

TABLE 2.—COMPARISON OF AIR BRAKE HOSE REQUIREMENTS/PROCEDURES IN FMVSS NO. 106 AND SAE J1402—Continued

Requirement/procedure		Existing FMVSS No. 106		SAE J1402
Low Temperature Resistance	1	Similar, excludes interior of hose from inspection.	1	Similar, requires internal inspection, excludes fabric covered hose exterior inspection.
Oil Resistance	x	Same		Same.
Length Change	x	Same; coiled nylon can meet FMCSR § 393.45.		Same.
Adhesion		Same except for wire reinforced hose	x	Same but includes specific test for wire reinforced hose.
Air Pressure (Leakage)		200 psi leak test	x	More test specifications including dynamic flex test.
Burst Strength		800 psi hydrostatic test	x	Salt spray test followed by 900 psi hydrostatic test.
Tensile Strength	x	Specifies longitudinal pull test		No corresponding, stand-alone test. Specifications are in Water Absorption test.
Water Absorption and Tensile Strength	x	70 hour water immersion followed by pull test; coiled.		168 hour water immersion followed by pull test.
Tensile Strength		Nylon can meet FMCSR 393.45		Followed by pull test.
Zinc Chloride Resistance	x	200 hour immersion in zinc chloride		No corresponding test.
End Fitting Corrosion Resistance	x	Similar, specifies angle of hose in test chamber.		Similar, does not specify angle of hose in test chamber.
Ozone Test		No ozone test	2	Hose bent around test cylinder exposed to 50 ppm ozone for 70 hours.
Minimum Bend Radius		None	3	Specifies minimum bend radii for hose as installed on a vehicle.

Note 1: for low temperature resistance, use the most severe requirements from each standard.

Note 2: propose J1402 test, except with 100-ppm ozone concentration.

Note 3: would not be appropriate for FMVSS No. 106.

C. Vacuum Brake Hoses

NHTSA's performance requirements and test procedures relating to vacuum brake hoses are located in paragraph S9., *Requirements—Vacuum brake hose, brake hose assemblies, and brake hose end fittings*, and paragraph S10., *Test procedures—Vacuum brake hose, brake hose assemblies, and brake hose end fittings*, of FMVSS No. 106. The corresponding SAE requirements are contained in SAE Highway Vehicle Standard J1403, *Vacuum Brake Hose*, Rev. July 1989.

When requirements for vacuum brake hoses were originally added to FMVSS No. 106 in November of 1973 (38 FR 31302), the substantive requirements of SAE J1403 were adopted. NHTSA proposes to update FMVSS No. 106 to include performance requirements from the most recent version of SAE J1403 that are not presently contained in the standard.

Again, as with hydraulic brake hoses, the agency tentatively concludes that many light vehicle manufacturers already voluntarily equip their vehicles with vacuum hoses that meet the current version of SAE J1403. Accordingly, NHTSA proposes applying the SAE specifications to all types of vacuum hoses and not just those used on commercial vehicles. The proposed amendments to FMVSS No. 106 represent incrementally more severe performance requirements that the

industry has adopted over the past 20 years.

The petitioners requested that the requirements of SAE J1403 be added to FMVSS No. 106 to upgrade the performance requirements for vacuum brake hose. The use of vacuum brake hose in automotive applications is generally for the vacuum hose connecting the power brake booster to the engine manifold, and although there may be other applications for vacuum brake hose, the agency tentatively concludes that vacuum-operated braking systems are no longer being used in the U.S. Although the use of this type of brake hose may be far more limited than it was 40 or 50 years ago, NHTSA tentatively concludes that upgrading the requirements for vacuum brake hose is still warranted given that use of such hose is still widespread.

A detailed discussion of the differences between the vacuum brake hose performance requirements and test procedures in SAE J1403 and FMVSS No. 106 follows, along with the agency's proposed resolution of those differences.

1. Constriction

Paragraph S9.2.1, *Constriction*, of FMVSS No. 106 requires the inside diameter of a heavy duty vacuum hose assembly to be at least 75 percent of the hose's nominal inside diameter. The inside diameter of a light duty vacuum

hose assembly is required, by S9.2.1, to be at least 70 percent of the hose's nominal inside diameter. FMVSS No. 106 excludes from these performance requirements those portions of the hose's end fittings that do not contain hose. Constriction testing, as outlined in Testing Procedure 106-08 (TP-106-08), is performed using plug gauges with diameters as specified in TP-106-08.

SAE J1403 does not contain a corresponding set of constriction test requirements/procedures. Accordingly, NHTSA does not propose any changes to Standard No. 106's constriction requirements/procedures for vacuum brake hose. NHTSA does seek public comments, however, on whether to continue to exclude those portions of end fittings that do not contain hose from the standard's constriction requirements.

2. High Temperature Resistance

Paragraph S9.2.2, *High temperature resistance*, of FMVSS No. 106 specifies bending a length of hose around a cylinder of specified diameter and exposing it to air at a temperature of 212 degrees F for 70 hours. After conditioning the hose in this manner, Standard No. 106 specifies that the hose be straightened and cut longitudinally and visually inspected. No visible cracking, charring, or disintegration on the exterior or interior of the hose is permitted.