

MOTOR VEHICLE DEPARTMENT

(c) Exception—transit and metropolitan vehicles. 1. Front axle shall be wide-track, heavy-duty bus type and shall have gross weight rating at ground equal to or exceeding that portion of total load which is supported by front axle,

2. Rear axle shall be full-floating, heavy-duty bus type and shall have gross weight rating at ground equal to or exceeding that portion of total load which is supported by rear axle.

(3) BATTERY. (a) Storage battery, as established by manufacturer's rating, shall be of sufficient capacity to care for starting, lighting, signal devices, heating and other electrical equipment.

(b) No bus shall be equipped with battery of less than 70 ampere hours at 12 volts or 120 ampere hours at 6 volts measured at 20-hour rate.

(c) When battery is to be mounted outside of engine compartment, it may be temporarily mounted to chassis by chassis manufacturer. Body company will permanently mount battery on a sliding tray located so that center line of battery is 52 inches back of cowl. One-piece battery cables shall be provided by chassis manufacturer, such cables to be at least 36 inches longer than normally required, to accommodate battery when located 52 inches to rear of cowl.

(d) Exception—transit and metropolitan vehicles: subsection (c) does not apply.

(4) BRAKES. The following provisions for brakes shall become effective January 1, 1968. Until that date, the requirements of section MVD 5.23, Wis. Adm. Code, 1963 edition shall be in effect.

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(a) *Service brakes:*

1. Stopping ability of service brake system. Service brake system shall be designed and constructed so that by application of single control unit vehicle can be stopped within distances specified in a. and b. of this subsection. Stopping distance requirement tests shall be conducted in accordance with SAE J658 (1966) and with vehicle loaded (MGVW—manufacturer's gross vehicle weight).

**Note:** SAE J658—Service Brake Performance, recommended practice of Society of Automotive Engineers. This reference is available in the office of the Motor Vehicle Department, the Secretary of State, and the Revisor of Statutes.

a. Brakes shall be designed to have capability of developing deceleration of 14 fpsps (feet per second per second) from speed of 20 mph at pedal effort of not more than 75 pounds.

b. Stopping distance test with brakes cold shall be conducted after proper conditioning according to SAE J880 and vehicle shall stop from speed of 20 mph, within following distances at pedal effort of not more than 200 pounds:

10,000 pounds GVW and under	-----	25 feet
Over 10,000 pounds GVW	-----	35 feet

c. Brake balance shall be such that, when tested at speed of 20 mph under any normal conditions of loading within MGVW (manufacturer's gross vehicle weight), deceleration of 12 fpsps (feet per second per second) can be achieved without locking wheels on any axle.

d. Energy absorption—horsepower rating. Energy absorption capability of brakes, when tested in accordance with procedure established by SAE J880 or equivalent, shall be not less than

$$12 + \frac{1.4 \text{ GVW}}{1000}.$$

**Note:** SAE J880—Brake Rating System Test Code, (1966)—Commercial Vehicles, recommended practice of Society of Automotive Engineers. This reference is available in the office of the Motor Vehicle Department, the Secretary of State and the Revisor of Statutes.

2. Travel reserve of air brake actuator or hydraulic brake pedal.

Brake actuator travel, when measured statically at actuating force required for compliance with item (a) 1 above, shall be not more than 60% of available travel.

3. Reservoirs required. Every brake system which employs air or vacuum shall include following reservoir capacity:

a. Air brake system shall have reservoir capacity which is equal to or greater than 12 times total volume of all brake actuators at full travel.

b. Vacuum brake system shall have reservoir used exclusively for brakes, with capacity of not less than 1,000 cubic inches and shall be adequate to insure loss in pressure at full stroke application of not more than 30%.

c. Brake system shall include suitable and convenient connection for installation of separate vacuum reservoir with capacity of not less than 1,000 cubic inches, furnished and installed by body manufacturer and protected by check valve, for actuation of other vacuum-powered accessories. Engine shall be protected by proper filters.

4. Safeguarding of air or vacuum system reservoir. Brake system reservoir shall be so safeguarded by a check valve or equivalent device that in the event of failure or leakage in its connection to the source of compressed air or vacuum, the stored air or vacuum shall not be depleted by the leak or failure. Means shall be provided to establish air check valve to be in working order.

5. Gauges. A vehicle using air or vacuum in operation of brake system shall be equipped with an illuminated gauge, accurate to within 10% of actual reservoir pressure, which will indicate to driver the air pressure in psi (pounds per square inch) which is available for the operation of air brakes; or the vacuum in inches of mercury which is available for the operation of vacuum brakes.

6. Warning devices. In addition to the gauges required in 5. above, vehicle shall be equipped with audible or visible warning signal which will give continuous warning to driver when air pressure in braking system is 60 psi (pounds per square inch) or less; or when vacuum in braking system is 8 inches of mercury or less.

(b) *Emergency braking system: General.* 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 valve(s) or master cylinder(s), will not leave vehicle without operative brakes capable of stopping vehicle when loaded up to and includ-

(b) There shall be displayed on the inside of the bus body directly over the windshield on the right side of the driver a sign indicating the maximum pupil seating capacity of the bus. The size of the letters and numerals shall be large enough to permit them to be read by passengers. Transportation of passengers in excess of the number designated on such sign is prohibited.

(23) **POWER OR GRADE ABILITY.** Chassis must be so geared and powered as to be capable of surmounting 3.7% grade at speed of at least 20 miles per hour with full load (see subsection (22) (a)) on continuous pull in direct drive.

Grade Ability Formula:  

$$33750 \times H. P. \quad \begin{array}{l} \text{---} 1.5 \text{ (for buses having seating capacity up to and} \\ \text{including 67 pupils)} \\ \text{or} \\ \text{---} 1.2 \text{ (for buses having seating capacity of 68 or} \\ \text{more pupils)} \end{array}$$

$$G = \frac{\text{G.V.W.} \times \text{M.P.H.}}{\text{---}}$$

Where G = Grade in per cent  
 H.P. = Certified net horsepower delivered at road speed (M.P.H.)  
 G.V.W. = Gross vehicle weight (see table below)  
 M.P.H. = Miles per hour vehicle is driven  
 Rolling Resistance = 1.5 or 1.2 (depending on seating capacity on bus)

Pupil Capacity	Gross Vehicle Weight (G.V.W.)
36	Chassis (wet) plus 7,500 lbs.
42	Chassis (wet) plus 8,600 lbs.
48	Chassis (wet) plus 9,800 lbs.
54	Chassis (wet) plus 10,800 lbs.
60	Chassis (wet) plus 11,900 lbs.
66	Chassis (wet) plus 13,200 lbs.

(24) **SHOCK ABSORBERS.** Bus shall be equipped with front and rear double-acting shock absorbers compatible with manufacturers rated axle capacity.

(25) **SPRINGS.** (a) Springs or suspension assemblies shall be of ample resiliency under all load conditions and of adequate strength to sustain loaded bus without evidence of overload.

(b) Springs or suspension assemblies shall be designed to carry their proportional share of gross vehicle weight in accordance with requirement for weight distribution as shown in subsection (29).

(c) If rear springs are used, they shall be of progressive type.

(d) If leaf-type front springs are used, stationary eyes shall be protected by full wrapper leaf in addition to main leaf.

(26) **STEERING GEAR.** (a) Steering gear shall be approved by chassis manufacturer and designed to assure safe and accurate performance when vehicle is operated with maximum load and at maximum speed.

(b) Steering mechanism shall provide for easy adjustment for lost motion.

(c) No changes shall be made in steering apparatus which are not approved by chassis manufacturer.

(d) There shall be clearance of at least 2 inches between steering wheel and cowl instrument panel, windshield, or any other surface.

(e) Power steering is permissible if approved by chassis manufacturer.

(27) TIRES AND RIM. (a) Minimum tire and rim sizes shall be as shown in table below:

Capacity-----	36	42	48	54	60	66	72
1. Tire Size (with tube)							
Size-----	7.00-20	7.50-20	7.50-20	8.25-20	8.25-20	9.00-20	9.00-20
Ply-----	8	10	10	10	10	10	10
2. Rim Size (with tube)							
Preferred-----	5.5	6.0	6.0	6.5	6.5	7.0	7.0
Alternate-----	5.0	5.5	5.5	6.0	6.0	6.5	6.5
3. Tire Size (tubeless)							
Size-----	7-22.5	8-22.5	8-22.5	9-22.5	9-22.5	10-22.5	10-22.5
Ply-----	6	10	10	10	10	10	10
4. Rim Size (tubeless)							
Preferred-----	5.25	6.00	6.00	6.75	6.75	7.50	7.50
Alternate-----		5.25	5.25	6.00	6.00	6.75	6.75

(b) In order to allow for reasonable tolerance, total weight imposed on any tire shall not be greater than 10% above 1967 standard of Tire and Rim Association, Command Bldg., 34 N. Hawkins Ave., Akron, Ohio 44313.

**Note:** This reference is available in the office of the Motor Vehicle Department, the Secretary of State and the Revisor of Statutes.

(c) Dual rear tires or wide single equivalents shall be provided on all vehicles.

(d) All tires shall be of same size and ply rating except where wide single equivalents are used.

(e) Unless adequate arrangements for service facilities have been made, spare tire is required and shall be suitably mounted in accessible location outside passenger compartment.

(f) All tires must have visible tread around its entire periphery.

(g) No recap tires are permitted on steering wheels.

(28) TRANSMISSION. (a) Mechanical type transmission shall be synchromesh except first and reverse gears. Its design shall provide not less than 4 forward and one reverse speeds.

(b) Automatic transmissions are permissible.

(29) WEIGHT DISTRIBUTION. (a) Weight distribution of fully loaded bus on level surface shall be such that not more than 75% of gross vehicle weight is on rear tires and not more than 35% is on front tires.

(b) Exception—transit and metropolitan vehicles with engine inside front of body: If entrance door is ahead of front wheels, not more than 75% of gross vehicle weight shall be on rear tires nor more than 50% on front tires. If entrance door is behind front wheels, not more than 75% of gross vehicle weight shall be on rear tires nor more than 40% on front tires. With engine in rear: Not more than 75% of gross vehicle weight shall be on rear tires nor more than 40% on front tires.

**History:** Cr. Register, August, 1967, No. 140, eff. 9-1-67.

Register, August, 1967, No. 140

(4) BRAKES. For buses not originally manufactured as school buses the following requirements shall apply:

(a) Four-wheel, increased or over-sized brakes, with highest possible braking area, adequate at all times to control bus when fully loaded, shall be provided.

(b) Foot or service brakes shall, at all times, be capable of stopping complete unit, when fully loaded, from speed of 20 miles per hour in not more than 30 feet, such distance to be measured from point at which movement of service brake pedal or control begins. Tests for stopping distance shall be made on substantially level (not to exceed plus or minus 1% grade), dry, smooth, hard surface that is free from loose material.

(c) Chassis shall be equipped with auxiliary brake capable of locking 2 wheels and capable of holding vehicle on any grade on which it is operated under any conditions of loading on a surface free from snow or ice. Operating controls of such auxiliary brake shall be independent of operating controls of service brakes.

(d) Buses having full compressed-air systems shall be equipped with:

1. At least 2 reservoirs (or one vessel divided into 2 compartments) connected in series.

2. Safety valve mounted on first reservoir to protect air brake system against excessive air pressure and check valve mounted in optional location.

3. Air gauge mounted on instrument panel to register air pressure in air brake system. See Wis. Adm. Code section MVD 17.20 (18).

4. Audible low-pressure indicator to warn driver if air pressure in air brake system falls below 60 pounds per square inch.

(e) Buses having vacuum-actuated or compressed air over hydraulic systems shall be equipped with check valve located between source of supply and reservoir and must have air or vacuum gauge on instrument panel.

(e m) For buses originally manufactured as school buses the requirements (4) (a) through (e) apply until January 1, 1968. After that date the following requirements shall apply:

(f) Service brakes:

1. Stopping ability of service brake system. Service brake system shall be designed and constructed so that by application of single control unit vehicle can be stopped within distances specified in a and b of this subsection. Stopping distance requirement tests shall be conducted in accordance with SAE J658 and with vehicle loaded (MGVW--manufacturer's gross vehicle weight).

**Note:** SAE J658 (1966)—Service Brake Performance, recommended practice of Society of Automotive Engineers. This reference is available in the office of the Motor Vehicle Department, the Secretary of State, and the Revisor of Statutes.

a. Brakes shall be designed to have capability of developing deceleration of 14 fpsps (feet per second per second) from speed of 20 mph at pedal effort of not more than 75 pounds.

b. Stopping distance test with brakes cold shall be conducted after proper conditioning according to SAE J880 and vehicle shall stop,

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from speed of 20 mph, within following distances at pedal effort of not more than 200 pounds:

10,000 pounds GVW and under -----	25 feet
Over 10,000 pounds GVW -----	35 feet

c. Brake balance shall be such that, when tested at speed of 20 mph under any normal condition of loading within MGWV (manufacturer's gross vehicle weight), deceleration of 12 fpsps (feet per second per second) can be achieved without locking wheels on any axle.

d. Energy absorption—horsepower rating. Energy absorption capability of brakes, when tested in accordance with procedure established by SAE J880 or equivalent, shall be not less than 12 +

$$\frac{1.4 \text{ GVW.}}{1000}$$

**Note:** SAE J880 (1966)—Brake Rating System Test code—Commercial Vehicles, recommended practice of Society of Automotive Engineers. This reference is available in the office of the Motor Vehicle Department, the Secretary of State and the Revisor of Statutes.

2. Travel reserve of air brake actuator or hydraulic brake pedal. Brake actuator travel, when measured statically at actuating force required for compliance with Item (f) 1 b above, shall be not more than 60% of available travel.

3. Reservoirs required. Every brake system which employs air or vacuum shall include following reservoir capacity:

a. Air brake system shall have reservoir capacity which is equal to or greater than 12 times total volume of all brake actuators at full travel.

b. Vacuum brake system shall have reservoir used exclusively for brakes, with capacity of not less than 1,000 cubic inches, and shall be adequate to insure loss in pressure at full stroke application of not more than 30%.

c. Brake system shall include suitable and convenient connection for installation of separate vacuum reservoir with capacity of not less than 1,000 cubic inches, furnished and installed by body manufacturer and protected by check valve, for actuation of other vacuum-powered accessories. Engine shall be protected by proper filters.

4. Safeguarding of air or vacuum system reservoir. Brake system reservoir shall be so safeguarded by a check valve or equivalent device that in the event of failure or leakage in its connection to the source of compressed air or vacuum, the stored air or vacuum shall not be depleted by the leak or failure. Means shall be provided to establish air check valve to be in working order.

5. Gauges. A vehicle using air or vacuum in operation of brake system shall be equipped with an illuminated gauge, accurate to within 10 percent of actual reservoir pressure, which will indicate to driver the air pressure in psi (pounds per square inch) which is available for the operation of air brakes; or the vacuum in inches of mercury which is available for the operation of vacuum brakes.

6. Warning devices. In addition to the gauges required in 5. above, vehicle shall be equipped with audible or visible warning signal which will give continuous warning to driver when air pressure in braking system is 60 psi (pounds per square inch) or less; or when vacuum in braking system is 8 inches of mercury or less.

(17) INSTRUMENTS AND INSTRUMENT PANEL. (a) Chassis shall be equipped with following instruments and gauges.

1. Speedometer which will show speed.
2. Odometer which will give accrued mileage.
3. Ammeter with charge and discharge.
4. Oil pressure gauge.
5. Water temperature gauge.
6. Fuel gauge.
7. Upper-beam headlamp indicator.
8. Air pressure or vacuum gauge, where air or vacuum brakes are used.

(b) All instruments shall be accessible for maintenance and repair. All instruments shall be kept in good working order.

(c) Above instruments and gauges shall be mounted on instrument panel in such manner that each is clearly visible to driver in normal seated position. Lights in lieu of gauges are not acceptable.

(d) Instrument panel shall have lamps of sufficient candlepower to illuminate all instruments and gauges.

(e) Manufacturer's standard acceptable on buses not originally manufactured as school buses.

(18) LENGTH. Over-all length shall not exceed 40 feet.

(19) OIL FILTER. Oil filter of replaceable element or cartridge type shall be provided and shall be connected by flexible oil lines if it is not of built-in or engine-mounted design. Oil filter shall have oil capacity of at least 1 quart.

(20) OPENINGS. All openings in floor board or firewall between chassis and passenger-carrying compartment, such as for gearshift lever and auxiliary brake lever, shall be sealed. See Wis. Adm. Code section MVD 17.50 (6) (d) 2.

(21) PASSENGER LOAD. (a) Gross vehicle weight (i.e. chassis weight with oil, water, and full fuel tank, plus body weight, plus driver's weight of 150 pounds, plus weight of maximum seated pupil load based on not less than 100 pounds per pupil) shall not exceed maximum gross vehicle weight rating as established by manufacturer.

(b) There shall be displayed on the inside of the bus body directly over the windshield on the right of the driver a sign indicating the maximum pupil seating capacity of the bus. The size of the letters and numerals shall be large enough to permit them to be read by passengers. Transportation of passengers in excess of the number designated on such sign is prohibited.

(22) POWER AND GRADEABILITY. Chassis must be so geared and powered as to be capable of surmounting 3.7% grade at speed of at least 20 mph with full load (see subsection (21) (a)) on continuous pull in direct drive. For formula refer to Wis. Adm. Code section MVD 17.20 (23).

(23) SHOCK ABSORBERS. Shall be equipped with front and rear double acting shock absorbers compatible with manufacturer's rated axle capacity.

(24) **SPRINGS.** (a) Springs or suspension assemblies shall be of ample resiliency under all load conditions and of adequate strength to sustain loaded bus without evidence of overload.

(b) Springs or suspension assemblies shall be designed to carry their proportional share of gross vehicle weight in accordance with requirement for weight distribution as shown in Wis. Adm. Code section MVD 17.20 (29).

(c) If rear springs are used, they shall be of progressive type.

(d) If leaf-type front springs are used, stationary eyes shall be protected by full wrapper leaf in addition to main leaf.

(e) Springs on small buses not originally manufactured as school buses shall be manufacturer's standard.

(25) **STEERING GEAR.** (a) Steering gear shall be approved by chassis manufacturer and designed to assure safe and accurate performance when vehicle is operated with maximum speed.

(b) Steering mechanism shall provide for easy adjustment for lost motion.

(c) No changes shall be made in steering apparatus which are not approved by chassis manufacturer.

(d) There shall be a clearance of at least 2 inches between steering wheel and cowl, instrument panel, windshield, or any other surface.

(e) Power steering is permissible if approved by chassis manufacturer.

(26) **TIRES AND RIMS.** (a) Tire and rim sizes, based upon standards contained in the 1967 Yearbook of Tire and Rim Association, Command Building, 34 N. Hawkins Avenue, Akron, Ohio, 44313, shall be required.

**Note:** This reference is available in the office of the Motor Vehicle Department, the Secretary of State and the Revisor of Statutes.

(b) In order to allow for reasonable tolerance, total weight imposed on any tire shall not be greater than 10% above said standard of Tire and Rim Association.

(c) All tires shall be of same size and ply rating, except where wide single equivalents are used.

(d) Spare tire, if required, shall be suitably mounted in accessible location outside passenger compartment. Spare tire is required unless adequate arrangements for service facilities have been made.

(e) Vehicles not manufactured originally as school buses must comply with subsections (a) (b) (c) above. Spare tire mounting may be manufacturer's standards.

(f) All tires must have visible tread around entire periphery.

(g) No recap tires are permitted on steering wheels.

(27) **TRANSMISSION.** Three speed and automatic transmissions are acceptable.

(28) **WEIGHT DISTRIBUTION.** Weight distribution of fully loaded vehicle on level surface shall be such that not more than 75% of gross vehicle weight is on rear tire and not more than 35% is on front tires.

**History:** Cr. Register, August, 1967, No. 140, eff. 9-1-67.

Register, August, 1967, No. 140