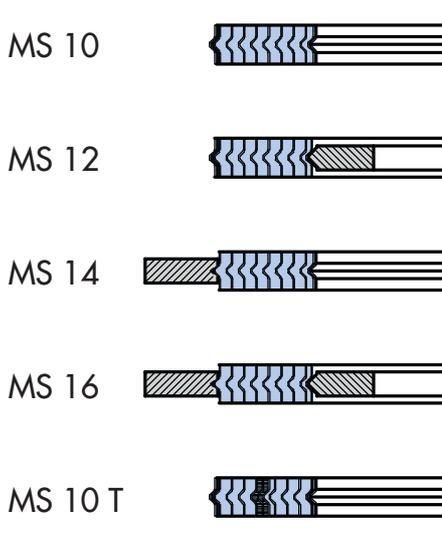


# 1. SPIRAL WOUND GASKETS



## PROPERTIES AND APPLICATION

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 mediums and solvents.



## ADVANTAGES:

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

## SHAPE AND CONSTRUCTION

TESNILA spiral wound gaskets are produced in several styles and combination of materials to fit the most stringent application. TESNILA spiral wound gaskets are usually of circular shape, however TESNILA 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 to 2200 mm and a nominal thickness of 3.2, 4.5 and 6.5mm. Spiral wound gaskets of non-standard dimensions and shapes, and larger diameters are available on request.

## Gasket standard styles:

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

\* With PTFE sealing zone



# 1. SPIRAL WOUND GASKETS

## Metallic strip

The standard thickness of the metallic strip is 0,2 mm.

MATERIALS FOR METALLIC STRIP	
ASTM	DIN Material No.
AISI 304	1.4301
AISI 316	1.4401
AISI 321	1.4541
AISI 316 Ti	1.4571
Monel (NiCu30Fe)	2.4360

## Filler

Filler is normally used for thicknesses from 0,5 mm to 0,6 mm.

- Flexible graphite 98%
- Flexible graphite 99,85%
- PTFE
- Ceramic

## Centering ring

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

## Inner ring

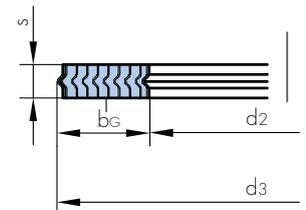
Inner ring is used to avoid excessive compression due to high seating stress in high-pressure service and it is also used to reduce turbulence in the flange area. It is normally made of the same material as the gasket metallic strip.

## DIMENSIONS

Manufacturing sizes

This limitations are general and can vary according to the special customer

LIMITATIONS FOR MANUFACTURING DIMENSIONS			
Thickness $s$ [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	1150	30	24
6,5	2500	35	24



## Thickness

The standard manufacturing thicknesses for spiral wound gaskets are: 3,2mm; 4,5mm; 6,5mm (measured across metallic strip not including the filler, which protrudes slightly beyond the metal).

## Manufacturing tolerances

The tolerance of the gasket diameters ( $d_1$ ,  $d_2$ ,  $d_3$ ,  $d_4$ ,  $s$ ,  $s_1$ ) 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.



# 1. SPIRAL WOUND GASKETS



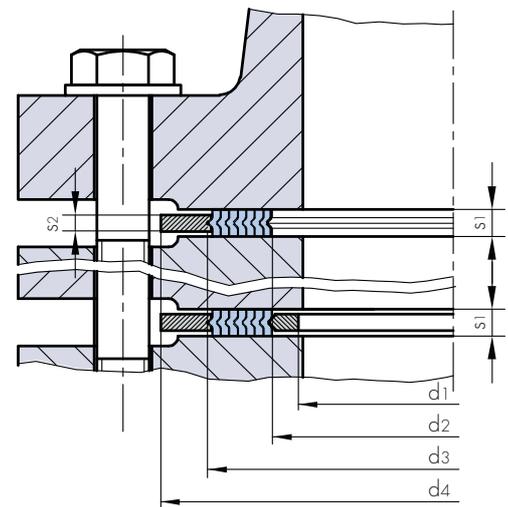
STANDARDS FOR SWG USED WITH FLANGES	
SWG Standard	Flange Standard
DIN Standard	DIN 2632 - 2638
EN 1514-2	PrEn 1092-1, flanges
ASME B 16.20 (API 601)	ANSI B 16.5
ASME B 16.20 (API 601)	ASME B 16.47 (API 605)
ASME B 16.20 (API 601)	MSS SP 44
ASME B 16.20	ANSI B 16.5
ASME B 16.20	BS 1560
ASME B 16.20	ASME B 16.47
EN 1514-2 (DIN 2691)	DIN 2512
EN 1514-2 (DIN 2692)	DIN 2513
ANSI B16.5	ANSI B16.21

## ASME B 16.20 (API 601) for ANSI B16.5 flanges

DN	d1					d2					d3		d4						
	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	209,6	206,2	200,2	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	260,4	257,8	247,7	287,3	274,6	272,4	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	314,5	314,5	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	342,9	339,9		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	393,7	387,4		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	444,5	438,2		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	495,3	489,0		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	603,3	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	

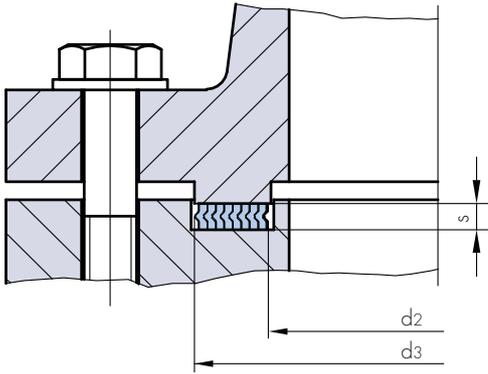
## ASME B16.47 Series B for API 605 flanges

DN	d1					d2					d3					d4				
	150	300	400	600	900	150	300	400	600	900	150	300	400	600	900	150	300	400	600	900
26	654,1	654,1	654,1	644,7	673,1	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	723,9	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	901,7
30	755,7	755,7	752,6	752,6	774,7	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	838,2	825,5	825,5	812,8	831,9	863,6	850,9	863,6	858,5	882,7	914,4	891,1	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	927,1	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	971,6	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	1168,4	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	

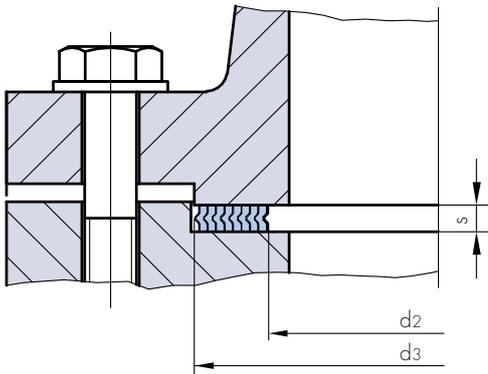




# 1. SPIRAL WOUND GASKETS



SWG FOR TONGUE and GROOVE FLANGES - EN 1514-2 (DIN 2691) and ANSI B16.5 according to DIN 2512 AND ANSI B16.21



SWG FOR MALE and FEMALE FLANGES - EN 1514-2 (DIN 2692) and ANSI B16.5 according to DIN 2513 and ANSI B16.21

## GASKET ORDERING EXAMPLE:

Spiral wound gasket MS 16,  
API 601 for ANSI B16.5, 2"-150lbs,  
Winding, inner ring: AISI 316,  
Filler: Graphite 98%,  
Centering ring: CS

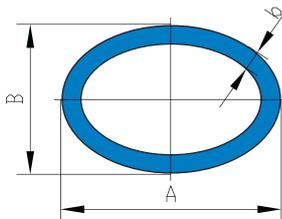
## NON-STANDARD SWG

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

## Gaskets for Boilers Handholes and Manholes:

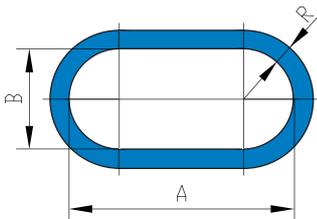
Gaskets Type MS 10 can be manufactured in other shapes like oval and oblong (stadium). There is no specific standard for this type of gasket. When ordering it providing complete specifications is required: Internal dimensions (AxB), width (b) and thickness (s) or a drawing.

### Oval shape



Dim.: AxBxbxs (mm)

### Oblong (stadium) shape



Dim.: AxBxbxs (mm)

## GASKET ORDERING EXAMPLE:

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

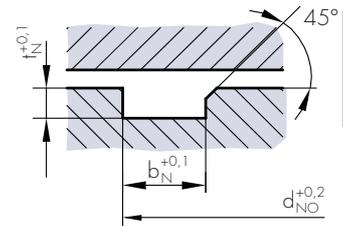


# 1. SPIRAL WOUND GASKETS

## 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	3,5	4,5	6,5
e	2,5 <sup>+0,1</sup>	3,3 <sup>+0,1</sup>	4,7 <sup>+0,1</sup>

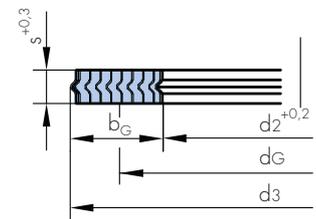


## Connections with non-load bearing gaskets

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

GASKETS AND GROOVES DIMENSIONS									
Spiral-wound gasket					Groove				
d <sub>M</sub>	b <sub>G</sub>	d <sub>3</sub>	d <sub>2</sub>	s	d <sub>NO</sub>	b <sub>N</sub>	d <sub>NI</sub>	t <sub>N</sub>	
< 300	5-9	d <sub>G</sub> +b <sub>G</sub>	d <sub>G</sub> -b <sub>G</sub>	3,5	d <sub>3</sub> +1	b <sub>G</sub> /0,86	d <sub>NO</sub> -2b <sub>N</sub>	2,5 <sup>+0,1</sup>	
< 1000	9-17	d <sub>G</sub> +b <sub>G</sub>	d <sub>G</sub> -b <sub>G</sub>	3,5	d <sub>3</sub> +1,5		d <sub>NO</sub> -2b <sub>N</sub>	2,5 <sup>+0,1</sup>	
< 300	5-9	d <sub>G</sub> +b <sub>G</sub>	d <sub>G</sub> -b <sub>G</sub>	4,5	d <sub>3</sub> +1		d <sub>NO</sub> -2b <sub>N</sub>	3,3 <sup>+0,1</sup>	
< 1000	9-17	d <sub>G</sub> +b <sub>G</sub>	d <sub>G</sub> -b <sub>G</sub>	4,5	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 contactface					
NPS	DN	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	+ + 0,1	+ 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 (Jacket)	DIN 2505		ASME	
		k <sub>1</sub> [mm]	k <sub>0</sub> xK <sub>D</sub> [N/mm]	m	y [MPa]
MS 10, MS 12,	Steel, Cr-Steel	1,3xb <sub>D</sub>	50xb <sub>D</sub>	1,3	50
MS 14, MS 16	CrNi-Steel, Monel	1,4xb <sub>D</sub>	55xb <sub>D</sub>	1,4	55
	CrNi-Steel (Graphite/ PTFE)	1,2xb <sub>D</sub>	40xb <sub>D</sub>	1,2	40

## LOAD BEARING GASKETS

