

SCHOOL BUS BRAKE SYSTEM

ITEM AND METHOD OF INSPECTION		POINT VALUE AND REQUIREMENT
DESCRIPTION		

(#) DESIGNATES POINTS TO BE DEDUCTED

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| III. Brakes | (25) 1 | . All school buses must have, at all times, four wheel brakes adequate to control the movement of and to stop and hold the bus. All brakes shall be maintained and in good working order and shall be so adjusted as to operate as equally as practicable with respect to the wheels on opposite sides of the vehicle. All school buses equipped with air brakes manufactured after December 31, 1994, must be equipped with automatic slack adjusters. |
| A. Service Brakes | | |
| 1. Requirements | | |
| 2. Test for stopping distance | (25) 2. | Foot or service brakes shall, at all times, be capable of stopping the complete unit (i.e. the wet chassis weight, plus body weight, plus drivers' weight, without pupils) from a speed of 20 miles per hour in not more than 25 feet for a Type A school bus and not more than 35 feet for a Type B, C, and D school bus. Such distance to be measured from point at which movement of brake pedal or control begins. Bus must stay in a 12 foot wide lane during test. (See Appendix A for further details.) |
| *Test shall be made on substantially level (not to exceed plus or minus one percent grade) dry, smooth, hard surface that is free of loose material. | | |
| * Driving of bus - Driving of the bus during any stopping test must be done by an employee of the school district or bus contractor. | | |
| 3. Federal Brake Requirements (CFR 49/571.105, 571.106, and 571.121) | (25) 3. | A school bus must meet federal brake standards at the time of manufacture and must include a service brake, a parking brake, and an emergency brake system. |

M.S. 169.4502

MS. 169.4502
49 CFR 570.59
49 CFR 570.5

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| 4. Parts: Visual Inspection of:
a. Hydraulic Brakes

Includes the hydraulic portion of vacuum actuated and compressed-air-over hydraulic systems. | (5) | a. A school bus shall not have hydraulic hoses, tubing, valves, and connections leaking, cracked, pinched, chafed, flattened, restricted, broken, missing, or improperly retained or supported to prevent damage by heat, vibration, or abrasion by contact with the frame, axle, other lines, or any other part of the vehicle. Brake hoses and tubing must conform to CFR 49/571.106. |
| 1) Master Cylinder | (25) | 1) A master cylinder shall have a reservoir compartment for each service brake subsystem serviced by the master cylinder. Loss of fluid from one compartment shall not result in a complete loss of fluid from another compartment. (See CFR 49/571.105 S5.4 for further information.)

If hydraulic system is suspect of being faulty, check brake fluid in master cylinder. If the brake fluid is cloudy, drain out the system because the fluid is contaminated.

CFR 49/571.105-.106-.121 |
| a) Fluid level | (5) | a) A master cylinder and assistor reservoir shall be full of fluid above the safe level recommended by the manufacturer for all compartments of the fluid reservoirs. |

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| b) Damage | (25) | b) Master cylinder, wheel cylinder, caliper, assistor pump, assistor pump gear, belts, or pulleys shall be free of cracks, leaks, wear, or damage, and they shall be securely mounted and properly adjusted. |
| 3) Warning Device
(Includes ABS warning system) | (25) | 3) A school bus with a hydraulic service brake system, or hydraulic-assistor type-over hydraulic service brake system must be equipped with a signal that provides a warning to the driver when a failure in the brake system occurs. The warning device shall be mounted in front of, and in clear view of the driver, and shall conform to CFR 49/571.105 subp. 5.3 and CFR 49/571.101. The ABS warning system must be in compliance with CFR 49/571.105. |
| b. Compressed air brakes includes compressed air portion of air over hydraulic systems. | | b. Every school bus with a compressed air service brake system shall have: |
| 1) Compressor | (25) | 1) An air compressor of sufficient capacity to increase air pressure in the supply and service reservoirs from 85 p.s.i. (pounds per square inch) to 100 psi within a reasonable amount of time, 3 to 4 minute maximum (actual reservoir capacity x 25) required reservoir capacity. |

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2) Reservoir

a) Testing procedure

a) Reservoir capacity shall be sufficient enough to ensure a full service brake application with the engine stopped, without depleting the air pressure below 70 percent of that air pressure as indicated by the gauge immediately before the brake application is made. (A full brake application is made when pedal is pushed to the limit of its travel.)

b) Safety Valve

(25)

CFR 49/571.121

b) The first reservoir of every air brake system shall have mounted on it, a safety valve to protect against excessive air-brake system pressure.

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c) Defect or Absent	(25)	c) Each service brake system shall be protected against loss of pressure due to failure or leakage in the system between the service reservoir and the source of the pressure, by check valves or equivalent devices whose proper functioning can be checked without disconnecting any air line or fitting.
d) Drain valve	(25)	d) Each reservoir shall have a condensation drain valve that can be operated annually.
e) Number of reservoirs	(25)	e) Each school bus with compressed air service brakes shall have at least two (2) reservoirs, or one vessel divided into two (2) compartments connected in a series.
3) Pressure Gauge (Ref. CFR 49/571.121) M.S. 169.4502 CFR 49/571.121	(25)	3) Each school bus with a compressed air service brake system shall have an illuminated pressure gauge for each service brake reservoir system, readily visible to a person in the normal driving position, that indicates the service reservoir system air pressure. The accuracy of the gauge shall be within plus or minus 7 percent of the compressor cut-out pressure.

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| 4) Low pressure warning device | (25) | 4) Each school bus with compressed air service brakes shall have a signal, other than a pressure gauge that gives a continuous warning to a person in a normal driving position when the ignition is in the "on" or "run" position and the air pressure in the service reservoir system is below 60 psi. The signal shall be either a red light visible within the driver's forward field of view, or both audible and visible to the driver as specified in CFR 49/571.101. |
| 5) Air brake parts | (25) | 5) A school bus shall not have any air brake parts such as air lines, valves, fittings, air brake chambers, governors, slack adjusters, leaking, cracked, missing, inoperative, out of adjustment, loose, worn, broken, improperly secured or retained, inadequate, or any other condition or defect likely to reduce the efficiency of the brake system. |
| a) Protection | (25) | a) Lines supplying air to the air system reservoirs shall be safe guarded through proper design and bracing to protect from excessive heat or vibration. |

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CFR 49/571.121-.101

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| C. Specific requirements for vacuum actuated and compressed air over hydraulic systems | (25) | 1. Buses with service brakes activated or assisted by air or vacuum must, with one such unit inoperative and depleted of all reserve capability, be capable of stopping the vehicle from 60 mph within the corresponding distance specified in column iv of Table II of CFR 49/571.105 S5.1.3.1a |
| 2. Warning device compressed air | (25) | 2. Buses with service brake assisted by compressed air must have a low air warning device that conforms to CFR 49/571.121. |
| 3. Warning device; gauge vacuum | (25) | 3. Buses with service brakes assisted by vacuum must be equipped with a device that provides a readily audible or visible continuous warning to the driver whenever the vacuum in the vehicle's supply reservoir is less than 8 inches of mercury and with a vacuum gauge that indicates to the driver the vacuum in inches of mercury available for braking. |
| 4. Check valves | (25) | 4. Buses having vacuum actuated or compressed air over hydraulic systems shall be equipped with check valves located between supply source and the reservoir.

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| D. Common parts | (25) | 1. A school bus shall not have brake drums or rotors worn or ground past the minimum safe thickness recommended by the manufacturer. Brake drums and rotors shall not: be cracked, broken, missing, or have loose or elongated mounting holes, or be contaminated with grease or oil. |
| 2. Brake shoes | (25) | 2. Brake shoes and pads shall not be thinner than manufacturers' recommended safe level, or cracked, or missing, or contaminated by grease or oil. |

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| 3. Shoe construction | (25) | 3. The brake linings on a school bus must be constructed and installed to avoid excessive fading and grabbing. The brake lining must be adequate in thickness, means of attachment and physical characteristics to provide for safe and reliable stopping of the vehicle. |
| 4. Brake slack adjustment and maximum push rod travel | | 4. Refer to Appendix A |
| B. Brake Hose | (25) | B. Hoses blistered, but not leaking (must conform to CFR 49/571.106). |
| C. Parking Brake | (25) | C. All school buses shall be manufactured with a parking brake system of a functional type with a solely mechanical means to retain engagement. |
| 1. Type B, C, and D | (25) | 1. The parking brake system of a type B, C, and D school bus shall be capable of holding the vehicle stationary for 5 minutes, in both forward and reverse positions on a 20 percent grade free from snow, ice, and from loose material. |
| 2. Type A and III | (25) | 2. The parking brake system of a type A and III school bus shall be capable of holding the vehicle stationary (to the limit of traction on the braked wheels) for 5 minutes in both forward and reverse direction on a 30 percent grade free from snow, ice, and loose material. |

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| 3. a. Parking Brake | (25) | 3. a. When applied, parking brake shall remain in applied position with capability set forth in item C, 1 & 2, despite exhaustion of source of energy used for application or despite leakage of any kind. |
| b. Markings | | b. Parking brake shall be readily accessible to driver in normal driving position and shall be equipped with warning light readily visible to driver in normal driving position and be marked "BRAKE." M.S. 169.4502 |
| D. Emergency Brake System | (25) | D. The brake system(s) shall perform emergency stopping function and be so designed and constructed that single failure anywhere in brake system which performs service brake function, excepting mechanical parts of wheel brake assemblies and brake pedal and brake pedal attachment to brake valves or master cylinder, will not leave vehicle without operative brakes capable of stopping vehicle when loaded up to and including manufacturer's rated gross vehicle weight at any legal speed.

CFR 49/571.105. |

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| 1. Emergency Features | (25) | 1. A school bus must have either emergency features in the service brake system or a system separate from the service brake system. |
| 2. Control | (25) | 2. A control by which the driver applies the emergency brake system must be located so that the driver can readily operate it while being properly restrained by a seat belt assembly provided for the driver's use.

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| 3. Control location | (25) | 3. The control for applying the emergency brake system may be combined with either the control for applying the service brake system or the control for applying the parking brake system. All three controls must not be combined. |
| 4. Method of inspection for a canister braker vacuum emergency system | (25) | 4. Test the system with the engine turned off, pump the brakes several times, then keep the brake pedal depressed. With brake pedal depressed, start engine and the brake pedal should push up to the natural position if the system is working correctly. |

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| 5. Safety Feature | (25) | 5. If the brake systems are interconnected, they must be designed, constructed, and maintained so that if one part of the operating mechanism of one or more of the systems fails, the vehicle will have brakes capable of performing as specified in CFR 49/571.105.

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Testing Procedure for Vacuum Booster Type Systems.

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| <p>A. Start engine to build up vacuum supply.</p> <p>B. Stop engine and turn key to the "on" position, depress the brake pedal fully. Vacuum supply shall not be depleted by more than 70 percent of that vacuum as indicated by the gauge immediately before the brake application.</p> <p>C. Depress brake pedal several times to eliminate all vacuum from the system; the low vacuum indicator should come on when the reservoir is less than 8 inches of mercury as shown on the vehicles vacuum gauge.</p> <p>D. Depress the brake pedal with 25-30 lbs. of foot force and maintain foot pressure while maintaining this force on the brake pedal. Start the engine and sense or feel a slight movement of the brake pedal when the engine starts. If there is no movement, the booster system is inoperable. The low vacuum indicator should go out after 8 inches of mercury if achieved.</p> | <p>Items tested during procedure:</p> <ol style="list-style-type: none"> 1. Vacuum gauge 2. Reservoir supply vacuum 3. Vacuum loss 4. Low vacuum indicator - come on 5. Vacuum booster 6. Low vacuum indicator - goes out |
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Testing Procedures for Compressed Air systems- **chock wheels before you start.

Items Tested:

- A. Start engine to build up air supply.
- B. Stop engine and turn key to the "on" position and make a full brake application. Pressure loss shall not exceed 3 lbs. per minute. Should also not deplete air supply more than 70 percent of that pressure indicated by the gauge immediately before the brake application is made.
- C. Drain the wet tank (first or primary reservoir) completely. The low air warning device should come on at 60 psi and stay on. Loosen the drain valves on the secondary tanks slightly to ascertain if the check valves are working. Then drain the secondary tanks completely while watching the emergency brake button and the air gauge. The button must pop out and the spring brakes must apply before the air supply is depleted (button should pop out between 20-45 psi).
- D. Start engine and build pressure. The warning device should go off at 60 psi. Check build up time - refer to CFR 49/571.121 S5.1.1.

- 1. Air gauge
- 2. Supply pressure
- 3. Air loss
- 4. Reservoir drain valves
- 5. Low air warning device - comes on
- 6. Reservoir check valves
- 7. Emergency brake button
- 8. Emergency brakes apply
- 9. Low-air warning device - goes out
- 10. Air compressor build up time

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Testing Procedure for Parking Brake

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| A. Stop the vehicle, and set the parking brake. Engine must remain at idle speed. | 1. | If the bus remains stationary, the parking brake system is functional |
| B. Attempt to move the bus by using the power of the engine and drive train (the bus may rock back and forth). At idle speed, the bus should not move. | 2. | If the bus does not remain stationary, the parking brake system is not functioning properly. |

