281—44.4(285) School bus body.

44.4(1) *Aisle.*

a. All emergency doors shall be accessible by a 12-inch minimum aisle. Aisles shall be unobstructed at all times by any type of barrier, seat, wheelchair or tiedown, unless a flip seat is installed and occupied. The track of a track seating system is exempt from this requirement. A flip seat in the unoccupied (up) position shall not obstruct the 12-inch minimum aisle to any side emergency door.

b. The seat backs shall be slanted sufficiently to give aisle clearance of 15 inches at the top of the seat backs.

44.4(2) *Backup warning alarm.* An automatic audible alarm shall be installed behind the rear axle and shall comply with the published Backup Alarm Standards (SAE J994B), providing a minimum of 112 dBA. A variable volume feature is not allowed.

44.4(3) *Battery compartment.*

a. Battery(ies) shall be furnished by the chassis manufacturer unless the body manufacturer agrees to provide battery(ies).

b. Battery(ies) shall be mounted in the body skirt of the vehicle and shall be accessible for convenient servicing from outside the bus. When the battery is mounted as described in 281—44.3(285), the body manufacturer shall securely attach the battery(ies) on a slide-out or swing-out tray with a safety stop to prevent the battery(ies) from dropping to the ground at the outermost extremity of tray travel.

c. The battery compartment shall have minimum dimensions of 25 inches wide, 14 inches deep, and 10 inches high.

d. The battery compartment door or cover shall be hinged at the top, bottom or forward side of the door. When hinged at the top, a fastening device shall be provided which will secure the door in an open position. The door or cover over the compartment opening shall completely cover and, as completely as practical, seal the opening and shall be secured by an adequate and conveniently operated latch or other type fastener to prevent free leakage of the battery contents into the passenger compartment should the vehicle overturn. Battery cables installed by the body manufacturer shall meet chassis manufacturer and SAE requirements. Battery cables shall be of sufficient length to allow the battery tray to fully extend. In Type A buses, if batteries cannot be installed under the hood, a battery compartment is required.

e. The top surface area of the inside of the battery compartment (the area likely to come into contact with battery electrical terminals as the result of a blow to, and upward collapse of, the bottom of the battery box in the event of an accident or other event) shall be covered with a rubber matting or other impact-resistant nonconductive material. The matting shall be a minimum of 1/8-inch thick and cover the entire top inside surface of the battery box. The matting shall be securely installed to maintain its position at all times.

f. The word "BATTERY" in 2-inch black letters shall be placed on the door covering the battery opening.

44.4(4) *Body sizes.* Type A vehicles may be purchased with manufacturer's recommended seating capacities when the chassis is manufactured with rear dual tires.

44.4(5) *Bumper, front.*

a. 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 of 281—44.3(285).

b. An optional energy-absorbing front bumper may be used, provided its design incorporates a self-restoring, energy-absorbing system of sufficient strength to:

(1) Push another vehicle of similar GVWR 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 performance standards:

- 7.5 mph fixed-barrier impact (FMVSS cart and barrier test).
- 4.0 mph corner impact at 30 degrees (Part 581, CFR Title 49).
- 20.0 mph into parked passenger car (Type B, C, and D buses of 18,000 lb GVWR or more).

(3) The manufacturer of the energy-absorbing system shall provide evidence of conformance to the above standards from an approved test facility capable of performing the above FMVSS tests.

44.4(6) *Bumper, rear.*

a. The rear 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-2 vehicles and a minimum of 9½ inches wide (high) on Type A-1, B, C and D buses and shall be of sufficient strength to permit being pushed by another vehicle without permanent distortion. Type A-2 vehicles with an overall body width of 80 inches or less may be equipped with the manufacturer's standard rear bumper.

b. The rear bumper shall be wrapped around the 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 the body side or protected with an end panel.

c. The rear bumper shall be attached to the chassis frame in such a manner that it may be easily removed. It shall be braced so as to resist deformation of the bumper resulting from a rear or side impact. It shall be designed so as to discourage hitching of rides.

d. The bumper shall extend at least 1 inch beyond the rear-most part of body surface measured at the floor line.

e. Additions or alterations to the rear bumper, including the installation of trailer hitches, are prohibited.

f. An optional energy-absorbing rear bumper may be used, provided a self-restoring, energy-absorbing bumper system attached to prevent the hitching of rides is 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:

- 2.0 mph fixed barrier impact (FMVSS cart and barrier test).
- 4.0 mph corner impact at 30 degrees (Part 581, CFR Title 49).
- 5.0 mph center impact (Part 581, CFR Title 49).

(3) The manufacturer of the energy-absorbing system shall provide evidence of conformance to the above standards from an approved test facility capable of performing the above FMVSS test.

44.4(7) *Certification.* The body manufacturer shall, upon request, certify to the department of education that the manufacturer's product(s) meets Iowa standards on items not covered by FMVSS certification requirements of 49 CFR Part 567.

44.4(8) *Chains, tire.* See subrule 44.3(35).

44.4(9) *Color.* See also subrule 44.3(11).

a. The school bus body shall be painted national school bus yellow. (See color standard, Appendix B, National School Transportation Specifications & Procedures Manual 2005, available from Missouri Safety Center, Central Missouri State University, Humphreys Suite 201, Warrensburg, Missouri 64093.)

b. The body exterior trim shall be glossy black, including the rear bumper, exterior lettering, numbering, body trim, rub rails, lamp hoods (if any), and emergency door arrow. This may also include the entrance door and window sashes. As an alternative, the rear bumper may be covered with a black retroreflective material as described in subrule 44.4(34). When the bus number is placed on the front or rear bumper, the number shall be yellow.

c. As an option, the roof of the bus may be painted white extending down to within 6 inches above the drip rails on the sides of the body, except that the vertical portion of the front and rear roof caps shall remain yellow.

d. Commercial advertising is forbidden on the exterior and in the interior of all school buses.

44.4(10) *Construction.*

a. The school bus body shall be constructed of materials certified to be durable under normal operating conditions and shall meet all applicable FMVSS at the date of manufacture as certified by the bus body manufacturer.

b. Construction shall be reasonably dustproof and watertight.

c. Body joints present in that portion of the Type A-2 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.

d. A flat floor system featuring no wheelwells and no step-up at the rear of the passenger compartment may be used in accordance with the following:

(1) The inside height of the body shall remain at least 72 inches, when measured in accordance with subrule 44.4(21) when this option is installed.

(2) If this option utilizes a raised floor that is stepped up behind the driver's area, the forward edge of the aisle shall have a white stripe and be labeled "Step Up" visible to passengers upon entering the aisle; and a label "Step Down" shall be visible to passengers as they exit the aisle. Minimum headroom of 72 inches shall be maintained at all times.

(3) A flat floor design shall provide for the additional option for a track-mounted seating system using button-type (L track) and a wheelchair securement system meeting Iowa specifications but mounting into the track of the track-seating system. Aisle clearances shall be maintained in accordance with these rules.

44.4(11) *Crossing control arms.*

a. Type A, B, and C school 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 degrees. This requirement does not apply to Type D vehicles having transit-style design features.

b. The crossing control arm shall incorporate a system of quick-disconnect connectors (electrical, vacuum, or air) at the crossing control arm base unit and shall be easily removable to allow for towing of the bus.

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

d. The crossing control arm shall be constructed of noncorrodible or nonferrous material or treated in accordance with the body sheet metal standard. See subrule 44.4(25).

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

f. The crossing control arm shall extend a minimum of 70 inches from the front bumper when in the extended position. This measurement shall be taken from the arm assembly attachment point on the bumper. However, the crossing control arm shall not extend past the ends of the bumper when in the stowed position.

g. The crossing control arm shall extend simultaneously with the stop arm(s) by means of the stop arm controls.

h. The crossing control arm system shall be designed to operate in extreme weather conditions including freezing rain, snow and temperatures below 0 degrees Fahrenheit without malfunctioning. The crossing control arm itself shall be constructed of a material that will prevent the arm from prematurely extending or from failing to retract due to sustained wind or wind gusts of up to 40 miles per hour.

i. The chassis bumper mounting bracket must be designed for the specific model chassis on which it will be mounted to ensure that the unit mounts flush and operates properly.

j. A single, cycle-interrupt switch with automatic reset shall be installed in the driver's compartment and shall be accessible to the driver from the driver's seat.

44.4(12) *Defrosters.*

a. Defrosting and defogging equipment shall direct a sufficient flow of heated air onto the interior surfaces of 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 SAE Standard J381.

c. The defroster and defogging system shall be capable of furnishing heated outside ambient air; however, the part of the system furnishing additional air to the windshield, entrance door and step well may be of the recirculating air type.

d. Auxiliary fans are required; however, they are not considered defrosting or defogging systems. See also subrule 44.4(53).

e. Portable heaters shall not be used.

44.4(13) *Doors and exits.*

a. Service door.

(1) The service door shall be heavy-duty power or manually operated under the control of the driver and shall be designed to afford easy release and prevent accidental opening. When a hand lever is used,

no parts shall come together to 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. A power-operated door must provide for manual operation in case of power failure.

(2) The service door shall be located on the right side of the bus opposite the driver and within the driver's direct view.

(3) The service door shall have a minimum horizontal opening of 24 inches and a minimum vertical opening of 68 inches. Type A-2 vehicles shall have a minimum opening of 1,200 square inches.

(4) The service door shall be of split or jackknife type. (Split door includes any sectioned door which divides and opens inward or outward.) If one section of the split door opens inward and the other opens outward, the front section shall open outward.

(5) Lower as well as upper panels shall be of approved safety glass. The bottom of each lower glass panel shall not be more than 10 inches from the top surface of the bottom step. The top of each upper glass panel shall not be more than 3 inches from the top of the door.

(6) The upper window panels of the service door shall be of insulated double glass. This standard applies to all vehicles equipped with a service door as described in 44.4(13)*"a."*

(7) Vertical closing edges on split or folding entrance doors shall be equipped with flexible material to protect children's fingers.

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

(9) 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 shall extend horizontally the full width of the door opening.

(10) Door hinges shall be secured to the body without the use of metal screws.

(11) There shall be no grab handle installed on the exterior of the service door.

(12) A door-locking mechanism may be installed in accordance with subrule 44.4(52).

(13) On power-operated service doors, the emergency release valve, switch or device to release the service door must be placed above or to the left or right of the service door and be clearly labeled.

b. Emergency doors.

(1) Emergency door(s) and other emergency exits shall comply with the requirements of FMVSS 217 and any of the requirements of these rules that exceed FMVSS 217.

(2) The upper portion of the emergency door shall be equipped with approved safety glazing, the exposed area of which shall be at least 400 square inches. The lower portion of the rear emergency doors on Type A-2, B, C and D vehicles shall be equipped with a minimum of 350 square inches of approved safety glazing.

(3) There shall be no steps leading to an emergency door.

(4) The emergency door(s) 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 shall extend the full width of the door opening.

(5) There shall be no obstruction higher than ¼ inch across the bottom of any emergency door opening.

c. Emergency exit requirements.

(1) Any installed emergency exit shall comply with the design and performance requirements of FMVSS 217, Bus Emergency Exits and Window Retention and Release, applicable to that type of exit, regardless of whether or not that exit is required by FMVSS 217, and shall comply with any of the requirements of these rules that exceed FMVSS 217.

(2) An emergency exit may include either an emergency door or emergency exit-type windows. Where emergency exit-type windows are used, they shall be installed in pairs, one on each side of the bus. Type A, B, C, and D vehicles shall be equipped with a total number of emergency exits as follows for the designed capacities of vehicles:

- 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.

These emergency exits are in addition to the rear emergency door or rear pushout window/side emergency door combination required by FMVSS 217. Additional emergency exits installed to meet

the capacity-based requirements of FMVSS 217 may be included to comprise the total number of exits specified. All roof hatches shall have design features as specified in subrule 44.4(53).

(3) Side and rear emergency doors and each emergency window exit shall be equipped with an audible warning device.

(4) Roof hatches shall be equipped with an audible warning device.

(5) Rear emergency windows on Type D, rear engine buses shall have a lifting-assistance device that will aid in lifting and holding the rear emergency window open.

(6) Side emergency windows may be either top-hinged or vertically hinged on the forward side of the window. No side emergency exit window will be located above a stop sign.

(7) On the inside surface of each school bus, located directly beneath or above all emergency doors and windows, shall be a "DO NOT BLOCK" label in a color that contrasts with the background of the label. The letters on this label shall be at least 1 inch high.

44.4(14) *Driver's compartment.*

a. The 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 flange-headed nuts.

b. The driver's 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.

c. See also subrule 44.4(37).

d. A driver's document compartment or pouch shall be provided. The document compartment or pouch shall measure at least 17 inches by 12 inches by 4 inches. If a document pouch, rather than a covered compartment, is provided, it shall be located on the barrier behind the driver. It shall be constructed of a material of equal durability to that of the covering on the barrier and shall have a lid or cover with a latching device to hold the cover or lid closed.

e. A manual noise suppression switch shall be required and located in the control panel within easy reach of the driver while seated. The switch shall be labeled. This switch shall be an on/off type that deactivates body equipment that produces noise, including, at least, the AM/FM radio, heaters, air conditioners, fans, and defrosters. This switch shall not deactivate safety systems, such as windshield wipers, lighting systems, or two-way radio communication systems.

44.4(15) *Emergency equipment.*

a. All Type A, B, C, and D school buses shall be equipped with the following emergency equipment: first-aid kit, fire extinguisher, webbing cutter, body fluid cleanup kit, and triangular warning devices.

b. All emergency equipment shall be securely mounted so that, in the event the bus is overturned, this equipment is held in place. Emergency equipment may be mounted in an enclosed compartment provided that the compartment is labeled in not less than 1-inch letters, stating the piece(s) of equipment contained herein.

c. Fire extinguishers shall meet the following requirements:

(1) The bus shall be equipped with at least one five-pound capacity, UL-approved, pressurized dry chemical fire extinguisher complete with hose. The extinguisher shall be located in the driver's compartment readily accessible to the driver and passengers and shall be securely mounted in a heavy-duty automotive bracket so as to prevent accidental release in case of a crash or in the event the bus overturns.

(2) A calibrated or marked gauge shall be mounted on the extinguisher to indicate the amount of pressure in the extinguisher and shall be easily read without moving the extinguisher from its mounted position. Plastic discharge heads and related parts are not acceptable.

(3) The fire extinguisher shall have a rating of 2A-10BC or greater. The operating mechanism shall be sealed with a type of seal which will not interfere with the use of the fire extinguisher.

(4) All fire extinguishers shall be inspected and maintained in accordance with the National Fire Protection Association.

(5) Each extinguisher shall have a tag or label securely attached that indicates the month and year the extinguisher received its last maintenance and the identity of the person performing the service.

d. First-aid kit.

(1) The bus shall have a removable moistureproof and dustproof first-aid kit in an accessible place in the driver's compartment. It shall be mounted and secured, and identified as a first-aid kit. The location for the first-aid kit shall be marked.

(2) Multipurpose and passenger-type vehicles used as school buses shall be equipped with a ten-unit first-aid kit containing the following items:

1	1-inch adhesive compress.
1	2-inch bandage compress.
1	4-inch bandage compress.
1	3-inch × 3-inch plain gauze pad.
1	gauze roller bandage (4-inch × 5 yards).
1	plain absorbent gauze compress (2 piece, 18-inch × 36-inch).
1	plain absorbent gauze compress (24-inch × 72-inch).
2	triangular bandages.
1	wire splint (instant splints may be substituted).

(3) A first-aid kit meeting the national standards (National Standards First Aid Kit) and containing the following items is required on all Type A, B, C and D school buses:

2	1-inch × 2½-yard adhesive tape rolls.
24	3-inch × 3-inch sterile gauze pads.
100	¾-inch × 3-inch adhesive bandages.
8	2-inch bandage compresses.
10	3-inch bandage compresses.
2	2-inch × 6-foot sterile gauze roller bandages.
2	39-inch × 35-inch × 54-inch nonsterile triangular bandages with two safety pins.
3	36-inch × 36-inch sterile gauze pads.
3	sterile eye pads.
1	pair medical examination gloves.
1	mouth-to-mouth airway.

e. Body fluid cleanup kit. Each bus shall be equipped with a disposable, removable, and moistureproof body fluid cleanup kit in a disposable container which includes the following items:

(1) An EPA-registered liquid germicide (tuberculocidal) disinfectant;

(2) A fully disposable wiping cloth;

(3) A water-resistant spatula;

(4) Step-by-step directions;

(5) Absorbent material with odor counteractant;

(6) Two pairs of gloves (latex);

(7) One package towelettes;

(8) A discard bag (nonlabeled paper bag with a plastic liner and a twist tie). This bag shall be approximately 4 inches by 6 inches by 14 inches, and shall be of a nonsafety color (i.e., the bag shall not be red, orange, or yellow). The kit shall be mounted by a method that will retain it in place during normal school bus operation and shall be removable without the use of tools. The kit container shall be sealed with a breakable, nonreusable seal and must be accessible to the driver.

f. Triangular warning devices. Each school bus shall contain at least three reflectorized triangle road warning devices mounted in an accessible place. These devices must meet requirements in FMVSS 125.

g. Each bus shall be equipped with a durable webbing cutter having a full-width handgrip and a protected, replaceable or noncorrodible blade. This device shall be mounted in an easily detachable manner and in a location accessible to the seated driver.

h. Axes are not allowed.

44.4(16) *Floor insulation and covering.*

a. The floor structure of Type A-2, B, C and D school buses shall be covered with an insulating layer of either a 5-ply minimum 5/8-inch-thick plywood, or a material of equal or greater strength and insulation R-value, having properties equal to or exceeding exterior-type softwood plywood, C-D grade as specified in standards issued by the United States Department of Commerce. All edges shall be sealed.

b. Type A-1 buses may be equipped with a minimum ½-inch-thick plywood meeting the above requirements.

c. The floor in the under-seat area of Type B, C, and D buses, including tops of wheelhousings, driver's compartment and toeboard, shall be covered with an elastomer floor covering having a minimum overall thickness of 1/8 inch and a calculated burn rate of 0.1 or less using the test methods, procedures and formulas listed in FMVSS 302. The floor covering of the driver's area and toeboard area on all Type A buses may be the manufacturer's standard flooring and floor covering.

d. The floor covering in aisles of all buses shall be of a ribbed or other raised-pattern elastomer, having a coefficient of friction of 0.85, using ASTM 1894 or 0.65 using ASTM 2047, and a calculated burn rate of 0.1 or less using the test methods, procedures and formulas listed in FMVSS 302. Minimum overall thickness shall be 3/16 inch measured from tops of ribs.

e. 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 the floor-covering material. All seams must be sealed with waterproof sealer.

f. On Type B, C and D buses, access to the fuel tank sending unit shall be provided. The access opening shall be large enough and positioned to allow easy removal of the sending unit. Any access opening in the body shall be capable of being sealed with a screw-down plate from within the body. When in place, the screw-down plate shall seal out dust, moisture and exhaust fumes. This plate shall not be installed under flooring material.

g. Cove molding shall be used along the sidewalls and rear corners. All joints or seams in the floor covering shall be covered with nonferrous metal stripping or stripping constructed of material exhibiting equal durability and sealing qualities.

44.4(17) *Fuel fill opening and cover.* Where an opening in the school bus body skirt is needed for access to the fuel fill cap, the opening shall be large enough to permit filling the fuel tank without the need for special fuel nozzle adapters, a funnel, or other device. The opening shall be equipped with a forward hinged cover held closed by a spring or other conveniently operated device.

44.4(18) *Heating and air conditioning.*

a. Each heater shall be hot-water or combustion type.

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

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

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

e. Auxiliary fuel-fired heating systems are permitted, provided they comply with the following:

(1) The auxiliary heating system shall utilize the same type of fuel as specified for the vehicle engine.

(2) Heater(s) may be direct hot air or connected to the engine's coolant system.

(3) An auxiliary heating system, when connected to the engine's coolant system, may be used to preheat the engine coolant or preheat and add supplementary heat to the bus's heating system.

(4) Auxiliary heating systems must be installed pursuant to the manufacturer's recommendations and shall not direct exhaust in a manner that will endanger bus passengers.

(5) Auxiliary heating systems which operate on diesel fuel shall be capable of operating on #1, #2 or blended diesel fuel without the need for system adjustment.

(6) The auxiliary heating system shall be low voltage.

(7) Auxiliary heating systems shall comply with all applicable FMVSS including FMVSS 301 as well as SAE test procedures.

f. 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 the bus shall be shielded to prevent scalding of the driver or passengers.

g. 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 Type A and B buses, the valves may be installed in another accessible location.

h. Each hot water heating system shall be equipped with a device that is installed in the hot water pressure line that regulates the water flow to all heaters and that is located for convenient operation by the driver while seated.

i. All combustion heaters shall be in compliance with current federal motor carrier safety regulations.

j. 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.

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

l. Air-conditioning systems may be installed in accordance with the following:

(1) Evaporator cases, lines and ducting (as equipped) shall be designed so that all condensation is effectively drained to the exterior of the bus below floor level under all conditions of vehicle movement without leakage on any interior portion of the bus.

(2) Any evaporator or ducting system shall be designed and installed so as to be free of injury-producing projections or sharp edges. Installation shall not reduce compliance with any FMVSS applicable to the school bus. Ductwork shall be installed so that exposed edges face the front of the bus and do not present sharp edges.

(3) Any evaporators used must be copper-cored (aluminum or copper fins acceptable), except that the front evaporator, if provided by a Type A chassis manufacturer, may be aluminum-cored.

(4) Air intake for any evaporator assembly(ies) except for the front evaporator of a Type A bus shall be equipped with replaceable air filter(s) accessible without disassembly of the evaporator case.

(5) On buses equipped for the transportation of persons with disabilities, the evaporator and ducting shall be placed high enough so that they will not obstruct existing or potential occupant securement shoulder strap upper attachment points. This clearance shall be provided along the entire length of the passenger area on both sides of the bus interior to allow for potential retrofitting of new wheelchair positions and occupant securement devices throughout the bus.

(6) The total system shall be warranted, including parts and labor, for at least two years and shall include, but not be limited to, compressor mounting bracketry and hardware and any belts which, directly or indirectly, drive the compressor(s). Air-conditioning compressor applications must be approved in writing by the chassis engine manufacturer, stating that the installations will not void or reduce the engine manufacturer's warranty or extended service coverage liabilities in any way.

(7) All components requiring periodic servicing must be readily accessible for servicing.

(8) Parts and service manuals shall be provided for the entire system including, but not limited to, compressor(s), wiring (includes wiring diagram), evaporators, condensers, controls, hoses and lines.

(9) Electrical requirements for the air-conditioning system shall be provided to the customer prior to vehicle purchase or, in the case of an after-purchase installation, prior to installing the air-conditioning system to ensure that adequate electrical demands imposed by the air-conditioning system are capable of being met.

(10) The installed air-conditioning system should cool the interior of the bus down to at least 80 degrees Fahrenheit, measured at a minimum of three points, located 4 feet above the floor at the longitudinal centerline of the bus. The three points shall be: near the driver's location; at the midpoint of the body; and 2 feet forward of the emergency door, or for Type D rear engine buses, 2 feet forward of the end of the aisle. Test conditions will be those as outlined in the National School Transportation Specifications & Procedures Manual 2005, Missouri Safety Center, Central Missouri State University, Humphreys Suite 201, Warrensburg, Missouri 64093.

44.4(19) *Hinges.* All exposed metal passenger-door hinges subject to corrosion shall be designed to allow lubrication without disassembly. All passenger-door hinges shall be securely bolted to the bus body. Metal screws are not acceptable.

44.4(20) *Identification.*

a. The body shall bear the words "SCHOOL BUS" in black letters at least 8 inches high on both front and rear of the body or on attached signs. The lettering shall be placed as high as possible without impairment of its visibility. The lettering shall conform to Series B of Standard Alphabets of Highway Signs. "SCHOOL BUS" lettering shall have a reflective background or, as an option, may be illuminated by backlighting.

b. The bus, whether school-owned or contractor-owned, shall have displayed at the beltline on each side of the vehicle the official name of the school in black standard unshaded letters at least 5 inches, but not more than 7 inches high.

Examples:

(1) Blank community school district.

(2) Blank independent school district.

(3) Blank consolidated school district.

If there is insufficient space due to the length of the name of the school district, the words "community," "independent," "consolidated," and "district" may be abbreviated. If, after these abbreviations, there is still insufficient space available, the words "community school district" may be replaced by the uppercase letters "CSD" upon prior approval by the school transportation consultant of the Iowa department of education.

c. The incorporated names of cities located within an officially reorganized school district may be placed on either side of the bus in a single line situated beneath the official school district name. The lettering shall not exceed 2 inches in height and shall be black. This paragraph shall apply only when the names of the cities are not included in the official school district name on the beltline.

d. Buses privately owned and operated by an individual or individuals and used exclusively for transportation of students shall bear the name of the owner, at the beltline on each side of the vehicle in black standard unshaded letters at least 5 inches, but not more than 7 inches high.

e. The words "RATED CAPACITY," along with the appropriate number indicating the rated pupil seating capacity of the bus, shall be printed to the left of the entrance door, at least 6 inches below the name of the school district and on the bulkhead of the bus above the right windshield. The letters shall be black in color and at least 2 inches in height. The word "CAPACITY" may be abbreviated and shown as "CAP." where necessary.

f. The number of the bus shall be printed in not less than 5-inch or more than 8-inch black letters, except as otherwise noted in this subrule, and shall be displayed on both sides, the front and the rear of the bus. The location of the bus number is at the discretion of the vehicle owner except that the number:

(1) Shall be located to the rear of the service door not more than 36 inches from the ground on the right side of the bus and at the same respective position on the left side of the bus.

(2) Shall be yellow if located on either the front or rear bumper.

(3) May be placed on the roof of the bus at a position representing the approximate lateral and longitudinal midpoint of the bus. The bus number shall be black and shall measure not less than 24 inches in length.

(4) Shall not be located on the same line as the name of the school district on either side of the bus, on the emergency door, or in a location that will interfere with the words "SCHOOL BUS."

g. Buses privately owned by individuals, a company, or a contractor shall also bear the name of the owner, followed by the word "OWNER" in not more than 2-inch characters printed approximately 6 inches below the bus capacity on the right side of the bus.

h. Symbols, characters or letters, for the purpose of vehicle or route identification by students, may be displayed in the lower, split-sash, glass portion of the third passenger window from the front on the service entrance side of the bus. Such symbols, characters or lettering, if used, shall not exceed 36 square inches. This requirement applies to all school buses regardless of date of purchase.

i. Symbols identifying the bus as equipped for or transporting students with special needs may be displayed. See subrule 44.5(7).

j. The words "UNLAWFUL TO PASS WHEN LIGHTS FLASH" shall be displayed on the rear emergency door of the bus between the upper and lower window glass sections. The letters shall be black and not less than 2 inches nor more than 6 inches in height. If there is not sufficient space on the emergency door, letter size may be reduced upon approval of the department of education.

k. Pressure-sensitive markings of vinyl material may be used for the above lettering in lieu of painting.

l. Any lettering, including the name of the school's athletic team(s), numbers, drawings, bumper stickers, characters, or mascot symbols other than the bus manufacturer's registered trademarks or those specifically noted in paragraphs *"a"* through *"k"* above are prohibited.

44.4(21) *Inside height.* Inside body height shall be 72 inches or more, measured metal to metal, at any point on the longitudinal centerline from the front vertical bow to the rear vertical bow. Inside body height of Type A-2 buses shall be 62 inches or more.

44.4(22) *Insulation.*

a. Thermal insulation in the ceiling and walls shall be fire-resistant, UL-approved, and approximately 1½-inch thick with a minimum R-value of 5.5. Insulation shall be installed in such a way as to prevent it from sagging.

b. Roof bows shall be insulated in accordance with 44.4(22)*"a."*

44.4(23) *Interior.*

a. The interior of the bus shall be free of all unnecessary projections, including luggage racks and attendant handrails, to minimize the potential for injury. 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. Buses may be equipped with a storage compartment for tools, tire chains, and tow chains. See also subrule 44.4(44).

b. Radio speakers are permitted in the passenger compartment area only. No radio speaker, other than that which is necessary for use with two-way communication equipment, shall be located within the driver's compartment area. All radio speakers shall be flush-mounted with the roof or side panels and shall be free of sharp edges which could cause injury to a child.

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

d. 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 Appendix B, National School Transportation Specifications & Procedures Manual 2005, Missouri Safety Center, Central Missouri State University, Humphreys Suite 201, Warrensburg, Missouri 64093.

e. An access panel must be provided, front and rear, so lights and wiring for the 8-light warning system may be repaired or serviced without removing ceiling panels.

f. Ceiling material designed to reduce noise within the driver compartment or passenger compartment may be installed by the manufacturer.

g. An electronic "child check" monitor shall be installed. This monitor shall operate in such a way as to require the driver to physically walk to the back of the bus to disengage the monitor system after having first shut off the engine of the bus.

44.4(24) *Lamps and signals.*

a. All lamps and lamp components shall meet or exceed applicable standards established by the Society of Automotive Engineers (SAE), the American Association of Motor Vehicle Administrators (AAMVA), and FMVSS. These lamps shall be of incandescent or LED design.

b. Clearance lamps. The body shall be equipped with two amber lamps at the front and two red clearance lamps at the rear mounted at the highest and widest portion of the body.

c. Identification lamps. The bus shall be equipped with three amber identification lamps on the front and three red identification lamps on the rear. Each group shall be evenly spaced not less than 6 or more than 12 inches apart along a horizontal line near the top of the vehicle.

d. Intermediate side marker lamps. On all buses over 30 feet long, one amber side lamp is required on each side, located midway between the front and rear clearance lamps.

e. Stop/tail (brake) lamps. Buses shall be equipped with four combination, red, stop/tail lamps meeting SAE specifications. Each lamp shall have double filament lamp bulbs or LEDs that are connected to the headlamp and brake-operated stop lamp circuits. These should be positioned as follows:

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

(2) Two combination lamps with a minimum diameter of 4 inches or, if a shape other than round, a minimum of 12 square inches of illuminated area shall be placed on the rear of the body between the beltline 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-2 buses with bodies supplied by the chassis manufacturer may have the manufacturer's standard stop and tail lamps.

f. Items described in paragraphs *"b," "c," "d,"* and *"e"* shall be connected to the headlamp switch.

g. Backup lamps. The bus body shall be equipped with two white rear backup lamps. All vehicles shall be equipped with lamps at least 4 inches in diameter or, if a shape other than round, a minimum of 13 square inches of illuminated area. All lamps shall have a white or clear lens and shall meet 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.

h. Interior lamps. Interior lamps shall be provided which adequately illuminate the interior aisle and the step well. Step well lights shall be illuminated by a service door-operated switch, to illuminate only when headlights and clearance lights are on and the service door is open. In addition, the following interior lamps shall be provided:

(1) Supervisor's light. The rearmost ceiling light or a separate light may be used as a supervisor's light and shall be activated by a separate switch controlled by the driver.

(2) Driver's area dome light. This light shall have a separate switch controlled by the driver and shall illuminate the driver's compartment area.

(3) Body instrument panel lights shall be controlled by a rheostat switch.

(4) On buses equipped with a monitor for 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.

i. License plate lamp. The bus shall be equipped with a rear license plate illuminator. This lamp may be combined with one of the tail lamps.

j. Reflectors. Reflectors shall be securely attached to the body with sheet metal screws or other method having equivalent securement properties and installed in accordance with the requirements of FMVSS 108; however, the vehicle shall, as a minimum, be equipped with the following:

(1) Two amber reflectors, one on each side at the lower front and corner of the body approximately at floor level and back of the door on the right side, and at a similar location on the left side. For all buses over 30 feet long, an additional amber reflector is required on each side at or near the midpoint between the front and rear side reflectors.

(2) Four red reflectors, one at each side at or near the rear and two on the rear, one at each side.

(3) Reflectors are to be mounted at a height not more than 42 inches or less than 30 inches above the ground on which the vehicle stands.

k. Warning signal lamps.

(1) Buses shall be equipped with two red lamps at the rear of the vehicle and two red lamps at the front of the vehicle.

(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 the same level, but closer to the vertical centerline of the bus. The system of red and amber signal lamps shall be wired so that amber lamps are energized manually and the red lamps are automatically energized (sequential), with amber lamps being automatically de-energized, when the stop signal arm is extended or when the 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.

(3) The area immediately around the lens of each alternately flashing signal lamp shall be black. In installations where there is no flat vertical portion of body immediately surrounding the entire lens of the lamp, there shall be a circular or square band of black immediately below and to both sides of the lens, on the body or roof area against which the signal lamp is seen from a distance of 500 feet along the axis of the vehicle. Black visors or hoods, with a minimum depth of 4 inches, may be provided.

(4) Red lamps shall flash at any time the stop signal arm is extended.

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

(6) Strobe lights are permissible.

l. Turn signal lamps.

(1) The bus body shall be equipped with amber rear turn signal lamps that meet SAE specifications and are at least 7 inches in diameter or, if a shape other than round, a minimum of 38 square inches of illuminated area. These signal lamps must be connected to the chassis hazard warning switch to cause simultaneous flashing of turning signal lamps when needed as a vehicular traffic hazard warning. Turn signal lamps are to be placed as far apart as practical and their centerline shall be approximately 8 inches below the rear window. Type A-2 conversion vehicle lamps must be at least 21 square inches in lens area and in the manufacturer's standard color.

(2) Buses shall be equipped with amber side-mounted 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.

m. A white flashing strobe light rated for outdoor use and weather-sealed shall be installed on the roof of the bus not less than 1 foot or more than 4 feet from the rear center of the bus. The strobe light shall be located to the rear of the rearmost emergency roof hatch to prevent the roof hatch from diminishing the effectiveness of the strobe light. In addition:

(1) The strobe light shall have a single clear lens emitting light 360 degrees around its vertical axis and may not extend above the roof more than the maximum legal height.

(2) The strobe light must be controlled by a separate switch with an indicator light which when lit will indicate that the strobe light is turned on.

(3) The light shall be used only in fog, rain, snow, or at times when visibility is restricted.

(4) Each model strobe shall be approved by the motor vehicle division, Iowa department of transportation.

44.4(25) *Metal treatment.*

a. All metal, except high-grade stainless steel or aluminum, used in construction of the bus body shall be zinc-coated or aluminum-coated to prevent corrosion. This requirement applies to, but is not limited to, 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.

b. 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 to improve paint adhesion.

c. 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.

d. As evidence that the above requirements have been met, samples of materials and sections used in construction of the bus body subjected to a 1,000-hour salt spray test as provided for in the latest revision of ASTM Standard B-117 shall not lose more than 10 percent of material by weight.

44.4(26) *Mirrors.*

a. The interior mirror shall be either clear view laminated glass or clear view glass bonded to a backing that retains the glass in the event of breakage. The mirror shall have rounded corners and protected edges. All Type A buses shall have a minimum of a 6-inch × 16-inch mirror; and Type B, C, and D buses shall have a minimum of a 6-inch × 30-inch mirror.

b. 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.

c. Heated right- and left-side rearview mirrors shall be provided.

d. Systems offering a design feature permitting the driver to remotely adjust mirrors from the driver's compartment may be utilized.

e. The right side rearview mirrors must be unobstructed by the unwiped section of the windshield.

44.4(27) *Mounting.*

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

b. Isolators shall be placed at all contact points between the body and chassis frame and shall be secured by a positive means to the chassis frame or body to prevent shifting, separation, or displacement of the isolators under severe operating conditions.

c. The body front shall be attached and sealed to the chassis cowl to prevent entry of water, dust, and fumes through the joint between the chassis cowl and body.

d. The refurbishing or reconditioning of a body-on-chassis school bus is restricted to the repair and replacement of school bus body or chassis components. The original body and chassis, as certified by the original equipment manufacturers, shall be retained as a unit upon completion of repairs. It is not permissible to exchange or interchange school bus bodies and chassis. The refurbisher or reconditioner shall certify that the vehicle meets all state and federal construction standards in effect as of the date of manufacture and shall provide suitable warranty on all work performed. See also subrule 44.7(1).

44.4(28) *Mud flaps.*

a. Mud flaps or guards are required and shall be provided and installed by the body manufacturer or manufacturer's representative for both front and rear wheels.

b. Front mud flaps or guards shall be of adequate size to protect body areas vulnerable to road debris from wheels and shall be mounted so as to be free of wheel movement at all times.

c. Rear mud flaps or guards shall be comparable in size to the width of the rear wheelhousing and shall reach within approximately 9 inches of the ground when the bus is empty. They shall be mounted at a distance from the wheels to permit free access to spring hangers for lubrication and maintenance and to prevent their being pulled off while the vehicle is in reverse motion or damaged by tire chains.

d. All mud flaps shall be constructed of rubber. Vinyl or plastic is not acceptable.

44.4(29) *Overall length.* Overall length of the bus shall not exceed the maximum allowed by the Iowa department of transportation.

44.4(30) *Overall width.* Overall width of the bus shall not exceed the maximum allowed by the Iowa department of transportation.

44.4(31) *Passenger securement.* See subrule 44.4(39).

44.4(32) *Public address system.* A public address system permitting interior or exterior communication with passengers, or both types of communication, may be installed.

44.4(33) *Radio system.* In the interest of safety for the children transported and the effective management of the school transportation program, a two-way radio communication system is highly recommended.

44.4(34) *Retroreflective material.*

a. Retroreflective material shall be provided in accordance with the following:

(1) The rear of the 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 "Retroreflective Sheeting Daytime Color Specification Proposal" of Appendix B, National School Transportation Specifications & Procedures Manual 2005, Central Missouri State University, Humphreys Suite 201, Warrensburg, Missouri 64093. The perimeter marking of rear emergency exits in accordance with 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 1¾-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) "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.

(3) Sides of the bus body shall be marked with reflective NSBY material at least 1¾ inches in width, extending the length of the bus body and located within 6 inches above or below the floor line or on the beltline.

b. Front and rear bumpers may be marked diagonally 45 degrees down to centerline of pavement with 2-inch +/- ¼ inch wide strips of noncontrasting reflective material. This material shall appear black during daylight hours; however, it will be seen as a reflective material during periods of reduced light conditions when a direct light source strikes the material.

44.4(35) *Rub rails.*

a. One rub rail located on each side of the bus at, or no more than 8 inches above, the seat level shall extend from the rear side of the entrance door completely around the bus body (except for emergency door or any maintenance access door) to the point of curvature near the outside cowl on the left side.

b. One rub rail located at, or no more than 10 inches above, the floor line shall cover the same longitudinal area as the upper rub rail, except at wheelhousings, and shall extend only to radii of the right and left rear corners.

c. Rub rails at or above the floor line shall be attached at each body post and all other upright structural members.

d. Each rub rail shall be 4 inches or more in width in its finished form, shall be of 16-gauge steel or suitable material of equivalent strength, and shall be constructed in corrugated or ribbed fashion.

e. Rub rails shall be applied to outside body or outside body posts. Pressed-in or snap-on rub rails do not satisfy this requirement. For all buses using a rear luggage or rear engine compartment, rub rails need not extend around rear corners.

f. The bottom edge of the body side skirts shall be stiffened by application of a rub rail, or the edge may be stiffened by providing a flange or other stiffeners.

44.4(36) *Seat, driver.*

a. Type A school buses shall be equipped with a driver's seat of manufacturer's standard design meeting FMVSS.

b. All Type B, C, and D school buses shall have a driver's seat equipped with a one-piece high back designed to minimize the potential for head and neck injuries in rear impacts, providing minimum obstruction to the driver's view of passengers and meeting applicable requirements of FMVSS 222. The height of the seat back shall be sufficient to provide the specified protection for a 5th percentile adult female up to a 95th percentile adult male, as defined in FMVSS 208. The seat shall be centered behind the steering wheel with a backrest a minimum distance of 11 inches behind the steering wheel. The seat shall be securely mounted to the floor of the bus with Grade 5 or better bolts and shall be secured with locking nuts or lock washers and nuts.

c. All air brake-equipped school buses may be equipped with an air suspension driver's seat meeting the following additional requirements:

(1) The air control for height adjustment shall be within easy reach of the driver in the seated position.

(2) The seat cushion shall be a minimum of 19½ inches wide, shall be fully contoured for maximum comfort, and shall have a minimum of four adjustment positions to allow changes in seat bottom angle.

(3) The backrest shall include adjustable lumbar support.

(4) The seat shall have a minimum of 7 inches of forward and rearward travel, adjustable with the driver in the seated position. This requirement applies to the seat mechanism. Reduction of this requirement to no less than 4 inches due to barrier placement on 89-passenger capacity buses will be acceptable.

(5) The seat shall have a minimum of 4 inches of up and down travel.

(6) Seat back shall include adjustability of tilt angle.

(7) All adjustments shall be by fingertip controls without the use of tools.

(8) The seat shall comply with all applicable FMVSS.

44.4(37) *Seat belt/shoulder harness system, driver.* Buses shall be equipped with a Type 2 lap belt/shoulder harness seat belt assembly for the driver. This assembly may be integrated into the driver's seat. The design shall incorporate a fixed female push-button type latch on the right side at seat level, and a male locking bar tongue on the left retracting side. The assembly shall be equipped with a single, dual-sensitive emergency locking retractor (ELR) for the lap and shoulder belt. This system shall be designed to minimize "cinching down" on air sprung and standard seats. The lap portion of the belt shall be anchored or guided at the seat frame by a metal loop or other such device attached to the right side of the seat to prevent the driver from sliding sideways out of the seat. There shall be a minimum of 7 inches of adjustment of the "D" loop of the driver's shoulder harness on a nonintegrated style of seat belt assembly. Shoulder belt tension shall be no greater than is necessary to provide reliable retraction of the belt and removal of excess slack. The seat belt assembly and anchorage shall meet applicable FMVSS.

44.4(38) *Seats and crash barriers.*

a. All seats, component parts, and seat anchorage shall comply with applicable federal requirements as of the date of their manufacture.

b. All seats shall have a minimum cushion depth of 15 inches and a seat back height of 24 inches above the seating reference point and shall comply with all other requirements of FMVSS 222.

c. In determining the rated seating capacity of the bus, allowable average rump width shall be:

(1) Thirteen inches where a three-three seating plan is used.

(2) Fifteen inches where a three-two seating plan is used.

d. The following knee room requirements shall apply to all school bus bodies:

(1) Knee room shall meet the requirements of FMVSS 222 and shall be measured, on Type A-2, B, C and D school buses, at the center of the transverse line of the seat and at seat cushion height. The distance from the front of a seat back (cushion) to the back surface of the cushion on the preceding seat shall be not less than 24 inches. The seat upholstery may be placed against the seat cushion padding, but without compressing the padding, before the measurement is taken.

(2) On Type A-1 school buses, seat spacing shall be of the manufacturer's standard spacing.

e. All seats shall be forward-facing with seat frames attached to the seat rail with two bolts, washers and nuts or flange-headed nuts. 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 222. This information shall be on a label permanently affixed to the bus.

f. Jump seats or portable seats are prohibited; however, use of a flip seat at any side emergency door location in conformance with FMVSS 222, including required aisle width to side door, is acceptable. Any flip seat shall be free of sharp projections on the underside of the seat bottom. The underside of the flip-up seat bottoms shall be padded or contoured to reduce the possibility of snagged clothing or injury during use. Flip seats shall be constructed to prevent passenger limbs from becoming entrapped between the seat back and the seat cushion when in an upright position. The seat cushion shall be designed to rise to a vertical position automatically when not occupied.

g. Seats, seat back cushions, and restraining barriers shall be covered with a material having 42-ounce finished weight, 54-inch width, and finished vinyl coating of 1.06 broken twill or other material

with equal tensile strength, tear strength, seam strength, adhesion strength, and resistance to abrasion, cold and flex separation.

h. All fabric seams shall be chain- or lock-stitch sewn with two threads, each equal to or exceeding the tensile strength of "F"-rated nylon thread.

i. Crash barriers shall be installed conforming to FMVSS 222; however, all Type A-2 school bus bodies shall be equipped with padded crash barriers, one located immediately to the rear of the driver's seat and one at the service door entrance immediately to the rear of the step well.

j. Crash barriers and passenger seats may be constructed with materials that enable them to meet the criteria contained in the school bus seat upholstery fire block test specified in the National School Transportation Standards & Procedures Manual 2005, Central Missouri State University, Warrensburg, Missouri 64093. Fire block material, when used, shall include the covering of seat bottoms.

k. Seat cushions may contain a positive locking mechanism that requires removal of a security device before the seat may be unlatched.

44.4(39) *Passenger securement seating system.*

a. Type A-1 vehicles shall conform to all FMVSS at date of manufacture.

b. Unless otherwise required by FMVSS, school bus seats may be equipped with passenger securement systems for passengers with disabilities in accordance with 281—Chapter 41 when it is determined by the child's individual education program staffing team that special seating and positioning are necessary during transportation. When the staffing team determines that a passenger securement system is necessary to safely transport a student with a disability, the need shall be documented in the student's individual education plan (IEP).

c. When a child securement system is required in 44.4(39)*"b,"* the seat, including seat frame, seat cushion, belt attachment points, belts and hardware shall comply with all applicable FMVSS at the time of manufacture. When it is determined that the securement system is no longer necessary to provide seating assistance to a child with a disability, the securement system shall be removed from the seat frame.

d. Children transported in child safety seats shall be secured to the school bus seat according to the child safety seat manufacturer's instructions.

44.4(40) *Steps.*

a. The first step at the service door shall be not less than 10 inches and not more than 14 inches from the ground when measured from the 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 11 inches to 16 inches from the ground. A step well guard/skid plate shall be installed by the manufacturer on all Type D vehicles.

b. 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.

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

d. Steps shall not protrude beyond the side body line.

e. A suitable device(s) shall be installed within the service entrance door area to assist passengers during entry or egress from the bus. The device(s) shall be designed so as to prevent injury or fatality to passengers from being dragged by the bus after becoming entangled in the device(s).

44.4(41) *Step treads.*

a. All steps, including floor line platform area, shall be covered with an elastomer floor covering having a minimum overall thickness of 3/16 inch.

b. Grooved design step treads shall be such that grooves run at a 90-degree angle to the long dimension of the step tread. The step covering shall be permanently bonded to a durable backing material that is resistant to corrosion.

c. Step treads shall have a l½-inch white nosing as an integral piece without any joint.

d. Step treads shall have abrasion resistance, slip resistance, weathering resistance, and flame resistance as outlined in the National School Transportation Specifications & Procedures Manual 2005, Missouri Safety Center, Central Missouri State University, Humphreys Suite 201, Warrensburg, Missouri 64093.

e. A 3-inch white rubber step edge at floor level, flush with the floor covering, shall be provided.

44.4(42) *Stirrup steps.*

a. 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. Handles on the service door are prohibited.

b. Steps or cutouts are permitted in the front bumper only, in lieu of the stirrup steps, if the windshield and lamps are easily accessible for cleaning from that position.

44.4(43) *Stop signal arm.*

a. The stop signal arm shall be a flat 18-inch octagon exclusive of brackets for mounting. All lamps and lamp components shall comply with the requirements of FMVSS 131.

b. Both surfaces of the sign shall be covered with reflectorized material having a reflective capability equal to or exceeding that of 3M Corporation high-intensity sheeting.

c. The application of the reflective sheeting material shall be in accordance with the sheeting manufacturer's suggested application process. All copy shall be sharply defined and clean cut.

d. The stop arm blade shall be mounted in the area below the driver's window on the left side of the bus.

e. Each stop arm blade shall be automatically extended upon activation of the red warning signal lamp system and remain extended until the red signal lamps are deactivated. In addition, each stop arm blade shall be equipped with two double-faced, 4-inch, alternately flashing red lights. The use of strobe lamps in the stop arm blade is acceptable.

f. A wind guard shall be installed which prevents air currents from circulating behind the blade.

g. The stop arm shall be vacuum-, electric-, or air-operated; and the system must positively hold the sign in extended or retracted position to prevent whipping in the wind.

h. If the air for an air-operated stop arm comes from the regular air brake system, the body manufacturer shall provide the necessary check valve and pressure reduction valve to safeguard the air supply for brake application.

i. A second stop signal arm may be installed on the left side at or near the left rear corner of the school bus and shall meet the requirements of FMVSS 131.

j. The two double-faced, 4-inch flashing lights may be replaced with an LED illuminated, high-visibility display, spelling out the word "STOP" visible to the front and rear. This lighting system shall comply with applicable FMVSS prior to installation.

44.4(44) *Storage compartments.*

a. An enclosed space shall be provided in the driver's compartment for storing manuals and bus driver records.

b. 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.

44.4(45) *Sun shield.*

a. For Type B, C, and D vehicles, an interior adjustable transparent sun shield not less than 6 inches by 30 inches with a finished edge shall be installed in a position convenient for use by the driver.

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

44.4(46) *Tailpipe.* See subrule 44.3(16).

44.4(47) *Front tow hooks.* See paragraph 44.3(7)*"f."*

44.4(48) *Rear tow hooks.* Two rear tow hooks are required on all school buses. Rear tow hooks shall be attached to the chassis frame and located under the rear bumper so the hook portion is under the body.

44.4(49) *Trash container and holding device.*

a. When a trash container is placed on the school bus, it shall comply with the following:

(1) Meet the requirements of FMVSS 302, Flammability of Interior Materials.

(2) Be no greater than 14-quart capacity.

(3) Be secured by a holding device that is designed to prevent movement and to allow easy removal and replacement.

b. The container shall be placed in an accessible location in the driver's compartment of the school bus subject to department of education approval. The container shall not obstruct the aisle of the bus, access to safety equipment or passenger use of the service entrance door.

44.4(50) *Undercoating.*

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

(1) Salt spray resistance—pass test modified to 5 percent salt and 1000 hours.

(2) Abrasion resistance—pass.

(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.

b. 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.

44.4(51) *Vacuum check valve.* A vacuum check valve shall be provided and installed on the chassis by the school bus body manufacturer for connecting vacuum accessory items.

44.4(52) *Vandal lock.*

a. The school bus may be equipped with a vandal locking system for securing the service entrance and emergency door(s).

b. The vandal locking system shall include the following design features:

(1) The entrance door is to be locked by an exterior key with a dead bolt, a remote control (cable) device or an electric device. The system must prevent the door from being accidentally locked by any motion the bus may encounter during its normal operation. This does not apply to Type A vehicles with a left-side driver's door.

(2) When the bus is equipped with a rear-mounted engine, the emergency door and rear emergency exit window are to be locked by an interior slide bolt which shall activate a buzzer when the door or emergency exit window is locked and the ignition of the bus is turned on. The locking mechanism must be capable of being locked or unlocked without the use of a separate key or other similar device.

(3) The engine starting system of the bus shall not operate if the rear or side emergency door or rear emergency exit window over the rear engine compartment is locked from either the inside or outside of the bus.

(4) Hasp-type devices may not be attached to the bus for the purpose of securing any door or window.

44.4(53) *Ventilation.*

a. The body ventilation system on Type A, B, C and D buses shall include one static, nonclosing exhaust vent in the low-pressure area of the roof and one or more combination roof ventilation/emergency escape hatches in accordance with 44.4(13)*"b."* The ventilation system shall be capable of being controlled and shall have sufficient capacity to maintain a proper quantity of air under operating conditions without the opening of windows except in extremely warm weather.

b. Each combination roof ventilation/emergency escape hatch shall be installed by the school bus body manufacturer or the body manufacturer's approved representative and shall have the following design and installation features:

(1) Multiposition fresh air ventilation.

(2) Release handle(s) permitting operation as an emergency exit(s), accessible inside and outside the vehicle.

(3) An audible warning system which sounds an alarm in the driver's compartment area when the emergency roof hatch is unlatched shall be installed as a design feature by the manufacturer.

(4) When more than one ventilation/emergency roof hatch is required, one shall be installed forward of the intersection of the horizontal and longitudinal midpoints of the bus in a low-pressure area of the

roof. The second unit shall be installed on the roof in a location behind the rear axle. When only one ventilation/emergency roof hatch is required, it shall be installed in a low-pressure area of the roof at or near the longitudinal midpoint of the bus.

(5) Ventilation/emergency escape hatches may include static-type nonclosable ventilation.

c. Auxiliary fans shall be installed and shall meet the following requirements:

(1) Two adjustable fans shall be installed on Type B, C and D buses. 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.

(2) Fans shall be a nominal 6-inch diameter except where noted below.

(3) Fan blades shall be covered with a protective cage. Each fan shall be controlled by a separate switch capable of two-speed operation.

(4) Type A buses shall have at least one fan having a nominal diameter of at least 4 inches meeting the above requirements.

44.4(54) *Wheelhousings.*

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

b. The wheelhousing shall be attached to the floor sheets in such a manner as to prevent any dust, water or fumes from entering the body. Wheelhousings shall be constructed of at least 16-gauge steel or other material capable of withstanding passenger or other expected loads applied internally or externally without deformation.

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

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

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

44.4(55) *Windshield and windows.*

a. All glass in windshield, windows, and doors shall be of approved safety glass consistent with American National Standard, Safety Code for Safety Glazing Materials for Glazing Motor Vehicles Operating on Land Highways, Z-26.1, mounted so the permanent mark is visible, and of sufficient quality to prevent distortion of view in any direction.

b. Glass in windshields may be heat-absorbing and may contain a shaded band across the top. Location of "fade out" shall be above the upper limit for maximum visibility.

c. Each full side window, other than emergency exits designated to comply with FMVSS 217, shall be split-sash type and 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 the window. When the driver's window consists of two sections, both sections shall be capable of being moved or opened.

d. Insulated double glass is required in both sections of the left-side driver's window and in the upper glass portion(s) of the service entrance door.

e. Window glass forward of the service door and in the driver's direct line of sight for observing exterior rearview mirrors and traffic shall be of insulated double glass. The door glass in Type A-2 vehicles equipped with a manufacturer's standard van-type, right-side service door may be of the manufacturer's standard design.

f. The school bus body manufacturer may design and install a protective device over the inside, lower window glass of a rear emergency door to protect it from being damaged or broken during normal operation. The protective device shall be securely mounted by the manufacturer, shall be free of projections which might harm passengers, and shall permit visibility through the device to the area outside and to the rear of the bus.

g. Tinted glazing capable of reducing the amount of light passing through a window may be installed consistent with rules established by the Iowa department of public safety relating to automotive window transparency standards, except that the following windows shall be of AS-II clear glass rating:

(1) Both sections of the window to the immediate left of the driver.

(2) All glass forward of and including the left-side driver's window.

(3) The entire windshield area shall be of AS-I rating.

(4) All glass in the service entrance door.

44.4(56) *Windshield washers.* Buses shall be equipped with electric wet-arm windshield washers which conform to the body manufacturer's recommendation as to type and size for the bus on which they are to be used. The windshield washer system on Type A vehicles may be of the manufacturer's standard design.

44.4(57) *Windshield wipers.*

a. For Type A vehicles, windshield wipers shall be supplied by the chassis manufacturer and shall be of the manufacturer's standard design. Windshield wipers shall meet the requirements of FMVSS 104.

b. Type B, C and D buses shall be equipped with two positive-action, two-speed or variable-speed electric or air windshield wipers. Windshield wipers shall have an intermittent wiping feature.

c. 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 a full sweep of the windshield.

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

44.4(58) *Wiring.*

a. All wiring shall conform to current SAE standards.

b. Circuits:

(1) Wiring shall be arranged in circuits, as required, with each circuit protected by a fuse or circuit breaker or circuit protection device. All wiring shall use a standard color or number coding system or a combination of color and number coding. Each chassis shall be delivered with a wiring diagram that illustrates the wiring of the chassis.

(2) A master wiring diagram shall be supplied for each vehicle provided by the body manufacturer. Chassis wiring diagrams, including any changes to wiring made by the body manufacturer, shall also be supplied to the end user.

(3) 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
Backup Lights	Blue
Taillights	Brown
Ground	White
Ignition Feed, Primary Feed	Black

The color of cables shall correspond to SAE J 1128.

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

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

(2) Clearance and step well lamps which shall be actuated when the service door is opened.

(3) Dome lamp.

(4) Ignition and emergency door signal.

(5) Turn signal lamps.

(6) Alternately flashing signal lamps.

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

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

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

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

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

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

j. 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.

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

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

m. Wires not enclosed within the 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.