



AEROSPACE STANDARD	AS1301	REV. F
	Issued 1975-08 Reaffirmed 2014-10 Revised 2015-06 Superseding AS1301E	
Adapters - Port Connection, Ring Locked Design, Installation and Removal of		

RATIONALE

Correction of Figure 1 references. Replacement of Installation Torque values of AS5368 fittings, add user definition requirement if torque values desired are other than those listed in Table 3B. Addition of equivalent alternate tooling numbers in Table 3B, and addition of individual wrench and drive tool part numbers. Update 5.2.4 to recognize use of other sealants/primers and discourage use of Zinc Chromate primer. Update 5.2.5 for installation torque limits.

1. SCOPE

This SAE Aerospace Standard (AS) provides the essential minimum design, installation and removal standard for AS1299, AS1985, AS1986, AS4099, AS5368, and AS5986 adapters and is applicable when specified on engineering drawings or in procurement documents.

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
- AS1299 Adapter - Port Connection Ring Locked to Flareless Tube End
- AS1300 Port - Ring Locked Fluid Connection Type, Standard Dimensions for
- AS1985 Fitting, Assembly, Adapter, Ring Locked Port Connection to Flared Tube End
- AS1986 Fitting Assembly, Adapter, Ring Locked Port Connection to Beam Seal 4000 psi and 5000 psi

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- AS4099 Adapter, Assembly - Port Connection, Ring Locked to Flareless Tube End
- AS5368 Fitting Assembly, Adapter - Ring Locked Port Connection to Flared Tube End, 3000 psi
- AS5986 Fitting Assembly, Adapter, Ring Locked Port Connection to Beam Seal 4000 psi and 5000 psi
- AMS3276 Sealing Compound, Integral Fuel Tanks and General Purpose, Intermittent Use to 360°F (182°C)

2.2 U.S. Government Publications

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

- MIL-PRF-23377 Performance Specification: Primer Coatings: Epoxy, High-Solids

2.3 Society for Protective Coatings Publications

Available from the Society for Protective Coatings, 40 24th Street, 6th Floor, Pittsburgh, PA 15222-4600, Tel: 412.281.2331, <http://www.sspc.org>.

- SSPC-PAINT-25 Zinc Oxide, Alkyd, Linseed Oil Primer for Use Over Hand Cleaned Steel

3. GENERAL DESIGN INFORMATION

- 3.1 These adapters provide a semi-permanent male fitting for use in fluid systems per Table 1 and compatible with titanium at -65 to +450 °F temperature range:

Table 1 - Pressure systems

Standard Number	System Operating Pressure (psi)	System Burst Pressure (psi)	Sizes
AS1299	3000	12 000	All Sizes
AS1985	4000	16 000	All Sizes
AS1986	4000	16 000	02, 03, 05, 14, 20, and 24
AS1986	5000	20 000	04, 06, 08, 10, 12, and 16
AS4099	4000	16 000	All Sizes
AS5368	3000	12 000	All Sizes
AS5986	4000	16 000	02, 03, 05, 14, 20, and 24
AS5986	5000	20 000	04, 06, 08, 10, 12, and 16

- 3.2 Adapters per AS1299, AS1985, AS1986, AS4099, AS5368, and AS5986 installed per this document into ports per AS1300 shall have a stand-off per dimension "P" in Figure 1 and Table 2.
- 3.3 O-ring size per Table 2 and per AS568 must be used. The O-ring compound shall be specified by the using design activity and shall be selected based on system fluid and temperature.
- 3.4 The lockring is driven into the mating port serrations after the adapter has been torqued. This prevents the adapter from rotating in the port during coupling nut assembly and disassembly and also eliminates the necessity of lock wiring the adapter. Only one wrench is required to install or remove coupling nut.
- 3.5 Adapter removal is accomplished by lifting the lockring out of the port using a removal tool per Table 3B.

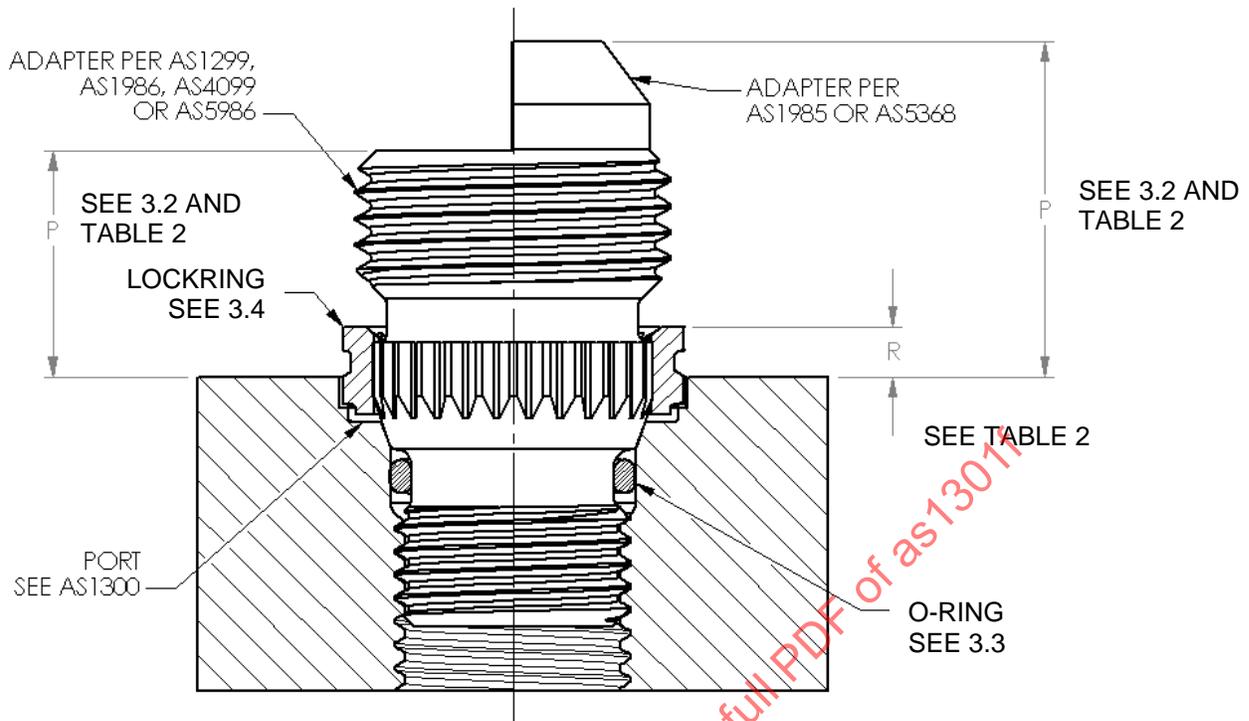


Figure 1 - Installed adapter

Table 2 - Dimensions

AS1300 Port Dash Number	Adapter Dash Number AS1299	Adapter Dash Number AS1985	Adapter Dash Number AS1986 and AS5986	Adapter Dash Number AS4099	Adapter Dash Number AS5368	O-ring Size See 3.3	P						R Max
							± 0.020 AS1299	± 0.020 AS1985	± 0.020 AS1986 and AS5986	± 0.020 AS4099	± 0.020 AS5368		
02	02	02	02	02	--	AS568-007	0.495	0.577	0.358	0.509	--	0.124	
03	03	03	03	03	--	AS568-008	0.517	0.608	0.389	0.556	--	0.124	
04	04	04	04	04	04	AS568-010	0.578	0.679	0.431	0.587	0.690	0.124	
05	05	05	05	05	05	AS568-011	0.578	0.679	0.431	0.587	0.690	0.124	
06	06	06	06	06	06	AS568-012	0.599	0.691	0.457	0.609	0.750	0.130	
08	08	08	08	08	08	AS568-014	0.662	0.792	0.470	0.702	0.910	0.130	
10	10	10	10	10	10	AS568-016	0.723	0.893	0.534	0.765	1.010	0.130	
12	12	12	12	12	12	AS568-116	0.733	1.009	0.584	0.838	1.120	0.140	
14	--	--	14	--	--	AS568-118	--	--	0.602	--	--	0.140	
16	16	16	16	16	16	AS568-120	0.733	1.056	0.632	0.838	1.160	0.140	
20	20	20	20	20	--	AS568-123	0.758	1.103	0.629	0.838	--	0.140	
24	24	24	24	24	--	AS568-128	0.768	1.228	0.714	0.838	--	0.140	
32	32	32	--	32	--	AS568-137	0.847	1.478	--	0.838	--	0.140	

Table 3A - Tooling

Adapter Dash Number	O-ring Tool Number		Combination Wrench and Drive Tool, AS1299, AS1985, AS4099, and AS5368		Combination Wrench and Drive Tool, AS1986 and AS5986	
	Option 1	Option 2	Option 1	Option 2	Option 1	Option 2
	02	ORT216	MORT216	RF9802DW	MF9802DW	RF5002DW
03	ORT250	MORT250	RF9803DW	MF9803DW	RF5003DW	MF5003DW
04	ORT312	MORT312	RF9804DW	MF9804DW	RF5004DW	MF5004DW
05	ORT375	MORT375	RF9805DW	MF9805DW	RF5005DW	MF5005DW
06	ORT437	MORT437	RF9806DW	MF9806DW	RF5006DW	MF5006DW
08	ORT562	MORT562	RF9808DW	MF9808DW	RF5008DW	MF5008DW
10	ORT687	MORT687	RF9810DW	MF9810DW	RF5010DW	MF5010DW
12	ORT812	MORT812	RF9812DW	MF9812DW	RF5012DW	MF5012DW
14	ORT937	MORT937	--	--	RF5014DW	MF5014DW
16	ORT1125	MORT1125	RF9816DW	MF9816DW	RF5016DW	MF5016DW
20	ORT1312	MORT1312	RF9820DW	MF9820DW	RF5020TDW	MF5020TDW
24	ORT1625	MORT1625	RF9824DW	MF9824DW	RF5024TDW	MF5024TDW
32	ORT2125	MORT2125	RF9832DW	MF9832DW	--	--

Table 3B - Tooling continued and installation torque

Adapter Dash Number	Removal Tool		Installation Torque, lbf-in	*Alternate Fitting Wrench Tool, AS1299, AS1985, AS1986, AS4099, AS5368, and AS5986		*Alternate Lockring Drive Tool, AS1299, AS1985, AS1986, AS4099, AS5368, and AS5986	
	Option 1	Option 2		Option 1	Option 2	Option 1	Option 2
	02	RF02LPDE		MF02LPDE	16-21	RF6902W	MF6902W
03	RF03LPDE	MF03LPDE	38-45	RF6903W	MF6903W	RF9803DEK	MF9803DEK
04	RF04LPDE	MF04LPDE	60-100	RF6904W	MF6904W	RF9804DEK	MF9804DEK
5	RF05LPDE	MF05LPDE	100-120	RF6905W	MF6905W	RF9805DEK	MF9805DEK
06	RF06LPDE	MF06LPDE	180-245	RF6906W	MF6906W	RF9806DEK	MF9806DEK
08	RF08LPDE	MF08LPDE	430-510	RF6908W	MF6908W	RF9808DEK	MF9808DEK
10	RF10LPDE	MF10LPDE	600-680	RF6910W	MF6910W	RF9810DEK	MF9810DEK
12	RF12LPDE	MF12LPDE	855-945	RF6912W	MF6912W	RF9812DEK	MF9812DEK
14	RF14LPDE	MF14LPDE	995-1105	RF6914W	MF6914W	RF9814DEK	MF9814DEK
16	RF16LPDE	MF16LPDE	1140-1260	RF6916W	MF6916W	RF9816DEK	MF9816DEK
20	RF20LPDE	MF20LPDE	1520-1680	RF6920W	MF6920W	RF9820DEK	MF9820DEK
24	RF24LPDE	MF24LPDE	1900-2100	RF6924W	MF6924W	RF9824DEK	MF9824DEK
32	RF32LPDE	MF32LPDE	2660-2940	RF6932W	MF6932W	RF9832DEK	MF9832DEK

NOTE: These fitting adapters require special tooling for proper installation. 'Option 1' tooling part numbers listed above are available from Alcoa Fastening Systems, Fullerton, CA - Cage Code 66776, and equivalent alternate 'Option 2' tooling part numbers are available from McKinnon Industries, a Shur-Lok Company, Irvine, CA - Cage Code 65085. *Alternate fitting wrench and lockring drive tools that conform to AS1301 installation requirements are available from the aforementioned suppliers.

4. DESIGN REQUIREMENTS

4.1 Minimum data to be specified on engineering drawing or specification.

4.1.1 Port diameter to be at least the minimum specified in AS1300.

4.1.2 Location of port.

4.1.3 Specific port size per AS1300. If tap drill depth is not through, then specify control dimensions.

4.1.4 Specific adapter size per AS1299, AS1985, AS1986, AS4099, AS5368, and AS5986.

4.1.5 Specific O-ring size and compound (see 3.3).

4.1.6 Install adapter per AS1301.

4.1.7 Corrosion protection is specified in 5.2.4. If materials or fluids require primer different from suggested barrier materials, or if an additional sealant is required, so specify.

4.1.8 Pressure testing of individual units is specified in 6.1. Testing other than that shown shall be specified.

4.1.9 The boss material for a 3000, 4000, or 5000 psi system must have a minimum shear strength per Table 4 to resist the axial load being generated from a respective burst pressure of 12 000, 16 000, or 20 000 psi (based on thread minimum shear engagement area shown). See AS1300 for material port strength and elongation requirements.

4.1.10 Torque values to be used for installation are specified in Table 3B. Torque values that differ from those defined in Table 3B shall be specified.

NOTE: Torque values other than those specified in Table 3B are to be validated by using design activity testing.

5. INSTALLATION OF ADAPTERS AS1299, AS1985, AS1986, AS4099, AS5368, OR AS5986 INTO PORT AS1300

5.1 O-ring Installation

5.1.1 Place the O-ring (per Table 2) over the small thread of the adapter as follows: Submerge the O-ring tool and O-ring in the fluid to be used in the working system, or a lubricant compatible with the system fluid. Slide the O-ring over the O-ring tool and onto the adapter. Be sure that the O-ring is not twisted and is properly seated in the groove of the adapter. See Figure 2.

5.1.2 Remove the O-ring tool.

5.2 Install Adapter Assembly into Port

5.2.1 Lubricate the internal surfaces and internal threads of the port using the same fluid or lubricant as specified in 5.1.1. Scratches, dings or rough spots are not allowed in O-ring contact area on the adapter or in the port.

5.2.2 Insert the smaller thread of the adapter into port by hand using a clockwise rotation until the adapter is seated. To avoid possible O-ring damage, the adapter should not be rotated in a counterclockwise direction.

5.2.3 Using the applicable combination wrench and drive tool specified in Table 3A or alternate fitting wrench tool specified in Table 3B, engage the serrations of the tool with the external serrations of the adapter locking per Figure 3. Place a torque wrench of the proper size over the hex of the wrench and apply a torque equal to the minimum value specified in Table 3B. Note the relationship of the locking serrations with respect to the prebroached serrations in the port. If they match, proceed to 5.2.4. If the locking serrations do not match the prebroached serrations in the port, continue to slowly torque the adapter toward the maximum value allowed in Table 3B until the serrations match. This will normally take between 3 and 8 degrees of turning, the maximum value need not be reached if the serrations align themselves prior to that value. Do not exceed maximum torque values.

Table 4 - Axial load and boss Fsu minimum

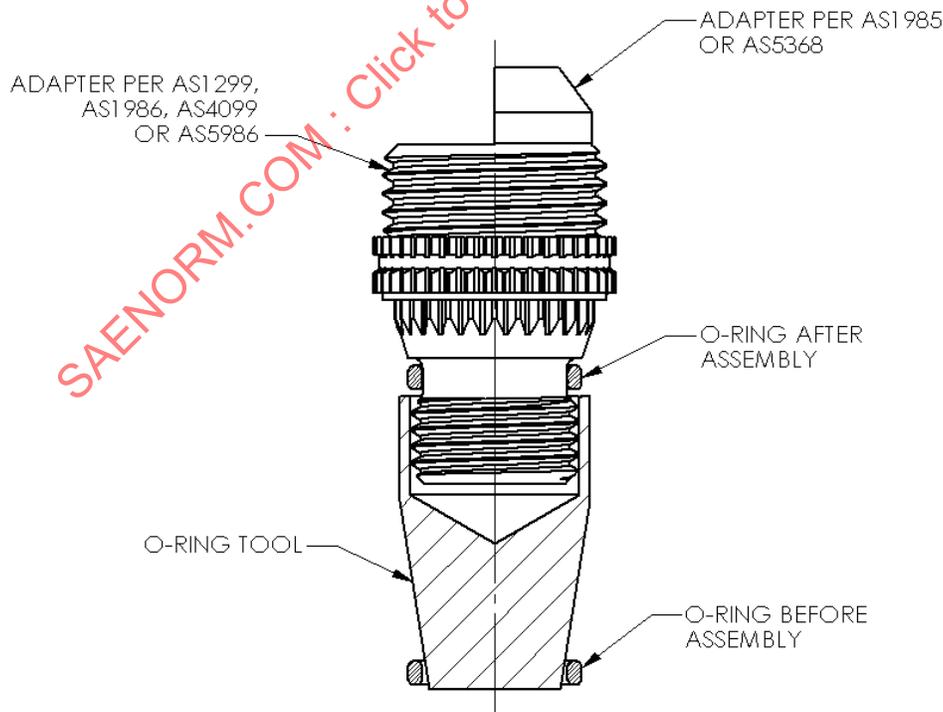
AS1300 Port Dash Number	K /1/ Total Thread Minimum Shear Engagement Area in ²	L Port "D" Maximum Per AS1300 Ref inch	M /2/ Axial Load on Adapter Developed by 12 000 psi Burst Pressure lbf	M /2/ Axial Load on Adapter Developed by 16 000 psi Burst Pressure lbf	M /2/ Axial Load on Adapter Developed by 20 000 psi Burst Pressure lbf	N /3/ Boss Material Min Fsu Required to Resist Axial Load (psi) for 12 000 psi	N /3/ Boss Material Min Fsu Required to Resist Axial Load (psi) for 16 000 psi	N /3/ Boss Material Min Fsu Required to Resist Axial Load (psi) for 20 000 psi
02	0.0417	0.256	618	824	--	14 821	19 760	--
03	0.0802	0.288	782	1024	--	9751	13 005	--
04	0.0989	0.341	1096	1461	1827	11 082	14 773	18 473
05	0.1406	0.403	1531	2041	--	10 889	14 517	--
06	0.1734	0.466	2047	2729	3411	11 805	15 739	19 671
08	0.2610	0.584	3214	4286	5357	12 315	16 422	20 525
10	0.3807	0.727	4981	6642	8302	13 084	17 447	21 807
12	0.4550	0.901	7651	10 201	12 752	16 816	22 420	28 026
14	0.6132	1.032	10 037	13 384	--	16 369	21 827	--
16	0.7312	1.164	12 770	17 026	21 283	17 465	23 285	29 107
20	0.8559	1.389	18 183	24 245	--	21 245	28 327	--
24	1.2328	1.666	26 159	34 879	--	21 220	28 293	--
32	2.1634	2.204	45 782	61 043	--	21 162	28 216	--

NOTES:

/1/ Minimum shear engagement area shown is the assembled dimensional value for the overall engaged area of mating port threads (port threads full depth of adapter). It does not represent a dimension of either of the members in an unassembled condition.

/2/ Axial Load = Area x Burst Pressure = $\frac{\pi L^2}{4}$ x Burst Pressure

/3/ Fsu Min = Axial Load ÷ Area = M ÷ K

**Figure 2 - O-ring installation**

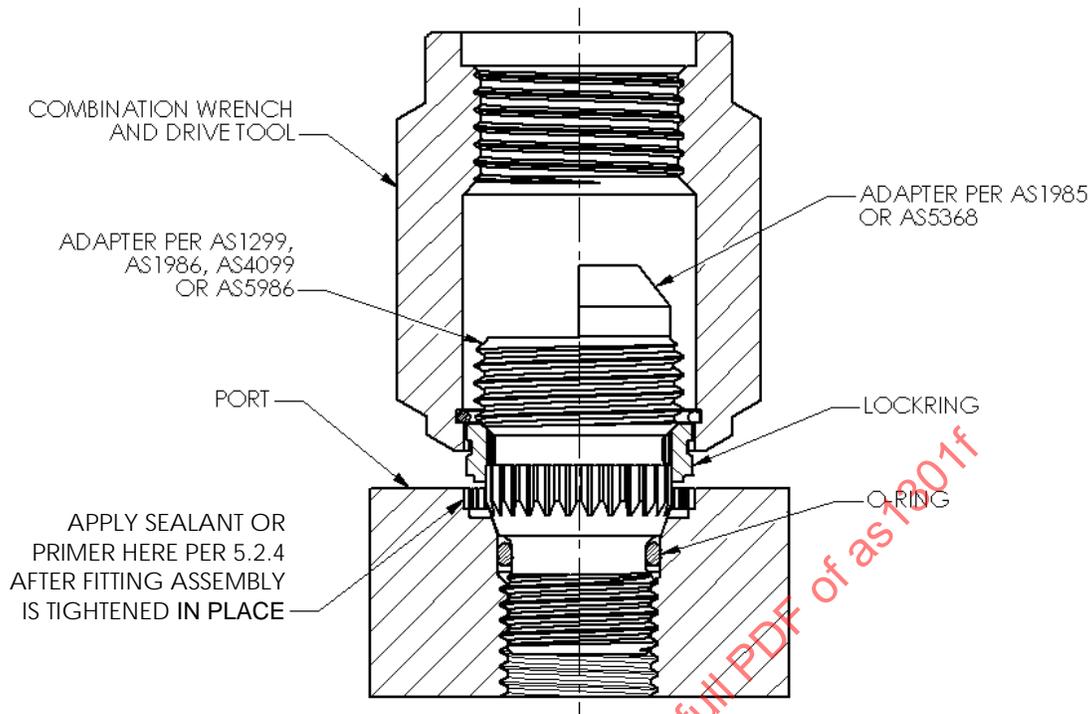


Figure 3 - Torquing adapter assembly

5.2.4 Apply enough sealant/primer with a brush or small syringe to the counterbore area of the port and below the adapter serrations so sealant/primer will be extruded out between external serrations of the lockring and serrations in the port when lockring is installed. Some adapter sizes, from certain manufacturers, may not provide adequate clearance for applying sealant/primer once adapter is fully torqued into port. Acceptable barrier materials include:

- a. MIL-PRF-23377 TYPE 1, CLASS N epoxy primer
- b. SSPC-PAINT-25 Zinc Oxide/Linseed Oil primer
- c. AMS3276 Polysulfide sealant

NOTE: Using design activity may specify another primer in place of, or in addition to, primers/sealants specified above. Earlier revisions of this installation specification prescribed the use of Zinc Chromate primer per TT-P-1757. Continued use of this primer is highly discouraged due to the environmental impacts associated with compounds containing chromium.

5.2.5 While the sealant/primer applied per 5.2.4 is still wet, install the lockring by rotating the threaded end of the combination wrench and drive tool clockwise onto the adapter assembly until it touches the lockring. Using an open end or socket wrench on the tool, turn the tool in a clockwise direction until it bottoms on the port surface as shown in Figure 4. Visually observe that the tool has bottomed. Torque not to exceed adapter dash number installation torque range per Table 3B. If torque exceeds, or in lieu of using the combination wrench and drive tool, alternate lockring drive tool without thread listed in Table 3B may be used to install lockring and meet dimension R per Table 2.

CAUTION: Overtightening to bottom the combination wrench and drive tool on the port surface may damage the port threads or stretch the port fitting and eliminate the installation joint preload. Any sudden increase in torque prior to bottoming may indicate that the lockring serrations and the port serrations are not aligned. If this occurs, remove wrench and drive tool by turning counterclockwise. Lift the lockring per 7.2. Tighten adapter clockwise per 5.2.3 until serrations in port and the external serrations on the lockring are aligned. Reinstall lockring and remove excess primer from surface of port and lockring.