DEPARTMENT OF EDUCATION
OFFICE OF THE SECRETARY
1100 Transportation

1101 Standards for School Bus Chassis and Bodies Placed in Production After March 1, 1998 (Terminology and School Bus Types are described in the National Standards for School Transportation 1995)

1.0 Bus Chassis Standards

1.1 Air Cleaner

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

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

1.2 Axles: The front and rear axle and suspension systems shall have gross axle weight rating at ground commensurate with the respective front and rear weight loads that will be imposed by the bus.

1.3 Brakes

1.3.1 The braking system shall include the service brake, an emergency brake that is a part of the service brake system and controlled by the service brake control, and a parking brake.

1.3.2 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, that will 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 in the system available 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 pounds per square inch or the inches of mercury vacuum available for the operation of the brakes.

1.3.2.1 Vacuum assist brake systems shall have a reservoir used exclusively for brakes that shall adequately ensure a full stroke application 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.

1.3.2.2 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. All buses with an air brake system shall be equipped with an air dryer.

1.3.2.3 Buses using a hydraulic assist brake shall be equipped with warning signals, readily audible and visible to the driver, that will 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.

1.3.2.4 The brake lines and booster assist lines shall be protected from excessive heat and vibration and installed in a manner which prevents chafing.

1.3.2.5 All brake systems shall be designed to permit visual inspection of brake lining wear without removal of any chassis components.

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

1.4 Bumper Front

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

1.4.2 Unless an energy absorbing bumper is used, the front bumper shall be of pressed steel channel or equivalent material at least 3/16" thick and not less than 8 inches wide (high) and shall extend beyond forward most part of the body, grille, hood, and fenders and shall extend to outer edges of the fenders at the bumper's top line.

1.4.3 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.

1.4.4 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.

1.4.5 If an optional energy absorbing front bumper is used, it shall meet the strength requirements in the 1995 National Standards.

1.5 Certification: Chassis manufacturer will, upon request, certify to the state agency having pupil transportation jurisdiction that their product meets minimum standards on items not covered by certification issued under requirements of the National Traffic and Motor Vehicle Safety Act.

1.6 Clutch

1.6.1 Clutch torque capacity shall be equal to or greater than the engine torque output.

1.6.2 A starter interlock shall be installed to prevent actuation of the starter if the clutch is not depressed.

1.7 Color

1.7.1 Chassis, including wheels and front bumper, shall be black. Body cowl, hood, and fenders shall be in National School Bus Yellow (NSBY). The hood may be painted with nonreflective paint. (See Appendix B, 1995 National Standards)

1.7.2 Demountable rims, if used, may be, silver, gray or black as received from the wheel manufacturer.

1.8 Daytime Running Lights: Exterior head lamps and parking lamps may be provided with a switch to automatically operate said lamps when the vehicle's ignition is engaged. This switch, if furnished, shall not engage while the starter is engaged. If this switch is designed to provide reduced illumination under normal operating conditions, a means whereby the head lamps and parking lamps can be engaged at full power shall be provided.

1.9 Drive Shaft: 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.

1.10 Electrical System

1.10.1 Battery

1.10.1.1 Storage battery shall have minimum cold cranking capacity rating equal to the cranking current required for 30 seconds at 0 degrees Fahrenheit (-17.8^{0}C) and a minimum reserve capacity rating of 120 minutes at 25 amps. Higher capacities may be required depending upon optional equipment and local environmental conditions.

1.10.1.2 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, except that van conversion or cutaway front section chassis may be manufacturer's standard configuration. In these cases, the final location of the battery and the appropriate cable lengths shall be according to the SBMI Design Objectives Booklet, 1990 edition, or as mutually agreed upon by the chassis and body manufacturer. In all cases, however, the battery cable provided with the chassis shall have sufficient length to allow some slack.

1.10.2 Alternator

1.10.2.1 All Type A buses and Type B buses up to 15,000 lbs. GVWR shall have a minimum 60 ampere alternator.

1.10.2.2 Types A-I and Type B buses over 15,000 lbs. GVWR and all types C and D buses shall be equipped with a heavy duty truck or bus type alternator meeting SAE J 180, having a minimum output rating of 100 amperes. Alternators of 100 through 145 ampere design shall produce a minimum of 50 amperes output at engine idle speed.

1.10.2.3 All buses equipped with an electrical power lift shall have a minimum 130 ampere alternator.

1.10.2.4 Direct drive alternator is permissible in lieu of belt drive. Belt drive shall be capable of handling the rated capacity of the alternator with no detrimental effect on other driven components.

1.10.2.5 Refer to SBMI Design Objectives, 1990 edition for estimating required alternator capacity.

1.10.3 Wiring

1.10.3.1 All wiring shall conform to current applicable recommended practices of the Society of Automotive Engineers (SAE).

1.10.3.1.1 All wiring shall use a standard color and number coding and each chassis shall be delivered with a wiring diagram that illustrates the wiring of the chassis.

1.10.3.2 Chassis manufacturer 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:

1.10.3.2.1 Main 100 amp body circuit

1.10.3.2.2 Tail lamps

1.10.3.2.3 Right turn signal

1.10.3.2.4 Left turn signal

1.10.3.2.5 Stop lamps

1.10.3.2.6 Back up lamps

1.10.3.2.7 Instrument panel lights (rheostat controlled by head lamp switch)

1.10.4 Circuits

1.10.4.1 An appropriate identifying diagram (color and number coded) for electrical circuits shall be provided to the body manufacturer for distribution to the end user.

1.10.4.2 Headlight system must be wired separately from the body controlled solenoid.

1.11 Exhaust System

1.11.1 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.

1.11.2 Tailpipe shall be constructed of a corrosion resistant tubing material at least equal in strength and durability to 16 gauge steel tubing.

1.11.3 Chassis manufacturers shall furnish an exhaust system with tailpipe of sufficient length to exit the rear of the bus or at the left side of the bus body no more than 18 inches forward of the front edge of the rear wheel house opening. If designed to exit at the rear of the bus, the tailpipe shall extend at least five inches beyond the end of the chassis frame. If designed to exit to the 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.

1.11.3.1 On Types C and D vehicles, the tailpipe shall not exit beneath a fuel fill or emergency door exit.

1.11.3.2 Type A and B chassis may be furnished with the manufacturer's standard tailpipe configuration.

1.11.4 Exhaust system on a chassis shall be adequately insulated from the fuel system.

1.11.5 Muffler shall be constructed of corrosion resistant material.

1.11.6 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.

1.12 Fenders, Front Type C Vehicles

1.12.1 Total spread of outer edges of front fenders, measured at fender line, shall exceed total spread of front tires when front wheels are in straight ahead position.

1.12.2 Front fenders shall be properly braced and free from any body attachments.

1.13 Frame

1.13.1 Frame or equivalent shall be of such design and strength characteristics as to correspond at least to standard practice for trucks of the same general load characteristics which are used for highway service.

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

1.13.3 Frames shall not be modified for the purpose of extending the wheel base.

1.13.4 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 chassis manufacturer.

1.13.5 Frame lengths shall be provided in accordance with SBMI Design Objectives, 1990 edition, except where body and chassis manufacturer are the same or have established mutual design criteria for the vehicle.

1.14 Fuel Tank

1.14.1 Fuel tank or tanks having a 30 gallon capacity with a 25 gallon actual draw shall be provided by the chassis manufacturer. The tank shall be filled and vented to the outside of the body, in a location where accidental fuel spillage will not drip or drain on any part of the exhaust system.

1.14.2 No portion of the fuel system which is located outside the engine compartment, except the filler tube, shall extend above the top of the chassis frame rail. Fuel lines shall be mounted to obtain maximum possible protection from the chassis frame.

1.14.3 Fuel filter with replaceable element shall be installed between the fuel tank and engine.

1.14.4 Fuel tank installation shall be in accordance with SBMI Design Objectives, 1990 edition, and all Federal Motor Vehicle Safety Standards in effect on the date of manufacture of the bus.

1.14.4.1 Fuel tanks may be mounted between the chassis frame rails or outboard of the frame rails on either the left or right side of the vehicle.

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

1.14.6 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 SBMI Design Objectives, 1990 edition.

1.14.7 Installation of alternative fuel systems, including fuel tanks and piping from tank to engine, shall comply with all applicable fire codes and applicable Federal Motor Vehicle Safety Standards in effect on the date of manufacture of the bus.

1.14.7.1 Installation of LPG tanks shall comply with National Fire Protection Association (NFPA) 58. Installation of other alternative fuel tanks shall comply with applicable NFPA standards.

1.14.8 Fuel gauges must be calibrated for size of tank used. If more than one tank is used, there must be a gauge for each tank.

1.15 Governor

1.15.1 An engine governor or road speed governor is permissible.

1.15.2 When engine is remotely located from driver, the governor shall be set to limit engine speed to maximum revolutions per minute recommended by engine manufacturer, and a tachometer shall be installed so the engine speed may be known to the driver.

1.16 Heating System, Provision For: 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 3/4 inch pipe thread/hose connector. 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. (SBMI Standard No. 001, Standard Code for Testing and Rating Automotive Bus Hot Water Heating and Ventilating Equipment.)

1.17 Horn: Bus shall be equipped with horn or horns of standard make with each horn capable of producing a complex sound in bands of audio frequencies between 250 and 2000 cycles per second and tested in accordance with SAE J-377.

1.18 Instruments and Instrument Panel

1.18.1 Chassis shall be equipped with the following instruments and gauges - lights in lieu of gauges are not acceptable, except as noted:

1.18.1.1 Speedometer.

1.18.1.2 Odometer which will give accrued mileage (to seven digits), including tenths of miles.

1.18.1.3 Voltmeter: Ammeter with graduated charge and discharge, with ammeter and its wiring compatible with generating capacities, is permitted in lieu of voltmeter.

1.18.1.4 Oil pressure gauge.

1.18.1.5 Water temperature gauge.

1.18.1.6 Fuel gauge.

1.18.1.7 Upper beam headlight indicator.

1.18.1.8 Brake indicator gauge (vacuum or air): Light indicator in lieu of gauge is permitted on vehicle equipped with hydraulic over hydraulic brake system.

1.18.1.9 Turn signal indicator.

1.18.1.10 Glow plug indicator light where appropriate.

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

1.18.3 Instruments and gauges shall be mounted on the instrument panel so that each is clearly visible to the driver while seated in a normal driving position in accordance with SBMI Design Objectives, 1990 edition.

1.18.4 Instrument panel shall have lamps of sufficient candlepower to illuminate all instruments and gauges and shift selector indicator for automatic transmission.

1.19 Oil Filter: An oil filter with a replaceable element shall be provided and connected by flexible oil lines if not a built in or an engine-mounted design. The oil filter shall have a capacity of at least 1 quart.

1.20 Openings: All openings in the floorboard or firewall between chassis and passenger compartment, such as for gearshift selector and parking brake lever, shall be sealed.

1.21 Passenger Load

1.21.1 Actual gross vehicle weight (GVW) is the sum of the chassis weight, plus the body weight, plus the driver's weight, plus total seated pupil weight. (For purposes of calculation, the driver's weight is 150 pounds and the pupil weight is 120 pounds per pupil.)

1.21.2 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 GVWR.

1.21.3 Manufacturer's GVWR shall be furnished in duplicate (unless more are requested) by manufacturers to the Delaware Department of Education. The Department of Education shall, in turn, transmit such ratings to other state agencies responsible for development or enforcement of state standards for school buses.

1.22 Power and Grade Ability: GVWR shall not exceed 185 pounds per published net horsepower of the engine at the manufacturer's recommended maximum number of revolutions per minute.

1.23 Shock Absorbers: The bus shall be equipped with double action shock absorbers compatible with manufacturer's rated axle capacity at each wheel location.

1.24 Springs

1.24.1 The capacity of springs or suspension assemblies shall be commensurate with the chassis manufacturer's GVWR.

1.24.2 Steel leaf rear springs shall be a progressive rate or multi stage 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.

1.25 Steering Gear

1.25.1 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.

1.25.2 If external adjustments are required, steering mechanism shall be accessible to accomplish same.

1.25.3 No changes shall be made in the steering apparatus which are not approved by the chassis manufacturer.

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

1.25.5 Power steering is required and shall be of the integral type with integral valves.

1.25.6 The steering system shall be designed to provide a means for lubrication of all wear points, if wear points are not permanently lubricated.

1.26 Throttle: The force required to operate the throttle shall not exceed 16 pounds throughout the full range of accelerator pedal travel.

1.27 Tires and Rims

1.27.1 Tires and rims of the proper size and tires with a load rating commensurate with chassis manufacturer's gross vehicle weight rating shall be provided. The use of multipiece rims and tube type tires shall not be permitted.

1.27.2 Dual rear tires shall be provided on Type A-I, Type B, Type C, and Type D buses.

1.27.3 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.

1.27.4 If the vehicle is equipped with a spare tire and rim assembly, it shall be the same size as those mounted on the vehicle.

1.27.5 If a tire carrier is required, it shall be suitably mounted in an accessible location outside the passenger compartment.

1.28 Tow Eyes or Hooks: Tow eyes or hooks shall be furnished and attached so as not to project beyond the front bumper. Tow eyes or hooks attached to the frame chassis shall be furnished by the chassis manufacturer. This installation shall be in accordance with the chassis manufacturer's standards.

1.29 Transmission

1.29.1 Automatic transmissions shall have no fewer than three forward speeds and one reverse speed. The shift selector shall provide a detent between each gear position when the gear selector quadrant and shift selector are not steering column mounted.

1.29.2 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.

1.30 Turning Radius

1.30.1 A chassis with a wheelbase of 264 inches or less shall have a right and left turning radius of not more than 42 1/2 feet, curb to curb measurement.

1.30.2 A chassis with a wheelbase of 265 inches or more shall have a right and left turning radius of not more than 44 1/2 feet, curb to curb measurement.

1.31 Undercoating: The chassis manufacturers or their agent shall coat the undersides of steel or metallic constructed front fenders with a rust proofing compound for which compound manufacturers have issued notarized certification of compliance to 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.

25 DE Reg. 1136 (06/01/22)

2.0 Bus Body Standards

2.1 Aisle

2.1.1 All emergency doors shall be accessible by a 12-inch minimum aisle. Aisle shall be unobstructed at all times by any type of barrier, seat, wheelchair or tiedown.

2.1.2 A 2-inch white line shall separate the driver compartment from the passenger compartment.

2.1.3 The seat backs shall be slanted sufficiently to give aisle clearance of 15 inches at tops of seat backs.

2.2 Back Up Warning Alarm: An automatic audible alarm shall be installed behind the rear axle and shall comply with the published Backup Alarm Standards (SAE 994), providing a minimum of 112 dBA for rubber tired vehicles.

2.3 Battery Compartment

2.3.1 When the battery is mounted as described in the chassis section, the body manufacturer shall securely attach the battery on a slide out or swing out tray in a closed, vented compartment in the body skirt, so that the battery is accessible for convenient servicing from the outside. Battery compartment door or cover shall be hinged at front or top, and secured by an adequate and conveniently operated latch or other type fastener. On all Type A buses, one or both batteries may be mounted in the engine compartment in an accessible location.

2.3.2 Buses may be equipped with a battery shut off switch. The switch is to be placed in a location not readily accessible to the driver or passengers.

2.4 Bumper (Front)

2.4.1 On a Type "D" school bus, if the chassis manufacturer does not provide a bumper, it shall be provided by the body manufacturer. The bumper will conform to the standards in the chassis section.

2.4.2 If an optional energy absorbing front bumper is used, it shall meet the strength requirements in the 1995 National Standards.

2.5 Bumper (Rear)

2.5.1 Bumper shall be pressed steel channel or equivalent material, at least 3/16 inch thick, and shall be a minimum of 8 inches wide (high) on Type A-II and a minimum of 9½ inches (high) on Types A-I, B, C, and D buses and of sufficient strength to permit being pushed by another vehicle without permanent distortion.

2.5.2 Bumper shall be wrapped around back corners of the bus. It shall extend forward at least 12 inches, measured from the rear most point of the body at the floor line and shall be flush mounted to body side or protected with an end panel.

2.5.3 Bumper shall be attached to the chassis frame in such a manner that it may be easily removed. It shall be so braced as to withstand impact from a rear or side impact. It shall be so attached as to discourage hitching of rides.

2.5.4 Bumper shall extend at least 1 inch beyond rear most part of body surface measured at the floor line.

2.5.5 If an optional energy absorbing rear bumper is used, it shall meet the strength requirements of the 1995 National Standards.

2.6 Ceiling: See Insulation and Interior, Body section.

2.7 Certification: Body manufacturer shall, upon request, certify to the Delaware Department of Education, that their product meets state standards on items not covered by certification issued under requirements of the National Traffic and Motor Vehicle Safety Act.

2.8 Chains (Tire): See Wheelhousing, Body section.

2.9 Color

2.9.1 The school bus body shall be painted National School Bus Yellow (NSBY).

2.9.2 The body exterior paint trim, bumper, lamp hoods, emergency door arrow, and lettering shall be black.

2.10 Communications: Buses shall be equipped with a radio or telephonic communication device. It will be added by the school district, school, or contractor.

2.11 Construction

2.11.1 Construction shall be of prime commercial quality steel or other metal or material with strength at least equivalent to all steel, as certified by the bus body manufacturer.

2.11.2 Construction shall be reasonably dust proof and watertight.

2.11.3 Body joints present in that portion of the Type A-II school bus body furnished exclusively by the body manufacturer shall conform to the performance requirements of FMVSS 221. This does not include the body joints created when body components are attached to components furnished by the chassis manufacturer.

2.12 Crossing Control Arm

2.12.1 Buses shall be equipped with a crossing control arm mounted on the right side of the front bumper, which shall not open more than 90°.

2.12.2 All components of the crossing control arm and all connections shall be weatherproofed.

2.12.3 The crossing control arm shall incorporate system connectors (electrical, vacuum, or air) at the gate and shall be easily removable to allow for towing of the bus.

2.12.4 The crossing control arm shall meet or exceed SAE Standard J1133.

2.12.5 The crossing control arm shall be constructed of noncorrosive or nonferrous material or treated in accordance with the body sheet metal standard (see METAL TREATMENT).

2.12.6 There shall be no sharp edges or projections that could cause hazard or injury to students.

2.12.7 The crossing control arm shall extend approximately 72 inches from the front bumper when in the extended position.

2.12.8 The crossing control arms shall extend simultaneously with the stop arm by means of the stop arm controls.

2.13 Defrosters

2.13.1 Defrosting and defogging equipment shall direct a sufficient flow of heated air onto the windshield, the window to the left of the driver, and the glass in the viewing area directly to the right of the driver to eliminate frost, fog and snow.

2.13.2 The defrosting system shall conform to SAE Standards J381 and J382.

2.13.3 The defroster and defogging system shall be capable of furnishing heated outside ambient air, except the part of the system furnishing additional air to the windshield, entrance door and stepwell may be of the recirculating air type.

2.13.4 Auxiliary fans are not considered defrosting or defogging systems and are described under “Ventilation.”

2.13.5 Portable heaters shall not be used.

2.14 Doors

2.14.1 Service door shall be in the driver's control, and designed to afford easy release and provide a positive latching device on manual operating doors to prevent accidental opening. When a hand lever is used, no part shall come together that will shear or crush fingers. Manual door controls shall not require more than 25 pounds of force to operate at any point throughout the range of operation. If a power assisted door is used, the actuation switch shall be to the right of the steering wheel (in the same position as the manual handles).

2.14.2 Service door shall be located on the right side of the bus, opposite and within direct view of driver.

2.14.3 Service door shall have a minimum horizontal opening of 24 inches and a minimum vertical opening of 68 inches. Type A-II vehicles shall have a minimum opening area of 1200 square inches.

2.14.4 Service door shall be a split type, sedan type, or jack knife type. (Split type door includes any sectioned door which divides and opens inward or outward.) If one section of a split type door opens inward and the other opens outward, the front section shall open outward.

2.14.5 Lower as well as upper door panels shall be of approved safety glass. Bottom of each lower glass panel shall not be more than 10 inches from the top surface of bottom step. Top of each upper glass panel shall not be more than 3 inches from the top of the door. Type A vehicles shall have an upper panel (windows) of safety glass with an area of at least 350 square inches.

2.14.6 Vertical closing edges on split type or folding type entrance doors shall be equipped with flexible material to protect children's fingers. Type A-II vehicles may be equipped with chassis manufacturer's standard entrance door.

2.14.7 There shall be no door to left of driver on Type B, C or D vehicles. All Type A vehicles may be equipped with chassis manufacturer's standard door.

2.14.8 All doors shall be equipped with padding at the top edge of each door opening. Padding shall be at least 3 inches wide and 1 inch thick and extend the full width of the door opening.

2.15 Driver Compartment

2.15.1 Driver's seat supplied by the body company shall be a high back seat with a minimum seat back adjustment of 15 degrees, not requiring the use of tools, and with a head restraint to accommodate a 95th percentile adult male, as defined in FMVSS 208. The driver's seat shall be secured with nuts, bolts, and washers or flanged headed nuts.

2.15.2 Driver seat positioning and range of adjustments shall be designed to accommodate comfortable actuation of the foot control pedals by 95 percent of the male and female adult population.

2.16 Emergency Exits

2.16.1 Emergency doors and other emergency exits shall comply with the requirements of FMVSS 217 and any of the requirements of these standards that exceed FMVSS 217.

2.16.2 Emergency door requirements

2.16.2.1 Upper portion of the emergency door shall be equipped with approved safety glazing, exposed area of which shall be at least 400 square inches. The lower portion of the rear emergency doors on Types A-I, B, C, and D vehicles shall be equipped with a minimum of 350 square inches of approved safety glazing.

2.16.2.2 There shall be no steps leading to an emergency door.

2.16.2.3 The words "EMERGENCY DOOR," in letters at least 2 inches high, shall be placed at the top of or directly above the emergency door, or on the door in the metal panel above the top glass, both inside and outside the bus.

2.16.2.4 The emergency doors shall be equipped with padding at top edge of each door opening. Padding shall be at least 3 inches wide and 1 inch thick and extend the full width of the door opening.

2.16.2.5 The side emergency door, if installed, must meet the requirements as set forth in FMVSS 217, regardless of its use with any other combination of emergency exits. There shall be a clear aisle leading to it i.e., flip seats shall not be used.

2.16.2.6 There shall be no obstruction higher than 1/4 inch across the bottom of any emergency door opening.

2.16.3 Emergency exit requirements: Types A, B, C, and D vehicles shall be equipped with a total number of emergency exits as follows for the indicated standard seating capacities of vehicles (See below). Exits required by FMVSS 217 may be included to comprise the total number of exits specified.

0 to 42 Passenger = 1 emergency exit per side and 1 roof hatch.

43 to 78 Passenger = 2 emergency exits per side and 2 roof hatches.

79 to 90 Passenger = 3 emergency exits per side and 2 roof hatches.

2.16.4 Each emergency exit above shall comply with FMVSS 217. These emergency exits are in addition to the rear emergency door or exit.

2.16.5 In addition to the audible warning required on emergency doors by FMVSS 217, additional emergency exits shall also be equipped with an audible warning device.

2.17 Emergency Equipment

2.17.1 Fire Extinguisher

2.17.1.1 The bus shall be equipped with at least one UL approved pressurized, dry chemical fire extinguisher complete with hose. Extinguisher shall be mounted in a bracket, located in the driver's compartment and readily accessible to the driver and passengers. A pressure gauge shall be

mounted on the extinguisher and be easily read without moving the extinguisher from its mounted position.

2.17.1.2 The fire extinguisher shall have a total rating of 2A10BC or greater. The operating mechanism shall be sealed with a type of seal which will not interfere with the use of the fire extinguisher.

2.17.2 First Aid Kit

2.17.2.1 The bus shall have a removable moisture proof and dust proof first aid kit in an accessible place in the driver's compartment. It shall be properly mounted and identified as a first aid kit. The location for the first aid kit shall be marked.

2.17.2.2 Minimum contents include

Units	Quantity per unit
2	12 - 1 inch by 3 inch adhesive bandages
1	2 - 2 inch bandage compresses
1	1 - 4 inch bandage compress
1	1 - non-sterile triangular bandage approximately 40 inches by 36 inches by 54 inches with 2 safety pins
1	1 - eye kit with 2 sterile eye pads and 1 oz. wash
1	3 - burn ointment, 1/8 oz.
1	5 - ammonia inhalants
1	5 - PVP antiseptic swabs
1	5 - insect sting swabs

2.17.3 Body fluid clean up kit: Each bus shall have a removable and moisture proof body fluid clean up kit accessible to the driver. It shall be properly mounted and identified as a body fluid clean up kit. Contents of body fluid clean up kit shall include the following:

2.17.3.1 1- 16 oz. bottle of 70 percent rubbing alcohol or 10 percent solution of bleach.

2.17.3.2 1- plastic trash bag with tie, minimum of 12 inches by 12 inches.

2.17.3.3 2- pairs of medical examination gloves.

2.17.3.4 10- paper towels, approximately 10 ½ inches by 12½ inches.

2.17.4 Warning devices: Each school bus shall contain at least 3 reflectorized triangle road warning devices mounted in an accessible place. These devices must meet requirements in FMVSS 125.

2.17.5 If any emergency equipment is mounted in an enclosed compartment, refer to the 1995 National Standards.

2.18 Floor

2.18.1 Floor in under seat area, including tops of wheelhousing, driver's compartment and toeboard, shall be covered with rubber floor covering or equivalent, having a minimum overall thickness of 1/8 inch. The driver's area on all Type A buses may be manufacturer's standard flooring and floor covering.

2.18.2 Floor covering in aisles shall be of aisle type rubber or equivalent, wear resistant and ribbed. Minimum overall thickness shall be 7/8 inch measured from tops of ribs.

2.18.3 Floor covering must be permanently bonded to floor and must not crack when subjected to sudden changes in temperature. Bonding or adhesive material shall be waterproof and shall be a type recommended by the manufacturer of floor covering material. All seams must be sealed with waterproof sealer.

2.18.4 On Types A-I, B, C and D buses a screw down plate that is secured and insulated shall be provided to access the fuel tank sending unit.

2.19 Heaters

2.19.1 Heater shall be a hot water type.

2.19.2 Every bus with a capacity of 36 or more shall have 2 heaters at the front: 1 to the left of the driver, and 1 to the right of the driver near the entrance door, and 1 heater in the rear portion of the bus.

2.19.3 If only one heater is used, it shall be fresh air or combination fresh air and recirculation type.

2.19.4 If more than one heater is used, additional heaters may be recirculating air type.

2.19.5 The heating system shall be capable of maintaining bus interior temperatures as specified in SAE test procedure J2233.

2.19.6 All heaters installed by body manufacturers shall bear a name plate that indicates the heater rating in accordance with SBMI Standard No. 001. The plate shall be affixed by the heater manufacturer and shall constitute certification that the heater performance is as shown on the plate.

2.19.7 Heater hoses shall be adequately supported to guard against excessive wear due to vibration. The hoses shall not dangle or rub against the chassis or any sharp edges and shall not interfere with or restrict the operation of any engine function. Heater hoses shall conform to SAE Standard J20c. Heater lines on the interior of bus shall be shielded to prevent scalding of the driver or passengers.

2.19.8 Each hot water system installed by a body manufacturer shall include one shut off valve in the pressure line and one shut off valve in the return line with both valves at the engine in an accessible location, except that on all Types A and B buses, the valves may be installed in another accessible location.

2.19.9 There shall be a water flow regulating valve installed in the pressure line for convenient operation by the driver while seated.

2.19.10 Accessible bleeder valves shall be installed in an appropriate place in the return lines of body company installed heaters to remove air from the heater lines.

2.19.11 Access panels shall be provided to make heater motors, cores, and fans readily accessible for service. Outside access panel may be provided for the driver's heater.

2.20 Hinges: All exposed metal door hinges subject to corrosion shall be designed to allow lubrication to be channeled to the center 75 percent of each hinge loop.

2.21 Identification

2.21.1 Body shall bear words "SCHOOL BUS" in black letters at least eight inches high on both front and rear of body or on signs attached thereto. Lettering shall be placed as high as possible without impairment of its visibility. Letters shall conform to "Series B" of Standard Alphabets for highway signs. "SCHOOL BUS" lettering shall have a reflective background, or as an option, may be illuminated by backlighting. All lettering on NSBY surfaces shall be black, and lettering on black surfaces shall be NSBY or white.

2.21.2 Bus identification number shall be displayed on the sides, on the rear, and on the front.

2.21.3 Other lettering, numbering, or symbols which may be displayed on the exterior of the bus, shall be limited to:

2.21.3.1 District or company name or owner of the bus may be displayed.

2.21.3.2 Bus identification number on the top of the bus, in addition to required numbering on sides, rear, and front.

2.21.3.3 The location of the batteries identified by the word "BATTERY" or "BATTERIES" on the battery compartment door in 2-inch lettering.

2.21.3.4 Lettering to identify the fuel type at the fuel filler location (2-inch letters maximum).

2.21.3.5 Symbols or letters near the service door displaying information for identification by the students of the bus or route served. Such symbols or lettering, if used, shall not exceed 36 square inches in size.

2.21.3.6 Symbols identifying the bus as equipped for or transporting students with special needs (see Specially Equipped School Bus section).

2.21.3.7 Manufacturer, company name, dealer, or school logo, or U.S. Flag (with no other wording or artwork) decal or plate not to exceed 6 inches x 12 inches may be displayed in the right side plate location on the rear of the bus.

2.22 Inside Height: Inside body height shall be 72 inches or more, measured metal to metal, at any point on longitudinal center line from front vertical bow to rear vertical bow. Inside body height of Type A buses shall be 62 inches or more.

2.23 Insulation

2.23.1 Thermal insulation shall be fire resistant, UL approved, and approximately 1½ inches thick with minimum R value of 5.5. Insulation shall be installed to prevent sagging.

2.23.2 If floor insulation is required, it shall be either 5 ply nominal 5/8 inch thick plywood, or a material of equal or greater strength and insulation R value, and it shall equal or exceed properties of the exterior type softwood plywood, C-D Grade as specified in standard issued by U.S. Department of Commerce. When plywood is used, all exposed edges shall be sealed. Type A-II buses may be equipped with nominal ½ inch thick plywood meeting above requirements.

2.24 Interior

2.24.1 Interior of bus shall be free of all unnecessary projections, which include luggage racks and attendant hand rails, to minimize the potential for injury. This standard requires inner lining on ceilings and walls. If ceiling is constructed to contain lapped joints, forward panel shall be lapped by rear panel and exposed edges shall be beaded, hemmed, flanged, or otherwise treated to minimize sharp edges. Buses may be equipped with a storage compartment for tools, tire chains, and tow chains. (See Storage Compartment, Body section)

2.24.2 The driver's area forward of the foremost padded barriers will permit the mounting of required safety equipment and vehicle operation equipment.

2.24.3 Every school bus shall be constructed so that the noise level taken at the ear of the occupant nearest to the primary vehicle noise source shall not exceed 85 dBA when tested according to the procedure found in the 1995 National Standards.

2.25 Lamps and Signals

2.25.1 Interior lamps shall be provided which adequately illuminate aisle and stepwell. Stepwell light shall be illuminated by a service door operated switch, to illuminate only when headlights and clearance lights are on and service door is open.

2.25.2 Body instrument panel lights shall be controlled by an independent rheostat switch.

2.25.3 School bus alternately flashing signal lamps:

2.25.3.1 Bus shall be equipped with two red lamps at the rear of vehicle and two red lamps at the front of the vehicle. Lamps may be the sealed beam or halogen type.

2.25.3.2 In addition to the four red lamps described above, four amber lamps shall be installed so that one amber lamp is located near each red signal lamp, at same level, but closer to vertical centerline of bus. The system of red and amber signal lamps shall be wired so that amber lamps are energized manually, and red lamps are automatically energized (with amber lamps being automatically deenergized) when stop signal arm is extended or when bus service door is opened. An amber pilot light and a red pilot light shall be installed adjacent to the driver controls for the flashing signal lamp to indicate to the driver which lamp system is activated.

2.25.3.3 Area around lens of each alternately flashing signal lamp and extending outward approximately 3 inches shall be black in color. In installations where there is no flat vertical portion of body immediately surrounding entire lens of lamp, a circular or square band of black approximately 3 inches wide, immediately below and to both sides of the lens, shall be black in color on body or roof area against which signal lamp is seen (from distance of 500 feet along axis of vehicle). Visors or hoods with an appropriate black background to fit the shape of the lights and roofcap are required and shall have a minimum depth of 4 inches.

2.25.3.4 Red lamps shall flash at any time the stop signal arm is extended.

2.25.3.5 All flashers for alternately flashing red and amber signal lamps shall be enclosed in the body in a readily accessible location.

2.25.4 Turn signal and stop and tail lamps:

2.25.4.1 Bus body shall be equipped with amber rear turn signal lamps that are at least 7 inches in diameter and meet SAE specifications. These signal lamps must be connected to the chassis hazard warning switch to cause simultaneous flashing of turn signal lamps when needed as vehicular traffic hazard warning. Turn signal lamps are to be placed as wide apart as practical and their centerline shall be approximately 8 inches below the rear windows. Type A-II conversion vehicle lamps must be at least 21 square inches in lens area. All turn signal lens shall be amber in color.

2.25.4.2 Buses shall be equipped with amber sidemounted turn signal lights. The turn signal lamp on the left side shall be mounted rearward of the stop signal arm and the turn signal lamp on the right side shall be mounted rearward of the service door.

2.25.4.3 Buses shall be equipped with four combination red stop and tail lamps:

2.25.4.3.1 Two combination lamps with a minimum diameter of 7 inches, or if a shape other than round, a minimum 38 square inches of illuminated area shall be mounted on the rear of the bus just inside the turn signal lamps.

2.25.4.3.2 Two combination lamps with a minimum diameter of 4 inches, or if a shape other than round, a minimum 12 square inches of illuminated area shall be placed on the rear of the body between the beltline and the floor line. Rear license plate lamp may be combined with one lower tail lamp. Stop lamps shall be activated by the service brakes and shall emit a steady light when illuminated. Type A-II buses with bodies supplied by chassis manufacturer may have manufacturer's standard stop and tail lamps.

2.25.4.4 All buses shall be equipped with a transistorized monitor which monitors the front and rear lamps of the school bus. The monitor shall be mounted in full view of the driver. If the full circuit current passes through the monitor, each circuit shall be protected by a fuse or circuit breaker against any short circuit or intermittent shorts.

2.25.4.5 Body markers shall be the armored type.

2.25.4.6 Backup lamps: Bus body shall be equipped with two white rear backup lamp signals that are at least 4 inches in diameter or, if a shape other than round, a minimum of 13 square inches of illuminated area, meeting SAE specifications. If backup lamps are placed on the same line as the brake lamps and turn signal lamps, they shall be to the inside.

2.26 Metal Treatment

2.26.1 All metal used in construction of bus body shall be zinc coated or aluminum coated or treated by equivalent process before bus is constructed. Included are such items as structural members, inside and outside panels, door panels and floor sills. Excluded are such items as door handles, grab handles, interior decorative parts and other interior plated parts.

2.26.2 All metal parts that will be painted shall be, in addition to above requirements, chemically cleaned, etched, zinc phosphate coated and zinc chromate or epoxy primed or conditioned by equivalent process.

2.26.3 In providing for these requirements, particular attention shall be given lapped surfaces, welded connections of structural members, cut edges punched or drilled hole areas in sheet metal, closed or box sections, unvented or undrained areas and surfaces subjected to abrasion during vehicle operation.

2.26.4 As evidence that above requirements have been met, samples of materials and sections used in construction of the bus body subjected to 1000 hour salt spray test as provided for in latest revision of ASTM Standard B-117 shall not lose more than 10 percent of material by weight.

2.27 Mirrors

2.27.1 Interior mirror shall be either clear view laminated glass or clear view glass bonded to a backing which retains the glass in the event of breakage. Mirror shall have rounded corners and protected edges. All Type A buses shall have a minimum of a 6 inches x 16 inches mirror and Types B, C, and D buses shall have a minimum of a 6 inches x 30 inches mirror.

2.27.2 Each school bus shall be equipped with exterior mirrors meeting the requirements of FMVSS 111. Mirrors shall be easily adjustable but shall be rigidly braced so as to reduce vibration.

2.28 Mounting

2.28.1 Chassis frame shall support rear body cross member. Bus body shall be attached to chassis frame at each main floor sill, except where chassis components interfere, in such manner as to prevent shifting or separation of the body from the chassis under severe operating conditions.

2.28.2 Insulation material shall be placed at all contact points between body and chassis frame on Types A-I, B, C, and D buses, and shall be so attached to the chassis frame or body that it will not move under severe operating conditions.

2.29 Overall Length: Overall length of bus shall not exceed 40 feet, excluding accessories.

2.30 Overall Width: Overall width of bus shall not exceed 96 inches, excluding accessories. Delaware Law (21 **Del.C.**, §4363b) states that the body, excluding mirrors, shall have a minimum width of 75 inches and a minimum height of 79 inches from road surface to top of roof.

2.31 Public Address System: There shall be installed a public address amplifier specifically designed for vehicular applications with a minimum power output of not less than 5 watts sine wave power. Such system shall consist of an on off switch, volume control, and an inside outside speaker selector switch. Additionally, it shall have an outside speaker completely weather proofed a minimum 7-watt power capability and two interior dynamic

speakers with a minimum diameter of 4 inches. These speakers shall be located above the window line, to the rear of the driver, and shall not project more than 1/2 inch from the interlining of the bus. There shall be no sharp edges or corners which could cause injury to a passenger. The front speaker shall be approximately 5 feet to the rear of the driver, and the rear speaker shall be in the back portion of the bus. The outside speaker shall be located on the front of the cowl under the hood or other suitable location under the hood.

2.32 Reflective Material (see Appendix B of the 1995 National Standards)

2.32.1 Front and rear bumper may be marked diagonally 45 degrees down to centerline of pavement with 2-inch, plus or minus 1/4 inch, wide strips of non-contrasting reflective material.

2.32.2 Rear of bus body shall be marked with strips of reflective NSBY material to outline the perimeter of the back of the bus using material which conforms with the requirements of FMVSS 571.131 Table 1. The perimeter marking of rear emergency exits per FMVSS 217 and the use of reflective “SCHOOL BUS” signs partially accomplish the objective of this requirement. To complete the perimeter marking of the back of the bus, strips of at least 1 3/4 inch reflective NSBY material shall be applied horizontally above the rear windows and above the rear bumper extending from the rear emergency exit perimeter marking outward to the left and right rear corners of the bus; and vertical strips shall be applied at the corners connecting these horizontal strips.

2.32.3 "SCHOOL BUS" signs, if not of lighted design, shall be marked with reflective NSBY material comprising background for lettering of the front and rear "SCHOOL BUS" signs.

2.32.4 Sides of bus body shall be marked with reflective NSBY material at least 1¾ inches in width, extending the length of the bus body and located vertically between the floor line and the beltline.

2.33 Rub Rails

2.33.1 There shall be one rub rail located on each side of bus approximately at seat level which shall extend from rear side of entrance door completely around bus body (except emergency door or any maintenance access door) to point of curvature near outside cowl on left side.

2.33.2 There shall be one rub rail located approximately at floor line which shall cover the same longitudinal area as upper rub rail, except at wheelhousing, and shall extend only to radii of right and left rear corners.

2.33.3 Both rub rails shall be attached at each body post and all other upright structural members.

2.33.4 Both rub rails shall be 4 inches or more in width in their finished form, shall be of 16 gauge steel or suitable material of equivalent strength, and shall be constructed in corrugated or ribbed fashion.

2.33.5 Both rub rails shall be applied outside body or outside body posts. Pressed in or snap on rub rails do not satisfy this requirement. For Type A-II vehicles using chassis manufacturer's body, or for Types A-I, B, C and D buses using rear luggage or rear engine compartment, rub rails need not extend around rear corners.

2.33.6 There shall be a rub rail or equivalent bracing located horizontally at the bottom edge of the body side skirts.

2.34 Seat Belt for Driver: A Type 2 lap belt shoulder harness seat belt shall be provided for the driver. The assembly shall be equipped with an emergency locking retractor (ELR) for the continuous belt system. On all buses except Type A equipped with standard chassis manufacturer's driver's seat, the lap portion of the belt shall be guided or anchored to prevent the driver from sliding sideways under it. The lap belt and shoulder harness shall be designed to allow for easy adjustment in order to fit properly and effectively protect drivers varying from 5th percentile female to 95th percentile male.

2.35 Seat and Crash Barriers

2.35.1 All seats shall have a minimum depth of 15 inches. All seat backs shall be a minimum of 24 inches high and a minimum 20 inches from seating reference point. There shall be a minimum of 8 inches clearance between the last seat and the rear of the bus.

2.35.2 In determining seating capacity of bus, allowable average rump width shall be:

2.35.2.1 13 inches where 3-3 seating plan is used.

2.35.2.2 15 inches where 3-2 seating plan is used.

2.35.3 All restraining barriers and passenger seats shall be constructed with materials that enable them to meet the criteria contained in the School Bus Seats Upholstery Fire Block Test (See Appendix B of the 1995 National Standards).

2.35.4 Each seat leg shall be secured to the floor by a minimum of 2 bolts, washers, and nuts. Flange head nuts may be used in lieu of nuts and washers, or seats may be track mounted in conformance with FMVSS 222.

If track seating is installed, the manufacturer shall supply minimum and maximum seat spacing dimensions applicable to the bus, which comply with FMVSS 222. This information shall be on a label permanently affixed to the bus.

2.35.5 All seat frames attached to the seat rail shall be fastened with 2 bolts, washers and nuts or flange headed nuts.

2.35.6 Type A-II school bus bodies shall be equipped with restraining barriers conforming to FMVSS 222.

2.36 Steps

2.36.1 First step at service door shall be not less than 10 inches and not more than 14 inches from the ground when measured from top surface of the step to the ground, based on standard chassis specifications, except that on Type D vehicles, the first step at the service door shall be 12 inches to 16 inches from the ground.

2.36.2 Step risers shall not exceed a height of 10 inches. When plywood is used on a steel floor or step, the riser height may be increased by the thickness of the plywood.

2.36.3 Steps shall be enclosed to prevent accumulation of ice and snow.

2.36.4 Steps shall not protrude beyond the side body line.

2.36.5 A suitable device (or devices) shall be designed and installed to prevent injury or fatality to passengers from being dragged. At least one such device shall assist passengers during entry or egress and be of such design to eliminate entanglement.

2.37 Step Treads

2.37.1 All steps, including floor line platform area, shall be covered with 3/16 inch rubber floor covering or other materials equal in wear and abrasion resistance to top grade rubber.

2.37.2 Metal back of tread, minimum 24 gauge cold roll steel, shall be permanently bonded to ribbed rubber; grooved design shall be such that said grooves run at 90 degree angles to long dimension of step tread.

2.37.3 3/16 inch ribbed step tread shall have a 1½ inches white nosing as an integral piece without any joint.

2.37.4 Rubber portion of step treads shall have the following characteristics:

2.37.4.1 Special compounding for good abrasion resistance and high coefficient of friction.

2.37.4.2 Flexibility so that it can be bent around a ½ inch mandrel both at 130 degrees Fahrenheit and 20 degrees Fahrenheit without breaking, cracking, or crazing.

2.37.4.3 Show a durometer hardness 85 to 95.

2.38 Stirrup Steps: There shall be at least one folding stirrup step or recessed foothold and suitably located handles on each side of the front of the body for easy accessibility for cleaning the windshield and lamps except when the windshield and lamps are easily accessible from the ground. Steps are permitted in or on the front bumper, in lieu of the stirrup steps, if the windshield and lamps are easily accessible for cleaning from that position.

2.39 Stop Signal Arm: The stop signal arm(s) shall comply with the requirements of FMVSS 131.

2.40 Storage Compartment: A storage container for tools, tire chains, and tow chains may be located either inside or outside the passenger compartment but, if inside, it shall have a cover (seat cushion may not serve this purpose) capable of being securely latched and fastened to the floor, convenient to either the service or emergency door.

2.41 Strobe Light

2.41.1 A white flashing strobe light shall be installed on the roof of all school buses manufactured after January 1, 2001. It shall be located from 4 to 6 feet from the rear of the roof edge (except air conditioned buses with roof top evaporators), within 1 foot of centerline, and behind all other roof equipment. The strobe shall extend above the roof between 4 ½ to 6 3/4 inches, and the light shall be 12 to 16 joules with a clear lens emitting light 360 degrees around its vertical axis.

2.41.2 The light shall be wired to activate when the amber alternately flashing signal lamps are activated, continuing through the full loading or unloading cycle, with an override switch to allow activation of the strobe light during inclement weather.

2.41.3 A pilot light shall be included to indicate when the light is in operation.

2.42 Sun Shield

2.42.1 Interior adjustable transparent sun shield not less than 6 inches x 30 inches for Types B, C, and D vehicles, with a finished edge, shall be installed in a position convenient for use by driver.

2.42.2 On all Type A buses the sun shield shall be manufacturer's standard.

2.43 Traction Assisting Devices

2.43.1 If traction assisting devices are used, sanders shall:

2.43.1.1 Be of hopper cartridge valve type.

2.43.1.2 Have metal hopper with all interior surfaces treated to prevent condensation of moisture.

2.43.1.3 Be of at least 100 pound (grit) capacity.

2.43.1.4 Have cover on filler opening of hopper, which screws into place, sealing unit airtight.

2.43.1.5 Have discharge tubes extending to front of each rear wheel under fender.

2.43.1.6 Have no clogging discharge tubes with slush proof, nonfreezing rubber nozzles.

2.43.1.7 Be operated by an electric switch with telltale pilot light mounted on the instrument panel.

2.43.1.8 Be exclusively driver controlled.

2.43.1.9 Have gauge to indicate that hopper needs refilling when it is down to 1/4 full.

2.43.2 Automatic traction chains may be installed.

2.44 Undercoating

2.44.1 Entire underside of bus body, including floor sections, cross member and below floor line side panels, shall be coated with rust proofing compound for which compound manufacturer has issued notarized certification of compliance to the bus body builder that compound meets or exceeds all performance and qualitative requirements of paragraph 3.4 of Federal Specification TT-C-520b using modified test procedures* for following requirements:

2.44.1.1 Salt spray resistance pass test modified to 5 percent salt and 1000 hours.

2.44.1.2 Abrasion resistance pass.

2.44.1.3 Fire resistance pass.

*Test panels to be prepared in accordance with paragraph 4.6.12 of TT-C-520b with modified procedure requiring that test be made on a 48 hour air cured film at thickness recommended by compound manufacturer.

2.44.2 Undercoating compound shall be applied with suitable airless or conventional spray equipment to recommended film thickness and shall show no evidence of voids in cured film.

2.45 Ventilation

2.45.1 Auxiliary fans shall meet the following requirements:

2.45.1.1 Fans for left and right sides shall be placed in a location where they can be adjusted for maximum effectiveness and do not obstruct vision to any mirror, the roadway, or students outside the bus. Note: All Type A buses may be equipped with one fan.

2.45.1.2 Fans shall be a nominal 6 inches diameter.

2.45.1.3 Fan blades shall be covered with a protective cage. Each fan shall be controlled by a separate switch.

2.45.2 Body shall be equipped with a suitably controlled ventilating system of sufficient capacity to maintain proper quantity of air under operating conditions, without having to open windows except in extremely warm weather.

2.45.3 Static type non-closeable exhaust ventilation shall be installed in low pressure area of roof.

2.45.4 Roof hatches designed to provide ventilation, regardless of the exterior weather conditions, may be provided.

2.46 Wheelhousing

2.46.1 The wheelhousing opening shall allow for easy tire removal and service.

2.46.2 The wheelhousing shall be attached to floor sheets in such a manner as to prevent any dust, water or fumes from entering the body. Wheelhousing shall be constructed of at least 16 gauge steel.

2.46.3 The inside height of the wheelhousing above the floor line shall not exceed 12 inches.

2.46.4 The wheelhousing shall provide clearance for installation and use of tire chains on single and dual (if so equipped) power driving wheels.

2.46.5 No part of a raised wheelhousing shall extend into the emergency door opening.

2.47 Windows

2.47.1 Each full side window, other than emergency exits designated to comply with FMVSS 217, shall provide an unobstructed emergency opening of at least 9 inches but not more than 13 inches high and 22 inches

wide, obtained by lowering window. One side window on each side of the bus may be less than 22 inches wide.

2.47.2 Optional tinted or frost free glazing may be installed in all doors, windows, and windshields consistent with federal, state, and local regulations.

2.48 Windshield Washers: A windshield washer system shall be provided.

2.49 Windshield Wipers

2.49.1 A windshield wiping system, two speed or variable speed, with an intermittent feature, shall be provided.

2.49.2 The wipers shall be operated by one or more air or electric motors of sufficient power to operate wipers. If one motor is used, the wipers shall work in tandem to give full sweep of windshield.

2.50 Wiring

2.50.1 All wiring shall conform to current SAE standards.

2.50.2 Circuits:

2.50.2.1 Wiring shall be arranged in circuits, as required, with each circuit protected by a fuse or circuit breaker. A system of color and number coding shall be used and an appropriate identifying diagram shall be provided to the end user along with the wiring diagram provided by the chassis manufacturer. The wiring diagrams shall be specific to the bus model supplied and include any changes to wiring made by the body manufacturer. Chassis wiring diagrams shall also be supplied to the end user. A system of color and number coding shall be used on buses. The following body interconnecting circuits shall be color coded as noted:

FUNCTION	COLOR
Left Rear Directional Light	Yellow
Right Rear Directional Light	Dark Green
Stoplights	Red
Back up Lights	Blue
Taillights	Brown
Ground	White
Ignition Feed, Primary Feed	Black

The color of cables shall correspond to SAE J 1128.

2.50.2.2 Wiring shall be arranged in at least six regular circuits as follows:

2.50.2.2.1 Head, tail, stop (brake) and instrument panel lamps.

2.50.2.2.2 Clearance and stepwell lamps (stepwell lamp shall be actuated when service door is opened).

2.50.2.2.3 Dome lamp.

2.50.2.2.4 Ignition and emergency door signal.

2.50.2.2.5 Turn signal lamps.

2.50.2.2.6 Alternately flashing signal lamps.

2.50.2.3 Any of the above combination circuits may be subdivided into additional independent circuits.

2.50.2.4 Whenever heaters and defrosters are used, at least one additional circuit shall be installed.

2.50.2.5 Whenever possible, all other electrical functions (such as sanders and electric type windshield wipers) shall be provided with independent and properly protected circuits.

2.50.2.6 Each body circuit shall be coded by number or letter on a diagram of circuits and shall be attached to the body in a readily accessible location.

2.50.3 The entire electrical system of the body shall be designed for the same voltage as the chassis on which the body is mounted.

2.50.4 All wiring shall have an amperage capacity exceeding the design load by at least 25 percent. All wiring splices are to be done at an accessible location and noted as splices on wiring diagram.

2.50.5 A body wiring diagram, of a size which can be easily read, shall be furnished with each bus body or affixed in an area convenient to the electrical accessory control panel.

2.50.6 The body power wire shall be attached to a special terminal on the chassis.

2.50.7 All wires passing through metal openings shall be protected by a grommet.

2.50.8 Wires not enclosed within body shall be fastened securely at intervals of not more than 18 inches. All joints shall be soldered or joined by equally effective connectors, which shall be water resistant and corrosion resistant.

4 DE Reg. 995 (12/01/00)
11 DE Reg. 1229 (03/01/08)
25 DE Reg. 1136 (06/01/22)

3.0 Standards for Specially Equipped School Buses

3.1 General Requirements

3.1.1 School buses designed for transporting students with special transportation needs shall comply with the 1995 National Standards and with Federal Motor Vehicle Safety Standards applicable to their GVWR category.

3.1.2 Any school bus to be used for the transportation of children who are confined to a wheelchair or other mobile positioning device, or who require life support equipment which prohibits use of the regular service entrance, shall be equipped with a power lift, unless a ramp is needed for unusual circumstances related to passenger needs.

3.2 Aisles: All school buses equipped with a power lift shall provide a 30 inch aisle leading from any wheelchair or mobility aid position to at least one emergency door and the lift area.

3.3 Glazing: Tinted glazing may be installed in all doors, windows, and windshields consistent with federal, state, and local regulations.

3.4 Identification: Buses with power lifts used for transporting individuals with disabilities shall display below the window line the International Symbol of Accessibility. Such emblems shall be white on blue background, shall not exceed 12 inches in size, and shall be of a high intensity reflectorized material meeting U.S. Department of Transportation's Federal Highway Administration (FHWA) FP-85 Standards.

3.5 Passenger Capacity Rating: The passenger capacity of a school bus is defined as the maximum standard seating capacity of that bus.

3.6 Power Lifts and Ramps

3.6.1 Power lift shall be located on the right side of the bus body when not extended.

3.6.1.1 A ramp device may be used in lieu of a mechanical lift if the ramp meets all the requirements of the Americans with Disability Act (ADA) as found in 36 CFR §1192.23 Vehicle ramp. (See Appendix D, 1995 National Standards).

3.6.1.2 A ramp device which does not meet the specifications of ADA but does meet the specifications of subsection 3.6.1.1 may be installed and used only when a power lift system is not adequate to load and unload students having special and unique needs. A readily accessible ramp may also be installed for emergency exit use. If stowed in the passenger compartment, the ramp must be properly secured and located away from general passenger contact. It must not obstruct or restrict any aisle or exit while in its stowed or deployed position.

3.6.1.3 All vehicles covered by this specification shall provide a level change mechanism or boarding device (e.g., lift or ramp) and sufficient clearances to permit a wheelchair or other mobility aid user to reach a securement location.

3.6.2 Vehicle lift

3.6.2.1 Design load. The design load of the lift shall be at least 600 pounds. Working parts, such as cables, pulleys, and shafts, which can be expected to wear, and upon which the lift depends for support of the load, shall have a safety factor of at least 6, based on the ultimate strength of the material. Nonworking parts, such as platform, frame, and attachment hardware which would not be expected to wear, shall have a safety factor of at least 3, based on the ultimate strength of the material.

Lift capacity. The lifting mechanism and platform shall be able to lift a minimum 800 pounds.

3.6.2.2 Controls: Controls shall be provided that enable the operator to activate the lift mechanism from either inside or outside the bus. The controls should be interlocked with the vehicle brakes, transmission, or door, or shall provide other appropriate mechanisms or systems to ensure the vehicle cannot be moved when the lift is not stowed and so the lift cannot be deployed unless the interlocks or systems are engaged. The lift shall deploy to all levels (i.e., ground, curb, and intermediate positions) normally encountered in the operating environment. Where provided, each control for deploying, lowering, raising, and stowing the lift and lowering the roll off barrier shall be of a momentary contact type requiring continuous manual pressure by the operator and shall not allow improper lift sequencing when the lift platform is occupied. The controls shall allow reversal of the lift operation sequence, such as raising or lowering a platform that is part way down, without allowing an occupied platform to fold or retract into the stowed position.

3.6.2.2.1 Exception: Where the lift is designed to deploy with its long dimension parallel to the vehicle axis and which pivots into or out of the vehicle while occupied (i.e., "rotary lift"), the requirements of subsection 3.6.2.2 prohibiting the lift from being stowed while occupied shall not apply if the stowed position is within the passenger compartment and the lift is intended to be stowed while occupied.

3.6.2.3 Emergency operation: The lift shall incorporate an emergency method of deploying, lowering to ground level with a lift occupant, and raising and stowing the empty lift if the power to the lift fails. No emergency method, manual or otherwise, shall be capable of being operated in a manner that could be hazardous to the lift occupant or to the operator when operated according to manufacturer's instructions, and shall not permit the platform to be stowed or folded when occupied, unless the lift is a rotary lift and is intended to be stowed while occupied. No manual emergency operation shall require more than 2 minutes to lower an occupied wheelchair to ground level.

3.6.2.4 Power or equipment failure: Platforms stowed in a vertical position, and deployed platforms when occupied, shall have provisions to prevent their deploying, falling, or folding any faster than 12 inches per second or their dropping of an occupant in the event of a single failure of any load carrying component.

3.6.2.5 Platform barriers: The lift platform shall be equipped with barriers to prevent any of the wheels of a wheelchair or mobility aid from rolling off the platform during its operation. A movable barrier or inherent design feature shall prevent a wheelchair or mobility aid from rolling off the edge closest to the vehicle until the platform is in its fully raised position. Each side of the lift platform which extends beyond the vehicle in its raised position shall have a barrier a minimum 1 ½ inch high. Such barriers shall not interfere with maneuvering into or out of the aisle. The loading edge barrier (outer barrier), which functions as a loading ramp when the lift is at ground level, shall be sufficient when raised or closed, or a supplementary system shall be provided, to prevent a power wheelchair or mobility aid from riding over or defeating it. The outer barrier of the lift shall automatically raise or close, or a supplementary system shall automatically engage, and remain raised, closed, or engaged at all times that the platform is more than 3 inches above the roadway or sidewalk and the platform is occupied. Alternatively, a barrier or system may be raised, lowered, opened, closed, engaged, or disengaged by the lift operator, provided an interlock or inherent design feature prevents the lift from rising unless the barrier is raised or closed or the supplementary system is engaged.

3.6.2.6 Platform surface: The platform surface shall be free of any protrusions over ¼ inch high and shall be slip resistant. The platform shall have a minimum clear width of 32 inches from the platform to 30 inches above it, and a minimum clear length of 48 inches measured from 2 inches above the surface of the platform to 30 inches above the surface of the platform.

3.6.2.7 Platform gaps: Any openings between the platform surface and the raised barriers shall not exceed 5/8 inch in width. When the platform is at vehicle floor height with the inner barrier (if applicable) down or retracted, gaps between the forward lift platform edge and the vehicle floor shall not exceed ½ inch horizontally and 5/8 inch vertically. Platforms on semiautomatic lifts may have a hand hold not exceeding 1 ½ inches by 4 ½ inches located between the edge barriers.

3.6.2.8 Platform entrance ramp: The outboard entrance ramp or loading edge barrier used as a ramp and the transition plate from the inboard edge of the platform to the vehicle floor shall not exceed a slope of 1:8, measured on level ground, for a maximum rise of 3 inches, and the transition from

roadway or sidewalk to ramp may be vertical without edge treatment up to 1/4 inch. Thresholds between 1/4 inch and 1/2 inch high shall be beveled with a slope no greater than 1:2.

3.6.2.9 Platform deflection: The lift platform (not including the entrance ramp) shall not deflect more than 3 degrees (exclusive of vehicle roll or pitch) in any direction between its unloaded position and its position when loaded with 600 pounds applied through a 26 inches by 26 inches test pallet at the centroid of the platform.

3.6.2.10 Platform movement: No part of the platform shall move at a rate exceeding 6 inches per second during lowering and lifting an occupant and shall not exceed 12 inches per second during deploying or stowing. This requirement does not apply to the deployment or stowage cycles of lifts that are manually deployed or stowed. The maximum platform horizontal and vertical acceleration when occupied shall be 0.3 g.

3.6.2.11 Boarding direction: The lift shall permit both inboard and outboard facing of wheelchair and mobility aid users.

3.6.2.12 Use by standees: Lifts shall accommodate persons using walkers, crutches, canes or braces, or who otherwise have difficulty using steps. The platform may be marked to indicate a preferred standing position.

3.6.2.13 Handrails: Platforms on lifts shall be equipped with handrails on two sides, which move in tandem with the lift, and which shall be graspable and provide support to standees throughout the entire lift operation. Handrails shall have a usable component at least 8 inches long with the lowest portion a minimum 30 inches above the platform and the highest portion a maximum 38 inches above the platform. The handrails shall be capable of withstanding a force of 100 pounds concentrated at any point on the handrail without permanent deformation of the rail or its supporting structure. The handrail shall have a cross sectional diameter between 1¼ inches and 1½ inches or shall provide an equivalent grasping surface and have eased edges with corner radii of not less than 1/8 inch. Handrails shall be placed to provide a minimum 1½ inch knuckle clearance from the nearest adjacent surface. Handrails shall not interfere with wheelchair or mobility aid maneuverability when entering or leaving the vehicle.

3.6.2.14 Circuit breaker: A resetable circuit breaker shall be installed between power source and lift motor if electrical power is used. It shall be located as close to the power source as possible, but not within the passenger and driver compartment.

3.6.2.15 Excessive pressure: Lift design shall prevent excessive pressure that could damage the lift system when the platform is fully lowered or raised, or that could jack the vehicle.

3.6.2.16 Documentation: The following information shall be provided with each vehicle equipped with a lift:

3.6.2.16.1 A phone number where information can be obtained about installation, repair, and parts. (Detailed written instructions and a parts list shall be available upon request.)

3.6.2.16.2 Detailed instructions regarding use of the lift and readily visible when the lift door is open, including a diagram showing the proper placement and positioning of wheelchair or mobility aids on lift.

3.6.2.17 Training materials: The lift manufacturer shall make available training materials to ensure the proper use and maintenance of the lift. These may include instructional videos, classroom curriculum, system test results, or other related materials.

3.6.2.18 Identification and certification: Each lift shall be permanently and legibly marked or incorporate a nonremovable label or tag which states that it conforms to all applicable requirements of the current National Standards for School Buses. In addition, the lift manufacturer, or an authorized representative, upon request of the original titled purchaser, shall provide a notarized Certificate of Conformance, either original or photocopied, which states that the lift system meets all the applicable requirements of the 1995 National Standards.

3.6.3 Vehicle ramp

3.6.3.1 If a ramp is used, it shall be of sufficient strength and rigidity to support the special device, occupant, and attendants. It shall be equipped with a protective flange on each longitudinal side to keep special device on the ramp.

3.6.3.2 Floor of ramp shall be constructed of nonskid material.

3.6.3.3 Ramp shall be equipped with handles and be of weight and design to permit one person to put ramp in place and return it to its storage place.

3.6.3.4 Ramps installed in raised floor buses by manufacturers may be used for emergency evacuation purposes. They shall not be used as a substitute for a lift when a lift is capable of servicing the need.

3.7 Regular Service Entrance

3.7.1 On power lift equipped vehicles, step shall be the full width of the stepwell, excluding the thickness of doors in open position.

3.7.2 A suitable device at the front and rear of the step well shall be provided to assist passengers during entry or egress. This device shall allow for easy grasping or holding and shall have no openings or pinch points which might entangle clothing, accessories or limbs.

3.8 Restraining Devices

3.8.1 On power lift equipped vehicles, seat frames may be equipped with attachments or devices to which belts, restraining harnesses or other devices may be attached. Attachment framework or anchorage devices, if installed, shall conform to FMVSS 210.

3.8.2 Seat belt assemblies, if installed, shall conform to FMVSS 209.

3.8.3 Child restraint systems, which are used to facilitate the transportation of children who in other modes of transportation would be required to use a child, infant, or booster seat, shall conform to FMVSS 213 and 222.

3.9 Seating Arrangements: Flexibility in seat spacing to accommodate special devices shall be permitted to meet passenger requirements. All seating shall be forward facing.

3.10 Securement and Restraint System for Wheelchair or Mobility Aid and Occupant: For purposes of better understanding the various aspects and components of this section, the term "securement" or phrase "securement system" is used exclusively in reference to the devices which secure the wheelchair or mobility aid. The term "restraint" or phrase "restraint system" is used exclusively in reference to the devices used to restrain the occupant of the wheelchair or mobility aid. The phrase "securement and restraint system" is used to refer to the total system which secures and restrains both the wheelchair or mobility aid and the occupant.

3.10.1 Securement and restraint system, general

3.10.1.1 The Wheelchair or Mobility Aid Securement and Occupant Restraint System shall be designed, installed, and operated to accommodate passengers in a forward facing orientation within the bus and shall comply with all applicable requirements of FMVSS 222. Gurney type devices shall be secured parallel to the side of each bus.

3.10.1.2 The securement and restraint system, including the system track, floor plates, pockets, or other anchorages shall be provided by the same manufacturer, or be certified to be compatible by manufacturers of all equipment or systems used.

3.10.1.3 When a wheelchair or mobility aid securement device and an occupant restraint share a common anchorage, including occupant restraint designs that attach the occupant restraint to the securement device or the wheelchair or mobility aid, the anchorage shall be capable of withstanding the loads of both the securement device and occupant restraint applied simultaneously, in accordance with FMVSS 222.

3.10.1.4 When a wheelchair or mobility aid securement device (webbing or strap assembly) is shared with an occupant restraint, the wheelchair or mobility aid securement device (webbing or strap assembly) shall be capable of withstanding a force twice the amount as specified in Section 4.4(a) of FMVSS 209.

3.10.1.5 The bus body floor and sidewall structures where the securement and restraint system anchorages are attached shall have equal or greater strength than the load requirements of the systems being installed.

3.10.1.6 The occupant restraint system shall be designed to be attached to the bus body either directly or in combination with the wheelchair or mobility aid securement system, by a method which prohibits the transfer of weight or force from the wheelchair or mobility aid to the occupant in the event of an impact.

3.10.1.7 When an occupied wheelchair or mobility aid is secured in accordance with the manufacturer's instructions, the securement and restraint system shall limit the movement of the occupied wheelchair or mobility aid to no more than 2 inches in any direction under normal driving conditions.

3.10.1.8 The securement and restraint system shall incorporate an identification scheme which will allow for the easy identification of the various components and their functions. It shall consist of one of the following, or combination thereof:

3.10.1.8.1 The wheelchair or mobility aid securement (webbing or strap assemblies) and the occupant restraint belt assemblies shall be of contrasting color or color shade.

3.10.1.8.2 The wheelchair or mobility aid securement device (webbing or strap assemblies) and occupant restraint belt assemblies shall be clearly marked to indicate the proper wheelchair orientation in the vehicle, and the name and location for each device or belt assembly, i.e., front, rear, lap belt, shoulder belt, etc.

3.10.1.9 All attachment or coupling devices designed to be connected or disconnected frequently shall be accessible and operable without the use of tools or other mechanical assistance.

3.10.1.10 All securement and restraint system hardware and components shall be free of sharp or jagged areas and shall be of a noncorrosive material or treated to resist corrosion in accordance with Section 4.3(a) of FMVSS 209.

3.10.1.11 The securement and restraint system shall be located and installed such that when an occupied wheelchair or mobility aid is secured, it does not block access to the lift door.

3.10.1.12 A device for storage of the securement and restraint system shall be provided.When the system is not in use, the storage device shall allow for clean storage of the system, shall keep the system securely contained within the passenger compartment, shall provide reasonable protection from vandalism, and shall enable the system to be readily accessed for use.

3.10.1.13 The entire securement and restraint system, including the storage device, shall meet the flammability standards established in FMVSS 302.

3.10.1.14 Each securement device (webbing or strap assembly) and restraint belt assembly shall be permanently and legibly marked or incorporate a nonremovable label or tag which states that it conforms to all applicable FMVSS requirements, as well as, the 1995 National Standards. In addition, the system manufacturer, or an authorized representative, upon request by the original titled purchaser, shall provide a notarized Certificate of Conformance, either original or photocopied, which states that the wheelchair or mobility aid securement and occupant restraint system meets all of the requirements as specified in FMVSS 222 and the 1995 National Standards.

3.10.1.15 The following information shall be provided with each vehicle equipped with a securement and restraint system:

3.10.1.15.1 A phone number where information can be obtained about installation, repair, and parts. (Detailed written instructions and a parts list shall be available upon request).

3.10.1.15.2 Detailed instructions regarding use, including a diagram showing the proper placement of the wheelchair or mobility aids and positioning of securement devices and occupant restraints, including correct belt angles.

3.10.1.16 The system manufacturer shall make available training materials to ensure the proper use and maintenance of the wheelchair or mobility aid securement and occupant restraint system. These may include instructional videos, classroom curriculum, system test results, or other related materials.

3.10.2 Wheelchair or mobility aid securement system

3.10.2.1 Each securement system location shall consist of a minimum of four anchorage points. A minimum of two anchorage points shall be located in front of the wheelchair or mobility aid and a minimum of two anchorage points shall be located in the rear. The securement anchorages shall be attached to the floor of the vehicle and shall not interfere with passenger movement or present any hazardous condition.

3.10.2.2 Each securement system location shall have a minimum clear floor area of 30 inches by 48 inches. Additional floor area may be required for some applications. Consultation between the user and the manufacturer is recommended to ensure adequate area is provided.

3.10.2.3 The securement system shall secure common wheelchair or mobility aids and shall be able to be attached easily by a person having average dexterity and who is familiar with the system and wheelchair or mobility aid.

3.10.2.4 As installed, each securement anchorage shall be capable of withstanding a minimum force of 3,000 pounds (13,344 Newtons) when applied as specified in FMVSS 222. When more than one securement device share a common anchorage, the anchorage shall be capable of withstanding the force indicated above, multiplied by the number of securement devices sharing that anchorage.

3.10.2.5 Each securement device, if incorporating webbing or a strap assembly, shall comply with the requirements for Type 1 safety belt systems, in accordance with Sections 4.2, 4.3 and 4.4(a) of FMVSS 209.

3.10.2.6 The securement system shall secure the wheelchair or mobility aid in such a manner that the attachments or coupling hardware will not become detached when any wheelchair or mobility aid component deforms, when one or more tires deflate, and without intentional operation of a release mechanism (e.g., a spring clip on a securement hook).

3.10.2.7 Each securement device (webbing or strap assembly) shall be capable of withstanding a minimum force of 2,500 pounds when tested in accordance with FMVSS 209.

3.10.2.8 Each securement device (webbing or strap assembly) shall provide a means of adjustment, of manufacturer's design, to remove slack from the device or assembly.

3.10.3 Occupant Restraint System

3.10.3.1 A Type 2A occupant restraint system which meets all applicable requirements of FMVSS 209 and 210 shall provide for restraint of the occupant.

3.10.3.2 The occupant restraint system shall be made of materials which do not stain, soil, or tear an occupant's clothing, and which are resistant to water damage and fraying.

3.10.3.3 Each restraint system location shall have not less than one anchorage, of manufacturer's design, for the upper end of the upper torso restraint.

3.10.3.3.1 The anchorage for each occupant's upper torso restraint shall be capable of withstanding a minimum force of 1,500 pounds (6,672 Newtons) when applied as specified in FMVSS 222.

3.10.3.4 Each wheelchair or mobility aid location shall have not less than two floor anchorages for the occupant pelvic and the connected upper torso restraint.

3.10.3.4.1 Each floor anchorage shall be capable of withstanding a minimum force of 3,000 pounds (13,344 Newtons) when applied as specified in FMVSS 222.

3.10.3.4.2 When more than one occupant restraint share a common anchorage, the anchorage shall be capable of withstanding a minimum force of 3,000 pounds (13,344 Newtons) multiplied by the number of occupant restraints sharing the common anchorage in accordance with FMVSS 222.

3.10.3.5 Each floor and wall anchorage which secures the occupant restraint to the vehicle and which is not permanently attached, shall be of a "positive latch" design, and shall not allow for any accidental disconnection.

3.10.4 Dynamic Testing

3.10.4.1 The wheelchair or mobility aid securement and occupant restraint system shall be subjected to, and successfully pass, a dynamic sled test at a minimum impact speed and deceleration of 30 mph/20g's.

3.10.4.2 The dynamic test shall be performed by experienced personnel using an impact simulator with proven ability to provide reliable, accurate, and test results which can be replicated.

3.10.4.3 The dynamic test shall be performed in accordance with the procedures set forth in Appendix A of SAE J2249 "Test for Frontal Impact Crash Worthiness."

3.10.4.4 The wheelchair or mobility aid used for testing purposes shall be a rigid, reusable surrogate wheelchair that complies with the requirements of Appendix D of SAE J2249 "Specification for Surrogate Wheelchair."

3.10.4.5 The dynamic test shall be performed using system assemblies, components and attaching hardware which are identical to the final installation in type, configuration and positioning. The body structure at the anchorage points may be simulated for the purpose of the sled test.

3.10.4.6 When tested, the wheelchair or mobility aid securement and occupant restraint system shall pass the criteria specified in Section 6.2 of SAE J2249 "Performance Requirements of Frontal Sled

Impact Test." Following is an abridged summary of the criteria. (See Appendix D, 1995 National Standards)

3.10.4.6.1 Retain the test dummy in the test wheelchair and on the test sled with the test wheelchair in an upright position.

3.10.4.6.2 Not show any fragmentation or complete separation of any load carrying part.

3.10.4.6.3 Not allow the horizontal excursions of the test dummy and the test wheelchair to exceed specified limits.

3.10.4.6.4 Prevent the test wheelchair from imposing forward loads on the test dummy.

3.10.4.6.5 Allow removal of the test dummy and the test wheelchair, subsequent to the test, without the use of tools.

3.11 Special Light: Doorways in which lifts are installed, shall have, when lift is to be used, at least 2 foot candles of illumination measured on the floor of the bus immediately adjacent to the lift, and on the lift, when deployed at the vehicle floor level.

3.12 Special Service Entrance

3.12.1 Power lift equipped bodies shall have a special service entrance to accommodate the power lift.

Exception: If the lift is designed to operate within the regular service entrance and is capable of stowing such that the regular service entrance is not blocked in any way, and that persons entering or exiting the bus are not impeded in any way, a special service entrance shall not be required.

3.12.2 The special service entrance and door shall be located on the right side of the bus and shall be designed so as not to obstruct the regular service entrance.

3.12.3 The opening may extend below the floor through the bottom of the body skirt. If such an opening is used, reinforcements shall be installed at the front and rear of the floor opening to support the floor and give the same strength as other floor openings.

3.12.4 A drip molding shall be installed above the opening to effectively divert water from entrance.

3.12.5 Door posts and headers from entrance shall be reinforced sufficiently to provide support and strength equivalent to the areas of the side of the bus not used for special service entrance.

3.13 Special Service Entrance Doors

3.13.1 A single door or double doors may be used for the special service entrance. They shall have rub rails.

3.13.2 A single door shall be hinged to the forward side of the entrance unless doing so would obstruct the regular service entrance. If, due to the above condition, the door is hinged to the rearward side of the doorway, the door shall utilize a safety mechanism which will prevent the door from swinging open should the primary door latch fail. If double doors are used, the system shall be designed to prevent the doors from being blown open by the wind resistance created by the forward motion of the bus, and shall incorporate a safety mechanism to provide secondary protection should the primary latching mechanisms fail.

3.13.3 All doors shall have positive fastening devices to hold doors in the open position.

3.13.4 All doors shall be weather sealed.

3.13.5 When manually operated dual doors are provided, the rear door shall have at least a 1 point fastening device to the header. The forward mounted door shall have at least 3 point fastening devices. One shall be to the header, one to the floor line of the body, and the other shall be into the rear door. The door and hinge mechanism shall be of a strength that is greater than or equivalent to the emergency exit door.

3.13.6 Door materials, panels and structural strength shall be equivalent to the conventional service and emergency doors. Color, rub rail extensions, lettering and other exterior features shall match adjacent sections of the body.

3.13.7 Each door shall have windows set in rubber which are visually similar in size and location to adjacent non-door windows. Glazing shall be of same type and tinting (if applicable) as standard fixed glass in other body locations.

3.13.8 Doors shall be equipped with a device that will actuate an audible or flashing signal located in the driver's compartment when doors is not securely closed and ignition is in "on" position.

3.13.9 A switch shall be installed so that the lifting mechanism will not operate when the lift platform doors is closed.

3.13.10 Special service entrance doors shall be equipped with padding at the top edge of the door opening. Padding shall be at least 3 inches wide and 1 inch thick and extend the full width of the door opening.

7 DE Reg. 1545 (05/01/04)
16 DE Reg. 415 (10/01/12)
25 DE Reg. 1136 (06/01/22)