NEVADA MINIMUM SCHOOL BUS STANDARDS & SPECIFICATIONS

Nevada Department of Education - 2020

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VISION STATEMENT

All Nevadans ready for success in the 21st Century

MISSION

To improve student achievement and educator effectiveness by ensuring opportunities, facilitating learning, and promoting excellence.

PURPOSE

Nevada Revised Statue 385.075 requires the State Board establish policies to govern the administration of all functions of the State relating to supervision, management and control of public schools not conferred by law on some other agency. Nevada Revised Statue 386.830 requires the State Board adopt regulations for school bus driver qualifications and training. The Nevada School Bus Driver Training Manual is the State Board of Education approved training document for all school bus drivers in Nevada. The manual was approved during the **October 8, 2020** Nevada State Board of Education meeting.

INTRODUCTION

The purpose of the State of Nevada Minimum School Bus Standards & Specifications is to provide state transportation personnel with minimum school bus standards/specifications for all new buses purchased by a district,

charter or private school in Nevada. The Nevada Minimum School Bus Standards & Specifications utilize the Federal Motor Vehicle Safety Standards and the 2015 National School Transportation Specifications and Procedures.

Used school buses purchased in Nevada must meet the minimum School Bus Standards established the year the bus was manufactured, with some exceptions.

The Nevada School Bus Standards & Specifications was approved by the Nevada State Board of Education, in accordance with Nevada Revised Statue 386.830.

All Nevada School transportation personnel are required to adhere to these standards when purchasing new school buses in Nevada. These minimum standards are utilized by the Nevada Highway Patrol when inspecting new school buses as required by Nevada Revised Statue 386.830.

It is the intent of these specifications to accommodate new technologies and equipment that would enhance the safety of students being transported. New technology and equipment are acceptable if it does:

1. Not compromise or modify the effectiveness or integrity of any major FMVSS safety standard system. (Examples of safety systems include, but are not limited to, compartmentalization, the eight-lamp warning system, emergency exits and the approved color scheme.)
2. Not diminish the safety of the bus interior.
3. Not create additional risk to students who are boarding or exiting the bus or are near the school bus loading zone.
4. Generally, increase efficiency and/or safety of the bus, generally provide for a safer or more pleasant experience for the occupants and pedestrians in the vicinity of the bus and/or generally assist the driver and makes his/her many tasks easier to perform.

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School Bus Types

School Bus: A bus owned, leased, contracted to or operated by a school district and regularly used to transport students to and from school or school-related activities, but not including a charter bus or transit bus. A school bus must meet all applicable FMVSS and is readily identified by alternately flashing lamps, National School Bus Yellow paint, and the legend "School Bus," except as may be provided for the multifunctional school activity bus (MOSAB). The following describes each of these types and styles of vehicle.

Type A: A Type "A" school bus is a conversation or bus constructed utilizing a cutaway front section vehicle with a left side driver's door. This definition includes two classifications:

Type A-1, with a Gross Vehicle Weight Rating (GVWR) of 14,500 pounds or less; and **Type A-2**, with a FVWR greater than 14,500, and less than or equal to 21,500 pounds.

Type B: A Type "B" school bus is constructed utilizing a stripped chassis. The entrance door is behind the front wheels. This definition includes two classifications:

Type B-1, with a GVWR of 10,000 pounds or less; and

Type B-2, with a GVWR greater than 10,000 pounds.

Type C: A Type "C" school bus is constructed utilizing a chassis with a hood and front fender assembly. The entrance door is behind the front wheels. This is also known as a *conventional school bus.* This type also includes cutaway truck chassis or truck chassis with cab with or without left side door and a GVWR greater than 21,500 pounds.

Type D: A Type "D" school bus is constructed utilizing a stripped chassis. The entrance door is ahead of the front wheels. These are also known as rear engine transit style school buses.

Multifunctional School Activity Bus (MFSAB): A school bus whose purposes do not include transporting students to and from home or school bus stops, as defined in Federal Motor Vehicle Safety Standards 571.3, Definitions. This subcategory of school bus meets all FMVSS standards for school buses except the traffic control requirements (alternately flashing signal and stop arm).

Body and Chassis Specifications

Air Cleaner

1. A dry element type air cleaner shall be provided.
2. All diesel engine air filters shall include a latch-type restriction indicator that retains the maximum restriction developed during operation of the engine. The indicator should include a reset control so the indication can be returned to zero when desired.

Aisle

All emergency exit doors shall be accessible by a 12-inch minimum aisle. The aisle shall be unobstructed at all times by any type of barrier, seat, wheelchair, or tie-down, 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 exit door.

Axles

The front and rear axle and suspension systems shall have a gross axle weight rating (GAWR) at ground commensurate with the respective front and rear weight loads of the bus loaded to the rated passenger capacity.

Back-Up Warning Alarm

An automatic audible alarm shall be installed behind the rear axle and shall comply with Society of Automotive Engineers J994B-197405, Backup Alarm Standards, providing a minimum of 112 dBA, or shall have a variable volume feature that allows the alarm to vary from 87 dBA to 112 dBA sound level, staying at least 5 dBA above the ambient noise level.

Brakes: General

1. The chassis brake system shall conform to the provisions of Federal Motor Vehicle Safety Standards 571.105, Hydraulic and Electric Brake Systems, Federal Motor Vehicle Safety Standards 571.106, Brake Hoses, and Federal Motor Vehicle Safety Standards 571.121, Air Brake Systems, as applicable. All buses shall have either a parking pawl in the transmission or a park brake interlock that requires the service brake to be applied to allow release of the parking brake
2. The anti-lock brake system (ABS), provided in accordance with Federal Motor Vehicle Safety Standards 571.105, Hydraulic and Electric Brake Systems, or Federal Motor Vehicle Safety Standards, 371.121 Air Brake Systems, shall provide wheel speed sensors for each front wheel and for each wheel on at least one rear axle. The system shall provide

anti-lock braking performance for each wheel equipped with sensors (Four Channel System).

3. All brake systems shall be designed to permit visual inspection of brake lining wear without removal of any chassis component(s).
4. The brake lines, booster-assist lines, and control cables shall be protected from excessive heat, vibration, and corrosion and installed in a manner which prevents chafing.
5. The parking brake system for either air or hydraulic service brake systems may be of a power-assisted design. The power parking brake actuator should be a device located on the instrument panel within reach of a seated 5th percentile female driver. As an option, the parking brake may be set by placing the automatic transmission shift control mechanism in the "park" position.
6. The power-operated parking brake system may be interlocked to the engine key switch. Once the parking brake has been set and the ignition switch turned to the "off" position, the parking brake cannot be released until the key switch is turned back to the on position.

Brakes: Hydraulic

Buses using hydraulic-assist brakes shall meet requirements of Federal Motor Vehicle Safety Standards 571.105, Hydraulic and Electric Brake Systems.

Brakes: Air

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

1. The chassis manufacturer shall provide an accessory outlet for air operated systems installed by the body manufacturer. This outlet shall include a pressure protection valve to prevent loss of air pressure in the service brake reservoir.
2. For air brake systems, an air pressure gage shall be provided in the instrument panel capable of complying with CDL pre-trip inspection requirements.
3. Air brake systems may include a system for anti-compounding of the service brakes and parking brakes.
4. Air brakes shall have both a visible and audible warning device whenever the air pressure falls below the level where warnings are required under Federal Motor Vehicle Safety Standards 371.121, Air Brake Systems.

Bumper: Front

1. School buses shall be equipped with a front bumper.

2. The front bumper on Type A-2 (with a GVWR greater than 14,500 pounds), Type B, Type C, and Type D shall be equivalent in strength and durability to pressed steel channel at 3/16 inches thick and not less than 8 inches wide (high). It shall extend beyond the forward-most part of the body, grille, hood, and fenders and shall extend to outer edges of the fenders at the bumper's top line. Type A buses having a GVWR of 14,500 pounds or less may be equipped with an OEM-supplied front bumper. The front bumper shall be of sufficient strength to permit being pushed by another vehicle on a smooth surface with a 5-degree (8.7 percent) grade, without permanent distortion. The contact point on the front bumper is intended to be between the frame rails, with as wide a contact area as possible. If the front bumper is used for lifting, the contact points shall be under the bumper attachments to the frame rail brackets unless the manufacturer specifies different lifting points in the owner's manual. Contact and lifting pressures should be applied simultaneously at both lifting points.
3. The front bumper, except breakaway bumper ends, shall be of sufficient strength to permit pushing a vehicle of equal gross vehicle weight, per Section B, without permanent distortion to the bumper, chassis, or body.
4. The bumper shall be designed or reinforced so that it will not deform when the bus is lifted by a chain that is passed under the bumper (or through the bumper if holes are provided for this purpose) and attached to both tow hooks/eyes. For the purpose of meeting this specification, the bus shall be empty and positioned on a level, hard surface and both tow hooks/eyes shall share the load equally.

Bumper: Rear

1. The bumper on Type A-1 buses shall be a minimum of 8 inches wide (high). Bumpers on Types A-2, B, C, and D buses shall be a minimum of 9 ½ inches wide (high). The bumper shall be of sufficient strength to permit being pushed by another vehicle of similar size and being lifted by the bumper without permanent distortion.
2. The bumper shall wrap 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 mounted flush with the sides of the body or protected with an end panel.
3. The bumper shall be attached to the chassis frame in such a manner that it may be removed. It shall be braced to resist deformation of the bumper resulting from impact from the rear or the side. It shall be designed to discourage hitching of rides by an individual.
4. The bumper shall extend at least one inch beyond the rear-most part of the body surface, measured at the floor line.

5. The bottom of the rear bumper shall not be more than 30 inches above ground level.

Certification

Upon request of the agency having student transportation jurisdiction, the chassis and body manufacturer(s) shall certify that their product(s) meets the state's minimum standards on items not covered by Federal Motor Vehicle Safety Standards 567.4, Requirements for Manufacturers of Motor Vehicles.

Color

1. The school bus shall be painted National School Bus Yellow (NSBY). (See APPENDIX B)
2. The body exterior trim, including rub rails, shall be black, NSBY, green (for alternate fuel buses) or blue (for gasoline buses).
3. Except for the vertical portion of the front and rear roof caps, the roof of the bus may be painted white. (See illustration in APPENDIX B, Placement of Retro-reflective Markings)
4. The chassis shall be black. Body, cowl, hood and fenders shall be NSBY. The flat top surface of the hood may be non-reflective black or NSBY. (See APPENDIX B)
5. The bumpers shall be black unless spec
6. Wheels and rims (including demountable rims) may be silver, gray, white, yellow, or black.
7. MFSABs shall be exempt from these requirements.

Construction

1. Colorado Rack Test: Requires that a school bus body, when subjected to the prescribed load for 2 cycles, cannot deflect more than 5 1/8 inches measured diagonally. Each emergency exit of the bus (pushout windows, emergency doors, etc.) must meet FMVSS both during the full application of the load and after release of the load to ensure that the emergency exits will be functional in the event of a rollover crash.
2. Kentucky Pole Test: Requires that when the school bus roof immediately above the passenger windows is impacted by an 8" diameter 'pole' with sufficient force to cause the roof to bend into the passenger compartment between 8-10 inches there can be no separation of the body panels
3. Side Intrusion Test: The bus body shall be constructed to withstand an intrusion force equal to the curb weight of the vehicle or 20,000 pounds, whichever is less. Each vehicle shall be capable of meeting this requirement when tested in accordance with the procedures set forth below. The complete body structure, or a representative seven-body section mockup with seats installed, shall be load-tested at a

location 24 + 2 inches above the floor line, with a maximum 10 inch diameter cylinder, 48 inches long, mounted in a horizontal plane.

4. The cylinder shall be placed as close as practical to the mid-point of the tested structure, spanning two internal vertical structural members. The cylinder shall be statically loaded to the required force of curb weight of 20,000 pounds, whichever is less, in a horizontal plane with the load applied from the exterior toward the interior of the test structure. When the minimum load has been applied, the penetration of the loading cylinder into the passenger compartment shall not exceed 10 inches from its original point of contact. There can be no separation of lapped panels or construction joints. Punctures, tears, or breaks in the external panels are acceptable but are not permitted on any adjacent interior panel. Body companies shall certify compliance with this intrusion requirement and include test results, as requested.
5. Construction shall be reasonable dust-proof and watertight.

Crossing Control Arm

1. School buses shall be equipped with a crossing control arm mounted on the right side of the front bumper. When opened, this arm shall extend in a line parallel to the body side and aligned with the right-side wheel.

   Note: This device is not required for a school bus which is used solely to transport pupils with special needs who are individually loaded and unloaded. Nevada Revised Statute 386.840 (1)b

2. All components of the crossing control arm and all connections shall be weatherproofed.
3. The crossing control arm shall incorporate system connectors (electrical, vacuum, or air) at the gate and shall be easily removable to allow for towing of the bus.
4. The crossing control arm shall be constructed of non-corrodible or nonferrous material or treated in accordance with the body sheet metal specification. (See *BUS BODY AND CHASSIS SPECIFICATIONS, Metal Treatment*)
5. There shall be no sharp edges or projections that could cause injury or be a hazard to students. The end of the arm shall be rounded.
6. The crossing control arm shall extend minimum 70 inches (measured from the bumper at the arm assembly attachment point) when in the extended position. The crossing control arm shall not extend past the end of the bumper when in the stowed position.
7. The crossing control arm shall extend simultaneously with the stop arm(s) activated by stop arm controls.

8. An automatic recycling interrupt switch may be installed for temporarily disabling of the crossing control arm.
9. The assembly may include a device attached to the bumper near the end of the arm to automatically retain the arm while in the stowed position. That device shall not interfere with normal operations of the crossing control arm.

Defrosters

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

   Note: The requirements of this standard do not apply to the exterior surfaces of double pane storm windows.

2. The defrosting system shall conform to Society of Automotive Engineers J381 200901, Windshield Defrosting Systems Test Procedure and Performance Requirements.
3. The defroster and defogging system shall be capable of furnishing heated, outside ambient air, except the part of the system furnishing additional air to the windshield, entrance door and stepwell may be of the re-circulating air type
4. Auxiliary fans are not considered defrosting or defogging systems.
5. Portable heaters shall not be used.

Doors

1. The primary entrance door shall be under the driver's control, designed to afford easy release and to provide a positive latching device on manual operating doors to prevent accidental opening. When a hand lever is used, no part shall come together that will shear or crush fingers. Manual door controls shall not require more than 25 pounds of force to operate at any point throughout the range of operation, as tested on a 10 percent grade, both uphill and downhill.
2. The primary entrance door shall be located on the right side of the bus, opposite and within direct view of driver.
3. The entrance door shall have a minimum horizontal opening of 24 inches and a minimum vertical opening of 68 inches.
4. The entrance door shall be a split-type door and shall open outward.
5. All entrance door glass 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 when viewed from the interior shall be not more than 3 inches below the interior door control cover or header pad.
6. Vertical closing edges on entrance doors shall be equipped with flexible material.

7. All door openings shall be equipped with padding at the top edge of the opening. Padding shall be at least 3 inches wide and 1 inch thick and extend the full width of the door opening.
8. On power-operated entrance doors, the emergency release valve, switch, or device to release the entrance door must be placed above or to the immediate left or immediate right of the entrance door and clearly labeled. The emergency release valve, switch, or device shall work in the absence of power.

Drive Shaft

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

Electrical System

1. Battery
    a. The storage batteries shall have a minimum cold cranking capacity rating (cold cranking amps) equal to the cranking current required for 30 seconds at 0 degrees Fahrenheit and a minimum reserve capacity rating of 120 minutes at 25 amps. Higher capacities may be required, depending upon optional equipment and local environmental conditions.
    b. The manufacturer shall securely attach the battery on a slide-out or swing-out tray in a closed, vented compartment in the body skirt or chassis frame so that the battery is accessible for convenient servicing from the outside. When in the stored position, the tray shall be retained by a securing mechanism capable of holding the tray [with battery(ies)] in position when subjected to a 5g load from any direction. The battery compartment door or cover if separate from the tray shall be hinged at the front or top. It shall be secured by a positive operated latching system or other type fastener. The door may be an integral part of the battery slide tray. The door or cover must fit tightly to the body, and not present sharp edges or snagging points. Battery cables shall meet SAE requirements. Battery cables shall be of sufficient length to allow the battery tray to fully extend. Any chassis frame-mounted batteries shall be relocated to a battery compartment on Type A Buses.
    c. All batteries are to be secured in a sliding tray except van conversions or cutaway front-section chassis may be secured in accordance with the manufacturer's standard configuration. In these cases, the final location of the battery and the appropriate cable lengths shall be mutually agreed upon by the chassis and

body manufacturers. However, in all cases the battery cable provided with the chassis shall have sufficient length to allow some slack and be of sufficient gauge to carry the required amperage.

d. Buses shall be equipped with a battery shut-off switch. The switch shall be labeled and in a location not readily accessible to the driver or passengers.

2. Alternator
   a. All Type A and Type B buses with a GVWR of 15,000 pounds or less shall have a minimum 130-amp alternator. Buses equipped with an electrically powered wheelchair lift and/or air conditioning shall be equipped with the highest rated capacity available from the chassis OEM.
   b. All buses over 15,000 pounds GVWR shall be equipped with a heavy-duty truck or bus-type alternator having a minimum output rating of 200 amps or higher and should produce a minimum current output of 50% of the rating at engine idle speed.
   c. All other buses than those described in B1 equipped with an electrically powered wheelchair lift and/or, air conditioning shall have a minimum alternator output of 240 amps and may be equipped with a device that monitors the electrical system voltage and advances the engine idle speed when the voltage drops to, or below, a pre-set level.
   d. A belt driven alternator shall be capable of handling the rated capacity of the alternator with no detrimental effect on any other driven components. For estimating required alternator capacity, see School Bus Technical Reference Publication.
   e. A direct-drive alternator is permissible in lieu of a belt-driven alternator.
3. Electrical Components
   a. Materials in all electrical components shall contain no mercury.
4. Wiring, Chassis
   a. All wiring shall conform to current applicable recommended practices of the Society of Automotive Engineers (SAE). All wiring shall use color and at least one other method of identification. The other method shall be either a number code or name code, and each chassis shall be delivered with a wiring diagram that illustrates the wiring of the chassis.
   b. Chassis manufacturer of an incomplete vehicle shall install a readily accessible terminal strip or plug on the body side of the cowl or in an accessible location in the engine compartment of vehicles designed without a cowl. The strip or connector shall contain the following terminals for the body connections.

i. Main 100-amp body circuit
ii. Tail lamps
iii. Right turn signal
iv. Left turn signal
v. Stop lamps
vi. Back up lamps
vii. Instrument panel lights (controlled by dimmer switch)

c. An appropriate identifying diagram (color plus a name or number code) for all chassis electric circuits shall be provided to the body manufacturer for distribution to the end user.
d. Wiring for the headlamp system must be separate from the electronic controlled body solenoid/module.

5. Wiring, Body
   a. All wiring shall conform to current applicable SAE recommended practices.
   b. All wiring shall have an amperage capacity exceeding the design load by at least 25%. All wiring splices are to be accessible and noted as splices on the wiring diagram.
   c. 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.
   d. The body power wire shall be attached to a special terminal on the chassis.
   e. Each wire passing through metal openings shall be protected by a grommet.
   f. 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 resistant to water and corrosion.
   g. Wiring shall be arranged in circuits, as required, with each circuit protected by a fuse or electronic protection device. A system of color and number-coding shall be used, and an appropriate identifying diagram shall be provided to the end user, along with the wiring diagram provided by the chassis manufacturer. The wiring diagrams shall be specific to the bus model supplied and shall include any changes to wiring made by the body manufacturer. Chassis wiring diagrams shall also be supplied to the end user.
   h. The following body interconnecting circuits shall be color-coded, as noted in the below table.

FUNCTION	COLOR
Left Rear Directional Light	Yellow

FUNCTION	COLOR
Right Rear Direction Light	Dark Green
Stop Lamps	Red
Back-up Lamps	Blue
Tail Lamps	Brown
Ground	White
Ignition Feed, Primary Feed	Black

The color of cables shall correspond to Society of Automotive Engineers J1128 201310, Low-Voltage Primary Cable.

i. Wiring shall be arranged in at least six regular circuits, as follows:
   i. Head, tail, and stop (brake), clearance and instrument panel lamps;
   ii. Step well lamps shall be actuated when the entrance door is open;
   iii. Dome lamps;
   iv. Ignition and emergency door signal;
   v. Turn signal lamps; and
   vi. Alternately flashing signal lamps.
j. Any of the above combination circuits may be subdivided into additional independent circuits.
k. Heaters and defrosters shall be wired on an independent circuit.
l. Whenever possible, all other electrical functions (such as sanders and electric type windshield wipers) shall be provided with independent and properly protected circuits.
m. Each body circuit shall be coded by number or letter on a diagram of circuits and shall be attached to the body in a readily accessible location.

6. Buses may be equipped with a 12-volt power port in the driver's area.
7. There shall be a manual noise suppression switch installed in the control panel. The switch shall be labeled and alternately colored. 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 or lighting systems.
8. The entire electrical system of the body shall be designed for the same voltage as the chassis on which the body is mounted.

Emergency Equipment

1. Fire Extinguisher
    a. The bus shall be equipped with at least one 5-pound minimum, UL-approved pressurized, dry chemical fire extinguisher. The extinguisher shall be secured in a mounted bracket, located in the driver's compartment and readily accessible to the driver and passengers. A pressure gauge shall be mounted on the extinguisher and be easily read without moving the extinguisher from its mounted position.
    b. The fire extinguisher shall have a total rating of 2-A:10-BC, or greater. The operating mechanism shall be secured with a type of seal that will not interfere with the use of the fire extinguisher.
2. First Aid Kit
    a. Each school bus shall have a minimum 12 unit, removable, moisture-proof and dust-proof first aid kit.
    b. Minimum contents for the First Aid Kit

Quantity	Item
2	1-inch x 2 ½ yards adhesive tape rolls
24	Sterile gauze pads 3 x 3 inches
50	¾ x 3 inches adhesive bandages
8	2-inch bandage compress
10	3-inch bandage compress
2	2-inch x 6-foot sterile gauze roller bandages
2	Non-sterile triangular bandages, minimum of 39x35x54 Inches with two safety pins
3	Sterile gauze pads 36x36 inches
3	Sterile eye pads
1	Rounded end scissors
1	Pair medical examination gloves
1	Mouth-to-mouth airway

National School Transportation Specifications and Procedures, 2015, (pg. 38)

3. Body Fluid Clean-Up Kit
    a. Each school bus shall have a minimum 7 unit, removable, moisture-proof and dust-proof body fluid clean-up kit.
    b. Minimum contents for body fluid kit

Quantity	Item
1	2-ounce absorbent power with bag
1	6x6 biohazard bag with seal
1	7-10-gallon biohazard bad with seal
1	Scoop & scraper/spatula

Quantity	Item
2	Pair medical grade gloves
1	Large protective apparel pack
1	Face mask

4. Emergency Warning Devices
    a. Each school bus shall contain at least three retroreflective triangle road warning devices that meet the requirements of Federal Motor Vehicle Safety Standards 571.125, Warning Devices.
5. Storage of Emergency Equipment
    a. Emergency equipment can be stored in an enclosed compartment. The compartment must be clearly labeled in not less than 1-inch letters identifying each piece of equipment contained in the compartment. All emergency equipment stored in a compartment cannot be blocked. If emergency equipment is stored in the driver compartment, the equipment must be clearly labeled, not blocked and secured to the bus.
6. Emergency Exits
    a. Any installed emergency exit shall comply with the design and performance requirements of Federal Motor Vehicle Safety Standards 571.217, Bus Emergency Exits and Window Retention and Release, applicable to that type of exit, regardless of whether or not that exit is required. National School Transportation Specifications and Procedures, 2015, (pg. 40)
    b. Each school bus emergency exit door shall be labeled "Emergency Door" or "Emergency Exit," and every other emergency exit shall be labeled "Emergency Exit" followed by concise operating instructions describing each motion necessary to unlatch and open the exit, located within 16 centimeters of the release mechanism in letters at least 5 centimeters high letters, of a color that contrasts with its background.

Examples
Lift to Unlatch, Push to open
Turn Handle, Push Out to Open

    c. Each opening for a required emergency exit shall be outlined around its outside perimeter with a retroreflective tape with a minimum width of 2.5 centimeters and either red, white, or yellow in color, that when tested under the conditions specified in S6.1 of Federal Motor Vehicle Safety Standards 571.217, Bus Emergency Exits and Window Retention and Release.

d. Concise operating instructions describing the motions necessary to unlatch and open the emergency exit shall be located 15 centimeters of the release mechanism on the inside surface of the bus. These instructions shall be in letters at least 1 centimeter high and of a color that contrasts with its background.
e. On the inside surface of each school bus with one or more wheelchair anchorage positions, there shall be a label directly beneath or above each "Emergency Door" or "Emergency Exit" designation specified by paragraph (a) of S5.5.3 of this standard for an emergency exit door or window. The label shall state in letters at least 25 mm (one inch) high, the words "DO NOT BLOCK" in a color that contrasts with the background of the label. Federal Motor Vehicle Safety Standards 571.217, Bus Emergency Exits and Window Retention and Release (S5.5.1).
f. Emergency Exit Window Requirements
    i. The rear emergency window shall have a lifting assistance device that will aid in lifting and holding the rear emergency window open.
    ii. Side emergency exit windows, when installed, may be vertically hinged on the forward side of the window. No side emergency exit window will be located above a stop arm.National School Transportation Specifications and Procedures, 2015, (pg. 40)
    iii. Emergency exit windows shall be labeled directly above, or at the bottom of the emergency window exit on both the inside and outside surfaces of the bus.
g. Emergency Door Requirements
    i. School buses shall be equipped with one rear emergency exit door that opens outward and is hinged on the right side (either side in the case of a bus with a GVWR of 10,000 pounds or less) and any additional exits specified in the chart below.
    ii. One emergency door on the vehicle's left side that is hinged on its forward side and meets the requirements of S5.2.3.2(a) and a push out rear window that provides a minimum opening clearance 41 centimeters high and 122 centimeters wide and meets the requirements of S5.2.3.2(c), and the additional exits specified in the table below.
    iii. The exposed area of the upper panel of emergency doors shall be a minimum of 400 square inches of approved safety glazing that meets Federal Motor Vehicle Safety Standards, 571.205 Glazing Materials.

iv. If installed, all other glass panels on emergency exit doors shall be approved safety glazing.
v. There shall be no steps leading to an emergency door.
vi. There shall be no obstruction higher that 1/4 inch across the bottom of any emergency door opening. Fasteners used within the emergency exit opening shall be free of sharp edges or burrs. National School Transportation Specifications and Procedures, 2015, (pg. 40)
vii. Emergency exit doors shall be clearly labeled "Emergency Door" or "Emergency Exit" in at least 5 centimeters (2 inches) letters and shall be located at the top of, or directly above, or at the bottom of the emergency window exit on both the inside and outside surfaces of the bus.

h. Emergency Exit Requirements
i. School buses shall be equipped with a total number of emergency exits as follows for the indicated capacities of vehicles.
ii. Bus Emergency Exits required under Federal Motor Vehicle Safety Standards 571.217, Bus Emergency Exits and Window Retention and Release may be included to comprise the total number of exits specified.
iii. Side emergency exit windows when installed may be vertically hinged on the forward side of the window. No side emergency exit window will be located above a stop arm.
iv. **Table 1:** Buses with Rear Emergency Doors (All front Engine Buses)

Seating Capacity	Roof Hatch	Left Emergency Exit Window	Right Emergency Exit Window	Left Side Emergency Door Exit
1 - 45	1	0	0	0
46 – 77	2	1	1	0
	2	0	0	1
78 – 93	2	2	2	0
	2	1	1	1

v. **Table 2:** Buses with Rear Pushout Window and Left Side Emergency Exit Door. (All Rear Engine Busses).

Seating Capacity	Roof Hatch	Left Emergency Exit Window	Right Emergency Exit Window	Left Side Emergency Door Exit
1 - 45	1	0	0	0
46 – 89	2	1	1	0

Seating Capacity	Roof Hatch	Left Emergency Exit Window	Right Emergency Exit Window	Left Side Emergency Door Exit
	2	0	0	1
90 – 105	2	2	2	0
	2	1	1	1

Exhaust System

1. The exhaust pipe, after-treatment system, and tailpipe shall be outside the bus body compartment and shall be attached to the chassis, so any other chassis component is not damaged.
2. The tailpipe and after-treatment system shall be constructed of a corrosion-resistant tubing material at least equal in strength and durability to 16-gauge steel tubing of equal diameter.
3. The tailpipe may be flush with, or shall not extend more than 2 inches beyond, the perimeter of the body for side-exit pipe or the bumper for rear-exit pipe. The exhaust system shall be designed such that exhaust gas will not be trapped under the body of the bus.
4. The tailpipe shall exit to the left or right of the emergency exit door in the rear of the vehicle or to the left side of the bus in front of or behind the rear drive axle or the tailpipe may extend through the bumper. The tailpipe exit location on all Types A-1 or B-1 buses may be in accordance to the manufacturer's standards. The tailpipe shall not exit beneath any fuel filler location, emergency door or lift door.
5. The exhaust system shall be in a manner to prevent any damage to any fuel system component.
6. The design of the after-treatment systems shall not allow active (non-manual) regeneration of the particulate filter during the loading and unloading of passengers. Manual regeneration systems will be designed such that unintentional operation will not occur.
7. For after treatment systems that require Diesel Exhaust Fluid (DEF) to meet federally mandated emissions:
    a. The composition of Diesel Exhaust Fluid (DEF) must comply with International Standard International Standard Organization 22241-1:2006, Diesel Engines NOx Reduction Agent. Refer to engine manufacturer for any additional DEF requirements.
    b. The DEF supply tank shall be sized to meet a minimum ratio of three diesel fills to one DEF fill.

Fenders: Front

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

2. Front fenders shall be properly braced and shall not require attachment to any part of the body.

Fire Suppression Systems

Fire suppression systems and shall:

1. Be located in the engine compartment and be automatically activated when the fire detector has picked up that there is a fire in the engine compartment. The system must also include a mechanism for activation by the driver.
2. Have nozzles for fire suppression that shall be located under the school bus, in the electrical panel, but not in the passenger compartment.
3. Include a lamp or buzzer to alert the driver when the system has been activated. Nevada Revised Statute 386.835 (3)
4. Should meet The Rise Institutes testing and P-marking of fire suppression systems in engine compartments of buses.
5. A new school bus that was purchased before July 1, 2016 must meet the fire safety standards set forth in Nevada Revised Statute 386.835 (1) and (2)

Floors

1. The floor in under-seat area, including tops of wheel housings, driver's compartment and toe board, shall be covered with an elastomeric floor covering, having a minimum over all thickness of .125 inch and a calculated burn rate of 0.1 mm per minute or less, using the test methods, procedures and formulas listed in Federal Motor Vehicle Safety Standards 571.302, Flammability of Interior Materials. The driver's area and toe board area in all Type-A buses may be manufacturer's standard flooring and floor covering.
2. The floor covering in the aisles shall be ribbed or other raised pattern elastomer and has a calculated burn rate of 0.1 mm per minute or less using the test methods, procedures and formulas listed in in Federal Motor Vehicle Safety Standards 571.302, Flammability of Interior Materials. Minimum overall thickness shall be .187 inch measured from tops of ribs.
3. The 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 a type recommended by the manufacturer of floor-covering material. All seams must be sealed with waterproof sealer.
4. On Types B, C and D buses, a flush-mounted, screw-down plate that is secured and sealed shall be provided to access the diesel or gasoline fuel tank sending unit and/or fuel pump. This plate shall not be installed under flooring material.

Frame

1. Frame lengths shall be established in accordance with the design criteria for the complete vehicle.
2. Making holes in top or bottom flanges or side units of the frame and welding to the frame shall not be permitted except as provided or accepted by the chassis manufacturer.
3. Frames shall not be modified for the purpose of extending the wheel base.
4. Any secondary manufacturer that modifies the original chassis frame shall provide a warranty at least equal to the warranty offered by the original equipment manufacturer (OEM) and shall certify that the modification and other workmanship under normal use and service intended by the OEM.

Fuel System

1. Fuel tank(s) having a minimum 25-gallon capacity shall be provided by the chassis manufacturer. Each tank shall be filled and vented to the outside of the passenger compartment, and each fuel filler should be placed in a location where accidental fuel spillage will not drip or drain on any part of the exhaust system.
2. The fuel system shall comply with Federal Motor Vehicle Safety Standards 571.301, Fuel System Integrity.
3. Fuel tank(s) may be mounted between the chassis frame rails or outboard of the frame rails on either the left or right side of the vehicle.
4. The actual draw capacity of each fuel tank shall be a minimum of 83% of the tank capacity.
5. Installation of alternative fuel systems, including fuel tanks and piping from the tank to the engine, shall comply with all applicable fire codes in effect on the date of manufacture of the bus.
6. Installation of Liquefied Petroleum Gas (LPG) tanks shall comply with National Fire Protection Association National Fire Protection Association 58, Liquid Petroleum Gas.
7. Installation of Compressed National Gas (CNG) containers shall comply with Federal Motor Vehicle Safety Standards 571.304, Compressed Natural Gas Fuel Container Integrity.
8. The CNG Fuel System shall comply with Federal Motor Vehicle Safety Standards 571.303, Fuel System Integrity of Compressed Natural Gas Vehicle.

Governor

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

Handrails

At least one handrail shall be installed. The handrail shall be a minimum of 1" 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 in National Highway Traffic Safety Administration, School Bus Handrail Guide.

Heating System

The engine shall be capable of supplying coolant at a temperature of at least 170 degrees Fahrenheit at the engine coolant thermostat opening. The coolant flow rate shall be 50 pounds per minute at the return end of 30 feet of one inch inside diameter automotive hot water heater hose. See School Bus Manufacturing Technical Council, Procedures for Testing and Rating Automotive Bus Hot Water, Heating, and Ventilating Equipment.

Heating and Air Conditioning Systems

1. Heating System
    a. The heater shall be hot water combustion type, electric heating element or heat pump.
    b. If only one heater is used, it shall be fresh-air or combination fresh-air and re-circulation type.
    c. If more than one heater is used, additional heaters may be re-circulating air type.
    d. The heating system shall be capable of maintaining bus interior temperatures, as specified in Society of Automotive Engineers J2233, Bus Body Heating System Test.
    e. Auxiliary fuel-fired heating systems are permitted, provided they comply with the following requirements.
        i. The auxiliary heating system shall utilize the same type fuel as specified for the vehicle engine.
        ii. The heater(s) may be direct, hot air-type or may be connected to the engine coolant system.
        iii. An auxiliary heating system, when connected to the engine coolant system, may be used to preheat the engine coolant or preheat and add supplementary heat to the heating system.
        iv. Auxiliary heating systems must be installed pursuant to the manufacturer's recommendations and shall not direct exhaust in such a manner that will endanger bus passengers.

v. All combustion heaters shall comply with current FMCSA Regulations.
vi. The auxiliary heating system shall require low voltage.
vii. Auxiliary heating systems shall comply with Federal Motor Vehicle Safety Standards 571.301, Fuel System Integrity, and all other applicable Federal Motor Vehicle Safety Standards, as well as with Society of Automotive Engineers test procedures.

f. All forced-air heaters installed by body manufacturers shall bear a name plate that indicates the heater rating in accordance with School Bus Manufacturer Technical Council 001, Procedure for Testing and Rating Automotive Bus Hot Water, Heating, and Ventilating Equipment. The plate shall be affixed by the heater manufacturer and shall constitute certification that the heater performance is as shown on the plate.
g. 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 Society of Automotive Engineers J20, Coolant System Hoses. Heater lines, cores, and elements on the interior of the bus shall be shielded to prevent scalding of the driver or passengers.
h. 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 Types A and B buses the valves may be installed in another accessible location.
i. All heaters of hot water type in the passenger compartment shall be equipped with a device installed in the hot water pressure line, which regulates the water flow to all passenger heaters. The device shall be conveniently operated by the driver while seated. The driver and passenger heaters may operate independently of each other for maximum comfort.
j. Accessible bleeder valves for removing air from the heater shall be installed in an appropriate place in the return lines of body company-installed heater.
k. Access panels shall be provided to make heater motors, cores, elements and fans readily accessible for service. An exterior access panel to the driver's heater may be provided.

2. Passenger Compartment Air Conditioning (Optional)

The following specifications are applicable to all types of school buses that may be equipped with air conditioning. This section is divided into two parts. Part 1 covers performance specifications, Part 2 covers test conditions and Part 3 covers other requirements applicable to all buses.

a. Performance Specifications

   i. Standard Performance: The installed air conditioning system should cool the interior of the bus from 100 degrees to 80 degrees Fahrenheit, measured at three points (minimum) located four feet above the floor on the longitudinal centerline of the bus. The three required points shall be: (1) three feet above the center point of the horizontal driver seat surface, (2) at the longitudinal midpoint of the body, and (3) three feet forward of the rear emergency door or, for Type D rear-engine buses, three feet forward of the end of the aisle.
   Note: For the Type A vehicles placement of the rear thermocouple should be centered in the bus over the rear axle. The independent temperature reading of each temperature probe inside the bus shall be within a range of +/- 3 degrees Fahrenheit of the average temperature at the conclusion of the test.

   ii. High Performance: The installed air conditioning system should cool the interior of the bus from 100 degrees to 70 degrees Fahrenheit, measured at three points (minimum) located four feet above the floor on the longitudinal centerline of the bus. The three required points shall be: (1) three feet above the center point of the horizontal driver seat surface, (2) at the longitudinal midpoint of the body, and (3) three feet forward of the rear emergency door or, for Type-D rear-engine buses, three feet forward of the end of the aisle.
   Note: For the Type A vehicles placement of the rear thermocouple should be centered in the bus over the rear axle. The independent temperature reading of each temperature probe inside the bus shall be within a range of +/- 3 degrees Fahrenheit of the average temperature at the conclusion of the test.

b. Test Conditions

   i. The test conditions under which the above performance must be achieved shall consist of (1) placing the bus in a room (such as a paint booth) where ambient temperature can be maintained at 100 degrees Fahrenheit; (2) heat-soaking the bus at 100 degrees Fahrenheit at a point

measured 2 feet horizontally from the top of the windows on both sides of the bus, with windows open for two hours; and (3) closing windows, turning on the air conditioner with engine running at 1250 +/- 50 RPM, and cooling the interior of the bus to 80 degrees Fahrenheit (standard performance) or 70 degrees Fahrenheit (high performance), within 30 minutes while maintaining 100 degrees Fahrenheit outside temperature.

c. The manufacturer shall provide test results that show compliance with standard systems. If the bid specifies, the manufacturer shall provide facilities for the user or user's representative to confirm that a pilot model of each bus design meets the above performance requirements.

d. Other Requirements

   i. Evaporator cases, lines and ducting (as equipped) shall be designed in such a manner that all condensation is effectively drained to the exterior of the bus below the floor level under all conditions of vehicle movement and without leakage on any interior portion of bus. Evaporators and ducting systems shall be designed and installed to be free of projections or sharp edges. Ductwork shall be installed so that exposed edges face the front of the bus and do not present sharp edges.

   ii. On school buses equipped with Type-2 seatbelts having anchorages above the windows, the ducting (if used) shall be placed at a height sufficient to not obstruct occupant securement anchorages. This clearance shall be provided along the entire length (except at evaporator locations) of the passenger area on both sides of the bus interior.

   iii. The body may be equipped with insulation, including sidewalls, roof, firewall, rear, inside body bows and plywood or composite floor insulation to reduce thermal transfer.

   iv. All glass (windshield, service and emergency doors, side, and rear windows) may be equipped with maximum integral tinting allowed by federal, state, or ANSI standards for respective locations, except that windows rear of the driver's compartment, if tinted, shall have approximately 28% light transmission.

   v. Electrical generating capacity shall be provided to accommodate the additional electrical demands imposed by the air conditioning system.

   vi. Roofs may be painted white to aid in heat dissipation. (See APPENDIX B).

vii. Air intake for any evaporator assembly(ies), except for front evaporator of Type A-1, shall be equipped with replaceable air filter(s) accessible without disassembly of evaporator case.

viii. For all buses (except Type D rear engine transit) equipped with a rear evaporator assembly, evaporator shall not encroach upon head impact zone, but may occupy an area of less than 26.5 inches from the rear wall and 14 inches from the ceiling.

ix. For Type D rear engine transit buses equipped with a rear evaporator over the davenport, the evaporator assembly may not interfere with rear exit window and may not extend above the rear seating row.

Hinges

All exterior metal door hinges which shall be designed to allow lubrication to be channeled to the center 75% of each hinge loop without disassembly, unless they are constructed of stainless steel, brass or non-metallic hinge pins or other designs that prevent corrosion.

Horn

The bus shall be equipped with a horn(s) of standard make with the horn(s) capable of producing a complex sound in bands of audio frequencies between 250 and 2,000 cycles per second and tested in accordance with Society of Automotive Engineers E J377, Performance of Vehicle Traffic Horns.

Identification

1. The body shall bear words "SCHOOL BUS" in black letters at least 8 inches high on both front and rear of the body or on signs attached thereto. Lettering shall be placed as high as possible without impairment of its visibility. Letters shall conform to "Series B" of Standard Alphabets for Highway Signs. "SCHOOL BUS" lettering shall have a reflective background, or as an option, may be illuminated by backlighting. MFSABs are exempt from these requirements.
2. Required lettering and numbering shall include:
    a. District, company name or owner of the bus displayed at the beltline in 6-inch-high letters.
    b. The bus identification number, minimum 12 inches high displayed on the sides, on the rear and on the front.
    c. Specially equipped school buses shall display the International Symbol of Accessibility below the window line. Such emblems shall be white on blue or black background, shall not exceed 12 inches square in size and shall be of a high-intensity retro-

reflective material–meeting the requirements of Federal Highway Administration Federal Highway Administration FP-14 718, Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects.

3. Optional lettering, numbering, or symbols which may be displayed on the exterior of the bus.
    a. Bus identification number, minimum 12-inch-high characters, on the top of the bus, in addition to required numbering on sides, rear, and front.
    b. The location of the battery(ies) identified by the word "BATTERY" or "BATTERIES" on the battery compartment door in 2-inch lettering.
    c. Symbols or letters not to exceed 64 square inches of total display near the entrance door, displaying information for identification by the students of the bus or route served.
    d. Manufacturer, dealer, or school identification or logos.
    e. Lettering on the rear of the bus relating to school bus flashing signal lamps.
    f. Letter relating to railroad stop procedures.
    g. Identification of fuel type shall be in 1-inch lettering adjacent to the fuel filler opening.
4. In-Lieu of the above optional lettering on the rear of the school bus, an electronic sign that displays warning messages to motorists may be installed on the rear of the school bus. The electronic sign:
    a. Shall be sealed weather tight construction approximately 23.5 X 8.75 X 1.5 in size.
    b. Shall be connected to the school bus safety lights.
    c. Shall alternately flash the word message “CAUTION” and “STOPPING” when the amber school bus safety lights are active. The letters in the word messages shall be amber with a minimum height of three inches.
    d. Shall alternately flash the word message “STOP” and the word message “DO NOT PASS” when the red school bus lights are active. The letters in the word messages shall be red with a minimum of three inches.
    e. May flash or display the word message “CAUTION” when the backup lights are activated. The letters in the word message shall be amber with a minimum height of three inches.
    f. Shall have a minimum viewing angle of 15 degrees on each side of the perpendicular axis.
    g. Flashing messages shall be activated when the amber or red lights are activated.
    h. Word and picture messages shall be clearly visible in direct sunlight from a distance of 500 feet along the axis of the vehicle.

i. LED lights shall be of sufficient quality to result in a clear and legible message.

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 or rear vertical bow. Inside body height of Type A-1 buses shall be 62 inches or more. Inside height does not apply to air conditioning equipment.

Instruments and Instrument Panel

1. The chassis shall be equipped with the following instruments and gauges listed below:
   Note: Telltale warning lamps in lieu of gauges are not acceptable, except as noted.
   a. Speedometer
   b. Odometer that can be read without using a key and that will give accrued mileage (to seven digits), including tenths of miles, unless tenths of miles are registered on a trip odometer.
   c. Tachometer
      Note: For types B, C, and D buses, a tachometer shall be installed so as to be visible to the driver while seated in a normal driving position.
   d. Voltmeter
      Note: An ammeter with graduated charge and discharge indications is permitted in lieu of a voltmeter; however, when used, the ammeter wiring must be compatible with the current flow of the system.
   e. Oil pressure gauge
   f. Water temperature gauge
   g. Fuel gauge
   h. High beam headlamp indicator
   i. Brake air pressure gauge (air brakes), brake indicator lamp (vacuum/hydraulic brakes), or brake indicator lamp (hydraulic/hydraulic).
   j. Turn signal indicator

    k. Glow-plug indicator lamp, where appropriate.
2. All instruments shall be easily accessible for maintenance and repair.
3. The instruments and gauges shall be mounted on the instrument panel so that each is clearly visible to the driver while seated in a normal driving position.
4. Instruments and controls must be illuminated as required Federal Motor Vehicle Safety Standards 571.101, Controls and Displays.
5. Multi-function gauge (MFG)
    a. The driver must be able to manually select any displayable function of the gauge on an MFG, whenever desired.
    b. Whenever an out-of-limits condition that would be displayed on one or more functions of an MFG occurs, the MFG controller should automatically display this condition on the instrument cluster. This should be in the form of an illuminated telltale warning lamp, as well as having the MFG automatically display the out-of-limits indications. If two or more functions displayed on the MFG go out of limits simultaneously, then the MFG should sequence automatically between those functions continuously until the condition(s) is corrected.
        i. The use of an MFG does not relieve the need for audible warning devices, where required.

Insulation

(Optional)

1. If thermal insulation is specified, it shall be fire-resistant, UL approved, with minimum R-value of 5.5. Insulation shall be installed to prevent sagging.
2. If floor insulation is required, it shall be 5-ply softwood plywood, nominal 5/8-inch thickness and shall equal to or exceed properties of the exterior-type softwood plywood, C-D Grade, as specified in standard issued by U.S. Department of Commerce. When plywood is used, all exposed edges shall be sealed. Type A-1 buses may be equipped with nominal ½ inch-thick plywood or equivalent material meeting above requirements. Equivalent material may be used to replace plywood, provided it has equal or greater insulation R-value, sound abatement, deterioration-resistant and moisture-resistant properties.

Interior

1. The interior of bus shall be free of all unnecessary projections, to minimize the potential for injury. This specification requires inner lining on ceilings and walls. If the ceiling is constructed with lap joints, the forward panel shall be lapped by rear panel and exposed edges shall be beaded, hemmed, flanged, or otherwise treated to minimize

sharp edges. Buses may be equipped with storage compartment for tools, tire chains, and/or tow chains. (See Storage Compartment)

2. Interior overhead storage may be provided if they meet the following criteria:
    a. Head protection requirements of Federal Motor Vehicle Safety Standards 571.222, School Bus Passenger Seating and Crash Protection, where applicable.
    b. Have all corners and edges rounded with a minimum radius of 1 inch or be padded equivalent to door header padding.
    c. Be attached to the bus sufficiently to withstand a force of equal to 20 times the maximum rated capacity of the compartment.
    d. Have no protrusions greater than ¼ inch.
3. The driver's area forward of the foremost padded barriers will permit the mounting of required safety equipment and vehicle operation equipment.
4. Every school bus shall be constructed so that the noise level 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.

Lamps and Signals

1. **Interior lamps** which illuminate the aisle and the step well shall be provided. The step well lamp shall be illuminated by an entrance door-operated switch, to illuminate only when headlights and clearance lamps are on and the entrance door is open.
2. **Body instrument panel lamps** shall be controlled by an independent dimmer switch or may be controlled by the dimmer that operates the gauge lighting.
3. School bus **alternately flashing signal lamps** shall be provided. MFSAB's are exempt from this requirement.
    a. The bus shall be equipped with two red lamps at the rear of vehicle and two red lamps at the front of the vehicle.
    b. 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 bus. The system of red and amber signal lamps shall be wired so that amber lamps are energized manually. The red lamps are automatically energized, and amber lamps are automatically de-energized when stop signal arms are extended or when the bus entrance door is opened.

    The above-mentioned activation sequence can be accomplished with either a *"sequential operation"* or a *"non-sequential operation"* warning lamp system. While each of the systems can be configured to include components such as a master switch, amber activation switch,

interrupt switch, etc., the presence (or absence) of these components does not affect the classification of the system as either *sequential* or *non-sequential*. Both *sequential* and *non-sequential* systems can be configured with a multitude of switch combinations to provide a unique system meeting specific user requirements. An amber pilot lamp and a red pilot lamp shall be installed adjacent to the driver controls for the flashing signal lamp to indicate to the driver which lamp system is activated.

c. The background color around the lenses of alternately flashing signal lamps shall be a minimum of one inch and shall be black in color.
d. Red lamps shall flash at any time the stop signal arm is extended.
e. All flashers for alternately flashing red and amber signal lamps shall be enclosed in the body in a readily accessible location.

4. Turn Signal and Stop/Tail Lamps
    a. The bus body shall be equipped with amber rear turn signal lamps that are at least 7 inches in diameter or, if a shape other than round, Federal Motor Vehicle Safety Standards 571.108, Lamps, Reflective Devices, and Associated Equipment. These signal lamps must be connected to the chassis hazard warning switch to cause simultaneous flashing of turn signal lamps when needed as a vehicular traffic hazard warning. Turn signal lamps are to be placed as wide apart as practical and their horizontal centerline shall be a maximum of 12 inches below the rear window.
    b. 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 entrance door.
    c. Buses shall be equipped with four combination red stop/tail lamps.
        i. Two combination lamps with a minimum diameter of seven inches, or if a shape other than round, a minimum 38 square inches of illuminated area shall be mounted on the rear of the bus just inside the turn signal lamps.
        ii. Two combination lamps with a minimum diameter of four inches, or if a shape other than round, a minimum 12 square inches of illuminated area, shall be placed on the rear of the body between the beltline and the floor line. 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.

d. 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 against any short circuit or intermittent shorts by a fuse circuit breaker, or electronic protection device.
e. An optional **white flashing strobe lamp** may be installed on the roof of a school bus, at a location not closer than 12 inches or more than 6 feet from the rear of the roof edge. However, if the bus is equipped with a roof hatch or other roof mounted equipment falling within the above-mentioned measurements, the strobe lamp may be located directly behind that equipment. The lamp shall have a single clear lens emitting light 360 degrees around its vertical axis, meeting the requirements of Society of Automotive Engineers J845, Optical Warning Devices for Authorized Emergency Vehicles. It may not extend above the roof more than a maximum legal height. A manual switch and a pilot lamp shall be included to indicate when lamp is in operation. Optionally, the strobe lamp may be wired to activate with the amber alternately flashing signal lamps, continuing through the full loading or unloading cycle; and may be equipped with an override switch to allow activation of the strobe at any time for use in inclement weather.
f. The bus body shall be equipped with two white rear backup lamps that are at least four inches in diameter or, if a shape other than round, a minimum of 12 square inches of illuminated area and shall meet Federal Motor Vehicle Safety Standards 571.108, Lamps, Reflective Devices, and Associated Equipment. If backup lamps are placed on the same horizontal line as the brake lamps and turn signal lamps, they shall be to the inside.
g. A daytime running lamps (DRL) system shall be provided.

Metal Treatment

1. All metal except high-grade stainless steel or aluminum used in construction of the bus body shall be zinc-coated or aluminum-coated or treated to prevent corrosion. This includes 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.
2. All metal parts that will be painted, in addition to above requirements, shall be chemically cleaned, etched, zinc phosphate-coated and zinc chromate or epoxy-primed to improve paint adhesion. This includes, but is not limited to, such items as crossing control arm and stop arm.

3. In providing for these requirements, particular attention shall be given to lapped surfaces, welded connections of structural members, cut edges on punched or drilled hole areas in sheet metal, closed or box sections, un-vented or un-drained areas and surfaces subjected to abrasion during vehicle operation.
4. As evidence that the above requirements have been met, sample of materials and sections used in construction of the bus body shall be subjected to a cyclic corrosion testing as outlined in Society of Automotive Engineers J1563, Guidelines for Laboratory Cyclic Corrosion Test Procedures for Painting Automotive Parts.

Mirrors

1. The interior glass mirror shall be either laminated or tempered and shall have rounded corners and protected edges. Mirrors shall be 6x16 inches minimum for Type A buses and be 6 x 30 inches minimum for Types of C and D buses.
2. Each school bus shall be equipped with exterior mirrors meeting the requirements of Federal Motor Vehicle Safety Standards 571.111, Rear Visibility. The right-side rearview mirror shall not be obscured by the un-wiped portion of the windshield. Mirrors shall be easily adjustable but shall be rigidly braced so as to reduce vibration.
3. Heated external mirrors may be used.
4. Remote controlled external rear view mirrors may be used.

Mounting

1. The rear body cross member shall be supported by the chassis frame. Except where chassis components interfere, the bus body shall be attached to the chassis frame at each main floor sill in such a manner as to prevent shifting or separation of the body from the chassis under severe operating conditions.
2. Isolators shall be installed at all contact points between body and chassis frame on Types A-2, B, C, and D buses, 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.

Oil Filter

An oil filter with a replacement element shall be provided and connected by flexible oil lines if it is not a built-in or an engine-mounted design. The oil filter shall have a capacity in accordance with the engine manufacturer's recommendation.

Openings

All openings in the floorboard or firewall between chassis and passenger compartment (e.g., for gearshift selector and parking brake lever) shall be sealed.

Overall Length

Overall length of bus shall not exceed 45 feet, excluding accessories.

Overall Width

Overall width of bus shall not exceed 102 inches, excluding accessories.

Passenger Load

1. Actual gross vehicle weight (GVW) is the sum of the chassis weight plus the body weight, plus the driver's weight, plus total seated student weight. For the purposes of calculation, the driver's weight is 150 pounds and for the purposes of calculation, the pupil weight is 120 pounds per pupil.
2. Actual GVW shall not exceed the chassis manufacturer's GVWR for the chassis, nor shall the actual weight carried on any axle exceed the chassis manufacturer's Gross Axle Weight Rating (GAWR).

Public Address System

1. Buses may be equipped with an AM/FM/audio and/or public address system having interior and exterior speakers.
2. No internal speakers, other than driver's communication systems, may be installed within four feet of the driver's seat back in its rearmost upright position.

Retarder System

(Optional)

A retarder system, if used, shall limit the speed of the fully loaded school bus at 19.0 mph on a 7% grade for 3.6 miles.

Retro-Reflective Material

(See APPENDICES B, Retro-reflective Sheeting)

1. The front and/or rear bumper may be marked diagonally 45 degrees down toward the centerline of pavement with two ± ¼ inch-wide strips of non-contrasting retro-reflective material.
2. The rear of the bus body shall be marked with strips of retro-reflective NSBY material to outline the perimeter of the back of the bus using material which conforms to the requirements of meeting Federal Motor Vehicle Safety Standards 571.131, School Bus Pedestrian Safety Devices, *Table 1*. The perimeter marking of rear emergency exits under Federal Motor Vehicle Safety Standards 571.217, Bus

Emergency Exits and Window Retention and Release, and/or the use of retro-reflective "SCHOOL BUS" signs partially accomplishes the objective of this requirement. To complete the perimeter marking of the back of the bus, strips of retro-reflective NSBY material, a minimum of 1 inch and a maximum of 2 inches in width 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 or the bus. Vertical strips shall be applied at the corners connecting these horizontal strips. Multifunctional school activity buses (MFSABs) shall be exempt from these color requirements.

3. “SCHOOL BUS" signs, if not a lighted design, shall be marked with retro-reflective NSBY material comprising background for lettering of the front and/or rear "SCHOOL BUS" signs.
4. Sides of bus body shall be marked with at least 1¾ inch retro-reflective NSBY material, extending the length of the bus body and located (vertically) between the floor line and the beltline.
5. If used, signs placed on the rear of the bus relating to school bus flashing signal lamps or railroad stop procedures may be retro-reflective material.

Road Speed Control

(Optional)

A vehicle road speed limiter may be utilized.

Rub Rail

1. There shall be one rub rail on each side of bus located at, or no more than 8 inches above, the seat cushion level. They shall extend from the rear side of the entrance door completely around the bus body (except at the emergency door or any maintenance access door) to point of curvature near the outside cowl on the left side.
2. There shall be one additional rub rail on each side located 10 inches or less above the floor line. The rub rail shall cover the same longitudinal span as the upper rub rail, except at the wheel housing, and it shall extend only to the longitudinal tangent of the right and left rear corners.
3. Rub rails above the floor line shall be attached at each body post and at all other upright structural members.
4. Each rub rail shall be four inches or more in width in its finished form and shall be constructed of 16-gauge metal or other material of equivalent strength suitable to help protect body side panels from damage. Rub rails shall be constructed in corrugated or ribbed fashion.

5. Rub rails shall be applied outside the body or outside body posts. (Pressed-in or Snap-on rub rails do not satisfy this requirement.) For Type A-1 vehicles using the body provided by the chassis manufacturer or for Types A-2, B, C and D buses containing the rear luggage or rear engine compartment, rub rails need not extend around rear corners.
6. 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.

Seat and Restraining Barriers

1. Passenger Seating
    a. School bus design capacities shall be in accordance with Federal Motor Vehicle Safety Standards 571.222, School Bus Passenger Seating and Crash Protection
    b. All seats shall have a minimum cushion depth of 15 inches, a seat back height of 24 inches above the seating reference point, and must comply with all other requirements of Federal Motor Vehicle Safety Standards 571.222, School Bus Passenger Seating and Crash Protection
    c. All restraining barriers and passenger seats shall be constructed with materials that enable them to meet the criteria of Federal Motor Vehicle Safety Standards 571.302, Flammability of Interior Materials. Also see *National Association of State Directors of Pupil Transportation Services, Position Paper-Flammability Standards on School Buses*.
    d. Each seat leg shall be secured to the floor by bolts, washers, and nuts, in order to meet the performance requirements of Federal Motor Vehicle Safety Standards 571.222, School Bus Passenger Seating and Crash Protection. Flange-head nuts may be used in lieu of nuts and washers.
    e. All seat frames attached to the seat rail shall be fastened with two or more bolts, washers and nuts, or with flange-head nuts. Seats may be track-mounted in conformances with Federal Motor Vehicle Safety Standards 571.222, School Bus Passenger Seating and Crash Protection.
    f. If track seating is installed, the manufacturer shall supply minimum and maximum seat spacing dimensions (applicable to the bus) which comply with Federal Motor Vehicle Safety Standards 571.222, School Bus Passenger Seating and Crash Protection. This information shall be on a label permanently affixed to the bus.
    g. All school bus bodies (including Type A) shall be equipped with restraining barriers which conform to Federal Motor Vehicle

Safety Standards 571.222, School Bus Passenger Seating and Crash Protection.

h. A flip-up seat may be installed at any side emergency door. If provided, the flip-up seat shall conform to Federal Motor Vehicle Safety Standards 571.222, School Bus Passenger Seating and Crash Protection, and aisle clearance requirements of under Federal Motor Carrier Safety Standards 571.217, Bus Emergency Exits and Window Retention and Release. The flip-up 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 clothing being snagged. Flip-up seats shall be constructed to prevent passenger limbs from becoming entrapped between the seat back and the seat cushion when the seat is in the upright position. The seat cushion shall be designed to rise to a vertical position automatically when not occupied.

2. Passenger Restraint Systems
   a. Effective July 1, 2019, all new school buses purchased shall be equipped with a Type 2 shoulder-harness-type seat belt assembly in compliance with Federal Motor Vehicle Safety Standards 571.209, Seat Belt Assemblies, and Nevada Revised Statue 386.837.
3. Pre-School Age Seating
   a. Passenger seats designed to accommodate a child or infant carrier seat shall comply with Federal Motor Vehicle Safety Standard 571.225, *Child Restraint Anchorage Systems.* These seats shall be in compliance with National Highway Traffic Safety Administration, Guideline for the Safe Transportation of Pre-School Age Children in School Buses.
4. Driver Seat
   a. The driver's seat supplied by the body manufacturer shall be a high back seat. The seat back shall be adjustable to 15 degrees minimum, without requiring the use of tools. The seat shall be equipped with a head restraint to accommodate a 5th percentile female to a 95th percentile adult male, as defined in Federal Motor Vehicle Safety Standards 571.208, Occupant Crash Protection.
   b. Type A buses may utilize the standard driver's seat provided by the chassis manufacturer.
5. Driver Restraint System
   a. A Type 2 lap/shoulder belt shall be provided for the driver. On buses where the driver's seat and upper anchorage for the shoulder belt are both attached to the body structure, a driver's seat with an integrated Type 2 lap/shoulder belt may be

substituted. On buses where the driver's seat and upper anchorage for the shoulder belt are separately attached to both body and chassis structures (i.e., one attached to the chassis and the other attached to the body), a driver's seat with an integrated Type 2 lap/shoulder belt should be used.

b. The assembly shall be equipped with an emergency locking retractor for the continuous belt system. On all buses except Type A that are equipped with a standard chassis manufacturers driver's seat, the lap portion of the belt system shall be guided or anchored to prevent the driver from sliding sideways under the belt system. The lap/shoulder belt shall be designed to allow for easy adjustment in order to fit properly and to effectively protect drivers varying in size from 5th percentile adult female to 95th percentile adult male.
c. The belt shall be of a high a visibility contrasting color.
d. Each bus shall be equipped with a durable belt cutter having a full width handgrip and a protected, replaceable or non-corrodible blade. The required belt cutter shall be mounted in a location accessible to the seated driver in an easily detachable manner.

Shock Absorbers

The bus shall be equipped with a double-action shock absorber compatible with manufacturer's rated axle capacity at each wheel location.

Side Skirts

School bus body side skirts between the front and rear axles shall extend down to within 2 inches plus or minus, of the horizontal line from the center of the front spindle to the center of the rear axle. The manufacturer may offer optional side skirt lengths that extend lower than this requirement. This measurement shall apply to a new unloaded school bus located on a flat, level surface.

Steering Gear

1. The steering gear shall be approved by the chassis manufacturer and designed to ensure safe and accurate performance when the vehicle is operated with maximum load and at maximum speed.
2. If external adjustments are required, the steering mechanism shall be accessible to make adjustments.
3. Changes shall not be made to the steering apparatus which are not approved by the chassis manufacturer.
4. There shall be a clearance of at least 2 inches between the steering wheel and cowl, instrument panel, windshield, or any other surface.

5. Power steering is required and shall be of the integral type with integral valves.
6. The steering system shall be designed to provide a means for lubrication of all wear-points that are not permanently lubricated.

Steps

1. The first step at the entrance door shall be not less than 10 inches and not more than 14 inches from the ground when measured from top surface of the step to the ground, based on standard chassis specifications, except that on Type D vehicles, the first step at the entrance door shall be 12 inches to 16 inches from 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.
2. Step risers shall not exceed a height of 10 inches.
   Note: When plywood is used on a steel floor or step, the riser height may be increased by the thickness of the plywood.
3. Steps shall be enclosed to prevent accumulation of ice and snow.
4. Steps shall not protrude beyond the side body line.

Step Treads

1. All steps, including floor line platform area, shall be covered with an elastomer floor covering having a minimum overall thickness of 0.187 inch.
2. The step covering shall be permanently bonded to a durable backing material that is resistant to corrosion.
3. Steps, including floor line platform area, shall have a 1 ½-inch nosing that contrasts in color by at least 70 percent measured in accordance with the contrasting color specification in 36 Code of Federal Regulations 1192, ADA Accessibility Guidelines for Transportation Vehicles.
4. Step treads should have the following characteristics:
   a. **Abrasion resistance:** Step tread material weight loss shall not exceed 0.40 percent, as tested under ASTM D 4060, Standard Test Method for Abrasion Resistance of Organic Coatings by Taber Abraser, (CS-17 Wheel, 1000 gram, 1000 cycle).
   b. **Weathering resistance:** Step treads shall not break, crack, or check after ozone exposure (7 days at 50 phm at 40 degrees C) and weatherometer exposure (ASTM D-750, *Standard Test Method for Rubber Deterioration in Carbon-Arc Weathering Apparatus,* seven days).
   c. **Flame resistance:** Step treads shall have a calculated burn rate of .01 mm per minute or less using the test methods, procedures

and formulas listed in Federal Motor Vehicle Safety Standards 571.302, Flammability of Interior Materials.

Note: A spray on application type material may be used in lieu of item A. that meets the requirements of items B. through D. The material shall be applied not only to the interior surfaces of the service doorstep treads but also to the exterior, if not covered by undercoating.

Stirrup Steps

If the windshield and lamps are not easily accessible from the ground, there may be at least one folding stirrup step or recessed foothold installed on each side of the front of the body for easy accessibility for cleaning. There also may be a grab handle installed in conjunction with the step. Steps are permitted in or on the front bumper in lieu of the stirrup steps if the windshield and lamps are easily accessible for cleaning from that position.

Stop Signal Arm

1. The stop signal arm(s) shall comply with the requirements of meeting Federal Motor Vehicle Safety Standards 571.131, School Bus Pedestrian Safety Devices.
2. School buses over 30 feet shall have two stop signal arms installed on the left side of the bus. The rearmost stop signal arm shall comply with the requirements of meeting Federal Motor Vehicle Safety Standards 571.131, School Bus Pedestrian Safety Devices.
3. The rearmost stop signal arm shall not contain any lettering, symbols, or markings on the forward side.

   Note: MFSABs are exempt from these requirements.

Storage Compartment

(Optional)

A storage container for tools, tire chains, and/or other equipment may be located either inside or outside the passenger compartment. If inside the compartment, it shall be fastened to the floor and have a cover with a positive fastening device.

Sun Shield

1. For Types B, C and D vehicles, an interior adjustable transparent sun shield, with a finished edge and dimensions not less than 6x30 inches, shall be installed in a position convenient for use by driver.
2. On Type A buses, the sun shield (visor) shall be installed by the chassis manufacturer.

Suspension Systems

1. The capacity of springs or suspension assemblies shall be commensurate with chassis manufacturer's GVWR.
2. Rear leaf rear springs shall be of a progressive rate or multi-stage design. Front leaf springs shall have a stationary eye at one end and shall be protected by a wrapped leaf in addition to the main leaf.

Throttle

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

Tires and Rims

1. Rims and tires of the proper size and load rating commensurate with chassis manufacturer's GVWR shall be provided. The use of multi-piece rims and/or Tube-type tires shall not be permitted.
2. Dual rear tires shall be provided on Type A-2, Type B, C, and D school buses.
3. All tires on a vehicle shall be of the same size, and the load range of the tires shall meet or exceed the GVWR as required by 49 CFR 571.120, Tire Selection and Rims for Vehicles with a GVWR of more than 10,000 pounds.
4. If the vehicle is equipped with a spare tire and rim assembly, it shall be the same size as those mounted on the vehicle.
5. If a tire carrier is required, it shall be suitably mounted in an accessible location outside the passenger compartment.

Towing Attachment Points

Front and/or rear towing devices (i.e. tow hooks, tow eyes, or other designated towing attachment points) shall be furnished to assist in the retrieval of buses that are stuck and/or for towing buses when a wrecker with a “wheel lift” or an “axle lift” is not available or cannot be applied to the towed vehicle.

1. Towing devices shall be attached to the chassis frame either by the chassis manufacturer or in accordance with the chassis manufacturer’s specifications.
2. Each towing device shall have a strength rating of 13,500 pounds each, for a combined rating of 27,000 pounds with the force applied in the rearward direction, parallel to the ground, and parallel to the longitudinal axis of the chassis frame rail. For pulling and lifting purposes, tow hooks are meant to be used simultaneously. For pulling, angularity applied to the tow hooks will decrease the capacities of the tow hooks.
3. The towing devices shall be mounted such that they do not project forward of the front bumper or rearward of the rear bumper.

Note: Type A buses are exempt from this requirement for the front tow hooks or eyes due to built-in crush zones.

Traction Assisting Devices

(Optional)

1. Where required or used, shall:
    a. Be of hopper cartridge-valve type.
    b. Have a metal hopper with all interior surfaces treated to prevent condensation of moisture.
    c. Be of at least 100-pound (grit) capacity.
    d. Have a cover that screws in place on the filler opening of hopper, thereby sealing the unit airtight.
    e. Have discharge tubes extending under the fender wheel housing to the front of each rear wheel.
    f. Have no-clogging discharge tubes with slush-proof, non-freezing rubber nozzles.
    g. Be operated by an electric switch with a pilot light mounted on the instrument panel located so as to exclusively be controlled by the driver.
    h. Be equipped with a gauge to indicate that the hopper has reached the one-quarter level (and needs to be refilled).
    i. Be designed to prevent freezing of all activation components and moving parts.
2. Automatic traction chains may be installed.

Transmission

1. Automatic transmissions shall have no fewer than three forward speeds and one reverse speed. Mechanical shift selectors shall provide a detent between each gear position when the gear selector quadrant and shift selector are not steering column mounted.
2. Automatic transmissions shall have a transmission shifter interlock controlled by the application of the service brake to prohibit accidental engagement of the automatic transmission.

Trash Container and Holding Device

(Optional)

When requested or used, the trash container shall be secured by a holding device that is designed to prevent movement and to allow easy removal and replacement. It shall be installed in an accessible location in the driver's compartment, not obstructing passenger access to the entrance door.

Turning Radius

1. A Chassis with a wheelbase of 264 inches or less shall have a right and left turning radius of not more than 42 ½ feet, curb-to-curb measurement.
2. A chassis with a wheelbase of 265 inches or more shall have a right and left turning radius of not more than 44 ½ feet, curb-to-curb measurement.

Undercoating

1. The entire underside of the bus body, including floor sections, cross member and below floor-line side panels, shall be coated with rust-proofing material for which the material manufacturer has issued to the bus body manufacturer a notarized certification to the bus body manufacturer that materials meet or exceed all performance requirements of Society of Automotive Engineers J1959, Corrosion Preventative Compound Underbody Vehicle Corrosion.
2. The undercoating material shall be applied with suitable airless or conventional spray equipment to the undercoating material manufacturer recommended film thickness and shall show no evidence of voids in the cured film.
3. The undercoating material shall not cover any exhaust components of the chassis.

Ventilation

1. Auxiliary fan(s) shall meet the following requirements:
    a. Fans shall be placed in a location where they can be adjusted for maximum effectiveness and where they do not obstruct the driver's vision to the mirrors or interfere with the safe operation of the vehicle.
    b. Fans shall be a six-inch (nominal) diameter.
    c. Fan blades shall be enclosed in a protective cage. Each fan shall be controlled by a separate switch.
    d. The bus body shall be equipped with a suitably controlled ventilating system with capacity sufficient to maintain the proper quantity of air flow under operating conditions without having to open a window except in extremely warm weather.
    e. Static-type, non-closeable exhaust ventilation shall be installed in low-pressure area of roof.
    f. Roof hatches designed to provide ventilation in all types of exterior weather conditions may be provided.

Wheelhousing

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

2. Wheelhousings shall be attached to floor panels in a manner to prevent any dust, water or fumes from entering the body. Wheelhousings shall be constructed of 16-gauge (or thicker) steel.
3. The inside height of the wheelhousings above the floor line shall not exceed 12 inches.
4. The wheelhousings shall provide a clearance for installation and use of tire chains on single and dual (if so equipped) power-driving wheels.
5. No part of a raised wheelhousing shall extend into the emergency door opening.

Windows

1. Other than emergency exits designated to comply with under Federal Motor Carrier Safety Standards 571.217, Bus Emergency Exits and Window Retention and Release. Each side window shall provide an unobstructed opening of at least 9 inches high (but not more than 13 inches high) and at least 22 inches wide, obtained by lowering window. One window on each side of the bus may be less than 22 inches wide.
2. Optional tinted and/or frost-free glazing may be installed in doors or windows.
3. Windshields shall comply with federal, state, and local regulations.

Windshield Washers

A windshield washer system shall be provided.

Windshield Wipers

1. A two-speed or variable speed windshield wiping system, with an intermittent feature, shall be provided and may be operated by a single switch.
2. The wipers shall meet the requirements of Federal Motor Vehicle Safety Standards 271.104, Windshield Wiping and Washing Systems.

Specially Equipped School Bus Specifications

Introduction

The specifications in this section are intended to supplement specifications in the BODY AND CHASSIS section. In general, specially equipped buses shall meet all the requirements of the preceding sections, plus those listed in this section. It is recognized that the field of special transportation is characterized by varied needs for individual cases and by rapidly emerging technologies for meeting individual student needs. A flexible, "common sense" approach to the adoption and enforcement of specifications for these vehicles is prudent.

Definition

A specially equipped school bus is any school bus that is designed, equipped and/or modified to accommodate students with special transportation needs.

General Requirements

1. Specially equipped school buses shall comply with the Federal Motor Vehicle Safety Standards applicable to the Gross Vehicle Weight Rating (GVWR) category.
2. Any school bus to be used for the transportation of children who utilize a wheelchair or other mobile positioning device, or who require life-support equipment that prohibits use of the regular service entrance, shall be equipped with a power lift.

Aisles

All school buses equipped with a power lift shall provide a minimum 30-inch pathway leading from any wheelchair position to at least one 30" wide emergency exit door. A wheelchair securement position shall never be located directly in front of (blocking) a power lift door location.

Glazing

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

Identification

Specially equipped school buses shall display the International Symbol of Accessibility below the window line. Such emblems shall be white on blue or black background, shall not exceed 12 inches square in size and shall be of a high-intensity retro-reflective material–meeting the requirements of Federal Highway Administration Federal Highway Administration FP-14 718, Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects.

Passenger Capacity Rating

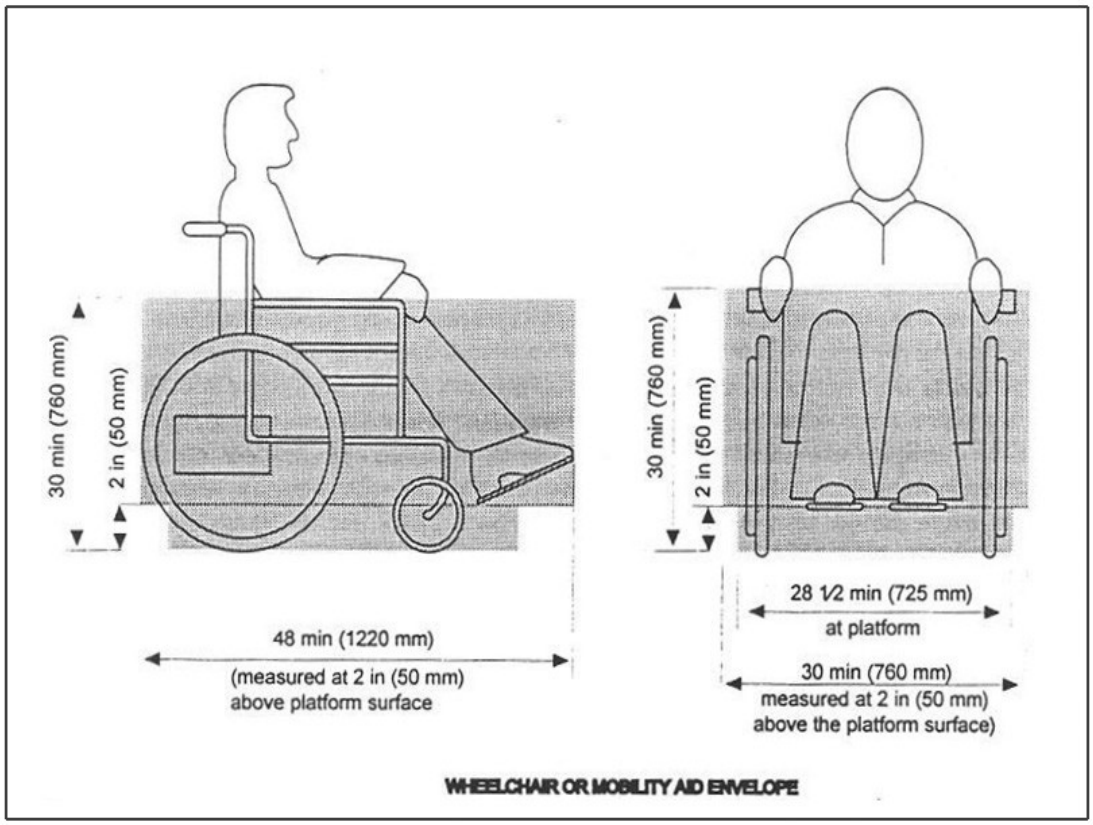
n determining the passenger capacity of a school bus for purposes other than actual passenger load (e.g., vehicle classification or various billing/reimbursement models), any location in a school bus intended for securement of a wheelchair during vehicle operation shall be regarded as four designated seating positions, and each lift shall count as four designated seating positions.

Power Lifts

1. The power lift shall be located on the right side of the bus body. **Note:** The lift may be located on the left side of the bus if, and only if, the bus is only used to deliver students to the left side of a one-way street.
2. Vehicle lift and installation
    a. **General:** Vehicle lifts and installations shall comply with the requirements set forth in Federal Motor Vehicle Safety Standards 571.403, Platform Lift Systems for Motor Vehicles.
    b. **Design Loads:** the design load of the lift shall be at least 800 pounds. Working parts, such as cables, pulleys, and shafts, which can be expected to wear, and upon which the lift depends for support of the load, shall have a safety factor of at least six, based on the ultimate strength of the material. Non-working parts, such as platform, frame, and attachment hardware that would not be expected to wear, shall have a safety factor of at least three, based on the ultimate strength of the material.
    c. **Lift Capacity:** The lifting mechanism and platform shall be capable of operating effectively with a wheelchair and occupant mass of at least 800 pounds.
    d. **Controls:** See Federal Motor Vehicle Safety Standards 571.403, Platform Lift Systems for Motor Vehicles.
    e. **Emergency Operations:** See Federal Motor Vehicle Safety Standards 571.403, Platform Lift Systems for Motor Vehicles,(S6.9).
    f. **Power or Equipment Failures:** See Federal Motor Vehicle Safety Standards 571.403, Platform Lift Systems for Motor Vehicles, (S6.2.2).
    g. **Platform Barriers:** See Federal Motor Vehicle Safety Standards 571.403, Platform Lift Systems for Motor Vehicles, (S6.4.7).
    h. **Platform Surface:** See Federal Motor Vehicle Safety Standards 571.403, Platform Lift Systems for Motor Vehicles, (S6.4.2) and (S6.4.3). Also see "*Wheelchair or Mobility Aid Envelope*" figures at the end of this subsection.

i. **Platform Gaps and Entrance Ramps:** See Federal Motor Vehicle Safety Standards 571.403, Gaps, Transitions and Openings, (S6.4.4).
j. **Platform Deflection:** See Federal Motor Vehicle Safety Standards 571.403, Platform Lift Systems for Motor Vehicles, (S6.4.5).
k. **Platform Movement:** See Federal Motor Vehicle Safety Standards 571.403, Maximum Platform, (S6.2.3).
l. **Boarding Direction:** The lift shall permit both inboard and outboard facing of wheelchair and mobility aid users.
m. **Handrails:** See Federal Motor Vehicle Safety Standards 571.403, Platform Lift Systems for Motor Vehicles-Handrails, (S6.4.9).
n. **Circuit breaker:** A resettable circuit breaker shall be installed between the power source and the lift motor if electrical power is used. It shall be located as close to the power source as possible, but not within the passenger/driver compartment.
o. **Excessive pressure:** See Federal Motor Vehicle Safety Standards 571.403, Platform Lift Systems for Motor Vehicles-Jacking Preventing, (S6.8).
p. **Documentation:** The following information shall be provided with each vehicle equipped with a lift:
    i. A phone number where information can be obtained about installation, repair, and parts. Detailed written instructions and a part's list shall be available upon request.
    ii. Detailed instructions regarding use of the lift shall be readily visible when the lift door is open, including a diagram showing the proper placement and positioning of wheelchair/mobility aids on lift.
q. **Training materials:** The lift manufacturer shall make training materials available to ensure the proper use and maintenance of the lift. These may include instructional videos, classroom curriculum, system test results, or other related materials.
r. **Identification and certification:** Each lift shall be permanently and legibly marked or shall incorporate a non-removable label or tag that states that it conforms to all applicable requirements of the current National School Transportation Specifications and Procedures, 2015. In addition and upon request of the original titled purchaser, the lift manufacturer or an authorized representative shall provide a notarized Certificate of Conformance, either original or photocopied, which states that the lift system meets all the applicable requirements of the current National School Transportation Specifications and Procedures, 2015.

Note: Graphic of wheelchair or mobility aid envelope



Regular Service Entrance

1. On power lift-equipped vehicles, steps shall be the full width of the step well, excluding the thickness of the doors in the open position.
2. In addition to the HANDRAIL required in the BUS BODY AND CHASSIS section, an additional handrail shall be provided on all SPECIALLY EQUIPPED SCHOOL BUSES. This rail shall be located on the opposite side of the entrance door from the rail required in the BUS BODY AND CHASSIS section and shall meet the same requirements for handrails.

Restraining Devices

1. On power-lift equipped school buses with a GVWR of 10,000 pounds or more, seat frames may be equipped with attachment points to which belt assemblies can be attached for use with child safety restraint systems (CSRS's) that comply with Federal Motor Vehicle Safety Standards 571.213, Child Restraint Systems. Any belt assembly anchorage shall comply with Federal Motor Vehicle Safety Standards 571.210, Seat Belt Assembly Anchorages.
2. Alternatively, a child restraint anchorage system that complies with Federal Motor Vehicle Safety Standards 571.225, Child Restraint Anchorage Systems may be installed.

3. Seat belt assemblies, if installed, shall conform to Federal Motor Vehicle Safety Standards 571.209, Seat Belt Assemblies.
4. Child restraint systems, which are used to facilitate the transportation of children who in other modes of transportation would be required to use a child, infant, or booster seat, shall conform to Federal Motor Vehicle Safety Standards 571.213, Child Restraint Systems.

Seating Arrangements

Flexibility in seat spacing to accommodate special devices shall be permitted to meet passenger requirements. All seating shall meet the requirements of Federal Motor Vehicle Safety Standards 571.222, School Bus Passenger Seating and Crash Protection.

Securement and Restraint System for Wheelchairs and Wheelchair-Seated Occupants

For the purposes of understanding the various aspects and components of this section, the term securement and tie down and the phrases securement system or tie down system are used exclusively in reference to the devices that anchor the wheelchair to the vehicle. The term restraint or phrase restraint systems are used exclusively in reference to the equipment that is intended to limit the movement of the wheelchair occupant in a crash or sudden maneuver. The term wheelchair tie down and occupant restraint system (WTORS) is used to refer to the total system that secures the wheelchair and restrains the wheelchair occupant.

1. Wheelchair Tiedown and Occupant Restraint Systems (WTORS)
    a. A wheelchair tie down and occupant restraint system installed in specially equipped school buses shall be designed, installed, and operated for use with forward-facing wheelchair-seated passengers and shall comply with all applicable requirements of Federal Motor Vehicle Safety Standards 571.222, School Bus Passenger Seating and Crash Protection, and Society of Automotive Engineers J2249, Wheelchair Tie Down and Occupant Restraint Systems for Use in Motor Vehicles.
    b. The WTORS, including the anchorage track, floor plates, pockets or other anchorages, shall be provided by the same manufacturer or shall be certified to be compatible by manufacturers of all equipment/systems.
    c. Wheelchair securement positions shall be located such that wheelchairs and their occupants do not block access to the lift door.
    d. A device for storage of the WTORS shall be provided. When the system is not in use, the storage device shall allow for clean

storage of the system, shall keep the system securely contained within the passenger compartment, shall provide reasonable protection from vandalism and shall enable the system to be readily accessed for use.

e. The WTORS, including the storage device, shall meet the flammability standards established in Federal Motor Vehicle Safety Standards 571.302, Flammability of Interior Materials.

f. The following information shall be provided with each vehicle equipped with a securement and restraint system.

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

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

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

2. Wheelchair Securement/Tie down

   a. See Federal Motor Vehicle Safety Standards 571.403, Platform Lift Systems for Motor Vehicles, (S5.4.1, S5.4.2). Each wheelchair position in a specially equipped school bus shall have a minimum clear floor area of 30 inches laterally by 48 inches longitudinally. Additional floor area may be required for some wheelchairs. Consultation between the user and the manufacturer is recommended to ensure that adequate area is provided.

3. Occupant restraint system

   a. See Federal Motor Vehicle Safety Standards 571.403, Platform Lift Systems for Motor Vehicles-Jacking Preventing,(S5.4.3 & S5.4.4). Shall be a retractable combination lap and should belt with a retractable or manual height adjuster on the upper anchorage, attached to the wall. If the upper torso belt anchorage is higher than 44 inches measured from the vehicle floor, an adjustment device, as part of the occupant restraint system, shall be supplied.

Special Light

Doorways in which lifts are installed shall be equipped with a special light that provides a minimum of two foot-candles of illumination measured on the floor of the bus immediately adjacent to the lift during operation.

Special Service Entrance

1. Power life-equipped bodies shall have a special service entrance to accommodate the power lift.
   Note: A special service entrance shall not be required if the lift is designed to operate within the regular service entrance, is capable of stowing such that the regular service entrance is not blocked in any way, and a person entering or exiting the bus is not impeded in any way.
2. The special service entrance and door shall be located on the right side of the bus and shall be designed so as not to obstruct the regular service entrance.
3. The opening may extend below the floor through the bottom of the body skirt. If such an opening is used, reinforcements shall be installed at the front and rear of the floor opening to support the floor and give the same strength as other floor openings.
4. A drip molding shall be installed above the special service entrance to effectively divert water from entrance.
5. Door posts and headers at the special service entrance shall be reinforced sufficiently to provide support and strength equivalent to the areas of the side of the bus not used for special service entrance.

Special Service Entrance Doors

1. A single door or double doors may be used for the special service entrance.
2. A single door may be hinged to the forward side of the entrance unless this would obstruct the regular service entrance. If the door is hinged to the rearward side of the doorway, the door shall utilize a safety mechanism that will prevent the door from swinging open should the primary door latch fail. If double doors are used, the system shall be designed to prevent the door(s) from being blown open by the aerodynamic forces created by the forward motion of the bus, and/or shall incorporate a safety mechanism to provide secondary protection should the primary latching mechanism(s) fail.
3. All doors shall have positive fastening devices to hold doors in the “open” position when the special service entrance is in use.
4. All doors shall be weather sealed.
5. When manually operated dual doors are provided, the rear door shall have at least a one-point fastening device to the header. The forward-mounted door shall have at least three one-point fastening devices. One shall be to the header, one to the floor line of the body, and the other shall be into the rear door. The door and hinge mechanism shall be of a strength that is greater than, or equivalent to, the emergency exit door.

6. Door materials, panels and structural components shall have strength equivalent to the conventional service and emergency doors. Color rub rail extensions, lettering and other exterior features shall match adjacent sections of the body.
7. Each door shall have windows set in a waterproof manner that are visually similar in size and location to adjacent non-door windows. Glazing shall be of same type and tinting (if applicable) as standard fixed glass in other body locations.
8. Door(s) shall be equipped with a device that will actuate an audible or visible signal located in the driver's compartment when door(s) is not securely closed and ignition is in "on" position.
9. A switch shall be installed so that the lift mechanism will not operate when the lift platform door(s) is closed.
10. Special service entrance doors shall be equipped with padding at the top edge of the door opening. The padding shall be at least 3 inches wide and 1 inch thick and shall extend the full width of the door opening.

Support Equipment and Accessories

1. In addition to the belt cutter required in the *Bus Body and Chassis* section, each specially equipped school bus that is set up to accommodate wheelchairs or other assistive or restraint devices with belts attached shall contain an additional belt cutter properly secured in a location to be determined by the purchaser. The belt cutter shall meet the requirements listed in the *Bus Body and Chassis* section, *Seats and Restraining Barriers*.
2. Special equipment or supplies that are used on the bus for mobility assistance, health support, or safety purposes shall meet local, federal, and engineering standards that may apply, including requirements for proper identification. Equipment that may be used for these purposes includes, but is not limited to:
    a. Wheelchairs and other mobile seating devices. (See Securement and Restraint System for Wheelchairs and Wheelchair-seated Occupants.)
    b. Crutches, walkers, canes, and other ambulating devices to assist ambulation.
    c. Medical support equipment. This may include respiratory devices, such as oxygen bottles (which should be no larger than 38 cubic feet for compressed gas) or ventilators. Tanks and valves should be located and positioned to protect them from direct sunlight, bus heater vents or other heat sources. Other equipment may include intravenous and fluid drainage apparatus.

3. Each specially equipped school bus that is set up to accommodate wheelchairs or other assistive restraint devices should be equipped with an emergency evacuation device that is certified and tested to withstand at least 300-pound load when used as an emergency stretcher or drag. This evacuation device shall be properly secured to the bus in a location to be determined by the purchaser.
4. Oxygen tank holders must meet AMD Standard 003.

Technology and Equipment, New

It is the intent of these specifications to accommodate new technologies and equipment that will better facilitate the transportation of students with special needs. New technology and equipment are acceptable for use in specially equipped vehicles if:

1. It does not compromise the effectiveness or integrity of any major safety system. (Examples of safety systems include, but are not limited to, compartmentalization, the eight-lamp warning system, emergency exits and the approved color scheme.
2. It shall not diminish the safety of the bus interior.
3. It does not create additional risk to students who are boarding or exiting the bus or are in or near the school bus loading zone.
4. It does not require undue additional activity and/or responsibility for the driver.
5. It generally increases efficiency and/or safety of the bus, generally provides for a safer or more pleasant experience for the occupants and pedestrians in the vicinity of the bus and/or generally assists the driver and makes his/her many tasks easier to perform.

Alternate Fuels

Introduction

This section is designed to be used as an overview of the alternative fuels being utilized for school transportation. It is not designed to replace current applicable federal, state, manufacturing or safety specifications that may exceed requirements within this section. There may be advancements in engineering and improvements in equipment fabrication methods and operation practices that differ from those specifically called for in this section. Such deviations or improvements may provide safety and may meet the intent of and be compatible with this section. Entities wishing to purchase alternative-fuel school buses should use this section only as a starting point. More detailed specifications, including specific design and performance criteria and safety specifications, should be researched by prospective purchasers of alternative-fuel school buses.

General Requirements

Alternative fuel school buses shall meet the following requirements:

1. Chassis shall meet all standards previously mentioned in *Bus Body and Chassis Standards.*
2. Chassis shall meet all applicable Federal Motor Vehicle Safety Standards (FMVSSs).
3. The fuel system integrity shall meet the specified leakage performance standards when impacted by a moving contoured barrier in accordance with test conditions specified in Federal Motor Vehicle Safety Standards 571.301, Fuel System Integrity, or Federal Motor Vehicle Safety Standards 571.303, Fuel System Integrity of Compressed Natural Gas Vehicles, as applicable.
4. Original equipment manufacturers (OEMs) and conversion systems using compressed natural gas (CNG) shall comply with National Fire Protection Association National Fire Protection Association Standard 52, Vehicular Natural Gas Fuel System Code. Fuel systems using liquefied petroleum gas (LPG) shall comply with National Fire Protection Association 58, Liquid Petroleum Gas.
5. Fuel tank(s) for vehicles of less than 54 passenger capacity powered by LPG or CNG shall have a minimum 40-gallon capacity, Fuel tank(s) for vehicles of 54 or more passenger capacity powered by LPG or CNG shall have a minimum 60-gallon capacity.
6. Natural gas-powered buses may be equipped with an interior/exterior gas detection system. All natural gas-powered buses may be equipped with an automatic or manual fire detection and suppression system.
7. All materials and assemblies used to transfer or store alternative fuels shall be installed outside the passenger/driver compartment.

8. All Types C and D buses using alternative fuel shall meet the same base requirements of BUS BODY and CHASSIS STANDARDS for passenger load.
9. The total weight shall not exceed the vehicle's GVWR when loaded to rated capacity.
10. The manufacturer supplying the alternative fuel equipment must provide the owner and operator with adequate training and certification in fueling procedures, scheduled maintenance, troubleshooting and repair of alternative fuel equipment.
11. All fueling equipment shall be designed specifically for fueling motor vehicles and shall be certified by the manufacturer as meeting all applicable federal, state and industry standards.
12. All on-board fuel supply containers shall meet all appropriate requirements of the American Society for Mechanical Engineering (ASME) code, DOT regulations, or applicable FMVSS and NFPA Standards.
13. All fuel supply containers shall be securely mounted to withstand a static force of eight times their weight in any direction.
14. All safety devices that discharge to the atmosphere shall be vented to the outside of the vehicle. The discharge line from the safety relief valve on all school buses shall be located in a manner appropriate to the characteristics of the alternative fuel. Discharge lines shall not pass through the passenger compartment.
15. CNG buses shall have a positive, quick acting (1/4 turn) shut-off control valve shall be installed in the gaseous fuel supply line, as close as possible to the fuel supply containers. The valve controls shall be placed in a location easily operable from the exterior of the vehicle. The location of the valve controls shall be clearly marked on the exterior surface of the bus.
16. An electrical grounding system shall be required for grounding of the fuel system during maintenance-related venting.
17. Fuel systems identified as compatible with biodiesel must be provided with components compatible with biodiesel conforming to the specifications of American Society for Testing and Materials D6751, Biodiesel Standard.
18. High Voltage-Powered Vehicles: Buses utilizing a high voltage propulsion system (more than 48 nominal volts) shall meet the requirements of Federal Motor Vehicle Safety Standards 571.305, Electric-Powered Vehicles: Electrolyte Spillage and Electrical Shock Protection, except for the following:
    a. The propulsion power source (batteries, fuel cells, etc.) shall be located outside the passenger compartment.

b. The propulsion power source enclosure shall be constructed to conform to the power source manufacturer's requirements and recommendations.
c. 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 constraint of Section S5.1, *Electrolyte Damage from Propulsion Batteries* and the requirements to statically rotate the vehicle on its longitudinal axis post-test.

Appendix A

Terms and Definitions

Access Panel: A body panel which must be moved or removed to provide access to one or more serviceable components.

Accessibility: Ability of vehicles and facilities to accommodate people with mobility impairments.

ADA: American's with Disabilities Act, PL 101-336, 42 USC 12101, *et seq.* When referenced in regard to student transportation, ADA generally refers to the specifications of 49 USC 38, Americans with Disabilities Act Accessibility Specification for Transportation Vehicles.

Adaptive device: Any item or piece of equipment used to increase, maintain, or improve functional capabilities of children with disabilities; also known as *assistive technology device.*

Advanced EGR (A-EGR): An exhaust gas recirculation system (EGR) utilizing advanced electronic fuel management systems combined with proprietary piston bowl design and twin turbo air management systems.

Allowable Alternate Vehicle: A vehicle designed for carrying eleven or more people, including the driver, that meets all Federal Motor Vehicle Safety Standards applicable to school buses except Federal Motor Vehicle Safety Standards 571.108, Lamps, Reflective Devices, and Associated Equipment, and meeting Federal Motor Vehicle Safety Standards 571.131, School Bus Pedestrian Safety Devices. (See also *Multifunctional School Activity Bus* under *Bus.*)

Alternately flashing signal lamps: A system of red or red and amber signal lights mounted horizontally both front and rear, intended to identify a vehicle as a school bus and to inform other users of the highway that the bus is about to stop or is stopped to load or unload children. The system of red and amber signal lamps is available in either sequential or non-sequential operation. Also known as school bus warning lamps, pupil warning lamps, eight light warning systems, alternately flashing warning bus safety light, school bus signal lamp, and alternately flashing school bus warning lights.

> **Sequential Operation:** The system of red and amber signal lamps is designed to operate in sequence. Amber signal lamps must be

activated before the red signal lamps can be activated. (Amber lamps are deactivated when the red lamps are activated.)

Non-Sequential Operation: The system of red and amber signal lamps is designed so that red lamps are activated whenever the entrance doors are opened, regardless of whether the amber lamps have been activated.

Alternative fuel Vehicle (AFV): A vehicle designed to operate on an energy source other than petroleum-based gasoline or diesel fuel. Such fuels include, but are not limited to, CNG, LNG, LPG and electricity.

Bi-fuel: A vehicle designed to operate on two different fuels, but not simultaneously.

Fuel: A vehicle designed to operate on a mixture of two different fuels.

Hybrid power: The use of two or more power sources to provide the motive force for the vehicle (e.g. electricity to drive the wheels with internal combustion to supplement the battery).

AMD: Ambulance Manufacturer Design

Anchorage point: The point of attachment of a securement system or occupant restraint to the vehicle structure.

ANPRM: Advanced Notice of Proposed Rule Making published in the *Federal Register* by a federal agency such as NHTSA, requesting information and inviting comment on a proposed change of regulation.

ANSI: American National Standards Institute; an organization which administers and coordinates the development of voluntary industry standards.

Antilock brakes (ABS): Brake systems with sensors that automatically control the degree of wheel slip during braking and relieve brake pressure on wheels that are about to lock up.

ARB: Air Resources Board; the state agency in California which sets the state's emission standards.

Aspect ratio: Percentage used to express the ratio of a tire's height to its width; also known as tire Profile.

Assistive device: (See *adaptive device.*)

ASTM: American Society for Testing and Materials; a voluntary standards development organization and a source for technical standards for materials, products, systems and services.

Bi-Fuel: Used to describe a bus capable of running on either of two fuels, although not simultaneously. Engines which can be switched to run on either CNG or gasoline are examples.

Biodiesel: Vehicle fuel made from plant or animal matter and used alone or mixed with diesel fuel in engines. B100 or "neat biodiesel" refers to the pure form. Biodiesel can be mixed with petrodiesel in any proportion, but the most common form is B20, which is 20 percent biodiesel and 80 percent petrodiesel. Biodiesel, as defined in ASTM D 6751, is registered with the US EPA as a fuel and a fuel additive under Section 211(b) of the Clean Air Act.

Blood Borne Pathogens: Common name for standards adopted by OSHA in 29 CFR 1910 to protect works against the health hazards of exposure to blood and other potentially infectious body fluids or materials; also refers to the pathogenic microorganisms present in human blood.

Body Fluid Cleanup Kit: Package of materials including, but not limited to, latex gloves, disposal bag, and absorbent material, used to clean up spills of potentially infected bodily fluids, under OSHA's Blood Borne Pathogens regulations and Universal Precautions practices.

Booster Seat: A firm platform, used with a lap-shoulder belt, that raises the child so that the height of his thighs and shoulders are closer to those of an adult and helps route both portions of the lap-shoulder belt to fit the smaller body; also called *belt positioning booster.*

Brake: A device or mechanism used to retard and stop the speed of a moving vehicle or to prevent the movement of a stopped vehicle.

> **Emergency Brake:** A mechanism designed to stop a motor vehicle after a failure of the service brake system.
>
> **Foundation Brake:** An assembly of the non-rotational components of a brake including its mechanism for developing a frictional force.
>
> **Retarder:** An auxiliary braking device used to reduce brake wear and/or improve braking performance.

Service Brake: The primary mechanism designed to retard and stop a moving vehicle.

Parking Brake: A mechanism designed to prevent the movement of a stationary motor vehicle.

Brake Fade: A condition that occurs as brakes become less effective.

BTU: British Thermal Unit; a unit of work or energy known as a British Thermal Unit. One BTU is the energy required to increase the temperature of one pound of water by one-degree Fahrenheit.

Bus: A motor vehicle with motive power, except a trailer, designed for carrying more than 10 persons.

Activity Bus: A bus owned, leased or contracted by a school district and regularly used to transport students on field trips, athletic trips, or other curricular or extracurricular activities, but not used for to-and-from school transportation; Must meet all FMVSS for school buses.

Charter Bus: A bus that is operated under a short-term contract with a school district or other sponsor who has acquired the exclusive use of the vehicle at a fixed charge to transport students to a school-related event.

DOT Bus: A school bus that meets the FMCSR standards for interstate transportation set forth in 49 CFR 390.

Nonconforming Bus: Any vehicle designed to carry more than ten passengers that are used to transport children to or from school or school-related activities which does not meet the federal standards to school buses.

School Bus: A bus owned, leased, contracted or operated by a school or school district and regularly used to transport students to and from school or school-related activities, but not include a charter bus or transit bus. A school bus must meet all applicable FMVSS's and is readily identified by alternately flashing lamps. National School Bus Yellow paint and the legend "School Bus" except as may be provided for the multifunction school activity bus.

Type A: A Type "A" school bus is a conversion or bus constructed utilizing cutaway front-section vehicle with a left side driver's door. This definition includes two classifications: Type A-1, with a Gross Vehicle Weight Rating (GVWR) of 14,500 pounds or less; and Type A-2, with a GVWR greater than 14,500 and less than or equal to 21,500 pounds.

Type B: A Type “B” school bus is constructed utilizing a stripped chassis. The entrance door is behind the front wheels. This definition eludes two classifications: Type B-1, with a GVWR of 10,000 pounds or less: and Type B-2 with a GVWR greater than 10,000 pounds.

Type C: A Type “C” school bus is constructed utilizing a chassis with a hood and front fender assembly. The entrance door is behind the front wheels; also known as a *conventional school bus.* This type also includes cutaway truck chassis or truck chassis with cab with or without a left side door and a GVWR greater than 21,500 pounds.

Type D: A type “D” school bus is constructed utilizing a stripped chassis. The entrance door is ahead of the front wheels; also known as rear or front engine transit style school buses.

Multifunction School Activity Bus (MFSAB): A school bus whose purposes do not include transporting students to and from home or school bus stops,” as defined in 40 CFR 571.3. This subcategory of school bus meets all FMVSS for school buses except the traffic control requirements (alternately flashing signal and stop arm).

Specially Equipped: A school bus designed, equipped, or modified to accommodate students with special needs.

School Activity Bus: Any motor coach other than a school bus or transit bus used for the transportation of any students enrolled in a public or private school at, or 3 below, the 12th grade level, to or from school-related activities.

Bus Body: The portion of a bus that encloses the bus occupant space exclusive of the bumpers, the chassis frame, and any structure forward of the forward most point of the windshield mounting.

Bus Yard: An area for storage and maintenance of buses.

CAA: Clean Air Act; also known as CAAA, The Clean Air Act Amendments of 1990.

Cam Wrap: A seat-mounted system for attaching a safety harness to a school bus seat.

Capacity: (See *seating capacity*.)

Capital Costs: Long-term costs associated with the purchase of vehicles, buildings, and property.

Captive: Refers to a non-removable attachment, part, or fitting on a securement system.

Carbon Monoxide: A product of incomplete combustion; this gas is colorless, odorless, very poisonous and does not contribute to smog.

Carrier: Any public school district, any public or private educational institution providing preschool elementary or secondary education, or any person, firm or corporation under contract to such a district or institution, engaged in transporting students.

Catalytic Converter: An exhaust after-treatment device containing a catalytic material this is used to burn off or reduce unburned fuel or gases and thus reduce emissions, particularly NOx and hydrocarbons. Diesel converters run at cooler temperatures than gasoline converters and require different catalysts.

CDL: Commercial Driver's License.

CDLP: Commercial Driver's Learners Instructional Permit.

Cetane Number: A measure of self-ignition properties of a fuel after injection in a diesel engine. It relates to the knock properties of fuel. The higher the number, the more easily the fuel will ignite under compression; therefore, higher cetane fuels are usually preferred in diesel engines.

CFR: Code of Federal Regulations.

Chassis: Vehicle frame with all operating parts including engine frame, transmission, wheels and brakes.

Chassis Starting Interlock Circuit: A device which prevents the engine of a bus from starting if any of the emergency exits are locked.

Clean Diesel: A combination of improved emission controls and cleaner-burning diesel fuel (see ULSD) that significantly reduces the pollutants from diesel engines. Can refer to new vehicles that meets EPA's 2007 or 2010 standards or to older vehicles retrofitted with emission control technology.

CMV: Commercial Motor Vehicle as defined in 49 CFR 390.5.

CMVSA: Commercial Motor Vehicle Safety Act of 1986; among other things, authorization for CDL.

CNG: Compressed natural gas.

Combustible Gas Sensor: Detector capable of sending the presence of natural gas.

COWHAT: A group comprised of safety experts, rehabilitation engineers, clinicians, manufacturers, and other stakeholders who work under the auspices of RESNA to develop voluntary equipment standards related to providing safer transportation for wheel-chair-seated occupants of motor vehicles.

Crash, School Bus: (1) A motor vehicle collision involving a school bus with or without a student on board, resulting in any personal injury or death or any disabling damage to one or more motor vehicles requiring the vehicle(s) to be transported away from the scene by a tow truck or other vehicle; or (2) A collision involving any vehicle with any student or with a school bus at any time during the loading or unloading process.

Preventable: A crash that could have been prevented by reasonable action on the part of the school bus driver.

Reportable: A crash required to be reported under FMCSR (i.e., a crash involving a CMV on a public road in which there is a fatality or an injury treated away from the scene, or that requires a vehicle to be towed from the scene.

Crossing Arm: A device attached to the front bumper of a school bus that is activated during loading and unloading and designed to force the students to walk far enough away from the front of the bus to be seen by the driver; also known as *crossing control arm.*

Cryogenic: Relates to storage and use at very low temperatures. LNG requires cryogenic systems.

CSRS: Child Safety Restraint System; a device (other than lap or lap/shoulder seatbelts) meeting the requirements of Federal Motor Vehicle Safety Standards 571.213, Child Restraint Systems, designed for use in a motor vehicle to restrain, seat or position a child who weighs 30 kg (66 lb.) or less; also known as child safety seat and car seat.

Curb Weight: The weight of a motor vehicle with standard equipment, maximum capacity of engine fuel, oil, and coolant, and, if applicable, air conditioning and additional weight of optional engine, but without passengers.

Deadhead: Movement of a bus without passengers (e.g., from school to bus yard).

Dealer: Any person who is engaged in the sale and distribution of new motor vehicles or motor vehicle equipment primarily to purchases who, in good faith, purchase any such vehicle or equipment for purposes other than resale.

Decibel (dB): A unit used to express the relative intensity of a sound as it is heard by the human ear. The decibel measuring scale is logarithmic. Zero (0 dB) on the scale is the lowest sound level that a normal ear can detect under very quiet ("laboratory" conditions) and is referred to as the "threshold" of human hearing. On a logarithmic scale, 10 decibels are 10 times more intense, 20 decibels are 100 times more intense, and 30 decibels are 1,000 times more intense than 1 decibel.

Decibel "A-Weighted" (dBA): The scale for measuring sound in decibels that assigns weights to different frequency ranges to reduce the effects of low and high frequencies in order to simulate human hearing.

DEF: Diesel Exhaust Fluid: The reactant necessary for the functionality of the SCR system. It is prepared by dissolving solid urea to create 32.5 percent solution in water. DEF breaks down into ammonia (NH_3) and reacts with NOx in the SCR system to produce Nitrogen (N_2) and water (H_2O).

DHS: Department of Homeland Security.

Distributor: Any person or company primarily engaged in the sale and distribution of motor vehicles and/or motor vehicle parts for resale

DOC: Diesel oxygenation catalyst; devices that use a chemical process to break down pollutants in the exhaust stream of diesel engines into less harmful components.

DOT: Department of Transportation.

Downtime: The period when a vehicle is not in service (e.g. due to mechanical failure or scheduled maintenance.)

DPF: Diesel particulate filter; Ceramic devices that collect particulate matter in the exhaust stream of diesel engines. The high temperature of the exhaust heats the ceramic structure and allows the particles inside to break down (or oxidize) into less harmful components.

DRL: daytime running lights; Head lamps that operate automatically at a reduced voltage during the day to increase the vehicle's visibility.

Dual Brake System: (See *split brake system.*)

Dual Fuel Engine: Also known as flex fuel. Used to describe a gasoline-methanol dual fuel engine using mixtures of gasoline and methanol, such as M85, which is 15 percent gasoline and 85 percent methanol. Dual-fuel engine can also refer to engines operating on any other mixture of fuels simultaneously, such as engines which run on a mixture of CNG and diesel.

DVIR: driver vehicle inspection report; Federal, state or local approval form for reporting results of pre-trip and post-trip inspections.

Dynamic Testing: The process of subjecting vehicle, mobility aid, or mobility aid/securement system components to a simulated crash condition.

EDR: Event data recorder; a device which records vehicle functions (e.g. speed change during a crash).

Effective Date: The date at which a regulation or standard takes effect, on or after which compliance is legally required.

EGR: Exhaust gas recirculation; a type of in-cylinder NOx reducing technology that involves the re-introduction of metered quantities of cooled exhaust gas back into the cylinder as it fills with air, displacing some of the air volume and hence some of the oxygen. Replacing a proportion of this oxygen reduces the NOx formed during combustion.

Elastomer: An elastic substance occurring naturally, as natural rubber, or produced synthetically (e.g., butyl rubber, vinyl, etc.)

Electronic Voice Communication System: A means by which the driver of a vehicle can communicate with a dispatcher or other person at a remote location (e.g., two-way radio, cellular phone).

Emergency Roof Exit: An opening in the roof of the bus meeting the requirements of under Federal Motor Carrier Safety Standards 571.217, Bus Emergency Exits and Window Retention and Release which provides emergency egress and sometimes ventilation; also known as *roof hatch*.

EOBR: Electronic on-board recorders; an electronic device that collects, stores, and displays data relative to driver and vehicle performance, including such elements as location, time, speed, and distance traveled.

EPA: United State Environmental Protection Agency

Ergonomics: The study of the design of equipment to reduce human fatigue and discomfort.

Ethanol: Grain alcohol, distilled from fermented organic matter and used as a vehicle duel.

FAPE: Free Appropriate Public Education; it refers to special education and related services, including transportation, provided at public expense in accordance with a child's IEP (34 CFR 300.13 and 300.121.)

FCC: Federal Communications Commission

FERPA: The Family Educational Rights and Privacy Act; of 1974, 20 USC 1232. Requires confidentiality of student records in public schools but allows access to necessary information regarding student disabilities and/or health needs to those who have a need to know, including school bus drivers.

FHWA: Federal Highway Administration; an agency of the U.S. Department of Transportation.

Final Rule: Notice published in the *Federal Register* by a federal agency announcing a new or changed regulation.

Final Stage Manufacturer: A person who performs such manufacturing operations on an incomplete vehicle that it becomes a completed vehicle.

FMSCA: Federal Motor Carrier Safety Administration; an agency of the U.S. Department of Transportation; formerly the Office of Motor Carrier Highway Safety within the Federal Highway Administration.

FMCSR: Federal Motor Carrier Safety Regulations; 49 CFT 383, 390-397, and 399; motor vehicle safety and construction standards under FMCSA that apply to commercial motor vehicles and drivers transporting passengers in interstate commerce.

FMVSS: Federal Motor Vehicle Safety Standards; 49 CFR 571. Construction standards under NHTSA that apply generally to all new motor vehicles and motor vehicle equipment.

Formaldehyde: A chemical compound that is a by-product of combustion from engines. Concentrations may be particularly high in emissions from engines fueled by methanol.

Forward Control Bus: A school bus in which more than half of the engine length is rearward of the foremost point of the windshield base and the steering wheel hub is in the forward quarter of the vehicle length; also known as *transit-style* or school bus Type D).

Forward-Facing: Installation of a seat (fixed bus seat or secured mobile seating device) in such a way that the mobile seating device and its occupant face the front of the vehicle when secured.

Four-Point Tiedown: A securement system in which four strap assemblies attach to the wheelchair frame at four separate points, and anchor to the vehicle floor at four separate points.

FSS: Fire suppressant system; a fire extinguisher system installed in the engine compartment of a vehicle and activated automatically in response to a fire sensor or manually in response to an alarm.

FTA: Federal Transit Administration, part of the U.S. Department of Transportation; formerly Urban Mass Transit Administration (UMTA).

Fuel Injection: System that uses no carburetor but sprays fuel directly into the cylinders or into intake manifold.

Fumigate: Literally means “to form a gas or disperse one gas in another.” The term is used to describe the injecting of gas, usually CNG, into the intake air of the engine.

Glazing: The glass or glass-like portion of a window.

Laminated Glass: Any glazing material that consists of one or more sheets of glass and an inboard-facing surface sheet of plastic, the components being held together by intervening plies of plastic interlayer or by the self-bonding characteristic of the inboard plastic layer.

Safety Glass: Glazing material constructed, treated or combined with other material so as to reduce, in comparison with ordinary glass, the likelihood of injury to persons as a result of contact with the glass, either broken or unbroken.

Storm Window: Two or more sheets of safety glazing material separated by an air space to provide insulting properties and fixed in a common frame or mounting.

Tempered Glass: Glazing which consists of glass that has been tempered to meet the properties of safety glass.

GAWR: Gross Axle Weight Rating; the value specified by the manufacturer as the load-carrying capacity of a single axle system, as measured at the tire-ground interfaces.

GPS: Global Positioning System; a satellite tracking system that enables a receiver to compute the position and speed of a vehicle.

Greenhouse Gases: Some of these gases are formed by vehicle emissions causing a rise in temperature of the earth's atmosphere.

Guideline 17: National Highway Traffic Safety Administration, Uniform Guidelines for State Highway Safety Programs.

GVW: Gross Vehicle Weight; the actual weight of the fully loaded vehicle, including all cargo, fluids, passengers, and optional equipment, as measured by a scale.

GVWR: Gross Vehicle Weight Rating; the value specified by the vehicle manufacturer as the load-carrying capacity of a single vehicle as measured at the tire-ground interfaces. For school buses, NHTSA has defined in Title 49 CFR, Section 567.4(g)(3), the minimum occupant weight allowance as 120 pounds per passenger times the number of the vehicles designated seating positions and 150 pounds for the driver. Gross vehicle weight rating shall not be less than the sum of the unloaded vehicle weight, plus the rated cargo load.

Handrail Inspection Tool: A device, formed by tying a half inch hex nut to a 36-inch cord, used to inspect school bus handrails and other areas for possible snagging hazards.

Hazard Lamps: Lamps that flash simultaneously to the front and rear on the right and left sides of a vehicle, used to indicate caution; also known as *four-way flashers*.

Head Protection Zone: The empty space above and in front of each school bus passenger seat which is not occupied by side wall, window, or door structure, the dimensions of which are detailed in Federal Motor Vehicle Safety Standards 571.222, School Bus Passenger Seating and Crash Protection.

Head Start: A program initiated in 1965 to provide comprehensive child development services to pre-school children of predominantly low-income families.

Highway: Any public highway, road, street, alley, parkway, or other place open to public motor vehicle travel.

Horsepower: The measurement of an engine's ability to do work. One horsepower is the ability to lift 33,000 lbs. one foot in one minute.

Hybrid Vehicle: Generally, refers to a vehicle designed to run on electric power and an internal combustion engine.

Hydrogen Fuel Cell: A chemical reaction process to develop electrical current from oxygen and hydrogen.

Hydrocarbon: A gaseous compound formed by incomplete combustion and comprised of unburned and partially burned fuel. It combines with NOx and sunlight to form ozone and is a major contributor to smog.

ICC: The former Interstate Commerce Commission, the economic regulation agency within the Department of Transportation. The agency was disbanded in 1997 as a result of economic deregulation, and most functions transferred to the Federal Highway Administration.

Impact Test: A simulated crash condition which evaluates the ability of a vehicle or any component or device to withstand crash forces; also known as *sled test* or *crash test*.

Inspection: A close examination of a motor vehicle performed in accordance with local, state and/or federal requirements, by an authorized agent of the local, state or federal government.

Integrated Restraint System: A system in which the occupant restraint of an individual in a wheelchair/mobility aid connects directly to, and is dependent upon, the mobility aids securement system's rear strap assemblies.

Intermediate Manufacturer: A person, other than the incomplete vehicle manufacturer or the final-stage manufacturer who performs manufacturing operations on an incomplete vehicle.

International Symbol of Accessibility: A white emblem on blue background used to indicate that a vehicle can accommodate individuals with disabilities.

Lap/shoulder belt: A Type 2 belt assembly meeting the requirements of Federal Motor Vehicle Safety Standards 571.209, Seat Belt Assemblies and intended to limit the movement of the pelvis and upper torso.

LATCH System: Lower Anchors and Tethers for Children system: Incorporates standardized hardware in vehicle seats including the lower anchorages and the upper tether anchorage. It is designed to allow installation of CSRS without using the vehicles seat belt system. All CSRSs sold in the US after 2002 are required to be LATCH compatible.

LEA: Local Education Authority

LED: Light emitting diode; an electronic semiconductor device that emits light when an electric current passes through it. LEDs are commonly used in lamps and digital displays.

Lean Burn: Uses more air than is needed for theoretical complete combustion. This added air allows combustion to take place at a lower temperature, thus reducing the emission of NOx and CO.

LED: Light Emitting Diodes. An electronic semiconductor device that emits light when an electric current passes through it. LEDs are commonly used in lamp and digital displays.

Life Cycle Procurement: A procurement contract based on both the initial capital cost and the cost of operation over the life of a vehicle, intended to identify the most cost-effective time to replace as asset.

Lift: (See *power lift*.)

LNG: Liquefied Natural Gas

Load Factor: The ratio of passengers actually carried to the vehicle's passenger capacity.

Low-Bid Procurement: Competitive procedure in which the lowest bidder is awarded the contract. See also *Performance-Based procurement.*

Low-Floor Vehicle: A bus in which the floor and entrance are closer to the ground, for easier access by students with disabilities or preschoolers.

Longitudinal: Parallel to the longitudinal centerline of the vehicle, front to rear.

LPG: Liquefied Petroleum Gas; also known as *propane.*

Manufacturer: Any person engaged in the manufacturing or assembling of motor vehicles or items of motor vehicle equipment, including any person importing motor vehicle equipment for resale.

MFSAB: (See multifunction school activity bus under Bus)

Minibus: A small school bus, usually a TypeA-1 or A-2 or Type B-1 or B-2.

Mirrors: The system of mirrors required to be installed on school buses in accordance with Federal Motor Vehicle Safety Standards 571.111, Rear Visibility, and applicable state laws.

Crossview: Convex mirrors mounted on the front of the school bus and designed for student detection during loading and unloading, also known as *System B mirrors* and including *elliptical, quadric-spherical, banana, or standard convex mirrors*.

Driving: Flat and convex mirrors mounted on each side of the bus designed for viewing the road along the sides to the rear while driving; also known as *rearview, double nickel, west coast, or System A mirrors*.

MIS: Management Information System; a means of data collection for analysis by management.

Mobility Aid: A wheelchair, walker, crutch, cane, or other device that is used to support and help convey a person with a physical disability.

Mobile Seating Device: A mobility aid designed to support a person in the seated position.

Modesty Panel: A panel located in front of a seat or row of seats to preserve the modesty of the passengers, usually supported by a stanchion and cross bar, and does not meet the performance standards of a *barrier* as defined in Federal Motor Vehicle Safety Standards 571.222, School Bus Passenger Seating and Crash Protection. Also, a short panel which extends from the bottom of a barrier to or near to the floor for the purpose of reducing the draft from the entrance door-also known as kick panel.

Motor Carrier or Carrier: The registered owner, lessee, licensee of any vehicle who operates or directs the operations of any such vehicle on either a for-hire or not-for-hire basis.

MPV: Multipurpose Passenger Vehicle; any vehicle with a seating capacity of ten or fewer, including the driver, which is built on a truck chassis, or with special features for occasional off-road use.

NASDPTS: National Association of State Directors of Pupil Transportation Services; a membership organization primarily comprised of state officials responsible for student transportation.

National School Bus Yellow: The color defined in the publication "National School Bus Color Standard" SBMTC-008.

Nebula Combustion Chamber: A unique high-turbulence combustion chamber in the top of a piston, which is particularly effective in efficient burning of lean gas-air mixtures.

Neutral Safety Switch: A device which prevents the bus from starting unless the transmission is in neutral gear or the clutch is depressed.

NFPA: National Fire Protection Association.

NGV: Natural Gas Vehicle.

NHTSA: National Highway Traffic Safety Administration; an agency of the U.S. Department of Transportation.

NIST: National Institute of Standards and Technology.

NOx (Oxides of Nitrogen): A regulated diesel emission which is a collective term for gaseous emissions composed of nitrogen and oxygen.

Nominal Dimension: A dimension which exists in name only (e.g. 5/8-inch plywood which is actually 19/32 inch thick, but is 5/8-inch nominal thickness). The variation between the actual dimension and the nominal dimensions is the result of manufacturing practices and tolerances.

Non-Conforming Van: A vehicle smaller that a bus, designed to carry seven to ten passengers and used to transport students, which does not meet FMVSS for school buses.

NPRM: Notice of Proposed Rulemaking; a notice published in the Federal Register by a federal agency of a proposed change in regulation.

NSC: National Safety Council.

NSBY: National School Bus Yellow: (See also SBMTC-008 for colorimetric specifications)

NSTA: National School Transportation Association, a membership organization comprising primarily school transportation contractor companies.

NSTSP: National School Transportation Specifications and Procedures; a publication of the National Congress on School Transportation.

NTSB: National Transportation Safety Board, an independent federal agency authorized by Congress to investigate accidents and to issue safety recommendations.

Occupant: A person who occupies space inside a school bus; refers to both passenger and driver.

Octane Number: A measure of anti-knock properties of a fuel that relates to spark ignition engines. The higher the number, the more resistant to knocking. Higher output and more efficient engine designs can be used with higher octane fuel.

OEM: Original Equipment Manufacturer.

On-board monitoring system: Computerized tracking of driver and vehicle performance, including speed, fuel consumption, etc. (See also *EOBR.*)

OSHA: Occupational Safety and Health Administration, an agency of the U.S. Department of Labor.

Out of Service: The removal of a school bus from passenger service due to a defective condition.

Overall vehicle width: The nominal design dimension of the widest part of the vehicle, exclusive of signal lamps, marker lamps, outside rearview mirrors, flexible fender extensions, and mud flaps, determined with the doors and windows closed and the wheels in the straight-ahead position.

Overhang: The distance from the center of the rear axle to the rearmost end of the body or from the center of the front axle to the forward edge of the front bumper.

Ozone: A pollutant formed from nitrogen oxides (NOx), hydrocarbons and sunlight. This gas has an irritating odor, is poisonous and is used as an oxidizing agent for bleaching.

P.A. system: Public address system which allows the driver of a bus to communicate with persons inside and/or outside the bus through a speaker installed on the inside and/or outside of the bus; also known as *external loudspeaker*.

Parallel restraint system: A system in which the occupant restraint lap belt anchors directly to the floor track or plates and is independent of the wheelchair/mobility aid securement system.

Parking pawl: A device fitted to a motor vehicle's automatic transmission designed to engage when the transmission shift lever selector is placed in the PARK position. The parking pawl locks the transmission's output shaft, stopping the shaft (and thus the driven wheels) from rotating.

Particulates: Small solid particles (soot, etc.) formed by engine combustion. Visible particulates are seen in smoke; however, invisible particles may be present in smokeless exhaust.
Particulate trap: An exhaust treatment device used to collect (trip) and periodically burn of particulates and other potential problem emission gases formed in engine exhaust. (See also DPF)

Passenger: A person who rides in a school bus but does not operate it. (See also *occupant.)*

Passenger compartment: Space within the school bus interior measured from a point 30 inches ahead of the forward most passenger seating reference point (SRP) rearward to the inside surface of the rear end of the bus at the center of the rear emergency exit.

Passenger miles: The total number of miles traveled by the aggregate number of passengers on a vehicle. (Example: Two students traveling four miles would equal 8 passenger miles and five students traveling three miles would equal 15 passenger miles-totaling 23 passenger miles.)

Performance base procurement: Competitive procedure in which contracts are awarded based on a combination of price and past performance; also known as Best Value Procurement.

Pilot ignition engine: An engine using a small quantity of diesel fuel to provide an ignition source for an alternative fuel that will not ignite on its own in a compression cycle.

Port Injection: Similar to the throttle body system except that the fuel is injected near each cylinder intake port. The injectors and their controls can be individually controlled for maximum performance and emissions control.

Postural support: a seat, belt or other component used to support a child with disabilities in a desired position but not designed or intended to provide occupant restraint in a crash; also known as *positioning device.*

Power base: A powered, wheeled platform used to mount a seating device for carrying an individual with a disability; usually characterized by smaller diameter tires.

Power cut-off switch: A device that cancels all power from the vehicle batteries.

Power lift: A mechanized platform designed to provide access to a vehicle for an occupied mobility aid/wheelchair; also known as a *wheelchair lift*.

Powertrain: The group of components used to transmit engine power to the wheels; includes engine, transmission, universal joints, driveshaft, drive axles and gears; also known as *drivetrain*.

Pphm: Parts per hundred million

Pusher: A school bus in which the engine is mounted in the rear of the vehicle; also known as *rear-engine bus*. (See also *School Bus, Type D*.)

Pushout Window: A bus window that is hinged at the top or front to enable the window to be swung upward or outward relative to the side of the bus and provide a means of emergency egress from the bus; also known as *emergency window*.

Reflective: Refers to the property of materials that cause them, when they are illuminated, to reflect the fight to some extent.

Reformulated Gasoline: Also known as "oxygenated gasoline," reformulated gasoline has oxygen added to improve combustion and reduce emissions.

Remanufactured: Refers to a vehicle component that has been structurally restored.

Repower Installation: A dedicated natural gas or other engine which was not part of the original chassis at the time of manufacturing.

RESNA: Rehabilitation Engineering and Assistive Technology Society of North America, an organization engaged in research and development of assistive technology for persons with disabilities.

Restraining Barrier: An assembly similar to a seat back located immediately in front of a single school bus passenger seat or row of seats to provide crash protection in accordance with Federal Motor Vehicle Safety Standards 571.222, School Bus Passenger Seating and Crash Protection, also known as *barrier, crash barrier, and seat barrier*.

Restraint System: A generic term for one or more devices intended to secure and protect a passenger with or without a mobility aid in a vehicle, including lap/shoulder belts, child safety seats, safety vests, etc.

Restraint/Securement System: (See *Securement and Restraint System.)*

Retractor, Automatic-Locking: A retractor that incorporates adjustment by means of a positive self-locking mechanism which is capable of withstanding restraint forces.

Retractor, Emergency-Locking: A retractor that incorporates adjustment by means of a locking mechanism that is activated by vehicle acceleration, webbing movement relative to the vehicle, or automatic action during an emergency, and that is capable of withstanding restraint forces.

Retroreflective: Refers to material that is designed to direct light back to its source.

RFID: Radio Frequency Identification, use of electromagnetic fields to capture and transfer data.

RFP: Requests for proposals; an invitation to submit a contract proposal, less restrictive than an invitation to bid on a contract.

Rim: The part of the wheel on which the tire is mounted and supported.

Rolling Stock: The vehicles in a transportation system.

Roof Hatch: (See *emergency roof exit*.)

Running Gear: The wheels, axles, springs, frames and other carrying parts of the vehicle.

SAE: Society of Automotive Engineers; the leading standards-writing organization for the automotive industry.

SBMTC: School Bus Manufacturers Technical Council; formerly the School Bus Manufacturers Institute (SBMI); a membership organization within NASDPTS which serves as a technical advisor regarding school buses technology and construction.

School bus equipment: Equipment designed primarily as a system, part or component of a school bus, or any similar part or component manufactured or sold for replacement or as an accessory or addition to a school bus.

School Bus Traffic Warning Lamps: (See Alternately Flashing Signal Lamps.)

SCR: Selective catalyst reduction; A type of NOx reducing technology which uses a chemical reduction (diesel exhaust fluid, or DEF) injected into the exhaust stream where it transforms into ammonia and reacts with NOx on a catalyst, converting the NOx to nitrogen gas and water vapor. The reducing agent needs to be periodically replenished.

Seat: A device designed and installed to provide seating accommodations.

Activity Seat: A seat-designed for passenger comfort with contoured seats and backs with the result that passengers' positions are distinctly separate; characterized by fixed seat backs; may have arm rests and head rests; can

be manufactured to meet Federal Motor Vehicle Safety Standards 571.222, School Bus Passenger Seating and Crash Protection.

Bench Seat: A seat designed to accommodate more than one passenger with no apparent partitioning between positions, which is characterized by fixed legs and a fixed back e.g., the standard school bus sat which meets Federal Motor Vehicle Safety Standards 571.222, School Bus Passenger Seating and Crash Protection.

Davenport Seat: A bench seat that extends from side wall to side wall at the rearmost seating position in the bus; not permitted in school buses.

Flex Seat: A type of bench seat equipped with lap, shoulder seat belts that can be reconfigured so that the number of seating positions on the seat can change. An example is a seat that can be reconfigured to accommodate either three smaller students or two larger students; also known as flexible seating systems or flexible occupancy seats.

Flip Seat: A school bus bench seat designed so that the cushion flips up when the seat is not occupied, similar to a theater seat; used to provide aisle clearance, as required by under Federal Motor Carrier Safety Standards 571.217, Bus Emergency Exits and Window Retention and Release, when a passenger seat is located adjacent to a side emergency door.

Integrated Child Safety Seat: A child safety seat meeting the requirements of Federal Motor Vehicle Safety Standards 571.213, Child Restraint Systems which is built into and thus an integral part of a bench seat.

Jump Seat: A seat designed to fold down to provide supplemental seating in a bus (e.g. in the aisle, in front of the door or along the side wall); not permitted in school buses.

Reclining Seat: An activity seat with a reclining seat back; not permitted in a school bus.

Seat Belt Ready Seat: A bench seat meeting the requirements of Federal Motor Vehicle Safety Standards 571.222, School Bus Passenger Seating and Crash Protection the frame of which is designed for the installation of lap belts or CSRS attachment devised under Federal Motor Vehicle Safety Standards 571.210, Seat Belt Assembly Anchorages.

Seat Belt: A passenger restraint system incorporating lap belts or lap/shoulder belts and meeting the requirements of Federal Motor Vehicle

Safety Standards 571.209, Seat Belt Assemblies, and Federal Motor Vehicle Safety Standards 571.201, Occupant Protection in Interior Impact.

Seating Capacity: The number of designated seating positions provided in a vehicle, including the driver's position. In determining seating capacity, each wheelchair securement location shall be counted as 4 designated seating positions.

Designed Seating Capacity: The theoretical passenger capacity that a vehicle would have if it were constructed with the maximum number of seating positions according to standard seating plans; also known as *Manufacturer's Seating Capacity*.

Equipped Seating Capacity: The number of designated seating positions provided in a new bus per manufacturer's body/seating plan.

Reduced Capacity: The capacity that is achieved when one or more seats are removed from the standard design during or after manufacture of the vehicle.

Seat Position: The space on a school bus bench seat designated for one student. The number of such positions per seat is determined by dividing the width of the seat by 15" and rounding to the nearest whole number, as described in Federal Motor Vehicle Safety Standards 571.222, School Bus Passenger Seating and Crash Protection.

Seating Reference Point: The manufacturer's design point, with coordinates relative to the vehicle structure, which establishes the rearmost normal driving or riding position of each designated seating position and simulates the position of the pivot center of the human torso and thigh.

Securement Points: Locations on the base or seat frame of the wheelchair/mobility aid where the securement system should be attached.

Securement System: The means of securing a mobile seating device to a vehicle in accordance with Federal Motor Vehicle Safety Standards 571.222, School Bus Passenger Seating and Crash Protection, including all necessary buckles, anchors, webbing/straps, and other fasteners.

Securement and Restraint System: The total system which secures and restrains both a wheelchair/mobility aid and its occupant; also known as *WTORS*.

Sensor: An electronic device installed on a school bus for the purpose of detecting animate objects in the loading zone; also known as *object detection system*.

Skid Plate: Stout metal plate attached to the underside of a vehicle to protect the oil pan, transmission, step well or fuel tank from scraping on rocks, curbs, and road surface.

Slack Adjuster: Adjustable device connected to the brake chamber pushrod that transmits brake application force and compensates for lining wear.

Special Equipped School Bus: Any school bus designed, equipped or modified to accommodate students with special needs.

Split-Brake System: A service brake system with two separate hydraulic circuits which, upon failure of either, retains full or partial braking ability.

Stoichiometric Burn: Use of fuel and air (or oxygen) in the exact ratio needed for complete combustion to generate maximum efficiency and power.

State Director: The chief government administrator in charge of a state's student transportation program and responsible for oversight of regulatory functions.

Stop Arm: A device in the form of a red octagon extending outward from the side of a school bus to signal that the bus has stopped to load or unload passengers and meeting Federal Motor Vehicle Safety Standards 571.131, School Bus Pedestrian Safety Devices, also known as *stop semaphore* and *stop signal arm*.

Stopping Distance: Braking distance plus reaction distance.

Braking Distance: The distance a vehicle travels between the time the brakes are applied and the time forward motion ceases.

Reaction Distance: Distance a vehicle travels during the time it takes for a driver to recognize the need to stop and to apply the brakes.

Strobe Light: A bright short duration light that flashes as a result of an electronic discharge of electricity through a gas.

Suspension System: The components of the vehicle that transmit the load of the vehicle's weight from the chassis framework to the ground, including the springs, axles, wheels, tires, and related connecting components.

Temperature Control System: The means of heating or cooling the interior of the vehicle.

Tether: An upper anchor strap used in addition to a seat belt to hold certain types of restraint devices in place.

Throttle Body Injection: A gasoline fuel injection system in which the fuel is injected directly into the air intake pipe or manifold. No carburetor is required; electronics monitor engine variable and control he rate of fuel injected.

Tie-Down Systems: (See *securement system*.)

Tire: The continuous solid or pneumatic rubber elastomeric cushion encircling a wheel intended for contact with the road.

Bias Ply: A pneumatic tire in which the ply cords extending to the beads are laid at alternate angles substantially less than 90 degrees to the centerline of the tire.

Low Profile: A tire that has a section height that is less than 85 percent of its nominal section width (e.g., a tire with an aspect ratio of less than 0.85).

Radial: A pneumatic tire in which the ply cords which extend to the beads are laid substantially at 90 degrees to the centerline of the tread.

Retread: A worn tire casing to which tread rubber has been affixed to extend the usable life of the tire; also known as *re-capped* or *retreaded tire*.
Siped: A tire which has been scored or cut perpendicular to the direction of rotation (across the tread) to improve traction.

Snow: A tire with an obvious aggressive or lug type tread across the entire width which is designed to be self-cleaning.

Studded: A tire to which metal protrusions have been added to improve traction.

Tire Cords: The strands forming the reinforcement structure in a tire.

Tow Devices: Attachments on the chassis frame for use in retrieving a stuck vehicle and/or for towing the vehicle backwards or forwards; also known as *tow eyes, tow hoods or towing attachment points.*

Track Seating: A seating system in which seating units, including mobility aids, are secured to the vehicle structure by attaching them to tracks on the vehicle floor.

Transverse: Perpendicular to the longitudinal centerline of the vehicle (i.e. from side to side).

TSA: Transportation Security Administration; an agency of the Department of Homeland Security.

Turbocharger: A device which uses the pressure of exhaust gases to drive a turbine that, in turn, pressurizes air normally drawn into the engine's chambers.

Turnkey: Partial privatization in which a school district hires a company to supply drivers, maintenance management, and/or vehicles; also known as *management contract.*

Two-Way Radio: Electronic communication system which uses a designated airway for transmission between a bus and a base station.

UL: Underwriters Laboratory

ULSD: Ultra-low sulfur diesel; Diesel fuel that has a sulfur content of not more than 15 ppm (parts per million). Regular diesel fuel has a sulfur content of 200 ppm.

Unloaded Vehicle Weight: The weight of vehicle with a maximum capacity of all fluids necessary for operation, but without cargo or occupants or accessories that are ordinarily removed from the vehicle when they are not in use.

Universal Precautions: Method of infection control designed to protect the individual from exposure to disease, which requires that all bodily fluids and secretions are treated as though they were infectious.

UST: Underground storage tank.

Vapor Lock: Boiling or vaporization of fuel in the lines from excessive heat, which interferes with liquid fuel movement and in some cases stops the flow.

Vehicle miles: The aggregate number of miles a vehicle travels in any given period.

Video System: A means of monitoring student behavior in a school bus. The system includes one or more video cameras to tape activity. Camera housing unites mounted in each bus appear to hold a camera, whether or not one is actually in place; also known as *surveillance*.

VIN: Vehicle Identification Number; a series of Arabic numbers and Roman letters which is assigned to a motor vehicle for identification purposes.

Viscosity: A measure of internal resistance to flow or motion offered by a fluid lubricant.

WC-19: A voluntary industry standard that establishes minimum design and performance requirements for wheelchairs that are occupied by users traveling in motor vehicles. The standard applies to a wide range of wheelchair types and styles, including manual wheelchairs, powerbase wheelchairs, three-wheeled scooters, tilt-in-space wheelchairs, and specialized mobile seating bases with removable seating inserts.

Weight Distribution: The distribution proportion of the vehicle load divided between the front and rear axles.

Wheel: A rotating load-carrying member between the tire and the hub, usually consisting of two major parts, the rim and the wheel disc, which may integral, permanently attached or detachable.

Ball Seat Nut Mounting: A wheel mounting system wherein the wheel centering is provided by the wheel mounting studs and the ball seat nuts which, when properly tightened, assure the centering alignment of the wheel.

Disc: The part of the wheel which is the supporting member between the hub and the rim.

Disc Wheel: A permanent combination of a rim and wheel disc.

Hub: The rotating outer member of the axle assembly which provides for wheel disc mounting.

Locking Ring: A removable, split rim ring that holds the rim flange in place on a multi-piece rim.

Piloted Hub Mounting: A wheel mounting system wherein the wheel centering is provided by a close fit between the wheel disc and the hub.

Rim: The part of the wheel on which the tire is mounted and supported.

Spoke Wheel: A rotating member which provides for mounting and support of one or two demountable rims; also known as *wheel for demountable rim*.

Wheelbase: The distance between the centerline of the front axle and the centerline of the rear axle.

Wheelchair: A seating system comprising at least a frame, seat, and wheels, for the support and mobility of a person with physical disabilities; also known as *mobile seating device.*

Wheelchair Lift: (See *power lift*.)

WTORS: Wheelchair tie down and occupant restraint system

ZEB: Zero-emissions bus.

ZEV: Zero-emissions vehicles.

Appendix B

School Bus Yellow, Retroreflective Markings and Noise Test

National School Bus Yellow

The color known as National School Bus Yellow (NSBY) is specified in School Bus Manufacturer's Technical Council (SBMTC) National School Bus Yellow Color Standard SBMTC-008.

S1: Scope

This standard defines the color for a newly manufactured school bus having "National School Bus Yellow" by fundamental colorimetric data.

S2: Purpose

This standard is intended for use by manufacturers of school bus type vehicle body and chassis for purposes of procurement, and inspection.

S3: Application

This standard applies to school buses.

S4: Color Definition

The color "National School Bus Yellow" is defined as the color resulting from the colorimetric tri-stimulus data shown below.

S5: Requirements

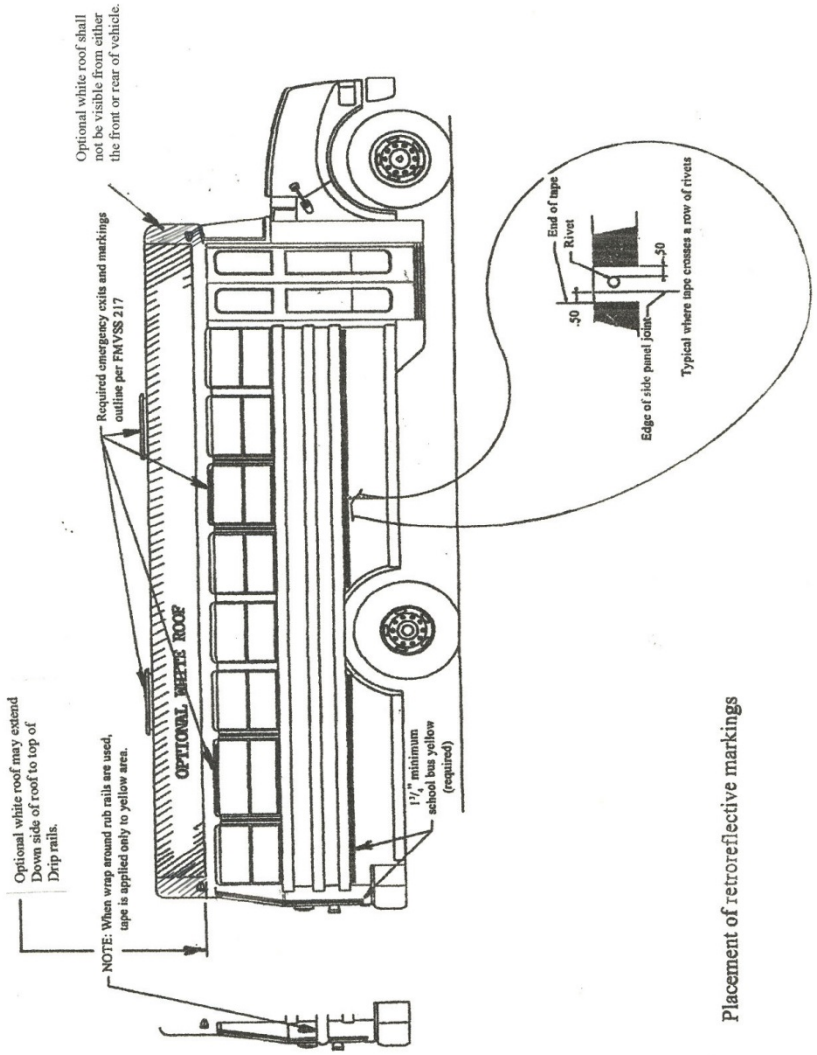
The color "National School Bus Yellow" shall conform to the tolerance limits set in S4.

S6: Color Matching

The colorimetric data should be used for acceptance testing purposes. However, accurate comparison can be made only if values are obtained on the same instrument standardized under the same conditions. Because this standard is not intended to be a performance standard for the paint and/or materials used in the manufacture of the school buses, color matching procedures provided in this standard

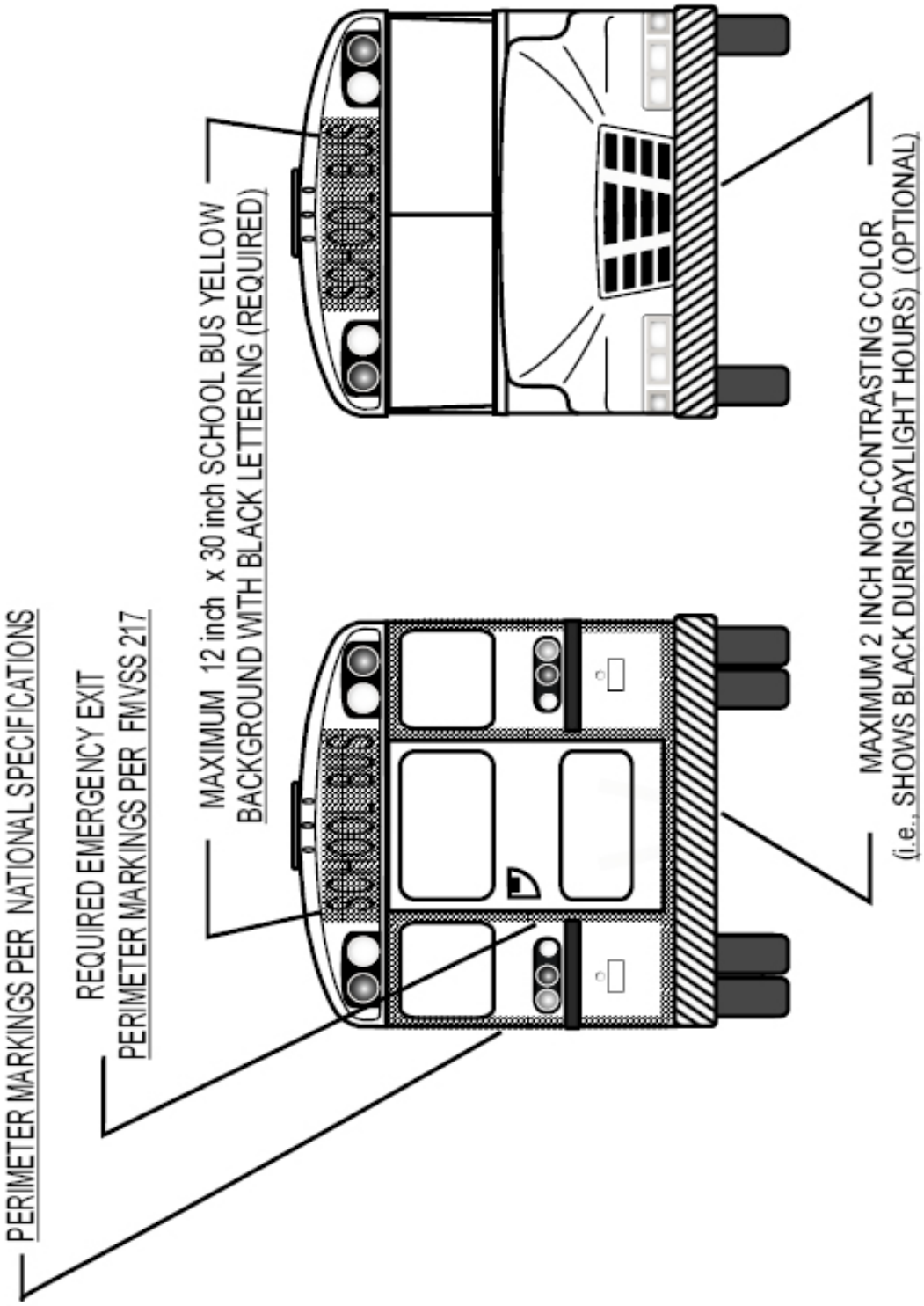
cannot be used to determine conformity with this standard of school bus type vehicles in use.

Placement of Retroreflective Markings and White Roof



Placement of retroreflective markings

Placement of Retroreflective Markings



Noise Test Procedure

1. The vehicle is located so that no other vehicle or signboard, building, hill or other large reflecting surface is within 15.2 m (50 feet) of the occupant's seating position.
2. All vehicle doors, windows, and ventilators are closed.
3. All power-operated accessories are turned off.
4. The driver is in the normal seated driving position and the person conducting the test is the only other person in the vehicle.
5. A sound level meter is used that is set at the "A-weighting fast" meter response and meets the requirements of:
    a. The American National Standards Institute, Standard ANSI S1.4-1971: *Specifications for Sound Level Meters, for Type 1 Meters*; or
    b. The International Electrotechnical Commission (IEC), Publication No. 179 (1973): *Precision Sound Level Meters*.
6. The microphone is located so that it points vertically upward 6 inches to the right and directly in line with, and on the same plane as, the occupant's ear, adjacent to the primary noise source.
7. If the motor vehicle's engine radiator fan drive is equipped with a clutch or similar device that automatically either reduces the rotational speed of the fan or completely disengages the fan from its power source in response to reduced engine cooling loads, the vehicle may be parked before testing with its engine running at high idle or any other speed the operator chooses for sufficient time, but not more than 10 minutes, to permit the engine radiator fan to automatically disengage.
8. With the vehicle's transmission in neutral gear, the engine is accelerated to:
    a. Its maximum governed speed, if it is equipped with an engine governor; or
    b. Its speed at its maximum rated horsepower, if it is not equipped with an engine governor, and the engine is stabilized at that speed.
9. The A-weighted sound level reading on the sound level meter for the stabilized engine speed condition referred to in H.1. or H.2., above, is observed and, if it has not been influenced by extraneous noise sources, is recorded.
10. The vehicle's engine speed is returned to idle and the procedures set out in paragraphs H. and I. are repeated until 2 maximum sound levels within 2 dBA of each other are recorded. The 2 maximum sound level readings are then averaged; and
11. The average obtained in accordance with paragraph J., with a value of 2 dBA subtracted there from to allow for variations in the test conditions and in the capabilities of meters, is the vehicle's interior

sound level at the driver's seating position for the purposes of determining compliance with the requirements of this test procedure.