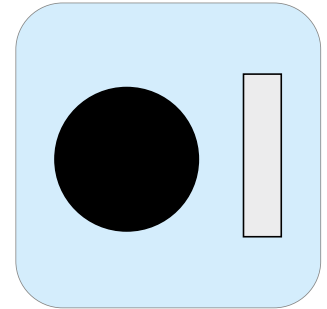


O RING AND BACK UP RING

OR & BRT

O-RING



Features:

O-Rings are ring shaped seals of circular cross section. They are mainly used to seal machined components-in static situations - against fluid and gaseous media. In certain conditions, they can be used as a dynamic sealing element for axial, rotating and oscillating movement.

Composition:

SEAL COMBINATION	SEAL COMPOSITION	TEMPERATURE RANGE	WORKING PRESSURE (Max.)		SURFACE SPEED
			WITHOUT BACK-UP	WITH BACK-UP	
OR7N	NB02	-35 to +100°C	110 Bar	250 Bar	0.5 m/s
OR9N	NB01	-35 to +100°C	160 Bar	400 Bar	0.5 m/s
OR8F	VT01	-25 to +200°C	110 Bar	400 Bar	0.5 m/s
ORPU	PU01/PU20/PU64	-40 to +100°C	320 Bar	-	0.5 m/s

For compound detail please refer Royal seal compounds (section - III)

* For O ring size list in Polyurethane ask ROYAL at info@royalcomposites.co.in / info@royalseals.co.in

Properties:-

- O ring can be used for both static and dynamic sealing application
- Wide temperature range
- Easy installation

Application:

- All sort of hydraulic and pneumatic sealing system

Surface finish:

Roughness depth	R(max)	Ra
Sliding surface	≤ 2.5 μm	0.05-0.3 μm
Bottom of groove	≤ 6.3 μm	≤ 1.6 μm
Side of groove	≤ 15 μm	≤ 3μm

Fitting:

Careful fitting of the seal is a prerequisite for its perfect functioning.



BACKUP RING

Features:

Standard backup element with rectangular cross section.

Composition:

SEAL COMBINATION	SEAL COMPOSITION	TEMPERATURE RANGE	WORKING PRESSURE (Max.)	SURFACE SPEED
BRT	PT01	-55 to +200°C	400 Bar	4 m/s
BRH	HY02	-40 to +110°C	320 Bar	0.5 m/s
BRN	NB01	-35 to +100°C	250 Bar	0.5 m/s
BRBT	PT02	-55 to +200°C	400 Bar	4 m/s

For compound detail please refer Royal seal compounds (section - III)

Application:

Backup element to prevent gap extrusion of radially sealing O-Rings and Rod seals in dynamic sealing.

Surface finish:

Roughness depth	R(max)	Ra
Sliding surface	≤ 2.5 μm	0.05-0.3 μm
Bottom of groove	≤ 6.3 μm	≤ 1.6 μm
Side of groove	≤ 15 μm	≤ 3μm

Fitting:

Careful fitting is prerequisite for perfect functioning of the backup ring.

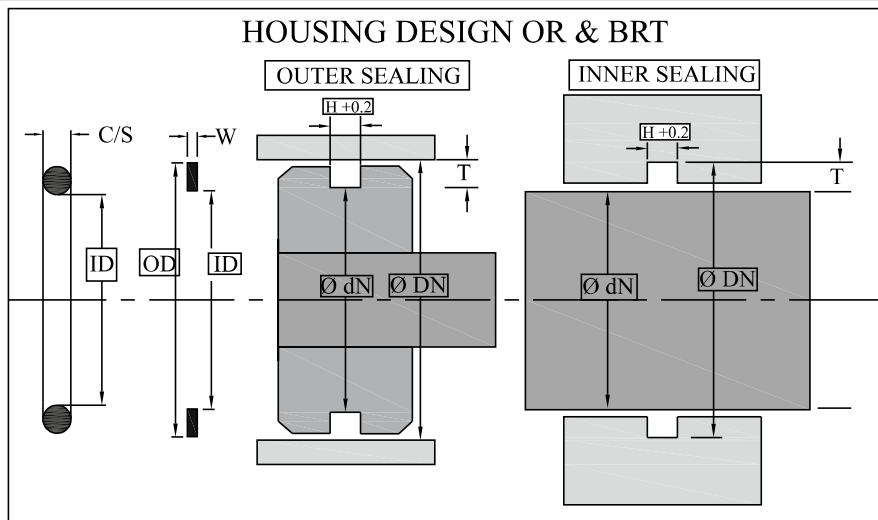
Ordering format:

Please mention ROYAL order code in your order.

Example: Size 25 X 30 X 1.3

Order code for BRT (Pure PTFE) is **BRT-G-025**

Order code for BRH (Hytrel) is **BRH-G-025**



ROYAL STANDARD SIZE LIST

CROSS SECTION		GLAND DEPTH(MM) T					H+0.2(MM)			BACKUP RING W (-0.10)
C/S	TOL.	STATIC RADIAL	STATIC AXIAL	DYNAMIC	PNUE.	TOL.	NO BACK UP	ONE BACK UP	TWO BACK UP	THICKNESS
1.78	±0.08	1.40	1.30	1.45	1.55	±0.02	2.40	3.60	4.80	1.20
1.90	±0.08	1.60	1.50	1.50	1.60	±0.02	2.50	3.70	4.90	1.20
2.40	±0.09	2.00	2.00	2.00	2.15	±0.02	3.20	4.40	5.60	1.20
2.62	±0.08	2.10	2.10	2.20	2.35	±0.02	3.60	4.80	6.00	1.20
3.10	±0.10	2.50	2.50	2.50	2.60	±0.02	4.10	5.50	6.90	1.40
3.50	±0.10	2.90	2.80	3.05	3.15	±0.05	4.70	6.10	7.50	1.40
3.53	±0.10	2.90	2.80	3.05	3.15	±0.05	4.80	6.20	7.60	1.40
5.33	±0.13	4.50	4.35	4.65	4.85	±0.05	7.20	9.20	11.20	2.00
5.70	±0.13	5.00	5.00	5.00	5.20	±0.05	7.50	9.50	11.50	2.00
6.99	±0.15	5.90	5.75	6.20	6.40	±0.05	9.60	12.10	14.60	2.50
8.40	±0.15	7.50	7.50	7.50	7.85	±0.05	11.00	13.50	16.00	2.50

O RING INSIDE DIAMETER TOLERANCES

I.D. (mm)	2.80 to 6.30	6.31 to 11.20	11.21 to 21.20	21.21 to 40.00	41.20 to 80.00	80.01 to 160	165 to 300	300 to 650
TOL.(mm)	±0.13 mm	±0.16 mm	±0.19 mm	±0.95%	±0.86%	±0.78%	±0.74%	±0.67%
of corresponding inside diameter								

* Above dimensions are just Recommendation. Please consider actual Application before finalising Groove Dimensions



ROYAL STANDARD SIZE LIST			
I.D.	C/S	O RING (N=NBR, F=FPM) ORDER CODE	BACKUP RING ORDER CODE
CROSS SECTION 1.9 mm			
2.8	1.90	OR-N/F-P-003	BRT-P-003
3.8	1.90	OR-N/F-P-004	BRT-P-004
4.8	1.90	OR-N/F-P-005	BRT-P-005
5.8	1.90	OR-N/F-P-006	BRT-P-006
6.8	1.90	OR-N/F-P-007	BRT-P-007
7.8	1.90	OR-N/F-P-008	BRT-P-008
8.8	1.90	OR-N/F-P-009	BRT-P-009
9.8	1.90	OR-N/F-P-010	BRT-P-010
CROSS SECTION 2.4 mm			
9.8	2.40	OR-N/F-P-010A	BRT-P-010A
10.8	2.40	OR-N/F-P-011	BRT-P-011
11	2.40	OR-N/F-P-011.2	BRT-P-011.2
11.8	2.40	OR-N/F-P-012	BRT-P-012
12.3	2.40	OR-N/F-P-012.5	BRT-P-012.5
13.8	2.40	OR-N/F-P-014	BRT-P-014
14.8	2.40	OR-N/F-P-015	BRT-P-015
15.8	2.40	OR-N/F-P-016	BRT-P-016
17.8	2.40	OR-N/F-P-018	BRT-P-018
19.8	2.40	OR-N/F-P-020	BRT-P-020
20.8	2.40	OR-N/F-P-021	BRT-P-021
21.8	2.40	OR-N/F-P-022	BRT-P-022
CROSS SECTION 3.1 mm			
24.4	3.10	OR-N/F-G-025	BRT-G-025
29.4	3.10	OR-N/F-G-030	BRT-G-030
34.4	3.10	OR-N/F-G-035	BRT-G-035
39.4	3.10	OR-N/F-G-040	BRT-G-040
44.4	3.10	OR-N/F-G-045	BRT-G-045
49.4	3.10	OR-N/F-G-050	BRT-G-050
54.4	3.10	OR-N/F-G-055	BRT-G-055
59.4	3.10	OR-N/F-G-060	BRT-G-060
64.4	3.10	OR-N/F-G-065	BRT-G-065
69.4	3.10	OR-N/F-G-070	BRT-G-070
74.4	3.10	OR-N/F-G-075	BRT-G-075
79.4	3.10	OR-N/F-G-080	BRT-G-080
84.4	3.10	OR-N/F-G-085	BRT-G-085
89.4	3.10	OR-N/F-G-090	BRT-G-090
94.4	3.10	OR-N/F-G-095	BRT-G-095
99.4	3.10	OR-N/F-G-100	BRT-G-100
104.4	3.10	OR-N/F-G-105	BRT-G-105
109.4	3.10	OR-N/F-G-110	BRT-G-110
114.4	3.10	OR-N/F-G-115	BRT-G-115
119.4	3.10	OR-N/F-G-120	BRT-G-120



ROYAL STANDARD SIZE LIST			
I.D.	C/S	O RING (N=NBR, F=FPM) ORDER CODE	BACKUP RING ORDER CODE
124.4	3.10	OR-N/F-G-125	BRT-G-125
129.4	3.10	OR-N/F-G-130	BRT-G-130
134.4	3.10	OR-N/F-G-135	BRT-G-135
139.4	3.10	OR-N/F-G-140	BRT-G-140
144.4	3.10	OR-N/F-G-145	BRT-G-145
CROSS SECTION 3.50 mm			
21.7	3.5	OR-N/F-P-022A	BRT-P-022A
22.1	3.5	OR-N/F-P-022.4	BRT-P-022.4
23.7	3.5	OR-N/F-P-024	BRT-P-024
24.7	3.5	OR-N/F-P-025	BRT-P-025
25.2	3.5	OR-N/F-P-025.5	BRT-P-025.5
25.7	3.5	OR-N/F-P-026	BRT-P-026
27.7	3.5	OR-N/F-P-028	BRT-P-028
28.7	3.5	OR-N/F-P-029	BRT-P-029
29.2	3.5	OR-N/F-P-029.5	BRT-P-029.5
29.7	3.5	OR-N/F-P-030	BRT-P-030
30.7	3.5	OR-N/F-P-031	BRT-P-031
31.2	3.5	OR-N/F-P-031.5	BRT-P-031.5
31.7	3.5	OR-N/F-P-032	BRT-P-032
33.7	3.5	OR-N/F-P-034	BRT-P-034
34.7	3.5	OR-N/F-P-035	BRT-P-035
35.2	3.5	OR-N/F-P-035.5	BRT-P-035.5
35.7	3.5	OR-N/F-P-036	BRT-P-036
37.7	3.5	OR-N/F-P-038	BRT-P-038
38.7	3.5	OR-N/F-P-039	BRT-P-039
39.7	3.5	OR-N/F-P-040	BRT-P-040
40.7	3.5	OR-N/F-P-041	BRT-P-041
41.7	3.5	OR-N/F-P-042	BRT-P-042
43.7	3.5	OR-N/F-P-044	BRT-P-044
44.7	3.5	OR-N/F-P-045	BRT-P-045
45.7	3.5	OR-N/F-P-046	BRT-P-046
47.7	3.5	OR-N/F-P-048	BRT-P-048
48.7	3.5	OR-N/F-P-049	BRT-P-049
49.7	3.5	OR-N/F-P-050	BRT-P-050
CROSS SECTION 5.70 mm			
47.6	5.7	OR-N/F-P-048A	BRT-P-048A
49.6	5.7	OR-N/F-P-050A	BRT-P-050A
51.6	5.7	OR-N/F-P-052	BRT-P-052
52.6	5.7	OR-N/F-P-053	BRT-P-053
54.6	5.7	OR-N/F-P-055	BRT-P-055
55.6	5.7	OR-N/F-P-056	BRT-P-056
57.6	5.7	OR-N/F-P-058	BRT-P-058
59.6	5.7	OR-N/F-P-060	BRT-P-060
61.6	5.7	OR-N/F-P-062	BRT-P-062
62.6	5.7	OR-N/F-P-063	BRT-P-063



ROYAL STANDARD SIZE LIST			
I.D.	C/S	O RING (N=NBR, F=FPM) ORDER CODE	BACKUP RING ORDER CODE
64.6	5.7	OR-N/F-P-065	BRT-P-065
66.6	5.7	OR-N/F-P-067	BRT-P-067
69.6	5.7	OR-N/F-P-070	BRT-P-070
70.6	5.7	OR-N/F-P-071	BRT-P-071
74.6	5.7	OR-N/F-P-075	BRT-P-075
79.6	5.7	OR-N/F-P-080	BRT-P-080
84.6	5.7	OR-N/F-P-085	BRT-P-085
89.6	5.7	OR-N/F-P-090	BRT-P-090
94.6	5.7	OR-N/F-P-095	BRT-P-095
99.6	5.7	OR-N/F-P-100	BRT-P-100
101.6	5.7	OR-N/F-P-102	BRT-P-102
104.6	5.7	OR-N/F-P-105	BRT-P-105
109.6	5.7	OR-N/F-P-110	BRT-P-110
111.6	5.7	OR-N/F-P-112	BRT-P-112
114.6	5.7	OR-N/F-P-115	BRT-P-115
119.6	5.7	OR-N/F-P-120	BRT-P-120
124.6	5.7	OR-N/F-P-125	BRT-P-125
129.6	5.7	OR-N/F-P-130	BRT-P-130
131.6	5.7	OR-N/F-P-132	BRT-P-132
134.6	5.7	OR-N/F-P-135	BRT-P-135
139.6	5.7	OR-N/F-P-140	BRT-P-140
144.6	5.7	OR-N/F-P-145	BRT-P-145
149.6	5.7	OR-N/F-P-150	BRT-P-150
149.3	5.7	OR-N/F-G-150	BRT-G-150
154.3	5.7	OR-N/F-G-155	BRT-G-155
159.3	5.7	OR-N/F-G-160	BRT-G-160
164.3	5.7	OR-N/F-G-165	BRT-G-165
169.3	5.7	OR-N/F-G-170	BRT-G-170
174.3	5.7	OR-N/F-G-175	BRT-G-175
179.3	5.7	OR-N/F-G-180	BRT-G-180
184.3	5.7	OR-N/F-G-185	BRT-G-185
189.3	5.7	OR-N/F-G-190	BRT-G-190
194.3	5.7	OR-N/F-G-195	BRT-G-195
199.3	5.7	OR-N/F-G-200	BRT-G-200
204.3	5.7	OR-N/F-G-205	BRT-G-205
209.3	5.7	OR-N/F-G-210	BRT-G-210
214.3	5.7	OR-N/F-G-215	BRT-G-215
219.3	5.7	OR-N/F-G-220	BRT-G-220
224.3	5.7	OR-N/F-G-225	BRT-G-225
229.3	5.7	OR-N/F-G-230	BRT-G-230
234.3	5.7	OR-N/F-G-235	BRT-G-235
239.3	5.7	OR-N/F-G-240	BRT-G-240
244.3	5.7	OR-N/F-G-245	BRT-G-245
249.3	5.7	OR-N/F-G-250	BRT-G-250
254.3	5.7	OR-N/F-G-255	BRT-G-255
259.3	5.7	OR-N/F-G-260	BRT-G-260



ROYAL STANDARD SIZE LIST			
I.D.	C/S	O RING (N=NBR, F=FPM) ORDER CODE	BACKUP RING ORDER CODE
264.3	5.7	OR-N/F-G-265	BRT-G-265
269.3	5.7	OR-N/F-G-270	BRT-G-270
274.3	5.7	OR-N/F-G-275	BRT-G-275
279.3	5.7	OR-N/F-G-280	BRT-G-280
284.3	5.7	OR-N/F-G-285	BRT-G-285
289.3	5.7	OR-N/F-G-290	BRT-G-290
294.3	5.7	OR-N/F-G-295	BRT-G-295
299.3	5.7	OR-N/F-G-300	BRT-G-300
304.3	5.7	OR-N/F-G-305	
309.3	5.7	OR-N/F-G-310	
314.3	5.7	OR-N/F-G-315	
319.3	5.7	OR-N/F-G-320	
324.3	5.7	OR-N/F-G-325	
329.3	5.7	OR-N/F-G-330	
334.3	5.7	OR-N/F-G-335	
339.3	5.7	OR-N/F-G-340	
344.3	5.7	OR-N/F-G-345	
349.3	5.7	OR-N/F-G-350	
354.3	5.7	OR-N/F-G-355	
359.3	5.7	OR-N/F-G-360	
364.3	5.7	OR-N/F-G-365	
369.3	5.7	OR-N/F-G-370	
374.3	5.7	OR-N/F-G-375	
379.3	5.7	OR-N/F-G-380	
384.3	5.7	OR-N/F-G-385	
389.3	5.7	OR-N/F-G-390	
394.3	5.7	OR-N/F-G-395	
399.3	5.7	OR-N/F-G-400	
CROSS SECTION 8.40 mm			
149.5	8.4	OR-N/F-P-150A	BRT-P-150A
154.5	8.4	OR-N/F-P-155	BRT-P-155
159.5	8.4	OR-N/F-P-160	BRT-P-160
164.5	8.4	OR-N/F-P-165	BRT-P-165
169.5	8.4	OR-N/F-P-170	BRT-P-170
174.5	8.4	OR-N/F-P-175	BRT-P-175
179.5	8.4	OR-N/F-P-180	BRT-P-180
184.5	8.4	OR-N/F-P-185	BRT-P-185
189.5	8.4	OR-N/F-P-190	BRT-P-190
194.5	8.4	OR-N/F-P-195	BRT-P-195
199.5	8.4	OR-N/F-P-200	BRT-P-200
204.5	8.4	OR-N/F-P-205	BRT-P-205
208.5	8.4	OR-N/F-P-209	BRT-P-209
209.5	8.4	OR-N/F-P-210	BRT-P-210



ROYAL STANDARD SIZE LIST			
I.D.	C/S	O RING (N=NBR, F=FPM) ORDER CODE	BACKUP RING ORDER CODE
214.5	8.4	OR-N/F-P-215	BRT-P-215
219.5	8.4	OR-N/F-P-220	BRT-P-220
224.5	8.4	OR-N/F-P-225	BRT-P-225
229.5	8.4	OR-N/F-P-230	BRT-P-230
234.5	8.4	OR-N/F-P-235	BRT-P-235
239.5	8.4	OR-N/F-P-240	BRT-P-240
244.5	8.4	OR-N/F-P-245	BRT-P-245
249.5	8.4	OR-N/F-P-250	BRT-P-250
254.5	8.4	OR-N/F-P-255	BRT-P-255
259.5	8.4	OR-N/F-P-260	BRT-P-260
264.5	8.4	OR-N/F-P-265	BRT-P-265
269.5	8.4	OR-N/F-P-270	BRT-P-270
274.5	8.4	OR-N/F-P-275	BRT-P-275
279.5	8.4	OR-N/F-P-280	BRT-P-280
284.5	8.4	OR-N/F-P-285	BRT-P-285
289.5	8.4	OR-N/F-P-290	BRT-P-290
294.5	8.4	OR-N/F-P-295	BRT-P-295
299.5	8.4	OR-N/F-P-300	
314.5	8.4	OR-N/F-P-315	
319.5	8.4	OR-N/F-P-320	
334.5	8.4	OR-N/F-P-335	
339.5	8.4	OR-N/F-P-340	
354.5	8.4	OR-N/F-P-355	
359.5	8.4	OR-N/F-P-360	
374.5	8.4	OR-N/F-P-375	
384.5	8.4	OR-N/F-P-385	
399.5	8.4	OR-N/F-P-400	
CROSS SECTION 1.78 mm			
2.90	1.78	OR-N/F-D-006	
3.68	1.78	OR-N/F-D-007	
4.47	1.78	OR-N/F-D-008	
5.28	1.78	OR-N/F-D-009	
6.07	1.78	OR-N/F-D-010	
7.65	1.78	OR-N/F-D-011	
9.25	1.78	OR-N/F-D-012	
10.82	1.78	OR-N/F-D-013	
12.42	1.78	OR-N/F-D-014	
14.00	1.78	OR-N/F-D-015	
15.60	1.78	OR-N/F-D-016	
17.17	1.78	OR-N/F-D-017	
18.77	1.78	OR-N/F-D-018	
20.35	1.78	OR-N/F-D-019	
21.95	1.78	OR-N/F-D-020	



ROYAL STANDARD SIZE LIST			
I.D.	C/S	O RING (N=NBR, F=FPM) ORDER CODE	BACKUP RING ORDER CODE
23.52	1.78	OR-N/F-D-021	
25.12	1.78	OR-N/F-D-022	
26.70	1.78	OR-N/F-D-023	
28.30	1.78	OR-N/F-D-024	
29.87	1.78	OR-N/F-D-025	
31.47	1.78	OR-N/F-D-026	
33.05	1.78	OR-N/F-D-027	
34.65	1.78	OR-N/F-D-028	
37.82	1.78	OR-N/F-D-029	
41.00	1.78	OR-N/F-D-030	
44.17	1.78	OR-N/F-D-031	
47.35	1.78	OR-N/F-D-032	
50.52	1.78	OR-N/F-D-033	
53.70	1.78	OR-N/F-D-034	
56.87	1.78	OR-N/F-D-035	
60.05	1.78	OR-N/F-D-036	
63.22	1.78	OR-N/F-D-037	
66.40	1.78	OR-N/F-D-038	
69.57	1.78	OR-N/F-D-039	
72.75	1.78	OR-N/F-D-040	
75.92	1.78	OR-N/F-D-041	
82.27	1.78	OR-N/F-D-042	
88.62	1.78	OR-N/F-D-043	
94.97	1.78	OR-N/F-D-044	
101.32	1.78	OR-N/F-D-045	
107.67	1.78	OR-N/F-D-046	
114.02	1.78	OR-N/F-D-047	
120.37	1.78	OR-N/F-D-048	
126.72	1.78	OR-N/F-D-049	
133.07	1.78	OR-N/F-D-050	
CROSS SECTION 2.62 mm			
4.42	2.62	OR-N/F-D-106	
5.23	2.62	OR-N/F-D-107	
6.02	2.62	OR-N/F-D-108	
7.59	2.62	OR-N/F-D-109	
9.19	2.62	OR-N/F-D-110	
10.77	2.62	OR-N/F-D-111	
12.37	2.62	OR-N/F-D-112	
13.94	2.62	OR-N/F-D-113	
15.54	2.62	OR-N/F-D-114	
17.12	2.62	OR-N/F-D-115	
18.72	2.62	OR-N/F-D-116	
20.29	2.62	OR-N/F-D-117	



ROYAL STANDARD SIZE LIST			
I.D.	C/S	O RING (N=NBR, F=FPM)	BACKUP RING
		ORDER CODE	ORDER CODE
21.89	2.62	OR-N/F-D-118	
23.47	2.62	OR-N/F-D-119	
25.07	2.62	OR-N/F-D-120	
26.64	2.62	OR-N/F-D-121	
28.24	2.62	OR-N/F-D-122	
29.82	2.62	OR-N/F-D-123	
31.42	2.62	OR-N/F-D-124	
32.99	2.62	OR-N/F-D-125	
34.59	2.62	OR-N/F-D-126	
36.17	2.62	OR-N/F-D-127	
37.77	2.62	OR-N/F-D-128	
39.34	2.62	OR-N/F-D-129	
40.94	2.62	OR-N/F-D-130	
42.52	2.62	OR-N/F-D-131	
44.12	2.62	OR-N/F-D-132	
45.69	2.62	OR-N/F-D-133	
47.29	2.62	OR-N/F-D-134	
48.90	2.62	OR-N/F-D-135	
50.47	2.62	OR-N/F-D-136	
52.07	2.62	OR-N/F-D-137	
53.64	2.62	OR-N/F-D-138	
55.25	2.62	OR-N/F-D-139	
56.82	2.62	OR-N/F-D-140	
58.42	2.62	OR-N/F-D-141	
59.99	2.62	OR-N/F-D-142	
61.60	2.62	OR-N/F-D-143	
63.17	2.62	OR-N/F-D-144	
64.77	2.62	OR-N/F-D-145	
66.34	2.62	OR-N/F-D-146	
67.95	2.62	OR-N/F-D-147	
69.52	2.62	OR-N/F-D-148	
71.12	2.62	OR-N/F-D-149	
72.69	2.62	OR-N/F-D-150	
75.87	2.62	OR-N/F-D-151	
82.22	2.62	OR-N/F-D-152	
88.57	2.62	OR-N/F-D-153	
94.92	2.62	OR-N/F-D-154	
101.27	2.62	OR-N/F-D-155	
107.62	2.62	OR-N/F-D-156	
113.97	2.62	OR-N/F-D-157	
120.32	2.62	OR-N/F-D-158	
126.67	2.62	OR-N/F-D-159	
133.02	2.62	OR-N/F-D-160	
139.37	2.62	OR-N/F-D-161	
145.72	2.62	OR-N/F-D-162	



ROYAL STANDARD SIZE LIST			
I.D.	C/S	O RING (N=NBR, F=FPM) ORDER CODE	BACKUP RING ORDER CODE
152.07	2.62	OR-N/F-D-163	
158.42	2.62	OR-N/F-D-164	
164.77	2.62	OR-N/F-D-165	
171.12	2.62	OR-N/F-D-166	
177.47	2.62	OR-N/F-D-167	
183.82	2.62	OR-N/F-D-168	
190.17	2.62	OR-N/F-D-169	
196.52	2.62	OR-N/F-D-170	
202.87	2.62	OR-N/F-D-171	
209.22	2.62	OR-N/F-D-172	
215.57	2.62	OR-N/F-D-173	
221.92	2.62	OR-N/F-D-174	
228.27	2.62	OR-N/F-D-175	
234.62	2.62	OR-N/F-D-176	
240.97	2.62	OR-N/F-D-177	
247.32	2.62	OR-N/F-D-178	
CROSS SECTION 3.53 mm			
9.12	3.53	OR-N/F-D-204	
10.69	3.53	OR-N/F-D-205	
12.29	3.53	OR-N/F-D-206	
13.87	3.53	OR-N/F-D-207	
15.47	3.53	OR-N/F-D-208	
17.04	3.53	OR-N/F-D-209	
18.64	3.53	OR-N/F-D-210	
20.22	3.53	OR-N/F-D-211	
21.82	3.53	OR-N/F-D-212	
23.39	3.53	OR-N/F-D-213	
24.99	3.53	OR-N/F-D-214	
26.57	3.53	OR-N/F-D-215	
28.17	3.53	OR-N/F-D-216	
29.74	3.53	OR-N/F-D-217	
31.34	3.53	OR-N/F-D-218	
32.92	3.53	OR-N/F-D-219	
34.52	3.53	OR-N/F-D-220	
36.09	3.53	OR-N/F-D-221	
37.69	3.53	OR-N/F-D-222	
40.87	3.53	OR-N/F-D-223	
44.04	3.53	OR-N/F-D-224	
47.22	3.53	OR-N/F-D-225	
50.39	3.53	OR-N/F-D-226	
53.57	3.53	OR-N/F-D-227	



ROYAL STANDARD SIZE LIST			
I.D.	C/S	O RING (N=NBR, F=FPM)	BACKUP RING
		ORDER CODE	ORDER CODE
56.74	3.53	OR-N/F-D-228	
59.92	3.53	OR-N/F-D-229	
63.09	3.53	OR-N/F-D-230	
66.27	3.53	OR-N/F-D-231	
69.44	3.53	OR-N/F-D-232	
72.62	3.53	OR-N/F-D-233	
75.79	3.53	OR-N/F-D-234	
78.97	3.53	OR-N/F-D-235	
82.14	3.53	OR-N/F-D-236	
85.32	3.53	OR-N/F-D-237	
88.49	3.53	OR-N/F-D-238	
91.67	3.53	OR-N/F-D-239	
94.84	3.53	OR-N/F-D-240	
98.02	3.53	OR-N/F-D-241	
101.19	3.53	OR-N/F-D-242	
104.37	3.53	OR-N/F-D-243	
107.54	3.53	OR-N/F-D-244	
110.72	3.53	OR-N/F-D-245	
113.89	3.53	OR-N/F-D-246	
117.07	3.53	OR-N/F-D-247	
120.24	3.53	OR-N/F-D-248	
123.42	3.53	OR-N/F-D-249	
126.59	3.53	OR-N/F-D-250	
129.77	3.53	OR-N/F-D-251	
132.94	3.53	OR-N/F-D-252	
136.12	3.53	OR-N/F-D-253	
139.29	3.53	OR-N/F-D-254	
142.47	3.53	OR-N/F-D-255	
145.64	3.53	OR-N/F-D-256	
148.82	3.53	OR-N/F-D-257	
151.99	3.53	OR-N/F-D-258	
158.34	3.53	OR-N/F-D-259	
164.69	3.53	OR-N/F-D-260	
171.04	3.53	OR-N/F-D-261	
177.39	3.53	OR-N/F-D-262	
183.74	3.53	OR-N/F-D-263	
190.09	3.53	OR-N/F-D-264	
196.44	3.53	OR-N/F-D-265	
202.79	3.53	OR-N/F-D-266	
209.14	3.53	OR-N/F-D-267	
215.49	3.53	OR-N/F-D-268	
221.84	3.53	OR-N/F-D-269	
228.19	3.53	OR-N/F-D-270	
234.54	3.53	OR-N/F-D-271	
240.89	3.53	OR-N/F-D-272	



ROYAL STANDARD SIZE LIST			
I.D.	C/S	O RING (N=NBR, F=FPM)	BACKUP RING
		ORDER CODE	ORDER CODE
247.24	3.53	OR-N/F-D-273	
253.59	3.53	OR-N/F-D-274	
266.29	3.53	OR-N/F-D-275	
278.99	3.53	OR-N/F-D-276	
291.69	3.53	OR-N/F-D-277	
304.39	3.53	OR-N/F-D-278	
329.79	3.53	OR-N/F-D-279	
355.19	3.53	OR-N/F-D-280	
380.59	3.53	OR-N/F-D-281	
405.26	3.53	OR-N/F-D-282	
430.66	3.53	OR-N/F-D-283	
456.06	3.53	OR-N/F-D-284	
CROSS SECTION 5.33 mm			
10.46	5.33	OR-N/F-D-309	
12.07	5.33	OR-N/F-D-310	
13.64	5.33	OR-N/F-D-311	
15.24	5.33	OR-N/F-D-312	
16.81	5.33	OR-N/F-D-313	
18.42	5.33	OR-N/F-D-314	
19.99	5.33	OR-N/F-D-315	
21.59	5.33	OR-N/F-D-316	
23.16	5.33	OR-N/F-D-317	
24.77	5.33	OR-N/F-D-318	
26.34	5.33	OR-N/F-D-319	
27.94	5.33	OR-N/F-D-320	
29.51	5.33	OR-N/F-D-321	
31.12	5.33	OR-N/F-D-323	
32.69	5.33	OR-N/F-D-323	
34.29	5.33	OR-N/F-D-324	
37.47	5.33	OR-N/F-D-325	
40.64	5.33	OR-N/F-D-326	
43.82	5.33	OR-N/F-D-327	
46.99	5.33	OR-N/F-D-328	
50.17	5.33	OR-N/F-D-329	
53.34	5.33	OR-N/F-D-330	
56.52	5.33	OR-N/F-D-331	
59.69	5.33	OR-N/F-D-332	
62.87	5.33	OR-N/F-D-333	
66.04	5.33	OR-N/F-D-334	
69.22	5.33	OR-N/F-D-335	



ROYAL STANDARD SIZE LIST			
I.D.	C/S	O RING (N=NBR, F=FPM) ORDER CODE	BACKUP RING ORDER CODE
72.39	5.33	OR-N/F-D-336	
75.57	5.33	OR-N/F-D-337	
78.74	5.33	OR-N/F-D-338	
81.91	5.33	OR-N/F-D-339	
85.09	5.33	OR-N/F-D-340	
88.27	5.33	OR-N/F-D-341	
91.44	5.33	OR-N/F-D-342	
94.62	5.33	OR-N/F-D-343	
97.79	5.33	OR-N/F-D-344	
100.97	5.33	OR-N/F-D-345	
104.14	5.33	OR-N/F-D-346	
107.32	5.33	OR-N/F-D-347	
110.49	5.33	OR-N/F-D-348	
113.67	5.33	OR-N/F-D-349	
116.84	5.33	OR-N/F-D-350	
120.02	5.33	OR-N/F-D-351	
123.19	5.33	OR-N/F-D-352	
126.37	5.33	OR-N/F-D-353	
129.54	5.33	OR-N/F-D-354	
132.72	5.33	OR-N/F-D-355	
135.89	5.33	OR-N/F-D-356	
139.07	5.33	OR-N/F-D-357	
142.24	5.33	OR-N/F-D-358	
145.42	5.33	OR-N/F-D-359	
148.59	5.33	OR-N/F-D-360	
151.77	5.33	OR-N/F-D-361	
158.12	5.33	OR-N/F-D-362	
164.47	5.33	OR-N/F-D-363	
170.82	5.33	OR-N/F-D-364	
177.17	5.33	OR-N/F-D-365	
183.52	5.33	OR-N/F-D-366	
189.87	5.33	OR-N/F-D-367	
196.22	5.33	OR-N/F-D-368	
202.57	5.33	OR-N/F-D-369	
208.97	5.33	OR-N/F-D-370	
215.27	5.33	OR-N/F-D-371	
221.62	5.33	OR-N/F-D-372	
227.97	5.33	OR-N/F-D-373	
234.32	5.33	OR-N/F-D-374	
240.67	5.33	OR-N/F-D-375	
247.02	5.33	OR-N/F-D-376	
253.37	5.33	OR-N/F-D-377	
266.07	5.33	OR-N/F-D-378	
278.77	5.33	OR-N/F-D-379	
291.47	5.33	OR-N/F-D-380	



ROYAL STANDARD SIZE LIST			
I.D.	C/S	O RING (N=NBR, F=FPM) ORDER CODE	BACKUP RING ORDER CODE
304.17	5.33	OR-N/F-D-381	
329.57	5.33	OR-N/F-D-382	
354.97	5.33	OR-N/F-D-383	
380.37	5.33	OR-N/F-D-384	
405.26	5.33	OR-N/F-D-385	
430.66	5.33	OR-N/F-D-386	
CROSS SECTION 6.99 mm			
113.67	6.99	OR-N/F-D-425	
116.84	6.99	OR-N/F-D-426	
120.02	6.99	OR-N/F-D-427	
123.19	6.99	OR-N/F-D-428	
126.37	6.99	OR-N/F-D-429	
129.54	6.99	OR-N/F-D-430	
132.72	6.99	OR-N/F-D-431	
135.89	6.99	OR-N/F-D-432	
139.07	6.99	OR-N/F-D-434	
142.24	6.99	OR-N/F-D-434	
145.42	6.99	OR-N/F-D-435	
148.59	6.99	OR-N/F-D-436	
151.77	6.99	OR-N/F-D-437	
158.12	6.99	OR-N/F-D-438	
164.47	6.99	OR-N/F-D-439	
170.82	6.99	OR-N/F-D-440	
177.17	6.99	OR-N/F-D-441	
183.52	6.99	OR-N/F-D-442	
189.87	6.99	OR-N/F-D-443	
196.22	6.99	OR-N/F-D-444	
202.57	6.99	OR-N/F-D-445	
215.27	6.99	OR-N/F-D-446	
227.97	6.99	OR-N/F-D-447	
240.67	6.99	OR-N/F-D-448	
253.37	6.99	OR-N/F-D-449	
266.07	6.99	OR-N/F-D-450	
278.77	6.99	OR-N/F-D-451	
291.47	6.99	OR-N/F-D-452	
304.17	6.99	OR-N/F-D-453	
316.87	6.99	OR-N/F-D-454	
329.57	6.99	OR-N/F-D-455	
342.27	6.99	OR-N/F-D-456	
354.97	6.99	OR-N/F-D-457	
367.67	6.99	OR-N/F-D-458	
380.37	6.99	OR-N/F-D-459	



ROYAL STANDARD SIZE LIST			
I.D.	C/S	O RING (N=NBR, F=FPM) ORDER CODE	BACKUP RING ORDER CODE
393.07	6.99	OR-N/F-D-460	
405.26	6.99	OR-N/F-D-461	
417.96	6.99	OR-N/F-D-462	
430.66	6.99	OR-N/F-D-463	
443.36	6.99	OR-N/F-D-464	
456.06	6.99	OR-N/F-D-465	
468.76	6.99	OR-N/F-D-466	
481.46	6.99	OR-N/F-D-467	
494.16	6.99	OR-N/F-D-468	
506.86	6.99	OR-N/F-D-469	
532.26	6.99	OR-N/F-D-470	
557.66	6.99	OR-N/F-D-471	
582.68	6.99	OR-N/F-D-472	
608.08	6.99	OR-N/F-D-473	
633.48	6.99	OR-N/F-D-474	
658.88	6.99	OR-N/F-D-475	



Section - V

NOTES

Housing Tolerance Chart in Metric size (mm)

Nominal sizes		Shaft (outside diameter)						Bore (inside diameter)			
mm		Units 0.001 mm						Units 0.001mm			
over	to	f8	f9	h8	h9	h10	h11	H8	H9	H10	H11
1.6	3	-6	-6	0	0	0	0	14	25	40	60
		-20	-31	-14	-25	-40	-60	0	0	0	0
3	6	-10	-10	0	0	0	0	18	30	48	75
		-28	-40	-18	-30	-48	-75	0	0	0	0
6	10	-13	-13	0	0	0	0	22	36	58	90
		-35	-49	-22	-36	-58	-90	0	0	0	0
10	18	-16	-16	0	0	0	0	27	43	70	110
		-43	-59	-27	-43	-70	-110	0	0	0	0
18	30	-20	-20	0	0	0	0	33	52	84	130
		-53	-72	-33	-52	-84	-130	0	0	0	0
30	50	-25	-25	0	0	0	0	39	62	100	160
		-64	-87	-39	-62	-100	-160	0	0	0	0
50	80	-30	-30	0	0	0	0	46	74	120	190
		-76	-104	-46	-74	-120	-190	0	0	0	0
80	120	-36	-36	0	0	0	0	54	87	140	220
		-90	-123	-54	-87	-140	-220	0	0	0	0
120	180	-43	-43	0	0	0	0	63	100	160	250
		-106	-143	-63	-100	-160	-250	0	0	0	0
180	250	-50	-50	0	0	0	0	72	115	185	290
		-122	-165	-72	-115	-185	-290	0	0	0	0
250	315	-56	-56	0	0	0	0	81	130	210	320
		-137	-186	-81	-130	-210	-320	0	0	0	0
315	400	-62	-62	0	0	0	0	89	140	230	360
		-151	-202	-89	-140	-230	-360	0	0	0	0
400	500	-68	-68	0	0	0	0	97	155	250	400
		-165	-223	-97	-155	-250	-400	0	0	0	0
500	630	-76	-76	0	0	0	0	110	175	280	440
		-186	-251	-110	-175	-280	-440	0	0	0	0
630	800	-80	-80	0	0	0	0	125	200	320	500
		-205	-280	-125	-200	-320	-500	0	0	0	0



NOTES

Housing Tolerance Chart in Imperial size (inch)

Nominal sizes		Shaft (outside diameter)						Bore (inside diameter)			
inch		Units 0.001 inch						Units 0.001			
over	to	f8	f9	h8	h9	h10	h11	H8	H9	H10	H11
0.063	0.118	-0.2	-0.2	0	0	0	0	0.6	1	1.6	2.4
		-0.8	-1.2	-0.6	-1	-1.6	-2.4	0	0	0	0
0.118	0.236	-0.4	-0.4	0	0	0	0	0.7	1.2	1.9	3
		-1.1	-1.6	-0.7	-1.2	-1.9	-3	0	0	0	0
0.236	0.394	-0.5	-0.5	0	0	0	0	0.9	1.4	2.3	3.5
		-1.4	-1.9	-0.9	-1.4	-2.3	-3.5	0	0	0	0
0.394	0.709	-0.6	-0.6	0	0	0	0	1.1	1.7	2.8	4.3
		-1.7	-2.3	-1.1	-1.7	-2.8	-4.3	0	0	0	0
0.709	1.181	-0.8	-0.8	0	0	0	0	1.3	2	3.3	5.1
		-2.1	-2.8	-1.3	-2	-3.3	-5.1	0	0	0	0
1.181	1.969	-1	-1	0	0	0	0	1.5	2.4	3.9	6.3
		-2.5	-3.4	-1.5	-2.4	-3.9	-6.3	0	0	0	0
1.969	3.15	-1.2	-1.2	0	0	0	0	1.8	2.9	4.7	7.5
		-3	-4.1	-1.8	-2.9	-4.7	-7.5	0	0	0	0
3.15	4.724	-1.4	-1.4	0	0	0	0	2.1	3.4	5.5	8.7
		-3.5	-4.8	-2.1	-3.4	-5.5	-8.7	0	0	0	0
4.724	7.087	-1.7	-1.7	0	0	0	0	2.5	3.9	6.3	9.8
		-4.2	-5.6	-2.5	-3.9	-6.3	-9.8	0	0	0	0
7.087	9.843	-2	-2	0	0	0	0	2.8	4.5	7.3	11.4
		-4.8	-6.5	-2.8	-4.5	-7.3	-11.4	0	0	0	0
9.843	12.402	-2.2	-2.2	0	0	0	0	3.2	5.1	8.3	12.6
		-5.4	-7.3	-3.2	-5.1	-8.3	-12.6	0	0	0	0
12.402	15.748	-2.4	-2.4	0	0	0	0	3.5	5.5	9.1	14.2
		-5.9	-8	-3.5	-5.5	-9.1	-14.2	0	0	0	0
15.748	19.685	-2.7	-2.7	0	0	0	0	3.8	6.1	9.8	15.7
		-6.5	-8.8	-3.8	-6.1	-9.8	-15.7	0	0	0	0
19.685	24.803	-3	-3	0	0	0	0	4.3	6.9	11	17.3
		-7.3	-9.9	-4.3	-6.9	-11	-17.3	0	0	0	0
24.803	31.496	-3.1	-3.1	0	0	0	0	4.9	7.9	12.6	19.7
		-8.1	-11	-4.9	-7.9	-12.6	-19.7	0	0	0	0



Section - VI STORAGE & FITTING

Storage

When storing **ROYAL** seals, please check the following points:

- 1) Do not open the packing unnecessarily. Dust may stick to the seal or scratch it.
- 2) Avoid exposure to direct sunlight and store in a cool place. Ultraviolet light and humidity may sometimes promote deterioration and dimensional change of rubber and resin materials.
- 3) When storing products already unpacked, be careful that foreign materials do not stick or become embedded. Store them in their original condition, in tightly sealed poly to prevent dimensional change resulting from humidity.
- 4) Do not place seals near any heat source such as a boiler, stove, oven etc. Heat may deteriorate the material.
- 5) Do not place seals near electric motors or equipments generating ozone.
- 6) Avoid hanging seals with a nail, wire or suspending them with a string as this may cause deformation and scratches on the top end of the lip.
- 7) Sometimes, colour changes or white powder appears on the surface of seals (blooming phenomenon). This will not affect the function of seal.
- 8) PTFE rings of combination seals may be easily scratched if dropped or impacted by an external force. Be careful when handling.
- 9) The store room should be cool, dry and dust-free; it should have moderate ventilation.
- 10) The seals should never be exposed to any ozone or ionizing radiation.

Check points before installation of seals :-

ROYAL quality control methods for material and manufacturing processes ensure that all seals going into application field are in a condition capable of giving a long and reliable service life. Sealing performance of a seal is greatly influence by the method of assembling of a cylinder. On the basis of many years experience, to avoid premature seal failure the following recommendations should be considered at the design and manufacturing stage of the cylinder:

- 1) Specify piston and gland bearings which are adequately proportioned to support the cylinder loads. As a result of mounting misalignment and / or the working action of the cylinder, piston and gland bearings will be subjected to side loading, causing damage to the rod or the tube surface and hence the seal, if the bearings are inadequate.
- 2) Check that the seal housing is free from damage likely to harm the seal. Remove all sharp edges and burrs from metal parts, paying particular attention to ports, grooves and threads over or through which the seal passes during assembly.
- 3) Clean all seal housing areas, ensuring that all metallic particles and other contaminants have been removed. Check that other surfaces adjacent to the passage of the seal on fitting are also free of dirt or other contaminants. Check that both static and dynamic housing surface finishes meet specifications.
- 4) Where the difference between a thread diameter over which the seal must pass and the seal diameter is small, use some form of protection over the thread, such as a fitting sleeve made of hard plastic.
- 5) Lubricate all seals and metal components liberally with clean operating fluid or a compatible grease prior to assembly. Note that silicone grease should not be used in normal hydraulic applications.
- 6) Where seals fitted to sub-assemblies, such as pistons, are awaiting further fitting operations, ensure that the seals are not subjected to any misaligned or localized loading which will cause local deformation. Ensure that sub-assemblies remain clean.
- 7) The use of metal levers is not recommended but should they be used it is imperative that they are completely smooth and free from nicks and burrs. When using them ensure that the metal surfaces adjacent to the seal are not damaged.
- 8) Make sure that hydraulic cylinder & system is free from dust, any burr or steel particle.