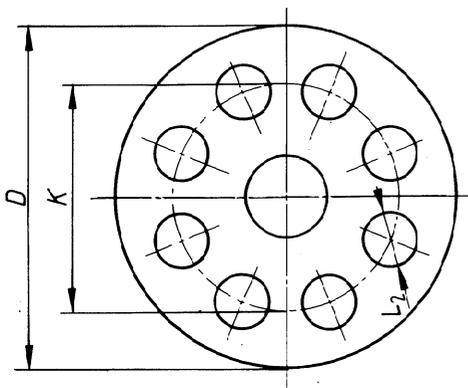
**Table 10 — Dimensions of ISO PN20 flanges**  
(See the notes at the end of this section.)

Dimensions in millimetres

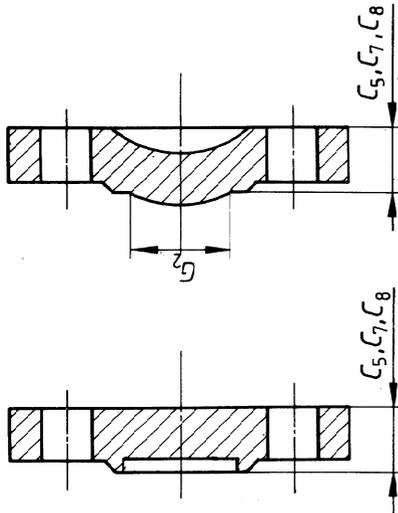
Nominal size DN	Mating dimensions				Flange thickness min.			Hub diameter min.		Length of hub min.		Bore min. D <sub>1</sub> <sup>(1)</sup> B <sub>5</sub>	Corner radius D <sub>1</sub> <sup>(1)</sup> r <sub>1</sub>	Diameter of port, radius of dish G <sub>2</sub>	Thickness of dish min. C <sub>2</sub>
	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>	C	D <sub>1</sub> <sup>(1)</sup>	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>	D <sub>1</sub> <sup>(1)</sup> H <sub>2</sub>	15				
												05, 13, 21	05, 13, 15	21	13
25	110	79,5	16	4	M14	11	14	11	50	18	18	35	4	25	
32	120	89	16	4	M14	13	15,5	13	60	21	21	44	5	32	
40	130	98,5	16	4	M14	14,5	17,5	14,5	65	22	22	50	6	38	
50	155	120,5	18	4	M16	16	19	16	80	25	25	63	8	51	
65	180	139,5	18	4	M16	17,5	22,5	17,5	90	28	28	76	8	64	
80	190	152,5	18	4	M16	19	24	19	110	30	30	92	10	76	
100	230	190,5	18	8	M16	24	24	24	136	33	33	117	11	102	
125	255	216	22	8	M20	24	24	24	165	37	37	145	11	127	
150	280	241,5	22	8	M20	25,5	25,5	25,5	190	40	40	172	13	152	
200	345	298,5	22	8	M20	28,5	28,5	28,5	245	44	44	223	13	203	
250	405	362	26	12	M24	30	30	30	305	49	49	278	13	254	
300	485	432	26	12	M24	32	32	32	355	56	56	329	13	305	20,5
350	535	476	29,5	12	M27	35	35	35	390	57	79	360	13	356	22,3
400	600	540	29,5	16	M27	36,5	36,5	36,5	445	64	87	412	13	406	25,4
450	635	578	32,5	16	M30	39,5	39,5	39,5	500	68	97	463	13	457	26,9
500	700	635	32,5	20	M30	43	43	43	555	73	103	515	13	508	28,4
600	815	749,5	35,5	20	M33	48	48	48	660	83	111	616	13	610	31,7
750	985	914,5	35,5	28	M33	54 <sup>(2)</sup>								762	36,5
900	1 170	1 086	42	32	M39	60,5 <sup>(2)</sup>								914	41,1

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

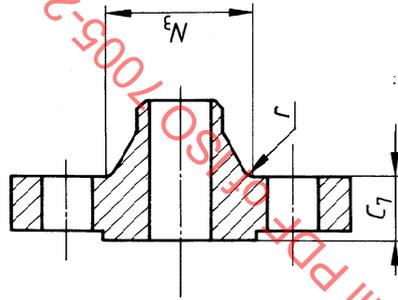
2) Applies to type 05 and type 21 flanges only.



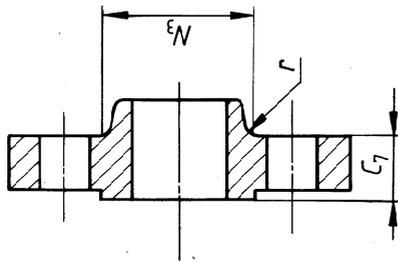
Type 05



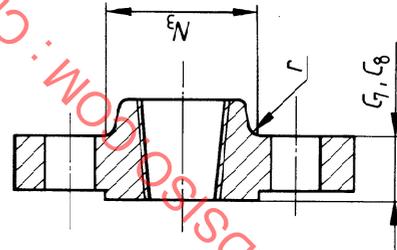
Type 11



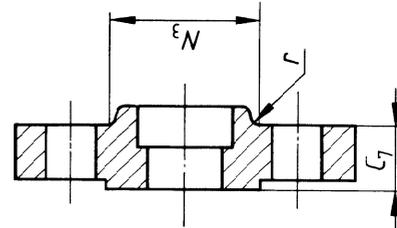
Type 12



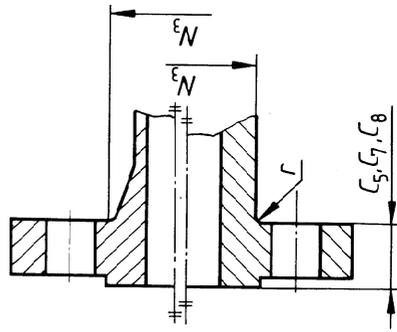
Type 13



Type 14



Type 21



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.

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

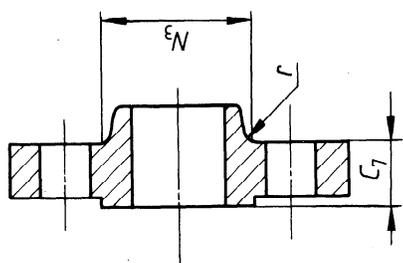
Dimensions in millimetres

Nominal size DN	Mating dimensions				Number	Nominal size	Flange thickness				Maximum diameter of shoulder	Neck diameter	Corner radii	
	Outside diameter of flange	Diameter of bolt circle	Diameter of bolt holes	Diameter of bolt holes			Flange thickness	Flange thickness	Flange thickness	Flange thickness				
	$D$	$K$	$L_2$	$L_2$			$G_1^{(1)}$	$C_5$	$D_1^{(1)}$	$C_7$	$M_1^{(1)}$	$G_2$	$N_3$	$r$
	05, 11, 12, 13, 14, 21													
	Flange type													
	05, 21													
	05, 11, 12, 13, 14, 21													
10														
15														
20														
25														
32														
40														
50														
65														
80														
100	235	190	23	23	8	M20	28	19	19	24	24	142	6	6
125	270	220	28	28	8	M24	30	19	19	26	26	162	6	6
150	300	250	28	28	8	M24	34	20	20	28	28	192	8	8
200	360	310	28	28	12	M24	34	22	22	30	30	252	8	8
250	425	370	31	31	12	M27	36	24,5	24,5	32	32	304	10	10
300	485	430	31	31	16	M27	40	27,5	27,5	34	34	364	10	10
350	555	490	34	34	16	M30	44	30	30			325	10	10
400	620	550	37	37	16	M33	48	32	32			375	10	10
450	670	600	37	37	20	M33	50	34,5	34,5			425	12	12
500	730	660	37	37	20	M33	52	36,5	36,5			475	12	12
600	845	770	40	40	20	M36	56	42	42			575	12	12
700	960	875	43	43	24	M39		46,5	46,5			675	12	12
800	1 085	990	49	49	24	M45		51	51			775	12	12
900	1 185	1 090	49	49	28	M45		55,5	55,5			875	12	12
1 000	1 320	1 210	56	56	28	M52		60	60			975	12	12
1 200	1 530	1 420	56	56	32	M52		69	69			1 175	12	12
1 400	1 755	1 640	62	62	36	M56		74	74			1 375	12	12
1 600	1 975	1 860	62	62	40	M56		81	81			1 575	12	12
1 800	2 195	2 070	70	70	44	M64		88	88			1 775	15	15
2 000	2 425	2 300	70	70	48	M64		95	95			1 975	15	15

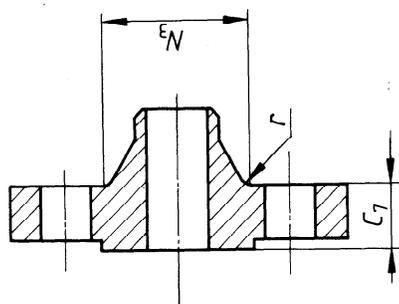
Use ISO PN40 dimensions

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

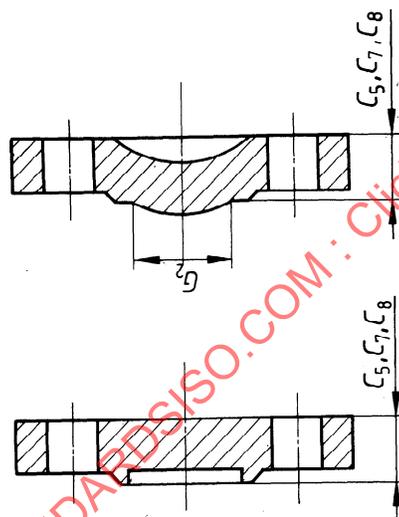
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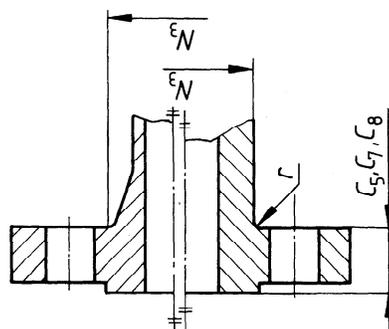
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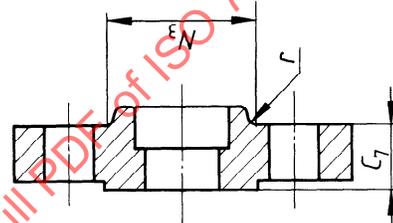
Type 05



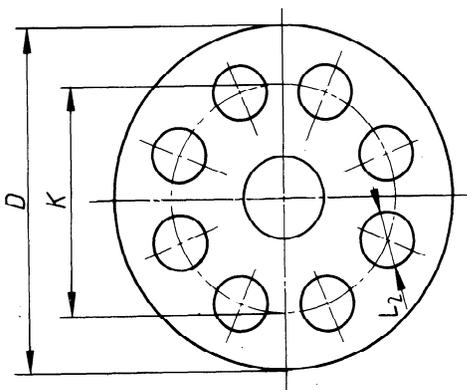
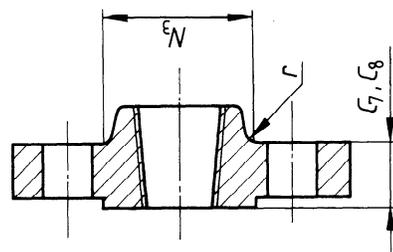
Type 21



Type 14



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 12 for the actual number.

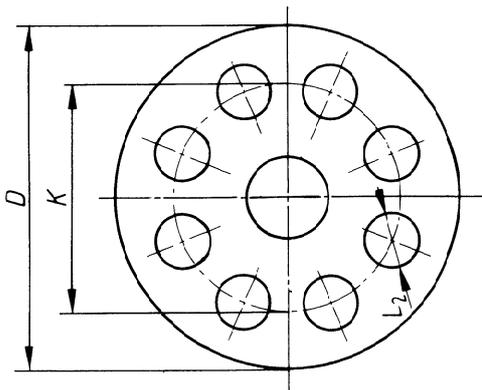
NOTE — For facing dimensions, see table 5.

**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 type 05, 11, 12, 13, 14, 21	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 Number Nominal size		$G_1^{(1)}$ $C_5$	$D_1^{(1)}$ $C_7$	$M_1^{(1)}$ $C_8$			
10	90	60	14	4	M12	16		05, 11, 12, 13, 14, 21	28	11, 12, 13, 14, 21	3
15	95	65	14	4	M12	16		05, 11, 12, 13, 14, 21	32	11, 12, 13, 14, 21	3
20	105	75	14	4	M12	18		05, 11, 12, 13, 14, 21	40	11, 12, 13, 14, 21	4
25	115	85	14	4	M12	18		05, 11, 12, 13, 14, 21	50	11, 12, 13, 14, 21	4
32	140	100	19	4	M16	20		05, 11, 12, 13, 14, 21	60	11, 12, 13, 14, 21	5
40	150	110	19	4	M16	20		05, 11, 12, 13, 14, 21	70	11, 12, 13, 14, 21	5
50	165	125	19	4	M16	22		05, 11, 12, 13, 14, 21	84	11, 12, 13, 14, 21	5
65	185	145	19	8	M16	24		05, 11, 12, 13, 14, 21	104	11, 12, 13, 14, 21	6
80	200	160	19	8	M16	26		05, 11, 12, 13, 14, 21	120	11, 12, 13, 14, 21	6
100	235	190	23	8	M20	28		05, 11, 12, 13, 14, 21	142	11, 12, 13, 14, 21	6
125	270	220	28	8	M24	30		05, 11, 12, 13, 14, 21	162	11, 12, 13, 14, 21	6
150	300	250	28	8	M24	34		05, 11, 12, 13, 14, 21	192	11, 12, 13, 14, 21	8
200	375	320	31	12	M27	40		05, 11, 12, 13, 14, 21	254	11, 12, 13, 14, 21	8
250	450	385	34	12	M30	46		05, 11, 12, 13, 14, 21	312	11, 12, 13, 14, 21	10
300	515	450	34	16	M30	50		05, 11, 12, 13, 14, 21	378	11, 12, 13, 14, 21	10
350	580	510	37	16	M33	54		05, 11, 12, 13, 14, 21	432	11, 12, 13, 14, 21	10
400	660	585	40	16	M36	62		05, 11, 12, 13, 14, 21	498	11, 12, 13, 14, 21	10
450	685	610	40	20	M36			05, 11, 12, 13, 14, 21	522	11, 12, 13, 14, 21	12
500	755	670	43	20	M39			05, 11, 12, 13, 14, 21	576	11, 12, 13, 14, 21	12
600	890	795	49	20	M45			05, 11, 12, 13, 14, 21	686	11, 12, 13, 14, 21	12

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

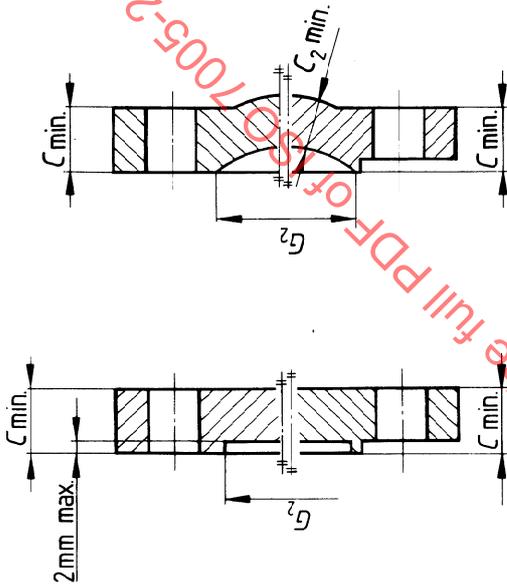


This diagram illustrates the arrangement but not necessarily the correct number of bolt holes. Refer to the column "number of bolts" in table 13 for the actual number.

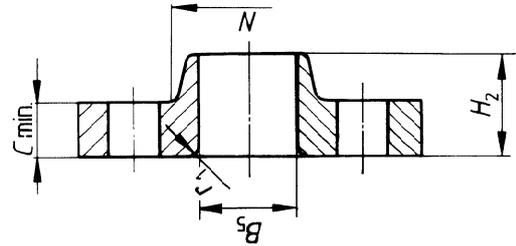
NOTE — For facing dimensions, see table 5.

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.

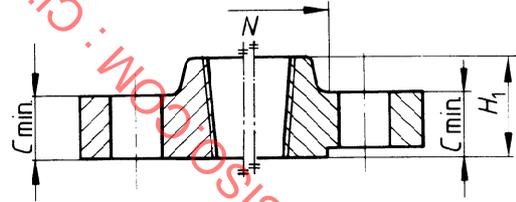
Type 05



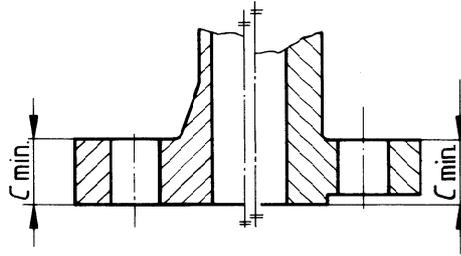
Type 15



Type 13



Type 21



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**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>g</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					05, 13, 15, 21	13	13, 15	13	13	15 <sup>1)</sup>	15	15	05	05			
25	125	89	18	4	M16	55	55	22	27	27	27	35	5	25				
32	135	98,5	18	4	M16	65	65	25	27	27	27	44	5	32				
40	155	114,5	22	4	M20	70	70	28	30	30	30	50	6	38				
50	165	127	18	8	M16	85	85	32	33	33	33	63	8	51				
65	190	149,5	22	8	M20	100	100	36	38	38	38	76	8	64				
80	210	168	22	8	M20	120	120	40	43	43	43	92	10	76				
100	255	200	22	8	M20	145	145	44	48	48	48	117	11	102				
125	280	235	22	8	M20	180	180	48	51	51	51	145	11	127				
150	320	270	22	12	M20	205	205	49	52	52	52	172	13	152				
200	380	330	26	12	M24	260	260	56	62	62	62	223	13	203				
250	445	387,5	29,5	16	M27	320	320	60	67	67	67	278	13	254	23,8			
300	520	451	32,5	16	M30	375	375	65	73	73	73	329	13	305	25,4			
350	585	514,5	32,5	20	M30	415	425	68	76	76	76	360	13	337	28,4			
400	650	571,5	35,5	20	M33	470	485	73	83	83	83	412	13	387	31,8			
450	710	628,5	35,5	24	M33		535		89	89	89	463	13	432	35,1			
500	775	686	35,5	24	M33		590		95	95	95	515	13	483	38,1			
600	915	813	42	24	M39		705		106	106	106	616	13	584	41,1			
750	1 095	997	48	28	M45									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.

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