SAE Aerospace
An SAE International Group

AEROSPACE STANDARD

SAE AS5860A

Issued 2006-04
Revised 2009-02

Retainers, (Back-Up Rings), Hydraulic and Pneumatic, Polytetrafluoroethylene Resin, Single Turn, Static Gland

RATIONALE

This minor revision corrects a typo in the scarf cut angle for rod rings -135 thru -137, 19-22 degrees was 35-39 degrees.

SCOPE

This Aerospace Standard (AS) covers scarf-cut polytetrafluoroethylene (PTFE) retainers (back-up rings) for use in static glands in accordance with AS5857. They are for use in hydraulic and pneumatic system components as anti-extrusion devices in conjunction with O-rings, packings and other elastomeric seals.

Because of the construction of groove dimensions, back-ups specific to rod applications are designated “R” - Rod (Female), back-ups specific to piston applications are designated “P” - Piston (Male).

Retainers specified herein have been designed for a temperature range of -65 °F to 275 °F (-54 °C to 135 °C) and a nominal operating pressure of 3000 psi (20.7 MPa) for code 09 material and 5000 psi (34.5 MPa) for code 10 material. Material codes are based on AMS3678 material types.

Consideration has been made to accommodate cylinder breathing on piston applications, calculated at .002 inch/inch diameter/1,000 psi (.051 mm/mm diameter/6.9 MPa) to ensure a minimum 50% lap at -65 °F (-54 °C). This has required an increase in the diameter on certain larger sizes and a slight overlap at ambient will therefore be apparent. These parts have been designed such that the overlap at 275 °F (135 °C) will not result in axial compression of the O-rings, even in the worst tolerance stack-up situation.

REFERENCES

1.1 Applicable Documents

The following publications form a part of this standard to the extent specified herein. The latest issue of SAE publications shall apply. In the event of a conflict between the text of this document and the 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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1.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001. Telephone: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), http://www.sae.org

AS5857 Gland Design, O-ring and Other Elastomeric Seals, Static Applications

AMS3678 Polytetrafluoroethylene (PTFE) Moldings and Extrusions Unfilled, Pigmented, and Filled Components

AMS3678/9 Virgin Polytetrafluoroethylene (PTFE) Moldings with Pigment for AS4716 and AS5857 Backup Rings

AMS3678/10 Virgin Polytetrafluoroethylene (PTFE) Moldings or Extrusions with 15% Carbon Fiber

1.1.2 U.S. Government Publications

Available from Document Automation and Production Service (DAPS), Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5096. Telephone: 215-697-6257, http://assist.daps.dla.mil/quicksearch/.

MIL-STD-2073-1 Standard Practice for Military Packaging

1.1.3 The following publication is provided for information purposes only and is not a required part of this SAE Aerospace document.

AS5861 Retainers, (Back-Up Rings), Hydraulic and Pneumatic, Polytetrafluoroethylene Resin, Solid, Static Gland

TECHNICAL REQUIREMENTS

1.2 Material

1.2.1 Code 09, Virgin PTFE with pigment

Parts made to material code 09 of this standard shall conform to AMS3678/9, Pigmented Virgin PTFE, Molded.

Parts made to material code 09 of this standard for “R” (Rod) applications shall be green per AMS3678/9.

Parts made to material code 09 of this standard for “P” (Piston) applications shall be brown per AMS3678/9.

1.2.2 Code 10, PTFE with 15% carbon fiber

Parts made to material code 10 of this standard shall conform to AMS3678/10, Virgin PTFE Moldings or Extrusions with 15% Carbon Fiber. Color shall be dark gray to black.

1.3 Dimensional Requirements

Parts shall conform to Figure 1 and the dimensions listed in Tables 1A and 1B.

Note: In general, dimensions are based on nominal ring “OD” equal to minimum A for piston back-up rings over 1.5 inches (38.1 mm). For piston back-up rings under 1.5 inches (38.1 mm), the “ID” is equal to maximum F plus .001 inch (.025 mm). For rod back-up rings the nominal ring “ID” is equal to maximum B. A, B and F dimensions are from AS5857. In certain sizes some adjustments are made to these rules to obtain the desired overlap over the full range of temperature and breathing conditions. Radial width “W” is based on a net fit in the gland at maximum material condition with all features concentric.

1.3.1 Surfaces and Edges

Surfaces shall be smooth and free from irregularities. Edges shall be clean and sharp.

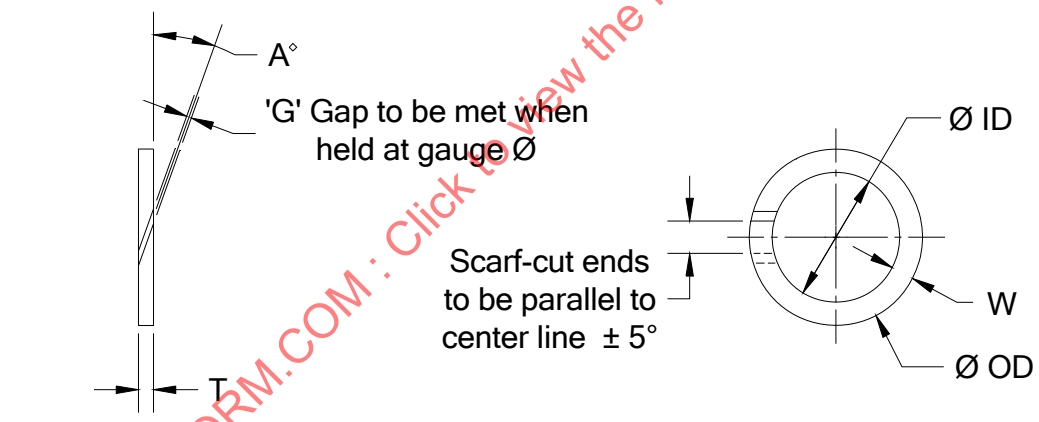
1.3.2 Scarf-cut

The scarf cut gap shall not exceed dimension “G” listed in Table 1, when measured with a gage mandrel diameter ± .001 inches (.025 mm). These measurements are to be made at a stabilized temperature of 73 °F ± 2 (23 °C ± 1)

1.4 Part Number

The part number consists of the standard number, the piston or rod code, the material code followed by the appropriate three digit dash number taken from Table 1.

Example: AS5860 P 10 -123



SEE TABLE 1A AND TABLE 1B FOR DIMENSIONS

FIGURE 1 – CONTROLLED FEATURES

TABLE 1A - MALE (PISTON) APPLICATIONS - DIMENSIONS IN INCHES AND DEGREES

Dash No.	ID Dia. ±.001	T ±.002	W ±.001	G ±.0025	A Degrees
004P	0.079	0.054	0.052	.0025	35-39
005P	0.111	0.054	0.052	.0025	32-36
006P	0.124	0.054	0.052	.0025	29-33
007P	0.155	0.054	0.052	.0025	24-27
008P	0.187	0.054	0.052	.0025	19-22
009P	0.220	0.054	0.052	.0025	19-22
010P	0.251	0.054	0.052	.0025	19-22
011P	0.314	0.054	0.052	.0025	19-22
012P	0.379	0.054	0.052	.0025	19-22
013P	0.444	0.054	0.052	.0025	19-22
014P	0.507	0.054	0.052	.0025	19-22
015P	0.569	0.054	0.052	.0025	19-22
016P	0.632	0.054	0.052	.0025	19-22
017P	0.694	0.054	0.052	.0025	19-22
018P	0.757	0.054	0.052	.0025	19-22
019P	0.819	0.054	0.052	.0025	19-22
020P	0.885	0.054	0.052	.0025	19-22
021P	0.947	0.054	0.052	.0025	19-22
022P	1.010	0.054	0.052	.0025	19-22
023P	1.072	0.054	0.052	.0025	19-22
024P	1.135	0.054	0.052	.0025	19-22
025P	1.198	0.054	0.052	.0025	19-22
026P	1.262	0.054	0.052	.0025	19-22
027P	1.325	0.054	0.052	.0025	19-22
028P	1.388	0.054	0.052	.0025	19-22

TABLE 1A - MALE (PISTON) APPLICATIONS (CONTINUED) - DIMENSIONS IN INCHES AND DEGREES

Dash No.	ID Dia. ±.001	T ±.002	W ±.001	G ±.003	A Degrees
104P	0.122	0.058	0.081	.003	31-35
105P	0.153	0.058	0.081	.003	26-29
106P	0.185	0.058	0.081	.003	23-26
107P	0.218	0.058	0.081	.003	19-22
108P	0.250	0.058	0.081	.003	19-22
109p	0.313	0.058	0.081	.003	19-22
110P	0.378	0.058	0.081	.003	19-22
111P	0.441	0.058	0.081	.003	19-22
112P	0.505	0.058	0.081	.003	19-22
113P	0.571	0.058	0.081	.003	19-22
114P	0.637	0.058	0.081	.003	19-22
115P	0.700	0.058	0.081	.003	19-22
116P	0.762	0.058	0.081	.003	19-22
117P	0.828	0.058	0.081	.003	19-22
118P	0.890	0.058	0.081	.003	19-22
119P	0.953	0.058	0.081	.003	19-22
120P	1.015	0.058	0.081	.003	19-22
121P	1.078	0.058	0.081	.003	19-22
122P	1.140	0.058	0.081	.003	19-22
123P	1.203	0.058	0.081	.003	19-22
124P	1.265	0.058	0.081	.003	19-22
125P	1.329	0.058	0.081	.003	19-22
126P	1.392	0.058	0.081	.003	19-22
127P	1.455	0.058	0.081	.003	19-22
	OD Dia. ±.001				
128P	1.678	0.058	0.081	.003	12-15
129P	1.741	0.058	0.081	.003	12-15
130P	1.805	0.058	0.081	.003	12-15
131P	1.867	0.058	0.081	.003	12-15
132P	1.930	0.058	0.081	.003	12-15
133P	1.992	0.058	0.081	.003	12-15

TABLE 1A - MALE (PISTON) APPLICATIONS (CONTINUED) - DIMENSIONS IN INCHES AND DEGREES

Dash No.	OD Dia. ±.001	T ±.002	W ±.001	G ±.003	A Degrees
134P	2.055	0.058	0.081	.003	12-15
135P	2.118	0.058	0.081	.003	12-15
136P	2.180	0.058	0.081	.003	12-15
137P	2.243	0.058	0.081	.003	12-15
138P	2.305	0.058	0.081	.003	12-15
139P	2.368	0.058	0.081	.003	12-15
	ID Dia. ±.001				
210P	0.768	0.062	0.111	.003	19-22
211P	0.830	0.062	0.111	.003	19-22
212P	0.893	0.062	0.111	.003	19-22
213P	0.955	0.062	0.111	.003	19-22
214P	1.018	0.062	0.111	.003	19-22
215P	1.080	0.062	0.111	.003	19-22
216P	1.143	0.062	0.111	.003	19-22
217P	1.205	0.062	0.111	.003	19-22
218P	1.268	0.062	0.111	.003	19-22
219P	1.331	0.062	0.111	.003	19-22
220P	1.395	0.062	0.111	.003	19-22
221P	1.457	0.062	0.111	.003	19-22
	OD Dia. ±.001				
222P	1.743	0.062	0.111	.003	19-22
223P	1.867	0.062	0.111	.003	12-15
224P	1.992	0.062	0.111	.003	12-15
225P	2.118	0.062	0.111	.003	12-15
226P	2.243	0.062	0.111	.003	12-15
227P	2.368	0.062	0.111	.003	12-15
228P	2.493	0.062	0.111	.003	12-15
229P	2.618	0.062	0.111	.003	12-15
230P	2.745	0.062	0.111	.003	12-15

TABLE 1A - MALE (PISTON) APPLICATIONS (CONTINUED) - DIMENSIONS IN INCHES AND DEGREES

Dash No.	OD Dia. ±.001	T ±.002	W ±.001	G ±.0035	A Degrees
325P	1.867	0.088	0.171	.0035	19-22
326P	1.992	0.088	0.171	.0035	19-22
327P	2.118	0.088	0.171	.0035	19-22
328P	2.243	0.088	0.171	.0035	19-22
329P	2.368	0.088	0.171	.0035	19-22
330P	2.494	0.088	0.171	.0035	19-22
331P	2.620	0.088	0.171	.0035	19-22
332P	2.747	0.088	0.171	.0035	19-22
333P	2.873	0.088	0.171	.0035	19-22
334P	2.993	0.088	0.171	.0035	12-15
335P	3.118	0.088	0.171	.0035	12-15
336P	3.243	0.088	0.171	.0035	12-15
337P	3.368	0.088	0.171	.0035	12-15
338P	3.493	0.088	0.171	.0035	12-15
339P	3.618	0.088	0.171	.0035	12-15
340P	3.743	0.088	0.171	.0035	12-15
341P	3.868	0.088	0.171	.0035	12-15
342P	3.994	0.088	0.171	.0035	12-15
343P	4.120	0.088	0.171	.0035	12-15
344P	4.247	0.088	0.171	.0035	12-15
345P	4.373	0.088	0.171	.0035	12-15
346P	4.500	0.088	0.171	.0035	12-15
347P	4.626	0.088	0.171	.0035	12-15
348P	4.753	0.088	0.171	.0035	12-15
349P	4.879	0.088	0.171	.0035	12-15

TABLE 1A - MALE (PISTON) APPLICATIONS (CONTINUED) - DIMENSIONS IN INCHES AND DEGREES

Dash No.	OD Dia. ±.001	T ±.002	W ±.001	G ±.004	A Degrees
425P	4.974	0.128	0.226	.004	12-15
426P	5.099	0.128	0.226	.004	12-15
427P	5.224	0.128	0.226	.004	12-15
428P	5.349	0.128	0.226	.004	12-15
429P	5.474	0.128	0.226	.004	12-15
430P	5.599	0.128	0.226	.004	12-15
431P	5.724	0.128	0.226	.004	12-15
432P	5.849	0.128	0.226	.004	12-15
433P	5.975	0.128	0.226	.004	12-15
434P	6.102	0.128	0.226	.004	12-15
435P	6.228	0.128	0.226	.004	12-15
436P	6.355	0.128	0.226	.004	12-15
437P	6.481	0.128	0.226	.004	12-15

TABLE 1B - FEMALE (ROD) APPLICATIONS - DIMENSIONS IN INCHES AND DEGREES

Dash No.	ID Dia. ±.001	T ±.002	W ±.001	G ±.0025	A Degrees
004R	0.076	0.054	0.053	.0025	35-39
005R	0.108	0.054	0.053	.0025	32-36
006R	0.123	0.054	0.053	.0025	29-33
007R	0.154	0.054	0.053	.0025	24-27
008R	0.185	0.054	0.053	.0025	19-22
009R	0.217	0.054	0.053	.0025	19-22
010R	0.248	0.054	0.053	.0025	19-22
011R	0.310	0.054	0.053	.0025	19-22
012R	0.373	0.054	0.053	.0025	19-22
013R	0.435	0.054	0.053	.0025	19-22
014R	0.498	0.054	0.053	.0025	19-22
015R	0.560	0.054	0.053	.0025	19-22
016R	0.623	0.054	0.053	.0025	19-22
017R	0.685	0.054	0.053	.0025	19-22
018R	0.748	0.054	0.053	.0025	19-22
019R	0.810	0.054	0.053	.0025	19-22
020R	0.873	0.054	0.053	.0025	19-22
021R	0.935	0.054	0.053	.0025	19-22
022R	0.998	0.054	0.053	.0025	19-22
023R	1.060	0.054	0.053	.0025	19-22
024R	1.123	0.054	0.053	.0025	19-22
025R	1.185	0.054	0.053	.0025	19-22
026R	1.248	0.054	0.053	.0025	19-22
027R	1.311	0.054	0.053	.0025	19-22
028R	1.374	0.054	0.053	.0025	19-22

TABLE 1B - FEMALE (ROD) APPLICATIONS (CONTINUED) - DIMENSIONS IN INCHES AND DEGREES

Dash No.	ID Dia. ±.001	T ±.002	W ±.001	G ±.003	A Degrees
104R	0.123	0.058	0.081	.003	31-35
105R	0.154	0.058	0.081	.003	26-29
106R	0.185	0.058	0.081	.003	23-26
107R	0.217	0.058	0.081	.003	19-22
108R	0.248	0.058	0.081	.003	19-22
109R	0.310	0.058	0.081	.003	19-22
110R	0.373	0.058	0.081	.003	19-22
111R	0.435	0.058	0.081	.003	19-22
112R	0.498	0.058	0.081	.003	19-22
113R	0.560	0.058	0.081	.003	19-22
114R	0.623	0.058	0.081	.003	19-22
115R	0.685	0.058	0.081	.003	19-22
116R	0.748	0.058	0.081	.003	19-22
117R	0.810	0.058	0.081	.003	19-22
118R	0.873	0.058	0.081	.003	19-22
119R	0.935	0.058	0.081	.003	19-22
120R	0.998	0.058	0.081	.003	19-22
121R	1.060	0.058	0.081	.003	19-22
122R	1.123	0.058	0.081	.003	19-22
123R	1.185	0.058	0.081	.003	19-22
124R	1.248	0.058	0.081	.003	19-22
125R	1.311	0.058	0.081	.003	19-22
126R	1.374	0.058	0.081	.003	19-22
127R	1.437	0.058	0.081	.003	19-22
128R	1.501	0.058	0.081	.003	19-22
129R	1.563	0.058	0.081	.003	19-22
130R	1.627	0.058	0.081	.003	19-22
131R	1.689	0.058	0.081	.003	19-22
132R	1.753	0.058	0.081	.003	19-22
133R	1.816	0.058	0.081	.003	19-22
134R	1.879	0.058	0.081	.003	19-22

TABLE 1B - FEMALE (ROD) APPLICATIONS (CONTINUED) - DIMENSIONS IN INCHES AND DEGREES

Dash No.	ID Dia. ±.001	T ±.002	W ±.001	G ±.003	A Degrees
135R	1.943	0.058	0.081	.003	19-22
136R	2.005	0.058	0.081	.003	19-22
137R	2.069	0.058	0.081	.003	19-22
138R	2.123	0.058	0.081	.003	12-15
139R	2.186	0.058	0.081	.003	12-15
210P	0.748	0.062	0.112	.003	19-22
211R	0.810	0.062	0.112	.003	19-22
212R	0.873	0.062	0.112	.003	19-22
213R	0.935	0.062	0.112	.003	19-22
214R	0.998	0.062	0.112	.003	19-22
215R	1.060	0.062	0.112	.003	19-22
216R	1.123	0.062	0.112	.003	19-22
217R	1.185	0.062	0.112	.003	19-22
218R	1.248	0.062	0.112	.003	19-22
219R	1.310	0.062	0.112	.003	19-22
220R	1.373	0.062	0.112	.003	19-22
221R	1.435	0.062	0.112	.003	19-22
222R	1.499	0.062	0.112	.003	19-22
223R	1.623	0.062	0.112	.003	12-15
224R	1.748	0.062	0.112	.003	12-15
225R	1.873	0.062	0.112	.003	12-15
226R	1.998	0.062	0.112	.003	12-15
227R	2.123	0.062	0.112	.003	12-15
228R	2.248	0.062	0.112	.003	12-15
229R	2.373	0.062	0.112	.003	12-15
230R	2.498	0.062	0.112	.003	12-15

TABLE 1B - FEMALE (ROD) APPLICATIONS (CONTINUED) - DIMENSIONS IN INCHES AND DEGREES

Dash No.	ID Dia. ±.001	T ±.002	W ±.001	G ±.0035	A Degrees
325R	1.498	0.088	0.173	.0035	19-22
326R	1.623	0.088	0.173	.0035	19-22
327R	1.748	0.088	0.173	.0035	19-22
328R	1.873	0.088	0.173	.0035	19-22
329R	1.998	0.088	0.173	.0035	19-22
330R	2.123	0.088	0.173	.0035	19-22
331R	2.248	0.088	0.173	.0035	19-22
332R	2.373	0.088	0.173	.0035	19-22
333R	2.498	0.088	0.173	.0035	19-22
334R	2.624	0.088	0.173	.0035	19-22
335R	2.748	0.088	0.173	.0035	12-15
336R	2.873	0.088	0.173	.0035	12-15
337R	2.997	0.088	0.173	.0035	12-15
338R	3.122	0.088	0.173	.0035	12-15
339R	3.247	0.088	0.173	.0035	12-15
340R	3.372	0.088	0.173	.0035	12-15
341R	3.497	0.088	0.173	.0035	12-15
342R	3.622	0.088	0.173	.0035	12-15
343R	3.747	0.088	0.173	.0035	12-15
344R	3.872	0.088	0.173	.0035	12-15
345R	3.997	0.088	0.173	.0035	12-15
346R	4.122	0.088	0.173	.0035	12-15
347R	4.247	0.088	0.173	.0035	12-15
348R	4.373	0.088	0.173	.0035	12-15
349R	4.499	0.088	0.173	.0035	12-15