Flanges and their joints

Circular flanges for pipes, valves, fittings and accessories, PN designated

Part 4: Aluminium alloy flanges

English version of DIN EN 1092-4

DIN EN 1092-4

ICS 23.040.60

Flansche und ihre Verbindungen – Runde Flansche für Rohre, Armaturen, Formstücke und Zubehörteile, nach PN bezeichnet – Teil 4: Flansche aus Aluminiumlegierungen

European Standard EN 1092-4 : 2002 has the status of a DIN Standard.

A comma is used as the decimal marker.

National foreword

This standard has been prepared by CEN/TC 74 'Flanges and their joints' (Secretariat: Germany).

The responsible German body involved in its preparation was the *Normenausschuss Rohrleitungen und Dampfkesselanlagen* (Pipelines and Pressure Vessels Standards Committee), Technical Committee *Flansche und ihre Verbindungen*.

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EN 1092-4

May 2002

ICS 23.040.60

English version

Flanges and their joints

Circular flanges for pipes, valves, fittings and accessories, PN designated

Part 4: Aluminium alloy flanges

Brides et leurs assemblages – Brides circulaires pour tubes, appareils de robinetterie, raccords et accessoires, désignées PN – Partie 4: Brides en alliages d'aluminium

Flansche und ihre Verbindungen – Runde Flansche für Rohre, Armaturen, Formstücke und Zubehörteile, nach PN bezeichnet – Teil 4: Flansche aus Aluminiumlegierungen

This European Standard was approved by CEN on 2002-03-28.

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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Management Centre: rue de Stassart 36, B-1050 Brussels

Ref. No. EN 1092-4 : 2002 E

Contents

Foreword

This document EN 1092-4:2002 has been prepared by Technical Committee CEN/TC 74 "Flanges and their joints", the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by November 2002, and conflicting national standards shall be withdrawn at the latest by November 2002.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative annex ZA, which is an integral part of this document.

EN 1092 consists of the following four parts:
Part 1: Steel flanges;
Part 2: Cast iron flanges;
Part 3: Copper alloy flanges;
Part 4: Aluminium alloy flanges.

The mating dimensions of the flanges of this standard are compatible with those flanges of other materials in accordance with the other parts of EN 1092 and with those flanges of ISO 7005.

Annex A is informative.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European Standard specifies requirements for PN designated circular flanges for pipes, valves, fittings and accessories made from aluminium alloy in the range of DN 15 to DN 600 and PN10 to PN 63 (see Table 1).

This European Standard specifies the types of flanges and their facings, dimensions and tolerances, bolt sizes, surface finish of jointing faces, marking and materials together with associated pressure/temperature (*p*/*T*) ratings.

The flanges are intended to be used for piping as well as for pressure vessels.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or provisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 764, *Pressure equipment - Terminology and symbols - Pressure, temperature, volume.*

EN 1333, *Pipework components - Definition and selection of PN.*

EN 1514, *Flanges and their joints - Dimensions of gaskets for PN-designated flanges.*

EN 1515-1, *Flanges and their joints - Bolting - Part 1: Selection of bolting.*

EN 12392, *Aluminium and aluminium alloys - Wrought products - Special requirements for products intended for the production of pressure equipment.*

EN ISO 887, *Plain washers for metric bolts, screws and nuts for general purposes - General plan (ISO 887:2000).*

EN ISO 4287, *Geometrical product specifications (GPS) - Surface texture: Profile method - Terms, definitions and surface texture parameters (ISO 4287:1997).*

EN ISO 6708, *Pipework Components - Definition and selection of DN (nominal size) (ISO 6708:1995).*

3 Terms and definitions

For the purposes of this European Standard the following terms and definitions apply.

3.1
DN
see EN ISO 6708

3.2
PN
see EN 1333

3.3
Ra, Rz
see EN ISO 4287

3.4
maximum allowable pressure, PS
PS means the maximum pressure for which the equipment is designed, as specified by the equipment manufacturer
(See also EN 764, where it is defined as allowable pressure p_S).

3.5
maximum allowable temperature, TS
TS means the maximum temperature for which the equipment is designed, as specified by th equipment manufacturer
(See also EN 764, where it is defined as allowable temperature t_S).

4 Designations

4.1 Range of DN

The range of DN applicable to each PN shall be as given in Table 1.

4.2 Range of PN designations

The range of PN designations shall be as given in Table 1.

4.3 Types of flanges

Figure 1 illustrates flanges identified according to type:

a) Type 05 Blank flange;

b) Type 11 Weld-neck flange.

4.4 Designation of flanges

The designation of the flanges shall contain the following information:

a) Description (flange);

b) Number of this standard (EN 1092-4);

c) Flange type number (11, 05 resp.);

d) Flange facing type (e.g. C);

e) DN (e.g. DN 300);

f) For type 11 flanges only, the neck diameter, *A* and the neck thickness, *S*, (e.g. 324 x 4);

g) PN (e.g. PN 40);

h) Material (e.g. EN AW-5083-O).

EXAMPLE 1
For a type 11 flange : Flange EN 1092-4 - 11 - C - DN 300 - 324 x 4 - PN 40 - EN AW-5083-O

EXAMPLE 2
For a type 05 flange : Flange EN 1092-4 - 05 - C - DN 300 - PN 40 - EN AW-5083-O

5 General requirements

5.1 Flange materials

Flanges shall be manufactured from the material grades EN AW-5083 (AlMg4,5Mn0,7) -O or EN AW-6061 (AlMg1SiCu) -T6 as specified in EN 12392. Other materials may be used. For the p/T ratings see 5.5.

Weld-neck flanges shall be forged or made from extruded bars; blank flanges shall be forged or made from plate.

5.2 Repairs

Repair welding of the flanges is not permitted.

5.3 Bolting

5.3.1 The bolting shall be chosen according to the pressure, temperature and gasket.

5.3.2 Bolting materials shall be selected according to the following criteria:

a) For all service conditions in accordance with EN 1515-1 (bolt/nut): 5.6/5, 8.8/8, 25Ni-15Cr-Ti/25Ni-15Cr-Ti, A4-70/A4-70, A2-70/A2-70, 18Cr-9Ni-Mo-AT+C/18Cr-9Ni-Mo, 18Cr-9Ni-AT+C/18Cr-9Ni;

b) For less severe service conditions e. g. water service or in case of oversized flanged joints, in accordance with EN 1515-1 (bolt/nut): A4-50/A4-50, A2-50/A2-50, 18Cr-9Ni-Mo/18Cr-9Ni-Mo, 18Cr-9Ni/18Cr-9Ni;

The choice of this bolting shall be based on either special experience or on recalculations.

c) Where bolting other than specified in EN 1515-1 is required, this shall be chosen according to the parameters above so that the flanged joint remains tight under the expected operating conditions.

5.3.3 The use of washers (EN ISO 887) is recommended.

5.4 Gaskets

Gaskets shall be selected from the relevant part of EN 1514.

NOTE If spiral wound gaskets are selected, than they should be low stress design (y = 5000, m = 3 for calculation in accordance with ASME Code).

5.5 Pressure temperature (*p/T*) ratings

The pressure temperature ratings (p/T ratings) for the material grades in 5.1 are given in Table 10.

For other aluminium alloys, which may be used, the p/T ratings shall be established according to the service conditions.

5.6 Dimensions

5.6.1 Dimensions of flanges shall be in accordance with Figure 3 to Figure 7 and as appropriate the following Tables:

- PN 10 flanges: Table 4;

- PN 16 flanges: Table 5;
- PN 25 flanges: Table 6;
- PN 40 flanges: Table 7;
- PN 63 flanges: Table 8.

NOTE 1 Approximate masses of flanges are given in annex A.

NOTE 2 Figures 3 to 7 are identical. They are repeated for better handling of the standard.

5.6.2 Bolt holes shall be equally spaced on the pitch circle diameter.

5.6.3 If the neck thickness, S is ordered smaller than given in Tables 4 to 8, the inside diameter at the neck shall be tapered at an angle of 14 ° to 18 °. If S is ordered greater, the bore diameter shall be $A - 2 \times S$.

5.7 Flange facings

5.7.1 Types of facings

The types of flange facings shall be as given in Figure 2, and their dimensions shall be as given in Table 2.

If not stated in the purchase order, flange facing B1 is standard for flanges up to PN 40, flange facing B2 is standard for PN 63 flanges.

5.7.2 Jointing face finish

All flange jointing faces shall be machine finished and, when compared by visual or tactile means with reference specimens, shall be in accordance with Table 3.

NOTE 1 It is not intended that instrument measurements are taken on the jointing faces.

NOTE 2 Other jointing face finishes may be agreed.

For jointing face type B1, turning shall be carried out with a round-nosed tool in accordance with Table 3.

5.8 Spot facing and back facing of flanges

Any spot facing and 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 in accordance with EN 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.

5.9 Tolerances

Tolerances on dimensions shall be as specified in Table 9.

5.10 Marking

All flanges shall be marked as follows:

a) Flange manufacturer's name or trade-mark (e.g. xxx);

b) Number of this standard (EN 1092-4);

c) DN (e.g. DN 300);

d) PN (e.g. PN 25);

e) Neck thickness if not standard (e.g. 7,1);

f) Material designation (e.g. EN AW-5083-O);

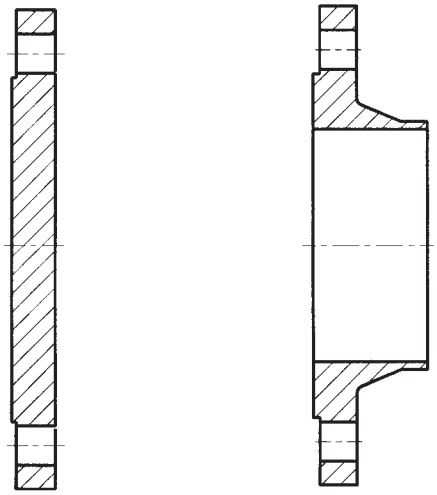
g) Batch number or suitable quality control number traceable to the batch number when test certification is required (e.g. yyy).

EXAMPLE: xxx - EN 1092-4 - DN 300 - PN 25 - 7,1 - EN AW-5083-O - yyy

The flanges shall be clearly and permanently marked around the rim.

Table 1 - Synoptic table

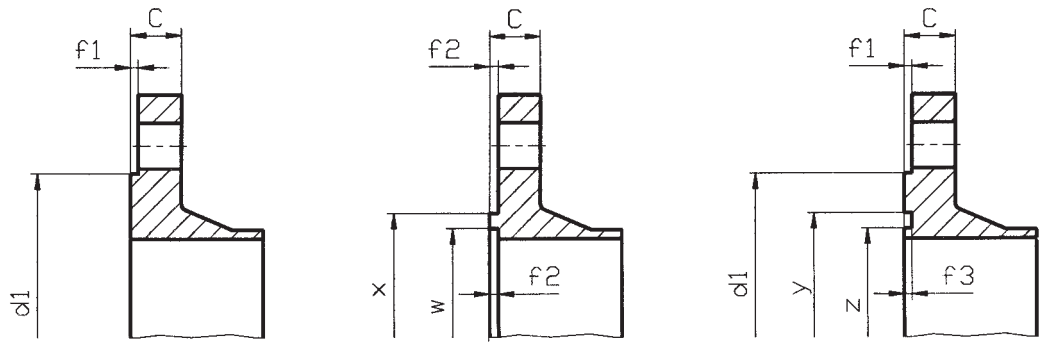
Type	PN	DN												
		15	25	40	50	80	100	150	200	250	300	400	500	600
05 and 11	10	Use PN 40				Use PN 16			x	x	x	x	x	x
	16	Use PN 40				x	x	x	x	x	x	x	x	x
	25	Use PN 40							x	x	x	x	x	x
	40	x	x	x	x	x	x	x	x	x	x	x	-	-
	63	x	x	x	x	x	x	x	x	x	x	-	-	-



Type 05
Blank flange

Type 11
Weld-neck flange

Figure 1 - Types of flanges



Type B
Raised face

Type C
Tongue face

Type D
Groove face

NOTE For types B and D, the transition from the edge of the raised face (d1) to the flange face is either by radius or chamfer.

Figure 2 - Flange facings

Table 2 - Flange facing dimensions

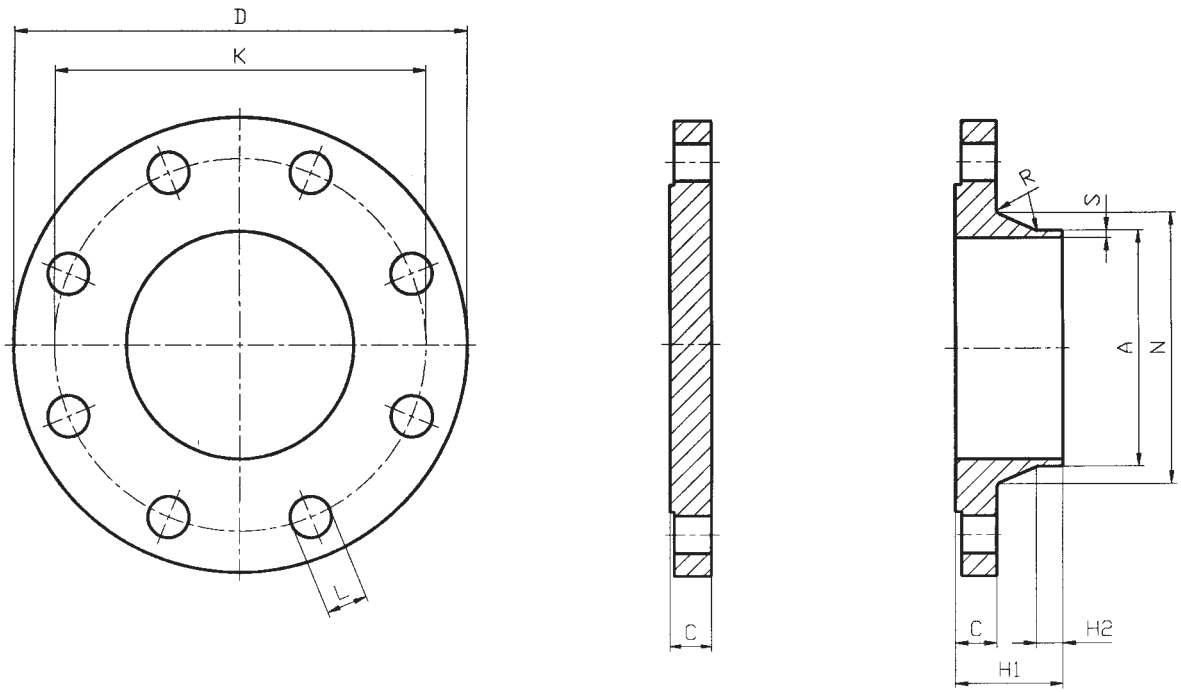
Dimensions in millimetres

DN	*d1*					*f1*	*f2*	*f3*	*w*	*x*	*y*	*z*
	PN10	PN16	PN25	PN40	PN63							
15	Use PN 63				45	2	4,5	4	29	39	40	28
25					68	2	4,5	4	43	57	58	42
40					88	2	4,5	4	61	75	76	60
50					102	2	4,5	4	73	87	88	72
80					138	2	4,5	4	106	120	121	105
100	Use	156	Use	156	162	2	5	4,5	129	149	150	128
150	PN 16	211	PN 40	211	218	2	5	4,5	183	203	204	182
200	266	266	274	284	285	2	5	4,5	239	259	260	238
250	319	319	330	345	345	2	5	4,5	292	312	313	291
300	370	370	389	409	410	2	5	4,5	343	363	364	342
400	480	480	503	535	-	2	5,5	5	447	473	474	446
500	582	609	609	-	-	2	5,5	5	549	575	576	548
600	682	720	720	-	-	2	5,5	5	649	675	676	648

Table 3 - Surface finish of flange jointing faces

Facing types	Method of machining	Radius of tool nose mm	R_a µm		R_z µm	
		min.	min.	max.	min.	max.
B1 [1]	turning [2]	1,0	3,2	12,5	12,5	50
B2 [1], C, D	turning [2]	-	0,8	3,2	3,2	12,5

1) B1 and B2 are raised face (type B) with different surface roughness.
2) The term "turning" includes any method of machine operation producing either serrated concentric or serrated spiral grooves.



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

Type 05

Type 11

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

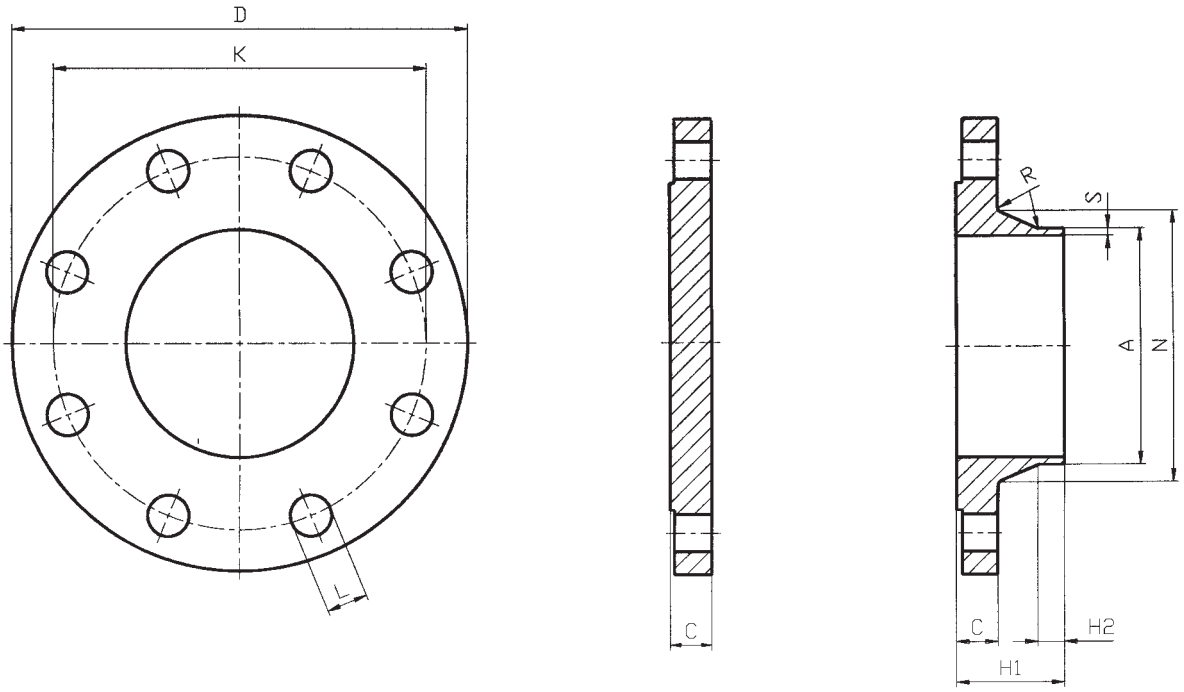
NOTE 2 For facing dimensions see Table 5.

Figure 3 - Dimensions of PN 10 flanges

Table 4 - Dimensions of PN 10 flanges

Dimensions in millimetres

DN	Mating dimensions					Flange thick-ness	Length		Neck			Corner radii
				Bolting					Diameter		Thick-ness	
	D	*K*	*L*	Number	Size	*C*	*H1*	*H2*	*N*	*A*	*S*	*R*
up to 50	Use PN 40 dimensions											
80 to 150	Use PN 16 dimensions											
200	340	295	22	8	M20	40	68	6	235	219	3	10
250	395	350	22	12	M20	45	79	8	292	273	4	12
300	445	400	22	12	M20	50	84	8	344	324	4	12
400	565	515	26	16	M24	65	103	8	440	406	4	12
500	670	620	26	20	M24	75	114	8	542	508	4	12
600	780	725	30	20	M27	90	134	10	642	610	5	12



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

Type 05

Type 11

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

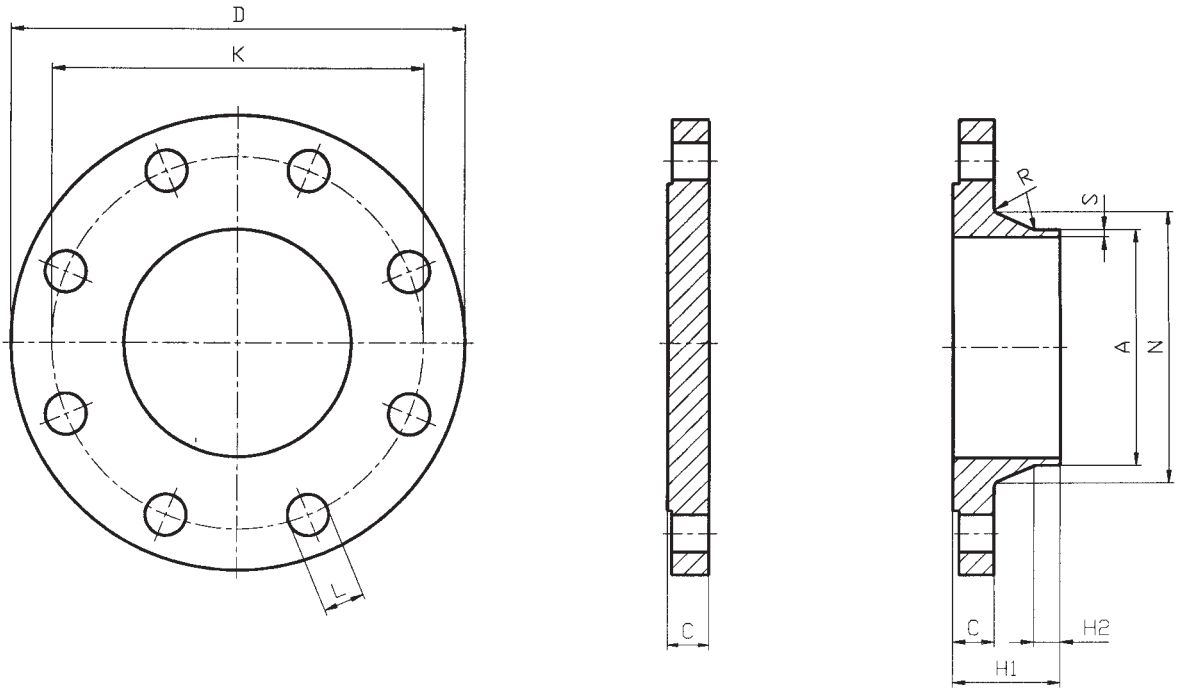
NOTE 2 For facing dimensions see Table 5.

Figure 4 - Dimensions of PN 16 flanges

Table 5 - Dimensions of PN 16 flanges

Dimensions in millimetres

DN	Mating dimensions					Flange thick-ness	Length		Neck			Corner radii
				Bolting					Diameter		Thick-ness	
	D	*K*	*L*	Number	Size	*C*	*H1*	*H2*	*N*	*A*	*S*	*R*
up to 50	Use PN 40 dimensions											
80	200	160	18	8	M16	30	55	5	105	89	2,5	8
100	220	180	18	8	M16	30	56	6	131	114	3	8
150	285	240	22	8	M20	40	67	6	184	168	3	10
200	340	295	22	12	M20	45	73	6	235	219	3	10
250	405	355	26	12	M24	45	81	8	292	273	4	12
300	460	410	26	12	M24	50	92	8	344	324	4	12
400	580	525	30	16	M27	65	112	10	445	406	5	12
500	715	650	33	20	M30	80	130	10	548	508	6	12
600	840	770	36	20	M33	90	143	12	652	610	8	12



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

Type 05

Type 11

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

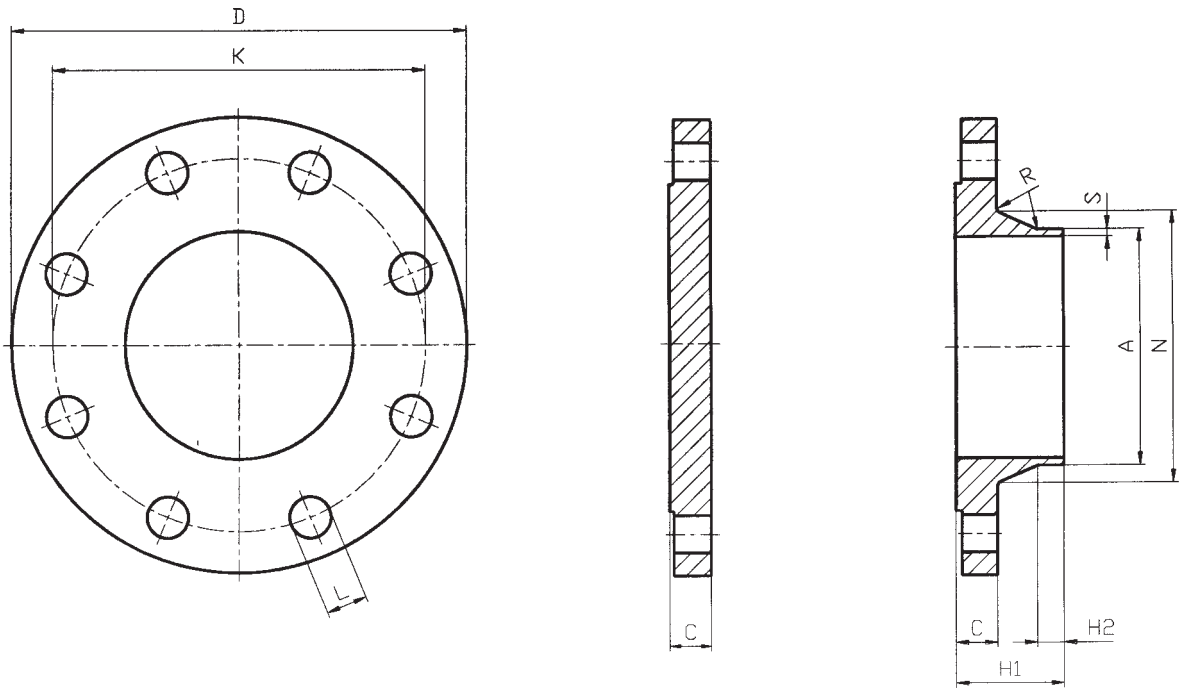
NOTE 2 For facing dimensions see Table 5.

Figure 5 - Dimensions of PN 25 flanges

Table 6 - Dimensions of PN 25 flanges

Dimensions in millimetres

DN	Mating dimensions					Flange thick-ness	Length		Neck			Corner radii
				Bolting					Diameter		Thick-ness	
	D	*K*	*L*	Number	Size	*C*	*H1*	*H2*	*N*	*A*	*S*	*R*
up to 50	Use PN 40 dimensions											
200	360	310	26	12	M24	45	89	10	244	219	5	10
250	425	370	30	12	M27	45	93	10	298	273	6	12
300	485	430	30	16	M27	50	102	12	352	324	8	12
400	620	550	36	16	M33	65	127	12	452	406	8	12
500	730	660	36	20	M33	80	156	15	558	508	10	12
600	845	770	39	20	M36	90	164	15	660	610	12	12



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

Type 05

Type 11

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

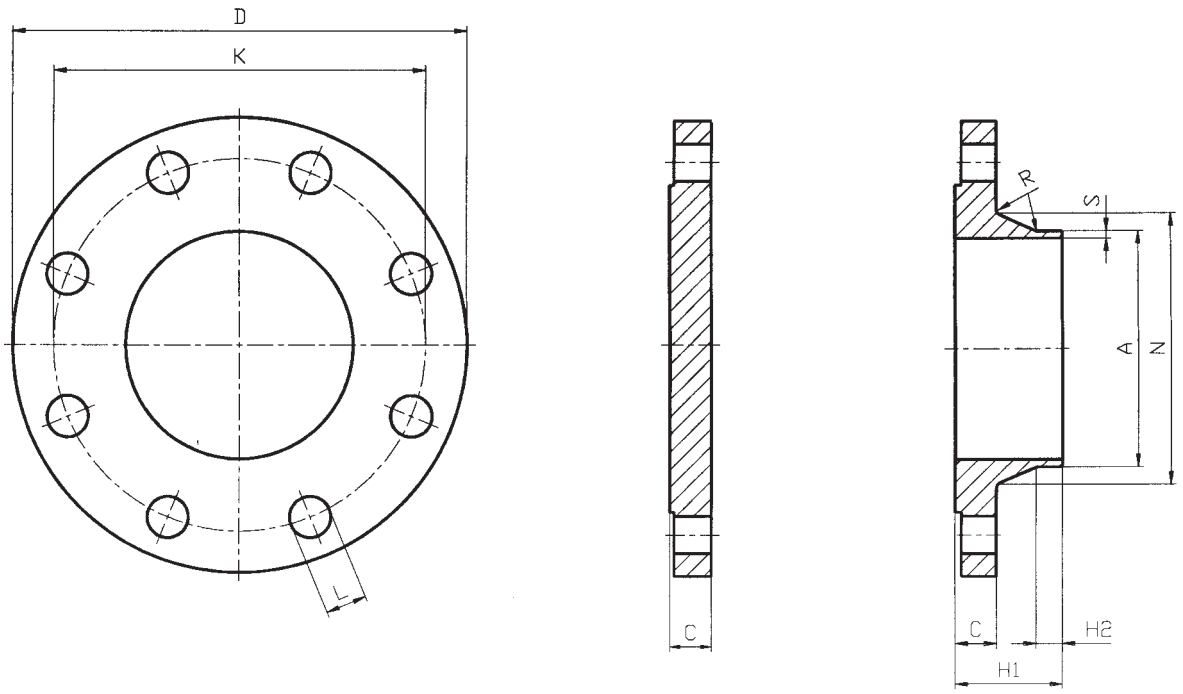
NOTE 2 For facing dimensions see Table 5.

Figure 6 - Dimensions of PN 40 flanges

Table 7 - Dimensions of PN 40 flanges

Dimensions in millimetres

DN	Mating dimensions					Flange thick-ness	Length		Neck			Corner radii
				Bolting					Diameter		Thick-ness	
	D	*K*	*L*	Number	Size	*C*	*H1*	*H2*	*N*	*A*	*S*	*R*
15	95	65	14	4	M12	25	46	5	32	21	2	8
25	115	85	14	4	M12	25	46	5	46	34	2	8
40	150	110	18	4	M16	30	56	6	64	48	3	8
50	165	125	18	4	M16	30	56	6	75	60	3,5	8
80	200	160	18	8	M16	35	63	6	105	89	3,5	8
100	235	190	22	8	M20	40	77	8	134	114	4	8
150	300	250	26	8	M24	40	85	10	192	168	5	10
200	375	320	30	12	M27	50	98	10	244	219	8	10
250	450	385	33	12	M30	50	111	12	306	273	10	12
300	515	450	33	16	M30	60	130	15	362	324	10	12
400	660	585	39	16	M36	75	158	18	462	406	12	12



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

Type 05

Type 11

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

NOTE 2 For facing dimensions see Table 5.

Figure 7 - Dimensions of PN 63 flanges

Table 8 - Dimensions of PN 63 flanges

Dimensions in millimetres

DN	Mating dimensions					Flange thick-ness	Length		Neck			Corner radii
				Bolting					Diameter		Thick-ness	
	D	*K*	*L*	Number	Size	*C*	*H1*	*H2*	*N*	*A*	*S*	*R*
15	105	75	14	4	M12	30	54	5	34	21	2	8
25	140	100	18	4	M16	35	66	5	52	34	2	8
40	170	125	22	4	M20	40	72	6	70	48	3	8
50	180	135	22	4	M20	40	72	6	82	60	3,5	8
80	215	170	22	8	M20	45	85	8	112	89	5	8
100	250	200	26	8	M24	45	91	10	138	114	6	8
150	345	280	33	8	M30	55	114	12	202	168	8	10
200	415	345	36	12	M33	70	137	15	256	219	10	10
250	470	400	36	12	M33	70	149	18	316	273	14	12
300	530	460	36	16	M33	75	166	21	372	324	16	12

Table 9 - Tolerances on dimensions

Dimensions in millimetres

Dimension	Symbol	Flange type	Size	Tolerance
Outside diameter of neck	*A*	11	all	±1 % max. +2 –1 including ovality
Neck thickness	*S*	11	all	±8%
Outside diameter of flange	*D*	05, 11	≤ DN 150	±2
			> DN 150	±3
Lengths	*H1, H2*	11	≤ DN 80	±1,5
			> DN 80 to DN 250	±2
			> DN 250	±3
Neck diameter	*N*	11	≤ DN 50	±2
			> DN 50 to DN 250	±3
			> DN 250	±4
Flange thickness	*C*	05, 11	all	±1
Facing diameter	*d1*	05, 11	≤ DN 250	+2 –1
			> DN 250	+3 –1
Facing height	*f1* *f2* *f3*	05, 11	all	+0,5
Facing diameter	*w*	05,11	all	+0,5
	x			–0,5
	y			+0,5
	z			–0,5
Diameter of bolt circle	*K*	05, 11	≤ M24	±1
			> M24	±1,5
Bolt hole diameter	*L*	05, 11	all	+1,5
Center to center of adjacent bolt holes		05, 11	≤ M24	±1
			> M24	±1,5
Eccentricity of facing diameter		05, 11	≤ DN 50	0,5
			> DN 50 to DN 150	1
			> DN 150 to DN 500	2
			DN 600	3
Parallelism between bolting bearing surface and jointing face		05, 11	all	1 °

Table 10 - *p/T* ratings

PN	Max. Allowable pressure, PS (bar) for material at max. allowable temperature, TS		
	EN AW-5083 (AlMg4,5Mn0,7) -O		AW-6061-T6
	-270 °C to 50 °C	65 °C	-270 °C to 150 °C
10	10	9,9	10
16	16	15,8	16
25	25	24,6	25
40	40	39,4	40
63	63	62,1	63

Annex A
(informative)

Masses of flanges

Table A.1 gives calculated masses of the flanges, which may be used for guidance only. These calculated masses are based on nominal dimensions given in Tables 4 to 8 and on a density of 2,7 kg/dm^3 for aluminium alloy materials.

The actual masses may vary from the calculated masses due to dimensional variations within the tolerances given in Table 9.

Table A.1 - Masses of flanges

Masses in kg

DN	Masses									
	PN10 Type		PN16 Type		PN25 Type		PN40 Type		PN63 Type	
	05	11	05	11	05	11	05	11	05	11
15	see PN40						0,41	0,41	0,62	0,62
25							0,62	0,60	1,3	1,3
40							1,3	1,3	2,2	2,2
50							1,6	1,5	2,5	2,4
80	see PN16		2,3	2	see PN40		2,7	2,3	3,9	3,6
100			2,8	2,2			4,2	3,6	5,3	4,8
150			6,4	4,4			7	5,6	13	11
200	9,3	5,8	10	6,3	11	8,0	14	10	23	19
250	14	8,0	15	9	16	11	20	15	30	25
300	20	10	21	12	23	15	31	23	41	34
400	42	22	44	24	50	32	65	48	-	-
500	69	31	83	44	85	52	-	-	-	-
600	110	46	129	66	130	73	-	-	-	-

Annex ZA
(informative)

Clauses of this European Standard addressing essential requirements (ER's) or other provisions of EU Directives

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association (EFTA) and supports essential requirements of the Directive 97/23/EC (Pressure Equipment Directive, PED).

WARNING: Other requirements and other EU Directives **may** be applicable to the products falling within the scope of this standard.

The following clauses of this standard given in Table ZA.1 are likely to support the requirements of Directive 97/23/EC.

Compliance with these clauses of this standard provides one means of conforming with the specific essential requirements of the Directive concerned and associated EFTA regulations.

Table ZA.1 - Correspondence between this European Standard and Directive 97/23/EC

Clause/ subclause of this European Standard	Essential requirements (ER's) of Directive 97/23/EC	Qualifying remarks/ notes
5.1	Annex 1, 4: Materials: Materials for pressure equipment to be suitable during lifetime - unless replacement is foreseen.	-
	Annex 1, 4.1a): Materials for pressurized parts to have appropriate properties for all operating and test conditions: - to be sufficiently ductile and tough; - characteristics of material to comply with ESR's at 7.5_ - to be selected in order to prevent brittle-type fracture, or appropriate measures to be taken.	-
5.5	Annex 1, 2: Design:	-
	Annex 1, 2.1: To be designed to ensure safety throughout intended life - to incorporate appropriate safety coefficients.	-
	Annex 1, 2.2: To be designed for adequate strength.	-
	Annex 1, 2.2.1: To be designed for loadings appropriate to its intended use.	-
	Annex 1, 2.2.2: To be designed for appropriate strength based on a calculation method.	-
	Annex 1, 2.2.3(a): Requirements to be met by applying one of the following methods - design by formula.	-
	Annex 1, 2.2.3(b): Design calculations to establish the resistance of equipment, in particular - account to be taken of combinations of temperature & pressure; - maximum stresses & peak stresses to be within safe limits.	-

(continued)

Table ZA.1 - (*concluded*)

Clause/ subclause of this European Standard	Essential requirements (ER's) of Directive 97/23/EC	Qualifying remarks/ notes
5.5	Annex 1, 7: Specific quantitative requirements for certain pressure equipment:	-
	Annex 1, 7.1.2: Permissible general membrane stresses, for predominantly static loads and for temperatures outside the creep range not exceed the smaller of the following values, according to the material used; Aluminium alloys excluding precipitation hardening alloys - 2/3 Re/t and 5/12 Rm/20.	-
5.10	Annex 1, 3.1.5: Traceability Materials making up component parts to be identified by suitable means from receipt, through production, up to final test.	-