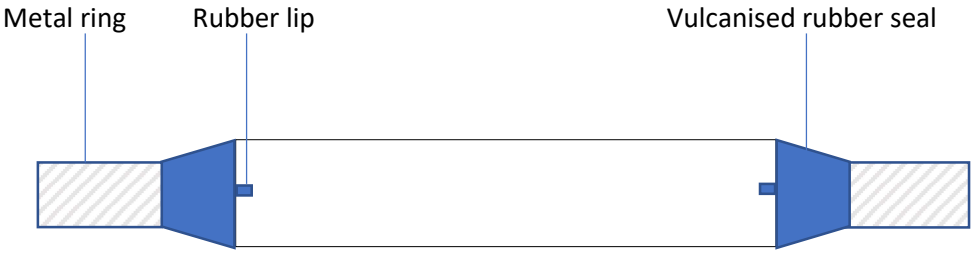


Bonded Seal
-
Material Information

Description

Bonded Seals, or also called Dowty seal/Dowty washer, was originally designed to replace copper type washers in higher pressure systems. The seal represents a combination of metal washer and elastomer sealing lip vulcanised to the edge of the metal part to seal bolted connections and mounting elements in all industrial applications e.g. pipe connections and couplings.



Working principle

When the bolted connection is tightened, the sealing lip is pressed against the flat surfaces. The metal washer ensures that the components to be connected are reliably and securely held. The thickness of the washer limits the compression of the elastomer seal, eliminates any over torque of the joint, thereby ensuring a reliable sealing system. The internal pressure increases the sealing force by energizing the sealing lip.

Applications

Often used as bolt seals in hydraulic equipment. Today, bonded seals are finding usage in many and varied applications throughout industry.

Operation conditions:

Media

Air, water, mineral oils, water-oil-emulsion, gases etc.

Temperature

-40°C to +120°C depending on of rubber type.

Working pressure:

Countersunk mounting – to appr. 1000 bar.
Non-countersunk mounting – outside diameter D ≤ 40 mm to appr. 400 bar.
Non-countersunk mounting – outside diameter D > 40 mm to appr. 250 bar.



Advantages

- Reliable sealing at low and high pressure
- Easy to use, metal/steel prevent over-compression
- Low bolt torque in comparison to fully metallic seals
- Can be pre-assembled
- Cost effective solution for bolt/thread sealing
- No sweating
- Reusable

In addition to these, the self-centralising version offer further advantages:

- The extra lip ensures that the seal is always correctly positioned beneath the bolt head, facilitating fitting.
- The seal remains on attached to the bolt if the bolt is removed.
- Countersinking is unnecessary in low-pressure applications, reduce costs.

Surface roughness

The sealing surface should be smooth and free of burr. Surface roughness Ra ≤ 2,5 µm.

Rubber material

Common rubber types we are working with:

Nitrile
Common name: Buna-N, Nitrile, NBR
ASTM D-2000 classification: BF, BK, BG
Chemical definition: Butadiene Acrylonitrile

Nitrile is one of the most widely used rubber materials due to its combination of low cost, resistance to many chemicals, and good physical properties. The acrylonitrile content of this highly polar elastomer provides excellent oil and gas permeation resistance which increases as the level of ACN increases.

Type:	**Nitrile**
Hardness range (Shore A)	40 – 90
Continuous high temperature limit	110°
Low temperature capacity	-30°
Tensile range (P.S.I)	200 - 3000
Elongation (Max %)	600



Hydrogenated Nitrile

Common name: HNBR
ASTM D-2000 classification: DH
Chemical definition: Hydrogenated Butadiene Acrylonitrile

HNBR is a hydrogenated version of NBR (nitrile) rubber and is widely known for its physical strength and retention of properties after long-term exposure to heat, oil, and chemicals. HNBR is used in a wide range of applications, including automotive (coolant, AdBlue, oil, fuel systems), industrial applications, oil and gas industries, food and pharma, and medical applications.

Type:	**Nitrile**
Hardness range (Shore A)	30 – 95
Continuous high temperature limit	150°
Low temperature capacity	-30°
Tensile range (P.S.I)	1500 - 3000
Elongation (Max %)	550

EPDM

Common name: EPDM
ASTM D-2000 classification: CA
Chemical definition: Ethylene Propylene Diene Monomer

EPDM s one of the most versatile types of rubber and is the most suitable for outdoor applications. It is highly resistant to ageing, even when exposed to the most aggressive external conditions: steam, UV rays, ozone, saltpetre or extreme weather conditions. EPDM maintains its properties even when subjected to a wide range of temperature differences. As a result it is consistently used in general industry and in construction, automotive, marine and outdoor applications.

Type:	**EPDM**
Hardness range (Shore A)	80 – 90
Continuous high temperature limit	120°
Low temperature capacity	-30°
Tensile range (P.S.I)	500 - 2500
Elongation (Max %)	600



Viton® (FKM, FPM)

Viton® is a registered trademark of DuPont Performance Elastomers.

Common name: Viton®, FKM, Fluro Elastomer, Fluorocarbons
ASTM D-2000 classification: HK
Chemical definition: Fluorinated Hydrocarbon

Fluoroelastomers or Fluorocarbons, widely known as Viton®, are among the most suitable rubbers for continuous use at temperatures of 200°C and up to 300°C for short periods. Various grades are available depending upon whether compression set, flexibility (as in diaphragms) or chemical resistance is the prime concern. Fluoroelastomers have excellent resistance to ozone and weathering, oils and most chemicals. They are, however, very expensive, unsuitable for use with phosphate esters and ketones and have poor low temperature capabilities.

Type:	**Viton®**
Hardness range (Shore A)	60 – 90
Continuous high temperature limit	225°
Low temperature capacity	-25°
Tensile range (P.S.I)	500 - 2000
Elongation (Max %)	300

Metal

The most common metal materials we use are:

Mild steel (Carbon steel SAE-AISI 1012)

Hardness, Rockwell B	60
Tensile strength, MPa	370
Yield strength, MPa	310
Elongation at break (in 50 mm)%	19

Stainless steel (AISI 316L, ASTM A240, EN 1.4404)

Hardness, Rockwell B	90
Tensile strength, MPa	530-680
Yield strength, MPa	270
Elongation at break (in 50 mm)%	40

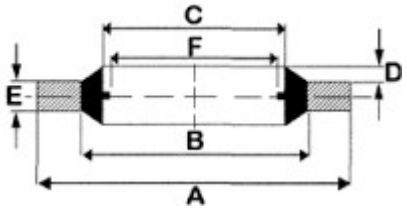
Other types on request.

Surface treatment

The most common surface treatments we use are:

Zinc plating
Yellow zinc (Gold zinc) plating

CRIII free from CR6+.





Inch Bonded Seal Size

item no.	BSP	Size Bolt	A +0.13/-0	B ±0.10	C ±0.10	D +0.25/-0	E Mild steel 0.10/-0	E Stainl. steel 0.10/-0	F ±0.20
		6BA	6.35	4.09	3.05	0.20/0.45	1.20	1.00	-
		4BA	7.26	5.26	4.12	0.20/0.45	1.20	1.00	-
		2BA	8.38	6.35	5.21	0.20/0.45	1.20	1.00	-
		1/4	13.21	8.00	5.21	0.20/0.45	1.20	1.00	4.70
		1/4	13.34	9.53	6.99	0.20/0.45	1.20	1.00	4.70
		5/16	13.34	9.53	8.31	0.20/0.45	1.20	1.00	6.10
		5/16	14.22	10.04	8.64	0.20/0.45	1.20	1.00	6.10
GBR-02	1/8	3/8	15.88	11.84	10.37	0.25/0.51	2.00	2.00	8.56
			18.36	12.45	11.36	0.25/0.51	2.00	2.00	8.56
		7/16	19.05	13.08	11.69	0.25/0.51	2.00	2.00	8.80
GBR-04	1/4	1/2	20.57	15.21	13.74	0.25/0.51	2.00	2.00	11.45
		9/16	22.23	16.39	14.86	0.25/0.51	2.00	2.00	11.58
		0.6	22.23	17.30	15.83	0.25/0.51	2.00	2.00	12.10
		5/8	25.40	18.75	16.51	0.25/0.51	2.00	2.00	14.30
GBR-06	3/8	3/8	23.80	18.75	17.28	0.25/0.51	2.00	2.00	14.96
		11/16	25.40	19.69	18.16	0.25/0.51	2.50	2.50	14.50
		3/4	26.92	21.21	19.69	0.25/0.51	2.50	2.50	15.80
GBR-08	1/2	13/16	28.58	23.01	21.54	0.25/0.51	2.50	2.50	18.64
GBR-10	5/8	7/8	31.75	24.97	23.49	0.25/0.51	2.50	2,50	20.60
		15/16	33.27	26.04	24.26	0.25/0.51	2.50	2.50	20.20
GBR-12	3/4	1.0	34.93	28.53	27.05	0.25/0.51	2.50	2.50	24.13



item no.	Size BSP	Bolt	A +0.13/-0	B ±0.10	C ±0.10	D +0.25/-0	E Mild steel +0.10/-0	E Stainl. steel +0.10/-0	F ±0.20
		1.1/16	38.61	30.61	27.82	0.25/0.51	2.50	2.50	22.90
		11/8	36.58	30.86	29.33	0.25/0.51	2.50	2.50	23.90
		1.3/16	38.10	32.29	30.81	0.25/0.51	2.50	2.50	27.89
		1.5/16	42.80	36.88	33.89	0.25/0.51	2.50	2.50	30.30
		1.1/4	41.40	35.69	32.64	0.25/0.51	3.20	3.00	27.10
GBR-16	1.0	1.5/16	42.80	36.88	33.89	0.25/051	3.20	3.00	30.30
		1.3/8	44.45	38.99	35.94	0.25/0.51	3.20	3.00	29.50
		1.1/2	47.75	42.04	38.96	0.25/0.51	3.20	3.00	32.70
GBR-20	1.1/4	1.5/8	52.38	45.93	42.93	0.25/051	3.20	3.00	38.96
		1.3/4	57.15	48.39	45.34	0.25/0.51	3.20	3.00	37.90
GBR-24	1.1/2	1.7/8	58.60	51.39	48.44	0.25/0.51	3.20	3.00	44.86
			63.50	54.74	51.69	0.25/051	3.20	3.00	43.80
			69.85	58.30	54.89	0.25/0.51	3.20	3.00	50.80
GBR-32	2.0	-	73.03	63.63	60.58	0.25/0.51	3.20	3.00	56.67
		2.1/2	77.72	67.44	64.39	0.25/051	3.20	3.00	55.40
			79.50	69.98	66.68	0.25/051	3.20	3.00	65.80
GBR-40	2.1/2	-	90.17	79.38	76.08	0.25/051	3.20	3.00	72.20
GBR-48	3.0	-	101.47	92.84	89.09	0.25/051	3.20	3.00	85.00

The standard color for Nitrile and EPDM rubber is black and for Viton rubber is brown.

We can make other colors, sizes and material combinations on request.