



DONIT INDUSTRIAL SEALING SOLUTIONS

DONIT® Sealing technologies

As a leader in gaskets, gasket sheets, and advanced sealing technologies, we offer the optimum solution with a perfect fit for your most challenging sealing requirements. Backed by decades of excellence in understanding of sealing problems, extensive know-how in application engineering, and consistent manufacturing of reliable high quality products, we are in position to respond quickly and efficiently to your inquiry.

WE ARE A TRUE PARTNER FOR YOUR SUCCESS

With a wide experience in problem-solving and unshaken commitment to high quality standards, we are dedicated to provide you the best service and products. In addition, through customer-driven innovation, our strong R&D team is qualified to successfully design the adequate sealing solution.

Our customer satisfaction rests upon four pillars:

- Complete production chain and international sales network
- Quality assurance and safety
- Application engineering
- Technical training courses and seminars

THE DONIT® PHILOSOPHY

Our philosophy is based on building long-term business relationship with our customers that extends across many sectors of industries. Customer satisfaction is our driving-force which is attained through the constant supply of reliable and high quality products embracing product improvement and support.

DONIT® gasket sheets and sealing solutions are high quality products which have received several industrial quality approvals. Our products support the environmental legislation without compromising their sealing performance.

EMPLOYEES

Over 200 employees dedicated to you:

We strive for permanent professional and personal growth. We promote teamwork and diversity.

Our international team supports you regardless of your geographical location.

80% - Secondary school / technical school or lower

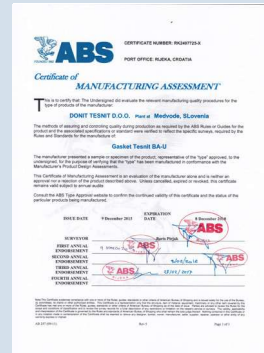
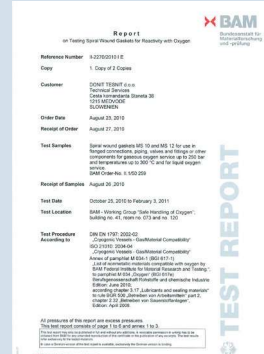
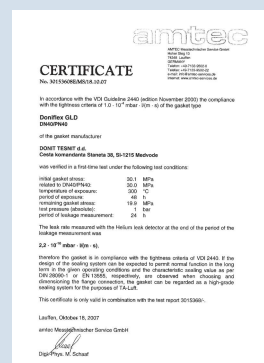
18% - Bachelor or equivalent

2% - Doctoral or equivalent

CERTIFIED QUALITY

We assure high quality, environmentally friendly products to our customers. Quality and care for the environment is embedded in both our minds and our organization. Care for the environment is embedded in our tradition. DONIT TESNIT d.o.o. is certified by international ISO 9001 and ISO 14001 standards.

We also ensure that product quality and safety are in accordance with a number of widely recognized international standards such as: DVGW (DIN 3535-6, VP 401), SVGW (DIN 3535-6), ELL, DVGW W270, BAM, WRAS, TA-Luft (VDI 2440), API 6FA / API 607, ISO 10497, ABS, DNV GL



TYPE	SECTION	APPLICATION	MAX DIAMETER (mm)	MAX THICKNESS (mm)	MAX OPERATING PRESSURE (bar)	MAX OPERATING TEMPERATURE (°C)	PG. NR.
MS10		valve bonets, stoppers for boilers	2200	2.5 ÷ 7.2	400	550	4
MS12		for high pressures, turbolences	2200	3.2 ÷ 7.2	400	550	4
MS14		for high pressures	2200	3.2 ÷ 7.2	400	550	4
MS16		for high pressures, turbolences	2200	3.2 ÷ 7.2	400	550	4
MS10T		gasket with sealing zone of PTFE	2200	3.2 ÷ 4.5	400	250	4
C		flange male-female	200	1.5 ÷ 5	100	550	10
MP10		heat exchangers, steam and fluid seal	4000	2 ÷ 10	100	550	10
MP10A		heat exchangers, steam and fluid seal	4000	3 ÷ 5	100	550	10
MP12		big flanges, not ideal flat	4000	2 ÷ 10	100	550	10
MP14		heat exchangers, steam and fluid seal	4000	2 ÷ 10	100	550	10
MP16		gas and vapor seals	4000	2 ÷ 5	100	550	10
MP18		gas and vapor seals	4000	2 ÷ 5	100	550	10
MP19		valve covers and vacuum seals	4000	2 ÷ 4	100	550	10
MP22		steam (vapor) and fluid seals	2000	2 ÷ 5	100	700	10
M7A		power plants, manhole, heat exchangers	3000	2.5 ÷ 6	400	700	16
M7B		power plants, manhole, heat exchangers	3000	2.5 ÷ 7	400	700	16
M7C		power plants, manhole, heat exchangers	3000	2.5 ÷ 8	400	700	16
M7E		power plants, manhole, heat exchangers	3000	2.5 ÷ 9	400	700	16
M10		power plants, manhole, heat exchangers	3000	0.2 ÷ 3	400	550	16
M10A		power plants, manhole, heat exchangers	3000	2 ÷ 6	400	550	16
M14		air and gas compressor	1000	30	160	500	20
M15-R		high temperature and pressure	1000	11.18 ÷ 44.45	700	1000	20
M16-R		high temperature and pressure	1000	9.65 ÷ 41.4	700	1000	20
M17-L		check valves, high temperature	1000	8 ÷ 50	320	600	20
M18-RX		high temperature and pressure	600	19.05 ÷ 25.4	700	1000	20
M19-BX		high temperature and pressure	850	9.30 ÷ 39.84	1500	1000	20
MW12		low pressure applications, space limitation	2000	1.2 ÷ 1.5	50	550	23
MW12A		low pressure applications, higher temperatures, gas ducts	2000	3 ÷ 5	50	550	23
MW12AE		low pressure applications, higher temperatures, gas ducts	2000	4 ÷ 5	50	550	23
MW13A		low pressure applications, higher temperatures, gas ducts	2000	4 ÷ 5	50	550	23
MW13AE		low pressure applications, higher temperatures, gas ducts	2000	4 ÷ 5	50	550	23
MW22A		flanges with large diameters, process industry	4000	8 ÷ 12	50	550	23
MW23A		flanges with large diameters, process industry	4000	8 ÷ 12	50	550	23
MW12C		flanges with large diameters, process industry	2000	5 ÷ 8	50	550	23
BA10		all common applications	1500	1.5 ÷ 3	100	250	26
MP1		good resistance to erosion	1500	1.5 ÷ 3	150	450	33
MP1		good resistance to erosion	1500	1.5 ÷ 3	250	450	33
TF02÷TF040		high chemical stability, good resistance to aggressive chemicals	800	2 ÷ 10	50	250	35

Temperature and pressure represent maximum values and should not be used simultaneously. They are given only as guidance, since they depend not only on the type of gasket material but also on the assembly conditions. Very important factors are nature of service medium, type of flange, surface pressure and others. Given values are recommended for typical flange gaskets constructions. Max. parameters can be changed by using special materials.

Industrial Sealing Solutions

SPIRAL WOUND GASKETS



PROPERTIES AND APPLICATIONS

Spiral wound gaskets are special semi-metallic gaskets of great resilience, therefore they are very suitable for applications featuring heavy operating conditions. Spiral wound gaskets are manufactured by spirally winding a V-shaped metal strip and a strip of non-metallic filler material. The metal strip holds the filler, providing the gasket with mechanical resistance and resilience. Spiral wound gaskets can be reinforced by an outer centering ring and/or inner retaining ring. The outer centering ring controls the compression and holds the gasket centrally within the bolt circle. The inner retaining ring increases the axial rigidity and resilience of the gasket. Spiral wound gaskets should always be in contact with the flange and should not protrude into the pipe or project from the flange. They can be used for sealing flange joints, manhole and handhold covers, tube covers, boilers, heat exchangers, pressure vessels, pumps, compressors and valves; in industries such as petrochemical, pharmaceutical, shipbuilding, and food processing, in power industries and nuclear power stations. They are ideal for sealing steam, oil, liquids, gases, acids, alkalines, various organic media and solvents.

ADVANTAGES

Sealing under heavy operating conditions. Strong stress compensation, stable and reliable sealing performance even under frequent pressure fluctuation conditions. Solid construction provides stability and sealability even when the sealing surfaces are slightly corroded or bent. Easy installation.

SHAPE AND CONSTRUCTION

Spiral wound gaskets are produced in several types and combination of materials to fit the most stringent application. Spiral wound gaskets are usually of circular shape, however we can produce them in other shapes such as: oval, rectangular, with round corners, etc. Our standard production program comprises a range of spiral wound gaskets with inner diameters of 10 mm to 3000 mm and a nominal thickness of 3.2 mm, 4.5 mm and 6.5 mm. Spiral wound gaskets of non-standard dimensions and shapes, and larger diameters are available on request.

GASKET STANDARD TYPES

- Gaskets without centering and inner ring (Type MS10)
- Gaskets without centering and inner ring (Type MS10T)*
- Gaskets with inner ring (Type MS12)
- Gaskets with centering (outer) ring (Type MS14)
- Gaskets with centering and with inner ring (Type MS16)

*With PTFE sealing zone

Metallic strip

Standard thickness of the metallic strip is 0.2 mm.

MATERIALS FOR METALLIC STRIP	
ASTM	EN Material No.
AISI 304	1.4301
AISI 309	1.4828
AISI 316, AISI 316L	1.4401, 1.4404
AISI 316Ti	1.4571
AISI 321	1.4541
Monel (NiCu30Fe)	2.4360

Other alloys available on request.

Filler

- Filler is normally used for thicknesses from 0.5 mm to 0.6 mm.
- Flexible graphite 98%
- Flexible graphite 99.85%
- PTFE, E-PTFE
- Mica

Centering ring

The centering ring does not come into direct contact with contained fluid. It is normally made of carbon steel and electroplated or painted to avoid corrosion. Other materials are available on request.

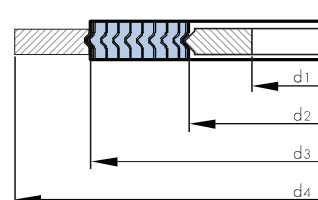
Inner ring

The inner ring is used to avoid excessive compression due to high seating stress in high-pressure service and it is also used to reduce turbulence in the flange area. It is normally made of the same material as the gasket metallic strip.

DIMENSIONS

Limitations for manufacturing of dimensions are general and can vary according to the special customer requirements.

LIMITATIONS FOR MANUFACTURING DIMENSIONS			
Thickness [mm]	Max diameter d_3 (mm)	Maximum width - b_g (mm)	
		Graphite	PTFE
2.5	300	16	13
3.2	700	22	19
4.5	1500	30	24
6.5	2300	35	24
7.2	2300	30	24



Thickness

The standard manufacturing thicknesses for spiral wound gaskets are: 3.2 mm, 4.5 mm and 6.5 mm (measured across metallic strip not including the filler, which protrudes 0.2-0.3 mm beyond the metal).

Manufacturing tolerances

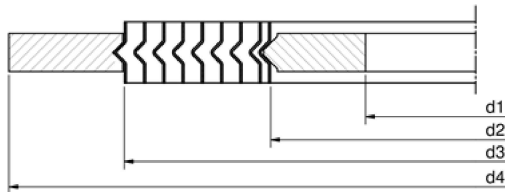
The tolerance of the gasket diameters (d_1 , d_2 , d_3 , d_4 , s , s_1 , s_2) are stipulated by ASME B16.20 and EN 1514-2 standards. The gaskets designed for non-standard flanges meet the recommendations by the ASME B16.20.

Dimensions

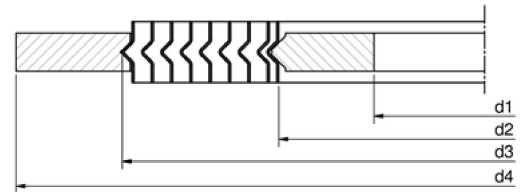
The dimensions of the standard SWG meet the ASME, BS, DIN and EN standards.

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SPIRAL WOUND GASKETS



Technical drawing for EN standards



Technical drawing for ASME standards

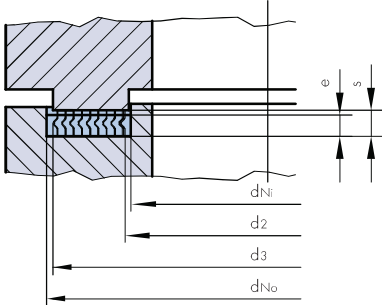
EN 1514-2:2005 Spiral wound gaskets for EN 1092-1 flanges

DN (mm)	d1 (mm)	d2 (mm)	d3 (mm)		d4 (mm)						
PN Class	PN 10-400	PN 10-400	PN 10-40	PN 64-400	PN 10	PN 16	PN 25	PN 40	PN 64	PN 100	PN 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	—
500	510	522	550	556	593	617	624	628	657	704	—
600	610	622	650	656	695	734	731	747	764	813	—
700	710	722	756	762	810	804	833	852	879	950	—
800	810	830	864	870	917	911	942	974	988	—	—
900	910	930	964	970	1017	1011	1042	1084	1108	—	—
1000	1010	1030	1074	1080	1124	1128	1154	1194	—	—	—

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SPIRAL WOUND GASKETS

LOAD BEARING GASKETS



Gasket compression

Spiral wound gaskets shall be designed in such a way that a uniform bolt stress, based on the nominal root diameter, will compress the gasket to a thickness [e].

STANDARD GASKET COMPRESSION			
s	3.2	4.5	6.5
e	$2.5^{+0.1}$	$3.3^{+0.1}$	$4.7^{+0.1}$

Connections with non-load bearing gaskets

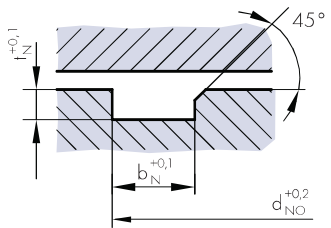
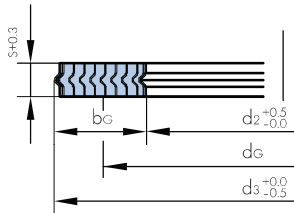
Since no standards exist as yet for the use of spiral-wound gaskets in non-load-bearing connections, the application of guidelines from the adjacent table is recommended.

Gaskets and grooves dimensions

SPIRAL WOUND GASKET				GROOVE				
d_g	s	b_g	d_3	d_2	d_{N0}	b_N	d_{Ni}	t_n
< 300	3.2	5-9	$d_g + b_g$	$d_g - b_g$	$d_3 + 1$	$b_g/0.86$	$d_{N0} - 2b_N$	$2.5^{+0.1}$
< 1000	3.2	9-17	$d_g + b_g$	$d_g - b_g$	$d_3 + 1.5$		$d_{N0} - 2b_N$	$2.5^{+0.1}$
< 300	4.5	5-9	$d_g + b_g$	$d_g - b_g$	$d_3 + 1$		$d_{N0} - 2b_N$	$3.3^{+0.1}$
< 1000	4.5	9-17	$d_g + b_g$	$d_g - b_g$	$d_3 + 1.5$		$d_{N0} - 2b_N$	$3.3^{+0.1}$

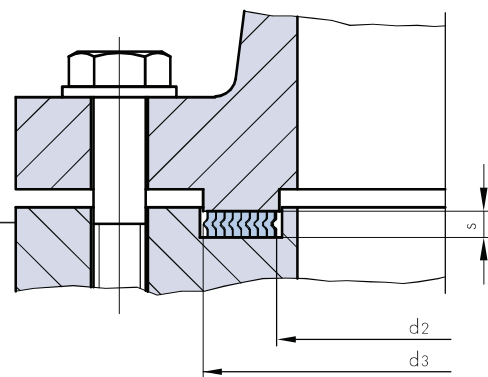
b_g - gasket width

b_N - groove width

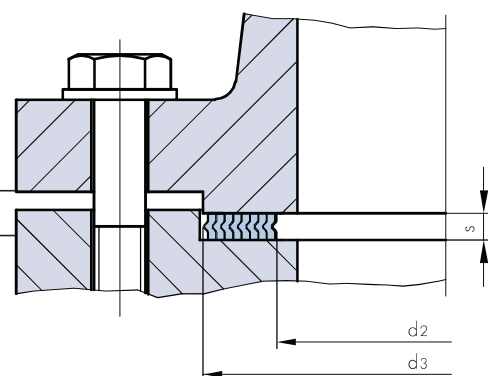


All standard and non-standard types can be delivered in non-standard dimensions according to customer request.

EN 1092 and ASME B16.5 TONGUE and GROOVE flanges meet SWG dimensions according to ASME B16.20 or other customer request.



EN 1092 and ASME B 16.5 MALE and FEMALE flanges meet SWG dimensions according to ASME B 16.20 or other customer request.



NON-STANDARD SWG

Gaskets for boilers handholes and manholes

Gaskets Type MS10 can be manufactured in other shapes like oval and oblong. There is no specific standard for this type of gasket. When ordering, complete specifications must be provided: inner dimensions (AxB), width (b) and thickness (s) or a drawing.

GASKET ORDERING EXAMPLE - ASME

Type, STANDARD, DN, PN.

Specify also material combinations and design required.

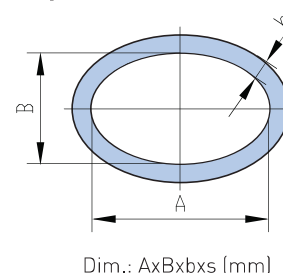
Design: SWG MS16, 2" / 300 lbs, ASME B16.20 for ASME B16.5

Winding and inner ring material: AISI 304

Filler material: Graphite 98% purity

Centering ring: CS

Oval shape



GASKET ORDERING EXAMPLE - EN

Type, STANDARD, DN, PN.

Specify also material combinations and design required.

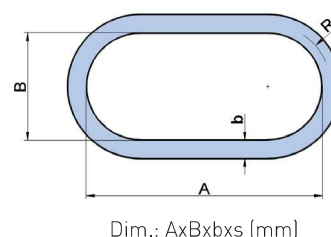
Design: SWG MS16, DN 80 / PN 16, EN 1514-2

Winding and inner ring material: Stainless steel 1.4301

Filler material: Graphite 98% purity

Centering ring: CS

Oblong shape



GASKET ORDERING EXAMPLE - CUSTOM SIZE

Type, STANDARD, d1, d2, d3, d4

Specify also material combinations and design required.

Design: SWG MS16, Ø1620/Ø1646/Ø1684/Ø1724

Winding and inner ring material: Stainless steel 1.4301

Filler material: Graphite 98% purity

Centering ring: CS

Industrial Sealing Solutions

METAL-JACKETED GASKETS



PROPERTIES AND APPLICATIONS

Metal-jacketed gaskets are particularly suitable for sealing flat surfaces of heat exchangers, gas pipes, cast iron flanges, autoclaves and similar. By their sealing efficiency, provided by exerting strong pressure on circular rims of the flanges, metal-jacketed gaskets can stand up to 30% deviation from the initial thickness, which is very useful in case of irregular or faulty flange rims. The chemical compatibility of the metal and the medium being sealed should be considered.

ADVANTAGES

Suitable for high assembly stress.
Highly resistant against blow-out.

SHAPE AND CONSTRUCTION

Metal-jacketed gaskets are produced in several types to meet the requirements of the most demanding applications. Inside a metallic jacket they feature a soft filler as shown in the figure.

Metallic Material

Material	ASTM	EN Material No.
Carbon steel	CS	1.0038 [DC04 St14]
Stainless steel	AISI 304	1.4301
Stainless steel	AISI 309	1.4828
Stainless steel	AISI 316, 316L	1.4401, 1.4404
Stainless steel	AISI 316Ti	1.4571
Stainless steel	AISI 321	1.4541
Monel (NiCu30Fe)	Alloy 400	2.4360
Copper	Copper	2.0090
Brass	Brass Ms 63	2.0321

The metallic jacket is normally 0.4 mm thick. Other materials are available on customer request.

Filler

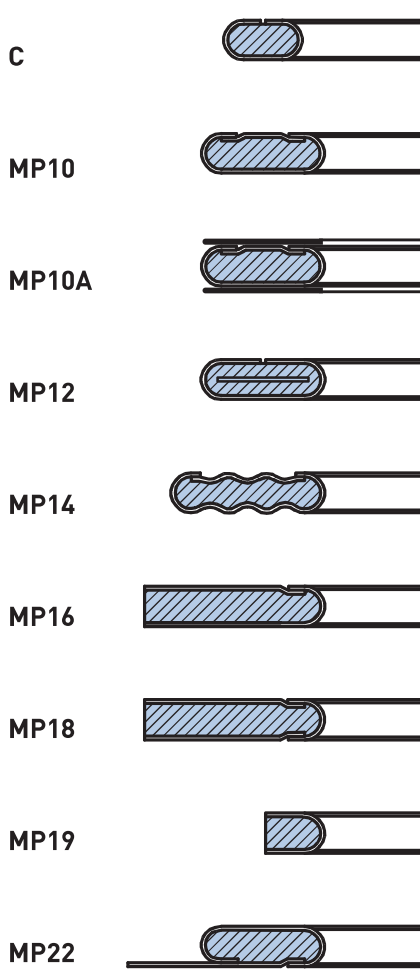
The standard filler material is flexible graphite.
Other fillers like ceramic, mineral or other can be also used.

SIZE

The metal jacketed gaskets come in sizes according to EN 1514-4 or ASME B16.20 standards.

Maximum size:

Outer diameter: up to 4000 mm
Thickness: from 2 to 10 mm



STANDARDS FOR METAL-JACKETED GASKETS USED WITH FLANGES

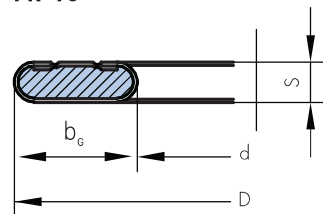
METAL-JACKETED GASKETS - Standard	Flange Standard
EN 1514-4:1997	EN 1092-1
EN 1514-7:2004*	EN 1092-1
ASME B16.20	ASME B16.5
ASME B16.20	ASME B16.47

*EN 1514-7:2004 is valid for covered metal-jacketed gaskets

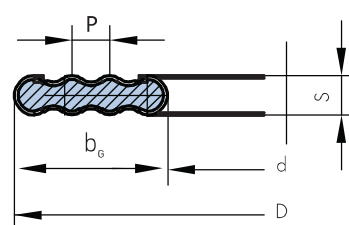
EN 1514-4:1997 Metal-jacketed gaskets for EN 1092-1 flanges

DN (mm)	Gasket inner diameter min. d (mm)	Gasket or center ring outer diameter D (mm)					
		PN10	PN16	PN25	PN40	PN63	PN100
10	18	48	48	48	48	58	58
15	22	53	53	53	53	63	63
20	27	63	63	63	63	74	74
25	34	73	73	73	73	84	84
32	43	84	84	84	84	90	90
40	49	94	94	94	94	105	105
50	61	109	109	109	109	115	121
65	77	129	129	129	129	140	146
80	89	144	144	144	144	150	156
100	115	164	164	170	170	176	183
125	141	194	194	196	196	213	220
150	169	220	220	226	226	250	260
200	220	275	275	286	293	312	327
250	273	330	331	343	355	367	394
300	324	380	386	403	420	427	461
350	356	440	446	460	477	489	515
400	407	491	498	517	549	546	575
450	458	541	558	567	574	-	-
500	508	596	620	627	631	660	708
600	610	698	737	734	750	768	819
700	712	813	807	836	-	883	956
800	813	920	914	945	-	994	-
900	915	1020	1014	1045	-	1114	-

MP10



MP14



ASME B16.20:2012 Metal-jacketed gaskets for ASME B16.5 flanges

NPS (in)	d (mm)	D (mm)						
		Class 150	Class 300	Class 400	Class 600	Class 900	Class 1500	Class 2500
1/2	22.4	44.5	50.8	50.8	50.8	60.5	60.5	66.8
3/4	28.7	54.1	63.5	63.5	63.5	66.8	66.8	73.2
1	38.1	63.5	69.9	69.9	69.9	76.2	76.2	82.6
1 1/4	47.8	73.2	79.5	79.5	79.5	85.9	85.9	101.6
1 1/2	54.1	82.6	92.2	92.2	92.2	95.3	95.3	114.3
2	73.2	101.6	108.0	108.0	108.0	139.7	139.7	143.0
2 1/2	85.9	120.7	127.0	127.0	127.0	162.2	162.2	165.1
3	108.0	133.4	146.1	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	

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METAL-JACKETED GASKETS

ASME B16.20:2012 Metal-jacketed gaskets for ASME B 16.47 series A flanges

NPS (in)	d (mm)	D (mm)				
	Class (lb)	150	300	400	600	900
26	673.1	771.7	831.9	828.8	863.6	879.6
28	723.9	828.8	895.4	889.0	911.4	943.1
30	774.7	879.6	949.5	943.1	968.5	1006.6
32	825.5	936.8	1003.3	1000.3	1019.3	1070.1
34	876.3	987.6	1054.1	1051.1	1070.1	1133.6
36	927.1	1044.7	1114.6	1114.6	1127.3	1197.1
38	977.9	1108.2	1051.1	1070.1	1101.9	1197.1
40	1028.7	1159.0	1111.3	1124.0	1152.7	1247.9
42	1079.5	1216.2	1162.1	1174.8	1216.2	1298.7
44	1130.3	1273.3	1216.2	1228.9	1267.0	1365.3
46	1181.1	1324.1	1270.0	1286.0	1324.1	1432.1
48	1231.9	1381.3	1320.8	1343.2	1387.6	1482.9
50	1282.7	1432.1	1374.9	1400.3	1444.8	
52	1333.5	1489.2	1425.7	1451.1	1495.6	
54	1384.3	1546.4	1489.2	1514.6	1552.7	
56	1435.1	1603.5	1540.0	1565.4	1603.5	
58	1485.9	1660.7	1590.8	1616.2	1660.7	
60	1536.7	1711.5	1641.6	1679.7	1730.5	

ASME B16.20:2012 Metal-jacketed gaskets for ASME B 16.47 series B flanges

NPS (in)	d (mm)	D (mm)				
	Class (lb)	150	300	400	600	900
26	673.1	722.4	768.4	743.0	762.0	835.2
28	723.9	773.2	822.5	797.1	816.1	898.7
30	774.7	824.0	882.7	854.2	876.3	955.8
32	825.5	877.8	936.8	908.1	930.4	1013.0
34	876.3	931.9	990.6	958.9	993.9	1070.1
36	927.1	984.3	1044.7	1019.3	1044.7	1120.9
38	977.9	1041.4	1095.5	1070.1	1101.9	1197.1
40	1028.7	1092.2	1146.3	1124.0	1152.7	1247.9
42	1079.5	1143.0	1197.1	1174.8	1216.2	1298.7
44	1130.3	1193.8	1247.9	1228.9	1267.0	1365.3
46	1181.1	1252.5	1314.5	1286.0	1324.1	1432.1
48	1231.9	1303.3	1365.3	1343.2	1387.6	1482.9
50	1282.7	1354.1	1416.1	1400.3	1444.8	
52	1333.5	1404.9	1466.9	1451.1	1495.6	
54	1384.3	1460.5	1527.3	1514.6	1552.7	
56	1435.1	1511.3	1590.8	1565.4	1603.5	
58	1485.9	1576.3	1652.5	1616.2	1660.7	
60	1536.7	1627.1	1703.3	1679.7	1730.5	

GASKET ORDERING EXAMPLE

STANDARD DIMENSION

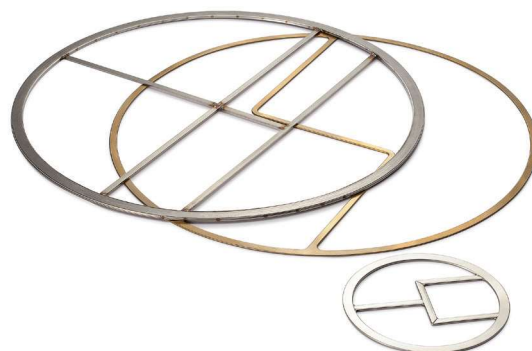
Metal-jacketed gasket MP10,
ASME B 16.20, 8" / 600 lbs,
Material: AISI 304,
Filler: Graphite

NON-STANDARD DIMENSION

Metal-jacketed gasket MP10,
D = 836 mm, d = 804 mm, s = 3.2 mm,
Material: Cu,
Filler: Ceramic

PROPERTIES AND APPLICATIONS

Heat exchanger gasket is a term that has been given to gaskets used in heat exchangers. The structure of the gasket or its type varies according to the operating conditions of the exchangers. The heat exchanger gaskets come in a wide spectrum of types including single or double-jacketed, corrugated, plain metal, soft and many others. A large selection of different materials allows heat exchangers to operate at temperatures beyond the capabilities of most soft gasket materials.



METAL-JACKETED GASKETS FOR HEAT EXC.

ADVANTAGES

- Available in wide range of materials, since they are all custom made. There are few limitations regarding size and shape.
- The metal jacket provides mechanical strength to contain the filler and improves chemical resistance.
- Unique construction provides stability and ensures trouble-free handling and installation.

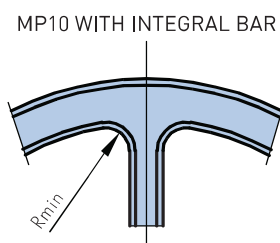
SHAPE AND CONSTRUCTION

These gaskets are used in shell and tube type heat exchangers. They can be manufactured in very different sizes, shapes, with or without bars. The primary seal is at the inner diameter of the gasket, the outer gasket diameter acts as a secondary seal. The bars seal between the heat exchangers passages.

The heat exchanger gaskets are produced in several types to meet the most demanding applications. Gaskets for heat exchangers can be manufactured in metal or alloy with a thickness 0.4 mm featuring a soft core inside a metallic jacket.

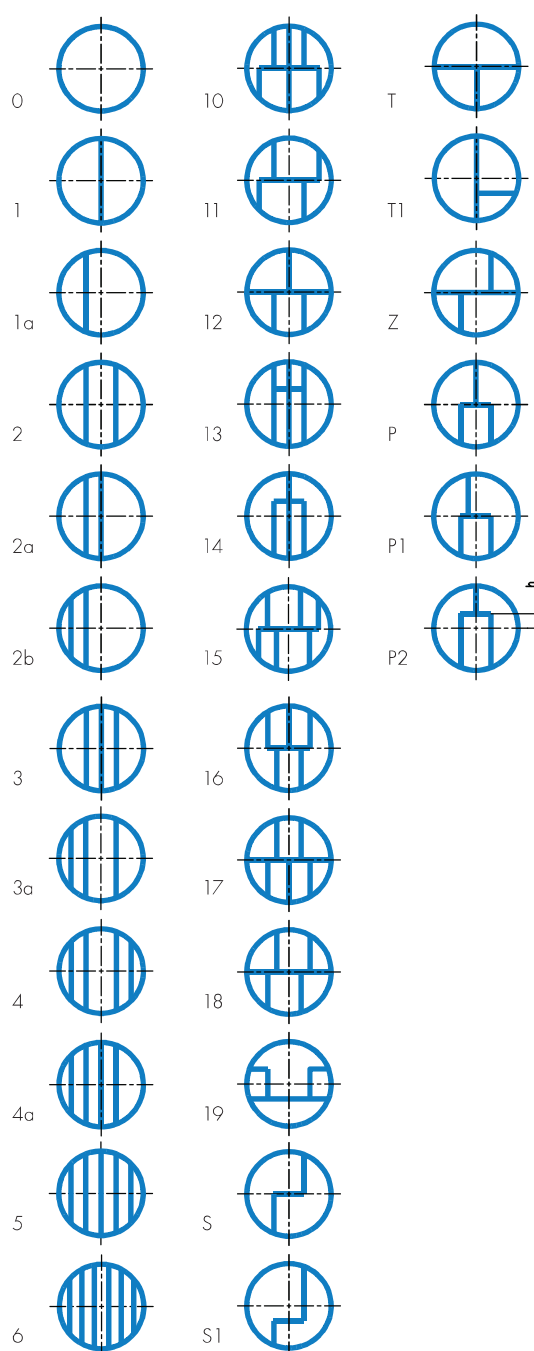
Gaskets with integrated bars

Traditionally double-jacketed gaskets for heat exchangers are manufactured with integrated bars. There is a radius between the bars and an internal diameter of the gaskets.



The values of the corresponding radius for the most commonly used metals and alloys are shown in the following table. If a radius is less than R_{min} , the material can crack, reducing the sealing properties of the gaskets.

GASKET MATERIALS and R_{min}	
Gasket material	R_{min}
Copper	8 mm
Soft iron	8 mm
Carbon steel	8 mm
Brass, Monel	10 mm
Stainless steel	10 mm



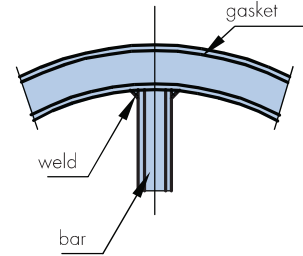
Industrial Sealing Solutions

GASKETS FOR HEAT EXCHANGERS

Gaskets with welded bars

Gaskets with welded bars have eliminated one of the greatest problems of conventional gaskets, namely cracks in the radius area. Metal or alloys are commercially available in sheets or rolls of 1000 mm width.

The primary and secondary seals are continuous all around the gasket. The gasket has excellent sealability, reducing leaks to the environment. The bars which seal between the heat exchangers passages are plasma or TIG welded with spot welds at each end. These welds should be soft and small to avoid areas of increased resistance to seating.



MP10 WITH WELDED BAR

Materials for heat exchanger gaskets

The selection of the jacket material depends on operating conditions. The standard filler is flexible graphite.

Metallic jacket

MATERIAL	ASTM	EN Material No.
Low carbon steel	CS	1.0038 (DC04 St14)
Stainless steel	AISI 304	1.4301
Stainless steel	AISI 309	1.4828
Stainless steel	AISI 316, AISI 316L	1.4401, 1.4404
Stainless steel	AISI 316Ti	1.4571
Stainless steel	AISI 321	1.4541
Monel (NiCu30Fe)	Alloy 400	2.4360
Copper	Copper	2.0090
Brass	Brass Ms 63	2.0321
Titanium	Titanium GR2	1.4462

Other alloys available on request.

Filler

Flexible graphite, ceramic, calandered sealing materials.

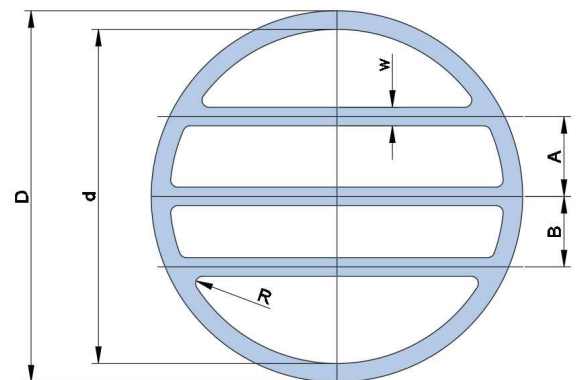
SIZES

STANDARD DIMENSIONS	
Gasket thickness	3.2 mm
Gasket width	10, 13 and 16 mm
Bar width	8, 10 and 13 mm

Gaskets with outer diameter to 1000 mm are normally made with integrated bars. Gaskets with an outer diameter greater than 1000 mm are normally made with welded bars. According to the heat exchangers shapes and sizes other dimensions can be manufactured on request.

GASKET ORDERING EXAMPLE

Gasket type (MP10, MP14), shape drawing dimensions: outer diameter D, inner diameter d, gasket thickness s, bar width w, radius R and distance between bars (A, B).
Material for metal jacket, material for filler.



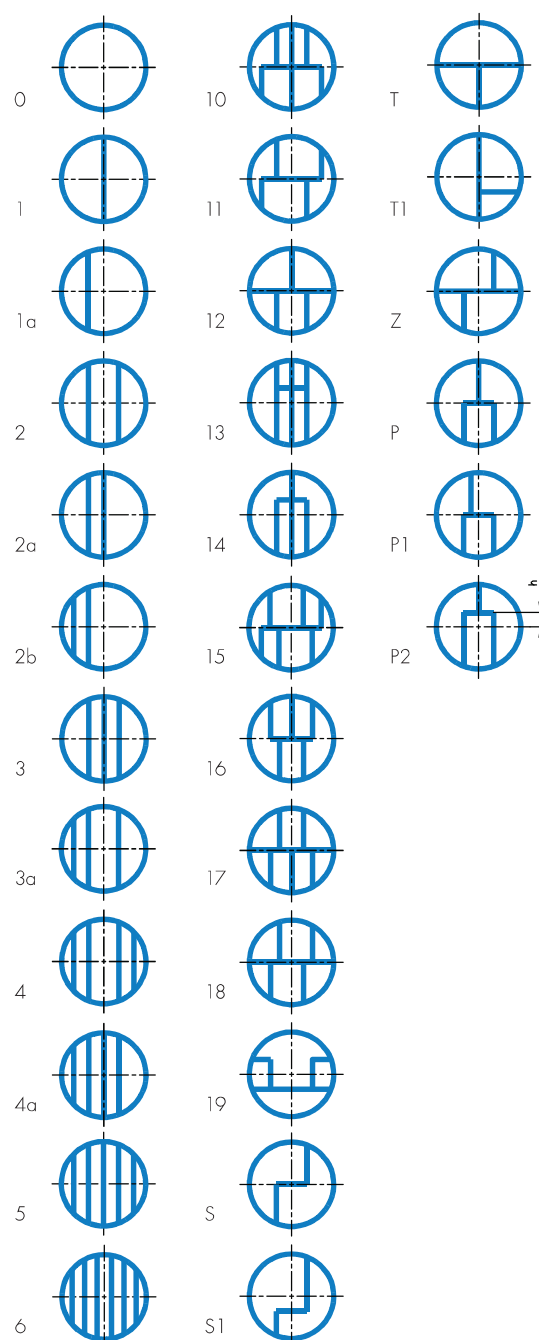
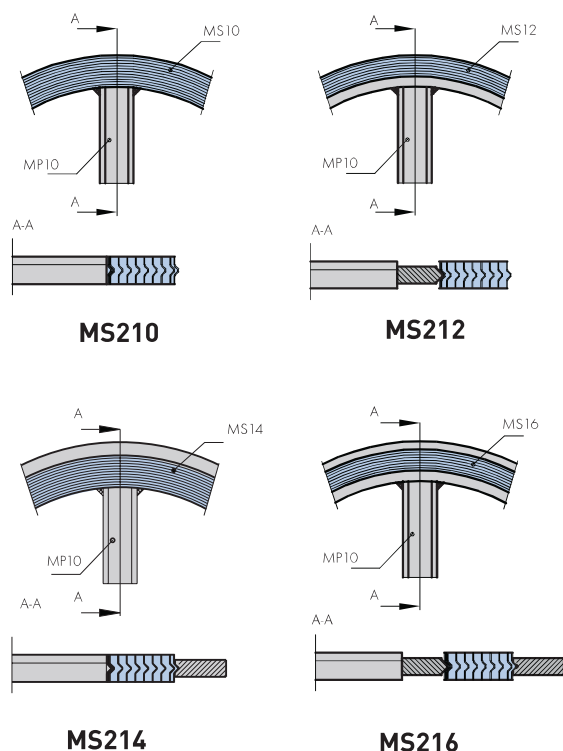
MP10

SPIRAL WOUND GASKETS FOR HEAT EXCHANGERS

The spiral wound gaskets of MS10, MS12, MS14 or MS16 type can be manufactured with one or more metal-jacketed bars (profile MP10) in different shape shown in drawing. Metal-jacketed bars are welded and made of the same material as the spiral windings. The standard thicknesses are 3.2 mm, 4.5 mm, 6.5 mm and 7.2 mm.

MAX. DIMENSIONS	
Thickness s (mm)	Max. diameter d ₃ (mm)
3.2	750
4.5	1500
6.5	2300
7.2	2300

METALLIC MATERIALS		
Material	ASTM	EN Material No.
Stainless steel	AISI 304	1.4301
Stainless steel	AISI 309	1.4828
Stainless steel	AISI 316, 316L	1.4401, 1.4404
Stainless steel	AISI 316Ti	1.4571
Stainless steel	AISI 321	1.4541
Monel (NiCu30Fe)	Alloy 400	2.4360



GASKET ORDERING EXAMPLE

SWG, type MS212,
metal-jacketed profile (MP10),
material: AISI 316L/flexible graphite,
shape drawing with dimensions

Industrial Sealing Solutions

GROOVED GASKETS



PROPERTIES AND APPLICATIONS

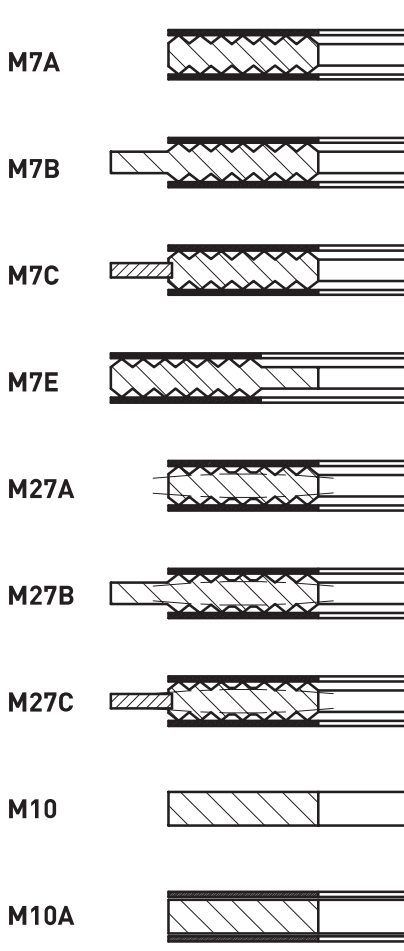
The grooved gasket is the preferred gasket solution when improved performance at low seating stresses is required. It features excellent anti-blow-out properties. A tighter joint is provided with reliable solid metal to metal seal combined with a soft sealing face. Metal gaskets with grooved faces have proven to be very effective for sealing flange connections, and they are particularly suitable for applications where high temperatures, pressures and fluctuating conditions are encountered. Non-metallic cover layers ensure that flanges are not damaged, even at extreme loads, and that they provide excellent sealing properties when supported by the grooved metallic gasket. The grooved gasket can be used as an alternative for applications associated with jacketed gaskets (for heat exchangers, vessels and reactors and various flanged connections).

ADVANTAGES

Capable of sealing pressures exceeding 250 bar.
Capable of withstanding temperatures up to 700 °C.
Particularly effective in maintaining performance under condition of fluctuating temperatures and pressures.
Solid construction provides stability even for large diameters and ensures trouble-free handling and installation.
Gaskets can be fitted to existing assemblies without modification.

SHAPE AND CONSTRUCTION

The grooved gaskets are produced in several types to fit the most demanding applications.

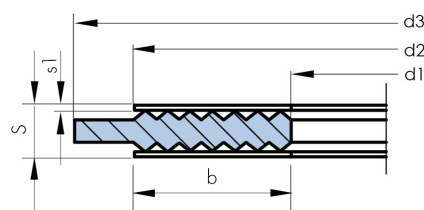


Metal core material

METAL CORE MATERIAL		
Material	ASTM	EN Material No.
Stainless steel	AISI 321	1.4541
Stainless steel	AISI 316Ti	1.4571
Stainless steel	AISI 304	1.4301
Stainless steel	AISI 316L	1.4404

SIZES

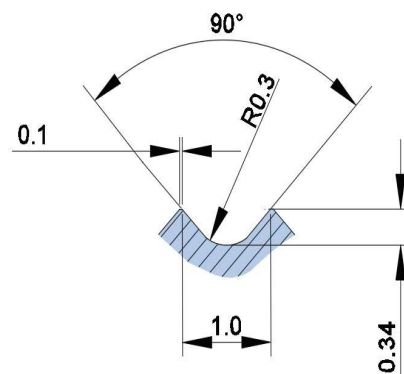
Upon request the grooved gaskets can be manufactured in various shapes and sizes.



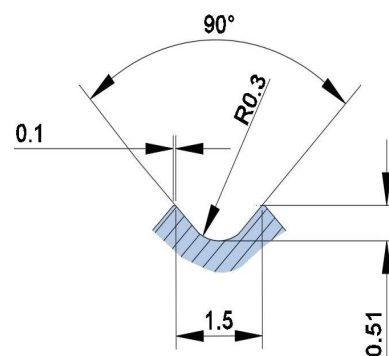
EN 12560-6:2003 Grooved gaskets for ASME B16.5 flanges

NPS [in]	d1 (mm)	d2 (mm)	d3 (mm)						
	Class [lb]		150	300	400	600	900	1500	2500
1/2	23.0	33.3	44.4	50.8	50.8	50.8	60.3	60.3	66.7
3/4	28.6	39.7	53.9	63.5	63.5	63.5	66.7	66.7	73.0
1	36.5	47.6	63.5	69.8	69.8	69.8	76.2	76.2	82.5
1 1/4	44.4	60.3	73.0	79.4	79.4	79.4	85.7	85.7	101.6
1 1/2	52.4	69.8	82.5	92.1	92.1	92.1	95.2	95.2	114.3
2	69.8	88.9	101.6	108.0	108.0	108.0	139.7	139.7	142.8
2 1/2	82.5	101.6	120.6	127.0	127.0	127.0	161.9	161.9	165.1
3	98.4	123.8	133.4	146.1	146.1	146.1	165.1	171.5	193.7
3 1/2	111.1	136.5	158.8	161.9	158.7	158.7			
4	123.8	154.0	171.5	177.8	174.6	190.5	203.2	206.4	231.7
5	150.8	182.6	193.7	212.7	209.5	238.1	244.5	250.8	276.2
6	177.8	212.7	219.1	247.7	244.5	263.5	285.8	279.4	314.3
8	228.6	266.7	276.2	304.8	301.6	317.5	355.6	349.3	384.1
10	282.6	320.7	336.5	358.8	355.6	396.9	431.8	431.8	473.0
12	339.7	377.8	406.4	419.1	415.9	454.0	495.3	517.5	546.1
14	371.5	409.6	447.7	482.6	479.4	488.9	517.5	574.7	
16	422.3	466.7	511.2	536.6	533.4	561.9	571.5	638.1	
18	479.4	530.2	546.1	593.7	590.5	609.6	635.0	701.7	
20	530.2	581.0	603.2	650.9	644.5	679.5	695.3	752.4	
22	581.0	631.8	657.2	701.7	698.5	730.3			
24	631.8	682.6	714.4	771.5	765.2	787.4	835.0	898.5	

FINE GROOVE PROFILE



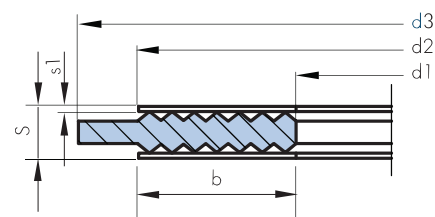
STANDARD GROOVE PROFILE



EN 1514-6:2003 Grooved gaskets for EN 1092-1 flanges

DN (mm)	d1 (mm)	d2 (mm)			d3 (mm)											
	PN Class	PN 10-40	PN 63-160	PN 250-400	PN 10	PN 16	PN 25	PN 40	PN 63	PN 100	PN 160	PN 250	PN 320	PN 400		
10	22	36	36	36	46	46	46	46	56	56	56	67	67	67		
15	26	42	42	42	51	51	51	51	61	61	61	72	72			
20	31	47	47	47	61	61	61	61								
25	36	52	52	52	71	71	71	71	82	82	82	83	92	104		
32	46	62	62	66	82	82	82	82								
40	53	69	69	73	92	92	92	92	103	103	103	109	119	135		
50	65	81	81	87	107	107	107	107	113	119	119	124	134	150		
65	81	100	100	103	127	127	127	127	137	143	143	153	170	192		
80	95	115	115	121	142	142	142	142	148	154	154	170	190	207		
100	118	138	138	146	162	162	168	168	174	180	180	202	229	256		
125	142	162	162	178	192	192	194	194	210	217	217	242	274	301		
150	170	190	190	212	217	217	224	224	247	257	257	284	311	348		
175	195	215	215	245	247	247	254	265	277	287	284	316	358	402		
200	220	240	248	280	272	272	284	290	309	324	324	358	398	442		
250	270	290	300	340	327	328	340	352	364	391	388	442	488			
300	320	340	356	400	377	383	400	417	424	458	458					
350	375	395	415		437	443	457	474	486	512						
400	426	450	474		489	495	514	546	543	572						
450	480	506			539	555		571								
500	530	560	588		594	617	624	628	657	704						
600	630	664	700		695	734	731	747	764	813						
700	730	770	812		810	804	833	852	879	950						
800	830	876	886		917	911	942	974	988							
900	930	982	994		1017	1011	1042	1084	1108							
1000	1040	1098	1110		1124	1128	1154	1194	1220							
1200	1250	1320	1334		1341	1342	1364	1398	1452							

M7B



PROFILE	s1 (mm)
standard	1.0
fine	0.5

Industrial Sealing Solutions

GROOVED GASKETS

ASME B16.20:2012 Grooved gaskets for ASME B16.5 flanges

NPS (in)	d1 (mm)	d2 (mm)	d3 (mm)						
			Class 150	Class 300	Class 400	Class 600	Class 900	Class 1500	Class 2500
1/2	23.1	33.3	47.8	54.1	54.1	54.1	63.5	63.5	69.9
3/4	28.7	39.6	57.2	66.8	66.8	66.8	69.9	69.9	76.2
1	36.6	47.5	66.8	73.2	73.2	73.2	79.5	79.5	85.9
1 1/4	44.5	60.2	76.2	82.6	82.6	82.6	88.9	88.9	104.9
1 1/2	52.3	69.9	85.9	95.3	95.3	95.3	98.6	98.6	117.6
2	69.9	88.9	104.9	111.3	111.3	111.3	143.0	143.0	146.1
2 1/2	82.6	101.6	124.0	130.3	130.3	130.3	165.1	165.1	168.4
3	98.3	123.7	136.7	149.4	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	492.9	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	605.6	654.1	647.4	682.8	698.5	755.7	
24	631.7	682.5	717.6	774.7	768.4	790.7	838.2	901.7	

ASME B16.20:2012 Grooved gaskets for ASME B16.47 series A flanges

NPS (in)	Class 150			Class 300			Class 400			Class 600			Class 900		
	Grooved Core			Grooved Core			Grooved Core			Grooved Core			Grooved Core		
	d1 (mm)	d2 (mm)	d3 (mm)	d1 (mm)	d2 (mm)	d3 (mm)	d1 (mm)	d2 (mm)	d3 (mm)	d1 (mm)	d2 (mm)	d3 (mm)	d1 (mm)	d2 (mm)	d3 (mm)
26	673.1	704.9	774.7	685.8	736.6	835.2	685.8	736.6	831.9	685.8	736.6	866.9	685.8	736.6	882.7
28	723.9	755.7	831.9	736.6	787.4	898.7	736.6	787.4	892.3	736.6	787.4	914.4	736.6	787.4	946.2
30	774.7	806.5	882.7	793.8	844.6	952	793.8	844.6	946.2	793.8	844.6	971.6	793.8	844.6	1009.7
32	825.5	860.6	939.8	850.9	901.7	1006.6	850.9	901.7	1003.3	850.9	901.7	1022.4	850.9	901.7	1073.2
34	876.3	911.4	990.6	901.7	952.5	1057.4	901.7	952.5	1054.1	901.7	952.5	1073.2	901.7	952.5	1136.7
36	927.1	968.5	1047.8	955.8	1006.6	1117.6	955.8	1006.6	1117.6	955.8	1006.6	1130.3	958.9	1009.7	1200.2
38	977.9	1019.3	1111.3	977.9	1016	1054.1	971.6	1022.4	1073.2	990.6	1041.4	1104.9	1035.1	1085.9	1200.2
40	1028.7	1070.1	1162.1	1022.4	1070.1	1114.6	1025.7	1076.5	1127.3	1047.8	1098.6	1155.7	1098.6	1149.4	1251
42	1079.5	1124	1219.2	1073.2	1120.9	1165.4	1076.5	1127.3	1178.1	1104.9	1155.7	1219.2	1149.4	1200.2	1301.8
44	1130.3	1178.1	1276.4	1130.3	1181.1	1219.2	1130.3	1181.1	1231.9	1162.1	1212.9	1270	1206.5	1257.3	1368.6
46	1181.1	1228.9	1327.2	1178.1	1228.9	1273.3	1193.8	1244.6	1289.1	1212.9	1263.7	1327.2	1270	1320.8	1435.1
48	1231.9	1279.7	1384.3	1235.2	1286	1324.1	1244.6	1295.4	1346.2	1270	1320.8	1390.7	1320.8	1371.6	1485.9
50	1282.7	1333.5	1435.1	1295.4	1346.2	1378	1295.4	1346.2	1403.4	1320.8	1371.6	1447.8	-	-	-
52	1333.5	1384.3	1492.3	1346.2	1397	1428.8	1346.2	1397	1454.2	1371.6	1422.4	1498.6	-	-	-
54	1384.3	1435.1	1549.4	1403.4	1454.2	1429.3	1403.4	1454.2	1517.7	1428.8	1479.6	1555.8	-	-	-
56	1435.1	1485.9	1606.6	1454.2	1505	1543.1	1454.2	1505	1568.5	1479.6	1530.4	1612.9	-	-	-
58	1485.9	1536.7	1663.7	1511.3	1562.1	1593.9	1505	1555.8	1619.3	1536.7	1587.5	1663.7	-	-	-
60	1536.7	1587.5	1714.5	1562.1	1612.9	1644.7	1568.5	1619.3	1682.8	1593.9	1644.7	1733.6	-	-	-

ASME B16.20:2012 Grooved gaskets for ASME B16.47 series B flanges

NPS (in)	Class 150			Class 300			Class 400			Class 600			Class 900		
	Grooved Core			Grooved Core			Grooved Core			Grooved Core			Grooved Core		
	d1 (mm)	d2 (mm)	d3 (mm)	d1 (mm)	d2 (mm)	d3 (mm)	d1 (mm)	d2 (mm)	d3 (mm)	d1 (mm)	d2 (mm)	d3 (mm)	d1 (mm)	d2 (mm)	d3 (mm)
26	673.1	698.5	725.4	673.1	711.2	771.7	666.8	698.5	746.3	663.7	714.5	765.3	692.2	749.3	838.2
28	723.9	749.3	776.2	723.9	762	825.5	714.5	749.3	800.1	704.9	755.7	819.2	743	800.1	901.7
30	774.7	800.1	827	774.7	812.8	886	765.3	806.5	857.3	778	828.8	879.6	806.5	857.3	958.9
32	825.5	850.9	881.1	825.5	863.6	939.8	812.8	860.6	911.4	831.9	882.7	933.5	863.6	914.4	1016
34	876.3	908.1	935	876.3	914.4	993.9	866.9	911.4	962.2	889	939.8	997	920.8	971.6	1073.2
36	927.1	958.9	987.6	927.1	965.2	1047.8	917.7	965.2	1022.4	939.8	990.6	1047.8	946.2	997	1124
38	974.9	1009.7	1044.7	1009.7	1047.8	1098.6	971.7	1022.4	1073.2	990.6	1041.4	1104.9	1035.1	1085.9	1200.2
40	1022.4	1063.8	1095.5	1060.5	1098.6	1149.4	1025.7	1076.5	1127.3	1047.8	1098.6	1155.7	1098.6	1149.4	1251
42	1079.5	1114.6	1146.3	1111.3	1149.4	1200.2	1076.5	1127.3	1178.1	1104.9	1155.7	1219.2	1149.4	1200.2	1301.8
44	1124	1165.4	1197.1	1162.1	1200.2	1251	1130.3	1181.1	1231.9	1162.1	1212.9	1270	1206.5	1257.3	1368.6
46	1181.1	1224	1255.8	1216.2	1254.3	1317.8	1193.8	1244.6	1289.1	1212.9	1263.7	1327.2	1270	1320.8	1435.1
48	1231.9	1270	1306.6	1263.7	1311.4	1368.6	1244.6	1295.4	1346.2	1270	1320.8	1390.7	1320.8	1371.6	1485.9
50	1282.7	1325.6	1357.4	1317.8	1355.9	1419.4	1295.4	1346.2	1403.4	1320.8	1371.6	1447.8	-	-	-
52	1333.5	1376.4	1408.2	1368.6	1406.7	1470.2	1346.2	1397	1454.2	1371.6	1422.4	1498.6	-	-	-
54	1384.3	1422.4	1463.8	1403.4	1454.2	1530.4	1403.4	1454.2	1517.7	1428.8	1479.6	1555.8	-	-	-
56	1444.8	1478	1514.6	1479.6	1524	1593.9	1454.2	1505	1568.5	1479.6	1530.4	1612.9	-	-	-
58	1500.6	1528.8	1579.6	1535.2	1573.3	1655.8	1505	1555.8	1619.3	1536.7	1587.5	1663.7	-	-	-
60	1557.3	1586	1630.4	1589	1630.4	1706.6	1568.5	1619.3	1682.8	1593.9	1644.7	1733.6	-	-	-

GASKET ORDERING EXAMPLE

Grooved gasket M7A, fine profile
 EN 1514-6, DN 80 / PN 40,
 material: 1.4541/Graphite 99.85% purity

Industrial Sealing Solutions

RING JOINT GASKETS



PROPERTIES AND APPLICATIONS

The metallic ring joint gaskets are manufactured according to the API 6A and ASME B16.20 standards for application at elevated temperatures and pressures. The small sealing area with high contact pressure results in great reliability. The contact surfaces of the gaskets and flange should be carefully processed. Some types of ring joints are pressure activated, which means, the higher the pressure the better the sealability.

ADVANTAGES

The metal ring joint gaskets have been designed to withstand exceptionally high assembly loads over a small area, thus producing high seating stresses.

SHAPE AND CONSTRUCTION

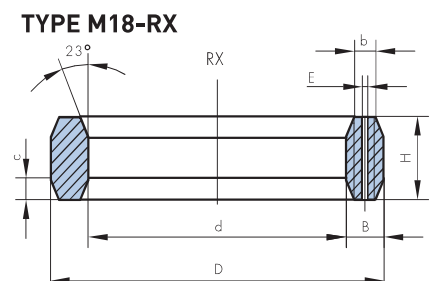
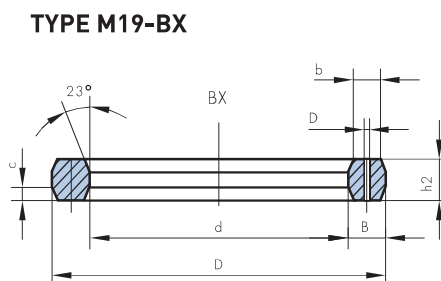
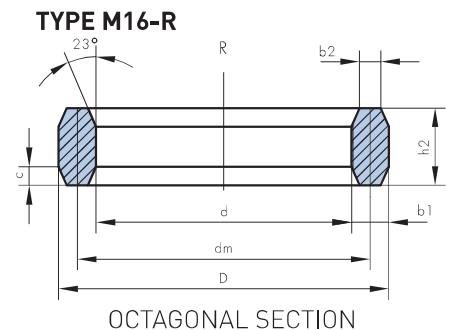
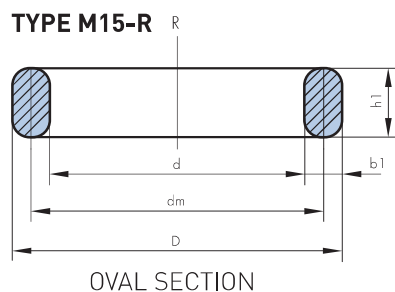
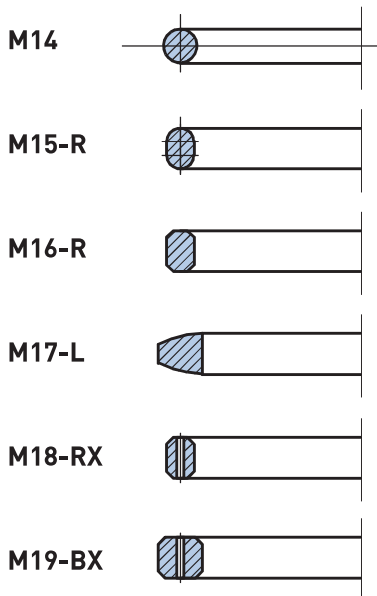
The ring joint gaskets are produced in several shapes and sizes to meet the most demanding applications.

STANDARD MATERIALS

STANDARD MATERIALS RECOMMENDED BY THE ASME B16.20				
ASTM	EN Material No.	Maximum HB "Brinell"	Maximum HRb "Rockwell B"	Material code
Soft Iron	1.1003	90	56	D
Low carbon steel	1.0038	120	68	S
4-6 chrome ½ Mo	1.7362 [AISI 501]	130	72	F5
AISI 410	1.4000	170	86	S410
AISI 304	1.4301	160	83	S304
AISI 316	1.4401	160	83	S316
AISI 347	1.4550	160	83	S347

DIMENSIONS

STANDARDS FOR RING JOINT GASKETS USED WITH FLANGES		
Ring joints gaskets type	Ring joints gaskets standard	Flange standard
R	ASME B16.20, API 6A	ASME B16.5, ASME B16.47
RX	ASME B16.20, API 6A	API 6B
BX	API 6A	API 6BX



GASKET ORDERING EXAMPLE

RING-JOINT GASKET API 6A,
R30-oval, material: AISI 321

ASME B16.20:2012 Type R ring gasket dimensions and tolerances

Tolerance	/	/	± 0.18	+ 1.3 - 0.5	+ 1.3 - 0.5	± 0.20
R	DIMENSIONS (mm)					
	D	d	d _m	h ₁	h ₂	b ₁
R 11	40.49	27.79	34.14	11.20	9.70	6.35
R 12	47.65	31.75	39.70	14.20	12.70	7.95
R 13	50.83	34.93	42.88	14.20	12.70	7.95
R 14	52.40	36.50	44.45	14.20	12.70	7.95
R 15	55.58	39.68	47.63	14.20	12.70	7.95
R 16	58.75	42.85	50.80	14.20	12.70	7.95
R 17	65.10	49.20	57.15	14.20	12.70	7.95
R 18	68.28	52.38	60.33	14.20	12.70	7.95
R 19	73.05	57.15	65.10	14.20	12.70	7.95
R 20	76.23	60.33	68.28	14.20	12.70	7.95
R 21	83.37	61.11	72.24	17.50	16	11.13
R 22	90.50	74.60	82.55	14.20	12.70	7.95
R 23	93.68	71.42	82.55	17.50	16	11.13
R 24	106.38	84.12	95.25	17.50	16	11.13
R 25	109.55	93.65	101.60	14.20	12.70	7.95
R 26	112.73	90.47	101.60	17.50	16	11.13
R 27	119.08	96.82	107.95	17.50	16	11.13
R 28	123.83	98.43	111.13	19.10	17.50	12.70
R 29	122.25	106.35	114.30	14.20	12.70	7.95
R 30	128.61	106.35	117.48	17.50	16	11.13
R 31	134.96	112.70	123.83	17.50	16	11.13
R 32	139.70	114.30	127	19.10	17.50	12.70
R 33	139.73	123.83	131.78	14.20	12.70	7.95
R 34	142.91	120.65	131.78	17.50	16	11.13
R 35	147.66	125.40	136.53	17.50	16	11.13
R 36	157.18	141.28	149.23	14.20	12.70	7.95
R 37	160.36	138.10	149.23	17.50	16	11.13
R 38	173.06	141.30	157.18	22.40	20.60	15.88
R 39	173.06	150.80	161.93	17.50	16	11.13
R 40	179.40	163.50	171.45	14.20	12.70	7.95
R 41	192.11	169.85	180.98	17.50	16	11.13
R 42	209.55	171.45	190.50	25.40	23.90	19.05
R 43	201.63	185.73	193.68	14.20	12.70	7.95
R 44	204.81	182.55	193.68	17.50	16	11.13
R 45	222.28	200.02	211.15	17.50	16	11.13
R 46	223.85	198.45	211.15	19.10	17.50	12.70
R 47	247.65	209.55	228.60	25.40	23.90	19.05
R 48	255.60	239.70	247.65	14.20	12.70	7.95
R 49	281.01	258.75	269.88	17.50	16	11.13
R 50	285.76	254.00	269.88	22.40	20.60	15.88
R 51	301.63	257.17	279.40	28.70	26.90	22.23
R 52	312.75	296.85	304.80	14.20	12.70	7.95
R 53	334.98	312.72	323.85	17.50	16	11.13
R 54	339.73	307.97	323.85	22.40	20.60	15.88
R 55	371.48	314.32	342.90	36.60	35.10	28.58
R 56	388.95	373.05	381	14.20	12.70	7.95
R 57	392.13	369.87	381	17.50	16	11.13

Tolerance	/	/	± 0.18	+ 1.3 - 0.5	+ 1.3 - 0.5	± 0.20
R	DIMENSIONS (mm)					
	D	d	d _m	h ₁	h ₂	b ₁
R 58	403.23	358.77	381	28.70	26.90	22.23
R 59	404.83	388.93	396.88	14.20	12.70	7.95
R 60	438.15	374.65	406.40	39.60	38.10	31.75
R 61	430.23	407.97	419.10	17.50	16	11.13
R 62	434.98	403.22	419.10	22.40	20.60	15.88
R 63	444.50	393.70	419.10	33.30	31.80	25.40
R 64	461.98	446.08	454.03	14.20	12.70	7.95
R 65	481.03	458.77	469.90	17.50	16	11.13
R 66	485.78	454.02	469.90	22.40	20.60	15.88
R 67	498.48	441.32	469.90	36.60	35.10	28.58
R 68	525.48	509.58	517.53	14.20	12.70	7.95
R 69	544.53	522.27	533.40	17.50	16	11.13
R 70	552.45	514.35	533.40	25.40	23.90	19.05
R 71	561.98	504.82	533.40	36.60	35.10	28.58
R 72	566.75	550.85	558.80	14.20	12.70	7.95
R 73	596.90	571.50	584.20	19.10	17.50	12.70
R 74	603.25	565.15	584.20	25.40	23.90	19.05
R 75	615.95	552.45	584.20	39.60	38.10	31.75
R 76	681.05	665.15	673.10	14.20	12.70	7.95
R 77	708.03	676.27	692.15	22.40	20.60	15.88
R 78	717.55	666.75	692.15	33.30	31.80	25.40
R 79	727.08	657.22	692.15	44.50	41.40	34.93
R 80	623.90	608.00	615.95	-	12.70	7.95
R 81	649.30	620.70	635	-	19.10	14.30
R 82	68.28	46.02	57.15	-	16	11.13
R 84	74.63	52.37	63.50	-	16	11.13
R 85	92.08	66.68	79.38	-	17.50	12.70
R 86	106.38	74.62	90.50	-	20.60	15.88
R 87	115.91	84.15	100.03	-	20.60	15.88
R 88	142.88	104.78	123.83	-	23.90	19.05
R 89	133.35	95.25	114.30	-	23.90	19.05
R 90	177.81	133.35	155.58	-	26.90	22.23
R 91	292.10	228.60	260.35	-	38.10	31.75
R 92	239.73	217.47	228.60	17.50	16	11.13
R 93	768.35	730.25	749.30	-	23.90	19.05
R 94	819.15	781.05	800.10	-	23.90	19.05
R 95	876.30	838.20	857.25	-	23.90	19.05
R 96	936.63	892.17	914.40	-	26.90	22.23
R 97	987.43	942.97	965.20	-	26.90	22.23
R 98	1044.58	1000.12	1022.35	-	26.90	22.23
R 99	246.08	223.82	234.95	-	16	11.13
R 100	777.88	720.72	749.30	-	35.10	28.58
R 101	831.85	768.35	800.10	-	38.10	31.75
R 102	889.00	825.50	857.25	-	38.10	31.75
R 103	946.15	882.65	914.40	-	38.10	31.75
R 104	1000.13	930.27	965.20	-	41.40	34.93
R 105	1057.28	987.42	1022.35	-	41.40	34.93

ASME B16.20:2012 Type BX ring gasket dimensions and tolerances

Tolerance	+0.0 - 0.15	/	+0.2 - 0.0	+0.2 - 0.0	± 0.5
R	DIMENSIONS (mm)				
	D	d	h ₂	B	E
BX-150	72.19	53.59	9.3	9.3	1.5
BX-151	76.4	57.14	9.63	9.63	1.5
BX-152	84.68	64.2	10.24	10.24	1.5
BX-153	100.94	78.18	11.38	11.38	1.5
BX-154	116.84	92.04	12.4	12.4	1.5
BX-155	147.96	119.52	14.22	14.22	1.5
BX-156	237.92	200.68	18.62	18.62	3
BX-157	294.46	252.5	20.98	20.98	3
BX-158	352.04	305.76	23.14	23.14	3
BX-159	426.72	375.32	25.7	25.7	3
BX-160	402.59	375.11	23.83	13.74	3
BX-161	491.41	458.99	28.07	16.21	3

Tolerance	+0.0 - 0.15	/	+0.2 - 0.0	+0.2 - 0.0	± 0.5
R	DIMENSIONS (mm)				
	D	d	h ₂	B	E
BX-162	475.49	447.05	14.22	14.22	1.5
BX-163	556.16	521.42	30.1	17.37	3
BX-164	570.56	521.38	30.1	24.59	3
BX-165	624.71	587.73	32.03	18.49	3
BX-166	640.03	587.75	32.03	26.14	3
BX-167	759.36	733.14	35.86	13.11	1.5
BX-168	765.25	733.15	35.86	16.05	1.5
BX-169	173.51	147.65	15.85	12.93	1.5
BX-170	218.03	189.59	14.22	14.22	1.5
BX-171	267.44	239	14.22	14.22	1.5
BX-172	333.07	304.63	14.22	14.22	1.5
BX-303	852.75	818.81	37.95	16.97	1.5

Industrial Sealing Solutions

RING JOINT GASKETS

ASME B16.20:2012 Type RX ring gasket dimensions and tolerances

Tolerances	+0.51 - 0	/	+0.2 - 0	+0.2 - 0	± 0.5
R	DIMENSIONS (mm)				
	D	d	B	H	E
RX-20	76.20	66.96	8.74	19.05	-
RX-23	93.27	80.37	11.91	25.40	-
RX-24	105.97	93.07	11.91	25.40	-
RX-25	109.55	100.31	8.74	19.05	-
RX-26	111.91	99.01	11.91	25.40	-
RX-27	118.26	105.36	11.91	25.40	-
RX-31	134.54	121.64	11.91	25.40	-
RX-35	147.24	134.34	11.91	25.40	-
RX-37	159.94	147.04	11.91	25.40	-
RX-39	172.64	159.74	11.91	25.40	-
RX-41	191.69	178.79	11.91	25.40	-
RX-44	204.39	191.49	11.91	25.40	-
RX-45	221.84	208.94	11.91	25.40	-
RX-46	222.25	208.89	13.49	28.58	-
RX-47	245.26	224.58	19.84	41.28	-
RX-49	280.59	267.69	11.91	25.40	-
RX-50	283.36	266.34	16.66	31.75	-
RX-53	334.57	321.67	11.91	25.40	-
RX-54	337.34	320.32	16.66	31.75	-
RX-57	391.72	378.82	11.91	25.40	-
RX-63	441.73	412.17	27.00	50.80	-
RX-65	480.62	467.72	11.91	25.40	-
RX-66	457.99	440.97	16.66	31.75	-
RX-69	544.12	531.22	11.91	25.40	-
RX-70	550.06	529.38	19.84	41.28	-
RX-73	596.11	582.75	13.49	31.75	-
RX-74	600.86	580.18	19.84	41.28	-
RX-82	67.87	54.97	11.91	25.40	1.5
RX-84	74.22	61.32	11.91	25.40	1.5
RX-85	90.09	76.73	13.49	25.40	1.5
RX-86	103.58	86.56	15.09	28.58	2.3
RX-87	113.11	96.09	15.09	28.58	2.3
RX-88	139.29	118.61	17.48	31.75	3.0
RX-89	129.77	109.09	18.26	31.75	3.0
RX-90	174.63	150.29	19.84	44.45	3.0
RX-91	286.94	247.32	30.18	45.24	3.0
RX-99	245.67	232.77	11.91	25.40	-
RX-201	51.46	45.06	5.74	11.30	-
RX-205	62.31	56.21	5.56	11.10	-
RX-210	97.64	86.82	9.53	19.05	-
RX-215	140.89	130.23	11.91	25.40	-

PROPERTIES AND APPLICATIONS

Corrugated gaskets without layer

There are different types of metal gaskets, like flat, grooved, tongue and sectional ones. They are used where compressibility (elasticity) of sealing material is not required. The construction of such gaskets based on the principle of different hardness of adjacent materials. These gaskets come in various shapes and there are almost no limits concerning their size. The corrugated metal gaskets have been proven to be both reliable and cost-effective for the application on flanges and heads where bolt loading is sufficient. Their operation principle is based on different degrees of hardness of adjacent materials. The sealing effect is produced by the constant load to which a gasket is exposed. They are used in applications, which require mechanical strength and thermal conductivity, as well as temperature and corrosion resistance. They are particularly useful when compressibility is not a factor and where sufficient clamping force is available. Metal gaskets feature greater mechanical strength, better heat transfer and resistance to higher temperatures and pressures, and can offer advantages over the clad type gaskets in certain applications.



Corrugated gaskets with soft layer

Corrugated metal is covered with graphite, ceramic or PTFE layers. An additional finishing layer is applied depending on the requirements of the medium to be sealed. Such gaskets are used on uneven or distorted sealing surfaces, where more elastic materials with better sealing performance are needed. The corrugated metal gaskets with soft layer on both sides are used in low-pressure applications in large diameter flue gas ducts at high temperatures. The use of corrugated gaskets eliminates the problem of difficult handling with large non-metal gaskets used in those applications. They are suitable for gas pipes and valve caps, or wherever acids, oils and chemicals are found. They can be used at lower pressures and higher temperatures.



Industrial Sealing Solutions

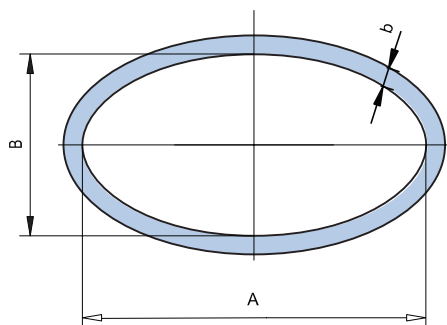
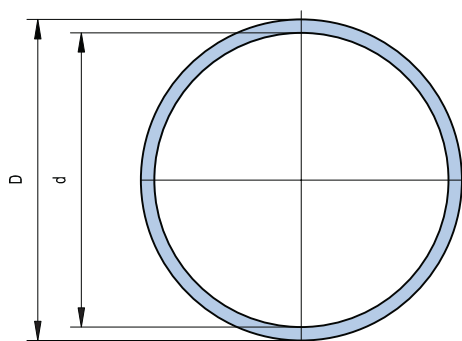
CORRUGATED METAL GASKETS

ADVANTAGES

- Outstanding mechanical strength and thermal conductivity.
- Capable of withstanding high temperatures.
- There are almost no limitations regarding size.
- Solid construction provides stability even for large diameters and ensures trouble-free handling and installation.

SHAPE AND CONSTRUCTION

The metal gaskets are produced in several types to meet the most demanding applications. Shapes: round, oval, rectangular etc.



Type: AxBxb (oval)

MATERIALS FOR METAL AND CORRUGATED METAL GASKETS

Material	ASTM	EN (DIN) Material No.
Low carbon steel	Soft iron (CS)	1.0333
Stainless steel	AISI 304	1.4301
Stainless steel	AISI 309	1.4828
Stainless steel	AISI 316, AISI 316L	1.4401, 1.4404
Stainless steel	AISI 316Ti	1.4571
Stainless steel	AISI 321	1.4541

EN 1514-4:1997 Corrugated gaskets for EN 1092-1 flanges

PN DN	d1 (mm)	d2 (mm)					
	10 - 100	10	16	25	40	63	100
10	18	48	48	48	48	58	58
15	22	53	53	53	53	63	63
20	27	63	63	63	63	74	74
25	34	73	73	73	73	84	84
32	43	84	84	84	84	90	90
40	49	94	94	94	94	105	105
50	61	109	109	109	109	115	121
65	77	129	129	129	129	140	146
80	89	144	144	144	144	150	156
100	115	164	164	170	170	176	183
125	141	194	194	196	196	213	220
150	169	220	220	226	226	250	260
200	220	275	275	286	293	312	327
250	273	330	330	343	355	367	394
300	324	380	386	403	420	427	461
350	356	440	446	460	477	489	515
400	407	491	498	517	549	546	575
450	458	541	558	567	574	-	-
500	508	596	620	627	631	660	708
600	610	698	737	734	750	768	819
700	712	813	807	836	-	883	956
800	813	920	914	945	-	994	-
900	915	1020	1014	1045	-	1114	-

EN 12560-4:2001 Corrugated gaskets for ASME B16.5 flanges

DN	Class NPS	d1 (mm)	d2 (mm)					
		150 - 2500	150	300	600	900	1500	2500
15	1/2"	22.0	47.6	54.0	54.0	63.5	63.5	69.9
20	3/4"	27.0	57.2	66.7	66.7	69.9	69.9	76.2
25	1"	34.0	66.7	73.0	73.0	79.4	79.4	85.7
32	1 1/4"	43.0	76.2	82.6	82.6	88.9	88.9	104.8
40	1 1/2"	49.0	85.7	95.3	95.3	98.4	98.4	117.5
50	2"	61.0	104.8	111.1	111.1	142.9	142.9	146.1
65	2 1/2"	73.0	123.8	130.2	130.2	165.1	165.1	168.3
80	3"	89.0	136.5	149.2	149.2	168.3	174.6	196.9
100	4"	115.0	174.6	181.0	193.7	206.4	209.6	235.0
125	5"	141.0	196.9	215.9	241.3	247.7	254.0	279.4
150	6"	169.0	222.3	250.8	266.7	288.9	282.6	317.5
200	8"	220.0	279.4	308.0	320.7	358.8	352.4	387.4
250	10"	273.0	339.7	362.0	400.1	435.0	435.0	476.3
300	12"	324.0	409.6	422.3	457.2	498.5	520.7	549.2
350	14"	356.0	450.9	485.8	492.1	520.7	577.9	
400	16"	407.0	514.4	539.8	565.2	574.7	641.4	
450	18"	458.0	549.3	596.9	612.8	638.2	704.9	
500	20"	508.0	606.4	654.1	682.6	698.5	755.7	
600	24"	610.0	717.6	774.7	790.6	838.2	901.7	

SIZE

Gaskets with an outer diameter up to 1000 mm are usually made in one piece, while larger dimensions are welded. Welding is also recommended for cost-effectiveness.

Profile

The metal is 0.5 mm thick and the corrugation pitch is 3 mm, 4 mm, 5 mm or 6 mm depending on the width and size of the gaskets. The thickness of corrugation is approx. 1 mm to 1.5 mm, depending on gasket size. Corrugated metal is covered with graphite, ceramic or PTFE layers in thickness 0.5 mm to 2 mm.

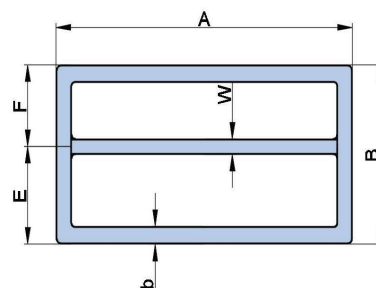
GASKET ORDERING EXAMPLE

STANDARD SIZE:

CORRUGATED GASKET MW12A, EN 1514-4, DN 100 / PN 40,
material: 1.4571/Graphite 99.85% purity

NON-STANDARD DIMENSION:

CORRUGATED GASKET MW12A, D=946 mm, d=914 mm, s=3.5 mm,
material: AISI 316Ti/Graphite 99.85% purity



PROPERTIES AND APPLICATIONS

The metal eyeleted flat gaskets offer special protection against blowout for the sealing of critical or dangerous media. The sealing insert is usually made from TESNIT BA or Grafilit gasket material. The standard metal jacket is formed with an austenitic stainless steel leaf with a thickness 0.15 mm - 0.2 mm U-shaped and pressed in such a way that it becomes a single body with a base seal. The good malleability grade of the austenitic stainless steel gives the covering excellent mechanical properties and good resistance to erosion, while the well-known resistance to heat and corrosion ensures a long working life for the seal.



ADVANTAGES

- Blow out protection.
- Protection against chemical attack.
- Improved sealability due to the local higher stress under eyelet.

SHAPE AND CONSTRUCTION

Gaskets are available according to EN 1514-1, ASME B16.21 and other Standard Forms. Custom made gaskets are available upon request.

SIZE

The only limitation of the eyeleted gasket is the size of the basic gasket material.

Size limitations:

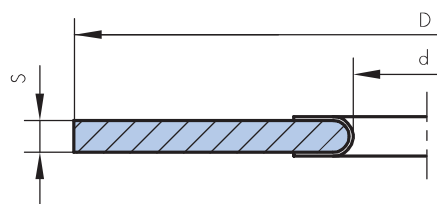
From 20 mm to 400 mm one piece eyelet.

From 400 mm upwards plasma welded eyelet.

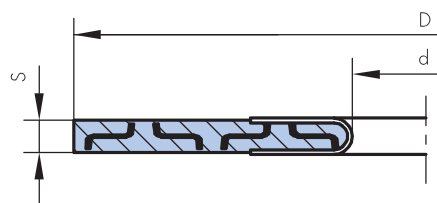
The standard production follows the sizes and norms by ASME B16.21 and EN 1514-1.

GASKET ORDERING EXAMPLE

EN 1514-1, DN65 / PN 16, Form IBC,
material: TESNIT BA-U, 2 mm, eyelet AISI 316



MP1



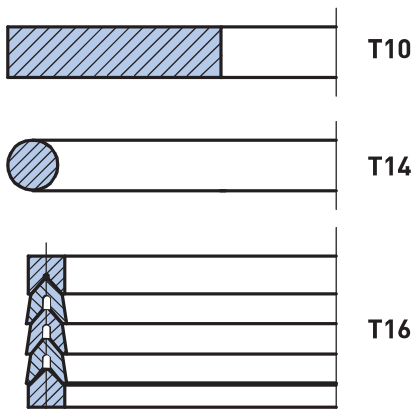
Industrial Sealing Solutions

PTFE GASKETS

PROPERTIES AND APPLICATIONS

PTFE gaskets are one of the most suitable types of gaskets for a variety of sealing applications and are mostly based on virgin PTFE or filled PTFE. PTFE gaskets provide an extensive range of applications. PTFE is a fluoropolymer, which features an outstanding chemical resistivity to almost all chemicals, good thermal insulation properties, and useful mechanical and processing characteristics. The above-mentioned PTFE features can be usefully applied in PTFE gaskets. They can be mostly used in valve seats, bearings, requested to resin sliding and chemicals, elastic band for un-lubricated compressors, O-rings where elastomers are not durable. In addition, an extended range of improved mechanical and processing properties can be achieved by combining virgin PTFE with different fillers. Different combinations offer a variety of different properties as described in the following table.

Filler	Improved properties
Glass	• enhanced wear resistance • chemical resistance
Graphite	• extremely low coefficient of friction • fairly good compressive strength • good wear resistance
Carbon	• good thermal resistance • resistance to deformation
Bronze	• enhanced compressive strength • good wear resistance • high thermal conductivity



Expanded PTFE gaskets and seal materials consist of virgin PTFE with multidirectional fibrous and/or porous structure, which the extruded PTFE consists of. A special manufacturing process provides the material with special chemical and physical properties. This can be of advantage in a wide range of applications.

ADVANTAGES

Virgin PTFE, PTFE compounds and expanded PTFE offer a wide range of compounded products with good mechanical properties, electrical properties, thermal properties, chemical resistance, low friction coefficient and good resistance to wear.

SHAPE AND CONSTRUCTION SIZE

Several types of PTFE gaskets are produced to meet the most demanding application.

Materials

Donit is using virgin PTFE powder and compounds for RAM extrusion and compression moulding delivered exclusively by recognised supplier.

SIZE

SIZE limitations: each piece can feature a maximum external diameter of up to 1000 mm.

GASKET ORDERING EXAMPLE

EN 1514-1, DN 65 / PN 16,
Form IBC (virgin PTFE), 2 mm

STANDARDS FOR PTFE GASKETS USED WITH FLANGES	
Gasket standard	Flange standard
EN 1514-1	EN 1092-1, -2, -3, -4, EN 545, EN 598, EN 969

PROPERTIES AND APPLICATIONS

The sealing insert is made of corrugated stainless steel, soft non-asbestos material, or rubber and different combinations. This insert is coated with PTFE and open on one side, usually on the outer. Thanks to their high chemical stability, good mechanical properties and permanent resistance in the atmosphere (to humidity, gasses, temperature changes) they are suitable for all types of gaskets and different media, mostly for aggressive chemicals.



ADVANTAGES

Benefits from the high stability of C-F bond virgin PTFE, which is used for the envelope and exhibits extraordinary chemical resistance. Combinations of two or more insert materials allow a large number of different applications.

SHAPE AND CONSTRUCTION

The PTFE enveloped gaskets are produced in several types to meet the most demanding applications. Standard shapes are round or oval.

Enveloped material: Virgin PTFE

Base materials: stainless steel, non-asbestos material, rubber ...

SIZE

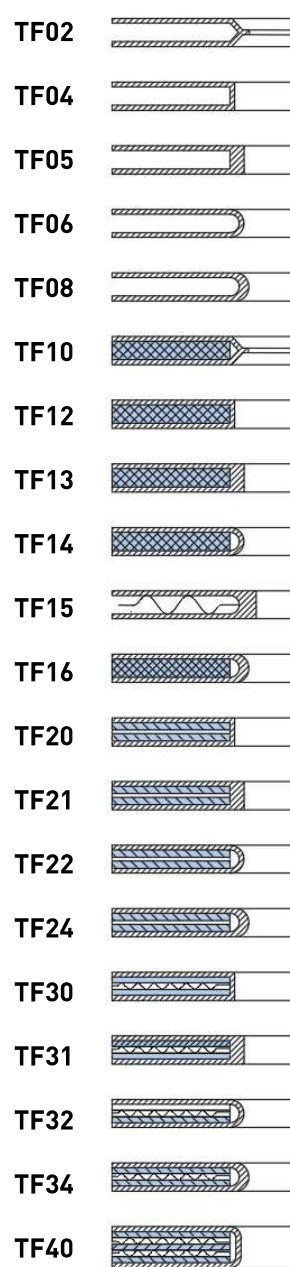
The PTFE envelope for gaskets with maximum external diameter of up to 500 mm are made in one piece, for gaskets with greater diameters they are welded. Oval shapes of PTFE envelopes are welded. There are no limitations regarding sizes for gaskets with welded envelopes.

EN 1514-3:1997 Non-metallic PTFE envelope gaskets

DN (mm)	Gasket inner diameter (mm)	Envelope outer diameter (mm)	Gasket outer diameter (mm)					
			PN6	PN 10	PN 16	PN25	PN40	PN63
			PN Class					
10	18	36	39	46	46	46	46	56
15	22	40	44	51	51	51	51	61
20	27	50	54	61	61	61	61	72
25	34	60	64	71	71	71	71	82
32	43	70	76	82	82	82	82	88
40	49	80	86	92	92	92	92	103
50	61	92	96	107	107	107	107	113
65	77	110	116	127	127	127	127	138
80	89	126	132	142	142	142	142	148
100	115	151	152	162	162	168	168	174
125	141	178	182	192	192	194	194	210
150	169	206	207	218	218	224	224	247
200	220	260	262	273	273	284	290	309
250	273	314	317	328	329	340	352	364
300	324	365	373	378	384	400	417	424
350	356	412	423	438	444	457	474	486
400	407	469	473	489	495	514	546	543
450	458	528	528	539	555	564	571	
500	508	578	578	594	617	624	628	
600	610	679	679	695	734	731	747	

GASKET ORDERING EXAMPLE

EN 1514-3, Type TF14, DN 65 / PN 16,
material: DONIFLEX G-LD, 2 mm, virgin PTFE



(and combinations)

PROPERTIES AND APPLICATIONS

Donit with its own technology, knowledge and experience is capable of meeting various customer needs. In close co-operation with customers the company develops and produces special types of gaskets for various applications. Gaskets are produced up to a size of 4000 mm in different special types for the most demanding applications in process industry for sealing hot gases.

ADVANTAGES

- Custom made gaskets according to customer specifications.
- Special large single piece gaskets up to 4000 mm in size.
- Unique and strong construction allows easy handling and transport.
- High temperature resistance up to 700 °C (depends on material).
- Capability to compensate for irregularities on flanges.

SHAPE AND CONSTRUCTION

Custom-made gaskets are made to customer's own drawing and specification, samples and templates. A highly skilled hardworking team can provide for almost any customer requirements.

DIMENSION

Up to 4000 mm, according to customers specification.

GASKET ORDERING EXAMPLE

According to customer specification.

AISI / ASTM	Individual name	Material No.	DIN 17006	Hardness HB	Tensile strenght - Rm (N/mm²)	Yield stress - Rp _{0.2} (N/mm²)	Temperature (°C)		Density (g/cm³)
							min.	max.	
FERROUS METALS									
A 570 Gr. 36	Low carbon steel	1.0038	RSt 37-2	100-130	370-450	220	-40	+ 450	7.85
Soft-iron	Soft-iron	1.1003	M2 / Armco	90-110	270-350	190	-60	+ 450	7.85
430	Stainless steel	1.4016	X6Cr17	130-170	450-600	270	-20	+ 350	7.70
304 (304H)	Stainless steel	1.4301	X5CrNi18-10	130-180	500-700	195	-200	+ 425	7.90
304L	Stainless steel	1.4306	X2CrNi19-11	130-170	460-680	180	-270	+ 425	7.90
316	Stainless steel	1.4401	X5CrNiMo17-12-2	130-180	500-670	205	-200	+ 425	7.95
316L	Stainless steel	1.4404	X2CrNiMo17-13-2	120-170	490-690	190	-200	+ 550	7.95
321	Stainless steel	1.4541	X6CrNiTi18-10	130-190	500-730	205	-270	+ 550	7.90
347	Stainless steel	1.4550	X6CrNiNb18-10	130-190	510-740	205	-200	+ 870	7.90
316Ti	Stainless steel	1.4571	X6CrNiMoTi17-12-2	130-190	500-730	215	-270	+ 550	7.98
309	Stainless steel	1.4828	X15CrNiSi20-12	130-220	500-750	230	-110	+ 800	7.90
B408, B409	Incoloy 800	1.4876	X10NiCrAlTi32-20	130-220	500-750	210	-110	+ 850	8.00
NON-FERROUS METALS									
-	Cooper	2.0090	SF-CU	55-65	200-250	90	-270	+ 350	8.94
Brass	Messing Ms 63	2.0321	CuZn 37	60-80	290-370	140	-200	+ 260	8.44
-	Plumbum 99.9	2.3040	Pb 99.9	4	12	-	-250	+ 200	11.50
-	Nickel 99.6	2.4060	Ni 99	100-150	340-400	140	-60	+ 600	8.90
Alloy 200	Nickel 99.2	2.4066	Ni 99.2	100-150	380-450	160	-60	+ 600	8.90
Alloy 400	Monel 400	2.4360	NiCu 30 Fe	100-130	450-580	200	-60	+ 500	8.88
Alloy 600	Inconel 600	2.4816	NiCr 15 Fe	140-200	550-800	200	-60	+ 600	8.42
-	Aluminium 99.5	3.0255	Al 99.5	20-25	70-80	509	-250	+ 300	2.70
-	Aluminium alloy	3.3315	AlMg 1	25-35	90-110	60	-250	+ 300	2.70
B 348 Gr. 1	Titan I	3.7025	71	110-140	290-410	180	-60	+ 300	4.50
B 348 Gr. 2	Titan II	3.7035	71	120-160	390-540	250	-60	+ 350	4.50

The values in the table are given only as guidance, since they depend not only on the type of material but also on the assembly conditions. Very important factors are type of gasket, nature of service medium, type of flange and surface stress.

Industrial Sealing Solutions

PHYSICAL PROPERTIES OF METAL GASKET MATERIALS

	Low-Carbon Steel	Brass	Lead	Copper	Aluminium	Monel	AlSi 304, 321	AlSi 316, 316Ti		Low-Carbon Steel	Brass	Lead	Copper	Aluminium	Monel	AlSi 304, 321	AlSi 316, 316Ti
SIMPLE AND COMBINED AROMATIC HYDROCARBONS									ALCOHOLS, ETHERS, ACIDS, ESTERS, ANHYDRIDES AND KETONES								
Aniline, $C_6H_5NH_2$									Acetone, CH_3COOH_3								
Citric acid, $C_6H_8O_7 \cdot H_2O$									Amyl acetate, $CH_3COOC_4H_{10}$								
Nitrobenzene, $C_6H_5NO_2$									Amyl alcohol, $C_5H_{11}OH$								
Toluene, $C_6H_5CH_3$									Acetic anhydride, $(CH_3CO)_2O$								
OTHER COMPOUNDS AND ORGANIC ELEMENTS									Cupric chloride, $CuCl_2$								
Bromine, Br									Cupric sulphate, $CuSO_4$								
Carbon dioxide, CO_2 , dry									Butyl alcohol, C_4H_9OH								
Carbon dioxide, CO_2 , wet									Butyl acetate, $CH_3COOC_4H_9$								
CO, hot									Zinc chloride, $ZnCl_2$								
Glue									Zinc sulphate, $ZnSO_4$								
Chlorine, Cl_2 , dry									Nitric acid, HNO_3 , crude								
Chlorine, Cl_2 , wet									Nitric acid, HNO_3 , diluted								
Oxygen, O_2 , at temp. below 260°C									Nitric acid, HNO_3 , concentrated								
Oxygen, O_2 , at temp. between 260°C and 535°C									Ethyl acetate, $CH_3COOC_2H_5$								
Oxygen, O_2 , at temp. over 535°C									Ethyl cellulose								
Creosote									Ethylene chloride, $(CH_2Cl)_2$								
Oxide, cold									Ethylene glycol, $(CH_2OH)_2$								
Ozone, O_3									Phenol, C_6H_5OH								
Steam, at temp. below 260°C									Formaldehyde, $HCHO$								
Steam, at temp. between 260°C and 535°C									Phosphoric acid, H_3PO_4								
Steam, at temp. over 535°C									- with concentr. below 45%								
Gas, lean									- cold, concentr. over 45%								
Gas, natural									- hot, concentr. over 45%								
Gas, coke gas									Hydrofluoric acid, HF								
Hydrogen (gas), H_2 , cold									- cold, concentr. below 65%								
Hydrogen (gas), H_2 , hot									- cold, concentr. over 65%								
Air									- hot, concentr. below 65%								
Mercury, Hg									- hot, concentr. over 65%								
Sulphur, S									Glycerine, $C_3H_8(OH)_3$								
Sulphur chloride, S_2Cl_2									Glucose								
BASES, ACIDS AND INORGANIC SALTS									Potash, K								
Aluminium fluoride, AlF_3									Potassium cyanide, KCN								
Aluminium chloride, $AlCl_3$									Potassium chloride, KCl								
Al-sulphate, $Al_2(SO_4)_3$									Potassium sulphate, K_2SO_4								
Ammonia vapour, NH_3 , cold									Stannic chloride, $SnCl_4$								
Ammonia vapour, NH_3 , hot									Chloroacetic acid, $CH_2ClCOOH$								
Ammonium monobas. phosph., $(NH_4)_2HPO_4$									Cresylic acid								
Ammonium dibasic phosph., $(NH_4)_2HPO_4$									Magnesium hydroxide, $Mg(OH)_2$								
Ammonium tribasic phosph., $(NH_4)_3PO_4$									Magnesium chloride, $MgCl_2$								
Ammonium hydroxide, NH_4OH									Magnesium sulphate, $MgSO_4$								
Ammonium chloride, NH_4Cl									Methyl alcohol, CH_3OH								
Ammonium nitrate, NH_4NO_3									Sodium cyanide, NaCN								
Ammonium sulphate, $(NH_4)_2SO_4$									Sodium phosphate, $Na_3PO_4 \cdot 12H_2O$, monobasic								
Barium hydroxide, $Ba(OH)_2$									Sodium phosphate, Na_2HPO_4 , dibasic								
Barium chloride, $BaCl_2$									Sodium phosphate, NaH_2PO_4 , tribasic								
Barium sulphide, BaS									Sodium hydroxide, NaOH								
Borax, $Na_2B_4O_7 \cdot 10H_2O$									Sodium hypochlorite, NaOCl								
Boric acid, H_3BO_3									Sodium carbonate, Na_2CO_3								
Bromic acid, HBr									Sodium chloride, NaCl								
Hydrocyanic acid, HCN									Sodium metaphosphate, $NaPO_3$								
Fluosilicic acid									Sodium nitrate, $NaNO_3$								
Phosphoric acid, H_3PO_4 , crude									Sodium perborate, $NaBO_3 \cdot 4H_2O$								
Alum, $KCr(SO_4)_2 \cdot 12H_2O$									Sodium peroxide, Na_2O_2								
Calcium bisulphite, $Ca(HSO_3)_2$									Sodium silicate, $Na_2SiO_3 \cdot K_2SiO_3$								
Calcium hydroxide, $Ca(OH)_2$									Sodium sulphate, Na_2SO_4								
Calcium hypochlorite, $CaOCl_2 \cdot 4H_2O$									Sodium sulphite, Na_2SO_3								
Calcium chloride, $CaCl_2$									Sodium thiosulphate, $Na_2S_2O_3$								
Chromic acid, H_2CrO_4									Nickel sulphate, $NiSO_4$								
Carbon bisulphide, CS_2									SIMPLE AND COMBINED ALIPHATIC HYDROCARBONS								
Hydrochloric acid, HCl , below 65°C									Acetylene, C_2H_2								
Hydrochloric acid, HCl , over 65°C									Butane, C_4H_{10}								
Iron chloride, $FeCl_3$									Freon, $CHClF_2$								
Iron sulphate, $Fe_2(SO_4)_3$									Methyl chloride, CH_3Cl								
FUELS, FLUIDS, LUBRICANTS									Lactic acid, $CH_3CHOHCOOH$, cold								
Asphalt									Lactic acid, $CH_3CHOHCOOH$, hot								
Petrol, with sulph. compounds									Formic acid, $HCOOH$								
Petrol, refined									Acetic acid, CH_3COOH , unrefined								
Benzoline									Acetic acid, CH_3COOH , pure								
Cellulose paints and solvents									Acetic acid, CH_3COOH , vapour								
Ether, $C_2H_5OC_2H_5$									Acetic acid, CH_3COOH at 10 bar and 200°C								
Vinegar, CH_3COOH , 5%									Oxalic acid, $(COOH)_2$								
Milk									Oleic acid, $C_{17}H_{33}COOH$								
Naphta									Palmitic acid, $C_{15}H_{31}COOH$								
Fuel oil									Molten picric acid, $(NO_2)_3C_6H_2OH$								
Linseed oil									Aqueous solution of picric acid $(NO_2)_3C_6H_2OH$								
Lubricant oil, unrefined									Propane, C_3H_8								
Lubricant oil, refined									Stearic acid, $C_{17}H_{35}COOH$								
Mineral oil									Carbon tetrachloride, CCl_4								
Castor oil									Solvents based on chlorine, dry								
Crude oil, at temp. below 260°C									Solvents based on chlorine, wet								
Crude oil, at temp. between 260°C and 535°C									Trichloroethylene, C_2HCl_3								
Crude oil, at temp. over 535°C									Nickel chloride, $NiCl_2$								
Tar									Sodium bicarbonate, Na_2CO_3								
Turpentine									Hydrogen peroxide, H_2O_2								
Water, H_2O distilled									Mercury chloride, $HgCl_2$								
Sea water, H_2O									Sulphurous acid, H_2SO_3								
Mineral water, H_2O with oxidizingsalts									Sulphuric acid, H_2SO_4								
Mineral water, H_2O without oxidizing salts									- cold, with concentr. up to 10%								
Drinking water, H_2O									- hot, with concentr. up to 10%								
									- cold, concentr. 10-75%								
									- hot, concentr. 10-75%								
									- cold, concentr. 75-95%								
									- hot, concentr. 75-95%								
									- steam concentr. 75-95%								
									Hydrogen sulphide, H_2S dry, cold								
									Hydrogen sulphide, H_2S dry, hot								
									Hydrogen sulphide, H_2S wet, cold								
									Hydrogen sulphide, H_2S wet, hot								

recommended

recommendation depends on operating conditions

not recommended

Chemical resistance chart for Tesnit products

The recommendations made here are intended as a guideline for the selection of a suitable gasket. The function and durability of these products depends upon a number of factors.

- + Recommended
- ? Recommendation depends on operating conditions
- Not recommended

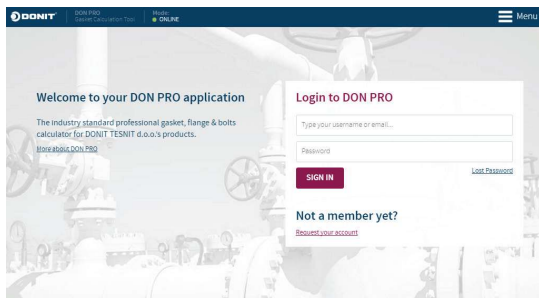
	BA-202	BA-203, BA-50, BA-55, BA-U, BA-M, BA-GL	BA-CF	BA-R, BA-REM, BA-R300, BA-R302
Acetamide	+	+	+	+
Acetic acid, 10%	+	+	+	-
Acetic acid, 100% (Glacial)	?	-	?	-
Acetone	?	?	?	?
Acetonitrile	-	-	-	-
Acetylene (gas)	+	+	+	+
Acid chlorides	-	-	-	-
Acrylic acid	-	?	?	-
Acrylonitrile	-	-	-	-
Adipic acid	+	+	+	-
Air (gas)	+	+	+	+
Alcohols	+	+	+	+
Aldehydes	?	?	?	?
Alum	+	+	+	?
Aluminium acetate	?	+	+	-
Aluminium chlorate	?	?	?	-
Aluminium chloride	-	?	?	-
Aluminium sulfate	-	?	?	-
Amines	-	-	-	-
Ammonia (gas)	-	?	?	?
Ammonium bicarbonate	+	+	+	+
Ammonium chloride	+	+	+	-
Ammonium hydroxide	?	+	+	+
Amyl acetate	?	?	?	?
Anhydrides	-	?	?	-
Aniline	-	-	-	-
Anisole	?	?	?	?
Argon (gas)	+	+	+	+
Asphalt	+	+	+	+
Barium chloride	+	+	+	-
Benzaldehyde	-	-	-	-
Benzene	+	+	+	+
Benzoic acid	?	?	?	?
Bio-diesel	+	+	+	+
Bio-ethanol	+	+	+	+
Black liquor	?	?	?	-
Borax	+	+	+	+
Boric acid	+	+	+	-
Butadiene (gas)	+	+	+	+
Butane (gas)	+	+	+	+
Butyl alcohol (Butanol)	+	+	+	+
Butyric acid	?	+	+	-
Calcium chloride	+	+	+	-
Calcium hydroxide	+	+	+	+
Carbon dioxide (gas)	+	+	+	+
Carbon monoxide (gas)	+	+	+	+
Cellosolve	?	?	?	?
Chlorine (gas)	-	-	-	-
Chlorine (in water)	-	-	-	-
Chlorobenzene	?	?	?	?
Chloroform	-	-	-	-
Chloroprene	?	?	?	?
Chlorosilanes	-	-	-	-
Chromic acid	-	-	-	-
Citric acid	?	?	?	-
Copper acetate	+	+	+	-
Copper sulfate	+	+	+	-
Creosote	?	?	?	?
Cresols (Cresylic acid)	-	-	-	-
Cyclohexane	+	+	+	+
Cyclohexanol	+	+	+	+
Cyclohexanone	?	?	?	?
Decalin	+	+	+	+
Dextrin	+	+	+	+
Dibenzyl ether	?	?	?	?
Dibutyl phthalate	?	?	?	?
Dimethylacetamide (DMA)	?	?	?	?
Dimethylformamide (DMF)	?	?	?	?
Dioxane	-	-	-	-

	BA-202	BA-203, BA-50, BA-55, BA-U, BA-M, BA-GL	BA-CF	BA-R, BA-REM, BA-R300, BA-R302
Diphenyl (Dowtherm A)	+	+	+	+
Esters	?	?	?	?
Ethane (gas)	+	+	+	+
Ethers	?	?	?	?
Ethyl acetate	?	?	?	?
Ethyl alcohol (Ethanol)	+	+	+	+
Ethyl cellulose	?	?	?	?
Ethyl chloride (gas)	-	-	-	-
Ethylene (gas)	+	+	+	+
Ethylene glycol	+	+	+	+
Formaldehyde (Formalin)	?	?	?	?
Formamide	?	?	?	?
Formic acid, 10%	?	+	+	-
Formic acid, 85%	-	?	?	-
Formic acid, 100%	-	-	-	-
Freon-12 (R-12)	+	+	+	+
Freon-134a (R-134a)	+	+	+	+
Freon-22 (R-22)	?	?	?	?
Fruit juices	+	+	+	-
Fuel oil	+	+	+	+
Gasoline	+	+	+	+
Gelatin	+	+	+	+
Glycerine (Glycerol)	+	+	+	+
Glycols	+	+	+	+
Helium (gas)	+	+	+	+
Heptane	+	+	+	+
Hydraulic oil (Glycol based)	+	+	+	+
Hydraulic oil (Mineral type)	+	+	+	+
Hydraulic oil (Phosphate ester based)	?	?	?	?
Hydrazine	-	-	-	-
Hydrocarbons	+	+	+	+
Hydrochloric acid, 10%	-	?	?	-
Hydrochloric acid, 37%	-	-	-	-
Hydrofluoric acid, 10%	-	-	-	-
Hydrofluoric acid, 48%	-	-	-	-
Hydrogen (gas)	+	+	+	+
Iron sulfate	+	+	+	-
Isobutane (gas)	+	+	+	+
Isooctane	+	+	+	+
Isoprene	+	+	+	+
Isopropyl alcohol (Isopropanol)	+	+	+	+
Kerosene	+	+	+	+
Ketones	?	?	?	?
Lactic acid	?	?	?	-
Lead acetate	?	+	+	-
Lead arsenate	+	+	+	-
Magnesium sulfate	+	+	+	+
Maleic acid	?	?	?	-
Malic acid	?	?	?	-
Methane (gas)	+	+	+	+
Methyl alcohol (Methanol)	+	+	+	+
Methyl chloride (gas)	?	?	?	?
Methylene dichloride	?	?	?	?
Methyl ethyl ketone (MEK)	?	?	?	?
N-Methyl-pyrrolidone (NMP)	?	?	?	?
Milk	+	+	+	+
Mineral oil (ASTM no.1)	+	+	+	+
Motor oil	+	+	+	+
Naphtha	+	+	+	+
Nitric acid, 10%	-	-	-	-
Nitric acid, 65%	-	-	-	-
Nitrobenzene	-	-	-	-
Nitrogen (gas)	+	+	+	+
Nitrous gases (NOx)	?	?	?	-
Octane	+	+	+	+
Oils (Essential)	+	+	+	+
Oils (Vegetable)	+	+	+	+
Oleic acid	+	+	+	-
Oleum (Sulfuric acid, fuming)	-	-	-	-

	BA-202	BA-203, BA-50, BA-55, BA-U, BA-M, BA-GL	BA-CF	BA-R, BA-REM, BA-R300, BA-R302
Oxalic acid	?	?	?	-
Oxygen (gas)	-	?	-	-
Palmitic acid	+	+	+	-
Paraffin oil	+	+	+	+
Pentane	+	+	+	+
Perchloroethylene	-	-	-	-
Petroleum (Crude oil)	+	+	+	+
Phenol (Carbolic acid)	-	-	-	-
Phosphoric acid, 40%	-	?	?	-
Phosphoric acid, 85%	-	-	-	-
Phthalic acid	+	+	+	-
Potassium acetate	+	+	+	-
Potassium bicarbonate	+	+	+	+
Potassium carbonate	+	+	+	+
Potassium chloride	+	+	+	-
Potassium cyanide	+	+	+	-
Potassium dichromate	-	?	?	-
Potassium hydroxide	-	?	?	?
Potassium iodide	+	+	+	-
Potassium nitrate	+	+	+	-
Potassium permanganate	-	?	?	-
Propane (gas)	+	+	+	+
Propylene (gas)	+	+	+	+
Pyridine	-	-	-	-
Salicylic acid	?	?	?	-
Seawater/brine	+	+	+	-
Silicones (oil/grease)	+	+	+	+
Soaps	+	+	+	+
Sodium aluminate	?	+	+	+
Sodium bicarbonate	+	+	+	+
Sodium bisulfite	?	+	+	-
Sodium carbonate	+	+	+	+
Sodium chloride	+	+	+	-
Sodium cyanide	+	+	+	-
Sodium hydroxide	-	?	?	?
Sodium hypochlorite (Bleach)	-	?	?	-
Sodium silicate (Water glass)	+	+	+	?
Sodium sulfate	+	+	+	+
Sodium sulfide	-	+	+	-
Starch	+	+	+	+
Steam	?	+	+	?
Stearic acid	+	+	+	-
Styrene	?	?	?	?
Sugars	+	+	+	+
Sulfur	?	?	?	?
Sulfur dioxide (gas)	?	?	?	?
Sulfuric acid, 20%	-	-	-	-
Sulfuric acid, 98%	-	-	-	-
Sulfuryl chloride	-	-	-	-
Tar	+	+	+	+
Tartaric acid	?	?	?	-
Tetrahydrofuran (THF)	-	-	-	-
Titanium tetrachloride	-	-	-	-
Toluene	+	+	+	+
2,4-Toluenediisocyanate	?	?	?	?
Transformer oil (Mineral type)	+	+	+	+
Trichloroethylene	-	-	-	-
Vinegar	+	+	+	-
Vinyl chloride (gas)	-	-	-	-
Vinylidene chloride	-	-	-	-
Water	+	+	+	?
White spirits	+	+	+	+
Xylenes	+	+	+	+
Xylenol	-	-	-	-
Zinc sulfate	+	+	+	-

Industrial Sealing Solutions

HOW TO SELECT AN INDUSTRIAL GASKET?



For any gasket application the choice of gasket material will depend on the operating conditions, mechanical features of the flanged assembly, the gasket characteristics and dimensions. In general, operating conditions determine the choice of jointing material, whereas the dimensional and mechanical features of the flange define the gasket type. The performance of any jointing material is influenced by the temperature, internal pressure, fluid, bolts (compressive stress), flange (type of flange, flange surface finish ...), cost-effectiveness and other special considerations.

DON PRO®

Bolt Properties		Gasket Properties	
Bolt size standard	ISO 724	Compressed outer gasket diameter	109.00 mm
Bolt size	M12	Compressed inner gasket diameter	27.00 mm
Number of bolts	4	Medium gasket diameter	68.00 mm
Width across flat	18	Gasket factor - m	1.5
Minimum diameter of bolt	10.96 mm	Minimum design seating stress - y	25.0 MPa
Thread pitch	2 mm	Gasket compressed area	7,470.71 mm ²
Friction angle	0.1713036 rad	Gasket internal area	7,421.29 mm ²
Coil angle	0.0912340 rad	Actual stress in bolt	636.39 MPa
Friction radius of nut	15.00 mm	Min required force in bolt	48,522.33 N
Max allowed tensile stress in bolt	210 MPa	Min required torque - gasket	114.25 Nm
Minimum bolt area	76 mm ²	Min required gasket surface stress	25.98 MPa
Max allowed force - bolt	16,393.26 N		
Max allowed torque - bolt	38.61 Nm		

The DON PRO® software represents a successful tool for proper choice of gasket materials and gaskets connected with major sealing problems of the static sealing area. The software includes a large number of flange and bolts dimensions according to different standards. The influence of internal pressure and temperature of the media on the gasket and bolts are checked as well as the chemical resistance of the gasket material against the media. Another possibility offered by the software is the optimization of the joint regarding the type of the selected sealing material or the gasket thickness.

CONSULTING AND SUPPORT

Bespoke gasket calculation software DON PRO® takes into account all of the gasket selection factors connected to the major sealing problems of static sealing areas and enables us to make the perfect recommendation:

- calculations take into account the influence of internal pressure and temperature on the gasket and bolts,
- calculations about the chemical resistance of the gasket material,
- optimizations of the joint regarding the type of selected sealant material and/or the gasket thickness.

HOW TO INSTALL AND USE GASKETS IN THE FIELD?

Successful sealing of a flanged connection depends upon many elements of a well-designed flanged system working well together. Here is a summary, which should serve as a guideline for maintenance operators, engineers, and fitters in order to ensure successful gasket installation and assembly of bolted flange connections.

TOOLS REQUIRED

Special tools are required for cleaning and tensioning the fasteners. In addition, always use standard safety equipment and follow good safety practice. Prepare the following equipment prior to installation:

- calibrated torque wrench, hydraulic or other tensioner,
- wire brush,
- lubricant,
- helmet and safety goggles,
- other plant-specified equipment.

1. Clean and examine

Remove all particles and debris from seating surfaces, fasteners (bolts or studs), nuts, and washers. Use plant-specified dust control procedures. Examine fasteners (bolts or studs), nuts, and washers for defects such as burrs or cracks. Examine flange surfaces for warping, radial scores, heavy tool marks, or anything prohibiting proper gasket seating. Replace components if found to be defective.

2. Align flanges

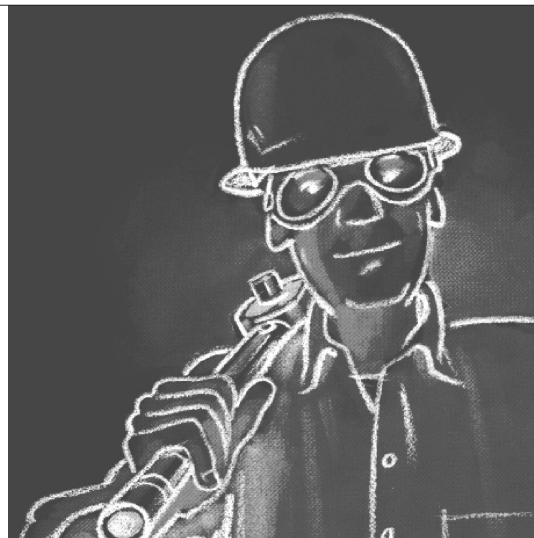
Align flange faces and bolt holes without using excessive force. Report any misalignment.

3. Install gasket

Verify if the gasket is of the specified size and material. Carefully insert gaskets between the flanges. Make sure the gasket is centred between the flanges. Do not use "jointing compounds", graphite, grease or release agents on the gasket or seating surfaces. Bring flanges together, ensuring the gasket isn't pinched or damaged.

4. Lubricate load-bearing surfaces

Use only specified or approved lubricants. Liberally apply lubricant uniformly to all thread, nut, and washer load-bearing surfaces. Ensure lubricant doesn't contaminate either flange or gasket face.



Industrial Sealing Solutions

GASKET INSTALLATION PROCEDURES

5. Install and tighten bolts

Always use proper tools: calibrated torque wrench or other controlled-tensioning device.

Consult our Technical expert or use the Gasket calculation software DON for guidance on torque specification.

Always torque nuts in a cross bolt-tightening pattern. Tighten the nuts in multiple steps:

- step-1 Tighten all nuts initially by hand.
(Larger bolts may require a small hand wrench.)
- step-2 Torque each nut to approximately 40% of full torque.
- step-3 Torque the nuts to approximately 70% of full torque.
- step-4 Torque each nut to full torque, again using the cross bolt-tightening pattern. (Large-diameter flanges may require additional tightening passes.)
- step-5 Apply at least one final full torque to all nuts in a clock-wise direction until all torque is uniform.
(Large-diameter flanges may require additional tightening passes.)



6. Retightening

Do not retorque elastomer-based, asbestos free gaskets after they have been exposed to elevated temperatures unless otherwise specified. Retorque fasteners exposed to aggressive thermal cycling. All retorquing should be performed at ambient temperature and atmospheric pressure.

STORING GASKETS

Industrial gaskets consist of various materials, which are subjected to ageing, weathering, oxidation ... Ageing causes decreasing of the mechanical properties of gaskets. For this reason storage under the following conditions is recommended:

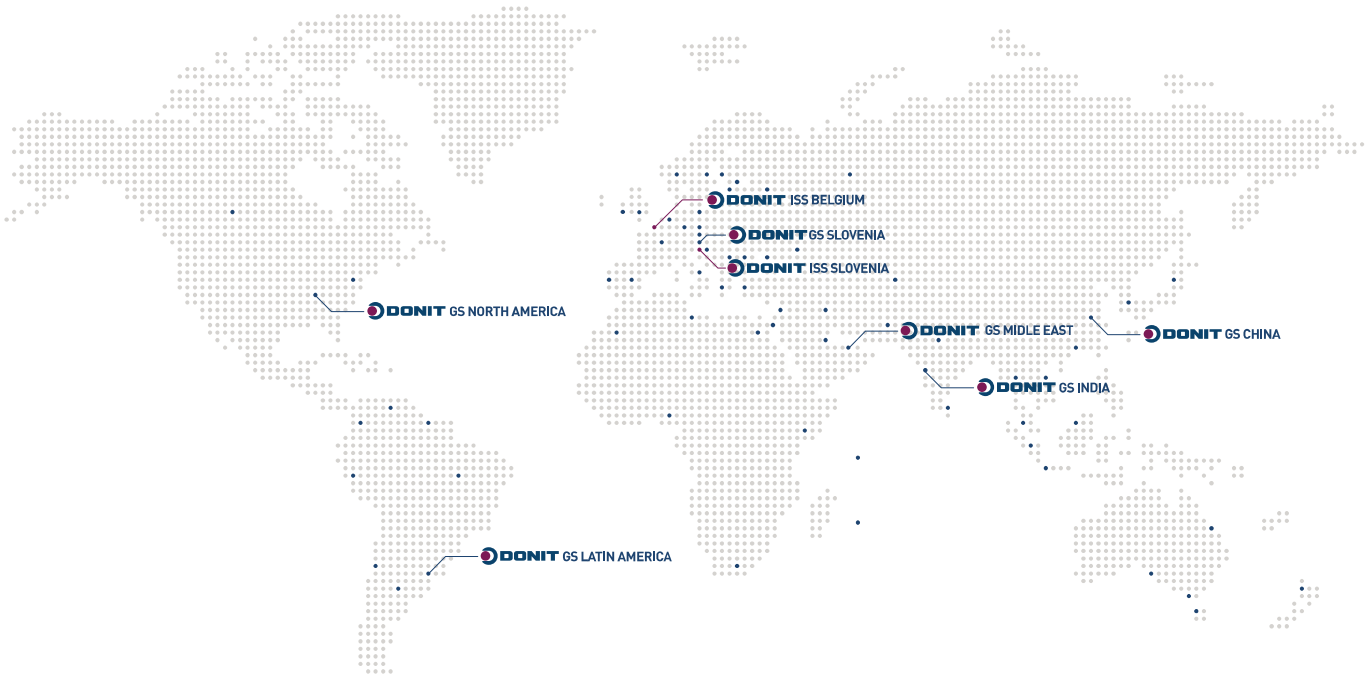
- ambient temperature of storage - move away from heaters,
- dark storage room - move away from direct sunlight,
- dry atmosphere,
- avoid areas where electric discharge appears - ozone production,
- gaskets must lie horizontally - avoid hanging on hooks or folding which could cause cracking.

Avoid storing gaskets for more than two years.

CUSTOMERS SERVICE - TECHNICAL SUPPORT

Our team is always available to our customers for any assistance they might need, including advice on the selection and use of our sealing products. This is provided by a special team of highly skilled experts making up the Application Engineering department. By passing on their comprehensive knowledge of our products, the Application Engineering experts can help you solve practically any sealing problem. If you need our help or advice, please do not hesitate to contact us.

**MADE IN THE EU WITH A PRESENCE IN MORE THAN 65 COUNTRIES SUPPLYING
CONSISTENT QUALITY TO THE WORLD.**



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DISCLAIMER

All information data quoted are based on decades of experience in production and operation of sealing elements. However, in view of the wide variety of possible installation and operating conditions one cannot draw final conclusions in all application cases regarding the behaviour in a gasket joint. The data may not, therefore, be used to support any warranty claims. Whenever there is any doubt, our experts will be pleased to assist you finding the optimum sealing solution.

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