BRITISH STANDARD

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1514-6:2003

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

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

The European Standard EN 1514-6:2003 has the status of a British Standard

ICS 23.040.80

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National foreword

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Flanges and their joints - Dimensions of gaskets for PN-designated flanges - Part 6: Covered serrated metal gaskets for use with steel flanges

Brides et leurs assemblages - Dimensions des joints pour les brides désignées PN - Partie 6: Joints métalliques striés revêtus pour utilisation avec des brides en acier

Flansche und ihre Verbindungen - Maße für Dichtungen für Flansche mit PN-Bezeichnung - Teil 6: Kammprofildichtungen für Stahlflansche

This European Standard was approved by CEN on 3 November 2003.

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Contents

page

Foreword

This document (EN 1514-6:2003) 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of an identical text or by endorsement, at the latest by June 2004, and conflicting national standards shall be withdrawn at the latest by June 2004.

The annex A is informative and contains "Information to be supplied by the purchaser".

EN 1514 consists of 6 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

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, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European Standard specifies the construction, dimensions and marking of covered serrated metal gaskets for use with flanges complying with EN 1092-1 for PN 10, PN 16, PN 25, PN 40, PN 63 and PN 100 up to and including DN 3000.

This document does not extend to covered serrated metal based heat exchanger gaskets with pass bars or large vessel gaskets but, in the lack of a dedicated document for such gaskets, the principles set down can be applied to them.

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 1514-2, EN 1514-3, EN 1514-4, prEN 1514-7 and prEN 1514-8.

NOTE 2 Annex A lists information that should 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 supplier.

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 revisions 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 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 1092-3:2003, *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 1333, *Pipework components — Definition and selection of PN.*

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

3 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in EN 1092-3:2003, EN ISO 6708:1995 and the following apply.

3.1
covered serrated metal gasket
consists of a sealing element with or without a location ring which may or may not be rigidly fixed to the sealing element. The sealing element consists of a metal core with serrated top and lower surfaces and a conformable sealing material adhered to each serrated surface. The serrations into metal core have the function of creating regions of high surface pressure on the conformable sealing material to ensure the required level of tightness in service. The density of the sealing material in the serrations during service should also be high enough to ensure that secondary sealing is provided by the impermeable nature of the material between the tips of the serrations. In service the thickness of the sealing material over the serrations is minimal, often about 0,1 mm. The widths of the tips of the serrations should also be of the order of 0,1 mm

3.2
DN
see EN ISO 6708

3.3
PN
see EN 1333

4 Designations

4.1 Range of PN designations

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

PN 10	PN 40	PN 250
PN 16	PN 63	PN 320
PN 25	PN 100	PN 400

NOTE There are no standards in the EN 1092 series that cover PN 160, PN 250, PN 320 or PN 400 flanges but there are national standards covering these.

4.2 Range of DN (nominal sizes)

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

The general principles described in this standard shall also be applied to gaskets outside of the range specified in Table 1 by agreement between supplier and customer.

4.3 Gasket types

Gasket types, as illustrated in Figure 1, shall be designated as:

Type NR: Sealing element without any location ring

Type IR: Sealing element with integral location ring.

Type LR: Sealing element with loose location ring.

Types NR is used only with spigot faced or tongue and groove faced flanges

4.4 Information to be supplied by the purchaser

The selection of gasket materials and type should take into account the fluid, the operating conditions and the properties of the gasket materials as well as the type of flange. It is recommended that selection of a gasket for any particular application is made in consultation with the gasket supplier who will advise on the materials required for a particular service (see annex A).

5 Constructional details

5.1 General details

Figure 1 gives illustrations of the cores and, where used, the location rings of the three types of covered serrated metal gasket listed in 4.3.

Figure 2 shows a typical covered serrated metal gasket for use with type A and type B flanges, the Type A and B flange facings are specified in EN 1092-1, EN 1092-2, EN 1092-3 and EN 1092-4.

5.2 Core

5.2.1 Core materials

The material of the core shall be selected to be compatible with the intended service. The core thickness, measured over the tips of the serrations, shall be a minimum of three times the depth of the serrations.

5.2.2 Core welding

If the core is of a welded construction then the method of welding shall be such as to ensure that the weld is throughout the full thickness of the core. The number of welds shall not be more than two.

5.2.3 Dressing of core welds

The welds shall be dressed to preserve the number and depth of the serrations of the rest of the core.

5.2.4 Core flatness

The out of flatness of the serrated core shall not be more than 3 mm for every 300 mm of outside diameter.

5.3 Serrations

The serration depth shall be a minimum of 0,4 mm. The pitch of the serration and the width of the serration shall be arranged so that the width of the tips is 0,1 mm. The first and last tips of the serrated core shall be as near as possible to the respective edges of the core.

Proprietary forms of serrations and core profiles may be used by agreement between the purchaser and manufacturer.

To minimise the possibility of vibration induced cracking of the core, the radius at the bottom of the grooves shall be as large as possible.

5.4 Location rings

5.4.1 Integral ring

The thickness of the integral ring shall be a minimum of 0,5 mm. The location ring shall be undercut on at least one side to protect the sealing element in the event of thermal expansion induced interference between the location ring and the bolts of the flange.

5.4.2 Loose ring

The thickness of the location ring shall be a minimum of 0,5 mm. When installed the ring shall be sufficiently loose in the location slot in the core so that thermal expansion effects never cause the ring to become tight in the location slot. The location ring may be made in sections and assembled around the core. The sections of the assembled ring shall be either welded together or otherwise securely held together. The material of the loose location ring may be carbon steel.

5.5 Facing materials

The facing material shall be selected to be suitable for the intended service and the material of the flanges. Suitable materials range from very soft, rubber bound, sheet material to metal foils.

The facing material may be cut from sheet to the appropriate size, applied in the form of texturised tape or by any other means that meets the other requirements of this standard.

5.6 Facing weight per unit area

The weight per unit area of facing in order to create the required level of tightness in service is a function of the thickness and density of the facing material, the depth, width and pitch of the serrations, the required in service density of the facing material and the thickness of facing required above the core in service. The weight per unit area shall be such that metal to metal contact between the tips of the serrations and the flange surface is avoided.

For guidance, a satisfactory level of sealing is routinely achieved with graphite of 0,5 mm thickness and a density of 1,0 gm/cm^3 as received when used with a core where the serrations are 0,4 mm in depth and the serration tip width is 0,1 mm.

Ignoring the effects of the thickness of any adhesive and the grooving of the flange surfaces, the target weight per unit area of facing can be estimated from the following:

Weight per unit area = ρ_s [t + (A_G / P)]

Where ρ_s is the required density of the facing in service

t is the required thickness in service of facing above the core

A_G is the cross sectional area, perpendicular to the plane of the core, of the serrations

P is the pitch of the serrations

5.7 Attachment of facing

5.7.1 Methods of attachment

The facing may be attached to the core by any means that satisfies the requirement of 5.8 provided that the attachment method does not result in the introduction of any component that is likely to initiate corrosion.

5.7.2 De-greasing of core

Where an adhesive is used the area of the core to which the facing is to be attached shall be de-greased before use of the adhesive and the amount of the adhesive used shall be minimised.

5.7.3 Number of joins

The number of joins in the facing material shall be minimised and shall never exceed two. At joins the facing material shall be overlapped or the two parts chamfered or, where a butt joint is used, overlapped with a thin layer of the facing material.

5.7.4 Excessive facing

Once the sealing faces have been applied any excess material shall be removed paying particular attention that none protrudes inside of the inner diameter of the gasket.

5.8 Integrity of facing attachment

The facing material and the method of attachment shall be selected so that the facing is held securely in place and will withstand reasonable handling during transport and location of the gasket in the flange.

The sealing face shall also be free of surface blemishes, defects and damage that would impair the sealing performance of the gasket.

5.9 Typical construction details

Commonly used details for Figure 2 are:

a Core thickness 4,0 mm

b Groove depth 0,4 mm

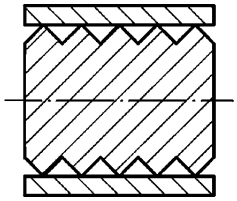
c Location ring thickness 0,5 mm

d Facing material thickness 0,5 mm

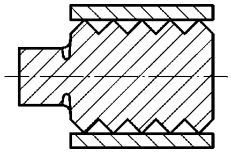
e Tip width 0,1 mm

Facing density 1,0 gm/cm^3

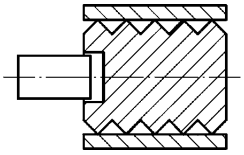
NOTE The selection of gasket type should take into account the fluid, the operating conditions and the properties of the gasket materials. It is recommended that selection of gasket type of any particular application is in consultation with the gasket supplier (see annex A).



a) Type NR: Sealing element with no locating ring



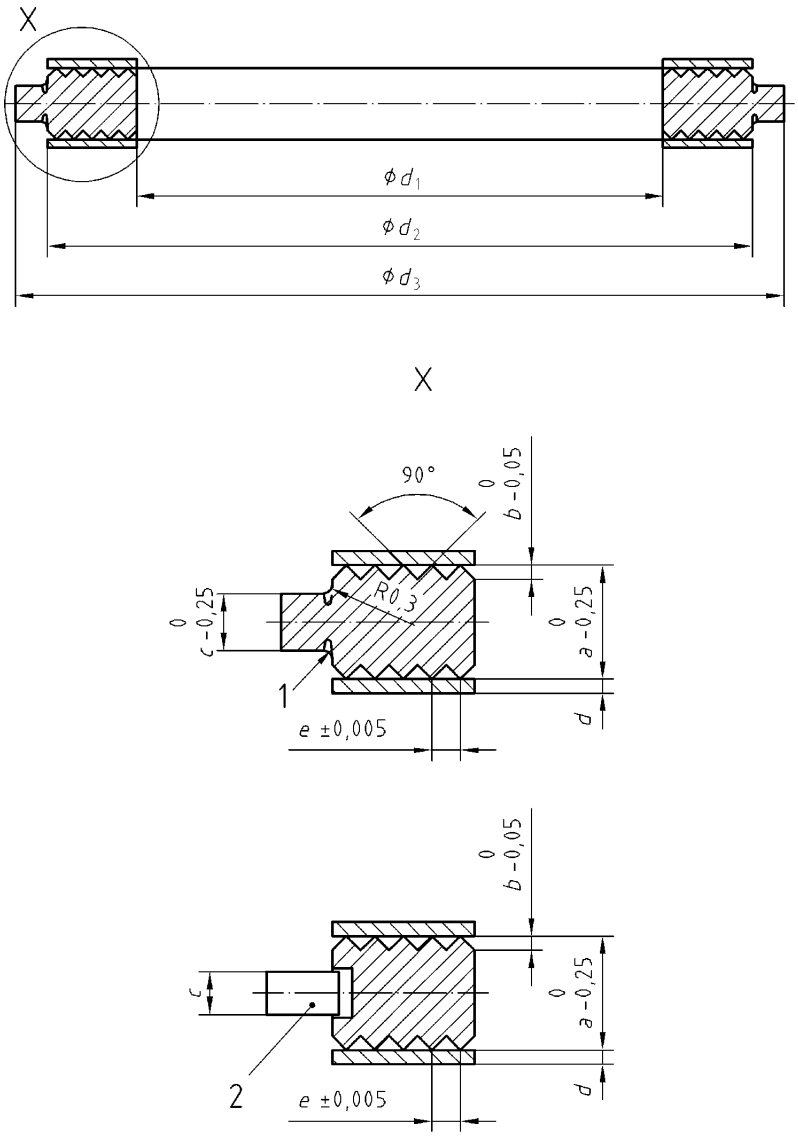
b) Type IR: Sealing element with integral locating ring



c) Type LR: Sealing element with loose locating ring

Figure 1 — Covered serrated metal gasket types with sealing facings

Dimensions in millimetres



Key
1 Integral locating ring
2 Loose locating ring

Figure 2 — Typical covered serrated metal gasket with sealing layer

6 Dimensions

The diameters of covered serrated metal gaskets, for use with types A and B flange facings, shall be as given in Table 1.

Table 1 — Dimensions of covered serrated metal gaskets for type A and type B flanges

Dimensions in millimetres

DN	Inner diameter	Outer diameter			Locating ring outer diameter									
		PN 10/40	PN 64/160	PN 250/400	PN 10	PN 16	PN 25	PN 40	PN 64	PN 100	PN 160	PN 250	PN 320	PN 400
10	22	See PN 64 to PN 160	see PN 250 to PN 400	36	46	46	46	46	56	56	56	67	67	67
15	26			42	51	51	51	51	61	61	61	72	72	—
20	31			47	61	61	61	61	—	—	—	—	—	—
25	36			52	71	71	71	71	82	82	82	83	92	104
32	46		62	66	82	82	82	82	—	—	—	—	—	—
40	53		69	73	92	92	92	92	103	103	103	109	119	135
50	65		81	87	107	107	107	107	113	119	119	124	134	150
65	81		100	103	127	127	127	127	137	143	143	153	170	192
80	95		115	121	142	142	142	142	148	154	154	170	190	207
100	118		138	146	162	162	168	168	174	180	180	202	229	256
125	142		162	178	192	192	194	194	210	217	217	242	274	301
150	170		190	212	217	217	224	224	247	257	257	284	311	348
175	195		215	245	247	247	254	265	277	287	284	316	358	402
200	220	240	248	280	272	272	284	290	309	324	324	358	398	442
250	270	290	300	340	327	328	340	352	364	391	388	442	488	—
300	320	340	356	400	377	383	400	417	424	458	458	536	—	—
350	375	395	415	—	437	443	457	474	486	512	—	—	—	—
400	426	450	474	—	489	495	514	546	543	572	—	—	—	—
450	480	506	—	—	539	555	—	571	—	—	—	—	—	—
500	530	560	588	—	594	617	624	628	657	704	—	—	—	—
600	630	664	700	—	695	734	731	747	764	813	—	—	—	—
700	730	770	812	—	810	804	833	852	879	950	—	—	—	—
800	830	876	886	—	917	911	942	974	988	—	—	—	—	—
900	930	982	994	—	1 017	1 011	1 042	1 084	1 108	—	—	—	—	—
1 000	1040	1 098	1 110	—	1 124	1 128	1 154	1 194	1 220	—	—	—	—	—
1 200	1250	1 320	1 334	—	1 341	1 342	1 364	1 398	1 452	—	—	—	—	—
1 400	1440	1 522	—	—	1 548	1 542	1 578	1 618	—	—	—	—	—	—
1 600	1650	1 742	—	—	1 772	1 764	1 798	1 830	—	—	—	—	—	—
1 800	1850	1 914	—	—	1 972	1 964	2 000	—	—	—	—	—	—	—
2 000	2050	2 120	—	—	2 182	2 168	2 230	—	—	—	—	—	—	—
2 200	2250	2 328	—	—	2 384	2 378	—	—	—	—	—	—	—	—
2 400	2460	2 512	—	—	2 594	—	—	—	—	—	—	—	—	—
2 600	2670	2 728	—	—	2 794	—	—	—	—	—	—	—	—	—
2 800	2890	2 952	—	—	3 014	—	—	—	—	—	—	—	—	—
3 000	3100	3 166	—	—	3 228	—	—	—	—	—	—	—	—	—

Diameter tolerances for Table 1:

Up to DN 1000 OD + 0/- 0,4 mm
ID + 0,4 mm/- 0

Above DN 1 000 OD + 0/-1,0 mm
ID + 1,0 mm/- 0

7 Marking

The gasket locating ring shall be marked with the following information:

a) manufacturer's name or trademark

b) nominal size — DN (see Table 1)

c) PN designation (see Table 1)

d) abbreviations given in Table 2 for the metallic sealing element core, the soft gasket covering layers and where applicable, the loose locating ring.

EXAMPLE AAA/BBB — DN 100 — PN 64 — XXX

The gasket shall be identified either individually or on the packaging containing the gasket(s) with the number of the European Standard i.e. EN 1514-6.

8 Colour coding

Covered serrated metal gaskets shall be marked with a colour code that identifies the metallic sealing element core and the soft gasket covering layers. The relevant colours that shall be used are shown in Table 2.

Where the thickness of the location ring is sufficient a continuous colour around the outer location ring shall identify the metallic sealing element core. Intermittent strips around the outer location ring shall identify the soft gasket covering layers.

For sizes below DN 40, gaskets will have a minimum of 2 strips – 180° apart.

For sizes above DN 40, gaskets will have a minimum of 4 strips – 90° apart.

Where the thickness do not allow the clear marking of the edge of the ring or the core then the marking shall be on the upper and lower surfaces of the locating ring.

9 Packaging

The packaging shall be sufficient to protect the sealing faces from damage during shipment and subsequent handling before installation. Large diameter gaskets shall be securely mounted on a carrier board or within a protective framework.

Table 2 — Colour coding and abbreviations for covered serrated metal gasket materials

Material	Abbreviation	Colour code
Metal of		
Carbon steel	CRS	Silver
X4CrNi18-10 (1.4301)	304	Yellow
X2CrNi19-11 (1.4306)	304L	No colour
X15CrNiSi20-12 (1.4828)	309	No colour
X15CrNiSi25-20 (1.4841)	310	No colour
X5CrNiMo17-12-2 (1.4401)	316	Green
X2CrNiMo17-12-2 (1.4404)	316L	Green
X6CrNiNb18-10 (1.4550)	347	Blue
X6CrNiTi18-10 (1.4541)	321	Turquoise
X6Cr17 (1.4016)	430	No colour
NiCu30Fe (2.4360)	MON	Orange
Ni99.2 (2.4066)	Ni	Red
Titanium	TI	Purple
NiMo28 (2.4617)	HAST B	Brown
NiMo16Cr15W (2.4819)	HAST C	Beige
NiCr15Fe (2.4816)	INC 600	Gold
NiCr22Mo9Nb (2.4856)	INC 625	Gold
X10NiCrA/Ti32-20 (1.4876)	IN 800	White
NiCr21Mo (2.4858)	IN 825	White
Soft gasket covering layers		
Flexible graphite	F. G.	Grey stripe
PTFE	PTFE	White stripe
Non asbestos	Mfg's designation	Pink stripe
Phyllosilicate	Mfg’s designation	Light blue stripe
NOTE Other materials can be used by agreement between the purchaser and the manufacturer. In this case it is recommended that a colour code be agreed between the two parties.		

Annex A
(informative)

Information to be supplied by the purchaser

Before ordering a gasket it is recommended that the selection of the gasket type and materials should be made in consultation with the gasket supplier. This selection should take account of the fluid, the properties of the gasket materials, the service temperature and the flange type and flange materials.

The following information should be supplied by the purchaser when ordering gaskets:

a) number and part of this European standard, i.e. EN 1514-6

b) gasket type

c) nominal size — DN (see Table 1)

d) PN designation (see Table 1)

e) required gasket materials or expected operating conditions for applications where the gasket manufacturer is required to select gasket materials.

f) type, thickness and density of facing material

g) type of metal for core and, where appropriate, for the locating ring.

BS EN 1514-6:2003

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