



AEROSPACE STANDARD	AS4088™	REV. F
	Issued 1988-10 Stabilized 2011-12 Revised 2020-11 Superseding AS4088E	
Aerospace Rod Scraper Gland Design Standard		

RATIONALE

AS4088 has been updated to include a technical correction to the gland sidewall diameter for -337 in Table 1 and some editorial corrections.

FOREWORD

This SAE Aerospace Standard (AS) was originally released with a gland design for a one backup groove width generally per AS4716 and with either a solid or a split gland construction to facilitate the installation of the scraper. The atmosphere side of the gland had a larger clearance than normally specified in AS4716 to prevent the entrapment of foreign matter.

Since the original release of this document, due to space constraints, many applications using scrapers in a zero backup groove width have been used successfully.

In addition, mechanical spring energized Polytetrafluoroethylene (PTFE) scrapers (MSE scrapers) have become more prevalent to utilize scraper designs offering inert properties that makes them compatible with almost all fluids and temperature ranges used in aerospace fluid power applications. To facilitate the scraper installation into a one-piece gland construction, this design requires a reduced outer lip (known as a click-fit gland) on the atmosphere sidewall.

This AS now includes four basic gland dimensional configurations as a result of the developments described above and to permit the use of the latest scraper designs.

1. SCOPE

This SAE Aerospace Standard (AS) defines gland details for scrapers for rod diameters from 1/4 to 15-1/2 inch (6.35 to 393.70 mm) inclusive, corresponding to AS568 O-ring Dash No. sizes -108/-111, -206/-222, -325/-349, and -425/-460.

The gland details herein allow the use of more stable, efficient, and reliable scraper devices than MS33675 glands.

NOTE: Scraper configurations are not specified in this document.

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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.

AS568	Aerospace Size Standard for O-Rings
AS4052	Gland Design: Scraper, Landing Gear, Installation
AS4716	Gland Design, O-ring and Other Seals

2.2 U.S. Government Publications

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

MS33675	Scraper Installation, Packing, Gland Ring (Inactive for New Design)
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3. GENERAL INSTALLATION DETAILS

The gland details in this specification provide more axial space than the MS33675 gland widths and use dimensions that are essentially the same as zero backup width (Types A₀ and B₀) and one backup width (Types A₁ and B₁) grooves per AS4716 (see 3.2 for detail description). This is in order to enable more efficient, more stable, and more reliable scrapers to be provided.

The atmospheric side of the Type A₀ and Type A₁ glands are designed to provide sufficient retention for scrapers while allowing clearance to avoid contaminants becoming trapped. This is referred to elsewhere in this document as "Full Depth Sidewall Gland" with the ID denoted as "ØT₁". Type A₀ and Type A₁ glands may be of split construction (see Figure 1) to facilitate the installation of the scraper particularly for smaller sizes (consult the scraper manufacturer for advice on the gland design).

Mechanical spring energized scrapers (MSE scrapers) may be installed in Type B glands of zero backup width (Type B₀) or one backup width (Type B₁). Type B glands are known as "click-fit" glands and elsewhere in this document are referred to as "Reduced Depth Sidewall Gland" and have a height from the groove diameter denoted as "L". Generally, MSE scrapers can be installed in glands to Figure 2, but it may not be possible for some of the smaller sizes (consult the MSE scraper manufacturer for advice). In this case, a Type A split gland construction per Figure 1 should be used. In this case the reduced depth sidewall gland is not permissible.

Scraper configurations are not provided in this standard although some comments on scraper design precautions and installation methods are included in Section 6.

4. GLAND DESIGN AND APPLICATION

4.1 General

Rod and gland diameters, gland widths and tolerances are in accordance with AS4716 with the exceptions described in 4.3 and 4.5. It should also be noted that hardware dimensions for dash sizes -206 through -209 are extrapolated from AS4716 dimensions.

Dash sizes -206 through -209 use the same rod diameters as AS4716 dash sizes -112 through -115.

Gland diameters are defined for each rod diameter from 1/4 to 15-1/2 inches, (6.35 to 393.70 mm) inclusive using essentially the same dash size designations as AS4716.

4.2 Gland Types

These are designated as follows:

4.2.1 Type A Glands

See Figure 1.

Type A₀ - Full depth sidewall gland, zero backup width G₀

Type A₁ - Full depth sidewall gland, one backup width G₁

4.2.2 Type B Glands

See Figure 2.

Type B₀ - Reduced depth sidewall gland (click-fit), zero backup width G₀

Type B₁ - Reduced depth sidewall gland (click-fit), one backup width G₁

NOTES:

1. The glands covered in AS4052 are similar to this standard for -300 and -400 series dash sizes using Type A₁ and Type B₁ glands.
2. The diametral clearance on the ambient side of Type A₀ and Type A₁ glands is greater than those specified in AS4716. This is in order to minimize the possibility of trapping contaminants in the rod and gland bushing diametral clearance, while still providing sufficient retention for the scraper. This is shown in Figure 1 as diameter T₁.
3. A two-piece Type A₀ and Type A₁ gland is shown as optional in Figure 1. This gland construction may be used where installation of scrapers into Type A or Type B glands would be difficult, for example:
 - Small sizes of elastomer energized slipper type scrapers where deformation of the part into a suitable shape for installation (kidney shape) would be difficult due to the ratio between the part radial cross-section and its diameter.
 - Small sizes of MSE scrapers where a reduction in the outer diameter of the part to pass through diameter T₂ for installation would likely cause irreparable damage to the spring energizer and thereby render the part ineffective.
4. Rod diameter "B" and gland bore "H" are per AS4716 or an extrapolation of AS4716 for dash sizes -206 through -209.

5. GLAND DIMENSIONS AND TOLERANCES

See Figure 1 for gland construction and dimensions for full depth sidewall glands, Type A₀ and Type A₁.

See Figure 2 for reduced depth sidewall gland construction Type B₀ and Type B₁, to be used for MSE scrapers only.