

or similar device shall operate automatically when the air pressure on the towing vehicle is between 138 kPa and 310 kPa (20 psi and 45 psi).

(b) *Emergency brake requirements, air brakes.* Every truck or truck tractor equipped with air brakes, when used for towing other vehicles equipped with air brakes, shall be equipped with two means of activating the emergency features of the trailer brakes. One of these means shall operate automatically in the event of reduction of the towing vehicle air supply to a fixed pressure which shall not be lower than 20 pounds per square inch nor higher than 45 pounds per square inch. The other means shall be a manually controlled device readily operable by a person seated in the driving seat. Its emergency position or method of operation shall be clearly indicated. In no instance may the manual means be so arranged as to permit its use to prevent operation of the automatic means. The automatic and manual means required by this section may be, but are not required to be, separate.

(c) *Emergency brake requirements, vacuum brakes.* Every truck tractor and truck when used for towing other vehicles equipped with vacuum brakes, shall have, in addition to the single control required by § 393.49 to operate all brakes of the combination, a second manual control device which can be 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) *Breakaway braking requirements for trailers.* Every trailer required to be equipped with brakes shall have brakes which apply automatically and immediately upon breakaway from the towing vehicle. With the exception of trailers having three or more axles, all brakes with which the trailer is required to be equipped must be applied upon breakaway from the towing vehi-

cle. The brakes must remain in the applied position for at least 15 minutes.

(e) *Emergency valves.* 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) *Exception.* The requirements of paragraphs (b), (c) and (d) of this section shall not be applicable to commercial motor vehicles being transported in driveaway-towaway operations.

[53 FR 49384, Dec. 7, 1988, as amended at 70 FR 48050, Aug. 15, 2005]

§ 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 hoses; hose assemblies and end fittings.

(a) *General construction requirements for tubing and hoses, assemblies, and end fittings.* All brake tubing and hoses, brake hose assemblies, and brake hose end fittings must meet the applicable requirements of FMVSS No. 106 (49 CFR 571.106).

(b) *Brake tubing and hose installation.* Brake tubing and hose must—

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

(2) Be secured against chaffing, kinking, or other mechanical damage; and

(3) Be installed in a manner that prevents it from contacting the vehicle's

§ 393.46

49 CFR Ch. III (10–1–14 Edition)

exhaust system or any other source of high temperatures.

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

(1) The coiled tubing has a straight segment (pigtail) at each end that is at least 51 mm (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 51 mm (2 inches) of closed coils or similar surface at its interface with the fitting and extends at least 38 mm (1½ inches) into the coiled segment of the tubing from its straight segment.

(d) *Brake tubing and hose connections.* All connections for air, vacuum, or hydraulic braking systems shall be installed so as to ensure an attachment free of leaks, constrictions or other conditions which would adversely affect the performance of the brake system.

[70 FR 48050, Aug. 15, 2005]

§ 393.46 [Reserved]

§ 393.47 Brake actuators, slack adjusters, linings/pads and drums/rotors.

(a) *General requirements.* Brake components must be constructed, installed and maintained to prevent excessive fading and grabbing. The means of attachment and physical characteristics must provide for safe and reliable stopping of the commercial motor vehicle.

(b) *Brake chambers.* The service brake chambers and spring brake chambers on each end of an axle must be the same size.

(c) *Slack adjusters.* The effective length of the slack adjuster on each end of an axle must be the same.

(d) *Linings and pads.* The thickness of the brake linings or pads shall meet the applicable requirements of this paragraph—

(1) *Steering axle brakes.* The brake lining/pad thickness on the steering axle of a truck, truck-tractor or bus shall not be less than 4.8 mm (¾ inch) at the shoe center for a shoe with a continuous strip of lining; less than 6.4 mm (¼ inch) at the shoe center for a shoe with two pads; or worn to the wear indicator if the lining is so marked, for air drum brakes. The steering axle brake lining/pad thickness shall not be less than 3.2 mm (⅛ inch) for air disc brakes, or 1.6 mm (¼ inch) or less for hydraulic disc, drum and electric brakes.

(2) *Non-steering axle brakes.* An air braked commercial motor vehicle shall not be operated with brake lining/pad thickness less than 6.4 mm (¼ inch) or to the wear indicator if the lining is so marked (measured at the shoe center for drum brakes); or less than 3.2 mm (⅛ inch) for disc brakes. Hydraulic or electric braked commercial motor vehicles shall not be operated with a lining/pad thickness less than 1.6 mm (¼ inch) (measured at the shoe center) for disc or drum brakes.

(e) *Clamp, Bendix DD–3, bolt-type, and rotochamber brake actuator readjustment limits.* (1) The pushrod stroke must not be greater than the values specified in the following tables:

CLAMP-TYPE BRAKE CHAMBERS

Type	Outside diameter	Brake readjustment limit: standard stroke chamber	Brake readjustment limit: long stroke chamber
6	4½ in. (114 mm)	1¼ in. (31.8 mm).	
9	5¼ in. (133 mm)	1⅝ in. (34.9 mm).	
12	5½ in. (145 mm)	1⅞ in. (34.9 mm)	1¼ in. (44.5 mm).
16	6⅝ in. (162 mm)	1¾ in. (44.5 mm)	2 in. (50.8 mm).
20	6¾ in. (172 mm)	1¾ in. (44.5 mm)	2 in. (50.8 mm).
24	7⅞ in. (184 mm)	1¾ in. (44.5 mm)	2 ½ in. (63.5 mm). ¹
30	8¾ in. (206 mm)	2 in. (50.8 mm)	2 in. (50.8 mm).
36	9 in. (229 mm)	2¼ in. (57.2 mm).	2 ½ in. (63.5 mm). ²

¹ For type 20 chambers with a 3-inch (76 mm) rated stroke.

² For type 24 chambers with a 3-inch (76 mm) rated stroke.