

**POWER STEERING RETURN HOSE —
LOW PRESSURE — SAE J189****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. This 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 coating 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 hose fabricated from fabric braid and synthetic rubber, assembled with end fittings or user applied clamps for use in automotive power steering applications as flexible connections within the temperature range of -40°C (-40°F) to $+121^{\circ}\text{C}$ ($+250^{\circ}\text{F}$) average, 149°C (300°F) maximum peaks. Hose assemblies shall be suitable for 250 psi maximum working pressure with end fittings and 100 psi maximum working pressure with user applied clamps.

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

Dimensions—Suggested hose dimensions are given in Table 1, but it is not the intent of this specification to exclude hose with different dimensions that comply with all other requirements of this specification.

In addition, 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 2 and shall conform to the applicable 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 2, 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 2. 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**—(Not applicable to hose assembled with user applied clamps.)

TEST CONDITIONS

Oil Temperature: $135 \pm 2^{\circ}\text{C}$ ($275 \pm 5^{\circ}\text{F}$).

Ambient Temperature: 93°C (200°F) max.

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: 0-25 maximum recommended working pressure.

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, end fittings shall withstand a minimum tensile load as shown in Table 1 without the fittings pulling off or rupture of the hose.

3. **Low Temperature Flexibility**—Samples shall be subjected to a temperature of $-40 \pm 1^{\circ}\text{C}$ ($-40 \pm 2^{\circ}\text{F}$) 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 having a diameter of eight times the nominal OD of the hose. 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 8 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 minimum bursting strength requirements shown in Table 1.

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 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 specimens 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 $38 \pm 1^{\circ}\text{C}$ ($100 \pm 2^{\circ}\text{F}$). 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. Tensile Strength and Elongation

Original tensile strength of cover: 1000 psi min

TABLE 1

Nominal ID, in.	Nominal OD, in.	ID Tolerance, in.	OD Tolerance, in.	Recommended Working Pressure, max, psi		Tensile Load, min, lb		Burst Strength, min, psi
				With End Fittings	With User Applied Clamps	With End Fittings	With User Applied Clamps	
3/8	21/32	0.390/0.344	0.688/0.625	250	100	450	Not applicable	1000