

not include test cylinder radii specifications for $\frac{1}{8}$ -inch ID hose. Third, SAE J1402 does not provide specifications for metric sized hose. Instead, the SAE specification provides only metric conversions for inch sizes of hose. Fourth, unlike FMVSS No. 106, SAE J1402 excludes hose with fabric covering from external inspection for cracks, stating that visual inspection is not practical.

NHTSA proposes that FMVSS No. 106 adopt the smaller radii test cylinders from SAE J1402 and, for $\frac{1}{8}$ -inch and 3 mm, 4 mm, and 5 mm hose, NHTSA proposes that the test cylinder radius of 1 inch as specified in SAE J1402 for $\frac{3}{16}$ -inch hose also be used for these hose sizes. As currently indicated in Table IV of FMVSS No. 106, the larger metric sizes of hose (6 mm and above) numerically correspond closely to inch sizes of hose, for example, 6 mm (0.236 inch) is very close to $\frac{1}{4}$ inch (0.250 inch). Accordingly, NHTSA proposes to apply the test cylinder values from SAE J1402 to metric sizes of hose as currently specified in Table IV of FMVSS No. 106. As to SAE J1402's exclusion of fabric-covered air brake hose from the external inspection requirement, NHTSA disagrees that external inspection of such hose is impractical and, therefore, does not propose to incorporate SAE J1402's exclusion.

6. Low Temperature Resistance

FMVSS No. 106 specifies that the hose and test cylinder be conditioned at minus 40 degrees F for 70 hours, followed by bending the hose 180 degrees around the test cylinder. No cracks may be visible on the outside cover of the hose after performing this test. The test procedure in SAE J1402 is similar, including the radii of the test cylinders, except that it does not specify test cylinder radii for $\frac{1}{8}$ inch or 3mm hose. SAE J1402 also prohibits cracks on the inside of the hose and, in this respect, the SAE test is more severe than the one specified by FMVSS No. 106. Unlike FMVSS No. 106, however, SAE J1402 excludes the exterior surface of hoses covered with fabric from external inspection.

The agency indicated in a February 26, 1974 final rule (39 FR 7425, Docket No. 1-5, Notice 10) amending FMVSS No. 106 that it would consider specifying inspection of the inner layer of an air brake hose subjected to the low-temperature resistance test at a future date. In addition, the agency notes that the test procedure for Standard No. 106, TP-106, specifies that the same test procedure be used for air brake hose as for hydraulic brake hose,

using the test cylinders sized for air brake hose, and does include internal inspection of both types of hoses. NHTSA is now proposing that the internal surface inspection of air brake hose, as specified in SAE J1402, be incorporated into FMVSS No. 106. The agency does not propose, however, to incorporate SAE J1402's exclusion of fabric-covered air brake hose from external inspection.

7. Oil Resistance

Paragraphs S7.3.4, *Oil resistance*, and S8.3, *Oil resistance test*, of FMVSS No. 106 specify that specimens prepared from the inner tube and outer cover of the subject brake hose, when immersed in American Society of Testing and Materials (ASTM) No. 3 oil for 70 hours at 212 degrees F, shall not increase in volume by more than 100 percent. SAE J1402 contains an identical test procedure. As indicated in ASTM D147-98e1, *Standard Test Method for Rubber Property—Effect of Liquids*, ASTM No. 3 oil is no longer commercially available and has been superseded by IRM 903 oil. Accordingly, NHTSA proposes that all references in S7.3.4 and S8.3 to ASTM No. 3 oil be changed to specify IRM 903 oil. The agency does not propose any additional changes to FMVSS No. 106's oil resistance requirements/specifications.

8. Ozone Resistance

FMVSS No. 106's ozone resistance requirements/specifications for air brake hose are the same as those specified for hydraulic brake hose. Standard No. 106 specifies that air brake hose be conditioned in an ozone chamber for 70 hours at 104 degrees F while the hose is secured around a test cylinder. Because the test procedure for air brake hose, S8.4 (*Ozone resistance test*), specifies that the same test procedure for a hydraulic brake hose ozone resistance test be utilized, and because NHTSA is proposing that the ozone concentration for hydraulic brake hose be changed from 50 ppm to 100 ppm, NHTSA proposes to specify the higher ozone concentration (100 ppm) for air brake hose as well. The agency tentatively concludes it is appropriate to specify the same concentration of ozone for testing all types of brake hoses and welcomes public comments on this issue.

9. Length Change

Paragraph S7.3.6, *Length change*, of FMVSS No. 106 requires that air brake hose, when subjected to 200 psi of air pressure, shall not contract more than 7 percent nor elongate more than 5

percent over the length of the hose. The associated test procedure, found in paragraph S8.5, *Length change test*, specifies that the initial length of the hose be measured at a pressure of 10 psi. Coiled nylon tube may alternatively comply with requirements in FMCSR 393.45 (which references J844 for nylon air brake tubing). SAE J1402's length change requirements/procedures are identical to those in FMVSS No. 106. Considering that FMCSA and NHTSA are proposing to consolidate all federal brake hose requirements/procedures into FMVSS No. 106 and because NHTSA is proposing specific requirements/procedures for plastic air brake tubing, the agency proposes to delete the option for coiled nylon tube to comply with FMCSR 393.45 from Standard No. 106. Aside from deleting this reference, the agency does not propose any additional changes to the length change requirements/procedures in FMVSS No. 106.

10. Adhesion

FMVSS No. 106 requires a minimum separation strength of 8 pounds per linear inch for each layer in an air brake hose, except for hose reinforced by wire. SAE J1402 has a similar requirement for non-wire reinforced hose, and a separate test procedure for wire reinforced hose, in which a steel ball is placed inside the hose sample, one end is capped and the other connected to a vacuum source, and the hose is bent 180 degrees around a test cylinder in one direction and then the opposite direction. While still under vacuum, the hose is straightened and the steel ball must be able to roll from one end of the hose to the other. NHTSA proposes to incorporate the SAE J1402 adhesion test for wire-reinforced air brake hose into FMVSS No. 106, with the exception of the steel ball sizes as discussed below.

The table of steel ball sizes for this test procedure in SAE J1402 indicates that for all but the $\frac{13}{32}$ -inch hose sizes, the ball diameter is equal to 75 percent of the nominal hose ID. For the $\frac{13}{32}$ -inch hose size, the specified ball diameter is 73 percent of the nominal hose ID. It appears that the reason for this one difference is that the ball sizes in the table are standard size steel balls measured in 64ths of an inch, thus 75 percent of $\frac{13}{32}$ -inch is slightly larger than $\frac{19}{64}$ -inch and 73 percent of $\frac{13}{32}$ equals $\frac{19}{64}$ -inch. The table in SAE J1402 also does not provide corresponding steel ball sizes for metric sized hose. Accordingly, to incorporate SAE J1402's specifications into FMVSS No. 106, NHTSA proposes that rather than specifying steel ball diameters for each hose size, the steel ball should be