



AEROSPACE RECOMMENDED PRACTICE

ARP1233™

REV. B

Issued 1977-04
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Reaffirmed 2026-06

Superseding ARP1233A

(R) Gland Design Criteria and Dimensions for Dynamic Radial O-Ring Seal Applications
Specifically for Engine and Engine Control Systems Operating at 1500 psi Max

RATIONALE

This standard has been updated to include technical and editorial changes.

NOTE: This standard was transferred from the E-25 General Standards for Aerospace and Propulsion Systems Committee to the A-6C Seals Committee.

ARP1233B has been reaffirmed to comply with the SAE Five-Year Review policy.

A reaffirmed status is given to technical reports that have been reviewed by the technical committee and deemed to be current with no need for immediate revision. No changes have been made to this document as a result of this review.

1. SCOPE

This document recommends standard gland design criteria and dimensions for dynamic radial O-ring seal applications specifically for engine and engine control systems operating at pressures up to a maximum of 1500 psi (10342.14 kPa) and provides recommendations for modifying these glands in special applications. There are no provisions in this document for anti-extrusion devices.

NOTE: The criteria set forth here are similar to but not identical with those in MIL-G-5514 and AS4716. This document is not intended to replace MIL-G-5514 or AS4716 for hydraulic applications.

1.1 Purpose

The purpose of this document is to provide the aerospace industry with standardized dimensional criteria for dynamic radial elastomeric O-ring seal glands specifically for engine and engine control systems. It is intended for use in conjunction with ARP1231.

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.

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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	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
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
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3. GENERAL REQUIREMENTS

3.1 Gland Configuration

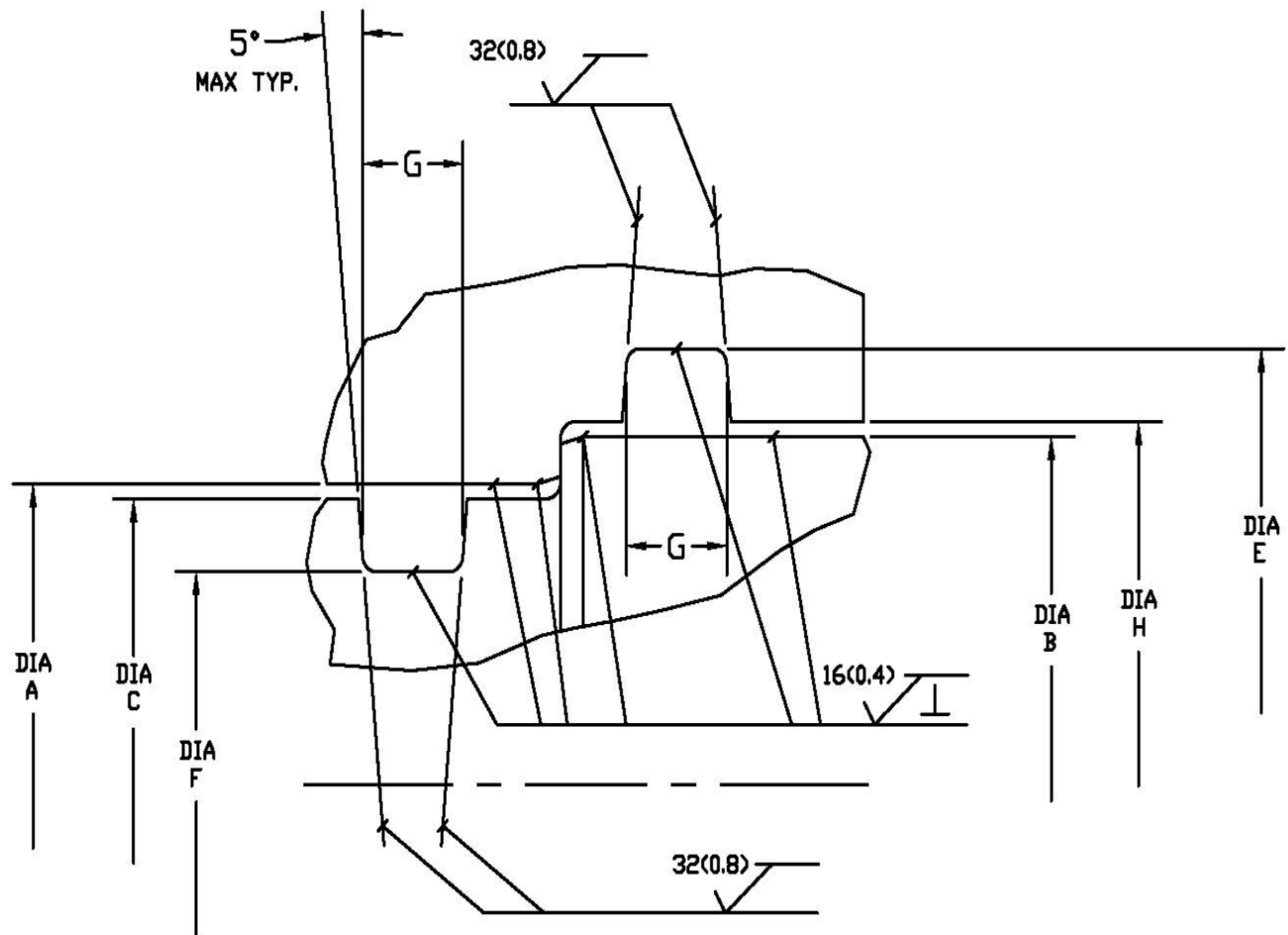
3.1.1 General

In addition to the considerations in ARP1231, gland designs for dynamic applications require consideration be given to the frictional forces imparted by O-ring seal compression and swell. Experience has shown that the O-ring seal squeezes employed in static applications result in friction forces which cannot be tolerated in most dynamic applications. In order to achieve an optimum dynamic gland, it is necessary to select gland dimensions which reduce squeeze below the levels used in ARP1232 and, at the same time, maintain a satisfactory minimum squeeze under all tolerance conditions.

It should be noted that with the reduction of squeeze below the ARP1232 level, a small incidence of seal leakage may be experienced. The actual amount of leakage will depend upon such factors as translational speed, temperature, fluid, and elastomeric material choice.

3.1.2 Standard Glands

Figure 1 depicts piston and rod radial O-ring seal glands. Standard dimensions for these glands are tabulated in Tables 1A and 1B. These dimensions are designed for use with seals conforming to AS568 tolerances. They are computed in accordance with the criteria defined in Section 4 of this document and in ARP1231.

**NOTE**

SURFACE TEXTURE: ANSI B46.1. INDICATED SURFACES SHALL BE FREE OF ANY FLAWS EXCEEDING THE ALLOWED SURFACE ROUGHNESS VALUES.

GEOMETRIC TOLERANCES, EDGE BREAKS, CORNER RADII, AND LEAD IN RAMP DIMENSIONS: SEE ARP 1231.

DIMENSIONS IN MICROINCHES AND (MICROMETERS)

Figure 1 - Typical o-ring Seal Glands

Table 1A - Standard gland dimensions in inches

Gland and AS568 Dash No.	ØC	ØA	ØF	ØB	ØH	ØE	G
	MIN MAX	MIN MAX	MIN MAX	MIN MAX	MIN MAX	MIN MAX	MIN MAX
006	0.228	0.230	0.120	0.120	0.123	0.230	0.100
	0.229	0.231	0.121	0.121	0.124	0.231	0.110
007	0.260	0.262	0.151	0.151	0.154	0.262	0.100
	0.261	0.263	0.152	0.152	0.155	0.263	0.110
008	0.292	0.294	0.182	0.182	0.185	0.294	0.100
	0.293	0.295	0.183	0.183	0.186	0.295	0.110
009	0.324	0.326	0.214	0.214	0.217	0.326	0.100
	0.325	0.327	0.215	0.215	0.218	0.327	0.110
010	0.356	0.358	0.245	0.245	0.248	0.358	0.100
	0.357	0.359	0.246	0.246	0.249	0.359	0.110
011	0.419	0.421	0.307	0.307	0.310	0.421	0.100
	0.420	0.422	0.308	0.308	0.311	0.422	0.110
012	0.482	0.484	0.370	0.370	0.373	0.484	0.100
	0.483	0.485	0.371	0.371	0.374	0.485	0.110
013	0.544	0.546	0.432	0.432	0.435	0.546	0.100
	0.545	0.547	0.433	0.433	0.436	0.547	0.110
014	0.607	0.609	0.495	0.495	0.498	0.609	0.100
	0.608	0.610	0.496	0.496	0.499	0.610	0.110
015	0.670	0.672	0.559	0.559	0.562	0.672	0.100
	0.671	0.674	0.561	0.561	0.564	0.674	0.110
016	0.734	0.736	0.624	0.624	0.627	0.736	0.100
	0.735	0.738	0.626	0.626	0.629	0.738	0.110
017	0.796	0.798	0.686	0.686	0.689	0.798	0.100
	0.797	0.800	0.688	0.688	0.691	0.800	0.110
018	0.860	0.862	0.749	0.749	0.752	0.862	0.100
	0.861	0.864	0.751	0.751	0.754	0.864	0.110
019	0.923	0.925	0.812	0.812	0.815	0.925	0.100
	0.924	0.927	0.814	0.814	0.817	0.927	0.110
020	0.986	0.988	0.875	0.875	0.878	0.988	0.100
	0.987	0.990	0.877	0.877	0.880	0.990	0.110
106	0.348	0.351	0.180	0.180	0.184	0.351	0.135
	0.350	0.353	0.182	0.182	0.186	0.353	0.145
107	0.381	0.384	0.212	0.212	0.216	0.384	0.135
	0.383	0.386	0.214	0.214	0.218	0.386	0.145
108	0.412	0.415	0.243	0.243	0.247	0.415	0.135
	0.414	0.417	0.245	0.245	0.249	0.417	0.145

Table 1A - Standard gland dimensions in inches (continued)

Gland and AS568 Dash No.	ØC	ØA	ØF	ØB	ØH	ØE	G
	MIN MAX	MIN MAX	MIN MAX	MIN MAX	MIN MAX	MIN MAX	MIN MAX
109	0.476	0.479	0.305	0.305	0.309	0.479	0.135
	0.478	0.481	0.307	0.307	0.311	0.481	0.145
110	0.539	0.542	0.368	0.368	0.372	0.542	0.135
	0.541	0.544	0.370	0.370	0.374	0.544	0.145
111	0.602	0.605	0.430	0.430	0.434	0.605	0.135
	0.604	0.607	0.432	0.432	0.436	0.607	0.145
112	0.665	0.668	0.493	0.493	0.497	0.668	0.135
	0.667	0.670	0.495	0.495	0.499	0.670	0.145
113	0.729	0.732	0.557	0.557	0.561	0.732	0.135
	0.731	0.734	0.559	0.559	0.563	0.734	0.145
114	0.793	0.796	0.622	0.622	0.626	0.796	0.135
	0.795	0.798	0.624	0.624	0.628	0.798	0.145
115	0.856	0.859	0.684	0.684	0.688	0.859	0.135
	0.858	0.861	0.686	0.686	0.690	0.861	0.145
116	0.919	0.922	0.747	0.747	0.751	0.922	0.135
	0.921	0.924	0.749	0.749	0.753	0.924	0.145
117	0.983	0.986	0.811	0.811	0.815	0.986	0.135
	0.985	0.988	0.813	0.813	0.817	0.988	0.145
118	1.046	1.049	0.874	0.874	0.878	1.049	0.135
	1.048	1.051	0.876	0.876	0.880	1.051	0.145
119	1.107	1.110	0.936	0.936	0.940	1.110	0.135
	1.109	1.112	0.938	0.938	0.942	1.112	0.145
120	1.171	1.174	0.999	0.999	1.003	1.174	0.135
	1.173	1.176	1.001	1.001	1.005	1.176	0.145
121	1.233	1.236	1.061	1.061	1.065	1.236	0.135
	1.235	1.238	1.063	1.063	1.067	1.238	0.145
122	1.296	1.299	1.124	1.124	1.128	1.299	0.135
	1.298	1.301	1.126	1.126	1.130	1.301	0.145
123	1.360	1.363	1.188	1.188	1.192	1.363	0.135
	1.362	1.365	1.190	1.190	1.194	1.365	0.145
124	1.423	1.426	1.251	1.251	1.255	1.426	0.135
	1.425	1.428	1.253	1.253	1.257	1.428	0.145
125	1.486	1.489	1.314	1.314	1.318	1.489	0.135
	1.488	1.491	1.316	1.316	1.320	1.491	0.145
202	0.474	0.478	0.240	0.240	0.244	0.478	0.175
	0.476	0.480	0.242	0.242	0.246	0.480	0.185
203	0.537	0.541	0.302	0.302	0.306	0.541	0.175
	0.539	0.543	0.304	0.304	0.308	0.543	0.185
204	0.601	0.605	0.365	0.365	0.369	0.605	0.175
	0.603	0.607	0.367	0.367	0.371	0.607	0.185

Table 1A - Standard gland dimensions in inches (continued)

Gland and AS568 Dash No.	ØC	ØA	ØF	ØB	ØH	ØE	G
	MIN MAX	MIN MAX	MIN MAX	MIN MAX	MIN MAX	MIN MAX	MIN MAX
205	0.664	0.668	0.427	0.427	0.431	0.668	0.175
	0.666	0.670	0.429	0.429	0.433	0.670	0.185
206	0.728	0.732	0.490	0.490	0.494	0.732	0.175
	0.730	0.734	0.492	0.492	0.496	0.734	0.185
207	0.791	0.795	0.554	0.554	0.558	0.795	0.175
	0.793	0.797	0.556	0.556	0.560	0.797	0.185
208	0.855	0.859	0.619	0.619	0.623	0.859	0.175
	0.857	0.861	0.621	0.621	0.625	0.861	0.185
209	0.918	0.922	0.681	0.681	0.685	0.922	0.175
	0.920	0.924	0.683	0.683	0.687	0.924	0.185
210	0.982	0.986	0.745	0.745	0.749	0.986	0.175
	0.984	0.988	0.747	0.747	0.751	0.988	0.185
211	1.045	1.049	0.808	0.808	0.812	1.049	0.175
	1.047	1.051	0.810	0.810	0.814	1.051	0.185
212	1.108	1.112	0.871	0.871	0.875	1.112	0.175
	1.110	1.114	0.873	0.873	0.877	1.114	0.185
213	1.171	1.175	0.933	0.933	0.937	1.175	0.175
	1.173	1.177	0.935	0.935	0.939	1.177	0.185
214	1.234	1.238	0.996	0.996	1.000	1.238	0.175
	1.236	1.240	0.998	0.998	1.002	1.240	0.185
215	1.295	1.299	1.058	1.058	1.062	1.299	0.175
	1.297	1.301	1.060	1.060	1.064	1.301	0.185
216	1.361	1.365	1.123	1.123	1.127	1.365	0.175
	1.363	1.367	1.125	1.125	1.129	1.367	0.185
217	1.423	1.427	1.185	1.185	1.189	1.427	0.175
	1.425	1.429	1.187	1.187	1.191	1.429	0.185
218	1.485	1.489	1.248	1.248	1.252	1.489	0.175
	1.487	1.491	1.250	1.250	1.254	1.491	0.185
219	1.548	1.552	1.311	1.311	1.315	1.552	0.175
	1.550	1.554	1.313	1.313	1.317	1.554	0.185
220	1.612	1.616	1.374	1.374	1.377	1.616	0.175
	1.614	1.618	1.376	1.376	1.380	1.618	0.185
221	1.674	1.678	1.436	1.436	1.440	1.678	0.175
	1.676	1.680	1.438	1.438	1.442	1.680	0.185
222	1.740	1.744	1.502	1.502	1.506	1.744	0.175
	1.742	1.746	1.504	1.504	1.508	1.746	0.185
223	1.864	1.868	1.627	1.627	1.631	1.868	0.175
	1.866	1.870	1.629	1.629	1.633	1.870	0.185
224	1.990	1.994	1.752	1.752	1.756	1.994	0.175
	1.992	1.996	1.754	1.754	1.758	1.996	0.185
225	2.118	2.122	1.881	1.881	1.885	2.122	0.175
	2.120	2.124	1.883	1.883	1.887	2.124	0.185