BS EN 1514-2:2014

BSI Standards Publication

Flanges and their joints — Gaskets for PN-designated flanges

Part 2: Spiral wound gaskets for use with steel flanges

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National foreword

This British Standard is the UK implementation of EN 1514-2:2014. It supersedes BS EN 1514-2:2005 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PSE/15/2, Flanges - Jointing materials and compounds.

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

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

ISBN 978 0 580 77211 5

ICS 23.040.80

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 September 2014.

Amendments issued since publication

Date	Text affected

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 1514-2

September 2014

ICS 23.040.80

Supersedes EN 1514-2:2005

English Version

Flanges and their joints - Gaskets for PN-designated flanges - Part 2: Spiral wound gaskets for use with steel flanges

Brides et leurs assemblages - Joints pour les brides désignées PN - Partie 2 : Joints spiralés pour utilisation avec des brides en acier

Flansche und ihre Verbindungen - Dichtungen für Flansche mit PN-Bezeichnung - Teil 2: Spiraldichtungen für Stahlflansche

This European Standard was approved by CEN on 25 July 2014.

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Foreword

This document (EN 1514-2:2014) 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of an identical text or by endorsement, at the latest by March 2015, and conflicting national standards shall be withdrawn at the latest by March 2015.

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

This document supersedes EN 1514-2:2005.

The reason for the revision is to include dimensions for PN 16. The dimensions of the various components of the spiral wound gaskets described and their tolerances have been set with the objective of controlling the possibility of protrusion of the inner ring into the bore of the pipeline being sealed. The other features of this European Standard have been set in order to ensure good functionality of spiral wound gaskets made according to this European Standard.

EN 1514, *Flanges and their joints — (Dimensions of) gaskets for PN-designated flanges,* consists 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 6: Covered serrated metal gaskets for use with steel flanges;*

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

— *Part 8: Polymeric O-Ring gaskets for grooved flanges.*

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Introduction

The dimensions of spiral wound gaskets for tongue and groove flanges and spigot and recess flanges to EN 1092-1 are not included in this part of EN 1514. Such gaskets may be available for these types of flange and the purchaser is advised to consult the manufacturer as to their availability.

1 Scope

This part of EN 1514 specifies the dimensions and marking of spiral wound gaskets for use in conjunction with flat face and raised face flanges complying with the requirements of EN 1092-1 for PN 10, PN 16, PN 25, PN 40, PN 63, PN 100 and PN 160 and up to and including DN 1 000.

NOTE 1 Dimensions of other types of gaskets for use with flanges to EN 1092-1, EN 1092-2, EN 1092-3 and EN 1092-4 are given in EN 1514-1, EN 1514-3, EN 1514-4, EN 1514-6, EN 1514-7 and EN 1514-8.

NOTE 2 Annex A lists information to be supplied by the purchaser when ordering gaskets in circumstances where the choice of the gasket materials appropriate to the service is left to the manufacturer.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 1333, *Flanges and their joints - Pipework components - Definition and selection of PN*

EN ISO 6708, *Pipework components - Definition and selection of DN (nominal size) (ISO 6708)*

3 Terms and definitions

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

3.1
DN
alphanumeric designation of size for components of a pipework system, which is used for reference purposes. It comprises the letters DN followed by a dimensionless whole number which is indirectly related to the physical size, in millimetres, 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 should not be used for calculation purposes except where specified in the relevant standard.

Note 2 to entry: In those standards which use the DN designation system, any relationship between DN and component dimensions should be given (e.g. DN/OD or DN/ID).

Note 3 to entry: The preferred DN values are:

DN 10	DN 250	DN 1 500
DN 15	DN 300	DN 1 600
DN 20	DN 350	DN 1 800
DN 25	DN 400	DN 2 000
DN 32	DN 450	DN 2 200
DN 40	DN 500	DN 2 400
DN 50	DN 600	DN 2 600
DN 60	DN 700	DN 2 800
DN 65	DN 800	DN 3 000
DN 80	DN 900	DN 3 200

DN 100	DN 1 000	DN 3 400
DN 125	DN 1 100	DN 3 600
DN 150	DN 1 200	DN 3 800
DN 200	DN 1 400	DN 4 000

[SOURCE: EN ISO 6708:1995, 2.1 and Clause 3]

3.2
PN
alphanumeric designation used for reference purposes related to a combination of mechanical and dimensional characteristics of a component of a pipework system. It comprises the letters PN followed by a dimensionless number

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

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

Note 3 to entry: The maximum allowable pressure of a pipework component depends on the PN number, the material and design of the component, its maximum allowable temperature, etc. The relevant European Component standards include tables of specified pressure/temperature ratings or, in minimum, include rules how to determine pressure/temperature ratings.

Note 4 to entry: It is intended that all components with the same PN and DN designations have the same mating dimensions for compatible flange types.

Note 5 to entry: The preferred PN values are:

PN 2,5	PN 25	PN 160
PN 6	PN 40	PN 250
PN 10	PN 63	PN 320
PN 16	PN 100	PN 400

[SOURCE: EN 1333:2006, 2.1 and Clause 3]

4 Designations

4.1 Essential features and dimensions

4.1.1 General

A major feature of the design of spiral wound gaskets meeting the requirements of this European Standard is the minimisation of the possibility of the inner ring protruding into the bore of the pipe to which the flange is attached. The fit of the inner ring and sealing element relative to the centring ring has been selected to comply with this requirement.

The essential features of a spiral wound gasket that complies with the requirements of this European Standard are given in Figures 1 and 2 and/or are shown in Table 1.

Table 1 — Spiral wound gaskets - Essential features

Parameter	Feature
Movement of centre of inner ring relative to centring ring	up to DN 200 : a maximum of 0,2 mm above DN 200 : a maximum of 0,4 mm
Centring ring thickness	3 mm ± 0,25 mm
Sealing element location groove shall be centrally located in the centring ring	centre ± 0,1 mm
Number of empty wraps on external diameter of the sealing element	3 to 5
Number of empty wraps on the internal diameter of the sealing element	2 to 3
Number of welds on the inner and outer diameters of the sealing element, i.e. on the empty wraps	Minimum of 4
Thickness of the metal of the sealing element	0,2 mm ± 0,02 mm
Width of the profiled metal of the sealing element	4,5 mm $^{+0,3}_{0}$ mm
Thickness of the filler material	As appropriate for the filler type
Protrusion of the filler above the profiled metal of the sealing element	0,3 mm ± 0,1 mm
Compression of the sealing element	Shall not result in contact between the flange and the centring ring (also see 4.1.2)
Graphite ash content	2 % maximum by weight
PTFE filler	May be either sintered or un-sintered
Sharp edges on inner and centring ring	Shall be removed
Dimensions	Shall be as given in Table 2

4.1.2 Maximum compression

Metal to metal contact between the centring ring and the flange shall not be achieved with the maximum load that can be generated by the flange bolts.

4.1.3 Use of an inner ring

An inner ring shall be used with all gaskets using PTFE as the filler and with all gaskets for pressure groups PN 63, PN 100 and PN 160.

In addition, it is strongly recommended that an inner ring should be used with all gaskets, this should be specified on the order for all gaskets for pressure groups PN 10, PN 16, PN 25 and PN 40.

4.2 Range of PN designations

Gaskets shall be designated as suitable for use with one or more of these PN flange designations:

a) PN 10;

b) PN 16;

c) PN 25;

d) PN 40;

e) PN 63;

f) PN 100;

g) PN 160.

4.3 Range of DN (nominal sizes)

Gasket nominal sizes shall be designated in accordance with the ranges specified in Table 2.

4.4 Gasket types

Gasket types are shown in Clause 6 and illustrated in Figure 1.

4.5 Information to be supplied by the purchaser

Where the purchaser requires the manufacturer to specify the materials of the gasket, then the minimum information that shall be supplied to the manufacturer with the order is given in Annex A.

5 Gasket designs

Gaskets for which dimensions are specified shall be of one of the designs shown in Figure 1.

The clearance between the sealing element and the centring ring shall be as shown in Figure 2.

NOTE 1 Figure 1 shows a typical design of a metallic spiral wound gasket and, for use with type A or type B flanges.

NOTE 2 Type A and type B flange facings are illustrated in EN 1092-1.

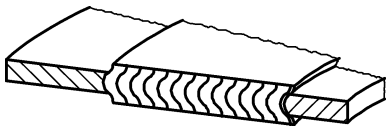
NOTE 3 The profile of the metal winding of the sealing element is at the option of the manufacturer.

The materials of the gasket may be specified either by:

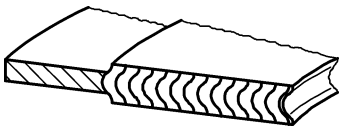
a) the purchaser; or

b) if required by the purchaser, by the manufacturer to suit the application operating conditions. In this case, the purchaser shall define the operating conditions in the enquiry and/or order (see Annex A).

The attention of the user is drawn to the load necessary to compress spiral wound gaskets and the available load with PN 10 flanges should be verified as adequate prior to using these gaskets.



a) Type C/I



b) Type C/O

Figure 1 — Spiral wound gaskets

6 Gasket types

Gaskets shall be either:

a) Type C/I having a sealing element with centring ring and inner ring; or

b) Type C/O having a sealing element with centring ring.

All gaskets shall have a centring ring.

All PN 63, PN 100 and PN 160 gaskets shall have an inner ring.

All gaskets containing PTFE filler material shall have an inner ring.

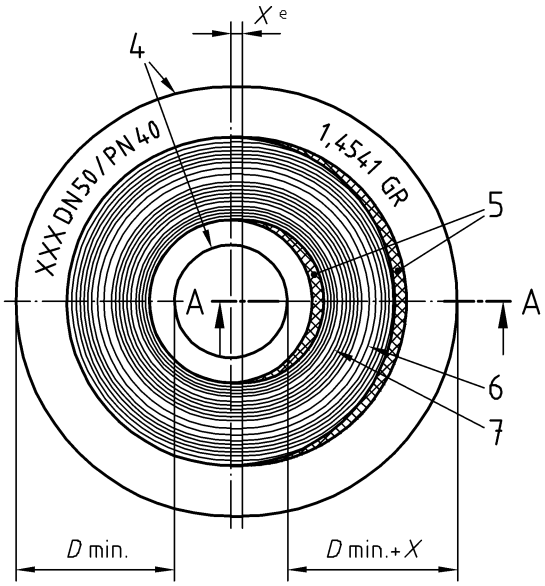
The use of an inner ring is recommended for all PN designations and the purchaser shall specify on the enquiry and/or order if an inner ring is required for PN 10, PN 16, PN 25 and PN 40 gaskets (see Annex A).

The selection of gasket type should take into account the fluids, the operating conditions, the properties of the gasket materials, the type and surface finish of the flange facing and the flange bolt loading. It is recommended that selection of gaskets for any particular application is made in consultation with the gasket supplier (see Annex A).

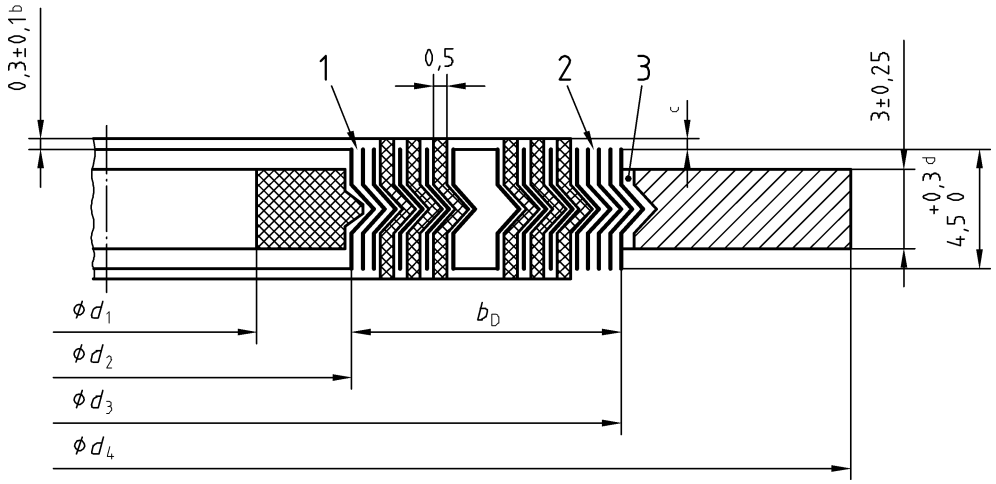
7 Dimensions

The dimensions of spiral wound gaskets for Types A and B flange facings shall be as given in Table 2 and the overall thickness, including filler, shall be as given in Figure 2.

Dimensions in millimetres



A – A a



Key

1 2 to 3 empty wraps
2 3 to 5 empty wraps
3 Central groove ± 0,1 mm
4 Sharp edges removed
5 Minimum of four welding points for each
6 Metal thickness 0,2 mm ± 0,02 mm
7 Thickness as appropriate to filler type,
graphite ash content < 2 %,PTFE filler to contain no re-cycled material and may be either sintered or non-sintered.

a See Table 2 for details
b Protrusion to be a minimum of 0,2 mm
c The gasket shall not compress such that metal to metal contact between flange and guide rings is achieved;
d Width (of profiled metal of the sealing element)
e Tolerance: ≤ DN 200: max. 0,2 mm;
> DN 200: max. 0,4 mm
This parameter controls the amount by which the ring might protrude into the bore.

Figure 2 — Spiral wound gasket details

Table 2 — Dimensions

Dimensions in millimetres

DN	Inner diameter of the inner ring d_1	Width of the inner ring $b_{IR\ min}$	Inner diameter of the sealing element $d_{2\ min}$	Width of the sealing element $b_{D\ min}$	Inner diameter of the centring ring $d_{3\ min}$	Width of the sealing element $b_{D\ min}$	Inner diameter of the centring ring $d_{3\ min}$	Outside diameter of the centring ring for each pressure class d_4						
				PN 10, PN 16, PN 25, PN 40		PN 63, PN 100, PN 160		PN 10	PN 16	PN 25	PN 40	PN 63	PN 100	PN 160
10	18	3,0	24	5	34	5	34	46				56		
15	23	3,0	29	5	39	5	39	51				61		
20	28	3,0	34	6	46	—	—	61				—		
25	35	3,0	41	6	53	6	53	71				82		
32	43	3,0	49	6	61	—	—	82				—		
40	50	3,0	56	6	68	6	68	92				103		
50	61	4,5	70	8	86	8	86	107				113	119	
65	77	4,5	86	8	102	10	106	127				137	143	
80	90	4,5	99	8	115	10	119	142				148	154	
100	115	6,0	127	8	143	10	147	162		168		174	180	
125	140	6,0	152	10	172	12	176	192		194		210	217	
150	167	6,0	179	10	199	12	203	218		224		247	257	
200	216	6,0	228	10	248	12	252	273		284	290	309	324	
250	267	6,0	279	12	303	14	307	327	329	340	352	364	391	388
300	318	6,0	330	12	354	14	358	377	384	400	417	424	458	458
350	360	8,0	376	12	400	14	404	437	444	457	474	486	512	—
400	410	6,0	422	14	450	17	456	488	495	514	546	543	572	—
500	510	6,0	522	14	550	17	556	593	617	624	628	657	704	—
600	610	6,0	622	14	650	17	656	695	734	731	747	764	813	—

700	710	6,0	722	17	756	20	762	810	804	833	852	879	950	—
800	810	10,0	830	17	864	20	870	917	911	942	974	988	—	—
900	910	10,0	930	17	964	20	970	1 017	1 011	1 042	1 084	1 108	—	—
1 000	1 010	10,0	1 030	22	1 074	25	1 080	1 124	1 128	1 154	1 194	—	—	—
NOTE With these dimensions, the inner ring will not protrude into the bore of the pipe to be sealed.														

8 Marking

8.1 General

The gasket centring ring shall be marked with:

a) The manufacturer's name or trade mark (e.g. ACME gasket company);

b) The Centring ring material abbreviation (e.g. AAA) except that the abbreviation may be omitted when the centring ring is of carbon steel;

c) The filler material abbreviation (e.g. BBB);

d) The winding material abbreviation (e.g. CCC);

e) The DN designation followed by the appropriate number (e.g. DN 300);

f) The PN designation followed by the appropriate number (e.g. PN 25);

g) The Inner ring material abbreviation (e.g. XXX) except that the abbreviation may be omitted when the inner ring is of 304 stainless steel; and

h) Gaskets shall be identified either individually or on their packaging with the number of this European Standard

EXAMPLE 1 A centring ring with all the required markings on it would show as:

ACME Gasket company AAA BBB/CCC DN 300 PN 25 XXX EN 1514-2.

EXAMPLE 2 A centring ring with the minimum required markings on it would show as:

ACME Gasket company BBB/CCC DN 300 PN 25

8.2 Colour coding

Spiral wound gaskets shall be marked with colour codes that identify the metal of the winding strip and the filler material.

A continuous colour around the centring ring edge shall identify the metal of the winding strip.

Intermittent stripes around the edge of the centring ring shall identify the filler material. For gasket sizes below DN 40 there will be a minimum of two stripes spaced approximately 180° apart. For gaskets of DN 40 and above there will be a minimum of four stripes spaced approximately 90° apart.

Colour codes shall be in accordance with the requirements of Table 3.

For materials not given in Table 3, the colour code shall be agreed between the purchaser and the manufacturer.

Table 3 — Colour coding and abbreviations for spiral-wound gasket materials

Materials	Material numbers	Abbreviations	Colour codes
Metallic materials			
Carbon steel		CRS	Silver
X4CrNi 18-10	1.4301	304	Yellow
X2CrNi 19-11	1.4306	304 L	No colour [a]
X15CrNiSi 20-12	1.4828	309	No colour [a]
X15CrNiSi 25-20	1.4841	310	No colour [a]
X5CrNiMo 17-12-2	1.4401	316	Green
X2CrNiMo 17-12-2	1.4404	316 L	Green
X6CrNiNb 18-10	1.4550	347	Blue
X6CrNiTi 18-10	1.4541	321	Turquoise
X6Cr 17	1.4016	430	No colour [a]
NiCu30Fe	2.4360	MON	Orange
Ni99.2	2.4066	NI	Red
Titanium		TI	Purple
NiCr20CuMo	2.4660	A-20	Black
NiMo28	2.4617	HAST B	Brown
NiMo16Cr15W	2.4819	HAST C	Beige
NiCr15Fe	2.4816	INC 600	Gold
NiCr22Mo9Nb	2.4856	INC 625	Gold
NiCr15Fe7TiAl	2.4669	INX	No colour [a]
X10NiCrAlTi 32-20	1.4876	IN 800	White
NiCr21Mo	2.4858	IN 825	White
Zirconium		ZIRC	No colour [a]
Non-metallic filler materials			
Polytetrafluoroethylene		PTFE	White stripe
Mica-graphite		Manufacturer's designation	Pink stripe
Flexible-graphite		FG	Grey stripe
Ceramic		CER	Light Green stripe

[a] To prevent confusion between gaskets of the same type made from different materials, it is recommended that a colour code is agreed between the gasket supplier and the purchaser.

Annex A
(informative)

Information to be supplied by the purchaser

Before ordering a gasket, it is recommended that the selection of the gasket type should be made in consultation with the gasket supplier. Selection of gasket type should take account of the fluid, the operating conditions, the gasket material properties, the type and surface finish of the flange facing and the flange bolt loading to which the gasket will see in service.

As a minimum, the information to be supplied by the purchaser to the supplier of manufacturer when ordering a gasket is:

a) reference to this European Standard;

b) the gasket type (see 4.3);

c) DN designation (see Table 2) and any requirement for a specific inner ring inside diameter;

d) PN designation (see Table 2);

e) whether an inner ring is required (see Clause 6);

f) the expected operating conditions to which the gasket will be exposed (e.g. maximum and minimum operating temperatures, media to be contained, operating pressure).

Bibliography

EN 1092-1, *Flanges and their joints — Circular flanges for pipes, valves, fittings and accessories, PN designated — Part 1: Steel flanges*

EN 1092-2, *Flanges and their joints - Circular flanges for pipes, valves, fittings and accessories, PN designated - Part 2: Cast iron flanges*

EN 1092-3, *Flanges and their joints - Circular flanges for pipes, valves, fittings and accessories, PN designated - Part 3: Copper alloy flanges*

EN 1092-4, *Flanges and their joints - Circular flanges for pipes, valves, fittings and accessories, PN designated - Part 4: Aluminium alloy flanges*

EN 13555, *Flanges and their joints - Gasket parameters and test procedures relevant to the design rules for gasketed circular flange connections*

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