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INTERNATIONAL
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SURFACE VEHICLE STANDARD

SAE J1502 | REV. APR97

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Superseding J1502 APR86

Submitted for recognition as an American National Standard

(R) CONNECTIONS FOR FLUID POWER AND GENERAL USE—HYDRAULIC COUPLINGS—DIAGNOSTIC

Foreword—SAE J1502 has been revised to update the metric stud end specifications to the new dimensions specified in SAE J2244-2 (ISO 6149-2) and to more clearly specify the test and performance requirements.

1. Scope—SAE J1502 specifies dimensions, performance requirements, and test procedures for the male half of a diagnostic coupler with either a metric M14x1.5 or an inch 9/16–18 straight thread stud end. The coupler is designed for use with a mineral based hydraulic fluid. It is used on machines specified in SAE J1116. It does not apply to the mating hydraulic quick action couplings not on the machine.

Diagnostic couplings in accordance with this part of ISO may be used at a working pressure of 41.4 MPa (414 bar). The permissible working pressure depends upon the materials, design, working conditions, application, etc.

Conformance to the dimensional information in this part of SAE J1502 does not guarantee rated performance. Each manufacturer should perform testing according to the specification contained in this document to ensure that components comply with the performance rating.

2. References

2.1 Applicable Publications—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 editions of the documents 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 J343—Test and Procedures for SAE 100R Series Hydraulic Hose and Hose Assemblies
SAE J515—Specification for Hydraulic O-Ring Materials, Properties, and Sizes for Metric and Inch Stud Ends, Face Seal Fitting and Four-Screw Flange Tube Connections
SAE J1116 JUN86—Categories of Off-Road Self-Propelled Work Machines
SAE J1644—Metallic Tube Connections for Fluid Power and General Use—Test Methods for Threaded Hydraulic Fluid Power Connectors
SAE J1926-2—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 Ends

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SAE J2244-2—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

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

ISO 261:1973—ISO general-purpose metric screw threads—General plan
ISO 4579-1:1978—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 6149-2:1993—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 SAE J2244-2.)
ISO 9227:1990—Corrosion tests in artificial atmosphere—Salt spray tests
ISO 11926-2 (To be published)—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 ends—Dimensions, design, test methods and requirements (This document is technically equivalent to SAE J1926-2.)

2.1.3 ASME PUBLICATION—Available from The American Society of Mechanical Engineers, 345 East 47th Street, New York, NY 10017.

ASME B1.1—Unified Inch Screw Threads

2.1.4 ASTM PUBLICATION—Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM B 117—Method of Salt Spray (Fog) Test

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

SAE J1298—Connections for Fluid Power and General Use—Hydraulic Couplings—Diagnostic Port Sizes and Locations

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

ISO 725:1978—ISO inch screw threads—Basic dimensions
ISO 965-1:1980—ISO general purpose metric screw threads—Tolerances—Part 1: Principles and basic data
ISO 1302:1978—Technical drawings—Method of indicating surface texture on drawings
ISO 6508:1986—Metallic materials—Hardness test—Rockwell test (scale A–B–C–D–E–F–G–H–K)

2.2.3 ASME PUBLICATION—Available from The American Society of Mechanical Engineers, 345 East 47th Street, New York, NY 10017.

ASME B46.1—Surface Texture (Surface Roughness, Waviness and Lay)

2.2.4 ASTM PUBLICATION—Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM B 633—Standard Specifications for Electrodeposited Coatings of Zinc on Iron and Steel

3. Definitions—For the purposes of this document, the definitions given in ISO 5598 and the following definition apply.

3.1 Quick Action—The joining of two components in a fashion with only hands and without wrenches and other mechanical means.

4. Requirements

4.1 Material

4.1.1 COUPLER CONSTRUCTION—Diagnostic couplers shall be manufactured from carbon steel that will satisfy the minimum pressure/temperature requirements specified. Couplers may be made by forging, cold forming, or machined from bar stock.

4.2 Performance—Male couplers shall meet the following performance requirements when tested per Section 5.

4.2.1 WORKING PRESSURE—Diagnostic couplings made of low-carbon steel shall be designated for use at a working pressure of 41.4 MPa.

4.2.2 RATED FLOW—The coupler shall be rated to handle a flow of 3 L/min with a maximum flow without malfunction of 15 L/min.

4.2.3 APPLICATION TEMPERATURE—Carbon steel fittings shall meet the working pressures when used at temperatures between –40 °C and +120 °C.

4.2.4 CYCLIC ENDURANCE (IMPULSE TEST)—Couplers shall exceed one million impulse cycles when impulse tested per SAE J343 at an impulse test pressure of 55 MPa (133% of the working pressure).

4.2.5 PROOF TEST—Couplers shall meet the minimum required proof pressure to verify a minimum of a 2:1 Proof to Working Pressure ratio.

4.2.6 BURST TEST—Diagnostic couplings shall meet the minimum burst pressure of 166 MPa to verify a minimum of a 4:1 Burst to Working Pressure ratio.

4.2.7 VACUUM TEST—Couplings shall be capable of withstanding a vacuum of 95 kPa negative pressure for 5 min without leakage.

4.3 O-Rings—O-rings for the stud end shall conform to the dimensions shown in Figure 1 and given in Table 1.

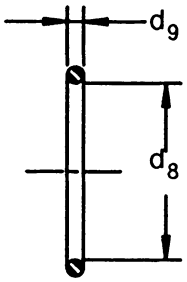

FIGURE 1—O-RING

TABLE 1—DIMENSIONS OF O-RING
Dimensions in millimeters

Thread	Inside Diameter d_8 Nom	Inside Diameter d_8 tol.	Cross-section Diameter d_9 Nom	Cross-section Diameter d_9 tol.
M14x1.5	11.3	±0.2	2.2	±0.08
9/16–18	11.3	±0.2	2.2	±0.08

4.4 Design

4.4.1 COUPLER DIMENSIONS IN MILLIMETERS—Dimensions shall conform to those given in Figure 2.

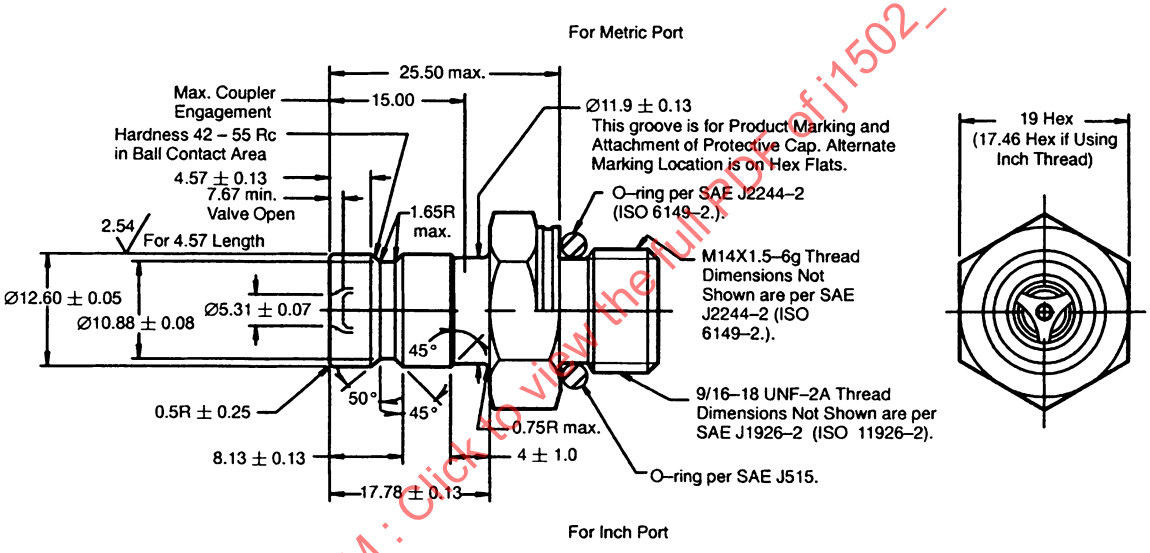

FIGURE 2—DIAGNOSTIC COUPLER, METRIC AND INCH DESIGNS

4.4.2 HEX TOLERANCES—Hex tolerances across flats shall be in accordance with ISO 4759-1, product grade C. Minimum across corner dimensions are 1.092 times the nominal width across flats. The minimum side flat is 0.43 times the nominal width across flats.

4.4.3 SCREW THREADS—The screw threads on the plug shall be metric screw threads to ISO 261 class 6g or inch threads to ASME B1.1 class 2A or 2B.

4.5 Manufacture

4.5.1 WORKMANSHIP—Workmanship shall conform to the best commercial practice to produce high quality plugs. Couplers shall be free from visual contaminants, all hanging burrs, loose scale, and slivers which might be dislodged in use, and any other defects that might affect the function of the parts.

4.5.2 SURFACE FINISH—Unless otherwise specified, surface finish on all surfaces shall be $R_a \leq 6.3$ µm.

4.5.3 PLATING—The external surfaces and threads of all carbon steel parts shall be plated or coated with a suitable material that passes a 72 h salt spray test in accordance with ASTM B 117 (ISO 9227). Any appearance of red rust during the 72 h salt spray test shall be considered failure.

NOTE— Cadmium Plating—Cadmium plating is not preferred due to environmental reasons. Parts manufactured to this document after January 1, 1997, shall not be Cadmium plated. Changes in plating may affect assembly torques and require re-qualification, where applicable.

4.5.3.1 Exceptions—The following exceptions to the plating requirement apply:

a. All internal fluid passages, but they shall be protected from rust during storage.
b. Edges such as hex points, serrations, and crests of threads where there may be mechanical deformation of the plating or coating typical of mass produced parts or shipping effects.
c. Areas where there is mechanical deformation of the plating or coating caused by crimping, flaring, bending, or other post-plate metal forming operations.
d. Areas where the parts are suspended or affixed in the test chamber where condensate can accumulate.

Corrosion protection requirements do not apply to corners or edges such as hex points, serrations, and the crest of threads.

5. Test Requirements and Quality Procedures

5.1 Test Procedures—Couplers shall be tested per SAE J1644.

5.2 Test Frequency—Qualification testing shall be required when there is a change in design, material, or process.

5.3 Sample Size—Three samples shall be tested.

5.4 O-Rings—O-rings for testing shall conform to SAE J515 Type 1 (90 durometer nitrile) and the size given in 4.3.

5.5 Test Torque—Diagnostic couplers shall be tested at the torque specified in Table 2.

TABLE 2—DIAGNOSTIC COUPLER TEST TORQUE

Port or Plug Thread Size	Torque (N·m) +10/–0%
M14x1.5	35
9/16–18	35

6. Packaging and Marking

6.1 Marking—Diagnostic couplers shall be permanently marked with the manufacturer's name or trademark.

6.2 Fitting Protection—By a method agreed between manufacturer and user, the face of the fittings and threads (both internal and external) shall be protected by the manufacturer from nicks and scratches which would be detrimental to the fitting's function. Passages shall be securely covered to prevent the entrance of dirt or other contaminants. Paper caps and plugs are not permitted.

6.3 Designation of Hydraulic Couplers—Hydraulic couplers shall be designated by this document and the stud end size when ordering, for example:

EXAMPLE—

SAE J1502 M14X1.5 or

SAE J1502 9/16–18

6.4 Procurement Information—The following information should be supplied by the purchaser when making an inquiry or placing an order:

a. Description of per Section 6
b. Material of plug
c. Fluid to be conveyed

7. Notes

7.1 Identification Statement—Use the following statement in test reports, catalogues, and sales literature when electing to comply with this document.

"Diagnostic couplers conform to SAE J1502: Connections for fluid power and general use—Hydraulic Couplings—Diagnostic."

7.2 Marginal Indicia—The change bar (l) located in the left margin is for the convenience of the user in locating areas where technical revisions have been made to the previous issue of the report. An (R) symbol to the left of the document title indicates a complete revision of the report.

PREPARED BY THE SAE COMMON TESTS TECHNICAL COMMITTEE SC1—HYDRAULIC SYSTEMS AND THE SAE FLUID CONDUCTORS AND CONNECTORS TECHNICAL COMMITTEE SC1—AUTOMOTIVE AND HYDRAULIC TUBE AND FITTINGS