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**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**

This document is technically equivalent to ISO 6149-2, except as noted in the Foreword.

Foreword—SAE J2244 parts 1 and 2 were prepared by SAE FCCTC-SC1, Automotive and Hydraulic Tube and Fitting Subcommittee and ISO/TC 131, Fluid power systems. SAE J2244 consists of the following parts under the general title: 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

Part 2: Heavy-duty (S series) Stud Ends—Dimensions, Design, Test Methods, and Requirements

The two parts of SAE J2244 constitute a revision of ISO 6149:1980. This revision defines performance requirements, dimensions, and designs for port and heavy-duty (S series) stud ends. Significant testing was conducted to confirm the performance requirements of stud ends made from carbon steel. ISO 6149-2 applies to fittings detailed in ISO 8434 parts 1, 3, and 4.

SAE J2244 Parts 1 and 2 are technically equivalent to ISO 6149 parts 1 and 2, respectively. Parts produced to either standard will interchange with parts produced to the other standard. **Two main differences exist between the SAE standards and the ISO standards: size M30 x 2 is included in SAE standard but not in the ISO standard and the tube ODs have been shown in the SAE standard for the port sizes.** The SAE subcommittee chose not to include ISO 6149-3, a light-duty stud end, within SAE J2244 to minimize part proliferation.

Appendix A of this standard is normative.

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 and pipes, or to hose fittings and hoses.

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SAE WEB ADDRESS:

- 1. Scope**—This part of SAE J2244 specifies dimensions, performance requirements, and test procedures for metric adjustable and nonadjustable heavy-duty (S series) stud ends and O-rings.

Stud ends in accordance with this part of SAE J2244 may be used at working pressures up to 63 MPa for nonadjustable stud ends and 40 MPa for adjustable stud ends. The permissible working pressure depends upon materials, design, working conditions, application, etc.

For threaded ports and stud ends for use in new designs in hydraulic fluid power applications, only SAE J2244 shall be used. Threaded ports and stud ends in accordance with ISO 1179, ISO 9974, and SAE J1926 (ISO 11926) shall not be used for new designs in hydraulic fluid power applications.

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

- 1.1 Rationale**—All parts of SAE J2244 are being cancelled. SAE J2244 was published to provide users and manufacturers access to metric port and stud end dimensions. ISO 6149 is more recognized in the industry as the preferred metric port and stud end standard, thus the SAE FCCTC SC1 committee has approved cancelling SAE J2244-2 and superseding it with ISO 6149-2.

2. References

- 2.1 Applicable Publications**—The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this Standard 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 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 261:1973—ISO general purpose metric screw threads—General plan

ISO 1179-1:-¹—Connections for fluid power and general use—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 fluid power and general use—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 fluid power and general use—Ports and stud ends with ISO 228-1 threads with elastomeric and metal-to-metal sealing—Part 3: Light duty (L series) stud ends with sealing by O-ring with retaining ring (types G and H)

ISO 1179-4:-¹—Connections for fluid power and general use—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 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 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

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- 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 6803:1984—Rubber or plastic hoses and hose assemblies—Hydraulic pressure impulse test without flexing
- ISO 7789:-²—Hydraulic fluid power—Two, three- and four-port screw-in cartridge valve cavities
- ISO 9974-1:-¹—Connections for fluid power and general use—Ports and stud ends with ISO 261 threads and elastomeric sealing ring and metal-to-metal sealing—Part 1: Threaded port
- ISO 9974-2:-¹—Connections for fluid power and general use—Ports and stud ends with ISO 261 threads and elastomeric sealing ring and metal-to-metal sealing—Part 2: Stud end with elastomeric sealing (type E)
- ISO 9974-3:-¹—Connections for fluid power and general use—Ports and stud ends with ISO 261 threads and elastomeric sealing ring and metal-to-metal sealing—Part 3: Stud end with metal-to-metal sealing (type S)
- ISO 11926-1:-¹—Connections for fluid power and general use—Ports and stud ends with ISO 725 threads and O-ring sealing—Part 1: Threaded port
- ISO 11926-2:-¹—Connections for fluid power and general use—Ports and stud ends with ISO 725 threads and O-ring sealing—Part 2: Heavy duty (S series) stud end
- ISO 11926-3:-¹—Connections for fluid power and general use—Ports and stud ends with ISO 725 threads and O-ring sealing—Part 3: Light duty (L series) stud end

2.2 Other Publications—U.S. References Identical to ISO References

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

ANSI/ASME B1.13M—83, Metric Screw Threads—M Profile

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

SAE J343 APR91—Test and Procedures for SAE 100R Series Hydraulic Hose and Hose Assemblies

SAE J1926 AUG88—Specifications for Straight Thread O-ring Boss Port

SAE J2244/1/ISO 6149-1:DEC91—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

3. **Definitions**—For the purposes of this part of SAE J2244, the definitions given in ISO 5598 and the following definitions shall apply:

3.1 **Adjustable Stud End**—A stud end that allows for orientation before final tightening of the connection.

3.2 **Nonadjustable Stud End**—A stud end that does not allow for orientation before final tightening of the connection.

4. **Stud End Size**—The stud ends shall be specified by SAE J2244/2 and the thread size, separated by a colon, for example, SAE J2244/2:M18 x 1.5.

5. Requirements

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

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5.2 Working Pressure—Heavy-duty (S series) stud ends made of 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 carbon steel shall meet or exceed the burst and impulse pressures given in Table 2, when tested according to Section 7.

5.4 Identification—Heavy-duty (S series) stud ends shall be identified according to the detail shown in Figures 1A and 1B and the dimensions given in Table 1. Nonadjustable (straight) stud ends shall be identified by a turn diameter, d_2 , and a notch on the turn diameter. Adjustable stud ends shall be identified by only a turn diameter, d_2 , on the locknut. In addition to this identification, for both the nonadjustable and adjustable stud ends, the manufacturer may mark the stud end with the word "metric."

5.5 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.

6. O-rings—O-rings for use with heavy-duty (S series) stud ends shall conform to the dimensions given in Figure 2 and Table 4.

7. Test Methods

NOTE—Parts used for cyclic endurance or burst test shall not be tested further, used, or returned to stock.

7.1 Burst Pressure Test

7.1.1 PRINCIPLE—Three samples of both adjustable and nonadjustable shall be tested to confirm that heavy-duty (S series) stud ends meet or exceed a ratio of 4:1 between the burst and working pressures.

7.1.2 MATERIALS

7.1.2.1 Test Block and Stud Ends—Test blocks shall be unplated and hardened to 45-55 HRC. Stud ends shall be made from carbon steel and plated.

7.1.2.2 Test O-rings—Unless otherwise specified, O-rings shall be made from nitrile (NBR) rubber with a hardness of 85 +10/-0 IRHD when measured per ISO 48. O-rings shall conform to the dimensions given in Table 4 and shall meet or exceed the quality requirement grade N in ISO 3601-3.

7.1.3 PROCEDURES

7.1.3.1 Thread Lubrication—For testing only, threads and contact surfaces shall be lubricated with hydraulic oil with a viscosity of VG 32 per ISO 3448 prior to the application of torque.

7.1.3.2 Stud End Torque—Stud ends shall be tested after application of the torques given in Table 5. Adjustable stud locknut torques shall be applied after the stud end has been backed out one full turn from finger tight position, to correctly test the worst possible actual assembly conditions.

7.1.3.3 Pressure Rise Rate—During the burst test, the rate of pressure rise shall not exceed 138 MPa per minute.

7.1.4 TEST REPORT—Test results and conditions shall be reported on the test data form in Appendix A.