

## 540 CMR: REGISTRY OF MOTOR VEHICLES

### 540 CMR 7.00: MINIMUM STANDARDS FOR CONSTRUCTION AND EQUIPMENT OF SCHOOL BUSES AND MINIMUM STANDARDS FOR SCHOOL PUPIL TRANSPORT VEHICLES

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#### 7.01: Purpose

540 CMR 7.00 is adopted by the Registrar of Motor Vehicles pursuant to M.G.L. c. 90, §§ 7A, 7C and 31 to establish uniform standards for the construction, maintenance, and inspection of school buses and to establish minimum standards for school pupil transport vehicles as described in M.G.L. c. 90, § 7D.

#### 7.02: Scope and Applicability

- (1) The standards established in 540 CMR 7.00 are minimum standards for the construction, equipping, maintenance and inspection of Type A, B, C, and D school buses, as defined in 540 CMR 7.00, in addition to the applicable Equipment Requirements in M.G.L. c. 90, § 7B.
- (2) 540 CMR 7.00 applies to school bus bodies and chassis placed in production after January 1, 1989, which shall be constructed in accordance with all applicable Federal Motor Vehicle Safety Standards (FMVSS) in addition to applicable Massachusetts General Laws and shall be maintained to assure continued compliance with such construction standards, while used to transport school pupils.
- (3) School buses which were manufactured prior to January 1, 1989 in compliance with all applicable federal motor vehicle safety Standards, Massachusetts General Laws, and Rules and Regulations applicable in the model year of the chassis, and continue to or have been retrofitted to meet such standards, shall be deemed to comply with 540 CMR 7.00.
- (4) School Pupil Transport Vehicle. A school pupil transport vehicle (7D) must be a passenger vehicle with a gross vehicle weight rating (GVWR) of 10,000 pounds or less and a seating capacity of no more than ten passengers, in addition to the operator, except when a temporary waiver is granted for a vehicle with a seating capacity of eleven passengers, in addition to the operator, pursuant to 540 C.M.R. 7.10.

#### 7.03: Definitions

Type A. The Type "A" school bus is a conversion or body constructed on a van-type compact truck or a front-section vehicle, with a gross vehicle weight rating of 14,500 lbs. or less, designed for carrying more than ten persons.

Type B. The Type "B" school bus is constructed utilizing a stripped chassis with a gross vehicle weight rating greater than 12,500 lbs. The entrance door is behind the front wheels.

Type C. The Type "C" school bus is a body installed on a flat back cowl chassis with a gross vehicle weight rating of more than 12,500 lbs., designed for carrying more than ten persons. In a Type C school bus, all of the engine is in front of the windshield and the entrance door is behind the front wheels. (May have a left side driver door).

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Type D. The Type "D" school bus is a body installed on a chassis, with the engine mounted in the front, midship, or rear, with a gross vehicle weight rating of more than 12,500 lbs., designed for carrying more than ten people. In a Type D school bus, the engine may be behind the windshield and beside the driver's seat or at the rear of the bus behind the rear wheels, or midship between the front and rear axles. The entrance door is ahead of the front wheels.

7.04: Bus Chassis Standards(1) Air Cleaner.

- (a) The engine intake air cleaner system shall be furnished and properly installed by the chassis manufacturer to meet engine manufacturer's specifications.
- (b) The intake air system for diesel engines may have an air cleaner restriction indicator properly installed by the chassis manufacturer to meet engine specifications.

(2) Axles. The front and rear ends, including suspension assemblies, shall have a gross axle weight rating, at ground, at least equal to that portion of the load as would be imposed by the chassis manufacturer's maximum gross vehicle weight rating.

(3) Brakes. A braking system, including service brake and parking brake, that meets the following standards shall be provided.

- (a) 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 eight inches of mercury or less. An illuminated gauge 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 shall be provided.
- (b) Vacuum-assist brake systems shall have a reservoir used exclusively for brakes that shall be adequate to ensure loss in vacuum at full stroke applicable of not more than 30% with the engine not running. Brake systems on gas-powered engines shall include suitable and convenient connection for the installation of a separate vacuum reservoir.
- (c) Any brake system dry reservoir shall be so safeguarded by a check valve or equivalent device that, in the event of failure or leakage in its connection to the source of compressed air or vacuum, the stored dry air or vacuum shall not be depleted by the leakage or failure.
- (d) Buses using a hydraulic-assist brake system 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 or loss of electric source powering the back-up system.
- (e) The brake lines and the hydraulic-assist lines shall be protected from excessive heat and vibration and be so installed as to prevent chafing.
- (f) All brake systems shall be designed to permit visual inspection of brake lining wear without removal of any chassis components.

(4) Front Bumper.

- (a) School buses shall be equipped with a front bumper. The front bumper shall be furnished by the chassis manufacturer for all school bus types unless there is a specific agreement between the chassis manufacturer and the body manufacturer.
- (b) The front bumper shall be of pressed steel channel or equivalent material (except Type A buses having a GVWR of 12,500 lbs. or less which may be OEM supplied) at least  $\frac{3}{16}$  inch thick and not less than eight inches wide (high). It shall extend beyond the forward-most part of the body, grille, hood, and fenders and shall extend to the outer edges of the fenders at the bumper's top line.
- (c) The front bumper, except breakaway bumper ends, shall be of sufficient strength to permit pushing a vehicle of equal gross vehicle weight (GVW) without permanent distortion to the bumper, chassis, or body.
- (d) Tow eyes or hooks may be furnished. Tow eyes or hooks if provided, shall be 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.

## 7.04: continued

(e) 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 specification, the bus shall be empty and positioned on a level, hard surface and both tow eyes shall share the load equally.

(f) An energy absorbing front bumper may be used providing its design shall incorporate a self-restoring energy absorbing system of sufficient strength to:

1. push another vehicle of similar GVW without permanent distortion to the bumper, chassis, or body; and
2. withstand repeated impacts without damage to the bumper, chassis, or body according to the following FMVSS performance standards:
  - a. 7.5 MPH fixed barrier impact (FMVSS cart and barrier test);
  - b. 4.0 MPH corner impact at 30° (49 CFR 581).
3. The manufacturer of the energy absorbing system shall provide evidence from an approved test facility (capable of performing the above FMVSS tests) that its product conforms to the above standard.

(5) Rear Bumper. The rear bumper shall be made of pressed steel channel or equivalent material at least  $\frac{3}{16}$  inch thick and eight inches wide (high), and of sufficient strength to permit pushing by another vehicle without permanent distortion.

(a) The bumper shall be wrapped around the back corners of the bus, and shall extend forward at least 12 inches, measured from the rear-most point of the body at the floor line;

(b) The bumper shall be attached to the chassis frame as to be easily removed, and to discourage the hitching of rides, and shall be braced to develop the full strength of the bumper section from rear or side impact;

(c) The bumper shall extend at least one inch beyond the rear-most part of body surface measured at the floor line;

(d) The bumper provided by the chassis manufacturer may be used on Type A vehicles;

(e) An energy-absorbing rear bumper may be used, providing its design shall incorporate a self-restoring energy absorbing bumper system of sufficient strength to:

1. permit pushing by another vehicle without permanent distortion to the bumper, chassis, or body;
2. withstand repeated impacts without damage to the bumper, chassis, or body according to the following FMVSS performance standards:
  - a. 2.0 MPH fixed barrier impact (FMVSS cart and barrier test)
  - b. 4.0 MPH corner impact at 30° (49 CFR 581)
  - c. 5.0 MPH center impact (49 CFR 581)
3. The manufacturer of the energy-absorbing system shall provide evidence from an approved test facility (capable of performing the above FMVSS test) that its product conforms to the above standard.

(6) Certification. Upon request, a chassis manufacturer will certify to the Registrar that its product meets Massachusetts minimum standards on items not covered by certification issued under the National Traffic and Motor Vehicle Safety Act.

(7) Drive Shaft. The drive shaft shall be protected by a metal guard or guards around each section to reduce the possibility of it whipping through the floor or dropping to the ground if broken.

(8) Exhaust System. The exhaust system, including the exhaust manifold, gaskets, pipes and mufflers, shall be secure, tight and free from exhaust leaks. The exhaust pipe will exit flush with bumper and left side will exit flush with outside of the bus body.

(a) The exhaust pipe, muffler and tailpipe shall be outside the bus body compartment and attached to the chassis.

(b) The tailpipe shall be constructed of a corrosion-resistant tubing material at least equal in strength and durability to 16-gauge steel tubing and shall extend to, but not beyond, the perimeter of the body or bumper.

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(c) The tailpipe shall extend beyond the rear axle and at least five inches beyond the chassis frame. It may be mounted outside of the chassis frame rail at end point, or may extend to the left side of the bus, behind the driver's compartment, outboard of the chassis centerline. It shall terminate from the chassis centerline as follows:

Type A vehicles	-	Manufacturer's standard
Type B, C, and D vehicles	-	48.5 inches

(d) On Type C and D buses, no exhaust pipe shall exit beneath an emergency exit or fuel fill.

(e) The exhaust system on a gas-powered chassis shall be properly insulated from fuel tank connections by a metal shield securely attached at each point where it is 12 inches or less from tank or tank connections.

(f) The muffler shall be constructed of corrosion-resistant material.

(g) The exhaust system may be routed to the left of the right frame rail to allow for the installation of a lift on the right side of the vehicle.

(9) Frame.

(a) The frame (or equivalent) shall be of such design and strength characteristics as to correspond at least to standard practices for trucks of the same general load characteristics which are used for highway service.

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

(c) Frames shall not be modified for the purpose of extending the wheelbase.

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

(e) Frame length shall be established in accordance with the design criteria for the complete vehicle.

(10) Fuel Tank.

(a) Fuel tank (or tanks) having a minimum 30-gallon capacity shall be provided by the chassis manufacturer. The tank shall be filled and vented to the outside of the body and the fuel filler should be placed in a location where accidental fuel spillage will not drip or drain on any part of the exhaust system.

(b) Fuel lines shall be mounted to the chassis frame in such a manner that the frame provides the maximum possible protection from damage.

(c) The fuel system shall comply with FMVSS No. 301.

(d) Fuel tank(s) may be mounted between the chassis frame rails or outboard of the frame rails on either the left or right side of the vehicle.

(e) The actual draw capacity of each fuel tank shall be a minimum of 83% of the tank capacity.

(f) Installation of alternative fuel systems, including fuel tanks and piping from the tank to the engine, shall comply with all applicable fire codes in effect on the date of manufacture of the bus.

(11) Horn. Buses shall be equipped with a horn or horns of standard make, each horn capable of producing complex sound in bands of audio frequencies between 250 and 2,000 cycles per second and tested per Society of Automotive Engineers Standard J377.

(12) Instruments and Instrument Panel and Ignition Lock. Chassis shall be equipped with the following instruments and gauges or warning lights:

(a) Speedometer.

(b) Odometer which will give accrued mileage, including tenths of miles.

(c) Voltmeter. Ammeter with graduated charge and discharge with ammeter and its wiring compatible with generating capabilities is permitted instead of voltmeter or warning light.

(d) Oil-pressure gauge and/or warning light.

(e) Water temperature gauge and/or warning light.

(f) Fuel gauge.

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- (g) High beam headlamp indicator.
- (h) Brake indicator gauge (vacuum or air). Light indicator instead of gauge is permitted on a vehicle equipped with hydraulic-over-hydraulic brake system. If ABS equipped, must have indicator light.
- (i) Turn signal indicator.
- (j) Glow-plug indicator light where appropriate.
- (k) Ignition lock, key or device to prevent starting of the engine by an unauthorized person.
- (l) All instruments shall be easily accessible for maintenance and repair.
- (m) Instruments and gauges shall be mounted on the instrument panel in such a manner that each is clearly visible to the driver while in a normal seated position, in accordance with School Bus Manufacturers Institute School Bus Design Objectives, January, 1985.
- (n) Instrument panel shall have lamps of sufficient candlepower to illuminate all instruments and gauges and shift selector indicator for automatic transmission.
- (o) Vehicles with an automatic transmission shall be equipped with a neutral safety switch to prevent starting in any gear other than park or neutral. For vehicles with a standard transmission clutch, pedal must be depressed to start vehicle.

(13) Openings. All openings in the floorboard and the firewall between the chassis and the passenger-carrying compartment, such as for gearshift selector and parking brake lever, shall be sealed.

(14) Shock Absorbers. Buses shall be equipped with front and rear double-action shock absorbers compatible with manufacturer's rated axle capacity at each wheel location.

(15) Springs. Capacity of springs or suspension assemblies shall be commensurate with chassis manufacturer's gross vehicle weight rating.

(16) Steering Gear. The steering gear shall be approved by the chassis manufacturer and designed to assure safe and accurate performance when the vehicle is operated with maximum load and at maximum speed.

- (a) Steering mechanism must be accessible to accomplish any required external adjustments.
- (b) No changes shall be made in the steering apparatus unless approved by the chassis manufacturer.
- (c) There shall be clearance of at least two inches between steering wheel and cowl instrument panel, windshield or any other surface.
- (d) Power steering is required and shall be of the integral type with integral valves.
- (e) The steering system shall be designed to provide means for lubrication of all wear-points that are not permanently lubricated.

(17) Tires. All tires must have a minimum tread depth of  $\frac{4}{32}$  inch. Reject all tires with less than  $\frac{4}{32}$  inch tread depth when measured at any point in a major tread groove.

(18) Undercoating. A chassis manufacturer shall coat the undersides of front fenders with rustproofing compound. The compound manufacturer must issue to the chassis manufacturer a notarized certification that the compound meets or exceeds all performance and qualitative requirements of Federal Specification TT-C 520b, paragraph 3.4 (General Services Administration) using modified test.

(19) Weight Distribution. Weight distribution of a fully loaded bus on a level surface shall be within the manufacturer's front gross axle weight rating and rear gross axle weight rating.

(20) Wiring. All wiring shall comply with applicable recommended practices of the Society of Automotive Engineers.

7.05: Bus Body Standards

- (1) Aisle. Clearance of all aisles shall be 12 inches or greater.
  - (a) The seat backs shall be slanted sufficiently to give aisle clearance of 15 inches at tops of seat backs.
  - (b) At all times, the aisle shall be unobstructed by any barrier or seat.
- (2) Back Up Warning Alarm. An automatic audible alarm shall be installed behind the rear axle and shall comply with published Backup Alarm Standards (SAE J994B), providing a minimum of 112 dBA.
- (3) Battery Carrier.
  - (a) Batteries mounted within the engine compartment must be secured to prevent dislodging in the event of vehicle upset or roll over.
  - (b) Batteries mounted outside the engine compartment shall be in a closed, drained, weather tight and vented compartment in the body skirt; be readily accessible from the outside for convenience of servicing; and be secured to prevent dislodging in the event of vehicle upset or roll over.
- (4) Child Reminder System. The child reminder system must include an audible device that must be disengaged by the driver before leaving the vehicle. The child reminder system shall be installed on all school buses model year 2018 or newer. The child reminder system control shall be located in the rear most seating compartment.
- (5) Construction. Must meet Federal Motor Vehicle Safety Standards for School Bus Construction.
- (6) Signage and Reflective Material. Effective August 20, 1997, every school bus shall display a sign located below the rear window of the bus which reads “unlawful to pass when red lights are flashing.” The sign shall have black letters not less than four inches nor more than six inches high on a white reflective background. Alternative signage and reflective material must be approved by the Registrar. Other reflective material may be installed on the bus, provided it is of automotive engineering grade or better, meets initial reflectance values in FHWA FP-85 and retains at least 50% of those values for a minimum of six years. Reflective materials and markings may include:
  - (a) Rear of bus body: may be marked with a strip of reflective National School Bus Yellow material no greater than two inches in width to be applied to the back of the bus, extending from the left lower corner of the "SCHOOL BUS" lettering, across to left side of the bus, then vertically down to the top of the bumper, across the bus on a line immediately above the bumper to the right side, then vertically up to a point even with the strip placement on the left side, and concluding with a horizontal strip terminating at the right lower corner of the "SCHOOL BUS" lettering.
  - (b) "SCHOOL BUS" signs: may be marked with black letters on a reflective National School Bus Yellow material comprising background for lettering of the front and/or rear "SCHOOL BUS" signs unless equipped with a lighted sign.
  - (c) Sides of bus body: may be marked with reflective National School Bus Yellow Material at least two inches but not more than 12 inches in width, extending the length of the bus body and located (vertically) as close as practicable to the beltline.
  - (d) Effective June 1, 2004, any bus entering service in the Commonwealth of Massachusetts shall display a sign that states “Bus Stops at all R/R Crossings.”  
Such sign shall:
    1. Be of reflective white material.
    2. Shall be black letters of four inches minimum height.
    3. Sign shall be 36 inches in length placed on the rear bumper.
    4. Alternative signage must be approved by the Registrar.
  - (e) Front bumper: May be marked diagonally 45° down the centerline of pavement with a two-inch wide strip of non-contrasting reflective material (*see* FHWA FP-85 Appendix).

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(7) Defrosters.

- (a) Defrosters 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.
- (b) The defrosting system shall conform to Society of Automotive Engineers Standards J381 and J382.
- (c) The defroster and defogging system shall be capable of furnishing heated outside ambient air, except to that part of the system furnishing additional air to the windshield, entrance door and stepwell may be of the recirculating air type.
- (d) Auxiliary fans are not considered defrosting or defogging systems.
- (e) Portable heaters may not be used.

(8) Service Door.

- (a) The service door shall be in the driver's control, designed to afford easy release and to 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 lbs. of force to operate at any point throughout the range of operation, as tested on a 10% grade both uphill and downhill.
- (b) The service door shall be located on the right side of the bus opposite the driver and within the direct view of driver.
- (c) The service door shall have a minimum horizontal opening of 24 inches and a minimum vertical opening of 68 inches. Type A vehicles shall have a minimum opening area of 1,200 square inches.
- (d) The service door shall be split, sedan, or jack-knife type. (Split type door includes any sectioned door which divides and opens inward or outward.) If one section of split type door opens inward and the other opens outward, the front section shall open outward.
- (e) Lower, as well as upper door panels shall be of approved safety glass. The bottom of the lower glass panel shall not be more than ten inches from the top surface of the bottom step. The top of the upper glass panel shall not be more than three inches from top of door. Type A vehicles shall have the upper panel (window/s) of safety glass with an area of at least 350 square inches.
- (f) The vertical closing edges on split type or folding type entrance doors shall be equipped with flexible material to protect the passengers' fingers. Type A vehicles may be equipped with chassis manufacturer's standard entrance door.
- (g) There shall be no door to the left of the driver on Type B or D vehicles. Type A and C vehicles may be equipped with chassis manufacturer's standard left-side door.
- (h) All doors shall be equipped with padding at the top edge of each door opening. The pad shall be at least three inches wide and one inch thick and extend the full width of the door opening.
- (i) On power-operated service doors, the emergency release valve, switch or device to release the service door must be placed above or to the immediate left or right of the service door and clearly labeled.

(9) Emergency Door. The emergency door shall be hinged on its right side if in the rear end of bus, and on its front side if on the left side of bus. It shall open outward and shall be labeled inside to indicate how it is to be opened. If double emergency doors are used on Type A vehicles, they shall be hinged on the outside edge and shall have a three-point fastening device. A device shall be used to hold the door open during emergencies and school bus evacuation drills. When the release mechanism is not in the position that causes an emergency door to be closed and the vehicle's ignition is in the "on" position, a continuous warning sound shall be audible at the driver's seating position and in the vicinity of the emergency door, as required by 49 CFR 571.217. When the release mechanism is not in the position that causes an emergency door to be closed and the vehicle's ignition is in the "on" position, emergency doors shall be identified by a red light which shall be lighted as required and readily visible to passengers.

- (a) The upper portion of the emergency door shall be equipped with approved safety glazing, the exposed area of which shall be not less than 400 square inches. The lower portion of the rear emergency door on Type B, C and D vehicles shall be equipped with a minimum of 350 square inches of approved safety glazing.

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- (b) There shall be no steps leading to the emergency door.
- (c) The words "EMERGENCY DOOR" both inside and outside in letters at least two 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.
- (d) The emergency door shall be equipped with padding at the top edge of each door opening. The pad shall be at least three inches wide and one inch thick and extend the full width of the door opening.
- (e) The side emergency door, if installed, must meet the requirements set forth in FMVSS 217 S5.4.2.1, (b), regardless of its use with any other combination of emergency exits.
- (f) There shall be no obstruction higher than  $\frac{1}{4}$  inch across the bottom of any emergency door opening.

(10) Emergency Exits.

- (a) For school bus bodies and chassis placed in production after August 31, 2004, Type A, B, C and D vehicles shall be equipped with emergency exits in the following capacity vehicles:
  - one to 42 Passengers = one emergency exit per side and one roof hatch
  - 43 to 78 Passengers = two emergency exit per side and two roof hatches
  - 79 and above Passengers = three emergency exits per side and two roof hatches
- (b) On buses manufactured after August 31, 2004, there shall be no seating position located at or adjacent to the side emergency door.
- (c) In addition to side and rear emergency exits, doors, or windows, one or more roof hatches may be installed, provided they meet all requirements specified in 49 CFR 571.217.
- (d) For all buses entering service after August 31, 2004, emergency windows shall be hinged vertically on the forward side.

(11) Floor. The floor in the underseat area, including tops of wheelhousing, driver's compartment and toeboard, shall be covered with rubber floor covering or equivalent having minimum overall thickness of    inch.

- (a) Floor covering in the aisle shall be of the aisle-type rubber or equivalent, wear-resistant and ribbed. Minimum overall thickness shall be  $\frac{3}{16}$  inch measured from the tops of the ribs.
- (b) Floor covering must be permanently bonded to the floor and must not crack when subjected to sudden changes in temperature. Bonding or adhesive material shall be waterproof and shall be of a type recommended by the manufacturer of floor-covering material. All seams must be sealed with waterproof sealer.

(12) Heaters. Heaters shall be of hot-water or combustion type.

- (a) If only one heater is used, it shall be of fresh-air or combination fresh-air and recirculating type.
- (b) If more than one heater is used, additional heaters may be of recirculating air type.
- (c) The heating system shall be capable of maintaining bus interior temperatures as specified in SAE Test Procedure J2233.
- (d) All heaters installed by body manufacturers shall bear a name plate indicating the heater rating in accordance with School Bus Manufacturers Institute Standard No. 001. The plate, as affixed by the heater manufacturer, shall constitute certification that the heater performance is as shown on the plate.
- (e) Heater hoses shall be adequately supported to guard against excessive wear due to vibration. The hoses shall not hang or rub against the chassis or sharp edges and shall not interfere with or restrict the operation of any engine function. Heater hoses shall conform to Society of Automotive Engineers Standard J20c. Heater lines on the interior of the bus shall be shielded to prevent scalding of the driver or passengers.
- (f) Each hot water system installed by a body manufacturer shall include a shutoff valve installed in the pressure and return lines at or near the engine in an accessible location, except that on all Type A and B buses, the valves may be installed in another accessible location.
- (g) For Type B, C and D buses there shall be a water flow regulating valve installed in the pressure line for convenient operation by the driver while seated.



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- (h) All combustion type heaters shall be approved by Underwriters Laboratories, Inc. and shall be in compliance with current Federal Motor Carrier Safety Regulations.
- (i) 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.
- (j) Heater motors, cores and fans must be readily accessible for service. Access panels shall be provided as needed.

(13) Identification. No signs or lettering shall appear on the front, back or sides of the bus, other than those specified in M.G.L. c. 90, § 7B and those required or permitted by 540 CMR 7.00, but the rated seating capacity and the owner's name shall be displayed. The designated seating capacity shall be displayed on the right side, to the left of the service door in two inch letters. Owner/Operator information shall be displayed on both sides of the bus in two inch letters or greater. The seating capacity and the owner's telephone number may also be displayed as specified above. The company bus number shall be displayed on the left and right sides and rear of the bus, said numbers and lettering to be not less than four inches in height and not less than ½ inch in stroke. The company bus number shall be displayed on the roof of the bus left to right, said numbers and lettering to be not less than 24 inches in height and not less than eight inches in stroke. The body and chassis manufacturer's trade name may be displayed if applied by the manufacturer. The Registrar in his or her discretion may authorize in writing such other markings as deemed appropriate.

(14) Inside Body Height. The inside body height shall be 72 inches or more, measured metal to metal, at any point on longitudinal center line from the front vertical bow to the rear vertical bow.

(15) Insulation. The ceiling and walls shall be insulated with proper material to deaden sound and to reduce vibration to a minimum. If thermal insulation is used, it shall be of fire-resistant material of a type approved by Underwriters Laboratories, Inc.

If floor insulation is required, it may be five-ply, at least \_ inch thick, or it shall equal or exceed properties of exterior type softwood plywood, C-D Grade, as specified in standard issued by the United States Department of Commerce. If plywood is used, all exposed edges shall be sealed.

(16) Interior. The interior of the bus shall be free of all unnecessary projections likely to cause injury and shall be kept clean. This standard requires inner lining on ceilings and walls. If the ceiling is constructed to contain lapped joints, the forward panel shall be lapped by the rear panel and exposed edges shall be beaded, hemmed, flanged or otherwise treated to minimize sharp edges.

- (a) The driver's area forward of the foremost padded barriers must permit the mounting of required safety equipment and vehicle operating equipment.
- (b) Every school bus shall be constructed and maintained 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 School Bus Manufacturers Institute School Bus Design Objectives, January, 1985.

(17) Lamps and Signals. Interior lamps shall be provided which adequately illuminate the aisle and stepwell. Body instrument panel lights shall be controlled by a rheostat switch.

- (a) School bus alternately flashing signal lamps shall comply with all applicable provisions of United States Department of Transportation Motor Vehicle Safety Standard – 108 (49 CFR 571.108), and the applicable provisions of M.G.L. c. 90, § 7B. Such lamps must also be equipped with a continuous warning signal, readily audible or visible to the driver in the event that any of the lamps are inoperative. A monitor board shall be utilized for this purpose.

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(b) The area around the lens of each alternately flashing signal lamp and extending outward approximately one to three inches shall be painted black. In installations where there is no flat vertical portion of body immediately surrounding the entire lens of lamp, a circular or square band of black approximately one to three inches wide, immediately below and to both sides of the lens, shall be painted on the body or roof area against which the signal lamp is seen (from distance of 500 feet along the axis of the vehicle). Visors or hoods with an appropriate black background to fit the shape of hoods/visors and roofcap may also be used.

(18) Turn Signal and Stop/Tail Lamps. Bus bodies shall be equipped with rear turn signal lamps which are at least seven inches in diameter or if not round, a minimum of 38 square inches of illuminated area, and which meet the specifications of the Society of Automotive Engineers. These signals must be connected to the chassis hazard warning switch to cause the 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 eight inches below the rear windows. Type A conversion vehicle lamps must be 21 square inches in the lens area, and be in Manufacturer's Standard Color.

(a) Buses shall be equipped with four combination red stop/tail lamps. Two combination lamps with a minimum diameter of seven inches or, if not round, a minimum of 38 square inches of illuminated area, shall be mounted on the rear of the bus just inside the turn signals.

(b) Two combination lamps with a minimum diameter of four inches or, if not round, a minimum of 12 square inches of illuminated area shall be placed on the rear of the body between the belt line and the floor line. The 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 buses with bodies supplied by the chassis manufacturer may have manufacturer's standard stop and tail lamps.

(19) Metal Treatment. All metal used in the construction of a bus body shall be zinc coated or aluminum coated or treated by an equivalent process before the bus is constructed. This includes 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.

(a) In addition to the above requirements, all metal parts that will be painted shall be chemically cleaned, etched, zinc-phosphate-coated and zinc-chromate or epoxy primed or conditioned by equivalent process.

(b) In complying with these requirements, particular attention shall be given to 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.

(c) As evidence that 540 CMR 7.05(18)(a) requirements have been met, samples of materials and sections used in the construction of a bus body, when subjected to 1,000-hour salt spray test, as provided for in latest revision of American Society For Testing And Materials Standard B-117 "Standard Method of Salt Spray (Fog) Testing", shall not lose more than 10% of material by weight.

(20) Mirrors.

(a) 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. The mirror shall have rounded corners and protected edges. Type A bus shall have a minimum of a six inch x 16 inch mirror, and Type B, C and D buses shall have a minimum of a six inch x 30 inch mirror.

(b) Exterior Mirror. Each school bus shall be equipped with a system of exterior mirrors (as defined in FMVSS No. 111).

1. Rear Vision Mirror: The mirror system shall be capable of providing, along the left and right sides of the vehicle, the driver with a view of the rear tires at ground level, a minimum distance of 200 feet to the rear of the bus and at least 12 feet perpendicular to the side of the bus at the rear axle line.

7.05: continued

2. Crossview Mirror System. The crossview mirror system shall provide the driver with indirect vision of an area at ground level from the front bumper forward and the entire width of the bus to a point where the driver can see by direct vision. The crossview system shall also provide the driver with direct vision of the area at ground level around the left and right front corners of the bus to include the tires and service entrance on all types of buses to a point where it overlaps with the rear vision mirror system.

3. This system of mirrors shall be easily adjustable but be rigidly braced so as to reduce vibration.

(21) Mounting. Chassis frame shall support rear body cross member. Except where chassis components interfere, bus body shall be attached to the chassis frame at each main floor sill, to prevent shifting or separation of body from the chassis under severe operating conditions.

Insulating material shall be placed at all contact points between the body and chassis frame on Type 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.

(22) Overall Length and Width. Overall length of bus shall not exceed 45 feet excluding accessories. Overall width of bus shall not exceed 102 inches, as provided in M.G.L. c. 90, § 19.

(23) Rub Rails. 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) to point of curvature near outside cowl on left side.

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

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

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

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

(e) Both rub rails shall be applied outside the body or outside the body posts. Pressed-in or snap-on rub rails do not satisfy 540 CMR 7.05(22). For Type A and B vehicles using chassis manufacturer's body, or for Type C and D buses using rear luggage or rear engine compartment, rub rails need not extend around rear corners.

(24) 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. The lap portion of the belt shall be guided or anchored where practical to prevent the driver from sliding sideways under it. The lap/shoulder belt shall be designed to allow for easy adjustment in order to fit properly and to effectively protect drivers varying in size from the 5<sup>th</sup> percentile adult female to the 95<sup>th</sup> percentile adult male.

(25) Seats and Restraining Barriers.

(a) Passenger Seating. All seats shall have a minimum cushion depth of 15 inches and must comply with all requirements of FMVSS No. 222. School bus design capacities shall be in accordance with 49 C.F.R. 571.3 and FMVSS No. 222. In determining the seating capacity of a bus the average rump width shall be a minimum of 13 inches.

(b) All restraining barriers and passenger seats shall be constructed with materials that comply with FMVSS No. 302 (Flammability of Interior Materials).

(c) Each seat leg shall be secured to the floor by a minimum of two 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 No. 222. If track seating is installed, the manufacturer shall supply minimum and maximum seat spacing dimensions applicable to the bus provided such installation complies with FMVSS No. 222. This information shall be on a label permanently affixed to the bus.

7.05: continued

- (d) All seat frames shall be fastened to the seat rail with either two bolts, washers and nuts or flange-head nuts.
- (e) All school buses (including Type A) shall be equipped with restraining barriers which conform to FMVSS No. 222.
- (f) All materials or hardware used to replace or repair seats or restraining barriers shall comply with FMVSS standards as they apply to school buses.

(26) Steps. The first step at the service door shall be not less than 12 inches and not more than 16 inches from the ground, based on standard chassis specifications.

- (a) The service door entrance may be equipped with a two-step or three-step stepwell. In either case, risers shall be approximately equal. When a plywood floor is used on steel, differential may be increased by the plywood thickness.
- (b) When a three-step stepwell is specified, the first step at the service door shall be approximately ten to 14 inches from the ground when the bus is empty, based on standard chassis specifications.
- (c) Type D vehicles shall have a three-step stepwell with the first step at service door 12 to 16 inches from the ground.
- (d) Steps shall be enclosed to prevent the accumulation of ice and snow.
- (e) Steps shall not protrude beyond the side body line.
- (f) A grab handle not less than 20 inches in length shall be provided in an unobstructed location inside doorway.

(27) Step Treads. All steps, including the floor line platform area, shall be covered with  $\frac{3}{16}$  inch rubber floor covering or other materials equal to top grade rubber in wear and abrasion resistance.

- (a) The metal back of the tread, minimum 24-gauge cold roll steel, shall be permanently bonded to ribbed rubber; of grooved design with grooves running at 90° angle to the long dimension of step tread.
- (b) A  $\frac{3}{16}$  inch ribbed step tread shall have a 1½ inch white nosing as integral piece without any joint.
- (c) Rubber portions of step treads shall have the following characteristics:
  1. Special compounding for good abrasion resistance and high coefficient of friction.
  2. Flexibility so that it can be bent around a ½ inch mandrel both at 130°F and 20°F without breaking, cracking or crazing.
  3. Show a durometer hardness 85 to 95.

(28) 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 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 cleaned from that position.

(29) Stop Warning Device. Stop warning devices must meet the applicable requirements of the Society of Automotive Engineers Standards, J1133 – April 1984. Arms shall be of an octagonal shape with a white border and with the word STOP in white letters not less than six inches high and one inch wide on a red background, to be visible on both sides with the arm extended. Two red lamps, incandescent strobe lights or LED lights not less than four inches in diameter or the word STOP in LED lighting shall be mounted on the arm, one above the word stop and one below, to be visible on both sides of the arm when in the extended position. The arm shall automatically be activated with the lights flashing whenever the red school bus warning lights are illuminated.

- (a) In accordance with M.G.L. c. 90, § 7B, stop warning devices are required on all school buses.
- (b) The stop warning device shall be installed on the left side forward of the bus center line. The top of the arm shall be below the lowest point of the window line and shall be positioned to assure it will not obscure the operator's reflected view of the area immediately forward of the rear wheels.

## 7.05: continued

(30) Sun Shield. An interior adjustable transparent sun shield not less than six inches x 30 inches for Types B, C and D vehicles, manufacturer standard sunshades for Type A vehicles, with a finished edge, shall be installed in a position convenient for use by the driver.

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

- (a) Salt spray resistance-pass test modified to 5% salt and 1,000 hours.
- (b) Abrasion resistance-pass.
- (c) Fire resistance-pass.

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

(d) The undercoating compound shall be applied with suitable airless or conventional spray equipment to the recommended film thickness and shall show no evidence of voids in cured film.

(32) Ventilation. Auxiliary fans, if used, shall meet the following requirements:

- (a) Fan for the left and right sides shall be in a location where it can be adjusted to its maximum effectiveness.
- (b) These fans shall be a nominal six-inch diameter.
- (c) Fan blades shall be covered with a protective cage. Each of these fans shall be controlled by a separate switch.
- (d) Body shall be equipped with a suitably controlled ventilating system of sufficient capacity to maintain the proper quantity of air under operating conditions without opening of windows except in extremely warm weather.
- (e) Static-type non-closeable exhaust ventilation shall be installed in the low-pressure area of roof.
- (f) Roof hatches designed to provide ventilation in all types of extreme weather conditions may be provided.

(33) Wheelhousing. Wheelhousing opening shall allow for easy tire removal and service.

- (a) Wheelhousing shall be attached to floor sheets in such a manner to prevent any dust, water or fumes from entering the body. Wheelhousing shall be constructed of a minimum 16-gauge steel or material of equivalent strength.
- (b) The inside height of the wheelhousing above the floor line shall not exceed 12 inches.
- (c) The wheelhousing shall provide clearance for installation and use of tire chains on single and dual (if so equipped) power-driving wheels.
- (d) No part of a raised wheelhousing shall extend into the emergency door opening.

(34) Windows. Each full side window shall provide an unobstructed emergency opening at least nine inches high and 22 inches wide, obtained by lowering the window. Push-out type, split-sash windows may be used.

(35) Windshield Wipers and Washers. A windshield wiping system, two-speed or more, shall be provided.

- (a) The wipers shall have 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 the windshield.
- (b) The bus shall have a windshield washer which will effectively clean the entire area covered by both windshield wipers.

(36) Wiring. All wiring shall conform to applicable current standards of Society of Automotive Engineers.

7.05: continued

(37) Paint Design, White Roof. Roof color to stop 5.5" above rain visor or gutter over passenger windows. Paint design to include a 10.5" radius at both front and rear roof caps which are painted body color.

7.06: Equipment Requirements

All school buses shall have equipment conforming to the following standards.

(1) Fire Extinguishers. The bus shall be equipped with at least one pressurized, dry chemical fire extinguisher complete with hose, to meet Underwriters Laboratories, Inc.'s approval. Extinguisher must 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 so as to be easily read without moving the extinguisher from its mounted position.

(a) The fire extinguisher shall be of a type approved by Underwriters Laboratories, Inc. with 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.

(b) An automatic fire extinguisher system may be provided within the engine compartment. This in no way eliminates the requirements 540 CMR 7.06(1)(a).

(2) First-aid Kit. The first-aid kit shall be removable, moistureproof, dustproof, and mounted in an accessible and marked place within the driver's compartment. The contents shall include:

- two - 1" x 2½ yards adhesive tape rolls
- 24 - sterile gauze pads 3" x 3"
- 100 - ¾" x 3" adhesive bandages
- eight - 2" bandage compress
- ten - 3" bandage compress
- two - 2" x 6 yards sterile gauze roller bandages
- two - non-sterile triangular bandages approximately 39" x 35" x 54" with two safety pins
- three - sterile gauze pads 36" x 36"
- three - sterile eye pads
- one - rounded end scissors
- one - pair medical examination gloves
- one - mouth-to-mouth airway

(3) Body Fluid Clean-up Kit. Each bus shall have a removable and moistureproof body fluid clean-up kit. It shall be properly mounted and identified as a body fluid clean-up kit.

The contents shall include:

- one - Absorbent powder
- one - Hard surface disinfectant towelette
- one - Scoop and spatula
- one - Biohazard bag
- one - Unmarked bag
- ten - Paper towelette
- two - Medical examination gloves
- two - Antiseptic toweletts

(4) Warning Devices for Disabled Vehicles. At least three red electric lanterns or red emergency reflectors which comply with United States Department of Transportation Motor Vehicle Safety Standards 125 shall be provided.

(5) Wheel Chocks. Each bus shall have one pair of secured rubber chocks, in compliance with M.G.L. c. 90, § 13.

(6) Storage of Equipment. All required equipment shall be readily accessible to the driver and passengers and secured to prevent dislodging in the event of vehicle upset. Any optional equipment or supplies must also be so secured. Any trash receptacle shall be securely mounted in a proper location and emptied daily. Any broom shall be securely mounted in a location away from passengers.

7.06: continued

(7) Locked Compartment. The fire extinguisher, first-aid kit, warning devices, and wheel chocks may be stored under lock and key provided that the locking device is connected with an automatic audible warning signal to notify the driver of the locked compartment when the ignition is turned on, and a device to prevent activation of the starter mechanism of the vehicle engine while said compartment is locked. The compartment shall be legibly labeled to indicate storage of the required equipment.

(8) Belt Cutter. All buses shall contain a belt cutter visibly mounted in the driver's area for use in emergencies including evacuations.

7.07: Specially Equipped School Bus Standards

The specifications in 540 CMR 7.07 are supplemental to specifications in the chassis and body sections; specially equipped buses should meet all the requirements of 540 CMR 7.05 and 7.06 in addition to those listed in 540 CMR 7.07. Because the field of special transportation is characterized by varied needs for individual cases and by a rapidly emerging technology for meeting these needs, a flexible, common-sense approach to the adoption and enforcement of specifications for these vehicles is prudent.

The following standards address modifications to school buses that, with standard seating arrangement prior to modification, would accommodate more than ten people. If, by addition of a power lift, mobile seating device positions or other modifications, the capacity is reduced so that a vehicle is classified as Multipurpose Passenger Vehicle (MPV), rather than a school bus, under Federal regulations, such vehicle is required to meet the same standards it would have had to meet prior to modification, and such MPV's are included in all references to school buses and subject to all requirements for school buses.

The Registrar will not approve of the structural modification of a school bus originally meeting Federal Motor Vehicle Safety Standards (FMVSS) unless the modifications are performed by the original vehicle manufacturer or its authorized representative.

(1) General Requirements.

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

(b) 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.

(2) Aisles. All school buses equipped with a power lift shall provide a 30-inch aisle leading from wheelchair position to at least one emergency door and the lift area.

(3) Communications. All school buses should be equipped with an electronic voice communication system.

(4) Glazing. Tinted glazing may be installed in all doors, windows and windshield consistent with federal, state, and local regulations.

(5) Identification. Buses with power lifts used for transporting physically handicapped students shall display universal handicapped symbols located below the windowline on the lift door. A second handicapped placard shall be displayed on the side of the school bus opposite the lift door not less than five inches in height below the windowline. 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 FHWA FP-85 Standards.

(6) Power Lift.

(a) Power lift shall be located on the right side of the bus body and confined within the bus body when not extended. No lift shall be installed above the vehicle fuel fill.

7.07: continued

- (b) Lifting mechanism and platform shall be able to lift a minimum weight of 800 lbs.. Lift platform shall have minimum 30" clear usable width, unobstructed by required handrail. The minimum clear length of the platform between the outer edge barrier and inner edge shall be 40 inches.
- (c) When the platform is stowed, it shall be secured by a method built into the lift system.
- (d) Controls shall be provided that enable the operator to activate the lift mechanism from either inside or outside of the bus. There shall be a means of preventing the lift platform from falling while in operation due to a power failure or a single component mechanical failure.
- (e) Power lifts shall be equipped with a manual backup system for use in the event of a power failure.
- (f) Lift travel shall allow the lift platform to rest securely on the ground.
- (g) Outboard platform edge and sides shall be designed to restrain wheelchairs or other mobile seating devices from slipping or rolling off the platform. Platform outer edge barriers shall be able to be automatically or manually lowered when the platform is at ground level, but shall not be equipped with any type of latch that could result in a lowered barrier when the platform is above ground level.
- (h) Platform shall be equipped with at least one handrail, approximately 25 - 34 inches in height and a minimum of 18 inches in length. The handrail shall be designed to fold when in stowed position so as not to add to overall lift projection into the vehicle.
- (i) A self-adjusting, skid resistant plate shall be installed on the outer edge of the platform to minimize the incline from the lift platform to the ground level. This plate, if so designed, may also suffice as the restraining device described in 540 CMR 7.07(6)(g). The lift platform must be skid resistant.
- (j) A circuit breaker shall be installed between power source and lift motor if electrical power is used.
- (k) 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.
- (l) The lift mechanism shall be designed to prevent folding or stowing of the lift when the lift platform is occupied.

(7) Ramps. When a power lift system is not adequate to load and unload students having special and unique needs, a ramp device may be installed.

- (a) If a ramp is used, it shall be of sufficient strength and rigidity to support the special device, occupant, and attendant(s). It shall be equipped with a protective flange on each longitudinal side to keep the special device on the ramp.
- (b) The floor of ramp shall be of non-skid construction.
- (c) The ramp shall be of weight and design, and equipped with handle(s), to permit one person to put the ramp in place and return it to its storage place.

(8) Regular Service Entrance.

- (a) Steps.
  - 1. On power-lift equipped vehicles, steps shall be the full width of the stepwell, excluding the thickness of doors in the open position.
  - 2. Steps shall be enclosed to prevent accumulation of ice and snow.
  - 3. Steps shall not protrude beyond the side body line.
- (b) A grab handle not less than 20 inches in length shall be provided in an unobstructed location inside the doorway.

(9) Restraining Devices. 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 with 49 CFR 571.210.

(10) Seating Arrangements. Flexibility in seat spacing to accommodate special devices shall be permitted to meet passenger requirements. All seating shall be forward-facing and seat spacing shall be in conformance with FMVSS No. 217 and FMVSS No. 222.



7.07: continued

(11) Securement System For Mobile Seating Device/Occupant.

(a) For vehicles manufactured on or after January 15, 1993, the body shall be designed for forward-facing positioning and securement of mobile seating devices and occupants. Securement system hardware and attachment points for the forward-facing system shall be in compliance with FMVSS No. 222.

(b) The mobile seating device securement system shall utilize four-point tie-downs, with a minimum of two body floor attachment points located at both the front and the rear of the space designated for the mobile seating device.

(c) A Type 2 occupant securement system shall provide for securement of the occupant's pelvic lap area and upper torso area.

(d) The mobile seating device/occupant securement system shall be successfully dynamically sled-tested at a minimum impact speed/force of 30 MPH/20 G's. The dynamic test shall be performed using system components and hardware (including attachment hardware) which are identical to the final installation in type, configuration, and positioning. The body structure at the attachment points may be simulated for the purpose of the sled test, but the simulated structure used to pass the sled test may not exceed the strength of the attachment structure to be used in the final body installation. The mobile seating device used for test purposes shall be a 150-pound powered wheelchair and the occupant shall be a 50<sup>th</sup> percentile male test dummy as specified in 49 CFR 571.208. Measurements shall be made on the test dummy during the test for head acceleration, upper thorax acceleration, and upper leg compressive force. These measurements shall not exceed the upper limits set forth in 49 CFR 571.208, S6.1.2, 6.1.3, and 6.1.4. The test dummy shall be retained within the securement system throughout the test and forward excursion shall be such that no portion of the test dummy's head or knee pivot points passes through a vertical transverse plane intersecting the forward-most point of the floor space designated for the mobile seating device. All hardware shall remain positively attached throughout the test and there shall be no failure of any component. Each mobile seating device belt assembly, including attachment hardware and anchorages, shall be capable of withstanding a force of not less than 2,500 lbs. to provide equal mobile seating device securement when subjected to forces generated by forward, rear or side impact.

The belt materials at each space designated for the mobile seating device and the occupant restraint system shall be similar in size and fabric.

(e) Occupant securement belt assemblies and anchorages shall also be certified to meet the requirements of 49 CFR 571.209 and 571.210.

(f) The occupant securement system must be designed to be attached to the bus body either directly or in combination with the mobile seating device securement system, by a method which prohibits the transfer of weight or force from the mobile seating device to the occupant in the event of an impact.

(g) All securement system attachments or coupling hardware not permanently attached shall be a "positive latch" type to prohibit accidental disconnecting.

(h) All attachment or coupling systems designed to be connected or disconnected frequently shall be accessible and operable without the use of tools or other mechanical assistance.

(i) All securement system hardware and components shall be free of sharp or jagged areas and shall be of a noncorrosive material or treated to resist corrosion.

(j) The occupant securement system shall be made of materials which do not stain, soil, or tear an occupant's clothing.

(k) No mobile seating device securement system hardware shall be placed so that a mobile seating device can be placed blocking access to lift door.

(l) The following information shall be provided with each vehicle equipped with a securement system:

1. Detailed instructions, including a parts list, regarding installation and use of the system.
2. Detailed instructions, including a diagram, regarding the proper placement and positioning of the system, including correct belt angles.

(12) Special Light. Lights shall be placed inside the bus to sufficiently illuminate the lift door area.

## 7.07: continued

(13) Special Service Entrance.

- (a) Power lift equipped bodies shall have a special service entrance to accommodate the power lift.
- (b) 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.
- (c) 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.
- (d) A drip molding shall be installed above the opening to effectively divert water from the entrance.
- (e) Door posts and headers from the 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.

(14) Special Service Entrance Doors.

- (a) A single door or double doors may be used for the special service entrance.
- (b) All doors shall have positive fastening devices to hold doors in the open position.
- (c) All doors shall be weather sealed.
- (d) When manually-operated dual doors are provided, the rear door shall have at least a one-point fastening device to the header. The forward-mounted door shall have at least three-point fastening devices, one to the header, one to the floor line of the body, and the one to the rear door. The door and hinge mechanism shall be of a strength that is equal to or greater than the emergency exit door.
- (e) 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.
- (f) Each door shall have windows set in rubber compatible within one inch of the lower line of adjacent sash. Glazing shall be of same type and tinting (if applicable) as standard fixed glass in other body locations.
- (g) Doors shall be equipped with a device that will activate an audible or flashing visible signal located in the driver's compartment when a door is not securely closed and ignition is in "on" position.
- (h) A switch shall be installed so that the lifting mechanism will not operate when the lift platform door is closed.
- (i) Special service entrance doors shall be equipped with padding at the top edge of the door opening. The pad shall be at least three inches wide and one inch thick and extend the full width of the door opening.

(15) Support Equipment and Accessories. Portable student equipment or special accessory items shall be secured at the mounting location to withstand a pulling force of five times the weight of the item, or shall be retained in an enclosed, latched compartment. Such special items, if used, shall meet the following specifications:

- (a) Belt Cutter. Buses shall contain a belt cutter for use in emergencies, including evacuations. Belt cutters should be designed to eliminate the possibility of the operator or others being cut during use, and should be secured in a safe location such as a first-aid kit.
- (b) Crutches, Walkers, Canes, and Similar Devices. Any of these items shall be secured as specified above.
- (c) Medical Support Equipment. Medical support equipment, including oxygen bottles, ventilators, and other items, shall be secured as specified in 540 CMR 7.07(15).

7.08: Out-of-service Criteria

The purpose of these criteria is to identify critical school bus components and to further provide standards that an inspector(s) shall utilize in determining if a school bus is safe for pupil transportation. These criteria are intended to establish minimum standards for inspecting and placing school buses out-of-service. Pursuant to M.G.L. c. 90, § 31, any authorized inspector finding a violation of the following criteria shall affix an out-of-service decal to the vehicle's windshield.

7.08: continued

- (1) Brake System.
  - (a) Adjustment. Any one brake beyond the adjustment LIMIT (49 CFR 396.9, Subchapter B, Appendix G).
  - (b) Air System. Fails to maintain pressure when:
    1. the leakage rate (brakes released) exceeds 2 psi/min.
    2. the leakage rate (brakes applied) exceeds 3 psi/min.
    3. fails to recover air pressure as recommended.
- (2) Brake System (Hydraulic).
  - (a) Master Cylinder.
    1. reservoir is below minimum level.
    2. any leakage of fluid in the master cylinder unit system.
  - (b) Pedal Reserve. Fails to maintain manufacturer designed height and travel requirements (OEM).
  - (c) Power Assist Unit. Fails to function as designed (OEM).
- (3) Brake Components (Air and Hydraulic).
  - (a) Brake Hoses/Tubing.
    1. brake hose with any damage extending through the outer reinforcement ply.
    2. any bulge or swelling when brakes are applied.
    3. any restriction due to cracked, broken or crimped line/hose.
    4. any line, tubing, hose, or connection that is not constructed to meet all applicable manufacturing codes and standards (OEM).
  - (b) Brake Lining.
    1. any lining/pad worn to the recommended replacement measurement or wear mark.
    2. lining pad is broken, not firmly attached to shoe or plate, or is contaminated with oil or grease.
    3. fails to make contact with drum (frozen, binding, uneven).
- (4) Parking Brake. Not present and working as designed.
- (5) Steering System.
  - (a) Steering Column.
    1. any modification or other condition that interferes with the free movement of any steering component.
    2. any absence or looseness of U-bolt(s) or positioning part(s).
    3. worn or faulty, or obvious repair-welded universal joint(s).
    4. steering wheel not properly secured.
  - (b) Front Axle Beam. Any cracks(s) or obvious welded repair.
  - (c) Steering Gear Box.
    1. any mounting bolt(s) loose or missing.
    2. any crack(s) in gear box or mounting brackets.
    3. any obvious welded repair.
  - (d) Pitman Arm.
    1. any looseness of the Pitman Arm on the steering gear output shaft.
    2. any obvious welded repair.
  - (e) Power Steering.
    1. auxiliary power assist cylinder loose.
    2. power steering pump inoperable.
  - (f) Ball and Socket Joints.
    1. any movement under steering load of a nut stud.
    2. any motion, other than rotational, between any linkage member and its attachment point of more than    inch measured with hand pressure only.
    3. any obvious welded repair.
  - (g) Tie Rods and Drag Links.
    1. loose clamp(s) or clamp bolt(s) on tie rod or drag links.
    2. any looseness in any threaded joint.

7.08: continued

- (h) Nuts. Loose or missing fasteners on tie rod, Pitman Arm, drag link, steering arm or tie rod arm.
- (i) Hoses and Fluids. Any faulty fluid control device, leak, or empty reservoir.
- (6) Suspension Components Axle Parts/Members.
  - (a) any U-bolt or other spring to axle clamp bolt(s) cracked, broken, loose, or missing.
  - (b) any spring hanger(s), or other axle positioning parts cracked, broken, loose, or missing that results in shifting of an axle from its normal position.
  - (c) any worn (beyond manufacturer's specifications) or improperly assembled U-bolt, shock, kingpin, ball joint, strut, air bag and positioning component (OEM).
  - (d) any spring hanger, assembly part or leaf, broken or missing.
  - (e) coil spring broken.
- (7) Chassis/Frame/Unibody.
  - (a) Frame.
    - 1. any cracked, loose, sagging or broken frame siderail.
    - 2. any obvious bend or damage resulting from a collision.
    - 3. any worn or loose mounting hole.
  - (b) Cross Members. Any cross member, outrigger or other structural support cracked, missing or deformed.
  - (c) Outriggers/Body Support. Any missing, broken, shifted or corroded part that would affect the safe operation of the vehicle.
  - (d) Bumpers. Any bumper missing or not secured.
- (8) Exhaust System - Leaks. Any part of the exhaust system that has a measurable leak (audible or felt) or discharges under the passenger or engine compartment.
- (9) Fuel System - Fuel Container/Connection.
  - (a) any fuel tank not securely attached to the vehicle.
  - (b) any part of the fuel system not properly secured or fastened.
  - (c) any liquid fuel leak at any point.
- (10) Drive Shaft - Drive Shaft Guard. Loose or missing.
- (11) Differential. Cracked housing.
- (12) Engine.
  - (a) Components. Any critical component that fails to function as designed.
  - (b) Leaks. Any fluid leaks that would affect the safe operation of the engine.
- (13) Tires/Wheels/Hubs.
  - (a) Tire Tread Depth. Any tire worn to less than  $\frac{4}{32}$  inch.
  - (b) Tire Sidewall.
    - 1. any sidewall that is cut, worn, or damaged to the extent that the plycord is exposed.
    - 2. any observable bump, bulge, or knot related to sidewall or tread separation.
  - (c) Tire Inflation. Tire is flat or has noticeable leak.
  - (d) Tire Type. Not of proper type (load range, size, mismatched, *etc.*).
  - (e) Wheels/Rims/Spiders.
    - 1. any nuts, bolts, studs, lugs, missing, damaged or loose.
    - 2. any wheel/rim is cracked, improperly seated, damaged, or welded.
  - (f) Hub. Excessive wheel bearing play that exceeds OEM specifications.
- (14) Aisle.
  - (a) Clearance. Aisle does not have the required clearance.
  - (b) Obstruction. There are objects blocking aisles or exits.
- (15) Electrical - Wiring. Any required wire or electrical component charred or showing evidence of being burnt or exposed.

7.08: continued

- (16) Battery.
  - (a) Condition. Battery will not activate the starter.
  - (b) Wires. Wiring is exposed or loose.
  - (c) Battery Securement. Battery not secured.
- (17) Windshield Wipers. Broken, missing or inoperative.
- (18) Body Interior.
  - (a) Panels. Any panel (ceiling, side, wheel well, *etc.*) protruding, having sharp edges, or not secured, that may cause injuries.
  - (b) Floors. Floor pan or inner panels having excessive perforated areas or openings sufficient to cause a hazard to an occupant.
  - (c) Step Well. Any part of the step well or support structure is damaged.
  - (d) Step Treads. Any condition that would present a tripping hazard.
  - (e) Handrail.
    - 1. missing.
    - 2. fails the NHSTA nut/drawstring test or has not complied with recall.
  - (f) Seats/Barriers.
    - 1. any seat/barrier that is not secured properly.
    - 2. any seat/barrier material so defective that it compromises the integrity of occupant protection and compartmentalization.
    - 3. seat spacing fails to comply with FMVSS No. 222.
  - (g) Seat (Driver).
    - 1. fails to adjust or hold proper adjustment.
    - 2. any part of the driver's safety restraint assembly is missing, not properly installed or so defective as to prevent proper securement.
  - (h) Doors (Service).
    - 1. the service door does not open or close properly.
    - 2. the door control handle does not lock in the closed position.
    - 3. door is equipped with a padlock or similar non-OEM locking device. (Excludes vehicles equipped with an interlock system.)
  - (i) Doors (Emergency Exits).
    - 1. any emergency door that does not open freely or completely, as designed.
    - 2. any door(s) warning device that is defective.
    - 3. door or roof hatch is equipped with a padlock or similar non-OEM locking device. (Excludes vehicles equipped with an interlock system.)
- (19) Windows.
  - (a) any glass that is broken through or missing.
  - (b) not of approved type.
  - (c) every school vehicle windshield shall be free of discoloration or other damage in that portion thereof extending upward from the height of the topmost portion of the steering wheel, but not including a one inch border at the top and a one inch border at each side of the windshield or each panel thereof, except that discoloration and damage as follows are allowed:
    - 1. coloring or tinting applied during manufacture, for reduction of glare;
    - 2. any crack not over three inches wide, if not intersected by any other crack;
    - 3. any damaged area which can be covered by a disc  $\frac{3}{4}$  inch in diameter, if not closer than three inches to any other such damaged area.
  - (d) driver's side area window(s) have chips, clouding or cracks that obscure the driver's vision.
  - (e) Windows (Emergency Exits).
    - 1. any emergency window that fails to open properly.
    - 2. lacks the required number of emergency windows/roof hatches. (Fails to comply with FMVSS No. 217.)
    - 3. required audible warning device(s) not working properly.
  - (f) Defrosters. Fails to operate.

7.08: continued

- (20) Body Exterior.
  - (a) Panels, Rub Rails, Trim. Any school bus body part that is loose, torn, dislocated or protruding from the surface of the bus, creating a hazard.
  - (b) Compartment Doors. Any engine, battery or other doors that are not secured properly.
  - (c) Mirrors. Any required mirror missing, broken, discolored or will not hold a set adjustment.
- (21) Lamps and Signals.
  - (a) Horn. Fails to function as designed.
  - (b) Gauges/Brake Warning. Any critical brake, telltale light, buzzer or gauge that fails to function as designed.
  - (c) Stop Arm/Optional Crossing Device. Required stop arm(s), or if equipped any crossing control device failing to function properly.
- (22) Emergency Equipment - Fire Extinguisher. Any required fire extinguisher(s) which is missing, not of proper type/size, not fully charged, has no pressure gauge, is not secured or is not accessible to the driver.
- (23) Wheelchair Equipped Vehicles.
  - (a) wheelchair lift does not function as designed or is inoperable.
  - (b) any hydraulic line leaking during lift operation.
  - (c) wheelchair securement missing or improperly installed, loose or damaged.
  - (d) any required wheelchair occupant restraint system not in compliance with FMVSS No. 222.

7.09: Minimum Standards for School Pupil Transport Vehicles

- (1) School Pupil Transport Vehicle (7D). Must be a passenger vehicle with a Gross Vehicle Weight rating of 10,000 pounds or less. Except when a temporary waiver is granted in accordance with 540 CMR 7.10, effective July 1, 2020, all school pupil transport vehicles shall have a seating capacity of no more than ten passengers, in addition to the driver.
- (2) Identification. All vehicles shall conspicuously display on both sides of the vehicle, the company name, city and state in lettering at least two inches high with a ¾ inch brush stroke in glossy black lettering.
- (3) Brakes.
  - (a) Every vehicle shall be equipped with an adequate working parking brake system.
  - (b) Every vehicle shall be equipped with an adequate working service brake system. The service brake shall be adequate to stop the vehicle while traveling at a speed of 20 MPH if not more than a distance of 30 feet.
- (4) Seatbelts. The vehicle shall be equipped with a seat belt for each permanent seating accommodation, in good working order, and in compliance with the United States Department of Transportation's Safety Standard.
- (5) Window Tinting. Any window tinting shall comply with 540 CMR 4.04: *Procedures for Inspections of Non-commercial Motor Vehicles.*
- (6) Side Doors and Rear Doors. The vehicle shall have, in good working order, an emergency door buzzer or warning device to indicate when door is open.
- (7) School Bus Signs, Alternating Flashing Red Signal Lamps and Actuation. The vehicle shall comply with all applicable provisions of 49 CFR 571.108.
- (8) Windshield. The windshield shall be in accordance with M.G.L. c. 90, § 9D.
- (9) Windshield Wiper/Washer System. The vehicle shall be equipped with a windshield wiper/washer system in good working order.

7.09: continued

- (10) Steering Mechanism. The steering mechanism shall be approved by the chassis manufacturer and designed to assure safe and accurate performance when the vehicle is operated with maximum load and at maximum speed.
- (11) Horn. The vehicle shall be equipped with a horn of standard make, capable of producing adequate sound.
- (12) Turn Signals. The vehicle shall be equipped with turn signals in good working order.
- (13) Emergency Four-way Flashers. The vehicle shall be equipped with emergency four-way flashers in good working order.
- (14) Ignition Lock. The vehicle shall be equipped with an ignition lock in good working order.
- (15) Interior of Vehicle. The interior of the vehicle shall be clean and in good condition.
- (16) Headlamps. The vehicle shall be equipped with headlamps and be in good working order.
- (17) Tires. All tires must have a minimum tread depth of  $\frac{4}{32}$  inch.
- (18) Wheels. Wheels shall not be missing, bent, cracked, have broken tire rims, broken studs or missing nuts.
- (19) Muffler and Exhaust System. The exhaust system, exhaust manifolds, exhaust pipes, mufflers and tail pipe shall be present and free of leaks. Systems components shall be securely fastened with fasteners in place and undamaged. All motor vehicle exhaust systems shall discharge the exhaust beyond the operator, passenger and or trunk compartment.
- (20) Fuel Tank. The fuel tank shall be present and not leak and shall be securely attached to the vehicle's body or chassis.
- (21) Springs. Capacity of springs or suspension assemblies shall be commensurate with chassis manufacturer's gross vehicle weight rating.
- (22) Tail Lights. The vehicle shall be equipped with two tail lights and two stop lights, one of each mounted at each side of the rear of the vehicle, provided both functions may be combined on a single tail lamp, one at each side.
- (23) Back Up Warning Alarm. All vehicles shall be equipped with an audible back up alarm. This alarm shall be installed behind the rear axle. This system must be installed on all vehicles by July 1, 2018.
- (24) Bumpers. All bumpers as originally equipped by the manufacturer shall be securely mounted in place.
- (25) Hood, Doors, and Compartment Lids. The hood, doors and compartment lids shall open and close properly and be capable of being firmly latched.
- (26) Fenders (front and rear). All fenders shall be securely mounted in place and be in good condition.
- (27) Additional Required Equipment. The vehicle shall carry a first aid kit, body fluid clean-up kit, two adequate chock blocks, seat belt cutter in the driver's compartment, fire/evacuation blanket (wheelchair vehicles only), fire extinguisher with a total rating of 2A 10BC or greater (accessible to the driver) and three reflective triangles.

The inspector shall issue a 7D Repair Form (EQ) for any vehicle that fails to satisfy any one of the following requirements.

7.09: continued

- (28) Speedometer. The speedometer shall be in good working order.
- (29) Sun Visor and Rearview Mirror. The sun visor and rearview mirror shall be in good condition.
- (30) Windows. In addition to the requirements of the windshield, all windows shall be present and in good working order.
- (31) Defroster and Heater. The defroster and heater shall be in good working order.
- (32) Interior Lights. All interior lights shall be in good working order to illuminate the interior of the vehicle.
- (33) Instruments, Lamps, and Gauges. All instruments, lamps and gauges shall be in good working order.
- (34) School Bus Light Indicator. Such indicator must be equipped with a continuous warning light(s) readily visible to the driver to indicate school bus lights are activated. This system must be installed on all vehicles by July 1, 2018.
- (35) Child Reminder System. The child reminder system must include an audible device that must be disengaged by the driver before leaving the vehicle. Effective July 1, 2020, all school pupil transport vehicles of model year 2018 or newer shall have a child reminder system. The child reminder system control shall be located in the rear most seating compartment.
- (36) Evacuation Plan for School Pupil Transport Vehicles. Every school pupil transport vehicle is required to have an evacuation plan that clearly states the procedures for the evacuation of each passenger. The plan must remain in the vehicle at all times. All drivers shall understand and be able to execute these plans. The company is to review the plans with the drivers at least twice per year and is required to keep a record of such reviews including the date and substance of the review and the names of those drivers and supervisor(s) participating in the reviews.
- (37) Power Train, Cooling System or Steering System. The power train, cooling system and steering system shall be free of any fluid leaks or seepage.
- (38) Battery. The battery shall be securely mounted in a carrier.
- (39) Belts (Alternator/Power Steering). Belts shall not be loose and shall be in good condition.
- (40) Mirrors. Mirrors shall be in good condition and mounted one on each side of the vehicle with a clear view to the rear.
- (41) Side Marker Lamps. The side marker lamps shall be as installed by the manufacturer, and in good working order.
- (42) Shock Absorbers. The vehicle shall have two shock absorbers in the front and two in the rear in good working order.

7.10: Request for a Temporary Waiver From the Passenger Capacity Requirement of School Pupil Transport Vehicles

Upon application, the Registrar may temporarily waive compliance with the ten-passenger seating capacity requirement in 540 CMR 7.02(4) and 7.09(1) for vehicles that have a seating capacity of eleven passengers in addition to the operator, which otherwise comply with 540 C.M.R. 7.00 and 21.00, and which were registered as school pupil transport vehicles on or after June 30, 2020. Any such waivers shall expire no later than August 31, 2021, and may be revoked at any time in the Registrar's sole discretion. The Registrar shall establish policies and procedures setting forth the terms and conditions for requesting and obtaining waivers under this section.



540 CMR: REGISTRY OF MOTOR VEHICLES

REGULATORY AUTHORITY

540 CMR 7.00: M.G.L. c. 90, §§ 7A, 7C and 31.