

(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-

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