



AIGI ENVIRONMENTAL INC.

A Subsidiary of AIGI Group

Seal Machining Technology • Hydraulic & Rotary Seal • Pipeline Connection

★ *INTERNATIONALLY PATENTED* ★

AIGI Fishbone Gaskets

**THE FUTURE OF
HIGH PERFORMANCE SEALING
HAS ARRIVED**

Patented **FISHBONE™**





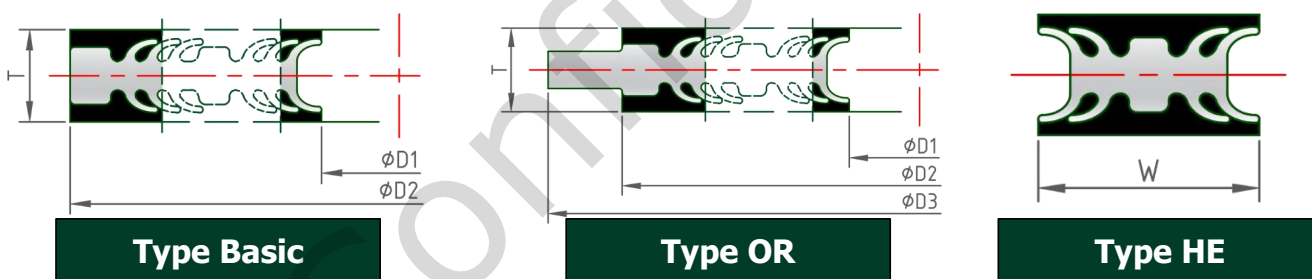
● **Features**

- * High recovery rate, high compression, at the same time, high strength;
- * Fishbone ribs bevelled to pressure, to create several closed self-sealing units;
- * Rounded, non-sharp contact surface;
- * Unique stop-step design, prevents over-compression;
- * Interchangeable with all spiral wound gaskets and Kammprofiles;

● **Applications**

- * Pipeline
- * Compression container
- * Heat exchanger
- * Valve
- * Christmas tree

● **Fishbone Gasket Types**



● **Typical Physical Properties**

Max.Pressure		420Bar
Compression	ASTM F36	≥ 12
Tensile Strenght	Metal part	≥ 520
Recovery Rate	ASTM F36	15~21%
m		2.5
y		50MPa

● Parameters

* Crushing Pressure

Test Item	Fishbone Gasket 22.5mm Width, 4.5mm thick	Spiral Wound Gasket 22.5mm Width, 4.5mm thick
Crushing Pressure	>205MPa	54 MPa



* Leakage rates(VDI Guideline 2440 & VDI Guideline 2200)

Test Item	1 bar absolute	40 bar overpressure
Leakage Rate (mbar*I)/(s*m)	1.8×10^{-9}	1.6×10^{-8}

The fishbone Gasket is considered to be of high grade performance according to TA-Luft.

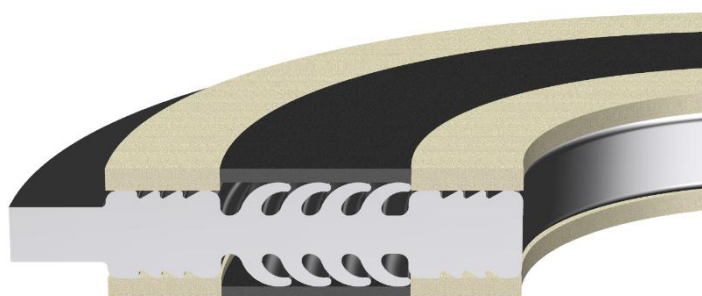
* Chevron Fugitive Emissions Test

Thermal Cycle Number	Leakage Readings (PPMv)				Flange Temperatures	
	Ambient Temp.		500 deg F Temp.		Heated	Other
	Avg.	Max.	Avg.	Max.	(deg F)	(deg F)
Start	1	1	11	12	500	473
1	10	15	10	11	500	474
2	2	2	8	8	500	457
3	6	7	3	3	499	458
4	3	3	6	6	500	441
5	11	13				
Averages ->	5	7	8	8	500	461
Maximums ->	11	15	11	12	500	474

● More Fishbone Gasket Designs

● MG Fishbone

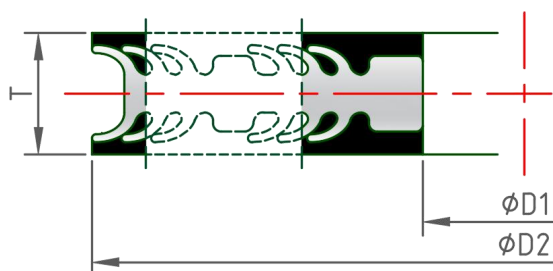
- * Gas application, temperature over 550°C.
- * Combined Mica and H.T Graphite as Fishbone Filler.
- * Mica filler sits at the inner and outer edge, to protect H.T.Graphite and avoid of graphite extrusion.
- * Min. Sealing element width is 12mm.



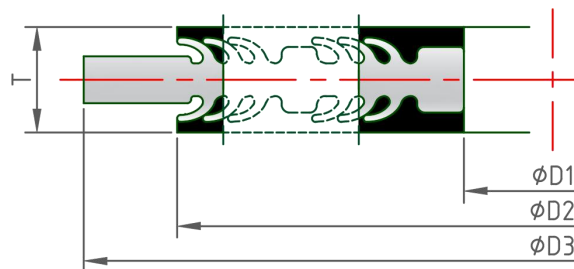
Type MG

● EX/IEX Fishbone: where internal pressure exists.

* Application: Only external pressure exists, such as Vacuum.

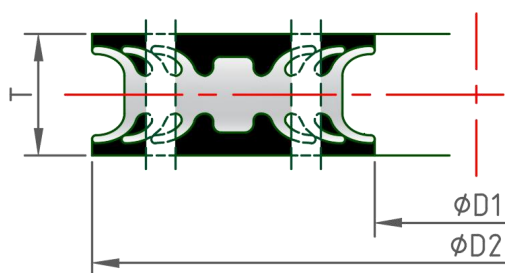


Type EX Basic

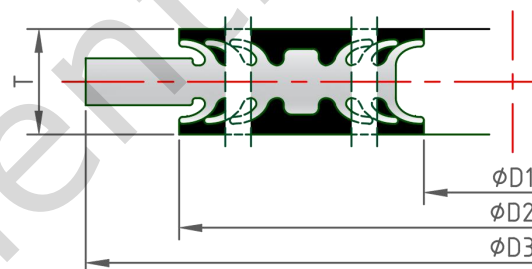


Type EX OR

* Application: Both external and internal pressure exists, prevent internal & external media contacting.



Type IEX Basic



Type IEX OR

● Tolerance

Gasket Diameter	Outside Diameter	Inside Diameter
$\leq 600\text{mm}$	$-0.5 \sim 0$	$0 \sim +0.5$
$\leq 1500\text{mm}$	$-0.8 \sim 0$	$0 \sim +0.8$
$\leq 2400\text{mm}$	$-1.2 \sim 0$	$0 \sim +1.2$

* Other Standard Tolerance Capabilities please contact: egc@environmentalgasket.com.

● Standard

AIGI Environmental Inc. manufactured Fishbone gasket is in accordance with all relevant international gasket standards like:

ASME B16.20 ASME B16.47 SERIES B (API 605) ASME B16.47 SERIES A (MSS-SP 44) HG/T20632

BS1560 BS10 BSEN1092 (BS 4504) DIN FLANGES JIS FLANGES FRENCH NFS TANDARDSTANDARD

* Download Fishbone Standard size at www.aigienviromental.com



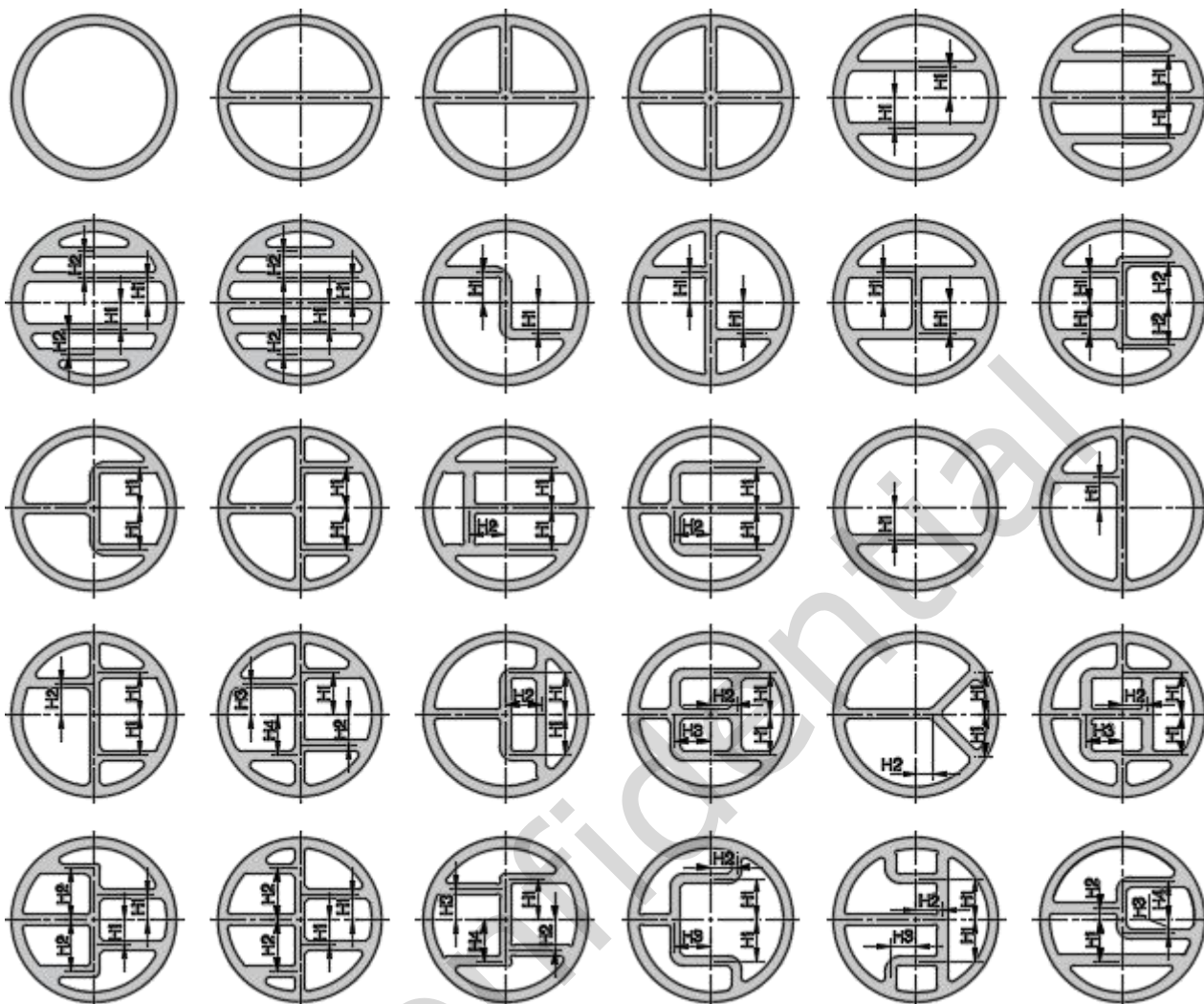
● Fishbone Gasket Materials

Standard Material					
Metal Part	Minimum °C	Maximum °C	Filler	Minimum °C	Maximum °C
304	-195°C	600°C	Graphite	-212°C	400°C
304L	-195°C	600°C	PTFE	-240°C	260°C
316	-100°C	600°C	H.T.GR	-250°C	550°C
316L	-100°C	600°C	ePTFE	-240°C	260°C
321	-195°C	760°C			
Non-Standard Material					
Metal Part	Minimum °C		Maximum °C		
316Ti	-100°C		760°C		
317L	-100°C		760°C		
347	-195°C		900°C		
310S (2520)	-195°C		1000°C		
904L	-195°C		1200°C		
724L (316L MOD)	-100°C		600°C		
S31803 (2205)	-100°C		300°C		
S32750 (2507)	-100°C		300°C		
725LN (25-22-2、2RE69)	-100°C		600°C		
Alloy 20 (20Cb-3)	-185°C		760°C		
HASTELLOY B 2	-185°C		1090°C		
HASTELLOY C 276	-185°C		1090°C		
MONEL 400	-130°C		820°C		
INCOLOY 800	-100°C		870°C		
INCOLOY 825	-100°C		870°C		
INCONEL 600	-100°C		1090°C		
INCONEL 625	-100°C		1090°C		
INCONEL X750	-100°C		1090°C		
Nickel 200	-195°C		760°C		
TA1	-195°C		1090°C		
TA2	-195°C		1090°C		
R60702	-100°C		1090°C		
Filler	Minimum °C		Maximum °C		
Mica	-212°C		1000°C		
MG(Mica/H.T.GR)	-212°C		700°C		
FDA ePTFE	-240°C		260°C		

* For other material please contact us at: info@aigienviroental.com



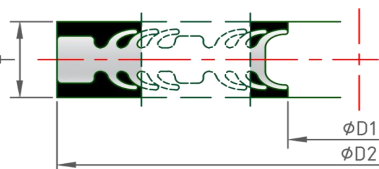
● *Heat Exchanger Fishbone Gaskets*



* For more Heat Exchanger Fishbone Gasket type, please contact us at: info@aigienviroental.com.



AIGI Fishbone Gasket™



TYPE Basic to suit TG (Tongue and Groove), ASME B16.5 Flanges

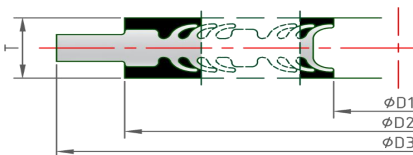
NPS	CL150-300-400		CL600		CL900		CL1500		CL2500	
	D1	D2	D1	D2	D1	D2	D1	D2	D1	D2
	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)
1/2" (15)	25.4	36	25.4	36	25.4	36	25.4	36	25.4	36
3/4" (20)	33.3	43.9	33.3	43.9	33.3	43.9	33.3	43.9	33.3	43.9
1" (25)	38.1	51.9	38.1	51.9	38.1	51.9	38.1	51.9	38.1	51.9
1 1/4" (32)	47.7	64.5	47.7	64.5	47.7	64.5	47.7	64.5	47.7	64.5
1 1/2" (40)	54.1	74	54.1	74	54.1	74	54.1	74	54.1	74
2" (50)	73.2	93	73.2	93	73.2	93	73.2	93	73.2	93
2 1/2" (65)	85.9	105.7	85.9	105.7	85.9	105.7	85.9	105.7	85.9	105.7
3" (80)	108.1	127.9	108.1	127.9	108.1	127.9	108.1	127.9	108.1	127.9
3 1/2" (90)	120.7	140.5	120.7	140.5						
4" (100)	132	158	132	158	132	158	160.5	186.5	160.5	186.5
5" (125)	160.5	186.5	160.5	186.5	160.5	186.5	190.7	216.7	190.7	216.7
6" (150)	190.7	216.7	190.7	216.7	190.7	216.7	238.3	271.7	238.3	271.7
8" (200)	238.3	271.7	238.3	271.7	238.3	271.7	286.1	324.5	286.1	324.5
10" (250)	286.1	324.5	286.1	324.5	286.1	324.5	343.3	381.7	343.3	381.7
12" (300)	343.3	381.7	343.3	381.7	343.3	381.7	375	413.4	375	413.4
14" (350)	375	413.4	375	413.4	375	413.4	425.9	470.5		
16" (400)	425.9	470.5	425.9	470.5	425.9	470.5	489.4	534		
18" (450)	489.4	534	489.4	534	489.4	534	533.8	584.8		
20" (500)	533.8	584.8	533.8	584.8	533.8	584.8	641.9	692.7		
24" (600)	641.9	692.7	641.9	692.7	641.9	692.7	25.4	36		

TYPE Basic to suit MFM (Male-Female), ASME B16.5 Flanges

NPS	CL150-300-400		CL600		CL900		CL1500		CL2500	
	D1	D2	D1	D2	D1	D2	D1	D2	D1	D2
	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)
1/2" (15)	23	36	23	36	23	36	22	36	19	36
3/4" (20)	29	43	29	43	29	43	28	43	22	43
1" (25)	36	51	36	51	36	51	35	51	29	51
1 1/4" (32)	46	64	46	64	46	64	44	64	39	64
1 1/2" (40)	53	74	53	74	53	74	51	74	47	74
2" (50)	69	93	69	93	69	93	67	93	64	93
2 1/2" (65)	80	105	80	105	80	105	79	105	76	105
3" (80)	101	127	101	127	101	127	98	127		
3 1/2" (90)	113	140	113	140					96	127
4" (100)	129	158	129	158	129	158	125	158	122	158
5" (125)	157	186	157	186	157	186	153	186	150	186
6" (150)	187	216	187	216	187	216	180	216	174	216
8" (200)	238	271	238	271	238	271	235	271	222	271
10" (250)	288	324	288	324	288	324	281	324	269	324
12" (300)	343	381	343	381	343	381	338	381	321	381
14" (350)	373	413	373	413	373	413	368	413		
16" (400)	425	470	425	470	425	470	420	470		
18" (450)	489	534	489	534	489	534	483	534		
20" (500)	534	584	534	584	534	584	524	584		
24" (600)	642	692	642	692	642	692	627	692		



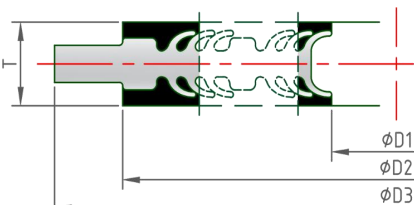
AIGI Fishbone Gasket™



TYPE OR to suit FF & RF, ASME B16.5 Flanges

NPS	CL150			CL300			CL400		
	D1	D2	D3	D1	D2	D3	D1	D2	D3
	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)
1/2" (15)	23	33	46	23	34	52	23	34	52
3/4" (20)	29	40	55	29	42.5	65	29	42.5	65
1" (25)	36	50	65	36	50.5	71	36	50.5	71
1 1/4" (32)	45	61	74	45	61	80	45	61	80
1 1/2" (40)	51	67	84	51	70	93	51	70	93
2" (50)	67	87	103	67	91	109	67	91	109
2 1/2" (65)	79	99	122	79	103	128	79	103	128
3" (80)	99	119	134	99	124	147	99	124	147
3 1/2" (90)	111	131	160	111	136	163	111	136	160
4" (100)	126	148	173	126	151	179	126	151	176
5" (125)	154	176	195	154	179	214	154	179	211
6" (150)	184	206	220	184	212	249	184	212	246
8" (200)	234	260	277	234	266	306	234	266	303
10" (250)	285	315	338	285	321	360	285	321	357
12" (300)	340	370	407	340	376	420	340	376	417
14" (350)	370	400	449	370	408	484	370	408	481
16" (400)	420	455	512	420	460	538	420	460	534
18" (450)	485	520	547	485	525	595	485	525	592
20" (500)	530	570	604	530	575	652	530	575	646
24" (600)	635	675	715	635	680	773	635	680	766

NPS	CL600			CL900			CL1500			CL2500		
	D1	D2	D3	D1	D2	D3	D1	D2	D3	D1	D2	D3
	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)
1/2" (15)	23	34.5	52	23	34.5	61	22	34.5	61	18.5	34.5	68
3/4" (20)	29	42.5	65	29	42.5	68	28	42.5	68	21.5	42.5	74
1" (25)	36	50.5	71	36	50.5	77	35	50.5	77	28.5	50.5	84
1 1/4" (32)	45	62.5	80	45	62.5	87	44.5	62.5	87	37.5	62.5	103
1 1/2" (40)	51	72	93	51	72	96	51	72	96	45	72	115
2" (50)	67	91	109	67	91	141	65	91	141	63	91	144
2 1/2" (65)	79	104	128	79	104	163	78.5	104	163	75	104	166
3" (80)	99	125	147	99	125	166	96	125	173	95	125	195
3 1/2" (90)	111	138	160									
4" (100)	126	155	192	126	155	204	122	155	207	120	155	233
5" (125)	154	183	239	154	183	246	150	183	252	147	183	277
6" (150)	184	214	265	184	214	287	178	214	280	173	214	315
8" (200)	234	267	319	234	269	357	231	269	350	219	269	385
10" (250)	285	322	398	285	322	433	280	322	433	266	322	474
12" (300)	340	378	455	340	378	496	335	378	519	318	378	547
14" (350)	370	410	490	370	410	519	364	410	576			
16" (400)	420	465	563	420	466	573	416	466	639			
18" (450)	485	530	611	485	531	636	480	531	703			
20" (500)	530	580	681	530	582	696	522	582	754			
24" (600)	635	685	788	635	687	836	620	687	900			

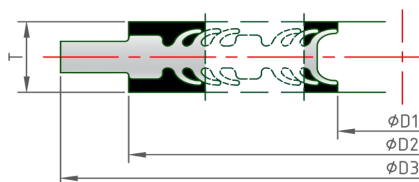
**AIGI Fishbone Gasket™****TYPE OR to suit FF & RF, ASME B16.47A Flanges**

NPS	CL150			CL300			CL400		
	D1	D2	D3	D1	D2	D3	D1	D2	D3
	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)
26" (650)	685	730	773	685	735	833	23	34	52
28" (700)	735	780	830	735	785	896	735	785	890
30" (750)	785	830	881	785	835	950	785	835	944
32" (800)	835	880	938	835	885	1004	835	885	1001
34" (850)	885	935	989	885	940	1055	885	940	1052
36" (900)	935	985	1046	935	990	1116	935	990	1116
38" (950)	976	1026	1109	976	1028	1052	976	1028	1071
40" (1000)	1030	1080	1160	1030	1085	1112	1030	1085	1125
42" (1050)	1080	1130	1217	1080	1135	1163	1080	1135	1176
44" (1100)	1135	1185	1274	1135	1190	1217	1135	1190	1230
46" (1150)	1185	1240	1325	1185	1245	1271	1185	1245	1287
48" (1200)	1235	1290	1382	1235	1295	1322	1235	1295	1344
50" (1250)	1290	1350	1433	1290	1355	1376	1290	1355	1401
52" (1300)	1340	1400	1490	1340	1405	1427	1340	1405	1452
54" (1350)	1390	1455	1547	1390	1465	1490	1390	1465	1516
56" (1400)	1440	1505	1604	1440	1515	1541	1440	1515	1566
58" (1450)	1490	1560	1662	1490	1570	1592	1490	1570	1617
60" (1500)	1540	1610	1712	1540	1620	1643	1540	1620	1681

NPS	CL600			CL900		
	D1	D2	D3	D1	D2	D3
	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)
26" (650)	23	34.5	52	23	34.5	61
28" (700)	735	795	912	735	795	944
30" (750)	785	850	970	785	850	1008
32" (800)	835	900	1020	835	900	1071
34" (850)	885	955	1071	885	955	1135
36" (900)	935	1005	1128	935	1005	1198
38" (950)	976	1051	1103	976	1051	1198
40" (1000)	1030	1105	1154	1030	1105	1249
42" (1050)	1080	1160	1217	1080	1160	1300
44" (1100)	1135	1215	1268	1135	1215	1366
46" (1150)	1185	1270	1325	1185	1270	1433
48" (1200)	1235	1320	1389	1235	1320	1484
50" (1250)	1290	1380	1446			
52" (1300)	1340	1430	1497			
54" (1350)	1390	1485	1554			
56" (1400)	1440	1535	1611			
58" (1450)	1490	1590	1662			
60" (1500)	1540	1640	1731			



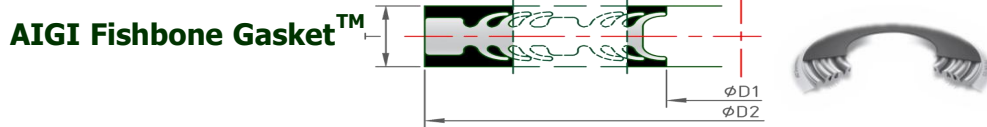
AIGI Fishbone Gasket™



TYPE OR to suit FF & RF, ASME B16.47B Flanges

NPS	CL75			CL150			CL300			CL400		
	D1	D2	D3	D1	D2	D3	D1	D2	D3	D1	D2	D3
	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)
26" (650)	662	698	706	662	698	723	662	710	769	662	710	744
28" (700)	712	748	757	712	748	774	712	760	823	712	760	798
30" (750)	766	802	808	766	802	825	766	814	884	766	814	855
32" (800)	818	854	858	818	854	879	818	866	938	818	866	909
34" (850)	866	906	909	866	906	933	866	918	992	866	918	960
36" (900)	920	960	971	920	960	985	920	972	1046	920	972	1020
38" (950)	970	1014	1022	970	1014	1043	970	1022	1096	970	1022	1071
40" (1000)	1020	1064	1073	1020	1064	1093	1020	1072	1147	1020	1072	1125
42" (1050)	1070	1114	1123	1070	1114	1144	1070	1122	1198	1070	1122	1176
44" (1100)	1130	1174	1179	1130	1174	1195	1130	1182	1249	1130	1182	1230
46" (1150)	1175	1223	1230	1175	1223	1254	1175	1231	1315	1175	1231	1287
48" (1200)	1227	1275	1281	1227	1275	1304	1227	1283	1366	1227	1283	1344
50" (1250)	1277	1325	1331	1277	1325	1355	1277	1339	1417	1277	1339	1401
52" (1300)	1327	1375	1385	1327	1375	1406	1327	1389	1468	1327	1389	1452
54" (1350)	1380	1428	1436	1380	1428	1462	1380	1454	1528	1380	1454	1516
56" (1400)	1430	1480	1493	1430	1480	1512	1430	1504	1592	1430	1504	1566
58" (1450)	1485	1535	1544	1485	1535	1577	1485	1561	1654	1485	1561	1617
60" (1500)	1535	1585	1595	1535	1585	1628	1535	1611	1704	1535	1611	1681

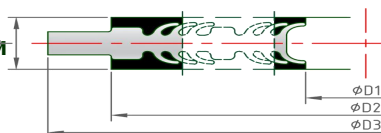
NPS	CL600			CL900		
	D1	D2	D3	D1	D2	D3
	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)
26" (650)	662	718	763	662	718	836
28" (700)	712	768	817	712	768	900
30" (750)	766	826	877	766	826	957
32" (800)	818	878	931	818	878	1014
34" (850)	866	930	995	866	930	1071
36" (900)	920	984	1046	920	984	1122
38" (950)	970	1045	1103	970	1045	1198
40" (1000)	1020	1095	1154	1020	1095	1249
42" (1050)	1070	1150	1217	1070	1150	1300
44" (1100)	1130	1210	1268	1130	1210	1366
46" (1150)	1175	1260	1325	1175	1260	1433
48" (1200)	1227	1312	1389	1227	1312	1484
50" (1250)	1277	1367	1446			
52" (1300)	1327	1417	1497			
54" (1350)	1380	1475	1554			
56" (1400)	1430	1525	1611			
58" (1450)	1485	1585	1662			
60" (1500)	1535	1635	1731			

**TYPE Basic to suit TG (Tongue and Groove), DIN Flanges**

DN	PN10/16/25		PN40/63/100		PN160/250		PN320/400	
	D1 (mm)	D2 (mm)	D1 (mm)	D2 (mm)	D1 (mm)	D2 (mm)	D1 (mm)	D2 (mm)
10	24	34.4	24	34.4	24	34.4	24	34.4
15	29	39.4	29	39.4	29	39.4	29	39.4
20	36	50.4	36	50.4	36	50.4	36	50.4
25	43	57.4	43	57.4	43	57.4	43	57.4
32	51	65.4	51	65.4	51	65.4	51	65.4
40	61	75.4	61	75.4	61	75.4	61	75.4
50	73.1	87.2	73.1	87.2	73.1	87.2	73.1	87.2
65	95.1	109.2	95.1	109.2	95.1	109.2	95.1	109.2
80	106.1	120.2	106.1	120.2	106.1	120.2	106.1	120.2
100	129.2	149.2	129.2	149.2	129.2	149.2	129.2	149.2
125	155.2	175.2	155.2	175.2	155.2	175.2	155.2	175.2
150	183.2	203.2	183.2	203.2	183.2	203.2	183.2	203.2
200	239.2	259.2	213.2	233.2	239.2	259.2	239.2	259.2
250	292.2	312.2	239.2	259.2	292.2	312.2	292.2	312.2
300	343.2	363.2	266.2	286.2	343.2	363.2		
350	395.4	421	292.2	312.2				
400	447.4	473	343.2	363.2				
450	497.4	523	395.4	421				
500	549.4	575	447.4	473				
600	649.4	675	497.4	523				
700	751.4	777	549.4	575				
800	856.4	882	649.4	675				
900	961.4	987	751.4	777				
1000	1061	1093	856.4	882				
1200	1261	1293	961.4	987				
1400	1461	1493	1061	1093				
1600	1661	1693	1261	1293				
1800	1861	1893	1461	1493				
2000	2061	2093	1661	1693				



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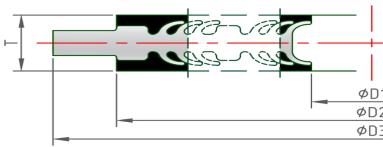
TYPE Basic to suit MFM (Male-Female), DIN Flanges

DN	PN10/16/25		PN40		PN63		PN63	
	D1 (mm)	D2 (mm)	D1 (mm)	D2 (mm)	D1 (mm)	D2 (mm)	D1 (mm)	D2 (mm)
10	18	34.4	18	34.4	18	34.4	18	34.4
15	23	39.4	23	39.4	23	39.4	23	39.4
20	32	50.4	32	50.4	32	50.4	32	50.4
25	39	57.4	39	57.4	39	57.4	39	57.4
32	44	65.4	44	65.4	44	65.4	44	65.4
40	51	75.4	51	75.4	51	75.4	51	75.4
50	63	87.2	63	87.2	63	87.2	63	87.2
65	85	109.2	85	109.2	85	109.2	85	109.2
80	96	120.2	96	120.2	96	120.2	96	120.2
100	123	149.2	123	149.2	123	149.2	123	149.2
125	148	175.2	148	175.2	148	175.2	148	175.2
150	176	203.2	176	203.2	176	203.2	176	203.2
175			200	233.2	200	233.2		
200	226	259.2	226	259.2	226	259.2	226	259.2
225			253	286.2	253	286.2		
250	279	312.2	279	312.2	279	312.2	279	312.2
300	330	363.2	330	363.2	330	363.2	330	363.2
350	381	421	381	421	381	421	381	421
400	433	473	433	473	433	473	433	473
450	486	523	486	523				
500	537	575	537	575	537	575	537	575
600	637	675	637	675	637	675	637	675
700	730	777	730	777	730	777	730	777
800	830	882	830	882	830	882	830	882
900	930	987	930	987	930	987	930	987
1000	1035	1093	1035	1093	1035	1093	1035	1093
1200	1235	1293	1235	1293	1235	1293	1235	1293
1400	1435	1493	1435	1493	1435	1493	1435	1493
1600	1625	1693	1625	1693	1625	1693	1625	1693
1800	1825	1893						
2000	2025	2093						

DN	PN160		PN250		PN320		PN400	
	D1 (mm)	D2 (mm)	D1 (mm)	D2 (mm)	D1 (mm)	D2 (mm)	D1 (mm)	D2 (mm)
10	18	34.4	18	34.4	18	34.4	18	34.4
15	23	39.4	19	39.4	19	39.4	19	39.4
20	32	50.4	28	50.4	28	50.4	28	50.4
25	39	57.4	35	57.4	35	57.4	35	57.4
32	44	65.4	40	65.4	40	65.4	40	65.4
40	51	75.4	46	75.4	46	75.4	46	75.4
50	63	87.2	58	87.2	58	87.2	58	87.2
65	85	109.2	80	109.2	80	109.2	80	109.2
80	96	120.2	89	120.2	89	120.2	89	120.2
100	123	149.2	113	149.2	113	149.2	113	149.2
125	148	175.2	139	175.2	139	175.2	139	175.2
150	176	203.2	163	203.2	163	203.2	163	203.2
175								
200	226	259.2	210	259.2	210	259.2	210	259.2
225								
250	279	312.2	258	312.2	258	312.2		
300	330	363.2	308	363.2				

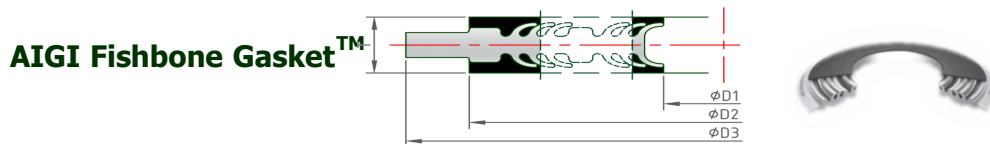


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TYPE OR to suit FF & RF, DIN Flanges, PN2.5-PN10

DN	PN2.5			PN6			PN10		
	D1 (mm)	D2 (mm)	D3 (mm)	D1 (mm)	D2 (mm)	D3 (mm)	D1 (mm)	D2 (mm)	D3 (mm)
10	20	34	39	20	34	39	20	37	46
15	25	39	44	25	39	44	25	42	51
20	30	44	54	30	44	54	30	47	61
25	36	50	64	36	50	64	36	52	71
32	46	60	76	46	60	76	46	62	82
40	53	69	86	53	69	86	53	71	92
50	65	83	96	65	83	96	65	87	107
65	81	100	116	81	100	116	81	103	127
80	95	114	132	95	114	132	95	117	142
100	118	140	152	118	140	152	118	140	162
125	144	166	182	144	166	182	144	166	192
150	172	194	207	172	194	207	172	194	218
175	200	222	237	200	222	237	200	224	248
200	225	247	262	225	247	262	225	249	273
225	250	272	287	250	272	287	250	274	303
250	280	302	317	280	302	317	280	305	328
300	330	352	373	330	352	373	330	355	378
350	380	404	423	380	404	423	380	408	438
400	430	454	473	430	454	473	430	458	489
450	485	511	528	485	511	528	485	515	539
500	535	565	578	535	565	578	535	570	594
600	635	665	679	635	665	679	635	670	695
700	735	775	784	735	775	784	735	780	810
800	835	880	890	835	880	890	835	885	917
900	935	980	990	935	980	990	935	990	1017
1000	1035	1080	1090	1035	1080	1090	1035	1100	1124
1200	1235	1280	1290	1235	1280	1307	1235	1310	1341
1400	1435	1480	1490	1435	1480	1524	1435	1520	1548
1600	1640	1690	1700	1640	1690	1724	1640	1740	1772
1800	1840	1890	1900	1840	1890	1931	1840	1940	1972
2000	2040	2090	2100	2040	2090	2138	2040	2140	2182

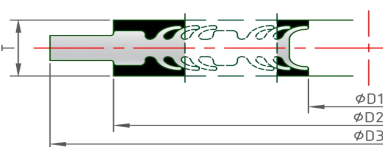


TYPE OR to suit FF & RF, DIN Flanges, PN16-PN40

DN	PN16			PN25			PN40		
	D1 (mm)	D2 (mm)	D3 (mm)	D1 (mm)	D2 (mm)	D3 (mm)	D1 (mm)	D2 (mm)	D3 (mm)
10	20	37	46	20	37	46	20	37	46
15	25	42	51	25	42	51	25	42	51
20	30	47	61	30	47	61	30	47	61
25	36	52	71	36	52	71	36	52	71
32	46	62	82	46	62	82	46	64	82
40	53	71	92	53	71	92	53	74	92
50	65	87	107	65	87	107	65	89	107
65	81	103	127	81	103	127	81	105	127
80	95	117	142	95	117	142	95	119	142
100	118	140	162	118	140	168	118	145	168
125	144	166	192	144	166	194	144	171	194
150	172	194	218	172	194	224	172	198	224
175	200	224	248	200	224	254	200	230	265
200	225	249	273	225	249	284	225	255	290
225	250	274	303	250	274	310	250	280	322
250	280	305	329	280	305	340	280	316	352
300	330	355	384	330	355	400	330	371	417
350	380	408	444	380	408	457	380	421	474
400	430	458	495	430	458	514	430	475	546
450	485	515	555	485	515	564	485	530	571
500	535	570	617	535	570	624	535	585	628
600	635	670	734	635	670	731	635	685	747
700	735	780	804	735	780	833	735	790	852
800	835	885	911	835	885	942	835	895	974
900	935	990	1011	935	990	1042	935	1000	1084
1000	1035	1100	1128	1035	1100	1154	1035	1110	1194
1200	1235	1310	1342	1235	1310	1364	1235	1320	1398
1400	1435	1520	1542	1435	1520	1578	1435	1530	1618
1600	1640	1740	1764	1640	1740	1798	1640	1750	1830
1800	1840	1940	1964	1840	1940	2000			
2000	2040	2140	2168	2040	2140	2230			



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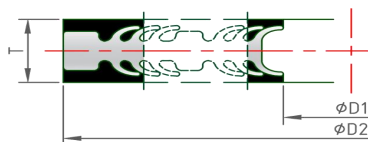
TYPE OR to suit FF & RF, DIN Flanges, PN63-PN160

DN	PN63			PN100			PN160		
	D1 (mm)	D2 (mm)	D3 (mm)	D1 (mm)	D2 (mm)	D3 (mm)	D1 (mm)	D2 (mm)	D3 (mm)
10	20	37	56	20	37	56	20	37	56
15	25	42	61	25	42	61	25	42	61
20	30	47	72	30	47	72	30	47	72
25	36	52	82	36	52	82	36	52	82
32	46	64	88	46	64	88	46	64	88
40	53	74	103	53	74	103	53	74	103
50	65	89	113	65	89	119	65	89	119
65	81	105	138	81	105	144	81	105	144
80	95	119	148	95	119	154	95	119	154
100	118	145	174	118	145	180	118	145	180
125	144	171	210	144	171	217	144	171	217
150	172	198	247	172	198	257	172	198	257
175	200	230	277						
200	225	255	309	225	255	324	225	255	324
225	250	280	334						
250	280	316	364	280	316	391	280	316	388
300	330	371	424	330	371	458	330	371	458
350	380	421	486	380	421	512			
400	430	475	543	430	475	572			
450									
500	535	585	657	535	585	704			
600	635	685	764						
700	735	790	879						
800	835	895	988						
900	935	1000	1108						
1000	1035	1110	1220						
1200	1235	1320	1452						

DN	PN250			PN320			PN400		
	D1 (mm)	D2 (mm)	D3 (mm)	D1 (mm)	D2 (mm)	D3 (mm)	D1 (mm)	D2 (mm)	D3 (mm)
10	18	37	67	18	37	67	18	37	67
15	21	42	72	21	42	72	21	42	78
20	26	47	77	26	47	78	26	47	93
25	32	54	83	32	54	93	32	54	104
32	41	66	98	41	66	104	41	66	119
40	49	76	109	49	76	119	49	76	135
50	60	89	124	60	89	134	60	89	150
65	76	105	154	76	105	170	76	105	192
80	89	119	170	89	119	190	89	119	207
100	113	145	202	113	145	229	113	145	256
125	137	173	242	137	173	274	137	173	301
150	165	206	284	165	206	311	165	206	348
175									
200	215	265	358	215	265	398	215	265	442
225									
250	265	320	442	265	320	488			
300	320	380	538						



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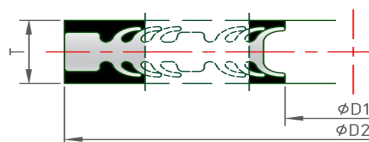


TYPE Basic to suit TG (Tongue and Groove), JIS Flanges

A	5K/10K/16K		20k		30k		40K/63K	
	D1 (mm)	D2 (mm)	D1 (mm)	D2 (mm)	D1 (mm)	D2 (mm)	D1 (mm)	D2 (mm)
10	28	38	28	38	28	38	28	38
15	32	42	32	42	32	42	32	42
20	38	50	38	50	38	50	38	50
25	45	60	45	60	45	60	45	60
32	55	70	55	70	55	70	55	70
40	60	75	60	75	60	75	60	75
50	70	90	70	90	70	90	70	90
65	90	110	90	110	90	110	90	110
80	100	120	100	120	100	120	100	120
90	110	130	110	130	110	130	110	130
100	125	145	125	145	125	145	125	145
125	150	175	150	175	150	175	150	175
150	190	212	190	212	190	212	190	212
200	230	260	230	260	230	260	230	260
250	295	325	295	325	295	325	295	325
300	340	370	340	370	340	370	340	370
350	380	415	380	415	380	415	380	415
400	440	475	440	475	440	475	440	475
450	483	523	483	523				
500	535	575	535	575				
550	585	625	585	625				
600	635	675	635	675				
650	682	727						
700	732	777						
750	787	832						
800	837	882						
850	889	934						
900	937	987						
1000	1042	1092						
1100	1142	1192						
1200	1237	1292						
1350	1387	1442						
1500	1537	1592						



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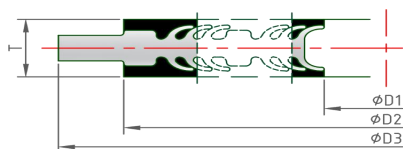


TYPE Basic to suit MFM (Male-Female), IIS Flanges

A	5K/10K		16K		20K		30K		40K		63K	
	D1 (mm)	D2 (mm)	D1 (mm)	D2 (mm)	D1 (mm)	D2 (mm)	D1 (mm)	D2 (mm)	D1 (mm)	D2 (mm)	D1 (mm)	D2 (mm)
10	26	38	26	38	26	38	22	38				
15	30	42	30	42	30	42	25	42	25	42	25	42
20	38	50	36	50	36	50	32	50	32	50	32	50
25	46	60	46	60	46	60	41	60	41	60	41	60
32	54	70	54	70	54	70	51	70	51	70	51	70
40	57	75	55	75	55	75	52	75	52	75	52	75
50	70	90	66	90	66	90	65	90	65	90	65	90
65	90	110	86	110	86	110	85	110	85	110	85	110
80	100	120	96	120	96	120	95	120	95	120	95	120
90	110	130	105	130	105	130	105	130	105	130	105	130
100	123	145	120	145	120	145	120	145	120	145	120	145
125	153	175	150	175	150	175	145	175	145	175	145	175
150	190	212	182	212	182	212	177	212	177	212	177	212
200	235	260	230	260	230	260	224	260	224	260	224	260
250	295	325	289	325	289	325	285	325	285	325	285	325
300	340	370	334	370	334	370	325	370	325	370	325	370
350	385	415	379	415	379	415	370	415	370	415	370	415
400	440	475	435	475	435	475	430	475	430	475	430	475
450	488	523	483	523	483	523						
500	535	575	530	575	530	575						
550	585	625	580	625	580	625						
600	635	675	630	675	630	675						
650	682	727										
700	732	777										
750	787	832										
800	832	882										
850	884	934										
900	937	987										
1000	1037	1092										
1100	1137	1192										
1200	1237	1292										
1350	1382	1442										
1500	1532	1592										



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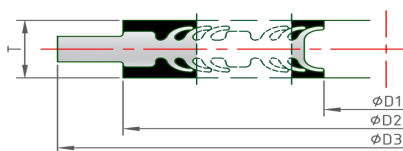


TYPE OR to suit FF & RF, JIS Flanges, 2K-16K

A	2K			5K			10K			16K		
	D1 (mm)	D2 (mm)	D3 (mm)	D1 (mm)	D2 (mm)	D3 (mm)	D1 (mm)	D2 (mm)	D3 (mm)	D1 (mm)	D2 (mm)	D3 (mm)
10				25	37	44	25	37	51	25	37	51
15				29	41	49	29	41	56	29	41	56
20				35	47	54	35	47	61	35	49	61
25				40	54	64	40	54	72	40	54	72
32				51	67	76	51	67	82	51	67	82
40				57	73	81	57	73	87	57	77	87
50				64	84	91	64	84	102	64	88	102
65				87	107	116	87	107	122	87	111	122
80				98	118	127	98	118	132	98	122	138
90				110	130	137	110	130	142	110	135	148
100				118	140	147	118	140	157	118	143	163
125				150	172	182	150	172	188	150	175	201
150				180	202	212	180	202	218	180	210	236
175				205	230	238	205	230	243			
200				225	250	258	225	250	268	225	255	281
225				250	275	283	250	275	288			
250				280	310	323	280	310	331	280	316	354
300				320	350	368	320	350	376	320	356	404
350				370	400	411	370	400	421	370	406	448
400				425	460	471	425	460	484	425	465	508
450	480	515	533	480	515	531	480	515	539	480	520	573
500	530	570	583	530	570	581	530	570	594	530	575	628
550	580	620	641	580	620	639	580	620	648	580	625	682
600	630	670	691	630	670	689	630	670	698	630	675	732
650	680	725	746	680	725	744	680	725	748			
700	730	775	796	730	775	794	730	775	808			
750	780	825	854	780	825	848	780	825	868			
800	830	880	904	830	880	898	830	880	918			
850	880	930	954	880	930	948	880	930	968			
900	930	980	1004	930	980	998	930	980	1018			
1000	1030	1085	1104	1030	1085	1098	1030	1085	1122			
1100	1135	1190	1214	1135	1190	1208	1135	1190	1232			
1200	1235	1290	1324	1235	1290	1318	1235	1290	1342			
1350	1390	1455	1479	1390	1455	1473	1390	1455	1496			
1500	1540	1610	1634	1540	1610	1628	1540	1610	1656			



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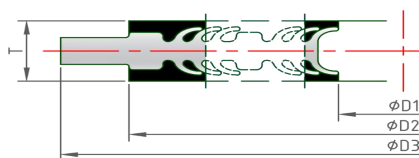


TYPE OR to suit FF & RF, JIS Flanges, 20K-63K

A	20K			30K			40K			63K		
	D1 (mm)	D2 (mm)	D3 (mm)	D1 (mm)	D2 (mm)	D3 (mm)	D1 (mm)	D2 (mm)	D3 (mm)	D1 (mm)	D2 (mm)	D3 (mm)
10	25	37	51	25	40	57						
15	29	41	56	29	45	62	29	45	62	29	45	67
20	35	49	61	35	52	67	35	52	67	35	52	73
25	40	54	72	40	58	77	40	58	77	40	58	78
32	51	67	82	51	70	87	51	70	87	51	70	88
40	57	77	87	57	80	98	57	80	98	57	80	106
50	64	88	102	64	91	112	64	91	112	64	91	123
65	87	111	122	87	114	138	87	114	138	87	114	151
80	98	122	138	98	125	148	98	125	148	98	125	161
90	110	135	148	110	140	161	110	140	161	110	140	179
100	118	143	163	118	148	171	118	148	181	118	148	194
125	150	175	201	150	180	206	150	180	224	150	180	233
150	180	210	236	180	215	249	180	215	263	180	215	273
175												
200	225	255	281	225	261	294	225	261	313	225	261	328
225												
250	280	316	354	280	320	358	280	320	378	280	320	392
300	320	356	404	320	365	418	320	365	432	320	365	447
350	370	406	448	370	415	463	370	415	477	370	415	486
400	425	465	508	425	470	522	425	470	532	425	470	546
450	480	520	573									
500	530	575	628									
550	580	625	682									
600	630	675	732									



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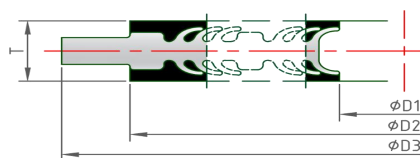


TYPE OR to suit FF & RF, BS10 Flanges, Table A,D,E,F,H

NPS	Table A			Table D			Table E			Table F			Table H		
	D1 (mm)	D2 (mm)	D3 (mm)	D1 (mm)	D2 (mm)	D3 (mm)	D1 (mm)	D2 (mm)	D3 (mm)	D1 (mm)	D2 (mm)	D3 (mm)	D1 (mm)	D2 (mm)	D3 (mm)
1/2"	26	38	53	26	38	53	26	38	53	26	38	53	26	38	65
3/4"	32	45	59	32	45	59	32	45	59	32	45	59	32	45	65
1	40	54	69	40	54	69	40	54	69	40	55	70	40	55	70
1 1/4	48	62	73	48	62	73	48	62	73	48	64	81	48	64	81
1 1/2	54	70	84	54	70	84	54	70	84	54	73	88	54	73	88
2	67	86	97	67	86	97	67	86	97	67	91	110	67	91	110
2 1/2	83	102	110	83	102	110	83	102	110	83	107	129	83	107	129
3	97	116	129	97	116	129	97	116	129	97	121	148	97	121	148
3 1/2	110	129	148	110	129	148	110	129	148	110	134	161	110	134	161
4	124	143	161	124	143	161	124	143	167	124	148	173	124	148	173
4 1/2															
5	150	169	192	150	169	192	150	169	192	150	175	214	150	175	214
6	175	194	218	175	194	218	175	194	214	175	200	239	175	200	239
7	200	224	243	200	224	243	200	224	239	200	230	271	200	230	271
8	226	250	275	226	250	275	226	250	271	226	256	303	226	256	303
9	248	276	307	248	276	307	248	276	303	248	284	331	248	284	331
10	274	302	334	274	302	334	274	302	334	274	310	357	274	310	357
12	324	352	385	324	352	385	324	352	382	324	360	414	324	360	414
13	356	384	417	356	384	417	356	384	414	356	392	442	356	392	442
14	382	410	446	382	410	446	382	410	446	382	418	468	382	418	468
15	407	435	471	407	435	471	407	435	471	407	443	493	407	443	493
16	437	469	496	437	469	496	437	469	496	437	481	525	437	481	525
17	462	494	528	462	494	528	462	494	528	462	506	557	462	506	557
18	488	520	560	488	520	560	488	520	560	488	532	579	488	532	579
19	524	556	585	524	556	585	524	556	585	524	568	611	524	568	611
20	547	583	617	547	583	617	547	583	617	547	595	642	547	595	642
21	572	608	649	572	608	649	572	608	646	572	620	668	572	620	668
22	596	632	671	596	632	671	596	632	671	596	644	693	596	644	693
23	623	659	696	623	659	696	623	659	696	623	671	722	623	671	722
24	648	684	728	648	684	728	648	684	725	648	696	747	648	696	747
26	685	721	754												
27	710	750	779	710	750	817	710	750	814	710	760	823			
29	760	800	830	760	800	871	760	800	868	760	810	881			
30	785	825	855	785	825	896	785	825	893	785	835	906			
33	860	908	938	860	908	982	860	908	982	860	916	982			
35	910	958	989	910	958	1033	910	958	1033	910	966	1042			
36	935	983	1014	935	983	1058	935	983	1058	935	991	1068			
39	1035	1083	1090	1035	1083	1141	1035	1083	1138	1035	1091	1157			
42	1085	1137	1166	1085	1137	1217	1085	1137	1214	1085	1145	1233			
45	1160	1212	1249	1160	1212	1300	1160	1212	1296	1160	1220	1319			
48	1235	1287	1325	1235	1287	1376	1235	1287	1373	1235	1295	1401			
54	1435	1495	1497	1435	1495	1497									
60	1535	1595	1668	1535	1595	1665									
66	1640	1710	1827	1640	1710	1824									
72	1840	1910	1982	1840	1910	1979									
78				2040	2116	2144									
84				2140	2216	2309									



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TYPE OR to suit FF & RF, BS10 Flanges, Table J, K, R, S, T

NPS	Table J			Table K			Table R			Table S			Table T		
	D1 (mm)	D2 (mm)	D3 (mm)	D1 (mm)	D2 (mm)	D3 (mm)	D1 (mm)	D2 (mm)	D3 (mm)	D1 (mm)	D2 (mm)	D3 (mm)	D1 (mm)	D2 (mm)	D3 (mm)
1/2"	26	38	65	26	38	65	26	38	65	24	38	68	24	38	80
3/4"	32	45	65	32	45	65	32	45	65	30	45	68	30	45	80
1	40	55	70	40	55	78	40	55	78	39	55	80	39	55	87
1 1/4	48	64	81	48	64	81	48	64	81	46	64	87	46	64	96
1 1/2	54	73	88	54	73	93	54	73	93	52	73	100	52	73	112
2	67	91	106	67	91	110	67	91	110	60	86	112	60	86	125
2 1/2	83	107	125	83	107	125	83	107	125	74	100	125	74	100	141
3	97	121	144	97	121	144	97	121	144	85	114	141	85	114	163
3 1/2	110	134	157	110	134	160	110	134	160	97	126	166	97	126	185
4	124	148	169	124	148	173	124	148	173	118	148	176	118	148	204
4 1/2										130	162	188	130	162	227
5	150	175	211	150	175	211	150	175	211	143	175	211	143	175	242
6	175	200	236	175	200	236	175	200	236	165	200	246	165	200	284
7	200	230	268	200	230	265	200	230	265	193	230	287	193	230	331
8	226	256	300	226	256	290	226	256	296	219	256	322	219	256	366
9	248	284	328	248	284	328	248	284	328	243	284	357	243	284	407
10	274	310	354	274	310	354	274	310	360	269	310	392	269	310	449
										294	335	433	294	335	487
12	324	360	411	324	360	401	324	360	427	320	364	468	320	364	525
13	356	392	439	356	392	449	356	392	461	352	396	500	352	396	557
14	382	418	465	382	418	474	382	418	493	378	422	538			
15	407	443	490	407	443	506	407	443	519	403	447	579			
16	437	481	522	437	481	531	437	481	550	433	481	614			
17	462	506	554	462	506	563	462	506	576						
18	488	532	576	488	532	617	488	532	636						
19	524	568	608												
20	547	595	639	547	595	671	547	595	690						
21	572	620	665												
22	596	644	690	596	644	728	596	644	754						
23	623	671	719												
24	648	696	744												