

# COLORADO MINIMUM STANDARDS GOVERNING SCHOOL TRANSPORTATION VEHICLES

## 1 CCR 301-25

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### 1.0 Statement of Basis and Purpose

- 1.1 Colorado law provides for the State Board of Education to adopt and enforce regulations governing the safe operation of school buses used for the transportation of students pursuant to Sections 22-51-108 and 42-4-1904, C.R.S.
- 1.2 The purpose of these rules is to adopt and enforce regulations governing the reasonable and adequate standards of safety for school transportation vehicles that promote the welfare of the students and afford reasonable protection to the public. The purpose of the amendments is to update the minimum standards to align with recent federal standards and reflect current industry practices.
  - 1.02(a) This does not include informal or intermittent arrangements, such as sharing of actual gasoline expenses or participation in a carpool and the use of vehicles rented and/or leased that are operated in other states.
  - 1.02(b) Exemption: Vehicles that carry students as part of their operation as a common carrier under the jurisdiction of the United States Department of Transportation or Colorado Public Utilities Commission are not included within the definition of a school transportation vehicle, including transportation network companies.
- 1.3 The Commissioner, or designee, may provide an exemption to these Minimum Standards to the extent the Commissioner finds an exemption to be appropriate.

### 2.0 Effective Date

- 2.1 Except as indicated in 4.01(a), school transportation vehicles manufactured, per the date listed on the certification plate, or decal, on or after the effective date of these rules, for the purpose of transporting Colorado students shall meet or exceed the Minimum Standards.
- 2.2 School transportation vehicles that were manufactured, per the date listed on the certification plate, or decal, which are over 20 years of age are discouraged from use for transporting students. These vehicles must meet Colorado minimum standards that were in effect at the time of manufacture.
- 2.3 School districts, charter schools, and service providers shall not sell or lease any school Transportation vehicle(s) over 20 years of age, per the date listed on the certification plate, or decal, to any other school district, charter school, or service provider for the use of transporting Colorado students for any purpose. Likewise, a school district, charter school, or service provider shall not purchase any school transportation vehicle over 20 years of age.
- 2.4 School districts, charter schools, and service providers shall not operate any school transportation vehicle that is over 25 years of age per the chassis manufacture date listed on the certification plate, or decal.

### **3.0 Testing and Certification**

- 3.1 School bus manufacturers shall provide annual certification to the Colorado Department of Education that their product(s) meet or exceed the regulations in Colorado Minimum Standards and all applicable Federal Motor Vehicle Safety Standards (FMVSS) in effect at the time of manufacture. School bus manufacturers shall record and report to CDE the test results as required by Section 8 - Construction. All school bus bodies that meet applicable FMVSS regulations and comply with the Minimum Standards shall be certified by the school bus manufacturer by attaching a certification plate or decal.
- 3.2 It shall be the responsibility of the school district, charter school, and service provider to ascertain whether all school buses purchased, leased, or under contract to the school district, charter school, or service provider meet all specifications of the Minimum Standards. This verification should be obtained at the time of delivery, in addition to the statement of compliance in the purchase bid, contract for or lease agreement.
- 3.3 When selling a school transportation vehicle, it is the responsibility of the school district, charter school, or service provider to eliminate the school district, charter school, or service provider's full name from the vehicle.
- 3.4 New and used school bus dealers shall register with the Colorado Department of Education, School Transportation Unit, certifying that only school transportation vehicles meeting or exceeding Colorado Minimum Standards will be sold to a school district, charter school, or service provider providing transportation from home to school, school to school and to school events in Colorado. There shall be no fee to register.
- 3.5 All school transportation vehicles must meet and continue to meet all applicable FMVSS regulations in effect on the date of manufacture, per the date listed on the certification plate or decal.

### **4.0 Responsibility of Suppliers**

- 4.1 Dealers, distributors, and manufacturers of school transportation vehicles each have a responsibility to comply with the Minimum Standards on or after the effective date of these rules.
- 4.2 Dealers, distributors or manufacturers which supply school transportation vehicles for use in the State of Colorado which do not meet the specifications of these rules shall be notified of noncompliance and a written notice will be sent to all school districts, charter schools, and service providers within the State of Colorado advising that equipment supplied by such dealer, distributor, or manufacturer is not in compliance with the Minimum Standards.
- 4.02(a) If a dealer, distributor, or manufacturer has been notified of non-compliance in accordance with Rule 4.2 of these rules and replaces or modifies the equipment to meet the Minimum Standards, a written notification of compliance will be issued from the Colorado Department of Education (CDE) within 30 days after proof of compliance.

## **5.0 Bus Delivery Requirements**

- 5.1 The bus manufacturer shall provide the following materials and information for direct delivery to the customer upon request:
  - 5.01(a) Line set tickets for each individual unit including chassis and body,
  - 5.01(b) A copy of the pre-delivery service performed and verified by a checkout form for each individual unit,
  - 5.01(c) Warranty book and statement of warranty for each individual unit,
  - 5.01(d) Service manual (hard copy or electronic copy) for each individual unit or identical units for all major components of the bus (e.g., body, chassis, transmission, etc.), and
  - 5.01(e) Parts manual (hard copy or electronic copy) for each individual unit or identical units for all major components of the bus (e.g., body, chassis, transmission, etc.).

## **6.0 Prohibited Use**

- 6.1 Under federal law (49 USC 30112(a)), a new over-the-road motor coach bus shall not be sold for the purpose of transporting school-age students to and from school or to school related events unless it meets all FMVSS regulations for school buses.
  - 6.01(a) Upon passage of a local board of education resolution, a school district may purchase a used over-the-road motor coach bus and/or attain a short-term rental of a motor coach bus from a contract carrier for the transportation of students to school related events. Such a resolution shall specify that consideration was given to the standards of safety to promote the welfare of students, including recommendations from national transportation organizations.
- 6.2 A motor coach bus may be used for transportation exclusively for school-related events upon passage of a local school board resolution and shall not be used for transporting students to and from school or school to school.
  - 6.02(a) A board resolution is not necessary for transporting students on common carriers.
- 6.3 Per the effective date of these rules, vans that transport 14 passengers plus the driver are prohibited to be used to transport students.
- 6.4 Pursuant to Section 8 of these rules, as of the effective date of these rules, all vehicles used for the transportation of students, for any purpose, with a capacity of more than nine passengers that do not meet the Colorado Rack and Load, Kentucky Pole test and FMVSS School Bus Safety Standards, are prohibited from being purchased (new or used) or leased for transporting students.

## 7.0 Definitions

- 7.1 **Boards of Cooperative Educational Services** - (BOCES) means a regional educational service unit designed to provide supporting, instructional, administrative, facility, community, or any other services contracted by participating. Section 22-5-103(2)
- 7.2 **Charter School** - A charter school is a public school that operates pursuant to a charter contract entered into pursuant to the provisions of article 30.5 of title 22. As used in this title, unless the context otherwise requires, "charter school" includes any type of charter school created pursuant to the provisions of article 30.5 of title 22. Section 22-1-101(2)
- 7.3 **Colorado Rack and Load Test** - verifies structural integrity and crashworthiness of school bus design as outlined in Rule 8.8 and Rule 8.9. The test simulates a rollover crash by applying a constant load along the full length of the bus body. This ensures that all pushout windows and emergency exits will be fully functional after an accident occurs.
- 7.4 **Kentucky Pole Test** - is designed to verify that the interior panels above the window will not separate and expose sharp edges in the event of a crash. The test involves a rollover simulation, in which the bus strikes a pole-like object, which forces the roof to bend into the passenger compartment. Standards require that separation of body panels must not occur when the roof bends between 8-10 inches.
- 7.5 **Fifteen Passenger Van** – per federal definition USC Title 49, Section 30117 is a fifteen-passenger vehicle that seats 10 to 14 passengers, not including the driver.
- 7.6 **Local Board of Education** - means the board of education of a school district or the governing board of a BOCES.
- 7.7 **Motor Coach** – is a bus that has a high elevated floor, with a full row of luggage bays found below the main cabin. It also has premium features such as restrooms, reclining seats, power outlets, television, etc.
- 7.8 **Multifunction School Activity Bus (MFSAB)** - per 49 CFR 571 is a type of school bus that is required to meet all FMVSS regulations applicable to school buses, except those requiring the installation of traffic control devices. An MFSAB is a school bus whose purposes do not include transporting students to or from home or school bus stops.
- 7.9 **Public School District** - means a public school district that derives its support, in whole or in part, from moneys raised by a general state, county, or district tax pursuant to Section 22-1-101, C.R.S.
- 7.10 **Regenerative Braking System** - is a mechanism found on most hybrid and full-electric vehicles. It captures the kinetic energy from braking and converts it into the electrical power that charges the vehicle's high-voltage battery. Regenerative braking also slows the vehicle down, which assists the use of traditional/service brakes.
- 7.11 **SAE** – Acronym for Society of Automotive Engineers, Inc.
- 7.12 **School Bus** - (FMCSA) means a passenger motor vehicle which is designed and used to carry more than 10 passengers in addition to the driver, and which the Secretary of Transportation determines is likely to be significantly used for the purpose of transporting preprimary, primary, or secondary school students to or from school or an event related to school. School buses are specifically designed for maximum safety.

- 7.13 **School Bus Eight-Way Alternating Flashing Warning Signal Lamps** - are amber and red lamps mounted at the same horizontal level intended to identify the vehicle as a school bus and to inform other users of the highway that such vehicle is stopped or about to stop on the roadway to take on or discharge school children.
- 7.14 **School Transportation Vehicle** - means every motor vehicle which is owned by a school district charter school, or service provider and operated, rented or leased for the transportation of students to and from school, from school to school, or to school related events or which is privately owned and operated for compensation provided that such transportation service is sponsored and approved by the local board of education or school's governing board and operating within the State of Colorado.
- 7.15 **Secondary Braking System** includes retarders, engine brakes, turbo brakes, driveline brakes, etc.
- 7.16 **Small Capacity Vehicle** - means a motor vehicle, which does not meet the requirements of Type A, B, C, or D school buses, designed for general purpose use. These vehicles (nine passengers including the driver or less) may be used to carry students to and from school, from school to school, or to school-related events, and shall meet or exceed all applicable rules and regulations.
- 7.17 **Specially Equipped Buses** - are buses equipped to accommodate students with disabilities that is dependent upon the needs of the passengers.
- 7.18 **Transportation Network Company (TNC)** – transportation provided by a company or individual as part of their operation as a common carrier, or transportation network company operating pursuant to Section 40-10.1-602, C.R.S., under the jurisdiction of the US Department of Transportation or the Public Utilities Commission.
- 7.19 **Type A School Bus** - is a conversion or body constructed utilizing a cutaway front-section vehicle with a left side driver's door and a gross vehicle weight rating (GVWR) of 21,500 pounds or less.
- 7.20 **Type B School Bus** - is a body constructed and installed upon a stripped chassis. Part of the engine is beneath and/or behind the windshield and beside the driver's seat. The service door is behind the front wheels.
- 7.21 **Type C School Bus** - is constructed utilizing a chassis with a hood and fender assembly. This includes the cutaway truck chassis, including cab, with or without a left side driver door, and with a GVWR greater than 21,500 pounds. The service door is behind the front wheels.
- 7.22 **Type D School bus** - is constructed utilizing a stripped chassis, the engine may be behind the windshield and beside the driver's seat; or it may be at the rear of the bus, behind the rear wheels. The service door is ahead of the front wheels.
- 7.23 **Vehicle Seating Capacity** - is the number of passengers (excluding the driver) assigned by the manufacturer as indicated on the certificate plate, or decal and cannot be changed by the purchaser.

## 8.0 Construction

- 8.1 All metal surfaces that will be painted shall be chemically cleaned, etched, zinc-phosphate-coated and zinc-chromate or epoxy primed or conditioned by equivalent process. 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 subject to abrasion during vehicle operation.
- 8.2 The floor shall be at least 14-gauge mill applied zinc-coated steel sheet and shall be on one plane. There shall be a main floor cross member of at least 10-gauge steel or equivalent extending the full width of the floor plate and permanently attached. There shall be a minimum of two intermediate floor cross members of at least 16-gauge steel equally between the main floor cross members and permanently attached.
- 8.02(a) Type A buses 14,500 GVWR or less may use other metal or material with strength and corrosion resistance at least equivalent to all-steel construction as certified by the bus body manufacturer.
- 8.3 Subfloor shall be either five ply nominal 5/8 inches thick plywood, or a material of equal or greater strength and insulation R value and it will equal or exceed properties of exterior-type softwood plywood C-D grade, as specified in National Bureau of Standards (NBS) Product Standard 1-83. Type A buses, 14,500 GVWR or less, shall have nominal ½ inch thick plywood or equivalent material equal to or exceeding the properties listed ~~above~~.
- 8.4 Ceiling Panels: If the ceiling is constructed to contain lap joints, the forward panel shall be lapped by the rear panel and the exposed edges shall be beaded, hemmed, or flanged or otherwise treated to eliminate sharp edges.
- 8.5 All body components shall be designed and constructed to avoid the entrapment of moisture and dust.
- 8.6 All openings between chassis and passenger-carrying compartment made for any reason must be sealed.
- 8.7 On Type B, C, and D buses, the bus body shall meet the test standards of the Kentucky Pole test.
- 8.8 In addition to complying with FMVSS 220 test procedures, the body manufacturers shall record and report the downward vertical movement of the force at 0, 25, 50, 75, and 100% of the maximum force (both loading and unloading). The expected force deflection curve is illustrated schematically in Figure 1a. Low load nonlinearities may indicate joint conformation; high load nonlinearities may indicate yielding structural members.
- 8.08(a) A second load cycle shall be performed following the procedure given in the first paragraph. The expected force-deflection curve is illustrated schematically in Figure 1b. Any hysteresis following the initial shakedown will be revealed by this second cycle.

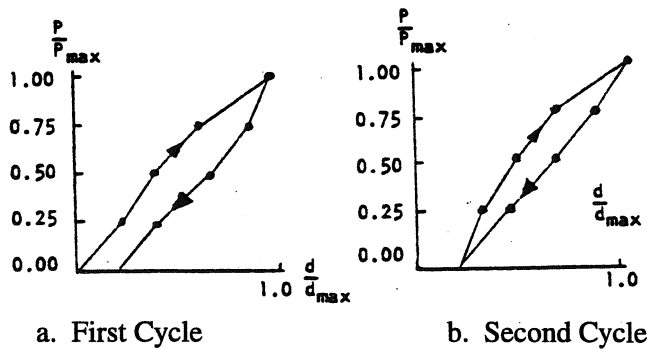


Figure 1. Static Load Test Load-Deflection Curves

8.9 A diagonal (racking) load test shall be performed on Type A, B, C and D school buses to assure adequate shear stiffness and strength of the bus body. Details of the test are provided below. A two-cycle loading sequence shall be conducted following the procedure described in Rule 8.09.

8.09(a) Requirements: When a force equal to  $1 \frac{1}{2}$  times the GVW is applied to the edge of the roof of the vehicle's body structure through a force application plate as specified in (b), Test Procedures:

8.09(a)(1) The diagonal movement of the force at any point on the application plate shall not exceed  $5 \frac{1}{8}$  inches; and

8.09(a)(2) Each emergency exit of the vehicle provided in accordance with FMVSS 217 shall be capable of operation as specified in that standard during the full application of the force and after release of the force.

8.09(b) Test Procedures: Each vehicle shall be capable of meeting the requirements of (1) and (2) when tested in accordance with the procedures set forth below.

8.09(b)(1) The vehicle shall be supported on a rigid surface along the lower edge of the frame or along the body sills in the absence of a frame.

8.09(b)(2) The load shall be applied through a force application plate that is flat and rigid. The dimensions of the plate shall be chosen to assure that the plate edges never make contact with the vehicle skin during testing. A typical width is 18 inches. A typical length is 20 inches less than the length of the vehicle's roof measured along its longitudinal centerline.

8.09(b)(3) Place the force application plate in contact with the edge of the vehicle roof. Orient the plate so that its flat, rigid surface is perpendicular to a diagonal line connecting the most distant points on an interior cross section of the vehicle. The rear edge of the plate shall be positioned approximately 20 inches from the rear edge of the vehicle roof. A temporary stand may be used to support the plate until a force is applied.

8.09(b)(4) Apply an evenly distributed force in a diagonally downward direction through the force application plate at any rate not more than 0.5 inches per second, until a force of 500 pounds has been applied.

8.09(b)(5) Apply additional force in a diagonally downward direction through the force application plate at a rate of not more than 0.5 inches per second until the force specified in (a) has been applied and maintain this application of force.

8.09(b)(6) Measure the diagonal movement of any point on the force application plate which occurred during the application of force in accordance with (5) and open the emergency exits as specified in (a)(2).

8.09(b)(7) Release all diagonal force applied through the force application plate and operate the emergency exits as specified in 8.09(a)(2).

8.09(c) Test Conditions: The following conditions apply to the requirements specified in (3).

8.09(c)(1) Temperature: The ambient temperature is any level between 32 degrees Fahrenheit and 90 degrees Fahrenheit.

8.09(c)(2) Windows and Doors: Vehicle windows, doors and emergency exits are in the fully-closed position and latched but not locked.

8.09(d) An alternative method of testing for the racking load test shall be as

follows:

8.09(d)(1) The racking load shall be applied along a line connecting the most distant points on a transverse cross section of the bus interior. It produces a shear distortion of the cross section as shown in figure 2.

A representative method of loading which employs a hydraulic jack to load a two-frame test assembly is illustrated in figure 2.

The maximum jack load for the two-frame assembly is determined by the following formula:

$$J = 2P \quad J - \text{maximum jack load for two-frame test assembly} \quad P = \text{load/frame}$$

where  $P = \text{DVW} \text{ divided by } N$

DVW - dynamic vehicle weight

$N$  - total number of bus body

frames and  $\text{DVW} = \text{DF} \times \text{GVW}$

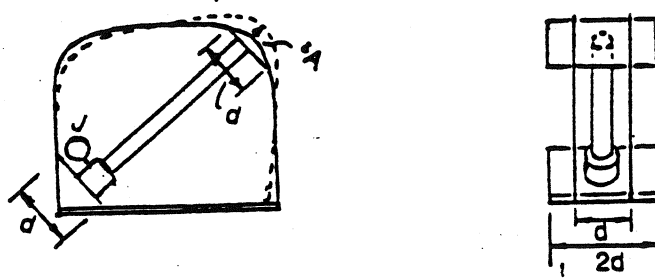
DF - dynamic factor, not less than 1.5

GVW - gross vehicle weight

Thus, for a DF = 1.5, a GVW = 22,000 pounds-force (lbf), and  $N = 11$ , the dynamic vehicle weight is DVW = 33,000 lbf, the load/frame is  $P = 3000$  lbf and the maximum jack load is  $J = 6000$  lbf.



- 8.09(d)(2) When a complete bus body is rack-loaded, the total load DVW must be distributed uniformly along the bus body. One method is to mount a series of hydraulic jacks along the length of the bus interior. Seats may be removed to facilitate jack mounting. The rack load will be considered to be uniformly distributed when the variation in the hydraulic jack readings is less than 10 percent. A maximum load for DVW shall be the sum of all jack readings.



Transverse Cross Section

Side View

Figure 2. Arrangement of Hydraulic Jack for Rack-Loading of Two-Frame Assembly

8.09(d)(2)(A) The test may be performed on a complete bus body or on a representative section composed of at least two complete frames (body posts plus roof bows) and floor. Standard seats may be installed in the test section in a manner identical to that of the full bus body. Fabrication procedures for the test assembly shall be identical to normal bus body production.

8.09(d)(2)(B) A two-cycle loading sequence shall be conducted, with intermediate and final load and deflection readings recorded according to the procedure described.

8.09(d)(2)(C) The maximum deflection in line with the jack (A, maximum) shall not exceed four inches.

8.09(d)(3) Manufacturers shall specify which testing method was used and submit appropriate certification information as called for in 3.1.

## 9.00 Overall Size

- 9.1 Overall length of school buses shall not exceed 40 feet pursuant to Section 42-4-504 C.R.S.
- 9.2 Overall width of the school bus shall not exceed eight feet six inches (8'6" feet) pursuant to Section 42- 4-502 (5)(a) C.R.S.

## **10.00 Interior**

- 10.1 Inside body height shall be 72 inches or more, measured metal to metal at any point on longitudinal center line from front vertical bow to rear vertical bow. Type A school buses of 14,500 GVWR or less shall have 62 inches or more inside height, measured metal to metal. Neither measurement shall include air conditioning units.
- 10.2 The interior of a school transportation vehicle shall be free of all projections likely to cause injury.
- 10.3 Global Positioning System Tablets
  - 10.3(a) Tablets shall be mounted in a location that will not interfere with the driver's vision.
  - 10.3(b) Wiring for the tablet is to be routed to not interfere with controls, vision, or become a tripping hazard. Wiring shall be hidden whenever possible.
  - 10.3(c) When the vehicle is placed in gear, the tablet may go black, but it is still permitted to give auditory directions. Once the vehicle is placed into "park" the screen may then become visible. Districts, charter schools, and service providers may opt to have the screen visible while driving to aid substitute and new operators.

## **11.00 Aisle**

- 11.1 Minimum aisle clearance between seats and to all emergency doors shall be 12 inches at seat level.
- 11.2 On forward control (front engine) Type D buses, the aisle passage area shall not be less than 12 inches, measured from floor level up, between engine cover and any other object. Hold down fastening devices used on engine cover shall be designed to prevent hooking or catching on shoes or clothing.

## **12.0 Axles**

- 12.1 Rear axle shall be single speed.

## **13.0 Battery (Low Voltage)**

- 13.1 On Type B, C and D buses, a drawer-type pull out tray shall be provided to facilitate servicing or removal of battery(ies) not used for the motive propulsion of the bus. The battery(ies) shall be enclosed by a vented compartment, provided with drain ports, a hold down carrier mounted to avoid blocking filler ports and a latching device to prevent accidental opening. Under-coating shall be provided and applied to battery box. The battery tray is to be equipped with a safety device to keep the tray from sliding completely out.
- 13.2 On Type A buses equipped with more than one battery, all batteries should be positioned in one location.
- 13.2 Battery labels shall be placed at all locations where batteries are installed.
- 13.3 Batteries shall be equipped with sufficient battery cable to allow the drawer-type pull out tray to fully extend.

## **14.0 Brakes**

14.1 Type C and D buses shall be equipped with full compressed air brake systems. Both air drum brake and air disc brake applications are acceptable.

14.2 Air brakes:

14.02(a) Compressors: On buses using full compressed air brakes for service, emergency, and parking brakes, the compressor shall be a standard production model with a minimum 12 cubic foot per minute displacement.

14.02(b) Moisture ejection valve: An automatic heated, moisture ejection valve or air drying system shall be properly installed. This is made to automatically eject moisture, sludge, and/or foreign matter and maintain clean, dry air lines.

14.02(c) Control requirements: Control valve of the parking brake system shall be designed and constructed to conform with the following:

14.02(c)(1) The parking brake control valve shall be visible to the driver and shall be mounted on the dash panel within 15 inches to the right of the steering column.

## **15.0 Bumpers**

15.1 Front bumper shall:

15.01(a) Be at least 3/16 inch thick of pressed steel channel, one piece construction with minimum of eight-inch width (high), except Type A buses under 14,500 GWVR.

15.01(b) Be of extended design to offer maximum protection of fender lines without permitting snagging or hooking.

15.01(c) Be attached to the frame and extend forward of grille, head lamps, fender or hood sections to provide maximum protection.

15.01(c) Be of sufficient strength to ensure that the front of the bus may be lifted by means of a bumper type jack without permanent deformation of the bumper.

15.2 Rear bumper shall:

15.02(a) Be of pressed steel channel or equivalent material, at least 3/16-inch thick, and shall be a minimum of eight inches wide (high) on Type A buses and shall be a minimum of 9 ½ inches wide (high) on Type B, C and D buses.

15.02(b) Be wrapped around back corners of bus and extend forward at least 12 inches from rear-most point of body at floor line.

15.02(c) Be fastened to chassis frame side rails in such a manner as to develop full strength of bumper section from rear or side impact. Bracing materials shall have an impact ratio comparable to that of bumper material and shall be fastened at the ends and radii of the bumper, attached to the side of the frame only, and not to body at any point.

- 15.02(d) Extend beyond rear-most part of body surface at least one inch, measured at floor lines.
  - 15.02(e) Not allow any spaces, projections, or cut-outs that will permit a hand hold or foot hold.
  - 15.02(f) Have the front ends enclosed by end caps or other protective metal or have the ends rounded or tucked in and shall be free from sharp edges or projections likely to cause injury or snagging.
  - 15.02(g) Have a gasket, rubber or equivalent, installed to close opening between the top of the rear bumper and body metal.
  - 15.02(h) Be of sufficient strength to permit being pushed by another vehicle of similar size. The bumper shall be of sufficient strength to ensure that the rear of the bus may be lifted by means of a bumper type jack without permanent deformation of the bumper.
- 15.3 Bumper stickers and/or signage are considered advertising. Consistent with Rule 30.09(a), advertising must have prior written CDE approval.
- 15.03(a) One bumper sticker, no larger than 3.75 inches by 15 inches, may be included on the rear bumper of school transportation vehicles.
  - 15.03(b) One American flag sticker, no larger than seven inches by 11 inches, may be included on the rear bumper of the school transportation vehicle consistent with the limitations outlined in Rule 30.09(a).
  - 15.03(c) Bumper stickers and/or signage shall not be located in the rear windows of school transportation vehicles.
  - 15.03(d) Bumper stickers and/or signage that do not comply with the above exemptions will need to be remediated.

## **16.00 Color**

- 16.1 All exterior metal shall be painted National School Bus Glossy Yellow (NSBY) except for:
- 16.01(a) Lettering and numbering shall be black, white, or yellow for bumper area.
  - 16.01(b) Bumpers and frame shall be black.
    - 16.01(b)(1) Exception: Bumpers may be colored blue or green to reflect the type of fuel being used in the vehicle.
  - 16.01(c) Rub rails shall be black or yellow.
    - 16.01(c)(1) Exception: Rub rails may be colored blue or green on an electric vehicle (EV) or to reflect the type of fuel being used in the vehicle.
  - 16.01(d) Background area for alternating flashing warning lamps shall be black.

16.01(e) The roof of the bus may be painted white, not to extend below the drip rails on the sides of the body.

16.01(f) Student window frames, posts and service door frame may be black.

16.01(g) The hood of a bus may be painted matte black.

## **17.0 Cooling System**

17.1 Permanent ethylene-glycol base or environmentally safe equivalent anti-freeze shall be provided to protect the cooling system to -30 degrees Fahrenheit when tested at normal engine temperature.

17.2 Cooling system shall be equipped with a visual fluid level indicator.

## **18.0 Defrosters**

18.1 A defroster system shall be installed of sufficient capacity to keep windshield area, left front side window to rear of driver's vision, and service door glass area free of condensation or ice.

18.2 The defrosting system shall conform to the requirements of the Society of Automotive Engineers, Inc. (SAE) J381-202006.

18.3 A minimum of one and no more than three adjustable six-inch auxiliary fans shall be installed to complement the defroster system used by the manufacturer. Such fans shall be controlled individually by two-speed switches located on control panel. Fan blades shall be covered with a protective cage.

18.03(a) The fans shall be located to not interfere with the driver's horizontal line of sight vision.

## **19.0 Doors**

19.1 The service door shall be power or manually operated, under control of the driver, and so designed to afford easy release and prevent accidental opening. When manual lever is used, no parts shall come together to shear or crush fingers.

19.2 Manual door controls shall not require more than 25 pounds of force to operate at any point throughout the range of operation as tested on a 10% grade both uphill and downhill. Power door controls shall be located within easy access of the driver.

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

19.4 Power operated doors shall be equipped with a separate manual emergency release, readily accessible in the door area, either above the service door, to the side of the service door or on the dash, so that the door may be opened in event of an emergency. The release shall be plainly labeled with instructions for use.

19.5 There shall be a head bumper pad installed on the inside at the top of the entrance door. The pad shall be approximately three inches wide (high), at least one inch thick, and extend across the entire top of the service door opening.

## **20.0 Drive Shaft**

20.1 Each drive shaft or section thereof shall be equipped with adequate metal guard(s) to prevent whipping through floor or dropping to ground, if broken.

## **21.0 Electric Drive High Voltage Specs (EV)**

21.1 An electric-powered school transportation vehicle shall meet all Federal Motor Vehicle Safety Standards and all SAE standards that are applicable at the time of manufacture.

### **21.2 EV-Specific Labeling**

21.02(a) Each door, cover, or other panels that affords immediate access to any high voltage area shall be plainly marked with a hazard warning label which shall read WARNING—HIGH VOLTAGE or DANGER—HIGH VOLTAGE. This label shall be in a highly conspicuous place. All high-voltage access areas shall be equipped with a lock or otherwise secured to Prevent unauthorized access.

21.02(b) An EV identifying label shall be affixed to the right rear corner of the bus body. An additional label shall be applied to the right side of the bus rearward of the entrance door and to the left side of the bus aft of the driver's window.

### **21.3 EV High Voltage Drive System Batteries**

21.03(a) EV High Voltage Batteries shall not be in or accessible from the interior of the school bus.

21.03(b) Energy storage for the EV High Voltage Drive System shall be protected from crash impacts and shall be encased in a non-conductive, acid-resistant compartment. This compartment shall be well-ventilated to preclude the possibility of hydrogen gas buildup. Energy storage shall be in an area and in such a way as to provide ease of service.

21.03(c) EV High Voltage Batteries shall require automatic electrical isolation in the case of a vehicle crash.

21.03(d) EV High Voltage-Powered Vehicles: Buses utilizing a high voltage propulsion system (more than 48 nominal volts) shall meet the requirements of FMVSS 305, Electric Powered Vehicles: Electrolyte Spillage and Electrical Shock Protection, except for the following:

21.03(d)(1) The propulsion power source (batteries, fuel cells, etc.) shall be located outside the passenger compartment.

21.03(d)(2) The propulsion power source enclosure shall be constructed to conform to the power source manufacturer's requirements and recommendations.

21.03(d)(3) Due to the much larger size and quantities of the propulsion power sources on larger vehicles, buses over 10,000 lbs. are permitted to exceed the 5.0- liter spillage. Electrolyte damage from propulsion batteries and the requirements to statically rotate the vehicle on its longitudinal axis post- test.

## 21.4 EV High Voltage Wiring Standards and Protection

- 21.04(a) Wire, cable, and conductor insulation in the High Voltage System shall provide adequate insulation for the voltage used and for ambient temperatures ranging from -15°F to 120°F. All high voltage circuits shall be bright orange in color or otherwise labeled as HIGH VOLTAGE. All high-voltage circuits shall provide adequate and automatic protection against electrical overloads caused by short circuits or other excessive current conditions through the use of fuses, circuit breakers, and ground fault interruption.
- 21.04(b) The EV Drive System shall have a system for protecting system components from thermal damage due to electrical overload. This system shall include temperature sensors at critical points and be capable of reducing EV Drive System electrical power when necessary.
- 21.04(c) The EV High Voltage System shall be designed so that when the ignition switch is off or in accessory mode, the propulsion motor is positively disconnected. All other accessories powered by the main propulsion battery circuit shall remain operable when the ignition switch is in accessory mode.
- 21.04(d) All buses shall be equipped with an additional manual and automatic switch or device independent of the propulsion motor disconnect controls that permit the positive disconnection of all circuits from the Hybrid Drive System Batteries. This switch shall be operable from outside the vehicle. Each door or panel providing access to this switch shall be plainly marked to indicate that it is a main-power-disconnect switch or device.
- 21.04(e) The ignition switch circuit shall be linked to the Battery Management System and shall prevent driving the vehicle while it is connected to an external battery charging source.
- 21.04(f) Charging connection point shall be outside the passenger compartment.
- 21.04(g) The High Voltage System shall be designed to prevent the passenger compartment from becoming energized.
- 21.04(h) Battery packs shall be cooled and heated as necessary to maintain proper operating temperatures.

## 21.5 EV Instrumentation

- 21.05(a) In addition to the required gauges, the instrument display panel must also contain an indication showing the state of charge (power and/or range).
- 21.05(b) The instrument display panel shall have a warning light that indicates when an EV Drive System component exceeds a safe temperature. The warning light should illuminate prior to critical temperature to allow sufficient time to safely stop the bus.
- 21.05(c) The instrument display panel shall have a warning light that indicates when an EV Drive System has a mechanical or electrical fault.

## 21.6 EV Range

- 21.06(a) All electric school buses shall have an OEM design which is capable of operating with a

range of 100 miles or more on a full charge.

#### 21.7 Sound Generation

21.07(a) All electric school buses must comply with FMVSS 141 producing sound while in motion below 20 mph.

#### 21.8 Propulsion System

21.08(a) The propulsion system on all electric school buses shall be of sufficient power to propel the vehicle fully loaded up to 65 mph.

21.08(b) The propulsion system may be mounted utilizing a normal drivetrain or positioned in a way to provide direct power to the wheels. All propulsion systems must be contained below the floor line and cannot come into contact with the road surface.

#### 21.9 Brakes

21.09(a) On electric school buses, brakes may produce regenerated power.

21.09(b) Park brake testing procedure:

21.09(b)(1) Allow the brake system air pressure to build to at least 100 psi

21.09(b)(2) Place the transmission of the vehicle in low gear release the parking brake and drive the vehicle forward to a speed of three to five mph.

21.09(b)(3) While in motion place the vehicle in neutral and engage the parking brake and the vehicle should stop.

#### 21.10 Passenger Heating system

21.10(a) On electric school buses the heating system must be capable of meeting performance and design standards without a fuel-fired heater. See Section 29.0.

21.10(b) Heating systems that are independent of other cooling system functions may forgo the use of manual shutoff valves to the passenger compartment as long as the flow of coolant can be stopped by means of a heating system shut down or electric heater control valve.

### **22.0 Emergency Exits**

22.1 All emergency exits shall conform to FMVSS 217.

22.2 A district may choose to have more emergency exits installed. Emergency doors may be installed in place of emergency windows.

22.3 Emergency door:

22.03(a) Emergency door(s) shall be equipped with a three-point latch mechanism. The inside door handle shall be designed with a guard for protection against accidental release.



- 22.03(b) Exterior door handle shall be of permanent hitch-proof design and mounted with enough clearance to permit opening without touching the door surface.
- 22.03(c) All emergency door openings shall be completely weather stripped. No obstruction shall be higher than 1/4 inch across the bottom of any emergency door opening.
- 22.03(d) A head bumper pad shall be installed over the emergency door on the inside of the bus body. The pad shall be approximately three inches wide (high), at least one inch thick, and extend across the entire top of the emergency door opening. Padding shall be of the same materials as the padding used over the service door.

### **23.0 Emergency Equipment**

- 23.1 All school transportation vehicles, except for small capacity vehicles, shall be equipped with at least one pressurized, five-pound, dry-chemical fire extinguisher, with a total rating of not less than 2A10BC. The operating mechanism shall be sealed with a type of seal that will not interfere with use of the fire extinguisher.
- 23.01(a) Fire extinguisher shall be securely mounted in an extinguisher bracket (automotive type) and located in full view of and readily accessible to the driver within the cab, or in a location plainly indicated by appropriate signage. A pressure gauge shall be so mounted on the extinguisher as to be easily read without removing the extinguisher from its mounted position.
- 23.01(b) Fire extinguishers shall be inspected annually for charging and certification to standards by a certified fire extinguisher technician.
- 23.2 Small capacity vehicles shall be equipped with one securely mounted, 2½ pound, dry chemical fire extinguisher with a minimum rating of 1A10BC.
- 23.3 First Aid Kit: All school transportation vehicles shall carry one first aid kit which shall be securely mounted in full view of the driver or with the location plainly indicated by appropriate signage. Additional kits may be installed. The kit(s) shall be mounted for easy removal.
- 23.02(a) The kit shall be sealed. The seal verifies the integrity of the contents without opening the kit. The seal shall be designed to allow easy access to the kit's contents. If zip ties are used to seal the kit, they must be breakaway zip ties.
- 23.03(b) Consideration should be given to replacing items in the First Aid Kit every 36 months due to the breakdown of materials.

Contents of the 24-unit First Aid Kit:

<b>Item</b>	<b>Unit(s)</b>
Adhesive Tape	1
1 inch adhesive bandage	2
2 inch bandage compress	1
3 inch bandage compress	1
4 inch bandage compress	1
3 inch x 3 inch plain gauze pads	1
Gauze roller bandage 2 inch wide	2
Plain absorbent gauze – ½ square yard	4
Plain absorbent gauze – 24 inch x 72 inch	3
Triangular bandages	4
Scissors, tweezers	1
Space rescue blanket	1
Non-latex disposable pair of gloves	1
CPR mask or mouth to mouth airway	1

Moisture and dustproof kit of sufficient capacity to store the required items.

- 23.4 Emergency Reflectors: All school transportation vehicles shall carry three bidirectional emergency triangle reflectors in compliance with Section 42-4-230, C.R.S. and with FMVSS 125, contained in a securely mounted case easily accessible to the driver or in a location plainly indicated by appropriate markings.
- 23.4 Body fluid cleanup kit: All school transportation vehicles shall have one removable body fluid clean-up kit accessible to the driver, within the cab, or in a location plainly indicated by appropriate signage.

Contents of the Basic Body Fluid Clean-up Kit:

<b>Item</b>
Antiseptic towelette
Disinfectant towelette
Absorbing powder (capable of ½ gallon absorption)
Non-latex disposable pair of gloves
Disposable wiper towels
Disposable scoop bag with closure mechanism and scraper
Moisture and dustproof container of sufficient capacity to store the required items.

- 23.6 Consideration should be given to replacing items in the Body Fluid Clean-Up Kit every 36 months due to the breakdown of materials.
- 23.7 All school transportation vehicles shall be equipped with one durable webbing cutter having a full width handgrip and a protected blade. The cutter shall be mounted in a location accessible to the seated driver.
- 23.07(a) Seat belt cutters shall be replaced after they have been used, or if there is any sign of rust or corrosion on the blade.
- 23.8 Emergency equipment shall be securely mounted, clearly visible or in a location plainly indicated by appropriate signage.

## **24.0 Exhaust System**

- 24.1 Tailpipe shall not exit the right side of the busbody.
- 24.2 Exhaust system shall be insulated in a manner to prevent any damage to any fuel system component.
- 24.3 There shall be a switch to manually start the diesel particulate filter regeneration process.
- 24.4 The tailpipe shall be flush with but not extend more than one inch beyond the perimeter of the body for side exit or the bumper for rear exit.
- 24.5 Tailpipe shall not exit beneath any fuel filler location or beneath any emergency door or lift door.

## **25.0 Floor Coverings**

- 25.1 The floor in the under-seat area, including tops of wheel housings, driver's compartment, aisle, and the kick board shall be covered with fire-resistant rubber floor covering or equivalent that is non-skid and wear resistant.
- 25.2 The floor covering in aisle shall be fire-resistant rubber or equivalent, non-skid, wear resistant, and ribbed. The minimum overall thickness shall be .1875 inch measured from tops of ribs.
- 25.3 The floor covering shall 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 type recommended by manufacturer of floor-covering material. All seams must be sealed with waterproof sealer.
- 25.4 Cove molding or new and emerging coatings shall be used along the side walls and rear corners. All floor seam separations shall be properly bonded or secured.
- 25.5 The entrance step treads, including the edge at floor level, shall be of the same quality as the aisle material. Step treads shall have an integral white or yellow nosing of 1 ½ inch or more or use diagonal stripes. Treads shall be permanently bonded to the metal steps and sealed to prevent water from getting underneath the step tread.
- 25.6 A sealed and insulated plate shall be provided when required to access fuel tank sending unit. The plate shall not be installed under flooring material. Type A buses 14,500 GVWR and under are exempt.

## **26.0 Frame**

- 26.1 No holes shall be permitted in the chassis rails except when drilled at the manufacturing plant or authorized by the manufacturer.
- 26.2 Any welding to the frame side rails that is necessary by design to strengthen, modify or alter basic vehicle configuration shall be authorized and documented by the manufacturer.

## **27.0 Fuel System**

- 27.1 All fuel tank specifications shall conform to FMVSS 301, FMVSS 303, FMVSS 305, National Fire Protection Association code 52, and/or National Fire Protection Association code 58, as applicable.
- 27.2 Engine supply line shall not be mounted below the fuel tank. Wiring shall be hidden whenever possible.
- 27.3 The fuel fill cap opening in the body skirt shall be equipped with a hinged cover held closed by a spring or other conveniently operated device. Type A buses under 14,500 GVWR and small capacity vehicles are exempt.

## **28.0 Handrail**

- 28.1 For type A, B, C and D buses an assist handrail not less than 20 inches in length designed to provide maximum loading assistance, shall be provided in an unobstructed location inside the service door.
- 28.2 At least one handrail shall be installed inside the service door. The handrail shall be a minimum of one inch in diameter and be constructed from corrosion-resistant material(s). The handrail(s) shall assist passengers during entry or exit and shall be designed to prevent entanglement, as evidenced by the passing of the NHTSA String and Nut test.
- 28.3 The handrail may be offered in a color provided by and applied by the manufacturer.

## **29.0 Heating System**

- 29.1 All school buses shall be equipped with two or more hot water heaters capable of delivering Water to the system at a rate of six gallons per minute using an ambient temperature of 0 degrees Fahrenheit to +10 degrees Fahrenheit and maintaining passenger compartment temperature of 50 degrees Fahrenheit. One of the heaters shall be in the rear half of the bus on or behind the rear wheel axle line. This standard must be obtained without a secondary heating source.
  - 29.01(a) Lift equipped buses may place the rear heater under the last row of seats or wall mount. The front heater may be wall mounted.
- 29.2 Buses shall be equipped with front heater(s) and integrated defroster system of capacity to provide heat for the front part of the bus (including driver's compartment) and to keep windshield area, service door glass, driver's left glass area and step well clear of moisture, ice and snow.
- 29.3 Heater cores and fans shall be completely encased but designed to permit servicing heater assembly by removing all or part of the case.
- 29.4 Heater hose installation in the engine compartment shall include two shut-off valves shutting off coolant completely when necessary.
  - 29.04(a) One shut-off valve mounted between the water pump outlet and heater hose connection.
  - 29.04(b) One shut-off valve mounted between the motor block and the return heater hose

connection.

29.04(c) Heater hoses shall be adequately supported to guard against excessive wear due to vibration. Hoses shall not rub against the chassis, body or other edges.

29.5 The body manufacturer shall add the required amount of permanent ethylene glycol base or environmentally safe equivalent anti-freeze after heaters have been connected to protect cooling system of bus to -30 degrees Fahrenheit tested at normal engine temperature.

29.6 A heater water flow regulating valve shall be installed for convenient operation by the driver.

### **30.0 Identification**

30.1 School buses shall bear words **“SCHOOL BUS”** in black letters at least eight inches high on both front and rear of body. Lettering shall be placed without impairment of its visibility. All lettering shall conform to Standard Alphabets for Highway Signs, Series B 2000. Lettering shall have a retro-reflective NSBY material background pursuant to Rule 36.1.

30.2 School buses shall bear name of school district/service provider on each side of the bus. The lettering must be black, standard, unshaded letters, and at least five inches in height. If there is insufficient space due to the length of the name of the school district, terms such as community, consolidated, and district may be abbreviated.

30.3 Small-capacity vehicles shall bear the name of the school district, charter school, or service provider plainly visible on each side of the vehicle.

30.4 The manufacturer’s original rated capacity of the vehicle shall be printed to the left of the service door on the lower skirt in two-inch characters. The word “capacity” may be abbreviated. (Example: Cap. 48)

30.5 The numbering of individual buses for identification purposes is permissible.

30.6 Lettering and numerals shall be painted or may be pressure sensitive marking of similar performance quality.

30.7 **“STOP”** shall be printed on the rear of the bus in letters at least eight inches high. **“ON FLASHING RED”** shall be printed below **“STOP,”** in letters at least 4 ½ inches high. An LED message panel giving safety messages to alert motorists may be used instead of the above lettering. These letters shall be placed in area(s) visible to the approaching motorist.

30.8 The school district logo may be placed above the side window drip line or along the side of the bus but shall not interfere with any required lettering.

30.9 Only signs and lettering specifically permitted by state law or regulation, and any marking necessary for safety and identification, shall appear on the outside of the bus.

30.09(a) Advertising, approved by the local board of education or charter school’s governing board, may appear only on the side(s) of the bus in the following areas:

30.09(a)(1) The location and securement of the advertising shall have prior written CDE approval.

30.09(a)(2) The signs shall not extend from the body to allow a handhold or present a danger to pedestrians.

30.09(a)(3) The signs shall not interfere with the operation of any door, window, required lettering, lamps, reflectors or other devices.

30.09(a)(4) The signs shall not be placed on side emergency door(s).

30.09(a)(5) Advertising signs shall not interfere with retro-reflective tape on the side of the bus.

30.09(a)(6) Bumper stickers and/or signage are considered advertising. Consistent with Rule 30.09(a)(1), advertising shall have prior written CDE approval.

30.10 The exterior of the battery compartment shall be labeled with the word "Battery".

30.11 Identification of fuel type shall be located outside and adjacent to the fuel filler opening.

### **31.0 Insulation**

31.1 The bus body shall be fully insulated in the roof including roof bows and all body panels. Insulation one-inch minimum thickness shall be fiber-glass or equivalent and fire resistant.

### **32.0 Lamps and Signals**

32.1 All lamps, signals, reflectors and their installation shall conform to the requirements of the Society of Automotive Engineers, Inc. (SAE) J2442. No lettering, symbols or arrows, except manufacturer's markings, shall be on any lens.

32.2 Tail and stop (brake) lamps:

32.02(a) Bus shall be equipped with four combination red stop/tail lamps. Two combination stop lamps shall have a lens diameter of at least seven inches or 38.48 square inches. Two combination tail lamps shall have a lens diameter of at least four inches or 12 ½ square inches.

32.02(b) If the bus is equipped with a retarder, secondary braking system/or another system that supplements the service brake system, the four brake lamps shall be illuminated when the braking system or other supplemental system is activated.

32.3 Interior lamps: Interior lamps shall be provided which adequately illuminate aisle. A separate lamp shall be provided in step well.

32.4 Back-up lamps: Back-up lamps of minimum diameter seven inch or 38.48 square inches, or four-inch LED shall be provided.

32.5 Turn signal lamps:

- 32.05(a) The bus shall be equipped with two amber turn signals in front and two amber turn signals in the rear. Rear turn signals shall be at least seven inches or a total of 38.48 square inches in diameter.
- 32.05(b) On buses over 30 feet, a minimum of one additional turn signal shall be mounted on each side below window and behind the service door axis plane.
- 32.6 All school buses shall be equipped with an alternating flashing eight-way warning signal lamp system.
- 32.7 The amber flashing warning signal lamps shall be energized manually by a switch. The flashing red warning signal lamp system shall be a sequential mode type.
- 32.8 The flashing warning signal lamp system shall have two pilot or indicator lights; one shall show amber light when the amber signal lamps are flashing and the other shall show red light when the red signal lamps are flashing.
- 32.08 (a) The areas around the lens of each alternating flashing signal lamp shall be black.
- 32.06(b) Visors shall be provided and securely mounted to adequately shade and protect the dual-lamp assemblies from sunlight above but not to obstruct the rear and side effectiveness of the warning lamps. LED warning signal lamps are not required to use visors.
- 32.9 Type D rear engine buses shall have two hazard lamps each visible to the rear when the engine door is open. The lamps shall be wired to be illuminated when the main hazard lamp circuit is energized.
- 32.10 A white flashing strobe light may be installed on the roof of a school bus. Amber lens may be used upon approval of local traffic regulatory authority. The light shall have a single clear lens emitting light 360 degrees around its vertical axis and may not extend above the roof more than eight inches. A manual switch and a pilot light must be included to indicate when light is in operation. The lamp must not be capable of activating emergency traffic control light switches.

### **33.0 Mirrors**

- 33.1 Exterior mirrors shall meet FMVSS 111.

### **34.0 Mounting, Body, and Chassis**

- 34.1 Insulation material shall be placed at all attachment points between body and chassis frame on all buses and shall be so attached to the chassis frame or body to prevent movement under severe operating conditions.
- 34.2 Body front shall be attached and sealed to the chassis cowl to prevent entry of moisture and gases.

### **35.0 Multifunction School Activity Bus**

35.1 A Multifunction School Activity Bus, pursuant to Rule 7.8, shall meet the standards contained in these Minimum Standards. The Multifunction School Activity Bus shall comply with the following:

35.01(a) Color shall not be traditionally National School Bus Glossy Yellow as required by Rule 16.1 of these rules.

35.01(a)(1) Shall not have the identification of "SCHOOL BUS", as required by Rule 30.1 of these rules.

35.01(a)(2) Shall not have the identification of "STOP ON FLASHING RED" as required by Rule 30.7 of these rules.

35.01(a)(3) Shall not have a School Bus eight-way alternating flashing warning signal lamps, as required by Rule 32.6 of these rules.

35.01(a)(4) Shall not have a stop signal arm, as required by Rule 41.1 of these rules

35.01(a)(5) Shall not be required to have the retro-reflective material color, as Required by Rule 36.3.

35.01(a)(5)(A) Exception: A Multifunction School Activity Bus is required to meet the requirements of Rule 36.4.

### **36.0 Retro-Reflective Material**

36.1 Retro-Reflective material shall be installed on the bus conforming to the requirements of FMVSS 131 and 217.

36.2 Rear of bus body: strips of between one- and two-inch Retro-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, with vertical strips applied at the corners connecting the horizontal strips.

36.3 "School Bus" signs: Shall be marked with Retro-Reflective NSBY material comprising background for lettering of the front and/or rear "school bus" signs.

36.4 "Activity Bus" signs: shall be marked with retro-reflective in white material comprising background for the lettering of the front and/or rear of the multifunction school activity bus.

36.5 Sides of bus body: Shall be marked with Retro-Reflective NSBY material at least 1 ¼ inches in width, extending the length of the bus body and located (vertically) as close as practicable to the floor line.

### **37.0 Rub Rails**

37.1 There shall be one rub rail located on each side of bus at approximately seat level which shall extend from rear side of service door completely around the bus body (except for emergency and/or access door) to point of curvature near outside cowl on left side.



- 37.2 There shall be one rub rail located at approximately floor line which shall cover the same longitudinal areas as the upper rub rail, except at the wheel housing, and shall extend at least to the radii of right and left rear corners.
- 37.3 There shall be one rub rail located on each side of bus at the bottom of the side skirts, or a side skirt stiffener of equivalent strength.
- 37.4 Rub rails shall be attached at each body post and all other upright structural members.
- 37.5 Rub rails shall be four inches or more in width, 16-gauge steel, or equivalent strength, constructed in corrugated or ribbed fashion and shall be self-draining.
- 37.6 Rub rails shall be applied to the outside of the body panels. Pressed-in or snap-on rub rails do not satisfy this requirement.

### **38.0 Seats/Restraining Barriers**

- 38.1 Type A school buses shall be equipped with restraining barriers conforming to FMVSS 222.
- 38.2 No bus shall be equipped with any type of seats that are not secured to the floor by the manufacturer.
- 38.3 Forward-most pupil seat on right side of bus shall be located not to interfere with driver's vision. The seat shall not be farther forward than the barrier behind driver or rear of driver's seat when adjusted to its rear-most position.
- 38.4 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 the upright position. The seat cushion shall be designed to rise to a vertical position automatically when not occupied.
- 38.4 School bus student seats and seat spacing shall meet FMVSS222.
- 38.5 School bus seat materials shall meet FMVSS302.
- 38.7 Integrated child seats shall not be installed at an emergency exit.
- 38.8 Each individual wheelchair securement system shall consist of materials from one brand only.

### **39.0 Steering Gear Assembly**

- 39.1 All school bus chassis, in all passenger capacities shall be equipped with heavy-duty, truck-type integral power steering. Power steering components shall be compatible with the GVW rating.
- 39.2 No changes shall be made in the steering apparatus that are not authorized in writing by manufacturer.
- 39.3 There shall be a clearance of at least two inches between steering wheel and any other surface

or control.

#### **40.0 Steps**

- 40.1 The first service doorstep shall be not less than ten inches from the ground while the vehicle is in motion and not more than 16 inches from the ground when measured from the top surface of the step to the ground. An auxiliary step may be provided to compensate for the increase in ground-to-first step clearance. The auxiliary step is not required to be enclosed.
- 40.2 Step risers shall not exceed a height of 10 inches. When plywood is used on the top step, the riser height may be increased by the thickness of the wood.
- 40.3 The surface of steps shall be of non-skid material.

#### **41.0 Stop Signal Arm**

- 41.1 The stop signal arm shall meet FMVSS 131. The stop signal arm may extend up to but shall not exceed 6.5 feet in length from the side of the bus.
- 41.2 Rubber spacers shall be installed on either the side of the bus or the stop arm to prevent the sign from making abrasive contact with the side of the bus.
- 41.3 The wind guard shall be provided to keep the sign in retracted position.

#### **42.0 Storage Compartment**

- 42.1 A metal container of adequate strength and capacity for the storage of tire chains, tow chains, and such tools as may be necessary for minor emergency repairs while bus is in route may be provided. The storage container may be located either inside or outside the passenger compartment. If inside, the storage compartment shall be securely fastened to prevent the contents from spilling and shall have a latched or secured cover other than a seat cushion.

#### **43.0 Sun Visor**

- 43.1 An interior, adjustable, sun visor shall be installed not less than six inches wide and 30 inches long. Type A school buses 14,500 GVWR or less shall have a sun visor according to manufacturer's standard size.

#### **44.0 Tires and Rims**

- 44.1 Minimum tire and rim sizes for vehicles with a 10,000 GVWR or greater, shall be in accordance with FMVSS120.
- 44.2 Type B, C and D schoolbuses shall have dual rear tires.
- 44.3 All wheels shall be one-piece disc type.

#### **45.0 Tow Hooks**

45.1 Two heavy duty tow hooks/loops shall be factory installed on the front of Type C and D buses.

45.2 Two heavy-duty tow hooks/loops shall be factory installed on the rear of school buses.

45.3 Hooks/loops shall not extend beyond the front or rear bumper on any school bus.

#### **46.0 Undercoating**

46.1 The entire underside of the bus body, including floor sections, cross members, and below floor line side panels, shall be coated with rust-proofing material.

46.2 The undercoating material shall be applied with suitable airless or conventional spray equipment as per manufacturer recommended film thickness and shall show no evidence of voids in the cured film.

46.3 The undercoating material shall not cover any exhaust components of the chassis.

#### **47.0 Ventilation**

47.1 School transportation vehicles more than 20 feet in length shall be equipped with a multi-speed powered exhaust roof ventilator or powered vent fan in roof hatch, mounted in the rear half of the bus.

#### **48.0 Windshield Wipers and Washers**

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

48.2 All wiper controls shall be located within easy reach of the driver and designed to move blades from the driver's direct view when in stop position.

48.3 The system reservoir capacity shall be a minimum of one gallon.

#### **49.0 Wiring**

49.1 All wiring shall conform to the requirements of the Society of Automotive Engineers, Inc. (SAE) J2202.

49.01(a) An appropriate identifying diagram (color plus a name or number code) for all chassis electrical circuits shall be provided to the body manufacturer for distribution to the end user.

49.01(b) A body wiring diagram, sized to be easily read, shall be furnished with each bus body or affixed to an area convenient to the electrical accessory control panel.

49.01(c) Each wire passing through metal openings shall be protected by a grommet.