AEROSPACE RECOMMENDED PRACTICE

ARP1234™	REV. F

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Superseding ARP1234E

Static Axial O-Ring Seal Applications Without Anti-Extrusion Devices for Engine and Engine Control Systems

RATIONALE

There are typographical errors and missing technical information in Revision E that was correct in Revision B. This revision corrects the errors.

1. SCOPE

This document establishes standard gland design criteria and dimensions for static axial O-ring seal applications without anti-extrusion devices specifically for engines and engine control systems operating at a maximum pressure of 1500 psi (10345 kPa).

NOTE: The criteria herein are similar, but not identical, to those in AS4716 and the legacy standard MIL-G-5514.

2. 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 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 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 General Gland Design Criteria for Static and Dynamic O-Ring Seal Applications Specifically for Engines and Engine Control Systems

AS568 Aerospace Size Standard for O-Rings

AS4716 Gland Design, O-Ring and Other Seals

2.2 U.S. Government Publications

Copies of these documents are available online at https://quicksearch.dla.mil.

MIL-G-5514 Gland Design, Packings, Hydraulic, General Requirements for (Cancelled)

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3. GENERAL REQUIREMENTS

3.1 Gland Configurations

3.1.1 General

A static axial O-ring seal is one which compresses the surfaces normal to the ID and OD of the O-ring. The most common axial gland configurations are depicted in Figures 1, 2, and 3. The preferred configuration is one that provides a complete groove in one part, as in Figure 1. This configuration minimizes the number of gaps through which the seal can extrude and reduces the potential damage to the seal during assembly. The use of configurations with one gland wall missing, as in Figure 3, is not recommended because it may result in damage of the seal through pressure reversals.

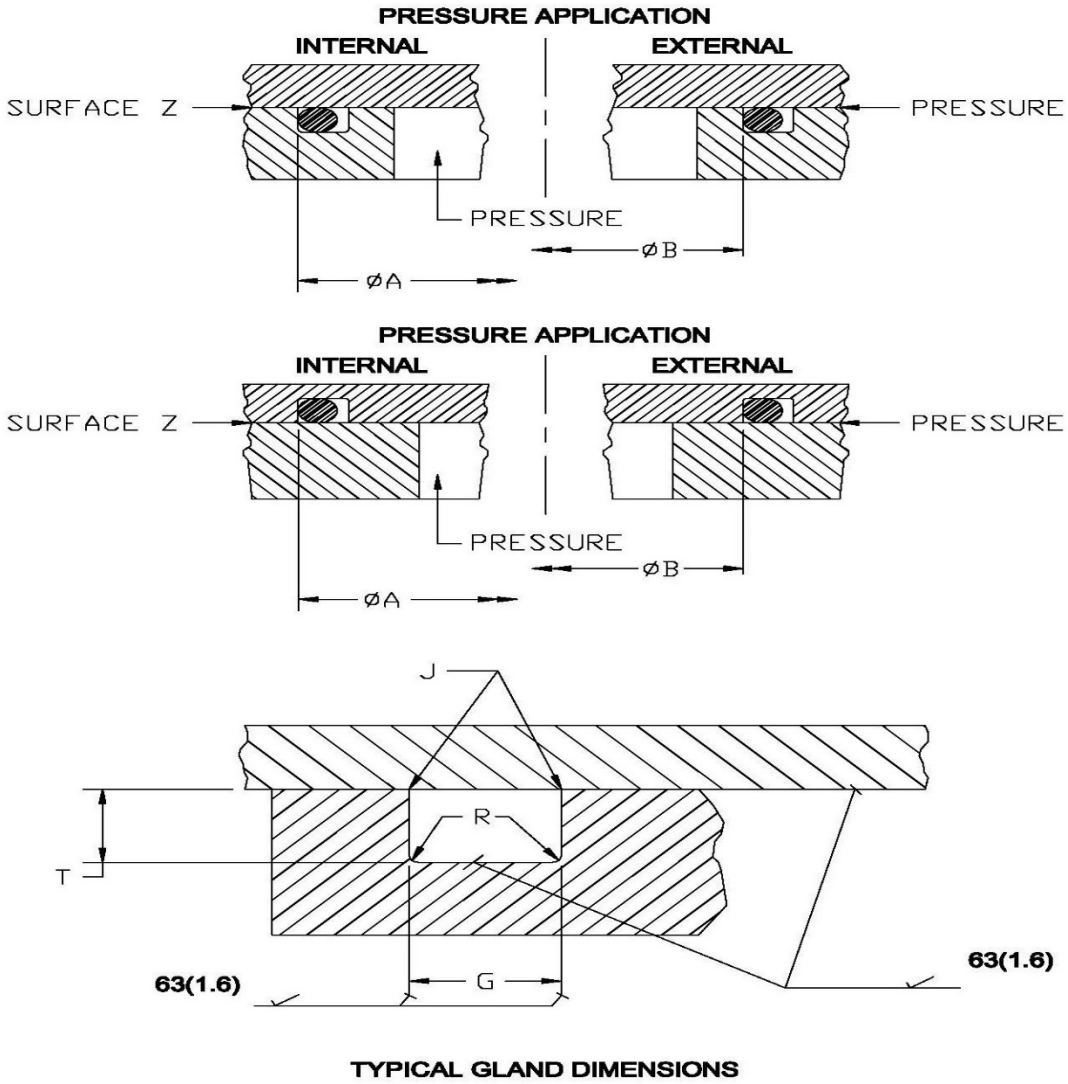

Figure 1 - O-ring seal axial gland preferred designs

NOTE: Values for J and R are listed in Table 1.

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Table 1 - Gland edge breaks and radii

AS568 Dash No.	Nominal O-Ring Cross Section		Edge Break J		Radius R	
	Inches	Millimeters	Inches	Millimeters	Inches	Millimeters
-004 thru -050	0.070	1.78	0.005-0.015	0.13-0.38	0.010-0.020	0.25-0.51
-102 thru -178	0.103	2.62	0.010-0.020	0.25-0.51	0.020-0.030	0.51-0.76
-201 thru -284	0.139	3.53	0.010-0.020	0.25-0.51	0.020-0.030	0.51-0.76
-309 thru -395	0.210	5.33	0.010-0.020	0.25-0.51	0.020-0.030	0.51-0.76
-425 thru -475	0.275	6.98	0.010-0.020	0.25-0.51	0.020-0.030	0.51-0.76

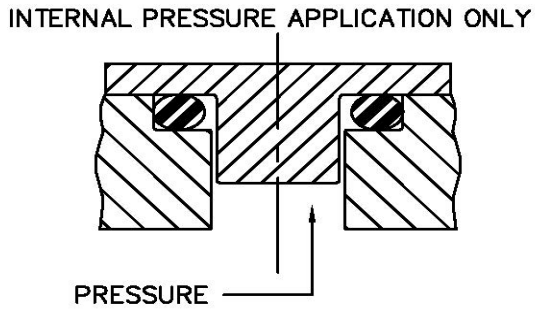

Figure 2 - O-ring seal axial glands alternate design

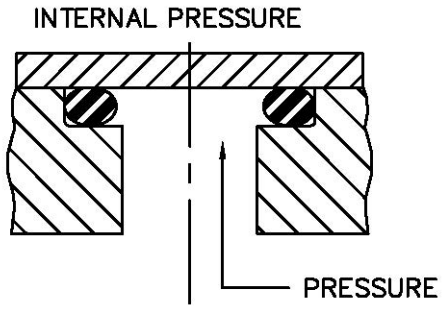

Figure 3 - O-ring seal axial glands

NOTE: This configuration is not recommended.

3.1.2 Noncircular Glands

Although axial seals are usually circular, alternate configurations like that in Figure 4 are sometimes used. Sharp corners are not recommended, and corners should be 0.005 x 45 degrees (0.13 x 45 degrees) minimum.

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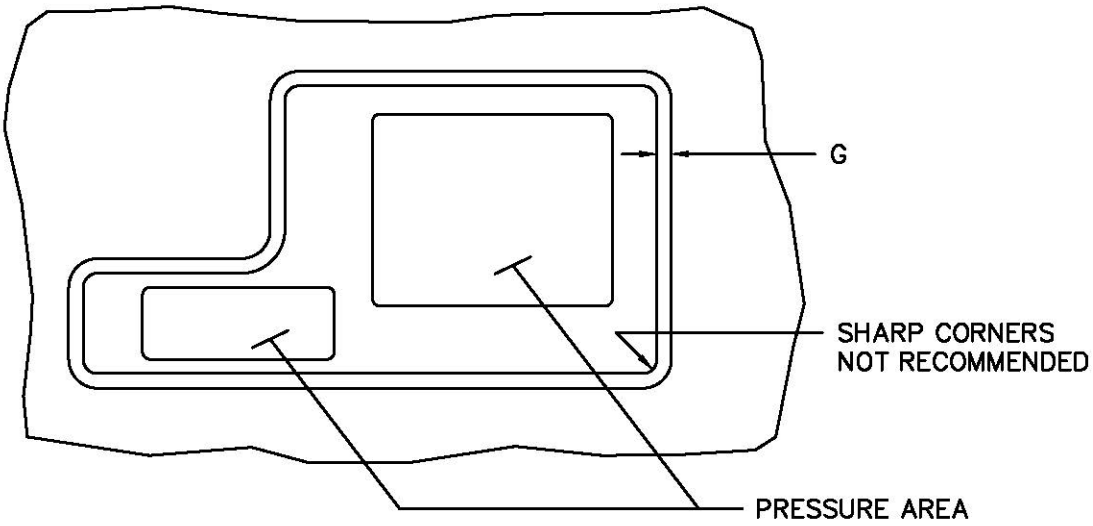

Figure 4 - Example of noncircular groove configuration (top view)

3.1.3 Placement of the Seal within the Groove

The placement of the seal within the groove depends on the direction of the pressure. Axial seals may be pressurized from a pressure source located within the seal's inner diameter (internal pressure application) or from a source located outside the outer diameter of the seal (external pressure application). The gland should be designed such that, prior to applying pressure, the seal will be in contact with the gland wall away from the pressure side of the seal.

3.1.4 Standard Glands

Standard gland diameters for axial seal glands are tabulated in Table 2. These dimensions are for use with seals conforming to AS568 tolerances. They are computed in accordance with the criteria defined in Section 4 and in ARP1231.

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Table 2 - Standard gland diameters

Gland and AS568 Dash No.	Internal Pressure Application - ØA			External Pressure Application - ØB	
	Inches Min Max	Millimeters Min Max		Inches Min Max	Millimeters Min Max
004	--	--		0.070	1.78
	--	--		0.075	1.90
005	--	--		0.101	2.57
	--	--		0.106	2.69
006	--	--		0.114	2.90
	--	--		0.119	3.02
007	--	--		0.145	3.68
	--	--		0.150	3.81
008	--	--		0.176	4.47
	--	--		0.181	4.60
009	--	--		0.208	5.28
	--	--		0.213	5.41
010	--	--		0.239	6.07
	--	--		0.244	6.20
011	0.436	11.07		0.301	7.65
	0.441	11.20		0.306	7.77
012	0.499	12.67		0.364	9.25
	0.504	12.80		0.369	9.37
013	0.561	14.25		0.426	10.82
	0.566	14.38		0.431	10.95
014	0.624	15.85		0.489	12.42
	0.629	15.98		0.494	12.55
015	0.686	17.42		0.551	14.00
	0.691	17.55		0.556	14.12
016	0.749	19.02		0.614	15.60
	0.754	19.15		0.619	15.72
017	0.811	20.60		0.676	17.17
	0.816	20.73		0.681	17.30
018	0.874	22.20		0.739	18.77
	0.879	22.33		0.744	18.90
019	0.936	23.77		0.801	20.35
	0.941	23.90		0.806	20.47
020	0.999	25.37		0.864	21.95
	1.004	25.50		0.869	22.07

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Table 2 - Standard gland diameters (continued)

Gland and AS568 Dash No.	Internal Pressure Application - ØA			External Pressure Application - ØB	
	Inches Min Max	Millimeters Min Max		Inches Min Max	Millimeters Min Max
021	1.061	26.95		0.926	23.52
	1.066	27.08		0.931	23.65
022	1.124	29.55		0.989	25.12
	1.129	29.68		0.994	25.25
023	1.186	30.12		1.051	26.70
	1.191	30.25		1.056	26.82
024	1.249	31.72		1.114	28.30
	1.254	31.85		1.119	28.42
025	1.311	33.30		1.176	29.87
	1.316	33.43		1.181	30.00
026	1.374	34.90		1.239	31.47
	1.379	35.03		1.244	31.60
027	1.436	36.47		1.301	33.05
	1.441	36.60		1.306	33.17
028	1.499	38.07		1.364	34.65
	1.504	38.20		1.369	34.77
029	1.624	41.25		1.489	37.82
	1.629	41.38		1.494	37.95
030	1.749	44.42		1.614	41.00
	1.754	44.55		1.619	41.12
031	1.874	47.60		1.739	44.17
	1.879	47.73		1.744	44.30
032	1.999	50.77		1.864	47.35
	2.004	50.90		1.869	47.47
033	2.124	53.95		1.989	50.52
	2.129	54.08		1.994	50.65
034	2.249	57.12		2.114	53.70
	2.254	57.25		2.119	53.82
035	2.374	60.30		2.239	56.87
	2.379	60.43		2.244	57.00
036	2.499	63.47		2.364	60.05
	2.504	63.60		2.369	60.17
037	2.624	66.65		2.489	63.22
	2.629	66.78		2.494	63.35
038	2.749	69.82		2.614	66.40
	2.754	69.95		2.619	66.52
039	2.874	73.00		2.739	69.57
	2.879	73.13		2.744	69.70
040	2.999	76.17		2.864	72.75
	3.004	76.30		2.869	72.87

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Table 2 - Standard gland diameters (continued)

Gland and AS568 Dash No.	Internal Pressure Application - ØA			External Pressure Application - ØB	
	Inches Min Max	Millimeters Min Max		Inches Min Max	Millimeters Min Max
041	3.124	79.35		2.989	75.92
	3.129	79.48		2.994	76.05
042	3.374	85.70		3.239	82.27
	3.379	85.83		3.244	82.40
043	3.624	92.05		3.489	88.62
	3.629	92.18		3.494	88.75
044	3.874	98.40		3.739	94.97
	3.879	98.53		3.744	95.10
045	4.124	104.75		3.989	101.32
	4.129	104.88		3.994	101.45
046	4.374	111.10		4.239	107.67
	4.379	111.23		4.244	107.80
047	4.624	117.45		4.489	114.02
	4.629	117.58		4.494	114.15
048	4.874	123.80		4.739	120.37
	4.879	123.93		4.744	120.50
049	5.124	130.15		4.989	126.72
	5.129	130.28		4.994	126.85
050	5.374	136.50		5.239	133.07
	5.379	136.63		5.244	133.20
102	--	--		0.049	1.24
	--	--		0.054	1.37
103	--	--		0.081	2.06
	--	--		0.086	2.18
104	--	--		0.112	2.84
	--	--		0.117	2.97
105	--	--		0.143	3.63
	--	--		0.148	3.76
106	--	--		0.174	4.42
	--	--		0.179	4.55
107	--	--		0.206	5.23
	--	--		0.211	5.36
108	--	--		0.237	6.02
	--	--		0.242	6.15
109	--	--		0.299	7.59
	--	--		0.304	7.72
110	0.563	14.30		0.362	9.19
	0.568	14.43		0.367	9.32

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Table 2 - Standard gland diameters (continued)

Gland and AS568 Dash No.	Internal Pressure Application - ØA			External Pressure Application - ØB	
	Inches Min Max	Millimeters Min Max		Inches Min Max	Millimeters Min Max
111	0.625	15.88		0.424	10.77
	0.630	16.00		0.429	10.90
112	0.688	17.48		0.487	12.37
	0.693	17.60		0.492	12.50
113	0.750	19.05		0.549	13.94
	0.755	19.18		0.554	14.07
114	0.813	20.65		0.612	15.54
	0.818	20.78		0.617	15.67
115	0.875	22.22		0.674	17.12
	0.880	22.35		0.679	17.25
116	0.938	23.83		0.737	18.72
	0.943	23.95		0.742	18.85
117	1.000	25.40		0.799	20.29
	1.005	25.53		0.804	20.42
118	1.063	27.00		0.862	21.89
	1.068	27.13		0.867	22.02
119	1.125	28.58		0.924	23.47
	1.130	28.70		0.929	23.60
120	1.188	30.18		0.987	25.07
	1.193	30.30		0.992	25.20
121	1.250	31.75		1.049	26.64
	1.255	31.88		1.054	26.77
122	1.313	33.35		1.112	28.24
	1.318	33.48		1.117	28.37
123	1.375	34.92		1.174	29.82
	1.380	35.05		1.179	29.95
124	1.438	36.53		1.237	31.42
	1.443	36.65		1.242	31.55
125	1.500	38.10		1.299	32.99
	1.505	38.23		1.304	33.12
126	1.563	39.70		1.362	34.59
	1.568	39.83		1.367	34.72
127	1.625	41.28		1.424	36.17
	1.630	41.40		1.429	36.30
128	1.688	42.88		1.487	37.77
	1.693	43.00		1.492	37.90
129	1.750	44.45		1.549	39.34
	1.755	44.58		1.554	39.47
130	1.813	46.05		1.612	40.94
	1.818	46.18		1.617	41.07

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