SAE International™

SURFACE VEHICLE RECOMMENDED PRACTICE

SAE J2545

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Test Procedures for Non-SAE Hydraulic Hoses

1. ***Scope***—This SAE Recommended Practice identifies test procedures and parameters which may be used to evaluate, qualify and inspect non-SAE hydraulic hoses or other hose constructions which do not conform to any established ISO or national standards defining hydraulic hoses. (Non-SAE hydraulic hoses are defined as those which do not conform to the categories listed in SAE J517.) It is not intended for evaluating fluoropolymer lined hose constructions or hose constructions with working pressures above 86 MPa.

2. ***References***

2.1 Applicable Publications—The following publications form a part of this specification to the extent specified herein. Unless otherwise specified, the latest issue of SAE publications shall apply.

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

SAE J343—Tests and Procedures for SAE 100R Series Hydraulic Hose and Hose Assemblies
SAE J516—Hydraulic Hose Fittings
SAE J517—Hydraulic Hose
SAE J1273—Recommended Practices for Hydraulic Hose Assemblies

2.2 Related Publications—The following publications are 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 J1401—Road Vehicle—Hydraulic Brake Hose Assemblies for Use with Nonpetroleum Base Hydraulic Fluids, Appendix A, Table A1 Hose Manufacturer Identification Code—Colored Yarn Assignments

2.2.2 FEDERAL STANDARD—Available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

Federal Standard 595 Colors Used In Government Procurement

3. ***Connectors***—The general and dimensional standards for hydraulic hose connectors are contained in SAE J516. It is recommended that connectors consistent with SAE J516 or ISO standards be used to conduct the following tests.

TO PLACE A DOCUMENT ORDER:
Tel: 877-606-7323 (inside USA and Canada)
Tel: 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: http://www.sae.org

4. ***General Information***—For information regarding Age Control, Application Factors, Size Designations, Identification, Offset, and Assembly Length, see sections 3 through 10 in SAE J517. Additional information regarding the selection, care, use and routing of hose can be found in SAE J1273.

5. ***Tests***—Unless otherwise agreed upon between the manufacturer and purchaser, tests for evaluating conformance of product with specifications shall be on the basis of Qualification Tests and Inspection Tests set forth in this document. Tests may be conducted by the manufacturer, the purchaser, or independent lab, as decreed by the purchaser. All tests shall be conducted in accordance with the procedures in SAE J343.

5.1 Inspection Retests and Rejection—In the event of failure of one or more samples to meet any of the inspection tests specified, the product shall be resampled and retested for the test or tests in which it failed. Twice the number of samples designated under the initial test procedure shall be selected from the lot in question for such retests, and failure of any of the retested samples shall be cause for rejection of the entire lot.

5.2 Qualification Tests—For qualification, hose and/or hose assemblies made from the hose in question shall conform to the following tests and requirements. The values used in these tests shall be taken from the hose manufacturers specification and used as described herein.

5.2.1 DIMENSIONAL CHECK TEST (ALL SAMPLES)—Shall conform to the dimensions in the hose manufacturers specification. The inside diameter of hose shall be concentric with outside diameter of hose and the outer surface of the reinforcement within the limits of Table 1.

TABLE 1—HOSE CONCENTRICITY

Type of Construction	Nominal Hose ID, mm	Concentricity, FIR ID to OD mm	Concentricity, FIR ID to Reinforcement mm
Rubber, Braided Reinforcement	Up to 6.3, incl	0.8	0.4
	Over 6.3 to 19, incl	1.0	0.7
	Over 19	1.3	0.9
Rubber, Spiral Wire Reinforcement	Up to 19, incl	1.0	0.7
	over 19	1.3	0.9
Thermoplastic	Up to 6.3, incl	0.8	—
	Over 6.3 to 19, incl	1.0	—
	Over 19	1.3	—

5.2.2 PROOF TEST (ALL SAMPLES)—Shall not leak at proof pressure which shall be twice the maximum working pressure of the hose.

5.2.3 CHANGE IN LENGTH TEST (ONE SAMPLE)—Shall not exceed the values shown in Table 2 when pressurized to maximum working pressure.

TABLE 2—LENGTH CHANGE

Type of Constuction	Allowable Length Change, %
Rubber, Braided Reinforcement	+2, –4
Rubber, Spiral Wire Reinforcement	±2
Thermoplastic	±3

5.2.4 BURST TEST (ONE 460 mm FREE HOSE LENGTH ASSEMBLY)—Shall not leak or fail below the minimum burst pressure which shall be at least 4 times the working pressure.

5.2.5 LEAKAGE TEST (TWO 300 mm FREE HOSE LENGTH ASSEMBLIES)—Shall not leak or fail.

5.2.6 COLD BEND TEST (ONE ASSEMBLY)—Shall exhibit no cover cracks or leakage when tested at the low temperature limit of the hose. If no temperature is available use –40 °C.

5.2.7 OIL RESISTANCE TEST—After 70 h immersion at the upper temperature limit of the hose in IRM 903 oil, the volume change of hose inner tube and cover specimens shall be between 0% and +100%.

5.2.8 OZONE RESISTANCE TEST (TWO SAMPLES)—Specimens shall be subjected to an atmosphere comprised of air and ozone with an ozone partial pressure of 50 mPa (50 parts ozone per 100 million parts of air at standard atmospheric conditions) at an ambient temperature of 40°C. After 70 h exposure, specimens shall not show evidence of cracking or deterioration when viewed with seven-power magnification while still in a stressed condition.

5.2.9 IMPULSE TEST (FOUR UNAGED ASSEMBLIES)—The parameters for this test, oil temperature, pressure and number of cycles, shall be as determined by the manufacturer and the user. To aid in selecting these parameters the following table may be used. The values shown should be considered as minimum requirements and can be adjusted, as required, for each hose type being evaluated.

TABLE 3—IMPULSE TEST PARAMETERS

Type of Construction	Test Pressure (psi) as % of Working Pressure	Oil Test Temperature °C	Minimum Test Cycles
Fabric Braid	133%	100	200 000
Wire Braid	125% to 133%	100	200 000
Spiral Wire	120% to 133%	121	400 000
Thermoplastic	125% to 133%	93	200 000

5.2.10 VISUAL EXAMINATION (ALL SAMPLES)

5.2.11 ELECTRICAL CONDUCTIVITY TEST (THIS TEST APPLIES ONLY TO NON-CONDUCTIVE HOSES)—The maximum leakage shall not exceed 50 µA when subjected to 75 kV/305 mm (75 kV/ft) for 5 min.

This test shall not be applicable to hoses which contain pinpricked outer covers, metallic wire reinforcement, and static electricity dissipative materials.

5.3 Inspection Tests—Inspection tests listed as follows shall be performed on two samples representing each lot of 150 to 3000 m of bulk hose. Lots of less than 150 m of hose need not be subjected to these tests if a lot has been tested and met the requirements within the previous 12-month period. Requirements shall be the same as for corresponding Qualification Tests:

a. Dimensional Check Test (see 5.2.1)
b. Proof Test (see 5.2.2)
c. Change in Length Test (see 5.2.3)
d. Burst Test (see 5.2.4)

In addition, all hose and/or hose assemblies made therefrom shall be subjected to visual examination.

5.4 Hose Identification—Except for hose with a wire braided exterior, the entire length of hose shall be legibly marked with one or more stripes parallel to the longitudinal axis if the manufacturing process permits. Marking shall include, but is not limited to the following, and shall be repeated with the first letter of each repeat not more than 762 mm from the first letter of that preceding. Marking may be in English or metric units as agreed upon by the user and manufacturer.

Manufacturers Identification
Hose Dash Size Number
Hose ID in Fractions or mm's
Maximum Working Pressure (MPa preferred)
Date Code

No mention of the burst pressure or the design factor is allowed on the hose. This information could be misinterpreted by the user and result in a hose being used above its rated working pressure.

For additional hose identification information, see SAE J517, Section 8.

PREPARED BY THE SAE FLUID CONDUCTORS AND CONNECTORS TECHNICAL COMMITTEE S2—
HYDRAULIC HOSE AND HOSE FITTINGS