



TECHNICAL REPORT

J188

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POWER STEERING PRESSURE HOSE — HIGH VOLUMETRIC EXPANSION TYPE — SAE J188

SAE Standard

Report of Nonmetallic Materials Committee approved August 1970.

The specifications in this SAE Standard originated in the SAE-ASTM Technical Committee on Automotive Rubber (other than tires). They represent the correlation of the best information available from research investigation and production experience on the minimum constructional and performance characteristics essential for new power steering hose assemblies used as original or replacement equipment. The standard applies to passenger cars. It may prove useful to truck manufacturers, but it is not to be presented as present practices.

They also represent the minimum quality recognized by original equipment manufacturers and hose suppliers as essential for satisfactory and safe operation by the hose itself and other coacting parts of the power steering system. The original equipment manufacturer may, at his option, add or alter tests through OEM specifications.

Scope—This specification covers two types of hose fabricated from fabric braid and synthetic rubber, assembled with end fittings for use in automotive power steering applications as flexible connections within the temperature range of -40 to $+121$ C (-40 to $+250$ F) average, $+149$ C ($+300$ F) maximum peaks.

These hoses are intended for use in applications where reduction in amplitude of pump pressure pulsations is required.

Type 1 hose shall be suitable for 1500 psi maximum working pressure.

Type 2 hose shall be suitable for 1300 psi maximum working pressure.

Hose Construction—The construction of this hose embodies a smooth bore inner tube of suitable synthetic rubber material, reinforced with two plies of braided fabric and covered with a synthetic rubber outer cover.

Dimensions

	Type 1	Type 2
ID	0.365/0.405	0.359/0.398
OD	0.750/0.813	0.750/0.813

Concentricity based upon full indicator reading between the inside bore and the outer surface of the hose shall not exceed 0.030 in.

Test Procedures—Procedures described in ASTM D 380, Methods of Testing Rubber Hose, shall be followed wherever applicable.

Qualification Tests—To qualify hose under this specification, all of the requirements shown under Test Requirements must be met.

Inspection Tests—Production shipments or lots of qualified hose shall be tested in accordance with Table 1 and shall conform to the appli-

TABLE 1—INSPECTION TESTS

Test	Samples Required
1. Volumetric Expansion (paragraph 7) followed by Length Change (paragraph 11) followed by Bursting Strength (paragraph 5)	3
2. Tensile (paragraph 2)	3
3. Adhesion (paragraph 4)	1
4. Low Temperature Flexibility (paragraph 3)	1
5. Impulse (paragraph 1)	6

cable test requirements, but the user may test hose or hose assemblies from any or all such production shipments or lots to all the test requirements. Fourteen sample hose assemblies, selected at random, as listed in Table 1, are required to conduct a complete test. In the event of a failure, the test or tests which have failed shall be retested using twice the number of samples indicated in Table 1. Failure of any of the retested samples shall be cause for rejection of the entire lot.

Frequency of Testing for Inspection—All inspection tests except Impulse shall be performed on either a bulk hose lot or a coupled hose lot basis or tests may be split between a bulk hose lot and a coupled hose lot.

A coupled hose lot shall not exceed 10,000 hose assemblies and a bulk hose lot shall not exceed 20,000 ft of bulk hose. The lot size for Impulse testing shall not exceed 100,000 ft of bulk hose.

Test Requirements

1. Impulse Test

TEST CONDITIONS

Oil Temperature: 135 ± 2 C (275 ± 5 F).

Ambient Temperature: 104 ± 11 C (220 ± 20 F).

Cycle Rate: 30-40 per minute.

Cycle Data: Pressure rise time, 0.20 ± 0.10 sec. High pressure hold time, 0.65 ± 0.20 sec. Pressure drop time, 0.20 ± 0.10 sec.

Pressure Variation:

Type 1 0-100 to 1500 psi

Type 2 0-100 to 1300 psi

HYDRAULIC FLUID AND TEST FIXTURE—As specified by the original equipment manufacturer.

CYCLE LIFE—Samples submitted to this test shall exceed 100,000 cycles for inspection acceptance and 225,000 cycles for qualification testing, without failure.

2. Tensile Test—When tested in accordance with ASTM D 571, Testing Automotive Hydraulic Brake Hose, hose assemblies shall withstand a minimum tensile load of 1200 lb without the fittings pulling off or rupture of the hose.

3. Low Temperature Flexibility—Samples shall be subjected to a temperature of -40 ± 1 C (-40 ± 2 F) for a period of 24 hr, after which the hose shall be flexed in the cold chamber through 180 deg from the centerline around a mandrel whose diameter is eight times the nominal hose OD. Flexing shall be accomplished within 4 sec. Hose shall not fracture or show any cracks, checks, or breaks in the tube or cover.

4. Adhesion Test—When tested in accordance with ASTM D 413, Tests for Adhesion of Vulcanized Rubber (Friction Test), a pull of not less than 10 lb shall be required to separate a 1 in. wide ring section of the bond between any adjacent layers of the hose.

5. Bursting Strength—Samples shall meet the following minimum bursting strength requirements:

Type 1—6000 psi

Type 2—5200 psi

6. Ozone Resistance—Test procedure and apparatus shall be in accordance with ASTM D 1149, Test for Accelerated Ozone Cracking of Vulcanized Rubber, where applicable. A specimen of the hose shall be bent around a mandrel having an outside diameter seven times the nominal outside diameter of the hose under test. The two ends of the hose shall be tied where they cross one another with enameled copper or aluminum wire. After mounting, the specimens shall be permitted to rest in a relatively ozone-free atmosphere for 24 hr at room temperature. The mounted specimen shall be placed in a suitable ozone test chamber that is maintained at an ozone concentration of 50 ± 5 parts ozone per 100 million parts of air (by volume) and a chamber ambient temperature of 38 ± 1 C (100 ± 2 F).

After 72 hr of exposure, specimens shall be removed from the chamber and permitted to cool to room temperature and then, while still on the mandrel, shall be visually inspected for signs of cracking under 7X magnification. There shall be no evidence of cracking of the cover. The area immediately adjacent to the wire shall be ignored in making the visual inspection.

7. Volumetric Expansion—Samples shall be installed on the test