

used to operate the brakes on the towed vehicles in emergencies. Such second control shall be independent of brake air, hydraulic, and other pressure, and independent of other controls, unless the braking system be so arranged that failure of the pressure on which the second control depends will cause the towed vehicle brakes to be applied automatically. The second control is not required by this rule to provide modulated or graduated braking.

(d) Every trailer required to be equipped with brakes shall be equipped with brakes of such character as to be applied automatically and promptly upon breakaway from the towing vehicle, and means shall be provided to maintain application of the brakes on the trailer in such case for at least 15 minutes.

(e) Air brake systems installed on towed vehicles shall be so designed, by the use of "no-bleed-back" relay emergency valves or equivalent devices, that the supply reservoir used to provide air for brakes shall be safeguarded against backflow of air to the towing vehicle upon reduction of the towing vehicle air pressure.

(f) The requirements of paragraphs (b), (c), and (d) of this section shall not be applicable to motor vehicles in driveaway-towaway operations.

§ 393.44 Front brake lines, protection.

On every bus, if equipped with air brakes, the braking system shall be so constructed that in the event any brake line to any of the front wheels is broken, the driver can apply the brakes on the rear wheels despite such breakage. The means used to apply the brakes may be located forward of the driver's seat as long as it can be operated manually by the driver when the driver is properly restrained by any seat belt assembly provided for use. Every bus shall meet this requirement or comply with the regulations in effect at the time of its manufacture.

[53 FR 49400, Dec. 7, 1988]

§ 393.45 Brake tubing and hose, adequacy.

(a) *General requirements.* Brake tubing and brake hose must—

(1) Be designed and constructed in a manner that insures proper, adequate,

and continued functioning of the tubing or hose;

(2) Be installed in a manner that insures proper continued functioning of the tubing or hose;

(3) Be long and flexible enough to accommodate without damage all normal motions of the parts to which it is attached;

(4) Be suitably secured against chafing, kinking, or other mechanical damage;

(5) Be installed in a manner that prevents it from contacting the vehicle's exhaust system or any other source of high temperatures; and

(6) Conform to the applicable requirements of paragraph (b) or (c) of this section. In addition, all hose installed on and after January 1, 1981, must conform to those applicable subsections of FMVSS 106 (49 CFR 571.106).

(b) *Special requirements for metallic brake tubing, nonmetallic brake tubing, coiled nonmetallic brake tubing and brake hose.* (1) Metallic brake tubing, nonmetallic brake tubing, coiled nonmetallic brake tubing, and brake hose installed on a commercial motor vehicle on and after March 7, 1989, must meet or exceed one of the following specifications set forth in the SAE Handbook, 1985 edition:

(i) Metallic Air Brake Tubing—SAE Recommended Practice J1149—Metallic Air Brake System Tubing and Pipe—July 76.

(ii) Nonmetallic Air Brake Tubing—SAE Recommended Practice J844—Nonmetallic Air Brake System Type B—OCT 80.

(iii) Air Brake Hose—SAE Recommended Practice J1402—Automotive Air Brake Hose and Hose Assemblies—JUN 85.

(iv) Hydraulic Brake Hose—SAE Recommended Practice J1401 Road Vehicle-Hydraulic Brake Hose Assemblies for Use with Non-Petroleum Base Hydraulic Fluid JUN 85.

(v) Vacuum Brake Hose—SAE Recommended Practice J1403 Vacuum Brake Hose JUN 85.

(2) Except as provided in paragraph (c) of this section, brake hose and brake tubing installed on a motor vehicle before March 7, 1989, must conform to 49 CFR 393.45 effective October 31, 1983.

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(c) *Nonmetallic brake tubing.* Coiled nonmetallic brake tubing may be used for connections between towed and towing vehicles or between the frame of a towed vehicle and the unsprung subframe of an adjustable axle of that vehicle if—

(1) The coiled tubing has a straight segment (pigtail) at each end that is at least 2 inches in length and is encased in a spring guard or similar device which prevents the tubing from kinking at the fitting at which it is attached to the vehicle; and

(2) The spring guard or similar device has at least 2 inches of closed coils or similar surface at its interface with the fitting and extends at least 1½ inches into the coiled segment of the tubing from its straight segment.

(d) *Brake tubing and brake hose, uses.* Metallic and nonmetallic brake tubing is intended for use in areas of the brake system where relative movement in the line is not anticipated. Brake hose and coiled nonmetallic brake tubing is intended for use in the brake system where substantial relative movement in the line is anticipated or the hose/coiled nonmetallic brake tubing is exposed to potential tension or impact such as between the frame and axle in a conventional type suspension system (axle attached to frame by suspension system). Nonmetallic brake tubing may be used through an articulation point provided movement is less than 4.5 degrees in a vertical plane, and 7.4 degrees in a transverse horizontal plane.

(49 U.S.C. 304, 1655; 49 CFR 1.48(b) and 301.60)

[38 FR 4333, Feb. 13, 1973, as amended at 44 FR 25457, May 1, 1979; 45 FR 46424, July 10, 1980; 47 FR 47837, Oct. 28, 1982; 53 FR 49400, Dec. 7, 1988]

§ 393.46 Brake tubing and hose connections.

All connections for air, vacuum, or hydraulic braking systems shall:

(a) Be adequate in material and construction to insure proper continued functioning;

(b) Be designed, constructed, and installed so as to insure, when properly connected, an attachment free of leaks, constrictions, or other defects;

(c) Have suitable provision in every detachable connection to afford reason-

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able assurance against accidental disconnection;

(d) Have the vacuum brake engine manifold connection at least three-eighths inch in diameter.

(e) If installed on a vehicle on or after January 1, 1981, meet requirements under applicable subsections of FMVSS 106 (49 CFR 571.106).

(f) Splices in tubing if installed on a vehicle after March 7, 1989, must use fittings that meet the requirements of SAE Standard J512–OCT 80 Automotive Tube Fittings or for air brake systems SAE J246–March 81 Spherical and Flanged Sleeve (Compression) Tube Fittings as found in the SAE Handbook 1985 edition.

[33 FR 19735, Dec. 28, 1968, as amended at 44 FR 25457, May 1, 1979; 53 FR 49400, Dec. 7, 1988]

§ 393.47 Brake lining.

The brake lining in every motor vehicle shall be so constructed and installed as not to be subject to excessive fading and grabbing and shall be adequate in thickness, means of attachment, and physical characteristics to provide for safe and reliable stopping of the motor vehicle.

§ 393.48 Brakes to be operative.

(a) *General rule.* Except as provided in paragraphs (b) and (c) of this section, all brakes with which a motor vehicle is equipped must at all times be capable of operating.

(b) *Devices to reduce or remove front-wheel braking effort.* A motor vehicle may be equipped with a device to reduce the braking effort upon its front wheels or, in the case of a three-axle truck or truck tractor manufactured before March 1, 1975, to remove the braking effort upon its front wheels, if that device conforms to, and is used in compliance with, the rules in paragraph (b) (1) or (2) of this section.

(1) *Manually operated devices.* A manually operated device to reduce or remove the front-wheel braking effort must not be—

(i) Installed in a motor vehicle other than a bus, truck, or truck tractor; or

(ii) Installed in a bus, truck, or truck tractor manufactured after February 28, 1975; or