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O Ring Seals

Important Note: The tables and information below are for reference only. The groove dimension and the associated information has been extracted from standards and catalogues. Selection of the O-ring parameters should include consideration of pressures, fluids, materials etc. Final details can only be completed using information from seal suppliers.

Introduction

An O- ring is basically defined by its section diameter and the inner diameter of the O-Ring.

O rings have many advantageous features including

1. Low Cost
2. Suit static and dynamic duties
3. Space efficient
4. Seals in both direction
5. Fluid pressure assists sealing
6. Suitable for all fluids-using appropriate elastomers

There are two current standards for O-rings in the UK

BS 1806:1989 Specification for dimensions of toroidal sealing rings ('O'-rings) and their housings (inch series).

Section sizes according to this standard include: 0.04in(1.02mm), 0.05inch(1.27mm), 0.06inch(1.52m), 0.07inch(1.78mm), 0.103inch(2.62mm), 0.139inch(3.53mm), 0.210inch(5.33mm), , 0.275inch(6.99mm)

BS 4518:1982 Specification for metric dimensions of toroidal sealing rings ('O'-rings) and their housings
Section sizes according to this standard include: 1.6mm, 2.4mm, 3.0mm, 4.1mm, 5.7mm, 8.4mm

O-Ring Reference Number

According to BS4518 the O-Ring reference number =

O-Ring Inside dia (mm - 4 digits -1 decimal place)"-" O Ring Section (mm - 2 digits - 1 decimal place)
with the decimal point excluded.

For example 0545-30 is an O-ring of 54.5mm ID with 3.0 mm section

Surface Texture

The surface texture of the surfaces in contact with the O-ring seals should not exceed

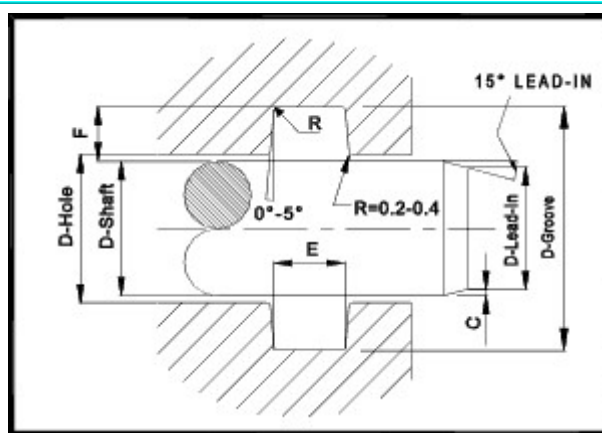
1. For Non Sealing surfaces 1.6 micrometers CLA
2. For static applications 0.8 micrometers CLA
3. For dynamic application 0.4 micrometers CLA

Notes:

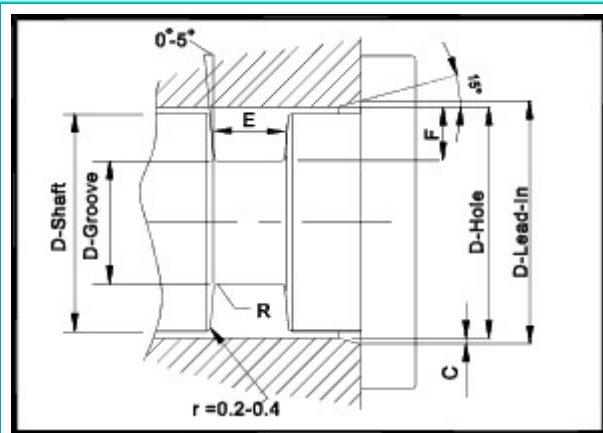
Sealing surfaces are Rod, Hole, and bottom of groove.

For dynamic applications it is important not to have too good a surface finish (less than 0.2 micrometers) as a dry surface would result from the seal wiping action.

Static and Rotating Shaft Seals



Lead-In dia = Shaft dia (nom) - 2x C
 Groove Dia max = Shaft Dia min + 2 x Fmax
 Groove Dia min = Shaft Dia max + 2 x Fmin
 Hole(Cyl) Dia max = Shaft Dia min + G



Lead-In dia = Hole Dia (nom) + 2x C
 Groove Dia Max = Hole dia min - 2 x Fmin
 Groove Dia Min = Hole dia max - 2 x Fmax
 Shaft Dia min = Hole Dia max - G

BS 4518 sizes For Dynamic Pneumatic and Hydraulic Applications

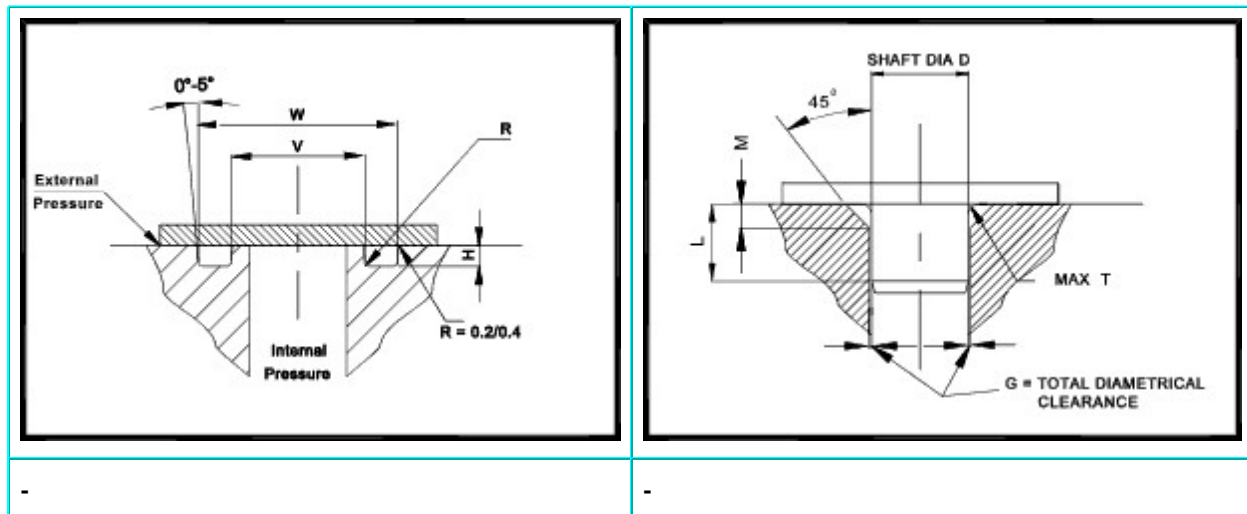
O-Ring Size	2.4mm	3.0mm	5.7mm	8.4mm
Width E	3.2/3.4	4.0/4.2	7.5/7.7	11/11.2
Radial Depth F Hydraulic	1.97/2.09	2.5/2.65	4.95/5.18	7.5/7.75
Radial Depth F Pneumatic	2.13/2.2	2.7/2.77	5.22/5.38	7.75/7.96
Max Clearance G	0.14	0.15	0.18	0.2
Lead_in C	0.6	0.7	1.0	1.2
Max Rad R	0.5	1.0	1.0	1.0

BS 4518 sizes For Static Applications

O-Ring Size	1.6mm	2.4mm	3.0mm	5.7mm	8.4mm
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Width E	2.3/2.5	3.1/3.3	3.7/3.9	6.4/6.8	9.0/9.2
Radial Depth F	1.18/1.25	1.84/1.97	2.35/2.5	4.7/4.95	7.2/7.5
Max Clearance G	0.12	0.14	0.15	0.18	0.2
Lead_in C	.6	0.7	0.8	1.2	1.5
Max Rad R	0.5	0.5	1.0	1.0	1.0

BS 4518 Sizes for Static Face Sealing Applications



BS 4518 sizes For Face Seal Static Applications

O-Ring Size	1.6mm	2.4mm	3.0mm	5.7mm	8.4mm
Depth H	1.2/1.3	1.7/1.8	2.2/2.3	4.4/4.5	6.6/6.7
Max Rad R	0.2	0.5	1.0	1.0	1.0
Max Rad T	0.8	1.3	2.0	3.0	4.0
Chamfer-M	2.2/2.32	3.3/3.42	4.2/4.32	7.8/7.92	11.5/11.62
Min.Len L	4.0	5.0	6.0	10.0	14.0

O Ring Metric Sizes to BS4518

O-Ring Size	1.6mm	2.4mm	3.0mm	5.7mm	8.4mm
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1.6mm O Ring

1.6mm +/- 0.08mm Dia O-ring						
-	Diameters		Flange Groove Diameters			
			Internal Pressure		External Pressure	
Ref. No	Shaft Dia	Hole(Cyl)Dia	Vmax	W(H11)	V(h11)	Wmin
0031-16	3.5	6	1	6.3	3.5	7.5
0041-16	4.5	7	2.3	7.3	4.5	8.5
0051-16	5.5	8	3.3	8.3	5.5	9.5
0061-16	6.5	9	4.3	9.3	6.5	10.5
0071-16	7.5	10	5.8	10.3	7.5	11.5
0081-16	8.5	11	6.8	11.3	8.5	12.5
0091-16	9.5	12	7.8	12.3	9.5	13.5
0101-16	10.5	13	8.8	13.3	10.5	14.5
0111-16	11.5	14	9.8	14.3	11.5	15.5
0121-16	12.5	15	10.8	15.3	12.5	16.5
0131-16	13.5	16	11.8	16.3	13.5	17.5
0141-16	14.5	17	12.8	17.3	14.5	18.5
0151-16	15.5	18	14	18.3	15.5	19.5
0161-16	16.5	19	15	19.3	16.5	20.5
0171-16	17.5	20	16	20.3	17.5	21.5
0181-16	18.5	21	17	21.3	18.5	22.5
0191-16	19.5	22	18	22.3	19.5	23.5
0221-16	22.5	25	21	25.3	22.5	26.5
0251-16	25.5	28	24	28.3	25.5	29.5
0271-16	27.5	30	26	30.3	27.5	31.5
0291-16	29.5	32	28	32.3	29.5	33.5
0321-16	32.5	35	31	35.3	32.5	36.5
0351-16	35.5	38	34	38.3	35.5	39.5
0371-16	37.5	40	36	40.3	37.5	41.5

2.4mm O Ring

2.4mm +/- 0.08mm Dia O-ring						
-	Diameters		Flange Groove Diameters			
Ref. No	Shaft Dia	Hole(Cyl)Dia	Vmax	W(H11)	V(h11)	Wmin
0036-24	4	8	-	8.4	4	10
0046-24	5	9	1	9.4	5	11
0056-24	6	10	2.5	10.4	6	12
0066-24	7	11	4	11.4	7	13
0076-24	8	12	5	12.4	8	14
0086-24	9	13	6.4	13.4	9	15
0096-24	10	14	7.4	14.4	10	16
0106-24	11	15	8.4	15.4	11	17
0116-24	12	16	9.5	16.4	12	18
0126-24	13	17	10.5	17.4	13	19
0136-24	14	18	11.5	18.4	14	20
0146-24	15	19	12.5	19.4	15	21
0156-24	16	20	13.5	20.4	16	22
0166-24	17	21	14.5	21.4	17	23
0176-24	18	22	15.5	22.4	18	24
0186-24	19	23	16.5	23.4	19	25
0196-24	20	24	17.5	24.4	20	26
0206-24	21	25	18.5	25.4	21	27
0216-24	22	26	19.5	26.4	22	28
0246-24	25	29	22.5	29.4	25	31
0276-24	28	32	25.5	32.4	28	34
0296-24	30	34	27.5	34.4	30	36
0316-24	32	36	29.5	36.4	32	38
0346-24	35	39	32.5	39.4	35	41
0356-24	36	40	33.5	40.4	36	42
0376-24	38	42	35.5	42.4	38	44
0396-24	40	44	37.5	44.4	40	46
0416-24	42	46	39.5	46.4	42	48
0446-24	45	49	42.5	49.4	45	51
0456-24	46	50	43.5	50.4	46	52

0476-24	48	52	45.5	52.4	48	54
0496-24	50	54	47.5	54.4	50	56
0516-24	52	56	49.5	56.4	52	58
0546-24	55	59	52.5	59.4	55	61
0556-24	56	60	53.5	60.4	56	62
0576-24	58	62	55.5	62.4	58	64
0586-24	59	63	56.5	63.4	59	65
0596-24	60	64	57.5	64.4	60	66
0616-24	62	66	59.5	66.4	62	68
0626-24	63	67	60.5	67.4	63	69
0646-24	65	69	62.5	69.4	65	71
0676-24	68	72	65.5	72.4	68	74
0696-24	70	74	67.5	74.4	70	76

3.0mm O Ring

3.0mm +/- 0.10mm Dia O-ring						
-	Diameters		Flange Groove Diameters			
Ref. No	Shaft Dia	Hole(Cyl)Dia	Vmax	W(H11)	V(h11)	Wmin
0195-30	20	25	17	25	20	28
0215-30	22	27	19	27	22	30
0225-30	23	28	20	28	23	31
0245-30	25	30	22	30	25	33
0255-30	26	31	23	31	26	34
0265-30	27	32	24	32	27	35
0275-30	28	33	25	33	28	36
0295-30	30	35	27	35	30	38
0315-30	32	37	29	37	32	40
0325-30	33	38	30	38	33	41
0345-30	35	40	32	40	35	43
0355-30	36	41	33	41	36	44
0365-30	37	42	34	42	37	45

0375-30	38	43	35	43	38	46
0395-30	40	45	37	45	40	48
0415-30	42	47	39	47	42	50
0425-30	43	48	40	48	43	51
0445-30	45	50	42	50	45	53
0495-30	50	55	47	55	50	58
0545-30	55	60	52	60	55	63
0555-30	56	61	53	61	56	64
0575-30	58	63	55	63	58	66
0595-30	60	65	57	65	60	68
0625-30	63	68	60	68	63	71
0645-30	65	70	62	70	65	73
0695-30	70	75	67	75	70	78
0745-30	75	80	72	80	75	83
0795-30	80	85	77	85	80	88
0845-30	85	90	82	90	85	93
0895-30	90	95	87	95	90	98
0945-30	95	100	92	100	95	103
0995-30	100	105	97	105	100	108
1045-30	105	110	102	110	105	113
1095-30	110	115	107	115	110	118
1145-30	115	120	112	120	115	123
1195-30	120	125	117	125	120	128
1245-30	125	130	122	130	125	133
1295-30	130	135	127	135	130	138
1345-30	135	140	132	140	135	143
1395-30	140	145	137	145	140	148
1445-30	145	150	142	150	145	153
1495-30	150	155	147	155	150	158
1545-30	155	160	152	160	155	163
1595-30	160	165	157	165	160	168
1645-30	165	170	162	170	165	173
1695-30	170	175	167	175	170	178
1745-30	175	180	172	180	175	183

1795-30	180	185	177	185	180	188
1845-30	185	190	182	190	185	193
1895-30	190	195	187	195	190	198
1945-30	195	200	192	200	195	203
1995-30	200	205	197	205	200	208
2095-30	210	215	207	215	210	218
2195-30	220	225	217	225	220	228
2295-30	230	235	227	235	230	238
2395-30	240	245	237	245	240	248
2445-30	245	250	242	250	245	253
2495-30	250	255	247	255	250	258

5.7mm O Ring

5.7mm +/- 0.12mm Dia O-ring						
-	Diameters		Flange Groove Diameters			
Ref. No	Shaft Dia	Hole(Cyl)Dia	Vmax	W(H11)	V(h11)	W min
0443-57	45	55	41	55	45	59
0453-57	46	56	42	56	46	60
0493-57	50	60	46	60	50	64
0523-57	53	63	49	63	53	67
0543-57	55	65	51	65	55	69
0553-57	56	66	52	66	56	70
0593-57	60	70	56	70	60	74
0623-57	63	73	59	73	63	77
0643-57	65	75	61	75	65	79
0693-57	70	80	66	80	70	84
0743-57	75	85	71	85	75	89
0793-57	80	90	76	90	80	94
0843-57	85	95	81	95	85	99
0893-57	90	100	86	100	90	104
0943-57	95	105	91	105	95	109

0993-57	100	110	96	110	100	114
1043-57	105	115	101	115	105	119
1093-57	110	120	106	120	110	124
1143-57	115	125	111	125	115	129
1193-57	120	130	116	130	120	134
1243-57	125	135	121	135	125	139
1293-57	130	140	126	140	130	144
1343-57	135	145	131	145	135	149
1393-57	140	150	136	150	140	154
1443-57	145	155	141	155	145	159
1493-57	150	160	146	160	150	164
1543-57	155	165	151	165	155	169
1593-57	160	170	156	170	160	174
1643-57	165	175	161	175	165	179
1693-57	170	180	166	180	170	184
1743-57	175	185	171	185	175	189
1793-57	180	190	176	190	180	194
1843-57	185	195	181	195	185	199
1893-57	190	200	186	199	190	204
1943-57	195	205	191	204	195	209
1993-57	200	210	195	209	200	214
2093-57	210	220	205	219	210	224
2193-57	220	230	215	229	220	234
2293-57	230	240	225	239	230	244
2393-57	240	250	235	249	240	254
2493-57	250	260	245	259	250	264
2593-57	260	270	255	269	261	275
2693-57	270	280	265	279	271	285
2793-57	280	290	275	289	281	295
2893-57	290	300	285	299	291	305
2993-57	300	310	295	309	301	315
3093-57	310	320	305	319	311	325
3193-57	320	330	315	329	321	335
3393-57	340	350	335	349	341	355

3593-57	360	370	355	369	361	375
3793-57	380	390	375	389	381	395
3893-57	390	400	385	399	391	405
3993-57	400	410	395	409	401	415
4193-57	420	430	415	429	422	436
4393-57	440	450	435	449	442	456
4593-57	460	470	455	469	462	476
4793-57	480	490	475	489	482	496
4893-57	490	500	485	499	492	506
4993-57	500	510	495	509	502	516

8.4mm O Ring

8.4mm +/- 0.15mm Dia O-ring						
-	Diameters		Flange Groove Diameters			
Ref. No	Shaft Dia	Hole(Cyl)Dia	Vmax	W(H11)	V(h11)	W min
1441-84	145	160	140	160	145	165
1491-84	150	165	145	165	150	170
1541-84	155	170	150	170	155	175
1591-84	160	175	155	175	160	180
1641-84	165	180	160	180	165	185
1691-84	170	185	165	185	170	190
1741-84	175	190	170	190	175	195
1791-84	180	195	175	195	180	200
1841-84	185	200	180	200	185	205
1891-84	190	205	185	205	190	210
1941-84	195	210	190	210	195	215
1991-84	200	215	195	215	200	220
2041-84	205	220	200	220	205	225
2091-84	210	225	205	225	210	230
2191-84	220	235	215	235	220	240

2291-84	230	245	225	245	230	250
2341-84	235	250	230	250	235	255
2391-84	240	255	235	255	240	260
2491-84	250	265	245	265	250	270

Links Providing information on O Ring Seals

1. [James Walker](#) Well known UK Supplier
2. [Garlock](#) A supplier of a wide range of seal products
3. [Supaseal](#) -Lots of information and seal dimensions
4. [mdmetric](#) Downloads including information on metric O-rings
5. [Trelleborg](#) A supplier homepage including lots of useful technical information including an O -ring calculator

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Roy Beardmore passed away on 9th March 2013. He is sadly missed. This website, Roymech, has been an invaluable resource for engineers around the world and we hope to maintain this incredible legacy going forward.

Have a question? [Contact us](#).