BS EN 12560-1:2024

BSI Standards Publication

Flanges and their joints — Dimensions of gaskets for Class-designated flanges

Part 1: Non-metallic flat gaskets with or without inserts

bsi.

National foreword

This British Standard is the UK implementation of EN 12560-1:2024. It supersedes BS EN 12560-1:2001, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PSE/15, Flanges.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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Published by BSI Standards Limited 2024

ISBN 978 0 539 21299 0

ICS 23.040.80

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This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 August 2024.

Amendments/corrigenda issued since publication

Date	Text affected

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 12560-1

August 2024

ICS 23.040.80

Supersedes EN 12560-1:2001

English Version

Flanges and their joints - Dimensions of gaskets for Class-designated flanges - Part 1: Non-metallic flat gaskets with or without inserts

Brides et leurs assemblages - Dimensions des joints pour les brides désignées Class - Partie 1 : Joints plats non-métalliques avec ou sans insert

Flansche und ihre Verbindungen - Maße für Dichtungen für Flansche mit Class-Bezeichnung - Teil 1: Flachdichtungen aus nichtmetallischem Werkstoff mit oder ohne Einlagen

This European Standard was approved by CEN on 3 June 2024.

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EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Contents

Figures

Tables

European foreword

This document (EN 12560-1:2024) 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of an identical text or by endorsement, at the latest by February 2025, and conflicting national standards shall be withdrawn at the latest by February 2025.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 12560-1:2001.

In comparison with the previous edition EN 12560-1:2001, the following technical modifications have been made:

a) normative references have been updated;

b) terms and definitions have been updated;

c) Clause 4 “Symbols and abbreviations” has been inserted;

d) in Clause 5 information to be supplied by the purchaser has been revised and more details have been added;

e) in Clause 8 table with gasket dimensions have been arranged according gasket types and tolerances for gaskets have been introduced in 8.3;

f) in Clause 9 former content has been incorporated in Clause 8 and markings have been revised;

g) former Annex A “A-deviation” has been incorporated in 5.5;

h) new Annex A “gasket materials” to give guidance how to mark gaskets;

i) the document has been editorially revised.

EN 12560 will consist of the following parts:

— *Part 1: Non-metallic flat gaskets with or without inserts*

— *Part 2: Spiral wound gaskets for use with steel flanges*

— *Part 3: Non-metallic PTFE envelope gaskets*

— *Part 4: Corrugated flat or grooved metallic and filled metallic gaskets for use with steel flanges*

— *Part 5: Metallic ring-joint gaskets for use with steel flanges*

— *Part 6: Covered serrated metal gaskets for use with steel flanges*

— *Part 7: Covered metal jacketed gaskets for use with steel flanges*

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Introduction

Dimensions for the internal diameter of gaskets are a compromise between all requirements of EN 1759-1, EN 1759-3 and EN 1759-4 so that a single value is given for each gasket size.

1 Scope

This document specifies the dimensions, types, designation and marking of non-metallic flat gaskets, with or without inserts, for flanges in accordance with EN 1759-1, EN 1759-3 and EN 1759-4, for Class 150, Class 300, Class 600 and Class 900 for nominal sizes DN 15 to DN 600. In addition, this document also gives guidance on typical materials used and how they should be marked.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 1759-1, *Flanges and their joint — Circular flanges for pipes, valves, fittings and accessories, Class designated — Part 1: Steel flanges, NPS 1/2 to 24*

EN 1759-3, *Flanges and their joints — Circular flanges for pipes, valves, fittings and accessories, Class designated — Part 3: Copper alloy flanges*

EN 1759-4, *Flanges and their joints — Circular flanges for pipes, valves, fittings and accessories, Class designated — Part 4: Aluminium alloy flanges*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at https://www.electropedia.org/

— ISO Online browsing platform: available at https://www.iso.org/obp

3.1
DN
alphanumeric designation of size for components of a pipework system, which is used for reference purposes, and is comprised of the letters DN followed by a dimensionless whole number which is indirectly related to the physical size, in millimeters, of the bore or outside diameter of the end connections

Note 1 to entry: The number following the letters DN does not represent a measurable value and is not used for calculation purposes except where specified in the relevant standard.

[SOURCE: EN ISO 6708:1995, 2.1, modified – definition made into one statement, recommendation removed from note 1 to entry]

3.2
NPS
alphanumeric designation of size for components of a pipework system, which is used for reference purposes and is comprised of, for the purpose of Class designated flanges according to this document, the letters NPS followed by a dimensionless number which is indirectly related to the physical size of the bore or outside diameter of the end connections

Note 1 to entry: The number following the letters NPS does not represent a measurable value and is not used for calculation purposes except where specified in the relevant standard. See EN ISO 6708.

[SOURCE: EN 1759-3:2004, 3.3, modified – definition made into one statement, recommendation removed from note1 to entry]

3.3
Class
alphanumeric designation used for reference purposes related to a combination of mechanical and dimensional characteristics of a component of a pipework system, and is comprised of the word Class followed by a dimensionless whole number

Note 1 to entry: The number following the word Class does not represent a measurable value and is not used for calculation purposes except where specified in the relevant standard.

Note 2 to entry: The designation Class is not meaningful unless it is related to the relevant component standard number.

Note 3 to entry: It is intended that all components with the same Class and NPS (see below) designations have the same mating dimensions for compatible flange types.

[SOURCE: EN 1759-3:2004, 3.1, modified – definition made into one statement, recommendation removed from Note 1]

4 Symbols and abbreviations

For the purposes of this document, the following notations apply.

Where units are applicable, they are shown in brackets. Where units are not applicable, no indication is given.

CLASS	Pressure Nominal, see 3.3	-
d	Gasket inside diameter	mm
D	Gasket outside diameter	mm
DN	Diameter Nominal, see 3.1	-
FF	Full face	-
IBC	Inside bolt circle	-
K	Gasket bolt circle diameter	mm
L	Gasket bolthole diameter	mm
NPS	Diameter Nominal, see 3.2	-
SR	Spigot and recess	-
t	Thickness of gasket	mm
TG	Tongue and groove	-

5 Classification, designation and coding

5.1 Range of Class designation

Gaskets shall be designated as suitable for use with one or more of the following Class values:

— Class 150

— Class 300

— Class 600

— Class 900

5.2 Range of NPS designation

Gasket nominal sizes shall be designated in accordance with the ranges specified in Table 1.

5.3 Gasket types

Gasket types, as defined in Clause 6 and as illustrated in Figure 1 and Figure 2, shall be designated as:

Type FF	Full face
Type IBC	Inside bolt circle
Type TG	Tongue and groove
Type SR	Spigot and recess

5.4 Information to be supplied at the time of purchase

5.4.1 Mandatory information

The following information shall be supplied at the time of enquiry and order:

a) the number and part of this document, i.e. EN 12560-1;

b) gasket type designation (see 5.3);

c) NPS designation (see Tables 2 to 4, as applicable);

d) Class designation (see Tables 2 to 4, as applicable);

e) thickness (see 8.1);

f) material(s) (see 5.5 and Annex A).

5.4.2 Optional information

Several options are specified in this document and these are listed below. In the event that the purchaser does not indicate a wish to implement any of these options at the time of enquiry and order, the gaskets shall be supplied in accordance with the mandatory information (see 5.4.1):

a) expected operating conditions for which the gasket will be used;

b) the purchaser should indicate if gaskets are to be used in applications with specific regulations (e.g. water intended for human consumption). It should be noted that the National regulations of both the country of origin and the country of use may be considered relevant.

5.5 Gasket designs and materials

For gaskets in accordance with this document, materials containing asbestos shall not be used. This is normally ensured by the gasket supplier.

Gaskets shall be manufactured in a single material or combination of materials and shall be:

a) single flat sheet; or

b) laminated ply; or

c) moulded.

Examples of commonly used materials are provided in Annex A.

Before ordering a gasket, it is recommended that the selection of the gasket type, material and thickness should be made in consultation with the gasket supplier (see Annex A).

6 Gasket types

Gaskets shall be one of the following types:

a) Type FF gasket, for use with type A (flat face) or type B (raised face) flange facings [see Figure 1 a) and Figure 2 a)];

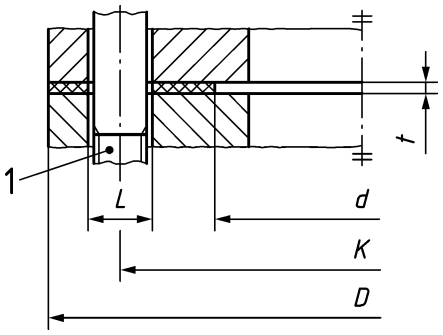
b) Type IBC gasket, for use with type A (flat face) or type B (raised face) flange facings [see Figure 1 b) and Figure 2 b)];

c) Type TG gasket, for use with type C/D (tongue/groove) flange facings [see Figure 1 c)] and Figure 2 b)];

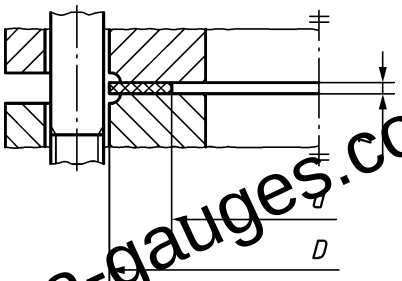
d) Type SR gasket, for use with type E/F (spigot/recess) flange facings [see Figures 1 d) and Figure 2 b)];

NOTE 1 The types of flange facings are specified in EN 1759-1, EN 1759-3, EN 1759-4 and, for information, the facings are shown in Figure 3.

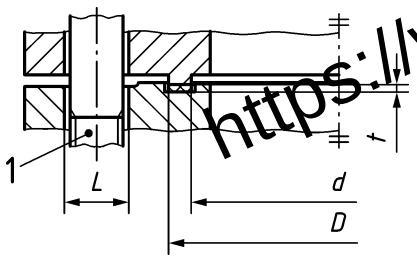
NOTE 2 Gaskets of types described in Clause 6 a), b), c) and d) and having an outside diameter greater than 1 500 mm are available only in segmental form. The purchaser can consult the gasket manufacturer or supplier as to the forms available for the larger sizes of gaskets.



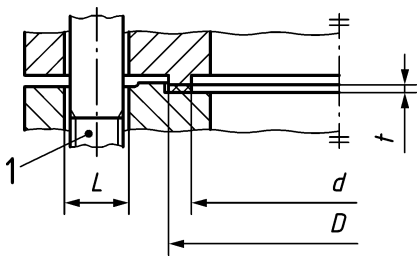
a) Type A flange facings with Type FF gasket



b) Type B flange facings with Type IBC gasket



c) Type C/D flange facings with Type TG gasket

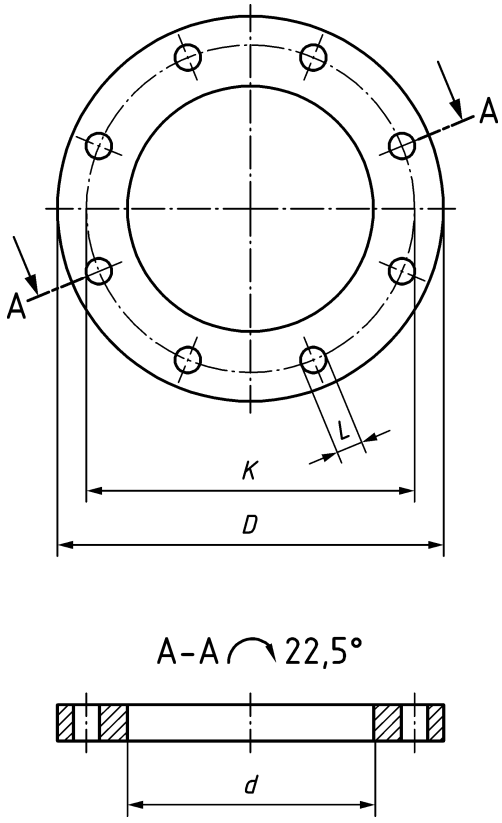


d) Type E/F flange facings with Type SR gasket

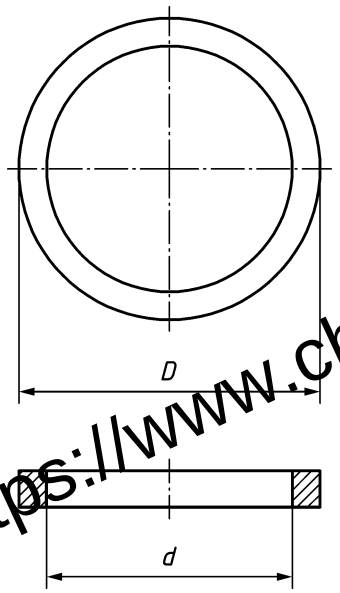
Key

1 bolt

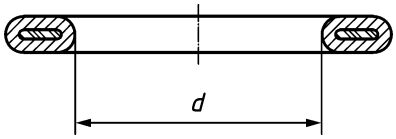
Figure 1— Types of flange facings and gaskets



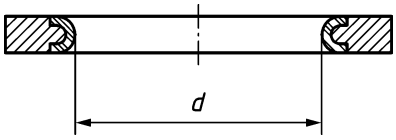
a) Type FF gasket (for types A and B flange facings)



b) Type IBC gasket (for type A and type B flange facings), Type TG gasket (for type C/D flange facings), Type SR gasket (for type E/F flange facings)



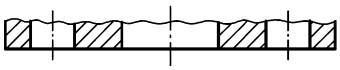
c) Gasket with metallic insertion



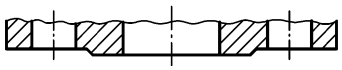
d) Gasket with metallic inner eyelet

Figure 2 — Gasket dimensions

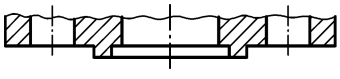
Figure 2 a) illustrates the arrangement but not necessarily the correct number of bolt holes. Refer to Table 3 for the actual number of bolt holes.



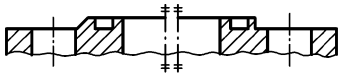
a) Type A: Flat face



b) Type B: Raised face

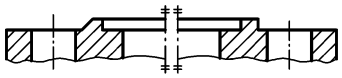


c) Type C: Tongue



d) Type D: Groove

e) Type E: Spigot



f) Type F: Recess

Figure 3 — Flange facing types

7 Range of gasket sizes

The ranges of sizes of gaskets for the various DN and Class designations shall be as given in Table 1 for the different gasket types.

Table 1 — Range of gasket sizes

Class	Gasket type [a]			
	Type FF	Type IBC	Type TG	Type SR
	DN Range			
150	15 to 600	15 to 600	-	-
300	15 to 600	15 to 600	15 to 600	15 to 600
600	-	15 to 600	15 to 600	15 to 600
900	-	15 to 600	15 to 600	15 to 600

[a] For gasket type designations see Clause 5.

8 Dimensions

8.1 Thickness

The selection of gasket thickness shall take into account the operating conditions, the properties of the gasket material, the flange facing and the flange bolt loading. The selection of gasket thickness for any particular application is advised to be made in consultation with the gasket supplier.

8.2 Diameters

The diameters of gaskets for flanges in accordance with EN 1759-1, EN 1759-3, and EN 1759-4 shall be as given in Table 2 to Table 4, as appropriate. Gaskets Type IBC shall be as given in Table 2, for Type FF in Table 3 and Type SR and TG in Table 4.

In the case of gaskets with a metallic inner eyelet, the gasket inside diameter shall be to the inside of the eyelet. [See Figure 2 d)].

Table 2 — Gasket dimensions of type IBC (Inside Bolt Circle) Class 150 – 900

Nominal size		Gasket inside diameter *d* mm	Gasket type IBC Gasket outside diameter *D* mm			
DN	**NPS [a]**		**Class 150**	**Class 300**	**Class 600**	**Class 900**
15	1/2	21	48,0	Use Class 600 dimensions	54,0	63,5
20	3/4	27	57,0		66,5	69,5
25	1	34	67,0		73,0	79,0
32	1 1/4	43	76,0		82,5	89,0
40	1 1/2	49	86,0		95,0	98,0
50	2	61	105,0		111,0	142,5
65	2 1/2	73	124,0		130,0	165,0
80	3	89	137,0		149,0	168,0
100	4	115	175,0	181,0	193,5	206,0
125	5	141	197,0	216,0	214,0	247,5
150	6	169	222,0	251,0	266,5	289,0
200	8	220	279,0	308,0	320,5	358,5
250	10	273	340,0	362,0	400,0	435,0
300	12	324	410,0	422,0	457,0	498,5
350	14	356	451,0	485,5	492,0	520,5
400	16	407	514,0	539,5	565,0	574,5
450	18	458	549,0	597,0	612,5	638,0
500	20	508	606,0	654,0	682,5	698,5
600	24	610	718,0	774,5	790,5	838,0

[a] For information only.

Table 3 — Dimensions of Class designated gaskets Type FF (Full Face) Class 150 - 300

Nominal size		Gasket inside diameter	Type FF									
			Class 150					Class 300				
			Gasket outside diameter	Holes			Bolt circle diameter	Gasket outside diameter	Holes			Bolt circle diameter
				No. of holes	Diameter [b]				No. of holes	Diameter [b]		
DN	NPS [a]	*d* mm	*D* mm		*L* mm	*L* inch	*K* mm	*D* mm		*L* mm	*L* inch	*D* mm
15	1/2	21	89	4	15,9	5/8	60,3	95	4	15,9	5/8	66,7
20	3/4	27	98	4	15,9	5/8	69,9	117	4	19,0	3/4	82,6
25	1	34	108	4	15,9	5/8	79,4	124	4	19,0	3/4	88,9
32	1 1/4	43	117	4	15,9	5/8	88,9	133	4	19,0	3/4	98,4
40	1 1/2	49	127	4	15,9	5/8	98,4	156	4	22,2	7/8	114,3
50	2	61	152	4	19,0	3/4	120,7	165	8	19,0	3/4	127,0
65	2 1/2	73	178	4	19,0	3/4	139,7	191	8	22,2	7/8	149,2
80	3	89	190	4	19,0	3/4	152,4	210	8	22,2	7/8	168,3
100	4	115	229	8	19,0	3/4	190,5	254	8	22,2	7/8	200,0
125	5	141	254	8	22,2	7/8	215,9	279	8	22,2	7/8	235,0
150	6	169	279	8	22,2	7/8	241,3	318	12	22,2	7/8	269,9
200	8	220	343	8	22,2	7/8	298,5	381	12	25,4	1	330,2
250	10	273	406	12	25,4	1	362,0	445	16	28,6	1 1/8	387,4
300	12	324	483	12	25,4	1	431,8	521	16	31,8	1 1/4	450,9

Nominal size		Gasket inside diameter	Type 11									
			Class 150					Class 300				
			Gasket outside diameter	Holes			Bolt circle diameter	Gasket outside diameter	Holes			Bolt circle diameter
				No. of holes	Diameter [b]				No. of holes	Diameter [b]		
DN	NPS [a]	*d* mm	*D* mm		*L* mm	*L* inch	*K* mm	*D* mm		*L* mm	*L* inch	*D* mm
350	14	356	533	12	28,6	1 1/8	476,3	584	20	31,8	1 1/4	514,4
400	16	407	597	16	28,6	1 1/8	539,8	648	20	34,9	1 3/8	571,5
450	18	458	635	16	31,8	1 1/4	577,9	711	24	34,9	1 3/8	628,7
500	20	508	698	20	31,8	1 1/4	635,0	775	24	34,9	1 3/8	685,8
600	24	610	813	20	34,9	1 3/8	749,3	914	24	41,3	1 5/8	812,8

[a] For information only.

[b] Either the metric or imperial dimension is permitted.

Table 4 — Dimensions for Class designated gaskets Type TG (Tongue and Groove) and SR (Spigot and Recess) Class 300 - 900

Nominal size		Type SR Gasket inside diameter *d* mm	Type TG Gasket inside diameter *d* mm	Type SR and Type TG Gasket outside diameter *D* mm
DN	NPS [a]	Class 300, 600 and 900		
15	1/2	21	25,5	35,0
20	3/4	27	33,5	43,0
25	1	34	38,0	51,0
32	1 1/4	43	47,5	64,0
40	1 1/2	49	54,0	73,0
50	2	61	73,0	92,0
65	2 1/2	73	85,5	105,0
80	3	89	108,0	127,0
100	4	115	132,0	157,0
125	5	141	160,5	186,0
150	6	169	190,5	216,0
200	8	220	238,0	270,0
250	10	273	286,0	324,0
300	12	324	343,0	381,0
350	14	356	374,5	413,0
400	16	407	425,5	470,0
450	18	458	489,0	533,0
500	20	508	533,5	584,0
600	24	610	641,5	692,0

[a] For information only.

8.3 Tolerances

The following tolerances shall be applied to gaskets with a thickness up to 6,4 mm. For thicker gaskets, tolerances shall be agreed between supplier and end user.

Table 5 — Tolerance for non-metallic gasket dimensions

Dimensions in millimetres

	(-) Tolerance	(+) Tolerance	
Centre to centre of adjacent bolt holes	- 1	1	All gasket types
Bolt circle diameter	-acc. to Table 6	+acc. to Table 6	
Bolt hole diameter	−0,5	+acc. to Table 6	
Outside diameter	-acc. to Table 6	+0,5	
Inside diameter w/o TG	-acc. to Table 6	+acc. to Table 6	
Inside diameter	-0,5	+acc. to Table 6	Only type TG

Table 6 — Additional tolerance for non-metallic gasket dimensions not listed in Table 5

Dimensions in millimetres

DN	≤ 300	350 – 700	800 – 1 800	> 2 000
Tolerance	±1,5	±3,0	±4,0	Agreement between supplier and end user

9 Marking

Gaskets shall be identified either individually or on the packaging containing the gasket(s) with the following information:

a) the number and part of this document, i.e. EN 12560-1;

b) gasket type designation (see 5.3);

c) DN designation (see Tables 2 to 4, as applicable);

d) Class designation (see Tables 2 to 4, as applicable);

NOTE Some gaskets are suitable for more than just one Class designation. See Example 1.

e) thickness (see 8.1);

f) information of gasket material(s) shall be described by short code, long description or manufacturer’s designation, name or trademark (see Clause 5 and Annex A);

g) manufacturer's name or trademark (AAA/BBB).

EXAMPLE 1

EN 12560-1, **Type IBC, DN 80, Class 150, 2 mm, GR-10-O-1M-Cr, AAA/BBB**

EXAMPLE 2

EN 12560-1, **Type FF, DN 300, Class 300, 3 mm, TF-EO-O, AAA/BBB**

Annex A
(informative)

Gasket materials

Commonly used materials for the manufacture of non-metallic flat gaskets are:

a) rubber with/without reinforcement;

b) PTFE/ePTFE or plastics with/without fillers;

c) graphite with/without reinforcement;

d) compressed fibre with binder;

e) vegetable fibre;

f) cork based;

g) silicates with/without reinforcement.

Table A.1 shows a selection of commercially available gasket materials used for manufacturing gaskets according to this document. The use of other materials than those listed, should be confirmed by the manufacturer.

For materials not listed in Table A.1, gasket manufacturer should assign a short code at their discretion.

NOTE The coding (as introduced in DIN 28091-2, DIN 28091-3, DIN 28091-4) for sheet material, supports the detailed description of gaskets in the material description.

Table A.1 — Coding for sheet material

Type of fibre	**Symbol**		**Type of binder** [a]	**Symbol**		**Type of filler**	**Symbol**
Aramide	A		NBR	1		No fillers used.	O
Glass	G		SBR	2		Steel	St
Carbon	C		NR	3		Nickel-chromium steel	Cr
Mineral	M		IIR	4		Nickel	Ni
Natural	N		Other	Z		Aluminium	Al
Other	Z					Other	Z

Type of PTFE	**Symbol**		**Type of filler**	**Symbol**		**Type of insert**	**Symbol**
Molded/Skived	O		No fillers used	O		No insert used	O
Modified/Structured	M		Barium Sulfate	B		Steel	St
Expanded	E		Carbon	C		Nickel-chromium steel	Cr
Other	Z		Glass	G		Nickel	Ni
			Mineral	M		Aluminium	Al
			Silica	S		Other	Z
			Other	Z			
Graphite (GR)							
Type of impregnation	**Symbol**		**Type of mounting**	**Symbol**		**Type of filler**	**Symbol**
Without impregnation	O		Mechanical	M		No fillers used	O
With impregnation	I		Bonded	K		Steel	St
						Chromium-nickel steel	Cr
						Nickel	Ni
						Aluminium	Al
						Other	Z
NOTE 1 Compressed fibre gasket materials (FA) are composite materials made from elastomer binders or a mixture of elastomer binders which are reinforced by the inclusion of fibres, and fillers. NOTE 2 PTFE sheets gasket materials are based on PTFE (TF), with or without fillers or inserts.							
[a] ISO 1629 standard designation.							

Bibliography

[1] EN ISO 6708:1995, *Pipework components — Definition and selection of DN (nominal size) (ISO 6708:1995)*

[2] DIN 28091-2, *Technical delivery conditions for gasket sheets — Part 2: Requirements and testing for fibre-based gasket materials (FA)*

[3] DIN 28091-3, *Technical delivery conditions for gasket sheets — Part 3: Requirements and testing for PTFE-based gasket materials (TF)*

[4] DIN 28091-4, *Technical delivery conditions for gasket sheets — Part 4: Requirements and testing for expanded graphite-based gasket materials (GR)*

[5] ISO 1629, *Rubber and latices — Nomenclature*

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