METRIC AEROSPACE RECOMMENDED PRACTICE

MAP3440™ REV. A

Issued 1990-03
Reaffirmed 2012-12
Revised 2021-11

Superseding MAP3440

(R) O-Ring Groove Design for Metric O-Ring Seals Used in Static Radial Compression Applications Specifically for Engine and Engine Control Systems

RATIONALE

This standard has been reformatted for ease of use with no technical changes.

NOTE: This standard was transferred from the E25 General Standards for Aerospace and Propulsion Systems Committee to A-6C2 Seals Committee.

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1. SCOPE

This SAE Recommended Practice provides the design criteria for static elastomeric O-ring seals used specifically in engine and engine control systems. It provides radial compression groove dimensions for aerospace metric O-ring sizes specified in MA2010. The conditions considered to formulate the design criteria are also described, e.g., seal stretch, cross-section reduction, seal squeeze, and swell.

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. In the event of a conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

ARP1231	Gland Design, Elastomeric O-Ring Seals, General Considerations
ARP1232	Gland Design Criteria and Dimensions for Static Radial O-Ring Seal Applications without Anti-Extrusion Devices Specifically for Engine and Engine Control Systems
MA2010	Packing, Preformed - O-Ring Seal, Standard Sizes and Size Codes, Metric

2.1.2 ANSI Accredited Publications

Copies of these documents are available online at http://webstore.ansi.org/.

ANSI B4.2-1978	Preferred Metric Limits and Fits
ANSI/ASME B46.1-1985	Surface Texture (Surface Roughness, Waviness, and Lay)
ANSI Y14.36-1978	Surface Texture Symbols

2.2 Symbols

Letter symbols used in this standard are as follows:

d_1 O-ring inside diameter

d_2 O-ring cross-section diameter

d_3 O-ring groove diameter, piston mounted

d_4 Bore inside diameter

d_5 Rod outside diameter

d_6 O-ring groove diameter, housing mounted

b O-ring groove width

t O-ring gland radial depth

nom Nominal

max Maximum

min Minimum

r_1 Corner radius, bottom of the groove

r_2 Edge radius, top of the groove

z Length of lead-in chamfer

g Radial clearance between rod and bore

v_o Volume of O-ring (unsoaked)

v_g Volume of O-ring gland

X Percent stretch of O-ring inside diameter, d_1

Y Percent reduction of O-ring cross-section, d_2, due to stretching d_1

3. TECHNICAL REQUIREMENTS

3.1 General

The following static, radial squeeze, O-ring groove categories have been incorporated in this standard:

a. Piston mounted O-ring groove/gland

b. Housing mounted O-ring groove/gland

The O-ring groove design is based on 2% minimum stretch and the following nominal percentage squeeze which is based on the mean gland depth (t nom) and the mean O-ring cross-section diameter (d_2 nom). This is shown in Table 1 using the formula in Equation 1. This criterion is similar to ARP1232.

Table 1 - Mean O-ring cross-section and corresponding nominal percentage squeeze

d_2 nom mm	nom squeeze % of d_2 nom
1.80	21
2.65	19
3.55	18
5.30	16
7.00	15

$$\text{Percentage squeeze, nom} = ((d_2 \text{ nom} - t \text{ nom})/d_2 \text{ nom})) \times 100 \quad \text{(Eq. 1)}$$

3.2 O-Rings

Figure 1 illustrates an O-ring; the inside diameters, cross-section diameters, and size codes are per MA2010.

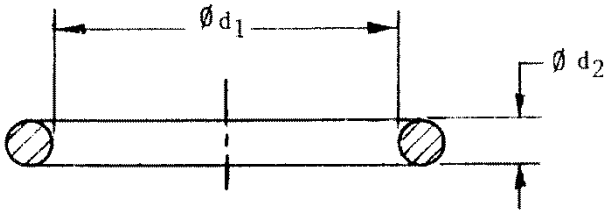

Figure 1 - O-ring dimensions

3.3 Typical Radial Compression Sealing

Figure 2 illustrates typical radial compression O-ring sealing applications without anti-extrusion devices (back-up rings).

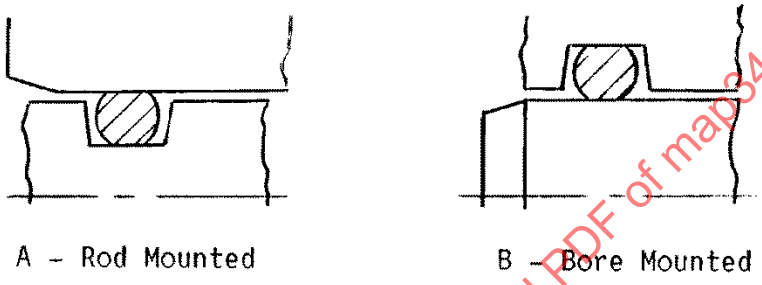

Figure 2 - O-ring radial compression sealing applications

3.4 Radial O-Ring Grooves

Figure 3 specifies the letter symbol dimensions for radial O-ring groove, piston mounted. Figure 4 specifies the letter symbol dimensions for radial O-ring groove, housing mounted.

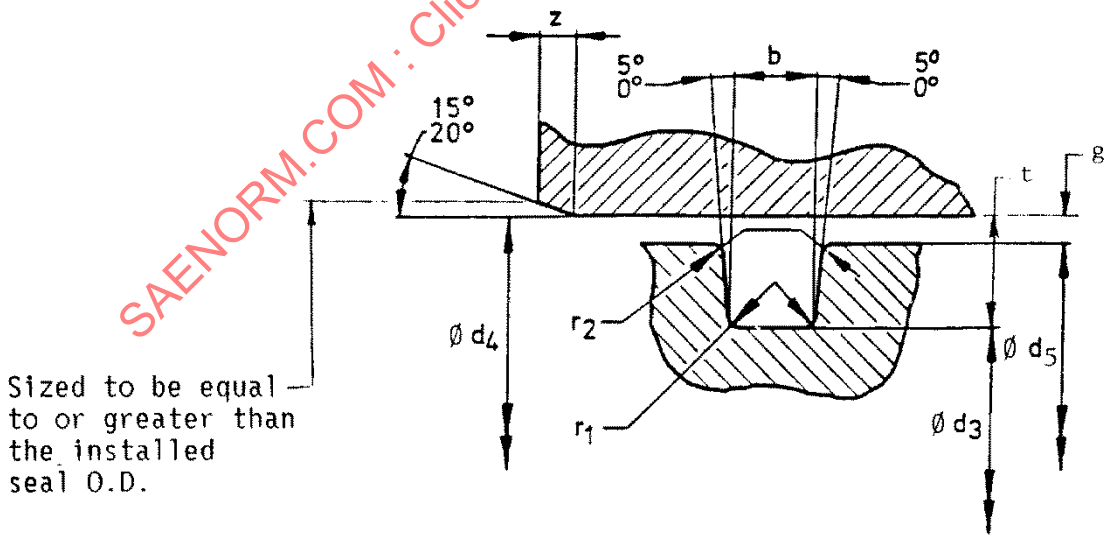

Figure 3 - Radial O-ring groove, piston mounted

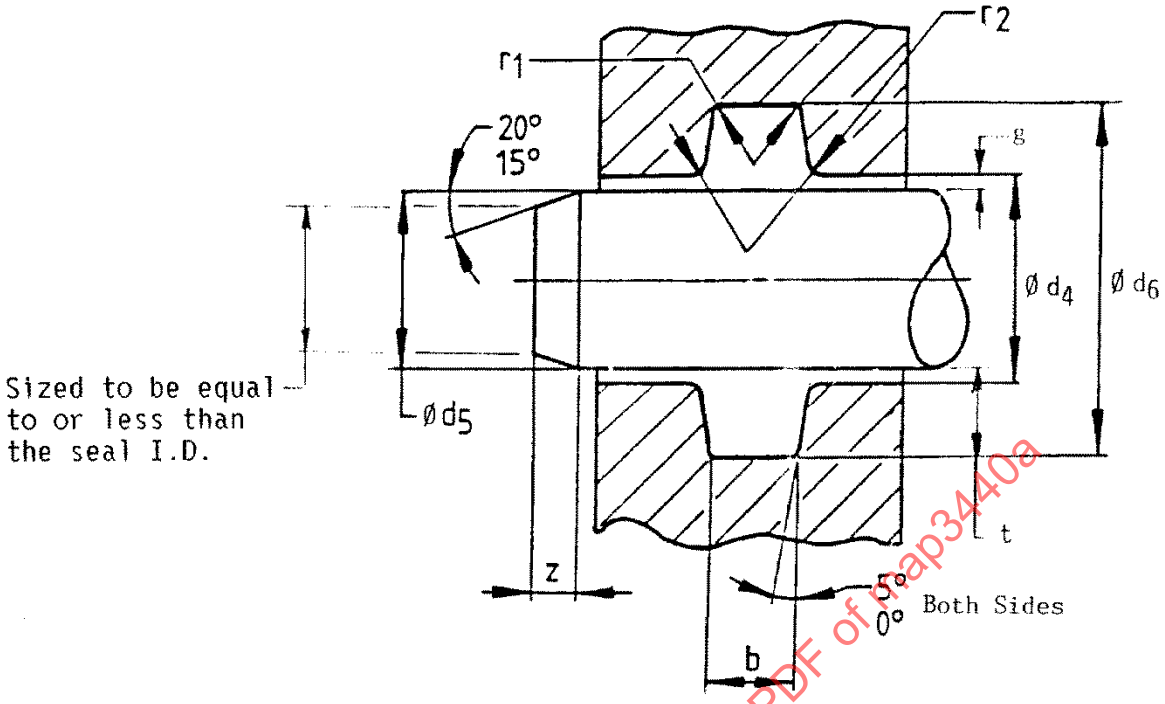

Figure 4 - Radial O-ring groove, housing mounted

3.5 Fluid Pressure

The recommended maximum fluid pressure is 10000 kPa that may be applied to the glands specified herein, using 70 durometer hardness O-rings. As a general rule, fluid systems above 10000 kPa pressure should design the gland for use of back-up rings to avoid O-ring extrusion into the gland clearance gap.

3.6 Surface Roughness

The surface roughness should be 1.6 µm Ra on the groove sides and bottom surfaces, also on the mating surface (rod or bore) in contact with the O-ring seal.

3.7 Corner and Edge Radii

The corner radius (r_1) and edge radius (r_2) of the O-ring groove shall be as specified in Table 2.

Table 2 - Groove corner and edge radii

d_2 nom	r_1 (corner)	r_2 (edge)
1.80	0.3-0.5	0.1-0.3
2.65	0.3-0.5	0.1-0.3
3.55	0.4-0.8	0.1-0.3
5.30	0.4-0.8	0.1-0.3
7.00	0.8-1.2	0.1-0.3

NOTE: Dimensions are in millimeters.

3.8 Lead-in Chamfers

A lead-in chamfer angle of 15 to 20 degrees is used to prevent damage to the O-ring seal on assembly by the bore for piston mounted applications or by the rod for housing mounted applications. Provide for the length of lead-in chamfer (z) as specified in Table 3. Chamfer edges to be rounded 0.1 to 0.3.

Table 3 - Lead-in chamfer length

d_2 nom	1.80	2.65	3.55	5.30	7.00
z min	1.1	1.5	1.8	2.7	3.6

NOTE: Dimensions are in millimeters

3.9 Groove Runout Tolerance

The groove runout tolerance of d_3 relative to d_5 and d_6 relative to d_4 shall be 0.025 up to 50 mm groove diameter, and 0.050 over 50 mm groove diameter.

3.10 Groove Diameter Tolerances

The groove diameter tolerances are as shown in Table 4.

Table 4 - Groove diameter tolerances

d_2 nom		1.80	2.65	3.55	5.30	7.00
Groove Diameter		Tolerances				
Groove, Piston Mounted	d_3	0.04	0.05	0.06	0.07	0.09
Bore, ID	d_4	0.06	0.07	0.08	0.09	0.11
Rod, OD	d_5	f7	f7	f7	f7	f7
Groove, Housing Mounted	d_6	0.06	0.07	0.08	0.09	0.11

NOTE: Dimensions are in millimeters.

3.11 Groove Depths, t

The maximum groove depths, t, are specified in Table 5 and are based on 2% stretch of d_1 max and 1.73% reduction of d_2 min. The resulting minimum percentage squeeze is also given in Table 5. The minimum depth results from the tolerances in Table 4.

Table 5 - Maximum groove depths, t

d_2 nom	1.80	2.65	3.55	5.30	7.00
T max	1.44	2.17	2.94	4.48	6.01
% Squeeze, min	14.8	13.7	13.3	11.8	10.7

NOTE: Dimensions are in millimeters.

3.12 Groove Widths, b

The groove widths, b, are specified in Table 6. Tolerance is 0 to +0.25. The values were calculated and averaged to provide a groove volume not less than 120% of the max O-ring volume, and for most groove sizes the volume is 130% or more, to allow for O-ring swell.

Table 6 - Minimum groove widths, b

d_2 nom	1.80	2.65	3.55	5.30	7.00
b min	2.65	3.68	4.80	6.86	8.82

NOTE: Dimensions are in millimeters.

3.13 Derivation of Groove Dimensions

The groove dimensions in this section are based on 2% minimum stretch and a minimum squeeze as given in Table 5. Percent seal stretch is calculated as follows:

$$\text{Percentage Stretch} = ((\text{Installed seal ID} - \text{free seal ID})/\text{free seal ID}) \times 100 \quad \text{(Eq. 2)}$$

3.13.1 Piston Mounted Groove Diameter, d_3

$$d_3 \text{ min} = 1.02(d_1 \text{ max}) \quad \text{(Eq.3A)}$$

$$d_3 \text{ max} = d_3 \text{ min} + \text{tol in Table 3} \quad \text{(Eq. 3B)}$$

3.13.2 Housing Mounted Groove Diameter, d_4

$$d_4 \text{ max} = d_3 \text{ min} + 2t \text{ max} \quad \text{(Eq. 4A)}$$

$$d_4 \text{ min} = d_4 \text{ max} - \text{tol in Table 3} \quad \text{(Eq. 4B)}$$

3.13.3 Piston Mounted, Rod Outside Diameter, d_5

$$d_5 \text{ max} = d_4 \text{ min} - 2g \text{ min} \quad \text{(Eq. 5A)}$$

where:

2g min = fundamental deviation f from ANSI B4.2

$$d_5 \text{ min} = d_5 \text{ max} - \text{tol grade IT7 from ANSI B4.2} \quad \text{(Eq. 5B)}$$

3.13.4 Reduction in O-Ring Cross Section Diameter, d_2, Due to Stretch

When an O-ring is stretched, its cross section is reduced and flattened. In the stretched condition, an O-ring cross section is no longer circular. The following empirical formulas were developed by the Research Laboratories of General Motors Corp. based on actual measurements of a large number of O-rings:

$$\text{0 to 3\% inside diameter stretch: } Y = 0.01 + 1.06X - 0.1(X)^2 \quad \text{(Eq. 6A)}$$

$$\text{3 to 25\% inside diameter stretch: } Y = 0.56 + 0.59X - 0.0046(X)^2 \quad \text{(Eq. 6B)}$$

where:

Y = percent reduction in cross-section diameter, d_2

X = percent stretch of inside diameter, d_1 (i.e., for 2% stretch, X = 2)

For 2% stretch, Y = 0.01 + 1.06(2) - 0.1(2)^2 = 1.73% reduction on d_2. Minimum cross section of 2% stretched O-ring is:

$$d_2^* \text{ min} = d_2 \text{ min} - 0.0173(d_2 \text{ min}) = 0.9827(d_2 \text{ min}) \quad \text{(Eq. 7)}$$

where:

d_2^* = min cross section of the 2% stretched O-ring

3.13.5 Maximum Groove Depth, t: Piston Mounted and Housing Mounted

$$t \text{ max} = d_2^* \text{ min} - (\text{percent squeeze min}/100)d_2^* \text{ min} \quad \text{(Eq. 8)}$$

where:

percent squeeze min is given in Table 5

The percent squeeze min was derived from ARP1232 by comparing comparable dimensions for max gland depth, t max, that is, (ØA max - ØF min) 0.5 for piston mounted and for housing mounted (ØE max - ØB min) 0.5, and the d_2^* min for the 2% stretched inch O-ring. The percent squeeze min in Table 4 is based on a t max depth of gland and an O-ring at d_1 max and d_2 min in a free state, which, when mounted, is stretched to 2% with d_2^* min in a stretched condition.

3.13.6 Groove Width, b: Piston Mounted

$$v_o \text{ max} = 2.4674(d_2 \text{ max})^2(d_1 \text{ max} + d_2 \text{ max}) \quad \text{(Eq. 9)}$$

$$v_g \text{ min} = [0.5(d_4 \text{ min}-d_3 \text{ max})b - 0.4292(r_1)^2]0.5(d_4 \text{ min}+d_3 \text{ max})\pi \quad \text{(Eq. 10A)}$$

$$v_g \text{ min} = 1.3(v_o \text{ max}) \quad \text{(Eq. 10B)}$$

$$b \text{ min} = \frac{1.3(v_o \text{ max})}{0.25\pi[(d_4 \text{ min})^2-(d_3 \text{ max})^2]} + \frac{0.4292(r_1 \text{ max})^2}{0.5(d_4 \text{ min}-d_3 \text{ max})} \quad \text{(Eq. 11)}$$

3.13.7 Groove Width, b: Housing Mounted

$$b \text{ min} = \frac{1.3(v_o \text{ max})}{0.25\pi[(d_6 \text{ min})^2-(d_4 \text{ max})^2]} + \frac{0.4292(r_1 \text{ max})^2}{0.5(d_6 \text{ min}-d_4 \text{ max})} \quad \text{(Eq. 12)}$$

3.13.8 Housing Mounted, Rod Outside Diameter, d_5

$$d_5 \text{ min} = 1.02(d_1 \text{ max})$$
$$d_5 \text{ max} = d_5 \text{ min} + \text{tol grade IT7 from ANSI B4.2} \quad \text{(Eq. 13)}$$

3.13.9 Housing Mounted Groove Diameter, d_6

$$d_6 \text{ max} = d_5 \text{ min} + 2t \text{ max (see 3.11.5 for derivation of t max)}$$
$$d_6 \text{ min} = d_6 \text{ max} - \text{tol in Table 4} \quad \text{(Eq. 14)}$$

3.13.10 Housing Mounted, Bore Inside Diameter, d_4

$$d_4 \text{ min} = d_5 \text{ max} + 2g \text{ min} = \text{fundamental deviation f from ANSI B4.2}$$
$$d_4 \text{ max} = d_4 \text{ min} + \text{tol in Table 4} \quad \text{(Eq. 15)}$$

3.14 Standard O-Ring Grooves

The dimensions for the standard O-ring grooves are tabulated in Tables 6 through 10. These dimensions are designed for use with O-ring seals conforming to MA2010 dimensions. They are computed per the technical requirements specified herein, except as follows:

3.14.1 Housing Mounted, Large O-Ring Sizes

Standard O-ring grooves are not provided for the larger diameter housing mounted applications where:

$$d_4 \text{ max} > (d_1 \text{ min} + d_2 \text{ min}) \quad \text{(Eq. 16)}$$

Because this condition of the free state O-ring in the housing mounted groove makes the installation of the shaft into the O-ring ID impractical when d_4 becomes too large to retain the O-ring in the groove at the installation of the shaft.

3.14.1.1 The following Housing Mounted O-ring seal size codes are not included in the Tables for standard grooves:

For d_2 nom = 1.80, A0450 and up

For d_2 nom = 2.65, B0710 and up

For d_2 nom = 3.55, C1000 and up

For d_2 nom = 5.30, D1550 and up

For d_2 nom = 7.00, E2060 and up

3.14.2 Small O-Ring Grooves

For d_2 nom = 1.80, size codes A0037 and smaller were not included because of the small size O-ring, a groove cannot be designed which will be within the 10% maximum stretch or to have a minimum groove volume equal to or exceeding 125% of maximum O-ring volume, using the standard minimum groove width, b min.

Table 7A - O-ring seal radial groove dimensions for piston mounted static applications, d_2 nom = 1.80 mm

2% Minimum stretch
Groove width b = 2.65 - 2.90
Corner radius r_1 = 0.3 - 0.5
Edge radius r_2 = 0.1 - 0.3
(Dimensions are in millimeters)

O-Ring MA2010		Piston Mounted		
Size Code	d_1 nom	d_3 Groove Dia	d_4 Bore Dia	d_5 Rod Dia
A0040	4.00	4.21- 4.25	7.03- 7.09	7.00- 7.02
A0045	4.50	4.72- 4.76	7.54- 7.60	7.51- 7.53
A0048	4.87	5.10- 5.14	7.92- 7.98	7.89- 7.91
A0050	5.00	5.23- 5.27	8.05- 8.11	8.02- 8.04
A0051	5.15	5.39- 5.43	8.21- 8.27	8.18- 8.20
A0053	5.30	5.54- 5.58	8.36- 8.42	8.33- 8.35
A0056	5.60	5.84- 5.88	8.66- 8.72	8.63- 8.65
A0060	6.00	6.25- 6.29	9.07- 9.13	9.04- 9.06
A0063	6.30	6.56- 6.60	9.38- 9.44	9.35- 9.37
A0067	6.70	6.97- 7.01	9.79- 9.85	9.76- 9.78
A0069	6.90	7.18- 7.22	10.00-10.06	9.97- 9.99
A0071	7.10	7.38- 7.42	10.20-10.26	10.17-10.18
A0075	7.50	7.79- 7.83	10.61-10.67	10.58-10.59
A0080	8.00	8.30- 8.34	11.12-11.18	11.09-11.10
A0085	8.50	8.82- 8.86	11.64-11.70	11.61-11.62
A0087	8.75	9.08- 9.12	11.90-11.96	11.87-11.88
A0090	9.00	9.33- 9.37	12.15-12.21	12.12-12.13
A0095	9.50	9.84- 9.88	12.66-12.72	12.63-12.64
A0100	10.00	10.35-10.39	13.17-13.23	13.14-13.15
A0106	10.60	10.98-11.02	13.80-13.86	13.77-13.78
A0112	11.20	11.59-11.63	14.41-14.47	14.38-14.39
A0118	11.80	12.21-12.25	15.03-15.09	15.00-15.01
A0125	12.50	12.92-12.96	15.74-15.80	15.71-15.72
A0132	13.20	13.64-13.68	16.46-16.52	16.43-16.44
A0140	14.00	14.46-14.50	17.28-17.34	17.25-17.26
A0150	15.00	15.48-15.52	18.30-18.36	18.26-18.28
A0160	16.00	16.51-16.55	19.33-19.39	19.29-19.31
A0170	17.00	17.54-17.58	20.36-20.42	20.32-20.34
A0180	18.00	18.56-18.60	21.38-21.44	21.34-21.36
A0190	19.00	19.59-19.63	22.41-22.47	22.37-22.39
A0200	20.00	20.61-20.65	23.43-23.49	23.39-23.41
A0212	21.20	21.85-21.89	24.67-24.73	24.63-24.65
A0224	22.40	23.08-23.12	25.90-25.96	25.86-25.88
A0236	23.60	24.32-24.36	27.14-27.20	27.10-27.12
A0250	25.00	25.74-25.78	28.56-28.62	28.52-28.54
A0258	25.80	26.57-26.61	29.39-29.45	29.35-29.37
A0265	26.50	27.28-27.32	30.10-30.16	30.05-30.08
A0280	28.00	28.83-28.87	31.65-31.71	31.60-31.63
A0300	30.00	30.88-30.92	33.70-33.76	33.65-33.68
A0315	31.50	32.42-32.46	35.24-35.30	35.19-35.22
A0325	32.50	33.45-33.49	36.27-36.33	36.22-36.25
A0335	33.50	34.47-34.51	37.29-37.35	37.24-37.27
A0345	34.50	35.50-35.54	38.32-38.38	38.27-38.30
A0355	35.50	36.53-36.57	39.35-39.41	39.30-39.33
A0365	36.50	37.55-37.59	40.37-40.43	40.32-40.35

Table 7A - O-ring seal radial groove dimensions for piston mounted static applications, d_2 nom = 1.80 mm (continued)

2% Minimum stretch
Groove width b = 2.65 - 2.90
Corner radius r_1 = 0.3 - 0.5
Edge radius r_2 = 0.1 - 0.3
(Dimensions are in millimeters)

O-Ring MA2010		Piston Mounted		
Size Code	d_1 nom	d_3 Groove Dia	d_4 Bore Dia	d_5 Rod Dia
A0375	37.50	38.58- 38.62	41.40- 41.46	41.35- 41.38
A0387	38.70	39.80- 39.84	42.62- 42.68	42.57- 42.60
A0400	40.00	41.14- 41.18	43.96- 44.02	43.91- 43.94
A0412	41.20	42.37- 42.41	45.19- 45.25	45.14- 45.17
A0425	42.50	43.71- 43.75	46.53- 46.59	46.48- 46.51
A0437	43.70	44.93- 44.97	47.75- 47.81	47.70- 47.73
A0450	45.00	46.27- 46.31	49.09- 49.15	49.04- 49.07
A0475	47.50	48.84- 48.88	51.66- 51.72	51.60- 51.63
A0500	50.00	51.40- 51.44	54.22- 54.28	54.16- 54.19
A0530	53.00	54.48- 54.52	57.30- 57.36	57.24- 57.27
A0560	56.00	57.55- 57.59	60.37- 60.43	60.31- 60.34
A0600	60.00	61.66- 61.70	64.48- 64.54	64.42- 64.45
A0630	63.00	64.73- 64.77	67.55- 67.61	67.49- 67.52
A0670	67.00	68.84- 68.88	71.66- 71.72	71.60- 71.63
A0710	71.00	72.94- 72.98	75.76- 75.82	75.70- 75.73
A0750	75.00	77.04- 77.08	79.86- 79.92	79.80- 79.83
A0800	80.00	82.17- 82.21	84.99- 85.05	84.92- 84.95
A0850	85.00	87.30- 87.34	90.12- 90.18	90.05- 90.08
A0900	90.00	92.43- 92.47	92.25- 92.31	95.18- 95.21
A0950	95.00	97.55- 97.59	100.37-100.43	100.30-100.33
A1000	100.00	102.68-102.72	105.50-105.56	105.43-105.46
A1060	106.00	108.84-108.88	111.66-111.72	111.59-111.62
A1120	112.00	114.99-115-03	117.81-117.87	117.74-117.77
A1180	118.00	121.15-121.19	123.97-124.03	123.89-123.93
A1250	125.00	128.33-128.37	131.15-131.21	131.07-131.11

Table 7B - O-ring seal radial groove dimensions for housing mounted static applications, d_2 nom = 1.80 mm

2% Minimum stretch
Groove width b = 2.65 - 2.90
Corner radius r_1 = 0.3 - 0.5
Edge radius r_2 = 0.1 - 0.3
(Dimensions are in millimeters)

O-Ring MA2010		Housing Mounted		
Size Code	d_1 nom	d_4 Bore Dia	d_5 Rod Dia	d_6 Groove Dia
A0040	4.00	4.23- 4.29	4.21- 4.22	7.03- 7.09
A0045	4.50	4.74- 4.80	4.72- 4.73	7.54- 7.60
A0048	4.87	5.12- 5.18	5.10- 5.11	7.92- 7.98
A0050	5.00	5.25- 5.31	5.23- 5.24	8.05- 8.11
A0051	5.15	5.41- 5.47	5.39- 5.40	8.21- 8.27
A0053	5.30	5.56- 5.62	5.54- 5.55	8.36- 8.42
A0056	5.60	5.86- 5.92	5.84- 5.86	8.66- 8.72
A0060	6.00	6.28- 6.34	6.25- 6.27	9.07- 9.13
A0063	6.30	6.59- 6.65	6.56- 6.58	9.38- 9.44
A0067	6.70	7.00- 7.06	6.97- 6.99	9.79- 9.85
A0069	6.90	7.21- 7.27	7.18- 7.20	10.00-10.06
A0071	7.10	7.41- 7.47	7.38- 7.40	10.20-10.26
A0075	7.50	7.82- 7.88	7.79- 7.81	10.61-10.67
A0080	8.00	8.33- 8.39	8.30- 8.32	11.12-11.18
A0085	8.50	8.85- 8.91	8.82- 8.84	11.64-11.70
A0087	8.75	9.11- 9.17	9.08- 9.10	11.90-11.96
A0090	9.00	9.36- 9.42	9.33- 9.35	12.15-12.21
A0095	9.50	9.87- 9.93	9.84- 9.86	12.66-12.72
A0100	10.00	10.38-10.44	10.35-10.37	13.17-13.23
A0106	10.60	11.01-11.07	10.98-11.00	13.80-13.86
A0112	11.20	11.62-11.68	11.59-11.61	14.41-14.47
A0118	11.80	12.24-12.30	12.21-12.23	15.03-15.09
A0125	12.50	12.95-13.01	12.92-12.94	15.74-15.80
A0132	13.20	13.67-13.73	13.64-13.66	16.46-16.52
A0140	14.00	14.49-14.55	14.46-14.48	17.28-17.34
A0150	15.00	15.51-15.57	15.48-15.50	18.30-18.36
A0160	16.00	16.54-16.60	16.51-16.53	19.33-19.39
A0170	17.00	17.57-17.63	17.54-17.56	20.36-20.42
A0180	18.00	18.60-18.66	18.56-18.58	21.38-21.44
A0190	19.00	19.63-19.69	19.59-19.61	22.41-22.47
A0200	20.00	20.65-20.71	20.61-20.63	23.43-23.49
A0212	21.20	21.89-21.95	21.85-21.87	24.67-24.73
A0224	22.40	23.12-23.18	23.08-23.10	25.90-25.96
A0236	23.60	24.36-24.42	24.32-24.34	27.14-27.20
A0250	25.00	25.78-25.84	25.74-25.76	28.56-28.62
A0258	25.80	26.61-26.67	26.57-26.59	29.39-29.45
A0265	26.50	27.32-27.38	27.28-27.30	30.10-30.16
A0280	28.00	28.87-28.93	28.83-28.85	31.65-31.71
A0300	30.00	30.93-30.99	30.88-30.91	33.70-33.76
A0315	31.50	32.47-32.53	32.42-32.45	35.24-35.30

Table 7B - O-ring seal radial groove dimensions for housing mounted static applications, d_2 nom = 1.80 mm (continued)

2% Minimum stretch
Groove width b = 2.65 - 2.90
Corner radius r_1 = 0.3 - 0.5
Edge radius r_2 = 0.1 - 0.3
(Dimensions are in millimeters)

O-Ring MA2010		Housing Mounted		
Size Code	d_1 nom	d_4 Bore Dia	d_5 Rod Dia	d_6 Groove Dia
A0325	32.50	33.50-33.56	33.45-33.48	36.27-36.33
A0335	33.50	34.52-34.58	34.47-34.50	37.29-37.35
A0345	34.50	35.55-35.61	35.50-35.53	38.32-38.38
A0355	35.50	36.58-36.64	36.53-36.56	39.35-39.41
A0365	36.50	37.60-37.66	37.55-37.58	40.37-40.43
A0375	37.50	38.63-38.69	38.58-38.61	41.40-41.46
A0387	38.70	39.85-39.91	39.80-39.83	42.62-42.68
A0400	40.00	41.19-41.25	41.14-41.17	43.96-44.02
A0412	41.20	42.42-42.48	42.37-42.40	45.19-45.25
A0425	42.50	43.76-43.82	43.71-43.74	46.53-46.59
A0437	43.70	44.98-45.04	44.93-44.96	47.75-47.81

Table 8A - O-ring seal radial groove dimensions for piston mounted static applications, d_2 nom = 2.65 mm

2% Minimum stretch
Groove width b = 3.68 - 3.93
Corner radius r_1 = 0.3 - 0.5
Edge radius r_2 = 0.1 - 0.3
(Dimensions are in millimeters)

O-Ring MA2010	Piston Mounted			
Size Code	d_1 nom	d_3 Groove Dia	d_4 Bore Dia	d_5 Rod Dia
B0045	4.50	4.72- 4.77	8.99- 9.06	8.96- 8.98
B0053	5.30	5.54- 5.59	9.82- 9.88	9.78- 9.80
B0060	6.00	6.25- 6.30	10.52-10.59	10.49-10.50
B0069	6.90	7.18- 7.23	11.45-11.52	11.42-11.43
B0080	8.00	8.30- 8.35	12.57-12.64	12.53-12.54
B0090	9.00	9.33- 9.38	13.60-13.67	13.57-13.58
B0095	9.50	9.84- 9.89	14.11-14.18	14.08-14.09
B0100	10.00	10.35-10.40	14.62-14.69	14.59-14.60
B0106	10.60	10.98-11.03	15.25-15.32	15.22-15.23
B0112	11.20	11.59-11.64	15.86-15.93	15.83-15.84
B0118	11.80	12.23-12.26	16.48-16.55	16.45-16.46
B0125	12.50	12.92-12.97	17.19-17.26	17.16-17.17
B0132	13.20	13.64-13.69	17.91-17.98	17.88-17.89
B0140	14.00	14.46-14.51	18.73-18.80	18.69-18.71
B0150	15.00	15.48-15.53	19.75-19.82	19.71-19.73
B0160	16.00	16.52-16.56	20.78-20.85	20.76-20.77
B0170	17.00	17.54-17.59	21.81-21.88	21.77-21.79
B0180	18.00	18.56-18.61	22.83-22.90	22.79-22.81
B0190	19.00	19.59-19.64	23.56-23.63	23.82-23.84
B0200	20.00	20.61-20.66	24.88-24.95	24.86-24.88
B0212	21.20	21.85-21.90	26.12-26.19	31.56-31.58
B0224	22.40	23.08-23.13	27.35-27.42	33.65-33.68
B0236	23.60	24.32-24.37	28.59-28.66	35.10-35.13
B0250	25.00	25.74-25.79	30.01-30.08	36.64-36.67
B0258	25.80	26.57-26.62	30.84-30.91	37.67-37.70
B0265	26.50	27.28-27.33	31.35-31.42	31.50-31.53
B0280	28.50	28.83-28.88	33.10-33.17	33.05-33.08
B0300	30.00	30.88-30.93	35.15-35.22	35.10-35.13
B0315	31.50	32.42-32.47	36.69-36.76	36.64-36.67
B0325	32.50	33.43-33.50	37.72-37.79	37.67-37.70
B0335	33.50	34.47-34.52	38.74-38.81	38.65-38.72
B0345	34.50	35.50-35.55	39.77-39.84	39.72-39.75
B0355	35.50	36.53-36.58	40.80-40.87	40.75-40.78
B0365	36.50	37.55-37.60	41.82-41.89	41.77-41.80
B0375	37.50	38.58-38.63	42.85-42.92	42.80-42.83
B0387	38.70	39.80-39.85	44.07-44.14	44.02-44.05
B0400	40.00	41.14-41.19	45.41-45.48	45.36-45.39
B0412	41.20	42.37-42.42	46.64-46.71	46.59-46.62
B0425	42.50	43.71-43.76	47.98-48.05	47.93-47.96
B0437	43.70	44.93-44.98	49.20-49.27	49.15-49.18

Table 8A - O-ring seal radial groove dimensions for piston mounted static applications, d_2 nom = 2.65 mm (continued)

2% Minimum stretch
Groove width b = 3.68 - 3.93
Corner radius r_1 = 0.3 - 0.5
Edge radius r_2 = 0.1 - 0.3
(Dimensions are in millimeters)

O-Ring MA2010		Piston Mounted		
Size Code	d_1 nom	d_3 Groove Dia	d_4 Bore Dia	d_5 Rod Dia
B0450	45.00	46.27- 46.32	50.54- 50.61	50.48- 50.51
B0462	46.20	47.50- 47.55	51.77- 51.84	51.71- 51.74
B0475	47.50	48.84- 48.89	53.11- 53.18	53.05- 53.08
B0487	48.70	50.06- 50.11	54.33- 54.40	54.27- 54.30
B0500	50.00	51.40- 51.45	55.67- 55.74	55.61- 55.64
B0515	51.50	52.94- 52.99	57.21- 57.28	57.15- 57.18
B0530	53.00	54.48- 54.53	58.75- 58.82	58.69- 58.72
B0545	54.50	56.02- 56.07	60.29- 60.36	60.23- 60.26
B0560	56.00	57.55- 57.60	61.82- 61.89	61.76- 61.79
B0580	58.00	59.61- 59.66	63.88- 63.95	63.82- 63.85
B0600	60.00	61.66- 61.71	65.93- 66.00	65.87- 65.90
B0615	61.50	63.19- 63.24	67.46- 67.53	67.40- 67.43
B0630	63.00	64.73- 64.78	69.00- 69.07	68.94- 68.97
B0650	65.00	66.79- 66.84	71.06- 71.13	71.00- 71.03
B0670	67.00	68.84- 68.89	73.11- 73.18	73.05- 73.08
B0690	69.00	70.89- 70.94	75.16- 75.23	75.10- 75.13
B0710	71.00	72.94- 72.99	77.21- 77.28	77.15- 77.18
B0730	73.00	74.99- 75.04	79.26- 79.33	79.20- 79.23
B0750	75.00	77.04- 77.09	81.31- 81.38	81.24- 81.27
B0800	80.00	82.17- 82.22	86.44- 86.51	86.37- 86.40
B0850	85.00	87.30- 87.35	91.57- 91.64	91.50- 91.53
B0900	90.00	92.43- 92.48	96.70- 96.77	96.63- 96.66
B0950	95.00	97.55- 97.60	101.82-101.89	101.75-101.78
B1000	100.00	102.68-102.73	106.95-107.02	106.88-106.91
B1060	106.00	108.84-108.89	113.11-113.18	113.04-113.07
B1120	112.00	114.99-115.04	119.26-119.33	119.19-119.22
B1180	118.00	121.15-121.20	125.42-125.49	125.34-125.38
B1250	125.00	128.33-128.38	132.60-132.67	132.52-132.56
B1320	132.00	135.51-135.56	139.78-139.85	139.70-139.74
B1400	140.00	143.71-143.76	147.98-148.05	147.90-147.94
B1500	150.00	153.97-154.02	158.24-158.31	158.16-158.20
B1600	160.00	164.22-164.27	168.49-168.56	168.41-168.48
B1700	170.00	174.48-174.53	178.75-178.82	178.67-178.71
B1800	180.00	184.73-184.78	189.00-189.07	188.91-188.95
B1900	190.00	194.99-195.04	199.26-199.33	199.16-199.21
B2000	200.00	205.24-205.29	209.51-209.58	209.41-209.46
B2120	212.00	217.56-217.61	221.83-221.90	221.73-221.78
B2240	224.00	229.86-229.91	234.13-234.20	234.03-234.08
B2360	236.00	242.17-242.22	246.44-246.51	246.34-246.39
B2500	250.00	256.52-256.57	260.79-260.86	260.68-260.73

Table 8A - O-ring seal radial groove dimensions for piston mounted static applications, d_2 nom = 2.65 mm (continued)

2% Minimum stretch
Groove width b = 3.68 - 3.93
Corner radius r_1 = 0.3 - 0.5
Edge radius r_2 = 0.1 - 0.3
(Dimensions are in millimeters)

O-Ring MA2010		Piston Mounted		
Size Code	d_1 nom	d_3 Groove Dia	d_4 Bore Dia	d_5 Rod Dia
B1120	112.00	114.99-115.04	119.26-119.33	119.19-119.22
B1180	118.00	121.15-121.20	125.42-125.49	125.34-125.38
B1250	125.00	128.33-128.38	132.60-132.67	132.52-132.56
B1320	132.00	135.51-135.56	139.78-139.85	139.70-139.74
B1400	140.00	143.71-143.76	147.98-148.05	147.90-147.94
B1500	150.00	153.97-154.02	158.24-158.31	158.16-158.20
B1600	160.00	164.22-164.27	168.49-168.56	168.41-168.48
B1700	170.00	174.48-174.53	178.75-178.82	178.67-178.71
B1800	180.00	184.73-184.78	189.00-189.07	188.91-188.95
B1900	190.00	194.99-195.04	199.26-199.33	199.16-199.21
B2000	200.00	205.24-205.29	209.51-209.58	209.41-209.46
B2120	212.00	217.56-217.61	221.83-221.90	221.73-221.78
B2240	224.00	229.86-229.91	234.13-234.20	234.03-234.08
B2360	236.00	242.17-242.22	246.44-246.51	246.34-246.39
B2500	250.00	256.52-256.57	260.79-260.86	260.68-260.73

Table 8B - O-ring seal radial groove dimensions for housing mounted static applications, d_2 nom = 2.65 mm

2% Minimum stretch
Groove width b = 3.68 - 3.93
Corner radius r_1 = 0.3 - 0.5
Edge radius r_2 = 0.1 - 0.3
(Dimensions are in millimeters)

O-Ring MA2010		Housing Mounted		
Size Code	d_1 nom	d_4 Bore Dia	d_5 Rod Dia	d_6 Groove Dia
B0045	4.50	4.74- 4.81	4.72- 4.73	8.99- 9.06
B0053	5.30	5.56- 5.63	5.54- 5.55	9.81- 9.88
B0060	6.00	6.28- 6.35	6.25- 6.27	10.52-10.59
B0069	6.90	7.21- 7.28	7.18- 7.20	11.45-11.52
B0080	8.00	8.33- 8.40	8.30- 8.32	12.57-12.64
B0090	9.00	9.36- 9.43	9.33- 9.35	13.60-13.67
B0095	9.50	9.89- 9.94	9.84- 9.86	14.11-14.18
B0100	10.00	10.38-10.45	10.35-10.37	14.62-14.69
B0106	10.60	11.01-11.08	10.98-11.00	15.25-15.32
B0112	11.20	11.62-11.69	11.59-11.61	15.86-15.93
B0118	11.80	12.24-12.31	12.21-12.23	16.48-16.55
B0125	12.50	12.95-13.02	12.92-12.94	17.19-17.26
B0132	13.20	13.67-13.74	13.64-13.66	17.91-17.98
B0140	14.00	14.49-14.56	14.46-14.48	18.73-18.80
B0150	15.00	15.51-15.58	15.48-15.50	19.73-19.82
B0160	16.00	16.54-16.61	16.51-16.53	20.78-20.85
B0170	17.00	17.57-17.64	17.54-17.56	21.80-21.88
B0180	18.00	18.60-18.67	18.56-18.58	22.83-22.90
B0190	19.00	19.63-19.70	19.59-19.61	23.86-23.93
B0200	20.00	20.65-20.72	20.61-20.63	24.88-24.95
B0212	21.20	21.89-21.96	21.85-21.87	26.12-26.19
B0224	22.40	23.22-23.19	23.08-23.10	27.35-27.42
B0236	23.60	24.36-24.43	24.32-24.34	28.59-28.66
B0250	25.00	25.78-25.85	25.74-25.76	30.01-30.08
B0258	25.80	26.61-26.68	26.57-26.59	30.84-30.91
B0265	26.50	27.32-27.39	27.28-27.31	31.55-31.62
B0280	28.00	28.87-28.94	28.83-28.86	33.10-33.17
B0300	30.00	30.93-31.00	30.88-30.91	35.15-35.22
B0315	31.50	32.47-32.54	32.42-32.45	36.69-36.76
B0325	32.50	33.50-33.57	33.45-33.48	32.72-37.79
B0335	33.50	34.52-34.59	34.47-34.50	38.75-38.81
B0345	34.50	35.55-35.62	35.50-35.53	39.78-39.84
B0355	35.50	36.58-36.65	36.53-36.56	40.80-40.87
B0365	36.50	37.60-37.67	37.55-37.58	41.82-41.89
B0375	37.50	38.63-38.70	38.58-38.61	42.85-42.92
B0387	38.70	39.85-39.92	39.80-39.83	44.07-44.14
B0400	40.00	41.19-41.26	41.14-41.17	45.41-45.48
B0412	41.20	42.42-42.49	42.37-42.40	46.64-46.71
B0425	42.50	43.76-43.83	43.71-43.74	47.98-48.05
B0437	43.70	44.98-45.05	44.93-44.96	49.20-49.27

Table 8B - O-ring seal radial groove dimensions for housing mounted static applications, d_2 nom = 2.65 mm (continued)

2% Minimum stretch
Groove width b = 3.68 - 3.93
Corner radius r_1 = 0.3 - 0.5
Edge radius r_2 = 0.1 - 0.3
(Dimensions are in millimeters)

O-Ring MA2010		Housing Mounted		
Size Code	d_1 nom	d_4 Bore Dia	d_5 Rod Dia	d_6 Groove Dia
B0450	45.00	46.32-46.39	46.27-46.30	50.54-50.61
B0462	46.20	47.55-47.62	47.50-47.53	51.77-51.84
B0475	47.50	48.89-48.96	48.84-48.87	53.11-53.18
B0487	48.70	50.12-50.19	50.06-50.09	54.33-54.40
B0500	50.00	51.46-51.53	51.40-51.43	55.67-55.74
B0515	51.50	53.00-53.07	52.94-52.97	57.21-57.28
B0530	53.00	54.54-54.61	54.48-54.51	58.75-58.82
B0545	54.50	56.08-56.15	56.02-56.05	60.29-60.36
B0560	56.00	57.61-57.68	57.55-57.58	61.82-61.89
B0580	58.00	59.67-59.74	59.61-59.64	63.88-63.95
B0600	60.00	61.72-61.79	61.66-61.69	65.93-66.00
B0615	61.50	63.25-63.32	63.19-63.22	67.46-67.53
B0630	63.00	64.79-64.86	64.73-64.76	69.00-69.07
B0650	65.00	66.85-66.92	66.79-66.82	71.06-71.13
B0670	67.00	68.90-68.97	68.84-68.87	73.11-73.18
B0690	69.00	70.95-71.02	70.89-70.92	75.16-75.23

Table 9A - O-ring seal radial groove dimensions for piston mounted static applications, d_2 nom = 3.55 mm

2% Minimum stretch
Groove width b = 4.80 - 5.05
Corner radius r_1 = 0.4 - 0.8
Edge radius r_2 = 0.1 - 0.3
(Dimensions are in millimeters)

O-Ring MA2010		Piston Mounted		
Size Code	d_1 nom	d_3 Groove Dia	d_4 Bore Dia	d_5 Rod Dia
C0140	14.00	14.46-14.52	20.26-20.34	20.22-20.24
C0150	15.00	15.48-15.54	21.28-21.36	21.24-21.26
C0160	16.00	16.51-16.57	22.31-22.39	22.27-22.30
C0170	17.00	17.54-17.60	23.34-23.42	23.30-23.32
C0180	18.00	18.56-18.62	24.36-24.44	24.32-24.34
C0190	19.00	19.59-19.65	25.39-25.47	25.35-25.37
C0200	20.00	20.61-20.67	26.41-26.49	26.37-26.39
C0212	21.20	21.85-21.91	27.65-27.73	27.61-27.63
C0224	22.40	23.08-23.14	28.88-28.96	28.84-28.86
C0236	23.60	24.32-24.38	30.12-30.20	30.07-30.10
C0250	25.00	25.74-25.80	31.54-31.62	31.49-31.52
C0258	25.80	26.57-26.63	32.37-32.45	32.32-32.35
C0265	26.50	27.28-27.34	33.08-33.16	33.03-33.06
C0280	28.00	28.83-28.89	34.63-34.71	34.58-34.61
C0300	30.00	30.88-30.94	36.68-36.76	36.63-36.66
C0315	31.50	32.42-32.48	38.22-38.30	38.17-38.20
C0325	32.50	33.45-33.51	39.25-39.33	39.20-39.23
C0335	33.50	34.47-34.53	40.27-40.35	40.22-40.25
C0345	34.50	35.50-35.56	41.30-41.38	41.25-41.28
C0355	35.50	36.53-36.59	42.33-42.41	42.28-42.31
C0365	36.50	37.55-37.61	43.35-43.43	43.30-43.33
C0375	37.50	38.58-38.64	44.38-44.46	44.33-44.36
C0387	38.70	39.80-39.86	45.60-45.68	45.55-45.58
C0400	40.00	41.14-41.20	46.94-47.02	46.89-46.92
C0412	41.20	42.37-42.43	48.17-48.25	48.12-48.14
C0425	42.50	43.71-43.77	49.51-49.59	49.46-49.49
C0437	43.70	44.93-44.99	50.73-50.81	50.67-50.70
C0450	45.00	46.27-46.33	52.07-52.15	52.01-52.04
C0462	46.20	47.50-47.56	53.30-53.38	53.24-53.27
C0475	47.50	48.84-48.90	54.64-54.72	54.58-54.61
C0487	48.70	50.06-50.12	55.86-55.94	55.80-55.83
C0500	50.00	51.40-51.46	57.20-57.28	57.14-57.17
C0515	51.50	52.94-53.00	58.74-58.82	58.68-58.71
C0530	53.00	54.48-54.54	60.28-60.36	60.72-60.75
C0545	54.50	56.02-56.08	61.82-61.90	61.76-61.79
C0560	56.00	57.55-57.61	63.35-63.43	63.29-63.32
C0580	58.00	59.61-59.67	65.41-65.49	65.35-65.38
C0600	60.00	61.66-61.72	67.46-67.54	67.40-67.43
C0615	61.50	63.19-63.25	68.99-69.07	68.93-68.96
C0630	63.00	64.73-64.79	70.53-70.61	70.47-70.50

Table 9A - O-ring seal radial groove dimensions for piston mounted static applications, d_2 nom = 3.55 mm (continued)

2% Minimum stretch
Groove width b = 4.80 - 5.05
Corner radius r_1 = 0.4 - 0.8
Edge radius r_2 = 0.1 - 0.3
(Dimensions are in millimeters)

O-Ring MA2010		Piston Mounted		
Size Code	d_1 nom	d_3 Groove Dia	d_4 Bore Dia	d_5 Rod Dia
C0650	65.00	66.79- 66.85	72.59- 72.67	72.53- 72.56
C0670	67.00	68.84- 68.90	74.64- 74.72	74.58- 74.61
C0690	69.00	70.89- 70.95	76.69- 76.77	76.63- 76.66
C0710	71.00	72.94- 73.00	78.74- 78.82	78.68- 78.71
C0730	73.00	74.99- 75.05	80.79- 80.87	80.72- 80.75
C0750	75.00	77.04- 77.10	82.84- 82.92	82.77- 82.80
C0775	77.50	79.61- 79.67	85.41- 85.49	85.34- 85.37
C0800	80.00	82.17- 82.23	87.97- 88.05	87.90- 87.93
C0825	82.50	84.73- 84.79	90.53- 90.61	90.46- 90.50
C0850	85.00	87.30- 87.36	93.10- 93.18	93.03- 93.06
C0875	87.50	89.86- 89.92	95.66- 95.74	95.59- 95.62
C0900	90.00	92.43- 92.49	98.23- 98.31	98.16- 98.19
C0925	92.50	94.99- 95.05	100.79-100.87	100.72-100.75
C0950	95.00	97.55- 97.61	103.35-103.43	103.28-103.31
C0975	97.50	100.12-100.18	105.92-106.00	105.85-105.88
C1000	100.00	102.68-102.74	108.48-108.56	108.41-108.44
C1030	103.00	105.76-105.82	111.56-111.64	111.49-111.52
C1060	106.00	108.84-108.90	114.64-114.72	114.57-114.60
C1090	109.00	111.91-111.97	117.71-117.79	117.64-117.67
C1120	112.00	114.99-115.05	120.79-120.87	120.71-120.75
C1150	115.00	118.08-118.14	123.88-123.96	123.80-123.84
C1180	118.00	121.15-121.21	126.95-127.03	126.87-126.91
C1220	122.00	125.26-125.32	131.06-131.14	130.98-131.02
C1250	125.00	128.33-128.39	134.13-134.21	134.05-134.09
C1280	128.00	131.41-131.47	137.21-137.29	137.13-137.17
C1320	132.00	135.51-135.57	141.31-141.39	141.23-141.27
C1360	136.00	139.61-139.67	145.41-145.49	145.33-145.37
C1400	140.00	143.71-143.77	149.51-149.59	149.43-149.47
C1450	145.00	148.84-148.90	154.64-154.72	154.54-154.58
C1500	150.00	153.97-154.03	159.77-159.85	159.69-159.73
C1550	155.00	159.10-159.16	164.90-164.98	164.82-164.86
C1600	160.00	164.22-164.28	170.02-170.10	169.94-169.98
C1650	165.00	169.35-169.41	175.15-175.23	175.07-175.11
C1700	170.00	174.48-174.54	180.28-180.36	180.18-180.23
C1750	175.00	179.61-179.67	185.41-185.49	185.31-185.36
C1800	180.00	184.73-184.79	190.53-190.61	190.43-190.48
C1850	185.00	189.86-189.92	195.66-195.74	195.56-195.61
C1900	190.00	194.99-195.05	200.79-200.87	200.69-200.74
C1950	195.00	200.12-200.18	205.92-206.00	205.82-205.87
C2000	200.00	205.24-205.30	211.04-211.12	210.94-210.99

Table 9A - O-ring seal radial groove dimensions for piston mounted static applications, d_2 nom = 3.55 mm (continued)

2% Minimum stretch
Groove width b = 4.80 - 5.05
Corner radius r_1 = 0.4 - 0.8
Edge radius r_2 = 0.1 - 0.3
(Dimensions are in millimeters)

O-Ring MA2010		Piston Mounted		
Size Code	d_1 nom	d_3 Groove Dia	d_4 Bore Dia	d_5 Rod Dia
C2120	212.00	217.56-217.62	223.36-223.44	223.26-223.31
C2240	224.00	229.86-229.92	235.60-235.68	235.56-235.61
C2360	236.00	242.17-242.23	247.97-248.05	247.87-247.92
C2500	250.00	256.52-256.58	262.32-262.40	262.21-262.26
C2650	265.00	271.90-271.96	277.70-277.78	277.59-277.64
C2800	280.00	287.28-287.34	293.08-293.16	292.97-293.02
C3000	300.00	307.80-307.86	313.60-313.68	313.49-313.54
C3150	315.00	323.18-323.24	328.98-329.06	328.86-328.92
C3350	335.00	343.69-343.75	349.49-349.57	349.37-349.43
C3550	355.00	364.20-364.26	370.00-370.08	369.88-369.94

Table 9B - O-ring seal radial groove dimensions for housing mounted static applications, d_2 nom = 3.55 mm

2% Minimum stretch
Groove width b = 4.80 - 5.05
Corner radius r_1 = 0.4 - 0.8
Edge radius r_2 = 0.1 - 0.3
(Dimensions are in millimeters)

O-Ring MA2010		Housing Mounted		
Size Code	d_1 nom	d_4 Bore Dia	d_5 Rod Dia	d_6 Groove Dia
C0140	14.00	14.49-14.57	14.46-14.48	20.26-20.34
C0150	15.00	15.51-15.59	15.48-15.50	21.28-21.36
C0160	16.00	16.54-16.62	16.51-16.53	22.31-22.39
C0170	17.00	17.57-17.65	17.54-17.56	23.34-23.42
C0180	18.00	18.60-18.68	18.56-18.58	24.36-24.44
C0190	19.00	19.63-19.71	19.59-19.61	25.39-25.47
C0200	20.00	20.65-20.73	20.61-20.63	26.41-26.49
C0212	21.20	21.89-21.97	21.85-21.87	27.65-27.73
C0224	22.40	23.12-23.20	23.08 -23.10	28.88-28.96
C0236	23.60	24.36-24.44	24.32-24.34	30.12-30.20
C0250	25.00	25.78-25.86	25.74-25.76	31.54-31.62
C0258	25.80	26.61-26.69	26.57-26.59	32.37-32.45
C0265	26.50	27.32-27.40	27.28-27.30	33.08-33.16
C0280	28.00	28.87-28.95	28.83-28.85	34.63-34.71
C0300	30.00	30.93-31.01	30.88 -30.91	36.68-36.76
C0315	31.50	32.47-32.55	32.42-32.45	38.22-38.30
C0325	32.50	33.50-33.58	33.45-33.48	39.25-39.33
C0335	33.50	34.52-34.60	34.47-34.50	40.27-40.35
C0345	34.50	35.55-35.63	35.50-35.53	41.30-41.38
C0355	35.50	36.58-36.66	36.53-36.56	42.33-42.41
C0365	36.50	37.60-37.68	37.55-37.58	43.35-43.43
C0375	37.50	38.63-38.71	38.58-38.61	44.38-44.46
C0387	38.70	39.85-39.93	39.80-39.83	45.60-45.68
C0400	40.00	41.19-41.27	41.14-41.17	46.94-47.02
C0412	41.20	42.42-42.50	42.37-42.40	48.17-48.25
C0425	42.50	43.76-43.84	43.71-43.74	49.41-49.49
C0437	43.70	44.98-45.06	44.93-44.96	50.73-50.81
C0450	45.00	46.32-46.40	46.27-46.30	52.07-52.15
C0462	46.20	47.55- 47.63	47.50-47.53	53.30-53.38
C0475	47.50	48.89-48.97	48.84-48.87	54.64-54.72
C0487	48.70	50.12-50.20	50.06-50.09	55.86-55.94
C0500	50.00	51.46-51.54	51.40-51.43	57.20-57.28
C0515	51.50	53.00-53.08	52.94-52.97	58.74-58.82
C0530	53.00	54.54-54.62	54.48-54.51	60.28-60.36
C0545	54.50	56.08-56.16	56.02-56.05	61.82-61.90
C0560	56.00	57.61-57.69	57.55-57.58	63.35-63.43
C0580	58.00	59.67-59.75	59.61-59.64	65.41-65.49
C0600	60.00	61.72-61.80	61.66-61.69	67.46-67.54
C0615	61.50	63.25-63.33	63.19-63.22	68.99-69.07
C0630	63.00	64.79-64.87	64.73-64.76	70.53-70.61
C0650	65.00	66.85-66.93	66.79-66.82	72.59-72.67
C0670	67.00	68.90-68.98	68.84-68.87	74.64-74.72
C0690	69.00	70.95-71.03	70.89-70.92	76.69-76.77
C0710	71.00	73.00-73.08	72.94-72.97	78.74-78.82

Table 9B - O-ring seal radial groove dimensions for housing mounted static applications, d_2 nom = 3.55 mm (continued)

2% Minimum stretch
Groove width b = 4.80 - 5.05
Corner radius r_1 = 0.4 - 0.8
Edge radius r_2 = 0.1 - 0.3
(Dimensions are in millimeters)

O-Ring MA2010		Housing Mounted		
Size Code	d_1 nom	d_4 Bore Dia	d_5 Rod Dia	d_6 Groove Dia
C0730	73.00	75.05- 75.13	74.99- 75.02	80.79- 80.87
C0750	75.00	77.10- 77.18	77.04- 77.07	82.84- 82.92
C0775	77.50	79.67- 79.75	79.61- 79.64	85.41- 85.49
C0800	80.00	82.24- 82.32	82.17- 82.21	87.97- 88.05
C0825	82.50	84.80- 84.88	84.73- 84.77	90.53- 90.61
C0850	85.00	87.37- 87.45	87.30- 87.34	93.10- 93.18
C0875	87.50	89.93- 90.01	89.86- 89.90	95.66- 95.74
C0900	90.00	92.50- 92.58	92.43- 92.47	98.23- 98.31
C0925	92.50	95.06- 95.14	94.99- 95.03	100.79-100.87
C0950	95.00	97.62- 97.70	97.55- 97.59	103.35-103.43
C0975	97.50	100.19-100.27	100.12-100.16	105.92-106.00