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400 Commonwealth Drive, Warrendale, PA 15096-0001

## AEROSPACE STANDARD

**SAE** AS4052

Issued 1994-04

Submitted for recognition as an American National Standard

### GLAND DESIGN: SCRAPER, LANDING GEAR, INSTALLATION

#### 1. SCOPE:

This SAE Aerospace Standard (AS) covers an alternate gland design for the installation of scraper/wiper rings in the lower end of landing gear shock struts for the purpose of contaminant exclusion.

The defined scraper gland covered by this document, as shown in Table 1, is a variant of MIL-G-5514, the accepted gland standard for MS28775. Piston diameters, gland internal diameters, and the groove sidewall angles and surface finish are defined by MIL-G-5514, but the gland outer retaining wall diameter is changed.

AS4088 is similar to this document, but was developed by SAE A-6 for flight control and general purpose cylinders. It differs from this document primarily by the clearance between the rod (piston) and outer gland wall. Since landing gears are more susceptible to dirt contamination, the additional clearance provides a larger path to allow excessive dirt accumulation to exit the gland.

#### 1.1 Purpose:

This document is intended to present an interface groove which will accommodate an improved scraper/assembly design and is not intended to obsolete MS33675.

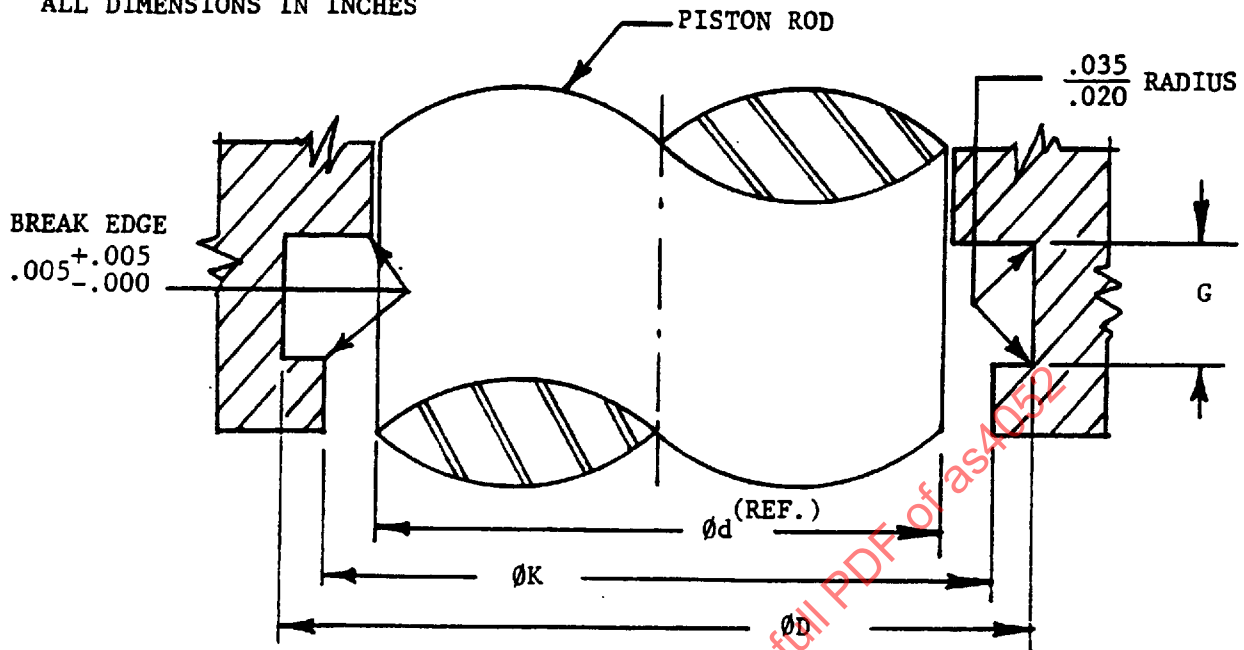
- 1.1.1 Present Practice: Currently the most common scraper gland is an MS33675 which accepts either an MS28776 bronze scraper or a comparable TFE scraper. It has been noted that this arrangement is deficient in two aspects: the metal scraper ring is split, allowing contaminants to pass through and around it; and, being installed in a very abbreviated gland, the scraper frequently dislodges under conditions of shock strut deflection. An improved metal, plastic, or elastomeric endless scraper ring would require additional gland volume with greater retaining surfaces than specified by MS33675.

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## SAE AS4052

ALL DIMENSIONS IN INCHES

TABLE 1 - Gland Dimensional Information  
All Dimensions in Inches

| Gland<br>Size Code<br>Dash No. | $\phi d$<br>Piston<br>OD Ref<br>+0.000<br>-0.002 | $\phi D$<br>Gland<br>ID<br>+0.002<br>-0.000 | $\phi K$<br>Retaining<br>Lip ID<br>+0.010<br>-0.000 | G<br>Gland<br>Length<br>Type I | +0.010<br>-0.000<br>Type II |
|--------------------------------|--------------------------------------------------|---------------------------------------------|-----------------------------------------------------|--------------------------------|-----------------------------|
| 325                            | 1.498                                            | 1.870                                       | 1.674                                               | 0.281                          | 0.334                       |
| 326                            | 1.623                                            | 1.995                                       | 1.799                                               | 0.281                          | 0.334                       |
| 327                            | 1.748                                            | 2.120                                       | 1.924                                               | 0.281                          | 0.334                       |
| 328                            | 1.873                                            | 2.245                                       | 2.049                                               | 0.281                          | 0.334                       |
| 329                            | 1.998                                            | 2.370                                       | 2.174                                               | 0.281                          | 0.334                       |
| 330                            | 2.123                                            | 2.495                                       | 2.299                                               | 0.281                          | 0.334                       |
| 331                            | 2.248                                            | 2.620                                       | 2.424                                               | 0.281                          | 0.334                       |
| 332                            | 2.373                                            | 2.745                                       | 2.549                                               | 0.281                          | 0.334                       |
| 333                            | 2.498                                            | 2.870                                       | 2.674                                               | 0.281                          | 0.334                       |
| 334                            | 2.623                                            | 2.995                                       | 2.799                                               | 0.281                          | 0.334                       |
| 335                            | 2.748                                            | 3.120                                       | 2.924                                               | 0.281                          | 0.334                       |
| 336                            | 2.873                                            | 3.245                                       | 3.049                                               | 0.281                          | 0.334                       |
| 337                            | 2.997                                            | 3.369                                       | 3.173                                               | 0.281                          | 0.334                       |
| 338                            | 3.122                                            | 3.494                                       | 3.299                                               | 0.281                          | 0.334                       |
| 339                            | 3.247                                            | 3.619                                       | 3.423                                               | 0.281                          | 0.334                       |
| 340                            | 3.372                                            | 3.744                                       | 3.548                                               | 0.281                          | 0.334                       |
| 341                            | 3.497                                            | 3.869                                       | 3.673                                               | 0.281                          | 0.334                       |
| 342                            | 3.622                                            | 3.994                                       | 3.799                                               | 0.281                          | 0.334                       |
| 343                            | 3.747                                            | 4.119                                       | 3.923                                               | 0.281                          | 0.334                       |
| 344                            | 3.872                                            | 4.244                                       | 4.048                                               | 0.281                          | 0.334                       |
| 345                            | 3.997                                            | 4.369                                       | 4.173                                               | 0.281                          | 0.334                       |
| 346                            | 4.122                                            | 4.494                                       | 4.299                                               | 0.281                          | 0.334                       |
| 347                            | 4.247                                            | 4.619                                       | 4.423                                               | 0.281                          | 0.334                       |
| 348                            | 4.372                                            | 4.744                                       | 4.548                                               | 0.281                          | 0.334                       |
| 349                            | 4.497                                            | 4.869                                       | 4.673                                               | 0.281                          | 0.334                       |

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TABLE 1 (Continued)

| Gland<br>Size Code<br>Dash No. | $\phi$ d<br>Piston<br>OD Ref<br>+0.000<br>-0.003 | $\phi$ D<br>Gland<br>ID<br>+0.003<br>-0.000 | $\phi$ K<br>Retaining<br>Lip ID<br>+0.010<br>-0.000 | G<br>Gland<br>Length<br>Type I | +0.010<br>-0.000<br>Type II |
|--------------------------------|--------------------------------------------------|---------------------------------------------|-----------------------------------------------------|--------------------------------|-----------------------------|
| 425                            | 4.497                                            | 4.974                                       | 4.726                                               | 0.375                          | 0.475                       |
| 426                            | 4.622                                            | 5.099                                       | 4.851                                               | 0.375                          | 0.475                       |
| 427                            | 4.747                                            | 5.224                                       | 4.976                                               | 0.375                          | 0.475                       |
| 428                            | 4.872                                            | 5.349                                       | 5.101                                               | 0.375                          | 0.475                       |
| 429                            | 4.997                                            | 5.474                                       | 5.226                                               | 0.375                          | 0.475                       |
| 430                            | 5.122                                            | 5.599                                       | 5.351                                               | 0.375                          | 0.475                       |
| 431                            | 5.247                                            | 5.724                                       | 5.476                                               | 0.375                          | 0.475                       |
| 432                            | 5.372                                            | 5.849                                       | 5.601                                               | 0.375                          | 0.475                       |
| 433                            | 5.497                                            | 5.974                                       | 5.726                                               | 0.375                          | 0.475                       |
| 434                            | 5.622                                            | 6.099                                       | 5.851                                               | 0.375                          | 0.475                       |
| 435                            | 5.747                                            | 6.224                                       | 5.976                                               | 0.375                          | 0.475                       |
| 436                            | 5.872                                            | 6.349                                       | 6.101                                               | 0.375                          | 0.475                       |
| 437                            | 5.997                                            | 6.474                                       | 6.226                                               | 0.375                          | 0.475                       |
| 438                            | 6.247                                            | 6.724                                       | 6.476                                               | 0.375                          | 0.475                       |
| 439                            | 6.497                                            | 6.974                                       | 6.726                                               | 0.375                          | 0.475                       |
| 440                            | 6.747                                            | 7.224                                       | 6.976                                               | 0.375                          | 0.475                       |
| 441                            | 6.997                                            | 7.474                                       | 7.226                                               | 0.375                          | 0.475                       |
| 442                            | 7.247                                            | 7.724                                       | 7.476                                               | 0.375                          | 0.475                       |
| 443                            | 7.497                                            | 7.974                                       | 7.726                                               | 0.375                          | 0.475                       |
| 444                            | 7.747                                            | 8.224                                       | 7.976                                               | 0.375                          | 0.475                       |
| 445                            | 7.997                                            | 8.474                                       | 8.226                                               | 0.375                          | 0.475                       |
| 446                            | 8.497                                            | 8.974                                       | 8.726                                               | 0.375                          | 0.475                       |
| 447                            | 8.997                                            | 9.474                                       | 9.226                                               | 0.375                          | 0.475                       |
| 448                            | 9.497                                            | 9.974                                       | 9.726                                               | 0.375                          | 0.475                       |
| 449                            | 9.997                                            | 10.474                                      | 10.226                                              | 0.375                          | 0.475                       |
| 450                            | 10.497                                           | 10.974                                      | 10.726                                              | 0.375                          | 0.475                       |
| 451                            | 10.997                                           | 11.474                                      | 11.226                                              | 0.375                          | 0.475                       |
| 452                            | 11.497                                           | 11.974                                      | 11.726                                              | 0.375                          | 0.475                       |
| 453                            | 11.997                                           | 12.474                                      | 12.226                                              | 0.375                          | 0.475                       |
| 454                            | 12.497                                           | 12.974                                      | 12.726                                              | 0.375                          | 0.475                       |
| 455                            | 12.997                                           | 13.474                                      | 13.226                                              | 0.375                          | 0.475                       |
| 456                            | 13.497                                           | 13.974                                      | 13.726                                              | 0.375                          | 0.475                       |
| 457                            | 13.997                                           | 14.474                                      | 14.226                                              | 0.375                          | 0.475                       |
| 458                            | 14.497                                           | 14.974                                      | 14.726                                              | 0.375                          | 0.475                       |
| 459                            | 14.997                                           | 15.474                                      | 15.226                                              | 0.375                          | 0.475                       |
| 460                            | 15.497                                           | 15.974                                      | 15.726                                              | 0.375                          | 0.475                       |

## 2. REFERENCES:

## 2.1 Applicable Documents:

The following documents shall form a part of this document to the extent specified herein:

- 2.1.1 SAE Publication: Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

AS568 Aerospace Size Standard for O-rings