

	SURFACE VEHICLE STANDARD	
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Superseding J1401 JUN2003		
Road Vehicle - Hydraulic Brake Hose Assemblies for Use With Nonpetroleum-Base Hydraulic Fluids		

RATIONALE

This revision contains three main updates. The first update is to the internal diameter categories. A gap exists in between the categories, and this gap could result in ambiguity of requirements for new brake hoses with new internal diameters. This revision has been recommended for adoption into FMVSS 106. The second update is to the brake fluid specification. This specification now refers to both DOT 3 and DOT4 fluids. Also, the composition of the Compatibility Fluids is changing more rapidly. It makes more sense to place a reference to SAE J1703 and SAE J1704 instead of updating many specifications each time the Compatibility Fluid is changed.

The third update is the requirement for identification yarn. The Automotive Brake and Steering Hose Committee has determined that the identification yarn is not necessary. Brake hose identification information can be found on fitting stamps and the printing on the outside diameter of the hose material. The identification yarn requirement has been declared optional.

1. SCOPE

This SAE Standard specifies the performance tests and requirements for hydraulic brake hose assemblies used in the hydraulic braking system of a road vehicle. It also specifies the methods used for identification of the hose manufacturer.

This document applies to brake hose assemblies made of a hose fabricated from yarn and natural or synthetic elastomers and assembled with metal end fittings for use with nonpetroleum-base brake fluids as specified in SAE J1703, SAE J1704 and SAE J1705.

The nominal internal diameter of the brake hose shall fall within one of the following values:

- a. less than 4 mm (1/8 in or less)
- b. 4 to 5 mm (3/16 in)

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2. REFERENCES

2.1 Applicable Documents

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

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

SAE J1703 Motor Vehicle Brake Fluid

SAE J1704 Motor Vehicle Brake Fluid Based Upon Glycols, Glycol Ethers and the Corresponding Borates

SAE J1705 Low Water Tolerant Brake Fluids

2.1.2 ASTM Publication

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org

ASTM B 117 Method of Salt Spray (Fog) Testing

2.1.3 ISO Publication

Available from American National Standards Institute, 25 West 43rd Street, New York, NY 10036-8002, Tel: 212-642-4900, www.ansi.org.

ISO R147 Load calibration of testing machines for tensile testing of steel

2.2 Related Publications

The following publications are provided for information purposes only and are not a required part of this SAE Technical Report.

2.2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

SAE J1288 Packaging, Storage, and Shelf Life of Hydraulic Brake Hose Assemblies

SAE J1406 Application of Hydraulic Brake Hose to Motor Vehicles - Wheel End and Axle

2.2.2 ISO Publication

Available from American National Standards Institute, 25 West 43rd Street, New York, NY 10036-8002, Tel: 212-642-4900, www.ansi.org.

ISO 3996 Hydraulic brake hose assemblies - Non-Petroleum Hose Hydraulic Fluid Standard

3. DEFINITIONS

3.1 BRAKE HOSE ASSEMBLY

A brake hose equipped with end fittings for use in a brake system.

3.2 BRAKE HOSE

A flexible conduit manufactured for use in a brake system to transmit and contain the fluid pressure medium used to apply force to the vehicle's brakes.

3.3 BRAKE HOSE END FITTING

A coupling, other than a clamp, designed for attachment to the end of a brake hose.

3.4 PERMANENTLY ATTACHED END FITTING

A coupling designed for permanent attachment to the ends of a brake hose by crimping or swaging.

3.5 FREE LENGTH

The linear measurement of brake hose exposed between the end fittings of a brake hose assembly while maintained in a straight position.

3.6 LEAKS, BURST

The loss of test fluid from the brake hose assembly other than by the designed inlet(s) and outlet(s).

3.7 CRACKING

The interruption of a surface due to environment and/or stress.

3.8 HOSE INTERNAL DIAMETER

A dimensional description of the nominal inside diameter that is printed on the hose cover. This dimension is to be used to calculate the gage size for the constriction test.

EXAMPLE: 3 mm

4. PERFORMANCE TESTS

Performance tests for hydraulic brake hose assemblies include all of the tests listed in Table 1. These tests shall be conducted on each I.D. size and type¹ from each hose manufacturer. A change in hose construction, that is, a change in material or a change in the manufacturing method, shall require a complete performance test. Accordingly, each coupler shall conduct the performance test on each coupling crimp design for each hose construction. A change of coupling crimp design shall require a complete performance test. Variations that do not influence the integrity of the hose coupling joint, such as variation in thread size, port dimensions, hex size, and the like, shall not be considered new design. The sample sizes listed in Table 1 represent minimums for validation of a production process. The manufacturer of the hydraulic brake hose assembly is responsible for conducting appropriate design verification exercises and for controlling the production processes such that any hose assembly provided for sale or use on a vehicle will be capable of meeting the performance requirements listed in Section 5 when subjected to the tests listed in Table 1, performed per the procedures and conditions described in 4.1 and 4.2.

¹ Various reinforcing cord(s) and/or elastomer(s)

TABLE 1 - HYDRAULIC BRAKE HOSE ASSEMBLY PERFORMANCE TEST SUMMARY⁽¹⁾

Sample Size	Performance Test	Test Procedure (paragraph)	Performance Requirement (paragraph)
All	100% Pressure Test	4.2.1	5.1
All ⁽²⁾	Constriction	4.2.2	5.2
4	Volumetric Expansion	4.2.3	5.3
	Followed by Burst	4.2.4	5.4
4	Brake Fluid Compatibility	4.2.5	5.5
4	Whip	4.2.6	5.6
4	Tensile	4.2.7	5.7
1	Cold Bend	4.2.8	5.8
1	Ozone	4.2.9	5.9
1	Salt Spray	4.2.10	5.10
	Water Absorption	4.2.11	5.11
4	Burst		
4	Whip		
4	Tensile		
4	Hot Impulse	4.2.12	5.12
4	Dynamic Ozone	4.2.13	5.13
39	Total Samples		

1. When the hose assembly configurations make it impractical to conduct tests such as tensile, whip, and constriction, hose assemblies produced from equivalent type end fittings, production type equipment, and processes must be used to make the substitute brake hose assemblies.
2. Four brake hose assemblies may be used if assemblies must be cut to conduct constriction tests.

4.1 Test Conditions

The assemblies for each performance test shall be new and unused and shall be at least 24 h old. The last 4 h prior to testing shall be at a temperature of 15 to 32 °C (60 to 90 °F). Prior to installation of the hose assembly on a whip or cold bend test, all external appendages such as mounting brackets, spring guards, and metal collars shall be removed or long tubes shortened, or both. The temperature of the testing room shall be between 15 and 32 °C (60 and 90 °F) for all tests except brake fluid compatibility, cold bend, hot impulse, ozone, dynamic ozone, salt spray, and water absorption. SAE Compatibility Fluid according to SAE J1703 or SAE J1704 should be used for all tests requiring brake fluid. Different test results may be obtained using different fluids.

4.2 Test Procedures

4.2.1 100% Pressure Test

The hose assembly shall be subject to a pressure test, using inert gas, air, water, or brake fluid as a pressure medium. Brake fluid shall meet SAE J1703/J1704/J1705. The test pressure shall be 10.3 MPa (1500 psi) minimum, 14.5 MPa (2100 psi) maximum for inert gas and air and 20.7 MPa (3000 psi) minimum, 24.8 MPa (3600 psi) maximum for water and nonpetroleum-base hydraulic brake fluid. Special care should be taken when gas or air is used. Under the pressure specified, gas or air is explosive if a failure should occur in the hose or hose assembly. The pressure shall be held for not less than 10 nor more than 25 s.

4.2.2 Constriction Test

For qualification and lab testing, the constriction of the hose assemblies shall be measured with a gage plug as shown in Figure 1.