

detail above, NHTSA is proposing to require that all portions of air brake assemblies, including those portions of end fittings that do not contain hose, meet this requirement. NHTSA proposes to apply the same 66 percent of nominal ID constriction requirement to plastic air brake tubing assemblies. The agency proposes to apply this requirement based on the tubing's nominal inside diameter even though, as noted above, NHTSA is proposing that other requirements relating to air brake tubing be expressed in terms of the tubing's nominal outside diameter.

#### 9. End Fitting Dimensional Requirements

FMVSS No. 106 does not presently contain end fitting dimensional requirements. The petitioners, however, requested incorporation of the requirements of FMCSR § 393.46, which references two SAE standards containing such requirements. FMCSR § 393.46 provides that splices in tubing installed on a vehicle after March 7, 1989, must use fittings that meet the requirements of SAE J512, *Automotive Tube Fittings Rev. October 1980* (SAE J512) or, for air brake systems, SAE J246, *Spherical and Flanged Sleeve (Compression) Tube Fittings Rev. March 1981* (SAE J246).

SAE J512 provides general and dimensional specifications for the various types of tube fittings intended for general application in the automotive, appliance, and allied fields, and includes the following categories of fittings: flare type fittings, inverted flare type fittings, and tapered sleeve compression type fittings intended for use with annealed copper alloy tubing. SAE J512 states that the spherical sleeve compression fitting components in SAE J246 are not to be intermixed with tapered sleeve compression type fitting components in SAE J512. The dimensions of single and double 45 degree flares on tubing used in conjunction with flared and inverted flared fittings in SAE J512 are provided in a different SAE standard, SAE J533.

The application of SAE J512 fittings in automotive braking systems as used in the U.S. is believed to be most commonly associated with inverted double flare hydraulic brake tubing connections, and also for metal tubing that may be used for connecting vacuum booster lines to engine manifolds. NHTSA does not believe that copper tubing is widely used in vehicle braking applications anymore. The agency also does not believe that SAE J512 fittings would be appropriate for use with plastic tubing.

Both SAE J246 and SAE J512 include dimensional requirements for fitting length, concentricity, pipe threads, wrench hexes, ferrule seats, tube support sleeves in the case of plastic tubing fittings, and material properties of brass stock used in fittings and stainless steel stock used in plastic tubing support sleeves. The standards also permit steel to be used if requested by the purchaser.

As already noted above, FMVSS No. 106 does not include any dimensional or material properties specifications for fittings used with brake hose or tubing. NHTSA does not agree with the petitioners that the substantive dimensional and material requirements of SAE J246 and SAE J512 are needed in FMVSS No. 106 for a number of reasons. First, the agency tentatively concludes that fittings that have demonstrated their compatibility with plastic air brake tubing through the testing required by SAE J1131. Second, NHTSA does not favor incorporating the SAE requirements because neither SAE J246 nor SAE J512 provides fitting standards for metric sized plastic tubing. Third, although FMVSS No. 106 does not provide any dimensional specifications for any types of fittings used with other types of brake hose or tubing, the agency is not aware of any field problems associated with these brake products. Fourth, even if FMVSS were to incorporate the dimensional specifications from the SAE standards, at least one of those standards, SAE J246, explicitly states that the standard is not intended to restrict or preclude other designs of a tube fitting for use with SAE J844 air brake tubing.

NHTSA tentatively concludes that the automotive industry generally standardizes, on a voluntary basis, such fittings for compatibility and repair purposes, and has no reason to believe that this will not continue to be the case for plastic air brake tubing fittings. Standard No. 106 currently permits specialized fittings as long as they can meet the specified performance requirements. In a November 13, 1973, final rule (38 FR 31302, Docket No. 1-5; Notice 8), NHTSA declined to adopt any specific standard for end fittings. For the reasons outlined above, NHTSA does not propose to include any dimensional or material properties specifications for end fittings at this time.

#### 10. End Fitting Corrosion Resistance

SAE J246 and SAE J512 specify that the external surfaces and threads of carbon steel fittings be subjected to a 72 hour salt spray test per ASTM B117,

with no appearance of red rust permitted except for: Internal portions of fittings; edges such as hex points, serrations, or thread crests where there may be mechanical deformation of the plating or coating of mass-produced parts or shipping effects; areas where the plating or coating is subjected to mechanical deformation due to crimping, flaring, bending, or other post plate metal forming operations; or areas where the parts are suspended or affixed in the test chamber where condensate can accumulate. Both standards specify that after January 1, 1997, no parts shall be cadmium plated due to environmental concerns relating to that process.

FMVSS No. 106 specifies that the fittings as installed on a brake hose assembly be subjected to a 24-hour salt spray test, the same test that is specified for hydraulic brake hose, as detailed above. The end fittings must show no base metal corrosion on the end fitting surface except where crimping or the application of labeling information causes a displacement of the protective coating. Standard No. 106 specifies that all fittings meet the corrosion test, and does not provide different specifications based on the end fitting's composition (steel, stainless steel, or brass).

The duration of the salt spray test is longer in the SAE standards than in FMVSS No. 106 (72 hours versus 24 hours), but the specified corrosion performance is more rigorous in FMVSS No. 106. The SAE standards specify testing of fittings without any hose attached, while FMVSS No. 106 specifies that the fittings be mounted to a hose for testing. NHTSA tentatively concludes that the existing corrosion resistance requirements in FMVSS No. 106 assure adequate integrity of end fittings, and in one respect is more strenuous than the SAE standards. Accordingly, the agency does not propose to change Standard No. 106's corrosion resistance requirements at this time. Nevertheless, NHTSA welcomes comments on the suitability and need to increase the duration of the salt spray test from the current 24 hours to the 72 hours specified in the SAE standards.

The table below summarizes the differences between the plastic air brake tubing assembly and end fitting performance requirements/test procedures of FMVSS No. 106 and SAE J1131 and indicates which requirements/procedures NHTSA proposes incorporating into the standard.