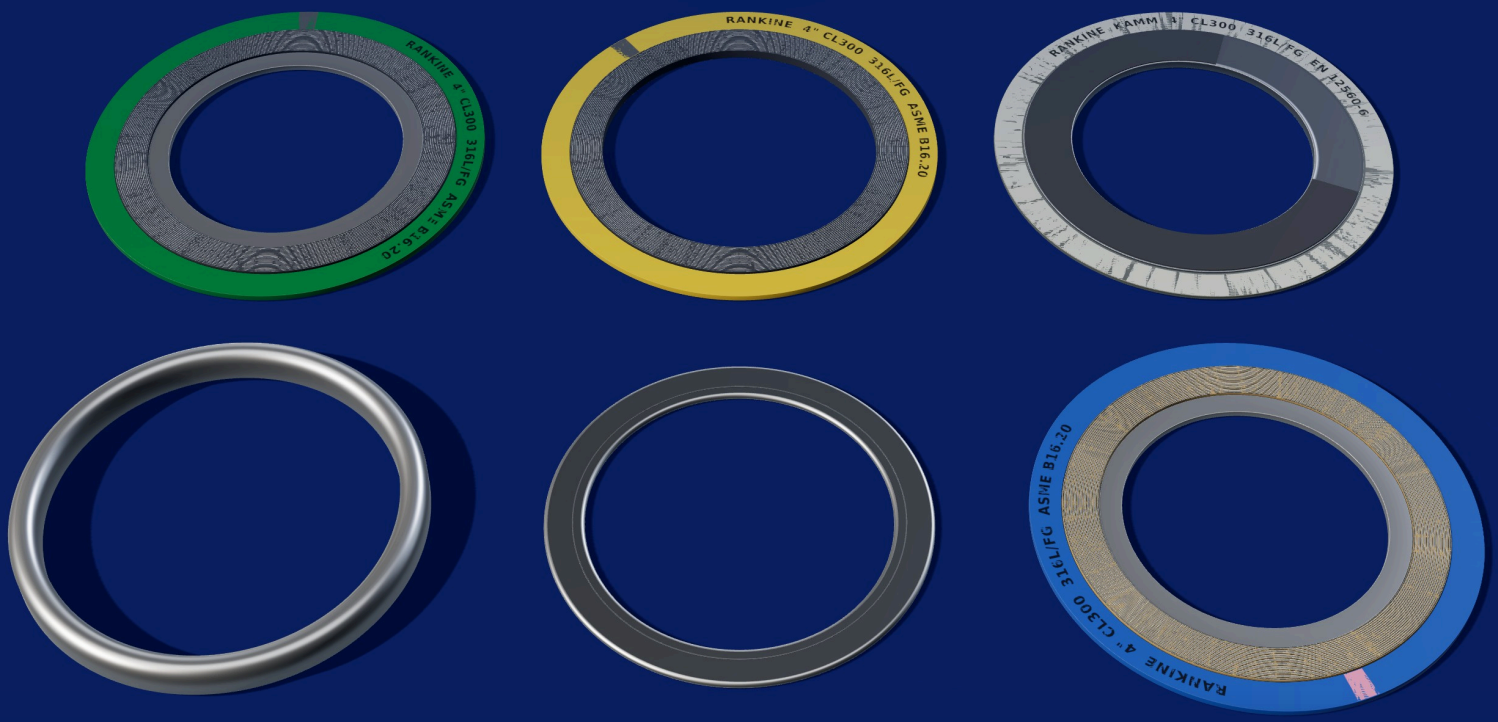
RANKINE
GASKETS

2026 edition
English

Gasket catalogue and data sheets



Spiral wound, Kammprofile, ring type joints, double jacketed, heat exchanger, corrugated, insulating and soft sheet gaskets. Construction, materials and the full size tables for ASME and EN flanges.

Gasket families	Pressure classes	Sizes	Metric
8	**150–2500**	**NPS ½–60**	**DN 10–600**

Sealing that holds at every temperature

sales@rankinegaskets.com
+966 13 511 7681

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Rankine Gaskets

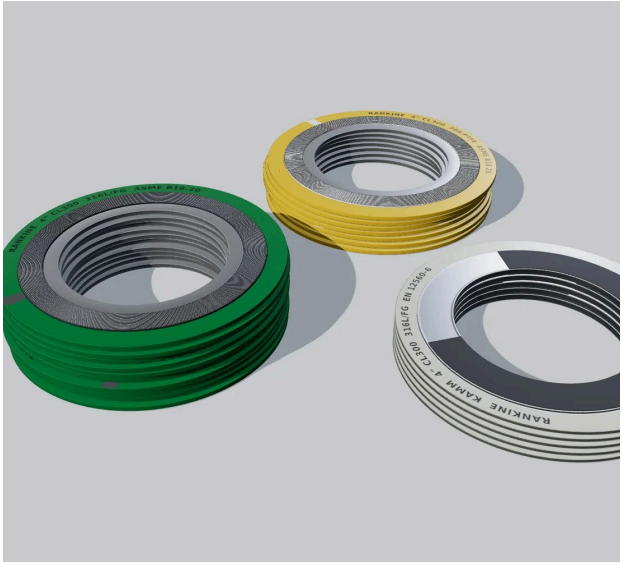
We make metallic and semi-metallic gaskets for the flanges of refineries, petrochemical plants, power stations, pipelines and water plants.

Rankine Gaskets is based in Al Yarmouk, Jubail Industrial City, close to the refineries and petrochemical plants of the Eastern Province. Spiral wound and Kammprofile gaskets are our core products. We also supply ring type joints, double jacketed and heat exchanger gaskets, corrugated gaskets, flange insulation kits and cut gaskets from sheet.

Standard sizes follow ASME B16.20, ASME B16.21 and EN 1514. Non-standard sizes, heat exchanger shapes and pass partition layouts are made to your drawing.

What every order includes

- Gaskets marked with size, class, materials and standard, as ASME B16.20 requires
- Material certificates for metal parts on request, with heat numbers traceable to the gasket
- Dimensional checks against the tolerances of the standard the gasket is made to
- Kitting and labelling by tag number for shutdowns, if you send the joint list



Made in Jubail

Winding, machining and cutting under one roof means short lead times for shutdowns and emergency replacements across the Gulf. Talk to our engineers on **+966 13 511 7681** or **sales@rankinegaskets.com**.

How to use this catalogue

Find the family

Pages 4 and 5 compare the eight gasket families and match them to flange face, temperature, pressure class and service.

Choose the materials

Page 6 lists metals and fillers with their temperature limits and ASME B16.20 colour codes.

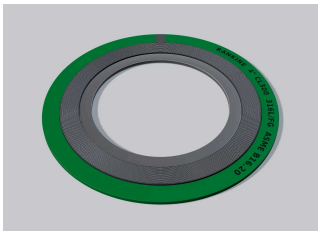
Look up the size

Each family section ends with its size tables. Dimensions are in millimetres with inches alongside for ASME sizes.

Dimensions are taken from the standards named on each table and cross-checked against published manufacturer tables. Temperatures, pressures and stresses are typical values for selection, not guarantees for every service. Confirm the final selection against your project specification and operating conditions. Product images are 3D renders.

The product range

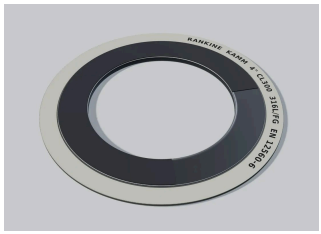
Eight gasket families, from standard spiral wound gaskets for process pipework to machined rings for wellheads and insulation kits for cathodic protection.



Spiral wound Section 1

Standards	ASME B16.20, EN 1514-2
Pressure	150 to 2500
Sizes	NPS ½–60, DN 10–600

-200 to 1000 °C



Kammprofile Section 2

Standards	ASME B16.20, EN 1514-6
Pressure	150 to 2500
Sizes	NPS ½–24, DN 10–600

-200 to 1000 °C



Ring type joints Section 3

Standards	ASME B16.20, API 6A
Pressure	150 to 2500, API 2000–20 000 psi
Sizes	R11–R105, RX20–RX215, BX150–BX303

-200 to 870 °C



Double jacketed Section 4

Standards	ASME B16.20-2017, drawing
Pressure	150 to 2500 sizes
Sizes	NPS ½–24 and to drawing

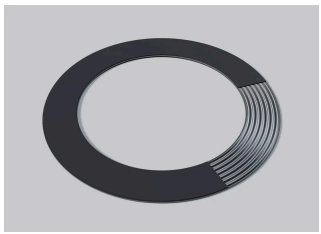
-200 to 1000 °C



Heat exchanger Section 5

Standards	TEMA, drawing
Pressure	To design
Sizes	To drawing

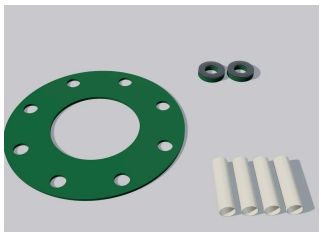
-200 to 1000 °C



Corrugated Section 6

Standards	Drawing
Pressure	150 to 600
Sizes	To drawing

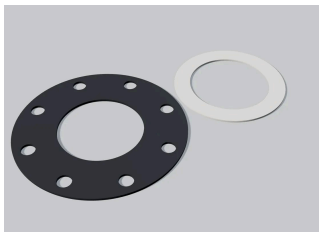
-200 to 450 °C



Insulating kits Section 7

Standards	ASME B16.5, API 6A, EN 1092-1
Pressure	150 to 2500
Sizes	NPS ½–48

-60 to 200 °C



Soft sheet Section 8

Standards	ASME B16.21, EN 1514-1
Pressure	150 to 300
Sizes	NPS ½–24 and to drawing

-200 to 450 °C

Temperature bars run from –200 °C to 1100 °C. The upper limit depends on the filler or facing; see page 6. Bars show the widest range the family covers with suitable materials.

Selecting a gasket

Start from the flange face, then check temperature, pressure class and the media. The interactive gasket selector at rankinegaskets.com/gasket-selector runs the same checks.

Start from the flange face

Flange face or duty	Start with
Raised face, ASME B16.5 / B16.47	Spiral wound style CGI. Kammprofile with integral ring where bolt load is low or the joint cycles.
Raised face, EN 1092-1 type B	Spiral wound EN 1514-2 or Kammprofile EN 1514-6.
Ring joint groove	Ring type joint: R oval or octagonal for B16.5, RX or BX for API 6A.
Tongue and groove, male and female	Spiral wound style R or RIR, or Kammprofile core only.
Flat face, cast iron, GRP, lined	Soft sheet full face gasket. Never a metal gasket on a flat-face cast or GRP flange.
Heat exchanger girth and channel	Kammprofile convex core, double jacketed or spiral wound with pass partition bars.
Dissimilar metals, cathodic protection	Insulating kit type E, F or D.
Large ducts, vessel manways, low bolt load	Corrugated metal with graphite facings, or soft sheet.

Typical suitability

●●● well suited ●●○ suitable with care ●○○ not the first choice

Family	High temperature	High pressure class	Thermal cycling	Low bolt load	Corrosive media	Large diameter
Spiral wound	●●●	●●●	●●○	●○○	●●○	●●○
Kammprofile	●●●	●●●	●●●	●●●	●●○	●●○
Ring type joints	●●●	●●●	●●○	●○○	●●○	●○○
Double jacketed	●●●	●●○	●○○	●○○	●●○	●●●
Heat exchanger	●●●	●●○	●●○	●●○	●●○	●●●
Corrugated	●●○	●○○	●●○	●●●	●●○	●●●
Insulating kits	●○○	●●○	●○○	●●○	●●○	●●○
Soft sheet	●○○	●○○	●○○	●●●	●●●	●●○

Temperature

The filler or facing usually sets the limit: PTFE 260 °C, flexible graphite 450 °C where air can reach it, mica 1000 °C. Check the metal limit on page 6 as well.

Media

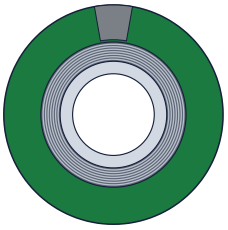
Choose the winding, core or jacket metal for corrosion, not only for strength. Use PTFE in place of graphite for oxygen and strong oxidising acids.

Bolting

Make sure the bolts can seat the gasket. Kammprofile and corrugated gaskets seat at lower stress than spiral wound gaskets. See section 9.

Materials and colour codes

ASME B16.20 identifies a spiral wound gasket by colour: the outer ring is painted the colour of the winding metal and carries a stripe for the filler. The same metals are used for Kammprofile cores, jacketed gaskets and ring type joints.



Reading the code

This outer ring is green with a grey stripe: **316L windings with flexible graphite filler**. The outer ring itself is normally carbon steel, painted, whatever the winding metal. Paint wears and some metals have no colour, so always confirm the materials from the marking stamped on the ring.

Winding, core and jacket metals

Temperature in °C; bar from –200 to 1100 °C

Metal	Ring colour	Temperature range	°C	Typical service
Carbon steel	Silver		-40 to 540	Outer rings; windings for mild, non-corrosive service
304 stainless	Yellow		-195 to 760	General process, water, steam, mild chemicals
316L stainless	Green		-195 to 760	The default for refinery, chemical and offshore service
317L stainless	Maroon		-100 to 760	Improved pitting resistance over 316L
321 stainless	Turquoise		-195 to 760	Hot service; titanium stabilised against sensitisation
347 stainless	Blue		-195 to 925	Hot service with intergranular corrosion risk; hydrogen
Alloy 20	Black		-185 to 760	Sulphuric acid
Monel 400	Orange		-130 to 820	Hydrofluoric acid, seawater, chlorides, alkylation
Nickel 200	Red		-195 to 760	Caustic soda and reducing media
Titanium Gr 2	Purple		-195 to 1090	Hot chlorides, wet chlorine, seawater, nitric acid
Inconel 600 / 625	Gold		-100 to 1090	High temperature oxidising service; 625 for severe corrosion
Incoloy 800 / 825	White		-100 to 870	800 for hot carburising gas; 825 for sulphuric and phosphoric acids
Hastelloy B2	Brown		-185 to 1090	Hydrochloric acid and other strong reducing acids
Hastelloy C276	Beige		-185 to 1090	Wet chlorine, mixed oxidising and reducing acids

Fillers and facings

Stripe colour on the outer ring

Filler	Stripe	Temperature range	°C	Notes
Flexible graphite	Grey stripe		-212 to 450	Standard filler. 450 °C in oxidising service, about 340 °C for very long service; higher in steam or inert gas. Oxidation-inhibited grade to about 520 °C.
PTFE	White stripe		-240 to 260	Strong chemicals, oxygen and where graphite is not allowed. Always with an inner ring: PTFE cold flows.
Mica (phlogopite)	Light blue stripe		-200 to 1000	High temperature and oxidising service, exhaust and fire-safe joints. Some makers mark proprietary mica grades pink.
Phyllosilicate (vermiculite)	Light blue stripe		-200 to 815	Oxidising service above the graphite limit; some grades rated to about 980 °C.
Ceramic	Light green stripe		-212 to 1090	Very high temperature at low pressure, where tightness is secondary.

304L, 309, 310, 430, Inconel X-750, zirconium and duplex have no assigned colour; the ring is left unpainted or marked with the metal name. Limits are the maximum and minimum metal temperatures published by the major gasket manufacturers for service in air; a gasket is limited by its lowest-rated part and by the media. Several European manufacturers publish lower limits for continuous duty, for example 550 °C for 304 and 316L, 425 °C for Monel and 300 °C for titanium: use those where your specification requires. Printed colours approximate the paint colours.

Choosing materials for the media

Start points for the winding, core or jacket metal and the filler or facing in common refinery, petrochemical and utility service. Concentration, temperature, aeration and impurities all change the answer.

Media	Winding, core or jacket metal	Filler or facing	Notes
Steam	304, 316L	Flexible graphite	The standard combination for utility and process steam.
Hydrocarbons, crude, naphtha	316L (304)	Flexible graphite	Spiral wound or Kammprofile to Class 900; ring joints for Class 1500 and 2500.
Hydrogen	316L; 321 or 347 when hot	Flexible graphite	Ring joints for high class hydrogen service.
Sour gas, H_2S	316L	Flexible graphite or PTFE	Check metal parts against NACE MR0175 / ISO 15156 hardness limits.
Amines (MEA, DEA, MDEA)	316L	Flexible graphite	Typical refinery practice for treating units.
Caustic soda	Nickel 200; Monel 400 or 316L for mild duty	Flexible graphite or barium sulphate filled PTFE	Avoid glass filled PTFE in strong alkalis.
Sulphuric acid	Alloy 20; Hastelloy B2 or C276	PTFE; graphite only below about 70 %	Graphite is attacked by concentrated acid and oleum.
Hydrochloric acid	Hastelloy B2 or C276	PTFE or flexible graphite	Stainless steels are not suitable.
Hydrofluoric acid, HF alkylation	Monel 400	PTFE	Monel with PTFE is the established choice for HF units.
Nitric acid	304L, 316L or titanium	PTFE or phyllosilicate	Not flexible graphite above about 10 %.
Phosphoric acid	316L or Alloy 20; Hastelloy when hot or impure	PTFE or flexible graphite	
Chlorine, dry	Nickel 200, Monel 400, Hastelloy C276	PTFE or flexible graphite	Stainless steels are not recommended.
Chlorine, wet	Titanium or Hastelloy C276	PTFE	Stainless steels and most nickel alloys perform poorly.
Seawater	Monel 400, titanium; 316L for intermittent exposure	PTFE preferred	Graphite can drive galvanic corrosion of windings and flange in chlorides.
Oxygen	316L, Monel, Inconel, oxygen cleaned	PTFE, oxygen cleaned	Use oxygen-tested materials, cleaned and packed for oxygen service.
Ammonia	304, 316L	Flexible graphite or PTFE	No copper or brass.
Hot oil, heat transfer fluids	316L (304)	Flexible graphite	Check the filler limit against the fluid temperature.
Flue gas, exhaust above 450 °C	321, 347, Inconel 600 or 625	Phyllosilicate or mica	Graphite oxidises; ceramic only for very hot, low pressure duty.
Cryogenic, LNG	304, 316L	PTFE or flexible graphite	Austenitic stainless steels keep their toughness to −195 °C.

Match the flange

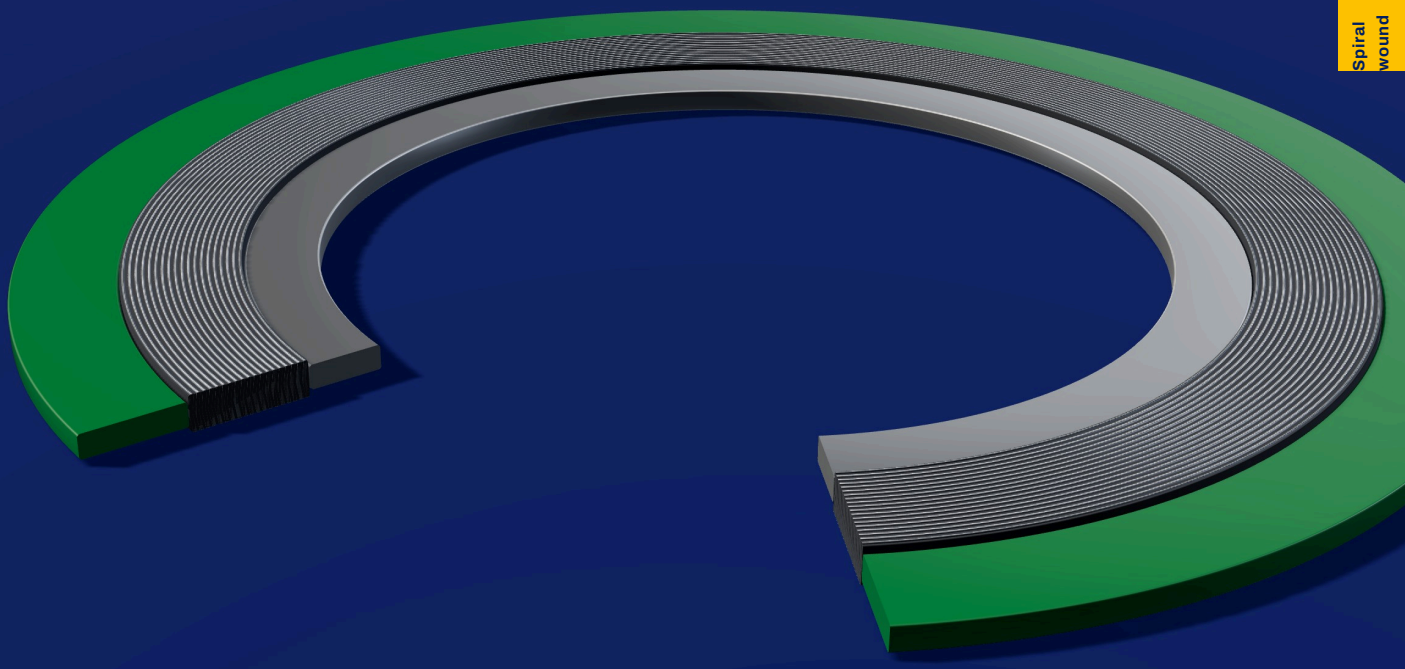
The winding or core metal should be at least as corrosion resistant as the flange. A less noble gasket metal corrodes first; a much more noble one can drive galvanic attack of the flange in conductive media.

Graphite and oxidisers

Flexible graphite resists most chemicals but not strong oxidisers: concentrated nitric and sulphuric acid, oleum, wet chlorine and chromic acid. Use PTFE there.

Ask us

Send the media, concentration and temperature with your enquiry. We confirm the material choice in every quotation.



1

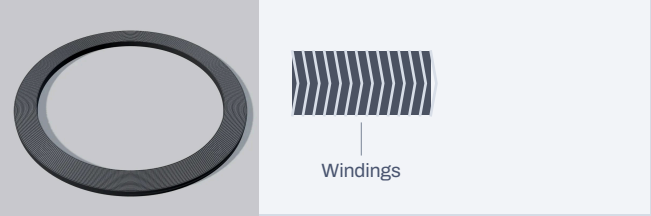
Spiral wound gaskets

A V-shaped metal strip and a soft filler wound together into a spring. The windings recover as the joint moves with pressure and temperature, which makes spiral wound gaskets the standard choice for raised-face process flanges.

Standards	Pressure	Sizes	Temperature
ASME B16.20, EN 1514-2	**Class 150 to 2500, PN 10 to 160**	**NPS ½ to 60, DN 10 to 600**	**–200 to 1000 °C by filler**

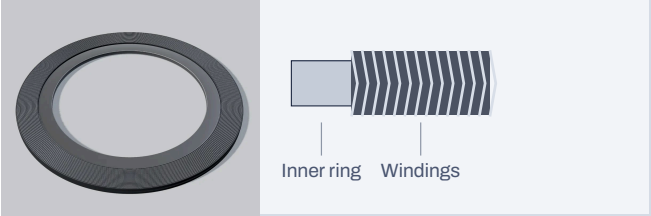
Construction and styles

Every spiral wound gasket has the same sealing element. Rings are added to centre it, limit its compression and protect it.



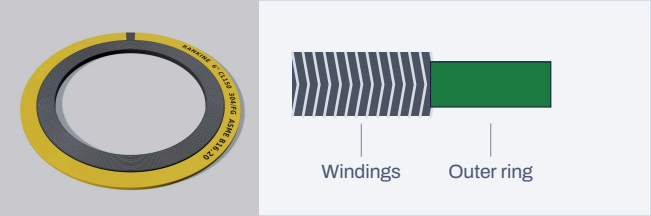
R Sealing element only

For tongue-and-groove, male-female and groove-to-flat faces, where the recess locates the gasket and limits compression.



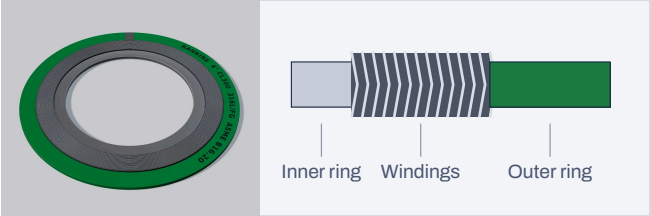
RIR Sealing element with inner ring

For male-female and recessed faces where the bore needs protection from turbulence and the windings from buckling inwards.



CG Sealing element with outer ring

The outer ring centres the gasket inside the bolts and acts as a compression stop. Only where the purchaser specification allows no inner ring.



CGI Outer and inner rings

Our standard for raised faces. B16.20 requires an inner ring with PTFE and flexible graphite fillers unless the purchaser specifies otherwise, and for Class 900 NPS 24 and above, 1500 NPS 12 and above, and 2500 NPS 4 and above.

Winding thickness	4.5 mm (0.175 in) standard; compresses to about 3.2 to 3.4 mm when seated
Ring thickness	3.0 to 3.3 mm (0.117 to 0.131 in)
Outer ring	Carbon steel, painted to the colour code; stainless steel on request
Inner ring	Same metal as the windings unless specified
Marking	Size, class, winding and filler, ring metals, standard and manufacturer, stamped on the outer ring

Other thicknesses	3.2 mm and 7.2 mm windings for special flanges and exchangers
Low stress variant	Softer winding density to seal Class 150 flanges with limited bolt load
Heat exchanger types	Round or oval, with welded pass partition bars; see section 5
Non-standard sizes	Made to drawing in any diameter up to the limits of our winding equipment
Inspection	Dimensions and thickness to the tolerances of ASME B16.20 or EN 1514-2

Thickness and compression

Recommended compressed thickness

Winding, nominal	Compressed to
1.6 mm (0.0625 in)	1.3 to 1.4 mm
2.5 mm (0.100 in)	1.9 to 2.0 mm
3.2 mm (0.125 in)	2.3 to 2.5 mm
4.5 mm (0.175 in), standard	**3.2 to 3.4 mm**
6.4 mm (0.250 in)	4.6 to 5.1 mm
7.2 mm (0.285 in)	5.1 to 5.6 mm

ASME B16.20 tolerances

B16.5 sizes

Dimension	NPS ½ to 8	NPS 10 to 24
Winding thickness	±0.13 mm	±0.13 mm
Winding ID	±0.4 mm	±0.8 mm
Winding OD	±0.8 mm	+1.5 / –0.8 mm
Outer ring OD	±0.8 mm	±0.8 mm
Ring thickness	2.97 to 3.33 mm	2.97 to 3.33 mm

Winding thickness is measured across the metal, not the filler.

Dimensions and ordering

The size tables that follow give four diameters for each nominal size and class. Use them to check fit against the flange and to identify gaskets already in stock.



d1, inner ring ID	Bore of the inner ring. Sits close to the pipe bore to protect the windings.
d2, winding ID	Inside diameter of the sealing element.
d3, winding OD	Outside diameter of the sealing element; the ID of the outer ring.
d4, outer ring OD	Centres the gasket on the bolts.

ASME tables	ASME B16.20 for B16.5 flanges NPS ½ to 24, and for B16.47 Series A and B flanges NPS 26 to 60
EN tables	EN 1514-2 for EN 1092-1 flanges, DN 10 to 600, PN 10 to 160
Tolerances	Follow the standard named on each table
Not listed	Other standards (JIS, BS 10, API 6A) and special sizes to drawing

Ordering code

Give us these nine items, in any format, and we can quote and make the gasket. Example: **SW CGI 6" 300 316L FG CS 316L B16.5**

SW	CGI	6"	300	316L	FG	CS	316L	B16.5
Product: spiral wound	Style: R, RIR, CG, CGI	Nominal size, NPS or DN	Class or PN	Winding metal	Filler: FG graphite, PT PTFE, MI mica	Outer ring metal	Inner ring metal	Flange standard

If you do not know a value, send the flange standard, size, class and service conditions. We will propose the gasket and confirm it in the quotation.

Sizes for ASME B16.5 flanges

Class 150

ASME B16.20 for ASME B16.5 raised face flanges

NPS	d1 Inner ring ID		d2 Winding ID		d3 Winding OD		d4 Outer ring OD	
	mm	in	mm	in	mm	in	mm	in
1/2	14.2	0.56	19.1	0.75	31.8	1.25	47.8	1.88
3/4	20.6	0.81	25.4	1.00	39.6	1.56	57.2	2.25
1	26.9	1.06	31.8	1.25	47.8	1.88	66.8	2.63
1 1/4	38.1	1.50	47.8	1.88	60.5	2.38	76.2	3.00
1 1/2	44.5	1.75	54.1	2.13	69.9	2.75	85.9	3.38
2	55.6	2.19	69.9	2.75	85.9	3.38	104.9	4.13
2 1/2	66.5	2.62	82.6	3.25	98.6	3.88	124.0	4.88
3	81.0	3.19	101.6	4.00	120.7	4.75	136.7	5.38
4	106.4	4.19	127.0	5.00	149.4	5.88	174.8	6.88
5	131.8	5.19	155.7	6.13	177.8	7.00	196.9	7.75
6	157.2	6.19	182.6	7.19	209.6	8.25	222.3	8.75
8	215.9	8.50	233.4	9.19	263.7	10.38	279.4	11.00
10	268.2	10.56	287.3	11.31	317.5	12.50	339.9	13.38
12	317.5	12.50	339.9	13.38	374.7	14.75	409.7	16.13
14	349.3	13.75	371.6	14.63	406.4	16.00	450.9	17.75
16	400.1	15.75	422.4	16.63	463.6	18.25	514.4	20.25
18	449.3	17.69	474.7	18.69	527.1	20.75	549.4	21.63
20	500.1	19.69	525.5	20.69	577.9	22.75	606.6	23.88
24	603.3	23.75	628.7	24.75	685.8	27.00	717.6	28.25

Class 300

ASME B16.20 for ASME B16.5 raised face flanges

NPS	d1 Inner ring ID		d2 Winding ID		d3 Winding OD		d4 Outer ring OD	
	mm	in	mm	in	mm	in	mm	in
1/2	14.2	0.56	19.1	0.75	31.8	1.25	54.1	2.13
3/4	20.6	0.81	25.4	1.00	39.6	1.56	66.8	2.63
1	26.9	1.06	31.8	1.25	47.8	1.88	73.2	2.88
1 1/4	38.1	1.50	47.8	1.88	60.5	2.38	82.6	3.25
1 1/2	44.5	1.75	54.1	2.13	69.9	2.75	95.3	3.75
2	55.6	2.19	69.9	2.75	85.9	3.38	111.3	4.38
2 1/2	66.5	2.62	82.6	3.25	98.6	3.88	130.3	5.13
3	81.0	3.19	101.6	4.00	120.7	4.75	149.4	5.88
4	106.4	4.19	127.0	5.00	149.4	5.88	181.1	7.13
5	131.8	5.19	155.7	6.13	177.8	7.00	215.9	8.50
6	157.2	6.19	182.6	7.19	209.6	8.25	251.0	9.88
8	215.9	8.50	233.4	9.19	263.7	10.38	308.1	12.13
10	268.2	10.56	287.3	11.31	317.5	12.50	362.0	14.25
12	317.5	12.50	339.9	13.38	374.7	14.75	422.4	16.63
14	349.3	13.75	371.6	14.63	406.4	16.00	485.9	19.13
16	400.1	15.75	422.4	16.63	463.6	18.25	539.8	21.25
18	449.3	17.69	474.7	18.69	527.1	20.75	596.9	23.50
20	500.1	19.69	525.5	20.69	577.9	22.75	654.1	25.75
24	603.3	23.75	628.7	24.75	685.8	27.00	774.7	30.50

Sizes for ASME B16.5 flanges

Class 400

ASME B16.20 for ASME B16.5 raised face flanges

NPS	d1 Inner ring ID		d2 Winding ID		d3 Winding OD		d4 Outer ring OD	
	mm	in	mm	in	mm	in	mm	in
1/2	14.2	0.56	19.1	0.75	31.8	1.25	54.1	2.13
3/4	20.6	0.81	25.4	1.00	39.6	1.56	66.8	2.63
1	26.9	1.06	31.8	1.25	47.8	1.88	73.2	2.88
1 1/4	38.1	1.50	47.8	1.88	60.5	2.38	82.6	3.25
1 1/2	44.5	1.75	54.1	2.13	69.9	2.75	95.3	3.75
2	55.6	2.19	69.9	2.75	85.9	3.38	111.3	4.38
2 1/2	66.5	2.62	82.6	3.25	98.6	3.88	130.3	5.13
3	81.0	3.19	101.6	4.00	120.7	4.75	149.4	5.88
4	102.6	4.04	120.7	4.75	149.4	5.88	177.8	7.00
5	128.3	5.05	147.6	5.81	177.8	7.00	212.9	8.38
6	154.9	6.10	174.8	6.88	209.6	8.25	247.7	9.75
8	205.7	8.10	225.6	8.88	263.7	10.38	304.8	12.00
10	255.3	10.05	274.6	10.81	317.5	12.50	358.9	14.13
12	307.3	12.10	327.2	12.88	374.7	14.75	419.1	16.50
14	342.9	13.50	362.0	14.25	406.4	16.00	482.6	19.00
16	389.9	15.35	412.8	16.25	463.6	18.25	536.7	21.13
18	438.2	17.25	469.9	18.50	527.1	20.75	593.9	23.38
20	489.0	19.25	520.7	20.50	577.9	22.75	647.7	25.50
24	590.6	23.25	628.7	24.75	685.8	27.00	768.4	30.25

Class 600

ASME B16.20 for ASME B16.5 raised face flanges

NPS	d1 Inner ring ID		d2 Winding ID		d3 Winding OD		d4 Outer ring OD	
	mm	in	mm	in	mm	in	mm	in
1/2	14.2	0.56	19.1	0.75	31.8	1.25	54.1	2.13
3/4	20.6	0.81	25.4	1.00	39.6	1.56	66.8	2.63
1	26.9	1.06	31.8	1.25	47.8	1.88	73.2	2.88
1 1/4	38.1	1.50	47.8	1.88	60.5	2.38	82.6	3.25
1 1/2	44.5	1.75	54.1	2.13	69.9	2.75	95.3	3.75
2	55.6	2.19	69.9	2.75	85.9	3.38	111.3	4.38
2 1/2	66.5	2.62	82.6	3.25	98.6	3.88	130.3	5.13
3	81.0	3.19	101.6	4.00	120.7	4.75	149.4	5.88
4	102.6	4.04	120.7	4.75	149.4	5.88	193.8	7.63
5	128.3	5.05	147.6	5.81	177.8	7.00	241.3	9.50
6	154.9	6.10	174.8	6.88	209.6	8.25	266.7	10.50
8	205.7	8.10	225.6	8.88	263.7	10.38	320.8	12.63
10	255.3	10.05	274.6	10.81	317.5	12.50	400.1	15.75
12	307.3	12.10	327.2	12.88	374.7	14.75	457.2	18.00
14	342.9	13.50	362.0	14.25	406.4	16.00	492.3	19.38
16	389.9	15.35	412.8	16.25	463.6	18.25	565.2	22.25
18	438.2	17.25	469.9	18.50	527.1	20.75	612.9	24.13
20	489.0	19.25	520.7	20.50	577.9	22.75	682.8	26.88
24	590.6	23.25	628.7	24.75	685.8	27.00	790.7	31.13

Sizes for ASME B16.5 flanges

Class 900

ASME B16.20 for ASME B16.5 raised face flanges

NPS	d1 Inner ring ID		d2 Winding ID		d3 Winding OD		d4 Outer ring OD	
	mm	in	mm	in	mm	in	mm	in
1/2	14.2	0.56	19.1	0.75	31.8	1.25	63.5	2.50
3/4	20.6	0.81	25.4	1.00	39.6	1.56	69.9	2.75
1	26.9	1.06	31.8	1.25	47.8	1.88	79.5	3.13
1 1/4	33.3	1.31	39.6	1.56	60.5	2.38	88.9	3.50
1 1/2	41.4	1.63	47.8	1.88	69.9	2.75	98.6	3.88
2	52.3	2.06	58.7	2.31	85.9	3.38	143.0	5.63
2 1/2	63.5	2.50	69.9	2.75	98.6	3.88	165.1	6.50
3	78.7	3.10	95.3	3.75	120.7	4.75	168.4	6.63
4	102.6	4.04	120.7	4.75	149.4	5.88	206.5	8.13
5	128.3	5.05	147.6	5.81	177.8	7.00	247.7	9.75
6	154.9	6.10	174.8	6.88	209.6	8.25	289.1	11.38
8	196.9	7.75	222.3	8.75	257.3	10.13	358.9	14.13
10	246.1	9.69	276.4	10.88	311.2	12.25	435.1	17.13
12	292.1	11.50	323.9	12.75	368.3	14.50	498.6	19.63
14	320.8	12.63	355.6	14.00	400.1	15.75	520.7	20.50
16	374.7	14.75	412.8	16.25	457.2	18.00	574.8	22.63
18	425.5	16.75	463.6	18.25	520.7	20.50	638.3	25.13
20	482.6	19.00	520.7	20.50	571.5	22.50	698.5	27.50
24	590.6	23.25	628.7	24.75	679.5	26.75	838.2	33.00

Class 1500

ASME B16.20 for ASME B16.5 raised face flanges

NPS	d1 Inner ring ID		d2 Winding ID		d3 Winding OD		d4 Outer ring OD	
	mm	in	mm	in	mm	in	mm	in
1/2	14.2	0.56	19.1	0.75	31.8	1.25	63.5	2.50
3/4	20.6	0.81	25.4	1.00	39.6	1.56	69.9	2.75
1	26.9	1.06	31.8	1.25	47.8	1.88	79.5	3.13
1 1/4	33.3	1.31	39.6	1.56	60.5	2.38	88.9	3.50
1 1/2	41.4	1.63	47.8	1.88	69.9	2.75	98.6	3.88
2	52.3	2.06	58.7	2.31	85.9	3.38	143.0	5.63
2 1/2	63.5	2.50	69.9	2.75	98.6	3.88	165.1	6.50
3	78.7	3.10	92.2	3.63	120.7	4.75	174.8	6.88
4	97.8	3.85	117.6	4.63	149.4	5.88	209.6	8.25
5	124.5	4.90	143.0	5.63	177.8	7.00	254.0	10.00
6	147.3	5.80	171.5	6.75	209.6	8.25	282.7	11.13
8	196.9	7.75	215.9	8.50	257.3	10.13	352.6	13.88
10	246.1	9.69	266.7	10.50	311.2	12.25	435.1	17.13
12	292.1	11.50	323.9	12.75	368.3	14.50	520.7	20.50
14	320.8	12.63	362.0	14.25	400.1	15.75	577.9	22.75
16	368.3	14.50	406.4	16.00	457.2	18.00	641.4	25.25
18	425.5	16.75	463.6	18.25	520.7	20.50	704.9	27.75
20	476.3	18.75	514.4	20.25	571.5	22.50	755.7	29.75
24	577.9	22.75	616.0	24.25	679.5	26.75	901.7	35.50

Sizes for ASME B16.5 flanges

Class 2500

ASME B16.20 for ASME B16.5 raised face flanges

NPS	d1 Inner ring ID		d2 Winding ID		d3 Winding OD		d4 Outer ring OD	
	mm	in	mm	in	mm	in	mm	in
1/2	14.2	0.56	19.1	0.75	31.8	1.25	69.9	2.75
3/4	20.6	0.81	25.4	1.00	39.6	1.56	76.2	3.00
1	26.9	1.06	31.8	1.25	47.8	1.88	85.9	3.38
1 1/4	33.3	1.31	39.6	1.56	60.5	2.38	104.9	4.13
1 1/2	41.4	1.63	47.8	1.88	69.9	2.75	117.6	4.63
2	52.3	2.06	58.7	2.31	85.9	3.38	146.1	5.75
2 1/2	63.5	2.50	69.9	2.75	98.6	3.88	168.4	6.63
3	78.7	3.10	92.2	3.63	120.7	4.75	196.9	7.75
4	97.8	3.85	117.6	4.63	149.4	5.88	235.0	9.25
5	124.5	4.90	143.0	5.63	177.8	7.00	279.4	11.00
6	147.3	5.80	171.5	6.75	209.6	8.25	317.5	12.50
8	196.9	7.75	215.9	8.50	257.3	10.13	387.4	15.25
10	246.1	9.69	270.0	10.63	311.2	12.25	476.3	18.75
12	292.1	11.50	317.5	12.50	368.3	14.50	549.4	21.63

Notes to the ASME B16.5 tables

- Class 400 flanges NPS ½ to 3 use Class 600 dimensions; Class 900 flanges NPS ½ to 2½ use Class 1500 dimensions. The tables repeat those values so every cell can be read directly.
- Class 2500 flanges stop at NPS 12 in ASME B16.5.
- An inner ring is required with PTFE filler, with flexible graphite unless the purchaser specifies otherwise, and for all fillers at Class 900 NPS 24 and above, Class 1500 NPS 12 and above, and Class 2500 NPS 4 and above.
- Millimetre values are converted from the inch values in the standard and rounded to 0.1 mm.

Sizes for ASME B16.47 Series A flanges

Series A flanges follow MSS SP-44 dimensions; Series B follow API 605. Check which series your flange is before ordering: the outer rings differ.

Series A, Class 150

ASME B16.20 for ASME B16.47 Series A flanges

NPS	d1 Inner ring ID		d2 Winding ID		d3 Winding OD		d4 Outer ring OD	
	mm	in	mm	in	mm	in	mm	in
26	654.1	25.75	673.1	26.50	704.9	27.75	774.7	30.50
28	704.9	27.75	723.9	28.50	755.7	29.75	831.9	32.75
30	755.7	29.75	774.7	30.50	806.5	31.75	882.7	34.75
32	806.5	31.75	825.5	32.50	860.6	33.88	939.8	37.00
34	857.3	33.75	876.3	34.50	911.4	35.88	990.6	39.00
36	908.1	35.75	927.1	36.50	968.5	38.13	1047.8	41.25
38	958.9	37.75	977.9	38.50	1019.3	40.13	1111.3	43.75
40	1009.7	39.75	1028.7	40.50	1070.1	42.13	1162.1	45.75
42	1060.5	41.75	1079.5	42.50	1124.0	44.25	1219.2	48.00
44	1111.3	43.75	1130.3	44.50	1178.1	46.38	1276.4	50.25
46	1162.1	45.75	1181.1	46.50	1228.9	48.38	1327.2	52.25
48	1212.9	47.75	1231.9	48.50	1279.7	50.38	1384.3	54.50
50	1263.7	49.75	1282.7	50.50	1333.5	52.50	1435.1	56.50
52	1314.5	51.75	1333.5	52.50	1384.3	54.50	1492.3	58.75
54	1358.9	53.50	1384.3	54.50	1435.1	56.50	1549.4	61.00
56	1409.7	55.50	1435.1	56.50	1485.9	58.50	1606.6	63.25
58	1460.5	57.50	1485.9	58.50	1536.7	60.50	1663.7	65.50
60	1511.3	59.50	1536.7	60.50	1587.5	62.50	1714.5	67.50

Series A, Class 300

ASME B16.20 for ASME B16.47 Series A flanges

NPS	d1 Inner ring ID		d2 Winding ID		d3 Winding OD		d4 Outer ring OD	
	mm	in	mm	in	mm	in	mm	in
26	654.1	25.75	685.8	27.00	736.6	29.00	835.2	32.88
28	704.9	27.75	736.6	29.00	787.4	31.00	898.7	35.38
30	755.7	29.75	793.8	31.25	844.6	33.25	952.5	37.50
32	806.5	31.75	850.9	33.50	901.7	35.50	1006.6	39.63
34	857.3	33.75	901.7	35.50	952.5	37.50	1057.4	41.63
36	908.1	35.75	955.8	37.63	1006.6	39.63	1117.6	44.00
38	952.5	37.50	977.9	38.50	1016.0	40.00	1054.1	41.50
40	1003.3	39.50	1022.4	40.25	1070.1	42.13	1114.6	43.88
42	1054.1	41.50	1073.2	42.25	1120.9	44.13	1165.4	45.88
44	1104.9	43.50	1130.3	44.50	1181.1	46.50	1219.2	48.00
46	1152.7	45.38	1178.1	46.38	1228.9	48.38	1273.3	50.13
48	1209.8	47.63	1235.2	48.63	1286.0	50.63	1324.1	52.13
50	1244.6	49.00	1295.4	51.00	1346.2	53.00	1378.0	54.25
52	1320.8	52.00	1346.2	53.00	1397.0	55.00	1428.8	56.25
54	1352.6	53.25	1403.4	55.25	1454.2	57.25	1492.3	58.75
56	1403.4	55.25	1454.2	57.25	1505.0	59.25	1543.1	60.75
58	1447.8	57.00	1511.3	59.50	1562.1	61.50	1593.9	62.75
60	1524.0	60.00	1562.1	61.50	1612.9	63.50	1644.7	64.75

Sizes for ASME B16.47 Series A flanges

Series A, Class 400

ASME B16.20 for ASME B16.47 Series A flanges

NPS	d1 Inner ring ID		d2 Winding ID		d3 Winding OD		d4 Outer ring OD	
	mm	in	mm	in	mm	in	mm	in
26	660.4	26.00	685.8	27.00	736.6	29.00	831.9	32.75
28	711.2	28.00	736.6	29.00	787.4	31.00	892.3	35.13
30	755.7	29.75	793.8	31.25	844.6	33.25	946.2	37.25
32	812.8	32.00	850.9	33.50	901.7	35.50	1003.3	39.50
34	863.6	34.00	901.7	35.50	952.5	37.50	1054.1	41.50
36	917.7	36.13	955.8	37.63	1006.6	39.63	1117.6	44.00
38	952.5	37.50	971.6	38.25	1022.4	40.25	1073.2	42.25
40	1000.3	39.38	1025.7	40.38	1076.5	42.38	1127.3	44.38
42	1051.1	41.38	1076.5	42.38	1127.3	44.38	1178.1	46.38
44	1104.9	43.50	1130.3	44.50	1181.1	46.50	1231.9	48.50
46	1168.4	46.00	1193.8	47.00	1244.6	49.00	1289.1	50.75
48	1206.5	47.50	1244.6	49.00	1295.4	51.00	1346.2	53.00
50	1257.3	49.50	1295.4	51.00	1346.2	53.00	1403.4	55.25
52	1308.1	51.50	1346.2	53.00	1397.0	55.00	1454.2	57.25
54	1352.6	53.25	1403.4	55.25	1454.2	57.25	1517.7	59.75
56	1403.4	55.25	1454.2	57.25	1505.0	59.25	1568.5	61.75
58	1454.2	57.25	1505.0	59.25	1555.8	61.25	1619.3	63.75
60	1517.7	59.75	1568.5	61.75	1619.3	63.75	1682.8	66.25

Series A, Class 600

ASME B16.20 for ASME B16.47 Series A flanges

NPS	d1 Inner ring ID		d2 Winding ID		d3 Winding OD		d4 Outer ring OD	
	mm	in	mm	in	mm	in	mm	in
26	647.7	25.50	685.8	27.00	736.6	29.00	866.9	34.13
28	698.5	27.50	736.6	29.00	787.4	31.00	914.4	36.00
30	755.7	29.75	793.8	31.25	844.6	33.25	971.6	38.25
32	812.8	32.00	850.9	33.50	901.7	35.50	1022.4	40.25
34	863.6	34.00	901.7	35.50	952.5	37.50	1073.2	42.25
36	917.7	36.13	955.8	37.63	1006.6	39.63	1130.3	44.50
38	952.5	37.50	990.6	39.00	1041.4	41.00	1104.9	43.50
40	1009.7	39.75	1047.8	41.25	1098.6	43.25	1155.7	45.50
42	1066.8	42.00	1104.9	43.50	1155.7	45.50	1219.2	48.00
44	1111.3	43.75	1162.1	45.75	1212.9	47.75	1270.0	50.00
46	1162.1	45.75	1212.9	47.75	1263.7	49.75	1327.2	52.25
48	1219.2	48.00	1270.0	50.00	1320.8	52.00	1390.7	54.75
50	1270.0	50.00	1320.8	52.00	1371.6	54.00	1447.8	57.00
52	1320.8	52.00	1371.6	54.00	1422.4	56.00	1498.6	59.00
54	1378.0	54.25	1428.8	56.25	1479.6	58.25	1555.8	61.25
56	1428.8	56.25	1479.6	58.25	1530.4	60.25	1612.9	63.50
58	1473.2	58.00	1536.7	60.50	1587.5	62.50	1663.7	65.50
60	1530.4	60.25	1593.9	62.75	1644.7	64.75	1733.6	68.25

Sizes for ASME B16.47 Series A flanges

Series A, Class 900

ASME B16.20 for ASME B16.47 Series A flanges

NPS	d1 Inner ring ID		d2 Winding ID		d3 Winding OD		d4 Outer ring OD	
	mm	in	mm	in	mm	in	mm	in
26	660.4	26.00	685.8	27.00	736.6	29.00	882.7	34.75
28	711.2	28.00	736.6	29.00	787.4	31.00	946.2	37.25
30	768.4	30.25	793.8	31.25	844.6	33.25	1009.7	39.75
32	812.8	32.00	850.9	33.50	901.7	35.50	1073.2	42.25
34	863.6	34.00	901.7	35.50	952.5	37.50	1136.7	44.75
36	920.8	36.25	958.9	37.75	1009.7	39.75	1200.2	47.25
38	1009.7	39.75	1035.1	40.75	1085.9	42.75	1200.2	47.25
40	1060.5	41.75	1098.6	43.25	1149.4	45.25	1251.0	49.25
42	1111.3	43.75	1149.4	45.25	1200.2	47.25	1301.8	51.25
44	1155.7	45.50	1206.5	47.50	1257.3	49.50	1368.6	53.88
46	1219.2	48.00	1270.0	50.00	1320.8	52.00	1435.1	56.50
48	1270.0	50.00	1320.8	52.00	1371.6	54.00	1485.9	58.50

Notes to the ASME B16.47 tables

- Class 900 flanges stop at NPS 48 in ASME B16.47; Classes 150 to 600 run to NPS 60.
- ASME B16.20 requires an inner ring on every Class 900 gasket in these tables, on all PTFE filled gaskets, and on graphite filled gaskets unless the purchaser specifies otherwise.
- For Classes 400, 600 and 900 from NPS 38 upwards, Series A and Series B gaskets have the same dimensions.
- Inch values are the standard values; millimetres are converted and rounded to 0.1 mm.

Sizes for ASME B16.47 Series B flanges

Series A flanges follow MSS SP-44 dimensions; Series B follow API 605. Check which series your flange is before ordering: the outer rings differ.

Series B, Class 150

ASME B16.20 for ASME B16.47 Series B flanges

NPS	d1 Inner ring ID		d2 Winding ID		d3 Winding OD		d4 Outer ring OD	
	mm	in	mm	in	mm	in	mm	in
26	654.1	25.75	673.1	26.50	698.5	27.50	725.4	28.56
28	704.9	27.75	723.9	28.50	749.3	29.50	776.2	30.56
30	755.7	29.75	774.7	30.50	800.1	31.50	827.0	32.56
32	806.5	31.75	825.5	32.50	850.9	33.50	881.1	34.69
34	857.3	33.75	876.3	34.50	908.1	35.75	935.0	36.81
36	908.1	35.75	927.1	36.50	958.9	37.75	987.6	38.88
38	958.9	37.75	974.9	38.38	1009.7	39.75	1044.7	41.13
40	1009.7	39.75	1022.4	40.25	1063.8	41.88	1095.5	43.13
42	1060.5	41.75	1079.5	42.50	1114.6	43.88	1146.3	45.13
44	1111.3	43.75	1124.0	44.25	1165.4	45.88	1197.1	47.13
46	1162.1	45.75	1181.1	46.50	1224.0	48.19	1255.8	49.44
48	1212.9	47.75	1231.9	48.50	1270.0	50.00	1306.6	51.44
50	1263.7	49.75	1282.7	50.50	1325.6	52.19	1357.4	53.44
52	1314.5	51.75	1333.5	52.50	1376.4	54.19	1408.2	55.44
54	1365.3	53.75	1384.3	54.50	1422.4	56.00	1463.8	57.63
56	1422.4	56.00	1444.8	56.88	1478.0	58.19	1514.6	59.63
58	1478.0	58.19	1500.1	59.06	1528.8	60.19	1579.6	62.19
60	1535.2	60.44	1557.3	61.31	1586.0	62.44	1630.4	64.19

Series B, Class 300

ASME B16.20 for ASME B16.47 Series B flanges

NPS	d1 Inner ring ID		d2 Winding ID		d3 Winding OD		d4 Outer ring OD	
	mm	in	mm	in	mm	in	mm	in
26	654.1	25.75	673.1	26.50	711.2	28.00	771.7	30.38
28	704.9	27.75	723.9	28.50	762.0	30.00	825.5	32.50
30	755.7	29.75	774.7	30.50	812.8	32.00	886.0	34.88
32	806.5	31.75	825.5	32.50	863.6	34.00	939.8	37.00
34	857.3	33.75	876.3	34.50	914.4	36.00	993.9	39.13
36	908.1	35.75	927.1	36.50	965.2	38.00	1047.8	41.25
38	971.6	38.25	1009.7	39.75	1047.8	41.25	1098.6	43.25
40	1022.4	40.25	1060.5	41.75	1098.6	43.25	1149.4	45.25
42	1085.9	42.75	1111.3	43.75	1149.4	45.25	1200.2	47.25
44	1124.0	44.25	1162.1	45.75	1200.2	47.25	1251.0	49.25
46	1178.1	46.38	1216.2	47.88	1254.3	49.38	1317.8	51.88
48	1231.9	48.50	1263.7	49.75	1311.4	51.63	1368.6	53.88
50	1267.0	49.88	1317.8	51.88	1355.9	53.38	1419.4	55.88
52	1317.8	51.88	1368.6	53.88	1406.7	55.38	1470.2	57.88
54	1365.3	53.75	1403.4	55.25	1454.2	57.25	1530.4	60.25
56	1428.8	56.25	1479.6	58.25	1524.0	60.00	1593.9	62.75
58	1484.4	58.44	1535.2	60.44	1573.3	61.94	1655.8	65.19
60	1557.3	61.31	1589.0	62.56	1630.4	64.19	1706.6	67.19

Sizes for ASME B16.47 Series B flanges

Series B, Class 400

ASME B16.20 for ASME B16.47 Series B flanges

NPS	d1 Inner ring ID		d2 Winding ID		d3 Winding OD		d4 Outer ring OD	
	mm	in	mm	in	mm	in	mm	in
26	654.1	25.75	666.8	26.25	698.5	27.50	746.3	29.38
28	701.8	27.63	714.5	28.13	749.3	29.50	800.1	31.50
30	752.6	29.63	765.3	30.13	806.5	31.75	857.3	33.75
32	800.1	31.50	812.8	32.00	860.6	33.88	911.4	35.88
34	850.9	33.50	866.9	34.13	911.4	35.88	962.2	37.88
36	898.7	35.38	917.7	36.13	965.2	38.00	1022.4	40.25
38	952.5	37.50	971.6	38.25	1022.4	40.25	1073.2	42.25
40	1000.3	39.38	1025.7	40.38	1076.5	42.38	1127.3	44.38
42	1051.1	41.38	1076.5	42.38	1127.3	44.38	1178.1	46.38
44	1104.9	43.50	1130.3	44.50	1181.1	46.50	1231.9	48.50
46	1168.4	46.00	1193.8	47.00	1244.6	49.00	1289.1	50.75
48	1206.5	47.50	1244.6	49.00	1295.4	51.00	1346.2	53.00
50	1257.3	49.50	1295.4	51.00	1346.2	53.00	1403.4	55.25
52	1308.1	51.50	1346.2	53.00	1397.0	55.00	1454.2	57.25
54	1352.6	53.25	1403.4	55.25	1454.2	57.25	1517.7	59.75
56	1403.4	55.25	1454.2	57.25	1505.0	59.25	1568.5	61.75
58	1454.2	57.25	1505.0	59.25	1555.8	61.25	1619.3	63.75
60	1517.7	59.75	1568.5	61.75	1619.3	63.75	1682.8	66.25

Series B, Class 600

ASME B16.20 for ASME B16.47 Series B flanges

NPS	d1 Inner ring ID		d2 Winding ID		d3 Winding OD		d4 Outer ring OD	
	mm	in	mm	in	mm	in	mm	in
26	644.7	25.38	663.7	26.13	714.5	28.13	765.3	30.13
28	685.8	27.00	704.9	27.75	755.7	29.75	819.2	32.25
30	752.6	29.63	778.0	30.63	828.8	32.63	879.6	34.63
32	793.8	31.25	831.9	32.75	882.7	34.75	933.5	36.75
34	850.9	33.50	889.0	35.00	939.8	37.00	997.0	39.25
36	901.7	35.50	939.8	37.00	990.6	39.00	1047.8	41.25
38	952.5	37.50	990.6	39.00	1041.4	41.00	1104.9	43.50
40	1009.7	39.75	1047.8	41.25	1098.6	43.25	1155.7	45.50
42	1066.8	42.00	1104.9	43.50	1155.7	45.50	1219.2	48.00
44	1111.3	43.75	1162.1	45.75	1212.9	47.75	1270.0	50.00
46	1162.1	45.75	1212.9	47.75	1263.7	49.75	1327.2	52.25
48	1219.2	48.00	1270.0	50.00	1320.8	52.00	1390.7	54.75
50	1270.0	50.00	1320.8	52.00	1371.6	54.00	1447.8	57.00
52	1320.8	52.00	1371.6	54.00	1422.4	56.00	1498.6	59.00
54	1378.0	54.25	1428.8	56.25	1479.6	58.25	1555.8	61.25
56	1428.8	56.25	1479.6	58.25	1530.4	60.25	1612.9	63.50
58	1473.2	58.00	1536.7	60.50	1587.5	62.50	1663.7	65.50
60	1530.4	60.25	1593.9	62.75	1644.7	64.75	1733.6	68.25

Sizes for ASME B16.47 Series B flanges

Series B, Class 900

ASME B16.20 for ASME B16.47 Series B flanges

NPS	d1 Inner ring ID		d2 Winding ID		d3 Winding OD		d4 Outer ring OD	
	mm	in	mm	in	mm	in	mm	in
26	666.8	26.25	692.2	27.25	749.3	29.50	838.2	33.00
28	717.6	28.25	743.0	29.25	800.1	31.50	901.7	35.50
30	781.1	30.75	806.5	31.75	857.3	33.75	958.9	37.75
32	838.2	33.00	863.6	34.00	914.4	36.00	1016.0	40.00
34	895.4	35.25	920.8	36.25	971.6	38.25	1073.2	42.25
36	920.8	36.25	946.2	37.25	997.0	39.25	1124.0	44.25
38	1009.7	39.75	1035.1	40.75	1085.9	42.75	1200.2	47.25
40	1060.5	41.75	1098.6	43.25	1149.4	45.25	1251.0	49.25
42	1111.3	43.75	1149.4	45.25	1200.2	47.25	1301.8	51.25
44	1155.7	45.50	1206.5	47.50	1257.3	49.50	1368.6	53.88
46	1219.2	48.00	1270.0	50.00	1320.8	52.00	1435.1	56.50
48	1270.0	50.00	1320.8	52.00	1371.6	54.00	1485.9	58.50

Notes to the ASME B16.47 tables

- Class 900 flanges stop at NPS 48 in ASME B16.47; Classes 150 to 600 run to NPS 60.
- ASME B16.20 requires an inner ring on every Class 900 gasket in these tables, on all PTFE filled gaskets, and on graphite filled gaskets unless the purchaser specifies otherwise.
- For Classes 400, 600 and 900 from NPS 38 upwards, Series A and Series B gaskets have the same dimensions.
- Inch values are the standard values; millimetres are converted and rounded to 0.1 mm.

Sizes for EN 1092-1 flanges

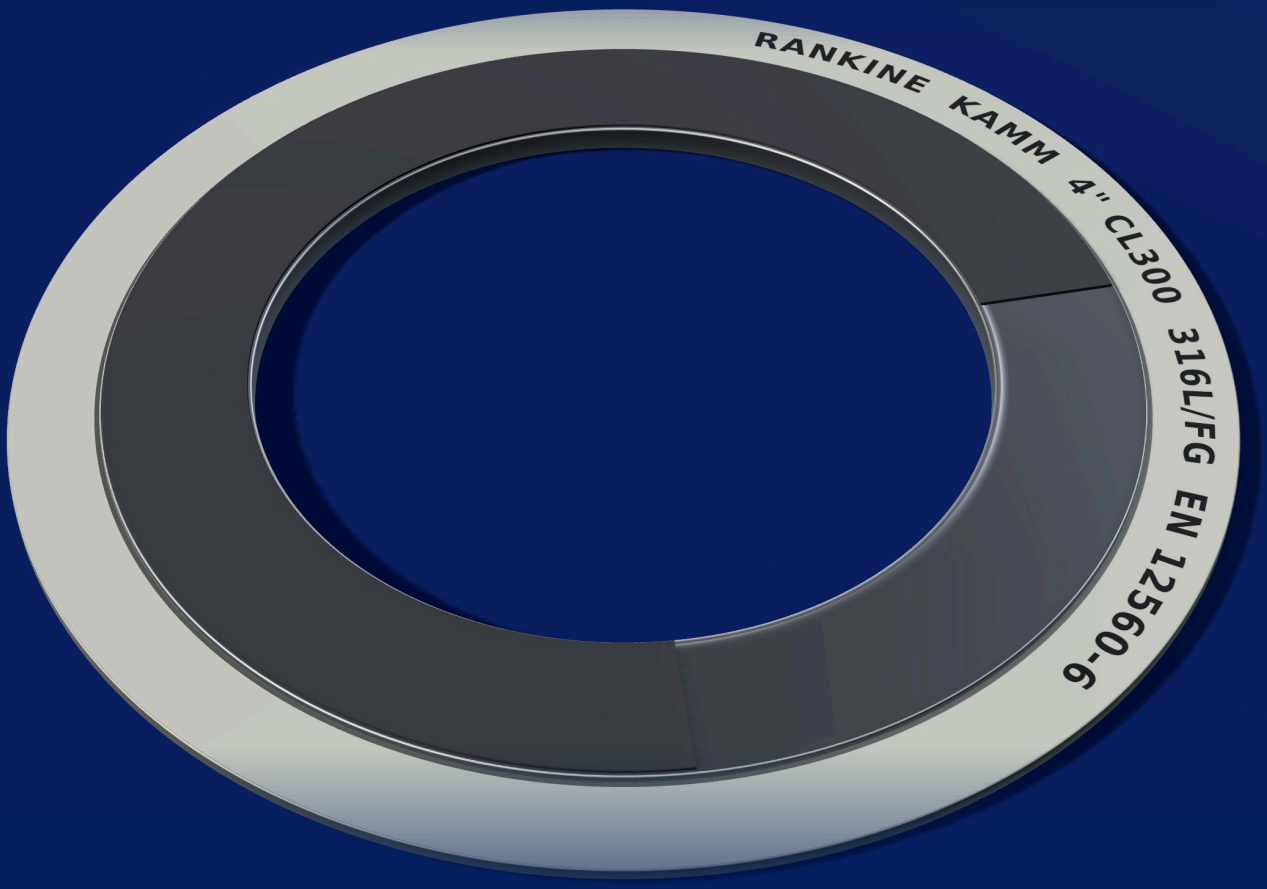
EN 1514-2 spiral wound gaskets with inner and outer rings, for type B raised face flanges. All dimensions in millimetres.

EN 1514-2, PN 10 to PN 160

d1 inner ring ID, d2 winding ID, d3 winding OD, d4 outer ring OD

DN	d1	d2	d3		d4, outer ring OD by PN						
			PN 10–40	PN 63–160	10	16	25	40	63	100	160
10	18	24	34	34	46	46	46	46	56	56	56
15	23	29	39	39	51	51	51	51	61	61	61
20	28	34	46	—	61	61	61	61	—	—	—
25	35	41	53	53	71	71	71	71	82	82	82
32	43	49	61	—	82	82	82	82	—	—	—
40	50	56	68	68	92	92	92	92	103	103	103
50	61	70	86	86	107	107	107	107	113	119	119
65	77	86	102	106	127	127	127	127	137	143	143
80	90	99	115	119	142	142	142	142	148	154	154
100	115	127	143	147	162	162	168	168	174	180	180
125	140	152	172	176	192	192	194	194	210	217	217
150	167	179	199	203	218	218	224	224	247	257	257
200	216	228	248	252	273	273	284	290	309	324	324
250	267	279	303	307	327	329	340	352	364	391	388
300	318	330	354	358	377	384	400	417	424	458	458
350	360	376	400	404	437	444	457	474	486	512	—
400	410	422	450	456	488	495	514	546	543	572	—
450	—	—	—	—	—	—	—	—	—	—	—
500	510	522	550	556	593	617	624	628	657	704	—
600	610	622	650	656	695	734	731	747	764	813	—

d1 and d2 are common to all pressures. d3 has one value for PN 10 to 40 and another for PN 63 to 160. A dash means the standard lists no gasket for that size and pressure. EN 1514-2 has no DN 450. Values are from EN 1514-2:2014 Table 2, cross-checked against five manufacturer tables; the 2021 amendment restates d2 and d3 as minimum values.



2

Kammprofile gaskets

A solid metal core with concentric serrations on both faces, covered with a thin soft facing. The serrations concentrate the load, so the gasket seals at lower bolt stress than a spiral wound gasket and keeps sealing through thermal cycles.

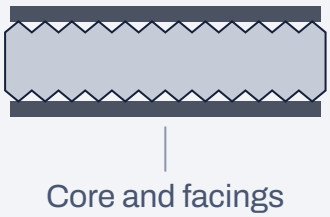
Standards	Pressure	Sizes	Temperature
ASME B16.20, EN 1514-6	**Class 150 to 2500, PN 10 to 160**	**NPS ½ to 24, DN 10 to 600, any size to drawing**	**–200 to 1000 °C by facing**

Construction and materials

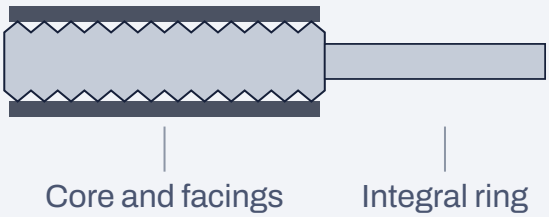
The core carries the load and the facing seals. Standard cores are 3 mm nominal with a 0.5 mm facing each side; heavier 4.8 mm cores suit large or heavily loaded joints.

Cores are machined from the same metals as spiral wound windings, listed on page 6. 316L is the default; choose the core metal for corrosion resistance against the process media.

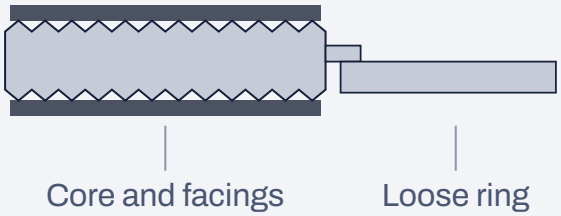




Core only
For tongue-and-groove, male-female and recessed faces, where the recess centres the gasket.



Integral outer ring
Core and centring ring machined from one piece, for raised-face flanges in standard sizes.



Loose outer ring
Centring ring attached with a step joint so the core can grow freely; for large diameters and hot joints.



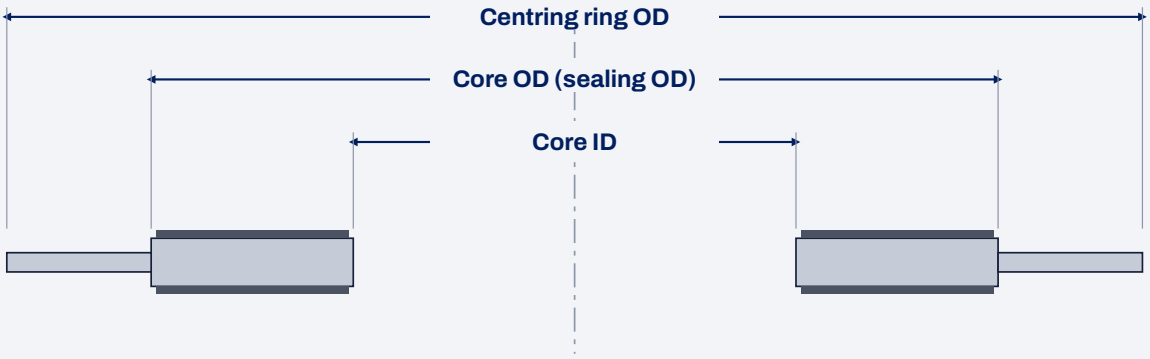
Convex core
Curved profile that keeps sealing as the flange rotates under load; for exchanger and girth flanges.

Facings

Temperature in °C

Facing	Temperature range	°C	Use
Flexible graphite		-200 to 450	General process, steam and hydrocarbons. Higher limit in steam or inert gas.
PTFE		-200 to 260	Strong acids, caustics and oxygen service.
Mica / phyllosilicate		-200 to 1000	High temperature and oxidising service.

Dimensions and ordering



Core thickness	2.97 to 3.33 mm (0.117 to 0.131 in), 3 mm nominal, to ASME B16.20; 4.8 mm (3/16 in) cores for large or heavily loaded joints
Facing thickness	0.46 to 0.56 mm (0.018 to 0.022 in) each side, graphite or PTFE
Centring ring	1.6 mm (0.06 in) nominal, never thicker than the core; integral or loose
Welded cores	Only NPS 14 and larger, full penetration, grooves machined after welding

Ordering	KP, style, size, class, core metal, facing, ring metal, flange standard
Example	**KP IR 4" 600 316L FG CS B16.5**
Styles	CO core only, IR integral ring, LR loose ring, CV convex
Refacing	Send used cores for inspection; sound cores can be cleaned and re-faced

Kammprofile or spiral wound?

For the same flange

	Spiral wound	Kammprofile
Seating stress needed	Higher	Lower
Thermal cycling	Good with inner ring	Excellent
Flange rotation	Tolerates some	Tolerates more, convex core most
Reuse	Single use	Core can be cleaned and re-faced
Cost in standard sizes	Lower	Higher
Best fit	Standard process pipework	Exchangers, cycling joints, weak or lightly bolted flanges



Sizes for ASME B16.5 flanges

ASME B16.20 grooved metal gaskets, millimetres

Core ID and OD are the same for every class

NPS	Core ID	Core OD	Centring ring OD by class						
			150	300	400	600	900	1500	2500
1/2	23.1	33.3	47.8	54.1	—	54.1	—	63.5	69.9
3/4	28.7	39.6	57.2	66.8	—	66.8	—	69.9	76.2
1	36.6	47.5	66.8	73.2	—	73.2	—	79.5	85.9
1 1/4	44.5	60.2	76.2	82.6	—	82.6	—	88.9	104.9
1 1/2	52.3	69.9	85.9	95.3	—	95.3	—	98.6	117.6
2	69.9	88.9	104.9	111.3	—	111.3	—	143.0	146.1
2 1/2	82.6	101.6	124.0	130.3	—	130.3	—	165.1	168.4
3	98.3	123.7	136.7	149.4	—	149.4	168.4	174.8	196.9
4	123.7	153.9	174.8	181.1	177.8	193.8	206.5	209.6	235.0
5	150.9	182.6	196.9	215.9	212.9	241.3	247.7	254.0	279.4
6	177.8	212.6	222.3	251.0	247.7	266.7	289.1	282.7	317.5
8	228.6	266.7	279.4	308.1	304.8	320.8	358.9	352.6	387.4
10	282.7	320.8	339.9	362.0	358.9	400.1	435.1	435.1	476.3
12	339.6	377.7	409.7	422.4	419.1	457.2	498.6	520.7	549.4
14	371.6	409.7	450.9	485.9	482.6	492.3	520.7	577.9	—
16	422.4	466.6	514.4	539.8	536.7	565.2	574.8	641.4	—
18	479.3	530.1	549.4	596.9	593.9	612.9	638.3	704.9	—
20	530.1	580.9	606.6	654.1	647.7	682.8	698.5	755.7	—
24	631.7	682.5	717.6	774.7	768.4	790.7	838.2	901.7	—

ASME B16.20 grooved metal gaskets, inches

Core ID and OD are the same for every class

NPS	Core ID	Core OD	Centring ring OD by class						
			150	300	400	600	900	1500	2500
1/2	0.91	1.31	1.88	2.13	—	2.13	—	2.50	2.75
3/4	1.13	1.56	2.25	2.63	—	2.63	—	2.75	3.00
1	1.44	1.87	2.63	2.88	—	2.88	—	3.13	3.38
1 1/4	1.75	2.37	3.00	3.25	—	3.25	—	3.50	4.13
1 1/2	2.06	2.75	3.38	3.75	—	3.75	—	3.88	4.63
2	2.75	3.50	4.13	4.38	—	4.38	—	5.63	5.75
2 1/2	3.25	4.00	4.88	5.13	—	5.13	—	6.50	6.63
3	3.87	4.87	5.38	5.88	—	5.88	6.63	6.88	7.75
4	4.87	6.06	6.88	7.13	7.00	7.63	8.13	8.25	9.25
5	5.94	7.19	7.75	8.50	8.38	9.50	9.75	10.00	11.00
6	7.00	8.37	8.75	9.88	9.75	10.50	11.38	11.13	12.50
8	9.00	10.50	11.00	12.13	12.00	12.63	14.13	13.88	15.25
10	11.13	12.63	13.38	14.25	14.13	15.75	17.13	17.13	18.75
12	13.37	14.87	16.13	16.63	16.50	18.00	19.63	20.50	21.63
14	14.63	16.13	17.75	19.13	19.00	19.38	20.50	22.75	—
16	16.63	18.37	20.25	21.25	21.13	22.25	22.63	25.25	—
18	18.87	20.87	21.63	23.50	23.38	24.13	25.13	27.75	—
20	20.87	22.87	23.88	25.75	25.50	26.88	27.50	29.75	—
24	24.87	26.87	28.25	30.50	30.25	31.13	33.00	35.50	—

From ASME B16.20 Table GM-2.1-1. Tolerances ±0.8 mm (±0.03 in) on core ID, core OD and ring OD. Class 400 below NPS 4 uses the Class 600 gasket; Class 900 at NPS 2½ and below uses the Class 1500 gasket; Class 2500 stops at NPS 12. Centring ring ODs match the spiral wound rings for the same flange, so the gaskets are interchangeable on the flange.

Sizes for EN 1092-1 flanges

EN 1514-6 grooved metal gaskets with centring ring, for type B raised face flanges. All dimensions in millimetres.

EN 1514-6, PN 10 to PN 160

Core ID, core OD and centring ring OD

DN	Core ID	Core OD		Centring ring OD by PN						
		PN 10–40	PN 63–160	10	16	25	40	63	100	160
10	22	36	36	46	46	46	46	56	56	56
15	26	42	42	51	51	51	51	61	61	61
20	31	47	—	61	61	61	61	—	—	—
25	36	52	52	71	71	71	71	82	82	82
32	46	62	—	82	82	82	82	—	—	—
40	53	69	69	92	92	92	92	103	103	103
50	65	81	81	107	107	107	107	113	119	119
65	81	100	100	127	127	127	127	137	143	143
80	95	115	115	142	142	142	142	148	154	154
100	118	138	138	162	162	168	168	174	180	180
125	142	162	162	192	192	194	194	210	217	217
150	170	190	190	217	217	224	224	247	257	257
200	220	240	248	272	272	284	290	309	324	324
250	270	290	300	327	328	340	352	364	391	388
300	320	340	356	377	383	400	417	424	458	458
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	—

A dash means the standard lists no gasket for that size and pressure. Centring ring diameters can differ by 1 mm from the EN 1514-2 spiral wound rings for the same flange; each table follows its own standard.



3

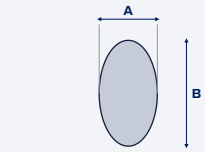
Ring type joints

Solid metal rings that seal by plastic deformation in machined grooves. For high pressure and high temperature pipework, wellheads, Christmas trees and valves, where the joint must not rely on a soft material.

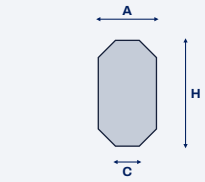
Standards	Pressure	Rings	Materials
ASME B16.20, API 6A	**Class 150 to 2500, API 2000 to 20 000 psi**	**R11–R105, RX20–RX215, BX150–BX303**	**Soft iron to nickel alloys, hardness controlled**

Types, materials and hardness

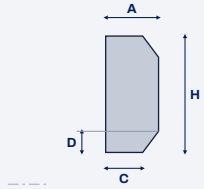
A ring joint seals because the ring is softer than the groove: under bolt load the ring flows into the groove surface while the groove stays undamaged. Ring hardness is therefore the critical property.



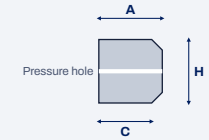
R oval
The original profile. Seats on a line contact in round-bottom or flat-bottom grooves. Fits ASME B16.5 and API 6B flanges.



R octagonal
Higher sealing efficiency than oval. For flat-bottom grooves only, which all current ASME B16.5 and API 6B flanges have.



RX
Pressure-energised: the outside bevels seal first and line pressure pushes the ring harder into the groove. Same groove as the R ring of the same number.



BX
For API 6BX flanges to 20 000 psi. Designed for face-to-face make-up; a pressure hole balances pressure across the ring.

Materials and maximum hardness

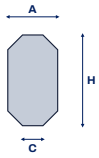
D to S410: ASME B16.20 / API 6A; other alloys: manufacturer data

Material	Mark	HB max	HRB max	°C max
Soft iron	D	90	56	540
Low-carbon steel	S	120	68	540
4-6% Cr 1/2% Mo (ASTM A182 F5 chemistry)	F5	130	72	—
Type 304 stainless steel	S304	160	83	760
Type 316 stainless steel	S316	160	83	760
Type 321 stainless steel	S321	160	83	—
Type 347 stainless steel	S347	160	83	870
Type 410 stainless steel	S410	170	86	650
Alloy 600	N06600 (UNS number)	200	92	—
Alloy 800	N08800 (UNS number)	200	92	—
Alloy C276	N10276 (UNS number)	200	92	—
254 SMO	S31254 (UNS number)	180	89	—
Duplex	S31803 (UNS number)	250	—	—
Super duplex	S32760 (UNS number)	200	92	—
Monel 400	N04400 (UNS number)	200	92	—
Titanium Gr.2	R50400 (UNS number)	215	94	—

HB for soft iron measured with a 500 kg load, all others with 3000 kg. Temperatures are typical published limits for metal gaskets; some European manufacturers rate all ring joints at 500 to 550 °C. Other alloys are marked with their UNS number.

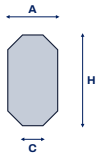
Marking	Ring number then material mark, e.g. **R46 S316**; API rings carry the API monogram where ordered
Groove hardness	Specify flange grooves harder than the ring, with a clear margin for soft iron and low carbon steel rings
Groove finish	Smooth, typically 1.6 µm Ra (63 µin) or finer on the sealing faces; see section 9
Reuse	Never. A ring deforms to seal; fit a new ring every time the joint is opened
Coating	Soft iron and low carbon steel rings zinc plated or phosphate coated (cadmium-free) against rust, on request

R rings R11 to R57



Ring	P pitch dia.		A width		B oval height		H oct. height		C oct. flat		R1 radius	
	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in
R11	34.14	1.344	6.35	0.250	11.18	0.44	9.65	0.38	4.32	0.170	1.52	0.06
R12	39.70	1.563	7.95	0.313	14.22	0.56	12.70	0.50	5.23	0.206	1.52	0.06
R13	42.88	1.688	7.95	0.313	14.22	0.56	12.70	0.50	5.23	0.206	1.52	0.06
R14	44.45	1.750	7.95	0.313	14.22	0.56	12.70	0.50	5.23	0.206	1.52	0.06
R15	47.63	1.875	7.95	0.313	14.22	0.56	12.70	0.50	5.23	0.206	1.52	0.06
R16	50.80	2.000	7.95	0.313	14.22	0.56	12.70	0.50	5.23	0.206	1.52	0.06
R17	57.15	2.250	7.95	0.313	14.22	0.56	12.70	0.50	5.23	0.206	1.52	0.06
R18	60.33	2.375	7.95	0.313	14.22	0.56	12.70	0.50	5.23	0.206	1.52	0.06
R19	65.10	2.563	7.95	0.313	14.22	0.56	12.70	0.50	5.23	0.206	1.52	0.06
R20	68.28	2.688	7.95	0.313	14.22	0.56	12.70	0.50	5.23	0.206	1.52	0.06
R21	72.24	2.844	11.13	0.438	17.53	0.69	16.00	0.63	7.75	0.305	1.52	0.06
R22	82.55	3.250	7.95	0.313	14.22	0.56	12.70	0.50	5.23	0.206	1.52	0.06
R23	82.55	3.250	11.13	0.438	17.53	0.69	16.00	0.63	7.75	0.305	1.52	0.06
R24	95.25	3.750	11.13	0.438	17.53	0.69	16.00	0.63	7.75	0.305	1.52	0.06
R25	101.60	4.000	7.95	0.313	14.22	0.56	12.70	0.50	5.23	0.206	1.52	0.06
R26	101.60	4.000	11.13	0.438	17.53	0.69	16.00	0.63	7.75	0.305	1.52	0.06
R27	107.95	4.250	11.13	0.438	17.53	0.69	16.00	0.63	7.75	0.305	1.52	0.06
R28	111.13	4.375	12.70	0.500	19.05	0.75	17.53	0.69	8.66	0.341	1.52	0.06
R29	114.30	4.500	7.95	0.313	14.22	0.56	12.70	0.50	5.23	0.206	1.52	0.06
R30	117.48	4.625	11.13	0.438	17.53	0.69	16.00	0.63	7.75	0.305	1.52	0.06
R31	123.83	4.875	11.13	0.438	17.53	0.69	16.00	0.63	7.75	0.305	1.52	0.06
R32	127.00	5.000	12.70	0.500	19.05	0.75	17.53	0.69	8.66	0.341	1.52	0.06
R33	131.78	5.188	7.95	0.313	14.22	0.56	12.70	0.50	5.23	0.206	1.52	0.06
R34	131.78	5.188	11.13	0.438	17.53	0.69	16.00	0.63	7.75	0.305	1.52	0.06
R35	136.53	5.375	11.13	0.438	17.53	0.69	16.00	0.63	7.75	0.305	1.52	0.06
R36	149.23	5.875	7.95	0.313	14.22	0.56	12.70	0.50	5.23	0.206	1.52	0.06
R37	149.23	5.875	11.13	0.438	17.53	0.69	16.00	0.63	7.75	0.305	1.52	0.06
R38	157.18	6.188	15.88	0.625	22.35	0.88	20.57	0.81	10.49	0.413	1.52	0.06
R39	161.93	6.375	11.13	0.438	17.53	0.69	16.00	0.63	7.75	0.305	1.52	0.06
R40	171.45	6.750	7.95	0.313	14.22	0.56	12.70	0.50	5.23	0.206	1.52	0.06
R41	180.98	7.125	11.13	0.438	17.53	0.69	16.00	0.63	7.75	0.305	1.52	0.06
R42	190.50	7.500	19.05	0.750	25.40	1.00	23.88	0.94	12.32	0.485	1.52	0.06
R43	193.68	7.625	7.95	0.313	14.22	0.56	12.70	0.50	5.23	0.206	1.52	0.06
R44	193.68	7.625	11.13	0.438	17.53	0.69	16.00	0.63	7.75	0.305	1.52	0.06
R45	211.15	8.313	11.13	0.438	17.53	0.69	16.00	0.63	7.75	0.305	1.52	0.06
R46	211.15	8.313	12.70	0.500	19.05	0.75	17.53	0.69	8.66	0.341	1.52	0.06
R47	228.60	9.000	19.05	0.750	25.40	1.00	23.88	0.94	12.32	0.485	1.52	0.06
R48	247.65	9.750	7.95	0.313	14.22	0.56	12.70	0.50	5.23	0.206	1.52	0.06
R49	269.88	10.625	11.13	0.438	17.53	0.69	16.00	0.63	7.75	0.305	1.52	0.06
R50	269.88	10.625	15.88	0.625	22.35	0.88	20.57	0.81	10.49	0.413	1.52	0.06
R51	279.40	11.000	22.23	0.875	28.70	1.13	26.92	1.06	14.81	0.583	1.52	0.06
R52	304.80	12.000	7.95	0.313	14.22	0.56	12.70	0.50	5.23	0.206	1.52	0.06
R53	323.85	12.750	11.13	0.438	17.53	0.69	16.00	0.63	7.75	0.305	1.52	0.06
R54	323.85	12.750	15.88	0.625	22.35	0.88	20.57	0.81	10.49	0.413	1.52	0.06
R55	342.90	13.500	28.58	1.125	36.58	1.44	35.05	1.38	19.81	0.780	2.29	0.09
R56	381.00	15.000	7.95	0.313	14.22	0.56	12.70	0.50	5.23	0.206	1.52	0.06
R57	381.00	15.000	11.13	0.438	17.53	0.69	16.00	0.63	7.75	0.305	1.52	0.06

R rings R58 to R105

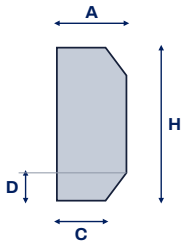


Ring	P pitch dia.		A width		B oval height		H oct. height		C oct. flat		R1 radius	
	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in
R58	381.00	15.000	22.23	0.875	28.70	1.13	26.92	1.06	14.81	0.583	1.52	0.06
R59	396.88	15.625	7.95	0.313	14.22	0.56	12.70	0.50	5.23	0.206	1.52	0.06
R60	406.40	16.000	31.75	1.250	39.62	1.56	38.10	1.50	22.33	0.879	2.29	0.09
R61	419.10	16.500	11.13	0.438	17.53	0.69	16.00	0.63	7.75	0.305	1.52	0.06
R62	419.10	16.500	15.88	0.625	22.35	0.88	20.57	0.81	10.49	0.413	1.52	0.06
R63	419.10	16.500	25.40	1.000	33.27	1.31	31.75	1.25	17.30	0.681	2.29	0.09
R64	454.03	17.875	7.95	0.313	14.22	0.56	12.70	0.50	5.23	0.206	1.52	0.06
R65	469.90	18.500	11.13	0.438	17.53	0.69	16.00	0.63	7.75	0.305	1.52	0.06
R66	469.90	18.500	15.88	0.625	22.35	0.88	20.57	0.81	10.49	0.413	1.52	0.06
R67	469.90	18.500	28.58	1.125	36.58	1.44	35.05	1.38	19.81	0.780	2.29	0.09
R68	517.53	20.375	7.95	0.313	14.22	0.56	12.70	0.50	5.23	0.206	1.52	0.06
R69	533.40	21.000	11.13	0.438	17.53	0.69	16.00	0.63	7.75	0.305	1.52	0.06
R70	533.40	21.000	19.05	0.750	25.40	1.00	23.88	0.94	12.32	0.485	1.52	0.06
R71	533.40	21.000	28.58	1.125	36.58	1.44	35.05	1.38	19.81	0.780	2.29	0.09
R72	558.80	22.000	7.95	0.313	14.22	0.56	12.70	0.50	5.23	0.206	1.52	0.06
R73	584.20	23.000	12.70	0.500	19.05	0.75	17.53	0.69	8.66	0.341	1.52	0.06
R74	584.20	23.000	19.05	0.750	25.40	1.00	23.88	0.94	12.32	0.485	1.52	0.06
R75	584.20	23.000	31.75	1.250	39.62	1.56	38.10	1.50	22.33	0.879	2.29	0.09
R76	673.10	26.500	7.95	0.313	14.22	0.56	12.70	0.50	5.23	0.206	1.52	0.06
R77	692.15	27.250	15.88	0.625	22.35	0.88	20.57	0.81	10.49	0.413	1.52	0.06
R78	692.15	27.250	25.40	1.000	33.27	1.31	31.75	1.25	17.30	0.681	2.29	0.09
R79	692.15	27.250	34.93	1.375	44.45	1.75	41.40	1.63	24.82	0.977	2.29	0.09
R80	615.95	24.250	7.95	0.313	—		12.70	0.50	5.23	0.206	1.52	0.06
R81	635.00	25.000	14.30	0.563	—		19.05	0.75	9.58	0.377	1.52	0.06
R82	57.15	2.250	11.13	0.438	—		16.00	0.63	7.75	0.305	1.52	0.06
R84	63.50	2.500	11.13	0.438	—		16.00	0.63	7.75	0.305	1.52	0.06
R85	79.38	3.125	12.70	0.500	—		17.53	0.69	8.66	0.341	1.52	0.06
R86	90.50	3.563	15.88	0.625	—		20.57	0.81	10.49	0.413	1.52	0.06
R87	100.03	3.938	15.88	0.625	—		20.57	0.81	10.49	0.413	1.52	0.06
R88	123.83	4.875	19.05	0.750	—		23.88	0.94	12.32	0.485	1.52	0.06
R89	114.30	4.500	19.05	0.750	—		23.88	0.94	12.32	0.485	1.52	0.06
R90	155.58	6.125	22.23	0.875	—		26.92	1.06	14.81	0.583	1.52	0.06
R91	260.35	10.250	31.75	1.250	—		38.10	1.50	22.33	0.879	2.29	0.09
R92	228.60	9.000	11.13	0.438	17.53	0.69	16.00	0.63	7.75	0.305	1.52	0.06
R93	749.30	29.500	19.05	0.750	—		23.88	0.94	12.32	0.485	1.52	0.06
R94	800.10	31.500	19.05	0.750	—		23.88	0.94	12.32	0.485	1.52	0.06
R95	857.25	33.750	19.05	0.750	—		23.88	0.94	12.32	0.485	1.52	0.06
R96	914.40	36.000	22.23	0.875	—		26.92	1.06	14.81	0.583	1.52	0.06
R97	965.20	38.000	22.23	0.875	—		26.92	1.06	14.81	0.583	1.52	0.06
R98	1022.35	40.250	22.23	0.875	—		26.92	1.06	14.81	0.583	1.52	0.06
R99	234.95	9.250	11.13	0.438	—		16.00	0.63	7.75	0.305	1.52	0.06
R100	749.30	29.500	28.58	1.125	—		35.05	1.38	19.81	0.780	2.29	0.09
R101	800.10	31.500	31.75	1.250	—		38.10	1.50	22.33	0.879	2.29	0.09
R102	857.25	33.750	31.75	1.250	—		38.10	1.50	22.33	0.879	2.29	0.09
R103	914.40	36.000	31.75	1.250	—		38.10	1.50	22.33	0.879	2.29	0.09
R104	965.20	38.000	34.93	1.375	—		41.40	1.63	24.82	0.977	2.29	0.09
R105	1022.35	40.250	34.93	1.375	—		41.40	1.63	24.82	0.977	2.29	0.09

A dash in B means no oval ring is made in that size. There is no R83. R93 to R105 fit ASME B16.47 Series A ring joint flanges NPS 26 to 36. Tolerances per ASME B16.20.

RX rings

Pressure-energised rings for API 6B flanges. An RX ring fits the groove of the R ring with the same number and gives a larger make-up gap.

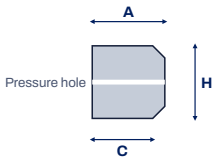


Ring	OD		A width		C flat		D bevel height		H height		R1 radius		E hole
	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	in
RX20	76.20	3.000	8.74	0.344	4.62	0.182	3.18	0.125	19.05	0.750	1.52	0.06	—
RX23	93.27	3.672	11.91	0.469	6.45	0.254	4.24	0.167	25.40	1.000	1.52	0.06	—
RX24	105.97	4.172	11.91	0.469	6.45	0.254	4.24	0.167	25.40	1.000	1.52	0.06	—
RX25	109.55	4.313	8.74	0.344	4.62	0.182	3.18	0.125	19.05	0.750	1.52	0.06	—
RX26	111.91	4.406	11.91	0.469	6.45	0.254	4.24	0.167	25.40	1.000	1.52	0.06	—
RX27	118.26	4.656	11.91	0.469	6.45	0.254	4.24	0.167	25.40	1.000	1.52	0.06	—
RX31	134.54	5.297	11.91	0.469	6.45	0.254	4.24	0.167	25.40	1.000	1.52	0.06	—
RX35	147.24	5.797	11.91	0.469	6.45	0.254	4.24	0.167	25.40	1.000	1.52	0.06	—
RX37	159.94	6.297	11.91	0.469	6.45	0.254	4.24	0.167	25.40	1.000	1.52	0.06	—
RX39	172.64	6.797	11.91	0.469	6.45	0.254	4.24	0.167	25.40	1.000	1.52	0.06	—
RX41	191.69	7.547	11.91	0.469	6.45	0.254	4.24	0.167	25.40	1.000	1.52	0.06	—
RX44	204.39	8.047	11.91	0.469	6.45	0.254	4.24	0.167	25.40	1.000	1.52	0.06	—
RX45	221.84	8.734	11.91	0.469	6.45	0.254	4.24	0.167	25.40	1.000	1.52	0.06	—
RX46	222.25	8.750	13.49	0.531	6.68	0.263	4.78	0.188	28.58	1.125	1.52	0.06	—
RX47	245.26	9.656	19.84	0.781	10.34	0.407	6.88	0.271	41.28	1.625	2.29	0.09	—
RX49	280.59	11.047	11.91	0.469	6.45	0.254	4.24	0.167	25.40	1.000	1.52	0.06	—
RX50	283.36	11.156	16.66	0.656	8.51	0.335	5.28	0.208	31.75	1.250	1.52	0.06	—
RX53	334.57	13.172	11.91	0.469	6.45	0.254	4.24	0.167	25.40	1.000	1.52	0.06	—
RX54	337.34	13.281	16.66	0.656	8.51	0.335	5.28	0.208	31.75	1.250	1.52	0.06	—
RX57	391.72	15.422	11.91	0.469	6.45	0.254	4.24	0.167	25.40	1.000	1.52	0.06	—
RX63	441.73	17.391	27.00	1.063	14.78	0.582	8.46	0.333	50.80	2.000	2.29	0.09	—
RX65	480.62	18.922	11.91	0.469	6.45	0.254	4.24	0.167	25.40	1.000	1.52	0.06	—
RX66	483.39	19.031	16.66	0.656	8.51	0.335	5.28	0.208	31.75	1.250	1.52	0.06	—
RX69	544.12	21.422	11.91	0.469	6.45	0.254	4.24	0.167	25.40	1.000	1.52	0.06	—
RX70	550.06	21.656	19.84	0.781	10.34	0.407	6.88	0.271	41.28	1.625	2.29	0.09	—
RX73	596.11	23.469	13.49	0.531	6.68	0.263	5.28	0.208	31.75	1.250	1.52	0.06	—
RX74	600.86	23.656	19.84	0.781	10.34	0.407	6.88	0.271	41.28	1.625	2.29	0.09	—
RX82	67.87	2.672	11.91	0.469	6.45	0.254	4.24	0.167	25.40	1.000	1.52	0.06	0.06
RX84	74.22	2.922	11.91	0.469	6.45	0.254	4.24	0.167	25.40	1.000	1.52	0.06	0.06
RX85	90.09	3.547	13.49	0.531	6.68	0.263	4.24	0.167	25.40	1.000	1.52	0.06	0.06
RX86	103.58	4.078	15.09	0.594	8.51	0.335	4.78	0.188	28.58	1.125	1.52	0.06	0.09
RX87	113.11	4.453	15.09	0.594	8.51	0.335	4.78	0.188	28.58	1.125	1.52	0.06	0.09
RX88	139.29	5.484	17.48	0.688	10.34	0.407	5.28	0.208	31.75	1.250	1.52	0.06	0.12
RX89	129.77	5.109	18.26	0.719	10.34	0.407	5.28	0.208	31.75	1.250	1.52	0.06	0.12
RX90	174.63	6.875	19.84	0.781	12.17	0.479	7.42	0.292	44.45	1.750	2.29	0.09	0.12
RX91	286.94	11.297	30.18	1.188	19.81	0.780	7.54	0.297	45.24	1.781	2.29	0.09	0.12
RX99	245.67	9.672	11.91	0.469	6.45	0.254	4.24	0.167	25.40	1.000	1.52	0.06	—
RX201	51.46	2.026	5.74	0.226	3.20	0.126	1.45	0.057	11.30	0.445	0.51	0.02	—
RX205	62.31	2.453	5.56	0.219	3.05	0.120	1.83	0.072	11.10	0.437	0.51	0.02	—
RX210	97.64	3.844	9.53	0.375	5.87	0.231	3.18	0.125	19.05	0.750	0.76	0.03	—
RX215	140.89	5.547	11.91	0.469	5.33	0.210	4.24	0.167	25.40	1.000	1.52	0.06	—

E is the pressure-passage hole, fitted only to RX82 to RX91. Check RX201 to RX215 against API 6A footnotes before ordering for critical service.

BX rings

For API 6BX flanges. BX joints are made up face to face; the ring is slightly larger than the groove and is coined into it as the flanges close.



Ring	Nominal size	OD		H height		A width		ODT flat OD		C flat width		D hole
		mm	in	mm	in	mm	in	mm	in	mm	in	in
BX150	1 11/16	72.19	2.842	9.30	0.366	9.30	0.366	70.87	2.790	7.98	0.314	0.06
BX151	1 13/16	76.40	3.008	9.63	0.379	9.63	0.379	75.03	2.954	8.26	0.325	0.06
BX152	2 1/16	84.68	3.334	10.24	0.403	10.24	0.403	83.24	3.277	8.79	0.346	0.06
BX153	2 9/16	100.94	3.974	11.38	0.448	11.38	0.448	99.31	3.910	9.78	0.385	0.06
BX154	3 1/16	116.84	4.600	12.40	0.488	12.40	0.488	115.09	4.531	10.64	0.419	0.06
BX155	4 1/16	147.96	5.825	14.22	0.560	14.22	0.560	145.95	5.746	12.22	0.481	0.06
BX156	7 1/16	237.92	9.367	18.62	0.733	18.62	0.733	235.28	9.263	15.98	0.629	0.12
BX157	9	294.46	11.593	20.98	0.826	20.98	0.826	291.49	11.476	18.01	0.709	0.12
BX158	11	352.04	13.860	23.14	0.911	23.14	0.911	348.77	13.731	19.86	0.782	0.12
BX159	13 5/8	426.72	16.800	25.70	1.012	25.70	1.012	423.09	16.657	22.07	0.869	0.12
BX160	13 5/8	402.59	15.850	23.83	0.938	13.74	0.541	399.21	15.717	10.36	0.408	0.12
BX161	16 3/4	491.41	19.347	28.07	1.105	16.21	0.638	487.45	19.191	12.24	0.482	0.12
BX162	16 3/4	475.49	18.720	14.22	0.560	14.22	0.560	473.48	18.641	12.22	0.481	0.06
BX163	18 3/4	556.16	21.896	30.10	1.185	17.37	0.684	551.89	21.728	13.11	0.516	0.12
BX164	18 3/4	570.56	22.463	30.10	1.185	24.59	0.968	566.29	22.295	20.32	0.800	0.12
BX165	21 1/4	624.71	24.595	32.03	1.261	18.49	0.728	620.19	24.417	13.97	0.550	0.12
BX166	21 1/4	640.03	25.198	32.03	1.261	26.14	1.029	635.51	25.020	21.62	0.851	0.12
BX167	26 3/4	759.36	29.896	35.86	1.412	13.11	0.516	754.28	29.696	8.03	0.316	0.06
BX168	26 3/4	765.25	30.128	35.86	1.412	16.05	0.632	760.17	29.928	10.97	0.432	0.06
BX169	5 1/8	173.51	6.831	15.85	0.624	12.93	0.509	171.27	6.743	10.69	0.421	0.06
BX170	6 5/8	218.03	8.584	14.22	0.560	14.22	0.560	216.03	8.505	12.22	0.481	0.06
BX171	8 9/16	267.44	10.529	14.22	0.560	14.22	0.560	265.43	10.450	12.22	0.481	0.06
BX172	11 5/32	333.07	13.113	14.22	0.560	14.22	0.560	331.06	13.034	12.22	0.481	0.06
BX303	30	852.75	33.573	37.95	1.494	16.97	0.668	847.37	33.361	11.61	0.457	0.06

BX ring for each API 6BX flange

Rated working pressure

Nominal size	2,000 psi	3,000 psi	5,000 psi	10,000 psi	15,000 psi	20,000 psi
1 11/16	—	—	—	BX150	BX150	—
1 13/16	—	—	—	BX151	BX151	BX151
2 1/16	—	—	—	BX152	BX152	BX152
2 9/16	—	—	—	BX153	BX153	BX153
3 1/16	—	—	—	BX154	BX154	BX154
4 1/16	—	—	—	BX155	BX155	BX155
5 1/8	—	—	—	BX169	BX169	—
7 1/16	—	—	—	BX156	BX156	BX156
9	—	—	—	BX157	BX157	BX157
11	—	—	—	BX158	BX158	BX158
13 5/8	—	—	BX160	BX159	BX159	BX159
16 3/4	—	—	BX162	BX162	—	—
18 3/4	—	—	BX163	BX164	BX164	—
21 1/4	—	—	BX165	BX166	—	—
26 3/4	BX167	BX168	—	—	—	—
30	BX303	BX303	—	—	—	—

Which ring fits which flange

ASME B16.5 ring joint flanges

R ring number

NPS	Class 150	Class 300 to 600	Class 900	Class 1500	Class 2500
1/2	—	R11	R12	R12	R13
3/4	—	R13	R14	R14	R16
1	R15	R16	R16	R16	R18
1 1/4	R17	R18	R18	R18	R21
1 1/2	R19	R20	R20	R20	R23
2	R22	R23	R24	R24	R26
2 1/2	R25	R26	R27	R27	R28
3	R29	R31	R31	R35	R32
4	R36	R37	R37	R39	R38
5	R40	R41	R41	R44	R42
6	R43	R45	R45	R46	R47
8	R48	R49	R49	R50	R51
10	R52	R53	R53	R54	R55
12	R56	R57	R57	R58	R60
14	R59	R61	R62	R63	—
16	R64	R65	R66	R67	—
18	R68	R69	R70	R71	—
20	R72	R73	R74	R75	—
24	R76	R77	R78	R79	—

Class 400 uses the Class 600 ring. Class 900 NPS ½ to 2½ uses the Class 1500 ring. Lapped Class 300 and 600 flanges NPS 3 use R30 in place of R31. A dash means no ring joint flange in that size and class.

API 6B flanges

R / RX ring number

Nominal size	2,000 psi	3,000 psi	5,000 psi
2 1/16	R23 / RX23	R24 / RX24	R24 / RX24
2 9/16	R26 / RX26	R27 / RX27	R27 / RX27
3 1/8	R31 / RX31	R31 / RX31	R35 / RX35
4 1/16	R37 / RX37	R37 / RX37	R39 / RX39
5 1/8	R41 / RX41	R41 / RX41	R44 / RX44
7 1/16	R45 / RX45	R45 / RX45	R46 / RX46
9	R49 / RX49	R49 / RX49	R50 / RX50
11	R53 / RX53	R53 / RX53	R54 / RX54
13 5/8	R57 / RX57	R57 / RX57	—
16 3/4	R65 / RX65	R66 / RX66	—
20 3/4	—	R74 / RX74	—
21 1/4	R73 / RX73	—	—

R and RX rings of the same number fit the same 6B groove. 5000 psi 6B flanges stop at 11 in nominal; larger sizes use 6BX flanges and BX rings.





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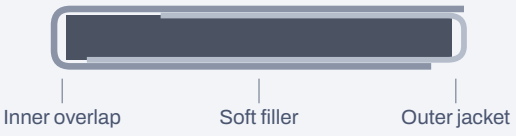
Double jacketed gaskets

A soft filler fully enclosed in a formed metal jacket. Made in almost any shape, from small pipe flanges to large vessel and exchanger flanges with pass partitions.

Standards	Pressure	Thickness	Temperature
ASME B16.20-2017 sizes, or drawing	**Sizes for Class 150 to 2500**	**3.2 mm nominal**	**To the limit of jacket and filler**

Construction and data

The jacket carries the load and protects the filler from the media. The filler gives the resilience. Seal is made on the inner and outer jacket laps where the gasket is thickest.





Double jacketed
Filler enclosed by two overlapping jackets. The standard for heat exchangers and vessel flanges.

With pass partition bars
Bars integral with the ring for exchanger channel covers; any layout to drawing.

Nubbin
A raised ridge on the jacket concentrates the seating stress where bolt load is limited.

Corrugated jacket
Corrugations on the jacket lower the seating stress needed; for large, lightly bolted flanges.

Jacket metals	Soft iron, carbon steel, 304, 316L, 321, Monel 400, nickel, titanium, Inconel and others; page 6 lists limits
Fillers	Flexible graphite (standard), ceramic, mica or PTFE
Thickness	3.2 mm (1/8 in) nominal. ASME B16.20 minimums: jacket 0.38 mm (0.015 in), filler 1.5 mm (0.06 in)
Tolerances	Thickness +0.8 / –0 mm. ID and OD +1.5 / –0 mm for NPS ½ to 24 (ASME B16.20-2017)
Flange finish	Ra 2.5 µm (100 µin) or finer (ASME PCC-1); see section 9

ASME VIII gasket factors

Flat metal jacketed, filled

Jacket metal	m	y psi	y MPa
Soft aluminium	3.25	5,500	38
Soft copper or brass	3.50	6,500	45
Iron or soft steel	3.75	7,600	52
Monel	3.50	8,000	55
4-6% chrome	3.75	9,000	62
Stainless steels and nickel-base alloys	3.75	9,000	62

Sizes for ASME B16.5 flanges

Double jacketed gaskets, millimetres

ID is the same for every class

NPS	ID	Gasket OD by class						
		150	300	400	600	900	1500	2500
1/2	22.4	44.5	50.8	—	50.8	—	60.5	66.8
3/4	28.7	54.1	63.5	—	63.5	—	66.8	73.2
1	38.1	63.5	69.9	—	69.9	—	76.2	82.6
1 1/4	47.8	73.2	79.5	—	79.5	—	85.9	101.6
1 1/2	54.1	82.6	92.2	—	92.2	—	95.3	114.3
2	73.2	101.6	108.0	—	108.0	—	139.7	143.0
2 1/2	85.9	120.7	127.0	—	127.0	—	162.1	165.1
3	108.0	133.4	146.1	—	146.1	165.1	171.5	193.8
4	131.8	171.5	177.8	174.8	190.5	203.2	206.5	231.9
5	152.4	193.8	212.9	209.6	238.3	244.6	251.0	276.4
6	190.5	219.2	247.7	244.6	263.7	285.8	279.4	314.5
8	238.3	276.4	304.8	301.8	317.5	355.6	349.3	384.3
10	285.8	336.6	358.9	355.6	397.0	431.8	431.8	473.2
12	342.9	406.4	419.1	416.1	454.2	495.3	517.7	546.1
14	374.7	447.8	482.6	479.6	489.0	517.7	574.8	—
16	425.5	511.3	536.7	533.4	562.1	571.5	638.3	—
18	489.0	546.1	593.9	590.6	609.6	635.0	701.8	—
20	533.4	603.3	651.0	644.7	679.5	695.5	752.6	—
24	641.4	714.5	771.7	765.3	787.4	835.2	898.7	—

Double jacketed gaskets, inches

ID is the same for every class

NPS	ID	Gasket OD by class						
		150	300	400	600	900	1500	2500
1/2	0.88	1.75	2.00	—	2.00	—	2.38	2.63
3/4	1.13	2.13	2.50	—	2.50	—	2.63	2.88
1	1.50	2.50	2.75	—	2.75	—	3.00	3.25
1 1/4	1.88	2.88	3.13	—	3.13	—	3.38	4.00
1 1/2	2.13	3.25	3.63	—	3.63	—	3.75	4.50
2	2.88	4.00	4.25	—	4.25	—	5.50	5.63
2 1/2	3.38	4.75	5.00	—	5.00	—	6.38	6.50
3	4.25	5.25	5.75	—	5.75	6.50	6.75	7.63
4	5.19	6.75	7.00	6.88	7.50	8.00	8.13	9.13
5	6.00	7.63	8.38	8.25	9.38	9.63	9.88	10.88
6	7.50	8.63	9.75	9.63	10.38	11.25	11.00	12.38
8	9.38	10.88	12.00	11.88	12.50	14.00	13.75	15.13
10	11.25	13.25	14.13	14.00	15.63	17.00	17.00	18.63
12	13.50	16.00	16.50	16.38	17.88	19.50	20.38	21.50
14	14.75	17.63	19.00	18.88	19.25	20.38	22.63	—
16	16.75	20.13	21.13	21.00	22.13	22.50	25.13	—
18	19.25	21.50	23.38	23.25	24.00	25.00	27.63	—
20	21.00	23.75	25.63	25.38	26.75	27.38	29.63	—
24	25.25	28.13	30.38	30.13	31.00	32.88	35.38	—

From ASME B16.20-2017 Table JA-3-1, the last edition to include jacketed gaskets. The gasket OD is 3 mm (1/8 in) smaller than the spiral wound centring ring, so the gasket sits inside the bolts. Tolerances +1.5 / –0 mm on ID and OD.



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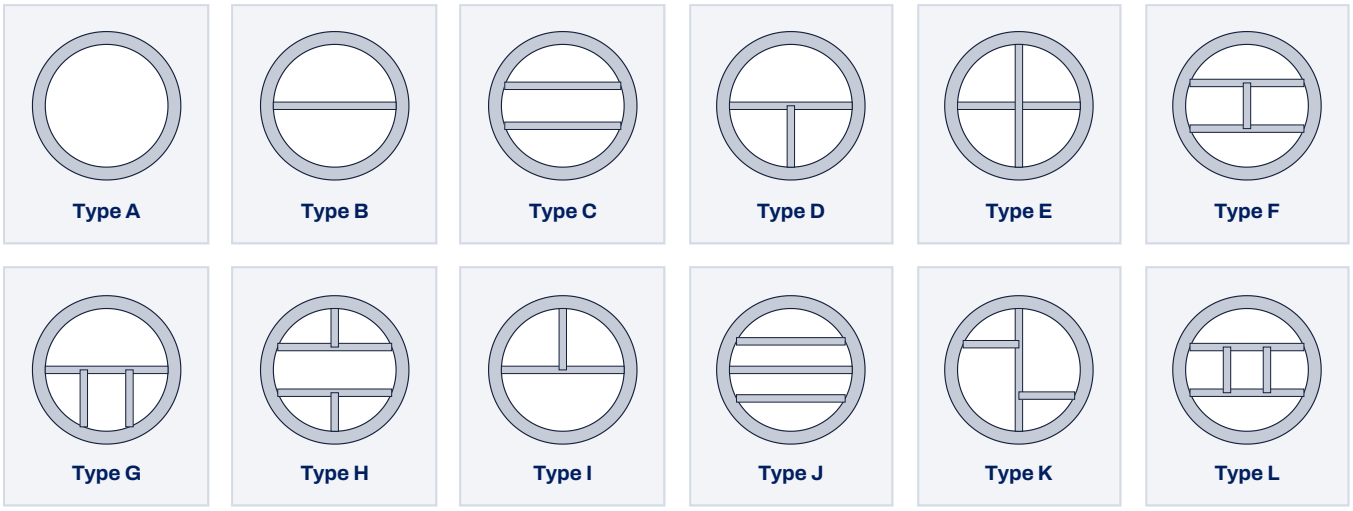
Heat exchanger gaskets

Shell, channel, girth and floating head gaskets with pass partition bars in any arrangement. Made as Kammprofile, double jacketed or spiral wound to suit the exchanger duty.

Design	Constructions	Shapes	Supply
TEMA exchangers and to drawing	**Kammprofile, double jacketed, spiral wound**	**Round, oval, obround, with bars**	**Single gaskets or matched bundle sets**

Pass partition configurations

Quote the type letter with the drawing. Bars are integral with the ring or welded; bar width and position follow the channel cover or tube sheet exactly.



Choosing the construction

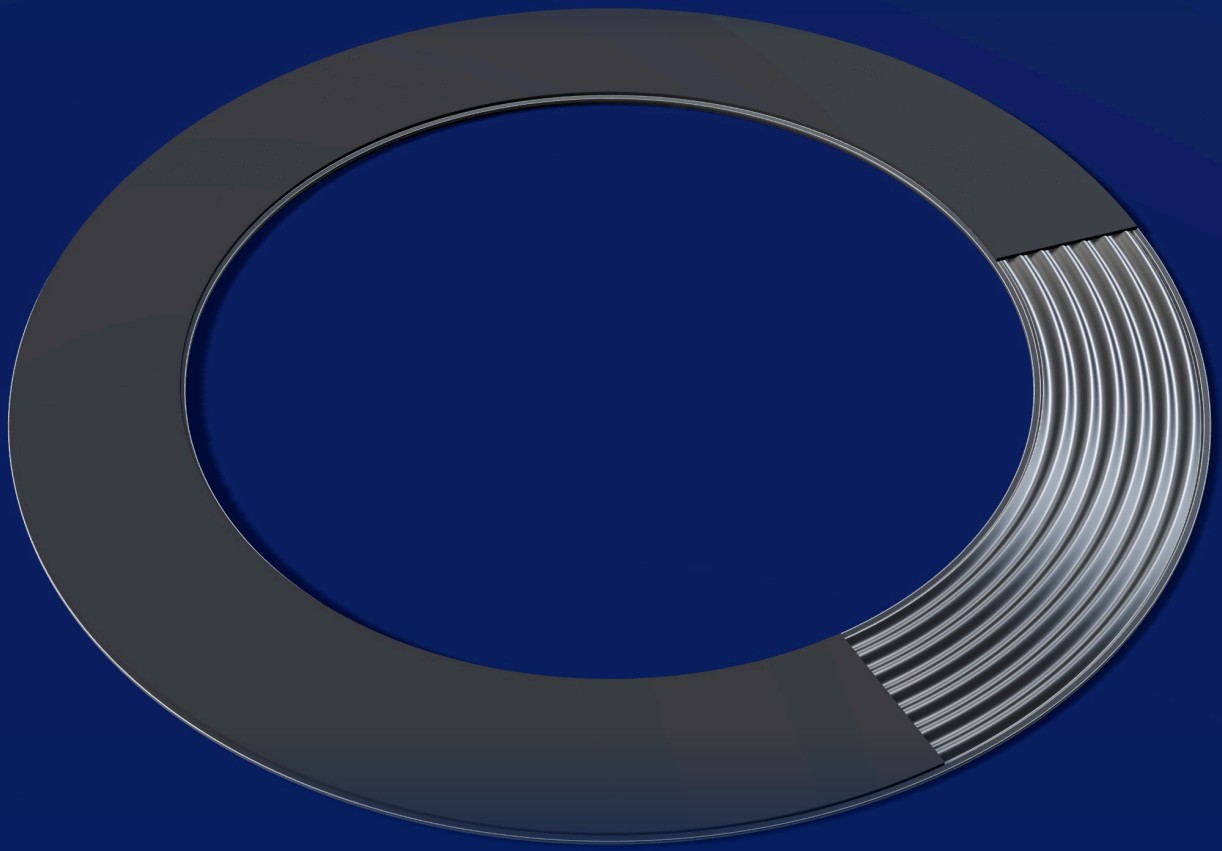
Construction	Best for	Notes
Kammprofile, convex or flat core	Thermal cycling, low bolt load, tight emission limits, flange rotation	Best tightness; core can be re-faced
Double jacketed	Large and irregular shapes, standard duty	Economical in any shape; single use
Spiral wound with welded bars	Round channel and girth flanges in standard process service	Familiar and resilient; bars are solid metal
Corrugated metal with graphite	Low bolt load, large diameters	Seals at low stress

Information we need

- Exchanger drawing, or TEMA type and the flange drawing
- OD, ID, thickness and corner radii
- Bar width, position and number of passes
- Bolt holes if the gasket is located by them
- Design temperature, pressure and media on both sides

Good practice

- Replace every gasket in the bundle when the exchanger is opened
- Check flatness and nubbin tracks on the tube sheet before fitting
- Order matched sets labelled by exchanger tag for turnarounds
- Where cycling has caused leaks, consider a convex Kammprofile



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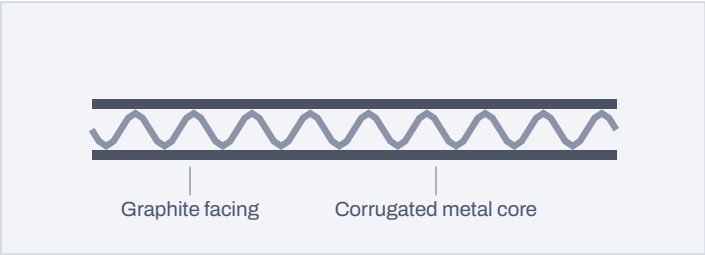
Corrugated gaskets

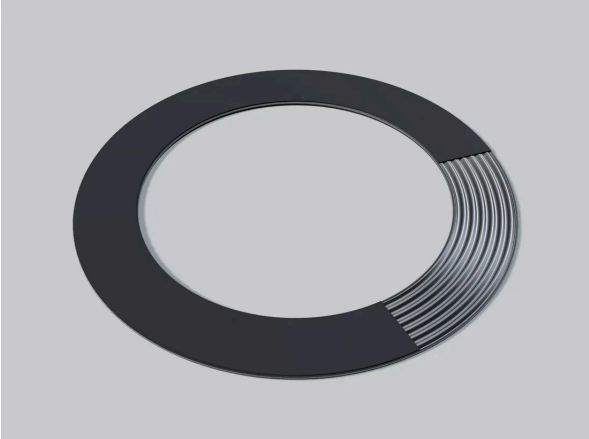
A corrugated metal core faced with flexible graphite or PTFE. The corrugations concentrate the load, so the gasket seals at low bolt stress like a soft gasket, while the metal core resists blow-out.

Design	Pitch	Facings	Temperature
Ring or full face, any shape	**3.2 mm standard; 4.8 and 6.4 mm**	**Graphite, PTFE, mica**	**To 450 °C graphite in air**

Construction and data

The best choice for large-diameter, lightly bolted joints: vessel manways, ducting, exchanger shells and flanges that cannot seat a spiral wound gasket.





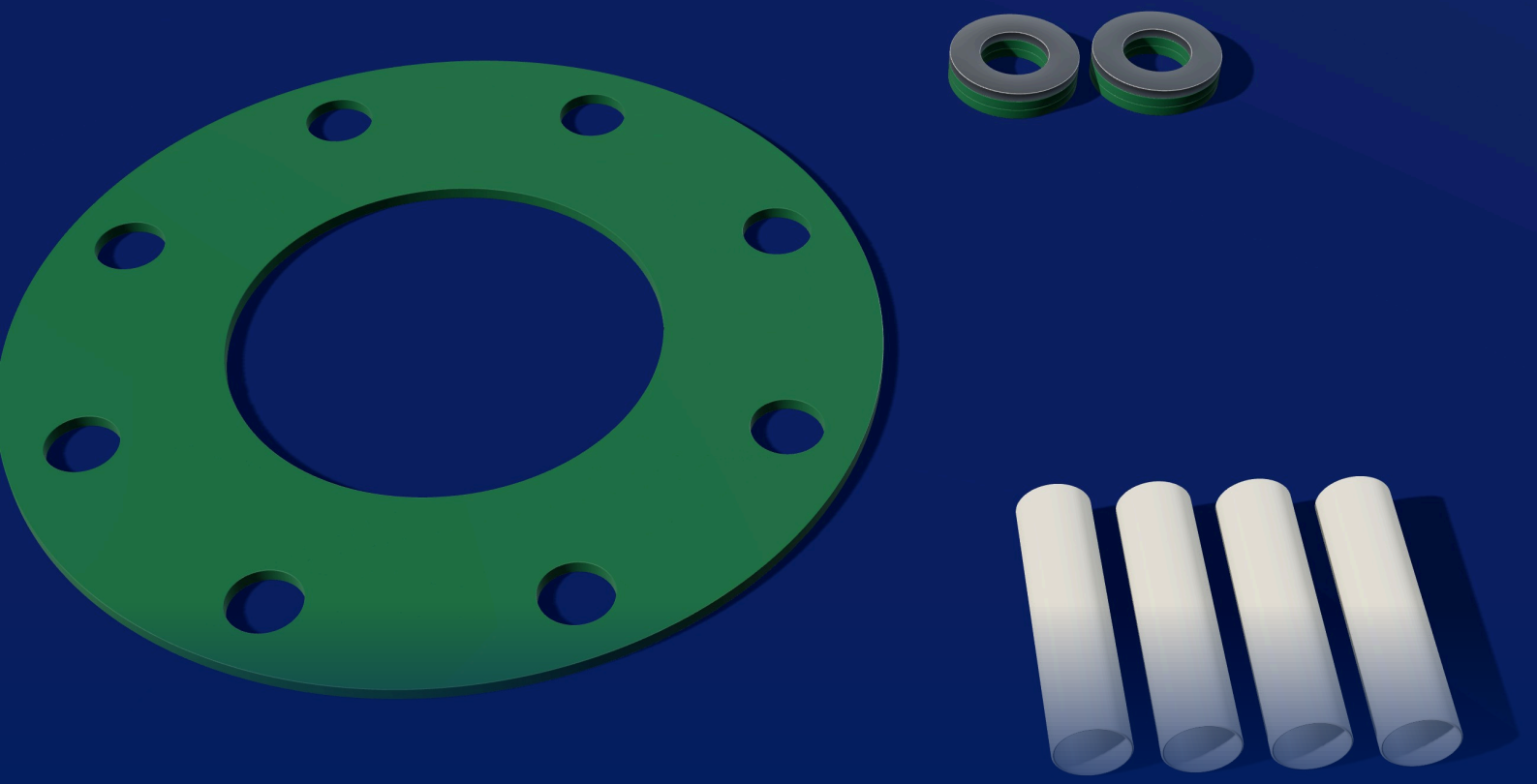
Core	Stainless steel 316L standard; other metals to order. About 0.76 mm (22 gauge) for the standard core
Pitch	3.2 mm (1/8 in) standard; 4.8 and 6.4 mm for larger gaskets. At least three corrugations across the width
Finished thickness	About 1.5 to 2.3 mm for 1.6 mm nominal, 2.7 to 3.4 mm for 3.2 mm nominal
Facings	Flexible graphite –212 to 450 °C in air (to 650 °C in steam); PTFE –240 to 260 °C; mica to 1000 °C
Shapes	Ring, full face with holes, oval, segmented or with bars to drawing

ASME VIII gasket factors

Corrugated metal

Metal	Type	m	y psi	y MPa
Soft aluminium	Unfilled	2.75	3,700	26
Soft copper or brass	Unfilled	3.00	4,500	31
Iron or soft steel	Unfilled	3.25	5,500	38
Monel or 4-6% chrome	Unfilled	3.50	6,500	45
Stainless steels and nickel-base alloys	Unfilled	3.75	7,600	52
Soft aluminium	Inserted or jacketed	2.50	2,900	20
Soft copper or brass	Inserted or jacketed	2.75	3,700	26
Iron or soft steel	Inserted or jacketed	3.00	4,500	31
Monel or 4-6% chrome	Inserted or jacketed	3.25	5,500	38
Stainless steels and nickel-base alloys	Inserted or jacketed	3.50	6,500	45

Code values are for bare or filled corrugated metal. Graphite-faced corrugated gaskets seal at lower stress; ask for our design values.



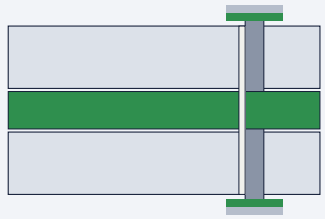
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Flange insulation kits

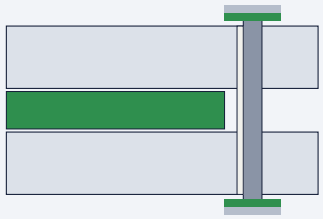
Gasket, sleeves and washers that electrically isolate one flange from the other. For cathodic protection systems, dissimilar metal joints and the prevention of stray current corrosion.

Types	Pressure	Gaskets	Temperature
E full face, F ring, D ring joint	**Class 150 to 2500, API 6A**	**G10, G11, phenolic, PTFE**	**To 200 °C with G11**

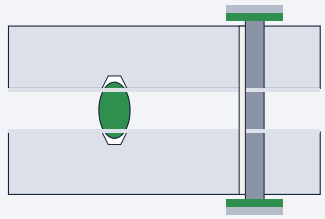
Kit types and materials



Type E, full face
Gasket the full OD of the flange, with bolt holes. The bolts centre it and it keeps dirt out of the bolt bore. The most reliable insulation.



Type F, ring
Gasket inside the bolt circle, for raised-face flanges. Centred by the sleeves on the bolts.



Type D, ring joint
An oval insulating ring that fits a standard RTJ groove, for ring joint flanges.

Gasket materials

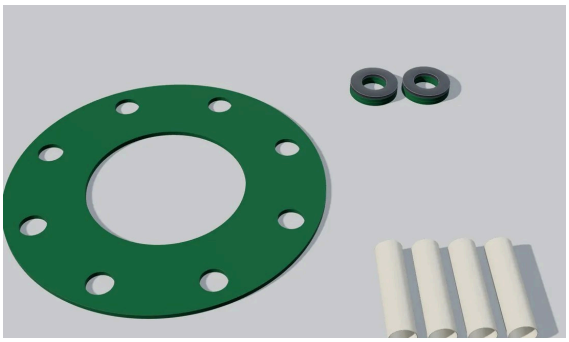
Typical values

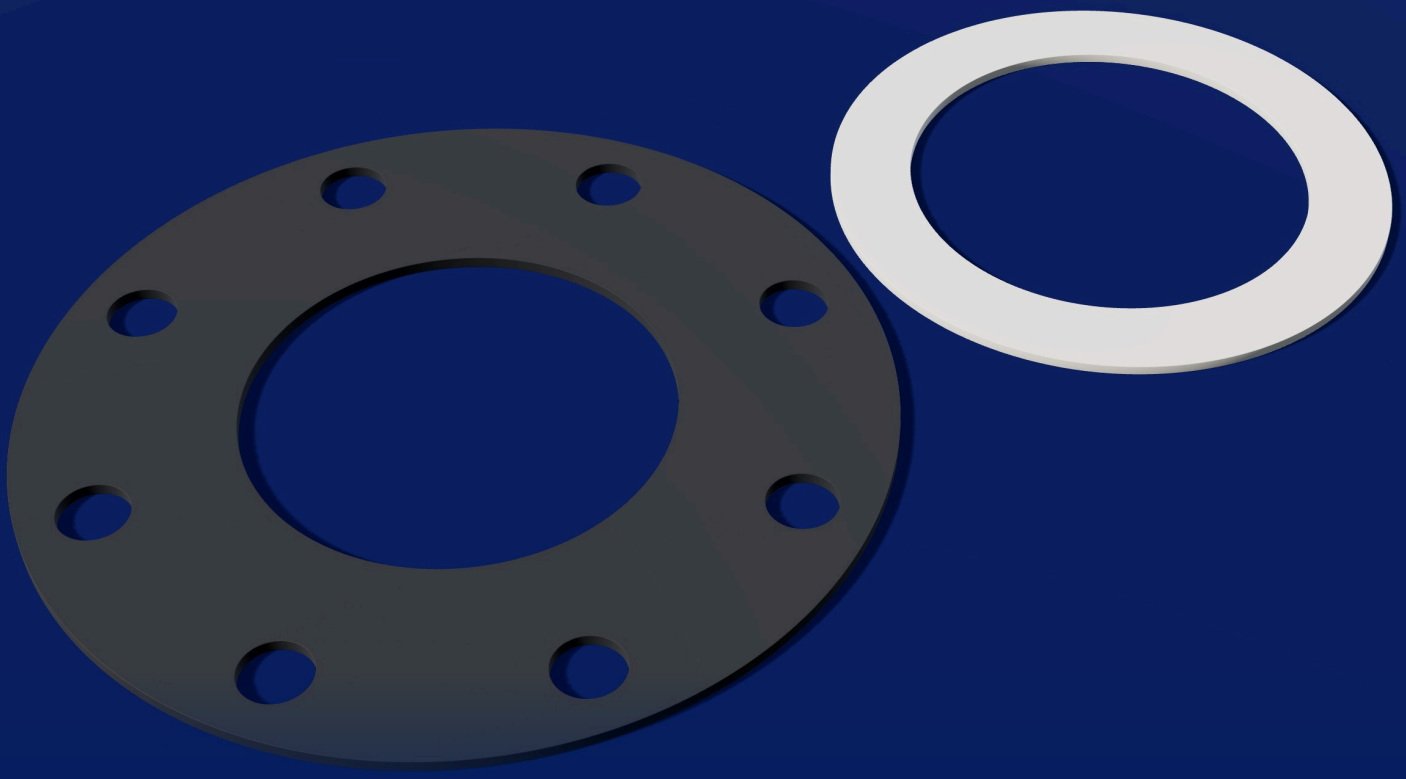
Material	°C max	Dielectric V/mil	Compressive psi
G10 (glass-reinforced epoxy)	150	750-800	65,000–66,000
G11 (glass-reinforced high-temperature epoxy)	200	550	50,000–63,000
Phenolic (plain / CE phenolic)	104	500	25,000
Neoprene-faced phenolic	79	500	25,000
PTFE (gasket or seal element)	232	600	—

Sleeve materials

Material	°C max	Dielectric V/mil
Mylar	150	4000
G10	138-150	400 (sleeve)
Nomex	232	400-600
Phenolic	107-121	400

A complete kit	One insulating gasket, one sleeve per bolt, two insulating washers and two steel washers per bolt
Sleeves	Full length through both flanges; order for the bolt diameter and the flange stack
Steel washers	3.2 mm zinc-plated steel, protect the insulating washer from the nut
Testing	Check isolation with an insulation tester across the joint after tightening and before the line is filled
Ordering	Type, size, class, flange standard, gasket material, bolt diameter and length, service temperature





8

Soft sheet gaskets

Ring and full face gaskets cut from flexible graphite, PTFE and compressed fibre sheet. For utilities, water, low pressure process lines and flat-faced flanges where a metal gasket must not be used.

Standards	Pressure	Materials	Cutting
ASME B16.21, EN 1514-1	**Class 150 to 300 typical**	**Graphite, PTFE, ePTFE, CNAF**	**CNC knife and water jet, any shape**

Sheet materials

Sheet gaskets seal at low bolt stress and suit flat-faced, cast iron, GRP and lined flanges. Choose the thinnest gasket the flange condition allows: thinner gaskets creep less and resist blow-out better.



Typical properties

Check the pressure and temperature chart for the grade and thickness

Material	Temperature °C	Max bar	Compress. %	Recovery %	Typical service
Flexible graphite, plain or with 316 foil insert	–240 to 450 (650 in steam)	100 to 150	35 to 45	12 to 25	Steam, hydrocarbons, heat transfer fluids, most chemicals
Expanded PTFE (ePTFE)	–268 to 260	about 200	55 to 60	8 to 15	Strong chemicals, damaged or uneven flanges, glass-lined and GRP
PTFE with silica filler	–268 to 260	83	5 to 15	40	Strong acids, chlorine, hydrocarbons
PTFE with barium sulphate	–268 to 260	83	4 to 10	40	Strong caustics, hydrofluoric acid, aluminium fluoride
PTFE with glass microspheres	–268 to 260	55	25 to 45	30	Low bolt load, non-metallic and lined flanges
Compressed non-asbestos fibre (CNAF)	–73 to 205–260 continuous	70 to 83	7 to 17	40 to 55	Water, air, oils, low pressure steam, general utilities

Thickness	1.5 mm (1/16 in) preferred; 3.0 mm (1/8 in) for rough or uneven faces
Limits	Pressure and temperature limits cannot be used together; the PxT value of the grade governs
Flange finish	Ra 3.2 to 6.4 µm (125 to 250 µin) for 1.5 mm gaskets; up to 13 µm (500 µin) for thicker gaskets
Re-tightening	Do not re-tighten PTFE or fibre gaskets at temperature

Never use a sheet gasket where

- The service is Class 600 or above, or above the PxT limit
- Fire-safe sealing is required, unless graphite with metal insert is specified
- A spiral wound or Kammprofile gasket is specified by the piping class

Sizes for ASME B16.5 flanges

ASME B16.21 ring gaskets, millimetres

Raised face; ID the same for every class

NPS	ID	Gasket OD by class				
		150	300	400	600	900
1/2	21.3	47.8	53.8	53.8	53.8	63.5
3/4	26.9	57.2	66.5	66.5	66.5	69.9
1	33.3	66.5	73.2	73.2	73.2	79.2
1 1/4	42.2	76.2	82.6	82.6	82.6	88.9
1 1/2	48.5	85.9	95.3	95.3	95.3	98.6
2	60.5	104.6	111.3	111.3	111.3	142.7
2 1/2	73.2	124.0	130.0	130.0	130.0	165.1
3	88.9	136.7	149.4	149.4	149.4	168.1
4	114.3	174.8	180.8	177.8	193.5	206.2
5	141.2	196.9	215.9	212.9	241.3	247.7
6	168.1	222.3	251.0	247.7	266.7	289.1
8	218.9	279.4	307.8	304.8	320.5	358.6
10	273.1	339.9	362.0	358.6	400.1	434.8
12	323.9	409.7	422.1	419.1	457.2	498.3
14	355.6	450.9	485.6	482.6	492.3	520.7
16	406.4	514.4	539.8	536.4	565.2	574.5
18	457.2	549.1	596.9	593.9	612.6	638.0
20	508.0	606.6	654.1	647.7	682.8	698.5
24	609.6	717.6	774.7	768.4	790.4	838.2

ASME B16.21 ring gaskets, inches

Raised face; ID the same for every class

NPS	ID	Gasket OD by class				
		150	300	400	600	900
1/2	0.84	1.88	2.12	2.12	2.12	2.50
3/4	1.06	2.25	2.62	2.62	2.62	2.75
1	1.31	2.62	2.88	2.88	2.88	3.12
1 1/4	1.66	3.00	3.25	3.25	3.25	3.50
1 1/2	1.91	3.38	3.75	3.75	3.75	3.88
2	2.38	4.12	4.38	4.38	4.38	5.62
2 1/2	2.88	4.88	5.12	5.12	5.12	6.50
3	3.50	5.38	5.88	5.88	5.88	6.62
4	4.50	6.88	7.12	7.00	7.62	8.12
5	5.56	7.75	8.50	8.38	9.50	9.75
6	6.62	8.75	9.88	9.75	10.50	11.38
8	8.62	11.00	12.12	12.00	12.62	14.12
10	10.75	13.38	14.25	14.12	15.75	17.12
12	12.75	16.13	16.62	16.50	18.00	19.62
14	14.00	17.75	19.12	19.00	19.38	20.50
16	16.00	20.25	21.25	21.12	22.25	22.62
18	18.00	21.62	23.50	23.38	24.12	25.12
20	20.00	23.88	25.75	25.50	26.88	27.50
24	24.00	28.25	30.50	30.25	31.12	33.00

ASME B16.21 covers ring gaskets for Classes 150 to 900. Class 400 and 900 small sizes repeat the Class 600 and 1500 values as printed in the standard. Sheet gaskets for Class 1500 and 2500 are made to drawing.

Full face gaskets, Class 150

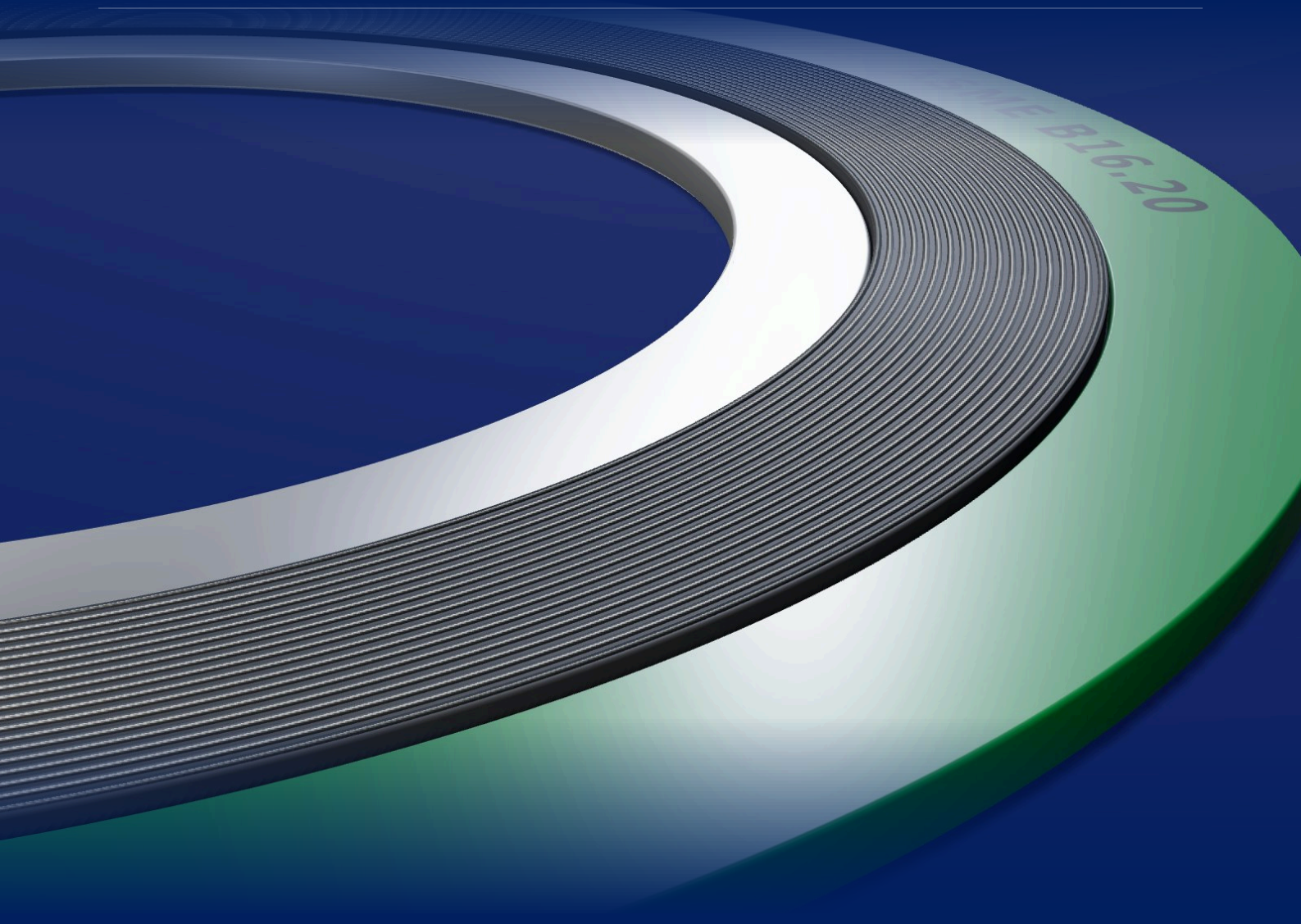
For flat-faced Class 150 flanges: cast iron, ductile iron, GRP, lined and some valves and pumps. The gasket covers the whole face so the flange is not bent when the bolts are tightened.

NPS	ID		OD		Bolt circle		Holes	Hole dia.	
	mm	in	mm	in	mm	in		mm	in
1/2	21.3	0.84	88.9	3.50	60.5	2.38	4	15.7	0.620
3/4	26.9	1.06	98.6	3.88	69.9	2.75	4	15.7	0.620
1	33.3	1.31	108.0	4.25	79.2	3.12	4	15.7	0.620
1 1/4	42.2	1.66	117.6	4.63	88.9	3.50	4	15.7	0.620
1 1/2	48.5	1.91	127.0	5.00	98.6	3.88	4	15.7	0.620
2	60.5	2.38	152.4	6.00	120.7	4.75	4	19.1	0.750
2 1/2	73.2	2.88	177.8	7.00	139.7	5.50	4	19.1	0.750
3	88.9	3.50	190.5	7.50	152.4	6.00	4	19.1	0.750
4	114.3	4.50	228.6	9.00	190.5	7.50	8	19.1	0.750
5	141.2	5.56	254.0	10.00	215.9	8.50	8	22.4	0.880
6	168.1	6.62	279.4	11.00	241.3	9.50	8	22.4	0.880
8	218.9	8.62	342.9	13.50	298.5	11.75	8	22.4	0.880
10	273.1	10.75	406.4	16.00	362.0	14.25	12	25.4	1.000
12	323.9	12.75	482.6	19.00	431.8	17.00	12	25.4	1.000
14	355.6	14.00	533.4	21.00	476.3	18.75	12	28.4	1.120
16	406.4	16.00	596.9	23.50	539.8	21.25	16	28.4	1.120
18	457.2	18.00	635.0	25.00	577.9	22.75	16	31.8	1.250
20	508.0	20.00	698.5	27.50	635.0	25.00	20	31.8	1.250
24	609.6	24.00	812.8	32.00	749.3	29.50	20	35.1	1.380

Why full face on flat flanges

On a flat-faced cast iron or GRP flange, a ring gasket inside the bolts lets the flange bend about the gasket as the bolts are tightened, which can crack the flange. A full face gasket supports the flange across the whole face.





9

Technical data

The engineering behind a tight joint: gasket design factors, bolt loads and torque, assembly to ASME PCC-1, flange finish and damage limits, and how to read a failed gasket.

Design	Assembly	Bolting	Units
ASME VIII Div. 1, EN 13555	**ASME PCC-1**	**ASME B16.5, ASTM A193**	**Metric with inch equivalents**

Gasket design data

ASME VIII Division 1 Appendix 2 uses two gasket factors: **y**, the minimum seating stress at assembly, and **m**, the ratio of gasket stress to internal pressure needed to keep the joint tight in operation.

ASME VIII Div. 1 Table 2-5.1, metallic gaskets

Non-mandatory suggested values

Gasket type	Metal	m	y psi	y MPa
Spiral wound, filled	Carbon	2.50	10,000	69
Spiral wound, filled	Stainless steel, Monel, nickel-base alloys	3.00	10,000	69
Double jacketed, filled	Soft aluminium	3.25	5,500	38
Double jacketed, filled	Soft copper or brass	3.50	6,500	45
Double jacketed, filled	Iron or soft steel	3.75	7,600	52
Double jacketed, filled	Monel	3.50	8,000	55
Double jacketed, filled	4-6% chrome	3.75	9,000	62
Double jacketed, filled	Stainless steels and nickel-base alloys	3.75	9,000	62
Grooved metal (bare)	Soft aluminium	3.25	5,500	38
Grooved metal (bare)	Soft copper or brass	3.50	6,500	45
Grooved metal (bare)	Iron or soft steel	3.75	7,600	52
Grooved metal (bare)	Monel or 4-6% chrome	3.75	9,000	62
Grooved metal (bare)	Stainless steels and nickel-base alloys	4.25	10,100	70
Solid flat metal	Soft aluminium	4.00	8,800	61
Solid flat metal	Soft copper or brass	4.75	13,000	90
Solid flat metal	Iron or soft steel	5.50	18,000	124
Solid flat metal	Monel or 4-6% chrome	6.00	21,800	150
Solid flat metal	Stainless steels and nickel-base alloys	6.50	26,000	180
Ring joint	Iron or soft steel (soft iron, low carbon steel)	5.50	18,000	124
Ring joint	Monel or 4-6% chrome	6.00	21,800	150
Ring joint	Stainless steels and nickel-base alloys	6.50	26,000	180
Kammprofile, graphite faced	Manufacturer value, not in the Code	2.00	2,500	17.2

Gasket stress in practice

MPa, room temperature, manufacturer data

Gasket	Minimum	Recommended	Maximum	Notes
Spiral wound with inner ring	50 to 70	90 to 120	about 300	Without inner ring, maximum about 180 MPa
Kammprofile, graphite faced	15 to 20	—	300 to 500	Core supports the facing; tolerates high stress
Flexible graphite sheet	10	—	110	Higher with metal insert
Filled PTFE sheet	20	—	50	Falls with temperature: creep
Corrugated, graphite faced	low	—	—	Seats like a soft gasket

EN 13555 gasket parameters

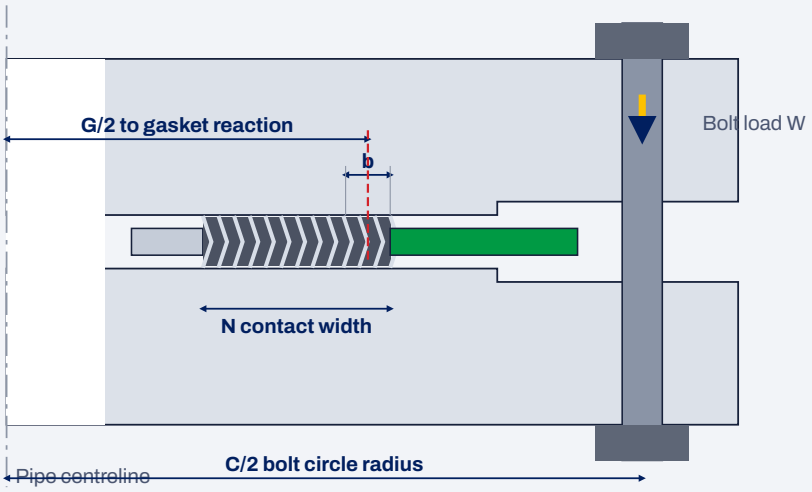
Qmin(L) minimum assembly stress to reach tightness class L. **QSmin(L)** minimum stress in service to keep class L after unloading. **QSmax** maximum stress the gasket can take at temperature without damage. **PQR** creep relaxation factor. **EG** unloading modulus. These feed the EN 1591-1 joint calculation; ask us for test data for a specific gasket.

m and y suit the Appendix 2 flange design calculation. For assembly, aim between the minimum and maximum gasket stress, and check against the flange and bolt limits; EN 1591-1 and EN 13555 gasket data give a more complete assessment for critical joints.

Worked example: bolt load and torque

A standard check of whether the bolting can seat and hold a spiral wound gasket, followed by the assembly torque. Use the same steps for any gasket in this catalogue.

Gasket	6 in Class 300, style CGI, 316L windings, flexible graphite filler. Winding ID 7.19 in, OD 8.25 in
Bolting	12 studs 3/4 in ASTM A193 B7, stress area 0.334 in² each, total 4.01 in²
Design conditions	P = 580 psi (40 bar); bolt allowable Sa = Sb = 25 000 psi (172 MPa)
Gasket factors	m = 3.00, y = 10 000 psi (69 MPa), Table 2-5.1
Contact width	N = (OD − ID)/2 = 0.530 in; b_0 = N/2 = 0.265 in; b = 0.5√b_0 = 0.257 in (b_0 > 0.25 in)
Reaction diameter	G = OD − 2b = 7.735 in
Operating load	Wm1 = π/4·G²·P + 2b·π·G·m·P = 27,256 + 21,767 = 49,023 lbf
Seating load	Wm2 = π·b·G·y = 62,548 lbf
Bolt area check	Am = max(Wm1, Wm2)/Sb = 2.50 in² ≤ Ab = 4.01 in²: **acceptable**
Assembly target	50 ksi bolt stress (about 48 % of B7 yield): 16,700 lbf per stud, 200,400 lbf total
Gasket stress	Total load / winding area 12.85 in² = 15,590 psi = **107 MPa**, within the recommended 90 to 120 MPa for spiral wound (page 48)
Torque	T = K·F·D = 0.16 × 16,700 × 0.75 / 12 = **167 ft·lb (226 N·m)** per stud



Half section of the joint. Where b_0 exceeds 6.4 mm (0.25 in), the Code moves the reaction diameter G inwards from the gasket OD by 2b, because the outer part of the contact carries most of the load. The bolt load W acts on the bolt circle C; the moment between C and G rotates the flange.

What the numbers say

The bolts have about 1.6 times the area the Code needs, so the joint is not bolt-limited. At 50 ksi the gasket sees about 107 MPa: well above the seating stress y of 69 MPa, in the recommended range and far below the 300 MPa limit of a gasket with inner ring. At 40 ksi it would be about 86 MPa, at the low end, which is why we suggest the higher target here. Pressure end load in operation reduces this; check that the residual stress stays above the minimum.

When to look harder

Low classes and large sizes (Class 150 above NPS 12) can be bolt-limited for spiral wound gaskets: the bolts cannot reach the seating stress. Consider a Kammprofile or low-stress spiral wound gasket there, or ask us for a joint calculation to EN 1591-1.

Simplified ASME VIII Div. 1 Appendix 2 method for illustration; a full flange design also checks flange stresses and rotation. Values computed from the tables in this catalogue.

Bolting for ASME B16.5 flanges

Number and nominal diameter of stud bolts for each flange size and class. Use it with the torque table on the next page.

NPS	Class 150		Class 300		Class 400		Class 600		Class 900		Class 1500		Class 2500	
	No.	Dia. in	No.	Dia. in	No.	Dia. in	No.	Dia. in	No.	Dia. in	No.	Dia. in	No.	Dia. in
1/2	4	1/2	4	1/2	4	1/2	4	1/2	4	3/4	4	3/4	4	3/4
3/4	4	1/2	4	5/8	4	5/8	4	5/8	4	3/4	4	3/4	4	3/4
1	4	1/2	4	5/8	4	5/8	4	5/8	4	7/8	4	7/8	4	7/8
1 1/4	4	1/2	4	5/8	4	5/8	4	5/8	4	7/8	4	7/8	4	1
1 1/2	4	1/2	4	3/4	4	3/4	4	3/4	4	1	4	1	4	1 1/8
2	4	5/8	8	5/8	8	5/8	8	5/8	8	7/8	8	7/8	8	1
2 1/2	4	5/8	8	3/4	8	3/4	8	3/4	8	1	8	1	8	1 1/8
3	4	5/8	8	3/4	8	3/4	8	3/4	8	7/8	8	1 1/8	8	1 1/4
4	8	5/8	8	3/4	8	7/8	8	7/8	8	1 1/8	8	1 1/4	8	1 1/2
5	8	3/4	8	3/4	8	7/8	8	1	8	1 1/4	8	1 1/2	8	1 3/4
6	8	3/4	12	3/4	12	7/8	12	1	12	1 1/8	12	1 3/8	8	2
8	8	3/4	12	7/8	12	1	12	1 1/8	12	1 3/8	12	1 5/8	12	2
10	12	7/8	16	1	16	1 1/8	16	1 1/4	16	1 3/8	12	1 7/8	12	2 1/2
12	12	7/8	16	1 1/8	16	1 1/4	20	1 1/4	20	1 3/8	16	2	12	2 3/4
14	12	1	20	1 1/8	20	1 1/4	20	1 3/8	20	1 1/2	16	2 1/4	—	
16	16	1	20	1 1/4	20	1 3/8	20	1 1/2	20	1 5/8	16	2 1/2	—	
18	16	1 1/8	24	1 1/4	24	1 3/8	20	1 5/8	20	1 7/8	16	2 3/4	—	
20	20	1 1/8	24	1 1/4	24	1 1/2	24	1 5/8	20	2	16	3	—	
24	20	1 1/4	24	1 1/2	24	1 3/4	24	1 7/8	20	2 1/2	16	3 1/2	—	

Class 400 flanges NPS ½ to 3 use Class 600 bolting; Class 900 flanges NPS ½ to 2½ use Class 1500 bolting. Class 2500 flanges stop at NPS 12. Bolt diameters are in inches; threads are UNC up to 1 in and 8UN above.

Common stud bolt materials

ASTM A193 / A320 studs with A194 nuts

Stud	Nut	Minimum yield, up to 2½ in	Typical use
A193 B7	A194 2H	105 ksi (724 MPa)	General refinery and process service; the default for spiral wound and Kammprofile joints
A193 B16	A194 4 or 7	105 ksi (724 MPa)	High temperature service where B7 would relax
A320 L7	A194 4 or 7, impact tested	105 ksi (724 MPa)	Low temperature service
A193 B8M Class 2	A194 8M	95 ksi at ¾ in and below, falling to 50 ksi at 1½ in	Corrosive environments; strain hardened, so the yield depends on diameter
A193 B8M Class 1	A194 8M	30 ksi (207 MPa)	Low strength: often cannot seat a spiral wound gasket. Check before use

Yield strengths are ASTM minimums for the diameters stated; larger diameters have lower minimums. Match the bolt material to the flange rating tables of ASME B16.5.

Bolt torque reference

Torque per bolt to reach a target bolt stress, for lubricated alloy steel studs (ASTM A193 B7 or B16) with heavy hex nuts.

Bolt dia.	Stress area	30 ksi (207 MPa)		40 ksi (276 MPa)		50 ksi (345 MPa)		60 ksi (414 MPa)	
	in²	N·m	ft·lb	N·m	ft·lb	N·m	ft·lb	N·m	ft·lb
1/2 in	0.142	38	28	51	38	64	47	77	57
5/8 in	0.226	77	56	102	75	128	94	153	113
3/4 in	0.334	136	100	181	134	226	167	272	200
7/8 in	0.462	219	162	292	216	365	270	438	323
1 in	0.606	329	242	438	323	548	404	657	485
1 1/8 in	0.790	482	356	643	474	803	592	964	711
1 1/4 in	1.000	678	500	904	667	1,130	833	1,356	1,000
1 3/8 in	1.233	919	678	1,226	904	1,532	1,130	1,839	1,356
1 1/2 in	1.492	1,214	895	1,618	1,194	2,023	1,492	2,427	1,790
1 5/8 in	1.780	1,569	1,157	2,092	1,543	2,614	1,928	3,137	2,314
1 3/4 in	2.080	1,974	1,456	2,632	1,941	3,290	2,427	3,948	2,912
1 7/8 in	2.410	2,451	1,808	3,268	2,410	4,084	3,012	4,901	3,615
2 in	2.770	3,004	2,216	4,006	2,955	5,007	3,693	6,009	4,432
2 1/4 in	3.560	4,344	3,204	5,792	4,272	7,240	5,340	8,688	6,408
2 1/2 in	4.440	6,020	4,440	8,026	5,920	10,033	7,400	12,040	8,880
2 3/4 in	5.430	8,098	5,973	10,798	7,964	13,497	9,955	16,197	11,946
3 in	6.510	10,592	7,812	14,122	10,416	17,653	13,020	21,183	15,624
3 1/4 in	7.690	13,554	9,997	18,072	13,329	22,590	16,662	27,108	19,994
3 1/2 in	8.960	17,007	12,544	22,677	16,725	28,346	20,907	34,015	25,088

How the table is calculated

T = K × F × D, where F is the target bolt stress times the tensile stress area and D the nominal diameter. Nut factor K = 0.16, typical of a good anti-seize or molybdenum disulphide lubricant. A different lubricant changes the torque in proportion to its nut factor.

Choosing the target stress

ASME PCC-1 gives a common range of 40 to 70 % of bolt yield, about 40 to 70 ksi for B7 studs, chosen per joint so the gasket is seated without exceeding the flange or gasket limits. Check the gasket stress for your flange with our torque calculator at rankinegaskets.com/bolt-torque-calculator.

Reference values only. Torque scatter is about ±25 %; where joint integrity is critical, use hydraulic tensioning or verified bolt load. Do not exceed the flange, bolt or gasket limits for your joint.

Installation

Most leaking joints are caused by uneven or insufficient bolt load, not by the gasket. Assemble to ASME PCC-1: the steps below follow its legacy star pattern.

1 Check the flanges

Faces clean and dry, no radial scratches across the sealing surface, no old gasket material. Flanges parallel and aligned without forcing.

2 Check the gasket

Correct size, class, materials and standard from the marking. No damage to windings, facings or rings. Never reuse a spiral wound or RTJ gasket.

3 Prepare the bolts

Correct grade and length, threads clean, nuts run freely. Lubricate threads and nut faces with the lubricant the torque values assume.

4 Fit the gasket

Centre the gasket on the bolts without adhesive or grease on the faces. Fit all bolts, then snug them to 15 to 30 N·m (10 to 20 ft·lb), no more than 20 % of the target torque.

5 Tighten in rounds

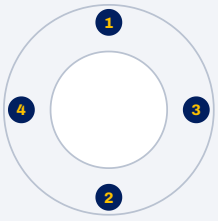
Star pattern: round 1 to 20 to 30 % of the target torque, round 2 to 50 to 70 %, round 3 to 100 %. Check the gap stays even after each round.

6 Finish with circular passes

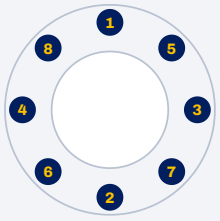
Tighten clockwise round the flange at 100 % until no nut turns further. Optionally repeat after 4 hours. Record the values on the joint tag.

Tightening sequence

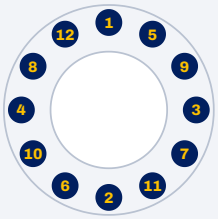
Numbers show the order to tighten each bolt in the cross pattern. Bolt 1 is any bolt; number the others clockwise.



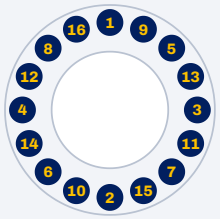
4 bolts



8 bolts



12 bolts



16 bolts

Storage

Store flat in the original packaging, indoors and dry. Do not hang spiral wound gaskets on hooks or stack heavy items on them.

Handling

Carry large gaskets supported on a board. Do not bend, pull on the windings or remove the shipping clips until fitting.

Re-tightening

Do not re-tighten graphite or PTFE gaskets at temperature unless your procedure requires it. Never re-tighten a joint under pressure.

Flange surface finish and flatness

The gasket can only seal the surface it is given. Most gaskets need a serrated finish that the facing can flow into; solid metal gaskets need a smooth one.

Recommended finish by gasket type

ASME PCC-1 Appendix C

Gasket	Ra µm	Ra µin
Spiral wound	3.2 to 6.4	125 to 250
Kammprofile, graphite or PTFE faced	3.2 to 6.4	125 to 250
Grooved metal, bare	1.6 max	63 max
Double jacketed	2.5 max	100 max
Corrugated, graphite or PTFE faced	3.2 to 6.3	125 to 250
Graphite sheet with metal insert	3.2 to 6.4	125 to 250
Solid flat metal	1.6 max	63 max
Ring joint, R and RX grooves	1.6 max	63 max
Ring joint, BX grooves (API 6BX)	0.8 max	32 max
Flexible graphite sheet	3.2 to 6.4 (up to 1.5 mm thick); 3.2 to 13 (>1.5 mm)	125 to 250 (≤1/16 in); 125 to 500 (>1/16 in)
PTFE sheet	3.2 to 6.4 (up to 1.5 mm); 3.2 to 13 (>1.5 mm)	125 to 250 (≤1/16 in); 125 to 500 (>1/16 in)
Compressed fibre sheet	3.2 to 6.4 (up to 1.5 mm); 3.2 to 13 (>1.5 mm)	125 to 250 (≤1/16 in); 125 to 500 (>1/16 in)

Sheet gaskets: the finer range applies to 1.5 mm (1/16 in) thick gaskets, the coarser one to thicker gaskets.

ASME B16.5 raised face	Serrated concentric or spiral, Ra 3.2 to 6.3 µm (125 to 250 µin), 45 to 55 grooves per inch (1.8 to 2.2 per mm), tool radius 1.5 mm or larger
Tongue and groove, small male and female	Ra 3.2 µm (125 µin) or finer
B16.5 ring joint groove	Side walls Ra 1.6 µm (63 µin) or finer
API 6A grooves	6B: 1.6 µm (63 µin); 6BX: 0.8 µm (32 µin) on all 23° surfaces
Radial marks	A radial scratch across the sealing face is a leak path that no gasket reliably seals

Allowable flatness of the gasket seating surface

ASME PCC-1 Appendix D

Measurement	Hard gaskets	Soft gaskets
Circumferential flatness, T1	less than 0.15 mm (0.006 in)	less than 0.25 mm (0.010 in)
Radial flatness, T2	less than 0.15 mm (0.006 in)	less than 0.25 mm (0.010 in)
Pass partition height, P (exchangers)	−0.25 to 0 mm	−0.50 to 0 mm

PCC-1 counts Kammprofile, corrugated and solid metal gaskets as hard (less than 1 mm compression at assembly) and spiral wound, PTFE, fibre and graphite sheet as soft. Values from PCC-1-2019; confirm against the edition your specification calls for.

Flange damage and alignment

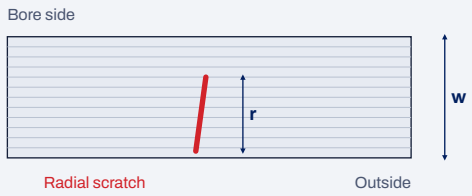
Check every flange face before fitting a new gasket. A defect matters most when it runs across the sealing width, so the limits depend on its radial length.

Allowable defect depth

Pits, dents, scratches and gouges

Radial length r, gasket width w	Hard-faced gaskets	Soft-faced gaskets
r less than w/4	less than 0.76 mm (less than 0.030 in)	less than 1.27 mm (less than 0.050 in)
w/4 less than r less than w/2	less than 0.25 mm (less than 0.010 in)	less than 0.76 mm (less than 0.030 in)
w/2 less than r less than 3w/4	Not allowed	less than 0.13 mm (less than 0.005 in)
r more than 3w/4	Not allowed	Not allowed

Hard-faced: all-metal sealing faces, such as solid metal, ring joints and double jacketed. Soft-faced: graphite, PTFE or fibre on the faces, such as spiral wound, Kammprofile and sheet. Depth is measured from the peaks of the finish. ASME PCC-1 Appendix D.



r is the length of the defect measured across the gasket seating width w.

Alignment before tightening

ASME PCC-1 Appendix E

Centreline offset	1.5 mm (1/16 in) or less, checked at four points 90° apart
Parallelism	Gap difference 0.8 mm (1/32 in) or less at the sealing face OD
Bolt hole rotation	3 mm (1/8 in) or less
Gap	No more than twice the uncompressed gasket thickness
Force to align	Under 10 % of the total target bolt load, and no single bolt above 20 % of its target, without external devices
After assembly	Measure the gap at 8 or more points; uniform within 0.25 mm (0.010 in)

Ring joint flanges

If the gap between the raised faces of an RTJ joint falls below 1.5 mm (1/16 in) at any point, the grooves are worn or the ring is undersized: consider re-machining the grooves.

Troubleshooting leaks

Keep the removed gasket: how it is marked and damaged usually shows why the joint leaked.

Failure	What you see	Likely causes	Remedy
Blow-out	Gasket extruded or partly ejected; sudden large leak	Low residual stress from bolt loss or under-tightening; soft gasket too thick or unreinforced	Use a spiral wound with rings or a Kammprofile; restore bolt load with a controlled procedure; use the thinnest practical soft gasket
Crushing	Windings collapsed, outer ring dished, gasket extruded	Bolt load beyond the gasket capacity; no compression stop	Fit inner and outer rings; choose a gasket with higher load capacity; lower the target bolt stress
Inward buckling	Windings buckled into the bore; loose pieces downstream	No inner ring, especially with PTFE, large sizes and high classes; over-compression	Fit an inner ring (mandatory for PTFE and for the B16.20 size and class limits); control bolt load
Too little seating stress	Gasket barely marked; leaks at first pressurisation or hydrotest	Low bolt load or weak bolts; gasket too stiff or too wide	Raise the bolt load within flange and bolt limits; lubricate; choose a Kammprofile, corrugated or narrower gasket
Flange rotation	Gasket thinner at OD than ID; uneven marking	High bolt load on flexible flanges; gasket far from the bolts	Use a gasket that seals at lower stress; a convex Kammprofile on exchangers; check the flange design
Uneven compression	Marking varies around the gasket	Wrong tightening sequence, misalignment, uneven lubrication	Align the flanges first; tighten in a star pattern in rounds; check the gap at 8 points
Relaxation in cycling	Leaks after start-ups, shutdowns or temperature swings	Gasket and bolt relaxation; differential expansion	Kammprofile or spiral wound with inner ring; higher assembly stress; longer bolts or disc springs
Graphite oxidation	Filler lost from the outer edge; slowly growing leak	Graphite above about 450 °C in air, or very long service above about 340 °C	Phyllosilicate or mica filler, or inhibited graphite; protect the gasket OD from air
Corrosion of windings	Pitting, cracking, broken windings	Wrong winding metal for the media; chlorides with 300 series stainless	Choose the winding metal for the media (page 7); Alloy 20, Hastelloy, Monel or titanium as needed
Ring joint groove damage	Leak at an RTJ flange; marks in the groove	Ring harder than the groove; reused rings; damaged groove	Use a softer ring; never reuse rings; recut the groove if damaged
PTFE creep	Torque loss; thin, extruded PTFE	Unsupported PTFE under load and temperature	Filled or expanded PTFE; inner ring for PTFE filled spiral wound; avoid re-tightening hot
Face damage	Leak path at a radial scratch	Radial tool marks or damage across the sealing face	Assess against the defect limits on page 54; machine the face if outside them

Send us photographs of a failed gasket, both faces and the edge, with the flange details and operating conditions. We will review it and recommend a change.

Conversions and equivalents

Inch fractions

Fraction	in	mm
1/16 in	0.0625	1.59
1/8 in	0.1250	3.18
3/16 in	0.1875	4.76
1/4 in	0.2500	6.35
5/16 in	0.3125	7.94
3/8 in	0.3750	9.53
7/16 in	0.4375	11.11
1/2 in	0.5000	12.70
9/16 in	0.5625	14.29
5/8 in	0.6250	15.88
11/16 in	0.6875	17.46
3/4 in	0.7500	19.05
13/16 in	0.8125	20.64
7/8 in	0.8750	22.23
15/16 in	0.9375	23.81
1 in	1.0000	25.40

Temperature

°C	°F
-196 °C	-321 °F
-100 °C	-148 °F
-50 °C	-58 °F
0 °C	32 °F
50 °C	122 °F
100 °C	212 °F
150 °C	302 °F
200 °C	392 °F
250 °C	482 °F
260 °C	500 °F
300 °C	572 °F
350 °C	662 °F
400 °C	752 °F
450 °C	842 °F
500 °C	932 °F
550 °C	1022 °F
600 °C	1112 °F
650 °C	1202 °F
700 °C	1292 °F
760 °C	1400 °F
800 °C	1472 °F
870 °C	1598 °F
925 °C	1697 °F
1000 °C	1832 °F
1090 °C	1994 °F

Pressure, torque, force

Unit	Equals	Equals
1 bar	14.504 psi	0.1 MPa
1 MPa	145.04 psi	10 bar
1 ksi	6.895 MPa	68.95 bar
1 psi	0.06895 bar	6.895 kPa
1 N·m	0.7376 ft·lb	8.851 in·lb
1 ft·lb	1.3558 N·m	12 in·lb
1 in	25.4 mm	
1 lbf	4.448 N	

NPS and DN

NPS	DN
½	15
¾	20
1	25
1¼	32
1½	40
2	50
2½	65
3	80
4	100
5	125
6	150
8	200
10	250
12	300
14	350
16	400
18	450
20	500
24	600

ASME class and ISO 7005 PN

Designations only; pressure ratings depend on material and temperature

ASME class	150	300	400	600	900	1500	2500
PN designation	20	50	68	110	150	260	420

Sending an enquiry

Send a gasket list in any format: an Excel sheet, a PDF of the line list, or a photo of the old gasket with its marking. These are the details we need to quote correctly.

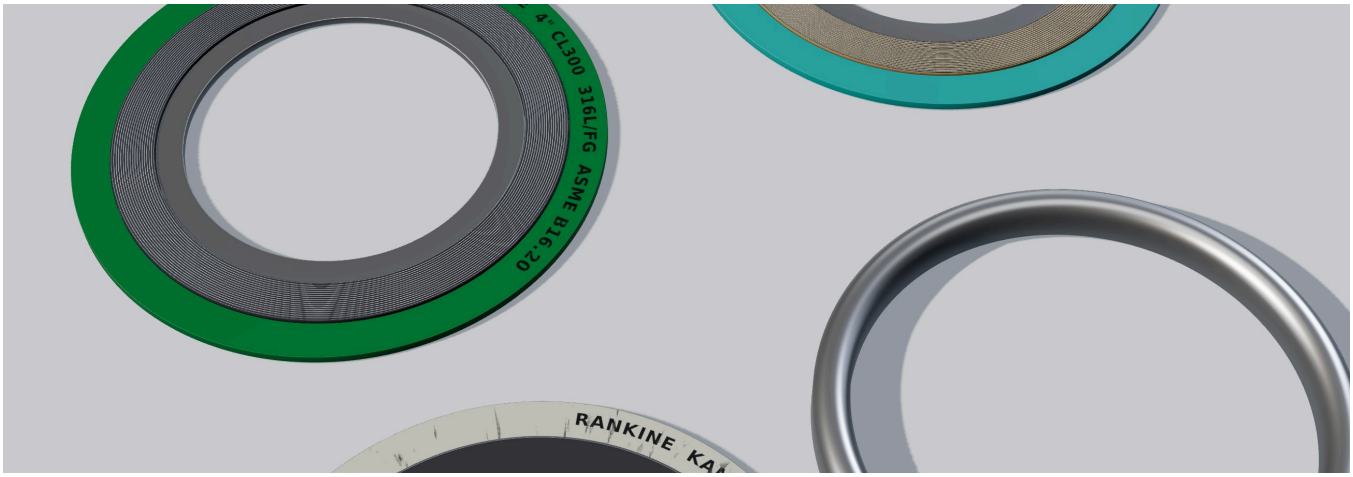
Flange	Standard (ASME B16.5, B16.47 A or B, EN 1092-1, API 6A), face type, size and class
Gasket	Family and style if known; quantity; any drawing
Service	Media, design and operating temperature, design pressure, cycling
Materials	Winding, core or jacket metal; filler or facing; ring metals; client material specification
Documents	Material certificates (EN 10204 3.1), inspection and test plan, vendor document requirements
Delivery	Required date, delivery point, kitting or labelling by tag

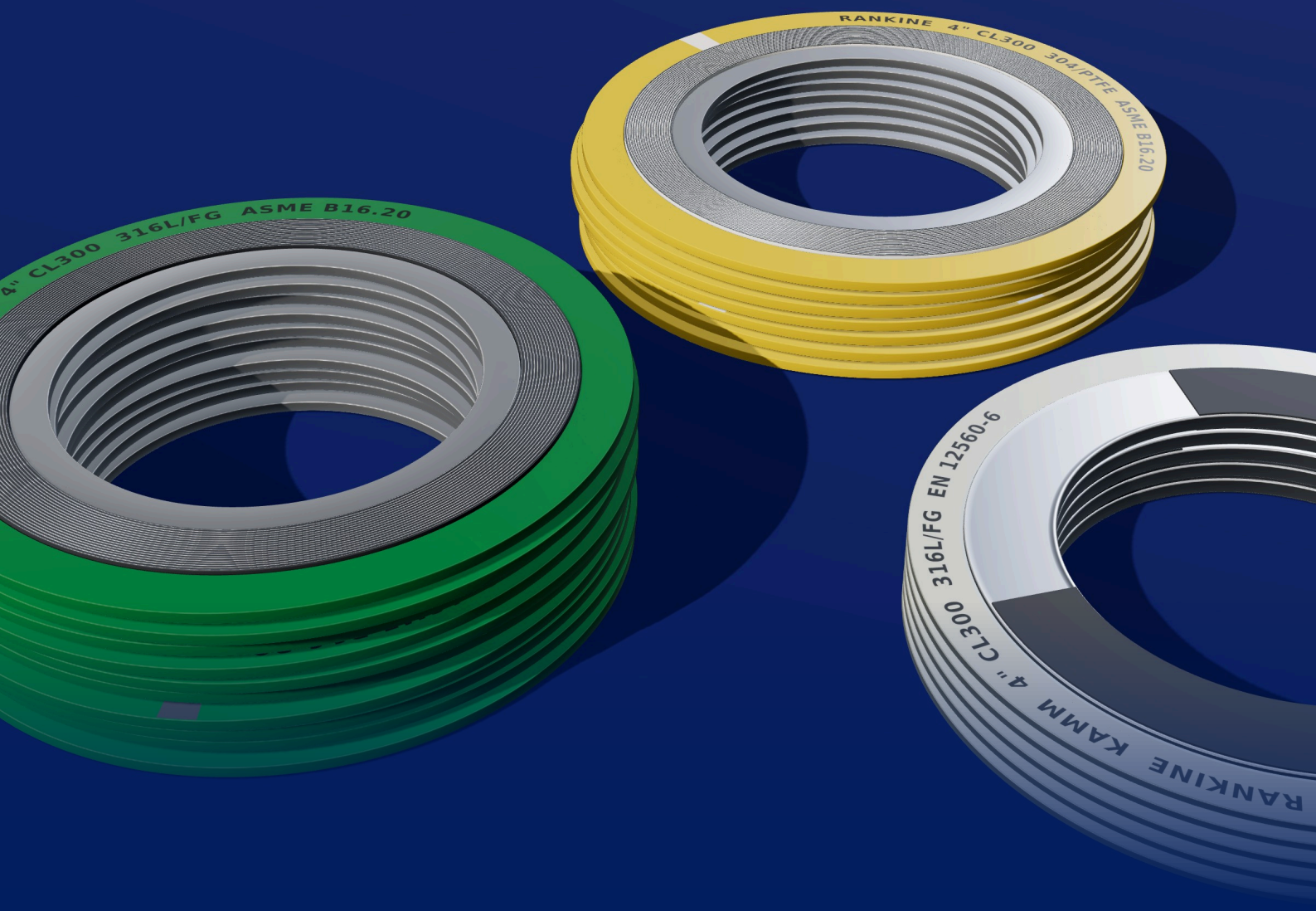
Request a quote

Email your list to **sales@rankinegaskets.com** or upload it at rankinegaskets.com/request-a-quote. For shutdowns, send the joint list early and we will kit and label by tag number.

Talk to an engineer

Call **+966 13 511 7681** or message us on WhatsApp on the same number for help choosing a gasket or reading a marking.





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Data in this catalogue is given in good faith for selection. Dimensions follow the standards cited; temperatures and stresses are typical values. Confirm the final selection against your specification and service conditions. Product images are 3D renders. 2026 edition.