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INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

SURFACE VEHICLE STANDARD

SAE J1926/2
ISO 11926-2
REV. MAR93

Issued 1988-08
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Submitted for recognition as an American National Standard

(R) CONNECTIONS FOR GENERAL USE AND FLUID POWER—PORTS AND STUD ENDS WITH ISO 725 THREADS AND O-RING SEALING— PART 2: HEAVY-DUTY (S SERIES) STUD ENDS

This document is technically equivalent to ISO 11926-2.

Foreword—SAE J1926 consists of the following parts, under the general title:

Connections for general use and fluid power—Ports and stud ends with ISO 725 threads and O-ring sealing:

— Part 1: Port With O-Ring Seal in Truncated Housing
— Part 2: Heavy-Duty (S Series) Stud Ends
— Part 3: Light-Duty (L Series) Stud Ends

These standards define performance requirements, dimensions, and designs for port and stud end connections for heavy-duty in Part 2 and light-duty in Part 3. Significant testing through 40 years of use has confirmed the performance requirements of these ports and stud ends. Stud ends in conformance with ISO 11926-2 are identical to those in conformance with SAE J1453, and stud ends in conformance with ISO 11926-3 are identical to those in conformance with SAE J514. Stud ends in conformance with SAE J1926-3 (ISO 11926-3) are used on fittings in ISO 8434-2.

In fluid power systems, power is transmitted and controlled through a fluid (liquid or gas) under pressure within an enclosed circuit. In general applications, a fluid may be conveyed under pressure. Components are connected through their threaded ports by stud ends on fluid conductor fittings to tubes/pipes, or to hose fittings and hoses.

1. ***Scope***—This part of SAE J1926 specifies dimensions, performance requirements, and test procedures for adjustable and nonadjustable heavy-duty (S series) stud ends with ISO 725 threads for use in fluid power and general applications and the O-rings used with them.

   Stud ends in accordance with this part of SAE J1926 may be used at working pressures up to 63 MPa for nonadjustable stud ends and up to 40 MPa for adjustable stud ends. The permissible working pressure depends upon materials, design, working conditions, application, etc.

   For threaded ports and stud ends specified in new designs for hydraulic fluid power applications, only SAE J2244 (ISO 6149) shall be used. Threaded ports and stud ends in accordance with ISO 1179, ISO 9974, and ISO 11926 shall not be used for new design in hydraulic fluid power applications.

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Conformance to the dimensional information does not guarantee rated performance. Each manufacturer shall perform testing according to the specification contained in this document to ensure that components made to this document comply with the performance rating.

Appendices A and B of this document are normative; Appendix C of this document is informative.

2. *References*

2.1 Applicable Documents—The following standards contain provisions which, through reference in this text, constitute provisions of this document. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this document are encouraged to investigate the possibility of applying the most recent edition of the standards indicated as follows. Members of IEC and ISO maintain registers of currently valid International Standards.

2.1.1 SAE PUBLICATIONS—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J515—Hydraulic O-ring
SAE J1644—Metallic Tube Connections for Fluid Power and General Use—Test Methods for Threaded Hydraulic Fluid Power Connectors
SAE J2244/2—Connections for Fluid Power and General Use—Ports and Stud Ends with ISO 261 Thread and O-ring Sealing—Part 2: Heavy-Duty (S Series) Stud Ends, Dimensions, Designs, Test Methods, and Requirements

2.1.2 ISO PUBLICATIONS—Available from ANSI, 11 West 42nd Street, New York, NY 10036-8002.

ISO 725:1978—ISO inch screw threads—Basic dimensions
ISO 1179-1:---[1]—Connections for general use and fluid power—Ports and stud ends with ISO 228-1 threads with elastomeric and metal-to-metal sealing—Part 1: Threaded port
ISO 1179-2:---[1]—Connections for general use and fluid power—Ports and stud ends with ISO 228-1 threads with elastomeric and metal-to-metal sealing—Part 2: Heavy duty (S series) and light duty (L series) stud ends with elastomeric sealing (type E)
ISO 1179-3:---[1]—Connections for general use and fluid power—Ports and stud ends with ISO 228-1 threads with elastomeric and metal-to-metal sealing—Part 3: Light duty (L series) stud end with sealing by O-ring with retaining ring (types G and H)
ISO 1179-4:---[1]—Connections for general use and fluid power—Ports and stud ends with ISO 228-1 threads with elastomeric and metal-to-metal sealing—Part 4: Stud end for general use only with metal-to-metal sealing (type B)
ISO 4759-1:1978—Tolerances for fasteners—Part 1: Bolts, screws and nuts with thread diameters between 1.6 (inclusive) and 150 mm (inclusive) and product grades A, B and C
ISO 5598:1985—Fluid power systems and components—Vocabulary
ISO 6149-1:---[1]—Connections for fluid power and general use—Ports and stud ends with ISO 261 threads and O-ring sealing—Part 1: Port with O-ring seal in truncated housing
ISO 6149-2:---[1]—Connections for fluid power and general use—Ports and stud ends with ISO 261 threads and O-ring sealing—Part 2: Heavy duty (S series) stud ends—Dimensions, design, test methods and requirements
ISO 6149-3:---[1]—Connections for fluid power and general use—Ports and stud ends with ISO 261 threads and O-ring sealing—Part 3: Light duty (L series) stud ends—Dimensions, design, test methods and requirements
ISO 8434-2:---[1]—Metallic tube fittings for fluid power and general use—Part 2: 37° Flared Fittings
ISO 9974-1:---[1]—Connections for general use and fluid power—Ports and stud ends with ISO 261 threads with elastomeric and metal-to-metal sealing—Part 1: Threaded port

[1] To be published.

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ISO 11926-1:—[1]—Connections for general use and fluid power—Ports and stud ends with ISO 261 threads and O-ring sealing—Part 1: Threaded port with O-ring seal in truncated housing
ISO 11926-2:—[1]—Connections for general use and fluid power—Ports and stud ends with ISO 261 threads and O-ring sealing—Part 2: Heavy duty (S series) stud ends
ISO 11926-3:—[1]—Connections for general use and fluid power—Ports and stud ends with ISO 261 threads and O-ring sealing—Part 3: Light duty (L series) stud ends

2.2 Related Publications—The following publications are provided for information purposes only and are not a required part of this document.

2.2.1 ASTM PUBLICATIONS—Available from ASTM, 1916 Race Street, Philadelphia, PA 19103-1187.

ASTM B 117—Method of Salt Spray (Fog) Test
ASTM B 633—Standard Specifications for Electrodeposited Coatings of Zinc or Iron and Steel

2.2.2 ISO PUBLICATIONS—Available from ANSI, 11 West 42nd Street, New York, NY 10036-8002.

ISO 48:1979—Vulcanized rubbers—Determination of hardness (Hardness between 30 and 85 IRHD)
ISO 263:1973—ISO inch screw threads—General plan and selection for screws, bolts and nuts—Diameter range 0,06 to 6 in
ISO 1101:1983—Technical drawings—Tolerancing of form, orientation, location and run-out—Generalities, definitions, symbols, indications on drawings
ISO 1302:1978—Technical drawings—Method of indicating surface texture on drawings
ISO 3448:1975—Industrial liquid lubricants—ISO viscosity classification
ISO 3601-3:1987—Fluid systems—Sealing devices—O-rings—Part 3: Quality acceptance criteria
ISO 6803:1984—Rubber or plastic hoses and hose assemblies—Hydraulic pressure impulse test without flexing
ISO 9974-2:—[1]—Connections for general use and fluid power—Ports and stud ends with ISO 261 threads with elastomeric and metal-to-metal sealing—Part 2: Stud end with elastomeric sealing (type E)
ISO 9974-3:—[1]—Connections for general use and fluid power—Ports and stud ends with ISO 261 threads with elastomeric and metal-to-metal sealing—Part 3: Stud end with metal-to-metal sealing (type B)

3. Definitions—For the purpose of this part of SAE J1926, the definitions given in ISO 5598 and the following shall apply.

3.1 Adjustable Stud End—A stud end connector that allows for fitting orientation through final tightening of the locknut to complete the connection. This type of stud end is typically used on shaped fittings (e.g., tees, crosses, and elbows).

3.2 Nonadjustable Stud End—A stud end connector that does not require specific orientation before final tightening of the connection because it is only used on straight fittings.

4. Stud End Size Specifications—The stud ends shall be specified by SAE J1926/2 and the thread size, separated by a colon, for example, SAE J1926/2:1/2-20.

5. Requirements

5.1 Dimensions—Heavy-duty (S series) SAE J1926-2 stud ends shall conform to the dimensions in Figures 1A and 1B and Table 1. Hex tolerances across flats shall be according to ISO 4759-1 product grade C.

5.2 Working Pressure—Heavy-duty (S series) stud ends made of low-carbon steel shall be designed for use at the working pressures given in Table 2.

5.3 Performance—Heavy-duty (S series) stud ends made of low-carbon steel shall meet or exceed the burst and impulse pressures given in Table 2 when tested according to 5.5.

[1] To be published.

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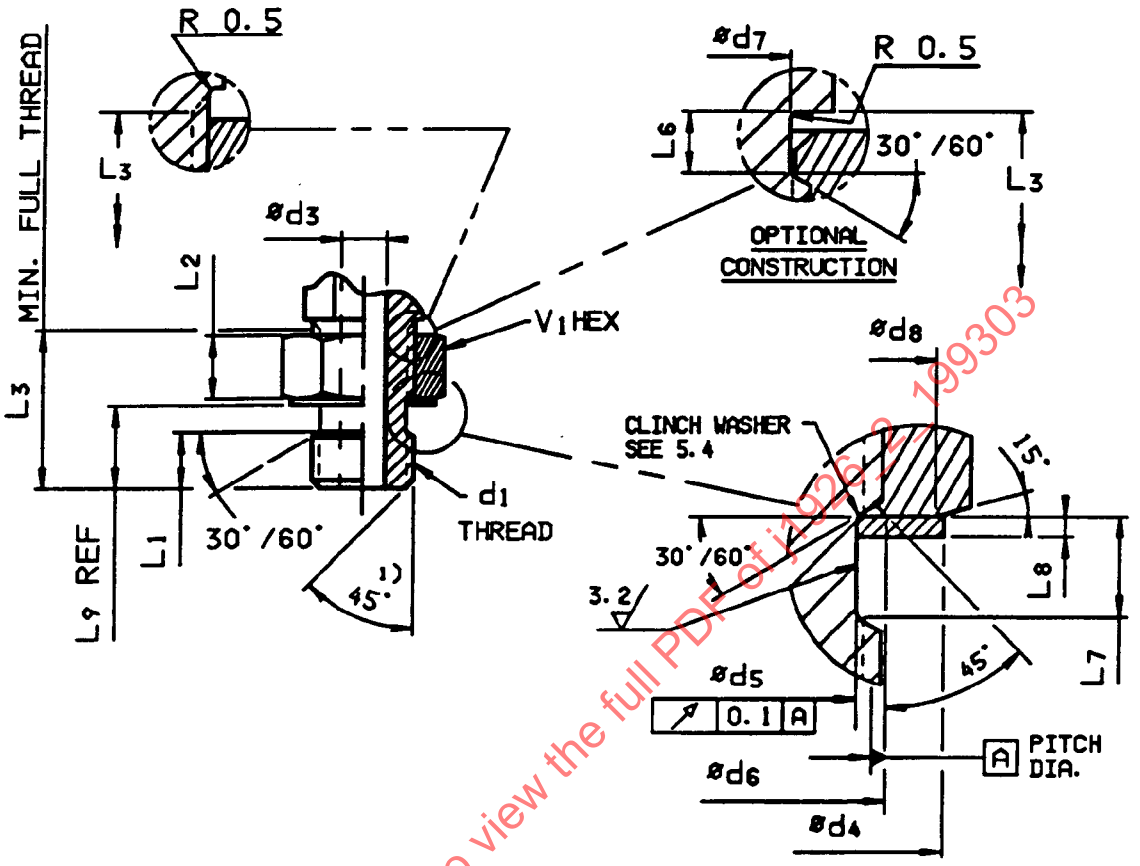

FIGURE 1A—ADJUSTABLE SAE J1926/2 HEAVY-DUTY (S SERIES) STUD END DETAIL

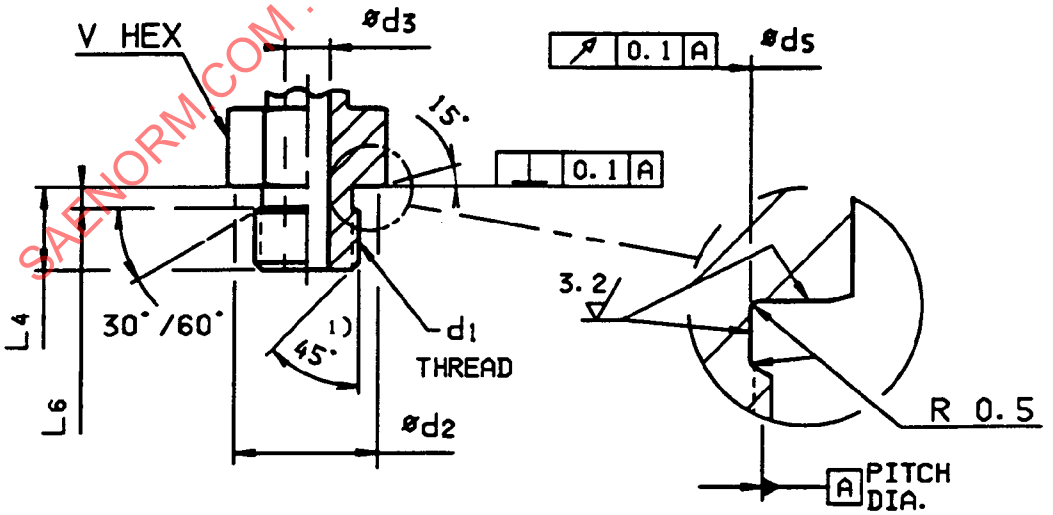

FIGURE 1B—NONADJUSTABLE SAE J1926/2 HEAVY-DUTY (S SERIES) STUD END DETAIL

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TABLE 1—SAE J1926/2 HEAVY-DUTY (S SERIES) STUD END DIMENSIONS
Dimensions in millimeters

Nominal Tube OD or Hose ID Inch Tubing Dash Size	Nominal Tube OD or Hose ID Inch Tubing mm	Nominal Tube OD or Hose ID Inch Tubing in	Nominal Tube OD or Hose ID Metric Tubing mm	d_1[1] Thread Size in	ϕd_2 ±0.2	ϕd_3		ϕd_4 ±0.4	ϕd_6 +0.05 -0.08	ϕd_8 ±0.2	ϕd_7 +0 -0.3	ϕd_9 ±0.2
-3	4.76	0.188	5	3/8-24	12.5	3.2	+0.18/0	14.6	7.95	9.9	8	14.1
-4	6.35	0.250	6	7/16-20	14.1	4.5	+0.18/0	16.5	9.25	11.5	9.3	14.9
-5	7.94	0.312	8	1/2-20	15.7	6	+0.18/0	18.3	10.85	13	10.9	17.3
-6	9.52	0.375	10	9/16-18	17.3	7.5	+0.22/0	20.2	12.24	14.6	12.3	18.8
-8	12.70	0.500	12	3/4-16	22	10	+0.22/0	25.7	16.76	19.4	16.8	23.6
-10	15.88	0.625	16	7/8-14	25.2	12.5	+0.27/0	29.3	19.63	22.6	19.7	26.8
-12	19.05	0.750	20	1-1/16-12	37.5	15.5	+0.27/0	36.7	24	27.3	24	34.7
-14	22.22	0.875	22	1-3/16-12	34.7	18	+0.27/0	40.4	27.18	30.5	27.2	37.9
-16	25.40	1.000	25	1-5/16-12	37.9	21.5	+0.33/0	44	30.35	33.7	30.4	41.1
-20	31.75	1.250	30	1-5/8-12	47.4	27.5	+0.33/0	55	38.28	41.6	38.3	47.4
-24	38.10	1.500	38	1-7/8-12	53.8	33.5	+0.39/0	62.3	44.6	48	44.6	53.8

TABLE 1—SAE J1926/2 HEAVY-DUTY (S SERIES) STUD END DIMENSIONS (CONTINUED)
Dimensions in millimeters

Nominal Tube OD or Hose ID Inch Tubing Dash Size	Nominal Tube OD or Hose ID Inch Tubing mm	Nominal Tube OD or Hose ID Inch Tubing in	Nominal Tube OD or Hose ID Metric Tubing mm	L_1 ±0.2	L_2 ±0.2	L_3 min	L_4 ±0.2	L_5 ±0.15	L_7 ±0.1	L_9 ±0.08	L_8 ref	$V^{2,3}$ Hex	V_1^2 Hex
-3	4.76	0.188	5	7	7.2	18.2	9.5	1.75	3.4	0.8	9.6	12.70	14.29
-4	6.35	0.250	6	8.2	8	20.5	11	2.05	3.7	0.9	11	14.29	15.88
-5	7.94	0.312	8	8.2	8	22.4	11	2.05	3.7	0.9	11	15.88	17.46
-6	9.52	0.375	10	9	8.5	22.4	12	2.05	4.1	0.9	12.2	17.46	19.05
-8	12.70	0.500	12	10	10.3	26.1	14	2.25	4.9	1	13.9	22.22	23.81
-10	15.88	0.625	16	11.8	11.5	30.2	16	2.85	5.7	1.25	16.3	25.40	26.99
-12	19.05	0.750	20	13.8	12.8	33.8	18.5	3.35	6	1.25	18.6	31.75	34.93
-14	22.22	0.875	22	13.8	12.8	33.8	18.5	3.35	6	1.25	18.6	34.93	38.10
-16	25.40	1.000	25	13.8	13.6	34.6	18.5	3.35	6	1.25	18.6	38.10	41.28
-20	31.75	1.250	30	13.8	13.6	34.6	18.5	3.35	6	1.25	18.6	47.63	47.63
-24	38.10	1.500	38	13.8	13.6	34.6	18.5	3.35	6	1.25	18.6	53.98	53.98

[1] Sizes 3/8 thru 7/8 are UNF-2A, sizes 1-1/16 thru 1-7/8 are UN-2A.

[2] See Appendix A for recommended metric hex sizes.

[3] For jump sizes V hex size may be larger; however, the corners may have to be turned to appropriate diameter and length to fit port spotface.

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TABLE 2—SAE J1926/2 HEAVY-DUTY (S SERIES) STUD END PRESSURES[1]
Units in megapascals[2]

Thread Size in	Stud End Styles Nonadjustable Working[1] Pressure	Stud End Styles Nonadjustable Test Pressure Burst	Stud End Styles Nonadjustable Test Pressure Impulse[3]	Stud End Styles Adjustable Working[1] Pressure	Stud End Styles Adjustable Test Pressure Burst	Stud End Styles Adjustable Test Pressure Impulse[3]
3/8-24 UNF-2A	63	252	83.8	40	160	53.2
7/16-20 UNF-2A	63	252	83.8	40	160	53.2
1/2-20 UNF-2A	63	252	83.8	40	160	53.2
9/16-18 UNF-2A	63	252	83.8	40	160	53.2
3/4-16 UNF-2A	63	252	83.8	40	160	53.2
7/8-14 UNF-2A	63	252	83.8	40	160	53.2
1-1/16-12 UN-2A	40	160	53.2	40	160	53.2
1-3/16-12 UN-2A	40	160	53.2	40	160	53.2
1-5/16-12 UN-2A	40	160	53.2	31.5	126	41.9
1-5/8-12 UN-2A	25	100	33.2	25	100	33.2
1-7/8-12 UN-2A	25	100	33.2	20	80	26.6

[1] These pressure ratings were established using fittings made of low-carbon steel and tested in accordance with 5.5.
[2] To convert from MPa to bar multiply by 10. To convert from MPa to psi multiply by 145.04.
[3] Cyclic endurance test pressure.

5.4 Adjustable Stud End Washer Fit and Flatness—The washer shall be clinched to the stud end with a tight slip fit to an interference fit. The slip fit shall be tight enough so that the washer cannot be shaken loose to cause it to drop from its uppermost position by its own weight. The locknut torque needed to move the washer at the maximum washer interference fit shall not exceed the torques given in Table 3.

Any washer surface that is out of flatness shall be uniform (i.e., not wavy) and concave with respect to the stud end and shall conform to the allowance given in Table 3.

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TABLE 3—ADJUSTABLE STUD END WASHER TORQUE AND FLATNESS ALLOWANCE

Thread Size in	Maximum Nut Torque to Move Washer N·m[1]	Maximum Washer Flatness Allowance mm
3/8-24 UNF-2A	3	0.25
7/16-20 UNF-2A	4	0.25
1/2-20 UNF-2A	5	0.25
9/16-18 UNF-2A	7	0.25
3/4-16 UNF-2A	10	0.25
7/8-14 UNF-2A	12	0.25
1-1/16-12 UN-2A	15	0.40
1-3/16-12 UN-2A	18	0.40
1-5/16-12 UN-2A	20	0.40
1-5/8-12 UN-2A	25	0.50
1-7/8-12 UN-2A	30	0.50

[1] To convert from N·m to lb,ft multiply by 0.737.

5.5 Test Methods—Stud ends shall be tested for burst and impulse per SAE J1644.

6. O-ring—O-rings used with heavy-duty (S series) SAE J1926/2 stud ends shall conform to the dimensions given in SAE J515.

7. Identification Statement—Use the following statement in test reports, catalogues, and sales literature when electing to comply with this part of SAE J1926:

"Heavy-duty (S series) stud end conforms to SAE J1926/2, Connections for general use and fluid power—Ports and stud ends with ISO 725 threads and O-ring sealing—Part 2: Heavy-duty (S series) stud ends."

8. Notes

8.1 Key Words—Fluid power, pipe fittings, standard connection, standard coupling, pipe joints, ports, stud ends, specifications, design, operating requirements, dimensions, designation, test methods, inch, straight thread, O-ring seal, high pressure

8.2 Marginal Indicia—The (R) is for the convenience of the user in locating areas where technical revisions have been made to the previous issue of the report. If the symbol is next to the report title, it indicates a complete revision of the report.

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TABLE 4—SAE J1926/2 STUD END QUALIFICATION TORQUE

Thread Size in	Torque +10% -0 N·m[1]
3/8-24 UNF-2A	10
7/16-20 UNF-2A	20
1/2-20 UNF-2A	25
9/16-18 UNF-2A	35
3/4-16 UNF-2A	70
7/8-14 UNF-2A	100
1-1/16-12 UN-2A	170
1-3/16-12 UN-2A	215
1-5/16-12 UN-2A	270
1-5/8-12 UN-2A	285
1-7/8-12 UN-2A	370

[1] To convert from N·m to $lb_f ft$ multiply by 0.737.

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PREPARED BY THE SAE FLUID CONDUCTORS AND CONNECTORS TECHNICAL COMMITTEE SC1—AUTOMOTIVE AND HYDRAULIC TUBE AND FITTING

APPENDIX A
(NORMATIVE)

A.1 By agreement between user and supplier, these metric hex sizes, shown in Table A1, shall be used in lieu of inch hex.

TABLE A1—METRIC HEX SIZES

Thread Size In	Nonadjustable V Hex	Nonadjustable d_2 ± 0.2 mm	Adjustable V_1 Hex	Adjustable d_8 ± 0.2 mm
3/8-24 UNF-2A	12	11.8	14	13.8
7/16-20 UNF-2A	14	13.8	17	16.8
1/2-20 UNF-2A	17	16.8	17	16.8
9/16-18 UNF-2A	17	16.8	19	18.8
3/4-16 UNF-2A	22	21.8	24	23.8
7/8-14 UNF-2A	27	26.8	27	26.8
1-1/16-12 UN-2A	32	31.8	36	35.8
1-3/16-12 UN-2A	36	35.8	41	40.8
1-5/16-12 UN-2A	41	40.8	41	40.8
1-5/8-12 UN-2A	50	49.8	50	48.8
1-7/8-12 UN-2A	55	54.8	55	54.8

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APPENDIX B
ASSEMBLY INSTRUCTIONS FOR ADJUSTABLE STYLE FITTINGS IN STRAIGHT THREAD O-RING PORT

B.1 Lubricate O-ring by coating with light oil or petrolatum and install in the groove adjacent to the face of the metal back-up washer which is assembled at the extreme end of the groove as shown in Figure B1.

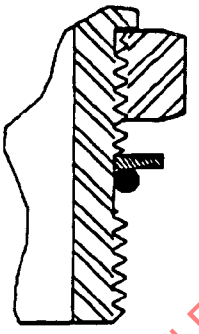

FIGURE B1—LOCKNUT BACKED OFF

B.2 Install the fitting into the SAE straight thread boss, Figure B2, until the metal back-up washer contacts the face of the boss as shown in Figure B2.

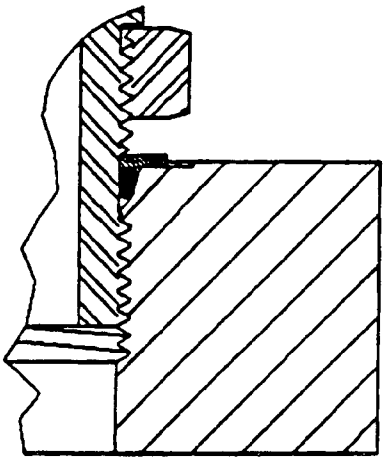

FIGURE B2—FITTING INSTALLED HAND TIGHT

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B.3 Position the fitting by turning out (counterclockwise) up to a maximum of one turn (see Figure B3). Holding the pad of the fitting with a wrench, tighten the locknut and washer against the face as shown in Figure B4.

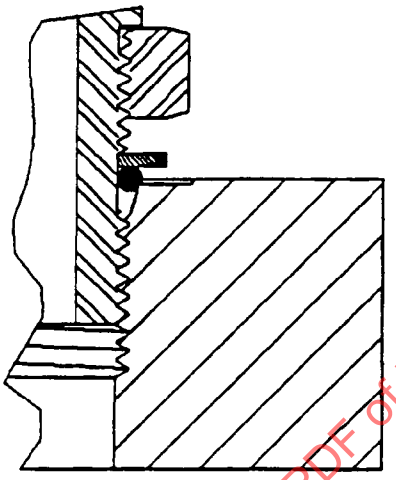

FIGURE B3—FITTING BACKED-OFF FOR ALIGNMENT (1 TURN MAXIMUM)

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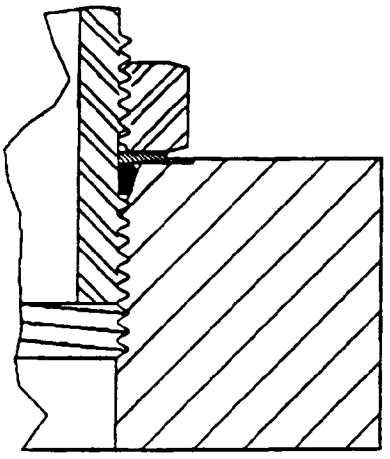

FIGURE B4—FITTING LOCKNUT TIGHTENED TO APPROPRIATE TORQUE

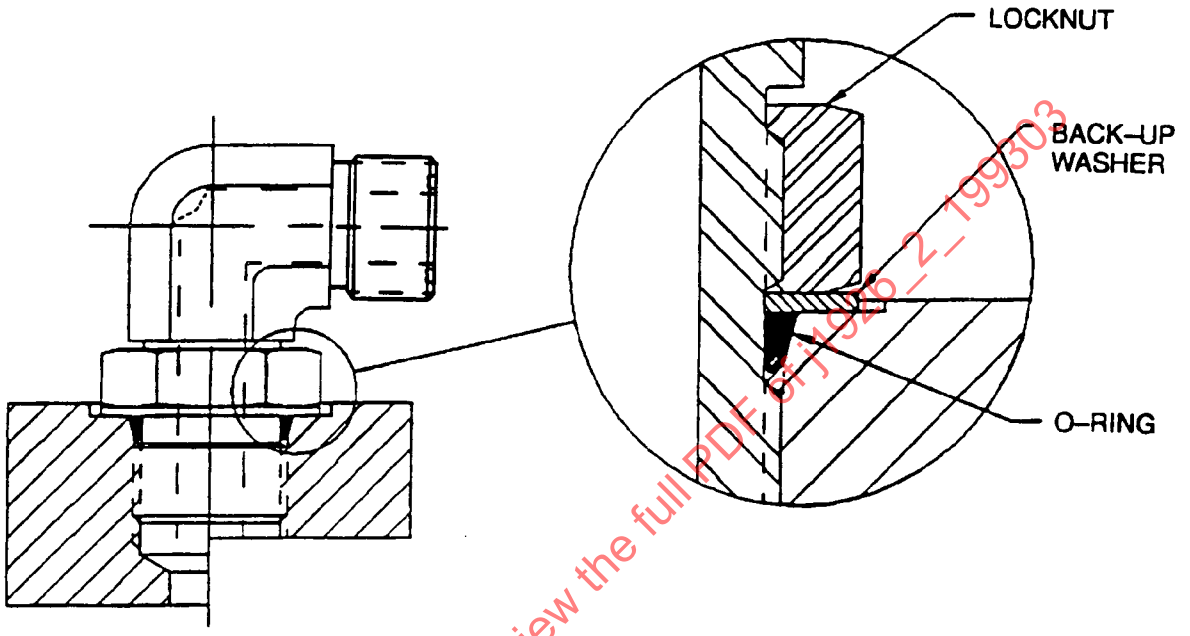

FIGURE B5—FINAL ASSEMBLY OF ADJUSTABLE STUD END

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