



METRIC AEROSPACE RECOMMENDED PRACTICE

MAP3439™

REV. A

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Superseding MAP3439

O-Ring Groove Design for Metric O-Ring Seals Used in Static Axial 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 E-25 General Standards for Aerospace and Propulsion Systems Committee to the A-6C2 Seals Committee.

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1. SCOPE

This recommended practice provides the design criteria for static elastomeric O-ring seals used specifically in engine and engine control systems. It provides axial compression (face type) 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 squeeze and groove volume to accommodate O-ring swell.

NOTE: Tables of O-ring groove dimensions are included based on the design criteria specified herein. Dimensions in this document are in millimeters unless otherwise specified.

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
ARP1234	Static Axial O-Ring Seal Applications Without Anti-Extrusion Devices 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	Preferred Metric Limits and Fits
ANSI Y14.36	Surface Texture Symbols

2.2 Symbols

Letter symbols used in this document are as follows:

d_1	O-ring inside diameter
d_2	O-ring cross-section diameter
d_7	Groove outside diameter, internal pressure
d_8	Groove inside diameter, external pressure
d_9	Plug diameter
d_{10}	Bore diameter, plug style
b	O-ring groove width
c	Diametral clearance between plug and bore

h	O-ring groove axial depth
h_{11}	Tolerance for d_8 , See 3.6
H_{11}	Tolerance for d_7 , See 3.6
max	Maximum
min	Minimum
r_1	Corner radius, the bottom of the groove
r_2	Edge radius, top of the groove
r_3	Fillet radius, plug style
tol	Tolerance
v_g	Volume of O-ring groove
v_o	Volume of O-ring in the free state (unsoaked and unstretched)

3. TECHNICAL REQUIREMENTS

3.1 General

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

- a. Rod mounted O-ring groove
- b. Bore mounted O-ring groove

3.2 O-Rings

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

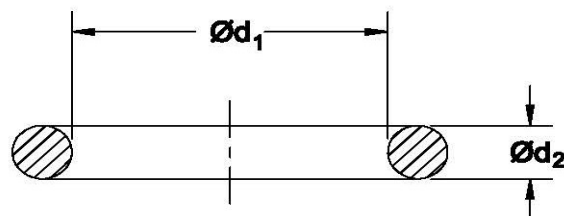


Figure 1 - O-ring dimensions

3.3 Typical Axial Compression (Face) Sealing

Figure 2 illustrates some typical axial compression O-ring sealing applications.

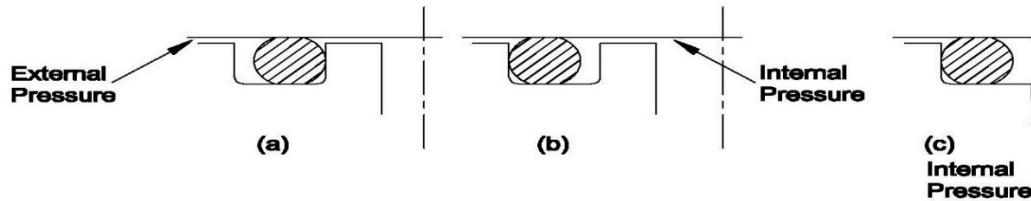


Figure 2 - O-ring face sealing application

3.4 Axial O-Ring Grooves

Figure 3 specifies the letter symbol dimensions for axial squeeze O-ring groove, internal pressure. Figure 4 specifies the letter symbol dimensions for axial squeeze O-ring groove, external pressure. The preferred configuration has a complete groove in one part, as in Figures 3 and 4, which minimizes the number of gaps through which the seal can extrude. The use of an O-ring groove with one wall missing should be used with a plug-style cover as in Figure 5 and is only applicable for internal applications.

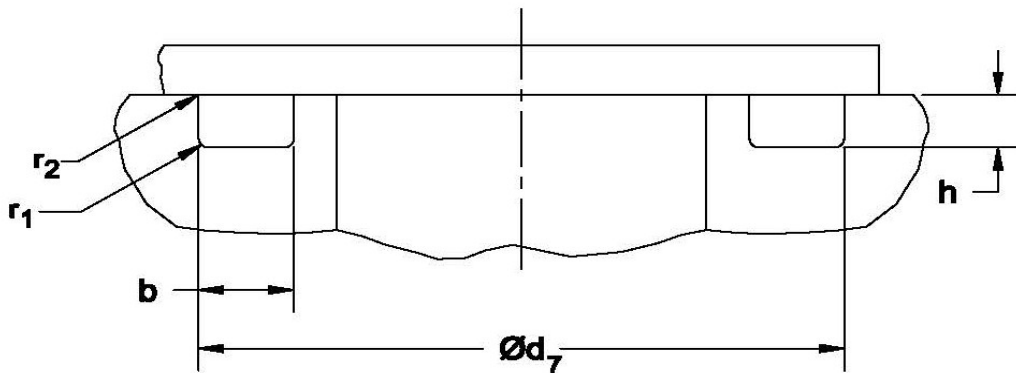


Figure 3 - Face seal groove dimensions, internal pressure

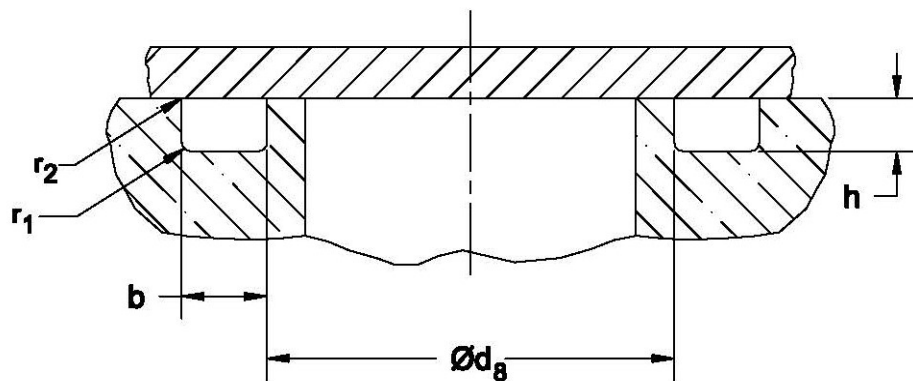


Figure 4 - Face seal groove dimensions, external pressure