

TABLE 4.—COMPARISON OF NYLON AIR BRAKE TUBING REQUIREMENTS/PROCEDURES IN FMVSS NO. 106 AND SAE J844—Continued

| Requirement/Procedure | | Existing FMVSS No. 106 | | SAE J844 |
|---|---|---|------|--|
| Cold Temperature Flexibility | | Low temperature resistance but not flexibility. | x | Cold conditioning followed by bending around test cylinder. |
| Heat Aging | | Does not include burst test | x | Three separate test procedures followed by burst test. |
| Zinc Chloride Resistance | | Similar but tubing is not bent during test | x | Similar, tubing is conditioned while bent around test cylinder. |
| Methyl Alcohol Resistance | | None | x | Tubing bent around test cylinder and conditioned in alcohol for 200 hours. |
| Stiffness | | None | x | Stiffness of tubing after conditioning at elevated temperature. |
| Boiling Water Stabilization and Burst Test .. | | None | | Considered redundant since more severe test condition included in heat aging test. |
| Cold Temperature Impact | | None | x | Cold conditioning, impact test, and burst test. |
| Adhesion Test | | 8 lbs. per linear inch, for any air brake hose. | 1 | Type B tubing only, no separation permitted. |
| Heat Aging Adhesion Test | | None | 1 | Type B tubing only, heat aging and adhesion test. No separation permitted. |
| Collapse Resistance | | None | x | Max. 20 percent collapse after high temp. conditioning bent around test cylinder. |
| Ozone Resistance | 2 | Same as air brake hose, 50 ppm | | None. |
| Oil Resistance | 3 | Same as air brake hose | | None. |

Note 1: NHTSA proposes a 25 lbs. per inch adhesion strength instead of "no separation."

Note 2: NHTSA proposes 100 ppm ozone concentration.

Note 3: NHTSA proposes an oil soak and burst test for plastic tubing.

E. Plastic Air Brake Tubing Assemblies and End Fittings

NHTSA's performance requirements and test procedures relating to plastic air brake tubing assemblies and end fittings are located in paragraph S7., *Requirements—Air brake hose, brake hose assemblies, and brake hose end fittings*, and paragraph S8., *Test procedures—Air brake hose, brake hose assemblies, and brake hose end fittings*, of FMVSS No. 106. The corresponding SAE performance requirements/test procedures are contained in SAE Surface Vehicle Standard J1131, *Performance Requirements for SAE J844 Nonmetallic Tubing and Fitting Assemblies Used in Automotive Air Brake Systems*, Rev. August 1998 (SAE J1131). SAE's end fitting performance requirements/test procedures are located in SAE Surface Vehicle Standard J512, *Automotive Tube Fittings* Rev. October 1980 (SAE J512) and SAE Surface Vehicle Standard J246, *Spherical and Flanged Sleeve (Compression) Tube Fittings* Rev. March 1981 (SAE J246).

This section addresses performance requirements and test procedures for plastic air brake tubing assemblies and end fittings. The previous section compared FMVSS No. 106 to SAE J844 and only addressed the properties of the tubing and not the properties of tubing assemblies or end fittings. SAE J1131 evaluates the performance of SAE J844

tubing when used in an assembly with either permanently-attached or reusable end fittings.

NHTSA proposes to incorporate the following end fitting performance requirements/test procedures from SAE J1131 into Standard No. 106: the hot tensile strength test, the conditioned pull test, the vibration leak test, the proof and burst test, the fitting compatibility test, and the serviceability test. The serviceability test specifies that an end fitting, after five assembly and disassembly cycles, not leak more than 25 cm³/min. and NHTSA proposes that this test will only apply to fittings that use a threaded retention nut. Push-to-connect fittings are often believed to result in damage to the tubing upon disassembly and therefore may not be able to meet this specification. When such fittings are disassembled, the end of the tubing can be cut off if there is enough slack in the assembly, or a new section of tubing will need to be fitted for reinstallation.

The agency also proposes specifying constriction testing for plastic air brake tubing assemblies as such testing is already specified for air brake hose assemblies under Standard No. 106.

NHTSA proposes including the current corrosion resistance test in FMVSS No. 106, as applied to all types of brake hose fittings (*i.e.*, hydraulic, vacuum, air), for fittings used with plastic air brake tubing. End fitting corrosion specifications are included in

SAE J246 and SAE J512 rather than SAE J1131, and these specifications are different than those currently in FMVSS No. 106, with the SAE test procedures including longer exposure to salt spray but less severe performance requirements for permissible corrosion.

A detailed discussion of the differences between the performance requirements/test procedures of SAE J1131, SAE J246, SAE J512, and FMVSS No. 106 as they relate to plastic air brake tubing assemblies and end fittings follows, along with the agency's proposed resolution of those differences.

1. Tensile Strength

FMVSS No. 106 specifies that an air brake hose assembly for use between either the frame and the axle, or a towing and towed vehicle, meet a longitudinal pull test, at a 1 inch per minute force application rate without separating from its end fittings at the following force levels: 250 pounds for ¼ inch or less, or 6mm or less, nominal ID; 325 pounds for more than ¼ inch or 6mm nominal ID. A hose assembly used in any other application must withstand force levels of: 50 pounds for ¼ in or less, or 6 mm or less, nominal ID; 150 pounds for ⅜ inch, ½ inch, or 10 mm to 12 mm, nominal ID; and 325 pounds if the hose assembly is larger than ½ inch or 12 mm nominal ID. A coiled nylon tube assembly may either meet these requirements or, alternatively,