

# Virginia Public School Bus Specifications

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Effective Month/Day, 2019

Virginia Department of Education  
Office of Support Services



VIRGINIA DEPARTMENT OF  
**EDUCATION**

*Virginia Public School Bus Specifications*

**FORWARD**

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## Effective Month/Day, 2019

These Specifications define certain, but not all, components required on a public school buses and public school multifunction school activity buses (body and chassis) purchased by Virginia public school divisions.

Any variation from the Specifications, in the form of additional equipment or changes in style of equipment, without prior approval of the Virginia Department of Education (VDOE), is prohibited.

The responsibility for compliance with the public school bus and public school multifunction school activity bus (MFSAB) Specifications rests with dealers and manufacturers. If any dealer or manufacturer sells public school bus or public school MFSAB vehicles that do not conform to any or all of these Specifications, a general notice will be sent to all school divisions advising that equipment supplied by such dealer or manufacturer will be disapproved for public school transportation until further notice. A copy of the notice will be sent to the dealer or manufacturer and will remain in effect until full compliance by the dealer or manufacturer is assured.

## TABLE OF CONTENTS

<b>Acknowledgements</b>	<b>4</b>
<b>General Information</b>	<b>5</b>
<b>General Requirements for Alternative Fuel Buses</b>	<b>6</b>
<b>Definitions</b>	<b>7</b>
<b>Acronyms</b>	<b>9</b>
<b>Specifications for <u>Public</u> School Bus Chassis</b>	<b>11</b>

<b>Specifications for Public School Bus Body</b>	<b>21</b>
<b>Specifications for Public <u>School</u> Multifunction School Activity Bus</b>	<b>52</b>
<b>Specifications for <u>Public School Wheelchair</u> Lift Bus</b>	<b>54</b>
<b>Lettering and Lighting Requirements:</b>	
<b>Diagram 1</b>	<b>60</b>
<b>Diagram 2</b>	<b>61</b>
<b>Addendum</b>	
<b>Minimum Chassis Specification Charts:</b>	
<b>Type A</b>	<b>62</b>
<b>Type C</b>	<b>63</b>
<b>Type D (FE)</b>	<b>65</b>
<b>Type D (RE)</b>	<b>67</b>

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## General Information

1. All public school and MFSAB buses (bodies and chassis) used to transport children to and from public schools or school-related events manufactured on or after the effective date of this document, as specified in 8VAC20-70-460, shall:
  - A. Meet or exceed the minimum requirements of the Specifications.
  - B. Meet all applicable Federal Motor Vehicle Safety Standards (FMVSS).
  - C. Meet or exceed the current National School Transportation Specifications and Procedures (referred to herein as the National Specifications) except when in conflict with the requirements herein. In such cases, the requirement specified in this document shall prevail.
  - D. Meet or exceed applicable National Fire Protection Association (NFPA) codes and safety standards for alternative fuel vehicles.
2. The requirements specified herein are the minimum requirements for public school and MFSAB buses in Virginia. The date used to determine the applicability of the Specifications shall be defined as the bus manufactured date.

3. Any variation from the Specifications, in the form of additional equipment or changes in style of equipment, without prior approval of the VDOE, is prohibited.
4. The VDOE may request the school bus (body and chassis) manufacturer to certify their product meets these minimum standards on items which are not covered by FMVSS certification requirements of *49 CFR, Part 567, Certification*.

## **General Requirements for Alternative Fuel Public School Buses**

1. All alternative fuel public school buses shall be capable of traveling not less than 200 miles with a full load, except those powered solely by electricity shall be capable of traveling not less than 80 miles.
2. Natural gas powered public school buses shall be equipped with an interior/exterior gas leak detection system and fire suppression system as outlined in item 15.A.
3. All materials and assemblies used to transfer or store alternative fuels shall be installed outside the passenger/driver compartment.
4. The manufacturer supplying the alternative fuel equipment shall provide the owner and operators with adequate training and certification in fueling procedures, schedule of maintenance, troubleshooting and repair of alternative fuel equipment.
5. All fueling equipment shall be designed specifically for fueling public school buses and shall be certified by the manufacturer as meeting all applicable federal, state and industry standards.
6. On board fuel supply containers shall meet all appropriate requirements of the American Society of Mechanical Engineers (ASME) code, U.S. Department of Transportation (DOT) regulations and applicable FMVSS and NFPA standards.
7. All fuel supply containers shall be securely mounted to withstand a static force of eight times their weight in any direction.
8. A positive quick acting ( one-fourth turn) shut-off control valve shall be installed in each gaseous fuel supply line, as close as possible to the fuel supply containers. The valve controls shall be placed in a location easily accessible without the use of tools, and shall be operable from the exterior of the bus. The location of the valve controls shall be clearly marked on the exterior surface of the bus.
9. An electrical grounding system shall be required for the grounding of the fuel system during maintenance-related venting.
10. Biodiesel must conform to the specifications of the American Society for Testing and Materials (ASTM) 6751 (*Biodiesel Standards*).
11. The manufacturer of alternative fuel public school buses shall provide written certification to the purchaser and the VDOE that the alternative fuel installation, parts, and materials meet the NFPA and other applicable standards, including all alternative fuel requirements of the Specifications.

# DEFINITIONS

## 1. Public School Buses:

### TYPE A:



**Type “A”** school bus is a conversion bus constructed utilizing a cutaway front-section vehicle with a left side driver’s door. This definition includes two classifications: Type A1, with Gross Vehicle Weight Rating (GVWR) 14,500 pounds or less; and Type A2 with a GVWR greater than 14,500 pounds but less than or equal to 21,500 pounds. Both Type A1 and A2 buses shall be equipped with dual rear wheels (DRW).

### TYPE C:



**Type “C”** (“Conventional”) school bus is a body installed upon a flat-back cowl chassis with a hood and fenders. This definition includes two classifications: Type C1, with a GVWR range of 17,500 pounds and a design seating capacity range from 16 to 30 students; and Type C2 with a GVWR of more than 21,500 pounds, designed for carrying more than 30 students. The engine is in front of the windshield and the entrance door is behind the front wheels. Both Type C1 and C2 buses shall be equipped with DRW.

### TYPE D:



**Type “D”** (“Transit”) school bus is a bus with a body constructed using a stripped chassis. The entrance door is ahead of the front wheels. The bus is also known as a rear engine (RE) or front engine (FE) transit style school bus. Type D buses shall be equipped with DRW.

### **Multifunction School Activity Bus:**



**Multifunction School Activity Bus (MFSAB )** is a school bus whose purposes do not include transporting students to and from home or school bus stops, as defined in *49 CFR 571.3*. This subcategory of school bus meets all FMVSS for school buses except the traffic control devices, color, use of cruise control, and seating requirements (see item 81.). All MFSAB buses shall be equipped with DRW.

2. **Alternative Fuel:** Any fuel other than gasoline or diesel, excluding battery or fuel cell power systems, but including CNG (Compressed Natural Gas), LNG (Liquefied Natural Gas), and LPG (Liquefied Petroleum Gas).
3. **Fuel Supply Container** (or “Fuel Cylinder”): A container or cylinder installed on a public school bus to supply fuel for the propulsion system of the vehicle.
4. **Fuel System:** The fuel supply container or cylinder, supply lines, and all ancillary fuel equipment.



5. **Non-Sequential Operations:** The system of red and amber signal lamps designed so that red lamps are activated whenever the passenger entrance doors open, regardless of whether the amber lamps have been activated.
6. **Gross Vehicle Weight:** The wet weight, plus body weight, plus driver's weight of 150 lbs, plus weight of maximum seated pupil load based on not less than 120 lbs per pupil.
7. **Liquid Fuel:** Any fuel that is in a liquid state under normal ambient atmospheric conditions of temperature and pressure.

## **A**cronyms

A list of acronyms and their definitions, used in this document:

- |     |             |   |
|-----|-------------|---|
| 1.  | <b>ABS</b>  | Anti-lock Braking System                              |
| 2.  | <b>AMPS</b> | Amperes   |
| 3.  | <b>ASME</b> | American Society of Mechanical Engineers, §§ VIII, IX |
| 4.  | <b>ASTM</b> | American Society for Testing and Materials            |
| 5.  | <b>BOE</b>  | Virginia Board of Education                           |
| 6.  | <b>BTU</b>  | British Thermal Unit                                  |
| 7.  | <b>“C”</b>  | Celsius   |
| 8.  | <b>CCA</b>  | Cold Cranking Amperes                                 |
| 9.  | <b>CFR</b>  | Code of Federal Regulations                           |
| 10. | <b>CFM</b>  | Cubic Feet per Minute                                 |
| 11. | <b>CDL</b>  | Commercial Driver License                             |

12.	<b>CNG</b>	Compressed Natural Gas
13.	<b>dB</b>	Decibel
14.	<b>DOT</b>	United States Department of Transportation
15.	<b>DRL</b>	Daytime Running Lights
16.	<b>DRW</b>	Dual Rear Wheels
17.	<b>“F”</b>	Fahrenheit
18.	<b>FMCSR</b>	Federal Motor Carrier Safety Regulations
19.	<b>FMVSS</b>	Federal Motor Vehicle Safety Standards
20.	<b>“g”</b>	Gravity-force
21.	<b>GALS</b>	Gallons
22.	<b>GAWR</b>	Gross Axle Weight Rating
23.	<b>GRD</b>	Ground

**Acronyms** (continued)

24.	<b>GVW</b>	Gross Vehicle Weight (wet weight, + body weight, + driver’s weight of 150 lbs, + weight of maximum seated pupil load based on not less than 120 lbs per pupil)
25.	<b>GVWR</b>	Gross Vehicle Weight Rating
26.	<b>HP</b>	Horse Power
27.	<b>LBS</b>	Pounds
28.	<b>LNG</b>	Liquefied Natural Gas
29.	<b>LPG</b>	Liquefied Petroleum Gas
30.	<b>MFSAB</b>	Multifunction School Activity Bus
31.	<b>MPH</b>	Miles per Hour
<b>32.</b>	<b>National Specifications</b>	<u>        </u> National School Transportation Specifications and Procedures
33.	<b>NFPA</b>	National Fire Protection Association
34.	<b>NSBY</b>	National School Bus Yellow
35.	<b>OEM</b>	Original Equipment Manufacturer
36.	<b>“P”</b>	Passenger Endorsement on Commercial Driver License

- |     |                       |   |
|-----|-----------------------|---|
| 37. | <b>RPM</b>            | Revolutions per Minute  |
| 38. | <b>“S”</b>            | School Bus Endorsement, Commercial and Regular Driver License |
| 39. | <b>SAE</b>            | Society of Automotive Engineers                               |
| 40. | <b>SBMTC</b>          | School Bus Manufacturers Technical Council                    |
| 41. | <b>Specifications</b> | Virginia School Bus Specifications                            |
|     | 42.                   | <b>TRA</b> Tire and Rim Association, Inc., <b>Standards</b>   |

**Acronyms** (continued)

- |     |             |                                  |
|-----|-------------|----------------------------------|
| 43. | <b>UL</b>   | Underwriters Laboratories, Inc.  |
| 44. | <b>VDOE</b> | Virginia Department of Education |
| 45. | <b>VSP</b>  | Virginia State Police Department |

## **SPECIFICATIONS FOR PUBLIC SCHOOL BUSES**

Effective Month/Day, 2019

### **SPECIFICATIONS FOR THE PUBLIC** **SCHOOL BUS CHASSIS**

**1. Air Cleaner**

- A. The engine intake air cleaner system shall be furnished and properly installed by the chassis manufacturer to meet the engine manufacturer’s specifications.
- B. An air cleaner restriction indicator shall be furnished and installed by chassis manufacturer.

**2. Alternator**

- A. All public school buses shall be equipped with a heavy duty truck or bus type alternator having a minimum output rating of 130 amperes (amps) for Type A buses, and 200 amps for Types C and D buses. The alternator shall be capable of producing a minimum of 50 percent of its maximum rated output at the engine manufacturer's recommended idle speed.
- B. Buses equipped with electrically powered wheelchair lift, air conditioning or other accessories 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.
- C. Belt drive shall be capable of handling the rated capacity of the alternator with no detrimental effect on other driven components. Direct/gear-drive alternator is permissible in lieu of belt drive.

### **3. Axles**

- A. The front and rear axles and suspension systems shall have a Gross Axle Weight Rating (GAWR) at ground commensurate with the respective front and rear weight loads that will be imposed by the bus.
- B. Rear axle shall be single speed, full-floating type.

### **4. Battery**

- A. The storage batteries shall have minimum cold cranking capacity rating (cold cranking amps, or cca) equal to the cranking current required for 30 seconds at 0 degrees (°) Fahrenheit (F) 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. Batteries shall be mounted in a slide out tray on the left side of the body in a compartment designed for batteries storage. When in the stored position, the tray shall be retained by a securing mechanism capable of holding the tray with batteries in position when subjected to a 5 gravity (g) load from any direction. The battery compartment door, 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 shall fit tightly to the body, and not presents sharp edges or snagging points. Battery cables shall meet Society of Automotive Engineers (SAE) requirements and shall be of sufficient length to allow the battery tray to fully extend.
- C. Type A public school bus batteries may be located in standard manufacturer's position.

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

## 5. **Brakes**

- A. Four-wheel brakes, adequate at all times to control bus when fully loaded, shall be provided in accordance with FMVSS.
- B. The chassis brake system shall conform to the provisions of FMVSS 105 (*Hydraulic and Electric Brake Systems*), 106 (*Brake Hoses*), and 121 (*Air Brake Systems*) as applicable.
- C. Chassis shall be equipped with auxiliary brakes capable of holding vehicle on any grade on which it is operated under any conditions of loading on a surface free from snow or ice. Operating controls of such auxiliary brakes shall be independent of operating controls of service brakes.
- D. Public school buses having full compressed air systems shall be equipped with a minimum 13.2 cubic feet per minute (cfm) engine oil-fed air compressor.
1. Air supply for air compressor shall be taken from the clean side of engine air cleaner system.
  2. A desiccant type air dryer with automatic purge and drain cycle and a heating element shall be installed on all air brake buses.
  3. Air brake systems shall include system for anti-compounding of the service and parking brakes.
- E. Public school buses using hydraulic brakes shall have power assist brakes. Hydraulic line pressure shall not exceed recommendation of chassis or brake manufacturer.
- F. All non-parking pawl transmissions shall incorporate a park brake interlock that requires the service brake to be applied to allow release of the parking brake.

## 6. **Bumper, Front**

- A. The front bumper on Types A2, C, and D public school buses shall be pressed steel channel, painted black at least three-sixteenths inches thick and not less than eight

inches wide (high). It shall extend beyond the forward-most part of the body, grille, hood and fenders and shall extend to the outer edges of the fenders at the bumper's top line. Type A1 public school buses may be equipped with an Original Equipment Manufacturer (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 five 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.

- B. The front bumper shall be of sufficient strength to permit pushing a vehicle of equal gross vehicle weight (GVW) without permanent distortion to the bumper, chassis or body.
- C. 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.

7. **Clutch**

- A. Torque capacity shall be equal to or greater than the engine torque output. Clutch facing shall be non-asbestos.
- B. A starter interlock shall be installed to prevent actuation of the starter if the clutch pedal is not depressed.

8. **Color**

- A. Chassis, including wheels, front bumper, rails and lettering shall be black. The balance of the bus Hood, Cowl and Fenders shall be NSBY.
- B. All paint shall be lead-free .
- C. Exception: MFSAB buses shall not be painted NSBY (see item 81.).

**9. Drive Shaft**

- A. Drive shaft shall be protected by metal guard or guards to prevent it from whipping through floor or dropping to ground if broken.

**10. Electrical System**

- A. Battery (see item 4.).
- B. Alternator (see item 2.).
- C. Lights and signals (see item 21.).
- D. Wiring (see item 80.).
- E. Power terminal: Chassis manufacturer shall provide an electric power source terminal for bus body power connection. Wiring from the power source in wiring terminal shall have a current carrying capacity of 125 amps continuous (minimum four gauge wire). If the bus is to be equipped with Air Conditioning or Wheelchair Lift, current carrying capacity shall be increased to 150 amps continuous.
  - 1. This conductor shall be routed to cover the least distance practicable between points of termination. It should be of continuous size protected by fusible links, fuses, circuit breakers, or a resettable electronic circuit protection device, no more than 24 inches from the battery. The terminal shall be of the single post-type, minimum of one-fourth inch stud and located in an accessible location for service .
- F. Light terminal: The chassis manufacturer shall provide a wire terminal adjacent to or in the under dash area of the left side panel accessible to the body company for connection of rear brake lights, tail lights, turn signal lights, and back-up lights. A terminal strip consisting of individual terminals with each terminal properly identified shall be provided to meet this requirement.
- G. Fuses: All fuses shall be located in fuse block and properly identified for the circuit protected.
- H. Each chassis circuit shall be color-coded and a diagram of the circuits shall be included with the chassis.

- I. Wiring harness. All conductors from the alternator to the battery shall be continuous in length. The conductors shall be sized to provide at least a 25 percent greater current carrying capacity than the design output of the alternator (minimum four-gauge wire). The conductor between the alternator and the battery shall be routed in a manner that will provide the least distance between points of termination. A separate ground conductor from alternator to engine shall be provided (minimum four-gauge).

**11. Electronic Road Speed Limiter**

- A. An electronic road speed limiter shall be provided and set to limit road speed to 60 miles per hour (MPH) on all public school buses. Cruise control shall not be installed on public school buses painted NSBY.

**12. Engine**

- A. The engine shall be of the internal-combustion, four-stroke cycle type.
- B. Public school buses equipped with CNG, LPG gaseous or liquid injected, and other gaseous fuels engines shall be equipped with the valves, valve seats, and other necessary components hardened for the use with such fuels.

**13. Exhaust System**

- A. Exhaust pipe, muffler, after treatment system, and tail pipe shall be outside the bus body and attached to the chassis so that any other chassis component is not damaged.
- B. Size of tail pipe shall not be reduced after it leaves muffler.
- C. Exhaust system shall be properly insulated from fuel supply containers and fuel supply container connections by securely attached metal shield at any point where it is twelve inches or less from fuel supply container or fuel supply container connections/components.
- D. Muffler shall be corrosive resistant .



- E. The tail pipe and after treatment system shall be constructed of 16-gauge steel tubing of equal diameter.
- F. The tail pipe may be flush with, or shall not extend more than two inches beyond the bumper. The exhaust system shall be designed such that exhaust gas will not be trapped under the body of the bus.
- G. The tail pipe shall exit to the left of the emergency exit door in the rear of the vehicle under or through the bumper.

**14. Fenders, Front**

- A. Total spread of outer edges of front fenders, measured at fender line, shall exceed total spread of front tires when front wheels are in straight-ahead position.
- B. Front fenders shall be properly braced and free from body attachments.

**15. Fire Suppression Systems (Optional except for natural gas powered Buses).**

- A. Natural gas-powered public school buses shall be equipped with an interior/exterior gas leak detection system and an automatic or manual fire suppression system in the engine compartment.
- B. All other public school buses may be equipped with a fire suppression system as an option.
- C. If equipped with a fire suppression system, it shall be located in the engine compartment.
- D. The fire suppression system nozzles shall be located in the engine compartment, under the bus, in the electrical panel or under the dash, but they shall not be located in the passenger compartment.
- E. The system shall be triggered by electronic activation through a control panel that provides an audible and visual alarm. The control panel shall be located within view and easy reach of the driver. The control panel shall supervise all suppression circuits. The fire suppressant chemical shall be Purple K (dry type), ABC (dry type) or FE-36 (liquid clean agent). A pressure gauge, light or monitor shall be mounted within the driver's compartment area to monitor the status of the charged chemical canister. If a light or monitor is utilized, a pressure gauge must still be provided at the charged chemical

canister. The fire suppression system shall be capable of being activated whether the engine is running or not. The complete fire suppression system shall be warranted for a minimum of one year. The fire suppression manufacturer shall supply a written certification report that is specific to each application of installation. The fire suppression system shall not have a vehicle shut down system. A placard shall be placed in clear view of the driver *that reads* "IN CASE OF FIRE, STOP VEHICLE, SHUT OFF ENGINE", and any necessary instructions providing further driver directions.

F. Option: Control panel may have a manual means of actuation accessible to the driver.

## 16. **Frame**

- A. Frame lengths shall be established in accordance with the design criteria for the complete vehicle.
- B. 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.
- C. Frames shall not be modified for the purpose of extending the wheel base.
- D. Any secondary manufacturer that modifies the original chassis frame shall provide a warranty at least equal to the warranty offered by the OEM, and shall certify that the modification and other parts or equipment affected by the modification shall be free from defects in material and workmanship under normal use and service intended by the OEM.

## 17. **Fuel Supply Container**

- A. Fuel supply container shall be rated for the appropriate passenger capacity of the vehicle, per manufacturer and FMVSS, but shall not be less than 25-gals for Type A public school buses and not less than 30-gals for Type C and D public school buses. The fuel supply container for alternative fuels shall be rated in the gasoline or diesel gallon equivalents. The fuel supply container shall be filled and vented to the outside of the body, and the fuel filler shall be placed on the right side in a location where accidental fuel spillage will not drop or drain on any part of the exhaust system. CNG and LPG cylinders shall have pressure relief device vented to the outside of the body and the fuel filler shall be placed on the right side in a location where access to filler port with high pressure fill connection can be made easily with filler hose.

- B. Fuel lines shall be mounted to the chassis frame in such a manner that the frame provides the maximum possible protection from damage.
- C. Fuel supply container may be mounted between the frame rails or outboard on the right side of the vehicle.
- D. The actual draw capacity of each fuel supply container shall be a minimum of 83 percent of the fuel supply container capacity. Alternative fuel capacity shall be equal to the gasoline or diesel equivalent.
- E. Exception: Type A public school buses that are Specially equipped buses may allow for a left side fuel filler.
- F. The installation of alternative fuel supply containers and fuel systems shall comply with all applicable FMVSS, CFRs, all applicable fire codes, all applicable DOT requirements and applicable standards of the NFPA. All alternative fuel supply containers shall be securely mounted and protected to withstand a static force of eight times their weight from any direction. School bus manufacturers or installers of alternative fuel systems shall provide written certification that all applicable standards have been met. No parts of the fuel supply containers shall be mounted in the drivers or passengers compartment of the bus. No fuel supply container shall be mounted above or on top of the bus. Fuel supply containers and supply lines and fittings shall be steel and meet ASME codes.

**18. Heating System, provision for**

- A. The chassis engine shall have plugged openings for the purpose of supplying hot water for the bus heating system. The opening shall be suitable for attaching three-fourth inch pipe thread/hose connector. The engine shall be capable of supplying water having a temperature of at least 170 ° F at a flow rate of 50 pounds per minute at the return end of 30 feet of one-inch inside diameter automotive hot water heater hose (reference: School Bus Manufacturers Technical Council (SBMTC), Standard Code for Testing and Rating Automotive Bus Hot Water Heating and Ventilating Equipment).
- B. Type A public school buses shall use manufacturer's standard heating system.

**19. Horn**

- A. Each public school 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 SAE J377 (*Horn – Forward Warning – Electric –Performance, Test, and Application*).

**20. Instrument and Instrument Panel**

- A. Chassis shall be equipped with the following instruments and gauges:
1. Speedometer which will show speed.
  2. Odometer which will show accrued mileage, including tenths of miles; tenths of miles can be accrued with trip odometer.
  3. Ammeter or voltmeter with graduated scale.
  4. Oil pressure gauge.
  5. Coolant temperature gauge.
  6. Fuel gauge.
  7. High beam headlamp indicator.
  8. Tachometer.
- B. All instruments or gauges shall be mounted on instrument panel in such manner that each is clearly visible to driver in normal seated position. Lights in lieu of gauges are not acceptable.
- C. Type A public school bus ammeter or voltmeter and its wiring shall be compatible with generating capacity. A tachometer is not required.

**21. Lights and Signals**

- A. Each chassis shall be equipped with not less than two headlights, beam controlled, and stop and tail lights, and two front turn signal lamps mounted on front fenders. Front turn signal lamps on Type D bodies shall be the same as the rear turn signals unless the turn

signals are incorporated as a part of the headlight assemblies or otherwise incorporated into the front end design as approved by the VDOE.

- B. Lights shall be protected by fuse or circuit breakers.
- C. Self-canceling directional signal switch shall be installed by the chassis manufacturer. The directional signals shall activate only when ignition is in “ON” position.
- D. Daytime Running Lights (DRL) shall be required.
- E. Brake air pressure gauge (air brakes), brake indicator lamp (vacuum/hydraulic brakes), or brake indicator lamp (hydraulic/hydraulic) shall be required.
- F. Turn signal indicator shall be required.
- G. Engine pre-heater lamp is required, where appropriate.
- H. Instruments and controls shall be illuminated as required by FMVSS 101 (*Controls and Displays*).

**22. Oil Filter**

- A. An oil filter with a replaceable 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.

**23. Openings**

- A. All openings in floorboard or firewall between chassis and passenger-carrying compartment, such as for gearshift lever and auxiliary brake lever, shall be sealed.

**24. Passenger Load**

- A. GVW shall not exceed maximum GVWR as established by manufacturer.

- B. 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).

**25. Retarder System (Optional)**

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

**26. Shock Absorbers**

- A. All public school and MFSAB buses shall be equipped with front and rear double-acting shock absorbers compatible with manufacturer's rated axle capacity.

**27. Springs and Suspension Systems**

- A. Springs or suspension assemblies shall be of ample resiliency under all load conditions and of adequate strength to sustain loaded bus without evidence of overload.
- B. Springs or suspension assemblies shall be designed to carry their proportional share of GVW.
- C. Rear springs shall be of progressive, variable, parabolic or air ride type.
- D. Stationary eye of the front spring shall be protected by full wrapper leaf in addition to main leaf.
- E. The capacity of springs or suspension assemblies shall be commensurate with the chassis manufacturer's GVWR and chassis specification minimums.

**28. Steering Gear**

- A. Steering gear shall be approved by chassis manufacturer and designed to assure safe and accurate performance when vehicle is operated with maximum load and maximum speed.

- B. No changes shall be made in steering apparatus that are not approved by chassis manufacturer.
- C. There shall be clearance of at least two inches between steering wheel and cowl instrument panel, windshield, or any other surface.
- D. Power steering is required and shall be of the integral type with integral valves.
- E. The steering system shall be designed to provide a means for lubrication of all wear-points that are not permanently lubricated.

**29. Tires and Rims**

- A. Tire and rim sizes, shall be based upon current standards of The Tire and Rim Association, Inc. (TRA).
- B. Total weight imposed on any tire shall not be above the current standard of the TRA.
- C. DRW shall be provided on all public school buses.
- D. All tires on public school buses shall be of the same size and shall meet or exceed the load range rating of the TRA for required GAWR.
- E. Spare tire, if required, shall be suitably mounted in accessible location outside passenger compartment.

**30. Towing Attachment Points**

- A. 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.
- B. Towing devices shall be attached to the chassis frame either by the chassis manufacturer or in accordance with the chassis manufacturer’s specifications.

C. 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.

D. The towing devices shall be mounted such that they do not project forward of the front bumper or rearward of the rear bumper.

E. Type A public school buses are exempt from this requirement for front tow hooks or eyes due to built-in crush zones. Tow eyes or hooks shall be furnished and attached so they do not project beyond the front bumper.

**31. Transmission**

A. Mechanical type transmission shall be synchromesh except first and reverse gears. Its design shall provide not less than five forward and one reverse speeds ; fifth gear shall be direct.

B. Automatic transmissions are permissible when equipped with a parking pawl or approved parking brake system.

C. Automatic transmissions incorporating a parking pawl shall have a transmission shifter interlock controlled by the application of the service brake to prohibit accidental engagement of the transmission. All non-parking pawl transmissions shall incorporate a park brake interlock that requires the service brake to be applied to allow release of the parking brake (see item 5.F.).

**32. Turning Radius**

A. Chassis with a wheel base of 264 inches or less shall have a right and left turning radius of not more than 42 .5 feet, curb to curb measurement.

B. Chassis with a wheel base over 264 inches shall have a right and left turning radius of not more than 44 .5 feet, curb to curb measurement.

**33. Weight Distribution**



A. Shall be established by chassis manufacturers' engineering department.

**34. Wheels**

A. Disc wheels are required.

**SPECIFICATIONS FOR THE PUBLIC SCHOOL BUS BODY**

**35. Aisle**

A. Minimum clearance of all aisles, including aisle (or passageway between seats) leading to emergency door shall be 12 inches. Aisles shall be unobstructed at all times.

**36. Back-up Alarm**

A. An automatic audible alarm shall be installed behind the rear axle and shall comply with the published SAE J994b (*Backup Alarm Standards*) providing a minimum of 112 decibels (dB), or shall have a variable volume feature that allows the alarm to vary from 87 dB to 112 dB sound level, staying at least 5 dB above the ambient noise level.

**37. Bumper, Rear**

A. Rear bumper shall be of pressed steel channel at least three sixteenth of an inch by 9 .5 inches.

B. It shall be wrapped around back corners of bus. It shall extend forward at least 12 inches, measured from rear-most point of body at floor line.

C. Bumper shall be attached to chassis frame in such manner that it may be easily removed, shall be so braced as to develop full strength of bumper section from rear or side impact, and shall be so attached as to prevent hitching of rides.

D. Rear bumper shall extend beyond rear-most part of body surface at least one inch, measured at floor line.

- E. Exception: Type A public school buses - Rear bumper shall be standard type furnished by chassis manufacturer as part of chassis on conversions. Body manufacturer will furnish bumper on cutaway chassis.

**38. Child Check System**

- A. All public school buses shall be equipped with an electronic audible and visual warning device that requires driver deactivation after the driver walks to the rear of the bus checking for children.

**39. Color**

- A. The public school bus body including hood, cowl, external speakers and fenders shall be painted uniform color NSBY. Prior to the application of the finish coats to the bus body, hood and cowl, external speakers and fenders, all surfaces shall be cleaned of grease, foreign matter, excessive body caulking, sealing material and treated as per paint manufacturer's recommendation for proper adhesion .
- B. Grill shall be NSBY, silver, or gray, if painted; otherwise it shall be chrome or anodized aluminum.
- C. Rear bumper, body trim, and rub rails shall be painted black. Must meet color requirements specific to bus (see item 8.).
- D. The roof of the public school bus may be painted white extending down to the drip rails on the sides of the body except that front and rear roof caps shall remain NSBY.
- E. All paint shall be lead-free .
- F. Paint shall be applied for a total dry thickness of at least 1.8 mils over all painted surfaces.
- G. Exception: The public MFSAB bus shall not be painted NSBY. Bumpers, body trim and rub rails may be painted a different color other than black (see item 81.).
- H. Retro-reflective tape material shall be Type V or better, as determined by the ASTM D4956- 90 (*Standard Specifications for Reflective Sheeting for Traffic Control*).

1. The rear of the public school 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 FMVSS 131 (*School Bus Pedestrian Safety Devices, Table 1*). The perimeter marking of rear emergency exits per FMVSS 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 one inch and a maximum of two 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 of the bus. Vertical strips shall be applied at the corners connecting these horizontal strips.
  2. “SCHOOL BUS” signs shall be marked with retro reflective NSBY material comprising background for lettering of the front and/or rear “SCHOOL BUS” signs.
  3. Sides of the public school bus body shall be marked with a minimum of one inch and a maximum of two inches in width retro reflective NSBY material, extending the length of the bus body and located vertically between the floor line and the beltline.
- I. The back of all mirrors shall be non-gloss black.

#### **40. Communication and Camera Systems (Optional)**

##### **A. Communication Systems.**

1. The radio mounting shall be in the driver’s compartment in a safe, secure location, so as not to interfere with normal bus operation.
2. Mounting shall be permanent. Temporary mountings will not be acceptable.
3. Wiring shall be protected by a proper fuse or circuit breaker and permanently connected to an accessory circuit shut off by ignition switch. Plug-in type connections are not acceptable.

4. Antenna shall be permanently mounted so as not to interfere with driver's vision of roadway. Antenna lead-in cable shall be permanently secured with the proper clamps, grommets, and sealant. Antenna cable may not pass through window opening.

B. Public Address System.

1. For use by driver, the system shall contain an inside speaker and/or an external speaker that is of special use when driver needs to caution pupils about surrounding dangers at school bus stops. Inside speakers shall be recessed type.

C. AM/FM Radio, CD Player.

1. Shall be properly mounted by the body manufacturer or local shop personnel.

2. All wiring shall be properly connected and concealed and any speakers shall be of recessed type.

3. No internal speakers, other than the driver's communication systems, may be installed within 4 feet of the driver's seat back in its rearmost upright position.

D. Interior Camera Systems.

1. ~~The recording equipment shall be~~ The recording equipment shall be installed in an area at the front of the bus.

2. The equipment shall be mounted outside the federal head impact zone, FMVSS 222 (*School Bus Passenger Seating and Crash Protection*).

3. The equipment shall be located in an area not likely to cause student injury.

4. The equipment shall have no sharp edges or projections.

E. Exterior Camera System Monitors.

1. Exterior view camera systems may be installed to view areas of restricted visibility outside of the public school bus and shall meet the following criteria:

- a. Shall not be mounted where it blocks the driver view in any direction.
- b. Shall only activate when the bus is in reverse for a rear camera or when the bus is in park or has the turn signals activated for side cameras.
- c. Shall be automatically controlled without requiring driver action.
- d. The exterior camera system monitor may be incorporated as part of the interior rear view mirror and shall not interfere with the normal use of the mirror.

F. Stop Arm Video Monitoring Systems.

1. Stop Arm video monitoring systems on public school buses shall include the minimum system requirements established by the *Code of Virginia*.

- a. The system shall produce live digital and recorded video of vehicles being operated in violation of the *Code of Virginia*.
- b. The system shall produce a recorded image of the license plate
- c. The system shall record the activation status of at least one warning device (activation of either and/or the red traffic warning lights and the side stop sign) mounted on the public school bus, and the time, date, and location of the vehicle when the image is recorded.
- d. The system shall not obscure the lettering on \_\_\_\_\_ the side of the bus.
- e. The system shall not impede or block any emergency exits.

- f. Wiring shall not be mounted on the outside of the public school bus and shall not be mounted inside the driver/passenger area.
- g. All roof and side mounting locations shall be sealed to ensure no leaks.
- h. The system shall have separate wiring from any emergency lights, alarms, etc.
- i. All exterior camera housings shall be painted NSBY.
- j. The system shall operate automatically and , not require driver activation.
- k. Vendor/ Manufacturer shall provide documentation to the locality that the system is properly mounted and camera(s) are capturing clear video identifying a moving vehicle.
- l. Vendor/ Manufacturer shall warranty the complete system for at least 12 months after the school division accepts documentation of mounting.
- m. Exterior camera(s) shall be designed to eliminate movement due to vandalism and rough roads.

**41. Construction, Types C and D Public School Buses**

- A. Construction of public school bus body shall meet all requirements of FMVSS 220 (*School Bus Rollover Protection*), 49 CFR § 571.220, FMVSS 221 (*School Bus Joint Strength*), 49 CFR § 571.221, and all other applicable federal standards.
- B. Construction shall be of prime commercial quality steel, or other material with strength at least equivalent to all steel as certified by bus body manufacturer. All such construction materials shall be fire resistant.

- C. Construction shall provide reasonable dust proof and watertight unit.
- D. **Bus Body:** The roof bows, body posts, strainers, stringers, floor, inner and outer linings, rub rails and other reinforcements shall be of sufficient strength to support entire weight of fully loaded vehicle on its top or side if overturned. Bus body as unit shall be designed and built to provide impact and penetration resistance.
- E. **Side Posts and Roof Bows:** There shall be a body side post and roof bow fore and aft of each window opening. This may be a continuous bow or two separate pieces effectively joined.
- F. **Floor:** Shall be of prime commercial quality steel of at least 14-gauge or other metal or other material at least equal in strength to 14-gauge steel. Floor shall be level from front to back and from side to side except in wheel housing, toe board, and driver's seat platform areas. When plywood is used, it shall be of one-half inch exterior B.B. Grade or equivalent and securely fastened to the existing steel floor.
- G. **Roof Strainers:** Two or more roof strainers or longitudinal members shall be provided to connect roof bows, to reinforce flattest portion of roof skin, and to space roof bows. These strainers may be installed between roof bows or applied externally. They shall extend from windshield header and, when combined with rear emergency doorpost, are to function as longitudinal members extending from windshield header to rear floor body cross member. At all points of contact between strainers or longitudinal members and other structural material, attachment shall be made by means of welding, riveting or bolting.
- H. **Floor Sills:** There shall be one main body sill at each side post and two intermediate body sills on approximately ten inch centers. All sills shall be of equal height, not to exceed three inches. All sills shall extend width of body floor except where structural members or features restrict area. Main body sill shall be equivalent to or heavier than 10-gauge and each intermediate body sill shall be equivalent to or heavier than 16-gauge, or each of all sills shall be equivalent to or greater than 14-gauge. All sills shall be permanently attached to floor. Connections between sides and floor system shall be capable of distributing loads from vertical posts to all floor sills.
- I. All openings between chassis and passenger-carrying compartment made due to alterations by body manufacturers shall be sealed (see item 61.).
- J. A cover shall be provided for the opening to the fuel supply container fill pipe.

- K. A moisture and rustproof removable panel shall be provided in the floor for access to the fuel supply container sender gauge. It shall be designed for prolonged use and adequate fastening to the floor.

**42. Construction, Type A Public School Bus**

- A. Construction of public school bus body shall meet all requirements of FMVSS 220 (*School Bus Rollover Protection*), 49 CFR § 571.220, and all other applicable federal standards.
- B. Body joints created by body manufacturer shall meet the 60 percent joint strength provision required in FMVSS 221 (*School Bus Body Joint Strength*), 49 CFR § 571.221, for Types C and D public school buses.
- C. Construction shall be of prime commercial quality steel or other material with strength at least equivalent to all steel as certified by bus body manufacturer. All such construction materials shall be fire resistant.
- D. Construction shall provide reasonably dustproof and watertight unit.
- E. Bus Body: The roof bows, body posts, strainers, stringers, floor, inner and outer linings, rub rails and other reinforcements shall be of sufficient strength to support entire weight of fully loaded vehicle on its top or side if overturned. Bus body as unit shall be designed and built to provide impact and penetration resistance.
- F. Floor: Plywood of one-half inch exterior B.B. Grade or equivalent shall be applied over the existing steel floor and securely fastened. Floor shall be level from front to back and from side to side except in wheel housing, toe board, and driver seat platform areas.
- G. Roof strainers: Two or more roof strainers or longitudinal members shall be provided to connect roof bows to reinforce flattest portion of roof skin, and to space roof bows. These strainers may be installed between roof bows or applied externally. They shall extend from windshield header to rear body header over the emergency door. At all points of contact between strainers of longitudinal members and other structural material, attachment shall be made by means of welding, riveting, or bolting.
  - 1. After load as called for in Static Load Test Code has been removed, none of the following defects shall be evident:



- a. Failure or separation at joints where strainers are fastened to roof bows.
  - b. Appreciable difference in deflection between adjacent strainers and roof bows.
  - c. twisting, buckling, or deformation of strainer cross-section.
- H. Area between floor and window line shall be restructured inside to include at least four vertical formed reinforcement members extending from floor to window line rail. They shall be securely attached at both ends.
- I. Rear Corner Reinforcements: Rear corner framing of the bus body between floor and window sill and between emergency door post and last side post shall consist of at least one structural member applied horizontally to provide additional impact and penetration resistance equal to that provided by frame members in areas of sides of body. Such member shall be securely attached at each end.
- J. All openings between chassis and passenger-carrying compartment made due to alterations by body manufacturers shall be sealed (see item 61.).

**43. Defrosters**

- A. 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. (Exception: The requirements of this standard do not apply to the exterior surfaces of double pane storm windows.)
- B. The defrosting system shall conform to SAE J381 (*Windshield Defrosting Systems Test Procedure and Performance Requirements – Trucks, Buses, and Multipurpose Vehicles*).
- C. The defroster and defogging system shall be capable of furnishing heated, outside ambient air, except that the part of the system furnishing additional air to the windshield, entrance door and step well may be the recirculating air type.
- D. Types C and D public school buses shall have two auxiliary fans. Auxiliary fans are not required on Type A public school buses.

#### 44. Doors

- A. Service door shall be under the driver's control, and designed to afford easy release and to provide a positive latching device, on manual operating doors, to prevent accidental opening.
1. When a hand lever is used, no parts shall come together that will shear or crush fingers. Manual door controls shall not require more than 25 lbs of force to operate. Power-operated door controls are allowed (see item 44.A.8.).
  2. The door shall be located on the right side of bus, opposite driver and the driver's direct view.
  3. Service door shall have minimum horizontal opening of 24 inches and minimum vertical opening of 68 inches.
  4. The door shall be of split-type, outward opening type.
  5. All door glass shall be approved safety glass. Bottom of each lower glass panel shall not be more than ten inches from the top surface of the bottom step. Top of each upper glass panel when viewed from the interior shall not be more than three inches below the interior door control cover or header pad.
  6. Vertical closing edges shall be equipped with flexible material to protect children's fingers.
  7. The door opening shall be equipped with padding at the top of each door. Padding shall be at least three inches wide and one inch thick and extend the full width of the door opening.
  8. For power-operated service doors, an emergency release valve, switch or device to release the service door shall be placed above, or to the immediate left or right of the door, and shall be clearly labeled in a color to contrast with the background of the label. The emergency release valve, switch or device shall work in the absence of power.
- B. Rear Emergency Door Types C and D Public School Buses.
1. Emergency door shall be located in center of rear end of bus.

2. Rear emergency door shall have minimum horizontal opening of 24 inches and minimum vertical opening of 45 inches measured from floor level.
3. Rear emergency door shall be hinged on right side and shall open outward and be equipped with an adequate strap or stop to prevent door from striking lamps or right rear of body. Such strap or stop shall allow door to open at least at a 90-degree angle from closed position.
4. Exception: Type D (RE) public school buses - Emergency door shall be located on the left side, shall be hinged on the front side and open outward. Door shall meet all requirements of FMVSS 217 (*Bus Emergency Exits and Window Retention and Release*), 49 CFR § 571.217.
5. The upper portion of the emergency door shall be equipped with approved safety glazing, the exposed area of which shall be at least 400 square inches. The lower portion of the rear emergency door shall be equipped with a minimum of 350 square inches of approved safety glazing. This glass shall be protected by a metal guard on the inside. This guard shall be free of any sharp edges that may cause injury to passengers.
6. There shall be no steps leading to emergency door.
7. When not fully latched, emergency door shall actuate signal audible to driver by means of mechanism actuated by latch.
8. Words "EMERGENCY DOOR," both inside and outside in black letters two inches high, painted or vinyl, shall be in compliance with FMVSS 217 (*Bus Emergency Exits and Window Retention and Release*).
9. The emergency door shall be designed to open from inside and outside bus. It shall be equipped with a slide bar and cam-operated lock located on left side of door and fastened to the door framing. The slide bar shall be approximately 1 .25 inches wide and three-eighth inch thick and shall have a minimum stroke of 1 .25 inches. The slide bar shall have a bearing surface of a minimum of three-quarter inch with the door lock in a closed position. Control from driver's seat shall not be permitted. Provision for opening from outside shall consist of non-detachable device so designed as to prevent hitching to, but to permit opening when necessary. Door lock shall be equipped with interior handle and guard that extend approximately to center of door. It shall lift up to release lock.
10. All doors shall be equipped with padding at the top edge of each door opening. Pad shall be at least three inches wide and one inch thick and extend the full width of the door opening.
11. There shall be no obstruction higher than one quarter-inch across the bottom of any emergency door opening. Fasteners used within the emergency exit opening shall be free of sharp edges or burrs.

C. Rear Emergency Door, Type A Public School Buses.

1. Emergency door shall be located in center of rear end of bus and shall be equipped with fastening device for opening from inside and outside body, which may be quickly released but is designed to offer protection against accidental release. Control from driver's seat shall not be permitted. Provision for opening from outside shall consist of device designed to prevent hitching to but to permit opening when necessary.
2. No seat or other object shall be placed in bus which restricts passageway to emergency door to less than 12 inches.
3. The lower portion of the rear emergency door shall be equipped with a minimum of 350 square inches of approved safety glazing.

D. Security Locking System.

1. A locking system to lock the emergency door(s) or roof hatch exits and the entrance door may be installed.
2. The system shall meet requirements of FMVSS 217 (*Bus Emergency Exits and Window Retention and Release*) and be equipped with an interlock in the chassis starting circuit and an audible alarm to indicate when an emergency exit is locked while the ignition switch is in the "ON" position.
3. A cutoff switch on the interlock circuit or any exit equipped with a lock and hasp shall not be allowed.
4. The service door lock system shall not permit hooking or snagging during passenger egress/ingress.

**45. Emergency Equipment**

A. Fire Extinguisher.

1. Each public school bus shall be equipped with one dry-chemical fire extinguisher of at least five-pound capacity with pressure indicator, mounted in extinguisher manufacturer's bracket of automotive type, and located in full view and in an accessible place in the front of the bus.
2. The fire extinguisher shall bear label of Underwriters Laboratories, Inc. (UL), showing a rating of 2-A:10-BC, or greater.



- h. Bee sting applicator (swab type) 10 per unit 1
- i. Pair medical non-latex examination gloves 1
- j. Mouth-to-mouth airway 1

Kit. C. Body Fluid Clean-up

1. Each public school bus shall have a removable, Grade A metal or rigid plastic kit, mounted in an accessible place and identified as a body fluid clean-up kit with a directions for use sheet attached to the inside cover.
2. The body fluid clean-up kit shall be moisture proof and properly mounted or secured in a storage compartment.

3. Contents shall include, but not be limited to, the following items:

	<u>Unit</u>
a. Non-latex gloves	1 pair
b. Pick-up spatula or scoop	1
c. Face mask	1
d. Infectious liquid spill control powder	1 bag
e. Anti-microbial hand wipes – individually wrapped	2
f. Germicidal disinfectant wipe – tuberculocidal	1
g. Plastic disposal bag with tie	1

D. Seat Belt Cutter.

1. Each public school bus shall be equipped with a durable webbing 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.

E. Warning Devices.

1. Each public school bus shall be equipped with a kit containing three reflectorized triangular warning devices meeting requirements of FMVSS 125 (*Warning Devices*), 49 CFR § 571.125.
2. The warning devices kit shall be securely mounted.

**46. Emergency Exits**

- A. Each emergency exit shall comply with FMVSS 217 (*Bus Emergency Exits and Window Retention and Release*), 49 CFR § 571.217, regarding the number of exits, types of exits and location of exits based on the capacity of the vehicle.
1. Side Emergency Exit Doors.
    - a. A dedicated aisle of at least 12 inches in width, referenced to the rear of the emergency exit door is required.
    - b. Side emergency exit doors shall be hinged on the forward edge.
    - c. When not fully latched, side emergency exit door shall actuate a signal audible to the driver by means of a mechanism actuated by the latch when the ignition switch is on.
    - d. A security locking system designed to prevent vandalism may be installed (see item 44.D.).
  2. Roof Exits/Vents.
    - a. All public school buses shall be equipped with a minimum of one emergency roof exit/vent .

- b. When not fully latched, this exit shall actuate a signal audible to the driver by means of a mechanism actuated by the latch when the ignition switch is on.
- c. A roof exit/vent security locking system designed to prevent vandalism may be installed (see item 44.D.).
- d. Roof exits/vents shall have rustproof hardware.
- e. Roof exits/vents shall be hinged in the front and be equipped with an outside release handle.

3. Emergency Exit Windows.

- a. Push-out emergency windows are permissible, if required by FMVSS 217 (*Bus Emergency Exits and Window Retention and Release*), 49 CFR § 571.217.
- b. When not fully latched, the emergency exit window shall actuate a signal audible to the driver by means of a mechanism actuated by the latch.
- c. No emergency exit window shall be located directly in front of a side emergency exit door.
- d. Type D (RE) public school bus emergency window shall have a lifting assistance device that will aid in lifting and holding the rear emergency window open.

47. **Floor Covering**



- A. Floor in under seat area, including tops of wheel housings, driver's compartment and toe board shall be covered with fire-resistant rubber floor covering or an approved equivalent, having minimum overall thickness of .125 inch. Driver's compartment and toe board area shall be trimmed with molding strips behind the cowl face line.
- B. Floor covering in aisle shall be of aisle-type fire resistant rubber or an approved equivalent, nonskid, wear-resistant and ribbed. Minimum overall thickness shall be .1875 inch measured from tops of ribs and have a calculated burn rate of 0.1 or less, using the test methods, procedures and formulas listed in FMVSS 302 (*Flammability of Interior Materials*). Rubber floor covering shall meet federal specifications ZZ-M71d.
- C. Floor covering shall be permanently bonded to floor, and shall not crack when subjected to sudden changes in temperature. Bonding or adhesive material shall be waterproof and shall be of the type recommended by manufacturer of floor-covering material. All seams shall be sealed with waterproof sealer.
- D. All floor covering seams shall be covered with trim and fastened with screws.
- E. Types C and D public school buses shall have a flush-mounted, screw-down plate that is secured and sealed to provide access to the fuel supply container sending unit and/or fuel pump. This plate shall not be installed under flooring material.

**48. Handrails**

- A. A minimum of one handrail shall be installed. The handrail(s) shall assist passengers during entry or exit, and shall be designed to prevent entanglement, as evidenced by the passing of the National Highway Traffic Safety Administration (NHTSA) string and nut test.

**49. Heating Systems**

- A. Hot water heaters of fresh air or combination fresh air and recirculating type, with power defrosters, are required.
- B. Heaters shall bear nameplate rating affixed by heater manufacturer on top of heater shell.
- C. Heaters shall be capable of maintaining inside temperature of 50° F, with an outside temperature of 20° F when the bus is loaded to one-half capacity (SAE test procedure J2233).

- D. The heater wiring shall be connected to the cold side of the ignition switch through a continuous duty solenoid relay.
- E. The power defroster shall deliver a sufficient amount of heated air distributed through a windshield duct, nozzle or nozzles to defog and de-ice the entire windshield, and to defog the driver's window. The duct, nozzle, or nozzles shall be designed to prevent objects from being placed in any manner that would obstruct the flow of air.
- F. Types C and D public school buses shall have water circulation cut-off valves in the supply and return lines, a minimum of three-quarter inch diameter (except Type A public school buses) **and** shall be located at or near the engine. A water flow-regulating valve in the pressure line for convenient operation by the driver is also required. All valves shall be one-quarter turn ball type. The driver and passenger heaters may operate independently of each other for maximum comfort.
- G. Heater hoses, including those in engine compartment, shall be supported in such manner that hose chafing against other objects will not occur nor shall suspended water lines interfere with routine vehicle maintenance.
- H. All water hoses in driver or passenger area shall be shielded.
- I. An auxiliary heater of recirculating type, having a minimum capacity of 60,000 BTU output, shall be installed aft of rear wheel housing. There shall be a grille or guard over exposed heater cores to prevent damage by pupils' feet.
- J. Exception: Types A and D public school buses.
  - 1. Front heater with high output and defroster shall be furnished by the chassis manufacturer.
  - 2. The body manufacturer shall provide an additional under seat heater near the rear of the bus.

50. **Passenger Compartment Air Conditioning (Optional)**

- A. The following specifications are applicable to all types of public school and MFSAB buses that may be equipped with air conditioning.
  - 1.. A standard performance air conditioning system should cool the interior of the bus from 100 ° to 80 ° F, 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 (RE) public school buses, three feet forward of the end of the aisle. Note for ~~the~~ Type A public school \_\_\_\_\_ buses, 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 ° F of the average temperature at the conclusion of the test.

2. A high performance air conditioning system should cool the interior of the bus from 100° F to 70° F, 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 emergency door or, for Type D (RE) buses, three feet forward of the end of the aisle. The independent temperature reading of each temperature probe inside the bus shall be within a range of +/- 3 ° F of the average temperature at the conclusion of the test. The test conditions under which the above performance standards 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 ° F; (2) heat-soaking the bus at 100 ° F 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 the engine running at 1,250 +/- 50 RPM, and cooling the interior of the bus to 80 ° F (standard performance) or 70 ° F (high performance), within 30 minutes, while maintaining 100 ° F outside temperature. 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.

### 3. Other Requirements.

a. 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 the bus.

- b. 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.
  
- c. 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.
  
- d. The body may be equipped with additional insulation, including sidewalls, back walls, roof, firewall, inside body bows, and plywood or composite floor insulation to reduce thermal transfer.
  
- e. All glass (windshield, service and emergency doors, side and rear windows) may be equipped with maximum integral tinting allowed by the *Code of Virginia* for the respective locations, except that windows rear of the driver's compartment, if tinted, shall have approximately 28 percent light transmission.
  
- f. Electrical generating capacity shall be provided to accommodate the additional electrical demands imposed by the air conditioning system.
  
- g. Air intake for any evaporator assembly(ies), except for front evaporator of Type A public school buses, shall be equipped with replaceable air filter(s) accessible without disassembly of evaporator case.
  
- h. In all public school buses (except Type D (RE) buses) equipped with a rear evaporator assembly, the 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.
  
- i. For Type D (RE) public school buses equipped with a rear evaporator over the davenport, the evaporator assembly shall not interfere with rear exit window and may not extend above the rear seating row.

**51. Hinges**

- A. All exterior metal door hinges shall be designed to allow lubrication to be channeled to the center 75 percent 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.

**52. Identification of Public School Buses**

- A. All lettering shall be of black paint or vinyl decal and conform to “Series B” for Standard Alphabets for Highway Signs. The words “SCHOOL BUS” shall be on reflective yellow background (see Diagrams 1 and 2, pages 62-63). For purposes of identification, public school buses shall be lettered as follows:
1. Both the front and rear of the body shall bear the words, “SCHOOL BUS” in black letters eight inches in height.
  2. The bus number shall be placed just back of the front warning sign on the left side, just behind the entrance door on the right side and be four inches high. The number is required on the left side of the front bumper (driver’s side). The number shall be placed on the rear body of the bus and shall be four inches high.
  3. (Name of) County Public Schools or (Name of) City Public Schools shall be placed on each side of the public school bus body at the beltline and be four inches high.
  4. Type of Fuel: Identification of fuel type shall be in two inch lettering adjacent to the fuel filler opening.
  5. A sign with black letters on clear or NSBY background, indicating the type of alternative fuel being used, may be placed on the side of the bus near the entrance door. No sign shall be more than 4 .75 inches long or more than 3 .25 inches high.
  6. Options: The following lettering and signs are options, but if equipped, they shall conform to these specifications:
    - a. The bus number shall be placed in the center of the public school bus roof with black ( twelve inches minimum) numbers.

- b. The bus number (four inches minimum) shall be placed on the inside rear header with black paint or vinyl decals. It shall not interfere with the Emergency Door letterings.
- c. Battery: The location of the battery identified by the word “Battery” or “Batteries” on the battery compartment door in two inch lettering.
- d. Traffic Warning Lights Sign: Shall be placed in between the top and bottom glass on the rear emergency door, and lettered “STOP WHEN RED LIGHTS FLASH.” The sign shall be marked with retro-reflective NSBY material comprising background for black letters, four inches in height. On Type D (RE) buses, the sign shall be placed in the center of the engine door. Exception: The sign shall not be mounted on any public MFSAB bus.
- e. Stop for Railroad Crossing Sign: The sign shall be placed on the rear of the public school bus.
- f. Identification Sign for Students: A sign with symbols and/or numbers displaying identification information for the students of the bus or route served shall be mounted on the right side of the bus near the entrance door. The sign shall be no larger than 121 square inches.
- g. American Flag Decals: Non-reflective, American Flag decals, no larger than six inches by ten inches shall be placed on the exterior of the bus, on both sides and/or at the rear of Types C and D public school buses. The decals shall be centered between the top two rub rails and mounted so that the right edge of the decal is no closer than three inches from the bus number or so that the left edge of the decal is no further than twelve inches from the bus number. A rear decal shall be centered in the rear of the bus. Type A public school buses shall mount the American Flag decals below the second rub rail and centered below the bus number on both sides.
- h. Bus Safety Hotline Sign: A sign with yellow lettering on black background may be mounted in the center of the rear bumper with the letters “School Bus Safety Hotline Call (area) xxx-xxxx.” The sign is not to exceed 3.25 inches high x ten inches wide.

7. Only manufacturer or dealer's identification, logos, signs or other items approved by the VDOE may be displayed.

**53. Inside Height**

- A. Inside body height shall be 72 inches or more, measured metal to metal, at any point on longitudinal center line from front vertical bow to rear vertical bow.
- B. Type A public school buses inside body height shall be 62 inches minimum. Does not apply to air conditioning equipment.

**54. Insulation**

- A. Ceilings and walls shall be coated with proper materials to deaden sounds and to reduce vibrations to a minimum. Thermal insulation (minimum R-value of 5.5) shall be used to insulate walls and roof between inner and outer panels.

**55. Interior**

- A. Interior of public school bus shall be free of all unnecessary projections likely to cause injury. This standard requires inner lining on ceilings and walls. Ceiling panels shall be constructed so as to contain lapped joints with all exposed edges hemmed to minimize sharpness. If lateral panels are used, forward panels shall be lapped by rear panels.

**56. License Plates**

- A. All public school buses shall be constructed so that mounting and securing of license plates will be compliant with FMVSS and the *Code of Virginia* § 46.2-716.

**57. Lights and Signals**

- A. No lights or signals other than specified here shall be installed on public school buses, except those required by federal regulations. All lights and reflectors shall be approved by the Superintendent of the VSP.
  1. Clearance Lights: Body shall be equipped with two red clearance lamps at rear, two amber clearance lamps at front, and intermediate side marker lamps on buses 30 feet or more in length controlled by headlight switch. They may be of armour type.

2. Identification Lamps: Three amber lamps shall be mounted on front and three red lamps on rear of body controlled by the headlight switch.
3. Stop and Tail Lamps: Public school buses shall be equipped with two matched stop and tail lamps of heavy duty type, which shall be in combination, emitting red light plainly visible from a distance of at least 500 feet to rear, and mounted on rear end with their centers not less than 12 nor more than 24 inches from plane side of body, and not less than six or more than 18 inches below D-glass in rear of body. They shall be approximately seven inches in diameter or, if a shape other than round, a minimum 38 square inches of illuminated area and shall meet SAE specifications. These lights shall be on the same horizontal line with the turn signal units and shall not flash.
4. Back-up Lamps: The public school bus body shall be equipped with two white rear back-up lamps that are at least four inches in diameter or, if a shape other than round, a minimum of twelve square inches of illuminated area and shall meet FMVSS 108 (*Lamps, Reflective Devices, and Associated Equipment*). If back-up lamps are placed on the same horizontal line as the brake lamps and turn signal lamps, they shall be to the inside.
5. Interior Lamps: Interior lamps shall be provided which adequately illuminate aisles and step well.
6. Turn Signal Units: Public school buses shall be equipped with Class A, flashing turn signal units of heavy-duty type. These signals shall be independent units equipped with amber lenses on all faces. The turn signals/directional signal units shall activate only when ignition is in "ON" position. A pilot light (s) shall indicate when these lights are activated. The front lights shall be mounted near the front corners of chassis on each side. The rear lights shall be seven inches in diameter, or if a shape other than round, the lights must be 38 square inches in area and mounted not less than six nor more than 18 inches from plane of the side of the body and not less than six nor more than 18 inches below D-glass in rear of body. They shall be on the same horizontal line with the stop and tail lights required item 3 above.
  - a. In addition to the turn signals described above, two amber lenses metal turn signal lamps of armour-type with a minimum of four candlepower each shall be mounted on the body side at approximate seat level height and located just to the rear of the entrance door on the right side of the body and approximately the same location on the left side. They are to be connected to and function with the regular turn signal lamps. Such lamps shall provide 180 degrees angle vision and if painted, they shall be black.



- b. Type A public school bus: Turn signals shall be chassis manufacturer's standard.
7. Hazard Warning Signal: The turn signal units shall also function as the hazard warning system. The system shall operate independently of the ignition switch and, when energized, shall cause all turn signal lamps to flash simultaneously.
8. Reflex Reflectors: (Class A) Two amber lights and two amber reflectors (they may be combined) shall be mounted, one on each side, near the front of the chassis. Two 3-inch red reflectors shall be mounted; one on each side near the rear of the body and two 3-inch red reflectors shall be mounted on the rear above the bumper. Two intermediate amber three-inch reflectors, one on each side near the middle of the bus, shall be mounted on buses 30 feet or more in length. They shall be mounted in accordance with FMVSS 108 (*Lamps, Reflective Devices, and Associated Equipment*).
9. School Bus Traffic Warning Lights: Public school buses shall be equipped with four red lights and four amber lights. One amber light shall be located near each red light, at the same level, but closer to the vertical centerline of the bus. All lights shall comply with SAE standards for school bus warning lamps.
- a. A non-sequential system for the traffic warning lights shall be installed that allow the red traffic warning lights to activate when the door opens. When doors close all lights shall immediately deactivate.
  - b. The traffic warning light system shall be wired so that the amber lights are activated manually by a hand operated switch. There shall be a momentary Amber Light Cancel Switch to deactivate the amber warning lights if the driver has determined a stop is not needed and the door does not need to be opened. When the door is opened, amber lights will automatically deactivate and red traffic warning lights, warning sign with flashing lights and crossing control arm shall be activated. When the door is closed, red traffic warning lights, warning sign with flashing lights and traffic crossing control arm shall be deactivated.
  - c. Warning Light Cancel Switch for Railroads: There shall be a momentary warning light cancel switch labeled "R/R Cancel" that when depressed and released deactivates the red traffic warning lights, crossing arm and stop arm for one entrance door cycle. The Warning Light Cancel Switch for Railroads shall be mounted on the accessory console, orange in color, clearly distinguishable, visible and accessible to the driver. The driver need not depress or reactivate any switch in any way for the continued operation of the non-sequential system.

- d. There shall also be a separate Master Warning Light Control Switch that would allow for deactivation of this feature during maintenance operation. The master light control circuit shall be connected to the cold side or switched side of the ignition switch and mounted on the accessory console, clearly labeled, distinguishable, red in color, or be black in color with a red bezel ring. This switch shall be located on the switch panel at the furthest point away from other light controls and door operations switches.
  
- e. The flasher and the relay shall be fastened in a compartment in the driver area and be easily accessible for servicing. The location of the flasher shall be approved by the VDOE.
  
- f. System shall contain an amber pilot light for amber lamps and a red pilot light for red lamps, clearly visible to the driver, to indicate when system is activated.
  
- g. A black border 1/25 to 3 inches wide shall be painted around the warning lights and must be equipped with a black painted hooded housing.
  
- h. All electrical connections shall be soldered or connected by an acceptable SAE method.
  
- i. All switches and pilot lights shall be properly identified by labels.
  
- j. There shall be an interrupt feature in the system to interrupt the traffic warning sign and the crossing control arm when their use is not desired. This feature shall consist of a double throw relay and a momentary switch.
  
- k. Amber Start Switch, Amber Cancel Switch, Warning Light Cancel Switch for Railroads "R/R Cancel," Traffic Warning Sign/Crossing Control arm, Master Warning Light Control Switch and Interrupt Switch shall be momentary switches.

- l. There shall be no controls and/or switches located in the steering wheel for operation of any system except controls and/or switches of the horn or optional cruise control. All controls and/or switches shall be labeled according to their function and shall meet the standards of FMVSS 101 (*Controls and Displays*).
  - m. Additional front, rear, and side-mounting warning lights for school divisions approved for participation in the BOE approved pilot program. Additional warning lights may be mounted on the front hood, bottom rear of the school bus above the bumper, and front sides of the school bus above the entrance door and the driver's window. Lights shall work in conjunction with the standard warning light system and shall meet FMVSS and SAE standards or must be of a type approved by the VSP. Contact the VDOE for approved mounting locations and lighting systems.
  - n. Fog lights (optional) shall be mounted by the manufacturer, meet FMVSS requirements and comply with the *Code of Virginia*.
10. School Bus Traffic Warning Sign: Public school buses shall be equipped with a traffic warning sign conforming to FMVSS 131 (*School Bus Pedestrian Safety Devices*).
- a. Warning sign shall be mounted on the left side near the front of the bus immediately below the window line.
  - b. Sign shall be of the octagon series, 18 inches in diameter, and be equipped with wind guard. The sign shall have a red background with a one-half inch white border, and the word "STOP" on both sides in white letters, six inches high and one inch wide. The sign shall be reflective.
  - c. Sign shall have double-faced alternately flashing red lights, four inches in diameter, located at the top and bottom most portions of the sign, one above the other.

- d. The sign shall be connected and energized through the red traffic warning lamps.
- e. Air operated signs require air pressure regulator in addition to control valve. Source of supply shall be the main air tank with a pressure protection valve at the tank.
- f. Sign and components shall comply with all provisions of SAEJ 1133.
- g. A second school bus traffic warning sign on the left side near the rear of the bus, may be mounted on all 65, or larger sized passenger Types C and D public school buses.

11. School Bus Crossing Control Arm: Public school buses shall be equipped with a crossing control arm mounted on the right side of the front bumper.

- a. When opened, the arm shall extend in a line parallel to the body side and aligned with the right front wheel.
- b. Appropriate grommets or a loom shall be used where wires or tubes go through holes in bumper and firewall.
- c. All components of the crossing control arm and all connections shall be weatherproofed.
- d. 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. Source of supply for air-operated arms shall be the main air supply tank with pressure protection valve at tank.
- e. The crossing control arm shall be constructed of nonferrous material.
- f. 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.

- g. The crossing control arm shall extend a minimum of 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.
- h. The crossing control arm shall extend simultaneously with the traffic warning sign(s) and shall be connected and energized through the traffic warning lamps.
- i. The assembly shall 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.

12. Strobe Warning Light.

- a. Each public school bus shall be equipped with a white flashing strobe light .
- b. The strobe light shall have self-contained power supply.
- c. The strobe light base shall be Lexan™ (or approved equal) or other polycarbonate or corrosion resistant metallic material. The lamp shall have a single clear lens emitting light 360 ° around its vertical axis, meeting the requirements of SAE J845. Unit shall be sealed to protect against intrusion of dust and moisture. All external fasteners including mounting screws shall be stainless steel. Unit shall have mounting gasket to isolate the light assembly from vibration.
- d. The overall height of the unit shall be approximately four inches to six inches, with lens diameter approximately four inches to six inches. Mounting location is to be centered (laterally) on roof of bus,

approximately 48 inches (longitudinally) from rear edge of rear roof cap and shall meet SAE J845 specifications .

- e. The body circuitry shall include a separate, clearly labeled driver's panel mounted switch, with a clearly labeled pilot light.

**58. Metal Treatment**

- A. All metal parts that will be painted shall be chemically cleaned, etched, zinc-phosphate-coated, and zinc-chromate or epoxy-primed or conditioned by equivalent process.

**59. Mirrors**

- A. Types C and D public school bus interior rear-view mirrors shall be at least 6 x 30 inches, metal encased safety glass with a minimum thickness of .125 inch, which will afford good view of pupils and roadway to rear and shall be installed in such a way that vibration will be reduced to a minimum. It shall have rounded corners and protected edges.
- B. Type A public school bus interior rear-view mirror shall be 6 x 16 inches.
- C. All public school buses shall have a mirror system that conforms to FMVSS 111 (*Rearview Mirrors*), 49 CFR § 271.111 as amended.
- D. Thermostatically controlled heated exterior mirrors are permissible.
- E. Motorized exterior mirrors may be used.

**60. Mounting**

- A. Chassis frame shall extend to rear edge of rear body cross member. Bus body shall be attached to chassis frame in such manner as to prevent shifting or separation of body from chassis under severe operating conditions.
- B. Body front shall be attached and sealed to chassis cowl in such manner as to prevent entry of water, dust, and fumes through joint between chassis cowl and body.
- C. Insulating material shall be placed at all contact points between body and chassis frame on Types A, C, and D public school buses. Insulating material shall be approximately .125 inch thick and shall be so attached to chassis frame or body member that it will not move under severe operating conditions.

**61. Openings**

- A. Any openings in body or front fenders of chassis resulting from change necessary to furnish required components shall be sealed (see items 23., 41.I., and 42.J.).

**62. Overall Length**

- A. Overall length of public school bus shall not exceed 40 feet when measured from bumper to bumper.

**63. Width**

- A. Overall width of public school bus shall not exceed 100 inches, including traffic-warning sign in closed position. Outside rearview mirrors are excluded.

**64. Rub Rails**

- A. There shall be one rub rail located on each side of the public school bus at seat cushion level which extends from the rear side of the entrance door completely around the bus body (except the emergency door or any maintenance access door) to the point of curvature near the outside cowl on the left side, or to the front corner of the bus body.
- B. There shall be one additional rub rail located on each side at, or no more than ten inches above, the floor line. The rub rail shall cover the same longitudinal area as the upper rub

rail, except at the wheel housings, and it shall extend only to the radii of the right and left rear corners.

- C. Both rub rails shall be attached at each body post and at all other upright structural members.
- D. Each rub rail shall be four inches or more in width in their finished form, shall be constructed of 16-gauge steel or suitable material of equivalent strength and shall be constructed in corrugated or ribbed fashion.
- E. Both 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 public school buses using the body provided by the chassis manufacturer or for types A-2, C, and D public school buses using the rear engine compartment, rub rails need not extend around the rear corners.
- F. There shall be a rub rail or equivalent bracing located horizontally at the bottom edge of the body side skirts.

**65. Seat Belt for Driver**

- A. A locking retractor Type 2-lap belt/shoulder harness seat belt shall be provided for the driver. Each belt section shall be booted so as to keep the buckle and button-type latch off the floor and within easy reach of the driver. Belt shall be anchored in such a manner or guided at the seat frame so as to prevent the driver from sliding sideways from under the belt. The driver's seat belt shall be high visible orange in color on all public school buses.

**66. Seating**

- A. Passenger Seating.
  - 1. Public school bus design capacities shall be in accordance with *49 CFR, Part 571.3, Definitions*, and FMVSS 222 (*School Bus Passenger Seating and Crash Protection*).



2. 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 FMVSS 222.

3. All restraining barriers and passenger seats shall be constructed with materials that enable them to meet the criteria of the School Bus Seat Upholstery Fire Block Test and comply with FMVSS 302 (*Flammability of Interior Materials*), 49 CFR Part 571.302.

4. Each seat leg shall be secured to the floor by bolts, washers and nuts in order to meet the performance requirements of FMVSS 222. Flange-head nuts may be used in lieu of nuts and washers. 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 conformance with FMVSS 222.

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

6. Seating plans for public schools buses with wheelchair positions: (see item 92.A.). All public school bus seating shall be of a three-to-three arrangement with the exception of the last row seat to the left of any rear emergency door. This seat shall meet the standards set forth in FMVSS 222 for last row seating and ingress and egress of standards of FMVSS 217 for emergency door and aisle clearance at that position. There shall be provided a full width barrier in front of each seating position. Type D (RE) public school buses shall be exempt from the last row requirements. Type A public school buses with a capacity of 16 passengers or less may have two-to-two seating arrangement with 30 inch seats.

7. All public school buses shall be equipped with restraining barriers which conform to FMVSS 222.

8. A flip-up seat may be installed at any side emergency door. If provided, the flip-up seat shall conform to FMVSS 222 and aisle clearance requirements of FMVSS 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 it is not occupied.

9. Lap belts shall not be installed on passenger seats in large school buses (over 10,000 pounds GVWR) except in conjunction with child safety restraint systems that comply with the requirements of FMVSS 213 (*Child Restraint Systems*).

B. Pre-School Age Seating.

1. Passenger seats designed to accommodate a child or infant carrier seat shall comply with FMVSS 225 (*Child Restraint Anchorage Systems*). These seats shall be in compliance with NHTSA's "Guideline for the Safe Transportation of Pre-school Age Children in School Buses" (see item 66.A.9.).

C. Driver Seat.

1. 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 FMVSS 208 (*Occupant Crash Protection*).

2. Minimum distance between steering wheel and backrest of driver's seat shall be 11 inches.

3. Type A public school buses may utilize the standard driver's seat provided by the chassis manufacturer.

**67. Barrier**

- A. A padded barrier shall be installed at rear of driver's seat in such a position as not to interfere with adjustment of driver's seat.
- B. A padded barrier shall be installed at rear of entrance step well. Barrier to coincide with length of the right front seat cushion with minimum width of 26 inches and shall have a modesty panel to extend from bottom of barrier to floor.
- C. All restraining barriers and passenger seats shall be constructed with materials that enable them to meet the criteria of the School Bus Seat Upholstery Fire Block Test. Padding and veering shall comply with provisions of FMVSS 302 (*Flammability of Interior Materials*), 49 CFR Part 571.302.

**68. Steps**

- A. First step at entrance door shall be not less than 10 inches and not more than 16 inches from the ground, based on standard chassis specifications.
- B. Entrance door may be equipped with two- or three-step step well. Risers in each case shall be approximately equal.
- C. Steps shall be enclosed to prevent accumulation of ice and snow.
- D. Steps shall not protrude beyond side bodyline.
- E. Grab handle not less than 20 inches in length shall be provided in unobstructed location inside doorway, but shall not be attached so that it will interfere with the opening of the glove compartment door. This handle shall be designed to eliminate exposed ends that would catch passenger clothing and shall be so placed in a position to aid small children entering the bus.
- F. Step covering: All steps, including the floor line platform area, shall be covered with an elastomer floor covering having a minimum overall thickness of 0.187 inch.

1. The step covering shall be permanently bonded to a durable backing material that is resistant to corrosion.
2. Steps, including the floor line platform area, shall have a 1 .5 inch nosing that contrasts in color by at least 70 percent measured in accordance with the contrasting color specification in *36 CFR, Part 1192, ADA, (Accessibility Guidelines for Transportation Vehicles)*.
3. Step treads shall 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 the Taber Abraser*, (CS-17 Wheel, 1,000 gram, 1,000 cycle).
  - b. Weathering resistance: Step treads shall not break, crack, or check after ozone exposure (7 days at 50 phm at 40 ° C) and Weatherometer exposure (ASTEM D-750, Standard Test method for Rubber Deterioration in Carbon-Arc Weathering Apparatus, 7 days).
  - c. Flame resistance: Step treads shall have a calculated burn rate of .01 or less using the test methods, procedures and formulas listed in FMVSS No. 302 (*Flammability of Interior Materials*).
- G. There shall be a “ No Smoking” sign placed on the top step riser of the entrance step well. The letters shall be red in color with a white background and a length of 9 .5 inches and lettering height of 1 .125 inches.

**69. Stirrup Steps**

- A. 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.

**70. Storage and Luggage Compartments**

- A. Public school buses may be equipped with luggage compartments or tool compartments in the body skirt provided they do not reduce ground clearance to less than 14 .5 inches from bottom of compartment and that the addition of the compartments does not exceed the vehicles' GVWR.
- B. Optional: A driver's storage compartment may be above the driver's area and must not impede ingress and egress. It shall not violate any FMVSS standard or the *Code of Virginia*.

**71. Sun Shield**

- A. Interior adjustable transparent sun shield, darkest shade available, not less than 6 x 30 inches shall be installed in position convenient for use by driver.
- B. Exception: Type A public school buses – Manufacturer's standard is acceptable.

**72. Trash Container and Hold Device (Optional)**

- A. 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 soft, pliable, and installed in an accessible location in the driver's compartment, not obstructing passenger access to the entrance door.

**73. Undercoating**

- A. Entire underside of public school bus body, including floor sections, cross members, and below floor line side panels, shall be coated with rust-proofing compound for which compound manufacturer has issued notarized certification of compliance to bus body building that compounds meet or exceed all performance requirements of SAE J1959.

- B. Undercoating compound shall be applied with suitable airless or conventional spray equipment to the undercoating manufacturer recommended film thickness and shall show no evidence of voids in cured film. Undercoating is expected to prevent rust under all bus service conditions for minimum of five years.
- C. The undercoating material shall not cover any exhaust components of the chassis.

**74. Ventilation**

- A. Body shall be equipped with suitable, controlled ventilating system of sufficient capacity to maintain proper quantity of air under operating conditions without opening of windows except in extremely warm weather.
- B. Static-type, non-closable, exhaust roof ventilators shall be installed in low-pressure area of roof panel.
- C. Auxiliary fans shall meet the following requirements:
  - 1. Types C and D public school buses shall be equipped with two fans. Type A public school buses may be equipped with auxiliary fans but is not required. Fans for left and right sides of the windshield shall be placed in a location where they can be adjusted for maximum effectiveness and where they do not obstruct vision to any mirror.
  - 2. Fans shall have a six-inch (nominal) diameter and be enclosed in a protective cage.
  - 3. Each fan shall be controlled by a separate switch.

**75. Water Test**

- A. Each and every public school bus body, after it is mounted on chassis ready for delivery, shall be subjected to a thorough water test in which water under pressure equal to a driving rain is forced against the entire bus body from various directions. Any leaks detected are to be repaired before the bus is declared ready for delivery.

76. **Wheel Housings**

- A. Wheel housings shall be of full open type.
- B. Wheel housings shall be designed to support seat and passenger loads and shall be attached to floor sheets in such manner as to prevent any dust or water from entering the body. Wheel housings shall be constructed of 16-gauge (or thicker) steel.
- C. Inside height of wheel housings above floor line shall not exceed 12 inches.
- D. No part of a raised wheel housing shall extend into the emergency door opening.
- E. Wheel housings shall provide clearance for dual wheels as established by National Association of Chain Manufacturers. Mounting of housings in the wheel area must be free of protruding screws and bolts.

77. **Windshield and Windows**

- A. All glass in windshield, windows, and doors shall be of approved safety glass, mounted **so** that permanent mark is visible, and of sufficient quality to prevent distortion of view in any direction. Windshield shall be AS1 and all other glass shall be AS2.
- B. Plastic glazing material of a thickness comparable to AS2 glass, meeting ANSI Standard Z 26.1 and FMVSS 205 (*Glazing Materials*), 49 CFR § 571.205, may be used in side windows behind the driver's compartment.
- C. Windshield shall have horizontal shade band consistent with SAE J-100 and *Code of Virginia*.
- D. Each full side window shall provide unobstructed emergency opening at least nine inches high and 22 inches wide, obtained either by lowering of window or by use of knock-out type split-sash windows.
- E. Approved tinted glass or plastic glazing material may be used consistent with the *Code of Virginia*.
- F. Windshield shall comply with all federal and state regulations.

**78. Windshield Washers**

- A. Windshield washers meeting federal requirements shall be provided and shall be controlled by a switch accessible to the driver. Reservoir shall be mounted outside passenger compartment.

**79. Windshield Wipers**

- A. Bus shall be equipped with variable-speed windshield wipers of air or electric-type powered by a motor or motors of sufficient power to operate wipers.
- B. Blades and arms shall be of such size that minimum blade length will be 12 inches with longer blades being used whenever possible.
- C. The wipers shall meet the requirements of FMVSS 104 (*Windshield Wiping and Washing Systems*).

**80. Wiring**

- A. All wiring shall conform to current standards of SAE.
- B. Circuits
  - 1. Wiring shall be arranged in at least 12 regular circuits as follows:
    - a. Head, tail, stop (brake) and instrument panel lamps.
    - b. Clearance lamps.
    - c. Dome and step well lamps.
    - d. Starter motor.



- e. Ignition.
  - f. Turn-signal units.
  - g. Alternately flashing red signal lamps.
  - h. Horns.
  - i. Heater and defroster.
  - j. Emergency door buzzer.
  - k. Auxiliary fans.
  - l. Booster pump (Type A bus exempt).
- 2. Any of the above combination circuits may be subdivided into additional independent circuits.
  - 3. Whenever possible, all other electrical functions (such as electric-type windshield wipers) shall be provided with independent and properly protected circuits.
  - 4. Each body circuit shall be color coded or numbered and a diagram of the circuits shall be attached to the body in a readily accessible location.
- C. A circuit breaker shall be provided for each circuit except starter motor and ignition circuits.
  - D. A continuous duty solenoid relay operated by the ignition switch, for Circuits i, j, k, and l.
  - E. All wires within the public school bus body shall be insulated and protected by covering of fibrous loom (or equivalent) that will protect them from external damage and minimize dangers from short circuits. Whenever wires pass through a body member, additional protection in a form of appropriate type of insert shall be provided.

- F. All light circuits shall be such as to provide, as nearly as possible, bulb design voltage at light bulb terminals.
- G. Buses using multiplexed electrical systems may meet the intent of the Specifications without the use of specified equipment, subject to the approval of the VDOE.
- H. 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, CD player, heaters, air conditioners, fans, and defrosters. This switch shall not deactivate safety systems, such as windshield wipers or lighting systems.

## **SPECIFICATIONS FOR PUBLIC SCHOOL MFSAB**

### **81. Public School MFSAB**

- A. Public school MFSAB buses shall meet all FMVSS requirements for public school buses except as noted in this section (see items 81.B. through 81.G.).
- B. Variations from the Specifications, in the form of additional equipment or changes in style of equipment, without prior approval from the VDOE, are prohibited.
- C. Identification.
  - 1. The public school MFSAB bus body shall be identified “Activity Bus”, lettered eight inches in height in the front and rear of the vehicle.
  - 2. The name of the school division or individual school shall be lettered in at least four inches height in the beltline area.

3. All lettering and numbering shall be painted or be vinyl decals of a contrasting color of the body and conform to FMVSS , the Specifications, and all reflectivity standards.
4. No manufacturer or vendor logos, signs or other items not approved in the Specifications shall be displayed.

D. Color.

1. The public school MFSAB bus shall not be painted NSBY. The local school division may determine the color of the body of the bus and the color scheme may utilize up to two colors. This combination may be in addition to a white painted roof. It is recommended that light colors be used for the body color to enhance visibility by other vehicles. Markings shall be contrasted against selected colors for ease of identification during periods of reduced visibility other than darkness. NOTE: The NSBY color shall not be used as a part of any color scheme.

E. Lights and Warning Devices.

1. All public school MFSAB buses shall meet all state and FMVSS ~~for~~ public school bus lighting and warning device requirements with the following exceptions:
  - a. Public school MFSAB buses shall not be equipped with the eight-lamp, traffic warning light system .
  - b. Public school MFSAB buses shall not be equipped with any flashing lighted stop arm ~~or and~~ crossing control arm .

F. Seats.

1. Other types of seats and increased spacing, which meet all regulations of FMVSS 222 (*School Bus Passenger Seating and Crash Protection*) and 302 (*Flammability of Interior Materials*) may be used in lieu of regular public school bus seats.

G. Cruise Control.

1. May only be installed on public school MFSAB buses and operated in accordance with regulation speeds.

2. Shall not be installed on yellow school buses.

## **SPECIFICATIONS FOR PUBLIC SCHOOL**

### **WHEELCHAIR LIFT BUSES**

#### **82. General Requirements**

- A. Public school buses or school vehicles designed for transporting children with special transportation needs shall comply with Virginia's standards applicable to school buses and FMVSS as applicable to their GVWR category.
- ~~B.~~ Any public school bus used for the transportation of children, who are confined to a wheelchair or other restraining devices that prohibit use of the regular entrance, shall be equipped with a power lift, ~~unless a ramp is needed for unusual circumstances.~~
- C. Lift shall be located on the right side of the body, in no way attached to the exterior sides of the bus but confined within the perimeter of the school bus body when not extended.

#### **83. Aisles**

- A. All aisles leading to the emergency door from wheelchair area shall be a minimum of 30 inches in width. A wheelchair securement position shall never be located directly in front of (blocking) a power lift door location.

**84. Communications**

- A. Special education public school buses shall be equipped with a two-way communication system (see item 40.A.).

**85. Fastening Devices**

- A. Unless otherwise specified below, fastening devices shall conform to FMVSS 222 (*School Bus Passenger Seating and Crash Protection*), 49 CFR § 571.222, as amended.
  - 1. Wheelchair fastening devices shall be provided and attached to the floor or walls or both to enable securement of wheelchairs in the public school bus. The devices shall be of the type that requires human intervention to unlatch or disengage. The fastening devices shall be designed to withstand forces up to 3,000 lbs. per tie-down leg or clamping mechanism or 12,000 lbs. total for each wheelchair.
  - 2. Additional fastening devices may be needed to assist the student due to the many different configurations of chairs and exceptionalities.

**86. Heaters**

- A. An additional heater shall be installed in the rear portion of the bus behind wheel wells as required in Item 48 I, except a 50,000 minimum BTU heater may be used in bodies originally designed for 31-66 passenger capacity and 30,000 minimum BTU heaters may be used in bodies of 30 passengers or less. Hose to rear heater, when under body shall be encased in metal tube.

**87. Identification**

- A. Public school buses with wheelchair lifts used for transporting children with physical disabilities shall display the International Symbol of Accessibility located on the front and rear of the bus below the window line. Such emblems shall be white on blue, shall be a minimum of nine inches and a maximum of 12 inches in size, and shall be of a high-intensity retro reflective material meeting the requirements of Federal Highway

Administration (FHWA) FP-85, *Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects*. They shall be placed so as not to cover lettering, lamps or glass.

**88. Passenger Capacity Rating**

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

**89. Wheelchair Lift**

- A. The wheelchair lift shall be located on the right side of the bus body. Exception: The lift may be located on the left side of the bus if the bus is only used to deliver students to the left side of one-way streets.

1. All specially equipped public school buses shall provide a level-change mechanism or boarding device (e.g., lift ), complying with paragraph B or C of this section, with sufficient clearances to permit a wheelchair user to reach a securement location.

B. Vehicle Lift and Installation.

1. General: School bus lifts and installations shall comply with the requirements set forth in FMVSS 403 (*Platform Lift Systems for Motor Vehicles*), and FMVSS 404 (*Platform Lift Installations in Motor Vehicles*).

2. 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.

3. Lift Capacity: The lifting mechanism and platform shall be capable of operating effectively with a wheelchair and occupant mass of at least 800 pounds.
4. Controls: ( see *49 CFR 571.403, S6.7, Control systems*).
5. Emergency Operations: (see *49 CFR 571.403, S6.9, Backup operation*).
6. Power or Equipment Failures: (see *49 CFR 571.403, S6.2.2, Maximum platform velocity*).
7. Platform Barriers: (see *49 CFR 571.403, S6.4.7, Wheelchair retention*).
8. Platform Surface: (see *49 CFR 571.403, S6.4.2, S6.4.3, Platform requirements*).
9. Platform Gaps and Entrance Ramps: (see *49 CFR 571.403, S6.4.4, Gaps, transitions and openings*).
10. Platform Deflection: (see *49 CFR 571.403, S6.4.5, Platform deflection*).
11. Platform Movement: (see *49 CFR 571.403, S6.2.3, Maximum platform acceleration*).
12. Boarding Direction: The lift shall permit both inboard and outboard facing of wheelchair and mobility aid users.
13. Use by Standees: Lifts shall accommodate students who are using walkers, crutches, canes or braces, or who otherwise have difficulty using steps. The platform may be marked to indicate a preferred standing position.
14. Handrails: (see *49 CFR 571.403, S6.4.9, Handrails*).

15. 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.
16. Excessive Pressure: (see *49 CFR 571.403, S6.8, Jacking prevention*).
17. Documentation: The following information shall be provided with each school bus equipped with a lift:
  - a. A phone number where information can be obtained about installation, repair and parts (detailed written instructions and parts list shall be available upon request).
  - b. 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 positions of wheelchair/mobility aids on the lift.
18. 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.
19. Identification and Certification: Each lift shall be permanently and legibly marked or shall incorporate a non-removable label or tag that states it conforms to all applicable requirements of the current National Specifications . 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 Specifications .

**90. Regular Service Entrance**

- A. Type D public school buses shall have three step risers of equal height in the stepwell.



- B. An additional foldout step may be provided which will provide for the step level to be no more than six inches from the ground level.
- C. Three step risers in Type C public school buses are optional.

**91. Restraining Devices**

- A. Seat frames may be equipped with attachments or devices to which restraining harnesses or other devices may be attached. Attachment framework or anchorage devices, if installed, shall conform to FMVSS 210 (*Seat Belt Assembly Anchorages*), 49 CFR § 571.210, and FMVSS No. 213 (*Child Restraint Systems*).

**92. Seating Arrangements**

- A. Flexibility in seat arrangements to accommodate special devices shall be permitted due to the constant changing of passenger requirements. All seating shall meet the requirements of FMVSS 222 (*School Bus Passenger Seating and Crash Protection*).
- B. There shall be a padded barrier forward of any standard seating position and between lift-gate and first seat to rear of lift-gate. A wheelchair position immediately forward of lift-gate shall have a barrier between lift and wheelchair (see item 67.).

**93. Special Light**

- A. Lights shall be placed inside the bus to sufficiently illuminate lift area and shall be activated from door area. An outside light to be activated when lift door is open and deactivated when lift door is closed is permissible.

**94. Special Service Entrance**

- A. Bus bodies may have a special service entrance constructed in the body to accommodate a wheelchair lift for the loading and unloading of passengers.
- B. The opening to accommodate the special service entrance shall be at any convenient point on the right (curb side) of the bus and far enough to the rear to prevent the doors, when open, from obstructing the right front regular service door (excluding a regular front service door lift).
- C. The opening shall not extend below the floor level. Outboard type lifts shall be used.

- D. The opening, with doors open, shall be of sufficient width to allow the passage of wheelchairs. The minimum clear opening through the door and the lift mechanism shall be 30 inches in width.
- E. A drip molding shall be installed above the opening to effectively divert water from entrance.
- F. Entrance shall be of sufficient width and depth to accommodate various mechanical lifts and related accessories as well as the lifting platform.
- G. Doorposts and headers from entrance shall be reinforced sufficiently to provide support and strength equivalent to the areas of the side of the bus not used for service doors.
- H. Special service entrance doors shall be equipped with padding at the top edge of the door opening. Pad shall be at least three inches wide and one inch thick and extend the full width of the door opening.

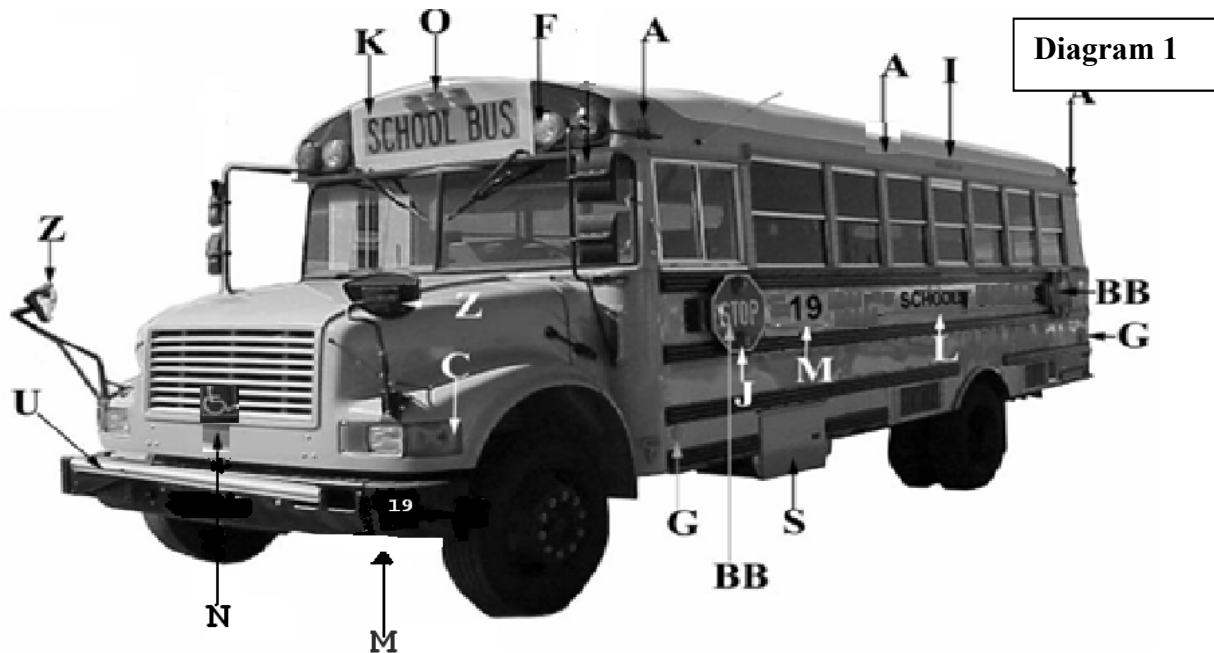
**95. Special Service Entrance Doors**

- A. A single door of a minimum 43 inches may be used.
- B. All doors shall open outwardly.
- C. All doors shall have positive fastening devices to hold doors in the open position.
- D. All doors shall be weather sealed and on buses with double doors, they shall be so constructed that a flange on the forward door overlaps the edge of the rear door when closed.
- E. When dual doors are provided, the rear door shall have at least a one-point fastening device to the header. The forward mounted door shall have at least three-point fastening devices. One shall be to the header, one to the floor line of the body, and the other shall be into the rear door. These locking devices shall afford maximum safety when the doors are in the closed position. The door and hinge mechanism shall be of a strength that will provide for the same type of use as that of a standard entrance door.

- F. Door materials, panels, and structural strength shall be equivalent to the conventional entrance and emergency doors. Color, rub rail extensions, lettering and other exterior features shall match adjacent sections of the body.
- G. Each door shall have windows set in a waterproof manner compatible within one inch of the lower line of adjacent sash.
- H. Doors shall be equipped with a device that will actuate a flashing visible signal located in the driver's compartment when doors are not securely closed and ignition is in "ON" position. A cluster light "LIFT" is allowed.
- I. A switch shall be installed so that the lifting mechanism will not operate when the lift platform doors are closed.

**96. Special Optional Equipment**

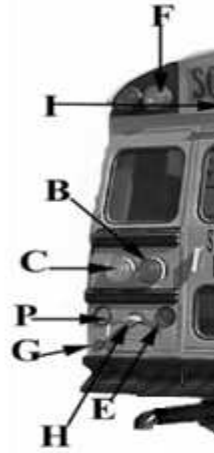
- A. Special seats for attendants may be installed on an optional basis. The location, restraints, and so forth shall be assessed and approved on an individual unit basis. All equipment shall be secured properly.



**MINIMUM LETTERING AND LIGHTING REQUIREMENTS**

A	Clearance Lights (see item 56.A.1.)	L	Name of Division (see item 52.A.3.)
BB	Octagonal Stop Arm (2 <sup>nd</sup> optional stop arm-see item 57.A.10.g.)	M	Bus Numbers (see item 52.A.2.)
C	Front Turn Signals, (amber lenses)	N	Universal Handicapped Symbol, Wheelchair Lift Equipped Buses (see item 87.)
F	Pupil Warning Lights, Side By Side Amber and Red, Flat Back Design	O	Identification Lamps
G	Reflectors (see item 57.A.8.)	S	Battery Box (see item 52.A.6.c.)
I	Emergency Exit	U	Pupil Crossing Arm
J	Double Faced Flashing Red Lights	Z	Cross/Side View Mirror System
K	SCHOOL BUS, Front And Rear, 8 inch letters on retroflective yellow background		

A	Clearance Lights (see item 57.A.1.)	M	Bus Numbers (see item 51.A.2.)
B	Seven inch Tail Lights	N	Universal Handicapped Symbol, Wheelchair Lift Equipped Buses (see item 86. <i>for exact size and location</i> )
C	Seven Inch Turn Signals (amber lenses)	O	Identification Lamps
E	4 inch Stop / Tail Lights	P	Back-up Lights
F	Pupil Warning Lights, Side By Side Amber and Red, Flat Back Design	R	Fuel Door (see item 51.A.4.)
G	Reflectors (see item 56.A.8.)	T	Wheelchair Lift Landing Light (see item 93.A.)
H	License Plate Lamp	Z	Cross/Side View Mirror System
I	Emergency Exit Signs	A A	Roof-mounted White Flashing Strobe Light
K	SCHOOL BUS, Front And Rear, 8 inch letters on retroreflective yellow background	C C	Rear Door Lettering (optional see item 51.A.5.e.)
L	Name of Division (see item 51.A.3.)		



## MINIMUM LETTERING AND LIGHTING REQUIREMENTS

## Addendum

### MINIMUM SPECIFICATIONS FOR PUBLIC SCHOOL AND MFSAB BUS CHASSIS TO MEET REQUIREMENTS OF VIRGINIA BOARD OF EDUCATION

<b><u>Minimum</u> Chassis Specification Chart</b>		
<b>Type A Bus</b>		
<b>Passenger Capacity</b>	<b>11 through 24 (see Notes)</b>	
<b>GVWR</b>	10,000 lbs	
<b>Engine Size</b>	<b>Diesel Engines</b>	3.2 Liter
	<b>Gasoline Engines</b>	3.7 Liter
<b>Wheelbase</b>	138"	
	<b>Tires</b>	195/65R16, DRW (see item 29.)
	<b>Rims</b>	Disc 6.0" X 16" (see item 29.)
<b>Transmission</b>	4 Speed Automatic	
<b>Alternator</b>	130 amps	
<b>Frame</b>	Per Standards for Severe Duty	
<b>Steering</b>	Power (see item 28.D.)	
<b>Front Bumper</b>	Heavy Duty, Painted Black	(MFSAB, see item 81.D.1.)
<b>Brakes</b>	Power, with ABS	
<b>Suspension</b>	Per Standards for Severe Duty	
<b>Drive Shaft</b>	Grease Fittings and Guards on All Shafts	
<b>Fuel Supply Container</b>	25 gals (see item 17.)	
<b>Air Cleaner</b>	Per Engine Manufacturer Specifications w/Restrictor Indicator	
<b>Oil Filter</b>	Replaceable, 1 Quart	
<b>Battery</b>	600 CCA	
<b>Horn</b>	Dual Electric	
<b>Lights</b>	Per FMVSS and DRL	(MFSAB, see item 81.D.1.)
<b>Gauges</b>	Speedometer, Oil Pressure, Fuel, Coolant Temp. & Voltmeter.	
<b>Color</b>	Frame, Wheels, Bumpers, Rails and Letterings-Black. Back of Mirrors-Non-gloss Black. The balance, NSBY.	(MFSAB, see item 81.D.1.)

**Notes:**

1. Alternative Fuel Engines shall be engine manufacturers' standard for vehicle type, which meets or exceeds the equivalent power rating for diesel or gasoline engines.
2. The Maximum Passenger Capacity of a Type A bus shall be 24 passengers.
3. Drivers of Type [A public](#) school and activity buses with a capacity of less than 16 passengers shall:

- a. Comply with the BOE Regulation 8VAC20-70-280. *Requirements for School Bus Drivers Both for Employment and Continued Employment.* Exception: Drivers are not subject to Section 6 of 8VAC20-70-280. School division alcohol and drug testing policies will apply to drivers operating Type A buses that have a capacity of less than 16 passengers.
- b. Comply with BOE Regulation 8VAC20-70-350. *Training.*

## Minimum Chassis Specification Chart

### TYPE C Bus

Maximum Design (Passenger) Capacity	Type C1 Bus <b>30</b>					
<b>GVWR</b>	17,500 lbs	21,000 lbs	25,000 lbs	27,500 lbs	29,000 lbs	31,000 lbs
	8-Stud Disc 19.5" X 6.	8-Stud Disc 22.5" X 6.5"	8-Stud Disc 22.5" X 76.5"	10-Stud Disc 22.5" X 7.5"	10-Stud Disc 22.5" X 8.25"	10-Stud Disc 22.5" X 8.25"
<b>Tires</b>	9R22.5 (see item 29)	9R22.5 (see item 29)	9R22.5 (see item 29)	10R22.5 (see item 29)	10R22.5 (see item 29)	11R22.5 (see item 29)
<b>Frame</b>	One Piece Side Member – Front Tow Hook	One Piece Side Member – Front Tow Hook	One Piece Side Member – Front Tow Hook	One Piece Side Member – Front Tow Hook	One Piece Side Member – Front Tow Hook	One Piece Side Member – Front Tow Hook
<b>Steering</b>	Power (see item 28 D)	Power (see item 28 D)	Power (see item 28.D)	Power (see item 28.D)	Power (see item 28.D)	Power (see item 28.D)
<b>Front Bumper</b>	3/16" Steel	3/16" Steel	3/16" Steel	3/16" Steel	3/16" Steel	3/16" Steel
<b>Front Axle</b>	7,000 lbs	6,000 lbs	8,000 lbs	10,000 lbs	10,000 lbs	10,000 lbs
<b>Rear Axle</b>	10,500 lbs	15,000 lbs	17,000 lbs	17,500 lbs	19,000 lbs	21,000 lbs
<b>Service Brakes:</b>						
<b>Hydraulic</b>	Hydraulic Disc w/ ABS	Hydraulic Disc w/ ABS	Hydraulic Disc w/ ABS			
<b>Air</b>		13.2 CFM, Air Compressor & Dryer (see item 5)	13.2 CFM, Air Compressor & Dryer (see item 5)	13.2 CFM, Air Compressor & Dryer	13.2 CFM, Air Compressor & Dryer	13.2 CFM, Air Compressor & Dryer
<b>Suspension</b>	Front Springs, ea. 5,400 lbs @ grd. Rear Springs, ea. 8,500 lbs @ grd. Front and Rear Shock Absorbers	Front Springs, ea. 5,400 lbs @ grd. Rear Springs, ea. 8,500 lbs @ grd. Front and Rear Shock Absorbers.	Front Springs, ea. 5,400 lbs @ grd. Rear Springs, ea. 8,500 lbs @ grd. Front and Rear Shock Absorbers.	Front Springs, ea. 5,400 lbs @ grd. Rear Springs, ea. 8,500 lbs @ grd. Front and Rear Shock Absorbers.	Front Springs, ea. 5,400 lbs @ grd. Rear Springs, ea. 8,500 lbs @ grd. Front and Rear Shock Absorbers.	Front Springs, ea. 5,400 lbs @ grd. Rear Springs, ea. 8,500 lbs @ grd. Front and Rear Shock Absorbers.
<b>Engine</b>	175 HP (see item 11)	175 HP (see item 11)	175 HP (See item 11)	175 HP (see item 11)	190 HP (see item 11)	210 HP (see item 11)
<b>Transmission (Allison or approved equal)</b>	5-Speed Direct or 1,000 PTS	5-Speed Direct, 2,100 or 2,200 PTS (see item 5)	5-Speed Direct, 2,100 or 2,200 PTS (see item 5)	5-Speed Direct or 2,500 PTS	2,500 PTS	2,500 PTS
<b>Drive Shaft</b>	Guards on All Shafts	Guards on All Shafts	Guards on All Shafts	Guards on All Shafts	Guards on All Shafts	Guards on All Shafts
<b>Fuel Supply Container</b>	30 gals	30 gals	30 gals	30 gals	30 gals	30 gals
<b>Air cleaner</b>	Dry Element Type w/Restriction Gauge	Dry Element Type w/Restriction Gauge	Dry Element Type w/Restriction Gauge	Dry Element Type w/Restriction Gauge	Dry Element Type w/Restriction Gauge	Dry Element Type w/Restriction Gauge



### Minimum Chassis Specification Chart

#### TYPE C Bus

Maximum Design (Passenger) Capacity	Type C1 Bus					
	<u>30</u>	<u>35</u>	<u>53</u>	<u>65</u>	<u>71</u>	<u>77</u>
<b>Alternator</b>	200 amps, 4gauge Charging and Ground Circuits	200 amps, 4gauge Charging and Ground Circuits	200 amps, 4gauge Charging and Ground Circuits	200 amps, 4gauge Charging and Ground Circuits	200 amps, 4gauge Charging and Ground Circuits	200 amps, 4gauge Charging and Ground Circuits
<b>Horn</b>	Per FMVSS	Per FMVSS	Per FMVSS	Per FMVSS	Per FMVSS	Per FMVSS
<b>Lights</b>	Per FMVSS and DRL	Per FMVSS and DRL	Per FMVSS and DRL	Per FMVSS and DRL	Per FMVSS and DRL	Per FMVSS and DRL
<b>Gauges</b>	Speedometer, Tachometer, Oil Pressure, Fuel, Coolant Temp. & Voltmeter.	Speedometer, Tachometer, Oil Pressure, Fuel, Coolant Temp. & Voltmeter. Air Pressure as required.	Speedometer, Tachometer, Oil Pressure, Fuel, Coolant Temp. & Voltmeter. Air Pressure as required.	Speedometer, Tachometer, Oil Pressure, Fuel, Coolant Temp., Voltmeter, & Air Pressure	Speedometer, Tachometer, Oil Pressure, Fuel, Coolant Temp., Voltmeter & Air Pressure.	Speedometer, Tachometer, Oil Pressure, Fuel, Coolant Temp., Voltmeter & Air Pressure.

<b>Color</b>	Frame, Wheels, Bumpers, Rails and Lettering - Black. Back of Mirrors – Non-gloss Black. The balance NSBY.	Frame, Wheels, Bumpers, Rails and Lettering - Black. Back of Mirrors – Non-gloss Black. The balance NSBY.	Frame, Wheels, Bumpers, Rails and Lettering - Black. Back of Mirrors – Non-gloss Black. The balance NSBY.	Frame, Wheels, Bumpers, Rails and Lettering - Black. Back of Mirrors – Non-gloss Black. The balance NSBY.	Frame, Wheels, Bumpers, Rails and Lettering - Black. Back of Mirrors – Non-gloss Black. The balance NSBY.	Frame, Wheels, Bumpers, Rails and Lettering - Black. Back of Mirrors – Non-gloss Black. The balance NSBY.
<b>Oil Filter</b>	1 Quart per Manufacturer	1 Quart per Manufacturer	1 Quart per Manufacturer	1 Quart per Manufacturer	1 Quart per Manufacturer	1 Quart per Manufacturer
<b>Battery</b>	750 CCA	750 CCA	750 CCA	750 CCA	750 CCA	750 CCA

### Minimum Chassis Specification Chart

#### TYPE D Front Engine (FE) Transit Bus

Maximum Design (Passenger) Capacity			<u>42 &amp; 53</u>	<u>65</u>	<u>71</u>	<u>77</u>	<u>83</u>
	GVWR		27,800 lbs	29,000 lbs	29,000 lbs	32,000 lbs	32,000 lbs
<b>Wheels</b>	10-Stud Disc 22.5" X 7.5"	10-Stud Disc 22.5" X 7.5"	10-Stud Disc 22.5" X 7.5"	10-Stud Disc 22.5" X 7.5"	10-Stud Disc 22.5" X 8.25"	10-Stud Disc 22.5" X 8.25"	10-Stud Disc 22.5" X 8.25"
<b>Tires</b>	11R22.5 (See item 29.)	11R22.5 (See item 29.)	11R22.5 (See item 29.)	11R22.5 (See item 29.)	11R22.5 (See item 29.)	11R22.5 (See item 29.)	11R22.5 (See item 29.)
<b>Frame</b>	One Piece Side Member – Front Tow Hooks	One Piece Side Member – Front Tow Hooks	One Piece Side Member – Front Tow Hooks	One Piece Side Member – Front Tow Hooks	One Piece Side Member – Front Tow Hooks	One Piece Side Member – Front Tow Hooks	One Piece Side Member – Front Tow Hooks
<b>Steering</b>	Power (see item 28.D.)	Power (See item 28.D.)	Power (See item 28.D.)	Power (See item 28.D.)	Power (See item 28.D.)	Power (See item 28.D.)	Power (See item 28.D.)
<b>Front Bumper</b>	3/16" Steel	3/16" Steel	3/16" Steel	3/16" Steel	3/16" Steel	3/16" Steel	3/16" Steel
<b>Front Axle</b>	10,800 lbs	12,000 lbs	12,000 lbs	12,000 lbs	13,000 lbs	13,000 lbs	13,000 lbs
<b>Rear Axle</b>	17,000 lbs	17,000 lbs	17,000 lbs	17,000 lbs	19,000 lbs	19,000 lbs	19,000 lbs
<b>Service Brakes:</b>							
<b>Air</b>	13.2 CFM Air Compressor/Dryer 16.5"x5" Front 16.5"x7" Rear	13.2 CFM Air Compressor/Dryer 16.5"x5" Front 16.5"x7" Rear	13.2 CFM Air Compressor/Dryer 16.5"x5" Front 16.5"x7" Rear	13.2 CFM Air Compressor/Dryer 16.5"x5" Front 16.5"x7" Rear	13.2 CFM Air Compressor/Dryer 16.5"x5" Front 16.5"x7" Rear	13.2 CFM Air Compressor/Dryer 16.5"x5" Front 16.5"x7" Rear	13.2 CFM Air Compressor/Dryer 16.5"x5" Front 16.5"x7" Rear
<b>Suspension</b>	Front Springs, ea. 5,400 lbs @ grd. Rear Springs, ea. 8,500 lbs @ grd. Front and Rear Shock Absorbers.	Front Springs, ea. 5,400 lbs @ grd. Rear Springs, ea. 8,500 lbs @ grd. Front and Rear Shock Absorbers.	Front Springs, ea. 5,400 lbs @ grd. Rear Springs, ea. 8,500 lbs @ grd. Front and Rear Shock Absorbers.	Front Springs, ea. 5,400 lbs @ grd. Rear Springs, ea. 8,500 lbs @ grd. Front and Rear Shock Absorbers.	Front Springs, ea. 5,400 lbs @ grd. Rear Springs, ea. 8,500 lbs @ grd. Front and Rear Shock Absorbers.	Front Springs, ea. 5,400 lbs @ grd. Rear Springs, ea. 8,500 lbs @ grd. Front and Rear Shock Absorbers.	Front Springs, ea. 5,400 lbs @ grd. Rear Springs, ea. 8,500 lbs @ grd. Front and Rear Shock Absorbers.
<b>Engine</b>	190 HP (see item 11.)	190 HP (see item 11.)	190 HP (see item 11.)	190 HP (see item 11.)	210 HP (see item 11.)	210 HP (see item 11.)	210 HP (see item 11.)
<b>Transmission (Allison or approved equal)</b>	2,500 PTS	2,500 PTS	2,500 PTS	2,500 PTS	2,500 PTS	2,500 PTS	3,000 PTS
<b>Drive Shaft</b>	Guards on All Shafts	Guards on All Shafts	Guards on All Shafts	Guards on All Shafts	Guards on All Shafts	Guards on All Shafts	Guards on All Shafts

<b>Wheels</b>	10-Stud Disc 22.5" X 7.5"	10-Stud Disc 22.5" X 7.5"	10-Stud Disc 22.5" X 7.5"	10-Stud Disc 22.5" X 8.25"	10-Stud Disc 22.5" X 8.25"
<b>Fuel Supply Container</b>	30 gals	30 gals	30 gals	30 gals	30 gals
<b>Air Cleaner</b>	Dry Element Type w/ Restriction Gauge	Dry Element Type w/ Restriction Gauge	Dry Element Type w/ Restriction Gauge	Dry Element Type w/ Restriction Gauge	Dry Element Type w/ Restriction Gauge
<b>Alternator</b>	200 amps 4-gauge Charging and Ground Circuits	200 amps 4-gauge Charging and Ground Circuits	200 amps 4-gauge Charging and Ground Circuits	200 amps 4-gauge Charging and Ground Circuits	200 amps 4-gauge Charging and Ground Circuits
<b>Horn</b>	Per FMVSS	Per FMVSS	Per FMVSS	Per FMVSS	Per FMVSS
<b>Lights</b>	Per FMVSS and DRL.	Per FMVSS and DRL.	Per FMVSS and DRL.	Per FMVSS and DRL.	Per FMVSS and DRL.
<b>Gauges</b>	Speedometer, tachometer, fuel, oil pressure, coolant temp & voltmeter, air pressure	Speedometer, tachometer, fuel, oil pressure, coolant temp & voltmeter, air pressure	Speedometer, tachometer, fuel, oil pressure, coolant temp & voltmeter, air pressure	Speedometer, tachometer, fuel, oil pressure, coolant temp & voltmeter, air pressure	Speedometer, tachometer, fuel, oil pressure, coolant temp & voltmeter, air pressure

### Minimum Chassis Specification Chart

#### TYPE D Front Engine (FE) Transit Bus

Maximum Design (Passenger) Capacity	<b>42 &amp; 53</b>	<b>65</b>	<b>71</b>	<b>77</b>	<b>83</b>
<b>Color</b>	Frame, Wheels, Bumpers, Rails and Lettering- Black. Back of Mirrors – Non- gloss Black. The balance NSBY.	Frame, Wheels, Bumpers, Rails and Lettering- Black. Back of Mirrors – Non- gloss Black. The balance NSBY.	Frame, Wheels, Bumpers, Rails and Lettering- Black. Back of Mirrors – Non- gloss Black. The balance NSBY.	Frame, Wheels, Bumpers, Rails and Lettering- Black. Back of Mirrors – Non- gloss Black. The balance NSBY.	Frame, Wheels, Bumpers, Rails and Lettering-Black. Back of Mirrors – Non- gloss Black. The balance NSBY.
<b>Oil Filter</b>	1 Quart per Manufacturer	1 Quart per Manufacturer	1 Quart per Manufacturer	1 Quart per Manufacturer	1 Quart per Manufacturer
<b>Battery</b>	750 CCA	750 CCA	750 CCA	750 CCA	750 CCA

### Minimum Chassis Specification Chart

#### TYPE D Rear Engine (RE) Transit Bus

Maximum Design (Passenger) Capacity	<b>66</b>	<b>72</b>	<b>78</b>	<b>84</b>	
<b>GVWR</b>	29,800 lbs	29,800 lbs	33,000 lbs	33,000 lbs	
<b>Wheels</b>	10-Stud Disc 22.5" X 7.5"	10-Stud Disc 22.5" X 7.5"	10-Stud Disc 22.5" X 7.5"	10-Stud Disc 22.5" X 7.5"	10-Stud Disc 22.5" X 7.5"
<b>Tires</b>	11R22.5 (see item 29.)	11R22.5 (see item 29.)	11R22.5 (see item 29.)	11R22.5 (see item 29.)	11R22.5 (see item 29.)

<b>Wheels</b>	10-Stud Disc 22.5" X 7.5"	10-Stud Disc 22.5" X 7.5"	10-Stud Disc 22.5" X 7.5"	10-Stud Disc 22.5" X 7.5"
<b>Frame</b>	One Piece Side Member – Front Tow Hook	One Piece Side Member – Front Tow Hook	One Piece Side Member – Front Tow Hook	One Piece Side Member – Front Tow Hook
<b>Steering</b>	Power (see item 28.D.)	Power (see item 28.D.)	Power (see item 28.D.)	Power (see item 28.D.)
<b>Front Bumper</b>	3/16" Steel	3/16" Steel	3/16" Steel	3/16" Steel
<b>Front Axle</b>	10,800 lbs	10,800 lbs	12,000 lbs	12,000 lbs
<b>Rear Axle</b>	19,000 lbs	19,000 lbs	21,000 lbs	21,000 lbs
<b>Service Brakes:</b>				
<b>Air</b>	13.2 CFM, Air Compressor & Dryer. 16.5" x 5" Front 16.5" x 7" Rear	13.2 CFM, Air Compressor & Dryer. 16.5" x 5" Front 16.5" x 7" Rear	13.2 CFM, Air Compressor & Dryer. 16.5" x 5" Front 16.5" x 7" Rear	13.2 CFM, Air Compressor & Dryer. 16.5" x 5" Front 16.5" x 7" Rear
<b>Suspension</b>	Front Springs, ea. 5,400 lbs @ grd. Rear Springs, ea. 8,500 lbs @ grd. Front and Rear Shock Absorbers	Front Springs, ea. 5,400 lbs @ grd. Rear Springs, ea. 8,500 lbs @ grd. Front and Rear Shock Absorbers	Front Springs, ea. 5,400 lbs @ grd. Rear Springs, ea. 8,500 lbs @ grd. Front and Rear Shock Absorbers	Front Springs, ea. 5,400 lbs @ grd. Rear Springs, ea. 8,500 lbs @ grd. Front and Rear Shock Absorbers
<b>Engine</b>	190 HP (see item 11)	190 HP (see item 11)	210 HP (see item 11)	210 HP (see item 11)
<b>Transmission (Allison or Approved Equal)</b>	2,500 PTS	2,500 PTS	3,000 PTS	3,000 PTS
<b>Drive Shaft</b>	Guards on All Shafts	Guards on All Shafts	Guards on All Shafts	Guards on All Shafts
<b>Fuel Supply Container</b>	30 gals	30 gals	30 gals	30 gals
<b>Air Cleaner</b>	Dry Element Type w/ Restriction Gauge	Dry Element Type w/ Restriction Gauge	Dry Element Type w/ Restriction Gauge	Dry Element Type w/ Restriction Gauge
<b>Alternator</b>	200 amp, 4-gauge Charging and Ground Circuits	200 amp, 4-gauge Charging and Ground Circuits	200 amp, 4-gauge Charging and Ground Circuits	200 amp, 4-gauge Charging and Ground Circuits
<b>Horn</b>	Per FMVSS	Per FMVSS	Per FMVSS	Per FMVSS
<b>Lights</b>	Per FMVSS and DRL	Per FMVSS and DRL	Per FMVSS and DRL	Per FMVSS and DRL
<b>Gauges</b>	Speedometer, Tachometer, Oil Pressure, Fuel, Coolant Temp. Voltmeter & Air Pressure.	Speedometer, Tachometer, Oil Pressure, Fuel, Coolant Temp. Voltmeter & Air Pressure.	Speedometer, Tachometer, Oil Pressure, Fuel, Coolant Temp. Voltmeter & Air Pressure.	Speedometer, Tachometer, Oil Pressure, Fuel, Coolant Temp. Voltmeter & Air Pressure.

### Minimum Chassis Specification Chart

#### TYPE D Rear Engine (RE) Transit Bus

<b>Maximum Design (Passenger) Capacity</b>	<b><u>66</u></b>	<b><u>72</u></b>	<b><u>78</u></b>	<b><u>84</u></b>
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<b>Color</b>	Frame, Wheels, Bumper, Rails and Lettering-Black. Back of Mirrors – Non-gloss Black. The balance NSBY	Frame, Wheels, Bumper, Rails and Lettering-Black. Back of Mirrors – Non-gloss Black. The balance NSBY	Frame, Wheels, Bumper, Rails and Lettering- Black. Black of Mirrors- Non-gloss Black. The balance NSBY.	Frame, Wheels, Bumper, Rails and Lettering-Black. Back of Mirrors – Non-gloss Black. The balance NSBY.
<b>Oil Filter</b>	1 Quart per Manufacturer	1 Quart per Manufacturer	1 Quart per Manufacturer	1 Quart per Manufacturer
<b>Battery</b>	750 CCA	750 CCA	750 CCA	750 CCA