

Granite Stone

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# **DONIT** | Industrial Gaskets



SPIRAL WOUND GASKETS

GASKETS FOR HEAT EXCHANGERS

GROOVED GASKETS

RING JOINT GASKETS

CORRUGATED METAL GASKETS

NON METALLIC FLAT GASKETS

METAL EYELETED FLAT GASKETS

PTFE GASKETS

PTFE ENVELOPED GASKETS

SPECIAL GASKETS AND  
CUSTOM MADE GASKETS

PHYSICAL PROPERTIES OF  
METAL GASKET MATERIALS

RESISTANCE OF SOFT GASKET  
MATERIALS TO MEDIA

HOW TO SELECT AN  
INDUSTRIAL GASKET?

GASKET INSTALLATION PROCEDURES

[www.donit.eu](http://www.donit.eu)

[www.rubber-products.com.mk](http://www.rubber-products.com.mk)  
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About us:

Donit Tesnit® was founded in 1946 and is today one of the world’s leading producers of sealing materials, gasket products and solutions serving all major markets. We provide integrated solutions for our customers’ challenging environments and supply various custom made applications. With our own infrastructure we have gained extensive knowledge and experience in the sealing business. We produce technologically advanced products that are more environment-friendly. Our products are used globally in the chemical-, oil-, automotive-, food-, mechanical- and shipbuilding industry, in power plants and construction. One of our biggest assets is the experience we have in building relationships and assuring quality. This generates trust which is embedded in the our brand. Through sustaining relationships with existing customers and expanding local presence, we align our business with that of our customers - a true partner for success.

Our Markets:

Our headquarters is in Medvode, Slovenia directly in the heart of Europe. From Slovenia we have direct access to a logistic infrastructure that enables us to provide fast and direct response to our customers. With more than 250 customers worldwide, our production is exported into more than 60 countries on all continents. Our extensive worldwide network of distributors, agents and other clients enables us to provide real-time high quality tangible solutions around the globe, with special focus on Europe, USA and Asia. We believe in supreme customer focus – listening keenly, then using our global

presence and experience to provide solutions is what makes us the preferred partner in success stories all over the world.

Us as Partner:

We produce a wide range of high quality products. What makes us different is our genuine interest in what our customers really need. This makes us a true partner in transforming ideas into actions. Our high quality products enable our customers to lead an environmentally safe business and decrease the possibility of environmental cost. We act responsibly because we are in it for the long haul. The wide range of products and services make Donit a one-stop shop for our customers’ diverse needs. This makes our customers’ day-to-day business easier. We advise and consult with our customers in order give them the confidence to face change and keep their business sustainable and safe.

Our Personality:

THE CURIOUS GUY WITH EXPERIENCE. We have the eagerness of an engineer - following the latest trends in the industry, asking questions and listening to our customer. When it is time to execute, the wisdom of a seasoned professional takes over. We demonstrate our deep knowledge about the industry in a way that is innovative and to-the-point. We engage with our customers and know that keeping promises matters more than big words.

Donit – A perfect fit.



TYPE	SECTION	APPLICATION	MAX DIMENSIONS (mm)		MAX.OPERATING PRESSURE (bar)	MAX.OPERATING TEMPERATURE (°C)	PG. NR.
			Diameter	Thickness			
MS 10		Valves bonets, stoppers for boilers	2200	2.5 ÷ 7.2	400	550	4
MS 12		for high pressures, turbolences	2200	3.2 ÷ 7.2	400	550	4
MS 14		for high pressures	2200	3.2 ÷ 7.2	400	550	4
MS 16		for high pressures, turbolences	2200	3.2 ÷ 7.2	400	550	4
MS 10 T		Gasket with sealing zone of PTFE	2200	3.2 ÷ 4.5	400	250	4
C		flange mail-femaile	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 seal	2000	2 ÷ 5	100	700	10
M7A		power plants, manhole, heat exchangers	3000	2.5 ÷ 6	400	700	15
M7B		power plants, manhole, heat exchangers	3000	2.5 ÷ 7	400	700	15
M7C		power plants, manhole, heat exchangers	3000	2.5 ÷ 8	400	700	15
M7D		power plants, manhole, heat exchangers	3000	2.5 ÷ 9	400	700	15
M10		power plants, manhole, heat exchangers	3000	0.2 ÷ 3	400	550	15
M10A		power plants, manhole, heat exchangers	3000	2 ÷ 6	400	550	15
M14		air and gas compressor	1000	30	160	500	17
M15-R		high temperature and pressure	1000	11.18 ÷ 44.45	700	1000	17
M16-R		high temperature and pressure	1000	9.65 ÷ 41.4	700	1000	17
M17-L		check valves, high temperature	1000	8 ÷ 50	320	600	17
M18-RX		high temperature and pressure	600	19.05 ÷ 25.4	700	1000	17
M19-BX		high temperature and pressure	850	9.30 ÷ 39.84	1500	1000	17
MW12		Low pressure applications, space limitation	2000	1.2 ÷ 1.5	50	550	19
MW12A		Low pressure applications, higher temperatures, gas ducts	2000	3 ÷ 5	50	550	19
MW12AE		Low pressure applications, higher temperatures, gas ducts	2000	4 ÷ 5	50	550	19
MW13A		Low pressure applications, higher temperatures, gas ducts	2000	5 ÷ 5	50	550	19
MW22A		Flanges with large diameter, process industry	4000	8 ÷ 12	50	550	19
MW23A		Flanges with large diameter, process industry	4000	8 ÷ 12	50	550	19
MW12C		Flanges with large diameter, process industry	2000	5 ÷ 8	50	550	19
BA10		All common applications	1500	1.5 ÷ 3	100	250	21
MP1		Good resistance to erosion	1500	1.5 ÷ 3	150	550	25
MP1		Good resistance to erosion	1500	1.5 ÷ 3	250	550	25
TF 02 ÷ TF040		High chemical stability, good resistance in the atmosphere, aggresive chemicals	800	2 ÷ 10	50	250	26

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 stress and others. Given values are recommended for typical flange gaskets constructions. Max. parameters can be changed by using special materials.





## 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. Spiral wound gaskets 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 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 styles 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 STYLES

- Gaskets without centering and inner ring (Type MS 10)
- Gaskets without centering and inner ring (Type MS 10T)\*
- Gaskets with inner ring (Type MS 12)
- Gaskets with centering (outer) ring (Type MS 14)
- Gaskets with centering and with inner ring (Type MS 16)

\*With PTFE sealing zone

## Metallic strip

Standard thickness of the metallic strip is 0.2 mm [0.18].

MATERIALS FOR METALLIC STRIP	
ASTM	EN (DIN) Material No.
AISI 304	1.4301
AISI 316, 316 L	1.4401, 1.4404
AISI 321	1.4541
AISI 316 Ti	1.4571
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
- Ceramic

## 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

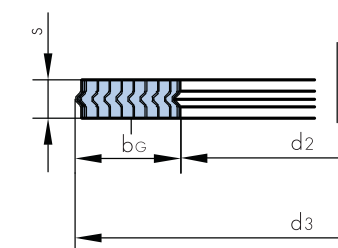
The inner ring is used to avoid excessive compression due to high seating stress in high-pressure service and it is also used to reduce turbulence in the flange area. It is normally made of the same material as the gasket metallic strip.

## DIMENSIONS

Manufacturing sizes

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

LIMITATIONS FOR MANUFACTURING DIMENSIONS			
Thickness [mm]	Max diameter d3[mm]	Maximum width - bg [mm]	
		Graphite	PTFE
2.5	300	16	13
3.2	700	22	19
4.5	1500	30	24
6.5	3000	35	24
7.2	3000	30	24



## Thickness

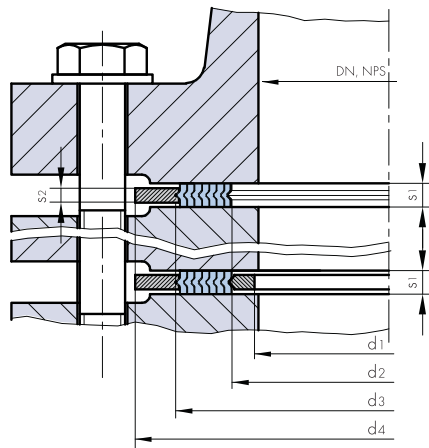
The standard manufacturing thicknesses for spiral wound gaskets are: 3.2 mm; 4.5 mm; 6.5 mm (measured across metallic strip not including the filler, which protrudes 0.2-0.3 mm beyond the metal).

## Manufacturing tolerances

The tolerance of the gasket diameters (d1, d2, d3, d4, s, s1, s2) are stipulated by ASME B 16.20 and EN 1514-2 standards. The gaskets designed for non-standard flanges meet the recommendations by the ASME B 16.20.

## Dimensions

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



**Flange nominal dimensions**

DN (mm)	NPS (in)
15	1/2
20	3/4
25	1
32	1 1/4
40	1 1/2
50	2
65	2 1/2

DN (mm)	NPS (in)
80	3
90	3 1/2
100	4
125	5
150	6
200	8
250	10

DN (mm)	NPS (in)
300	12
350	14
400	16
450	18
500	20
550	22
600	24

**Spiral wound gaskets for BS 1560 and ASME B 16.5 flanges**

NPS (in)	d1 (mm)		d2 (mm)		d3 (mm)	d4 (mm)						
Class (lb)	150-400	600-2500	150-400	600-2500	150-2500	150	300	400	600	900	1500	2500
1/2	12.7	12.7	19.1	19.1	31.8	44.4	50.8	50.8	50.8	60.3	60.3	66.7
3/4	20.6	20.6	27	27	39.7	53.9	63.5	63.5	63.5	66.7	66.7	73
1	27	27	33.3	33.3	47.6	63.5	69.8	69.8	69.8	76.2	76.2	82.5
1 1/4	41.3	39.7	47.6	46	60.3	73	79.4	79.4	79.4	85.7	85.7	101.6
1 1/2	49.2	47.6	55.6	54	69.9	82.5	92.1	92.1	92.1	95.2	95.2	114.3
2	61.9	60.3	71.4	69.9	85.7	101.6	108	108	108	139.7	139.7	142.8
2 1/2	74.6	73	84.1	82.6	98.4	120.6	127	127	127	161.9	161.9	165.1
3	95.3	92.1	104.8	101.6	120.7	133.4	146.1	146.1	146.1	165.1	171.5	193.7
3 1/2	108	104.8	117.5	114.3	133.4	158.8	161.9	158.7	158.7			
4	117.5	114.3	130.2	127	149.2	171.5	177.8	174.6	190.5	203.2	206.4	231.7
5	144.5	141.3	157.2	154	177.8	193.7	212.7	209.5	238.1	244.5	250.8	276.2
6	171.5	168.3	184.2	181	209.6	219.1	247.7	244.5	263.5	285.8	279.4	314.3
8	222.3	219.1	235	231.8	263.5	276.2	304.8	301.6	317.5	355.6	349.3	384.1
10	276.2	269.9	288.9	282.6	317.5	336.5	358.8	355.6	396.9	431.8	431.8	473
12	330.2	323.8	342.9	336.5	374.6	406.4	419.1	415.9	454	495.3	517.5	546.1
14	361.9	355.6	374.6	368.3	406.4	447.7	482.6	479.4	488.9	517.5	574.7	
16	412.7	406.4	425.4	419.1	463.5	511.2	536.6	533.4	561.9	571.5	638.1	
18	466.7	460.4	479.4	473.1	527	546.1	593.7	590.5	609.6	635	701.7	
20	517.5	511.2	530.2	523.9	577.8	603.2	650.9	644.5	679.5	695.3	752.4	
22	574.4	568.4	587.4	581.1	635	657.2	701.7	698.5	730.3			
24	622.3	615.9	635	628.6	685.8	714.4	771.5	765.2	787.4	835	898.5	

**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	PN 250	PN 320	PN 400
10	18	24	36	36	46	46	46	46	56	56	56	67	67	67
15	22	28	40	40	51	51	51	51	61	61	61	72	72	78
20	27	33	47	47	61	61	61	61	72	72	72	77	77	
25	34	40	54	54	71	71	71	71	82	82	82	83	92	104
32	43	49	65	65	82	82	82	82	90	90	90	100		
40	48	54	70	70	92	92	92	92	103	103	103	109	119	135
50	57	66	84	84	107	107	107	107	113	119	119	124	134	150
65	73	82	102	104	127	127	127	127	137	143	143	153	170	192
80	86	95	115	119	142	142	142	142	148	154	154	170	190	207
100	108	120	140	144	162	162	168	168	174	180	180	202	229	256
125	134	146	168	172	192	192	194	194	210	217	217	242	274	301
150	162	174	196	200	217	217	224	224	247	257	257	284	311	348
175	183	195	221	227	247	247	254	265	277	287	284	316	358	402
200	213	225	251	257	272	272	284	290	309	324	324	358	398	442
250	267	279	307	315	327	328	340	352	364	391	388	442	488	
300	318	330	358	366	377	383	400	417	424	458	458	538		
350	363	375	405	413	437	443	457	474	486	512				
400	414	426	458	466	488	495	514	546	543	572				
450	460	478	526	551	558	567	564	571	534					
500	518	530	566	574	593	617	624	628	657	704				
600	618	630	666	674	695	734	731	747	764	813				
700	718	730	770	778	810	804	833	852	879					
800	818	830	874	882	917	911	942	974	988					
900	910	930	974	982	1017	1011	1042	1084	1108					
1000	1010	1030	1078	1086	1124	1128	1154	1194	1220					
1200	1210	1230	1280	1290	1341	1342	1364	1398	1452					
1400	1420	1450	1510		1548	1542	1578	1618						
1600	1630	1660	1720		1772	1764	1798	1830						
1800	1830	1860	1920		1972	1964	2000							
2000	2020	2050	2120		2182	2168	2230							
2200	2230	2260	2330		2384	2376								
2400	2430	2480	2530		2594									
2600	2630	2660	2730		2794									
2800	2830	2860	2930		3014									
3000	3030	3060	3130		3228									

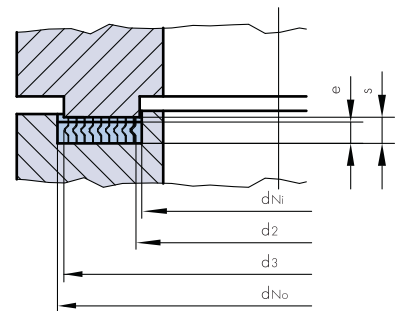
**ASME B 16.20 gaskets for ASME B 16.5 flanges**

NPS (in)	d1 (mm)					d2 (mm)					d3 (mm)		d4 (mm)						
Class (lb)	150-300	400-600	900	1500	2500	150-300	400-600	900	1500	2500	150-600	900-2500	150	300	400	600	900	1500	2500
1/2	14.2	14.2	14.2	14.2	14.2	19.1	19.1	19.1	19.1	19.1	31.8	31.8	47.8	54.1	54.1	54.1	63.5	63.5	69.9
3/4	20.6	20.6	20.6	20.6	20.6	25.4	25.4	25.4	25.4	25.4	39.6	39.6	57.2	66.8	66.8	66.8	69.9	69.9	76.2
1	26.9	26.9	26.9	26.9	26.9	31.8	31.8	31.8	31.8	31.8	47.8	47.8	66.8	73.2	73.2	73.2	79.5	79.5	85.9
1 1/4	38.1	38.1	38.1	33.3	33.3	47.8	47.8	39.6	39.6	39.6	60.5	60.5	76.2	82.6	82.6	82.6	88.9	88.9	104.9
1 1/2	44.5	44.5	44.5	41.4	41.4	54.1	54.1	47.8	47.8	47.8	69.9	69.9	85.9	95.3	95.3	95.3	98.6	98.6	117.6
2	55.6	55.6	55.6	52.3	52.3	69.9	69.9	58.7	58.7	58.7	85.9	85.9	104.9	111.3	111.3	111.3	143.0	143.0	146.1
2 1/2	66.5	66.5	66.5	63.5	63.5	82.6	82.6	69.9	69.9	69.9	98.6	98.6	124.0	130.3	130.3	130.3	165.1	165.1	168.4
3	81.0	81.0	81.0	81.0	81.0	101.6	101.6	95.3	92.2	92.2	120.7	120.7	136.7	149.4	149.4	149.4	168.4	174.8	196.9
4	106.4	106.4	106.4	106.4	106.4	127.0	127.0	120.7	117.6	117.6	149.4	149.4	174.8	181.1	177.8	193.8	206.5	209.6	235.0
5	131.8	131.8	131.8	131.8	131.8	155.7	147.6	147.6	143.0	143.0	177.8	177.8	196.9	215.9	212.9	241.3	247.7	254.0	279.4
6	157.2	157.2	157.2	157.2	157.2	182.6	174.8	174.8	171.5	171.5	209.6	209.6	222.3	251.0	247.7	266.7	289.1	282.7	317.5
8	215.9	209.6	196.9	196.9	196.9	233.4	225.6	222.3	215.9	215.9	263.7	257.3	279.4	308.1	304.8	320.8	358.9	352.6	387.4
10	268.2	260.4	246.1	246.1	246.1	287.3	274.6	276.4	266.7	270.0	317.5	311.2	339.9	362.0	358.9	400.1	435.1	435.1	476.3
12	317.5	317.5	292.1	292.1	292.1	339.9	327.2	323.9	323.9	317.5	374.7	368.3	409.7	422.4	419.1	457.2	498.6	520.7	549.4
14	349.3	349.3	320.8	320.8		371.6	362.0	356.6	362.0		406.4	400.1	450.9	485.9	482.6	492.3	520.7	577.9	
16	400.1	400.1	374.7	368.3		422.4	412.8	412.8	406.7		463.6	457.2	514.4	539.8	536.7	565.2	574.8	641.4	
18	449.3	449.3	425.5	425.5		474.7	469.9	463.6	463.6		527.1	520.7	549.4	596.9	593.9	612.9	638.3	704.9	
20	500.1	500.1	482.6	476.3		525.5	520.7	520.7	514.4		577.9	571.5	606.6	654.1	647.7	682.8	698.5	755.7	
24	603.3	603.3	590.6	577.9		628.7	628.7	628.7	616.0		685.8	679.5	717.6	774.7	768.4	790.7	838.2	901.7	

**ASME B 16.20 gasket for ASME B 16.47 Series B flanges**

NPS (in)	d1 (mm)					d2 (mm)					d3 (mm)					d4 (mm)					
Class (lb)	150	300	400	600	900	150	300	400	600	900	150	300	400	600	900	150	300	400	600	900	
26	656.1	654.1	654.1	654.1	644.7	666.8	673.1	673.1	666.8	663.7	692.2	698.5	711.2	698.5	714.5	749.3	725.4	771.7	746.3	765.3	838.2
28	704.9	704.9	701.8	692.2	717.6	723.9	723.9	714.5	704.9	743.0	749.3	762.0	749.3	755.7	800.1	776.2	825.5	800.1	819.2	901.1	
30	755.7	755.7	752.6	752.6	781.7	774.7	774.7	765.3	778.0	806.5	800.1	812.8	806.5	828.8	857.3	827.0	886.0	857.3	879.6	958.3	
32	806.5	806.5	800.1	793.8	826.2	825.5	825.5	812.8	831.9	863.6	850.9	863.6	858.5	882.7	914.4	881.1	939.8	911.4	933.5	1016.0	
34	857.3	857.3	850.9	850.9	895.4	876.3	876.3	866.9	889.0	920.8	908.1	914.4	911.4	939.8	971.6	935.0	993.9	962.2	997.0	1073.2	
36	908.1	908.1	898.7	901.7	920.8	927.1	927.1	917.7	939.8	946.2	958.9	962.2	965.2	990.6	997.0	987.6	1047.8	1022.4	1047.8	1124.0	
38	958.9	958.9	952.5	952.5	1009.7	974.6	1009.7	971.6	990.6	1035.1	1009.7	1047.8	1022.4	1041.4	1085.9	1044.7	1098.6	1073.2	1104.9	1200.2	
40	1009.7	1003.3	1000.3	1009.7	1060.5	1022.4	1060.5	1025.7	1047.8	1098.6	1063.8	1098.6	1076.5	1098.6	1149.4	1095.5	1149.4	1127.3	1155.7	1251.0	
42	1060.5	1054.1	1051.1	1066.8	1111.3	1079.5	1111.3	1076.5	1104.9	1149.4	1114.6	1149.4	1127.3	1155.7	1200.2	1146.3	1200.2	1178.1	1219.2	1301.8	
44	1111.3	1124.0	1104.9	1111.3	1155.7	1124.0	1162.1	1130.3	1162.1	1206.5	1165.4	1200.2	1181.1	1212.9	1257.3	1197.1	1251.0	1231.9	1270.0	1368.6	
46	1162.1	1178.1	1168.6	1162.1	1219.2	1181.1	1216.2	1193.8	1212.9	1270.0	1224.0	1254.3	1244.6	1263.7	1320.8	1255.7	1317.8	1289.1	1327.2	1435.1	
48	1212.9	1231.9	1206.5	1219.2	1270.0	1231.9	1263.7	1244.6	1270.0	1320.8	1270.0	1311.4	1295.4	1320.8	1371.6	1306.6	1368.6	1346.2	1390.7	1485.9	
50	1263.7	1267.0	1257.3	1270.0		1282.7	1317.8	1295.4	1320.8		1325.6	1355.9	1346.2	1371.6		1357.4	1419.4	1403.4	1447.8		
52	1314.5	1317.8	1308.1	1320.8		1335.5	1368.6	1346.2	1371.6		1376.4	1406.7	1397.0	1422.4		1408.2	1470.2	1454.2	1498.6		
54	1365.3	1365.3	1352.6	1378.0		1384.3	1403.4	1403.4	1428.8		1422.4	1454.2	1454.2	1479.6		1463.8	1530.4	1517.7	1555.8		
56	1422.4	1428.8	1403.4	1428.8		1444.8	1479.6	1454.2	1479.6		1477.8	1524.0	1505.0	1530.4		1514.6	1593.8	1568.5	1612.9		
58	1478.0	1484.4	1454.2	1473.2		1500.4	1535.2	1505.0	1536.7		1528.8	1573.3	1555.8	1587.5		1579.6	1655.8	1619.3	1663.7		
60	1535.2	1557.3	1517.7	1530.4		1557.3	1589.0	1568.5	1593.9		1586.0	1630.4	1619.3	1644.7		1630.4	1706.6	1682.8	1733.6		

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 <sup>+0.1</sup>	3,3 <sup>+0.1</sup>	4,7 <sup>+0.1</sup>

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 <sub>g</sub>	s	b <sub>g</sub>	d <sub>3</sub>	d <sub>2</sub>	d <sub>NO</sub>	b <sub>N</sub>	d <sub>NI</sub>	t <sub>n</sub>
< 300	3.2	5-9	d <sub>g</sub> +b <sub>g</sub>	d <sub>g</sub> -b <sub>g</sub>	d <sub>3</sub> +1	b <sub>g</sub> /0.86	d <sub>NO</sub> -2b <sub>N</sub>	2.5 <sup>-1</sup>
< 1000	3.2	9-17	d <sub>g</sub> +b <sub>g</sub>	d <sub>g</sub> -b <sub>g</sub>	d <sub>3</sub> +1.5		d <sub>NO</sub> -2b <sub>N</sub>	2.5 <sup>-1</sup>
< 300	4.5	5-9	d <sub>g</sub> +b <sub>g</sub>	d <sub>g</sub> -b <sub>g</sub>	d + 1		d <sub>NO</sub> -2b <sub>N</sub>	3.3 <sup>+0.1</sup>
< 1000	4.5	9-17	d <sub>g</sub> +b <sub>g</sub>	d <sub>g</sub> -b <sub>g</sub>	d <sub>3</sub> +1.5		d <sub>NO</sub> -2b <sub>N</sub>	3.3 <sup>+0.1</sup>

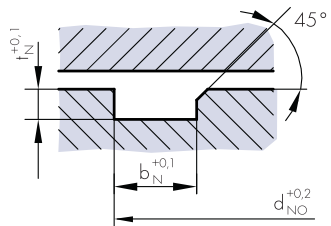
b<sub>g</sub> - gasket width  
b<sub>N</sub> - groove width

Tolerance Table

FLANGE SIZE		PROJECTION AND RECESS			SMOOTH CONTACT FACE					
NPS (in)	DN (mm)	d2	d3	s1	d1	d2	d3	d4	s1	s2
< 10"	< 300	±0.5	±0.5	+0.8 +0.1	±0.8	±0.8	±0.8	±0.8	+0.8 +0.1	+0.25 -0.15
10"-24"	300-700	±0.8	±0.8	+0.8 +0.1	±0.8	±0.8	±0.8	+0.8 -1.6	+0.8 +0.1	+0.25 -0.15
26"-50"	800-1200	±1.2	±1.2	+0.8 +0.1	±1.6	±1.6	±1.6	+0.8 -2.0	+0.8 +0.1	+0.25 -0.15
> 50"	> 1200				±2.4	±2.4	±2.4	+0.8 -3.0	+0.8 +0.1	+0.25 -0.15

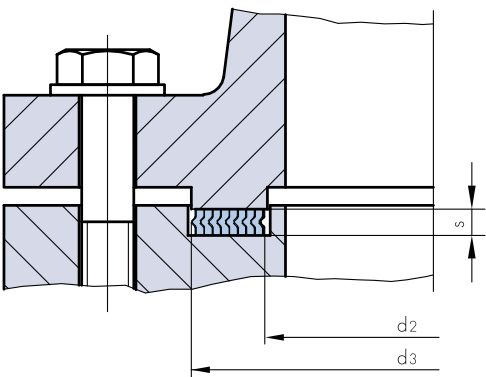
Gasket parameters

Gasket Type	MATERIAL	DIN 2505		ASME	
		ki [mm]	K <sub>y</sub> ,K <sub>g</sub> [N/mm]	m	y [MPa]
MS 10, MS 12, MS 14, MS 16	Steel, Cr-Steel	1.3xb <sub>g</sub>	50xb <sub>g</sub>	1.3	50
	CrNi-Steel, Monel	1.4xb <sub>g</sub>	55xb <sub>g</sub>	1.4	55
	CrNi-Steel (Graphite/PTFE)	1.2xb <sub>g</sub>	40xb <sub>g</sub>	1.2	40

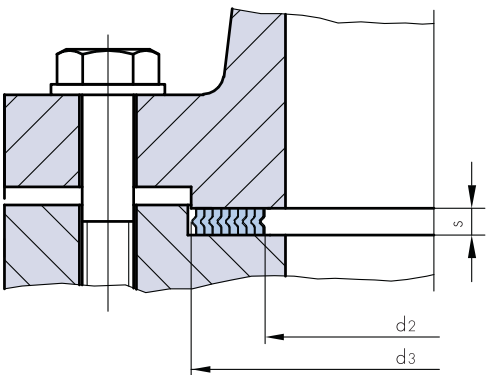


All standard and non-standard types can be delivered in non-standard dimensions according to customer request.

EN 1092 and ASME B 16.5 TONGUE and GROOVE flanges meet SWG dimensions according to ASME B 16.21 or other costumer request.



EN 1092 and ASME B 16.5 MALE and FEMALE flanges meet SPIRAL WOUND GASKETS dimensions according to ASME B 16.21 or other customer request.



NON-STANDARD SWG

Gaskets for Boilers Handholes and Manholes:

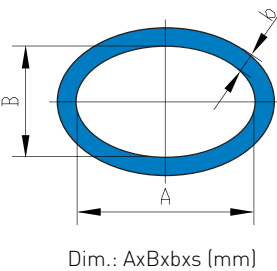
Gaskets Type MS 10 can be manufactured in other shapes like oval and oblong (stadium). There is no specific standard for this type of gasket. When ordering, complete specifications must be provided: inside dimensions (AxB), width (b) and thickness (s) or a drawing.

GASKET ORDERING EXAMPLE

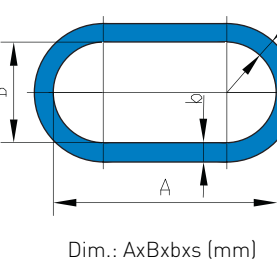
Spiral wound gasket MS 10,  
A x B x b x s,  
Winding: AISI 316,  
Filler: Graphite 98%

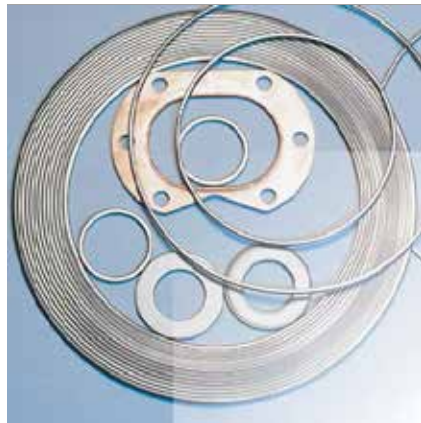
Spiral wound gasket MS 16,  
ASME B 16.20 for ASME B 16.5, 2"-150lbs,  
Winding, inner ring: AISI 316,  
Filler: Graphite 98%,  
Centering ring: CS

Oval shape



Oblong (stadium) shape





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.

Material	ASTM	EN (DIN) Material No.
Low Carbon Steel	Soft iron [CS]	1.0333
Stainless steel	AISI 304	1.4301
Stainless steel	AISI 316,316 L	1.4401, 1.4404
Stainless steel	AISI 321	1.4541
Stainless steel	AISI 316 Ti	1.4571
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 ASME B 16.21 standards.

Maximum size:

Outside diameter: up to 4000 mm  
Thickness: from 2 to 12 mm

MANUFACTURING TOLERANCES		
Gasket inside diameter (mm)	Diameter tolerance (mm)	
	Inside diameter	Outside diameter
Up to 150	+ 0.8; -0.0	+ 0.0; -0.8
from 150 to 1500	+ 1.6;-0.0	+ 0.0; -1.6
1500 or greater	+ 2.4;-0.0	+ 0.0; -2.4

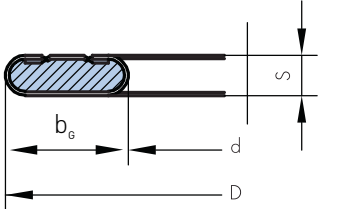
Gasket Type	MATERIAL (Jacket)	DIN 2505		ASME	
		ki [mm]	K <sub>v</sub> x K <sub>s</sub> [N/mm]	m	y [MPa]
MP 10, MP 12, MP 16, MP 18, MP 19, MP 22	Cr-Ni steel	2.0Xb <sub>g</sub>	100xb <sub>g</sub>	2.0	100
	Soft iron	1 .8Xb <sub>g</sub>	70xb <sub>g</sub>	1.8	70
	Cu	1 .6Xb <sub>g</sub>	60XD <sub>g</sub>	1.6	60
	Ms	1 .6Xb <sub>g</sub>	60xb <sub>g</sub>	1.6	60

STANDARDS FOR METAL JACKETED GASKETS USED WITH FLANGES	
METAL JACKETED GASKETS - Standard	Flange Standard
EN 1514-4	EN 1092
ASME B 16.20	ASME B 16.5
ASME B 16.20	ASME B 16.47

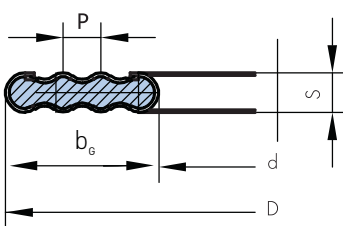
Metal - jacketed gaskets dimensions for ASME B 16.5 flange

NPS (in)	d (mm)	D (mm)							
	Class (lb)	150	300	400	600	900	1500	2500	
1/2"	23.8	44.5	50.8	50.8	50.8	60.4	60.4	66.8	
3/4"	31.8	54	63.5	63.5	63.5	66.7	66.7	73.1	
1"	36.5	63.5	69.9	69.9	69.9	76.2	76.2	82.5	
1 1/4"	46	73	79.4	79.4	79.4	85.8	85.8	101.6	
1 1/2"	52.4	82.6	92.1	92.1	92.1	95.3	95.3	114.3	
2"	73.2	101.6	108	108	108	139.7	139.7	143	
2 1/2"	85.9	120.6	127	127	127	161.9	161.9	165.1	
3"	107.8	133.4	146.1	146.1	146.1	165.1	171.5	193.8	
4"	131.8	171.5	177.8	174.7	190.5	203.2	206.5	231.9	
5"	152.4	193.8	212.8	209.5	238.2	244.6	250.9	276.3	
6"	190.5	219.1	247.7	244.5	263.6	285.8	279.4	314.5	
8"	238.3	276.3	304.8	301.7	317.5	355.6	349.3	384.3	
10"	285.8	336.6	358.8	355.6	396.9	431.8	431.8	473.2	
12"	342.9	406.4	419.1	415.9	454.1	495.3	517.6	546.1	
14"	374.7	447.7	482.6	479.5	489	517.6	574.7		
14"	425.5	511.2	536.6	533.4	562	571.5	638.2		
18"	489	546.1	593.7	590.6	609.6	635	701.8		
20"	533.4	603.3	650.9	644.5	679.5	695.5	752.5		
24"	641.4	714.4	771.6	765.3	787.4	835.1	898.6		

MP10



MP14



Metal - jacketed gaskets dimensions for ASME B 16.47 Series A raised face flanges

NPS (in)	d (mm)	D (mm)				
	Class (lb)	150	300	400	600	900
26"	673.1	771.6	831.8	828.8	863.6	879.6
28"	723.9	828.8	895.3	889	911.3	943.1
30"	774.7	879.6	949.4	943.1	968.5	1006.6
32"	825.5	936.7	1003.3	1000.2	1019.3	1070.1
34"	876.3	987.5	1054.1	1051	1070.1	1133.6
36"	927.1	1044.7	1114.7	1114.5	1127.2	1197.1
38"	977.9	1108.2	1051	1070.1	1101.8	1197.1
40"	1028.7	1159	1111.2	1124	1152.6	1248
42"	1079.5	1286.1	1162	1174.7	1216.1	1298.7
44"	1130.3	1273.3	1216.1	1228.8	1267	1365.2
46"	1181.1	1324.1	1270	1286	1324.1	1432
48"	1231.9	1381.2	1320.8	1343.1	1387.6	1482.8
50"	1282.7	1432	1374.9	1400.3	1444.7	
52"	1333.5	1489.2	1425.7	1451.1	1495.5	
54"	1384.3	1546.3	1489.2	1514.6	1552.7	
56"	1431.1	1603.5	1540	1565.4	1603.5	
58"	1485.9	1660.6	1590.8	1616.2	1660.6	
60"	1536.7	1711.4	1641.6	1679.7	1730.5	

TOLERANCES (mm)

	up to 24"	above 24"
D	+ 1.58	+ 3.3
	0	0
d	+ 1.58	+ 3.3
	0	0
s	+ 0.8	+ 0.8
	0	0

GASKET ORDERING EXAMPLE

STANDARD DIMENSION:

Metal-jacketed gasket MP 10,  
ASME B 16.5, 8"-600lbs,  
Material: AISI 304,  
Filler: Graphite

NON-STANDARD DIMENSION:

Metal-jacketed gasket MP 10,  
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.

### 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.

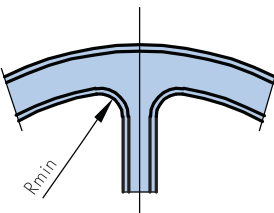
#### Gaskets with integrated bars

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	Rmin
Copper	8m
Soft iron (CS)	8 mm
Brass, Monel	10 mm
Stainless steel	10 mm

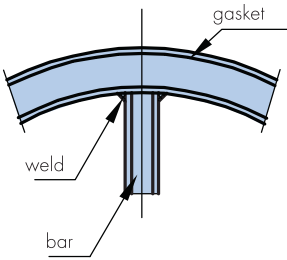
MP10WITH INTEGRAL BAR



#### 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 Echanger Gaskets

The selection of the jacket material depends on operating conditions. The standard filler is Flexible Graphite.

#### Metallic jacket

MATERIAL	ASTM	EN (DIN) Material No.
Low Carbon Steel	Soft iron (CS)	1.0333
Stainless steel	AISI 304	1.4301
Stainless steel	AISI 316, 316 L	1.4401, 1.4404
Stainless steel	AISI 321	1.4541
Stainless steel	AISI 316 Ti	1.4571
Monel (NiCu30Fe)	Alloy 400	2.4360
Copper	Copper	2.0090
Brass	Brass Ms 63	2.0321
Titanium	B348 Gr.1	3.7025

Other alloys available on request

#### Filler

Flexible graphite, ceramic, calandered sealing materials,

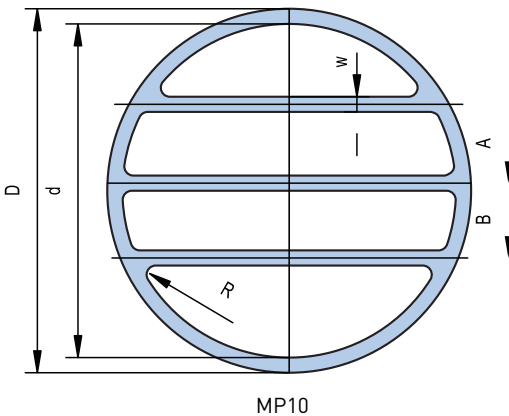
### SIZES

STANDARD DIMENSIONS	
gasket thickness	3.2 mm
gasket width	10, 13 and 16 mm
bar width	8, 10 and 13 mm

Gaskets with outside diameter to 1000 mm are normally made with integrated bars. Gaskets with an outside 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.

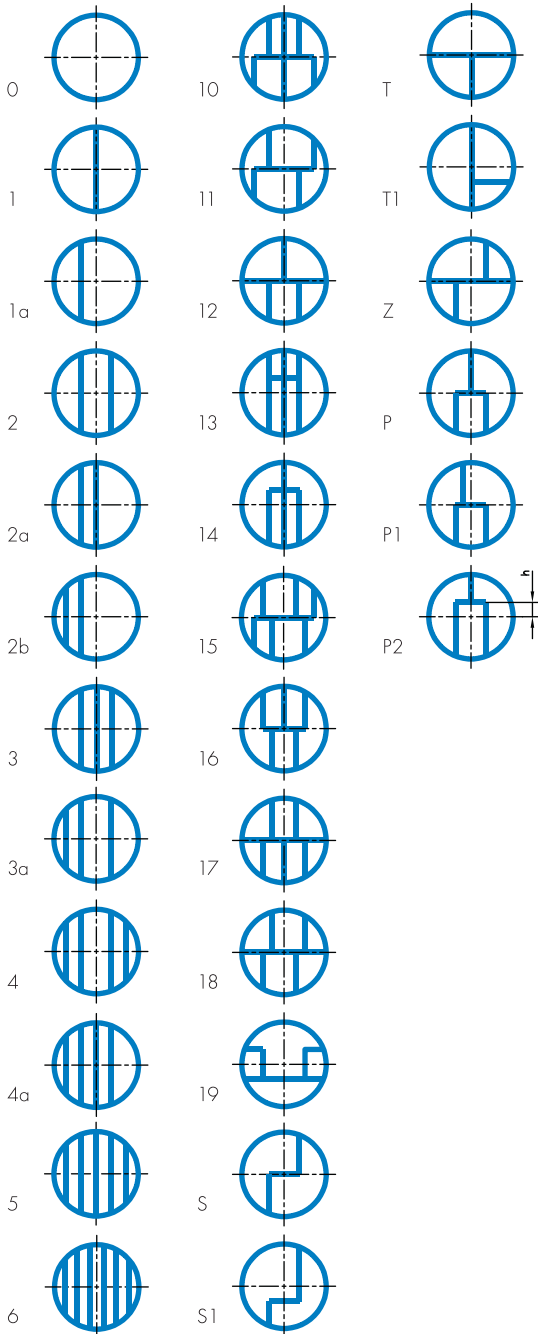
### GASKET ORDERING EXAMPLE

Gasket style (MP 10, MP 14), shape drawing dimensions: outside diameter D, inside diameter d, gasket thickness s, bar width w, radius R and distance between bars (A, B). Material for metal jacket, material for filler.

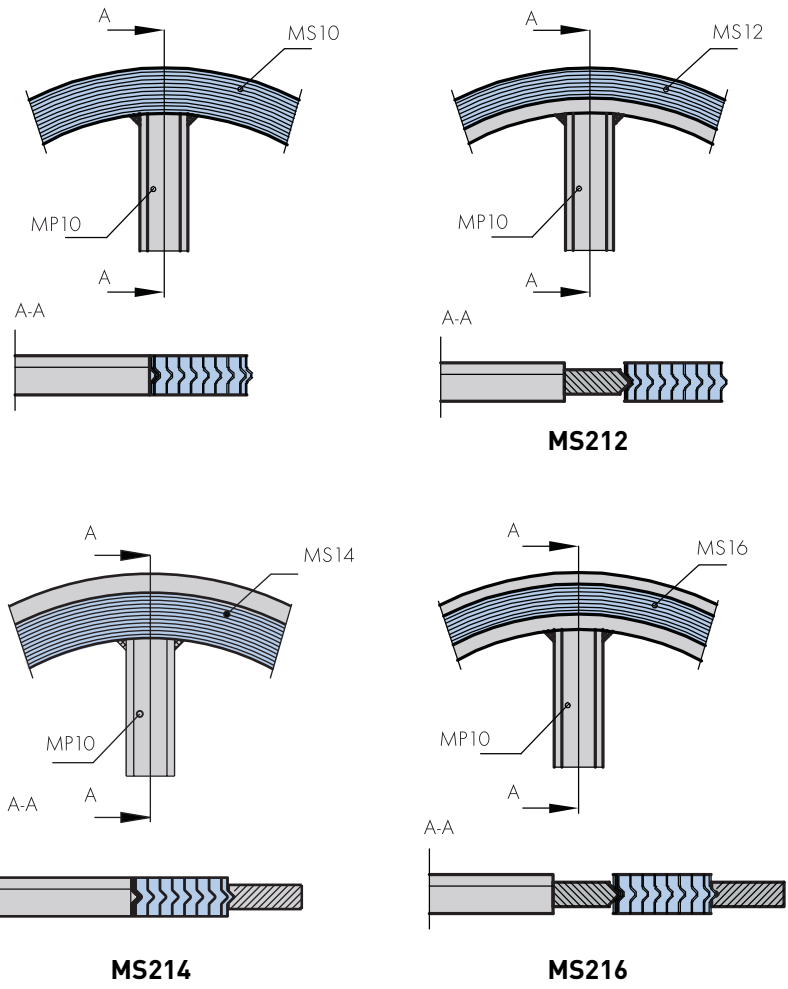


### SPIRAL WOUND GASKETS FOR HEAT EXCHANGERS

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 mmy 6.5 mm and 7.2 mm.



MAX. DIMENSIONS	
Thickness s [mm]	Max. diameter d3 [mm]
3.2	750
4.5	1500
6.5	2200
7.2	2500



### GASKET ORDERING EXAMPLE

SWG style,  
metal jacketed profile (MP10),  
material,  
shape drawing

### 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-metal 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.

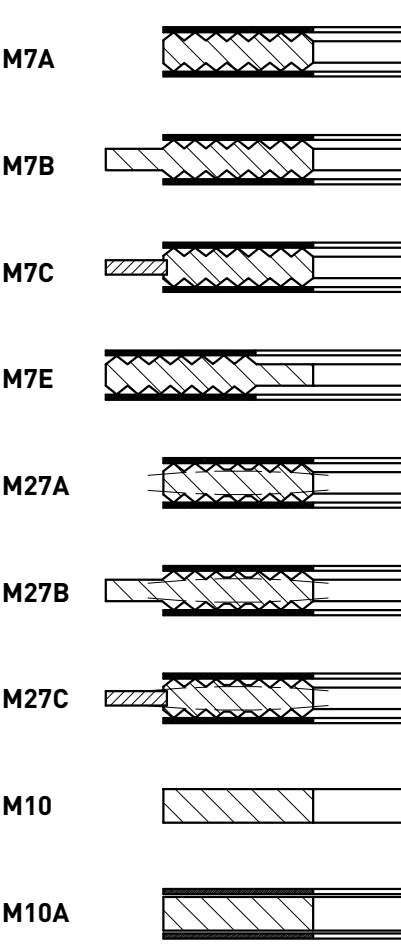
### SHAPE AND CONSTRUCTION

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

METAL CORE		
Material	ASTM	EN (DIN) Material No.
Stainless steel	AISI 321	1.4541
Stainless steel	AISI316TI	1.4571

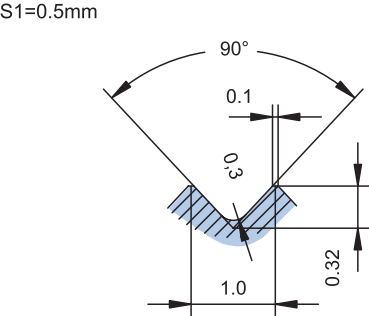
### SIZES

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

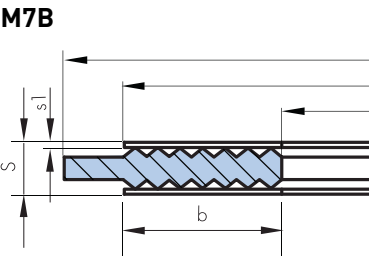
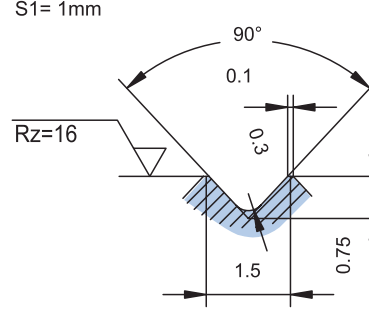




FINE GROOVE PROFILE



STANDARD GROOVE PROFILE



PROFILE	s1 (mm)
standard	1.0
fine	0.5

EN 12560-6 Grooved Gaskets for ASME B 16.5 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	369.9	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	

EN 1514-6 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				
10	22	36	36	36	46	46	46	46	56	56	56	67				
15	26	42	42	42	51	51	51	51	61	61	61	72				
20	31	47	47	47	61	61	61	61								
25	36	52	52	52	71	71	71	71	82	82	82	83				
32	46	62	62	66	82	82	82	82								
40	53	69	69	73	92	92	92	92	103	103	103	109				
50	65	81	81	87	107	107	107	107	113	119	119	124				
65	81	100	100	103	127	127	127	127	137	143	143	153				
80	95	115	115	121	142	142	142	142	148	154	154	170				
100	118	138	138	146	162	162	168	168	174	180	180	202				
125	142	162	162	178	192	192	194	194	210	217	217	242				
150	170	190	190	212	217	217	224	224	247	257	257	284				
175	195	215	215	245	247	247	254	265	277	287	284	316				
200	220	240	248	280	272	272	284	290	309	324	324	358				
250	270	290	300	340	327	328	340	352	364	391	388	442				
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							

GASKET ORDERING EXAMPLE

Grooved gasket M7A,

PROPERTIES AND APPLICATIONS

The metallic ring joint gaskets are manufactured according to the API 6A and ASME B 16.20 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.

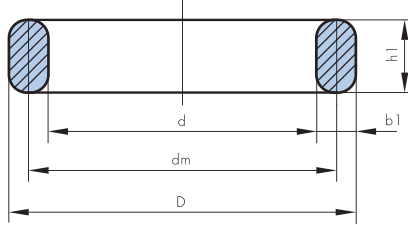
STANDARD MATERIALS

STANDARD MATERIALS RECOMMENDED BY THE ASME B16.20				
ASTM	EN Material No.	Maximum HB	Maximum HV	Material code
Soft Iron	1.1003	90	56	D
LowCS	1.0038	120	68	S
A182-F5	1.7362	130	72	F5
AISI410	1.4000	170	86	S410
AISI 304	1.4301	160	83	S304
AISI316	1.4401	160	83	S316
AISI 347	1.4550	160	83	S347

DIMENSIONS

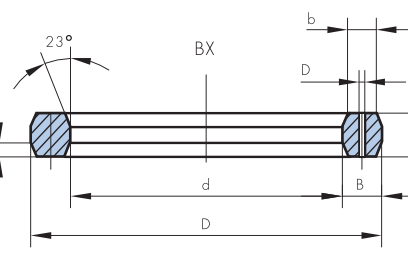
STANDARDS FOR RING JOINT GASKETS USED WITH FLANGES		
Ring Joints Gaskets Style	Ring Joints Gaskets Standard	Flange Standard
R	ASME B 16.20 API 6A	ASME B 16.5 ASMEB 16.47
RX	ASME B 16.20 API 6A	API 6B
BX	API 6A	API 6BX

STYLE M15-R

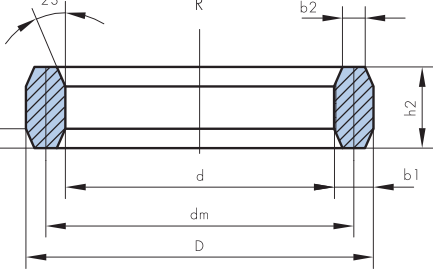


OVAL SECTION

STYLE M19-BX

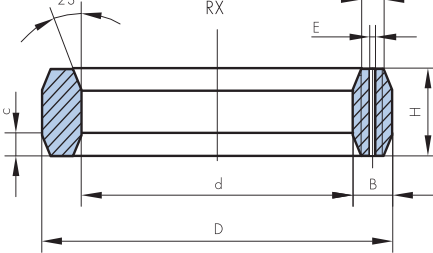


STYLE M16-R



OCTAGONAL SECTION

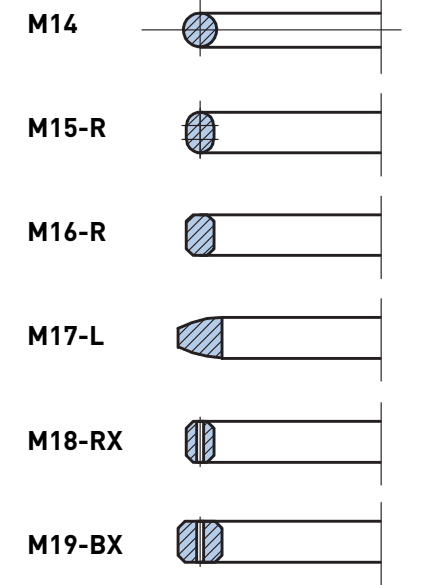
STYLE M18-RX



OCTAGONAL SECTION

GASKET ORDERING EXAMPLE

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



ASME-ANSI B16.5					ASME B16-47A		API6B			Tol- erances	+/-0,38	+/-0,38	+/-0,17	+/-0,39	+/-0,39	+/-0,20		
NOMINAL PIPE SIZE (in)										R	DIMENSIONS (mm)						WEIGHT (kg)	
150 lb	300- 600 lb	900 lb	1500 lb	2500 lb	300- 600 lb	900 lb	2000 lb	3000 lb	5000 lb		D	d	d <sub>m</sub>	hi	h2	b1	OVAL	OCTAG.
	1/2									R11	40.49	27.79	34.14	11.18	9.65	6.35	0.05	0.05
		1/2	1/2							R12	47.65	31.75	39.70	14.22	12.70	7.95	0.10	0.10
	3/4			1/2						R13	50.83	34.93	42.88	14.22	12.70	7.95	0.10	0.10
		3/4	3/4							R14	52.40	36.50	44.45	14.22	12.70	7.95	0.11	0.11
1										R15	55.58	39.68	47.63	14.22	12.70	7.95	0.12	0.12
	1	1	1	3/4				1	1	R16	58.75	42.85	50.80	14.22	12.70	7.95	0.12	0.11
1 1/4										R17	65.10	49.20	57.15	14.22	12.70	7.95	0.14	0.13
	1 1/4	1 1/4	1 1/4	1				1 1/4	1 1/4	R18	62.28	52.38	60.33	14.82	12.70	7.95	0.15	0.14
1 1/2										R19	73.05	57.15	65.10	14.82	12.70	7.95	0.16	0.15
	1 1/2	1 1/2	1 1/2					1 1/2	1 1/2	R20	76.23	60.33	68.28	14.82	12.70	7.95	0.17	0.15
				1 1/4						R21	83.37	61.11	72.24	17.53	16.00	11.13	0.30	0.29
2										R22	90.50	74.60	82.55	14.82	12.70	7.95	0.20	0.19
	2			1 1/2				2		R23	93.68	71.42	82.55	17.53	16.00	11.13	0.34	0.33
		2	2						2	R24	106.3	84.12	95.25	17.53	16.00	11.13	0.39	0.38
2 1/2										R25	109.5	93.65	101.6	14.22	12.70	7.95	0.25	0.23
	2 1/2			2				2 1/2		R26	112.73	90.47	101.6	17.53	16.00	11.13	0.42	0.41
		2 1/2	2 1/2						2 1/2	R27	119.08	96.82	107.9	19.05	16.00	11.13	0.45	0.43
				2 1/2						R28	123.8	98.43	111.13	14.22	17.53	12.70	0.57	0.55
3										R29	122.2	107.9	114.30	17.53	12.70	7.95	0.28	0.26
	3									R30	128.6	106.3	117.48	17.53	16.00	11.13	0.48	0.47
	3	3						3	3	R31	134.9	112.70	123.8	17.53	16.00	11.13	0.51	0.50
				3						R32	139.7	114.30	127.0	19.05	17.53	12.70	0.65	0.63
3 1/2										R33	139.7	123.8	131.7	14.22	12.70	7.95	0.32	0.30
	3 1/2									R34	142.9	120.6	131.7	17.53	16.00	11.13	0.54	0.52
			3						3	R35	147.6	125.4	136.5	17.53	16.00	11.13	0.56	0.55
4										R36	157.1	141.2	149.2	14.22	12.70	7.95	0.37	0.34
	4	4						4	4	R37	160.3	138.1	149.2	17.53	16.00	11.13	0.62	0.60
				4						R38	173.0	141.3	157.1	22.35	20.57	15.88	1.16	1.14
			4						4	R39	173.0	150.8	161.9	17.53	16.00	11.13	0.67	0.65
5										R40	179.4	163.5	171.4	14.22	12.70	7.95	0.42	0.39
	5	5						5	5	R41	192.11	169.8	180.9	17.53	16.00	11.13	0.75	0.73
				5						R42	209.5	171.4	190.5	24.40	23.88	19.05	1.91	1.88
6										R43	201.6	185.7	193.6	14.22	12.70	7.95	0.48	0.44
			5						5	R44	204.8	182.5	193.6	17.53	16.00	11.13	0.80	0.78
	6	6						6	6	R45	222.2	200.0	211.15	17.53	16.00	11.13	0.87	0.85
			6						6	R46	223.8	198.4	211.15	19.05	17.53	12.70	1.08	1.05
				6						R47	247.6	209.5	228.6	25.40	23.88	19.05	2.29	2.26
8										R48	255.6	239.7	247.6	14.22	12.70	7.95	0.61	0.56
	8	8						8	8	R49	281.0	258.7	269.8	17.53	16.00	11.13	1.11	1.09
			8						8	R50	285.7	254.0	269.8	22.35	20.57	15.88	1.99	1.95
				8						R51	301.6	257.1	279.4	28.70	26.92	22.23	3.65	3.69
10										R52	312.7	296.8	304.8	14.22	12.70	7.95	0.75	0.69
	10	10						10	10	R53	334.9	312.7	323.8	17.53	16.00	11.13	1.34	1.30
			10						10	R54	339.7	307.9	323.8	22.35	20.57	15.88	2.39	2.35
				10						R55	371.4	314.3	342.9	36.58	35.05	28.58	7.35	7.68
12										R56	388.9	373.0	381.0	14.22	12.70	7.95	0.93	0.87
	12	12			12	12	12	12		R57	392.1	369.8	381.0	17.53	16.00	11.13	1.57	1.53
			12							R58	403.2	358.7	381.0	28.70	26.92	22.23	4.98	5.03
14										R59	404.8	388.9	396.8	14.22	12.70	7.95	0.98	0.90
	14				14		14	14		R60	438.1	374.6	406.4	39.62	38.10	31.75	10.47	11.09
		14								R61	430.2	407.9	419.1	17.53	16.00	11.13	1.73	1.69
			14			14				R62	434.9	403.2	419.1	22.35	20.57	15.88	3.09	3.04
				14						R63	444.5	393.7	419.1	33.27	31.75	25.40	7.33	7.54
16										R64	461.9	446.0	454.0	14.22	12.70	7.95	1.12	1.03
	16				16		16			R65	481.0	458.7	469.9	17.53	16.00	11.13	1.94	1.89
		16				16		16		R66	485.7	454.0	469.9	22.35	20.57	15.88	3.47	3.40
			16							R67	498.4	441.3	469.9	36.58	35.05	28.58	10.07	10.53
18										R68	525.4	509.5	517.5	14.22	12.70	7.95	1.28	1.18
	18				18		18			R69	544.5	522.2	533.4	17.53	16.00	11.13	2.20	2.15
		18				18		18		R70	552.4	514.3	533.4	25.40	23.88	19.05	5.35	5.27
			18							R71	561.9	504.8	533.4	36.58	35.05	28.58	11.43	11.95
20										R72	566.7	550.8	558.8	14.22	12.70	7.95	1.38	1.27
	20				20		20			R73	596.9	571.5	584.2	19.05	17.53	12.70	2.99	2.92
		20						20		R74	603.2	565.1	584.2	25.40	23.88	19.05	5.85	5.77
			20							R75	615.9	552.4	584.2	39.62	38.10	31.75	15.05	15.94
24										R76	681.0	665.1	673.1	14.22	12.70	7.95	1.66	1.53
	24				24					R77	708.0	676.2	692.1	22.35	20.57	15.88	5.11	5.01
		24				24				R78	717.5	666.7	692.1	33.27	31.75	25.40	12.10	12.46
			24							R79	727.0	657.2	692.1	44.45	41.40	34.93	22.58	22.06
				22						R80	623.9	608.0	615.9		12.70	7.95		1.40
					22					R81	649.3	620.7	635.0		19.05	14.30		3.86
									1	R82	68.28	46.02	57.15		16.00	11.13		073
									1 1/2	R84	74.63	52.37	63.50		16.00	11.13		0.25
									2	R85	92.08	66.68	79.38		17.53	12.70		0.40
									2 1/2	R86	106.3	74.62	90.50		20.57	15.88		0.65

## 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.



MW12



MW12A



MW12AE



MW13A



MW22A



MW23A



MW12C

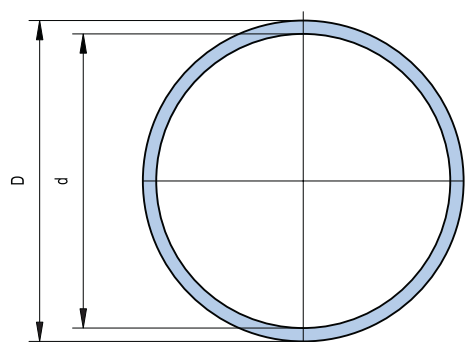


## ADVANTAGES

- 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.



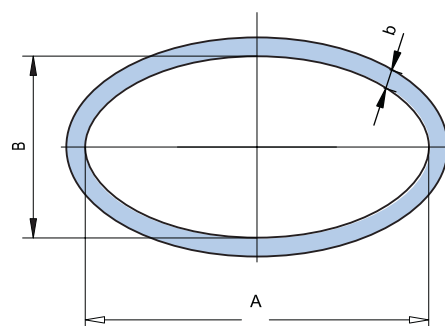
MATERIALS FOR METAL AND CORUGATED METAL GASKETS		
Material	ASTM	EN (DIN) Material No.
Low Carbon Steel	Soft iron (CS)	1.0333
Stainless steel	AISI 304	1.4301
Stainless steel	AISI316, 316 L	1.4401, 1.4404
Stainless steel	AISI 321	1.4541
Stainless steel	AISI 316 Ti	1.4571

## SIZE

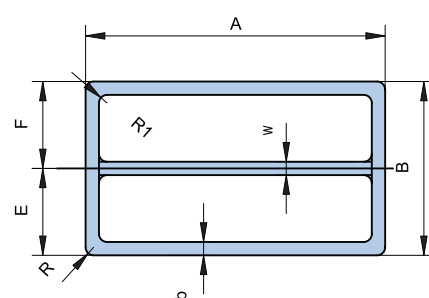
Gaskets with an outside diameter up to 1000 are usually made in one piece, whilst larger dimensions are welded. Welding is also recommended for cost-effectiveness.

### 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 - 2 mm.



Tip: AxBxb(oval)



## GASKET ORDERING EXAMPLE

### STANDARD SIZE:

CORRUGATED GASKET M12A, EN 1514-4 DN 100, PN40,  
Material: 1.4571 /Graphite

### NON-STANDARD DIMENSION:

CORRUGATED GASKET M12A, D=946 mm, D=914 mm, S=3.5 mm,  
Material: AISI316Ti/Graphite

## PROPERTIES AND APPLICATIONS

The non-metallic or flat gaskets are the most typical ones from the family of flat static gaskets. They are used in large numbers by various industries and in a variety of applications. Soft gaskets are made of non-asbestos (CSF), graphite, PTFE, mica, aramid/graphite and rubber sealing materials. Available in standard and non-standard gasket design.



### Gasket materials and application

Standard Line	Basis	Max.T[°C/°F]	Max. P[bar/psi]	Application and properties
BA-202	Organic fibres, NBR	• Peak • Continuous 180/356 140/284	40/580	for over loadings, good resistance to water, gases, oils, Fuels
BA-203	Aramid fibres, NBR	• Peak • Continuous 250/482 200/392	50/725	for medium loading, good resistance to water, gases, oils, fuels
BA-50	Aramid fibres, NBR	• Peak • Continuous 280/536 220/428	80/1160	good dynamic resistance for higher loading, gas, food industry
BA-55	Synthetic fibres, NBR	• Peak • Continuous 350/662 270/518	100/1450	excellent thermal properties and good steam resistance, economical quality for wide field of application
BA-U	Aramid fibres, NBR	• Peak • Continuous 350/662 250/482	100/1450	general use
BA-GL	Glass fibres, NBR	• Peak • Continuous 440/824 350/662	100/1450	very good thermal properties and excellent torque retention
BA-CF	Carbon fibres, NBR	• Peak • Continuous 400/752 300/572	100/1450	resistance to steam and alkaline media, chemical and petrochemical industry
BA-Auto	Aramid fibres, SBR	• Peak • Continuous 280/536 220/428	80/1160	controlled swell properties in oil, automotive industry
BA-N	Aramid fibres, CR	• Peak • Continuous 350/662 270/518	100/1450	resistance to refrigerant, general use
BA-C	Aramid fibres, CSM	• Peak • Continuous 200/392 150/302	60/870	excellent resistance to acids and alkaline media
BA-R	Aramide fibres, NBR/SBR,	• Peak • Continuous 400/752 350/662	140/2030	great strength, for dynamic loadings, automotive and petrochemical
BA-R300	Inorganic fibres, NBR, special reinforced	• Peak • Continuous 550/1022 450/842		excellent dynamic and thermal resistance, automotive and petrochemical industry, shipyards
BA-R302	Inorganic fibres, NBR, special reinforcement	• Peak • Continuous 650/1202 600/1112		extreme dynamic and thermal resistance, automotive and petrochemical industry, shipyards
BA-U R200	Aramid fibres, NBR, Expanded metal	• Continuous 75/143	140/2030	improved strength, for dynamic loadings, high pressure applications, district heating, ship's piping system

High Performance Line	Basis	Max.T[°C/°F]	Max. P [bar/psi]	Application and properties
BAU 2000	Aramid fibres, NBR	• Peak • Continuous 400/752 280/536	140/2030	environment friendly gasket material with specially balanced sealing, thermal, chemical and mechanical
BAGL 3000	Glass fibres, NBR	• Peak • Continuous 440/824 350/662	120/1740	environment friendly gasket material with excellent torque retention and thermal resistance
BACF 4000	Carbon fibres, NBR	• Peak • Continuous 440/824 350/662	12/1740	environment friendly gasket material with very good resistance to strong alkaline media and steam
BAX 5000	Aramid fibres, NBR	• Peak • Continuous 400/752 250/482	150/2175	environment friendly gasket material with supreme mechanical properties
BAM 6000	Biosoluble mineral fibres, NBR	• Peak • Continuous 440/824 350/662	120/1740	environment friendly gasket material with excellent resistance to steam and long-term steam sealability
BA HC	Synthetic fibres, NBR, special fillers	• Peak • Continuous 280/536 200/392	80/1160	for sealing of applications with rough and uneven sealing surfaces, oil, fuels, lubricants, cooling liquids, steam, etc
BA EG	Synthetic fibres, NBR, graphite	• Peak • Continuous 400/752 300/572	100/1450	for high temperature applications, steam, gases, liquids, where high torque retention is required



		Basis	Max. temperature [°C / F]	Max. pressure [bar/psi]	Application and properties
Graphite sealing material					
GRAFILIT	SF	Expanded graphite	Continuous (air) 450 / 842	80/1160	excellent creep, strength, chemical stability
	SL	Expanded graphite, Flat stainless steel insertion		100/1450	excellent creep, strength, chemical stability with very good surface loadings and operating pressure
	SP	Expanded graphite, Tanged stainless steel insertion		200 / 2900	excellent creep, strength, chemical stability with very good surface loadings and operating pressure
Aramid / Graphite sealing material					
DONIFLEX	GLD	Aramid fibers, fillers and graphite	Continuous 360 / 680	100/1450	outstanding chemical and thermal resistance, environment friendly, steam sheet
	GMD	Aramid fibers, fillers and graphite			excellent resistance to hot water, steam and oils
	GMDr	Aramid fibers, fillers and graphite			excellent resistance to hot water, steam and oils, specially designed for radiators and boilers
	GR-A	Aramid fibers, fillers and graphite, tanged steel insert	Continuous 400 / 752	150/2175	excellent thermal and stress resistance for applications that require high strength and thermal integrity at extreme temperature
	GR-EM	Aramid fibers, fillers and graphite, expanded mild steel insert			exceptional radial strength, significantly improved tensile strength, resilience and other fluid resisting properties
	GR-SP	Aramid fibers, fillers and graphite, pegged AISI 316 steel core	Continuous 450 / 842		excellent thermal and stress resistance, good adaptability, for application in automotive, petrochemical industry and exhaust systems
Elastomeric sealing products					
DONIGUM	NBR, SBR, NR, CR, BR, EPDM		depends on product type	depends on product type	various applications for low bolting loads - depends on product type
PTFE sealing materials					
DONIFLON	Virgin PTFE, Filled PTFE, Expanded PTFE		Continuous 270 / 543 Peak 315/588	depends on installation and working parameters	excellent resistance to strong chemicals

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 thickness of material, nature of service medium, type of flange and surface stress. Steam application requires special considerations.

Request for detail product Catalogues

To obtain more information about our products, please do not hesitate to contact us. Any requested product Data Sheets or Catalogues will be sent to you immediately. Our highly skilled group of experts in the technical service department can assist you in solving practically any sealing problem. If you need our help, please contact us.

SIZE AND CONSTRUCTION - CUSTOM MADE GASKETS

The non-metallic gaskets are produced in several sizes and shapes to meet the most demanding applications. They are available in standard and non-standard gasket design. In terms of non-standard gaskets we can provide any shape and size according to customer design or sample.

DIMENSIONS

The dimensions of our standard gaskets meet the requirements of the EN 1514-1, ANSI B16.21 or other internationally recognised standards. Gaskets of up to 1500 mm x 1500 mm are made from one piece, while larger ones are assembled from segments. Two kinds of splicing are used: dove-tail and bevelled (there is practically no limitation regarding gasket dimension). In accord with gasket shapes and sizes all other dimensions can be manufactured upon request.

CUTTING CAPABILITIES

With our cutting technology, experience and knowledge we are able to cut almost any material. A wide range of cutting equipment provides competitive pricing and high quality regardless of gasket size or quantity. A large range of presses and special cutting tools together with a CAM-CAD Water Jet and a skilled team are available for the swift production of small quantities. Custom-cut gaskets can be made according to the customers own drawings and specifications, samples and templates. In-house manufactured cutting tools are an integral part of the production unit. There is an extensive catalogue of cutters available.

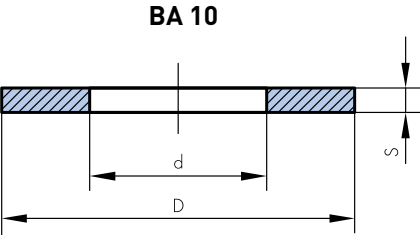
Water Jet Cutting

CAM-CAD Water Jet cutter is an excellent system for manufacturing a variety of two-dimensional items both large and small in simple or complex shapes from a wide range of materials. Steel, rubber, aluminium are just a few of the materials that can be cut to the desired shape - drawn, programmed and stored on a CAD-system. The process will leave a smooth finish on steel with no heat affected zones and exceptional two-dimension accuracy.

STANDARDS FOR NON-METALLIC FLAT GASKETS	
Gasket Standard	Flange Standard
EN 1514-1 ASME B 16.21 (ASME B16.5)	EN 1092-1,-2,-3,-4, EN 545, EN 598, EN 969

BA 10 gaskets for raised face flanges ASME B 16.21 (ASME B16.5)

NPS (in)	d (mm)	D (mm)					
	Class (lb)	150	300	400	600	900	1500
1/2"	21.4	47.6	54	54	54	63.5	63.5
3/4"	27	57.2	66.7	66.7	66.7	69.8	69.8
1"	33.3	66.7	73	73	73	79.4	79.4
1 1/4"	42	76.2	82.5	82.5	82.5	88.9	88.9
1 1/2"	48.4	85.7	95.2	95.2	95.2	98.4	98.4
2"	60.3	104.8	111.1	111.1	111.1	142.9	142.9
2 1/2"	73	123.8	130.2	130.2	130.2	165.1	165.1
3"	88.9	136.5	149.2	149.2	149.2	168.3	174.6
3 1/2"	101.6	161.9	165.1	161	161		
4"	114.3	174.6	181	177.8	193.7	206.4	209.5
5"	141.3	196.8	215.9	212.7	241.3	247.6	254
6"	168.3	222.2	250.8	247.6	266.7	288.9	282.6
8"	219.1	279.4	308	304.8	320.7	358.8	352.4
10"	273	339.7	362	358.8	400	435	435
12"	323.8	409.6	422.3	419.1	457.2	498.5	520.7
14"	355.6	450.9	485.8	482.6	492.1	520.7	577.8
16"	406.4	514.4	539.7	536.6	565.1	574.7	641.3
18"	457.2	549.3	596.9	593.7	612.8	638.2	704.8
20"	508	606.4	654	647.7	682.6	698.5	755.7
22"	558.8	660.4	704.9	701.7	733.4		
24"	609.6	717.5	774.7	768.3	790.6	838.2	901.7
26"	660.4	774	835	831.9	866.8	882.6	
28"	711.2	831.9	898.5	892.2	914.4	946.1	
30"	762	882.7	952.5	946.2	971.6	1010	
32"	812.8	939.8	1006	1003	1022	1073	
34"	863.6	990.6	1057	1054	1073	1037	
36"	914.4	1047.	1118	1118	1130	1200	
38"	965.2	1111.3					
40"	1016	1162.1					
42"	1066.	1219.					
44"	1117.5	1276					
46"	1169.6	1327					
48"	1220	1384					
50"	1270	1435					
52"	1320	1492					
54"	1372	1549					
56"	1422	1606					
58"	1475	1663					



TOLERANCES

(mm)	up to 600	over 600
d	±0.4	+0 -3.2
D	±0.4	+0 -3.2

EN 1514-1 (DIN 2690) BA 10 gaskets for EN 1092-1 flanges

DN (mm)	d (mm)	D (mm)							
	PN Class	PN2.5	PN6	PN10	PN16	PN25	PN40	PN64	PN 100
10	18	38	38	45	45	45	45	56	56
15	22	43	43	50	50	50	50	61	61
20	28	53	53	60	60	60	60	72	72
25	35	63	63	70	70	70	70	82	82
32	43	75	75	82	82	82	82	88	88
40	49	85	85	92	92	92	92	103	103
50	61	95	95	107	107	107	107	113	120
65	77	115	115	127	127	127	127	138	145
80	90	132	132	142	142	142	142	148	155
100	115	152	152	162	162	168	168	175	180
125	141	182	182	192	192	195	195	210	217
150	169	207	207	218	218	225	225	247	257
175	195	237	237	248	248	255	267	277	287
200	220	262	262	273	273	285	292	309	324
250	274	318	318	328	330	342	353	364	391
300	325	373	373	378	385	402	418	424	458
350	368	423	423	438	445	458	475	486	512
400	420	473	473	490	497	515	547	543	627
450	470	528	528	540	557	565	572	588	704
500	520	578	578	595	618	625	628	657	813
600	620	680	680	695	735	730	745	764	950
700	720	785	785	810	805	830	850	879	
800	820	890	890	915	910	940	970	988	
900	920	990	990	1015	1010	1040	1080	1108	
1000	1020	1090	1090	1120	1125	1150	1190	1220	
1200	1220	1290	1305	1340	1340	1360	1395		
1400	1420	1490	1520	1545	1540	1575	1615		
1600	1620	1700	1720	1770	1760	1795	1830		
1800	1820	1900	1930	1970	1960	2000			
2000	2020	2100	2135	2180	2165	2230			
2200	2220	2305	2345	2380	2375				
2400	2420	2505	2555	2590	2585				
2600	2620	2705	2760	2790	2785				
2800	2820	2920	2970	3010					
3000	3020	3120	3170	3225					
3200	3220	3320	3380						
3400	3420	3520	3590						
3600	3620	3730	3800						
3800	3820	3930							
4000	4020	4130							

TOLERANCES (mm)

(mm)	up to 600	over 600
d	±0.4	+0 -3.2
D	±0.4	+0 -3.2

GASKET ORDERING EXAMPLE

EN 1514-1, DN65, PN 16, Form FF,  
material TESNIT BA-U, 2 mm

ASME B 16.21,4-300 lbs, Form RF,  
material TESNIT BAM 6000, 2 mm

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

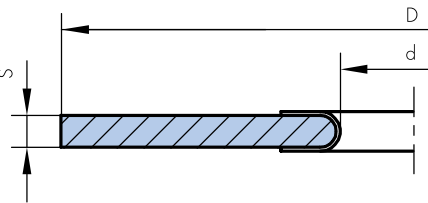
Gaskets are available according to EN 1514-1, ASME B 16.21 and other Standard Forms. Custom made gaskets are available upon request.

SIZE

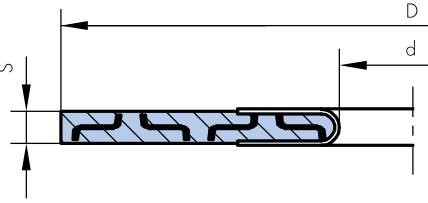
The only limitation of the eyeleted gasket is the size of the basic gasket material.  
Size limitations:  
From 20 mm to 400 mm one piece eyelet.  
From 400 mm upwards plasma welded eyelet.  
The standard production follows the sizes and norms by ASME B16-21 and EN 1514-1.

GASKET ORDERING EXAMPLE

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



MP1

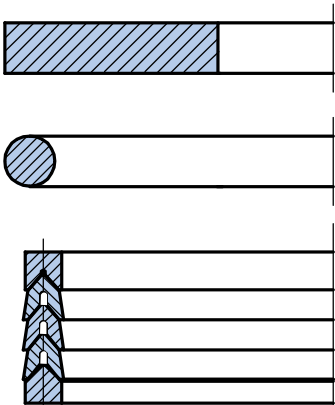




PROPERTIES AND APPLICATIONS

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	<ul style="list-style-type: none"><li>• enhanced wear resistance</li><li>• chemical resistance</li></ul>
Graphite	<ul style="list-style-type: none"><li>• extremely low coefficient of friction</li><li>• fairly good compressive strength</li><li>• good wear resistance</li></ul>
Carbon	<ul style="list-style-type: none"><li>• good thermal resistance</li><li>• resistance to deformation</li></ul>
Bronze	<ul style="list-style-type: none"><li>• enhanced compressive strength</li><li>• good wear resistance</li><li>• high thermal conductivity</li></ul>



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 TESNIT 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.

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

GASKET ORDERING EXAMPLE

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



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 outside. 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

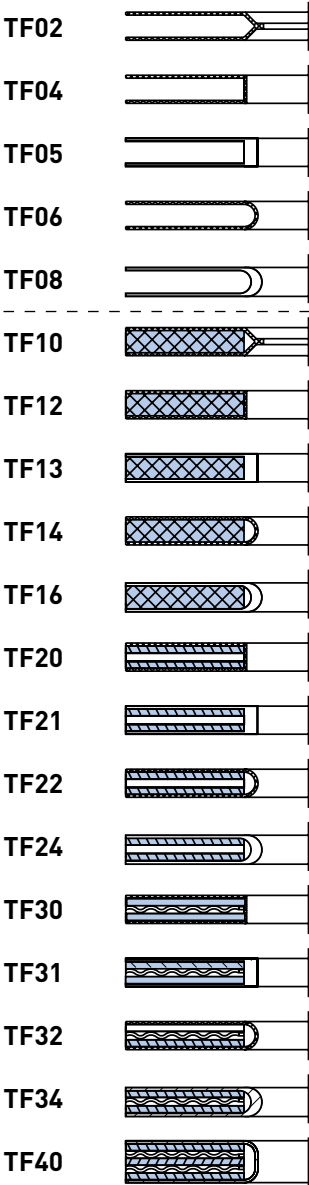
The PTFE envelope for gaskets with maximum external diameter of up to 500 mm are made in one piece, for gaskets with greater diameters they are welded. Oval shapes of PTFE envelopes are welded. There are no limitations regarding sizes for gaskets with welded envelopes.

EN 1514-3 gaskets

DN (mm)	Gasket inside diameter (mm)	Envelope outside diameter (mm)	Gasket outside diameter (mm)						
			PN Class						
			PN6	PN 10	PN 16	PN25	PN40	PN63	
10	18	36	39	46	46	46	46	56	
15	22	40	44	51	51	51	51	61	
20	17	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		

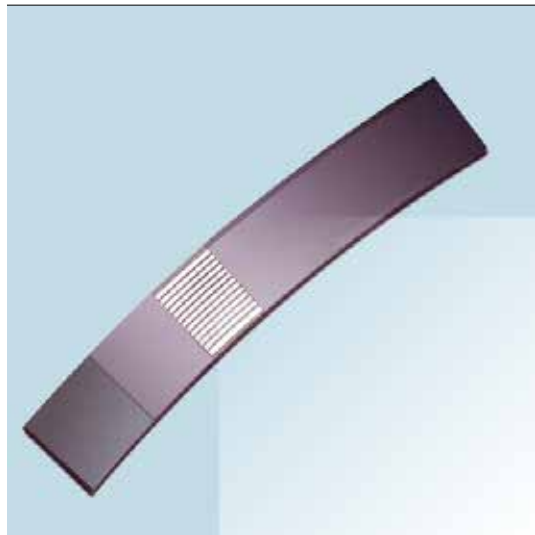
GASKET ORDERING EXAMPLE

EN 1514-3, Type C, DN 65, PN 16, 2 mm, virgin PTFE



(and combinations)





PROPERTIES AND APPLICATIONS

DONIT TESNIT 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 customers 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

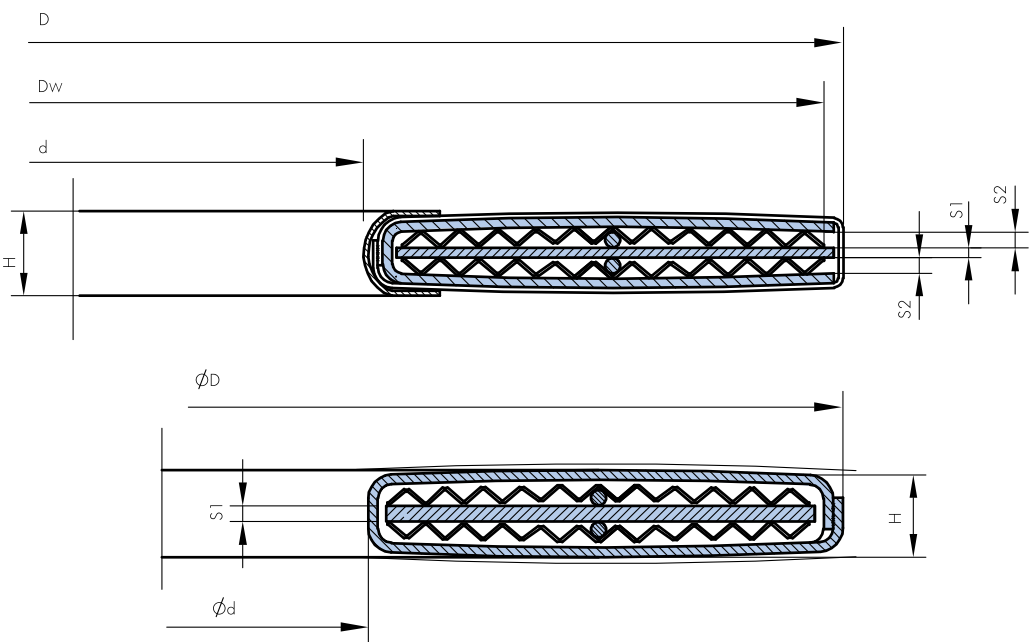
Custom-made gaskets are made to customer’s own drawing and specification, samples and templates. A highly skilled hardworking team can provide for almost any customer requirements.

DIMENSION

Up to 4000 mm, according to customers specification.

GASKET ORDERING EXAMPLE

According to customer specification.



AISI/ ASTM	Individual name	Material No.	DIN 17 006	Hardness HB	Tensile strenght - Rm [N/mm²]	Yield stress - Rp <sub>0.2</sub> [N/mm²]	Temperature [°C]		Density
							min.	max.	
FERROUS METALS									
A 570 Gr. 36	Lov carbon steel	1.0038	RSt 37-2	100-130	370-450	220	-40	+ 500	7.85
A619[100]	Steel sheet	1.0333	Ust 13; St 13; S t3	90-120	270-370	250	-40	+ 500	7.85
Soft-Iron	Soft-Iron	1.1003	M2 / Armco	90-110	270-350	190	-60	+ 450	7.85
430	Stainless steel	1.4016	X6 Cr. 17	130-170	450-600	270	-20	+ 350	7.70
304(304H)	Stainless steel	1.4301	X5CrNi 18 10	130-180	500-700	195	-200	+ 550	7.90
304L	Stainless steel	1.4306	X2 CrNi 19 11	130-170	460-680	180	-270	+ 550	7.90
316	Stainless steel	1.4401	X5CrNiMo 17 122	130-180	500-670	205	-200	+ 550	7.95
316L	Stainless steel	1.4404	X2CrNiMoTi 17 13 2	120-170	490-690	190	-200	+ 550	7.95
316L	Stainless steel	1.4435	X2CrNi 18 14 3	120-170	490-690	190	-200	+ 550	7.98
321	Stainless steel	1.4541	X6CrnITL 18 10	130-190	500-730	205	-270	+ 550	7.90
347	Stainless steel	1.4550	X6CrNiNb 18 10	130-190	510-740	205	-200	+ 550	7.90
316Ti	Stainless steel	1.4571	X6 CrNiMoTi 17 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	X10 NiCrAlTi32 20	130-220	500-750	210	-110	+ 850	8.00
NON-FERROUS METALS									
-	Cooper	2.0090	SF-CU	55-65	200-250	90	-270	+ 400	8.94
Brass	Messing Ms 63	2.0321	CuZn 37	60-80	290-370	140	-200	+ 350	8.44
-	Plumbum 99,9	2.3040	Pb99,9	4	12	-	-250	+ 200	11.50
-	Nickel 99,6	2.4060	Ni99,6	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 15Fe	140-200	550-800	200	-60	+ 600	8.42
-	Aluminium 99,5	3.0255	Al 99,5	20-25	70-80	509	-250	+ 350	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

[illegible]

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. By using special software like the Gasket Calculation software DON, we combined all gasket selection factors thus offering our customers an easy and safe gasket selection.



### DON 3.0

Designers and installers of flange joints need a universal and specific tool to meet the requirements of EN 1591 standard. Numerous characteristics of the flange design are taken into account and consequently a large number of mathematical operations are required for such calculations.

DON 3.0 software was developed especially to reduce the time needed for flange joint calculation according to the EN 1591-1 standard. The calculations consider all mechanical and thermal effects on the flange joint, as well as flange rotation and external loads. Additionally all corrigenda of the standard are already included in this software. The DON 3.0 database provides different parameters of sealing materials and gaskets defined by the EN 13555 standard. The database also includes different standard flanges, bolts and gaskets parameters (dimensions and materials). It is also possible for the user to define and calculate any other user-defined flange joint.

By using the software it is possible to verify if the bolts, flanges and sealing material in the analysed joint will be able to withstand the operating conditions. The final result of the calculation is the required minimum bolting-up torque needed to achieve the criteria for the selected tightness class. The results are presented numerically and graphically. Because of extremely short calculation time it is very easy to simulate the impact of modifying various parameters the joint is exposed to.

### DON 2.0

The DON 2.0 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.



## 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

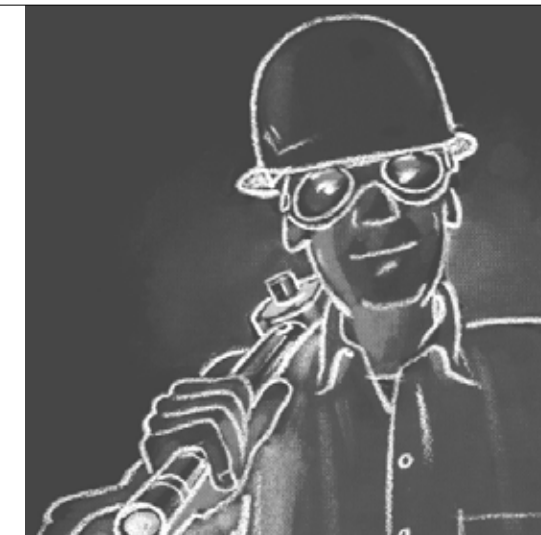
Align flange faces and bolt holes without using excessive force. Report any misalignment.

#### 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.





### 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
- The 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

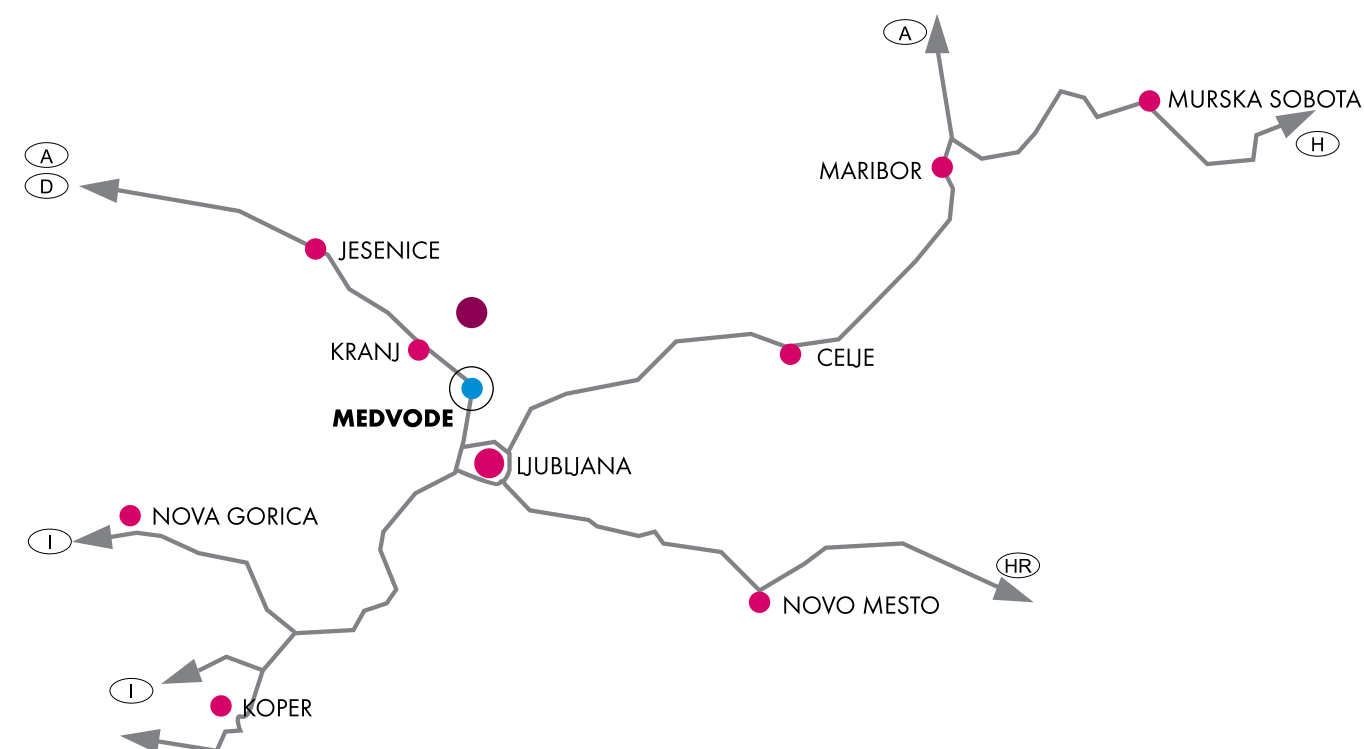
Our team is always available to our customers for any assistance they might need, including advice on the selection and use of our sealing products. This is provided by a special team of highly skilled experts making up the Technical Service department. By passing on their comprehensive knowledge of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

## CONTACT



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### DISCLAIMER

All information data quoted are based on years 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 and warranty claims. Whenever there is any doubt, our staff will be pleased to assist you finding the optimum sealing solution.

This edition cancels all previous issues and subject to change without notice.

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