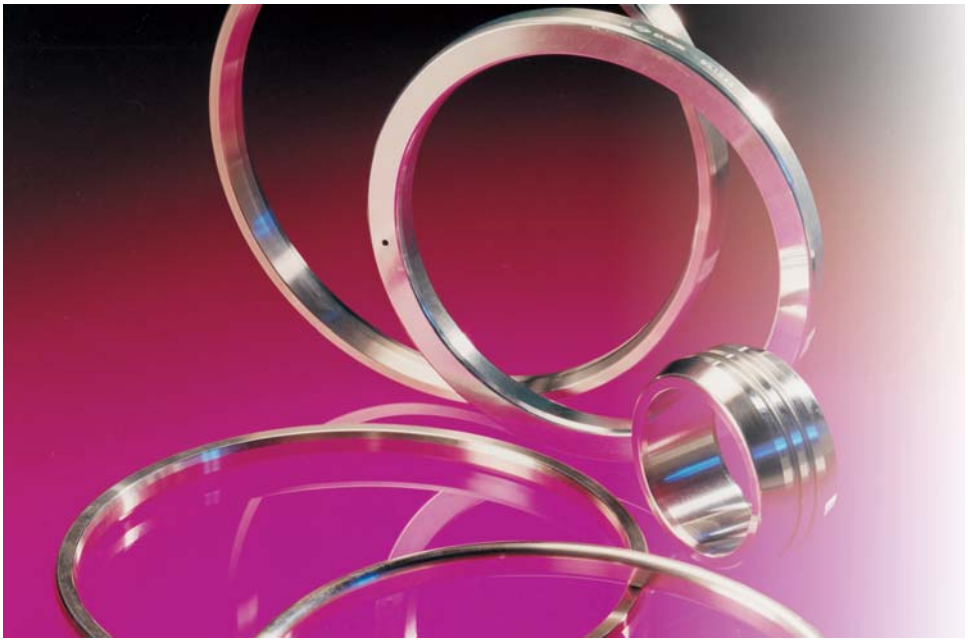
James Walker Moorflex

Metallic Gaskets



Top performance under extreme conditions

James Walker Moorflex's precision machining creates a product with the high performance standards needed for today's extremely demanding applications. Moorflex use only the best forged metals, no welded rings, which undergo a stringent machining process to ensure that close tolerances and smooth contact surfaces are rigidly maintained.

Quality is guaranteed by a strict series of tests and process quality control, and Moorflex's final inspection assures total compliance with customer specifications. Hence, engineers confidently continue to specify Moorflex gaskets for their requirements in both original equipment and replacements.

Introduction

Origin and application

The sealing of well-head valves and fittings in exploration and production areas of the oil and natural gas industry has constantly presented a higher pressure requirement than has been necessary in most other major manufacturing processes.

To meet this requirement, the American Petroleum Institute developed ring joint flanges and their accompanying gasket requirement and issued standards covering "general use" and "oil field use". These two categories are now covered by ASME and API standards respectively, of similar dimension but differently rated in material strength to allow the API flange to operate at a higher working pressure.

The solid metal gasket provides an excellent mechanical joint and has almost universal acceptance in the oil, petroleum and chemical processing industries where high mechanical and thermal performance is required.

Typical uses

- *High pressure oil field drilling and production equipment.*
- *Pressure vessels.*
- *Pipeline valves.*
- *Gas and chemical plants.*

Under their *Moorside*™ brand James Walker Moorflex are leading manufacturers of the complete range of solid metal ring joint gaskets. The gaskets are manufactured to API 6A, ASME B16 20 and BS7076 Pt 2 standards and to customers' own specifications.

Moorside™ Metal ring joint gaskets

Protection

Soft iron and low carbon steel ring joint gaskets to API Standard 6A are supplied with zinc plating to 0.0002" - 0.0005" thick unless otherwise specified. Other platings are also available if preferred. Unplated rings are treated with a rust preventative fluid.

During storage and handling it is very important that the mating faces (the oval radius or the chamfered face) are not damaged as this can lead to leakage when the ring joint is used in its particular application.

To afford the maximum degree of protection, Moorflex offer as an extra feature individual vacuum packaging. Gaskets are vacuum packed using a strong clear film onto a stout backing board. This style of packaging ensures full protection of the gasket, whilst allowing visual inspection of its condition and marking.

How to order

The styles described are manufactured as standard and are available ex-stock or to short lead-times. When ordering please submit the following data:

- *Gasket standard.*
- *Relevant ring number or nominal pipe size with rating.*
- *Material required.*
- *Oval or octagonal shape for Style 'R' gaskets.*
- *Quantity and required delivery.*

Materials

Gasket metal should be selected to suit the service conditions and should be of a hardness lower than the flange metal. At Moorflex, the annealing process of the metal and the machining is carefully controlled to keep the hardness of the gasket below the maximum allowable, to ensure correct flow and sealing without damage to the flange surfaces.

Checks carried out during manufacture ensure that the hardness of the finished product does not exceed the figures stated below.

The principal types of material are:

METAL	MAXIMUM HARDNESS IDENTIFICATION ROCKWELL B
SOFT IRON	56 (90 BHN) D
LOW CARBON STEEL	68 (120 BHN) S
F5 ALLOY STEEL (4/6% Cr, 1/2% Mo)	72 (130 BHN) F5
410 ALLOY STEEL (11/13% Cr)	86 (170 BHN) S410
304 STAINLESS STEEL	83 (160 BHN) S304
304L STAINLESS STEEL	83 (160 BHN) S304L
316 STAINLESS STEEL	83 (160 BHN) S316
316L STAINLESS STEEL	83 (160 BHN) S316L
347 STAINLESS STEEL	83 (160 BHN) S347
321 STAINLESS STEEL	83 (160 BHN) S321
825 NICKEL ALLOY	93 (200 BHN) 825

Other stainless and super alloy steels, Duplex, Monel, Inconel, Incoloy, Nickel and other materials are available. Based on almost 50 years of experience, Moorflex have established specifications to ensure gasket suitability. Certification and compliance with NACE MRO175 are standard features.

Identification and traceability

For convenience in ordering, numbers are assigned to gaskets and prefixed by the letter 'R', 'RX' or 'BX', followed by the material identification. Marking is effected so as not to injure the contact faces, nor to harmfully distort the gasket. Moorflex use only low stress DOT stamps approved to NACE standards in order to ensure that stresses are not introduced into the gasket.

All non-API gaskets are typically marked Moorside R45 S316. Gaskets complying to API Standard 6A are additionally marked with API Monogram Licence No., Product Specification Level 4 and date of manufacture. (It is standard procedure for Moorflex to supply API 6A gaskets to PSL4).

All API gaskets are typically marked:-

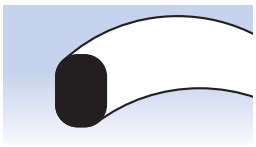
Moorside 6A-0038 R45 S316-4 12/2001 (December 2001).

Traceability of material and constant monitoring of manufacture are essential for effective quality control. All Moorside ring joint gaskets carry a Material Reference Number, which directly relates to the batch of material from which it was manufactured. The MRN number is applied to the gasket in the same way as the identification marks. This reference is included in material certificates, thus ensuring full traceability of supply.

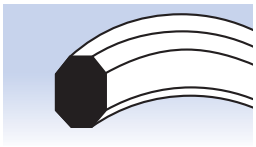
Moorside or (M) denotes James Walker Moorflex trade mark.

Gasket styles and types

Series 'R' Oval



Series 'R' Octagonal



The type R oval configuration is the original ring joint design and was followed by the type R octagonal which offered more specific sealing contact areas. Both types can be used with flanges having the standard ring joint flat bottom groove and hold off flanges by a specified amount, relying entirely on correctly applied initial bolt-load for their proper operation in service.

Available in ring numbers R11 through R105 to suit the following flange specifications:

NOMINAL PIPE SIZE	CLASS RATING AND STANDARD
1/2" - 24"	150 - 2500 ASME B16.5 and BS1560
26" - 36"	300 - 600 MSS SP44 and BS 3293
26" - 36"	900 MSS SP44
1 1/2" - 20"	API Spec. 6A

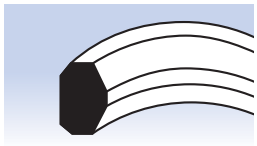
Series 'R' manufactured to the standards ASME B 16.20 - API Std 6A BS EN 12560-5

			HEIGHT			NOMINAL BORES					
Ring Number	Pitch	Width	Oval	Octagonal	Width of flat on octagonal ring	Class 150	Class 300	Class 600	Class 900	Class 1500	Class 2500
R11	1.344	0.25	0.44	0.38	0.17		0.5	0.5			
R12	1.563	0.313	0.56	0.5	0.206				0.5	0.5	
R13	1.688	0.313	0.56	0.5	0.206		0.75	0.75			0.5
R14	1.75	0.313	0.56	0.5	0.206				0.75	0.75	
R15	1.875	0.313	0.56	0.5	0.206	1					
R16	2	0.313	0.56	0.5	0.206		1	1	1	1	0.75
R17	2.25	0.313	0.56	0.5	0.206	1.25					
R18	2.375	0.313	0.56	0.5	0.206		1.25	1.25	1.25	1.25	1
R19	2.563	0.313	0.56	0.5	0.206	1.5					
R20†	2.688	0.313	0.56	0.5	0.206		1.5	1.5	1.5	1.5	
R21	2.844	0.438	0.69	0.63	0.305						1.25
R22	3.25	0.313	0.56	0.5	0.206	2					
R23†	3.25	0.438	0.69	0.63	0.305		2	2			1.5
R24†	3.75	0.438	0.69	0.63	0.305				2	2	
R25	4	0.313	0.56	0.5	0.206	2.5					
R26†	4	0.438	0.69	0.63	0.305		2.5	2.5			2
R27†	4.25	0.438	0.69	0.63	0.305				2.5	2.5	
R28	4.375	0.5	0.75	0.69	0.341						
R29	4.5	0.313	0.56	0.5	0.206	3					
R30	4.625	0.438	0.69	0.63	0.305		3	3			
R31†	4.875	0.438	0.69	0.63	0.305		3	3	3		
R32	5	0.5	0.75	0.69	0.341						3
R33	5.188	0.313	0.56	0.5	0.206	3.5					
R34	5.188	0.438	0.69	0.63	0.305		3.5	3.5			
R35†	5.375	0.438	0.69	0.63	0.305					3	
R36	5.875	0.313	0.56	0.5	0.206	4					
R37†	5.875	0.438	0.69	0.63	0.305		4	4	4		
R38	6.188	0.625	0.88	0.81	0.413						4
R39†	6.375	0.438	0.69	0.63	0.305					4	
R40	6.75	0.313	0.56	0.5	0.206	5					
R41†	7.125	0.438	0.69	0.63	0.305		5	5	5		
R42	7.5	0.75	1	0.94	0.485						5
R43	7.625	0.313	0.56	0.5	0.206	6					
R44†	7.625	0.438	0.69	0.63	0.305					5	
R45†	8.313	0.438	0.69	0.63	0.305		6	6	6		
R46†	8.313	0.5	0.75	0.69	0.341					6	
R47†	9	0.75	1	0.94	0.485						6
R48	9.75	0.313	0.56	0.5	0.206	8					
R49†	10.625	0.438	0.69	0.63	0.305		8	8	8		

All dimensions are in inches. † Denotes API Std. 6A Ring Joint Gaskets.

Ring Number	Pitch	Width	HEIGHT		Width of flat on octagonal ring	NOMINAL BORES					
			Oval	Octagonal		Class 150	Class 300	Class 600	Class 900	Class 1500	Class 2500
R50†	10.625	0.625	0.88	0.81	0.413					8	
R51	11	0.875	1.13	1.06	0.583						8
R52	12	0.313	0.56	0.5	0.206	10					
R53†	12.75	0.438	0.69	0.63	0.305		10	10	10		
R54†	12.75	0.625	0.88	0.81	0.413					10	
R55	13.5	1.125	1.44	1.38	0.78						10
R56	15	0.313	0.56	0.5	0.206	12					
R57†	15	0.438	0.69	0.63	0.305		12	12	12		
R58	15	0.875	1.13	1.06	0.583					12	
R59	15.625	0.313	0.56	0.5	0.206	14					
R60	16	1.25	1.56	1.5	0.879						12
R61	16.5	0.438	0.69	0.63	0.305		14	14			
R62	16.5	0.625	0.88	0.81	0.413				14		
R63†	16.5	1	1.31	1.25	0.681					14	
R64	17.875	0.313	0.56	0.5	0.206	16					
R65†	18.5	0.438	0.69	0.63	0.305		16	16			
R66†	18.5	0.625	0.88	0.81	0.416				16		
R67	18.5	1.125	1.44	1.38	0.78					16	
R68	20.375	0.313	0.56	0.5	0.206	18					
R69†	21	0.438	0.69	0.63	0.305		18	18			
R70†	21	0.75	1	0.94	0.485				18		
R71	21	1.125	1.44	1.38	0.78					18	
R72	22	0.313	0.56	0.5	0.206	20					
R73†	23	0.5	0.75	0.69	0.641		20	20			
R74†	23	0.75	1	0.94	0.485				20		
R75	23	1.25	1.56	1.5	0.879					20	
R76	26.5	0.313	0.56	0.5	0.206	24					
R77	27.25	0.625	0.88	0.81	0.413		24	24			
R78	27.25	1	1.31	1.25	0.681				24		
R79	27.25	1.375	1.75	1.63	0.977					24	
R80	24.25	0.313		0.5	0.206	22					
R81	25	0.563		0.75	0.377		22	22			
R82†	2.25	0.438		0.63	0.305						
R84†	2.5	0.438		0.63	0.305						
R85†	3.125	0.5		0.69	0.341						
R86†	3.563	0.625		0.81	0.413						
R87†	3.938	0.625		0.81	0.413						
R88†	4.875	0.75		0.94	0.485						
R89†	4.5	0.75		0.94	0.485						
R90†	6.125	0.875		1.06	0.583						
R91†	10.25	1.25		1.5	0.879						
R92	9	0.438	0.69	0.63	0.305						
R93	29.5	0.75		0.94	0.485		26	26			
R94	31.5	0.75		0.94	0.485		28	28			
R95	33.75	0.75		0.94	0.485		30	30			
R96	36	0.875		1.06	0.583		32	32			
R97	38	0.875		1.06	0.583		34	34			
R98	40.25	0.875		1.06	0.583		36	36			
R99†	9.25	0.438		0.63	0.305						
R100	29.5	1.125		1.38	0.78				26		
R101	31.5	1.25		1.5	0.879				28		
R102	33.75	1.25		1.5	0.879				30		
R103	36	1.25		1.5	0.879				32		
R104	38	1.375		1.63	0.977				34		
R105	40.25	1.375		1.63	0.977				36		

All dimensions are in inches. † Denotes API Std. 6A Ring Joint Gaskets.



Series 'RX'

As well-head pressures increased to 700 bar (10,000lbf/in^2) and beyond, flanges designed with type 'R' oval or octagonal rings became excessively heavy, requiring impracticably large bolts to perform the double duty of holding pressure while keeping the gasket compact.

The solution to this problem was found in higher strength materials and the development of the 'RX' and 'BX' series joint which are pressure energised. (The higher the contained pressure, the tighter the seal).

The 'RX' Style Ring Joint has the unique self-sealing action. The outside bevels of the ring make the initial contact with the groove as the flanges are brought together, thus pre-loading the gasket against the grooved outer surfaces. Internal pressure during service increases this loading and, therefore, the gasket's sealing performance.

Available in ring numbers RX20 through RX215 to suit the following flange specifications:

NOMINAL PIPE SIZE	CLASS RATING AND STANDARD
1 1/2" - 20"	720 - 5,000 API 6B Flanges

Series 'RX' manufactured to the standards ASME B 16.20 - API Std 6A

GASKET DIMENSIONS				PRESSURE CLASS RATING			
Ring No.	I/D	O/D	Height	720-960 2000	2900	3000	5000
				Nominal Pipe Size			
RX 20	2.313	3.000	0.750	1.1/2		1.1/2	
RX 23	2.672	3.672	1	2			
RX 24	3.234	4.172	1			2	2
RX 25	3.625	4.313	0.750				3.1/8
RX 26	3.469	4.406	1	2.1/2			
RX 27	3.719	4.656	1			2.1/2	2.1/2
RX 31	4.359	5.297	1	3		3	
RX 35	4.859	5.797	1				3
RX 37	5.359	6.297	1	4		4	
RX 39	5.859	6.797	1				4
RX 41	6.609	7.547	1	5		5	
RX 44	7.109	8.047	1				5
RX 45	7.797	8.734	1	6		6	
RX 46	7.688	8.750	1.125				6
RX 47	8.094	9.656	1.625				8
RX 49	10.109	11.047	1	8		8	
RX 50	9.844	11.156	1.250				8
RX 53	12.234	13.172	1	10		10	
RX 54	11.969	13.281	1.250				10
RX 57	14.484	15.422	1	12		12	
RX 63	15.266	17.391	2				14
RX 65	17.984	18.922	1	16			
RX 66	17.719	19.031	1.250			16	
RX 69	20.484	21.422	1	18			
RX 70	20.094	21.656	1.625			18	
RX 73	22.406	23.469	1.250	20			
RX 74	22.094	23.656	1.625			20	
RX 82	1.734	2.672	1		1		
RX 84	1.984	2.922	1		1.1/2		
RX 85	2.484	3.547	1		2		
RX 86	2.891	4.078	1.125		2.1/2		
RX 87	3.266	4.453	1.125		3		
RX 88	4.109	5.484	1.250		4		
RX 89	3.672	5.109	1.250		3.1/2		
RX 90	5.188	6.875	1.750		5		
RX 91	8.922	11.297	1.781		10		
RX 99	8.734	9.672	1	8		8	
RX 201	1.573	2.026	0.445				1.3/8
RX 205	2.016	2.453	0.437				1.13/16
RX 210	3.094	3.844	0.750				2.9/16
RX 215	4.609	5.547	1				4 .1/16

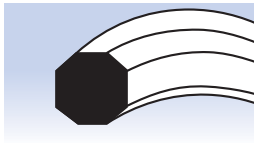
All dimensions are in inches. † Denotes API Std. 6A Ring Joint Gaskets.

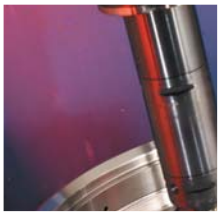
Designed to API specifications for use with grooved flanges on special applications involving high pressure up to 20,000 p.s.i. the 'BX' series is available in ring numbers BX 150 through BX 303 to suit the following flange specifications:

Style 'BX' Ring Joint Gaskets can only be used with special 'BX' grooves and are not interchangeable with the Style 'RX' series.

NOMINAL PIPE SIZE	CLASS RATING AND STANDARD
$1^{11}/_{16}$" - $21^{1}/_{4}$"	5,000-20,000 API 6 BX Flanges

Series 'BX'





Series 'BX' manufactured to the standards ASME B 16.20 - API Std 6A

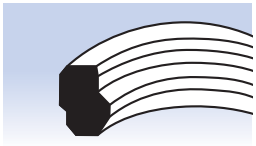
GASKET DIMENSIONS				PRESSURE CLASS RATING					
Ring No.	I/D	O/D	Height	2000	3000	5000	10000	15000	20000
				Nominal Pipe Size					
BX 150	2.110	2.842	0.366				1.11/16	1.11/16	
BX 151	2.250	3.008	0.379				1.13/16	1.13/16	
BX 152	2.528	3.334	0.403				2.1/16	2.1/16	2.1/16
BX 153	3.078	3.974	0.448				2.9/16	2.9/16	2.9/16
BX 154	3.624	4.600	0.488				3.1/16	3.1/16	3.1/16
BX 155	4.705	5.825	0.560				4.1/16	4.1/16	4.1/16
BX 156	7.901	9.637	0.733				7.1/16	7.1/16	7.1/16
BX 157	9.941	11.593	0.826				9	9	
BX 158	12.038	13.860	0.911				11	11	11
BX 159	14.776	16.800	1.012				13.5/8	13.5/8	13.5/8
BX 160	14.768	15.850	0.938			13.5/8			
BX 161	18.071	19.347	1.105			16.3/4			
BX 162	17.600	18.720	0.560			16.3/4	16.3/4	16.3/4	
BX 163	20.528	21.896	1.185			18.3/4			
BX 164	20.527	22.463	1.185				18.3/4	18.3/4	
BX 165	23.139	24.595	1.261			21.1/4			
BX 166	23.140	25.198	1.261				21.1/4		
BX 167	28.864	29.896	1.412	26.3/4					
BX 168	28.864	30.128	1.412		26.3/4				
BX 169	5.813	6.831	0.624				5.1/8		
BX 170	7.464	8.584	0.560				6.5/8	6.5/8	
BX 171	9.409	10.529	0.560				8.9/16	8.9/16	
BX 172	11.993	13.113	0.560				11.5/32	11.5/32	
BX 303	32.237	33.573	1.494	30	30				

Transition rings

Description

Transition rings are used for sealing ring type joints in which the mating flanges have different ring groove diameters. These can be made in any standard ring joint gasket metal. Popular transition combinations are R23/R24, R26/R27, R49/R50 and R65/R66.

Other sizes made with oval or octagonal facings are available to order. When ordering please specify which cross-section is preferred.



Transition rings

PTFE inner rings

Description

Moorflex PTFE inner rings are designed to occupy the cavity between the flange bore and ring joint, fitting closely to the internal diameter of the ring joint and having a small clearance from the bore of the flange.

The use of these components ensures that the effects of discontinuity in pipe bore smoothness are considerably reduced. Turbulence of flow, accumulation of sediment which will not be removed by normal descaling and pig cleaning equipment, and the possibility of corrosion or erosion of flange and joint surfaces are minimised.

Inserts for type 'R' joints have a coarse machined finish, whilst type 'RX' inserts have a deeper grooved profile to control spread under compression within the clearance allowance from the flange bore. Ports permit pressure access to the ring joint to aid venting in the case of sudden system decompression.

Material

Moorflex PTFE inner rings for metallic ring joint gaskets are manufactured from pure PTFE which is chemically inert to nearly all substances. Only molten alkali metals, fluorine and some fluorine compounds at high temperatures and pressures have been known to affect it. PTFE is also suitable for a wide range of temperatures from -200°C to +250°C.

How to order

Inserts are available to suit all metallic ring joint gaskets, and may be ordered by supplying the same information specified for metal ring gaskets.

Flange guard protectors

Description

Moorflex neoprene flange guard protectors may be fitted externally to ring joint gaskets, and ensure that the ingress of moisture and dirt in the joint area is minimised. The installation of flange guard protectors minimises corrosion of the outer flange area, bolts and gasket, and assists in the ease of dismantling.

Material

Moorflex flange guard protectors are manufactured from closed cell neoprene sponge. In use, the material is compressed to ensure the necessary degree of resilience to prevent the ingress of moisture, whilst not allowing the passage of moisture through the material.

How to order

Flange guard protectors are available to suit all metallic ring joint gaskets, and may be ordered by supplying the same information specified for metal ring joint gaskets.