Type		Style Number	Gasket Factor m	Min. Loading Stress y (MPa)	Working Range		Page
					Temperature (℃)	Pressure (bar)	
Semi-Metallic Gasket	Spiral Wound Gasket	ZW#659X system (Graphite filler)	3.0	69	-200~450(1)	300	5-8
		ZW#759X system (Expanded PTFE filler)	3.0	69	-200~260	200	
		ZW#859X system (Non-Asbestos filler)	3.0	69	-150~250	300	
		ZW#959X system (Complex e.g.Mica/Graphite(2))	3.0	52	-200~750	100	
	Kammprofile Gasket	ZW#70X system	2.0	Graphite 28 ePTFE 28 Mica 40	Graphite -200~450(1) ePTFE -200~260 Mica -100~1000	Graphite 400 ePTFE 200 Mica 20	14
		ZW#80X system (Convex)					
	Metal Jacketed Gasket	ZW#5200/ZW#6200 (Single w/FG both sides)	3.25~3.75	38~62	Copper:-100~315 Aluminum:-200~425 304SS:-200~540(3)	70	16
		ZW#5800/ZW#6800 (Double w/FG both sides)					
		ZW#5100 (Corrugated)	2.5~3.5	20~45		68	
	Metal Corrugated Gasket	ZW#5000/ZW#5010	2.0	26	304SS:-200~540(3)	250	
	Metal Reinforced Graphite Gasket	ZW#6600 Frenzelit novaphit® SSTC XT	2.5	25	-200~550	250	26
		ZW#3600-N/F/T	ZW#3600-N:2.0 ZW#3600-F:2.0 ZW#3600-T:2.5	ZW#3600-N : 8 ZW#3600-F : 8 ZW#3600-T : 8	-200~450(1)	150	27
		ZW#3632 MRG	2.5	25	-200~550	250	
Metallic Gasket	Metal Ring-Joint Gasket	ZW#5500 system	Soft Iron:5.5 Monel:6.0 F5:6.0 SS:6.5 Alloy:6.5	Soft Iron:124 Monel:150 F5:150 SS:180 Alloy:180	E.G.:304SS -250~540(4)	Flange Rating 150#~20000#	18-19
Non-Metallic Gasket	Non-Asbestos Sheet Gasket	ZW#3000	2.75	26	-50~350	60	22
		Flexitallic® SF 2400	3.2	20	-40~400	100	23
		ZW#8800 Frenzelit novapress® Basic	2.5	12	-50~300	85(water,steam), 80(other)	24
	Fiber-reinforced Graphite gasket	ZW#9500 Frenzelit novatec® Premium XP	2.5	16	-100~450	100	25
	Graphite	ZW#3600-P Graphite Gasket/ZW#3700 Graphite Tape/ ZW#3800 Graphite Ring	2.0	8	-200~450(1)	150	27
	Thermiculite® Gasket – High Temperature	Flexitallic® Thermiculite® 815	2.0	17	-200~1000	200	28
		Flexitallic® Thermiculite® 715	3.0	20	-40~454	140	
	Filled PTFE Gasket	Flexitallic® Sigma500/Sigma511/Sigma533	Sigma500 : 1.4 Sigma511 : 1.4 Sigma533 : 1.4	Sigma500 : 13 Sigma511 : 16 Sigma533 : 16	-200~260	85(1.5T), 80(2.0T), 75(3.0T)	29
	Pure PTFE Gasket	ZW#7500	3.0	20	-100~150	10	30
	PTFE Envelope Gasket	ZW#7530、7531、7535	3.0	20	-100~150	20	
	Expanded PTFE Envelope gasket	Metal Corrugated Gasket with GORE® GR	2.5	19.3	-268~315	200	35
	Expanded PTFE Gasket	GORE® GR	2.5	19.3	-268~315	200	31
		GORE® UPG (Style800)	2.4	10.6	-268~315	200	32
		GORE Gasket Tape, Joint Sealant(incl.500/600	2.5	19.3	-268~315	200	33-34
		ZEALON ZW#70XX system (expanded PTFE joint sealant, Tape)	2.0	20.7	-268~260	200	36
	Rubber Sheet Gasket	ZW#2200 CR, ZW#2300 NBR, ZW#2600 EPDM	0.5	0	-20~90	55	46
		ZW#2500 VITON(FKM)	0.5	0	-30~120	55	
		ZW#2700 SBR	0.5	0	-30~90	55	
	Oil-Proof Paper Jointing Sheet Gasket	ZW#2900	0.5	0	Max. 120	8	48
	Cork Rubber Sheet Gasket	ZW#2950	0.5	0	-30~110	15~60	49

Note:(1) The max. temperature of Graphite is 450℃ in air, and max. 650℃ in reducing atmosphere. If over than 450℃, please contact with our technical division.
(2) Spiral filler materials are available as per customer demand.
(3) If metal gasket is with Graphite on both sides, the gasket max. temperature shall refer to Note(1).
(4) Metal material properties please refer to page 19.
(5) Most gaskets can't reach the working range in max. pressure and max. temperature at the same time. If similar requirement, please contact with us.
(6) Chemical Compatibility Chart of various gasket materials are available, please contact with us.

Spiral Wound Gasket

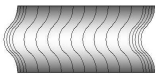
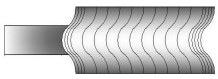
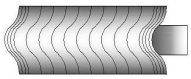
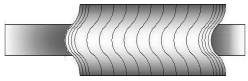
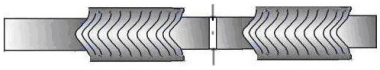
Spiral Wound Gasket is made of alternate piles of V-preformed hoop and soft filler that are tightly and spirally wound together. According to the need of the mating flange, the gasket is provided with an outer ring, an inner ring or both outer and inner rings.

The outer ring serves as a compression stop, anti-blowout device, which properly centers the gasket on the flange. The inner ring acts as a compression stop and is used to fill the annular space between the flange bores and the gasket inside diameter to minimize trubulence of process fluids and erosion of flanges faces.

The spiral wound outer or inner rings are used primarily as reinforcement and are chosen instead of a solid metal ring, because of lower costs or because of limited space when the use of a solid metal ring would be prohibited due to the difficulty in fabrication or usage. ZW spiral wound gaskets can be manufactured in accordance with all relevant gasket standards to suit various flange designation such as ASME/ANSI B16.5, API 605 (ASME B16.47 Series B), MSS SP-44 (ASME B16.47 Series A), AWWA, CNS, DIN and JIS. The size is available from OD 1/2" to 5000mm. Please note the gaskets for non-standard flanges or heat exchanger with partitions are also readily available. Low stress spiral wound gasket could replace normal non-metallic gasket in ANSI 150#/300# Flange under lower torque, about only 60% of traditional spiral wound gasket.

®

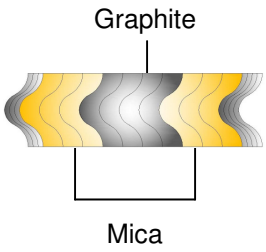
●Style

Style	Profile	Soft Filler Material			
		Graphite	ePTFE	Non-Asbestos	Complex
Basic		ZW#6590	ZW#7590	ZW#8590	ZW#9590
With Outer Ring		ZW#6591	ZW#7591	ZW#8591	ZW#9591
With Inner Ring		ZW#6592	ZW#7592	ZW#8592	ZW#9592
With Inner and Outer Ring		ZW#6596	ZW#7596	ZW#8596	ZW#9596
Double Spiral		Custom-made			

※ZW#6596 had approved by API 6FB fire test

Complex means customize by two soft filler materials as the following, e.g.: Graphite, ePTFE, Non-Asb., Mica, Ceramic…etc.

Standard

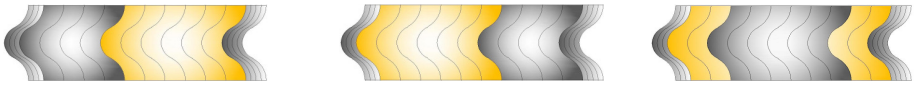


e.g. : ZW#9596 – Mica / Graphite / Mica

The complex soft filler, e.g. Mica , then Graphite, and then Mica, the construct designed for Mica filler covered the outside of Graphite filler to isolate oxygen. Graphite is flexible to meet the flange surface and allow the use of high temperature in the non-oxidizing space, and Graphite will not pollute the media.

※ **Below Special styles are also available as per customer's requirement**

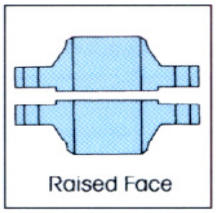
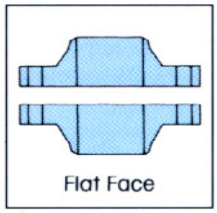
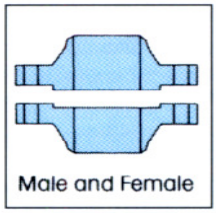
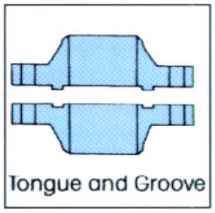
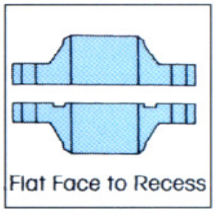
Special



●Working Range

Filler Material	Temperature (℃)	Pressure (bar)
Graphite	-200~450(air) 650(reducing atmosphere)	300
Expanded PTFE	-200~260	200
Non-Asbestos	-150~250	300
Mica / Graphite / Mica	-100~750	100

●Selection Guide

Flange Face					
	Unsuitable	Unsuitable	Suitable 1/2”~24” 150#~600#	Suitable 1/2”~60” 300#~1500#	Suitable 1/2”~60” 300#~1500#
	Unsuitable	Unsuitable	Suitable 1/2”~60” 150#~1500#	Unsuitable	Unsuitable
	Suitable 1/2”~24” 150#~600#	Suitable 1/2”~24” 150#~600#	Unsuitable	Unsuitable	Unsuitable
	Suitable 1/2”~60” 150#~1500#	Suitable 1/2”~60” 150#~1500#	Unsuitable	Unsuitable	Unsuitable

●Standard Thickness Selection

Gasket Thickness	Flange Nominal Size
3.2 mm (0.125 in)	< φ 1500 mm
4.5 mm (0.175 in)	< φ 3000 mm
6.4 mm (0.250 in)	< φ 3500 mm
7.2 mm (0.285 in)	< φ 5000 mm

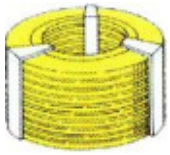
The Identification of Metallic Winding Materials and Fillers

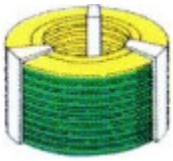
The Color Coding on Outer Ring

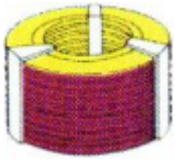
For clear identification, ZW spiral wound gaskets nominate a color-coding system around the outside edge of the outer ring, thus allowing full identification of both the winding strip and filler materials in according to ASME B16.20.

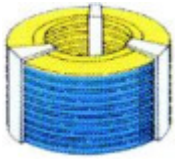
●Metallic Winding Materials

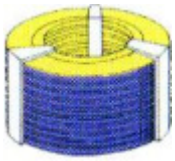
The metallic winding material is designated by solid color identification around the outside edge of the outer ring

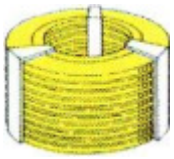

304SS
Yellow

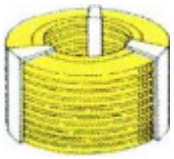

316LSS
Green

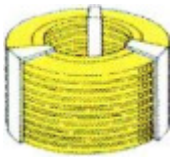

317LSS
Maroon

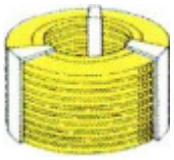

321SS
Turquoise


347SS
Blue

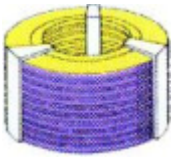

310SS
No color

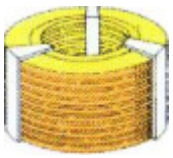

304LSS
No color

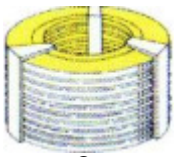

309SS
No color

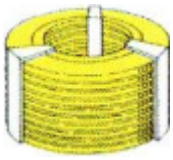

430SS
No color

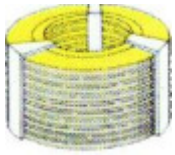

Alloy 20
Black

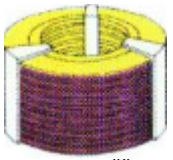

Titanium
Purple

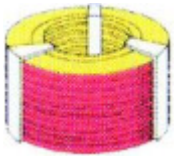

Inconel® 600/625
Gold

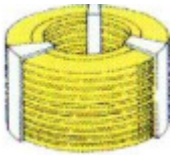

Inconel® 800/825
White

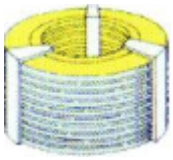

Inconel® X750
No color

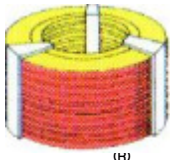

Hastelloy® C276
Beige


Hastelloy® B2
Brown


Nickel 200
Red

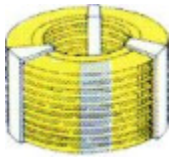

Zirconium
No color

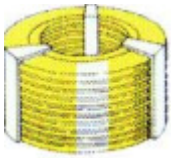

Carbon Steel
Silver

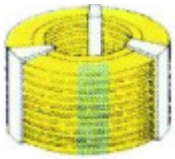

Monel®
Orange

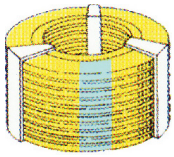
●Non-Metallic Fillers Materials

The gasket filler materials are designated by a number of strips marked at equal intervals around the outside edge of the outer ring


Flexible Graphite/F.G.
Grey strip


PTFE
White strip


Ceramic / CER
Light green strip


Mica/Vermiculite
Light blue strip

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INCOLOY® and INCONEL® are registered trademarks of Inco Alloys International, Inc.
MONEL® is a registered trademark of International Nickel.

Spiral Wound Gasket

Order Code

ZW # 6 5 9 0 – M M E

Filler Material	
6	Flexible Graphite
7	PTFE
8	Non-Asbestos
9	Complex

Style	
0	Basic
1	With Outer Ring
2	With Inner Ring
6	With Inner and Outer Ring

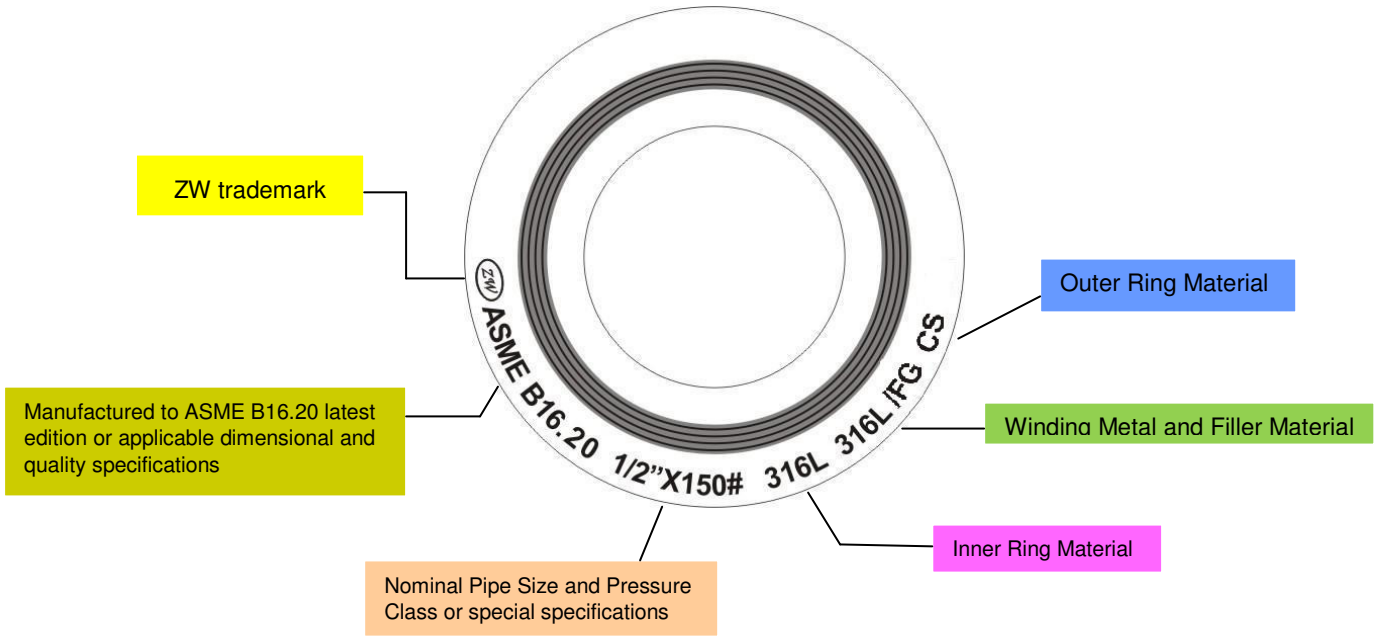
Inner Ring Material			
S	Low Carbon Steel	Y	Inconel 600, 625
E	304SS	Y1	Inconel X750
L	304LSS	W	Incolel 800(H), 825
G	316SS	T	Titanium
H	316LSS	X1	Hastelloy B2,B3
O	310SS	X2	Hastelloy C276
P	316Ti SS	X3	Hastelloy C22
Q	317LSS	A	Aluminum
J	321SS	C	Copper
K	347SS	B	Bronze
R	410SS	Z	Zirconium 702
U	430SS	I1	Duplex S31803/S32205
F	904LSS	I2	Alloy 20
M	Monel 400	I3	Super Duplex S32750
N	Nickel 200		

Outer Ring Material			
S	Low Carbon Steel	Y	Inconel 600, 625
E	304SS	Y1	Inconel X750
L	304LSS	W	Incolel 800(H), 825
G	316SS	T	Titanium
H	316LSS	X1	Hastelloy B2,B3
O	310SS	X2	Hastelloy C276
P	316Ti SS	X3	Hastelloy C22
Q	317LSS	A	Aluminum
J	321SS	C	Copper
K	347SS	B	Bronze
R	410SS	Z	Zirconium 702
U	430SS	I1	Duplex S31803/S32205
F	904LSS	I2	Alloy 20
M	Monel 400	I3	Super Duplex S32750
N	Nickel 200		

Winding Strip Material			
E	304SS	Y	Inconel 600, 625
L	304LSS	Y1	Inconel X750
G	316SS	W	Incolel 800(H), 825
H	316LSS	T	Titanium
O	310SS	X1	Hastelloy B2,B3
P	316Ti SS	X2	Hastelloy C276
Q	317LSS	X3	Hastelloy C22
J	321SS	A	Aluminum
K	347SS	C	Copper
R	410SS	B	Bronze
U	430SS	Z	Zirconium 702
F	904LSS	I1	Duplex S31803/S32205
M	Monel 400	I2	Alloy 20
N	Nickel 200	I3	Super Duplex S32750

※ Order example: ZW 6596 MME stands for a combination of Monel 400 & Graphite winding, Monel 400 inner ring, and 304SS outer ring.
※ The material of Inner ring should match the winding material.
※ Winding metal strip thickness 0.15mm~0.23mm

● Gasket Marking/Stamp follow ASME B16.20



Kammprofile Gasket

The Kammprofile gasket consists of a precision serrated metallic core with additional soft sealing tapes bonded to each serrated face. It is particularly suitable for flanges, pressure vessels cover, heat exchangers and various valve connections in high temperature, pressure or fluctuating conditions. The equally separated concentric circles can minimize lateral flow of soft seal and ensures to provide exceptional gasket rigidity and blow out resistance. Size designed to meet EN12560-6 and B16.20 standards, available soft sealing materials are graphite, Gore ePTFE, Non-asbestos fiber and Mica…etc. The gasket can be re-used by just updating soft seal and is an alternative solution to enhance Spiral Wound and Metal Jacketed Gasket. Custom-made Kammprofile and Spiral Wound complex gasket is also available.

●Style

Description	Profile	Style No.	Thickness	Core Materials	Facing Materials			
					Material	Temperature(℃)		Pressure (bar)
						Min.	Max.	
Flat		ZW#700	1.5~3.2mm	SOFT IRON CARBON STEEL 304SS 304LSS 316SS 316LSS 316Ti 317LSS 321SS 347SS 410SS 904LSS 5Cr-0.5Mo(F5) MONEL 400 NICKEL 200 INCONEL 600 625 INCOLOY 800 825 TITANIUM HASTELLOY B2/B3 HASTELLOY C276 HASTELLOY C22 ALUMINUM COPPER BRONZE SILVER ZIRCONIUM DUPLEX S31803/S32205 ALLOY 20 OTHERS				
Basic		ZW#701						
With Loose O.R.		ZW#702						
With Integral O.R.		ZW#703						
With Integral I.R.		ZW#704	3.2 mm		Graphite	-200	450 (air) 600 (reducing atmosphere)	400
With Loose O.R. & Integral I.R.		ZW#705	4.0 mm					
With Integral I.R. & O.R.		ZW#706	4.5 mm					
Double Kammprofile		ZW#707	5.0 mm		ePTFE	-200	260	200
Convex		ZW#801			Mica	-100	1000	20
Convex with Loose O.R.		ZW#802						
Convex with Integral O.R.		ZW#803						

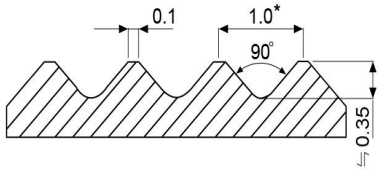
※ZW#703-316L/FG-316L had approved by API 6FB fire test
※Style No.ZW#704, ZW#705 and ZW#706 with Integral I.R. only suit for special requirement, it is custom-made.

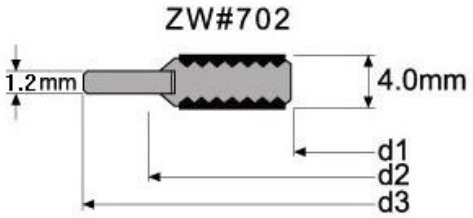
●Recommended Application

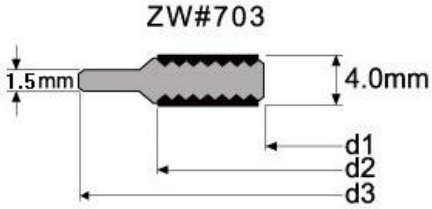
Flange Face	Flat Face	Raised Face	Tongue and Groove
Recommended gasket style	702 & 802 703 & 803 704 705 & 706 707	702 & 802 703 & 803 704 705 & 706 707	701 & 801

Kammprofile Gasket

Dimensions to ASME B16.20
to suit ASME B16.5 Flanges





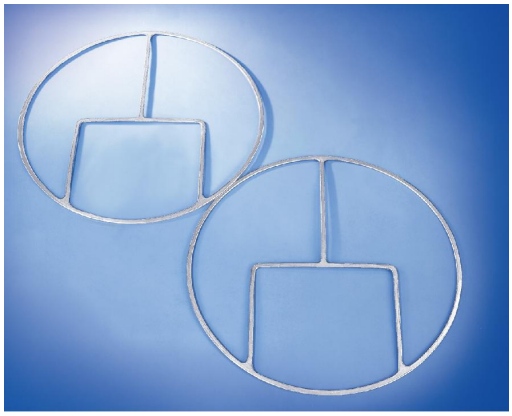


*Note: The tip distance could be custom-made in bigger size. Unit: mm

Flange Norminal Size	d1	d2	d3						
			150#	300#	400#	600#	900#	1500#	2500#
1/2"	23.1	33.3	47.8	54.1	—	54.1	—	63.5	69.9
3/4"	28.7	39.6	57.2	66.8	—	66.8	—	69.9	76.2
1"	36.6	47.5	66.8	73.2	—	73.2	—	79.5	85.9
1-1/4"	44.5	60.2	76.2	82.6	—	82.6	—	88.9	104.9
1-1/2"	52.3	69.9	85.9	95.3	—	95.3	—	98.6	117.6
2"	69.9	88.9	104.9	111.3	—	111.3	—	143.0	146.1
2-1/2"	82.6	101.6	124.0	130.3	—	130.3	—	165.1	168.4
3"	98.3	123.7	136.7	149.4	—	149.4	168.4	174.8	196.9
4"	123.7	153.9	174.8	181.1	177.8	193.8	206.5	209.6	235.0
5"	150.9	182.6	196.9	215.9	212.9	241.3	247.7	254.0	279.4
6"	177.8	212.6	222.3	251.0	247.7	266.7	289.1	282.7	317.5
8"	228.6	266.7	279.4	308.1	304.8	320.8	358.9	352.6	387.4
10"	282.7	320.8	339.9	362.0	358.9	400.1	435.1	435.1	476.3
12"	339.6	377.7	409.7	422.4	419.1	457.2	498.6	520.7	549.4
14"	371.6	409.7	450.9	485.9	482.6	492.3	520.7	577.9	—
16"	422.4	466.6	514.4	539.8	536.7	565.2	574.8	641.4	—
18"	479.3	530.1	549.4	596.9	593.9	612.9	638.3	704.9	—
20"	530.1	580.9	606.6	654.1	647.7	682.8	698.5	755.7	—
24"	631.7	682.5	717.6	774.7	768.4	790.7	838.2	901.7	—

※ There are no Class 400 flanges in NPS 1/2 through NPS 3. (Use Class 600)
※ There are no Class 900 flanges in NPS 1/2 through NPS 2-1/2. (Use Class 1500)
※ There are no Class 2500 flanges in NPS 14 and larger.
※ Any special custom-made size is available.
※ Marking & Color Coding as per ASME B16.20-2012.

Metal Jacketed Gasket



Metallic or non-metallic heat-resistant filler encapsulated in a very thin metallic shell forms metal jacketed Gaskets. The Filler material provides resilience while the metal jacket resists pressures, temperature and corrosion.

A wide range of size, profile, and materials are available to suit various specific application, especially for heat exchanger, pumps, valve cover, autoclaves, and manhole. Due to limited resilience and recovery properties, Metal Jacketed Gaskets require smooth flange surface finishes, high bolt loads, and flange flatness to seal effectively. Recently, this kind of gasket have been replaced by Kammprofile Gaskets.

• Order Code

ZW# 5 2 00 – 304SS/FG

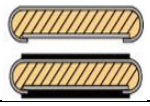
Layer Material	
5	None
6	Graphite

Style	
2	Single
8	Double
1	Corrugated

Filler	
FG	Graphite
PTFE	PTFE
NA	Non-Asbestos
CE	Ceramic Fiber

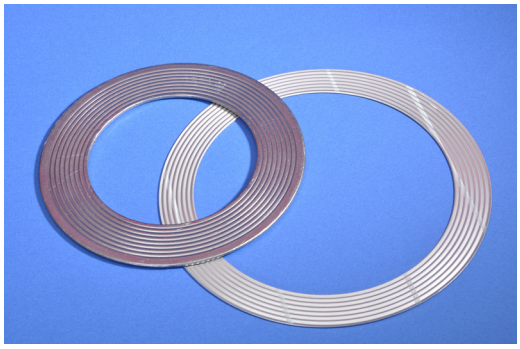
Jacket Metal	
Low Carbon Steel	Inconel 600/625
304SS	Incoloy 800(H)/825
304LSS	Titanium
316SS	Hastelloy B2/B3
316LSS	Hastelloy C276
316TiSS	Hastelloy C22
317LSS	Aluminum
321SS	Copper
347SS	Bronze
410SS	Duplex S31803/S32205
5Cr-0.5Mo	Alloy 20
Monel 400	Others
Nickel 200	

• Style

Style	Profile	Style No.
Single Jacket		ZW#5200 ZW#6200
Double Jacket		ZW#5800 ZW#6800
Corrugated Jacket		ZW#5100

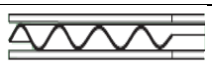
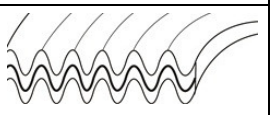
Order example: ZW#5200-304/FG stands for Metal Single Jacketed Gasket that comprises of 304SS metallic jacket shell with Graphite filler.

Encapsulated Corrugated Gasket



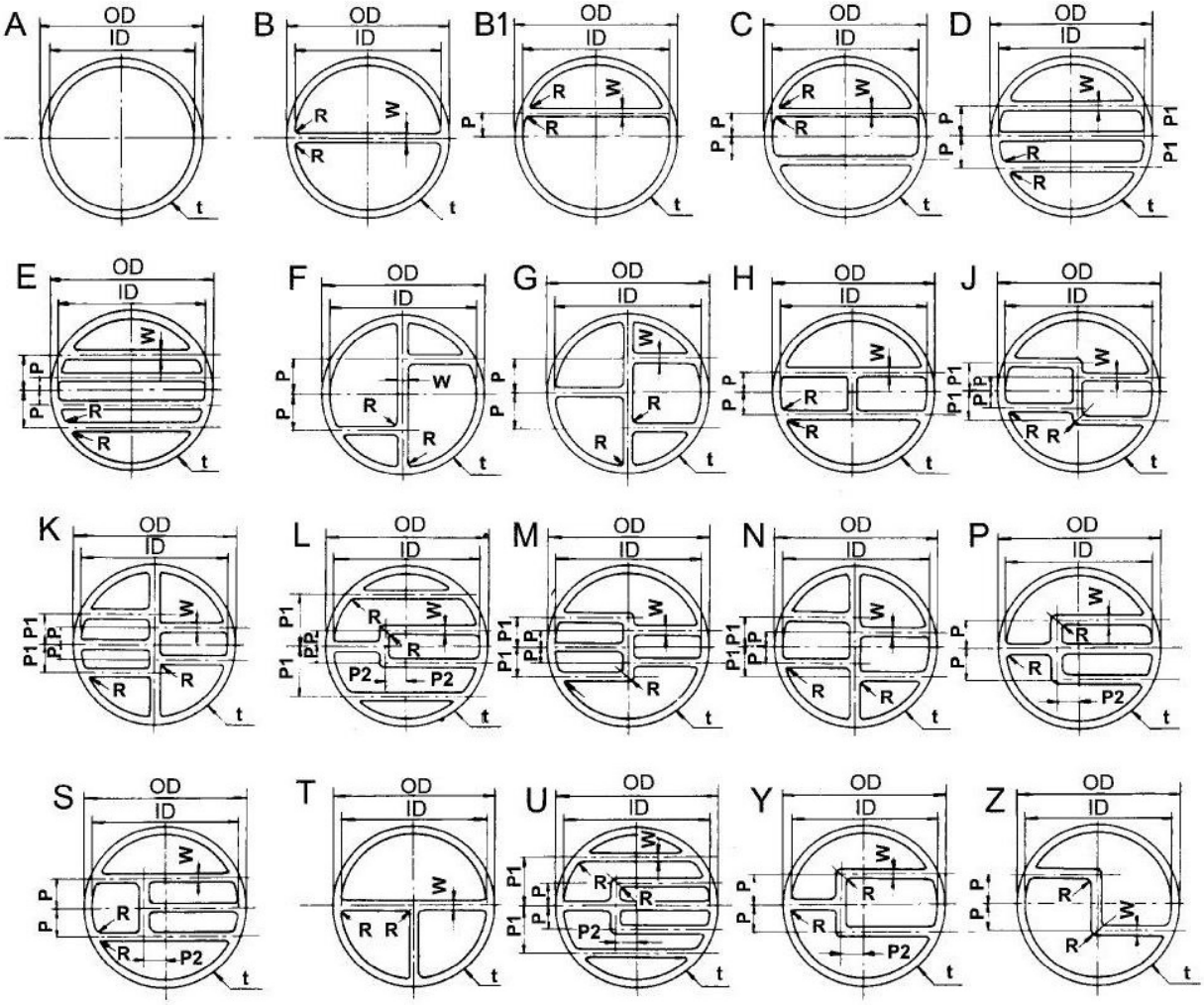
A metal core and non-metallic composite materials with special structure, pressed into concentric corrugation with both metal strength and elastic characteristics of the waveform. This unique construction, utilizing corrugated metal and compressible sealing elements, provides for excellent performance in thermal cycling applications. This configuration provides a rigid gasket that easily seals against flange seating surface imperfections.

Corrugated metal core having a multi-channel concentric sealing, the layer sealing material is not easy to blow out or creep relaxation, lower stress required can maintain long-term sealing performance. Meanwhile, the non-metallic layer can fit fill surface defects after compressed to form MMC, it is suitable for sealing heat exchangers, piping, valves, flanges joints…etc.

Style No.	Profile	Metal Material	Layer Materail	Temperature (℃)	Pressure (bar)
ZW#5000		304SS 316LSS	Graphite ePTFE	Graphite -200~450(air)/ 650(Reducing atmosphere) ePTFE -200~260	150
ZW#5010					

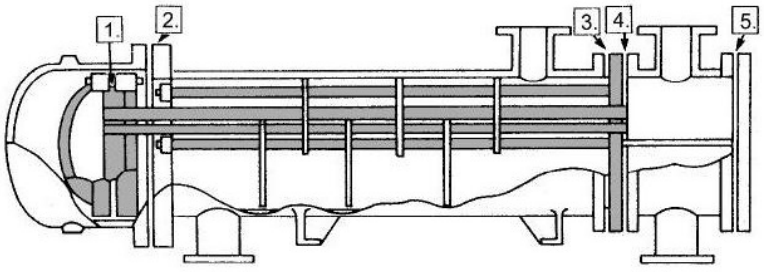
※ Other Metal materials are available.

● Schedule of Standard Shapes for Heat Exchanger Gaskets



● Gasket location on Heat Exchanger

SHELL SIDE TUBE SIDE



1. FLOATING HEAD.
2. SHELL COVER.
3. SHELL TO TUBESHEET.
4. TUBESHEET TO CHANNEL BOX.
5. CHANNEL BOX COVER.

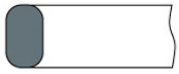
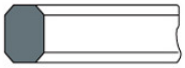
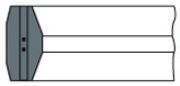
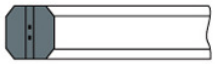
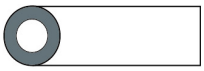
Metal Ring-Joint Gasket

Metal Ring Joint Gasket is a high integrity seal and predominantly used in high pressure / temperature oilfield applications and for petrochemical industry, such as valves, piping assemblies, and pressure vessels. Various materials and profiles are available for most-demanded design and operation conditions and conform to API 6A (oilfield use) and ASME B16.20 (general use) standards to fit ASME, BS and DIN flanges. Steel Oval and Octagonal ring joints are in stock and can be interchangeable on the modern flat bottom groove. We could deliver in the short period.

Note: the hardness of metal ring joint gasket should lower 15~20 HB than the hardness of applied flange, as the material may harden to damage the flange and affect sealing properties, we DO not recommend to re-use the gasket.

Hollow metal O-ring is made by heat resistant and noncorrosive stainless steel pipe. It is available to have small holes in the inner diameter or outer diameter, when the pressure increasing, the self-sealing function will be work. The hollow O-ring with small holes is specially applied when the pressure over than 70kgf/cm^2, the pressure resistant will better than no holes O-ring. Upon customer's requirement, we also offer O-ring surface coating PTFE or silver.

●Style

Style	Profile	Style No.
Oval		ZW#5500-OV
Octagonal		ZW#5500-OT
RX (High Pressure)		ZW#5500-RX
BX (High Pressure)		ZW#5500-BX
Delta		ZW#5500-DT
Lens		ZW#5500-LN
Hollow		ZW#5500-HL

Metal Ring-Joint Gasket

●Order Code

ZW#5500-OV-AG-E

Style	
OV	Oval
OT	Octagonal
RX	RX High Pressure
BX	BX High Pressure
DT	Delta
LN	Lens
HLZ	Hollow (no holes)
HLI	Hollow (Inner Holes)
HLX	Hollow (Outer Holes)

Surface (Coating)	
Blank	Nil
PF	PTFE
AG	Silver
MO	MOS2
Z	Others

Materials			
D	Soft Iron	M	Monel 400
S	Low Carbon Steel	F	5Cr-0.5Mo
E	304SS	N	Nickel 200
L	304LSS	Y	Inconel 600/625
G	316SS	Y1	Inconel X750
H	316LSS	W	Incoloy 800(H)/825
O	310SS	T	Titanium
P	316Ti SS	X1	Hastelloy B2/B3
J	321SS	X2	Hastelloy C276
K	347SS	X3	Hastelloy C22
R	410SS	A	Aluminum
U	430SS	C	Copper

It is recommended the material and maximum hardness as below list in accordance with API 6A, and also offer other materials for example as 5Cr-0.5Mo, Monel, Inconel, Hastelloy, Duplex…etc.

● Material Properties

Material			Code	Max. Hardness		Working Temperature(℃)	
Category		Description		Brinell BHN/HB	Rockwell B HRB	Min.	Max.
General Grade	Carbon steel	Low Carbon Steel	S	120	68	-40	540
		Soft Iron	D	90	56	-40	500
		5Cr-0.5Mo	F	130	72	-29	650
	Stainless steel	304SS	E	160	83	-250	540
		304LSS	L	160	83	-250	540
		316SS	G	160	83	-200	815
		316LSS	H	160	83	-200	815
		410SS	R	170	86	-40	850
	Non-ferrous metal	Copper	C	81	41	-100	315
		Aluminum	A	35	-	-200	425
Special Grade	Stainless steel	321SS	J	160	83	-200	870
		347SS	K	160	83	-200	870
		Inconel 600/625	Y	150	78	-100	1095
		Incoloy 800(H)/825	W	150	78	-100	1095
	Non-ferrous metal	Monel 400	M	160	83	-100	760
		Titanium	T	160	83	-200	540
		Nickel 200	N	120	68	-200	760
		Hastelloy B2/B3	X1	230	98	-100	1095
		Hastelloy C276/C22	X2/X3	210	96	-100	1095

※ It is recommended that the Ring Joint Gaskets to be of a lesser hardness than that of the mating flanges.

※ Ring joint gaskets of materials listed shall have a hardness equal to or less than that shown as above.

Ring Joint Gasket

Unit : mm

Flange Nominal Size / Pressure										
ASME-ANSI B16.5					ASME B16.47 A			API 6B		
150	300-600	900	1500	2500	150	300-600	900	2000	3000	5000
	1/2"									
		1/2"	1/2"							
	3/4"			1/2"						
		3/4"	3/4"							
1"										
	1"	1"	1"	3/4"				1"	1"	1"
1-1/4"										
	1-1/4"	1-1/4"	1-1/4"	1"				1-1/4"	1-1/4"	1-1/4"
1-1/2"										
	1-1/2"	1-1/2"	1-1/2"					1-1/2"	1-1/2"	1-1/2"
				1-1/4"						
2"										
	2"			1-1/2"				2"		
		2"	2"						2"	2"
2-1/2"										
	2-1/2"			2"				2-1/2"		
		2-1/2"	2-1/2"						2-1/2"	2-1/2"
				2-1/2"						
3"										
	3"									
	3"	3"						3"	3"	
				3"						
3-1/2"										
	3-1/2"									
			3"							3"
4"										
	4"	4"						4"	4"	3-1/2"
				4"						
			4"							4"
5"										
	5"	5"						5"	5"	
				5"						
6"										
			5"							5"
	6"	6"						6"	6"	
			6"							6"
				6"						
8"										
	8"	8"						8"	8"	
			8"							8"
				8"						
10"										
	10"	10"						10"	10"	
			10"							10"
				10"						
12"										
	12"	12"				* 12"	* 12"	12"	12"	
			12"							
14"										
				12"						
	14"					* 14"		14"	14"	
		14"					* 14"			
			14"							
16"										
	16"					* 16"		16"		
		16"					* 16"		16"	
			16"							
18"										
	18"					* 18"		18"		
		18"					* 18"		18"	
			18"							

Dimension						
Ring No.	P	A	B	H	C	R_1
Tolerance	±0.18	±0.20	+1.3,-0.5	+1.3,-0.5	±0.20	±0.5
R11	34.14	6.35	11.2	9.7	4.32	1.5
R12	39.70	7.95	14.2	12.7	5.23	1.5
R13	42.88	7.95	14.2	12.7	5.23	1.5
R14	44.45	7.95	14.2	12.7	5.23	1.5
R15	47.63	7.95	14.2	12.7	5.23	1.5
R16	50.80	7.95	14.2	12.7	5.23	1.5
R17	57.15	7.95	14.2	12.7	5.23	1.5
R18	60.33	7.95	14.2	12.7	5.23	1.5
R19	65.10	7.95	14.2	12.7	5.23	1.5
R20	68.28	7.95	14.2	12.7	5.23	1.5
R21	72.24	11.13	17.5	16.0	7.75	1.5
R22	82.55	7.95	14.2	12.7	5.23	1.5
R23	82.55	11.13	17.5	16.0	7.75	1.5
R24	95.25	11.13	17.5	16.0	7.75	1.5
R25	101.60	7.95	14.2	12.7	5.23	1.5
R26	101.60	11.13	17.5	16.0	7.75	1.5
R27	107.95	11.13	17.5	16.0	7.75	1.5
R28	111.13	12.70	19.1	17.5	8.66	1.5
R29	114.30	7.95	14.2	12.7	5.23	1.5
R30	117.48	11.13	17.5	16.0	7.75	1.5
R31	123.83	11.13	17.5	16.0	7.75	1.5
R32	127.00	12.70	19.1	17.5	8.66	1.5
R33	131.78	7.95	14.2	12.7	5.23	1.5
R34	131.78	11.13	17.5	16.0	7.75	1.5
R35	136.53	11.13	17.5	16.0	7.75	1.5
R36	149.23	7.95	14.2	12.7	5.23	1.5
R37	149.23	11.13	17.5	16.0	7.75	1.5
R38	157.18	15.88	22.4	20.6	10.49	1.5
R39	161.93	11.13	17.5	16.0	7.75	1.5
R40	171.45	7.95	14.2	12.7	5.23	1.5
R41	180.98	11.13	17.5	16.0	7.75	1.5
R42	190.50	19.05	25.4	23.9	12.32	1.5
R43	193.68	7.95	14.2	12.7	5.23	1.5
R44	193.68	11.13	17.5	16.0	7.75	1.5
R45	211.15	11.13	17.5	16.0	7.75	1.5
R46	211.15	12.70	19.1	17.5	8.66	1.5
R47	228.60	19.05	25.4	23.9	12.32	1.5
R48	247.65	7.95	14.2	12.7	5.23	1.5
R49	269.88	11.13	17.5	16.0	7.75	1.5
R50	269.88	15.88	22.4	20.6	10.49	1.5
R51	279.40	22.23	28.7	26.9	14.81	1.5
R52	304.80	7.95	14.2	12.7	5.23	1.5
R53	323.85	11.13	17.5	16.0	7.75	1.5
R54	323.85	15.88	22.4	20.6	10.49	1.5
R55	342.90	28.58	36.6	35.1	19.81	2.3
R56	381.00	7.95	14.2	12.7	5.23	1.5
R57	381.00	11.13	17.5	16.0	7.75	1.5
R58	381.00	22.23	28.7	26.9	14.81	1.5
R59	396.88	7.95	14.2	12.7	5.23	1.5
R60	406.40	31.75	39.6	38.1	22.33	2.3
R61	419.10	11.13	17.5	16.0	7.75	1.5
R62	419.10	15.88	22.4	20.6	10.49	1.5
R63	419.10	25.40	33.3	31.8	17.30	2.3
R64	454.03	7.95	14.2	12.7	5.23	1.5
R65	469.90	11.13	17.5	16.0	7.75	1.5
R66	469.90	15.88	22.4	20.6	10.49	1.5
R67	469.90	28.58	36.6	35.1	19.81	2.3
R68	517.53	7.95	14.2	12.7	5.23	1.5
R69	533.40	11.13	17.5	16.0	7.75	1.5
R70	533.40	19.05	25.4	23.9	12.32	1.5
R71	533.40	28.58	36.6	35.1	19.81	2.3

Ring Joint Gasket

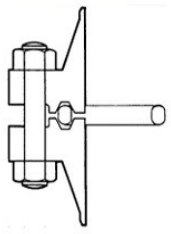
Unit : mm

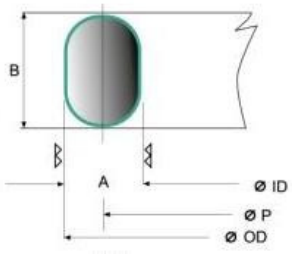
Flange Nominal Size / Pressure											Dimension						
ASME-ANSI B16.5					ASME B16.47 A			API 6B			Ring No.	P	A	B	H	C	R_1
150	300-600	900	1500	2500	150	300-600	900	2000	3000	10000	Tolerance	±0.18	±0.20	+1.3,-0.5	+1.3,-0.5	±0.20	±0.5
20"											R72	558.80	7.95	14.2	12.7	5.23	1.5
	20"					* 20"		20"			R73	584.20	12.70	19.1	17.5	8.66	1.5
		20"					* 20"		20"		R74	584.20	19.05	25.4	23.9	12.32	1.5
			20"								R75	584.20	31.75	39.6	38.1	22.33	2.3
24"											R76	673.10	7.95	14.2	12.7	5.23	1.5
	24"					* 24"					R77	692.15	15.88	22.4	20.6	10.49	1.5
		24"					* 24"				R78	692.15	25.40	33.3	31.8	17.30	2.3
			24"								R79	692.15	34.93	44.5	41.4	24.82	2.3
					* 22"						R80	615.95	7.95		12.7	5.23	1.5
						* 22"					R81	635.00	14.30		19.1	9.58	1.5
										1'	R82	57.15	11.13		16.0	7.75	1.5
										1-1/2"	R84	63.50	11.13		16.0	7.75	1.5
										2"	R85	79.38	12.70		17.5	8.66	1.5
										2-1/2"	R86	90.50	15.88		20.6	10.49	1.5
										3"	R87	100.03	15.88		20.6	10.49	1.5
										4"	R88	123.83	19.05		23.9	12.32	1.5
										3-1/2"	R89	114.30	19.05		23.9	12.32	1.5
										5"	R90	155.58	22.23		26.9	14.81	1.5
										10"	R91	260.35	31.75		38.1	22.33	2.3
											R92	228.60	11.13	17.5	16.0	7.75	1.5
						26"					R93	749.30	19.05		23.9	12.32	1.5
						28"					R94	800.10	19.05		23.9	12.32	1.5
						30"					R95	857.25	19.05		23.9	12.32	1.5
						32"					R96	914.40	22.23		26.9	14.81	1.5
						34"					R97	965.20	22.23		26.9	14.81	1.5
						36"					R98	1022.35	22.23		26.9	14.81	1.5
								8"	8"		R99	234.95	11.13		16.0	7.75	1.5
							26"				R100	749.30	28.58		35.1	19.81	2.3
							28"				R101	800.10	31.75		38.1	22.33	2.3
							30"				R102	857.25	31.75		38.1	22.33	2.3
							32"				R103	914.40	31.75		38.1	22.33	2.3
							34"				R104	965.20	34.93		41.4	24.82	2.3
							36"				R105	1022.35	34.93		41.4	24.82	2.3

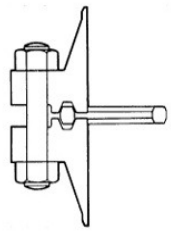
Note: 1. The above data of API 6B Class 10000 flange is only for reference as it is no longer applied.

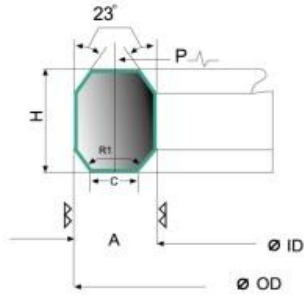
2. Ring No. R30 is suitable for lapped flanges only.

* Above specifications are in accordance with ASME B16.20, API std 6A and EN 12560-5。



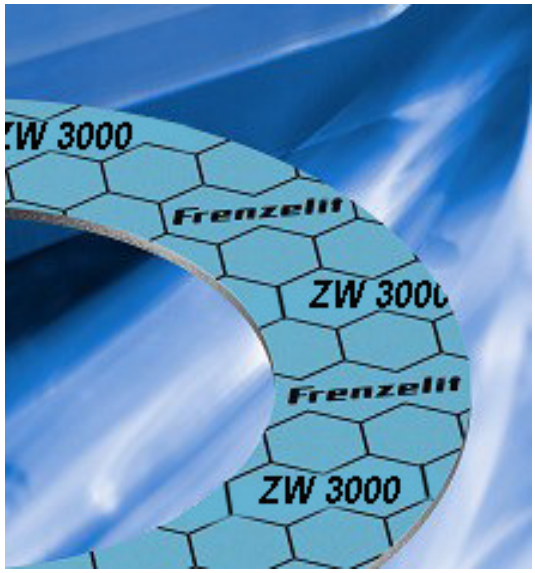






Tolerance	mm	inch
A , C (Width)	± 0.20	± 0.008
B , H (Height)	+1.3 / -0.5	+0.05/-0.020
P (Average pitch diameter of ring)	± 0.18	± 0.007
23 deg (Angle)	± 0 deg 30 min.	
R1 (Radius in Ring)	± 0.5	± 0.02

novapress® 260 ZW 3000



Non-asbestos sheet gasket is a general purpose sheet material combination consists of high-quality aramid fibers bonded with nitrile-butadiene-rubber (NBR). It is optimized with special functional fillers, and a good alternative to compressed asbestos gasket and suitable for sealing off water, seawater, alkaline, hot oil, organic solvent, and all applications where low and average temperature and pressure conditions and where uncritical gaseous and liquid media have to be sealed off.

●Approval

* BS 75531 Grade Y (British standard)
* DVGW (gas and water approval)
  DVGW W270 (drinking water approval)
* KTW / WARS (drinking water approval)

● Physical properties

General data	Binders	NBR		
	Fiber	Aramid		
	Anti-stick coating	Both side anti-stick coating		
	Colour	Blue		
Gasket Thickness 2.0mm Product data: Thickness in mm 0.3/0.5/0.75/1.0/1.5/2.0/3.0/4.0 Dimensions in mm 1500x3000 (Further dimensions and thickness are available on request.)	Temperature Range	-100 ~ 300℃		
	Maximum Pressure	Max. 90 Bar		
	Density	DIN 28090-2	[g/cm^3]	1.7
	Tensile Strength Transverse	DIN 52910	[N/mm^2]	7.5
	Residual stress 175℃ 300℃	DIN 52913	[N/mm^2] [N/mm^2]	27 22
	Compressibility	ASTM F36J	[%]	9
	Recovery	ASTM F36J	[%]	45
	Specific leakage rate	DIN 3535-6	[mg/(m·s)]	0.08
	Fluid resistance	ASTM F146		
	ASTM IRM903 Weight change Thickness increase	5h/150℃	 [%] [%]	 10 4
	ASTM Fuel B Weight change Thickness increase	5h/23℃	 [%] [%]	 11 9
	Leachable chloride content	QS-001-133	[ppm]	≤ 150

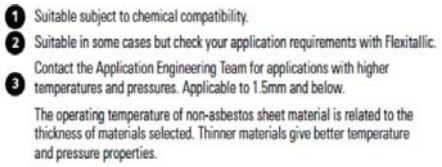
Version: 04.08.2016

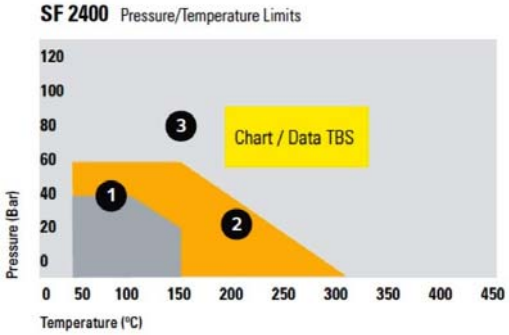
SF 2400

SF2400 is a general purpose sheet material reinforced with aramid fibers and bound with a high quality nitrile rubber (NBR).
It is excellent high performance and the replacement for normal Asbestos gaskets, and complies with the British Standard for non-asbestos sealing materials – BS 7531 Grade Y, and WRAS drinking water approval.

It is suitable for use in applications involving hot and cold water, steam, oils, fuels, gases, mild solvents, alkalis, and a wide range of general chemicals.

Temperature range from -40˚C ~350˚C (-40~660˚F), and maximum pressure is 100 bar. Application as public works, chemical plants, oil refineries, steel mills, power plants, shipyards, pipeline engineering, piping flanges used in the manufacturing machinery, heat exchangers for valves tanks, cover and seal the joint of pressure vessels, etc.



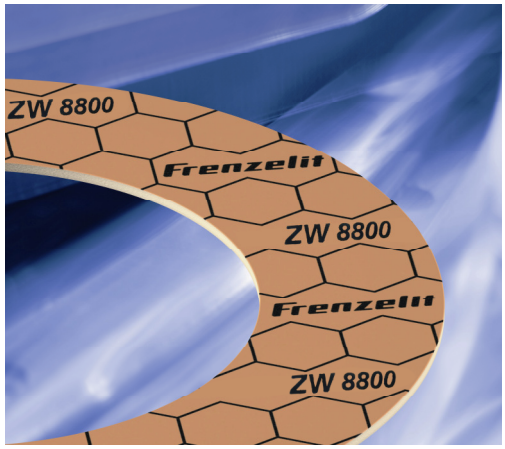


●Physical Properties

Thickness			mm	0.75	1.5
Density			g/cm³	1.79	1.84
Compressibility	ASTM F36J		%	6.8	7.7
Recovery	ASTM F36J		%	>50	>50
Creep Relaxation	ASTM F38		%	11.4	
Tensile Strength	ASTM F152		Mpa	>12	>13
Residual Stress	BS 7531	40MPA,16hr, 300˚C	Mpa	>29	>22
Gas Permeability	DIN3535 part 6		mL/min	<0.3	<0.3
pH Range				3-11	
Immersion Properties ASTM F 146	ASTM Oil#3	Thickness Incease	%	2.6	
		Weight Increase	%	7.8	
	ASTM Fuel B	Thickness Incease	%	3.7	
		Weight Increase	%	10.2	

Sheet Width X Length(mm): 1500x1500,1500x3000, 2000x6000
Thickness(mm): 0.5/0.8/1.0/1.5/2.0/3.0
Also available with release coating on both sides.

novapress® BASIC ZW 8800

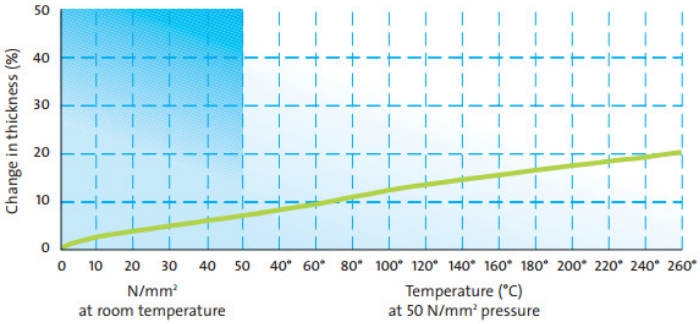


This Germany-made gasket has balanced raw material combination, consisting of high-grade Aramid fibers, special fillers and NBR rubber (Nitrile Butadiene Rubber) binder with A310 anti-stick coating. It demonstrates good resistance to media, standard permeability to gas, good stress relaxation, favorable cost-performance in a wide range of applications such as utility or sanitary applications (gas and water supply), chemical plant, steel works, ship building, oil refinery, power plant, pipeline construction, plant and machine building industry.

●Approval

- ∗ DVGW (gas and water industry in Germany)
- ∗ HTB (DVGW VP 401) Fire Safe Test approval
- ∗ SVGW (gas and water industry in Switzerland)
- ∗ KTW/WARS (drinking water approval)
- ∗ EG 1935/2004 (European Regulation of Food Contact Material)
- ∗ Germanischer Lloyd (Vessel's or offshore materials & Equipment approval)

Deformation under temperature 2.0 mm



● Physical properties

General data	Binders	NBR		
	Fiber	Aramid		
	Anti-stick coating	Serially one side anti-stick coating		
	Colour	Both sides orange		
	Sheet size and thickness tolerance	According DIN 28091-1		
Gasket Thickness 2.0mm	Temperature Range	-50 ~ 300℃		
	Maximum Pressure	Max. 85 Bar		
	Density	DIN 28090-2	[g/cm³]	1.7
	Tensile Strength	DIN 52910		
	Longitudinal		[N/mm²]	14
	Transverse		[N/mm²]	6
	Residual stress $\sigma_{dE/16}$	DIN 52913		
	175℃		[N/mm²]	28
	300℃		[N/mm²]	18
	Compressibility	ASTM F36J	[%]	6
	Recovery	ASTM F36J	[%]	55
	Cold compressibility ε_{KSW}	DIN 28090-2	[%]	8
	Cold recovery ε_{KRW}	DIN 28090-2	[%]	3
	Hot creep $\varepsilon_{KSW/200}$	DIN 28090-2	[%]	22
	Hot recovery $\varepsilon_{KRW/200}$	DIN 28090-2	[%]	2
	Recovery R	DIN 28090-2	[mm]	0.04
Product data:	Specific leakage rate	DIN 3535-6	[mg/(m·s)]	≤ 0.100
	Specific leakage rate $\lambda_{2,0}$	DIN 28090-2	[mg/(m·s)]	0.100
Thickness in mm 0.3/0.5/0.75	Fluid resistance	ASTM F146		
1.0/1.5/2.0/3.0/4.0	ASTM IRM903	5h/150℃		
	Weight change		[%]	7
Dimensions in mm 1500x3000	Thickness increase		[%]	2
(Further dimensions and	ASTM Fuel B	5h/23℃		
	Weight change		[%]	9
thickness are available on request.)	Thickness increase		[%]	5
	Leachable chloride content	FZT PV-001-133	[ppm]	≤ 150

Issue: 07.10

novatec® PREMIUM XP ZW 9500

Thanks to optimum composition of graphite and Kevlar®, this Germany-made gasket has offer completely new product qualities and outperforms all common high pressure gasket materials. Kevlar® gives it its high tensile strength and high percentage of graphite but low percentage of binder provides remarkable resistance to media and temperature. It distinguishes itself by its excellent adaptability to flange irregularities. The standard A310 anti-stick coating on both sides facilitates the removal of the gasket during routine maintenance inspections.

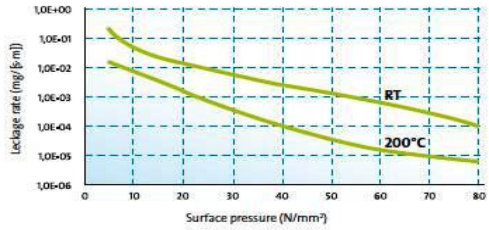
The combination of good media resistance at high temperatures, excellent stress relaxation, and very good adaptability guarantee universally applicable and maximum design safety. Novatec® PREMIUM XP covers 80% of all industrial applications.

Kevlar® is a trademark registered by Dupont.

● Approval

- DVGW Gas and Water Approval
  DVGW VP 401 Gas, W270 Drinking Water
- SVGW Gas and Water Approval
- KTW / WRAS Drinking Water
- BAM Max. 120℃/130 bar (gaseous oxygen)
- EC 1935/2004 Food Grade
- Germanischer Lloyd
- TA-Luft (According to DIN 1591-1, reach $L_{0.01}$ under VDI 2290)

Leakage rate under the influence of temperature



novatec® PREMIUM XP is designed for minimum leakage. The microporosity of the innovative gasket material decrease under the influence of temperature and surface pressure.

-Sample dimensions : 92 x 49 x 2 mm.
-Internal pressure: 25bar,

● Physical properties

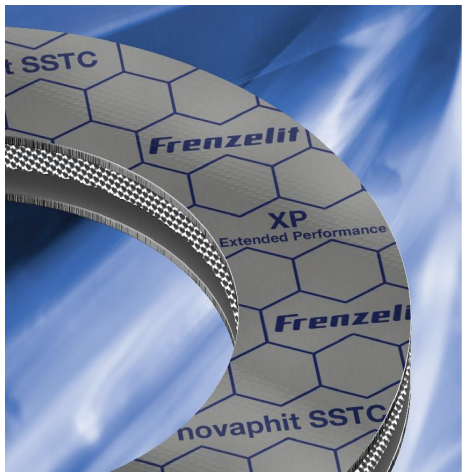
General date	Binders		NBR
	Fiber		Graphite & Kevlar® Fiber
	Anti-stick coating		Both sides A310 standard
	Colour		Royal blue
	Tolerances in thickness		According to DIN 28 091-1
Gasket thickness 2.0mm	Identification		DIN 28 091-2 FA-A1-O
	Temperature		Working 300°C Short Peak 450°C
	Pressure		Max. 100 bar
	Density		DIN 28 091-2 [g/cm³] 1.74
	Tensile Strength		DIN 52 910
	longitudinal		[N/mm²] 20
	transverse		[N/mm²] 18
	Residual stress $\sigma_{dE/16}$		DIN 52 913
	170°C		[N/mm²] 37
	300°C		[N/mm²] 30
	Compressibility		ASTM F36 J [%] 6
	Recovery		ASTM F36 J [%] 60
	Cold compressibility	ε_{KEW}	DIN 28 090-2 [%] 6
	Cold recovery	ε_{KRW}	DIN 28 090-2 [%] 3
	Hot creep	$\varepsilon_{WSW/200}$	DIN 28 090-2 [%] 8
	Hot recovery	$\varepsilon_{WRW/200}$	DIN 28 090-2 [%] 2
	Recovery R		DIN 28 090-2 [mm] 0.04
Product data ●Dimensions in mm : 1500 x 3000 Thicknesses in mm : 0.5 / 0.8 ●Dimensions in mm : 1500 x 2000 Thicknesses in mm : 1.0 / 1.5 / 2.0 / 3.0 ●Further dimensions and thicknesses are available on request	Specific leakage rate		DIN 3535-6 [Mg/s-m] ≤0.05
	Specific leakage rate	$\lambda_{2.0}$	DIN 28 090-2 [Mg/s-m] ≤0.05
	Fluid resistance		ASTM F146
	IRM 903 Weight change		5h / 150°C [%] ≤8
	Thickness increase		[%] ≤ 5
	Fuel B Weight change		5h / 23°C [%] ≤8
	Thickness increase		[%] ≤ 5
	Chloride content		FZT PV-001-133 [ppm] ≤50

Note: If required, we also offer the best service in all systems products of Frenzelit.

Issue: 02.12

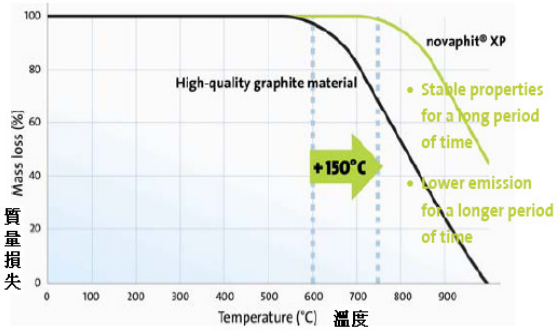
Engineered graphite with expanded metal gasket

ZW 6600
novaphit® SSTC / XP
novaphit® SSTC TA-L / XP



novaphit® SSTC XP consists of high-quality, expanded graphite (purity level at least 99%) and an expanded metal insert made from acid-proof stainless steel AISI 316L – DIN 1.4404 foil (0.15mm). Under high pressure the expanded graphite particles are compressed to films without adding any binders or fillers. The expanded metal is then incorporated into the sealing material. The special geometry of the expanded metal produces a three-dimensional-mechanical bond with excellent stress relaxation and recovery of the graphite. Novaphit SSTC XP has an excellent workability, long-term non-stick properties, outstanding thermal and mechanical loading capabilities and exceptional chemical resistance.

The exceptional product properties open a wide spectrum of applications including the most extreme operating conditions, novaphit products are especially suited for dynamic and static sealing assemblies where durability and resistance to deformation, flexibility, loading capacity and a good chemical resistance are mandatory.



Oxidation stability (TGA) 氧化穩定性

- **Approval**

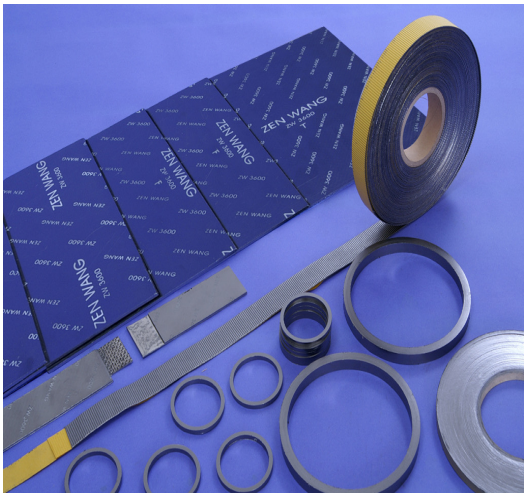
∗ DVGW, KTW Drinking Water Approval
∗ EC 1935/2004 Food Grade
∗ BAM (O_2: max. 200℃ / 130 bar, including liquid O_2)
∗ DIN EN ISO 10497, API607, BS6755 Fire Safe
∗ Germanischer Lloyd
∗ TA-Luft (VDI 2440) and VDI2290
∗ ROSENERGOATOM Nuclear
∗ GOSPROMNADZOR
∗ ROSECHNADZOR

- **Physical Properties**

General Data Gasket thickness 2.0mm	Anti-stick coating	Both sides		
	Color	Grey		
	Binders	Without organic binder		
	Sheet size and thickness tolerance	DIN 28091-1		
	Identification	DIN 28091-4	GR-10-I-1M-Cr	
	Purity	99%		
	Temperature	-200~550℃		
	Pressure	Max. 250 Bar		
	Density	DIN 28090-2	[g/cm3]	1.35
	Tensile strength longitudinal transverse	DIN 52910	[N/mm2] [N/mm2]	17 8
	Residual stress $\sigma_{dE/16}$ 170℃ 300℃	DIN 52913 DIN 52913	[N/mm2] [N/mm2]	47 45
	Compressibility	ASTM F36J	[%]	40
	Recovery	ASTM F36J	[%]	15
	Cold compressibility ε_{KSW}	DIN 28090-2	[%]	39.0
	Cold recovery ε_{KRW}	DIN 28090-2	[%]	4.0
	Hot creep $\varepsilon_{KSW/200}$	DIN 28090-2	[%]	2.0
Product data: Dimensions(mm) Thickness(mm) 1000x1000 1.0/1.5/2.0/3.0 1500x1500 1000x2000 Further dimensions and thicknesses are available on request.	Hot recovery $\varepsilon_{KRW/200}$	DIN 28090-2	[%]	3.5
	Recovery R	DIN 28090-2	[mm]	0.070
	Specific leakage rate	DIN 3535-6	[mg/(m·s)]	≤ 0.100
	Specific leakage rate $\lambda_{2,0}$	DIN 28090-2	[mg/(m·s)]	0.050
	Fluid resistance	ASTM F146		
	ASTM IRM903 Weight change Thickness increase	5h/150℃	 [%] [%]	 30 6
	ASTM Fuel B Weight change Thickness increase	5h/23℃	 [%] [%]	 30 6
	Chloride content (total)	DIN 28090-2	[ppm]	≤ 50
	Chloride content (water-soluble)	FZT PV-001-133	[ppm]	≤ 20
Issue: 06.11	Total Fluoride and Chloride		[ppm]	≤ 100

Flexible Graphite Sheet Gasket, Tape & Ring

The graphite tapes, gasket, molded ring, and laminated sheets are made from flake (exfoliated) graphite with high carbon content which is gone through chemical treatment, expanding under high temperature and then machine compressing. It has the characteristics of high temperature resistance, corrosion resistance and good elasticity, and is the basic material for making all kinds of reinforced graphite sheets, graphite ring tapes, packing ring and sealing gaskets. Working temperature –200 to 450℃ (in air), up to 650℃ (in reducing atmosphere), Service pressure is 150 bar maximum. The graphite gasket is mainly adopted in static sealing application and widely adopted in nuclear and petrochemical industry, such as level gauge, mold and flange joints; graphite tape is mainly used for thread, flange, the stem and the shaft seal packing and other occasions; graphite ring is applicable to compressors, pumps, valves, chemical equipment and instruments…etc. The applicable fluid including water, high temperature, high pressure steam, heat exchange liquid, ammonia, hydrogen, organic solvents, hydrocarbons, cryogenic fluids. Certain categories are reinforced with flat or tang stainless steel / Nickel inserts which enhance mechanical properties of the gasket. It is extremely conformable to suit either worn or pitted flange.



●Style

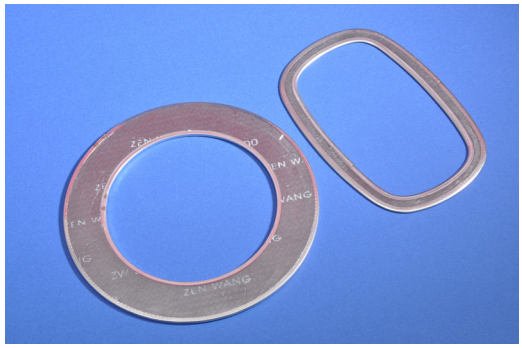
ZW 3600-P	Pure flexible graphite sheet gasket
ZW 3600-N	Flexible graphite reinforced flat Nickel foil
ZW 3600-F	Flexible graphite reinforced 0.05mm thick flat SS316 foil
ZW 3600-T	Flexible graphite reinforced 0.1mm thick tanged SS316
ZW 3700	Flexible graphite crinkling tapes (with / without adhesive)
	Flexible graphite flat tapes (without adhesive)
ZW 3800	Flexible graphite packing ring

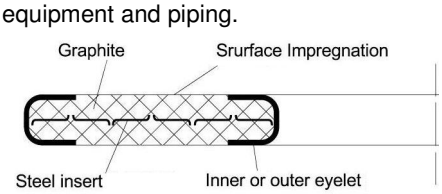
●Physical properties

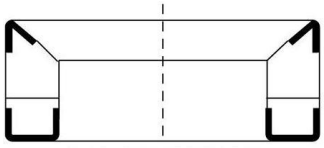
Density	0.8 – 1.3 g/cm³
Carbon content	＞99%
Ash content	＜1%
Sulfur content	＜1000 ppm
Chloride content	＜50 ppm
Tensile strength	45 kg/cm²
Compressibility	＞40%
Recovery	＞10%
PH	0-14

● Graphite Gasket/Ring with Metal Eyelet

Flexible graphite gasket reinforced flat SS316 or flexible graphite ring with thin metal foil eyelet are as per below profiles. The metal eyelet could improve the integral and complete the sealing performance, specially suit for contact pollute media and production. Metal eyelet could avoid any permeated leakage and erosion caused by pressure disproportionate, it could reach excellent gas sealing, and good for use to steam, chemical equipment and piping.



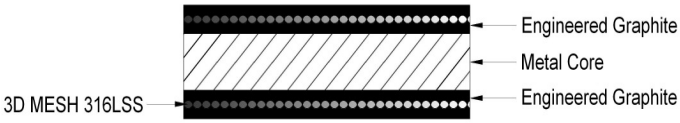




Graphite Ring with metal eyelet

Metal Reinforced Gasket (MRG)

ZW 3632

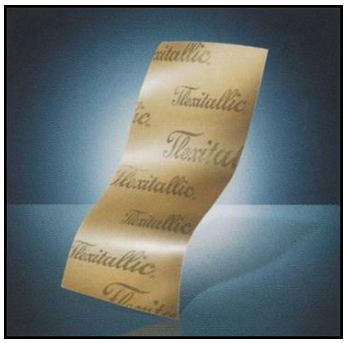


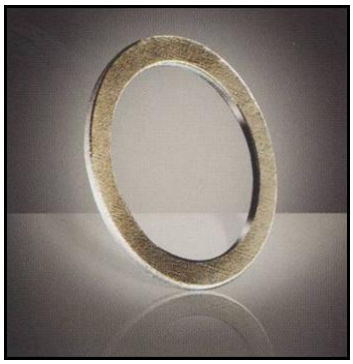
Metal core is high rigidity, corrosion-resistant metal plate, both sides compress and covered by graphite gasket reinforced 3D diamond mesh, no binder, with excellent heat resistance and chemical resistance, excellent surface fitness and easy to install.

Applies to poor surface roughness of the large flange surface (Ra 3.2 ~ 12.5), significantly improve thick graphite plate temperature creep and resilience inadequate shortcomings, allow lower surface pressure to get excellent sealing performance, and for the application of various types of pressure vessels, it can replace Metal Jacketed Gasket, Spiral Wound Gasket and Kammprofile Gasket.

The material and thickness of metal core are chosen by operating conditions and customer demand.

Thermiculite® Gasket – High Temperature





In 1998, Flexitallic set new standards for sealing technology with the introduction of Thermiculite® Critical Service Series gasket material, it is exclusive to Flexitallic, and this revolutionary material, comprised of chemical and thermally exfoliated vermiculite, simulated structure of exfoliated graphite, with one notable exception – it maintains integrity through a wide range of extreme temperatures.

This innovative and versatile material is available in Coreless Sheet and Spiral Wound Filler styles, and is suitable for replacing aramid fiber, glass fiber, carbon fiber, PTFE and Graphite in a wider array of applications.

Since its inception, Thermiculite® gasket material has proven itself as an effective long-term sealing solution in over 500 of the most demanding industrial sealing applications, with the combination of Thermiculite® Critical Service (800 Series) and Thermiculite® Performance (700 Series), a single, proven material can be used for virtually all of your sealing requirements. That's why we call Thermiculite® The Total Static Sealing Solution.

Total Freedom From Oxidation

Conventional graphite gaskets are susceptible to attack by oxidizing agents. This occurs from oxygen flowing through pipes, or simply from oxygen present in the atmosphere surrounding the flange. The rate at which graphite oxidizes depends on the application temperature and the concentration of oxygen present. But when it does happen – the end result is seal failure. The unique composition of Thermiculite® gasket material ensures that seal maintain their integrity at maximum service temperature far exceeding that of graphite.

Characteristics

- Total freedom from oxidation
- 800 series chemical compatibility exceeds graphite
- 800 series contains sulfate and chloride <50ppm each, never corrode the flange
- Fire Safe API 607 Certificate
- Thermiculite 715 meet BS 7531 Grand X standard
- Genuine opportunity for gasket standardization and inventory consolidation

Style No.	Thermiculite® 715	Thermiculite® 815	Thermiculite® 835	Thermiculite® 845
Product Type	Coreless Sheet	Tanged Sheet	Spiral Wound Filler	Kammprofile Facing
Temperature Range	-40~454°C	-200~1000°C	-200~1000°C	
Pressure Range	140 Bar	200 Bar	ASME B16.5 2500LB	
Typical Use	General Environment Replaced Asbestos, Non-Asbestos, PTFE	High Temperature Environment Nominal and non-standard pipe sizes Critical seal and problem application Replaced graphite The total static sealing solution		
Standard Size (mm)	0.75~3T 1500x1500 1500x3000	0.75~4T 1000x1000, 1500x1500	0.5T	

*The above test results of 715 and 815 produced by 1.5mm thick specimens.

Thermiculite™ 894 packing made by over-knitting strips of foil of Thermiculite™ 835 with fine (0.09mm diameter) Inconel 600 wire to braid a square section sealing packing. Thermiclute® 894 is intended for service in applications where an asbestos rope or plaited asbestos packing would previously have been used. Such applications include the manufacture of nitric acid and ammonium nitrate fertilizer. It can be also be used for on-off valve stem sealing and as the header rings either side of the conventional valve stem sealing stack. The lower than standard weight per unit length so that the friction created is lower than otherwise. The maximum temperature up to 1050°C.

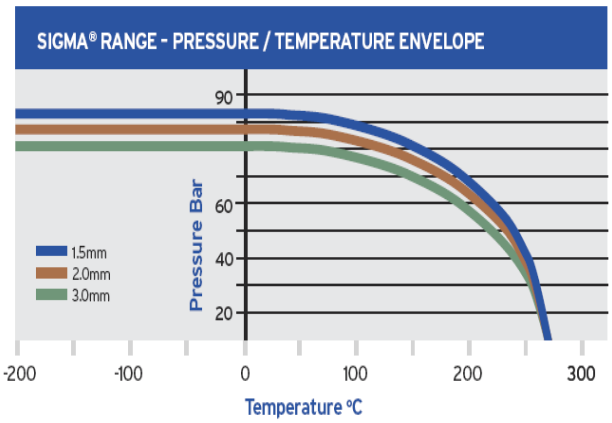
Square cross section available in coils: 5-19mm, Standard Length: 8000mm
Rectangular or particular requirements are also available.

Flexitallic **TAIWAN Agent**

Filled PTFE Sheet Gasket

Flexitallic® SIGMA®

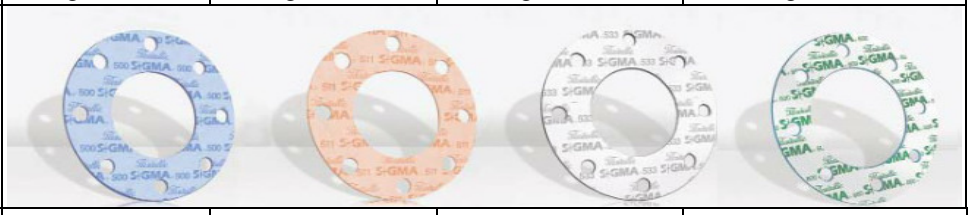
Sigma has unique biaxial fibrillated structure and excellent dimensional stability, and maximum reduction in creep and stress relaxation of PTFE by combining these fillers. The PTFE material has excellent chemical resistance (pH 0 ~ 14) and good cleanliness can be widely used for alkali and corrosive fluids, very suitable for food, medicine, electronics (except hydrofluoric acid), and pressure range from vacuum to 8.5MPa. SIGMA sheet gasket is softer and lower stress requirement than pure PTFE, it can be used in glass lined, plastic, ceramic flange; and good sealing performance to slender or damaged flange surface, or low loading conditions.



Approval: TA Luft, DVGW, BAM, WRAS, UDT, FDA, The Chlorine Institute

Standard Sheet: Thickness(mm) 0.75 ~ 3.0, Width x Length 60"x 60"

• Physical properties

Product	Sigma 500	Sigma 511	Sigma 533	Sigma 600
Outlook				
Color	Blue	Fawn	Off-white	White
Filler	Hollow glass microspheres	Silica	Barium sulfate	None
Max. Pressure (bar)	85 (1.5mm), 80 (2.0mm), 75 (3.0mm)			
Service Temperature (℃)	-200 ~ 260			
Density ASTM F1513 (g/cm3)	1.40	2.2	2.9	0.75
Compressibility ASTM F36 (%)	35	7	8	68
Recovery ASTM F36 (%)	44	44	43	5
Tensile Strength ASTM F152 (Mpa)	14	15	15	6.7
Residual Stress(175℃) DIN52913 (Mpa)	30	30	28	34
Creep Relaxation ASTM F38 (%)	31	35	33	<50
Liquid Leakage ASTM F37 (mL/hr)	0.7	1.8	1.8	1.2
Gas Leakage DIN3754 (mL/min.)	0.02	0.01	0.01	0.01
Application	Low bolt loads, Improved flexibility, Suitable for use in alkali, acid and chlorine service, WRAS approved for potable water, Glass lined, plastic and ceramic flange	Strong acids (except hydrofluoric), Suitable for oxygen & peroxide, WARS approved potable water	Strong alkalis, Aqueous hydrofluoric acid <49%, Ideal for sealing food, pharmaceutical and non contamination application, Not suited for sealing molten alkali or fluorine gas	Universal mis-application, minimized inventory, High compressibility for ultra-low bolt loads, A wide range of chemical media; acids, alkalis, halogens and hydrocarbons, For contamination sensitive, Plastic and glass lined equipment

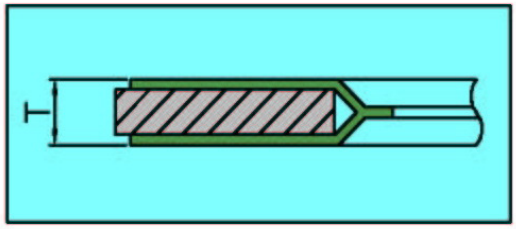
The above test results are produced by 1.5 mm thick specimens.

PTFE Gasket & PTFE Envelope Gasket

ZW 7500 Virgin/Pure PTFE sheet gasket

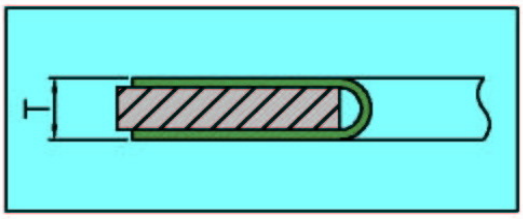
Virgin/Pure PTFE Sheet ZW 7500 is universal gasket produced from 100% PTFE. Thanks to the excellent in versatile chemical resistance, very low friction, wide working temperature range –100℃ to +150℃, and inherent clean, ZW 7500 has been widely adopted in oil refinery, chemical processing, pharmaceutical, and foodstuff industry. Maximum service pressure is limit to 10 bars.

ZW 7530 Virgin PTFE Envelope V-shape gasket



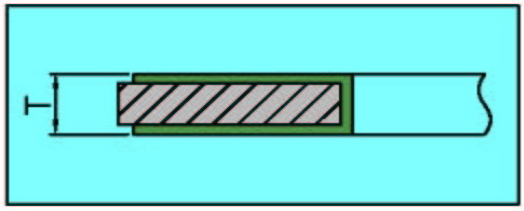
V-shape gasket enveloping is machined from virgin PTFE and inserted with Non-Asbestos or rubber filler. It is one of the most popular gaskets and well suited to general application except for corrosive media or thicker filler. Maximum service pressure is limit to 20 bars.

ZW 7531 Virgin PTFE Envelope U-shape gasket

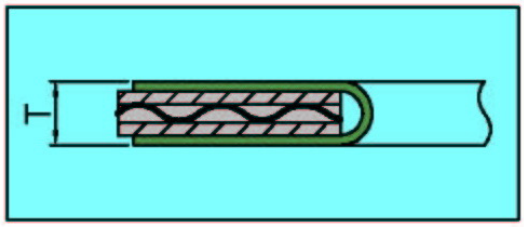


U-shape gasket enveloping is lathe cut from virgin PTFE and inserted with Non-Asbestos or rubber filler. It is mainly shaped into large diameter and used in toxic chemical environment. Maximum service pressure is limit to 20 bars.

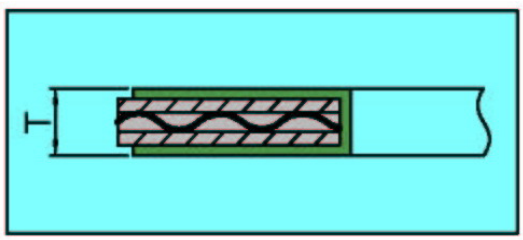
ZW 7535 Virgin PTFE Envelope 凵-shape gasket



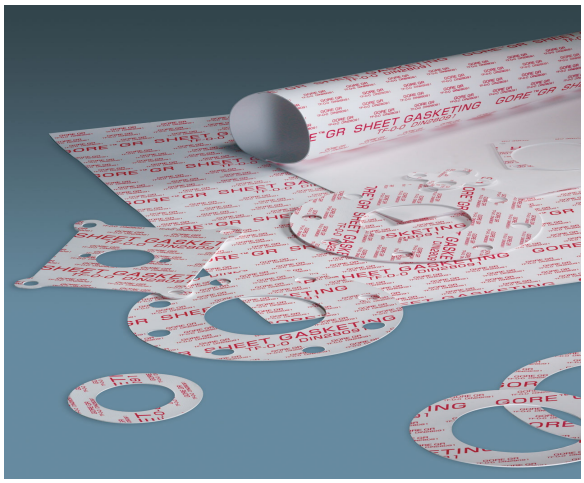
凵-shape gasket enveloping is machine cut from virgin PTFE and inserted with Non-Asbestos or rubber filler. It is mainly shaped into large diameter with thicker filler and used in toxic chemical environment. Maximum service pressure is limit to 20 bars.



ZW 7531 and ZW 7535 PTFE envelop gasket filler material also available for metal corrugated reinforced (normally 316SS), when the PTFE envelope three layers filler or more than three, the multi layers with good compressibility, and metal corrugated provide memory and resilience, this gasket requires lower stress to seal, and suit for Glass lined and FRP piping seal. Maximum service pressure is limit to 40 bar. We also offer special metal material for middle corrugated gasket.



GORE® GR (Sheet Gasketing)



GORE® GR sheet gasketing has been developed for a secure flange connection offering an enduring seal for all pipeline and apparatus flange connections made of steel. It consists of pure, high quality expanded PTFE (ePTFE) with multidirectional oriented fibril structure that ensures an almost unlimited chemical resistance of the seal.

GORE® GR sheet gasketing is distinguished by its minimum loss of gasket stress (high PQR value according to EN 13555). This is particularly beneficial when gasketing material is subjected to the stress of temperature cycling, high temperatures and external forces, which can lead to leakage and/or blow-out.

The high strength of the material results in increased pressure and blow-out resistance. The higher rigidity of the material simplifies installation of the gasket. GORE® GR sheet gasketing offers a long-lasting seal on an extremely wide range of steel flange geometries.

The temperature range of GORE® GR is -268℃(-450℉) to +315℃（600℉）, resistant to all media in range pH 0-14 (except molten or dissolved alkali metals and elemental fluorine, particularly at elevated temperature and pressure). Not subject to aging and physiologically harmless within the material's temperature range, UV-resistant and can be stored indefinitely. Low dielectric constant, insulation resistance, low friction coefficient (μ = 0.02). The maximum applicable pressure as well as the maximum safe operating temperature depend mainly on the equipment. Standard pressures range from full vacuum to 200 bar (3,000 psig).

Application

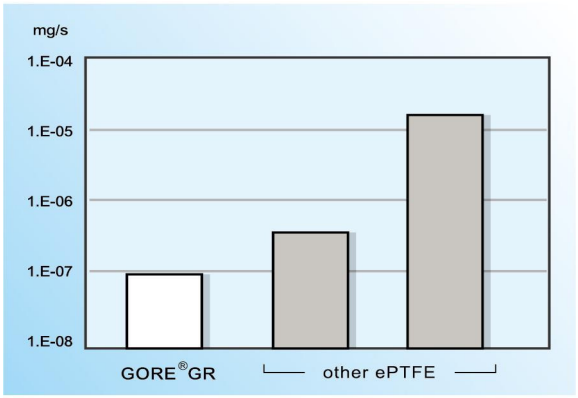
- Steel Flange and complex flange shapes
- Old, rough, and damaged flange
- High Aggressive and dangerous media
- Facing material of Kammprofile gasket for high temperature and high pr

Approval

- EN 13555, ASTM F-36/F-152 Gasket properties testing standard
- DIN 28091-3, ASTM F-38 Creep and relaxation testing
- BAM Oxygen applicable
- TA Luft VDI 2440 German air clean (leakage testing)
- Blow-out resistance VDI 2200 (06-2007) blow-out testing
- HOBT2-cycling ARLA, ROTT Hot blow-out testing

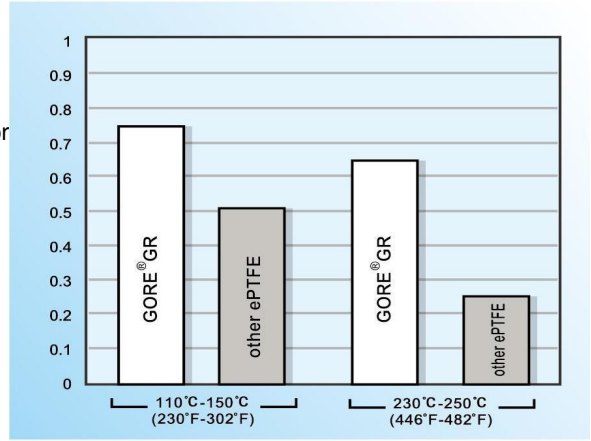
Sheet Size: 60"X60"
Sheet Thickness(mm): 0.5, 1.0, 1.6, 2.0,3.2, 5.0, 6.4

Leak Rate after Aging



Legend:ARLA, 3mm(1/8")sheet thickness
Initial Gasket Stress: 34.5 MPa(5000 psi)
Initial Pressure:55bar(800 psi)
Aging Conditions:96 hours at 315℃(600℉)

Ratio of Gasket Stress Retained

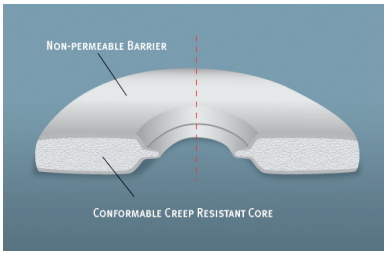


Legend:EN13555 Relaxation Ratio, P_{QR}
3.2mm(1/8")sheet thickness

Universal Expanded PTFE Sheet Gasket

GORE® Universal Pipe Gasket (Style 800)

GORE® Universal Pipe Gaskets are used to seal all types of flanges in chemical-process piping. Style 800 gaskets are designed to meet the needs of various piping materials. They are ideal for standardizing gasket material across steel, glass-lined steel, and Fiberglass reinforced plastic (FRP) systems – any application in which a non-metallic gasket can be used.



Unaffected by even the most aggressive chemicals, Style 800 gaskets combine all the properties of expanded PTFE with exceptional seal ability. Engineered to deliver superior bolt load retention, it exhibits exceptional creep resistance for reliable sealing of steel piping flanges. And due to it's unique design, they provide the lowest stress-to-seal for application in the most fragile plastic and glass-lined flanges. The exceptional performance in three important areas: conforming to irregular surfaces, helping to protect flanges, and seal reliability. With over 30 years of manufacturing and technical experience, depend on Gore™ gaskets when you need the highest level of confidence.

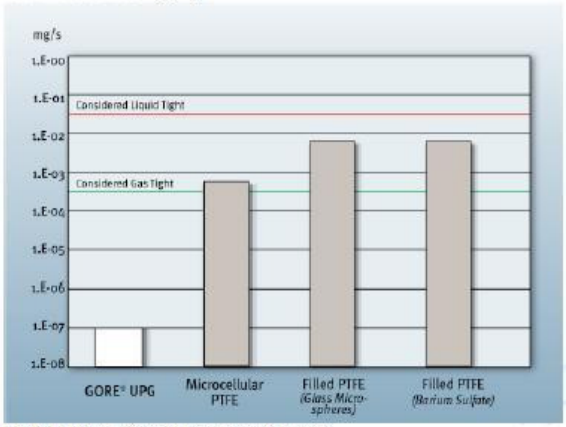
Widely applications

Temperature Range from -268℃ (-450℉) to +315℃ (+600℉), resistance to all media in the 0-14 pH range (except molten alkali metals and element fluorine), particularly at elevated temperatures and pressures. Operating Pressure from Vacuum to 3,000 psig (200 bar). Not subject to aging and can be stored indefinitely.

Available Size

DN10~DN600, 1/2"~24"
PN6~PN40, Class 150~300
Thickness 1.5mm, 3.0mm, 6.0mm
Metallic flanges are suit for 1.5mm thick gasket
FRP flanges are suit for 3.0mm thick gasket
Glass-lined flanges are suit for 6.0mm thick gasket
All 6.0mm thick (DN spec.) gasket with smaller inner diameter, the size different with standard EN 1514-1.

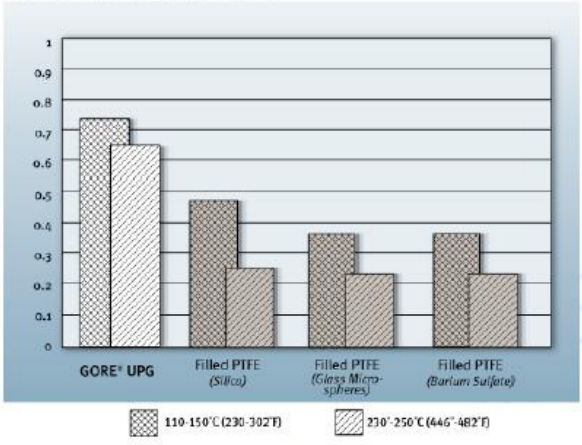
Leak Rate after Aging



Legend: ARLA, 3.2mm (1/8") sheet thickness
Initial Gasket Stress: 43.5 MPa (5000 psi)
Initial Pressure: 55 bar (800 psi)
Aging Conditions: 96 hours at 315˚C (600˚F)

Note: Third party testing validates 100,000 times less emission for GORE® GR sheet gasketing.

Ratio of Gasket Stress Retained



Legend: EN13555 Relaxation Ratio, Pqr 3.2mm (1/8") sheet thickness

Note: If required, we also offer the best service in Gasket system products of GORE®.

GORE
Authorized Distributor
GORE. Sealant Technologies

Industry Sealant authorized distributor in Taiwan

ZEALON

100% Expanded PTFE Joint Sealant

ZEALON Joint Sealant, a unique ePTFE gasket tape, is the ideal choice for Sealing large diameter flanges. Made from 100% multi-directionally expanded PTFE, the entire gasket owns high conformability and compressibility, good creep relaxation, chemically inertness (pH 0~14), and very high tensile strength. As a result, the user will resolve and sealing problems associated with aggressive media or outside environment. The service temperature range from -200 to 260°C and maximum pressure can be up to 200 bar. This unique joint sealant performs well and reliable in sealing imperfect flanges like glass-lined flange surfaces.
Easy and quick installation enables end users to gain initial benefits as urgent maintenance or unexpected outage can be greatly reduced.

- **Specifications**

Product code	Width		Thickness	Length
	inch	mm	mm	M
ZW# 7003	1/8”	3	2.0	30
ZW# 7005	3/16”	5	3.0	25
ZW# 7006	1/4”	6	3.0	20
ZW# 7010	3/8”	10	4.0	10
ZW# 7013	1/2”	13	5.0	5
ZW# 7016	5/8”	16	5.0	5
ZW# 7020	3/4”	20	7.0	5
ZW# 7025	1”	25	12.0	5
ZW# 7030	1-1/4”	30	3.0	5
ZW# 7035	1-1/4”	30	5.0	5
ZW# 7050	2”	50	3.0	5
ZW# 7055	2”	50	5.0	5

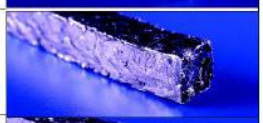
High-temperature & Fireproof Braided Fabrics, Tape, Rope

Various fireproof braided fabrics in form of cloth, fiber, tape and rope can be supplier in stock. Certain standard material like glass fiber, and ceramic fiber can meet versatile applications. They are suitable for making duckwork expansion joint, moulds thermal barrier cover, fire & smoke barrier (curtain), fireproof clothes, fireproof blankets, non-flammable apron and gloves, oven door seal and gasket in high temperature application.

Product code	Product name	Max. Temp. ℃
ZW# 910	Glass Fiber Fabric	593
ZW# 920	Ceramic Fiber Fabric	1260
ZW# 940	Glass Fiber Braided Tape	593
ZW# 950	Ceramic Fiber Braided Tape	1260
ZW# 970	Glass Fiber Braided Rope	593
ZW# 980	Ceramic Fiber Braided Rope	1260

Braided Gland Packing

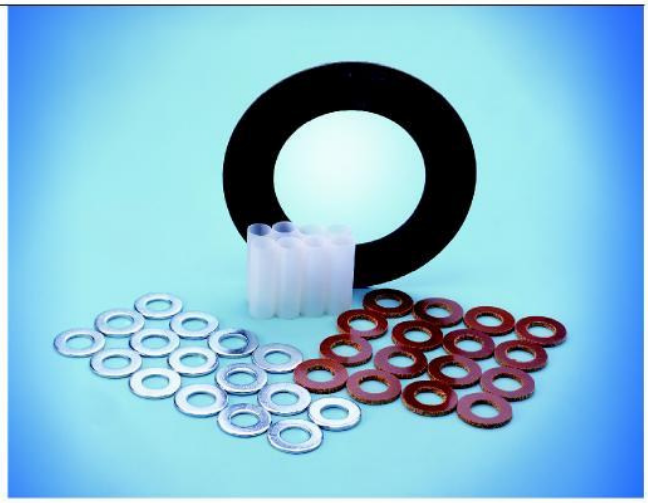
仁望 Zen Wang

Product Code	Product Name	Temperature ℃		Max. pressure (bar)	Picture
		Min.	Max.		
ZW 100	Asbestos With PTFE Dipped Braided Packing	-50	260	300	
ZW 200	Ramie With PTFE Dipped Braided Packing	-50	130	100	
ZW 210	Pure PTFE Braided Packing	-200	280	150	
ZW 220	PTFE With Lubricants Braided Packing	-200	280	150	
ZW 230	PTFE & Aramid Fiber In Corners Braided Packing	-100	280	200	
ZW 240	PTFE Filament Braided Packing	-200	280	250	
ZW 250	PTFE With Graphite Braided Packing	-200	280	200	
ZW 260	PTFE With Graphite & Aramid Fiber In Corners Braided Packing	-100	280	250	
ZW 270	Aramid Fiber With PTFE Dipped Braided Packing	-100	280	250	
ZW 280	Carbon Fiber With PTFE Dipped Braided Packing	-50	260	150	
ZW 300	Flexible Graphite Braided Packing	-250	650	250	
ZW 310	Flexible Graphite With Fiberglass & Inconel Wire Reinforced Braided Packing	-250	650	250	
ZW 320	Flexible Graphite With Inconel Wire Mesh Reinforced Braided Packing	-250	650	500	
ZW 330	Flexible Graphite With Inconel Wire Reinforced Braided Packing	-250	650	300	
ZW 340	Flexible Graphite & Carbon Fiber In Corners Braided Packing	-250	650	400	

Insulating Gasket Kits

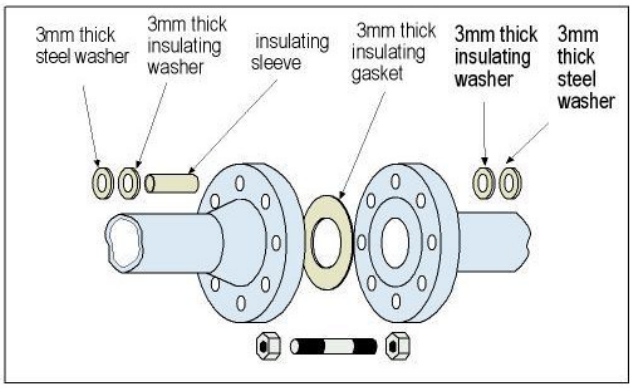
Flanges, the most common trouble area of piping, need to be sealed properly to prevent leakage and must also be cathodically insulated to prevent stray currents which cause corrosion and eventual breakdown of the metal. The insulating gasket kits solve most flange sealing problems, therefore preventing subsequent corrosion and saving the integrity of the pipeline.

There are three styles of insulating gasket kits available to suit raised face, flat face, and ring grooved flanges as illustrated below.



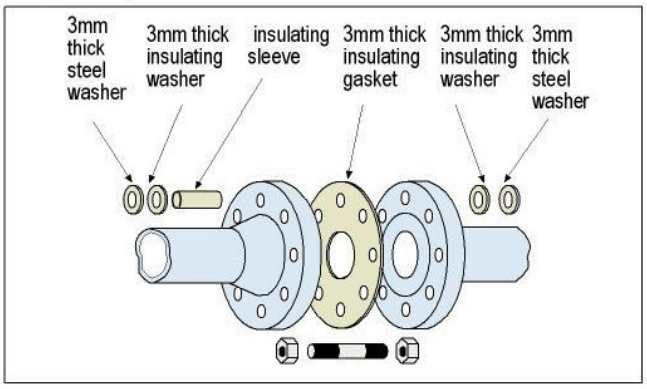
ZW 1200 - RF (APS TYPE F)

ZW 1200 – RF gaskets are made to fit the raised face portion of the flange only. As there are no boltholes in the gasket, the inside diameter of the bolthole circle is slightly smaller than the outside diameter of the gasket, assuring an exact, automatic positioning of the gasket.
Available in the same materials as the ZW 1200 – FF gasket. Standard thickness of 1/8".



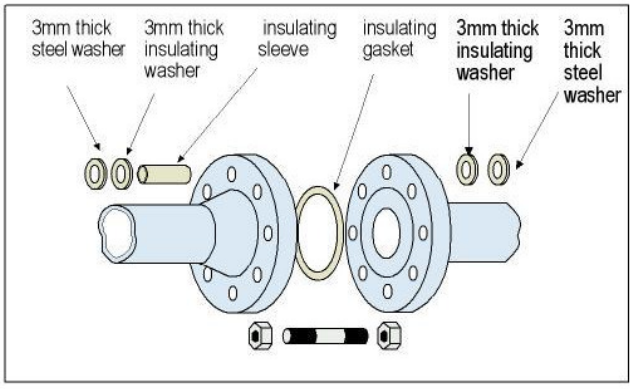
ZW 1200 - FF (APS TYPE E)

ZW 1200 – FF is a full-faced gasket with the same outside diameter as the flange and precision cut boltholes.
This design facilitates proper alignment of the gasket during installation and foreign material is prevented from shorting the flange insulation. ZW 1200 – FF gaskets are available in Neoprene/NBR coated plain face phenolic, as well as a variety of high temperature materials. Standard thickness of 1/8".



ZW 1200 - RTJ (APS TYPE D)

ZW 1200 – RTJ is specifically designed to fit into the ring groove of ring type joint flanges. They are manufactured of a medium weave, fabric-reinforced phenolic material and are sized to ANSI specifications available in basic oval or octagonal shape. Also available are BX gaskets with pressure ratings to 15,000 PSI.



Note :
If required, we also offer the best service in all systems products of APS.

Zen Wang Co., Ltd. is an exclusive agent for APS in Taiwan.

Insulating Gasket Kits

● Insulating Gasket Material

Name	Grade	Water Absorption %	Tensile Strength PSI	Compression Strength PSI	Flexural Strength PSI	Dielectric Strength VPM	Max. Continuous Operating Temperature
Canvas Based Phenolic	CE	3.5	11,000	34,000	17,500	400	257℉ (125℃)
Phenolic &Paper Laminate	XP	1.5	18,000	45,000	29,000	600	266℉ (130℃)
Neoprene/NBR faced Phenolic & Paper Laminate	XPN	1.5	18,000	45,000	29,000	600	266℉ (130℃)
Glass Fiber Reinforced Epoxy	FR4/G10	0.05	50,000	66,000	65,000	800	302℉ (150℃)
Glass Fiber Reinforced Epoxy	FR5/G11	0.085	43,000	63,000	80,000	900	390℉ (200℃)
Glass Fiber Reinforced Silicon	G7	0.19	25,000	40,000	18,500	350	428℉ (220℃)
Glass Fiber Reinforced Phenolic Resin	G3	2.0	42,000	76,000	55,000	375	617℉ (325℃)

● Insulating Sleeve & Washer Material

Name	Grade	Water Absorption%	Dielectric Strength Volts/mil	Max. Continuous Operating Temperature
Polyethylene	-	0.01	450	105℉ (41℃)
Mycarta Phenolic	LE	1.1	400-500	225℉ (107℃)
Glass Fiber Reinforced Epoxy	FR4/G10	0.085	800	285℉ (140℃)
Polyester Film	Mylar®	0.8	4,000	300℉ (149℃)
Meta-aramid Fiber	Nomex®	-	400	450℉ (232℃)

One-piece integral Insulating Sleeve & Washer Material

Name	Grade	Water Absorption%	Dielectric Strength volts/mil	Max. Continuous Operating Temperature
Mineral and Mineral/Glass Fiber Reinforced Nylon Resins	Minlon®	0.22	1,200	250℉ (121℃)

● Special Materials for High Temperature

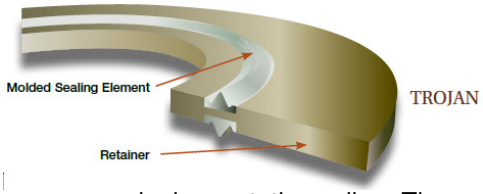
- GASKETS: NEMA grades G3, G7, G10 and G11, Durabla®, Durlon®
- SLEEVES: Nomex®, NEMA grade G7, G10, Durabla®, Durlon®
- WASHERS: NEMA grade G7, G10, Durabla®, Durlon®

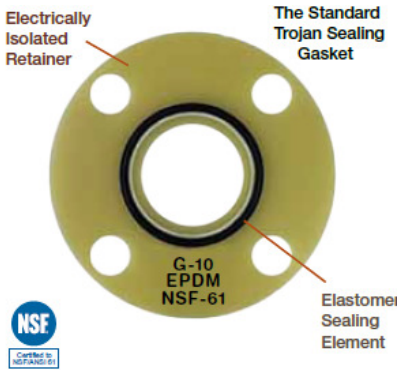
Other high temperature materials are available upon request. It is recommended that the factory be contacted to discuss technical data on the above referenced products.

NEMA: the National Electrical Manufacturers Association of U.S.A.

Durlon is registered trademarks of Gasket Resources Incorporated, For example: Durlon 8500 Green are aramid and inorganic fibers with NBR resist temp. 700℉ (371℃).

Insulating Gasket Kits



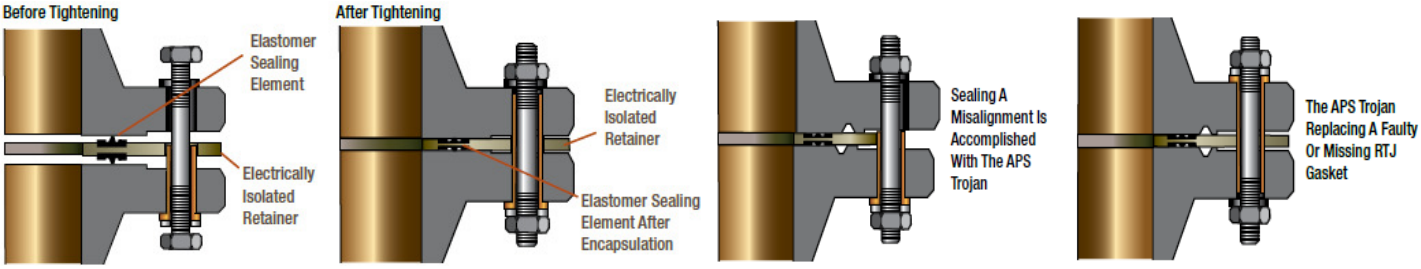


THE APS TROJAN

Trojan gaskets are state-of-the-art in near zero leakage static sealing. The elastomer sealing element is encapsulated in the electrically isolated retainer. The encapsulation of the sealing element permits only micro-exposure of the seal to hostile environs of fire, chemical and corrosive fluids.

Because of the controlled confinement of the elastomer sealing ring within the retainer allows the availability of a 92% to 94% filled volume groove. A consistent controlled pressure seal can always be obtained without tremendous bolt loads. Reduced loads allow for reduced flange thickness with smaller circles and smaller bolt holes.

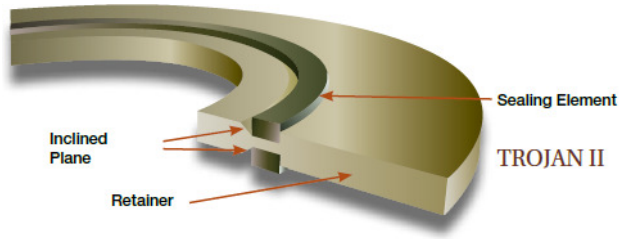
The cross section of APS's Trojan Sealing Gasket (A) shows the elastomer sealing element as it appears before compression between flanges. This compression causes the seal to effectively fill the void of the groove and encapsulate, permitting only micro exposure of the actual seal to hostile elements either from within or without.

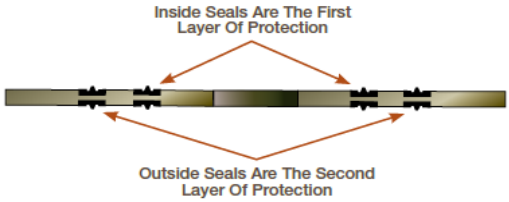


• Sealing Element Material		
Name	Min. Operating Temperature	Max. Continuous Operating Temperature
Nitrile (NBR)	-60℉ (-51℃)	240℉ (116℃)
Viton (FKM)	-75℉ (-60℃)	400℉ (205℃)
EPDM	-40℉ (-40℃)	250℉ (121℃)
Teflon (PTFE)	-250℉ (-121℃)	450℉ (232℃)

THE APS TROJAN II / DUPLEX SEAL TROJAN

Four seals on the new Duplex-Seal Trojan further ensures the integrity of the sealing capability of an already proven reliable gasket. For areas where absolute zero leakage is a must, the Duplex-Seal Trojan works twice as hard.





• Advantages

- Can be utilized with mismatched flanges
- Can be utilized with misaligned flanges
- Can be used in place of RTJ rings
- Little initial torque required
- No re-torquing required
- Sealing ring cannot be left out
- Reusable
- Limited area of seal exposed (long fire life)
- Compensates for pressure fluctuations, compression changes, vibrations, temperature, etc.
- Greatly reduces human error during installation
- Large selection of materials available
- Three to four times the dielectric strength necessary
- Low installation and maintenance costs
- Gaskets through 144"

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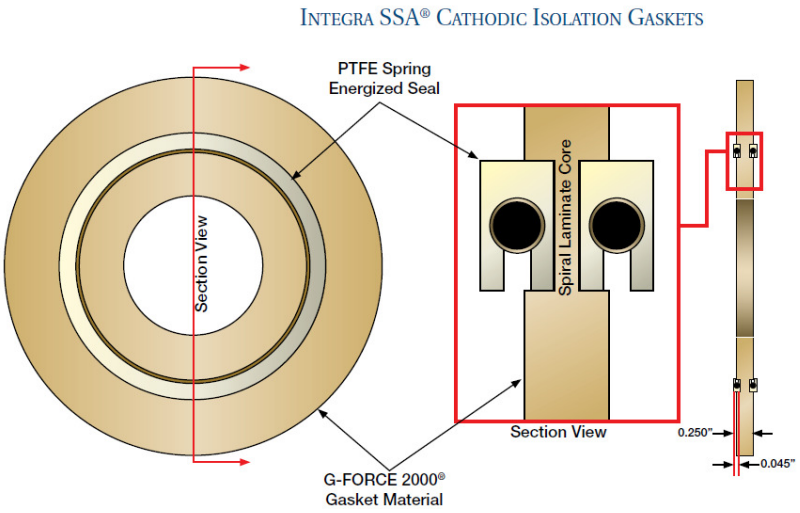
APS INTEGRA SSA®



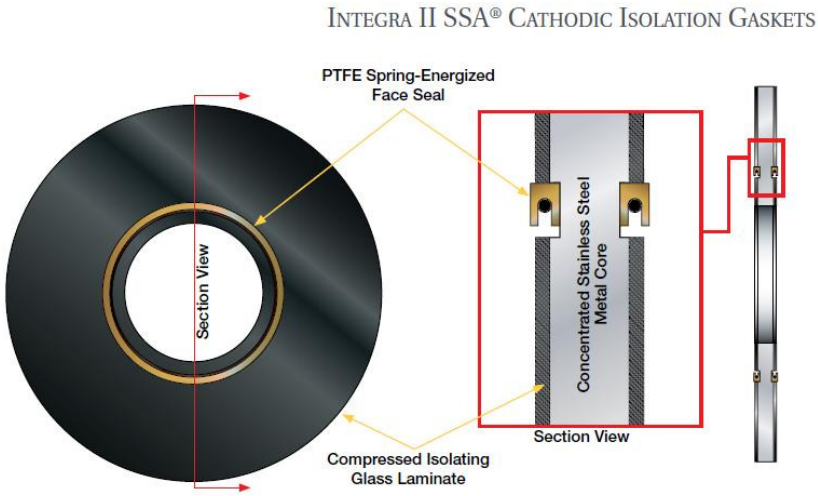
The Integra SSAR Cathodic Isolation Gasket is manufactured from proprietary G-FORCE 2000®, a special glass epoxy material with an impressively high compression strength. Inserted in the gasket is a glass reinforced, spring energized PTFE seal to assist in maintaining a high pressure, chemically resistant seal within the flange. Incorporated within the PTFE seal, a 316 stainless steel coil spring provides additional compression with minimal cold flow.
These characteristics allow constant pressure to be applied with low cold flow characteristics ultimately providing an outstanding seal and cathodically isolating the flange for superior reliability. It can be installed in flanges from ANSI 150# to ANSI 2500# up to an API 10,000# flange.
Integra SSAR gaskets have excellent electrical properties while at elevated temperatures. During mechanical operations, Integra SSAR gaskets can operate at 374 ℉. Integra SSAR gaskets are manufactured to accommodate RTJ, full and raised face flanges. All kit components include either G-10 or Mylar sleeves and G-10 isolating washers when Integra SSAR gaskets are installed. These gaskets are constructed from an extremely high compressive strength material formulated for high temperatures. Integra SSAR gaskets are manufactured in 1/4 inch thick material.

- **Typical Properties**

Material	Hardness Rockwell	Moisture Absorption	Flexural Strength	Tensile Strength	Compressive Strength	Max. Operating Temperature
G-Force 2000	111 M Scale	0.12 %	80,000 psi	61,000 psi	91,000 psi	190℃ (375℉)

Material Tested: 0.25” thickness

APS INTEGRA II SSA®



The APS Integra II SSA (severe service application Stainless/Steel) Gasket is an exceptionally expendable gasket used for both isolating and general sealing purposes in severe service applications. This gasket has been developed as an inimitable and effective seal for sealing flanges in which the opportunity for leakage must be held at zero allowance and exclusively designed for severe isolating service in harsh environmental applications especially where hydrocarbons are a factor. The Integra II SSA Gasket consists of a PTFE spring-energized face seal, seated in a highly compressed isolating glass laminate affixed to a concentrated stainless steel metal core. Because of its all-composite exclusive construction and its exceptional pressure-activated sealing properties, the gasket requires far less bolt stress to seal than most standard isolating gaskets in the industry. The Integra II SSA Gasket’s inner diameter is machined to match the exact flange bore dimension specified by the customer to eradicate the possibility of turbulent flow and inner flange face corrosion. This gasket is engineered to be reusable with a replaceable sealing element. The Integra II SSA Gasket is suitable in all services up to and including ANSI 2500# and API 15,000# classes. All Integra II gaskets are manufactured in 1/4” thickness for all diameters.

Retainer Material	Compressive Strength	Dielectric Strength	Max. Continuous Operating Temp.	Water Absorption	Flexural Strength	Tensile Strength	Bond Strength	Shear Strength
G10 SSA S/S	66,000PSI	800 VPM	302℉(150℃)	0.05%	65,000PSI	50,000PSI	2,600 lb.	22,000 lb.
G11 SSA S/S	63,000PSI	900 VPM	390℉(200℃)	0.085%	80,000PSI	43,000PSI	2,200 lb.	21,200 lb.

Seal Material	PTFE (Spring-Energized), Temp. -250℉~+450℉, designed for multiple applications.
	Viton, Temp. -75℉~+400℉, designed for general oil and gas applications.

Sleeve Material	G-10, max. Temp. 302℉
	Mylar, max. Temp. 300℉
Isolating Washers	G-10, thickness 1/8”(0.125”)
Steel Washers	Zinc-Plated Steel
	Stainless Steel

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Safety Spray Shields

CLOTH

APS PTFE cloth safety shields are manufactured from single and multi layered clear cloth for ease of visibility, or from a colored cloth with a leak indicating patch. Weep holes located behind the sensitive pH indicating patch allow the indicator to immediately signal a leak and will change color to red in the presence of an acid, or green if an alkali. The pH patch is also replaceable which allows reuse of the shield. APS safety shields are UV stabilized and resistant to sun, rain and fumes and may be used indoors or outdoors. Our cloth shields are quickly and easily installed by one person without any tools by means of a hook and loop fastener and drawstrings.

PTFE Spray Shield
Style T

PTFE Premium Spray Shield
Style TP

Clear PTFE Spray Shield
Style TC

PTFE Super Shield
Style TW

- PTFE coated glass cloth
- PTFE or Nomex® thread and drawstring
- Maximum operating temperature 450˚F
- Fire and tear resistant. Broad spectrum of chemical resistance.

Style TS	Style T	Style TP	Style TC	Style TW
PTFE Single Ply	PTFE Standard	PTFE Premium	Clear PTFE	PTFE Super
Similar in design to standard PTFE shield, Single-layered, economical construction for less severe applications.	The most popular and best selling shield. 3-ply multilayered reinforced construction.	High PTFE content for severe applications. Outlasts all other brands on market. 3-ply multi-layered construction. Laboratory test proven.	Similar in design to standard PTFE. 100% clear PTFE strip in center of shield allows to visual inspection.	White and solid PTFE construction (expanded PTFE cloth. PTFE or Nomex® cord, thread and reinforcement. Suitable for applications where coated glass is not acceptable. Reinforced construction through multi-layered design.

Nomex® is registered trademark of E.I. du Pont de Nemours and Company.

Safety spray shields shall be used to inhibit and detect chemical sprayout due to failures of flanged connections. They shall be installed on all un-insulated process lines conveying acid, caustic, and other identified chemicals.

Shields shall enclose all flanges, all of expansion joint and connecting flanges, all valves and connecting flanges, and cover bonnet on gate and globe valves. APS spray shields available for all ANSI, DIN, PN, BS, JIS and KS flange sizes.

The shields shall be manufactured of chemical resistant cloth or metal. The cloth shields shall be sewn with chemical resistant thread, and have chemical resistant drawcords and hook and loop attachments for closure. Solid cloth shields shall be pH indicator tape for leak indication or transparent shields shall provide visual inspection.

Material of construction shall be chosen by customer using the APS safety spray shields and chemical resistant chart guide or by manufacture's recommendations.

Note: Whole lines products of APS are available under requested.

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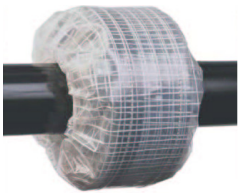
Safety Spray Shields

ADDITIONAL CLOTH

Polypropylene Spray Shield Style P



Polyethylene Spray Shield Style PE

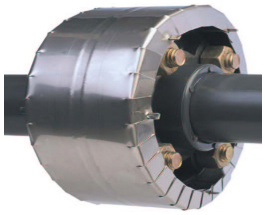
Polyvinyl Chloride (PVC) Spray Shield Style V

Clear PVC Spray Shield Style VC

Clear PTFE Spray Shield with Drain Style TCD

Style P	Style PE	Style V	Style VC	Style TCD
Polypropylene	Polyethylene	Polyvinyl Chloride(PVC)	Clear PVC	Optional Drain
100% black polypropylene cloth, thread, and drawstring. Polypropylene stiffener lines the interior for adds protection. Maximum operating temperature 200℉.	Manufactured from transparent, reinforced polyethylene. Reinforced thread and drawstring. Maximum operating temperature 170℉.	Manufactured from yellow, reinforced polyvinyl chloride (other colors available). Reinforced thread and drawstring. Maximum operating temperature 170℉.	Similar in design to standard PVC shields. Clear vinyl strip in center allows for visual inspection.	Available on clear PTFE shield, 100% PTFE drain nipple attached to bottom of shield. Used for secondary containment, venting, and emissions testing.

METAL



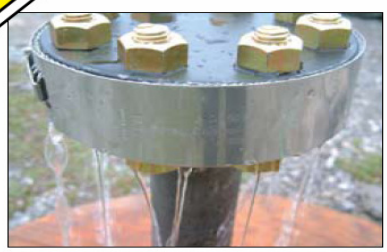
The metal material shield manufactured from 22 to 24 gauge (0.6 to 0.76mm) sheet metal used in high temperature, high pressure or when conditions are unfavorable for cloth shields. The slotted overlapped edges prevent lateral spray-outs, and spacer rods raise shield off flange to dissipate pressure. The metal shields shall be attached by keyway slot and screw. In addition, shield can be easily installed by one person. A screwdriver, stainless steel screws and keyway slot make installation simple. If required, the attached stainless steel hose clamp connections optional is available for secondary containment, venting and emissions testing. APS metal shields are available with anti-mist screen to help eliminate aerosol effect.

Stainless Steel	Galvanized Steel	Optional Drain
Recommended for corrosive and hazardous environments. Available in 304 and 316 grade stainless steel. Maximum operating temperature 2,000℉. Maximum operating pressure 3,500 psi.	Recommended for oil, water and steam application only. Maximum operating temperature 800℉. Maximum operating pressure 3,500 psi.	Available in 304 and 316 grade stainless steel. Stainless steel nipple attached in bottom of shield. Used for secondary containment, venting and emissions testing.

Splash Arrestor® specifically designed to capture sprayouts from faulty flanges carrying dangerous liquids, the Splash Arrestor® gets the job done right the first time.

Advantage

- Produced entirely with stainless steel
- Easy & accurate installation by one person
- No maintenance required
- Reusable many times over the life of the installation
- Available for most ANSI & API flanges
- Lightweight



Note: Whole lines products of APS are available under requested.

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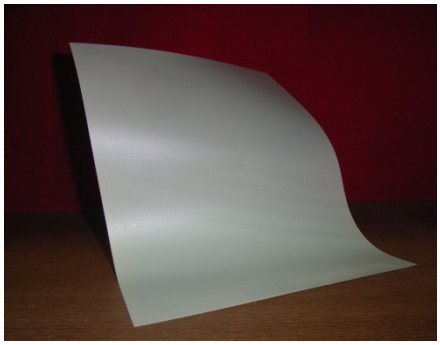
Safety Spray Shields / Hydrogen Gas Safety Shields

Safety Spray Shields are made of high strength expanded PTFE, and PTFE drawstring. A sensitive pH indicating patch on the exterior surface allows the earliest warning of initial leak while its color changes to red in the presence of an acid or to green if an alkali. The pH patch (replaceable leak indicating patch) is replaceable which reuse of the shield is possible. Besides, 100% PTFE center clear strip is also available and easy for visual inspecting the leak level is serious or not. It is kind of effective proactive maintenance to prevent and diagnose any abnormal spray of spattering of high concentration or corrosive chemicals. It is necessary for labor safety to protect from the environment hazardous factor.

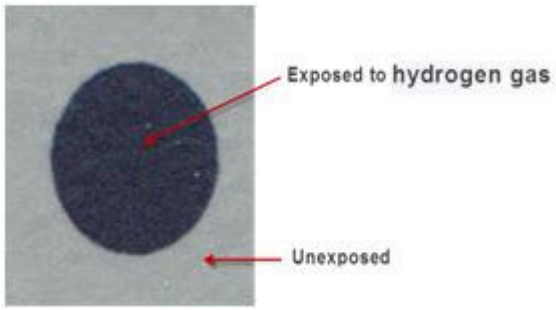
TYPE	 **ZW#600-S (Standard)**	 **ZW#600-SC (Clear)**	 **ZW#610 (Hydrogen Clear)**
Standard	Made by 100% High Strength expanded PTFE；100% PTFE drawstring and thread；Enclosed drawstring stopper;		
	Anti Corrosion(pH 0-14) clear high molecule patch pocket；replaceable pH patch.	Specially adopt anti corrosion (pH 0-14) clear high molecule foil for center strip；	Adopt anti corrosion (pH 0-14) clear visual strip plus patent high sensitive Hydrogen gas detecting patch.
Characteristics	1. 100%PTFE drawstring and thread, high performance. 2. pH indicating patch on out of shield help for visual inspection. 3. Clear high molecule patch pocket could protect pH indicating patch easy to visual and to avoid damage. 4. Replace pH indicating patch design for long term using. 5. Especially suitable for strong acid and alkali piping flange around the walking way of the plant.	1. 100%PTFE drawstring and thread, high performance. 2. Anti corrosion (pH 0-14) clear high molecule foil to direct visual inside of shields, it is good for inspecting the leak direction when leakage and to avoid the media spraying out to hurt worker's body during disassemble. 3. Especially suitable for dangerous chemicals, high pressure steam piping flange around the walking way of the plant.	1. 100%PTFE drawstring and thread, high performance. 2. Micro Hydrogen gas leakage though Anti corrosion (pH 0-14) clear visual strip plus hydrogen detecting patch become visible, it reduced the detection costs, suitable for outdoor and flame-proof area, it is easy for Risk-based Inspection (RBI) system and daily routing-inspection for a wide-area determination of hydrogen presence prior to any combustion or local temperature rise. 3. Newly innovative technical patent； 4. Excellent Sensitive Hydrogen gas detecting (1/80 flaring concentration), and patent concentrate accumulating indicator design, high identification. 5. Replaceable Hydrogen detecting patch.
Maintenance & Warranty	pH indicating patch shall be replaced per 10 months after delivery to maintain the properties and ensure the best warning function.		Hydrogen gas detecting patch shall be replaced in regular period after installation to maintain the high sensitive and prove the best warning function. The period time depends on the environment.
	• Warranty excluding the replaceable patch. • Every Shield with exclusive code and Warranty. • Exclusive code filed the produce date, warranty period, maintenance and inspection experience for tracking the material and records. • Warranty one year after delivery to ensure the excellent protect and detecting function and avoid possible potential failure and recommend take apart the shields to do the fully function inspection and necessary maintenance every 18 months or maintenance period (within 2 years).		

Safety Spray Shields / Hydrogen Gas Safety Shields

ZW #610 Hydrogen detecting patch adopt global patent technical [micro-particles + polymer coating], The color change chemical reaction against a very small intentional hydrogen gas leak of 0.004 mole per second for 20 minutes, and the speed of color change increases with the concentration of hydrogen and higher temperature. It is easy for Risk-based Inspection (RBI) system and daily routing-inspection for a wide-area determination of hydrogen presence prior to any combustion or local temperature rise.



ZW safety shields made by 100% PTFE, and with excellent performance for anti corrosion, UV stabilized, temperature resistance, waterproof, smoke prevention, anti-oxidation properties, and suitable for high concentration acid, alkali, hazardous chemical and high-pressure steam piping flange. PTFE material is much better to compare with legacy PP, PE or PVC material and meet most industry requirement. It can be used in room or outside, and easy to install by one-man in short time without tools. The shields meet most of international industrial standard such as ANSI, DIN, PN, BS, JIS, CNS or non-standard flange, and also available upon customer request.



● Material properties comparison of PTFE vs PE, PP, PVC

◎ Excellent , △Good , X Inferior

		PTFE	(HD)PE	(LD)PE	PP	PVC
1	Chemical Resistance (pH 0~14)	◎	△	△	△	X
2	Maximum Temperature Resistance ℃	300	115	115	130	95
	Maximum Working Temperature ℃ (pH indicating patch)	230	80	80	105	80
	Maximum Working Temperature ℃ (Hydrogen gas detecting patch)	90	80	80	90	80
3	Working Pressure (psi)	1650	350	350	1100	435
4	Tensile Strength (psi) , ASTM D638	4600	4600	2000	2850	400
5	UV Stabilized , ASTM G154 Cycle 1	◎	X	X	X	X
6	Water Absorption (non-absorbency)	◎	◎	◎	◎	◎
7	Air Permeability	◎	X	X	X	X
8	Incombustibility (compare to plastic material)	◎	X	X	X	X
9	Dielectric Strength (V/mil) , ASTM D149	1390	460	450	500	554
10	Reuse possibility	◎	X	◎	X	X

● **Easy Installation**
Enclosed Velcro and drawstring stopper, it is easy to install by one-man.

● **Applications**
For strong acid and alkali piping flange, valve and other joints,
For hazardous chemicals, high-pressure steam piping flange, valve and other joints
For hydrogen gas piping flange, valve and other joints.

PTFE Coated Rubber Gasket

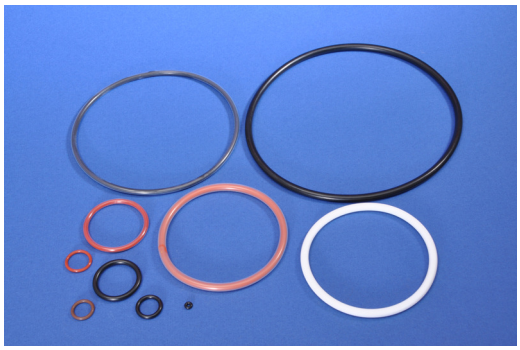
ZW 2960

It is improved from full face rubber gasket, surface with molded virgin PTFE coating which covered inner diameter to inside bolt circle on both sides with one to two concentric convex sealing rings. PTFE coating increase the maximum corrosion resistance possibility to suit for universal corrosive chemicals. Normal rubber material is EPDM, the EPDM giving elastic recovery and low seating stress advantages (only one third of traditional PTFE enveloped Gasket), and a long sealing life. It meets ASME B16.5、JIS、DIN flange standard, standard size 1/2" up to 24", continue service temperature range -30℃ ~+150℃, maximum pressure 20 Bar. It can be used for application such as plastic piping and metal lining or glass lining piping.

Remark: Custom size depends on requirement is available.

PTFE Encapsulated O-Ring

ZW 2970



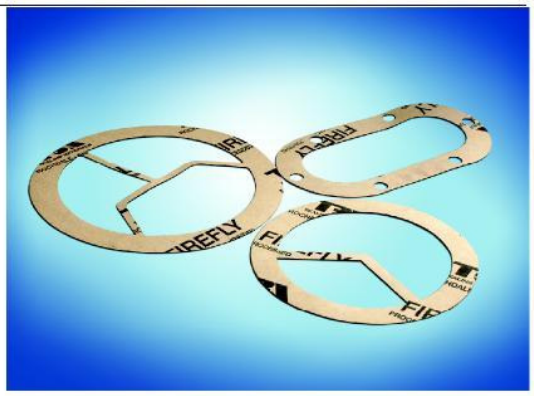
PTFE (PFA or FEP material) encapsulated elastomer (Viton® or Silicone) core to perform the excellent chemical corrosive resistance and higher temperature resistance. It is novel type and suitable for the special requirement when other single elastic material can't meet. O-Ring installation will result variation depends on the pressure rating, it is specially suit for low pressure environment, and itself elasticity will be formed the sealing property. The properties are corrosion resistance, smooth, no stick, low absorption, low ovality and no swelling.

Outer Material		Inner Material		Temperature Range ℃	Max. Pressure
FEP	Transparent	VITON®	Black	-200 ~ 205	50 Bar
PFA		VITON®		-200 ~ 260	
FEP		SILICONE	Red	-200 ~ 205	
PFA		SILICONE		-200 ~ 260	

Remark: Custom size depends on requirement is available. We also offer various rubber materials O-ring.

Oil-Proof Paper Jointing Sheet Gasket

FIREFLY (TBA) ZW 2900



FIREFLY Jointing Sheet Gasket is one of the most economic solution for the automobile and engineering industries due to its excellent oil and fuel resistance up to 120° C. The cellulose based paper gasket is made of plasticized gelatin impregnated material. Typical applications include Carburetor, Fuel Pump, Front Plate, Oil Pump, Oil Filter, Side Cover, Timing Cover, Thermostat, Water Pump, Input Shaft, Exit Housing, Top Cover and Gearbox to Clutch of the Gearbox, Axle Cover and Axle Shaft of the Rear Axle. It is also suitable for certain industrial applications without critical issue of heat or chemical resistance.

● Physical properties

Maximum Service Temperature		120° C (250° F)
Color		Brown
Compression (ASTM F36)		25 - 40%
Recovery (ASTM F36)		40% min.
Tensile Strength (ASTM F152)		13.79 MN/m² min.
Fluid Resistance Properties after 22 hours at 21°C (70°F) to 30° C (85° F) refer to ASTM F146		
IRM 903 Oil	Change in weight	(+)15% Max.
	Change in thickness	(+) 5% Max.
Fuel B	Change in weight	(+)15% Max.
	Change in thickness	(+) 5% Max.
Distilled Water	Change in weight	(+)90% Max.
	Change in thickness	(+)30% Max.

Note: Above properties based upon 0.8mm material refer to ASTM F104 section 7.

● Fluid resistance

Acetone	2	Dibutyl Pathalate	1	Linseed Oil	1
Acids Inorganic	3	Ether	2	Lubricating Oil	1
Alcohols Methyl/Ethyl/Amyl	1	Ethyl Acetate	1	Methyl Ethyl Ketone	1
Alkalis	3	Ethylene Glycol	1	Nitrobenzene	1
Ammonia	3	Formaldehyde	1	Phenol	1
Aniline	1	Freon 12 and 22	3	Propane	1
Benzene	1	Fuel Oil	1	Propylene Glycol	1
Butane	1	Gasoline	1	Sodium Silicate	1
Butyl Acetate	1	Glycerine	1	Steam	3
Carbolic Acid	1	Greases	1	Toluol	1
Carbon Dioxide	1	Hydrogen	1	Trichloroethylene	1
Carbon Tetrachloride	1	Hydrogen Peroxide	2	Vegetable Oils	1
Chlorinated Solvents	1	Hydrogen Sulphide	1	Water / Sea Water	2
Cresol	2	Inks	1	White Spirit	1
Detergents	1	Kerosene	1	Xylol	1

Note: 1 - Good Resistance, 2 - Medium Resistance, 3 - Not Resistant.

Cork Rubber Sheet Gasket

ZW 2950

It is a highly compressible material suitable for low and medium bolt pressure, with good flexibility and resilience. The physical characteristics along with oil and fuel resistance make ZW 2950 a qualified material for automotive and industrial gaskets. This also creates a better distribution of load when compression occurs between bolt spans. Thanks to the combination between the compressibility and recovery characteristics of cork with the flexibility and shelf life of synthetic rubber, ZW 2950 Cork Rubber Sheet Gasket proves it as an excellent product for sealing, insulation or anti-vibration applications. These unique characteristics will meet or exceed gasketing requirements in automotive, aerospace, marine, gas, electrical and many other industries.

● Physical properties

Service Temperature		-30° C ~ 110° C
Color		Black Brown
Density (ASTM F1315)		560 ~ 760 kg/m^3
Hardness (Shore A) (ASTM D2240)		50 ~ 70
Compressibility (400 psi) (ASTM F36)		30% ~ 55%
Compression Set (Method A, 22hr at 70 ºC) (ASTM D395)		55% Max.
Recovery (400 psi) (ASTM F36)		75% Min.
Tensile Strength (ASTM F152)		0.96 MPa Min.
Oil No.1 (ASTM F147) (70 hr at 100ºC, 212ºF)	Change in Volume	-10% ~ 10%
Fuel A (ASTM F146) (22 hr at RT)	Change in Volume	0% ~ 15%
IRM 903 (ASTM F146) (70 hr at 100ºC, 212ºF)	Change in Thickness	-2% ~ 15%