



**FLOW ENGINEERING AND SERVICE CO.,LTD.**

บริษัท โฟลว์ เอ็นจิเนียริ่ง แอนด์ เซอร์วิส จำกัด

*Flexitallic*

# KAMMPROFILES FLEXPRO™



**FLEXITALLIC GROUP:** ผู้นำตลาดระดับโลก  
ด้านผลิตภัณฑ์ ปะเก็นเหล็กสำหรับ  
อุตสาหกรรมคุณภาพสูง



ทนทานต่ออุณหภูมิและ  
ความดันที่หลากหลาย



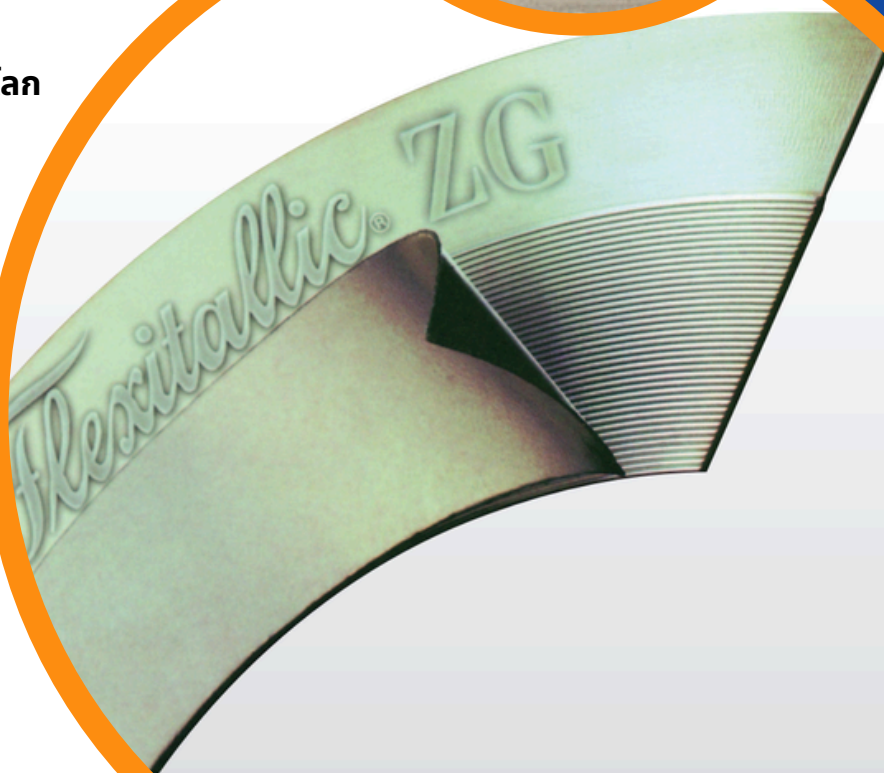
ลดการปล่อยสารพิษ



ติดตั้งง่าย

ปะเก็น KAMMPROFILE  
นวัตกรรม เพื่อความปลอดภัย  
และประสิทธิภาพที่เชื่อถือได้

มีอายุการใช้งานยาวนาน ลดการบำรุง  
รักษา สามารถใช้งานในพื้นที่จำกัด และ  
สามารถนำกลับมาใช้งานใหม่ได้  
(RE-FACE) เพื่อความคุ้มค่าสูงสุด



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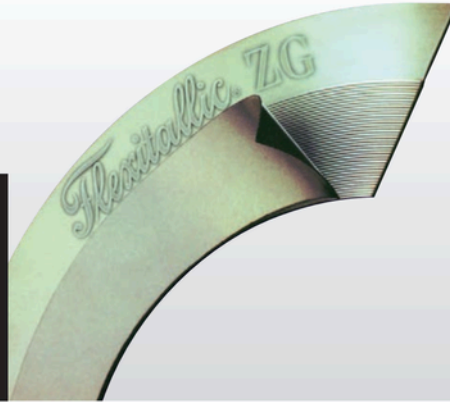
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*Flexitallic*

## FLEXPRO™ KAMMPROFILES



Flexpro™ - The versatile gasket with three key features: compressibility, low stress, convenience.

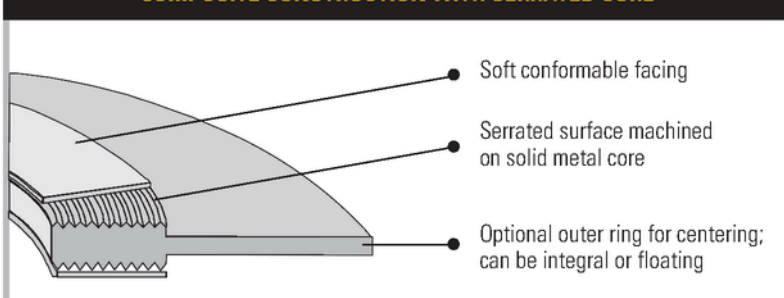
*Flexpro*

The FLEXPRO™ gasket has been providing an extremely tight, reliable seal in a wide range of applications globally since its development in Germany over 50 years ago.

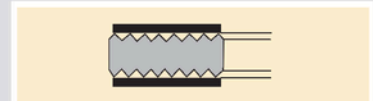
The FLEXPRO™ gasket is comprised of a concentrically serrated solid metal core with a soft, conformable sealing material bonded to each face. The soft facing material provides low stress gasket seating, while the serrated geometry of the metal core enhances sealing performance by inducing stress concentrations on the sealing surfaces. The serrations minimise lateral movement of the facing material, while the metal core provides rigidity and blowout resistance.

The FLEXPRO™ gasket exhibits excellent compressibility and recovery characteristics, maintaining joint tightness under pressure and temperature fluctuations, temperature differential across the flange face, flange rotation, bolt stress relaxation, and creep. Suitable for vacuum to extremely high pressure applications.

### COMPOSITE CONSTRUCTION WITH SERRATED CORE

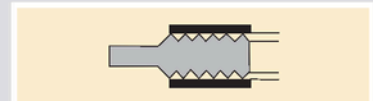


### STYLE PN



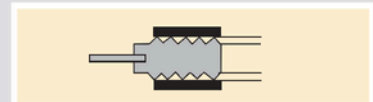
Style PN FLEXPRO™ gaskets are selected for use in confined locations, including male and female, tongue and groove, spigotted and/or recessed flange arrangements.

### STYLE ZG



Variation of the PN FLEXPRO™, utilises an integral outer locating ring for correct gasket positioning within the flange assembly bolt circle. Style ZG FLEXPRO™ gaskets are recommended for use in standard raised face and flat face flange assemblies.

### STYLE ZA



The Style ZA FLEXPRO™ is a slight variation of the Style ZG. The integral outer locating ring is replaced by a loose fitting independent ring which is preferred in applications where differential radial thermal expansion may be encountered.

# FLEXPRO™ KAMMPROFILES

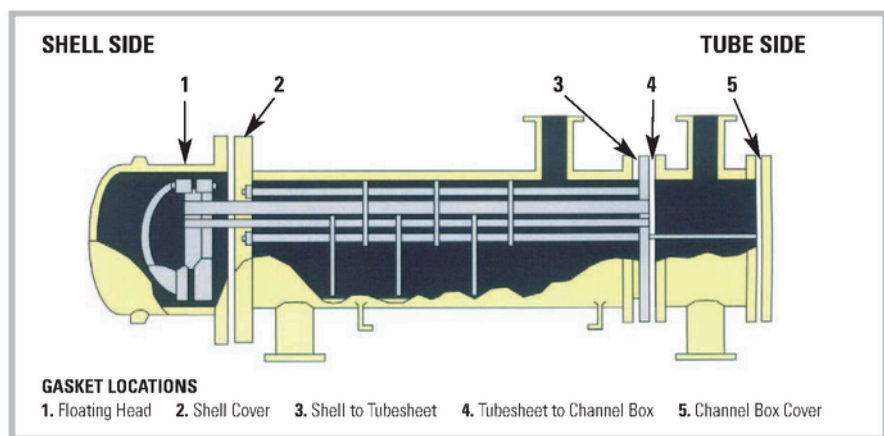
## Ideal for Shell and Tube style Heat Exchanger Flanges.

Although suitable for use on all standard pipeline flanges in a wide range of difficult applications, the FLEXPRO™ gasket is proving to be reliable, as a cost effective alternative to metal jacketed gaskets, that are commonly used in heat exchanger applications.

Use of the Flexitallic FLEXPRO™ gasket will ensure a reliable seal, from initial hydrotest through difficult operating conditions.

FLEXPRO™ gaskets are suitable for use on TEMA flanges, and when required, pass partition ribs can be supplied in any configuration.

The FLEXPRO™ gasket provides a high integrity, low seating stress seal, and is ideal for heat exchanger applications with limited bolt load or less rigid flanges.



## Standard Core Materials

Standard core thickness is 3.0mm; other thicknesses and materials are readily available to suit specific applications.

## Standard Facing Materials

Standard facing thickness is 0.5mm or 0.75mm (material dependent); other thicknesses and materials are readily available to suit specific applications.

## Flange Surface Finish Requirements

The ideal flange surface finish for use with Flexitallic FLEXPRO™ gaskets is 3.2 – 6.4µ – metre Ra (125 – 250 µ – inch Ra).

CORE MATERIAL	MAX. TEMPERATURE
Stainless Steel	535 - 870°C
Carbon Steel	535°C
Aluminium	425°C
Monel®	815°C
Nickel	650°C
Inconel®	1100°C
Titanium Gr.2	1095°C
Duplex 2205* (UNS S31803)	300°C

\*Duplex is subject to embrittlement between 350°C and 500°C

FACING MATERIAL	MAX. TEMPERATURE	SEATING STRESS AT ROOM TEMP	
		MIN. PSI (MPa)	MAX. PSI (MPa)
Thermiculite®	1000°C	2500 (17)	72500 (500)*
Flexicarb® Flexible Graphite	450°C	2500 (17)	72500 (500)*
Sigma®	260°C	2500 (17)	72500 (500)*
Virgin PTFE	260°C	2500 (17)	72500 (500)*
Soft Metals	Per material	Per material	Per material

\*While high stresses have been utilised, Flexitallic Engineering should be contacted for operating stresses above 40,000 psi.



# FLEXPRO™ KAMMPROFILES

Independent PVRC testing confirms superior tightness, room temperature tightness (ROTT), behaviour characterisation.

## ROTT test procedure

The ROTT test includes a gasket load sequence (5 stress levels, S1 to S5), called Part A, which represents the initial joint tightening and gasket seating. The maximum stress level (S5) is 15160 psi for semi-metallic gaskets. Part A is interrupted at its three highest stress levels to run unload-reload sequences, called Parts B1, B2, B3 which simulate joint relaxation and re-tightening. At each stress level, helium leakage is measured (for two pressures in Part A and one pressure in Part B).

ROTT test data are plotted in the form of Gasket Stress,  $S_g$ , vs. Tightness Parameter,  $T_p$ , on a log-log scale. The tightness parameter,  $T_p$ , is a measure of the ability of an installed gasket to control its leakage performance in a pressurised flange joint.  $T_p$  is proportional to the pressure causing a small leak and inversely proportional to the square of the leak. Higher the  $T_p$  value, the tighter the joint. A joint that is 10 times tighter than another leaks 100 times less (at the same pressure).

## Gaskets constants

The calculated gasket constants are reported in the table below, along with computed values of  $S_{100}$ ,  $S_{1000}$  and the maximum  $T_p$  value obtained in the ROTT tests.

TABLE 1: PVRC CONSTANTS

Gb	a	Gs	$S_{100}$	$S_{1000}$	$T_p$ MAX
387 psi	0.334	14 psi	1802 psi	3888 psi	55000

TABLE 2: ASME CONSTANTS

m	y
2	2500 psi

The ROTT behavior characterisation of a gasket consists of:

- Performing a minimum of two ROTT tests on NPS 4" samples
- Treating and reporting ROTT data on the basis of the Tightness Parameter concept
- Calculating the PVRC Gasket constants, Gb, "a" and Gs, according to the proposed ASTM Standard
- Reporting the gasket constants and characteristics

## Constants Gb, "a", and Gs

The PVRC tightness based gasket constants are determined from the results of two or more ROTT tests. Constants Gb and "a" together define an initial seating performance line. The combined effect of Gb, and "a" is best represented by the value of  $STp = Tp \times Gb \times "a"$  calculated for typical values of  $T_p$  such as 100 or 1000. For example  $S_{100} = Gb (100)a$ . Constant Gs independently represents operation. Low values of Gb, "a", Gs,  $S_{100}$  and  $S_{1000}$  are favourable.

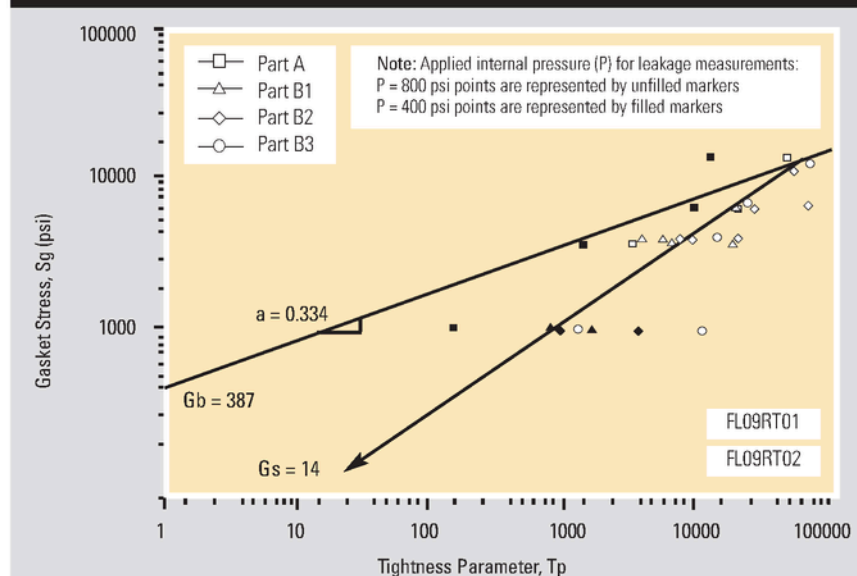
## Performance in ROTT tests

The results of two ROTT tests conducted at TTRL<sup>1</sup> on Flexitallic FLEXPRO™ gaskets are shown in Figure 1.

At the highest Part A stress level (S5 - 15160 psi),  $T_p$  values above 55000 were obtained. A  $T_p$  of 55000 corresponds to a Helium leak rate of approximately  $1 \times 10^{-6}$  mg/s at a test pressure of 800 psi.

Part B test data indicates that this gasket maintains superior tightness during stress cycling.

FIGURE 1: ROTT TEST RESULTS



<sup>1</sup>Tightness Testing and Research Laboratory - Ecole Polytechnique of Montreal



## FLEXPRO™ KAMMPROFILES

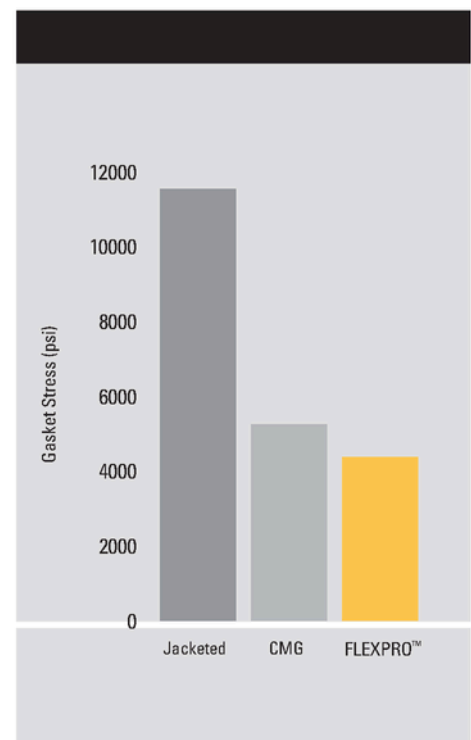
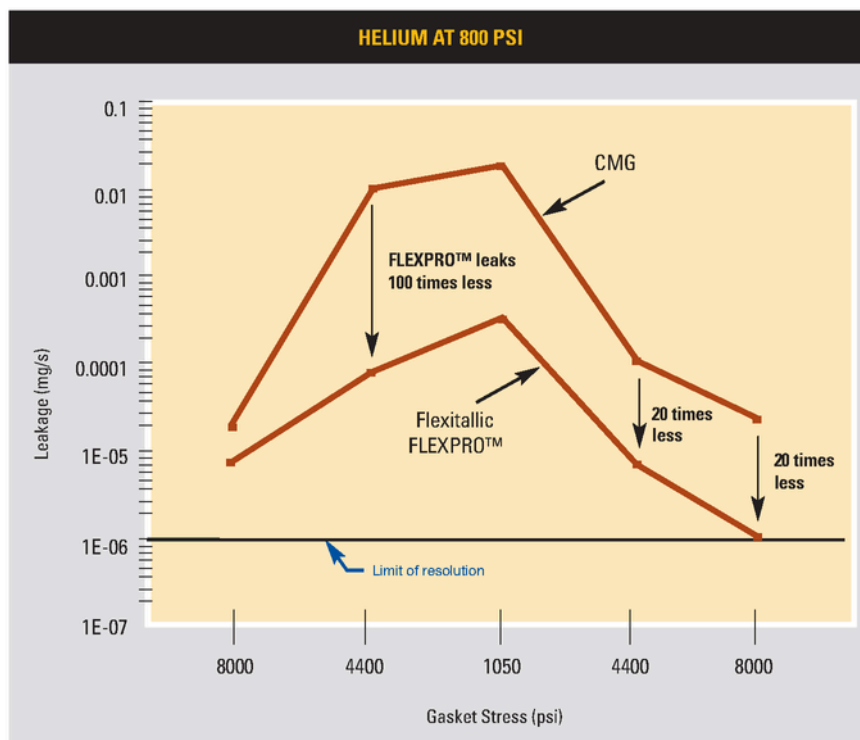
### Cyclic Service Comparison

During operation, unloading of a bolted-gasketed joint can occur due to pressurisation, fluctuation in pressure and temperature, thermal effects, joint relaxation, etc. PVRC test data confirms the superior ability of the FLEXPRO™ gasket to maintain tightness under these cyclic loading conditions. As shown in the graph, when gasket stress is reduced from 8000 psi to 4400 psi, the FLEXPRO™ gasket leaks 100 times less than a comparable corrugated metal graphite gasket (CMG).

**A tighter joint is a safer joint!**

### T3 Tightness

The PVRC developed method for characterising gasket performance specifies three classes of tightness. T1 (economy), T2 (standard), and T3 (tight). A tightness class of T3 represents a mass leak rate of helium per unit diameter, of 0.00002 mg/sec-mm. This graph shows that the Flexitallic FLEXPRO™ gasket achieves a tightness class of T3 at the lowest seating stress when compared to other types of gaskets. Results are based on PVRC test data, using a gasket with dimensions of 20" ID x 20.5" OD, with 20 x 1" diameter bolts and an assembly efficiency of 0.75. The Flexitallic FLEXPRO™ gasket is ideal for use in applications where limited bolt load and/or light weight flanges are used.



## FLEXPRO™ KAMMPROFILES



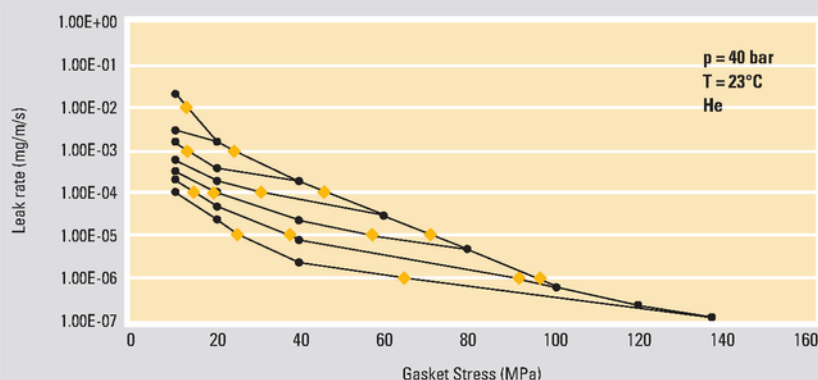
### Flange Calculations and Gasket Parameters – EN 1591-1 and EN 13555

Driven by national requirements within the European Union for increasing plant efficiency and reducing fugitive emissions the European Standard EN 1591-1 was first published in 2001. The Standard outlines a calculation method in which strength criteria of the individual mechanical components in a bolted joint namely; flanges, bolts and gasket, and importantly leakage criteria are satisfied for a particular application. The calculation method adopts the premise that all gasketed bolted flanged connections leak and requires the user to specify what a permissible level of leakage is for a particular application. This is done via the introduction of the concept of the tightness class. At the time of writing EN 1591-1 is the only stand alone standardised calculation method that includes both stress analysis and tightness proof of a bolted connection.

The calculation requires the input of data specific to the particular application in question. The required gasket characteristics are generated in accordance with the European standard EN 13555. The test protocol outlined in EN 13555 is complex and requires the use of costly sophisticated test equipment.

As the leading supplier of technical solutions in the field of industrial sealing Flexitallic makes use of the latest innovative materials technologies and calculation methodologies to ensure the highest levels of joint integrity. Gasket characteristics in accordance with EN13555 are available for wide selection of Flexitallic static sealing products. Alternatively Flexitallic can undertake flange calculations in accordance with EN1591-1 on behalf of the end user.

**LEAKAGE CURVE - KAMM 316L FG 154x124x4.78mm. Test number 07-133**

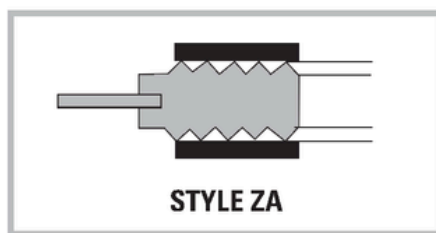
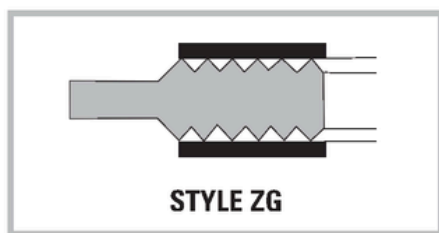


### GASKET CHARACTERISTICS ACROSS A RANGE OF TEMPERATURES, STRESSES AND PRESSURES, RELATING TO THE FOLLOWING PROPERTIES ARE GENERATED:

$Q_{Smax}$	Maximum surface pressure that can be imposed on a gasket before failure occurs
$Q_{min(L)}$	Minimum gasket surface pressure required for leakage class (L) on initial loading
$Q_{Smin(L)}$	Minimum gasket surface pressure required for leakage class (L) after off-loading
$L_N$	Leakage tightness classes: Tightness Class LN: Specific Leakage Rate ( $mg.s^{-1}.m^{-1}$ ):
	$L_{1.0}$ $L_{0.1}$ $L_{0.01}$ $\leq 1.0$ $\leq 0.1$ $\leq 0.01$
$P_{QR}$	Creep relaxation factor. Ratio of the original and final surface pressures
$\Delta_{eGc}$	Change in gasket thickness due to creep
$E_G$	Elastic unloading modulus
$\alpha_G$	Coefficient of axial thermal expansion
$\mu_G$	Static friction factor between the gasket and contacting flange face.

# DIMENSIONAL DATA

## FLEXPRO™ KAMMPROFILES ASME B16.20



NOMINAL BORE		SEALING INNER DIAMETER	SEALING OUTER DIAMETER	CENTERING RING OUTER DIAMETER						
INCHES	MM			150 Class	300 Class	400 Class	600 Class	900 Class	1500 Class	2500 Class
1/2	15	23.1	33.3	47.8	54.1	Note (2)	54.1	Note (3)	63.5	69.9
3/4	20	28.7	39.6	57.2	66.8	Note (2)	66.8	Note (3)	69.9	76.2
1	25	36.6	47.5	66.8	73.2	Note (2)	73.2	Note (3)	79.5	85.9
1 1/4	32	44.5	60.2	76.2	82.6	Note (2)	82.6	Note (3)	88.9	104.9
1 1/2	40	52.3	69.9	85.9	95.3	Note (2)	95.3	Note (3)	98.6	117.6
2	50	69.9	88.9	104.9	111.3	Note (2)	111.3	Note (3)	143.0	146.1
2 1/2	65	82.6	101.6	124.0	130.3	Note (2)	130.3	Note (3)	165.1	168.4
3	80	98.3	123.7	136.7	149.4	Note (2)	149.4	168.4	174.8	196.9
4	100	123.7	153.9	174.8	181.1	177.8	193.8	206.5	209.6	235.0
5	125	150.9	182.6	196.9	215.9	212.9	241.3	247.7	254.0	279.4
6	150	177.8	212.6	222.3	251.0	247.7	266.7	289.1	282.7	317.5
8	200	228.6	266.7	279.4	308.1	304.8	320.8	358.9	352.6	387.4
10	250	282.7	320.8	339.9	362.0	358.9	400.1	435.1	435.1	476.3
12	300	339.6	377.7	409.7	422.4	419.1	457.2	498.6	520.7	549.4
14	350	371.6	409.7	450.9	485.9	482.6	492.3	520.7	577.9	Note (4)
16	400	422.4	466.6	514.4	539.8	536.7	565.2	574.8	641.4	Note (4)
18	450	479.3	530.1	549.4	596.9	593.9	612.9	638.3	704.9	Note (4)
20	500	530.1	580.9	606.6	654.1	647.7	682.8	698.5	755.7	Note (4)
24	600	631.7	682.5	717.6	774.7	768.4	790.7	838.2	901.7	Note (4)

### GENERAL NOTES

Dimensions in mm. Tolerances in mm.

Figures stated are for information only. Please refer to the current version of the original standards for dimensional information.

### NOTES

1) Tolerances +/- 0.8mm for all diameters

2) There is no Class 400 flanges in NPS 1/2" through NPS 3" (use Class 600)

3) There is no Class 900 flanges in NPS 1/2" through NPS 2 1/2" (use Class 1500)

4) There is no Class 2500 flanges in NPS 14" and larger



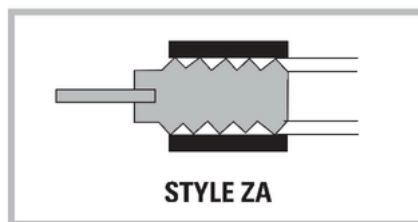
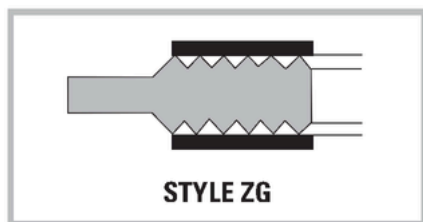


# DIMENSIONAL DATA

## FLEXPRO™ KAMMPROFILES

Covered Serrated Metal Gaskets for Type A and Type B Flanges.

EN1514-6



OUTER DIAMETER					CENTERING RING OUTER DIAMETER									
NOMINAL BORE	SEALING INNER DIAMETER	SEALING OUTER DIAMETER			PN10	PN16	PN25	PN40	PN64	PN100	PN160	PN250	PN320	PN400
DN		PN10/40	PN64/160	PN250/400										
10	22	-	See	36	46	46	46	46	56	56	56	67	67	67
15	26	-	PN250	42	51	51	51	51	61	61	61	72	72	-
20	31	-	to	47	61	61	61	61	-	-	-	-	-	-
25	36	-	PN400	52	71	71	71	71	82	82	82	83	92	104
32	46	See	62	66	82	82	82	82	-	-	-	-	-	-
40	53	PN64	69	73	92	92	92	92	103	103	103	109	119	135
50	65	to	81	87	107	107	107	107	113	119	119	124	134	150
65	81	PN160	100	103	127	127	127	127	137	143	143	153	170	192
80	95	-	115	121	142	142	142	142	148	154	154	170	190	207
100	118	-	138	146	162	162	168	168	174	180	180	202	229	256
125	142	-	162	178	192	192	194	194	210	217	217	242	274	301
150	170	-	190	212	217	217	224	224	247	257	257	284	311	348
175	195	-	215	245	247	247	254	265	277	287	284	316	358	402
200	220	240	248	280	272	272	284	290	309	324	324	358	398	442
250	270	290	300	340	327	328	340	352	364	391	388	442	488	-
300	320	340	356	400	377	383	400	417	424	458	458	536	-	-
350	375	395	415	-	437	443	457	474	486	512	-	-	-	-
400	426	450	474	-	489	495	514	546	543	572	-	-	-	-
450	480	506	-	-	539	555	-	571	-	-	-	-	-	-
500	530	560	588	-	594	617	624	628	657	704	-	-	-	-
600	630	664	700	-	695	734	731	747	764	813	-	-	-	-
700	730	770	812	-	810	804	833	852	879	950	-	-	-	-
800	830	876	886	-	917	911	942	974	988	-	-	-	-	-
900	930	982	994	-	1017	1011	1042	1084	1108	-	-	-	-	-
1000	1040	1098	1110	-	1124	1128	1154	1194	1220	-	-	-	-	-
1200	1250	1320	1334	-	1341	1342	1364	1398	1452	-	-	-	-	-
1400	1440	1522	-	-	1548	1542	1578	1618	-	-	-	-	-	-
1600	1650	1742	-	-	1772	1764	1798	1830	-	-	-	-	-	-
1800	1850	1914	-	-	1972	1964	2000	-	-	-	-	-	-	-
2000	2050	2120	-	-	2182	2168	2230	-	-	-	-	-	-	-
2200	2250	2328	-	-	2384	2378	-	-	-	-	-	-	-	-
2400	2460	2512	-	-	2594	-	-	-	-	-	-	-	-	-
2600	2670	2728	-	-	2794	-	-	-	-	-	-	-	-	-
2800	2890	2952	-	-	3014	-	-	-	-	-	-	-	-	-
3000	3100	3166	-	-	3228	-	-	-	-	-	-	-	-	-

### GENERAL NOTES

Diameter tolerances for Table 1. Up to DN 1000: OD  $\pm 0.4$ mm, ID  $\pm 0.4$  mm/ $\pm 0$ . Above DN 1000: OD  $\pm 1.0$ mm, ID  $\pm 1.0$  mm/ $\pm 0$

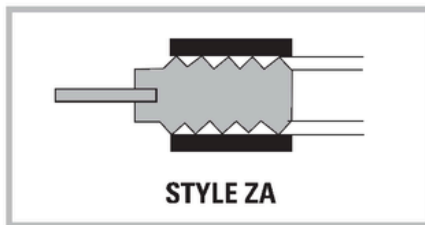
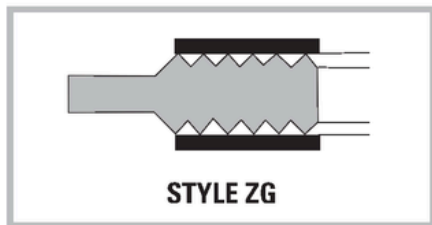
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# DIMENSIONAL DATA

## FLEXPRO™ KAMMPROFILES

ASME B16.20 Series A



NOMINAL BORE		SEALING INNER DIAMETER	SEALING OUTER DIAMETER	SEALING INNER DIAMETER	SEALING OUTER DIAMETER	SEALING INNER DIAMETER	SEALING OUTER DIAMETER	SEALING INNER DIAMETER	SEALING OUTER DIAMETER	SEALING INNER DIAMETER	SEALING OUTER DIAMETER	CENTERING RING OUTER DIAMETER				
INCHES	MM	150	150	300	300	400	400	600	600	900	900	150	300	400	600	900
26	650	673.1	704.9	685.8	736.6	685.8	736.6	685.8	736.6	685.8	736.6	774.7	835.2	831.9	866.9	882.7
28	700	723.9	755.7	736.6	787.4	736.6	787.4	736.6	787.4	736.6	787.4	831.9	898.7	892.3	914.4	946.2
30	750	774.7	806.5	793.8	844.6	793.8	844.6	793.8	844.6	793.8	844.6	882.7	952.5	946.2	971.6	1009.7
32	800	825.5	860.6	850.9	901.7	850.9	901.7	850.9	901.7	850.9	901.7	939.8	1006.6	1003.3	1022.4	1073.2
34	850	876.3	911.4	901.7	952.5	901.7	952.5	901.7	952.5	901.7	925.5	990.6	1057.4	1054.1	1073.2	1136.7
36	900	927.1	968.5	955.8	1006.6	955.8	1006.6	955.8	1006.6	958.9	1009.7	1047.8	1117.6	1117.6	1130.3	1200.2
38	950	977.9	1019.3	977.9	1016.0	971.6	1022.4	990.6	1041.4	1035.1	1085.9	1111.3	1054.1	1073.2	1104.9	1200.2
40	1000	1028.7	1070.1	1022.4	1070.1	1025.7	1076.5	1047.8	1098.6	1098.6	1149.4	1162.1	1114.6	1127.3	1155.7	1251.0
42	1050	1079.5	1124.0	1073.2	1120.9	1076.5	1127.3	1104.9	1155.7	1149.4	1200.2	1219.2	1165.4	1178.1	1219.2	1301.8
44	1100	1130.3	1178.1	1130.3	1181.1	1130.3	1181.1	1162.1	1212.9	1206.5	1257.3	1276.4	1219.2	1231.9	1270.0	1368.6
46	1150	1181.1	1228.9	1178.1	1228.9	1193.8	1244.6	1212.9	1263.7	1270.0	1320.8	1327.2	1273.3	1289.1	1327.2	1435.1
48	1200	1231.9	1279.7	1235.2	1286.0	1244.6	1295.4	1270.0	1320.8	1320.8	1371.6	1384.3	1324.1	1346.2	1390.7	1485.9
50	1250	1282.7	1333.5	1295.4	1346.2	1295.4	1346.2	1320.8	1371.6	Note (4)	Note (4)	1435.1	1378.0	1403.4	1447.8	Note (4)
52	1300	1333.5	1384.3	1346.2	1397.0	1346.2	1397.0	1371.6	1422.4	Note (4)	Note (4)	1492.3	1428.8	1454.2	1498.6	Note (4)
54	1350	1384.3	1435.1	1403.4	1454.2	1403.4	1454.2	1428.8	1479.6	Note (4)	Note (4)	1549.4	1492.3	1517.7	1555.8	Note (4)
56	1400	1435.1	1485.9	1454.2	1505.0	1454.2	1505.0	1479.6	1530.4	Note (4)	Note (4)	1606.6	1543.1	1568.5	1612.9	Note (4)
58	1450	1485.9	1536.7	1511.3	1562.1	1505.0	1555.8	1536.7	1587.5	Note (4)	Note (4)	1663.7	1593.9	1619.3	1663.7	Note (4)
60	1500	1536.7	1587.5	1562.1	1612.9	1568.5	1619.3	1593.9	1644.7	Note (4)	Note (4)	1714.5	1644.7	1682.8	1733.6	Note (4)

### GENERAL NOTES

Dimensions in mm. Tolerances in mm.

Figures stated are for information only. Please refer to the current version of the original standards for dimensional information.

### NOTES

1) Sealing ID Nom Bore 26 to 34 tolerances +/- 0.8mm and Nom Bore 36 to 60 +/- 1.5mm

2) Sealing OD Nom Bore 26 to 60 tolerances +/- 1.5mm

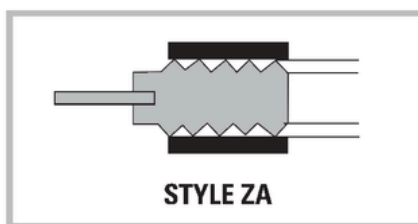
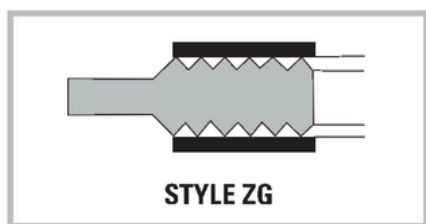
3) Centering Ring OD tolerances +/- 0.8mm

4) There is no Class 900 Flange in NPS 50 and above.



# DIMENSIONAL DATA

## FLEXPRO™ KAMMPROFILES ASME B16.20 Series B



NOMINAL BORE		SEALING INNER DIAMETER	SEALING OUTER DIAMETER	SEALING INNER DIAMETER	SEALING OUTER DIAMETER	SEALING INNER DIAMETER	SEALING OUTER DIAMETER	SEALING INNER DIAMETER	SEALING OUTER DIAMETER	SEALING INNER DIAMETER	SEALING OUTER DIAMETER	CENTERING RING OUTER DIAMETER				
INCHES	MM	150	150	300	300	400	400	600	600	900	900	150	300	400	600	900
26	650	673.1	698.5	673.1	711.2	666.8	698.5	663.7	714.5	692.2	749.3	725.4	771.7	746.3	765.3	838.2
28	700	723.9	749.3	723.9	762.0	714.5	749.3	704.9	755.7	743.0	800.1	776.2	825.5	800.1	819.2	901.7
30	750	774.7	800.1	774.7	812.8	765.3	806.5	778.0	828.8	806.5	857.3	827.0	886.0	857.3	879.6	958.9
32	800	825.5	850.9	825.5	863.6	812.8	860.6	831.9	882.7	863.6	914.4	881.1	939.8	911.4	933.5	1016.0
34	850	876.3	908.1	876.3	914.4	866.9	911.4	889.0	939.8	920.8	971.6	935.0	993.9	962.2	997.0	1073.2
36	900	927.1	958.9	927.1	965.2	917.7	965.2	939.8	990.6	946.2	997.0	987.6	1047.8	1022.4	1047.8	1124.0
38	950	974.9	1009.7	1009.7	1047.8	971.6	1022.4	990.6	1041.4	1035.1	1085.9	1044.7	1098.6	1073.2	1104.9	1200.2
40	1000	1022.4	1063.8	1060.5	1098.6	1025.7	1076.5	1047.8	1098.6	1098.6	1149.4	1095.5	1149.4	1127.3	1155.7	1251.0
42	1050	1079.5	1114.6	1111.3	1149.4	1076.5	1127.3	1104.9	1155.7	1149.4	1200.2	1146.3	1200.2	1178.1	1219.2	1301.8
44	1100	1124.0	1165.4	1162.1	1200.2	1130.3	1181.1	1162.1	1212.9	1206.5	1257.3	1197.1	1251.0	1231.9	1270.0	1368.6
46	1150	1181.1	1224.0	1216.2	1254.3	1193.8	1244.6	1212.9	1263.7	1270.0	1320.8	1255.8	1317.8	1289.1	1327.2	1435.1
48	1200	1231.9	1270.0	1263.7	1311.4	1244.6	1295.4	1270.0	1320.8	1320.8	1371.6	1306.6	1368.6	1346.2	1390.7	1485.9
50	1250	1282.7	1325.6	1317.8	1355.9	1295.4	1346.2	1320.8	1371.6	Note (4)	Note (4)	1357.4	1419.4	1403.4	1447.8	Note (4)
52	1300	1333.5	1376.4	1368.6	1406.7	1346.2	1397.0	1371.6	1422.4	Note (4)	Note (4)	1408.2	1470.2	1454.2	1498.6	Note (4)
54	1350	1384.3	1422.4	1403.4	1454.2	1403.4	1454.2	1428.8	1479.6	Note (4)	Note (4)	1463.8	1530.4	1517.7	1555.8	Note (4)
56	1400	1444.8	1478.0	1479.6	1524.0	1454.2	1505.0	1479.6	1530.4	Note (4)	Note (4)	1514.6	1593.9	1568.5	1612.9	Note (4)
58	1450	1500.6	1528.8	1535.2	1573.3	1505.0	1555.8	1536.7	1587.5	Note (4)	Note (4)	1579.6	1655.8	1619.3	1663.7	Note (4)
60	1500	1557.3	1586.0	1589.0	1630.4	1568.5	1619.3	1593.9	1644.7	Note (4)	Note (4)	1630.4	1706.6	1682.8	1733.6	Note (4)

### GENERAL NOTES

Dimensions in mm. Tolerances in mm.

Figures stated are for information only. Please refer to the current version of the original standards for dimensional information.

### NOTES

1) Sealing ID Nom Bore 26 to 34 tolerances +/- 0.8mm and Nom Bore 36 to 60 +/- 1.5mm

2) Sealing OD Nom Bore 26 to 60 tolerances +/- 1.5mm

3) Centering Ring OD tolerances +/- 0.8mm

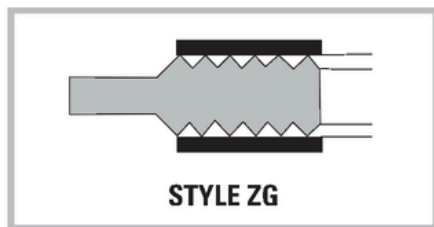
4) There are no Class 900 flanges NPS 50" and above.



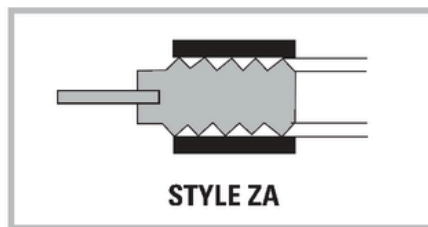
# DIMENSIONAL DATA

## FLEXPRO™ KAMMPROFILES

EN 12560-6



STYLE ZG



STYLE ZA

NOMINAL PIPE SIZE		SEALING ELEMENT		CENTERING RING OUTER DIAMETER						
INCHES	MM	INNER DIAMETER	OUTER DIAMETER	150 Class	300 Class	400 Class	600 Class	900 Class	1500 Class	2500 Class
1/2	15	23.0	33.3	44.4	50.8	50.8	50.8	60.3	60.3	66.7
3/4	20	28.6	39.7	53.9	63.5	63.5	63.5	66.7	66.7	73.0
1	25	36.5	47.6	63.5	69.8	69.8	69.8	76.2	76.2	82.5
1 1/4	32	44.4	60.3	73.0	79.4	79.4	79.4	85.7	85.7	101.6
1 1/2	40	52.4	69.8	82.5	92.1	92.1	92.1	95.2	95.2	114.3
2	50	69.8	88.9	101.6	108.0	108.0	108.0	139.7	139.7	142.8
2 1/2	65	82.5	101.6	120.6	127.0	127.0	127.0	161.9	161.9	165.1
3	80	98.4	123.8	133.4	146.1	146.1	146.1	165.1	171.5	193.7
3 1/2	90	111.1	136.5	158.8	161.9	158.7	158.7	-	-	-
4	100	123.8	154.0	171.5	177.8	174.6	190.5	203.2	206.4	231.7
5	125	150.8	182.6	193.7	212.7	209.5	238.1	244.5	250.8	276.2
6	150	177.8	212.7	219.1	247.7	244.5	263.5	285.8	279.4	314.3
8	200	228.6	266.7	276.2	304.8	301.6	317.5	355.6	349.3	384.1
10	250	282.6	320.7	336.5	358.8	355.6	396.9	431.8	431.8	473.0
12	300	339.7	377.8	406.4	419.1	415.9	454.0	495.3	517.5	546.1
14	350	371.5	409.6	447.7	482.6	479.4	488.9	517.5	574.7	-
16	400	422.3	466.7	511.2	536.6	533.4	561.9	571.5	638.1	-
18	450	479.4	530.2	546.1	593.7	590.5	609.6	635.0	701.7	-
20	500	530.2	581.0	603.2	650.9	644.5	679.5	695.3	752.4	-
22	550	581.0	631.8	657.2	701.7	698.5	730.3	-	-	-
24	600	631.8	682.6	714.4	771.5	765.2	787.4	835.0	898.5	-

### GENERAL NOTES

Diameter tolerances:

Up to 1000mm OD +0/-0.4mm

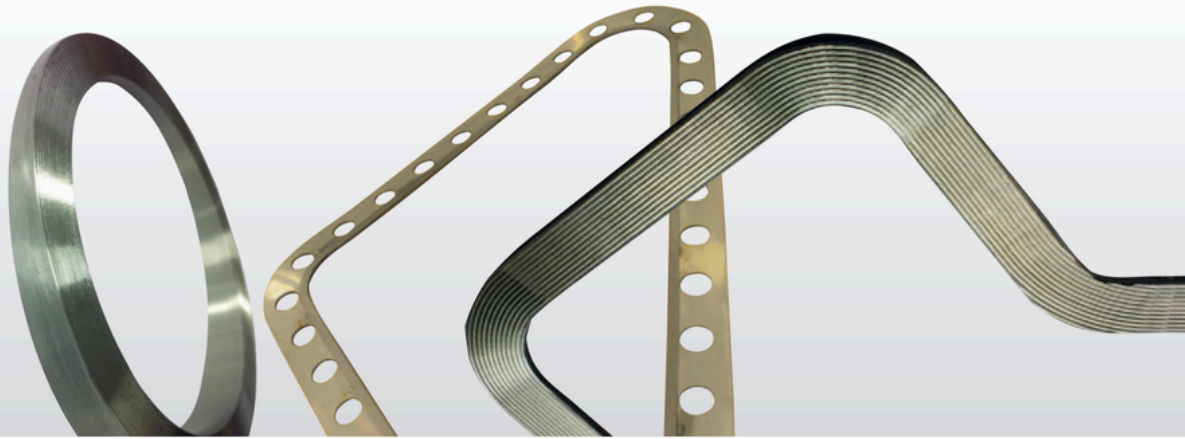
ID +0.4mm/-0

Above 1000mm OD +0/-0.1mm

ID +1.0mm/-0



## HYBRID AND SPECIAL DESIGNS

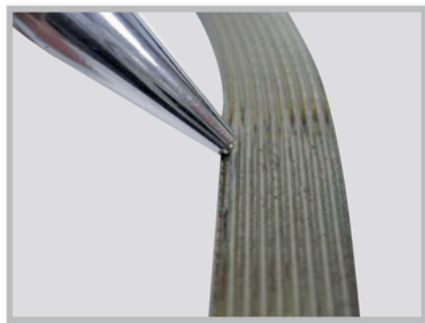


### Standard Flexpro™ Design Profile

Whenever possible Flexitallic recommend the use of a single piece construction serrated core (no welds), however, in many instances the size of gasket required is larger than the standard commercially available sheet material. In these instances, strip material is ring rolled and welded together using the minimum number of welds possible. Flexitallic ensure that the ends of the ring-rolled metal strip are carefully aligned, both vertically and horizontally, before full penetration fusion welding. This process eliminates any potential leakage paths in the weld location and minimises the heat affected zone.

After careful dressing of the weld concentric serrations are machined on the ring. This eliminates any potential high and/or low spots in the weld area.

Lower cost manufacturing routes involving ring-rolling and welding of pre-serrated metal strip, can result in the integrity of the gasket being compromised (leakage paths at weld locations).



*Flexitallic processes eliminate potential leakage paths at weld location.*

### Serration Profiles

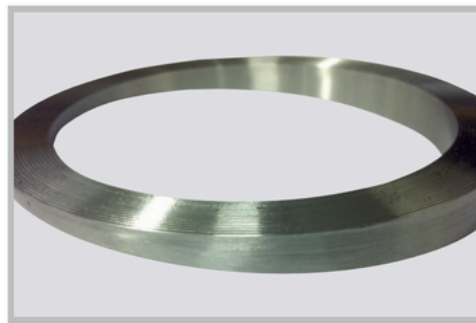
Flexitallic can manufacture Flexpro™ gaskets with various serration profiles. The standard Flexitallic shallow profile has been designed to effect a high integrity seal when covered with any one of a range of facing materials and thicknesses. Other serration profiles as defined by different international or customer standards are available.

### Special Shapes

Flexitallic have designed and built a number of serration profiling machine tools that provide the capability of machining complex shapes while maintaining the concentric serrations on the sealing faces. These shapes can include oval, obround, rectangular and irregular shapes which are often required for manholes, special access door seals and fin fan cooler box covers. The Flexpro™ core can be supplied in a wide range of thicknesses from 2.0mm upwards.

The Flexpro™ design is especially suited for use in connections with narrow radial widths commonly found in fin fan plug gaskets and other applications where space is limited such as floating head and valve body and bonnet locations.

In addition to complex shapes, Flexitallic have successfully provided Flexpro™ kammprofile gaskets for use on misaligned flanged connections. These 'wedge' shaped gasket are machined to meet a specific misalignment angle.



*Special shapes.*

### Pass Bars

The Flexpro™ kammprofile section is commonly supplied in pass bar form and incorporated into the tube side of multi-pass heat exchanger gaskets.

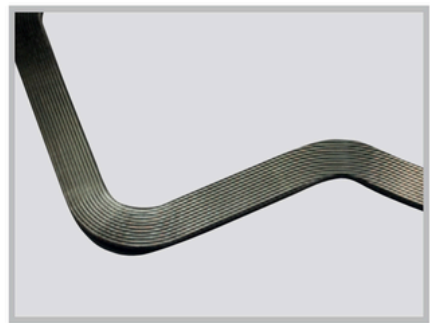
### Hybrid Designs

For difficult sealing applications, hybrid technology can be applied to provide a high integrity assembly. Flexitallic can provide sealing solutions where Flexpro™ sealing technology is combined with other gasket styles such as spiral wound and Change gaskets. The metal core of the Flexpro™ section of the gasket provides additional seal integrity, compression limitation and rigidity.

For difficult and special applications please contact the Flexitallic Applications Engineering team.

### Re-Facing Flexpro™ Gaskets

Typically a gasket is used only once, however, when using large diameter or expensive core material it may be cost effective to re-face and re-use the Flexpro™ gasket. This service can be provided by Flexitallic or undertaken on site by suitable personnel following appropriate training.



*Special shapes.*



## SUPERIOR PERFORMANCE BY DESIGN



### WHY FLEXPRO™ KAMMPROFILE GASKETS?

<b>Proven Design</b>	Many years of proven success in sealing difficult applications.
<b>Superior Sealing Tightness and Safety</b>	Correct material selection provides longer service life, no need to 'hot torque', reduced emissions and reduced maintenance requirements.
<b>Low Seating Stress</b>	Ideal for light flanges with limited bolt load, as well as highly loaded flanges.
<b>Different Shapes</b>	Flexitallic production methods provide the capability of manufacturing a wide range of sizes in circular and non-circular shapes to suit a wide range of flange types.
<b>Wide Range of Materials</b>	Flexpro™ gasket metal cores and soft facings are selected from a wide range of materials to suit specific applications.
<b>Wide Pressure Range</b>	Suitable for use on all standard flange pressure classes and norms.
<b>Wide Temperature Range</b>	Suitable for use in cryogenic service up to 1000°C
<b>Conformable Sealing Surfaces</b>	The soft conformable sealing faces of the Flexpro™ gaskets, are more tolerant to smooth and or damaged flange sealing faces.
<b>Reproducible Construction</b>	The Flexitallic manufacturing processes provide a highly repeatable process from one manufacturing batch to another.
<b>Easy to Handle and Install</b>	The rigid and stable core of the Flexpro™ gasket facilitates easy handling and installation, with reduced risk of damage to the gasket.
<b>Fire Safe</b>	Material specific, Flexpro™ gaskets are API-6FB Fire Safe.
<b>Re-usable</b>	Flexpro™ gaskets can be re-faced and re-used.
<b>Replaces Double Jacketed Gaskets</b>	Flexpro™ gaskets are a direct replacement for double jacketed gaskets. Note: Where Nubbins (stress raisers) are present, please check with Flexitallic Applications Engineering Team.
<b>Space Limitations</b>	Flexpro™ gaskets can be manufactured with narrow seal land widths
<b>Cost Effective</b>	Longer service life, less maintenance, reduced emissions.





# FLOW ENGINEERING AND SERVICE CO.,LTD.

## บริษัท โฟลว์ เอ็นจิเนียริง แอนด์ เซอร์วิส จำกัด

55/89 หมู่ที่ 5 ต.ทับมา อ.เมืองระยอง จ.ระยอง 21000



### ABOUT US

### WHO WE ARE

บริษัท โฟลว์ เอ็นจิเนียริง แอนด์ เซอร์วิส จำกัด (Flow Engineering and Service Co.,Ltd.) ดำเนินธุรกิจเกี่ยวกับการจำหน่ายผลิตภัณฑ์ซีลและปะเก็นต่างๆ. บริษัทก่อตั้งขึ้นเมื่อวันที่ 28 พฤษภาคม 2558

HAVE A GOOD

VISION AND MISSION

You've got what you need

ความมุ่งมั่นในการให้บริการลูกค้าด้วย  
ผลิตภัณฑ์ที่ลูกค้าต้องการ

ผลิตภัณฑ์และบริการของบริษัทฯ จำหน่ายผลิตภัณฑ์ซีลและปะเก็นหลากหลายชนิด, โอริงและชุดคิก, ซีลประเภทต่างๆ เช่น Oil Seal, V-Ring, Gamma Seal, Hydraulic Seal, Pneumatic Seal, ซีลกลึงตามแบบ (Machined Seal) ,ท่องานอุตสาหกรรม(Food Hose), และชิ้นส่วนยางสั่งทำพิเศษ (Custom Rubber Parts) ให้บริการ ด้วย ประสบการณ์มากกว่า 10 ปี



*Flexitallic*

บริษัท โฟลว์ เอ็นจิเนียริง แอนด์ เซอร์วิส จำกัด

ได้รับการแต่งตั้งให้เป็นตัวแทนจำหน่ายอย่างเป็นทางการในประเทศไทยโดย Flexitallic Thailand