DEPARTMENT OF TRANSPORTATION

National Highway Traffic Safety Administration

49 CFR Part 571

[Docket No. NHTSA–2007–29348]

RIN 2127–AK01

Federal Motor Vehicle Safety Standards; Brake Hoses

AGENCY: National Highway Traffic Safety Administration (NHTSA), Department of Transportation (DOT).

ACTION: Notice of proposed rulemaking (NPRM).

SUMMARY: This document, together with a companion final rule; technical amendments; response to petitions; published in today's edition of the **Federal Register**, addresses issues raised in petitions received in response to a December 2004 final rule that updated the Federal motor vehicle safety standard on brake hoses, and a related petition for rulemaking. In that rule, we incorporated updated versions of substantive specifications of several Society of Automotive Engineers (SAE) Recommended Practices relating to hydraulic brake hoses, vacuum brake hoses, air brake hoses, plastic air brake tubing, and end fittings.

In this NPRM, we respond to some issues raised in the petitions and propose a number of amendments to the brake hose rule in response to the petitions.

In the companion document, we deny several of the petitions and also correct typographical errors in, and inadvertent omissions from, the December 20, 2004 final rule.

DATES: Comments must be received on or before December 10, 2007.

ADDRESSES: Comments should refer to the docket number above and be submitted to:

- *Mail:* Docket Management Facility, M–30, U.S. Department of Transportation, West Building, Ground Floor, Rm. W12–140, 1200 New Jersey Avenue, SE., Washington, DC 20590.
- *Hand Delivery:* Documents may be submitted by hand delivery or courier to: Docket Management Facility, West Building, Ground Floor, Rm. W12–140, 1200 New Jersey Avenue, SE., Washington, DC between 9 a.m. and 5 p.m., except for Federal holidays.
- *Fax:* Faxed submissions are accepted at: 202–493–2251.
- *Online:* Alternatively, you may submit your comments electronically by logging onto the Federal Docket Management System (FDMS) Web site at *http://www.regulations.gov*. Follow the online instructions for submitting comments.

Regardless of how you submit your comments, you should mention the docket number of this document.

You may call the Docket at 202–366–9324. Docket hours are 9 a.m. to 5 p.m., Monday through Friday, except for Federal holidays.

Please see the Privacy Act heading under Rulemaking Analyses and Notices.

FOR FURTHER INFORMATION CONTACT:

For non-legal issues, Mr. Jeff Woods, Vehicle Dynamics Division, Office of Vehicle Safety Standards (Telephone: 202–366–6206) (Fax: 202–366–4921). Mr. Woods' mailing address is National Highway Traffic Safety Administration, NVS–122, 1200 New Jersey Avenue, SE., Washington, DC 20590.

For legal issues, Ms. Dorothy Nakama, Office of the Chief Counsel (Telephone: 202–366–2992) (Fax: 202–366–3820). Ms. Nakama's mailing address is National Highway Traffic Safety Administration, NCC–112, 1200 New Jersey Avenue, SE., Washington, DC 20590.

SUPPLEMENTARY INFORMATION:

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I. Background

On October 30, 1998, a joint petition for rulemaking was filed by Elf Atochem North America, Inc., Mark IV Industrial/Dayco Eastman, and Parker Hannifin Corporation, three brake hose manufacturers. The petitioners petitioned for certain requirements relating to brake hoses, brake hose tubing, and brake hose end fittings administered by the Federal Motor Carrier Safety Administration (FMCSA) to be incorporated into the brake hose standard that is currently administered by the National Highway Traffic Safety Administration (''NHTSA'' or the ''agency''). Specifically, the petitioners sought incorporation of the requirements in section 393.45 (Brake tubing and hose, adequacy) and section 393.46 (Brake tubing and hose connections) of the Federal Motor Carrier Safety Regulations (FMCSR) into section 571.106 (Brake hoses) of the Federal motor vehicle safety standards (''FMVSS''). The petition requested that the application of these SAE specifications be limited to hose, tubing, and fittings used on trucks, truck-trailer combinations, and buses with either a GVWR greater than 10,000 lbs. or which are designed to transport 16 or more people, including the driver. In addition, the petitioners requested that the current versions of the SAE specifications be adopted instead of the older versions cited in the FMCSRs.

NHTSA granted the joint petition for rulemaking, and published a notice of proposed rulemaking on May 15, 2003 (68 FR 26384, DOT Docket No. 03–14483). The agency agreed with the petitioners that there was a safety need to transfer the brake hose, tubing, and fitting requirements currently contained in sections 393.45 and 393.46 of the FMCSRs to FMVSS No. 106, before those requirements are deleted. NHTSA tentatively concluded that to ensure the continued safety of commercial motor vehicle braking systems, the substantive specifications of the SAE Recommended Practices should be incorporated into FMVSS No. 106, with a few exceptions as noted. This would involve, among other changes, establishing a new category in the standard for plastic air brake tubing, end fittings, and tubing assemblies.

NHTSA's decision to grant the joint petition was also based on the fact that FMVSS No. 106 has not been substantially updated in many years. Revisions over the past 20 years primarily addressed labeling issues,

inclusion of metric-sized brake hoses, updating test fluids to match advances in industry, and minor regulatory revisions to individual test conditions such as the whip test and the adhesion test. We noted that most of the substantive requirements in Standard 106, other than the labeling requirements, were originally based on SAE standards and American Society for Testing and Materials (ASTM) standards referenced therein. While the SAE and ASTM standards have been modified over time to keep pace with technological developments in the industry, the substantive requirements of FMVSS No. 106 have remained relatively unchanged. NHTSA's proposed changes to Standard No. 106 would take into account the substantial technological developments that have occurred and align the standard's requirements with standard industry practices. Incorporating many of the SAE standard's performance requirements is consistent with Office of Management and Budget (OMB) Circular A–119, which directs federal agencies to use and/or develop voluntary consensus industry standards, in accordance with Public Law 104–113, the ''National Technology Transfer and Advancement Act of 1995.''

II. December 2004 Final Rule

On December 20, 2004 (69 FR 76298, DOT Docket No. NHTSA–2003–14483), NHTSA published a final rule amending the brake hose standard. The agency's rule differed in the following respects from that petitioned for by the petitioners—

First, instead of simply incorporating complete SAE standards by reference as the FMCSRs currently do, NHTSA incorporated only the specific requirements/specifications of the SAE standards that are either more rigorous than those in Standard No. 106 or are not present at all in FMVSS No. 106.

Second, the agency did not limit the application of those SAE requirements/specifications to brake hose, tubing, and fittings used on commercial motor vehicles. NHTSA determined that all brake hose, tubing, and fittings can and should meet the requirements/specifications, regardless of their end use.

Third, although NHTSA agreed with the petitioners that changes to FMVSS No. 106 should be based on the most recent versions of the SAE standards, instead of the older versions cited in the FMCSRs, the agency noted that a number of SAE's standards have been updated since the joint petition was filed (in 1998). Accordingly, NHTSA relied on what it believed to be the most recent versions of the SAE standards.

Fourth, the agency did not incorporate SAE standards relating to copper tubing, galvanized steel pipe, or end fittings used with metallic or non-metallic tubing, materials that are occasionally used in chassis plumbing. Since these products are not considered to be brake hoses, NHTSA determined them not to be appropriate to include in FMVSS No. 106, a brake hose standard.

Fifth, NHTSA did not incorporate the material and construction specifications for Type A and Type B tubing contained in SAE J844, *Nonmetallic Air Brake System Tubing*, and SAE J1394, *Metric Nonmetallic Air Brake System Tubing* because the agency tentatively concluded that incorporating those material specifications would be design-restrictive.

Sixth, NHTSA did not incorporate the manufacturer identification requirements in SAE J1401, *Hydraulic Brake Hose Assemblies for Use with Nonpetroleum-Base Hydraulic Fluids*, because it concluded that the manufacturer identification requirements already present in FMVSS No. 106 are sufficient.

III. Petitions

In early 2005, NHTSA received petitions for reconsideration of the December 20, 2004 final rule from Cooper Standard Automotive (Fluid Division), Degussa Corporation, George Apgar Consulting, MPC, Inc., and Parker Hannifin Corporation (with separate comments from its Brass Division and from its Hose Products Division). In July 2005, Arkema, Inc., submitted a document styled as a petition for reconsideration. NHTSA is treating the document as a petition for rulemaking instead since its regulations (49 CFR 553.35(a)) provide that a document styled as a petition for reconsideration of a final rule and received by the agency more than 45 days after the issuance of that final rule will be treated as a petition for rulemaking. The petitions addressed a wide range of FMVSS No. 106 subjects.

We are addressing a number of the petitions by proposing amendments to FMVSS No. 106 in this NPRM. In a companion document published in today's edition of the **Federal Register**, we are addressing other issues raised in the petitions and in some instances, are denying the petitions. In some cases, in this NPRM, we are proposing changes based on suggestions or petitions, but which deviate from the requested changes. Thus, several petitions are partially granted in this respect.

IV. Proposed Revisions to FMVSS No. 106

A. Hydraulic Brake Hoses

1. Compatibility Fluid—In the final rule, the agency adopted a revised SAE compatibility brake fluid, RM–66–04, incorporated by reference in FMVSS No. 106, S5.3.9, Brake Fluid Compatibility, Constriction, and Burst Strength test requirements. Since the publication of the December 2004 final rule, we have discovered that SAE J1703 was revised in April 2004. Appendix B of SAE J1703 (April 2004) references a new compatibility brake fluid, RM–66–05. In this NPRM, we propose to incorporate the reference to the current version of SAE compatibility brake fluid, RM–66–05.

We have checked the SAE Web site (*http://www.sae.org*) for information on the availability of the RM–66–05 compatibility brake fluid, since we have been made aware by SAE that it would no longer be selling this referee material. However, as indicated on the SAE website, the compatibility brake fluid is now available for purchase from Greening Associates, Inc. in Detroit, Michigan. As long as SAE continues to identify the supplier of the compatibility brake fluid, NHTSA sees no need to provide this information in FMVSS No. 106. Therefore, we are not proposing to identify the supplier in this notice. We welcome comments on this issue.

B. Air Brake Hoses

1. Overview of Petitions—In response to the agency's final rule, there was one petition received on air brake hose from Parker Hannifin, Hose Products Division. Parker provided suggestions for changes to the construction and labeling information provided in Table III of FMVSS No. 106. Parker also petitioned for changes to the high temperature resistance test for air brake hose. We also address a petition for rulemaking from Gates Corporation that requests adding Type AIII air brake hose to Table III. All these issues are discussed in further detail below.

2. Air Brake Hose Dimensions—Parker stated in its petition that the footnotes for Table III in FMVSS No. 106 should indicate that all types of air brake hose (Type A, AI, and AII) can be used with either reusable or permanently attached end fittings, and that fittings types are not interchangeable with hose types due to differences in outside diameters of Type A, AI, and AII hose. In addition, in this NPRM, we address a petition for rulemaking from Gates Corporation that asks that we add Type AIII air brake hose to Table III. Gates also petitioned

for a change in the applicability so that Table III applies only to air brake hoses for use with reusable end fittings. As is addressed in more detail below, in response to the Gates petition, we propose that Table III be revised so that it applies to air brake hoses only for use with reusable end fittings, meaning that there would no longer be a need for the table's footnotes. Therefore, in this notice we are not proposing any changes to the footnotes as requested by Parker. Instead, we are proposing to remove all of the footnotes from Table III.

3. Type AIII Dimensions for Air Brake Hose—Gates' Petition for Rulemaking—In a submission dated November 22, 2005, Gates Corporation (Gates) petitioned NHTSA to amend the December 20, 2004 version of FMVSS No. 106. In particular, Gates asked us to amend S7.1 *Construction* for the following reason:

> The revised wording now places dimensional limits, that were not present in the previous version, on hoses manufactured for use with permanently attached brake hose end fittings only. Gates Corporation manufactures such hoses and this new ruling would exclude Gates Corporation from providing air brake assemblies which it currently supplies under FMVSS 106. These current air brake assemblies meet all the performance requirements of the current version of FMVSS 106 and will continue to meet the performance requirements set forth in the above listed final ruling [referring to FMVSS No. 106 in the October 1, 2000 edition of Title 49 of the Code of Federal Regulations, Parts 400 to 599].

Gates petitioned to amend FMVSS No. 106 as follows: First, to amend S7.1, *Construction*, by reverting to the regulatory text that exists now (before the December 20, 2004 final rule text takes effect) so that Table III, that specifies dimensional requirements for air brake hoses, only applies to air brake hoses that are assembled with reusable end fittings. Second, Gates asked that the statement ''except for brake hose manufactured in metric sizes'' (having the effect that metric sizes of brake hose for use with reusable fittings could be sold without meeting any dimensional requirements specified in FMVSS No. 106) be added.

Third, Gates petitioned to add Type AIII dimensions for air brake hose to Table III in FMVSS No. 106. Table III already includes dimensions for Type A, Type AI, and Type AII air brake hoses. According to its petition, Gates manufactures Type AIII, an air brake hose used only with permanently attached end fittings.

The agency has reviewed Gates' petition and has decided to grant it for the following reasons. We have determined that amending S7.1 in the way Gates has petitioned for would mean, as was the case prior to the agency's December 20, 2004 final rule, that the Table III designations would apply only to air brake hoses that are assembled with reusable end fittings. Although Gates did not indicate why it wants Type AIII added to Table III when Gates has no stated intention of using this hose with reusable end fittings, the agency believes that adding the Type AIII designation would not be problematic or adversely affect safety.

The agency believes that it may not be as critical to specify dimensions for air brake hoses that are only assembled with permanently attached end fittings, because specialized equipment is needed to produce such brake hose assemblies. Many of the assemblers doing this work on a repair basis (as evidenced by the agency's listing of registered brake hose assemblers) are small businesses that purchase or use a complete system of compatible end fittings, brake hoses, and crimping or swaging equipment for a particular brand of brake hoses. Thus the agency believes that it is not likely for an assembler with specialized knowledge and equipment to mix improper components when assembling air brake hoses with permanently attached end fittings, compared to a person making field repairs to an air brake hose with reusable end fittings that do not require specialized equipment to disassemble and reassemble the end fittings.

4. Metric Sizes of Air Brake Hoses—In the final rule of December 20, 2004, Table III specifies hose sizes only in English units of measurement (i.e., 3/16 inch, 1/4 inch, 5/16 inch). In contrast, metric measurements are metric units expressed in whole millimeters such as 5 millimeters or 8 millimeters.[1] In the December 20, 2004 final rule, at page 76,303, NHTSA addressed the issue of specifying metric measurements for air brake hoses:

> Regarding metric sizes of air brake hose, in the NPRM, NHTSA noted that dimensions for metric air brake hoses are not included in FMVSS No. 106, and solicited comments on the dimensions for metric air brake hose (for use with permanently attached, or reusable end fittings) that may be appropriate to include in FMVSS No. 106. Since it received no comments on this subject, NHTSA will not include metric air brake hoses in Table III.

In order to assure standardization and compatibility of the hose and end fittings and to ensure the safety of replacement brake hoses used with existing end fittings, in this NPRM, the agency proposes, for air brake hoses in metric measurements, to permit air brake hoses with permanently attached end fittings only. Therefore, the agency does not propose to change the regulatory text in S7.1 as requested by Gates to exclude metric brake hoses for use with reusable end fittings from having dimensional requirements specified in Table III. Metric air brake hoses would still be permitted to be assembled and sold with permanently attached end fittings under this proposal. This issue is ambiguous under the regulatory text of the December 20, 2004 final rule because metric air brake hoses are referred to in the labeling requirements of S7.2 (without specifying whether the metric air brake hoses are those with permanently-attached or reusable end fittings), while every air brake hose was required to meet the dimensional requirements in Table III and no ''metric measurement'' sizes were included in that table.

This NPRM seeks to resolve the ambiguity by proposing to specify metric air brake hose for use only with permanently attached end fittings. As explained above, we believe that it may not be as critical to specify dimensions for air brake hoses that are only assembled with permanently-attached end fittings, because specialized equipment is needed to produce such brake hose assemblies. Therefore, before a manufacturer may manufacture or sell new metric air brake hose for use with reusable end fittings, the metric hose dimensions must first be added to Table III in FMVSS No. 106 through the agency's rulemaking process.

We agree that it would be appropriate to propose adding Type AIII air brake hoses to Table III in FMVSS No. 106 as requested by Gates. In its petition, Gates stated that it had initiated a project with the SAE to have Type AIII air brake hose added to the dimensional tables in recommended practice SAE J1402, *Automotive Air Brake Hose and Hose Assemblies*. However, since amended SAE J1402 has not yet been issued by the SAE, NHTSA has decided not to wait for issuance of an amended J1402, and then propose to incorporate by reference the amended J1402 into FMVSS No. 106. In this NPRM, we propose to include in FMVSS No. 106, the Type AIII air brake hose dimensions from the draft J1402 document.

By proposing to include the Type AIII designation for brake hose in Table III, NHTSA is not proposing to require that the hoses be assembled with reusable fittings. However, to meet Gates' petition for their hose designation to be

[1] NHTSA does not consider the inside diameter and outside diameter conversions of English units into metric measurements (resulting in numbers such as 5.8 millimeters or 16.7 millimeters) to be ''metric-sized air brake hose.''

added to FMVSS No. 106, S7.1 would need additional language so that if a hose is manufactured to the specifications in Table III it must be labeled as such. The agency is proposing that language in this notice at S7.2.1(e).

We also reviewed the footnotes of various revisions of J1402 and found that while Type AI and AII hoses could be installed with either permanently attached end fittings or reusable end fittings, only three sizes of Type A hose (3⁄8 inch, 7⁄16 inch, and 1⁄2 SP (''special'') inch) are designated in J1402 for use with reusable end fittings, and the remaining three sizes (1⁄4 inch, 5⁄16 inch, and 5⁄8 inch) are designated for use with permanently attached end fittings only. NHTSA's proposal, if made final, would eliminate the need for footnotes, since various types of hoses can be included in Table III regardless of whether they are used with reusable or permanently attached end fittings.

We therefore propose to remove all footnotes to Table III. These footnotes were added in the December 20, 2004 brake hose final rule to identify brake hoses that can be used with reusable and/or permanently attached end fittings. With the proposed revision of S7.1 and S7.2.1(e), the footnotes would no longer serve any purpose. In addition, NHTSA proposes that any one of the designations of brake hoses proposed for Table III, as well as hose types that are not listed in Table III, be permitted to be assembled with permanently-attached end fittings.

Public comment is sought on whether the proposed Type AIII designated hoses should be applicable both to hoses with permanently-attached end fittings and to hoses with reusable end fittings.

5. High Temperature Resistance—In its rulemaking to update FMVSS No. 106, the agency adopted the substantive requirements of SAE J1402, *Automotive Air Brake Hose and Hose Assemblies*, June 1985, into FMVSS No. 106. Revisions in the final rule included modification of the FMVSS No. 106 requirements in S7.3.2, High temperature resistance test, in which an air brake hose is secured around a test cylinder and conditioned at 100 degrees Celsius (212 degrees Fahrenheit) for 70 hours. After this conditioning, the hose is cooled and examined on the inside and outside for cracks, charring, or disintegration. In the final rule, the test cylinder specification was revised to include smaller test cylinders for each size of air brake hose that are specified in SAE J1402 (June 1985).

Parker's comment submitted in response to the final rule stated that SAE J1402 was in the process of being revised to change the dimensions of the test cylinders for the high temperature resistance test, and requested that the agency now consider adopting the new sizes of test cylinders in FMVSS No. 106. The agency has reviewed the revised standard, SAE J1402, *Automotive Air Brake Hose and Hose Assemblies* (January 2005), and finds that it includes revisions to the test cylinders for the high temperature test. The sizes of the high temperature test cylinders were increased to be the same size as the test cylinders used for other tests in SAE J1402, including the low temperature resistance test, ozone resistance test, and the adhesion test for air brake hose reinforced by wire.

The agency proposes that the latest requirements for the size of the test cylinders for the high temperature test as stated in SAE J1402 (January 2005) be adopted in FMVSS No. 106 as well. The stringency of the high temperature resistance test would be reduced slightly, due to larger test cylinders being used, but this would also result in only one size of test cylinders being needed for all of the test requirements for air brake hose in FMVSS No. 106 where the use of test cylinders is required, and in addition, FMVSS No. 106 would be aligned with the latest revision of SAE J1402. The net effect of this proposed change is that the test cylinder dimensions for the high temperature resistance test would be changed back to their original values (prior to the agency's extensive recent rulemaking on brake hoses) that were in effect for many years.

C. Vacuum Brake Hose

1. Overview of Petitions—In the May 15, 2003 NPRM to amend FMVSS No. 106, the agency indicated that it was aware that plastic vacuum brake tubing is being used in automotive applications as an alternative material to rubber vacuum brake hose (68 FR 26397). The agency stated that it was not aware of SAE or other industry standards for plastic vacuum tubing, but that if a suitable industry standard were developed, we would consider adopting performance requirements from that standard into FMVSS No. 106. In response to the final rule, Degussa, Cooper, and MPC have petitioned for changes to the requirements in FMVSS No. 106 for vacuum brake hose constructed of plastic. The requirements in FMVSS No. 106 at issue are S9.2.2, High temperature resistance, and S9.2.9, Deformation.

Degussa stated that there are no industry standards for plastic vacuum brake tubing and believes that it is not feasible to create a complete separate set of requirements for plastic vacuum brake tubing within FMVSS No. 106. However, it and other petitioners submitted two proposed changes specific to plastic vacuum brake tubing that could be incorporated within the S9 and S10 requirements for vacuum brake tubing in FMVSS No. 106.

MPC, Degussa, and Cooper provided the view that plastic vacuum brake tubing has advantages over rubber vacuum brake hose in certain automotive applications, including recyclability, smaller packaging size, lighter weight, improved abrasion and leak resistance, and ease of assembly. Cooper stated that the majority of European automakers that import motor vehicles into the United States use plastic vacuum brake tubing, and that this product has been used in Europe for more than a decade.

MPC stated that it could not locate Table V or Table VI in the final rule or in the agency's compliance test procedure. The agency notes that since these tables were not revised in the brake hose rulemaking, they did not appear in the final rule, but they are included in FMVSS No. 106 (49 CFR 571.106). However, as discussed below, the agency is now considering revisions to Table V and the proposed revisions to the table are included in this notice.

2. High Temperature Resistance—The requirements in S9.2.2 and S10.1 of FMVSS No. 106 include conditioning the hose at an elevated temperature of 257 degrees Fahrenheit (125 degrees Celsius) under an internal vacuum of 26 inches of mercury for 96 hours. Upon completion of that conditioning, the collapse of the outside diameter shall not exceed 10 percent for a heavy-duty vacuum brake hose or 15 percent for a light duty vacuum brake hose. Next, the hose is cooled to room temperature and bent around a mandrel with a diameter equal to five times the initial outside diameter of the hose. Upon inspection, while still bent around the mandrel, the hose must not exhibit any indications of cracks, charring, or disintegration. Finally, the hose is removed from the mandrel and subjected to a 175 psi hydrostatic burst test for one minute with no leakage permitted.

MPC stated that plastic tubing is more rigid than rubber hose and they have a concern that the tubing may kink when bent around the mandrel. The kinking can cause stress marks on the outside of the tubing, and although these marks are not associated with mechanical failure of the tubing, the marks could be interpreted as cracks resulting in failure of the test. MPC states that a typical 12.7 mm outside diameter tube will kink at

mandrel diameters below 100 mm (or approximately 8 times the outside diameter of the tube). MPC recommends that the mandrel size be increased to a diameter in excess of 8 times the outside diameter of the plastic tube.

The agency agrees that vacuum tubing manufactured from plastic typically is less flexible than a vacuum hose constructed of rubber and therefore a larger mandrel should be considered for this test requirement. The agency is proposing that the mandrel diameter be changed to eight times the outside diameter of the tubing if the tubing is constructed of plastic.

3. Deformation—The vacuum brake hose deformation requirements are specified in S9.2.10 of FMVSS No. 106, and the deformation test procedure is specified in S10.9. In this performance test, a one-inch long sample of vacuum brake hose is compressed so that the inside diameter is flattened to a specified value, and then the compressive force is released. This is repeated four more times, and upon completion of the compression test sequence the inside diameter of the vacuum brake hose shall be at least 90 percent of its original inside diameter, or, in the case of a vacuum brake hose reinforced with wire, it shall return to at least 85 percent of its original diameter. The compressive force application for a heavy-duty vacuum brake hose shall not exceed 70 pounds in the first compressive cycle, and shall be at least 40 pounds in the fifth compressive cycle. The compressive force application for a light-duty vacuum brake hose shall not exceed 50 pounds in the first compressive cycle, and shall be at least 20 pounds in the fifth compressive cycle.

In summary, this performance test requires that the hose has at least a minimum amount of flexibility (specified through an upper limit of compressive force application) and shape recovery so it returns nearly to its original shape after several applications of compressive force.

Degussa stated that the deformation requirements as currently included in FMVSS No. 106 would, in effect, prohibit the use of plastic tubing. It stated that the high shape recovery requirements and low compression force are typical for elastomers but that plastics are typically stronger and cannot meet these requirements. Degussa recommended either removing these requirements from FMVSS No. 106, or changing the post-compression recovery criteria to 60 percent of original outside diameter with a first compression force of less than 500 pounds.

Cooper cited similar reasons to exclude plastic tubing from the deformation requirements or to adopt an alternative requirement of a post-compression recovery of 60 percent of original outside diameter with a first compressive application force of no more than 500 pounds. Cooper stated that plastic tubing is constructed of a stronger material than that of elastomeric hose and that the stronger plastic tubing does not deform as easily under the low compressive forces in the deformation test.

MPC stated similar concerns. It stated that the thermoplastic tubes will not compress with loads as low as 70 pounds and will not have the shape recovery of an elastomeric hose, and that it would take a significantly higher amount of force to compress the plastic tubing. MPC recommended that the deformation test be eliminated for plastic tubing, or as an alternative, that if no deformation occurs at a compressive force of 70 pounds for a sample of tubing one inch in length, then the tubing would meet the deformation requirement.

The agency agrees that plastic vacuum brake tubing has properties that are substantially different than those of an elastomeric (rubber) vacuum brake hose. Principal among these differences is the increased stiffness of the plastic tubing that would not result in substantial collapse upon application of compressive forces in the 20 to 70-pound range for a test sample that is one inch in length (the specified sample length for all diameters of brake hose in Table VI).

After consideration of the suggested alternatives for plastic vacuum brake hose, the agency has decided to propose that a compressive force of 70 pounds be applied to the hose for five cycles, and that the recovery shall be at least 90 percent of the original outside diameter. This approach keeps the test parameters within the original specifications of the deformation test, and recognizes the increased mechanical strength of the plastic hose.

The agency also proposes to modify Table V to accommodate the proposed deformation test. The agency proposes to remove the ninth column of Table V that specifies the collapsed hose inside dimension for the deformation test, because these dimensions are redundant with the same dimensions in column six of Table VI. The agency prefers to have these specifications included in only one table where it is most relevant, which the agency proposes to be Table VI.

4. Table V—In addition, the agency notes that Table V—Vacuum Brake Hose Test Requirements, was not revised in the recent brake hose rulemaking to be consistent with the high temperature resistance requirements in the final rule. The third and fourth columns of the table indicate hose test sample length and test cylinder radius, respectively, for the high temperature resistance test. However, since the test cylinder radius or diameter was changed to a specification as a multiple of the vacuum brake hose initial outside diameter (five times the outside diameter of the brake hose), column four of Table V should be deleted.

The agency also notes that the length of the test sample of brake hose in column three of Table V deviates from SAE J1403 Vacuum Brake Hose (July 1989) which indicates that a 300 mm (11.8 inch) length of vacuum brake hose is used in this test. Therefore, the agency proposes to revise S10.1 to specify the length of the brake hose test sample as specified in SAE J1403, and remove column three from Table V. However, considering that the agency is also proposing a larger test cylinder radius for plastic vacuum brake tubing, a longer length of hose specimen would be needed for plastic hoses. Therefore, the agency proposes that test samples of plastic vacuum brake tubing be 450 mm (17.7 inches) in length.

D. Plastic Air Brake Tubing

1. Overview of Petitions—The agency received four petitions regarding plastic air brake tubing in response to the final rule. NHTSA also received a letter dated June 19, 2007 from Philatron International, asking for changes in plastic air brake tubing requirements. Because the letter was not submitted in time to be considered a petition for reconsideration, NHTSA will consider Philatron's letter to be a petition for rulemaking.

Each of the organizations petitioning for reconsideration (Degussa, Parker Brass Division, Apgar, and Arkema) stated that because the agency did not include a requirement that plastic air brake tubing be constructed of nylon (polyamide), there are risks that alternate materials will not provide adequate long-term service in air brake systems. Each petitioner noted that SAE J844, upon which the agency based its new requirements for plastic air brake tubing, is based on the assumption the nylon specified in that standard has known properties that other materials may not possess, such as material hardness that could affect end fitting retention. However, the agency notes that it went beyond solely the SAE J844 requirements and incorporated substantive requirements from SAE

J1131 as well to address such issues to the extent practicable. The agency is not aware of what additional steps it could take to further ensure that plastic air brake tubing and end fittings could be more compatible.

Parker stated that the agency's final rule now shifts the burden of qualification such that the entity assembling a plastic air brake tube to its end fittings must bear the entire burden of compliance, and that the final rule changes the business model significantly. The agency disagrees. Under the newly adopted requirements of the December 20, 2004 final rule, there are plastic tubing specifications including dimensional requirements, tensile strength, etc., that qualify the tubing, and then there are assembly requirements that qualify plastic air brake tubing assemblies with the end fittings installed. The requirements for assemblers were not changed in the final rule such that additional compliance burdens were placed on them.

Apgar and Arkema cited the efforts of the SAE committee to develop SAE J2547 to address specifications for plastic air brake tubing that is constructed from materials other than nylon, but the agency notes that this effort has been ongoing for several years and work on this standard has still not been completed, nor has any draft of that standard been provided to the agency. Both companies stated that SAE J2547 is still a working document and is only for use within the subcommittee. Thus the agency has not been able to consider this document in addressing the petitions.

Degussa, Parker, Apgar, and Arkema all stated that by not adopting the nylon (polyamide) material specification from SAE J844, the safety of air brake tubing is potentially reduced because alternative materials that could be used in air brake tubing may not have the same demonstrated performance as nylon. However, as discussed at length in the December 20, 2004 final rule (69 FR 76307), the agency has determined that the specification of nylon construction would be unnecessarily design-restrictive. The agency believes it is more appropriate, and enforceable, to measure the pass/fail performance of any air brake tubing through appropriate performance tests that are included in FMVSS No. 106.

Degussa, Apgar, and Arkema provided recommendations for additional performance tests for plastic air brake tubing. Sources for these additional tests include SAE 2260, Nonmetallic Fuel System Tubing, with One or More Layers (November 2004); ISO 7628–2, Road Vehicles—Thermoplastics Tubing for Air Brake Systems (1998); and independent or proprietary performance tests that were developed and proposed by the commenters. We have reviewed these performance tests and decided that certain aspects could be adopted into FMVSS No. 106 and these are proposed in this notice for public comment. However, the agency is not proposing to adopt the extensive additional performance requirements recommended by Arkema and Degussa. In the companion document published in today's **Federal Register**, we are denying substantial portions of these petitions.

2. *Plastic Air Brake Tubing Dimensions*—Apgar brought to the agency's attention that several minor changes to the dimensions of plastic air brake tubing were made by the SAE subcommittee in the most recent revision of SAE J844 (November 2004). The requirements from SAE J1394, Metric Nonmetallic Air Brake Tubing (April 2000) were also incorporated into SAE J844 so that one standard would cover both inch-dimensioned and metric sizes of tubing.

Apgar submitted changes to the dimensional requirements in Table I of SAE J844 that were made in the November 2004 revision of SAE J844. These are recommended by Apgar to be adopted into Table VII of FMVSS No. 106. The agency is requesting comments on whether to make these changes. A notable change to SAE J844, and proposed for FMVSS No. 106, is that three sizes of metric tubing (4-mm, 8-mm, and 19-mm) are sized the same as three sizes of inch-dimensioned tubing (5⁄32 inch, 5⁄16 inch, and 3⁄4 inch).

Two of the metric sizes, 4 mm and 19 mm, are new designations for metric-sized tubing. 8 mm tubing was previously included in both SAE J1394 and in the final rule specifications of FMVSS No. 106. The two metric sizes, however, were subsequently moved from SAE J1394 to SAE J844, and Apgar submitted revisions from SAE J844 to the 5⁄16 inch dimensions to make that size of tubing the same as 8-mm tubing. The agency proposes to make 5⁄16 inch dimensions the same size as 8 mm tubing in FMVSS No. 106 in this NPRM and finds that if made final, there will be a slight increase (0.8 percent) in the overall diameter of 5⁄16 inch brake tubing. The agency does not believe this slight increase in overall diameter of 5⁄16 inch brake tubing will result in incompatibility for new tubing manufactured to these dimensions with the existing end fittings on motor vehicles, as this change is small, but the agency welcomes comments on this issue.

Since SAE J844 no longer includes measurements in inches, the agency has converted dimensions of millimeters to inches and is presenting these proposed revisions to Table VII in FMVSS No. 106 in this notice. A detailed description of the changes proposed for each size of tubing in Table VII is provided below. Unless otherwise noted, the dimensional changes provided here, as recommended by Apgar, are considered to be very minor deviations from the dimensions published in the December 20, 2004 final rule. The changes are on the order of hundredths of a millimeter (i.e., from 2.01-mm to 2.02-mm) and thousandths of an inch (i.e., from 0.079 inch to 0.080 inch):

1⁄8 inch O.D.—The maximum O.D. is proposed to change from 3.25 to 3.26 mm. The inch equivalent is proposed to remain unchanged at 0.128 inches. The nominal inside diameter is proposed to be changed from 2.01 to 2.02 mm. The inch equivalent is proposed to be changed from 0.079 to 0.080 inches.

5⁄32 inch O.D.—The maximum O.D. is proposed to change from 4.04 to 4.08 mm. The inch equivalent is proposed to change from 0.159 to 0.161 inches. The minimum O.D. is proposed to change from 3.89 to 3.92 mm. The inch equivalent is proposed to change from 0.153 to 0.154 inches. The nominal I.D. is proposed to change from 2.34 to 2.38 mm. The inch equivalent then is proposed to change from 0.092 to 0.094 inches. If made final, these changes would represent a small increase in the overall size of 5⁄32 inch O.D. tubing. Also, SAE J844 now designates this size of tubing as equivalent to metric-sized 4 mm O.D. tubing, which is a new size that now appears in that SAE standard. The agency proposes that this new size also be incorporated in FMVSS No. 106.

1⁄4 inch O.D.—The nominal I.D. is proposed to change from 4.32 to 4.35 mm. The inch equivalent is proposed to change from 0.170 to 0.171 inches. The nominal wall thickness is proposed to be changed from 1.02 to 1.00 mm. The inch equivalent then is proposed to be changed from 0.040 to 0.039 inches.

5⁄16 inch O.D.—The maximum O.D. is proposed to change from 8.03 to 8.10 mm. The inch equivalent is proposed to be changed from 0.316 to 0.319 inches. The minimum O.D. is proposed to be changed from 7.82 to 7.90 mm. The inch equivalent then is proposed to be changed from 0.308 to 0.311 inches. The nominal I.D. is proposed to be changed from 5.89 to 6.00 mm. The inch equivalent then is proposed to be changed from 0.232 to 0.236. The nominal wall thickness is proposed to

be changed from 1.02 to 1.00 mm. The inch equivalent then is proposed to be changed from 0.040 to 0.039 inches. If made final, these changes would represent a moderate increase in the overall diameter of 5/16 O.D. tubing, and would make it identical to 8 mm metric-sized air brake tubing.

3/8 inch O.D.—The minimum O.D. is proposed to change from 9.42 to 9.43 mm. The inch equivalent is proposed to remain unchanged at 0.371 inches. The nominal inside diameter is proposed to change from 6.38 to 6.39 mm. The inch equivalent is then proposed to change from 0.251 to 0.252 inches.

1/2 inch O.D.—The nominal I.D. is proposed to change from 9.55 to 9.56 mm. The inch equivalent is proposed to remain unchanged at 0.376 inches.

5/8 inch O.D.—The maximum O.D. is proposed to change from 16.00 to 16.01 mm. The inch equivalent is proposed to remain unchanged at 0.630 inches.

3/4 inch O.D.—The nominal I.D. is proposed to change from 14.38 to 14.37 mm. The inch equivalent is proposed to remain unchanged at 0.566 inches.

4 mm O.D.—This is a new size of metric-dimensioned air brake tubing proposed to be added to Table VII of FMVSS No. 106 as discussed above. It is proposed to be identical in size to 5/32 inch O.D. tubing.

6 mm O.D.—The maximum O.D. is proposed to change from 6.10 to 6.08 mm. The inch equivalent is proposed to change from 0.240 to 0.239 inches. The minimum O.D. is proposed to change from 5.90 to 5.92 mm. The inch equivalent is then proposed to change from 0.232 to 0.233 inches. The wall thickness tolerance is proposed to change from 0.10 mm to 0.08 mm. The inch equivalent is then proposed to change from 0.004 to 0.003 inches.

8 mm O.D.—No changes are proposed for this size of tubing, but minor changes to 5/16 inch O.D. tubing are proposed so that it will be identical to 8 mm O.D. tubing, as described above.

10 mm O.D.—Apgar stated that the nominal I.D. of 7.00 mm as published in the agency's final rule is the correct value for this dimension. However, the value of 8.50 mm that is in the November 2004 revision of SAE J844 is in error, and the SAE committee working on that standard will make the correction in the next revision of SAE J844. No changes to the 10 mm O.D. in FMVSS No. 106 are proposed in this NPRM.

12 mm O.D.—Apgar stated that the nominal I.D. of 9.00 mm as published in the agency's final rule is the correct value for this dimension. However, the value of 10.50 mm that is in the November 2004 revision of SAE J844 is in error, and the SAE committee working on that standard will make the correction in the next revision of SAE J844. No changes to the 12 mm O.D. in FMVSS No. 106 are proposed in this NPRM.

19 mm O.D.—This is a new size of metric air brake tubing that is proposed to be added to Table VII in FMVSS No. 106. It is proposed to be dimensionally identical to 3/4 inch O.D. tubing as described above.

3. *Table VII*—Philatron International petitioned the agency to amend the tubing dimension requirements by distinguishing air brake tubing used in conjunction with replaceable and/or reusable end fittings from air brake tubing assemblies manufactured with permanent end fittings. Philatron stated that these differences existed prior to the agency's December 20, 2004 final rule. Because of the outer dimension requirements, there is no longer an allowance for the construction of air brake assemblies with permanent end fittings. To resolve the situation, Philatron asked that the title of Table VII be changed to specifically state that it only applies to air brake tubing with reusable end fittings, and the regulatory text of S11.1 *Construction* reflect that change.

NHTSA agrees with Philatron's request. We did not intend to drop the distinction between permanent end fittings and those that can be reused and/or replaced. However, rather than changing the title of Table VII as suggested by the petitioner, the agency proposes to change the regulatory text in S11.1 to reflect that the outer dimensions in Table VII do not apply to air brake assemblies with permanently attached end fittings.

We propose to add notation to Table VII to indicate that the following sizes of tubing are identical, and that they can be labeled with either or both size identification labeling: 5/32 inch and 4mm; 5/16 inch and 8 mm; and 3/4 inch and 19 mm.

4. *Plastic Air Brake Tubing Mechanical Properties*—As the agency is proposing to add two new sizes (4 mm and 19 mm) of air brake tubing to FMVSS No. 106, it is necessary to provide updates to Table VIII— Plastic Air Brake Tubing Mechanical Properties. The agency proposes to adopt the burst strength pressure, supported bend radii, and unsupported bend radii for these new sizes of tubing directly from SAE J844 as follows:

4 mm O.D.—The agency proposes to adopt mechanical properties from 5/32 inch tubing that is the same size as 4 mm tubing, as follows: Burst strength pressure 8,300 kPa (1,200 psi), supported bend radius 12.7 mm (0.50 inches), and unsupported bend radius 12.7 mm (0.50 inches). The proposed conditioned tensile load strength is 178 N (40 lbf).

19 mm O.D.—The agency proposes to adopt mechanical properties from 3/4 inch tubing that is the same size as 19 mm tubing, as follows: Burst strength pressure 5,500 kPa (800 psi), supported bend radius 76.2 mm (3.00 inches), and unsupported bend radius 88.9 mm (3.50 inches). The proposed conditioned tensile load strength is 1,557 N (350 lbf).

In addition, the agency proposes to make the following changes to the supported and unsupported bend radii for the following sizes of plastic air brake tubing that are in agreement with the latest revision of SAE J844:

5/16 inch O.D.—Supported bend radius is proposed to be changed from 31.8 mm (1.25 inches) to 32.0 mm (1.26 inches).

6 mm O.D.—Supported bend radius is proposed to be changed from 20.0 mm (0.75 inches) to 25.4 mm (1.00 inches).

8 mm O.D.—Supported bend radius is proposed to be changed from 31.8 mm (1.25 inches) to 32.0 mm (1.26 inches).

12 mm O.D.—Supported bend radius is proposed to be changed from 44.5 mm (1.75 inches) to 45.0 mm (1.77 inches). Unsupported bend radius is proposed to be changed from 63.5 mm (2.50 inches) to 56.3 mm (2.22 inches).

16 mm O.D.—Supported bend radius is proposed to be changed from 69.9 mm (2.75 inches) to 70.0 mm (2.76 inches). Unsupported bend radius is proposed to be changed from 76.2 mm (3.00 inches) to 84.0 mm (3.31 inches).

5. *Impact Test Apparatus*—Since the agency is proposing to revise the dimensional specifications for some sizes of tubing, it is also necessary to revise the dimensions of the impact test apparatus with regard to the hole diameters in its base. The agency has reviewed SAE J844 and found that some sizes for the impact test apparatus were changed slightly in the November 2004 revision, and references to 4 mm and 19 mm brake tubing were added. The agency proposes to change the table accompanying Figure 8 in FMVSS No. 106 to reflect the latest revisions to J844.

6. *Resistance to Corrosive Salt Compounds*—In its final rule to amend FMVSS No. 106, the agency included a zinc chloride resistance test for plastic air brake tubing in S11.3.12, Zinc Chloride Resistance, consisting of immersion of a sample of tubing bent around a test cylinder and submerged in a 50 percent zinc chloride aqueous solution for 200 hours. The required performance is that the outer surface of the tubing shall not show cracks visible under 7-power magnification. Such

cracks are most likely to occur along the bent section of tubing where the stresses are highest. This zinc chloride resistance test was based on identical requirements in SAE J844.

Comments to the NPRM indicated that the zinc chloride resistance test proposed by the agency, and adopted in the final rule, was not particularly severe in evaluating the resistance of plastic materials to salts. However, the agency did not adopt any more stringent requirements than it had proposed in the NPRM. We are revisiting this issue based upon two petitions and also comments received previously in response to the NPRM, and are proposing a moderate increase in severity of this test requirement by changing to a mixture of five salt compounds as specified in ISO 7628–2 Road Vehicles—Thermoplastic Tubing for Air Brake Systems (1998–08–15), and by exposing the cut ends of tubing to the salt solution.

In their petitions, both Degussa and Arkema recommended adopting the zinc chloride resistance test from SAE J2260, Nonmetallic Fuel System Tubing with One or More Layers (November 1, 1996) to FMVSS No. 106. In section 7.5 of SAE J2260 it states that a sample of plastic fuel tubing is prepared with end fittings, bent 180 degrees, and then submerged, in a 50 percent aqueous solution of zinc chloride at 23 degrees Celsius for 200 hours. The requirements are specific in stating that the tubing is submerged in the salt solution with both cut ends of the tubing submerged, but the solution is not permitted to enter through the fittings to the inside of the tubing. This exposes each layer of the tubing at its cut ends. Although the agency does not have detailed information on the styles of end fittings used with this tubing, there is flexibility provided in standard J2260 for the selection of end fittings used in this test. This would be a variable in the test procedure regarding stresses at the cut ends of the tubing because different sizes of end fittings or plugs would impart different levels of stress on the tubing depending on how much the ends of the tubing are expanded.

Other than the treatment and exposure of the tubing ends, the requirements in J844 are similar to those in J2260 with regard to salt solution composition, solution temperature, and exposure time.

In its petition, Arkema recommends a requirement for test mandrels (tubing end plugs) that would be specified for exposing the cut tubing ends in salt resistance test. The recommended mandrels described by Arkema are in Table X on page 11 of its petition and range from 145 percent to 130 percent of the nominal inside diameter of the tubing. Mandrels of these sizes would substantially expand the tubing and induce large stresses at the ends of the tubing. Since plastic air brake tubing is not particularly flexible in expansion, inserting mandrels of these sizes would require considerable force and would result in high stresses at the tubing end. Arkema further recommends that tubing manufactured from more than one layer be abraded through at least 25 percent of the wall thickness and exposed to zinc chloride.

We reviewed two SAE standards describing push-to-connect end fittings for use with air brake tubing to see if they could provide information on the expansion of plastic air brake tubing at the end fittings: J2494, Push-to-Connect Tube Fittings for Use in the Piping of Vehicular Air Brake; and J2494–2 Dimensional Specifications for Non-Metallic Body Push-to-Connect Fittings Used on a Vehicular Air Brake System. These standards provide external dimensions of push-to-connect end fittings but do not provide dimensions of the tube support that is inserted into the inside diameter of the tubing during assembly.

The agency also reviewed SAE J246, Spherical and Flanged Sleeve (Compression) Tube Fittings and determined that the tube supports described in *Table 4 Dimensions of Tube Support,* for these fittings are smaller than the inside diameter of SAE J844 air brake tubing described in *Table 1—Dimensions and Tolerances,* of that standard. It appears that assembling air brake tubing with these end fittings would not result in expansion of the ends of the tubing during assembly, and therefore these standards do not provide any insight into what size of test mandrels might be suitable for use in the salt resistance test.

The agency believes that the mandrel sizes recommended by Arkema that are between 130 and 145 percent of tubing nominal inside diameter would be too large for typical plastic air brake tubing, and instead we are proposing that the plugs be 5 percent larger than the nominal inside diameter of the tubing. The agency believes this specification would satisfactorily plug the tubing without inducing excessive stresses at the ends of the tubing. The agency also is proposing a change to S11.3.12 in FMVSS No. 106 to include submersion of the cut ends of the tubing during the immersion of the tubing sample in the salt solution. By exposing the cut ends of the tubing, and therefore each layer that exists in the tubing, it would not be necessary to conduct salt compound resistance tests as recommended by Arkema by partially abrading the samples of brake tubing.

Regarding the composition of the salt solution, the agency is proposing to change from a simple zinc chloride salt solution to a mixture of salts specified in ISO 7628–2 Road Vehicles—Thermoplastic Tubing for Air Brake Systems (1998–08–15). The agency discussed this issue in the final rule (69 FR 76310) and noted that comments received from DuPont Engineered Polymers and Saint-Gobain Performance Plastics in response to the NPRM indicated that those companies believed it may be appropriate to consider adopting the salt solution specified in ISO 7628–2.

The salt resistance test in Section 7.9 of ISO 7628–2 requires that six samples of tubing be bent to a radius of 5.5 times the outside diameter of the tubing and then submerged in a salt bath to within 5 mm of the cut ends of the tubing. The salt bath consists of a mixture of 30 percent copper chloride, 20 percent sodium chloride, 20 percent potassium chloride, 30 percent zinc chloride, with this mixture added to one part water to produce a 50 percent aqueous solution. The bent tubing is removed from the salt bath after five minutes and then placed in an environmental chamber at a temperature of 60 degrees Celsius (140 degrees Fahrenheit) and a relative humidity of at least 85 percent for 24 hours. The immersion and environmental conditioning is repeated for a total of 8 cycles (one environmental conditioning period is permitted to be 72 hours rather than 24 hours).

After this conditioning, the tubing is subjected to a burst test at 23 degrees Celsius (73.4 degrees Fahrenheit) with the required performance of withstanding 4 MPa (580 psi) if the tubing is designated as 1 MPa (145 psi) tubing or 5 MPa (725 psi) if it is 1.25 MPa (181 psi) tubing. Annex D of the standard requires testing of the end fitting area of the tubing if it is assembled using barbed (fir-tree) end fittings and the tubing is constructed of copolyester, but this test does not include submerging the cut ends of the tubing in the salt bath. It does subject the ends of the tubing to exposure (to within 5 mm of the cut ends) in an area of high stress where the tubing has been expanded over the barbed end fitting. However, the agency is proposing to minimize the tubing stress at the cut ends by using plugs that are 105 percent of the inside diameter of the tubing. Further, the agency is not aware of any barbed-type end fittings being used with plastic air brake tubing in the U.S.

The agency proposes to maintain the 200-hour immersion requirement for the salt resistance test in S11.3.12 of FMVSS No. 106. The agency invites comments on the proposal to adopt the salt solution from ISO 7628 into FMVSS No. 106, and to add requirements to test the cut ends of plastic tubing by fully immersing the tubing sample in the salt solution.

7. *Resistance to Methyl Alcohol*—In the final rule, the agency adopted the requirements of SAE J844 for resistance to methyl alcohol (69 FR 76310). In the test as specified in SAE J844, a sample of tubing is bent around a test cylinder of specified radius and the tubing and cylinder are immersed in a 95 percent methyl alcohol aqueous solution for 200 hours. Upon completing this exposure, the tubing must not exhibit cracks on its outer surface when viewed under 7-power magnification.

In its petition for reconsideration, Degussa stated that in both the methyl alcohol resistance test and in the zinc chloride resistance test (discussed above), each layer of the tubing at the cut ends of the tubing should be exposed to these chemical solutions to determine the chemical resistance of each layer of the tubing. Since the agency believes it is appropriate to expose each layer of tubing during a chemical resistance test, we are proposing to modify the methyl alcohol resistance test in S11.3.13 to include testing of the cut ends of the tubing.

The agency believes that this is similar to the salt resistance test requirements described in the section above since SAE J844 is not detailed as to the specific requirements for the cut ends of the tubing. The agency proposes to adopt similar requirements for methyl alcohol resistance as for corrosive salt resistance by plugging the ends of the tubing with plugs having a diameter equal to 105 percent of the nominal inside diameter of the tubing and specifying that the entire length of tubing be immersed in the methyl alcohol solution.

V. Rulemaking Analyses and Notices

A. Executive Order 12866 and DOT Regulatory Policies and Procedures

Executive Order 12866, ''Regulatory Planning and Review'' (58 FR 51735, October 4, 1993), provides for making determinations whether a regulatory action is ''significant'' and therefore subject to Office of Management and Budget (OMB) review and to the requirements of the Executive Order. The Order defines a ''significant regulatory action'' as one that is likely to result in a rule that may:

(1) Have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or Tribal governments or communities;

(2) Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;

(3) Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations or recipients thereof; or

(4) Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.

This notice was not reviewed under Executive Order 12866. Further, this notice was determined not to be significant within the meaning of the DOT Regulatory Policies and Procedures.

In this document, NHTSA is proposing to incorporate performance requirements and test procedures that are based on voluntary standards adopted by the Society of Automotive Engineers. The agency believes that most, if not all, such hoses, tubing, and fittings are already designed to meet the SAE requirements/procedures. However, in the event that there are some brake hose products that would need to be modified to comply with the proposed regulations, the agency (1) estimates that it is a small proportion of brake hose products that would need modification, as most are believed to already comply; and (2) tentatively concludes that the manufacturers of the components used in producing such products are not small businesses.

The agency believes that there are large manufacturers that produce both hydraulic and vacuum brake hoses in such large quantities. There are many small companies that use the brake hose material and end fitting components to produce brake hose assemblies, but NHTSA does not anticipate that they would be affected by the proposed changes because they simply assemble already-compliant components supplied by the large manufacturers.

Since evidence available to NHTSA suggests that most, if not all, of these hose, tubing, and fittings are already compliant with the minimum performance requirements that the agency is proposing to apply, the agency believes that the impacts of this rulemaking would be minimal. Thus, it has not prepared a full regulatory evaluation.

B. Regulatory Flexibility Act

Pursuant to the Regulatory Flexibility Act (5 U.S.C. 601 *et seq.,* as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996), whenever an agency is required to publish a notice of rulemaking for any proposed or final rule, it must prepare and make available for public comment a regulatory flexibility analysis that describes the effect of the rule on small entities (i.e., small businesses, small organizations, and small governmental jurisdictions). The Small Business Administration's regulations at 13 CFR Part 121 define a small business, in part, as a business entity ''which operates primarily within the United States.'' (13 CFR § 121.105(a)). No regulatory flexibility analysis is required if the head of an agency certifies that the rule will not have a significant economic impact on a substantial number of small entities. The SBREFA amended the Regulatory Flexibility Act to require Federal agencies to provide a statement of the factual basis for certifying that a rule will not have a significant economic impact on a substantial number of small entities.

NHTSA has considered the effects of this rulemaking action under the Regulatory Flexibility Act. As explained above, NHTSA is proposing to incorporate performance requirements and test procedures that are based on voluntary standards adopted by the Society of Automotive Engineers. The agency believes that most, if not all, such hoses, tubing, and fittings are already designed to meet the most recent SAE requirements/procedures. As earlier stated, any potential additional cost would not be expected to have any impact on small businesses, but only on large manufacturers of brake hose materials that are produced in large quantities. Accordingly, I hereby certify that it would not have a significant economic impact on a substantial number of small entities.

C. National Environmental Policy Act

NHTSA has analyzed this rulemaking action for the purposes of the National Environmental Policy Act. The agency has determined that implementation of this action would not have any significant impact on the quality of the human environment.

D. Executive Order 13132 (Federalism)

NHTSA has examined today's proposal pursuant to Executive Order 13132 (64 FR 43255, August 10, 1999) and concluded that no additional consultation with States, local

governments or their representatives is mandated beyond the rulemaking process. The agency has concluded that the proposal does not have federalism implications because the rule does not have ''substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.''

Further, no consultation is needed to discuss the preemptive effect of today's proposal. NHTSA rules can have preemptive effect in at least two ways. First, the National Traffic and Motor Vehicle Safety Act contains an express preemptive provision: ''When a motor vehicle safety standard is in effect under this chapter, a State or a political subdivision of a State may prescribe or continue in effect a standard applicable to the same aspect of performance of a motor vehicle or motor vehicle equipment only if the standard is identical to the standard prescribed under this chapter.'' 49 U.S.C. 30103(b)(1). If this proposal is adopted as a final rule, it is this statutory command that would preempt State law, not the rule, so consultation would be inappropriate.

In addition to the express preemption noted above, the Supreme Court has also recognized that State requirements imposed on motor vehicle manufacturers, including sanctions imposed by State tort law, can stand as an obstacle to the accomplishment and execution of a NHTSA safety standard. When such a conflict is discerned, the Supremacy Clause of the Constitution makes these State requirements unenforceable. *See Geier* v. *American Honda Motor Co.,* 529 U.S. 861 (2000). NHTSA has not outlined such potential State requirements in connection with the proposed rule, however, in part because such conflicts can arise in varied contexts. If the proposal is adopted as a final rule, it is conceivable that such a conflict could become clear through subsequent experience with the rule and test regime. NHTSA may opine on such conflicts in the future, if warranted.

E. Executive Order 12988 (Civil Justice Reform)

With respect to the review of the promulgation of a new regulation, section 3(b) of Executive Order 12988, ''Civil Justice Reform'' (61 FR 4729, February 7, 1996) requires that Executive agencies make every reasonable effort to ensure that the regulation: (1) Clearly specifies the preemptive effect; (2) clearly specifies the effect on existing Federal law or regulation; (3) provides a clear legal standard for affected conduct, while promoting simplification and burden reduction; (4) clearly specifies the retroactive effect, if any; (5) adequately defines key terms; and (6) addresses other important issues affecting clarity and general draftsmanship under any guidelines issued by the Attorney General. This document is consistent with that requirement.

Pursuant to this Order, NHTSA notes as follows. The preemptive effect of this proposed rule is discussed above. NHTSA notes further that there is no requirement that individuals submit a petition for reconsideration or pursue other administrative proceeding before they may file suit in court.

F. Paperwork Reduction Act

Under the Paperwork Reduction Act of 1995, a person is not required to respond to a collection of information by a Federal agency unless the collection displays a valid Office of Management and Budget (OMB) control number. This proposed rule would not require any collections of information as defined by the OMB in 5 CFR part 1320.

G. National Technology Transfer and Advancement Act

Section 12(d) of the National Technology Transfer and Advancement Act of 1995 (NTTAA), Public Law 104–113, section 12(d) (15 U.S.C. 272) directs NHTSA to use voluntary consensus standards in its regulatory activities unless doing so would be inconsistent with applicable law or otherwise impractical. Voluntary consensus standards are technical standards (e.g., materials specifications, test methods, sampling procedures, and business practices) that are developed or adopted by voluntary consensus standards bodies, such as the Society of Automotive Engineers (SAE). The NTTAA directs the agency to provide Congress, through the OMB, explanations when we decide not to use available and applicable voluntary consensus standards.

The proposed changes that NHTSA is proposing are based on voluntary consensus standards adopted by the Society of Automotive Engineers. Accordingly, this proposed rule is in compliance with Section 12(d) of NTTAA.

H. Unfunded Mandates Reform Act

Section 202 of the Unfunded Mandates Reform Act of 1995 (UMRA) requires Federal agencies to prepare a written assessment of the costs, benefits, and other effects of proposed or final rules that include a Federal mandate likely to result in the expenditure by State, local or tribal governments, in the aggregate, or by the private sector, of more than $100 million in any one year (adjusted for inflation with base year of 1995). Before promulgating a rule for which a written statement is needed, section 205 of the UMRA generally requires NHTSA to identify and consider a reasonable number of regulatory alternatives and adopt the least costly, most cost-effective, or least burdensome alternative that achieves the objectives of the rule. The provisions of section 205 do not apply when they are inconsistent with applicable law. Moreover, section 205 allows NHTSA to adopt an alternative other than the least costly, most cost-effective or least burdensome alternative if the agency publishes with the final rule an explanation why that alternative was not adopted.

This proposed rule would not result in the expenditure by State, local, or tribal governments, in the aggregate, or by the private sector of more than $100 million annually. Accordingly, the agency has not prepared an Unfunded Mandates assessment.

I. Plain Language

Executive Order 12866 requires each agency to write all rules in plain language. Application of the principles of plain language includes consideration of the following questions:

—Have we organized the material to suit the public's needs?
—Are the requirements in the rule clearly stated?
—Does the rule contain technical language or jargon that is not clear?
—Would a different format (grouping and order of sections, use of headings, paragraphing) make the rule easier to understand?
—Would more (but shorter) sections be better?
—Could we improve clarity by adding tables, lists, or diagrams?
—What else could we do to make this rulemaking easier to understand?

If you have any responses to these questions, please include them in your comments on this NPRM.

J. Regulation Identifier Number (RIN)

The Department of Transportation assigns a regulation identifier number (RIN) to each regulatory action listed in the Unified Agenda of Federal Regulations. The Regulatory Information Service Center publishes the Unified Agenda in April and October of each year. You may use the RIN contained in the heading at the beginning of this document to find this action in the Unified Agenda.

K. Privacy Act

Anyone is able to search the electronic form of all comments received into any of our dockets by the name of the individual submitting the comment (or signing the comment, if submitted on behalf of an association, business, labor union, etc.). You may review DOT's complete Privacy Act Statement in the **Federal Register** published on April 11, 2000 (65 FR 19477 at 19478).

L. Comments

How do I prepare and submit comments?

Your comments must be written and in English. To ensure that your comments are correctly filed in the Docket, please include the docket number of this document in your comments.

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List of Subjects in 49 CFR Part 571

Imports, Motor vehicle safety, Motor vehicles, Rubber and rubber products, and Tires.

In consideration of the foregoing, NHTSA proposes to amend 49 CFR part 571 and to further amend the final rule published at 69 FR 76321, December 20, 2004, and effective December 15, 2006, delayed until December 20, 2007 (71 FR 74823, December 13, 2006), as follows:

PART 571—FEDERAL MOTOR VEHICLE SAFETY STANDARDS

1. The authority for part 571 would continue to read as follows:

Authority: 49 U.S.C. 322, 30111, 30115, 30117 and 30166; delegation of authority at 49 CFR 1.50.

2. Section 571.106 would be amended by:

a. Revising in paragraph S5.3.9, the first sentence,

b. Revising paragraph S7.1,

c. Revising Table III,

d. Revising in paragraph (e) of paragraph S7.2.1, the second and third sentences,

e. Revising paragraph S7.3.2,

f. Revising paragraph S7.3.3,

g. Revising Table IV,

h. Revising paragraph (a) of paragraph S8.1,

i. Revising paragraph (a) of paragraph S8.2,

j. Revising paragraph S8.4,

k. Revising the second sentence in paragraph (b) of paragraph S8.13,

l. Revising Table V,

m. Revising paragraph S9.2.10,

n. Revising in paragraph S10.1, paragraph (a) by adding a sentence before the existing sentence and paragraph (d) by revising the second sentence,

o. Revising paragraph (b) of paragraph S10.9.2,

p. Revising S11.1 by revising the second sentence, and adding a third sentence,

q. Revising paragraphs S11.3.12 and S11.3.13,

r. Revising Table VII,

s. Revising Table VIII,

t. Revising the Table accompanying Figure 8, that follows S12.7,

u. Revising in S12.13, the heading; revising in paragraph (a) the second and third sentences and adding fourth and fifth sentences; revising paragraph (c); revising in paragraph (d) the second sentence, and adding a third sentence, and

v. Revising in S12.14, the heading; revising paragraph (a) by adding third, fourth and fifth sentences, revising paragraph (b) by removing the second sentence; by revising paragraph (c); and by revising in paragraph (d), the second sentence and by adding a third sentence.

Section 571.106 would be amended as follows:

§571.106 Standard No. 106; Brake hoses.

* * * * *

S5.3.9 *Brake fluid compatibility, constriction, and burst strength.* Except for brake hose assemblies designed for use with mineral or petroleum-based brake fluids, a hydraulic brake hose assembly shall meet the constriction requirement of S5.3.1 after having been subjected to a temperature of 248 degrees Fahrenheit (120 degrees Celsius) for 70 hours while filled with SAE RM-66-05 ''Compatibility Fluid,'' as described in Appendix B of SAE Standard J1703, revised APR 2004, ''Motor Vehicle Brake Fluid.''* * *

* * * * *

S7.1 *Construction.* Each air brake hose assembly constructed of synthetic or natural elastomeric rubber shall be equipped with permanently-attached brake hose end fittings or reusable brake hose end fittings. Each air brake hose so constructed and intended or use with reusable end fittings shall conform to the dimensional requirements specified in Table III.

* * * * *

TABLE III.—AIR BRAKE HOSE DIMENSIONS FOR REUSABLE ASSEMBLIES.—INSIDE DIAMETER (I.D.) AND OUTSIDE DIAMETER (O.D.) DIMENSIONS IN INCHES (MILLIMETERS)

	Type A: Hose Size—Nominal Inside Diameter					
	1/4	5/16	3/8	7/16	1/2 SP (1)	5/8
Min. I.D.	0.227 (5.8)	0.289 (7.3)	0.352 (8.9)	0.407 (10.3)	0.469 (11.9)	0.594 (15.1)
Max. I.D.	0.273 (6.9)	0.335 (8.5)	0.398 (10.1)	0.469 (11.9)	0.531 (13.5)	0.656 (16.7)
Min. O.D.	0.594 (15.1)	0.656 (16.7)	0.719 (18.3)	0.781 (19.8)	0.844 (21.4)	1.031 (26.2)
Max. O.D.	0.656 (16.7)	0.719 (18.3)	0.781 (19.8)	0.843 (21.4)	0.906 (23.0)	1.094 (27.8)
	Type AI: Hose Size—Nominal Inside Diameter					
	3/16	1/4	5/16	13/32	1/2	5/8
Min. I.D.	0.188 (4.8)	0.250 (6.4)	0.312 (7.9)	0.406 (10.3)	0.500 (12.7)	0.625 (15.9)
Max. I.D.	0.214 (5.4)	0.281 (7.1)	0.343 (8.7)	0.437 (11.1)	0.539 (13.7)	0.667 (16.9)
Min. O.D.	0.472 (12.0)	0.535 (13.6)	0.598 (15.1)	0.714 (18.1)	0.808 (20.5)	0.933 (23.7)
Max. O.D.	0.510 (13.0)	0.573 (14.6)	0.636 (16.2)	0.760 (19.3)	0.854 (21.7)	0.979 (24.9)
	Type AII: Hose Size—Nominal Inside Diameter					
	3/16	1/4	5/16	13/32	1/2	5/8
Min. I.D.	0.188 (4.8)	0.250 (6.4)	0.312 (7.9)	0.406 (10.3)	0.500 (12.7)	0.625 (15.9)
Max. I.D.	0.214 (5.4)	0.281 (7.1)	0.343 (8.7)	0.437 (11.1)	0.539 (13.7)	0.667 (16.9)
Min. O.D.	0.500 (12.7)	0.562 (14.3)	0.656 (16.7)	0.742 (18.8)	0.898 (22.8)	1.054 (26.8)
Max. O.D.	0.539 (13.7)	0.602 (15.3)	0.695 (17.7)	0.789 (20.1)	0.945 (24.0)	1.101 (27.9)
	Type AIII: Hose Size—Nominal Inside Diameter					
	1/4	3/8	1/2	5/8		
Min. I.D.	0.244 (6.2)	0.366 (9.3)	0.484 (12.3)	0.610 (15.5)	.....	.....
Max. I.D.	0.276 (7.0)	0.398 (10.1)	0.531 (13.5)	0.657 (16.7)	.....	.....
Min. O.D.	0.472 (12.0)	0.610 (15.5)	0.748 (19.0)	0.894 (22.7)	.....	.....
Max. O.D.	0.551 (14.0)	0.689 (17.5)	0.827 (21.0)	0.972 (24.7)	.....	.....

* * * * *

S7.2.1(e) * * * The letter ''A'' shall indicate intended use in air brake systems. In the case of a hose constructed of synthetic or natural elastomeric rubber that is manufactured to meet the dimensional requirements in Table III, whether it is intended for use with permanently-attached end fittings or reusable end fittings, the letters ''AI'', ''AII'', or ''AIII'' shall indicate Type AI, Type AII, Type AIII air brake hose, respectively. Metric air brake hose, and any hose that does not conform to the AI, AII, or AIII dimensional requirements, shall be labeled with the letter ''A''.

* * * * *

S7.3.2 *High temperature resistance.* An air brake hose shall not show external or internal cracks, charring, or disintegration visible without magnification when straightened after being bent for 70 hours at 212 degrees Fahrenheit (100 degrees Celsius) over a test cylinder having the radius specified in Table IV for the size of hose tested (S8.1).

S7.3.3 *Low temperature resistance.* The inside and outside surfaces of an air brake hose shall not show cracks as a result of conditioning at minus 40 degrees Fahrenheit (minus 40 degrees Celsius) for 70 hours when bent around a test cylinder having the radius specified in Table IV for the size of hose tested (S8.2)

TABLE IV.—AIR BRAKE HOSE DIAMETERS AND TEST CYLINDER RADII

Nominal hose inside diameter, inches*	3/16	1/4	5/16	3/8	13/32	7/16, 1/2	5/8
Nominal hose inside diameter, mm*	4, 5	6	8		10	12	16
Test cylinder, radius in inches (millimeters)	2 (51)	2½ (64)	3 (76)	3½ (89)	3½ (89)	4 (102)	4½ (114)

*These sizes are listed to provide test cylinder radii for brake hoses manufactured in these sizes. They do not represent conversions.

* * * * *

S8.1 *High temperature resistance test.*

(a) Utilize a test cylinder with a radius specified in Table IV for the size of hose tested.

* * * * *

S8.2 *Low temperature resistance test.*

(a) Utilize a test cylinder with a radius specified in Table IV for the size of hose tested.

* * * * *

S8.4 *Ozone resistance test.* Conduct the test specified in S6.8, using air brake hose, except use the test cylinder specified in Table IV for the size of hose tested.

* * * * *

S8.13 *Adhesion test for air brake hose reinforced by wire.*

* * * * *

(b) * * * With the vacuum still applied to the hose, bend the hose 180 degrees around a test cylinder with a radius specified in Table IV for the size of hose tested. * * *

* * * * *

S9.2.10 *Deformation.*

(a) *Requirements for a vacuum brake hose constructed of synthetic or natural (elastomeric) rubber.* A vacuum brake hose shall return to 90 percent of its original outside diameter within 60 seconds after five applications of force as specified in S10.9, except that a wire-reinforced hose need only return to 85 percent of its original outside diameter. In the case of a heavy-duty hose the first application of force shall not exceed a peak value of 70 pounds, and the fifth application of force shall reach a peak value of at least 40 pounds. In the case of a light-duty hose the first application of force shall not exceed a peak value of 50 pounds, and the fifth application of force shall reach a peak value of at least 20 pounds.

(b) *Requirements for a vacuum brake hose constructed of plastic.* A vacuum brake hose shall return to 90 percent of its original outside diameter within 60 seconds after five applications of a 70 pound force (S10.9).

* * * * *

S10.1 *High temperature resistance test.*

(a) Use a 300 mm (11.8 inch) length of vacuum brake hose if it is constructed of synthetic or natural (elastomeric) rubber, or a 450 mm (17.7 inch) length of vacuum brake hose if it is constructed of plastic. * * *

* * * * *

(d) * * * Bend the hose around a mandrel with a diameter equal to five times the initial outside diameter of the hose if it is constructed of synthetic or natural (elastomeric) rubber, or eight times the initial outside diameter of the hose if it is constructed of plastic. * * *

* * * * *

TABLE V.—VACUUM BRAKE HOSE TEST REQUIREMENTS

Hose inside diameter*		Low temperature resistance test		Bend test	
Inches	Millimeters	Hose length, inches	Radius of cylinder, inches	Hose length, inches	Maximum collapse of outside diameter, inches
7/32	5	17½	3	7	11/64
1/4	6	17½	3	8	3/32
9/32		19	3½	9	3/16
11/32	8	19	3½	11	13/64
3/8	10	19	3½	12	5/32
7/16		20½	4	14	17/64
15/32		20½	4	14	17/64
1/2	12	20½	4	16	7/32
5/8	16	22	4½	22	7/32
3/4		24	5	28	7/32
1		28½	6½	36	9/32

* These sizes are listed to provide test values for brake hoses manufactured in these sizes. They do not represent conversions.

* * * * *

S10.9.2 *Operation.*

* * * * *

(b) For a hose constructed of synthetic or natural (elastomeric) rubber, apply gradually increasing force to the test specimen to compress its inside diameter to that specified in Table VI (dimension D of Figure 4) for the size of hose tested. For a hose constructed of plastic, apply gradually increasing force until 70 pounds of force is reached.

* * * * *

S11.1 *Construction.* * * * Plastic air brake tubing equipped with reusable end fittings shall conform to the dimensional requirements specified in Table VII. Plastic air brake tubing equipped with permanently attached end fittings shall conform to the dimensional requirements specified in Table VII except for the ''Maximum outside diameter'' dimensions.

* * * * *

S11.3.12 *Corrosive salt resistance.* Plastic air brake tubing shall not show cracks, voids, or delamination visible under 7-power magnification after immersion in an aqueous salt solution measured by weight of 50 percent water and 50 percent of a salt mixture consisting of 30 percent copper chloride, 20 percent sodium chloride, 20 percent potassium chloride, and 30 percent zinc chloride, for 200 hours while bent around a cylinder having a radius equal to the supported bend radius in Table VIII for the size of tubing tested (S12.13).

S11.3.13 *Methyl alcohol resistance.* Plastic air brake tubing shall not show cracks, voids, or delamination visible under 7-power magnification after immersion in a 95 percent methyl alcohol aqueous solution for 200 hours while bent around a cylinder having a radius equal to the supported bend radius in Table VIII for the size of tubing tested (S12.14).

* * * * *

TABLE VII.—PLASTIC AIR BRAKE TUBING DIMENSIONS

Nominal tubing outside diameter	Maximum outside diameter		Minimum outside diameter		Nominal inside diameter		Nominal wall thickness		Wall thickness tolerance	
	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches
1/8 inch	3.26	0.128	3.10	0.122	2.02	0.080	0.58	0.023	0.08	0.003
5/32 inch	4.08	0.161	3.92	0.154	2.38	0.094	0.81	0.032	0.08	0.003
3/16 inch	4.83	0.190	4.67	0.184	2.97	0.117	0.89	0.035	0.08	0.003
1/4 inch	6.43	0.253	6.27	0.247	4.35	0.171	1.00	0.039	0.08	0.003
5/16 inch	8.10	0.319	7.90	0.311	6.00	0.236	1.00	0.039	0.10	0.004
3/8 inch	9.63	0.379	9.43	0.371	6.39	0.252	1.57	0.062	0.10	0.004
1/2 inch	12.83	0.505	12.57	0.495	9.56	0.376	1.57	0.062	0.10	0.004
5/8 inch	16.01	0.630	15.75	0.620	11.20	0.441	2.34	0.092	0.13	0.005
3/4 inch	19.18	0.755	18.92	0.745	14.37	0.566	2.34	0.092	0.13	0.005
4 mm	4.08	0.161	3.92	0.154	2.38	0.094	0.81	0.032	0.08	0.003
6 mm	6.08	0.239	5.92	0.233	4.00	0.157	1.00	0.039	0.08	0.003
8 mm	8.10	0.319	7.90	0.311	6.00	0.236	1.00	0.039	0.10	0.004
10 mm	10.13	0.399	9.87	0.389	7.00	0.276	1.50	0.059	0.10	0.004
12 mm	12.13	0.478	11.87	0.467	9.00	0.354	1.50	0.059	0.10	0.004
16 mm	16.13	0.635	15.87	0.625	12.00	0.472	2.00	0.079	0.13	0.005
19 mm	19.18	0.755	18.92	0.745	14.37	0.566	2.34	0.092	0.13	0.005

Note: The following sizes of metric and inch-dimensioned tubing are identical: 5/32 inch and 4 mm; 5/16 inch and 8 mm; 3/4 inch and 19 mm. These sizes may be labeled with either or both of the metric and inch nominal outside diameters.

* * * * *

TABLE VIII.—PLASTIC AIR BRAKE TUBING MECHANICAL PROPERTIES

Nominal Tubing OD	Burst strength pressure		Supported bend radius(1)		Unsupported bend radius(2)		Conditioned tensile load	
	kPa	Psi	mm	inches	mm	inches	N	lbf
1/8 inch	6900	1000	9.4	0.37	9.4	0.37	156	35
5/32 inch	8300	1200	12.7	0.50	12.7	0.50	178	40
3/16 inch	8300	1200	19.1	0.75	19.1	0.75	222	50
1/4 inch	8300	1200	25.4	1.00	25.4	1.00	222	50
5/16 inch	6900	1000	32.0	1.26	38.1	1.50	334	75
3/8 inch	9700	1400	38.1	1.50	38.1	1.50	667	150
1/2 inch	6600	950	50.8	2.00	63.5	2.50	890	200
5/8 inch	6200	900	63.5	2.50	76.2	3.00	1446	325
3/4 inch	5500	800	76.2	3.00	88.9	3.50	1557	350
4 mm	8300	1200	12.7	0.50	12.7	0.50	178	40
6 mm	7600	1100	25.4	1.00	25.4	1.00	222	50
8 mm	6200	900	32.0	1.26	38.1	1.50	334	75
10 mm	8200	1200	38.1	1.50	38.1	1.50	667	150
12 mm	6900	1000	45.0	1.77	56.3	2.22	890	200
16 mm	6000	875	70.0	2.76	84.0	3.31	1446	325
19 mm	5500	800	76.2	3.00	88.9	3.50	1557	350

Notes: (1) Supported bend radius for tests specifying cylinders around which the tubing is bent. (2) Unsupported bend radius for the collapse resistance test in which the tubing is not supported by a cylinder during bending.

* * * * *

TABLE ACCOMPANYING FIGURE 8

Nominal tubing outside diameter	Hole diameter "D"	
	Mm	Inches
1/8 inch	4.00	0.157
5/32 inch	4.80	0.189
3/16 inch	5.54	0.218
1/4 inch	7.14	0.281
5/16 inch	8.80	0.346
3/8 inch	10.30	0.406
1/2 inch	13.49	0.531
5/8 inch	16.66	0.656
3/4 inch	20.32	0.800
4 mm	4.80	0.189
6 mm	6.80	0.268
8 mm	8.80	0.346
10 mm	10.80	0.425
12 mm	12.80	0.504
16 mm	16.80	0.661
19 mm	20.32	0.800

* * * * *

S12.13 *Corrosive salt resistance test.*

(a) * * * The cylinder is constructed of a non-reactive material or coated to prevent chemical reaction with corrosive salt compounds. Prepare a sample of tubing with a length equal to three times the circumference of the cylinder. Plug each end of the tubing with a non-reactive, smooth surface plug with a diameter equal to 105 percent of the nominal inside diameter of the tubing in Table VII for the size of tubing being tested. Each plug shall be inserted into the tubing a distance equal to the nominal inside diameter of the tubing.

* * * * *

(c) Immerse the tubing and cylinder in the 50-percent aqueous salt solution specified in S11.3.12 at room temperature so that the entire tubing sample including the plugged ends is submerged in the solution, for a duration of 200 hours.

(d) * * * Remove the end plugs but retain the tubing on the cylinder. Inspect the outer surface of the tubing, the ends of the tubing, and the inside of the tubing that is visible from the open ends, under 7-power magnification, for cracks, voids, or delamination.

S12.14 *Methyl alcohol resistance test.*

(a) * * * Prepare a sample of tubing with a length equal to three times the circumference of the cylinder. Plug each end of the tubing with a non-reactive, smooth surface plug with a diameter equal to 105 percent of the nominal inside diameter of the tubing in Table VII for the size tubing being tested. Each plug shall be inserted into the tubing a distance equal to the nominal inside diameter of the tubing.

* * * * *

(c) Immerse the tubing and cylinder in a solution measured by weight of 95 percent methyl alcohol and 5 percent water at room temperature so that the entire tubing sample including the plugged ends is submerged in the solution, for a duration of 200 hours.

(d) * * * Remove the end plugs but retain the tubing on the cylinder. Inspect the outer surface of the tubing, the ends of the tubing, and the inside of the tubing that is visible from the open ends, under 7-power magnification, for cracks, voids, or delamination.

* * * * *

Issued: September 27, 2007.

Ronald L. Medford,

Senior Associate Administrator for Vehicle Safety.

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