Bonded Seals

Bonded Seals are also known as Dowty Seals or Dowty Bonded Washers. They are high pressure seals which are used in the Mechanical, Hydraulic and Pneumatic sectors. They comprise of a metal washer and an elastomeric ring which is bonded inside the diameter. The metal washer prevents over-compression and limits deformation of the elastomeric ring.

CHARACTERISTICS

- Ideal Pressure Gasket
- Reliable sealing at high & low pressure
- High & low temperature capability
- Reduced bolt torque with no loss of tightening loads
- Metal ring prevents rubber compression

The most common washer types are Mild Steel or Stainless steel. Other more unusual metals can be supplied. Different combinations of metal washer and rubber sealing elements can be produced.

Bonded Seals are available in a choice of materials including:

Mild Steel	Stainless Steel	Brass	Aluminium
Nitrile	Viton	EPDM	Silicone

Eastern Seals supply both Standard and Self Centering styles in: Inch, BSP, German Metric, and French Metric.

ORDER REFERENCES: Sample Dowty part No.

Product Reference	Size and Range setting	Rubber Material reference	Metal Outer Ring
BON-	825-	4490-	41

PRODUCT REFERENCES: Bonded Seals - Aerospace 300 Bonded Seals - Industrial 400

SIZE AND RANGE REFERENCES

Select the required size and type of product. Insert the relevant size reference. E.g. 825 = ½" BSP self-centring bonded seal.

RUBBER MATERIAL REFERENCES

Select the material suitable to the application requirements. e.g. 4490 = non released 90 IRHD medium nitrile.

METAL OUTER RING

As with the elastomeric material, preferred metal types should be used if possible.

EASTERN SEALS
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Bonded Seals

BONDED SEALS - METAL OUTER RINGS

Most common used released metals / Most common used industrial metals.

Dowty Metal Reference	Metal Type	Material Specification	Tensile Strength MN/m² (minimum)	Special Plating Conditions
02	MILD STEEL CADMIUM PLATED	BS1449 PART 1: 1983 CS4 BRH 5	540	CADMIUM PLATED TO DTD904C OR DEF STAN 03-19, COLOUR PASSIVATED TO DEF 03-33
12	MILD STEEL CADMIUM PLATED	BS1449 PART 1: 1983 CS4 BRH 5	540	CADMIUM PLATED TO DTD904C OR DEF STAN 03-19 WITH IDENTIFICATION MARKS TO GD1967 COLOUR PASSIVATED TO DEF 03-33
13	MILD STEEL CADMIUM PLATED	BS1449 PART 1: 1983 CS4 BRH 5	540	CADMIUM PLATED TO DTD904C OR DEF STAN 03-19 WITH IDENTIFICATION MARKS TO GD1483
41	MILD STEEL ZINC PLATED	BS1449 PART 1: 1983 CS4 BRH 5	540	ZINC PLATED TO DEF STAN 03-20/1 COLOUR PASSIVATED TO DEF 03-33
08	STAINLESS STEEL TYPE 416	BS1449 PART 2 410 S21	540	
31	STAINLESS STEEL AEROSPACE RELEASED MATERIAL	BS S130	540	LOW MAGNETISM (AUSTENITIC)
74	STAINLESS STEEL TYPE 316	BS1449 PART 2 316 S33	540	
26	HIGH STRENGTH STEEL	BS970 PART 1: 1983 817 M4OU	925	
73	HIGH STRENGTH STEEL CADMIUM PLATED	BS970 PART 1: 1983 817 M4OU	925	CADMIUM PLATED TO DTD904C OR DEF STAN 03-19 COLOUR PASSIVATED TO DEF 03-33
19	LIGHT ALLOY	L102 1971 (1985)	370	
05	LIGHT ALLOY ANODISED	L168:1978 BAR L156:1978 (SHEET & STRIP)	370	ANODISED TO DEF STAN 03-24
16	LIGHT ALLOY ANODISED RED SEE NOTE BELOW	L102 1971 (1985)	370	ANODISED TO DEF STAN 03-24 (RED)
18	LIGHT ALLOY ANODISED GREEN SEE NOTE BELOW	L102 1971 (1985)	370	ANODISED TO DEF STAN 03-24 (GREEN)
10	BRASS	STEEL STRIP BS2870:1980 CZ106 BAR BS2876:1986 CZ121	380	
09	BRASS	STEEL STRIP BS2870:1980 CZ106 BAR BS2876:1986 CZ121	380	CADMIUM PLATED TO DEF STAN 03-33
28	ALUMINIUM BRONZE	BS2874: 1986 CZ104	700	

Note: For identification purpose light alloy 16 (red) is used with 5615 elastomer; light alloy 18 (green) is used with 0073 elastomer.

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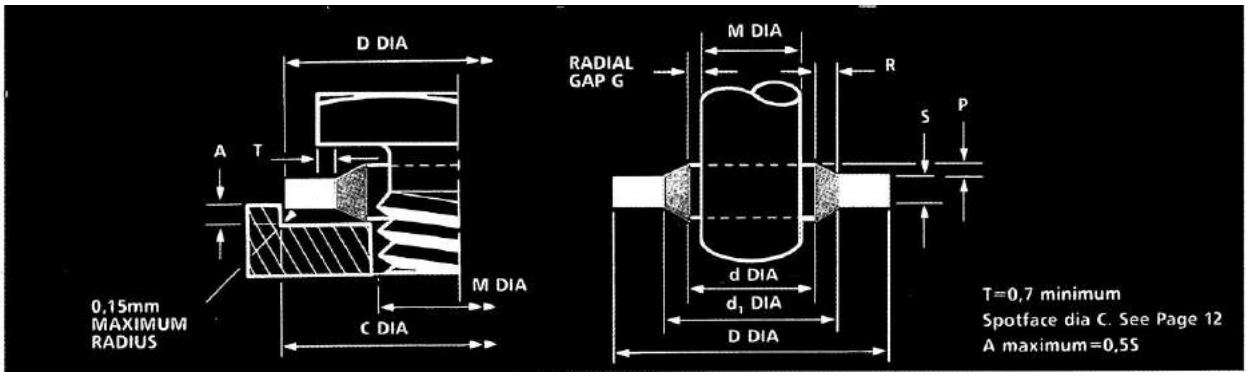
Bonded Seals

BONDED SEALS - ORIGINAL RANGE - BRITISH IMPERIAL

800 References are self- centring
i.e: 82S = ½" S/C



BONDED SEAL													
THREAD DIA M		SIZE REFERENCE		D +0,13 −0,00	d ±0,13	d_1 ±0,13	S		R ±0,13	P	RADIAL GAP G+0,07		MINIMUM BURST PRESSURE BAR
INCH	BSP	***	†								INCH	BSP	
6BA		001	1	6,35	3,05	4,09/4,16			0,54		0,13		2150
4BA		002	2	7,26	4,12	5,26			0,57		0,26		1570
2BA		003	3	8,38	5,21	6,35			0,57		0,26		1360
1/4		004	4	13,21	6,86	8	1,22	+0,15	0,57	0,2/0,38	0,26		2430
1/4		005	5	13,34	6,99	9,53		−0,00	1,27		0,32		1680
5/16		006	6	13,34	8,31	9,53			0,56		0,19		1680
5/16		007	7	14,22	8,64	10,04			0,70		0,35		1750
3/8	1/8	020	A	15,88	10,37	11,84			0,73		0,42	0,32	1480
40		008	8	18,36	11,26	12,45			0,60		0,55		1950
7/16		009	9	19,05	11,69	13,08			0,70		0,29		1890
1/2	1/4	021	B	20,57	13,74	15,21			0,73		0,52	0,29	1540
9/16		010	10	22,23	14,86	16,39	2,00	±0,1	0,76		0,29		1560
60		022	BB	22,23	15,83	17,30			0,73		0,30		1290
5/8		011	11	25,40	16,51	18,75			1,12		0,32		1560
	3/8	023	C	23,80	17,28	18,75			0,73			0,31	1230
11/16		012	12	25,40	18,16	19,69			0,76		0,35		1310
3/4		024	CC	26,92	19,69	21,21			0,76		0,32		1230
13/16	1/2	025	D	28,58	21,54	23,01			0,73		0,45	0,29	1120
7/8	5/8	026	E	31,75	23,49	24,97			0,74		0,63	0,29	1240
15/16		013	13	33,27	24,26	26,04	2,34		0,89		0,23		1275
1	3/4	027	F	34,93	27,05	28,53			0,74		0,82	0,30	1050
1 1/16		028	FF	38,61	27,82	30,61			1,40		0,41		1210
1 1/8		014	14	36,58	29,33	30,86			0,76	0,25/0,51	0,38		880
1 3/16	7/8	029	G	38,10	30,81	32,39			0,74		0,33	0,30	860
1 1/4		015	15	41,40	32,64	35,69	3,25		1,52		0,45		775
1 5/16	1	030	H	42,80	33,89	36,88	3,25		1,50		0,28	0,40	780
1 5/16	1	031	HH	42,80	33,89	36,88	2,34	+0,26	1,50		0,28	0,40	780
1 3/8		016	16	44,45	35,94	38,99		−0,00	1,52		0,51		680
1 1/2		017	17	47,75	38,96	42,04			1,54		0,43		660
1 5/8	1 1/4	032	J	52,38	42,93	45,93			1,50		0,82	0,51	690
1 3/4		018	18	57,15	45,34	48,39			1,52		0,45		870
1 7/8	1 1/2	033	K	58,60	48,44	51,39			1,47		0,40	0,32	690
2		019	19	63,50	51,69	54,74	3,25		1,52		0,45		780
2 1/8	1 3/4	034	L	69,85	54,89	58,30			1,70		0,45	0,57	950
2 1/4		035	LL	70,36	58,04	61,09			1,52		0,45		740
	2	036	M	73,03	60,58	63,63			1,52			0,48	720
2 1/2		037	MM	77,72	64,39	67,44			1,52		0,45		750
	2 1/4	038	N	79,50	66,68	69,98			1,65			0,59	670
	2 1/2	039	P	90,17	76,08	79,38			1,65			0,45	680

Note: *** size reference fourth, fifth, sixth digits. Previous mark numbers for PP45 (industrial) and AGS1186 are shown by symbol †
Burst pressures were calculated using 540MN/m² (35 ton f/in²) UTS steel

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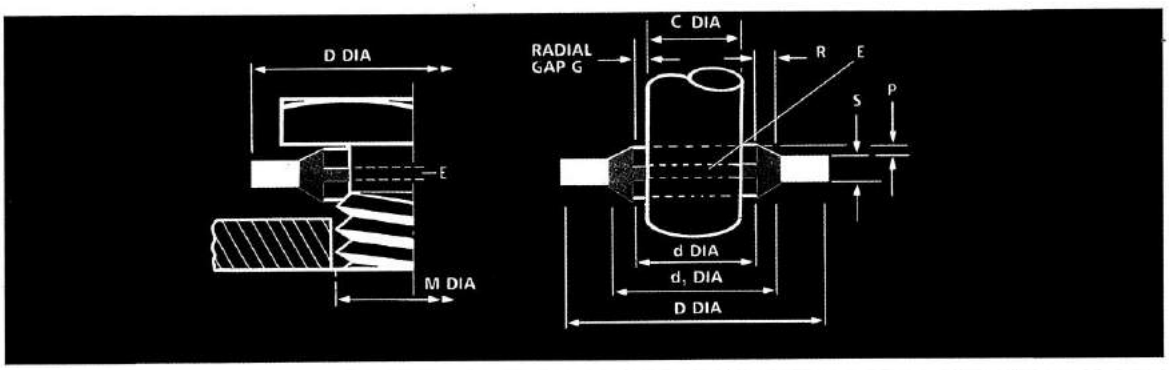
Bonded Seals

BONDED SEALS - SELF-CENTERING RANGE



THREAD SIZE M	SIZE REFERENCE	dø ±0.13	Cø CENTRALISING LIP		E	P	R ±0.1	d1ø ±0.10	Dø +0.13	S ±0.10
M8	866	8.70	6.40	-0+0.25	0.38/0.63	0.25/0.51	0.20	10.40	14.00	1.00
1/8 BSP	820	10.37	8.26					11.84	15.88	2.00
M10	708	10.70	8.05					12.40	16.00	1.50
M12	867	12.70	9.73					14.10	19.00	1.50
1/4 BSP	821	13.74	11.18					15.21	20.57	2.00
M14	868	14.70	11.38					16.40	22.00	1.50
5/8	869	16.51	12.90					18.75	25.40	2.00
M16	870	16.70	13.41					18.40	24.00	1.50
3/8 BSP	823	17.28	14.76					18.75	23.80	2.00
11/16	871	18.16	14.50					19.69	25.40	2.40
M18	872	18.70	14.76					20.40	26.00	1.50
M20	873	20.70	16.76					22.50	28.00	1.50
1/2 BSP	825	21.54	18.24					23.01	28.58	2.47
M22	874	22.70	18.74					24.40	30.00	2.00
5/8 BSP	826	23.49	20.27					24.97	31.75	2.47
M24	875	24.70	20.11					26.40	32.00	2.00
3/4 BSP	827	27.05	23.83					28.53	34.93	2.47
7/8 BSP	829	30.81	27.51	-0+0.37				32.29	38.10	2.47
1 BSP	830	33.89	29.92					36.88	42.80	3.40
1 1/4 BSP	832	42.93	38.45					45.93	52.38	3.40
1 1/2 BSP	833	48.44	44.45					51.39	58.60	3.40
1 3/4 BSP	834	54.89	50.42					58.30	69.85	3.40
2 BSP	836	60.58	56.26					63.63	73.03	3.40
2 1/4 BSP	838	66.68	62.36					69.98	79.50	3.40
2 1/2 BSP	839	76.08	71.50					79.38	90.17	3.40

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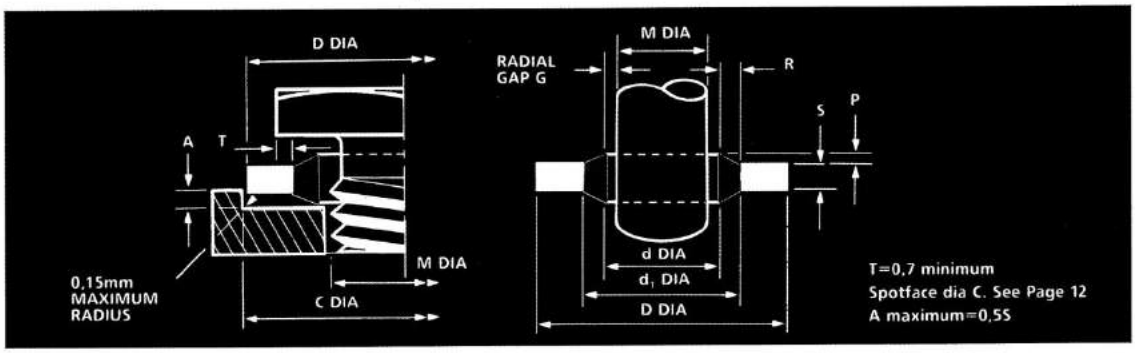
Bonded Seals

BONDED SEALS - GERMAN METRIC RANGE



THREAD SIZE DIA M	SIZE REFERENCE	D +0,13 −0,00	d ±0,10	d_1 ±0,10	S	R ±0,1	P +0,25 −0,00	RADIAL GAP G ±0,05	MINIMUM BURST PRESSURE BAR
3,5	201	7,2	4,1	5,2		0,55		0,30	1600
4	202	7,0	4,5	5,4		0,45		0,25	1270
5	203	9,0	5,7	6,8		0,65		0,35	1400
5	204	10,0	5,7	7,4	1,0±0,1	0,85		0,35	1510
5,5	205	9,2	6,2	7,2		0,5		0,35	1220
6	206	10,0	6,7	8,0		0,65		0,35	1120
6	207	11,0	6,7	8,2		0,75		0,35	1480
6	208	11,0	6,7	8,2	2,5±0,1	0,75	0,30	0,35	1480
6,5	209	12,0	7,1	8,8		0,85		0,30	1560
6,7	210	10,2	7,3	8,6		0,65		0,30	850
8	211	13,4	8,5	9,4		0,45		0,25	1780
8	212	13,0	8,7	10,0	1,0±0,1	0,65		0,35	1330
8	213	14,0	8,7	10,4		0,85		0,35	1510
8	214	16,0	8,7	10,4		0,85		0,35	2150
8,5	215	13,3	9,3	10,5		0,60		0,40	1200
10	216	16,0	10,35	12,0	2,0±0,1	0,82		0,17	1470
10	217	16,0	10,7	12,4		0,85		0,35	1300
10	218	18,0	10,7	12,4		0,85		0,35	1880
11	219	16,3	11,4	12,7	1,5±0,1	0,65	0,40	0,20	1280
11	220	18,5	11,8	13,7		0,95		0,40	1540
11	221	19,1	11,8	13,5		0,85		0,40	1760

Burst pressures were calculated using 540MN/m² (35 ton f/in²) UTS steel

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Bonded Seals

BONDED SEALS - GERMAN METRIC RANGE

THREAD SIZE DIA M	SIZE REFERENCE	D +0,13 −0,00	d ±0,10	d_1 ±0,10	S	R ±0,1	P +0,25 −0,00	RADIAL GAP G ±0,05	MINIMUM BURST PRESSURE BAR
12	222	18,0	12,7	14,4		0,85		0,35	1150
12	223	20,0	12,7	14,4		0,85		0,35	1680
13	224	20,0	13,7	15,4		0,85		0,35	1340
13	225	22,0	13,7	15,4		0,85		0,35	1810
13,5	226	18,7	14,0	15,7		0,85		0,25	900
14	227	22,0	14,7	16,4	1,5±0,1	0,85		0,35	1510
15	228	22,7	16,0	17,78		0,89		0,50	1260
16	229	24,0	16,7	18,4		0,85		0,35	1370
17	230	24,0	17,4	19,2		0,90		0,20	1150
17,5	231	24,7	18,0	20,1		1,05		0,25	1070
18	232	26,0	18,7	20,4		0,85		0,35	1260
20	233	28,0	20,7	22,5		0,90		0,35	1140
21	234	28,7	21,5	23,3	2,5±0,15	0,90		0,25	1080
22	235	28,0	22,5	24,2	1,5±0,1			0,25	760
22	236	30,0	22,7	24,4	2,0±0,1	0,85		0,35	1080
22	237	30,0	22,7	24,4	3,0±0,1	0,85	0,40	0,35	1080
24	238	32,0	24,7	26,4		0,85		0,35	1000
27	240	36,0	27,2	29,0		0,90		0,10	1130
30	242	39,0	31,0	33,0	2,0±0,1	1,0		0,50	870
33	243	42,0	33,7	35,8		1,05		0,35	840
33	244	43,0	34,3	36,4		1,05		0,65	870
36	245	46,0	36,7	38,8		1,05		0,35	890
39	246	51,0	40,0	41,9	2,5±0,1	0,95		0,50	1030
42	247	53,0	42,7	44,4		0,85		0,35	930
48	248	59,0	48,7	50,8		1,05		0,35	790
51	249	60,0	52,0	54,1	3,0±0,15			0,50	540
52	250	64,5	53,3	56,4				0,65	710
60	251	73,0	60,7	63,0		1,15		0,35	780
68	252	79,5	68,6	72,1	3,5±0,15	1,75		0,30	510
75	253	90,3	76,08	79,1	3,38±0,15	1,51		0,54	700
88	254	101,48	89,09	92,1	3,25±0,15	1,50		0,54	510
125	255	143,67	127,0	132,7	5,0±0,15			1,0	420

PREFERRED SIZE WHERE OPTIONS ARE PRESENT

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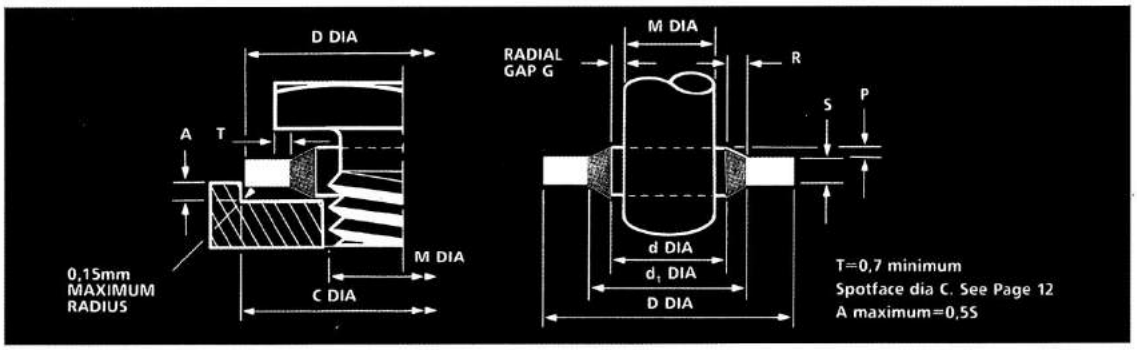
Bonded Seals

BONDED SEALS - FRENCH METRIC RANGE



THREAD SIZE DIA M	SIZE REFERENCE	D +0,13 −0,00	d ±0,10	d_1 ±0,10	S	R ±0,1	P +0,25 −0,00	RADIAL GAP G ±0,05	MINIMUM BURST PRESSURE BAR
3	301	7,5	3,6	5		0,7		0,3	1980
4	302	9	4,6	6		0,7		0,3	2000
5	303	10	5,6	7	1,0±0,1	0,7		0,3	1780
6	304	11	6,6	8		0,7	0,30	0,3	1680
6	305	13,27	6,85	8	1,3±0,1	0,57		0,42	1970
6	306	11,4	7	8,4		0,7		0,5	1540
8	307	13	8,6	10	1,0±0,1	0,7		0,3	1330
10	310	17	10,7	12,1		0,7		0,35	1730
11	312	18,1	11,8	13,2		0,65		0,4	1610
12	313	19	12,7	14,1		0,7		0,4	1530
13	315	20,1	13,8	15,2	1,5±0,1	0,7		0,4	1430
14	316	21	14,7	16,1		0,7		0,35	1370
16	317	23	16,7	18,1		0,7		0,35	1240
16,5	319	23,9	17,2	18,7	2,1±0,1	0,75		0,35	1020
17	318	23,7	17,4	18,8	1,5±0,1	0,7		0,2	1130
18	320	27	18,7	20,4		0,85		0,35	1450
20	321	29	20,7	22,4		0,85		0,35	1340
21	323	30	21,7	23,4		0,85		0,35	1290
22	324	31	22,7	24,4		0,85		0,35	1240
23	325	32	23,7	25,4		0,85	0,40	0,35	965
24	326	33	24,7	26,4	2,0±0,1	0,85		0,35	1160
26	327	35,3	27	28,7		0,85		0,5	860
27	328	36	27,7	29,4		0,85		0,35	1060
28	329	36	28,6	30,3		0,85		0,3	720
28,5	330	37,5	29,2	30,9		0,85		0,35	810
30	331	39	30,7	32,4		0,85		0,35	970
33	332	42	33,7	35,4		0,85		0,35	900
36	333	48	37	39,6		1,3		0,5	1010
39	334	51	40	42,6		1,3		0,5	950
42	335	54	43	45,6	2,5±0,15	1,3		0,5	890
45	336	57	46	48,6		1,3		0,5	860
48	337	60	49	51,6		1,3		0,5	790

Burst pressures were calculated using 540MN/m² (35 ton f/in²) UTS steel

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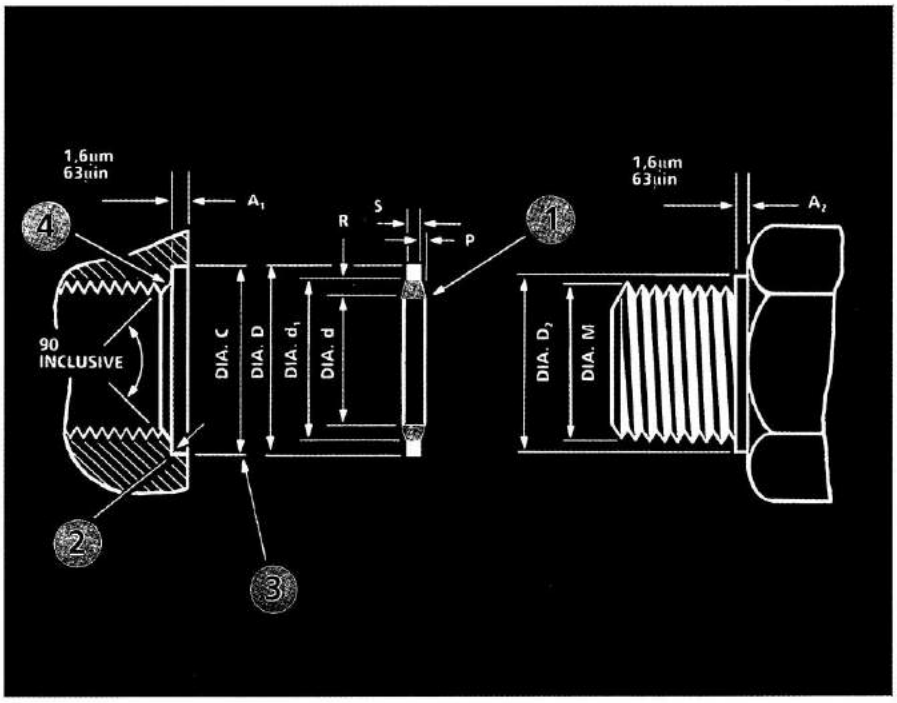
Bonded Seals

BONDED SEALS TO SUIT PIPE CONNECTIONS AND COUPLINGS

(As recommended in ISO1179-1973 (Formerly a CETOP recommendation) Installation data)

Series C



1. IRREGULAR, ADHERING FLASH PERMISSIBLE 0.38mm WIDE MAXIMUM (0.015in)
2. 0.13mm MAXIMUM RADIUS (0.005in)
   THE JOINT SURFACE IS TO BE FLAT AND SQUARE TO THE AXIS OF THE THREAD.
3. CONCENTRICITY TOLERANCE 0.25mm (0.010in) DIAMETER MAXIMUM DATUM THREAD DIAMETER
4. THE DIAMETER OF CHAMFER OR COUNTERBORE FOR REMOVAL OF FIRST THREAD MUST BE CONCENTRIC WITH AND NOT EXCEED THE THREAD DIAMETER

THREAD DIA. 'M' BSP	BONDED SEAL							D_2 +0,5	A A_1 max A_2 min	C +0,4	MINIMUM BURST PRESSURE BAR
	SIZE REF ***	D −0,2	d +0,2	d_1 +0,2	S ±0,15	R ±0,2	P +0,25 −0,00				
1/16	519	12,7	8,3	9,9		0,8		12	1	13	1100
1/8	510	14,7	10,4	12		0,8		14	1	15	930
1/4	511	18,7	13,85	15,75		0,95		18	1,5	19	793
3/8	512	22,7	17,35	19,25	1,25	0,95		22	2	23	775
1/2	513	26,7	21,65	23,55		0,95		26	2,5	27	586
3/4	514	32,5	27,3	29,2		0,95	0,25	32	2,5	33	500
1	515	39,5	34,2	36,1		0,95		39	2,5	40	414
1 1/4	516	49,5	42,8	44,7	2	0,95		49	2,5	50	500
1 1/2	517	55,5	48,7	50,6		0,95		55	2,5	56	434
2	518	68,5	60,5	62,4		0,95		68	3	69	448

Part number example 400-510-4490-41

Burst pressures were calculated using 540 MN/m² (35 ton f/in²), UTS steel

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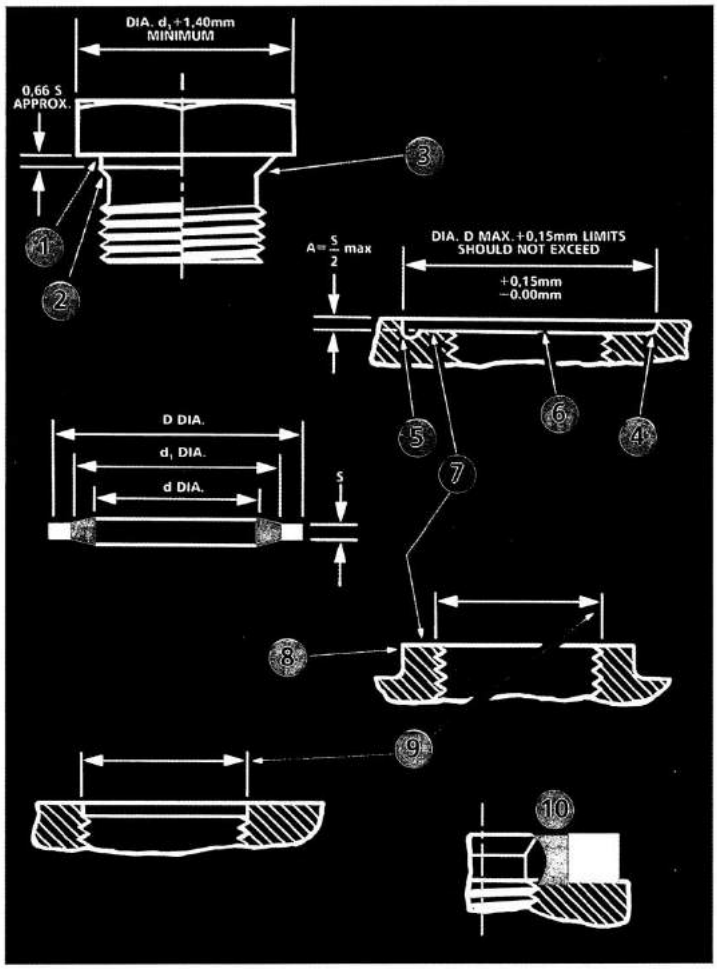
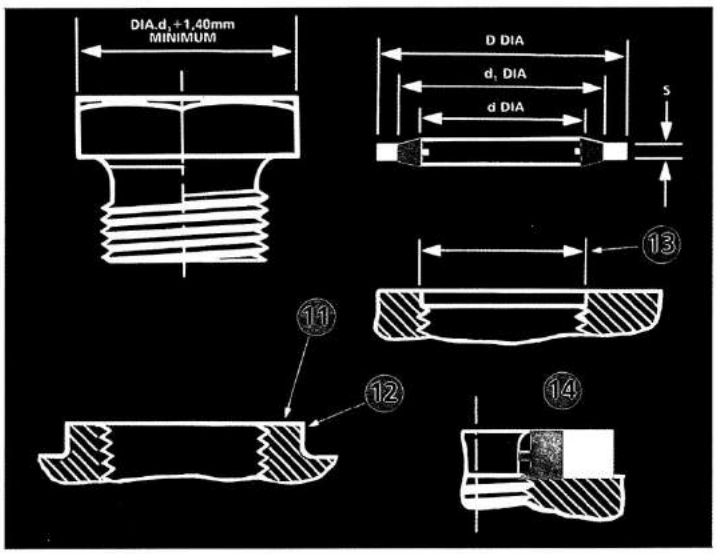
Bonded Seals

BONDED SEALS INSTALLATION DATA





ORIGINAL

1. THIS DIAMETER EQUALS BASIC MAJOR THREAD DIAMETER
2. PLAIN SHOULDER AND ANY FORM OF UNDERCUT
3. TAPER NECK UNDERCUT TO BS. 1936 OR AGS OR SIMILAR STANDARD. A PARALLEL OR SEMI-CIRCULAR FORM WIDTH NOT EXCEEDING S IS ALSO ACCEPTABLE
4. 0.15mm MAX. RADIUS
5. ALTERNATIVE IF LARGER CORNER RADIUS IS REQUIRED
6. RECESS ELIMINATING THE NEED FOR SPECIAL UNDER-CUT OR SHOULDER IN MATING PART
7. FACE TO BE NORMAL TO THREAD WITHIN 0,08mm/25mm RUN.
8. BOSS DIAMETER TO BE EQUAL TO OR GREATER THAN D DIA.
9. THE DIAMETER OF A CHAMFER OR COUNTER-BORE FOR REMOVAL OF FIRST THREAD SHOULD BE CONCENTRIC WITH AND NOT EXCEED THE THREAD DIAMETER
10. DIAGRAM TYPICAL OF THE ASSEMBLY AS IT SHOULD APPEAR AT ANY RADIAL SECTION i.e. RING CENTRALISED AND RUBBER IN FULL CONTACT WITH FLAT FACES.

BONDED SEALS CAPNUT CLOSURES

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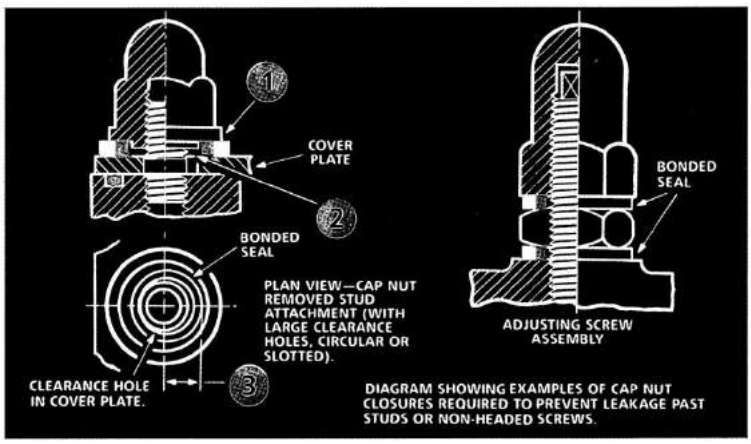
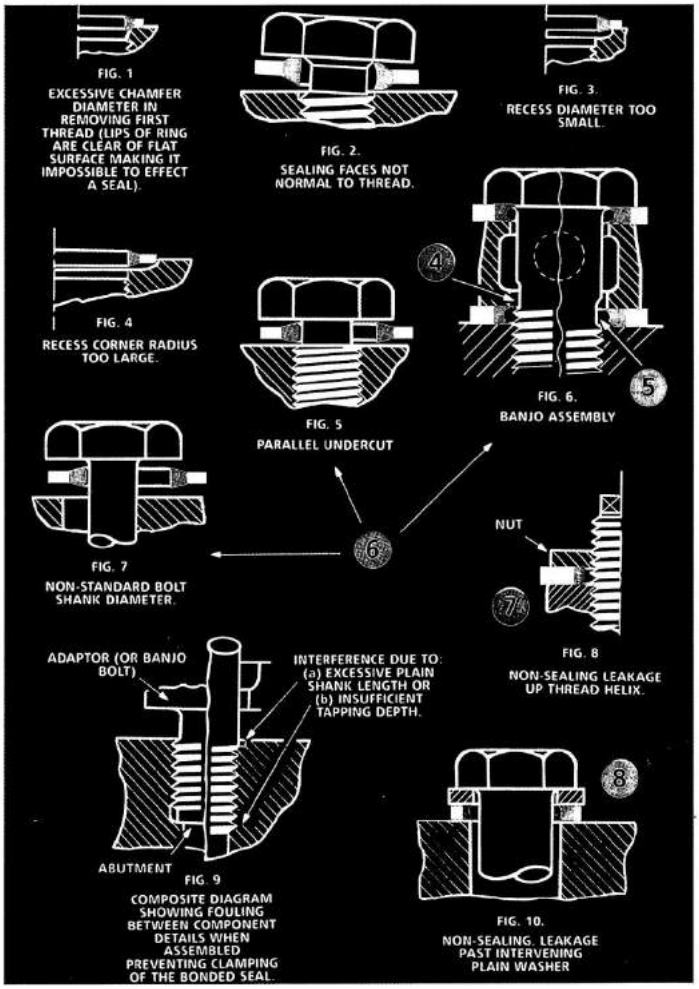


1. THE FLANGE DIAMETER (OR SIZE ACROSS FLATS IF THE CAP NUT IS MACHINED FROM HEXAGON BAR) SHOULD NOT BE LESS THAN THE OUTSIDE DIAMETER OF THE RUBBER RING PLUS 2.0mm.
2. THE SPIGOT DIAMETER SHOULD BE EQUAL TO THE INSIDE DIAMETER OF THE RUBBER RING (MIN.) MINUS 0,75mm AND THE DEPTH ABOUT TWO THIRDS METAL RING THICKNESS.
3. TO BE NOT GREATER THAN INSIDE RADIUS OF RUBBER RING—0.4mm.
4. IF AN UNDERCUT IS PREFFERED TO THREAD RUN-OUT, ENSURE POSITION IS BEYOND BONDED SEAL AS SHOWN THUS PERMITTING THE THREAD TO CENTRALISE THE RING.
5. AVOID HAVING UNDERCUT IN BOLT OPPOSITE BONDED SEAL.
6. FIGURES 5, 6.(IN PART) & 7 ILLUSTRATE CASES IN WHICH (THROUGH NON-INCORPORATION ON COMPONENT DETAILS OF MECHANICAL MEANS OF CENTRALISING) THE BONDED SEAL SHOULD BE HELD CENTRAL WHEN TIGHTENING DOWN TO ENSURE COMPLETE CIRCUMFERENTIAL LIP CONTACT WITH THE FLAT SURFACES.
7. IN FIGURE 8 OR OTHER SIMILAR TYPE OF ASSEMBLY, FLUID WILL LEAK UP THE THREAD HELIX AND PAST THE BONDED SEAL. TO OBTAIN A 100% SEAL THE NUT MUST BE OF THE CAP TYPE.
8. THIS IS INCORRECT. FLUID WILL BYPASS THE BONDED SEAL WITH RESULTANT LEAKAGE.

INSTALLATION FAULTS AND USAGE REMINDERS



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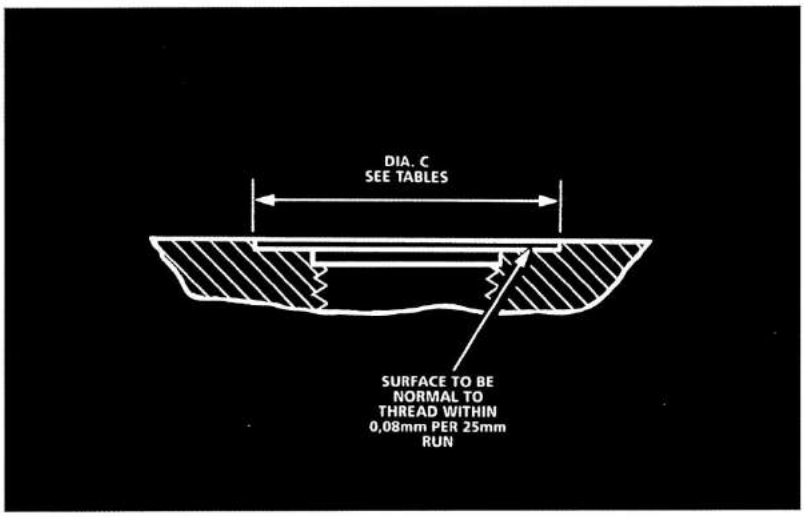
Bonded Seals

BONDED SEALS - SURFACE FINISH



It is important that all possible leakage paths are removed such as spiral or longitudinal machined ridges and excessive roughness. Spot facing is recommended to clean such surfaces.

FLUIDS AND GASES AT PRESSURES OVER 207 BAR (3000lbf/in²)
0,8µm (32µin)

FLUIDS AND GASES AT PRESSURES BELOW 207 BAR (3000lbf/in²)
If lay is circular and concentric
1,6µm (64µm)
Spiral or longitudinal machined ridges 0,8µm (32µin)

WITH PRESSURE DIE CASTING, HOT BRASS STAMPINGS AND SIMILAR DETAILS, THE SURFACE FINISH OBTAINED IS NORMALLY SATISFACTORY FOR PRESSURES BELOW 69 BAR (1000lbf/in²) PROVIDING THE SURFACE IS NORMAL TO THE THREAD WITHIN 0,08mm FOR 25mm RUN.

TORQUE LOADING

THREAD SIZE			TORQUE REQUIRED		FACTOR FOR TANDEM SEALING (EG BANJO ASSEMBLY)
METRIC	IMPERIAL	BSP	Nm	lbf.in	
UP TO 8	5/16		5.3	47	1.6
10	3/8	1/8	7.1	63	
11	7/16		11.8	105	1.3
12	½	¼	15.8	140	
14	9/16	.60x19	22.6	200	
16	5/8	3/8	30.5	270	
18	¾	.75x14	40.7	360	
20	0.825	½	56.5	500	1.2
22	7/8	5/8	67.8	600	1.1
24	1		73.4	650	1
27 AND ABOVE	1.041	¾	79	700	

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