



Bonded Seals



Danmark

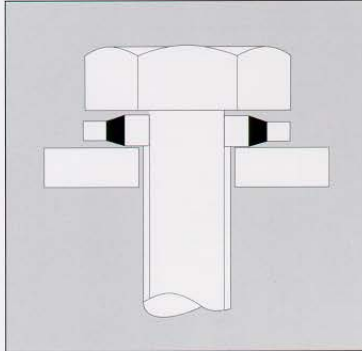
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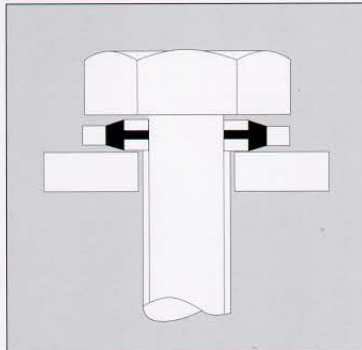
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WASHER SPECIFICATIONS

The Pamargan bonded seal is a rectangular section, metal washer, with a trapezoidal shaped ring of vulcanised rubber bonded to the inside. Both the washer and the material can be selected to suit a given application. The seal is for use in high pressure environments where copper washers are unsuitable.

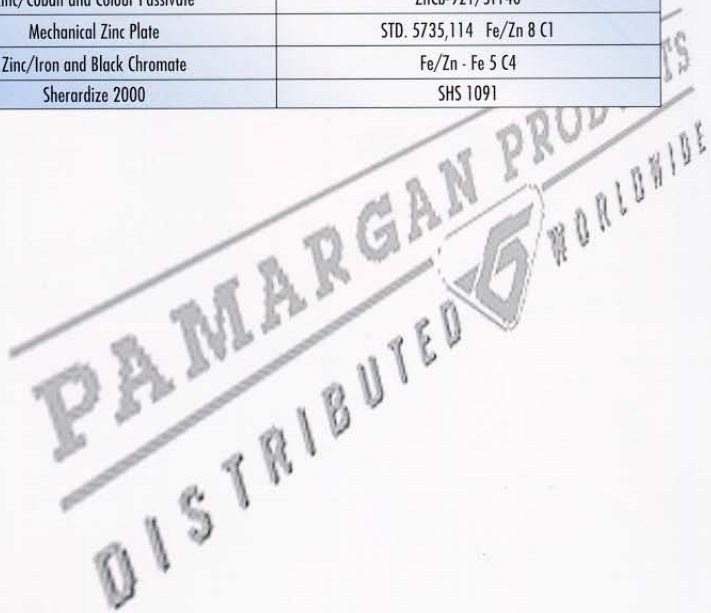


An improvement to the original concept is the self-centring bonded seal – designed by Pamargan – that offers additional benefits. It is available in all popular BSP sizes and many other metric sizes.



METAL	TENSILE STRENGTH MN/m ² (MINIMUM)	SPECIFICATION
Mild Steel Pressings	540	BS 1449 Part 1 CS4 BRH5
Mild Steel Turned	540	BS 970 Part 1 EN8
Stainless Steel Pressings	540	BS 1449 Part 2 T316
Stainless Steel Turned	540	BS 970 Part 1 T303
Stainless Steel Turned	540	BS 970 Part 1 T316
Stainless Steel Turned	540	BS 970 Part 1 T304
Brass Turned	380	BS 2874 CZ 121
Brass Pressings	380	BS 2870 CZ108
Aluminium Bronze Turned	700	BS 2874 CA104
Aluminium Alloy Turned	370	L102 & L168
High Tensile Steel	880	S154
Aluminium Alloy Turned	370	HE 30 (6086 - T6)

SURFACE FINISH	SPECIFICATION
Zinc Plating	Def. STAN. 03-20
Gold Passivate	Def. STAN. 03-33
Cadmium Plating	Def. STAN. 03-19
Chromic Anodise	Def. STAN. 03-24/2
Sulphuric Anodise	Def. STAN. 03-25/2
Clear Passivate	Fe/Zn-5CIA
Zinc/Cobalt and Colour Passivate	ZnCb-921/ST140
Mechanical Zinc Plate	STD. 5735,114 Fe/Zn 8 C1
Zinc/Iron and Black Chromate	Fe/Zn - Fe 5 C4
Sherardize 2000	SHS 1091



RUBBER SPECIFICATIONS

Pamargan's **Nitrile** is based on an Acrylonitrile Butadiene Copolymer material that is resistant to all mineral oils, water and watery liquids, hot air and numerous chemicals. It is a general purpose rubber and is used in a variety of applications.

Pamargan's **Fluorocarbon** material is based on a Fluorocarbon elastometer with an operating temperature of -25°C to

+250°C and is resistant to mineral oils, petrols, a wide range of solvents and many chemicals. In this respect fluorocarbon is superior to other oil resistant materials such as nitrile (NBR) rubber.

Pamargan's **Hydrogenated Nitrile (HNBR)** is a compound with an operating temperature range of +150°C continuous

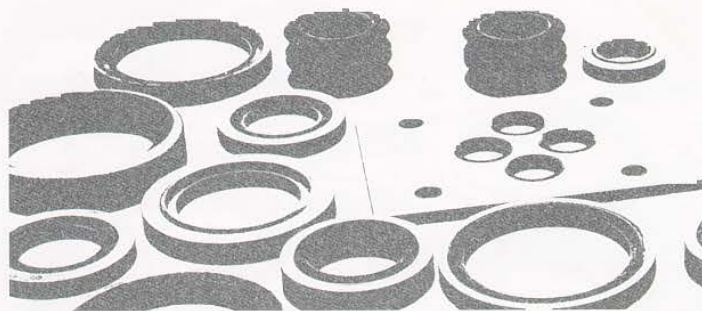
(10,000 hrs) to -30°C continuous.

HNBR has higher tensile strength and wear resistance than NBR, five times higher sour gasoline, sour gas and ozone resistance. The material is highly efficient in oil wells, with resistance to heat, hydrogen sulphide, corrosion inhibitor, oil and steam. HNBR has wide applications in the auto and oil industries.

NITRILE NBR	
Temp. Range: -30°C to +110°C	
Physical Properties	
Hardness IRHD	80-90
Tensile strength Mpa	10.34 Min
Elongation at Break %	100 Min
Specific Gravity	1.30 +/-0.02
Air Aged 70 hours at 100°C	
Hardness change (points)	+/- 15 Max
Tensile strength change %	+/-30 max
Elongation change %	-50 Max
Compression Set	
22 hours at 100°C	25 max
Aged in ASTM no.1 oil 70 hours at 100°C	
Hardness change (points)	-5 to +15
Tensile strength change %	-25 Max
Elongation change %	-45 Max
Volume change %	-10 to +5
Aged in ASTM no.3 oil 70 hours at 100°C	
Hardness change (points)	-10 to +5
Tensile strength change %	-45 Max
Elongation change %	-45 Max
Volume change %	-0 to +25 Max
Aged in ASTM fuel A 70 hours at Room Temp	
Hardness change (points)	+/-10
Tensile strength change %	-25 Max
Elongation change %	-25 Max
Volume change %	-5 to +10
Aged in ASTM fuel B 70 hours at Room Temp	
Hardness change (points)	0 to -30
Tensile Strength change %	-60 Max
Elongation change %	-60 Max
Volume change %	0 to +40 Max
Aged in Water 70 hours at 100°C	
Hardness change (points)	+2.4
Volume change %	+1

FLUOROCARBON	
Temp. Range: -25°C to +250°C	
Physical Properties	
Hardness IRHD	75-85
Tensile strength Mpa	12 Min
Elongation at Break %	200
Specific Gravity	1.83 +/-0.02
Air Aged 168 hours at 200°C	
Hardness change (points)	+5 Max
Tensile strength change %	-10 Max
Elongation change %	-25 max
Compression Set	
70 hours at 150°C	+20 max
Aged in ASTM no.1 oil 7 days at 150°C	
Volume change %	+2
Aged in ASTM no.3 oil 7 days at 150°C	
Volume change %	+2.5
Aged in ASTM Fuel A 3 days at 23°C	
Volume change %	+5 max
Aged in ASTM Fuel B 7 days at 23°C	
Volume change %	+2.5
Aged in ASTM Fuel C 3 days at 23°C	
Volume change %	+4.5
Aged in ASTM Fuel D 3 days at 23°C	
Volume change %	+4.8

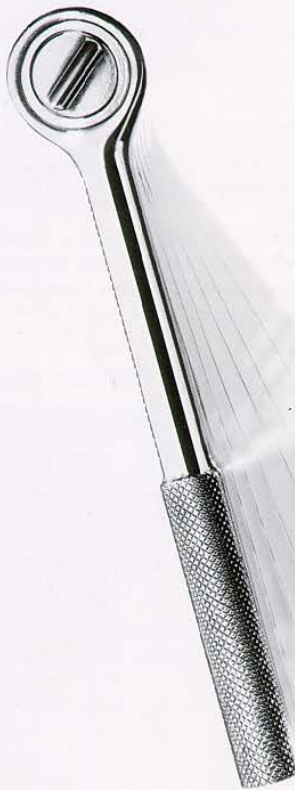
HYDROGENATED NITRILE HNBR	
Temp. Range: -30°C to +150°C	
Physical Properties	
Hardness IRHD	75-85
Tensile strength Mpa	22.4
Elongation at Break %	210
Specific Gravity	1.19 +/-0.02
Air Aged 168 hours at 150°C	
Hardness change (points)	+5
Tensile strength change %	-14.8
Elongation change %	-36.5
Compression Set	
70 hours at 150°C	+25 max
Aged in ASTM no.1 oil 168 hours at 150°C	
Hardness change (points)	-1.0
Tensile strength change %	-14.5
Elongation change %	-22.5
Volume change %	+2.9
Aged in ASTM no.3 oil 168 hours at 150°C	
Hardness change (points)	-8.0
Tensile strength change %	-53.4
Elongation change %	-52.61
Volume change %	+24.2
Aged in Ethylene Glycol 70 hours at 115°C	
Tensile strength change %	-4.6
Elongation change %	-3.8
Volume change %	+0.96



TORQUE LOADING

Satisfactory performance of the seal depends on correct torque loading during assembly. The following table indicates recommended figures.

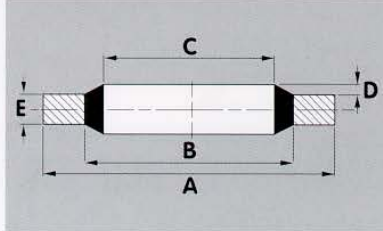
For double sealing, additional torque is generally required.



THREAD SIZE			TORQUE REQUIRED		DOUBLE SEALING FACTOR
METRIC	BOLT	BSP	Nm	lbf.in	
Up to 8	5/16	-	5.3	47+/-3	1.6
10	3/8	1/8	7.1	63+/-3	
11	7/16	-	11.8	105+/-5	1.3
12	1/2	1/4	15.8	140+/-5	
14	9/16	-	22.6	200+/-10	
16	5/8	3/8	30.5	270+/-12	
18	3/4	-	40.7	360+/-15	1.2
20	13/16	1/2	56.5	500+/-25	
22	7/8	5/8	67.8	600+/-30	1.1
24	1.0	3/4	73.4	650+/-30	1.0
27+	1.1/16	-	79.0	700+/-35	

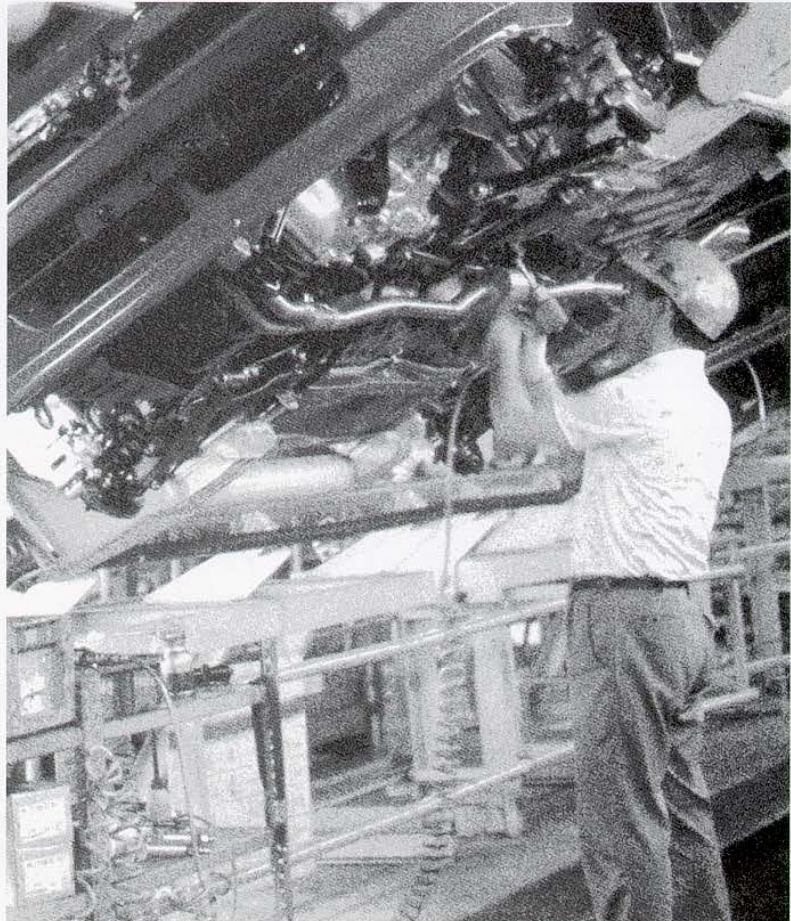


CETOPS (RECOMMENDED IN ISO 1179-1973)



THREAD SIZE BSPF	ALTERNATIVE REFERENCE	A	B	C	D	E	MIN. BURST PRESSURE (BAR)
		+0.00 -0.20	+0.20 -0.00	+0.20 -0.00	+0.25 -0.00	+0.15 -0.15	
1/16	519	12.70	9.90	8.30	0.25	1.25	1100
1/8	510	14.70	12.00	10.40			930
1/4	511	18.70	15.75	13.85			790
3/8	512	22.70	19.25	17.35			775
1/2	513	26.70	23.55	21.65			580
3/4	514	32.50	29.20	27.30			500
1.0	515	39.50	36.10	34.20		2.00	410
1.1/4	516	49.50	44.70	42.80			500
1.1/2	517	55.50	50.60	48.70			430
2.0	518	68.50	62.40	60.50			445

Note: There is a permitted moulding flashline on the inner diameter C in accordance with AGS 1186 All dimensions in mm

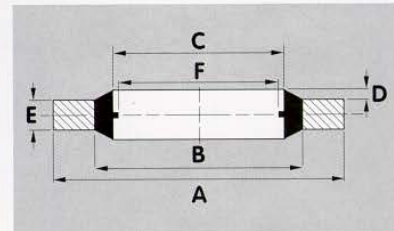
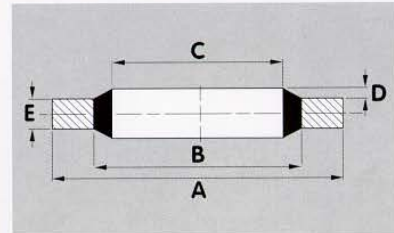


GERMAN METRIC BONDED SEALS

PAMARGAN REFERENCE	ALTERNATIVE REFERENCE	A +0.13 -0.00	B +0.10 -0.10	C +0.10 -0.10	D +0.25 -0.00	E +0.10 -0.10	F +0.20 -0.20	MIN. BURST PRESSURE (BAR)			
PPM3.5	201	7.20	5.20	4.10	0.30	1.00	-	1600			
PPM4	202	7.00	5.40	4.50			3.40	1250			
PPM5	203	9.00	6.80	5.70			4.50	1400			
PPM5	204	10.00	7.40	5.70			4.50	1500			
PPM5.5	205	9.20	7.20	6.20			4.70	1220			
PPM6	206	10.00	8.00	6.70			4.70	1130			
PPM6	207	11.00	8.20	6.70			4.70	1510			
PPM6.7	210	10.20	8.60	7.30			5.77	1330			
PPM8	212	13.00	10.00	8.70			6.40	1330			
PPM8	213	14.00	10.40	8.70			6.40	1550			
PPM8.5	215	13.30	10.50	9.30			6.90	1200			
PPM10	216	15.88	12.00	10.35			0.40	1.50	2.00	8.56	1450
PPM10	217	16.00	12.40	10.70					8.05	1350	
PPM10	218	18.00	12.40	10.70					8.05	1880	
PPM11	219	16.30	12.70	11.40					9.80	1250	
PPM11	221	19.10	13.50	11.80					9.80	1770	
PPM12	222	18.00	14.30	12.70	9.73	1250					
PPM12	223	20.00	14.40	12.70	9.73	1680					
PPM13	225	22.00	15.40	13.70	10.80	1810					
PPM13.5	226	18.70	15.70	14.00	11.30	900					
PPM14	227	22.00	16.40	14.70	11.38	1510					
PPM16	229	24.00	18.40	16.70	13.41	1400					
PPM17	230	24.00	19.20	17.40	13.08	1150					
PPM17.5	231	24.70	20.10	18.00	13.60	1070					
PPM18	232	26.00	20.40	18.70	14.76	1275					
PPM20	233	28.00	22.50	20.70	16.76	1150					
PPM21	234	28.70	23.30	21.50	0.40	2.00			2.50	17.80	1080
PPM22	236	30.00	24.40	22.70			18.74	1100			
PPM24	238	32.00	26.40	24.70			20.11	1050			
PPM26	239	35.00	28.40	26.70			22.30	1050			
PPM27	240	36.00	29.00	27.20			23.30	1130			
PPM30	242	39.00	33.00	31.00			25.70	860			
PPM33	243	42.00	35.80	33.70			28.70	900			
PPM33	244	43.00	36.40	34.30			28.70	880			
PPM36	245	46.00	38.80	36.70			31.10	880			
PPM39	246	51.00	41.90	40.00			2.50	34.10	1020		
PPM42	247	53.00	44.40	42.70				36.50	940		
PPM48	248	59.00	50.80	48.70				3.00	41.90	800	
PPM52	250	64.50	56.40	89.09					-	710	
PPM88	254	101.35	92.10	89.09			3.25	-	510		

KEY FEATURES OF SELF-CENTRALISING:

1. Elimination of seal offset
2. Elimination of leaks
3. Ease of installation
4. Reduced assembly time
5. Captive assembly



For seals that are not self-centralsing refer to conditions of assembly P.14

WHEN ORDERING SELF-CENTRALISING BONDED SEALS ADD SC TO THE PAMARGAN REFERENCE, E.G. SCPPM4

Note: There is a permitted moulding flashline on the inner diameter C in accordance with AGS 1186

All dimensions in mm