

281—44.3(285) School bus chassis.**44.3(1) Air cleaner.**

a. The engine air intake cleaning system shall be furnished and properly installed by the chassis manufacturer to meet engine manufacturer's specifications.

b. The intake air system for diesel engines shall have an air cleaner restriction indicator properly installed by the chassis manufacturer to meet engine specifications.

44.3(2) Alternator.

a. All alternators shall be a minimum of 130 amperes while maintaining a minimum of 50 amperes while at the manufacturer's suggested idle speed.

b. All Type C and Type D buses shall be equipped with a heavy-duty truck or bus-type alternator meeting SAE J180 or incorporating a pad-type mounting.

44.3(3) Axles. The front and rear axle and suspension systems shall have gross axle weight rating (GAWR) at ground commensurate with the respective front and rear weight loads that will be imposed by the bus.

44.3(4) Backup warning alarm. A backup warning alarm shall be installed on every school bus. Responsibility for installation of the alarm shall rest with the school bus body manufacturer unless other arrangements have been made between the body and chassis manufacturers. See also subrule 44.4(2).

44.3(5) Battery system.

a. A 12-volt battery system tested at 0 degrees Fahrenheit shall be provided which meets or exceeds the following capacity ratings:

(1) Gasoline engines (greater than 10,000 pounds GVWR): 150 minutes reserve and 500 cold cranking ampere capacity.

(2) Gasoline engines (10,000 pounds GVWR or less): 125 minutes reserve and 450 cold cranking ampere capacity.

(3) Diesel engines (all): 200 minutes reserve and 1,000 cold cranking ampere capacity, or a cold cranking ampere capacity not less than the engine manufacturer's minimum requirements, whichever is greater.

b. Since all batteries are to be secured in a sliding tray in the body, chassis manufacturers shall temporarily mount the battery on the chassis frame. Type A or B van conversion or cutaway front-section chassis may have the battery located in the forward engine compartment beneath the hood or temporarily mounted for final mounting in the body skirt by the body manufacturer. In these cases, the final location of the battery and the appropriate cable lengths shall be according to the SBMTC School Bus Design Objectives, August 1996 edition, or as mutually agreed upon by the chassis and body manufacturers. In all cases, however, the battery cable provided with the chassis shall have sufficient length to allow some slack.

44.3(6) Brakes.**a. Brakes, all, general requirements.**

(1) The chassis brake system shall conform to the provisions of FMVSS No. 105, Hydraulic and Electric Brake Systems, No. 106, Brake Hoses, and No. 121, Air Brake Systems, as applicable.

(2) The antilock brake system (ABS), provided in accordance with FMVSS No. 105 or No. 121, shall provide wheel speed sensors for each front wheel and for each wheel on at least one rear axle. The system shall provide antilock braking performance for each wheel equipped with sensors (Four Channel System).

(3) All brake systems shall be designed to permit visual inspection of brake lining wear without removal of any chassis component(s).

(4) The brake lines, booster-assist lines, and control cables shall be protected from excessive heat, vibration and corrosion and installed in a manner which prevents chafing.

(5) The parking brake system for either air or hydraulic service brake systems may be of a power-assisted design. The power parking brake actuator should be a device located on the instrument panel within reach of a seated 5th percentile female driver. As an option, the parking brake may be set by placing the automatic transmission shift control mechanism in the "park" position.

(6) The power-operated parking brake system may be interlocked to the engine key switch. Once the parking brake has been set and the ignition switch turned to the “off” position, the parking brake cannot be released until the key switch is turned back to the “on” position.

b. Hydraulic brakes, general requirements. Buses using a hydraulic-assist brake shall be equipped with audible and visible warning signals that provide a continuous warning to the driver indicating a loss of fluid flow from the primary source or a failure of the backup pump system.

c. Air brakes, general requirements.

(1) The air pressure supply system shall include a desiccant-type air dryer installed according to the manufacturer’s recommendations. The air pressure storage tank system may incorporate an automatic drain valve.

(2) The chassis manufacturer shall provide an accessory outlet for air-operated systems installed by the body manufacturer. This outlet shall include a pressure protection valve to prevent loss of air pressure in the service brake reservoir.

(3) For air brake systems, an air pressure gauge capable of complying with commercial driver’s license (CDL) pretrip inspection requirements shall be provided in the instrument panel.

(4) All air brake-equipped buses may be equipped with a service brake interlock. If the bus is equipped with a service brake interlock, the parking brake cannot be released until the brake pedal is depressed.

(5) Air brake systems shall include a system for anticomponding of the service brakes and parking brakes.

(6) Air brakes shall have a warning device that is both visible and audible and that provides warning to the driver whenever the air pressure falls below the level where warnings are required under FMVSS No. 121.

d. Brakes, all, specific requirements.

(1) The braking system shall include the service brake, an emergency brake that is part of the service brake system and controlled by the service brake pedal, and a parking brake meeting FMVSS at date of manufacture.

(2) Buses using air or vacuum in the operation of the brake system shall be equipped with warning signals readily audible and visible to the driver. The signal shall give a continuous warning when the air pressure available in the system for braking is 60 psi (pounds per square inch) or less or the vacuum available in the system for braking is 8 inches of mercury or less. An illuminated gauge shall be provided that will indicate to the driver the air pressure in psi or the inches of mercury available for the operation of the brakes.

(3) Buses using a hydraulic-assist brake system shall be equipped with warning signals readily audible and visible to the driver. The warning signal shall provide continuous warning in the event of a loss of fluid flow from primary source and in the event of discontinuity in that portion of the vehicle electrical system that supplies power to the backup system.

(4) Brake system reservoirs.

1. Every brake system which employs air or vacuum shall include a reservoir of the following capacity, where applicable, for brake operation: Vacuum-assist brake systems shall have a reservoir used exclusively for brakes that shall adequately ensure a full-stroke application so that loss in vacuum shall not exceed 30 percent with the engine off. Brake systems on gas-powered engines shall include suitable and convenient connections for the installation of a separate vacuum reservoir.

2. Any brake system with a dry reservoir shall be equipped with a check valve or equivalent device to ensure that, in the event of failure or leakage in its connection to the source of compressed air or vacuum, the stored dry air or vacuum shall not be depleted by the leakage or failure.

3. Connection for auxiliary accessory reservoir. The brake system shall include a suitable and convenient connection for installation of an auxiliary air or vacuum reservoir by the body manufacturer.

(5) An air brake system is required on every chassis meeting one or more of the following:

1. Wheelbase equal to or greater than 274 inches.

2. Designed seating capacity rating greater than 66 passengers. Designed seating capacity, also known as manufacturer's seating capacity, is the actual or theoretical passenger capacity of the vehicle if it were constructed with the maximum number of seating positions.

(6) An air brake system shall comply with the following system and component designs:

1. The system cannot be of wedge design.

2. The system shall include an air dryer system having design features equal to or exceeding the Bendix Westinghouse Model AD9. The system shall be self-purging and capable of removing oil, dirt, and moisture. The dryer system shall also be equipped with a heater to prevent the freezing of moisture within the system. All plumbing from air compressor to input of air dryer or after-cooler shall provide soft flow bends not producing sumps in the air compressor line having direct entry into the dryer. An automatic moisture ejector or "spitter valve" does not meet the above requirement.

3. Automatic slack adjusters are required to be installed at all wheel positions.

4. The air compressor shall produce a minimum output of 12.0 cubic feet per minute (CFM).

(7) Vehicles with 10,000 pounds GVWR or less shall be equipped with a hydraulic, dual-braking system of manufacturer's standard, with power assist.

(8) Antilock brake systems for either air or hydraulic brakes shall include control of all axles in compliance with FMVSS 105 or 121.

44.3(7) Bumper, front.

a. All school buses shall be equipped with a front bumper. The chassis manufacturer shall furnish the front bumper on all chassis unless there is a specific arrangement between the chassis manufacturer and body manufacturer that the body manufacturer will furnish the front bumper.

b. The bumper shall be not less than 8 inches wide (high), except on Type D buses where the front bumper shall be a minimum of 9 inches wide (high).

c. The front bumper shall be of pressed steel channel or equivalent material of sufficient structural and mounting strength to ensure that the front of the vehicle may be lifted by means of an air bumper-type jack, without permanent deformation of the bumper, bracketry, or chassis frame rail(s). The front bumper, except breakaway bumper ends, shall be of sufficient strength to permit pushing a vehicle of equal gross vehicle weight without permanent distortion to the bumper, chassis, or body.

d. On Type A vehicles less than 14,500 pounds GVWR, the front bumper may be of manufacturer's standard construction.

e. The bumper shall extend beyond the forward-most part of the body, grille, hood, and fenders (flush-mounted bumpers are not acceptable) and shall extend to the outer edges of the fenders at the bumper's top line. The bumper shall be curved, beveled, or have other design features at each end to prevent snagging or hooking and shall be bolted to the chassis frame so it can be conveniently removed for maintenance.

f. Tow eyes or hooks are required on chassis of 14,500 pounds GVWR or greater. Two tow eyes or hooks shall be installed by the chassis manufacturer so as not to project beyond the front bumper. Tow eyes or hooks shall be attached to the chassis frame in accordance with the chassis manufacturer's standards.

g. The bumper shall be designed or reinforced so that it will not deform when the bus is lifted by a chain that is passed under the bumper (or through the bumper if holes are provided for this purpose) and attached to both tow eyes. For the purpose of meeting this standard, the bus shall be empty and positioned on a level, hard surface and both tow eyes shall share the load equally.

44.3(8) Bumper, rear. A rear bumper of manufacturer's standard construction shall be provided by the chassis manufacturer on all Type A-2 chassis unless there is a specific arrangement between the chassis manufacturer and body manufacturer that the body manufacturer will furnish the rear bumper. The rear bumper shall be painted glossy black.

44.3(9) Certification, chassis. The chassis manufacturer will, upon request, certify to the state agency having pupil transportation jurisdiction that the product(s) meets minimum standards on items not covered by certification issued under requirements of the National Traffic and Motor Vehicle Safety Act.

44.3(10) Clutch.

- a. Clutch torque capacity shall be equal to or greater than the engine torque output.
- b. A starter interlock shall be installed to prevent actuation of the starter if the clutch is not depressed.

44.3(11) Color.

a. Chassis and front bumper shall be black. Body cowl, hood, and fenders shall be national school bus yellow. The flat top surface of the hood may be nonreflective national school bus yellow; black is not acceptable.

b. Wheels and rims shall be gray, black, or national school bus yellow.

c. The grille must be gray, black, or national school bus yellow. Chrome is not acceptable.

44.3(12) Daytime running lights (DRL). Rescinded IAB 10/11/06, effective 11/15/06.

44.3(13) Defroster. See subrules 44.3(22) and 44.4(18).

44.3(14) Drive shaft. The drive shaft shall be protected by a metal guard or guards around the circumference of the drive shaft to reduce the possibility of its whipping through the floor or dropping to the ground if broken.

44.3(15) Electrical system. See subrule 44.3(41).

44.3(16) Exhaust system.

a. The exhaust pipe, muffler and tailpipe shall be outside the bus body compartment and attached to the chassis so as not to damage any other chassis component.

b. The tailpipe shall be constructed of a corrosion-resistant tubing material at least equal in strength and durability to 16-gauge steel tubing.

c. Chassis manufacturers shall furnish an exhaust system with tailpipe of sufficient length to extend at least 5 inches beyond the end of the chassis frame to the vertical line of the rear end of the body, but not beyond the rear bumper. The exhaust may exit at the left side or rear of the bus body provided that the exit is no more than 18 inches forward of the front edge of the rear wheelhouse opening. If designed to exit to the left side of the bus, the tailpipe shall extend at least 48.5 inches (51.5 inches if the body is to be 102 inches wide) outboard from the chassis centerline. Final positioning shall result in the exhaust system's extending to, but not beyond, the body limits on the left side of the bus.

d. On Type A-1 chassis greater than 15,000 pounds GVWR, Type C and Type D vehicles, the tailpipe shall not exit beneath a fuel fill or emergency door exit.

e. On Type A-2 and Type B chassis of 15,000 pounds GVWR or less, the tailpipe may be furnished with the manufacturer's standard tailpipe configuration.

f. The exhaust system on a chassis shall be adequately insulated from the fuel system.

g. The muffler shall be constructed of corrosion-resistant material.

h. The exhaust system on vehicles equipped with a power lift unit may be routed to the left of the right frame rail to allow for the installation of a power lift unit on the right side of the vehicle.

i. The tailpipe shall not exit beneath the fuel fill, lift door or emergency door.

44.3(17) Fenders, front and hood. This subrule does not apply to Type A-1, A-2 or D vehicles.

a. The total spread of outer edges of front fenders, measured at the fender line, shall exceed the total spread of front tires when the front wheels are in the straight-ahead position.

b. Front fenders shall be properly braced and free from any body attachment.

c. Chassis sheet metal shall not extend beyond the rear face of the cowl.

d. Front fenders and hood may be of manufacturer's standard material and construction.

e. The hood shall not require more than 20 pounds of force to open and shall include design features to secure the hood in an open position.

44.3(18) Frame.

a. The frame or equivalent shall have design and strength characteristics corresponding at least to standard practice for trucks of the same general load characteristics which are used for highway service.

b. Any secondary manufacturer that modifies the original chassis frame shall guarantee the performance of workmanship and materials resulting from such modification.

c. Extensions of frame lengths are permissible only when alterations are behind the rear hanger of the rear spring or in front of the front hanger of front spring and shall not be for the purpose of extending the wheelbase.

d. Holes in top or bottom flanges or side units of the frame and welding to the frame shall not be permitted except as provided or accepted by the chassis manufacturer.

e. Frame lengths shall be provided in accordance with SBMTC School Bus Design Objectives, August 1996 edition, except where body and chassis manufacturers are the same or have established mutual design criteria for the vehicle.

44.3(19) Fuels, alternative. An alternative fuel is defined as propane (LPG), compressed natural gas (CNG), liquefied natural gas (LNG), electricity, hydrogen, methanol, ethanol, clean diesel, biodiesel, soydiesel, reformulated gasoline, or any type of hybrid system. Vehicles that operate on an alternative fuel shall meet the following requirements:

a. Chassis shall meet all standards of this rule.

b. Chassis shall meet all applicable FMVSS standards including, but not limited to, the fuel system integrity standards of FMVSS 301 or FMVSS 303 and FMVSS 304.

c. Original equipment manufacturers (OEMs) and conversion systems using compressed natural gas (CNG) shall comply with NFPA Standard 52 "Compressed Natural Gas Vehicular Fuel Systems" in effect at the time of installation. Fuel systems using liquefied petroleum gas (LPG) shall comply with the NFPA Standard 58 "Liquefied Petroleum Gases Engine Fuel Systems" in effect at the time of installation.

d. All alternative fuel buses shall travel a loaded range of not less than 200 miles, except those powered by electricity which shall travel not less than 80 miles.

e. Liquefied natural gas (LNG)-powered buses shall comply with NFPA Standard 57, "Liquefied Natural Gas Vehicular-Fueled Systems" and be equipped with an interior/exterior gas detection system. All natural gas-powered buses shall be equipped with a fire detection and suppression system.

f. All materials and assemblies used to transfer or store alternative fuels shall be installed outside the passenger/driver compartment.

g. The total weight shall not exceed the GVWR when loaded to rated capacity.

h. The manufacturer supplying the alternative fuel equipment must provide the owner and operator with adequate training and certification in fueling procedures, scheduled maintenance, troubleshooting, and repair of alternative fuel equipment.

i. All fueling equipment shall be designed specifically for fueling motor vehicles and shall be certified by the manufacturer as meeting all applicable federal, state and industry standards.

j. All on-board fuel supply containers shall meet all appropriate requirements of the ASME code, the DOT regulations, or applicable FMVSS and NFPA standards.

k. All fuel supply containers shall be securely mounted to withstand a static force of eight times their weight in any direction.

l. All safety devices that may discharge to the atmosphere shall be vented to the outside of the vehicle. The discharge line from the safety relief valve on all school buses shall be located in a manner appropriate to the characteristics of the alternative fuel. Discharge lines shall not pass through the passenger compartment. Discharge lines shall be kept clear with flapper-valve or other device which will allow low-pressure discharge but prevent clogging by foreign matter or insects.

m. A positive, quick-acting ($\frac{1}{4}$ turn), shut-off control valve shall be installed in the gaseous fuel supply lines as close to the fuel supply containers as possible. The controls for this valve shall be placed in a location easily operable from the exterior of the vehicle. The location of the valve control shall be clearly marked on the exterior surface of the bus.

n. A grounding system shall be required for grounding of the fuel system during maintenance-related venting.

o. Automatic engine shut-down systems are not permissible.

p. Storage batteries for hybrid power systems shall be protected from crash impacts and shall be encased in a nonconductive, acid-resistant compartment. This compartment must be well-ventilated to preclude the possibility of hydrogen gas buildup.

44.3(20) Fuel system.

a. All fuel tanks, including auxiliary fuel tanks, fuel tank filler pipes, and fuel tank connections shall conform to all applicable FMVSS at the date of manufacture and shall be installed in accordance with SBMTC School Bus Design Objectives, August 1996 edition.

b. On all Type B, C, and D vehicles, the fuel tank shall comply with FMVSS 301, Fuel System Integrity, and with Motor Carrier Safety Regulations, Section 393.67, paragraphs (c) through (f), with reference to material and method of construction, leak testing and certification. On Type A-1 and A-2 vehicles, the fuel tank may be of the manufacturer's standard construction.

c. On chassis with a wheelbase greater than 170 inches, at least one fuel tank of 60-gallon capacity shall be provided and installed by the manufacturer. Chassis with a wheelbase of 170 inches or less shall be equipped with at least one fuel tank of 30-gallon minimum capacity, as provided and installed by the manufacturer.

d. Fuel tank(s) may be mounted between the chassis frame rails or outboard of the frame rails on either the left or right side of the vehicle by the manufacturer. Tanks shall be mounted directly to the chassis frame, filled, and vented outside the body, in a location where accidental fuel spillage will not drip or drain on any part of the exhaust system.

e. Fuel filtration shall be accomplished by means of the following:

(1) Gasoline-powered systems—one in-line fuel filter shall be installed between the fuel tank and the engine.

(2) Diesel-powered systems—one engine-mounted fuel filter with water/fuel separator shall be supplied and installed by the engine manufacturer.

f. The actual draw capacity of each fuel tank shall be 83 percent of the tank capacity.

g. Unless specific agreement has been made between the body and chassis manufacturers, fuel tanks and filler spouts shall not be located in spaces restricted by SBMTC School Bus Design Objectives, 1996 edition.

44.3(21) Governor. An electronic engine speed limiter shall be provided and set to limit engine speed, not to exceed the maximum revolutions per minute as recommended by the engine manufacturer.

44.3(22) Heating system.

a. The chassis engine shall have plugged openings for the purpose of supplying hot water for the bus heating system. The openings shall be suitable for attaching ¾-inch or metric equivalent pipe thread/hose connector.

b. The engine shall be capable of supplying water having a temperature of at least 170 degrees Fahrenheit at a flow rate of 50 pounds per minute at the return end of 30 feet of one-inch inside-diameter automotive hot water heater hose. Engine temperature performance shall be measured in accordance with the School Bus Manufacturer's Technical Council Standard Number 001—Procedures for Testing and Rating Automotive Bus Hot Water Heating and Ventilating Equipment, July 1996.

c. For Type A-2 vehicles with GVWR of 10,000 pounds or less, the chassis manufacturer shall provide a fresh-air front heater and defroster of recirculating hot water type. See also subrules 44.4(12) and 44.4(18).

44.3(23) Headlamps.

a. Buses shall be equipped with a minimum of two headlamps meeting FMVSS 108 with circuit protection.

b. The headlamp switch shall be of adequate ampere capacity to carry the load of the clearance and identification lamps in addition to the headlamps and tail lamps since these will be activated by the same switch.

c. There shall be a manually operated switch for selection of high- or low-beam distribution of the headlamps.

d. The headlight system must be wired separately from the body-controlled solenoid.

e. A daytime running lamp (DRL) system shall be provided.

44.3(24) Horn. Chassis shall be equipped with a horn of standard make capable of producing a complex sound in a band of audio frequencies between approximately 250 and 2,000 cycles per second and tested in accordance with Society of Automotive Engineers Standard J377.

44.3(25) Instruments and instrument panel.

a. Chassis shall be equipped with an instrument panel having, as a minimum, the following instrumentation: (Lights in lieu of gauges are not acceptable except as noted.)

- (1) Speedometer.
- (2) Odometer with accrued mileage including tenths of miles unless tenths of miles are registered on a trip odometer.
- (3) Voltmeter with graduated scale.
- (4) Oil pressure gauge.
- (5) Water temperature gauge.
- (6) Fuel gauge.
- (7) Upper-beam headlamp indicator.
- (8) Air pressure gauge, where air brakes are used. A light indicator in lieu of a gauge is permitted on vehicles equipped with hydraulic-over-hydraulic brake system.
- (9) Turn signal indicator.
- (10) Glow-plug indicator light, where appropriate.
- (11) Tachometer required on vehicles 14,500 pounds GVWR and greater.

b. Gauges shall be displayed as single-gauge installations or as gauges contained in a multifunction instrument display. The multifunction instrument display shall comply, as a minimum, with the following design criteria:

- (1) The driver must be able to manually select any displayable function of the gauge on a multifunction display whenever desired.
- (2) Whenever an out-of-limits condition occurs, which would be displayed on one or more functions of a multifunction gauge, the multifunction gauge controller should automatically display this condition on the instrument cluster. This should be in the form of an illuminated warning light as well as having the multifunction gauge automatically display the out-of-limits indications. Should two or more functions displayed on the multifunction gauge go out of limits simultaneously, the multifunction gauge should automatically sequence between those functions continuously until the condition(s) is corrected.
- (3) The use of a multifunction instrument display does not relieve the requirement of audible warning devices as required in this subrule.

c. All instruments shall be easily accessible for maintenance and repair.

d. Instruments and gauges shall be mounted on the instrument panel so each is clearly visible to the driver in a normal seated position in accordance with SBMTC School Bus Design Objectives, August 1996 edition.

e. The instrument panel shall have rheostatically controlled lamps of sufficient candlepower to illuminate all instruments, gauges, and the shift selector indicator for automatic transmission.

44.3(26) Oil filter. An oil filter with a replaceable element or cartridge shall be of manufacturer's recommended capacity and shall be connected by flexible oil lines if it is not of built-in or engine-mounted design.

44.3(27) Openings. All openings in the floorboard or fire wall between the chassis and passenger compartment, such as for gearshift selector and parking brake lever, shall be sealed.

44.3(28) Passenger load.

a. Actual gross vehicle weight (GVW) is the sum of the chassis weight, plus the body weight, plus the driver's weight, plus the total seated pupil weight.

- (1) For purposes of calculation, the driver's weight is 150 pounds.
- (2) For purposes of calculation, the pupil weight is 120 pounds per pupil.

b. Actual gross vehicle weight (GVW) shall not exceed the chassis manufacturer's GVWR for the chassis, nor shall the actual weight carried on any axle exceed the chassis manufacturer's gross axle weight rating.

44.3(29) Road speed control. When it is desired to accurately control vehicle maximum speed, a road speed control device may be utilized. A vehicle cruise control may also be utilized.

44.3(30) Shock absorbers. Buses shall be equipped with double-action shock absorbers compatible with manufacturer's rated axle capacity at each wheel location.

44.3(31) Suspensions.

- a. The capacity of springs or suspension assemblies shall be commensurate with the chassis manufacturer's GVWR rating.
- b. Steel leaf rear springs shall be a progressive rate or multistage design. Front leaf springs shall have a stationary eye at one end and shall be protected by a wrapped leaf in addition to the main leaf. Parabolic or taper-leaf springs are acceptable.
- c. Air suspension systems are acceptable. Air bags, hoses, hose routing, and all related hardware shall conform to the chassis manufacturer's recommendations.

44.3(32) Steering gear.

- a. The steering gear shall be approved by the chassis manufacturer and designed to ensure safe and accurate performance when the vehicle is operated with maximum load and at maximum speed.
- b. If external adjustments are required, the steering mechanism shall be accessible.
- c. No changes shall be made in the steering apparatus including addition of spinners or knobs which are not approved by the chassis manufacturer.
- d. There shall be a clearance of at least 2 inches between the steering wheel and cowl, instrument panel, windshield, or any other surface.
- e. Power steering is required and shall be of the integral type with integral valves.
- f. The steering system shall be designed to provide a means for lubrication of all wear points, if wear points are not permanently lubricated.
- g. Tilting and telescopic steering wheels are acceptable.

44.3(33) Sun shield. See subrule 44.4(45).**44.3(34) Throttle.**

- a. The force required to operate the throttle shall not exceed 16 pounds throughout the full range of accelerator pedal travel.
- b. A driver-operated, mechanical or electronic variable-speed hand throttle, or a fast idle switch shall be provided on all Type C and D vehicles.
- c. OEM adjustable pedals are acceptable as an option.

44.3(35) Tires and rims.

- a. Tires and rims of the proper size and tires with a load rating commensurate with the chassis manufacturer's gross vehicle weight rating shall be provided.
- b. Tires shall be of tubeless, steel-belted, radial (standard or low-profile) construction.
- c. "Bud" type, hub-piloted steel rims are required. Multipiece and "Dayton" rims are prohibited.
- d. Dual tires shall be provided on all vehicles listed in rule 281—44.2(285).
- e. All tires on a vehicle shall be of the same size, and the load range of the tires shall meet or exceed the GVWR as required by FMVSS 120.
- f. Spare tires are not required; however, if specified, the spare tire shall be located outside the passenger compartment. The spare tire may not be attached to any part of the rear portion of the body including the emergency door, bumper or roof. If a tire carrier is required, it shall be suitably mounted in an accessible location outside the passenger compartment.
- g. Recapped tires are permissible as replacements on equipment now in operation for use on rear wheels only, providing tires are guaranteed by the seller. Recapped tires are not permissible where single rear wheels are used.
- h. Tires, when measured on any two or more adjacent tread grooves, shall have a tread groove pattern depth of at least 4/32 of an inch on the front wheels and 2/32 of an inch on the rear wheels. No measurement shall be made where tire bars, humps, or fillets are located. On Type A-1 and Type A-2 buses with single front and rear wheels, the tread groove pattern depth shall be at least 4/32 of an inch. Where specific measurement points are provided by the tire manufacturer, they shall be utilized in determining tires approved for service. This requirement also applies to buses now in service.
- i. Tire pressure equalizing systems for dual rear wheels are acceptable.
- j. Traction-assisting devices including hopper-sanders or automatic traction chains may be installed.

44.3(36) Tow hooks. See subrule 44.3(7).

44.3(37) Transmission.

a. Automatic transmissions shall provide for not less than three forward speeds and one reverse speed. The shift lever, if applicable, shall provide a detent between each gear position when the gear selector quadrant and shift lever are not steering column-mounted.

b. An electronic control or similar device shall be installed to ensure that the automatic transmission cannot accidentally be moved out of the neutral or park gear position.

c. In manual transmissions, second gear and higher shall be synchronized except when incompatible with engine power. A minimum of three forward speeds and one reverse speed shall be provided.

44.3(38) Turning radius.

a. A chassis with a wheelbase of 264 inches or less shall have a right and left turning radius of not more than 42½ feet, curb-to-curb measurement.

b. A chassis with a wheelbase of 265 inches or more shall have a right and left turning radius of not more than 44½ feet, curb-to-curb measurement.

44.3(39) Undercoating. Chassis manufacturers or their agents shall coat the undersides of steel or metallic-constructed front fenders with a rustproofing compound for which compound manufacturers have issued notarized certification of compliance to the chassis builder that the compound meets or exceeds all performance and qualitative requirements of Paragraph 3.4 of Federal Specification TT-C-520B, using modified tests.

44.3(40) Windshield washer/wiper system.

a. On Type A-1 vehicles, wet-arm-type windshield wipers and washer system shall be provided by the chassis manufacturer. On Type A-2 vehicles, the windshield wiper/washer system shall be of the manufacturer's standards.

b. A two-speed or variable speed windshield wiping system, with an intermittent feature, shall be provided and shall be operated by a single switch.

c. The wipers shall meet the requirements of FMVSS No. 104.

d. Wiper control(s) shall be located within easy reach of the driver and shall be designed to move the blades from the driver's direct view when the wiper control is in the "off" position.

e. Wiper blades and arms shall be heavy duty and of manufacturer's standard length for the vehicle.

44.3(41) Wiring.

a. All wiring shall conform to current, applicable SAE-recommended practices.

b. All wiring shall use a standard color or number coding system or a combination of color and number. Each chassis shall be delivered with a wiring diagram that illustrates the wiring of the chassis.

c. The chassis manufacturer of an incomplete vehicle shall install a readily accessible terminal strip or plug on the body side of the cowl, or in an accessible location in the engine compartment of vehicles designed without a cowl, that shall contain the following terminals for the body connections:

- (1) Main 100-amp body circuit.
- (2) Tail lamps.
- (3) Right turn signal.
- (4) Left turn signal.
- (5) Stop lamps.
- (6) Backup lamps.
- (7) Instrument panel lights (rheostat controlled by headlamp switch).
- d. Circuits.

(1) An appropriate identifying diagram (coded by color or number or both) for electrical circuits shall be provided to the body manufacturer for distribution to the end user.

- (2) The headlight system must be wired separately from the body-controlled solenoid.