

at 200 degrees F for 24 hours and then cooled to room temperature (75 degrees F) and, while still installed on the bend fixture, the minor OD is measured. The minor OD collapse of the heat-conditioned samples must not exceed 20 percent of the initial minor OD. FMVSS No. 106 does not contain corresponding test procedures/performance requirements.

NHTSA proposes to incorporate the collapse resistance test procedures/performance requirements from SAE J844 into FMVSS No. 106, with two changes. First, the agency proposes to specify that only one sample be tested rather than three. Second, NHTSA notes that the minimum kink radii in Table 3 of SAE J844 represents the minimum unsupported bend radii for tubing as installed on a vehicle while the test bend radii in Table 2 of that standard represent the minimum bend radii for supported tubing during applicable test procedures. NHTSA tentatively concludes that because heavy vehicle manufacturers are aware that such installation criteria are included in SAE J844 there is no need to incorporate them into FMVSS No. 106. NHTSA welcomes public comments on both of these proposed modifications.

17. Oil Resistance

SAE J844 does not include an oil resistance test as specified by FMVSS No. 106. The oil test is used to measure the volumetric expansion of specimens prepared from the inner and outer layers of a hose, after immersion in ASTM No. 3 oil at 212 degrees F for 70 hours, with a maximum permissible volumetric expansion of 100 percent. While such a test is appropriate for the type of materials used in elastomeric, synthetic rubber air brake hoses, NHTSA tentatively concludes that in the case of plastic air brake tubing it would be more appropriate to evaluate a mechanical property of the tubing such as the ability

to pass a burst test after conditioning in oil.

NHTSA is aware of a problem that was encountered several years ago with pre-assembled air brake tubing assemblies used for tractor-trailer connections supplied by one manufacturer. This particular product, when subjected to conditioning in oil, would undergo material property changes that resulted in failure (dissolution) of the tubing. The manufacturer of the tubing assemblies petitioned NHTSA to request that coiled air brake tubing assemblies be exempt from the oil resistance requirements in Standard No. 106. NHTSA ultimately denied this request and stated in the denial (58 FR 38346) that coiled air brake tubing assemblies are subjected to elevated temperatures and exposed to oil. The agency notes that this particular product was not compliant with SAE J844.

NHTSA tentatively concludes it is critical that plastic air brake tubing be resistant to oil exposure. Oil can be introduced into air brake systems due to air compressor leakage, and exposed portions of tubing are subject to oil and grease contamination from sources such as hydraulic work equipment mounted on vocational trucks, axle lubricant leakage, and fifth wheel lubrication. Therefore, NHTSA proposes a test procedure for plastic tubing that combines existing FMVSS No. 106 oil conditioning criteria with the burst strength requirements of SAE J844.

The proposed test procedure involves preparation of a tubing assembly, conditioning it in ASTM IRM 903 oil (which supercedes ASTM No. 3 oil as described in ASTM D471-98e1, *Standard Test Method for Rubber Property-Effect of Liquids*), and then subjecting the tubing to the burst test specified in SAE J844. NHTSA proposes that the tubing not burst at less than 80 percent of the burst pressure listed in

Table 2 of SAE J844. This required performance is the same as that specified in SAE J844 for the boiling water stabilization and burst test. NHTSA tentatively concludes that using an 80 percent value for the oil test is appropriate given that the tubing is pre-conditioned in oil, similar to the preconditioning of the boiling water test, and notes that the tubing would not be required to have the 100 percent burst strength required for non-conditioned tubing tested at room temperature. NHTSA welcomes comments on this proposed test procedure in lieu of the existing Standard No. 106 requirement that limits volumetric expansion of the material during oil conditioning.

18. Ozone Resistance

SAE J844 does not include an ozone resistance test as specified by FMVSS No. 106. Standard No. 106 specifies bending a hose around a test cylinder and conditioning it in a test chamber at 50-ppm ozone concentration at 104 degrees F for 70 hours. After performing this test, no visible cracks may be detected when viewed under 7-power magnification. The agency notes that the ozone test for hydraulic brake hose in SAE J1401 specifies an ozone concentration of 100 ppm and that, as noted above, NHTSA is proposing to increase the ozone concentration requirements for all types of brake hose covered by FMVSS No. 106. Accordingly, NHTSA proposes that the ozone test that is currently specified in Standard No. 106 continue to be applied to plastic air brake tubing at the higher ozone concentration level of 100 ppm.

The table below summarizes the differences between the plastic air brake tubing requirements/procedures of FMVSS No. 106 and SAE J844 and indicates which requirements/procedures NHTSA proposes incorporating into the standard.

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

Requirement/Procedure		Existing FMVSS No. 106		SAE J844
Plastic Air Brake Tubing				
"x" Indicates Requirements/Procedures Proposed to be Included in FMVSS No. 106. A new section would be added with performance requirements/test procedures for plastic air brake tubing. Some existing requirements/procedures for air brake hose would also apply.				
100 Percent Leak Test	x	Not Specified		Each lot to be tested.
Classification		Type AI or All air hose	x	Type A or B plastic air brake tubing.
Dimensional Specifications		None	x	J844 (inch) and J1394 (metric) dimensions for plastic tubing.
Burst Test		800 psi requirement	x	Strength based on tubing size and type, minimum is 800 psi.
Moisture Absorption		None	x	Not to exceed 2 percent.
Ultraviolet Resistance		None	x	300 hour exposure followed by impact test.