

§ 393.46

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 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.

49 CFR Ch. III (10–1–11 Edition)

(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 ($\frac{3}{16}$ inch) at the shoe center for a shoe with a continuous strip of lining; less than 6.4 mm ($\frac{1}{4}$ 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 ($\frac{1}{8}$ inch) for air disc brakes, or 1.6 mm ($\frac{1}{16}$ 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 ($\frac{1}{4}$ 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 ($\frac{1}{8}$ 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 ($\frac{1}{16}$ inch) (measured at the shoe center) for disc or drum brakes.

(e) *Clamp and roto-chamber brake actuator readjustment limits.* The pushrod travel for clamp and roto-chamber type actuators must be less than 80 percent of the rated strokes listed in SAE J1817—Long Stroke Air Brake Actuator Marking, July 2001 (See § 393.7 (b) for information on incorporation by reference and availability of this document), or 80 percent of the rated stroke marked on the brake chamber by the chamber manufacturer, or the readjustment limit marked on the brake chamber by the chamber manufacturer. The pushrod travel for Type 16 and 20 long stroke clamp type brake actuators must be less than 51 mm (2 inches) or 80 percent of the rated stroke marked on the brake chamber by the chamber manufacturer, or the readjustment

limit marked on the brake chamber by the chamber manufacturer.

(f) *Wedge brake adjustment.* The movement of the scribe mark on the lining shall not exceed 1.6 mm ($\frac{1}{16}$ inch).

(g) *Drums and rotors.* The thickness of the drums or rotors shall not be less than the limits established by the brake drum or rotor manufacturer.

[70 FR 48051, Aug. 15, 2005]

§ 393.48 Brakes to be operative.

(a) *General rule.* Except as provided in paragraphs (b), (c), and (d) 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 commercial motor vehicle may be equipped with a device to reduce the front wheel braking effort (or in the case of a three-axle truck or truck tractor manufactured before March 1, 1975, a device to remove the front-wheel braking effort) if that device meets the applicable requirements of paragraphs (b)(1) and (2) of this section.

(1) *Manually operated devices.* Manually operated devices to reduce or remove front-wheel braking effort may only be used on buses, trucks, and truck tractors manufactured before March 1, 1975. Such devices must not be used unless the vehicle is being operated under adverse conditions such as wet, snowy, or icy roads.

(2) *Automatic devices.* Automatic devices must not reduce the front-wheel braking force by more than 50 percent of the braking force available when the automatic device is disconnected (regardless of whether or not an antilock system failure has occurred on any axle). The device must not be operable by the driver except upon application of the control that activates the braking system. The device must not be operable when the brake control application pressure exceeds 85 psig (for vehicles equipped with air brakes) or 85 percent of the maximum system pressure (for vehicles which are not equipped with air brakes).

(c) *Exception.* Paragraph (a) of this section does not apply to—

(1) A towed vehicle with disabling damage as defined in § 390.5;

(2) A vehicle which is towed in a driveaway-towaway operation and is included in the exemption to the requirement for brakes on all wheels, § 393.42(b);

(3) Unladen converter dollies with a gross weight of 1,361 kg (3,000 lbs) or less, and manufactured prior to March 1, 1998;

(4) The steering axle of a three-axle dolly which is steered by a co-driver;

(5) Loaded house moving dollies, specialized trailers and dollies used to transport industrial furnaces, reactors, and similar motor vehicles provided the speed at which the combination of vehicles will be operated does not exceed 32 km/hour (20 mph) and brakes on the combination of vehicles are capable of stopping the combination within 12.2 meters (40 feet) from the speed at which the vehicle is being operated or 32 km/hour (20 mph), whichever is less.

(6) Raised lift axles. Brakes on lift axles need not be capable of being operated while the lift axle is raised. However, brakes on lift axles must be capable of being applied whenever the lift axle is lowered and the tires contact the roadway.

(d) *Surge brakes.* (1) Surge brakes are allowed on:

(i) Any trailer with a gross vehicle weight rating (GVWR) of 12,000 pounds or less, when its GVWR does not exceed 1.75 times the GVWR of the towing vehicle; and

(ii) Any trailer with a GVWR greater than 12,000 pounds, but less than 20,001 pounds, when its GVWR does not exceed 1.25 times the GVWR of the towing vehicle.

(2) The gross vehicle weight (GVW) of a trailer equipped with surge brakes may be used instead of its GVWR to calculate compliance with the weight ratios specified in paragraph (d)(1) of this section when the trailer manufacturer's GVWR label is missing.

(3) The GVW of a trailer equipped with surge brakes must be used to calculate compliance with the weight ratios specified in paragraph (d)(1) of this section when the trailer's GVW exceeds its GVWR.

(4) The surge brakes must meet the requirements of § 393.40.

[70 FR 48051, Aug. 15, 2005, as amended at 72 FR 9870, Mar. 6, 2007]