

SERRATED METAL GASKETS



INNOVATION FOR THE TOP OF THE TECHNOLOGY



KUKIL INNTOT CO., LTD.



지정 제139호
인증 제82호

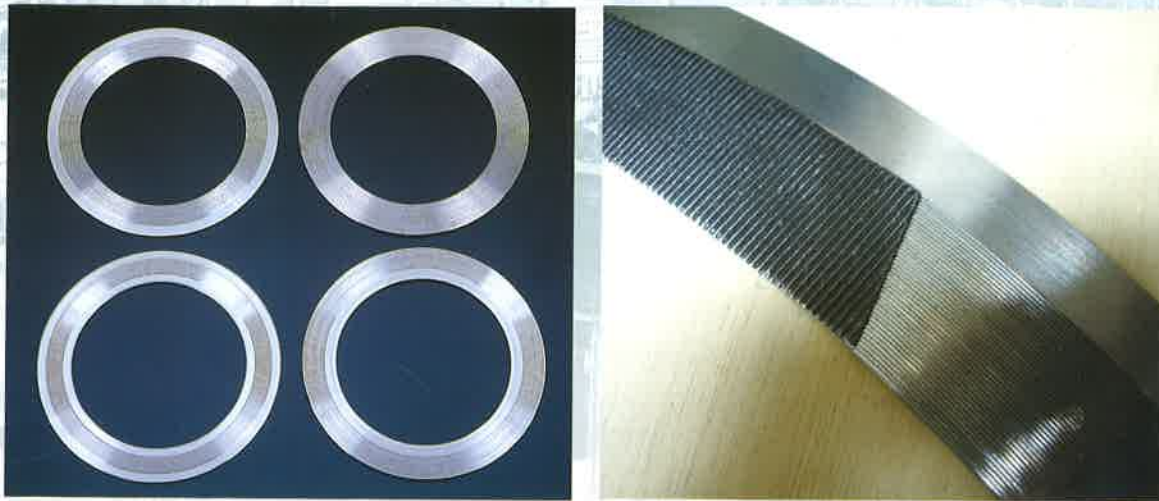


제UG-033호
KPS M 2017



GASKET, PACKING, COUPLING

KUKIL INNTOT SERRATED METAL GASKET-



1. DESCRIPTION

The Serrated Metal Gasket offers a safe, effective seal under the most severe operating conditions on both standard pipe work and special applications.

The Serrated Metal Gasket offers excellent flexibility and recovery characteristics, allowing seal integrity under pressure and temperature fluctuations, temperature differential across the flange face, flange rotation, bolt stress relaxation and creep.

The Serrated Metal Gasket is a two part assembly, consisting of a precision serrated metal core with the addition of soft sealing materials bonded to each face.

The soft gasket sealing material provides initial low stress gasket seating, while the serrated geometry of the metallic core enhances sealing performance by means of inducing stress concentration on the sealing layers, containing these sealing faces within the radial grooves. This minimizes lateral flow and ensures the applied load is confined upon the gasket sealing faces.

A further function of the metallic core is to provide exceptional gasket rigidity and blow out resistance, as well as offering an integral compression stop.

The Serrated Metal Gaskets are suitable for Class 150 to 2500 service.

As standard, graphite is the preferred sealing face material, due to its excellent stability and flow characteristics. Other facing materials available are PTFE, silver and soft materials. The metallic core must be selected to suit the application design conditions and the media to be sealed, with both chemical resistance properties and temperature stability characteristics taken into account.

A full range of metallic core materials are available, from the relatively low cost carbon steels, through the range of stainless steels up to the other alloys.

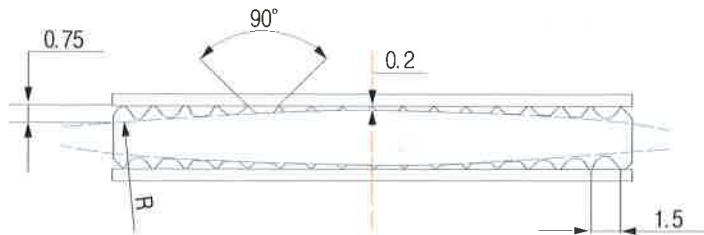
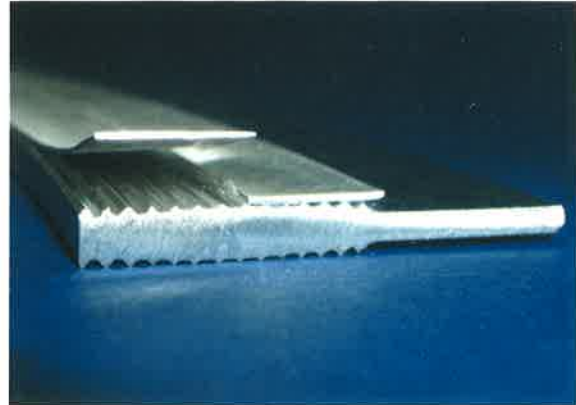
For a full listing, please refer to the table (Maximum Service Temperature) below.

The Serrated Metal Gaskets are available for non standard flange applications such as heat exchangers, pumps, and valves. For heat exchanger applications, The Serrated Metal Gaskets can be designed to suit male and female flange arrangements as well as tongue and groove flanges requiring any type of pass bar configuration.

2. "CONVEX" TYPE

KUKIL "CV" is "Convex" Serrated Metal gasket.
 The tops of grooves have the same parallel plane.
 The bottoms of the grooves, however, follow a convex root form.

Therefore the soft sealing covering layers of plastically moldable material form a thicker padding in the middle of the profile the specific contact pressure is highest and causes a localized extraordinary good flow of the sealing covering layers into the unavoidable unevenness and roughness of the flange surfaces.



3. APPLICATIONS

- Accommodates standard ASME flanges as well as weaker and non-circular flanges
- Economical replacement for jacketed heat exchanger gaskets
- Seals less-than-perfect flanges
- Handles pressures from vacuum to Class 2500
- Withstands temperatures from cryogenics to 2000°F (1090°C)

4. SERRATED METALLIC CORE

- Serrations concentrate bolt load on small area for tight seal at lower stress
- Solid metal core resists cold flow, over compression and blowout
- Rigid core provides exceptional stability, even in large sizes, and facilitates handling and installation

◆ MAXIMUM SERVICE TEMPERATURE

UNIT: °C

Material	Temperature
Soft iron	+500
5Cr-0.5Mo	+650
SS 304	+550
SS 316	+550
SS 316L	+550
SS 321	+550
SS 347	+550
Aluminum	+300

Material	Temperature
Copper	+300
Monel	+600
Nickel	+600
Titanium	+1090
Inconel 600	+600
Incoloy 800	+850
Hastelloy	+1090
Brass	+350

5. SOFT SEALING MATERIAL - LAYER

- Under compression, fills seating surface imperfections to form a tight, metal-to-metal connection
- Seals under low stress-ideal for weaker flanges
- Withstands extreme fluctuations in temperatures and pressures

The following table may be to determine the appropriate sealing layer material. Serrated Metal Gasket recommends the use of graphite layers for most applications. Only in cases where graphite may cause media pollution, or is not chemically resistant, an alternative layer material should be chosen.

Material	Max. Temperature [°C]	Max. Pressure [Kg/cm ²]
Graphite	650	250
PTFE	250	100
Non-Asbestos	200	100
Silver	750	250

Graphite

- Very Good Chemical resistance
- Resistance to high temperatures and pressures
- Excellent gas tightness qualities

PTFE

- Excellent chemical resistance
- Temperature resistant up to 250°C
- Good ageing resistance
- Excellent gas tightness qualities

Silver

- Silver is precious metal combining excellent gas tightness and chemical resistance properties. Generally used in applications requiring gas tightness at elevated temperature.

Non-Asbestos

- Aramid(Synthetic) fibre compounds with NBR binder and mineral fillers

6. GASKET FACTOR









The soft layer material of the serrated metal gasket determines the minimal required surface pressure.

Gasket Type	Material of Layer	m	y [psi]
C OC	PTFE	2.25	2,900
CI OCI	Graphite	2.25	2,900
RC CV	Non-Asbestos	2.25	5,800
OCV RCV	Silver	4.25	18,000

7. FLANGE SURFACE FINISH

The recommended flange surface finish for Serrated Metal Gasket with sealing layers is from 3.2 to 6.3 μmRa (125~250 RMS), also referred to as a smooth finish..

8. KUKIL STYLE

Cross - Section	Style No.
	Without Collar C
	With Outer Collar OC
	With Inner Collar CI
	With In & Outer Collar OCI
	With Outer Ring RC
	Convex Type - Without Collar CV
	Convex Type - With Outer Collar OCV
	Convex Type - With Outer Ring RCV

9. NOTATION OF PRODUCTS

SECTION STYLE	ATTACHMENT	MATERIAL OF METAL CORE / RING	SHAPE	HEAT EX. SHAPES	
C	None	Z	Soft Iron	D	See, Note 1
OC	Graphite	G	Low Carbon Steel	S	
CI	PTFE	P	Copper	C	
OCI	Non-Asbestos	N	Aluminium	A	
RC	Silver	S	Brass	B	
CV	Special Order	E	SS304	E	
OCV			SS304L	L	
RCV			SS316	G	
			SS316L	Q	
			SS321	J	
			SS347	K	
			SS410	V	
			SS430	U	
			5Cr-1/2Mo	F	
			Monel	M	
			Titanium	T	
			Hastelloy	H	
			Inconel	I	

◆ Example

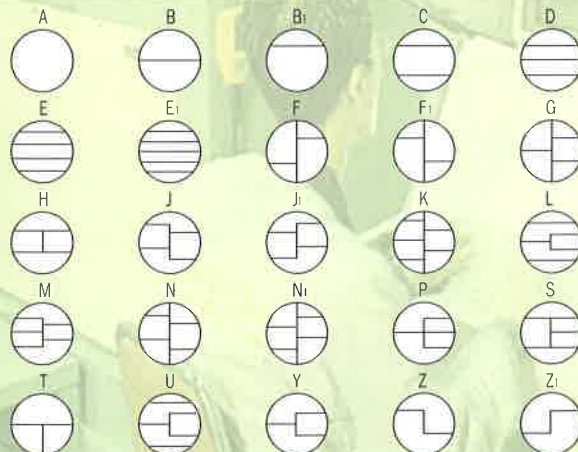
K/# CV-G-E-R-A

Type	Convex Type – Without Collar	CV
Attachment	Graphite	G
Material of Metal Core	SS304	E
Material of Metal Ring		
Shape	Round	R
Heat EX. Shape		A

K/# RC-G-JE-R-B

Type	With Outer Ring	RC
Attachment	Graphite	G
Material of Metal Core	SS321	J
Material of Metal Ring	SS304	E
Shape	Round	R
Heat EX. Shape		B

Note. 1 Heat Exchanger Shapes



GASKET FACTORS "m" & "y"

"m" and "y" data are to be used for flange designs only as specified in the ASME Boiler and Pressure Vessel Code Division 1, Section VIII, Appendix 2.

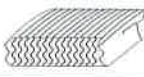



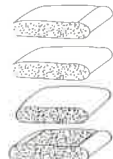





"m" - GASKET FACTOR

A factor that provides the additional preload needed in the flange fasteners to maintain the compressive load on a gasket after internal pressure is applied to a joint.

"y" - GASKET SEATING STRESS

Defined as the applied stress required to seat the gasket upon the flange faces. The actual required seating stress is a function of flange surface finish, gasket material, density, thickness, fluid to be sealed and allowable leak rate.

TABLE. 1

Gasket Type	Gasket Material	Gasket Design	Gasket Factor "m"	Min. Design Seating Stress "y" (psi)
Spiral wound gasket	with graphite filler		3.00	7,100
	non-asbestos & PTFE filler		3.00	10,000
	low stress type		3.00	5,000
Corrugated metal with filled & jacketed with filled gasket	Soft aluminum		2.50	2,900
	Soft copper or brass		2.75	3,700
	Iron or soft steel		3.00	4,500
	Monel or 4%-6% chrome		3.25	5,500
	Stainless steels & Nickel based alloys		3.50	6,500
Corrugated metal	Soft aluminum		2.75	3,700
	Soft copper or brass		3.00	4,500
	Iron or soft steel		3.25	5,500
	Monel or 4%-6% chrome		3.50	6,500
	Stainless steels & Nickel based alloys		3.75	7,600
VOC gasket	220CM		3.00	4,500
	220CME			
Flat metal jacketed with filled	Soft aluminum		3.25	5,500
	Soft copper or brass		3.50	6,500
	Iron or soft steel		3.75	7,600
	Monel		3.50	8,000
	4%-6% chrome		3.75	9,000
	Stainless steels & Nickel based alloys		3.75	9,000
Serrated metal	Soft aluminum		3.25	5,500
	Soft copper or brass		3.50	6,500
	Iron or soft steel		3.75	7,600
	Monel or 4%-6% chrome		3.75	9,000
	Stainless steels & Nickel based alloys	4.25	10,100	
	with graphite/PTFE layer		2.25	2,900
	with Silver layer		4.25	18,000
Hiflex metal gasket	G-10,11		3.75	9,000
	G-20,21,22,23			
Solid flat metal	Soft aluminum		4.00	8,800
	Soft copper or brass		4.75	13,000
	Iron or soft steel		5.50	18,000
	Monel or 4%-6% chrome		6.00	21,800
	Stainless steels & Nickel based alloys		6.50	26,000
Ring joint	Iron or soft steel		5.50	18,000
	Monel or 4%-6% chrome		6.00	21,800
	Stainless steels & Nickel based alloys		6.50	26,000

Notes: (1) When require customer, can manufacture by "y=10,000psi (Min design seating stress)" application.

(2) This Table gives a list of many commonly used gasket materials and contact facings with suggested design values of "m" and "y" that have generally proved satisfactory in actual service when using effective gasket width b given in Table 2. The design values and other details given in this Table are suggested only and are not mandatory.

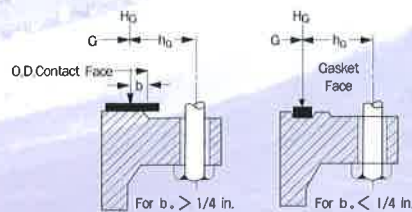
(3) The surface of a gasket having a lap should not be against the nubbin.

TABLE 2
EFFECTIVE GASKET WIDTH

Facing Sketch (Exaggerated)	Basic Gasket Seating Width, b_0	
	Column I	Column II
(la)	$\frac{N}{2}$	$\frac{N}{2}$
(lb)		
See Note(1)	$\frac{W+T}{2} : \left(\frac{W+N}{4} \text{ max.}\right)$	$\frac{W+T}{2} : \left(\frac{W+N}{4} \text{ max.}\right)$
(lc)		
(ld)	$\frac{W+N}{4}$	$\frac{w+3N}{8}$
(ld)		
(2)	$\frac{N}{4}$	$\frac{3N}{8}$
(3)		
(4)	$\frac{3N}{8}$	$\frac{7N}{16}$
(5)		
(6)	$\frac{W}{8}$	

Effective Gasket Seating Width, b
 $b = b_0$, when $b_0 \leq 1/4$ in.; $b = 0.5\sqrt{b_0}$, when $b_0 > 1/4$ in.

Location of Gasket Load Reaction



Notes:

- (1) Where serrations do not exceed 1/64 in. depth and 1/32 in. which spacing, sketches (lb) and (ld) shall be used.
- (2) The gasket factors listed only apply to flanged joints in which the gasket is contained entirely within the inner edges of the bolt holes.

TABLE. 3
GASKET SEATING SURFACE FINISHES

Gasket Description	Gasket Cross-Section	Flange Surface Finish μ'' -AARH
Flat-Non-Metallic(all materials)		500~750
Flat-Metallic	Solid 	63
	Graphite tape attached 	63~125
Corrugated metal		63
Corrugated metal with soft filler		125
Metal jacketed gaskets		63~80
Metal jacketed gasket		63~80
Solid metallic		63
Hollow metallic		32
Spiral wound "SEE NOTE"		80~500

Notes: This table gives a list of suggested surface finishes that have generally proven satisfactory in actual service. They are suggested only suggested and not mandatory: however, they are based upon the best cross-section of successful design experience currently available.

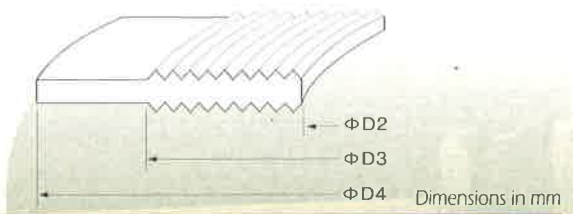
Notes: (1) Solid metal washer type gaskets require extremely high seating stresses to seal. If this is not possible it is preferred to use a profiled or serrated, special coating and graphite tape attached gasket to achieve the necessary seating load on the gasket.
 (2) · 150 and 300 psi: 500 AARH · 400 psi and above: 250 AARH
 · hot hydrogen hazardous materials and hard to hold fluids: 125 AARH · For vacuum Service: 80 AARH finish is recommended

SERRATED METAL GASKET DIMENSIONS

Standard Sizes

Serrated Metal Gasket with Outer Collar
for ANSI B16.5 Pipe Flanges.

KUKIL STYLE OC & OCV



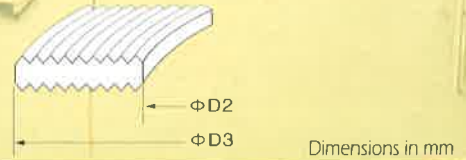
NPS	Φ D2	Φ D3	Φ D4						NPS
			150#	300#	600#	900#	1500#	2500#	
1/2"	23	33	48	54	54	63	64	70	1/2"
3/4"	29	40	57	67	67	69	70	76	3/4"
1"	37	48	67	73	73	79	80	86	1"
1 1/4"	44	60	76	83	83	88	89	105	1 1/4"
1 1/2"	52	70	86	95	95	98	99	118	1 1/2"
2"	70	89	105	111	111	142	143	146	2"
2 1/2"	83	102	124	130	130	165	165	168	2 1/2"
3"	98	124	137	149	149	168	175	197	3"
4"	124	154	175	181	194	207	210	235	4"
5"	151	183	197	216	241	248	254	279	5"
6"	178	213	222	251	267	289	283	318	6"
8"	229	267	279	308	321	359	353	387	8"
10"	283	321	340	362	400	435	435	476	10"
12"	340	378	410	422	457	499	521	549	12"
14"	372	410	451	486	492	521	578	-	14"
16"	422	467	514	540	565	575	641	-	16"
18"	479	530	549	597	613	638	705	-	18"
20"	530	581	607	654	683	699	756	-	20"
24"	632	683	718	775	791	838	902	-	24"

METAL CORE : 3.0 t, LAYER : 0.5 t

Standard Sizes

Serrated Metal Gasket without Collar
For ANSI B16.5 Pipe Flanges.

KUKIL STYLE C & CV



NPS	Large Male & Female				Large Tongue & Groove		Small Tongue & Groove		NPS
	Class 150 ~ 1500		Class 2500		Class 150 ~ 2500		Class 150 ~ 2500		
	Φ D2	Φ D3	Φ D2	Φ D3	Φ D2	Φ D3	Φ D2	Φ D3	
1/2"	25.4	35.1	20.6	35.1	25.4	35.1	25.4	35.1	1/2"
3/4"	33.3	42.9	27.0	42.9	33.3	42.9	33.3	42.9	3/4"
1"	38.1	50.8	31.8	50.8	38.1	50.8	38.1	47.8	1"
1 1/4"	47.6	63.5	41.3	63.5	47.8	63.5	47.8	57.2	1 1/4"
1 1/2"	54.0	73.2	47.6	73.2	53.8	73.2	53.8	63.5	1 1/2"
2"	73.0	91.9	60.3	91.9	73.2	91.9	73.2	82.6	2"
2 1/2"	85.7	104.6	76.2	104.6	85.9	104.6	85.9	95.3	2 1/2"
3"	108.0	127.0	95.3	127.0	108.0	127.0	108.0	117.3	3"
3 1/2"	120.7	139.7	-	-	120.7	139.7	120.7	130.0	3 1/2"
4"	131.8	157.2	120.7	157.2	131.8	157.2	131.8	144.5	4"
5"	160.3	185.7	146.1	185.7	160.3	185.7	160.3	173.0	5"
6"	190.5	215.9	171.5	215.9	190.5	215.9	190.5	203.2	6"
8"	238.1	269.7	222.3	269.7	238.3	269.7	238.3	254.0	8"
10"	285.8	323.9	273.1	323.9	285.8	323.9	285.8	304.8	10"
12"	342.9	381.0	330.2	381.0	342.9	381.0	342.9	362.0	12"
14"	374.7	412.8	-	-	374.7	412.8	374.7	393.7	14"
16"	425.5	469.9	-	-	425.5	469.9	425.5	447.5	16"
18"	489.0	533.4	-	-	489.0	533.4	489.0	511.0	18"
20"	533.4	584.2	-	-	533.4	584.2	533.4	558.8	20"
24"	641.4	692.2	-	-	641.4	692.2	641.4	666.8	24"

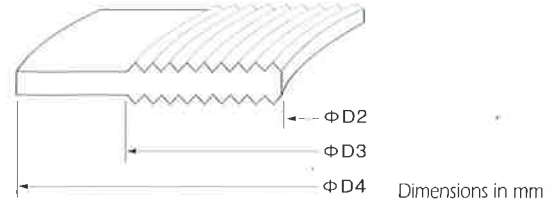
METAL CORE : 3.0 t, LAYER : 0.5 t

KUKIL INVTOT SERRATED METAL GASKET-

Standard Sizes

Serrated Metal Gasket with Outer Collar
for KS / JIS Pipe Flanges.

KUKIL STYLE OC & OCV



NPS	10 Kg _f /cm ²			16 & 20 Kg _f /cm ²			40 Kg _f /cm ²			63 Kg _f /cm ²			NPS
	Φ D2	Φ D3	Φ D4	Φ D2	Φ D3	Φ D4	Φ D2	Φ D3	Φ D4	Φ D2	Φ D3	Φ D4	
10A	36	46	52	36	46	52	25	35	59	25	35	64	10A
15A	41	51	57	41	51	57	32	42	64	32	42	69	15A
20A	46	56	62	46	56	62	40	50	69	40	50	76	20A
25A	54	67	74	54	67	74	47	60	79	47	60	81	25A
32A	60	76	84	60	76	84	52	68	89	52	68	90	32A
40A	62	81	89	62	81	89	56	75	100	56	75	107	40A
50A	77	96	104	77	96	104	71	90	114	71	90	125	50A
65A	97	116	124	97	116	124	86	105	140	86	105	152	65A
80A	107	126	134	113	132	140	101	120	150	101	120	162	80A
90A	110	136	144	119	145	150	104	130	162	104	130	179	90A
100A	125	151	159	134	160	165	119	145	182	119	145	194	100A
125A	156	182	190	169	195	202	144	170	224	144	170	236	125A
150A	186	212	220	204	230	237	179	205	266	179	205	276	150A
175A	205	237	245	—	—	—	—	—	—	—	—	—	175A
200A	230	262	270	243	275	282	228	260	316	228	260	327	200A
225A	250	282	290	—	—	—	—	—	—	—	—	—	225A
250A	286	324	332	307	345	354	277	315	377	277	315	394	250A
300A	330	368	377	357	395	404	337	375	434	337	375	446	300A
350A	375	413	422	402	440	451	377	415	479	377	415	488	350A
400A	431	475	484	451	495	510	421	465	531	421	465	545	400A
450A	486	530	539	516	560	573	—	—	—	—	—	—	450A
500A	535	585	584	565	615	627	—	—	—	—	—	—	500A
550A	590	640	650	620	670	684	—	—	—	—	—	—	550A
600A	640	690	700	670	720	734	—	—	—	—	—	—	600A

METAL CORE : 3.0 t , LAYER : 0.5 t

KOREA NANO & SEAL INDUSTRY INSTITUTE

KUKIL INNTOT Co., Ltd. established "Korea Seal Industry Institute" in 1999 for the best technology development and client-satisfaction. In 2004, we have changed the name to "Korea Nano & Seal Industry Institute".

Based on the best technology and know-how, all members in our company try most hard to have a thorough grasp of the problem and solve it completely. Which is shown by the fact that our company has applied first in the country "GASKET LEAKAGE TESTING MACHINE [150ton] - COMPRESSIBILITY, RECOVERY, SPRING BACK" for performance test and quality improvement of the gasket. And also we have various test equipment such as "UNIVERSAL TESTING M/C", "GASKET VIBRATION TESTER M/C", "VOC CYCLING TESTER M/C", "HELITEST" and so on.



QUALIFICATION

- 1994. API SPEC.Q1 & API SPEC.6A(License NO.6A-0357), ISO 9002
- 2000. Acquired an ISO 9001 Authentication





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KUKIL INNTOT is a professional manufacturer of gasket, packing, coupling and cleaning system with the latest technology not only for the plant but also the plant maintenance and emergency repair.

• 본 사

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