

FLORIDA
SCHOOL BUS SPECIFICATIONS
Revised 2013

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FOREWORD

Florida School Bus Specifications are adopted as authorized under Section 1006.25, Florida Statutes (F.S.), and Rule 6A-3.003, Florida Administrative Code (F.A.C.).

FLORIDA SCHOOL BUS SPECIFICATIONS

General Information and Warranty Provisions

1. All public school buses (bodies and chassis) owned, operated, rented, leased, and contracted for by any public school board and charter school in Florida, used to transport children to and from school or school-related events, and purchased after the effective date of this document, as specified in Rule 6A-3.003, F.A.C., must:
 - a. Meet or exceed the minimum requirements of these specifications; and,
 - b. Meet all applicable Federal Motor Vehicle Safety Standards (FMVSS); and,
 - c. Meet or exceed the National School Transportation Specifications & Procedures, May 2010 (also referred to herein as the 2010 National Specifications), except when in conflict with the requirements herein. In such cases, the requirements specified in this document shall prevail.
2. The requirements specified herein are the minimum requirements for school buses in Florida. The date used to determine the applicability of these specifications is defined as the date the vendor receives the purchase order or signs a valid sales contract with the purchaser.
3. All school bus chassis and body manufacturers must certify to the Commissioner of Education, Florida Department of Education, by letter, that all school buses offered for sale to or use by the public school systems, including charter schools, in Florida meet or exceed all standards, specifications, and requirements as specified herein.
4. Used school buses purchased or operated by a public school board or charter school in Florida must meet or exceed all federal and state requirements for public school buses that were in effect on the date the vehicle was manufactured.
5. Under the authority of Section 316.615, F.S., certain capacity size school buses owned, operated, or leased by nonpublic schools in Florida are required to meet the specifications prescribed herein.
6. **Definition of School Bus:**
 - a. **State Definition:** In Section 1006.25, F.S., a “school bus” is defined as "a motor vehicle regularly used for the transportation of prekindergarten disability program and kindergarten through grade 12 students of the public schools to and from school or to and from school activities, and owned, operated, rented, contracted, or leased by any district school board..."
 - b. **Federal Definition:** Title 49 CFR Part 571.3 states, "...‘school bus’ means a bus that is sold or introduced in interstate commerce for purposes that include carrying students to and from school or related events.”
7. **School Bus Types:**

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

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

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

8. Warranties and Parts Availability: New Vehicles

All warranties listed herein must apply to all school buses manufactured after the effective date of these specifications and sold through the state school bus bid purchase program. Body and chassis manufacturers' warranty policies must allow revision of warranty start date for each vehicle to the actual in-service date by the school district. Appropriate forms to update chassis warranties must be included in the owner-operator's packet supplied with the chassis and must be conveyed along with the body warranty by the body builder to the district upon delivery of the completed unit. Above requirements must apply to the basic warranties, all component warranties, and any extended warranties offered or required. There must be no hours-of-use limitation on any warranty required in these specifications or the associated state bid for school buses.

Manufacturers offering school bus chassis or bodies for sale in the State of Florida must make available replacement parts for said buses for a period of no less than 10 years.

The minimum labor rate for all warranty related repairs must be \$75.00 per hour.

a. Chassis Warranties

- 1) The chassis warranty must be manufacturer's standard, and minimum 12,000 miles or 12 months.
- 2) Diesel engines (including flywheel, flex plate, and harmonic balancer) on types A2, C, and D chassis must be warranted for 60 months/100,000 miles, 100 percent parts and labor.
- 3) Pricing requests will be added to the bid for the following extended engine warranty options: a) pricing for 60 months/150,000 miles; b) pricing for 60 months/200,000 miles; and, c) pricing for 60 months/unlimited mileage.
- 4) The chassis or component supplier for all types A2, C, and D chassis must warranty or provide extended service coverage for the following items, including removal and replacement, for five years, or 100,000 miles, 100 percent parts and labor: radiator and coolant recovery tank; and, rear axle assembly (hub to hub), but not including gaskets and seals covered under the basic 12 months/12,000 miles chassis warranty. Types C and D buses are required to include a 60 months/100,000 miles, 100 percent parts and labor warranty on rear axle seals and brake components if the axle is not equipped with oil diverter rings. Chassis frame rails, cross members, fuel tanks, front axle I-beams, and rear axle housings must be warranted for a period of 10 years, from the updated in-service date of the vehicle, 100 percent parts and labor. Automatic transmissions must be warranted for three years, 50,000 miles, 100 percent parts and labor, for all types A, C, and D school buses.
- 5) All bus chassis electrical components, including wiring, switches, alternators, computers, and controllers, must be warranted for 60 months/100,000 miles against failure, 100 percent parts and labor, including, but not limited to, damage resulting from wiring or connectors becoming abraded, pierced by fasteners, shorted, or otherwise damaged during manufacture or use.
- 6) Paint finish coats to chassis hood, fenders, and cowl must be warranted for 60 months/100,000 miles, 100 percent parts and labor, for adhesion, color retention, and gloss retention. Acceptable lower limits during the warranty period are as follows:
 - a) Adhesion: During the 60-month warranty period, paint and priming compounds must not fail to adhere to the bus with normal use and care.
 - b) Color Retention: During the first 36 months from the in-service date, the color coat must not shift colors more than 4 ΔE from the centroid as specified in School Bus Manufacturers Technical Council Publication SBMTC-008. During the 60-month warranty period, the color coat must not shift color more than 8 ΔE from the centroid as specified in SBMTC-008.
 - c) Gloss: During the first 36 months from the in-service date, the gloss reading must not fall below 60 at 60°. During the 60-month warranty period, the gloss reading must not drop below 30 at 60°.
 - d) All measurements must be the average of 12 readings taken at various points on the bus, but no reading must be more than 3 points under the stated minimum. All readings must be taken after the bus is thoroughly washed to remove road film and dust.

b. Body Warranties

- 1) The body warranty must be manufacturer's standard, minimum 12 months.
- 2) Wheelchair lifts on any bus so equipped must be warranted for 24 months from the updated in-service date of the vehicle. The warranty must provide 100 percent coverage for parts.
- 3) The total air conditioner system on any bus so equipped must be warranted for 24 months, including parts (excluding fluids, gases, and air filters used in normal preventive maintenance) and labor with no warranty limitation on number of operating hours. Warranty must include at least the items listed in Appendix B. Chassis engine-driven air conditioner compressor applications must be approved in writing by the engine manufacturer, stating that the installation will not void or reduce the engine manufacturer's warranty or extended service liabilities in any way.
- 4) All mirror assemblies (including mounting bracketry) must be warranted (100 percent parts replacement coverage) for 60 months against rust and corrosion and against any reduction in clarity of view due to discoloration or other deterioration of the lens.
- 5) All bus body electrical wiring and switches must be warranted for 60 months/unlimited mileage against failure, 100 percent parts and labor, including, but not limited to, damage resulting from wiring or connectors becoming abraded, pierced by fasteners, shorted, or otherwise damaged during manufacture or use.
- 6) Paint finish coats to body, hood, and cowl must be warranted for 60 months, unlimited mileage, 100 percent parts and labor, for adhesion, color retention, and gloss retention. Acceptable lower limits during the warranty period are as follows:
 - a) Adhesion: During the 60-month warranty period, paint and priming compounds must not fail to adhere to the bus with normal use and care.
 - b) Color Retention: During the first 36 months from the in-service date, the color coat must not shift colors more than 4 ΔE from the centroid, as specified in SBMTC-008. During the 60-month warranty period, the color coat must not shift color more than 8 ΔE from the centroid, as specified in SBMTC-008.
 - c) Gloss: During the first 36 months from the in-service date, the gloss reading must not fall below 60 at 60°. During the 60-month warranty period, the gloss reading must not drop below 30 at 60°.
 - d) All measurements must be the average of 12 readings taken at various points on the bus but no reading must be more than 3 points under the stated minimum. All readings must be taken after the bus is thoroughly washed to remove road film and dust.
- 7) All emergency exit roof hatches must be warranted (100 percent parts and labor) for 60 months against defects in material and workmanship and against leakage.
- 8) All passenger seat back cushions and seat frame assemblies must be warranted for 60 months, 100 percent parts and labor. This warranty must not apply to vandalism of any exposed foam.
- 9) All powered entrance doors and operating and control systems must be warranted for a period of 5 years, unlimited mileage, 100 percent parts and labor.

c. Lift Warranty

A statement of warranty must be provided with each lift assuring the quality of materials and workmanship of the product for at least two years from the date of acceptance by the final consumer. The warranty must provide 100 percent coverage for parts.

d. Manufacturer's Standard Warranty

Each manufacturer or dealer must include as part of its bid package credit option allowances for districts who wish to forego the aforementioned extended warranty plans and purchase the manufacturer's standard/base warranty option package.

9. Changes or Clarification of Specifications:

Florida School Bus Specifications may be amended pursuant to the provisions of Rule 6A-3.003, F.A.C..

The School Transportation Management Section, with the concurrence of the Florida Association for Pupil Transportation (FAPT), School Bus Specifications Committee, and consistent with Florida purchasing laws and the bus bid contract, may at its discretion grant variances or exemptions and may from time to time issue clarifications of these specifications as necessary to provide safe, efficient, and cost-effective equipment to Florida school districts and charter schools and to provide for advances in technology.

Should a clarification or interpretation of these Florida School Bus Specifications be requested, inquiries should be directed to **Director, School Transportation Management Section, Florida Department of Education, 325 West Gaines Street, Suite 834, Tallahassee, Florida 32399-0400.**

SECTION I

CHASSIS SPECIFICATIONS

TYPE A1 (19-29 Capacity)

TYPE A2 (30-47 Capacity)

DUAL REAR WHEEL

CUTAWAY CHASSIS

**BASIC MINIMUM SPECIFICATIONS
FOR TYPE A GASOLINE AND DIESEL SCHOOL BUS CHASSIS
FOR MOUNTING TYPES A1 (19-29 capacity) and A2 (30-47 capacity)
SCHOOL BUS BODIES**

ALTERNATOR

Type A1 chassis alternators must have a 120 amp minimum rating, with 50 amperes (amp) minimum output at manufacturer's recommended engine idle speed. Type A2 chassis alternators must have a minimum of 160 amperes current output, hot rated.

BATTERY (IES)

Type A1 chassis batteries must provide a total of 1,200 cold cranking amps (CCA) minimum at 0°F, and must be 12 volts. For Type A2, chassis batteries must provide a total of 1,750 CCA minimum at 0°F and must be 12 volts.

BRAKE, PARKING

On Type A1 chassis the manufacturer's standard parking brake is acceptable. On Type A2 chassis with hydraulic brakes the parking brake control must be mounted for easy access by the driver. On air brake models, the control valve to spring-set the parking brakes on the rear wheels must be dash-mounted.

BRAKES, SERVICE

Hydraulic brake models must have power assist. Types A1 and A2 buses equipped with hydraulic brakes must be equipped with the manufacturer's standard antilock brake system.

All air brake models (drum, disc-drum, or air disc) must be equipped with spring-set parking brakes on the rear wheels. Drum brakes must be cam-actuated and brake S-cam rotation must be in same direction as forward wheel rotation. All brake drums must be outboard mounted; i.e., drums must be removable without removal of the axle hub. A minimum 12 cubic feet per minute (CFM), engine oil-fed air compressor is required on all air brake models. Clean air to the air compressor must be supplied from the "clean" side of the engine air cleaner or air system. The compressor must not be equipped with a separate, compressor-mounted air filter. Air brake system design must provide for anti-compounding of service and emergency brakes and spring brake modulation upon application of the front service brakes in the event of loss of air pressure to the rear service brakes. The rear axle of all buses with air brakes must be equipped with grease guards to divert excessive oil or grease leaks away from brake linings in the event of a rear wheel seal leak; alternatively, the bus supplier must provide a warranty for rear axle seals and brake components as noted under **GENERAL INFORMATION AND WARRANTY PROVISIONS**. Buses equipped with air brakes must be equipped with an antilock braking system (ABS) with independent controls for each wheel position.

BUMPER, FRONT

Type A1 buses must have a front bumper of channel design that is a minimum of six inches wide (vertically) and is the full width of the vehicle.

Type A2 buses must have a front bumper that is black, of full-width channel type, and is a minimum of eight inches wide (vertically). The bumper on Type A2 buses must have sufficient structural and mounting strength to ensure that front of vehicle can be lifted by means of an air bumper-type jack, without permanent deformation of the bumper, brackets, or chassis frame rail(s).

ENGINE EQUIPMENT

- a. A dry type air cleaner is required. An air filter restriction indicator is required on diesel engines in Type A2 buses.

- b. The engine must be equipped with full-flow, spin-on, or cartridge-type oil filter(s), with the filter header(s) mounted directly to engine.
- c. An engine coolant recovery or deaeration system is required on all chassis. Type A2 diesel engines must include a means to visually check the coolant level without removing the deaeration tank cap or releasing pressure from the cooling system.
- d. A warning system consisting of a light and a buzzer is required on diesel powered Type A2 chassis to notify the driver of low engine oil pressure and/or coolant overheating.
- e. A fuel filtration system and water separator is required on all Type A2 diesel engines. The system must remove from the fuel prior to entry into the engine all contaminants capable of adversely affecting the fuel system. The system must have a clear sight bowl or be equipped with a water-in-fuel light to notify technicians of the presence of water. The system must provide a valve for draining trapped water from the system. The fuel system must include an electric or a manual priming pump.
- f. An engine oil pressure gauge is required. It must provide accurate, easily discernible readings across the entire operating range from hot idle to full oil pressure. The gauge on engines with idle oil pressure that under normal conditions is low must provide a clear distinction between no oil pressure and engine idle oil pressure. The gauge must be directly visible to the driver in the normal seated position and must not be mounted near the center of the dash where the service door control or its associated hardware could block visibility of the gauge.
- g. Radiator and other engine coolant hoses supplied by the chassis manufacturer (not including heater hoses) must be constructed of silicone rubber or must be constructed with ethylene propylene diene monomer (EPDM) covering and aramid fiber reinforcement meeting or exceeding SAEJ20R EC Class D-1. Silicone hose, if used, must include stainless steel shoe-type hose clamps or constant-torque clamps. Hoses must have markings, coloring, or other visible means of distinguishing this hose from the standard hoses.

ENGINE PERFORMANCE REQUIREMENTS FOR TYPE A2 BUSES

- a. Each bus must be furnished with a power train that meets or exceeds the following minimum criteria when tested at the gross vehicle weight rating (GVWR) required for a given bus capacity, and with all accessories (including air conditioner compressor(s), if equipped) on and operating:
 - (1) Startability of 20 percent.
 - (2) Gradeability of 5 percent at 25 miles per hour.
 - (3) Gradeability of 1.5 percent at 50 miles per hour.
 - (4) Top speed of 60 miles per hour minimum.
- b. Performance must be measured with the actual completed vehicle (i.e., with the body installed, unloaded except for the driver and one passenger). The vehicle must be in drive, with the engine at idle, the service brakes applied, the emergency brakes released, and all accessories on and operating. Measurement of acceleration time must begin at the moment the throttle is applied (the throttle is to be immediately and rapidly depressed to full throttle).

NOTE: The chassis manufacturer should use the heaviest chassis/body combination meeting these specifications for the specific bus size to determine required power train components. This test is an on-road test and will be performed using the heaviest available chassis/body, depending on body(ies) supplied. At the discretion of the Department, unanticipated factors or variations in test conditions affecting performance test results that are beyond the control of the chassis manufacturer may be taken into account. A Pro Link, a diagnostic computer, or a speed wheel are also acceptable tools for this test.

Maximum acceleration time (from zero mph), under the conditions specified above, must be as follows (measured in seconds):

TEST METHOD	0-10 MPH	0-20 MPH	0-30 MPH	0-40 MPH	0-50 MPH
ACTUAL	3.4	6.2	12.0	20.0	32.2

Manufacturers may offer additional engine configurations and horsepower ratings that exceed these requirements as optional equipment.

EXHAUST SYSTEM

Type A1

The exhaust system on Type A1 buses must be corrosion resistant and the exhaust must exit behind the rear wheels and left of the left frame rail. As an exception, a dual exhaust system may be used on Type A1 diesel chassis.

Type A2

The exhaust system on Type A2 buses must have a corrosion-resistant muffler and tailpipe. The tailpipe must exit to the left of left frame rail and behind the rear wheels. The chassis manufacturer must ensure that the exhaust design allows the exit location left of the left frame rail to be maintained after any modifications to frame length by the chassis or body manufacturer. Manufacturers must ensure that exhaust temperature exiting the tailpipe with the engine running during any normal loading or unloading activity will not produce first, second, or third-degree burns on students or other individuals present. The bus must not automatically regenerate the diesel particulate filter while the bus is stationary.

FRAME SIDE MEMBERS

Frame side members must be of one-piece construction between the front and rear spring hangers. Frame rails of Type A2 chassis must have a minimum tensile strength of 50,000 pounds per square inch (psi).

FRONT AXLE WHEEL SEALS

All Type A2 buses must have oil-lubricated front axles and seals.

FUEL TANK

The fuel tank filler spout must be located for ease in servicing. See the Chassis Specifications Chart in this section for minimum tank capacities by size.

HEADLIGHTS

Headlights must meet Society of Automotive Engineers (SAE) and Federal Motor Vehicle Safety Standards (FMVSS) and must use a quartz halogen bulb. All buses must be equipped with Full-Time Lights (FTL) meeting the following requirements:

- a. With the ignition switch off, the headlights will operate normally and the FTL system will not operate.
- b. With the ignition switch on or in the accessory position, and with the engine not running, the FTL must not operate.
- c. With the ignition switch on and the engine running with the headlight switch off, the FTL system must operate; it must provide low-beam headlights, and tail, clearance, and identification (ID) lights. This activation may be accomplished by any reasonable means, including the use of the park brake system.
- d. In all cases, the headlight switch must override the FTL system when in the “on” position.

- e. This system must include a buzzer that activates if the headlight system is on with the key switch in the “off” position.

IGNITION SYSTEM

Ignition systems on all Type A2 chassis must be keyed alike. All buses of like chassis manufacturer must have one key, regardless of the type of key supplied to Florida purchasers.

INSULATION

Type A2 chassis must include heat and noise insulation inside the bus covering the dash panel (fire wall) area to as great an extent as possible. Insulation must extend at least down to the point where the body floor connects to the fire wall, including the engine cover (doghouse), which may be insulated on the interior or exterior.

LINE-SETT TICKET

The manufacturer must include with delivery of the vehicle a line-sett ticket to accurately reflect all chassis components, the GAWR of both front and rear axles, and the gross vehicle weight rating (GVWR).

PAINT AND FINISH

School bus yellow paint must meet SBMTC-008 for color and must have a finished gloss rating of at least 85 at 60°F and a distinctness of image rating of an average of at least 50, measured using the same method specified for gloss under **GENERAL INFORMATION AND WARRANTY PROVISIONS**. Paint must be applied for a total dry thickness of at least 1.8 mils over all painted surfaces. Trim, lettering, and the bumper must be black except that the bumper must be striped with reflective material in accordance with National School Transportation Specifications and Procedures or these specifications. Rims for all Type A1 buses must be manufacturer’s standard. Rims for all Type A2 buses with hub-piloted wheels must be powder-coated, National School Bus Yellow, by the rim manufacturer. Lug nuts must not be painted. All Type A2 stud-piloted rims must be painted black.

STEERING

A factory installed tilt steering wheel/column is required.

TIRES AND RIMS

Chassis must be equipped with radial tubeless tires. Type A1 buses must have dual rear wheels (see **Chassis Specifications Chart** in this section). Type A2 buses must use hub-piloted disc wheels. Tires and rims must conform to current standards of the Tire and Rim Association.

TRANSMISSION, AUTOMATIC

- a. An automatic transmission is required on all chassis. It shall be heavy-duty, with a minimum of four forward speeds, on all units. On Type A2 chassis, 30 capacity and larger, the transmission must be an Allison 1000 or 2000 or approved equal. An external filter in the transmission oil cooler return line is required on Allison 1000 and 2000 equipped units.
- b. Automatic transmissions incorporating a parking pawl must have a transmission shifter interlock controlled by the application of the service brake to prohibit accidental engagement of the transmission. All non-park pawl transmissions must incorporate a park brake interlock that requires the service brake to be applied to allow release of the parking brake.

VOLTAGE CONTROL

The voltage regulator must be solid state (transistorized) and readily accessible for service. A voltmeter is required with a graduated scale.

WARRANTIES

See required chassis and component warranties under **GENERAL INFORMATION AND WARRANTY PROVISIONS**.

WIRING HARNESS

The wiring must be rated for 100 amps load and include complete wiring for the tail and stop lights. It must be designed with color coding for circuits. The fuse box door, if equipped, must have a positive latch.

Chassis Specifications Chart Types A1 and A2 Buses								
<u>Maximum Design (Passenger) Capacity</u>		<u>19</u>	<u>23</u>	<u>29</u>	<u>30</u>	<u>36</u>	<u>42</u>	<u>47</u>
<u>Type</u>		<u>A1</u>	<u>A1</u>	<u>A1</u>	<u>A2</u>	<u>A2</u>	<u>A2</u>	<u>A2</u>
GVWR (pounds)		11,500	14,050	14,050	14,500	21,500	21,500	21,500
Minimum engine size for diesel engines (liters)		6.0L	6.0L	6.0L	6.0L	6.0L	6.0L	6.0L
Approximate wheelbase (inches)		139	139	152	152	170	194	202
Minimum fuel tank (gallons)		30	30	30	35	35	35	60
Minimum Sizes and Ratings	Tires*	LT225/75R16, Load Range D	LT225/75R16, Load Range D	LT225/75R16 Load Range D	225/70R19.5 Load Range F	225/70R19.5 Load Range F	225/70R19.5 Load Range F	225/70R19.5 Load Range F
	Rims	6.0 X 16	6.0 X 16	6.0 X 16	6.75 x 19.5	6.75 x 19.5	6.75 x 19.5	6.75 x 19.5
Transmission minimum specifications		Automatic 4 Speed	Automatic 4 Speed	Automatic 4 Speed	Allison PTS 2200	Allison PTS 2200	Allison PTS 2200	Allison PTS 2200
Alternator minimum amps		120	120	120	160	160	160	160

* Low-profile tubeless radial tires of size and load range meeting Tire and Rim Association Standards for the required GAWRs may be approved in lieu of standard conventional tubeless radial tires. Minimum tire sizes specified above are to be supplied as standard equipment, unless specific approval is granted for use of low-profile sizes.

SPECIFICATIONS for OPTIONAL CHASSIS EQUIPMENT for TYPE A BUSES

AIR-SPRUNG REAR SUSPENSION SYSTEM

There shall be an option for an air-ride or approved equivalent air-sprung rear suspension system, when available. Rear shock absorbers are also required with this option, as on standard suspension systems.

HIGHER OUTPUT ALTERNATOR

There shall be an option for an alternator having a minimum of 270 amps hot-rated output.

LOW-PROFILE RADIAL TIRES

There shall be an option for all-wheel-position, highway-ribbed, low-profile, tubeless radial tires of size and load range meeting Tire and Rim Association Standards for the required GAWRs.

SILICONE COOLANT HOSES

There shall be an option on Type A2 buses for radiator and coolant hoses manufactured using silicone rubber.

SPARE DISC WHEEL

There shall be an option for a spare disc wheel, which must be same size and type as the original rims.

STRAIGHT FLOOR CHASSIS

There shall be an option for Type A chassis to accept straight floor bodies (i.e., bodies with no wheel wells). This type chassis must have a combination of axles, suspension, tires, wheels, and axle stops that ensures that the maximum upward travel of the rear suspension in normal straight-ahead driving does not protrude above the top of the frame rails.

TOW HOOKS OR TOW EYES

There must be two subcategories for this option: (1) two heavy-duty front tow hooks or tow eyes (each hook or eye must be installed by the chassis manufacturer in an approved manner to each frame rail); (2) two heavy-duty rear tow hooks or tow eyes (each hook or eye must be installed by the chassis manufacturer in an approved manner to each frame rail).

TRANSMISSION FLUID

Type A2 chassis shall have an option to have original fill of the transmission with TES-295 (*Transynd*) or approved equal transmission fluid.

AUTOMATIC TRANSMISSION WARRANTY

There shall be an option for extension of the transmission warranty to 5 years, unlimited mileage, 100 percent parts and labor. Also see **GENERAL INFORMATION AND WARRANTY PROVISIONS**.

SECTION II
TYPES C AND D CHASSIS
SPECIFICATIONS

BASIC MINIMUM SPECIFICATIONS FOR SCHOOL BUS CHASSIS FOR MOUNTING TYPES C and D SCHOOL BUS BODIES

ALTERNATOR

Types C and D chassis alternators must have a 200 amperes (amp) minimum rating, with 50 amp minimum output at manufacturer's recommended engine idle speed.

All chassis on which lift bodies are to be mounted must be equipped with an alternator producing at least 75 amp current output at the chassis manufacturer's recommended engine idle speed, while maintaining the chassis manufacturer's recommended regulated voltage.

BATTERY(IES)

For diesel-powered chassis, the battery(ies) must provide a total of 1,750 cold cranking amps (CCA) minimum at 0°F.

BRAKE, PARKING

On hydraulic brake models a parking brake is required, with the control mounted for easy access by the driver. On air brake models, a dash-mounted control valve to spring-set the parking brake on the rear wheels is required.

BRAKES, SERVICE

Hydraulic brakes are acceptable only on 29-35 capacity Type C buses. Brake lining material must not contain asbestos. Type C buses equipped with hydraulic brakes must be equipped with the manufacturer's standard antilock brake system.

Air brakes are required on all Type C buses larger than 41 capacity, and all Type D front and rear engine buses. A minimum 12 cubic feet per minute (CFM), engine oil-fed air compressor is required on all air brake models. Clean air to the air compressor must be supplied from the "clean" side of the engine air cleaner or air system. The compressor must not be equipped with a separate, compressor-mounted air filter. Air brake models must be equipped with a desiccant air dryer with an automatic purge and drain cycle and a heating element. The air brake system design must provide for anti-compounding of service and emergency brakes, and spring brake modulation upon application of the front service brakes in the event of loss of air pressure to the rear service brakes. All hoses used in the air brake system must be constructed of nylon tubing that is compliant with Society of Automotive Engineers (SAE) J844 Type A or B DOT FMVSS 106 compliant, and must be color-coded. The chassis must be equipped with an antilock braking system (ABS) with independent controls for each wheel position.

All air brake equipped chassis, including air disc/drum or air disc, must be equipped with a spring-set parking brake on the rear wheels. Drum brakes must be cam-actuated, and brake S-cam rotation must be in same direction as forward wheel rotation. All brake drums must be outboard mounted; i.e., drums must be removable without removal of the axle hub. The rear axle of all types C and D buses with air brakes must be equipped with grease guards to divert excessive oil or grease leaks away from brake linings in the event of a rear wheel seal leak; alternatively, the bus supplier must provide warranty of rear axle seals and brake components as noted under **GENERAL INFORMATION AND WARRANTY PROVISIONS**. All air brake chambers less than Type 20 must have at least a 2.5 inch stroke. All air brake chambers of Type 20 or greater must have at least a 3.0 inch stroke. All spring brake chambers must be equipped with a spring brake caging device. All air brake equipped chassis must have a minimum rear brake shoe width of 7 inches.

BUMPER, FRONT

Types C and D buses must have a front bumper that is black, of full width channel type, and a minimum of 8 inches wide (vertically). The bumper must have sufficient structural and mounting strength to ensure that the front of the vehicle can be lifted by means of an air bumper-type jack, without permanent deformation of the bumper, brackets, or chassis frame rail(s).

ENGINE EQUIPMENT

a. Configuration: Diesel engines must be available in at least one of the following two configurations:

- (1) Parent bore type block; in-line 6 cylinder design; minimum 6.4 liters displacement.
- (2) Wet sleeve type block; in-line 6 cylinder design; minimum 6.4 liters displacement.

NOTE: Additional diesel engines of other configurations or displacements (not in lieu of the above) meeting all other requirements listed herein may be offered, subject to approval by the Department of Education.

b. Engine Requirements

- (1) A dry type air cleaner is required. An air filter restriction indicator is required on diesel engines. The restriction indicator must incorporate a system that does not allow unfiltered air into the engine if the indicator cracks or breaks.
- (2) The engine must be equipped with a full-flow, spin-on, or cartridge-type oil filter(s), with the filter header(s) mounted directly to engine.
- (3) An engine coolant recovery or deaeration system is required on all chassis. Diesel engines must include a means for visually checking the coolant level without removing the deaeration tank cap or releasing pressure from the cooling system.
- (4) A warning system consisting of a light and a buzzer is required on diesel-powered chassis to notify the driver of low engine oil pressure and/or coolant overheating.
- (5) A fuel filtration system with a water separator is required on diesel engines. The system must remove from the fuel prior to entry into the engine all contaminants capable of adversely affecting the fuel system. System must have a clear sight bowl, or be equipped with a water-in-fuel light to notify technicians of the presence of water. The system must provide a valve for draining trapped water from the system. The fuel system must include an electric or a manual priming pump.
- (6) An engine oil pressure gauge and a coolant temperature gauge are required. The oil pressure gauge must provide accurate, easily discernible readings across the entire operating range from hot idle to full oil pressure. Gauges on engines with idle oil pressure, which under normal conditions is low, must provide a **clear** distinction between no oil pressure and engine idle oil pressure. Gauges must be directly visible to the driver in the normal seated position and must not be mounted near the center of the dash where the service door control or associated hardware could block visibility of the gauges.
- (7) Radiator and other engine coolant hoses supplied by the chassis manufacturer (not including heater hoses) must be constructed of silicone rubber or must be constructed with ethylene propylene diene monomer (EPDM) covering and aramid fiber reinforcement meeting or exceeding SAEJ20R EC Class D-1. Silicone hose, if used, must include stainless steel shoe-type hose clamps or constant-torque clamps. Hoses must have markings, coloring, or other visible means of distinguishing this hose from the standard hoses.
- (8) Manufacturers must use the largest capacity oil pan available for each engine configuration in order to achieve the longest duration oil change interval.

ENGINE PERFORMANCE REQUIREMENTS

a. Each bus must be furnished with a power train that meets or exceeds the following minimum criteria when tested at the gross vehicle weight rating (GVWR) required for a given bus capacity, and with all accessories (including air conditioning compressor(s), if equipped) on and operating:

- (1) Startability of 20 percent.
- (2) Gradeability of 5 percent at 25 miles per hour.
- (3) Gradeability of 1.5 percent at 50 miles per hour.

- (4) Top speed of 60 miles per hour minimum.

Performance must be measured with the actual completed vehicle (i.e., with body installed, unloaded except for the driver and one passenger). The vehicle must be in drive, with the engine at idle, the service brakes applied, the emergency brakes released, and all accessories on and operating. Measurement of acceleration time must begin at the moment the throttle is applied (the throttle is to be immediately and rapidly depressed to full throttle).

NOTE: The chassis manufacturer should use the heaviest chassis/body combination meeting these specifications for the specific bus size to determine required power train components. This test is an on-road test and will be performed using the heaviest available chassis/body, depending on body(ies) supplied. At the discretion of the Department, unanticipated factors or variations in test conditions affecting performance test results that are beyond the control of the chassis manufacturer may be taken into account. A Pro Link, a diagnostic computer, or a speed wheel are also acceptable tools for this test.

Maximum acceleration time (from zero mph), under conditions specified above, must be as follows (measured in seconds):

29-77 Capacity Types C and D:

TEST METHOD	0-10 MPH	0-20 MPH	0-30 MPH	0-40 MPH	0-50 MPH
ACTUAL	3.4	6.2	12.0	20.0	32.2

78-90 Capacity Type D

TEST METHOD	0-10 MPH	0-20 MPH	0-30 MPH	0-40 MPH	0-50 MPH
ACTUAL	3.7	7.1	12.0	20.0	32.2

Manufacturers may offer additional engine configurations and horsepower ratings that exceed these requirements as optional equipment.

EXHAUST SYSTEM

The exhaust system must have a corrosion-resistant muffler and tailpipe. The tailpipe must exit to the left of left frame rail and behind the rear wheels. Manufacturers must ensure that exhaust temperature exiting the tailpipe with the engine running during any normal loading or unloading activity will not produce first-, second-, or third-degree burns on students or other individuals present. The bus must not automatically regenerate the diesel particulate filter while the bus is stationary. Also see **Section III, Electrical Equipment and Wiring**.

FRAME SIDE MEMBERS

Frame side members must be of one-piece construction between the front and rear spring hangers. Frame rails must have a minimum tensile strength of 50,000 pounds per square inch (psi).

FRONT AXLE LUBRICATION

All buses must have oil-lubricated front axle hubs, providing an externally visible means of checking the lubricant level.

FUEL TANK

The fuel tank filler spout must be located for ease in servicing. The filler neck must be located on the right side of the bus unless other locations are pre-approved by the Department. The fuel tank may be located on the right chassis frame rail or between the frame rails. See **Chassis Specifications Charts** for the required fuel tank capacity.

HEADLIGHTS

Headlights must meet Society of Automotive Engineers (SAE) and Federal Motor Vehicle Safety Standards (FMVSS) and must use a quartz halogen bulb. All buses must be equipped with Full-Time Lights (FTL) meeting the following requirements:

- a. With the ignition switch off, the headlights will operate normally and the FTL system will not operate.
- b. With the ignition switch on or in the “accessory” position, and with the engine not running, the FTL must not operate.
- c. With the ignition switch on and the engine running with the headlight switch off, the FTL system must operate; it must provide low-beam headlights, tail, clearance, and identification (ID) lights. This activation may be accomplished by any reasonable means, including the use of the park brake system.
- d. In all cases the headlight switch must override the FTL system when in the “on” position.
- e. This system must include a buzzer that activates if the headlight system is on with the key switch in the “off” position.

HOOD

Engine hood on Type C buses must not require more than 20 pounds of force to open or close.

IGNITION SYSTEM

All ignition switches must be keyed alike. All buses of like chassis manufacturer and type must have one key.

INSULATION

Type C chassis must include full width and height heat and noise insulation on the inside or outside of the bus covering the dash panel (firewall) area to as great an extent as possible and at least up to the top of the firewall and down to the point that the body floor connects to the firewall, including the engine cover (doghouse). Type D Front Engine buses must include complete heat and noise insulation of the doghouse area.

LINE-SETT TICKET

Manufacturer must include with delivery of vehicle a line-sett ticket to accurately reflect all chassis components, GAWR of both front and rear axles, and GVWR.

PAINT AND FINISH, TYPES C and D CHASSIS

School bus yellow paint must meet SBMTC-008 for color and must have a finished gloss rating of at least 85 at 60° and a distinctness of image rating of an average of at least 50 measured using the same method specified for gloss under **GENERAL INFORMATION AND WARRANTY PROVISIONS**. Paint must be applied for a total dry thickness of at least 1.8 mils over all painted surfaces. Trim, lettering, and bumper must be black except that bumper must be striped with reflective material in accordance with National School Transportation Specifications and Procedures or these specifications. Rims must be powder-coated, National School Bus Yellow, by the wheel manufacturer. Lug nuts must not be painted.

RADIATOR FILLER TUBE

The radiator filler must be located for ease of service from the engine compartment on Type C and Type D rear engine buses. It must be located for ease of service from outside the bus on Type D front engine buses.

STEERING

A tilt steering wheel/column is required.

TIRES AND RIMS

Chassis must be equipped with radial tubeless tires mounted on hub-piloted disc wheels. All wheels of 8.25 inches or greater width must be two hand-hold wheels. Tires and rims must conform to current standards of the Tire and Rim Association (see **Chassis Specifications Charts** for sizes). See **PAINT AND FINISH** for wheel color information.

TRANSMISSION, AUTOMATIC

An automatic transmission is required on all chassis as specified:

- a. Type C 29-47 capacity, Allison PTS 2100, 5 speed or approved equal.
- b. Type C 65-78 capacity, Allison PTS 2500, 5 speed or approved equal.
- c. Type D 71 capacity front engine, Allison PTS 2500, 5 speed or approved equal.
- d. Type D 78-89 capacity front engine, Allison PTS 3000, 5 speed or approved equal.
- e. Type D 72 capacity rear engine, Allison PTS 2500, 5 speed or approved equal.
- f. Type D 78-89 capacity rear engine, Allison PTS 3000, 6 speed or approved equal.

Allison PTS 2000 series transmissions must include an external spin-on type, vertically mounted, transmission fluid filter. The shifter must be dash- or console-mounted and must be either a T-handle or push-button design.

Allison PTS 3000 series transmissions must have at least five speeds enabled for front engine Type D and six speeds for rear engine Type D.

All transmissions require original filling of the transmission with TES-295 (*Transynd*) or approved equal transmission fluid.

Automatic transmissions incorporating a parking pawl must have a transmission shifter interlock controlled by the application of the service brake to prohibit accidental engagement of the transmission. All non-park pawl transmissions must incorporate a park brake interlock that requires the service brake to be applied to allow release of the parking brake.

WIRING HARNESS

All chassis electrical wiring must conform to current standards of the Society of Automotive Engineers, be coded by color, insulated, and completely encased in convoluted loom or equivalent protective wrapping. In locations that prevent such looming, wires must be properly held in place by appropriate fasteners at intervals necessary to prevent possible damage to wire insulation. The fuse box door, if equipped, must have a positive latch. All chassis electrical circuits must be fused per the requirements of FMVSS. Buses using multiplexed electrical systems may meet the intent of these specifications without the use of specified equipment, subject to approval by the Department.

TYPE C CHASSIS

<u>Maximum Design (Passenger) Capacity</u>	<u>29LT</u>	<u>29</u>	<u>47</u>	<u>65</u>	<u>71</u>	<u>77</u>
Front Axle Weight Rating (pounds)	5,000	6,000	7,000	9,000	10,000	10,000
Rear Axle Weight Rating (pounds)	10,000	13,000	15,000	19,000	19,000	20,000
Cowl to axle, minimum (inches)	123	123	162	229	250	250
Minimum tire size-Load Range; tubeless-radial ply*	225R-19.5F	10R-22.5-F	11R-22.5-G	11R-22.5-G	11R-22.5-G	11R-22.5-G
Disc wheels -- minimum rim width (inches)	6.75	7.5	8.25	8.25	8.25	8.25
Hub-piloted disc wheels for tubeless radial tires	6 stud, 5 hand hold	6 stud, 5 hand hold	10 stud, 2 hand hold	10 stud, 2 hand hold	10 stud, 2 hand hold	10 stud, 2 hand hold
Fuel tank minimum size (gallons)	30	30	60	60	60	60
Allison transmission series (# of forward gears)	PTS 1000 or 2200 (5)**	PTS 2100 (5)	PTS 2100 (5)	PTS 2500 (5)	PTS 2500 (5)	PTS 2500 (5)

- *Low-profile tubeless radial tires of size and Load Range meeting Tire and Rim Association Standards for the required GAWRs may be approved in lieu of standard conventional tubeless radial tires. Minimum tire sizes specified above are to be supplied as standard equipment, unless specific approval is granted for use of low-profile tires.
- ** Must include park pawl.

TYPE D FORWARD CONTROL FRONT ENGINE

<u>Maximum Design (Passenger) Capacity</u>	<u>71</u>	<u>77</u>	<u>83</u>	<u>89</u>
Front Axle Weight Rating (pounds)	10,800	12,000	12,000	12,000
Rear Axle Weight Rating (pounds)	17,000	19,000	21,000	23,000
Tires – minimum size, Load Range acceptable*	11R-22.5G	11R-22.5G	11R-22.5-G	11R-22.5-G
Hub-piloted disc wheels-10 stud, minimum rim width (inches)	8.25, 2 hand hold	8.25, 2 hand hold	8.25, 2 hand hold	8.25, 2 hand hold
Minimum size fuel tank (gallons)	60	60	60	60
Allison transmission series (# of forward gears)	PTS 2500 (5)	PTS 3000 (5)	PTS 3000 (5)	PTS 3000 (5)

NOTES: 1) An automatic transmission is required on all chassis. See **TRANSMISSION, AUTOMATIC** for required specifications.

2) Maximum overall length of the bus must not exceed 45 feet, bumper to bumper.

*Low-profile tubeless radial tires of size and Load Range meeting Tire and Rim Association Standards for the required GAWRs may be approved in lieu of standard conventional tubeless radial tires.

TYPE D REAR ENGINE CHASSIS SPECIFICATIONS CHART

Maximum Design (Passenger) Capacity	<u>72</u>	<u>78</u>	<u>84</u>	<u>90</u>
Front Axle Weight Rating (pounds)	11,000	12,000	12,000	12,000
Rear Axle Weight Rating (pounds)	19,000	21,000	23,000	23,000
Tires – minimum size, Load Range acceptable *	11R-22.5-G	11R-22.5-G	11R-22.5-G	11R-22.5-G
Hub-piloted disc wheels-10 stud, minimum rim width (inches)	8.25, 2 hand hold	8.25, 2 hand hold	8.25, 2 hand hold	8.25, 2 hand hold
Minimum size fuel tank (gallons)	60 gal.	60 gal.	60 gal.	60 gal.
Allison transmission series (# of forward gears)	PTS 2500 (5)	PTS 3000 (6)	PTS 3000 (6)	PTS 3000 (6)

NOTE: Maximum length of vehicle must not exceed 45 feet, bumper to bumper.

*Must meet Tire and Rim Association Standards. Low-profile tubeless radial tires of size and Load Range meeting Tire and Rim Association Standards for the required GAWRs may be approved in lieu of standard conventional tubeless radial tires.

SPECIFICATIONS FOR OPTIONAL CHASSIS EQUIPMENT IN TYPES C AND D BUSES

AIR-SPRUNG FRONT SUSPENSION SYSTEM

There shall be an option for an air-ride or approved equivalent air-sprung front suspension system, when available. Front shock absorbers are also required with this option, as on standard suspension systems.

AIR-SPRUNG REAR SUSPENSION SYSTEM

There shall be an option for an air-ride or approved equivalent air-sprung rear suspension system, when available. Rear shock absorbers are also required with this option, as on standard suspension systems.

ALTERNATOR, HIGHER OUTPUT

There shall be an option for alternators having a minimum of 270 amps hot-rated output.

HIGH CAPACITY FUEL TANK

There shall be an option for a fuel tank of higher capacity than the standard fuel tank, mounted on the right side or between the frame rails, when available.

LOW-PROFILE RADIAL TIRES

There shall be an option for all-wheel-position, highway-ribbed, low-profile tubeless radial tires of size and Load Range meeting Tire and Rim Association Standards for the required GAWRs.

SPARE DISC WHEEL

There shall be an option for a spare disc wheel, which must be same size, type, and color as the original rims.

TOW HOOKS OR TOW EYES

There shall be an option for two heavy-duty tow hooks or tow eyes, installed by manufacturer on each frame rail at the front of the bus in an approved manner. The manufacturer may also offer rear-mounted tow hooks or tow eyes meeting these requirements.

STRAIGHT FLOOR CHASSIS

There shall be an option for a chassis designed to accept straight floor bodies (i.e., bodies with no wheel wells). This type of chassis must have a combination of axles, suspension, tires, wheels, and axle stops that ensures that the maximum upward travel of the rear suspension in normal straight-ahead driving does not protrude above the top of the frame rails.

TIRES

There shall be an option for alternate brand, size, and tread designs of tires when available. Optional tires must meet GAWR requirements and Tire and Rim Association Standards.

SILICONE COOLANT HOSES

There shall be an option for radiator and coolant hoses manufactured using silicone rubber.

SECTION III

BODY SPECIFICATIONS

TYPES A1, A2, C, AND D BUSES

MINIMUM FLORIDA SCHOOL BUS BODY SPECIFICATIONS

The specifications set forth in this section apply to types A1 (19-29 capacity with dual rear wheels), A2 (30-47 capacity), C, and D school buses. Special exceptions for Type D bodies are listed at the end of this section. The design of school bus bodies is to provide for the safety and comfort of students and for economical transportation as required by Florida Statutes and Federal Motor Vehicle Safety Standards. **The completed school bus must meet all Federal Motor Vehicle Safety Standards (FMVSS), requirements of the State of Florida and, if not in conflict, requirements of the 2010 National School Transportation Specifications and Procedures, storage compartment and tow hooks excepted.** References to bus capacity within these specifications are for Maximum Design Capacity, as defined below under **BODY DATA PLATE**.

BATTERY DISCONNECT SWITCH

There must be a battery disconnect switch in the air conditioning (A/C) or battery compartment or within three feet of the battery box if no A/C box is available. This switch must be accessible and operable from the exterior of the bus.

BODY DATA PLATE

A durable body data plate must be mounted inside the body in a clearly visible location. The body data plate information must include (in part) a listing of the "Maximum Design Capacity" and the "Equipped Capacity" of the body. Maximum Design Capacity must be the maximum number of passengers the bus (body shell size) can carry, based on 12.8 inches minimum seat width per passenger, with the minimum knee room (seat spacing) required under **SEATING AND MODESTY PANELS**. Equipped Capacity must be the actual passenger capacity of the finished body, as equipped by the manufacturer, based on:

- a. The number of total passengers the installed bench seats are designed to carry, and,
- b. The number of wheelchair positions installed (based on wheelchair space dimensions contained in Section IV of these specifications).

An example of the format to be used for Equipped Capacity is "28 + 3 WC," meaning 28 regular passenger seating positions plus 3 wheelchair positions.

BODY FLUID CLEANUP KIT

- a. Each bus must be equipped with a disposable, sealed body fluid cleanup kit in a disposable container with the following items:
 - 1) A U.S. Environmental Protection Agency (EPA) registered liquid germicide (tuberculicidal) disinfectant
 - 2) A fully disposable wiping cloth
 - 3) A water-resistant spatula
 - 4) Step-by-step directions
 - 5) Absorbent material with odor counteractant
 - 6) 2 pairs gloves (Nitrile)
 - 7) 1 package towelettes
 - 8) A discard bag (non-labeled paper bag with plastic liner and a twist tie). This bag must be approximately 4 inches x 6 inches x 14 inches, and of a non-safety color (i.e., not red, orange, or yellow).
- b. The kit must be mounted by a method that will retain it under a load equivalent to 20 times the weight of the kit and must be removable without the use of tools. The kit must be accessible to the driver. The kit container must be sealed with a breakable, nonreusable seal.

BUMPER, REAR

The rear bumper must be of pressed steel channel at least 3/16 inch thick, 8 inches wide (vertically), and flanged 2 inches at the top and bottom or otherwise designed to furnish equal flexural strength. It must be of wraparound design and securely fastened to each chassis rail and braced from each end of bumper to chassis rail with heavy braces to permit the fully loaded bus to be pushed without permanent distortion to bumper, chassis, or body. The bumper must also have the structure and strength necessary to allow the unloaded vehicle to be lifted with a bumper jack without deformation or damage. The

contour of the bumper must fit the contour of the body in a manner to prevent hitching to or riding on the bumper. An appropriate seal must be applied between the bumper and the body panel, unless the gap between the bumper and the body panel is 1/8 inch or less.

DRIVER'S DOCUMENT COMPARTMENT

On Types C and D buses, a pouch on the front side of the driver's side crash barrier with minimum dimensions of 17 inches x 12 inches x 4 inches is required. This pouch must be located to the left side of the barrier for types B and C, and to the right side of the barrier for Type D, accessible to the driver from the seated position. It must be made of the same material as the covering on the barrier and have a lid or cover with a latching device such as Velcro™ or snaps.

DRIVER'S SEAT

- a. All types A2, C, and D school buses must have a driver's seat equipped with a one-piece high back designed to minimize the potential for head and neck injuries in rear impacts, providing minimum obstruction to the driver's view of passengers, and meeting applicable requirements of Federal Motor Vehicle Safety Standard 222. The height of the seat back must be sufficient to provide the specified protection for up to a 95th percentile adult male, as defined in FMVSS 208. The driver contact area of the cushion and seat back must be made of soil and wear-resistant cloth material, nylon, or equivalent. The remainder of the seat may be of a different material. The seat must be centered behind the steering wheel with the backrest a minimum distance of 11 inches behind the steering wheel. The seat must be securely mounted to ensure minimal flexing of the seat and the floor panel(s).
- b. All school buses equipped with air brakes must also be equipped with an air suspension driver's seat meeting the following additional requirements:
 - 1) The air control for the height adjustment must be within easy reach of the driver in the seated position.
 - 2) The seat cushion must be a minimum of 19 1/2 inches wide, must be fully contoured for maximum comfort, and must have a minimum of 2 adjustment positions to allow adjustment of seat bottom angle.
 - 3) The backrest must include adjustable lumbar support.
 - 4) The seat must have a minimum of 7 inches fore and aft travel, adjustable with the driver in the seated position. This requirement applies to the seat mechanism.
 - 5) The seat must have a minimum 4 inches up and down travel.
 - 6) The seat back must include adjustability of tilt angle.
 - 7) All adjustments must be by fingertip controls not requiring the use of tools.
 - 8) Air suspension seats must be dampened by dual shock absorbers, acting independently.
 - 9) The seat must comply with all applicable Federal Motor Vehicle Safety Standards.
- c. All other buses must have a driver's seat equipped with a hydraulic and/or spring suspension base, and a minimum seat cushion width of 19 inches, and must meet the other requirements listed herein for air suspension seats.
- d. The chassis manufacturer's standard driver's seat is acceptable for Type A1 buses.
- e. The overall seat design must be approved by the Department of Education. Also, see **GENERAL INFORMATION AND WARRANTY PROVISIONS**.

DRIVER'S SEAT BELT

Buses must be equipped with a Type 2 lap belt/shoulder harness seat belt assembly for the driver. The design must incorporate a fixed female push-button latch on the right side at seat level, and a male locking bar tongue on the left, retracting side. The assembly must be equipped with a single, dual sensitive Emergency Locking Retractor (ELR) for the lap and shoulder belt. This system must be designed to minimize cinching down on suspension type seats. The lap portion of the belt must be anchored or guided at the seat frame by a metal loop or other means at the right side of the seat to prevent the driver from sliding sideways out of the seat. There must be a minimum of 7 inches of adjustment of the "D" loop of the driver's shoulder harness, designed to provide adequate adjustment for all sizes of drivers within the range of a 5th percentile female to a 95th percentile adult male, as defined in FMVSS 208. Shoulder belt tension must be no greater than is necessary to provide reliable retraction of the belt and removal of excess slack. The seat belt assembly and anchorage must meet applicable Federal Motor Vehicle Safety Standards. Seat belt material must be bright orange or lime green in color, in order to provide maximum contrast with the driver's clothing.

NOTE: The driver's seat belt assembly for Type A1 buses must be the manufacturer's standard Type 2 driver seat belt, meeting applicable FMVSS for school buses of 10,000 pounds GVWR and less.

ELECTRICAL EQUIPMENT AND WIRING

All wiring must conform to current standards of the Society of Automotive Engineers (SAE), be coded by color, and be insulated. All joints must be soldered or joined by equally effective fasteners. All wires connected directly to the battery must have the end terminals protected with heat-shrink tubing. Body wiring and connectors, including any battery cables routed by the body manufacturer, must be routed so as to eliminate the possibility of wiring and connectors becoming abraded, pierced by fasteners, shorted, or otherwise damaged during manufacture and use. All chassis and body electrical wiring must be completely encased in convoluted loom or equivalent protective wrapping. In locations that prevent such looming, wires must be properly held in place by appropriate fasteners at intervals necessary to prevent possible damage to wire insulation. A complete body wiring diagram showing the location of wires and the code of circuits for buses meeting Florida Specifications must be installed in each body. Additionally, for all school bus body optional electronic components installed in the bus, the body manufacturer must provide each district with at least one comprehensive parts and repair manual. Buses using multiplexed electrical systems may meet the intent of these specifications without the use of specified equipment subject to approval by the Department. All requirements listed herein for Light Emitting Diode (LED) type lights must be for the latest generation LEDs available at the time of manufacture. Electrical components specified below must be provided and wiring must be in circuits as follows:

1. ACCESS PANEL, ELECTRICAL

All Type C buses must be equipped with an exterior electrical access panel or must provide easy internal access to body electrical components and circuits.

All Type D buses must be equipped with an exterior electrical access panel to provide easy access to body electrical components and circuits.

2. AUXILIARY FAN

A 6 inch or header-mounted squirrel cage fan must be installed and mounted to the left side of the windshield, when possible, in a location approved by the Department. A body header mounted squirrel cage fan with louvers that can be adjusted directionally, or an integrated dash air-conditioning system, are approved by the Department in lieu of the 6 inch fan.

3. BACKUP LIGHTS; BACKUP ALARM and STICKER

- a. There must be two backup lights of 4 inches in diameter, or 12.5 square inches, on the rear of all bodies meeting the following requirements:
 - 1) They must be sealed incandescent or LED lights.
 - 2) They must use a plug connector.
 - 3) They must be inset into the bus body (flush-mounted).
- b. The body manufacturer must provide a backup alarm on each bus to provide audible warning that the bus is in reverse gear. The alarm must meet the requirements of Society of Automotive Engineers (SAE) J994, and must have a variable volume feature that allows the alarm to vary from 87 dBA to 112 dBA sound level, staying at least 5 dBA above the ambient noise level. All buses must have a sticker affixed to the dash in full view of the driver indicating that the bus is equipped with a backup alarm.

4. BRAKE/TAIL LAMPS, LARGE

- a. Buses must be equipped with two combination brake/tail lamps of a minimum of 7 inches in diameter or 38 square inches, mounted as high and spaced as far apart laterally as practical, below the window line, but not less than 3 feet measured from the center of the lamps.
- b. Brake/tail lamps must be LED lights.
- c. They must use a plug connector.
- d. Lamps must meet current SAE standards and be installed in compliance with Federal Motor Vehicle Safety Standards.

5. **BRAKE/TAIL LAMPS, SMALL**

Bus must be equipped with two combination brake/tail lamps of 4 inches in diameter or 12.5 square inches, meeting Federal Motor Vehicle Safety Standards. Light intensity must at least equal Class A turn signal units. These lights must be LED lights with smooth exterior lens surfaces. They must use a plug connector and be inset into the bus body.

6. **CIRCUIT BREAKERS**

All body electrical circuits must be fused per the requirements of FMVSS. The main body electrical circuit must be protected by a manually resettable circuit breaker or fusible link.

7. **CLEARANCE AND IDENTIFICATION LIGHTS**

All clearance and identification lights must meet current SAE requirements and Federal Motor Vehicle Safety Standards and must:

- a. Be sealed lights.
- b. Be surface-mounted with Lexan™, polycarbonate, or other non-corrosive material guard to prevent breakage. Lights inset into the body do not require guards.
- c. Use a plug connector.
- d. Be activated by the headlight circuit.

8. **CONTROL PANEL LIGHTING**

The control panel or switches supplied by the body manufacturer must be illuminated, and must have a control for varying the illumination to the control panel or switches.

9. **EMERGENCY EXIT BUZZER**

Emergency door and emergency window buzzers must be connected to the accessory side of the ignition switch.

10. **HEATER/DEFROSTER**

There must be a heater mounted in the front of the bus. A supplemental heater, minimum 80,000 British Thermal Units (BTU) rating, may be installed in any bus. All heaters must meet the following requirements:

- a. School bus heating systems must meet the following performance standards:
 - 1) Provide evenly distributed heat throughout the bus body.
 - 2) Provide defrosting for the windshield and entrance door.
- b. Heaters must have capabilities of providing evenly distributed heat and creating a temperature rise to 50° F inside the body shell when soaked in an ambient temperature of 0° F for 15 hours.
- c. Heater performance must be measured as follows:
 - 1) Temperature measurement must be taken 39 inches inward from side walls, 39 inches inward from windshield and rear door, and 36 inches above floor. Heat must be evenly distributed through the aisle area.
 - 2) Temperature must rise to 50° F inside (when soaked in ambient temperature of 0° F for 15 hours) in 20 minutes when 170° F hot water is applied at the rate of 3 gallons per minute at a maximum of 6 psi pressure.

Defrosters – Must meet the following criteria:

- a. Must be able to defrost the total windshield area in a reasonable period of time under all normal driving conditions.
- b. Must be directional to provide the driver capability of defrosting in the drive view area first.

- c. Defroster system must have the capability of mixing a minimum of 50 percent outside fresh air with the defrosting air.
- d. Defroster system must meet the SAE Standard J381-J382 performance requirement.

All heater hoses must meet or exceed SAEJ20R EC Class D-1 standards. If silicone hoses are used, shoe design hose clamps must be used. Heater lines on the interior of the bus must be fully shielded to prevent scalding of the driver or passengers in the event of a hose or connection failure. The modesty panels must not obstruct heat flow from the driver's area to the passenger area of the bus; this may be accomplished by ducting or other means that retains, to the extent practical, the required full width aluminized steel panel extending down to the floor. Also see **SEATING AND MODESTY PANELS**.

A ¼ turn ballcock coolant flow regulating valve for the heater must be installed so that its control is accessible to the driver, but in such a location as to discourage tampering by students. This valve may be remotely located if a suitable remote control system is used. Also required are ¼ turn ballcock coolant flow regulating shut-off valves, installed in the pressure and return lines as close to the engine as possible.

The windshield defroster and defogging system must provide defogging of the entire windshield, driver's side window, and entrance door glasses by using hot air taken from the heater core. Bodies that do not have defrosters providing forced heated air by means of ducting across entire base of windshield must be equipped with an additional right-side mounted defroster fan that uses hot air from the heater. One electrical switch must be provided to simultaneously turn on or off any fan(s) providing hot air for defogging of the windshield, driver's side window, and entrance door glass.

NOTE: Type A1 buses must have a fresh air type heater and defroster system as installed by the chassis manufacturer.

11. INTERIOR LIGHTS

There must be installed at least four recessed flush-mounted interior lights in the passenger compartment of the bus, operated by one switch mounted on the control panel. If more than six lights are used, then an additional switch may be added to control these lights. There must also be two recessed flush-mounted interior lights mounted in the driver's area of the bus (to the left and right of the centerline of the bus), operated by a separate switch mounted on the control panel. Lenses for all interior lights must be Lexan™ or other polycarbonate material.

12. LICENSE PLATE LAMP

This lamp may be combined with one of the required combination brake/tail lamps.

13. MASTER SWITCH FOR BODY ELECTRICAL CIRCUITS AND OTHER SWITCHES

All bodies must be equipped with an electrical circuit master switch that will turn body circuits ON and OFF by means of a solenoid (relay) controlled by the ignition switch. There must also be a manual noise abatement switch installed in the control panel, labeled and alternately colored, and wired into the activation circuit for the master body circuit solenoid. This must be an on/off switch that deactivates all body equipment that produces noise, including, at least, the radio, heaters, air conditioners, fans, and defrosters. This switch must not deactivate safety systems such as windshield wipers or lighting systems. On types C and D buses there must also be a switch or plug connector, mounted in a location inaccessible to the driver, to manually start the diesel particulate filter regeneration process. This switch or plug connector must be appropriately labeled.

14. POST-TRIP PASSENGER CHECK SYSTEM

a. System Requirements:

- 1) The bus must be equipped with a system to require the driver to walk to the rearmost interior of the bus after each trip to deactivate the system via a push button and to ensure that no passengers are left on the bus. The system must interconnect with the entrance door (and the driver's door on Type A buses) and immediately activate if the door is opened when the system is armed.
- 2) The system must be armed any time the bus is in service transporting students. This may be accomplished through the use of any reasonable method, such as recording a speed above 20 MPH or exceeding 10 minutes of operation with the door closed. In all cases, the system must arm itself after 10 minutes of operation. The system should not normally arm during shop maintenance.

- 3) The system may not be disarmed until the vehicle ignition switch has been switched to the “off” position. The system must not be activated if the ignition switch is placed in the accessory position or if the bus is restarted.
- 4) The system must turn on the interior lights when the ignition switch is turned to the “off” position. The lights must remain on for 60 seconds after system deactivation.
- 5) The system must not have a bypass.
- 6) The system must sound the vehicle horn and flash the headlights if the driver fails to deactivate the system within 60 seconds of turning the ignition off. Type A1 buses may activate the red student warning lights in lieu of the headlights.
- 7) The system must be disarmed by the use of a heavy-duty push button placed on the left rear bulkhead or above the left rear passenger window for types A, C, and D front engine (FE) buses. The push button must be placed above the left rear passenger window for Type D rear engine (RE) buses. This button must be clearly marked.

b. System Definitions:

- 1) Armed = The system is functioning and is ready to alarm.
- 2) Disarmed = The system is off and inactive.
- 3) Activated = The horn is blowing and the lights are flashing.
- 4) Deactivated = The disarm switch at the rear of the bus has been operated by the driver.

c. System Functionality:

- 1) The system must be fully automatic in function and must not provide for manual bypass or override capability under any circumstances.
- 2) From the bus sitting still with ignition key in the “off” position:
 - (a) With the ignition key switched to the “accessory” position, the system remains disarmed.
 - (b) With the ignition key switched to the “on” position (engine remaining off), the system remains disarmed.
 - (c) With the ignition key switched to the “on” position (engine running) and the bus operated under 20 MPH, the system remains disarmed.
 - (d) With the ignition key switched to the “on” position (engine running) and the bus operated over 20 MPH or for more than 10 minutes of continuous operation (or other reasonable operational trigger mechanism), the system is armed.
- 3) From bus having been operated over 10 minutes, no longer moving, with the entrance door (and driver’s door, if equipped) closed, the ignition key in the “on” position (engine running), and the system armed:
 - (a) With the ignition key switched to “off” position (engine off), the interior dome lights are immediately illuminated.
 - (b) With the ignition key switched to the “off” position (engine off) and the ignition key switched back to the “on” position (engine off or restarted) within 60 seconds, the interior dome lights are extinguished and the system remains armed, but flashing lights and horn alarms are not activated.
 - (c) With the ignition key switched to the “off” position (engine off), interior dome lights illuminated and entrance door (or driver’s door, if equipped) opened, flashing light and horn alarms are activated.
 - (d) With the ignition key switched to the “off” position (engine off), interior dome lights illuminated, and the driver taking no action for 60 seconds, the flashing lights and horn alarms are activated.
 - (e) With the ignition key switched to the “off” position (engine off), interior dome lights illuminated, and driver walking to the rear of the bus and disarming the system within 60 seconds, the system is disarmed and no flashing lights and horn alarms are activated.
- 4) Once the flashing lights and horn alarms are activated, they can be deactivated only by disarming the system at the rear of the bus.
- 5) The interior dome lights are extinguished 60 seconds after the system is disarmed.

15. STUDENT WARNING LIGHTS, STOP ARMS, STUDENT CROSSING ARM, AND SYSTEM CONTROLS AND OPERATION

a. Student Warning Lights Student warning lights must be dual-mounted side by side on all corners of bus roof caps. Mounting must be as high as practical on the top and as near the outer edge of the bus as curvature permits. The lamps must be securely mounted. There must be a black background that is 1¼ inches to 3 inches wide. The lamps installed in the outboard locations must be red; the lamps installed in the inboard locations must be amber. The lamps must be clearly visible in bright sunlight for a minimum of 500 feet. Additionally, student warning lights must:

- 1) Have light assemblies of a flat back design. Note: Cutouts in roof caps must be no larger than necessary to accommodate the student warning lights wires. A flush-mounted design is acceptable.
- 2) Use replaceable quartz halogen bulbs.
- 3) Be 7 inches in diameter or 38 square inches minimum.

b. System Controls – The system must be equipped with the following driver-actuated controls:

- 1) Master switch – provides means for deactivating the entire system, as would be required when opening the door at a railroad grade crossing.
- 2) Control switch – three positions: OFF, AMBER, and RED. The switch may be a rocker, pull-type, or other switch providing three positions. This switch must be separated from the master switch by at least one inch, and must be colored red.
- 3) Switch actuated by the service door.
- 4) Controls must provide for the combinations of switch positions and conditions of student warning lights, stop arm(s), stop arm lights, and audible alarm as indicated on the chart below.

NOTE: The system must not be designed in such a way that the operator is required to actuate the controls in a particular sequence to achieve the desired combination of conditions. For example, if the driver places the three-position switch in the AMBER position, with the master switch ON, it must not be required that the three-position switch be moved to RED or that the service door be opened in order to deactivate the AMBER lights. In this example, the driver must be able to deactivate the AMBER lights by going directly from the AMBER to the OFF position.

With Master Switch, Control Switch, and Service Door In The Following Positions:				Condition of Stop Arm(s), Stop Arm Lights, Amber and Red Student Warning Lights and Audible Alarm Must Be:				
	MASTER SWITCH POSITION (ON or OFF)	CONTROL SWITCH POSITION (three positions: off, amber, or red)	SERVICE DOOR POSITION		STOP ARMS, STOP ARM LIGHTS	AMBER STUDENT WARNING and PILOT LIGHTS	RED STUDENT WARNING and PILOT LIGHTS	AUDIBLE ALARM
1	ON	OFF	CLOSED	1	RETRACTED, OFF	OFF	OFF	OFF
2	ON	OFF	OPEN	2	RETRACTED, OFF	OFF	ON	ON
3	ON	AMBER	CLOSED	3	RETRACTED, OFF	ON	OFF	OFF
4	ON	AMBER	OPEN	4	RETRACTED, OFF	OFF	ON	ON
5	ON	RED	CLOSED	5	EXTENDED, ON	OFF	ON	OFF
6	ON	RED	OPEN	6	EXTENDED, ON	OFF	ON	OFF
7	OFF	ANY POSITION	ANY POSITION	7	RETRACTED, OFF	OFF	OFF	OFF

c. Student Crossing Arm- Required; the student crossing arm must be:

- 1) Air-operated on all air brake-equipped buses. It must be electrically operated on all hydraulic brake buses.
NOTE: An electrically operated crossing arm may be used on buses equipped with air brakes only if it is a behind-the-bumper design and no air-operated arm is available. This alternative requires prior approval of the Department.

- 2) Mounted to the far right side of the front bumper and must open to an angle perpendicular to the bus.
 - 3) Designed so that all components and connections are weatherproofed.
 - 4) Removable with hand tools for towing of the bus.
 - 5) Designed to meet or exceed SAE Standard J1133.
 - 6) Constructed of noncorrosive or nonferrous material or treated consistent with the body sheet metal standard.
 - 7) Designed so that it has no sharp edges or projections that could cause hazard or injury to students.
 - 8) Designed and equipped with a four-point mounting to the front bumper.
 - 9) Designed so that the arm extends approximately 72 inches from the front bumper when in the extended position; the arm must be constructed of a yellow polycarbonate material or noncorrosive tubing painted yellow; approximate dimensions of the arm must be 65 inches by 3 inches by 1 inch.
 - 10) Designed and installed to extend simultaneously with the stop arms by means of the stop arm control and to retract within eight seconds of deactivation.
 - 11) Equipped with a magnetic device or other assembly attached to the bumper at the end of the arm to provide a positive latch for the arm when not in use; this device must also reduce the tendency of the arm to rattle and vibrate when not in use.
- d. Stop Arm Signals- For all buses, 47 capacity and larger, there must be installed on the left outside of the body two approved octagonal stop-signal arms, each equipped with two double-faced alternately flashing strobe lights for signaling a student stop. All buses of less than 47 capacity must be equipped with one stop arm as described. Bodies to be mounted on chassis with hydraulic brakes must be equipped with electrically actuated stop arm(s). Air-powered stop arms must be provided as standard equipment on all buses equipped with air brakes. The rear stop arm location on buses equipped with dual stop arms must be on the left side of the bus, as close as is practical to the left rear corner of the body. The light lenses of all stop arms must be RED. Air lines must not be readily accessible to students inside or outside the bus. Air lines must be made of copper, steel, or nonmetallic materials meeting SAE Standard J848d, and fittings must be brass. Stop signal arms must meet the applicable requirements of SAE J1133. For controls, see the requirements above under System Controls. Stop arms must retract within six seconds of deactivation. For color, see LETTERING AND TRIM.

16. STEP WELL LIGHT

A step well light must illuminate the bus entrance and be adequately protected. The step well light must be activated automatically when the service door is opened and the clearance lights are on. See SERVICE DOOR for further operational requirements.

17. STROBE LIGHT, WHITE FLASHING

Each bus must be equipped with a white flashing strobe light meeting the following requirements:

- a. Must have a self-contained power supply.
- b. Construction: The base must be Lexan™ or other polycarbonate material or corrosion-resistant metal. The lens must be clear Lexan™ or other polycarbonate material of equal or better strength, resilience, and durability. The unit must be sealed to protect against intrusion of dust and moisture. All external fasteners, including mounting screws, must be stainless steel or coated using the dacromat or magnagard process. The unit must have a mounting gasket to isolate the light assembly from vibration.
- c. Electrical characteristics: The light must have a flash energy of 8 joules minimum, must display 80 (plus or minus 10) single or double flashes per minute, must have integral fuse or circuit breaker protection and reverse polarity protection, and have a maximum current draw of 2 amperes at 12 volts.
- d. Dimensions and location: The overall height of unit must be approximately 4 inches to 6 inches, with a lens diameter of approximately 4 inches to 6 inches. The mounting location is to be centered (laterally) on the roof of bus, approximately 48 inches (longitudinally) from the rear edge of the rear roof cap. Installed roof-mounted A/C components may require relocation of the light assembly so there is an unobstructed view of the light from the rear of the bus.
- e. SAE Specifications: Must meet SAE J575 and J1318.

- f. Body circuitry: The light must be controlled by a separate, clearly labeled driver's panel-mounted switch, with a clearly labeled pilot light.

18. TURN SIGNAL LAMPS

- a. Front turn signal lamps on Type D bodies must be the same as the rear turn signals, unless the turn signals are incorporated as part of the headlight assemblies or otherwise incorporated into the front end design as approved by the Department. Lenses of rear turn signal lights must be amber in color, 7 inches in diameter or 38 square inches minimum, Class A, mounted as far apart laterally as practical on the same horizontal centerline as the large brake/tail lamps. All buses must also be equipped with an amber turn signal light in a protective rim on each side of the bus, mounted rearward of the service door on the right side and rearward of the front stop arm on the left side. All buses over 30 feet in length must have 2 turn signal lights mounted in protective rims on each side of the bus. The rearmost side turn signals on buses over 30 feet long must be mounted at or rearward of the centerline of the rear axle.
- b. Rear turn signal lights must:
 - 1) Be LED type lights.
 - 2) Use a plug connector.
 - 3) Meet current SAE requirements and be installed in compliance with Federal Motor Vehicle Safety Standards.
 - 4) Be 7 inches diameter or at least 38 square inches.

19. TWO-WAY RADIO

Use of a two-way radio communications system approved by the school district is acceptable.

20. VIDEO CAMERA MONITORING SYSTEMS

Districts may install video cameras in buses provided the installed system:

- 1) Is mounted securely in the bus.
- 2) Is outside the federal head impact zone (FMVSS 222).
- 3) Is located in an area not likely to cause student injury.
- 4) Has no sharp edges or projections.

EMERGENCY EXITS

- a. The emergency door on all types A, C, and front engine Type D buses must be located at the center of the rear of the bus and have a minimum horizontal opening of 24 inches and vertical opening of 48 inches. The emergency door must be hinged on the right-hand side using hinge(s) with a brass or rust-resistant rod.
- b. The outside control must consist of a nondetachable opening device designed to prevent "hitching to."
- c. The emergency door must be equipped with a slide bar, cam-operated latching device, having a minimum stroke of one inch. The switch for the warning system must be enclosed in a metal case or durable case of other material, with rounded, protected edges. Wires leading from the switch must be concealed in the bus body. The switch must be installed so that the plunger contacts the farthest edge of the slide bar in such a manner that any movement of slide bar will immediately close the switch circuit and activate the buzzer. The door latch must be equipped with an interior handle that extends approximately to the center of the emergency door. It must lift up to release.
- d. There must also be attached to the door, in such a way that it is visible inside and outside the bus, labeling as follows: "This door is equipped with a hold-open device. To release, open the door to its fully opened position." This sticker must be red on a white background and the lettering must be a minimum height of ½ inch.
- e. Each non-lift bus must also be equipped with push-out type emergency exit side windows of similar design to the standard side windows, except for the following:
 - 1) The emergency window assemblies must be hinged on the forward side.
 - 2) No emergency window may be placed next to any child safety seat.

3) Emergency windows must be installed in the following quantity on non-lift buses:

0 to 40 capacity	1 window per side
41 to 72 capacity	2 windows per side
73 to 90 capacity	3 windows per side

- f. Buses 35 capacity and smaller must be equipped with one roof hatch emergency exit/ventilator. Buses over 35 capacity must be equipped with two roof hatch emergency exit/ventilators. Specifications for roof hatch(es) must be as follows (also see **GENERAL INFORMATION AND WARRANTY PROVISIONS**):
- 1) Hinge(s) must be located on forward and rearward side of hatch.
 - 2) The design must provide a “partially open” position along the full width of the hatch, adequate to allow air to enter or exit and thereby ventilate the bus by opening either the front or rear of the hatch. The hatch must allow for partial opening on any of its four sides and on all four sides simultaneously.
- g. Buses equipped with a lift are not required to be equipped with push-out emergency exit windows unless mandated by FMVSS 217. Lift buses may be equipped with push-out type emergency exit windows based on the capacity of a comparably sized non-lift bus.

EMERGENCY ROADSIDE REFLECTORS

There must be three reflector warning devices, meeting the requirements of FMVSS 125, mounted in a location accessible to driver in the front section of the bus, and stored in a container. The container must be sealed with a breakable, nonreusable seal.

FIRE EXTINGUISHER

- a. A dry chemical fire extinguisher with a gauge and designed to restrain tampering must be mounted in a place accessible to the driver, preferably near the service door.
- b. The fire extinguisher must bear the label of Underwriters' Laboratories, Inc., showing a rating of no less than 2A-10BC.

FIRST-AID KIT

- a. The bus must carry a Grade A, moisture- and dust-proof first-aid kit with a clear cover, mounted in such a manner that it can be easily detached and made portable and in an accessible place in the driver's compartment. The container must be sealed with a breakable, nonreusable seal.
- b. The contents must be as follows:

1 inch bandage compress (e.g., Band-Aids)	2 packages
40 inch triangular bandage with 2 safety pins	1 package
4 inch x 4 inch sterile gauze pads	2 packages of 6 each
Rolled curlex bandage each in length	2 inches x 6 yards
1 inch roll adhesive tape in length	1 roll 2½ yards
Eye dressing packet	2 packages

FLOOR AND FLOOR COVERING

- a. The floor must be level from front to back and from side to side except for the wheel housings, the toeboard, and the driver's seat platform.
- b. All sills must be permanently attached to the floor.
- c. The driver's compartment plate on conventional bodies must be removable, installed level with the bus floor. All components requiring servicing must be readily accessible. Openings in the bus floor to meet this requirement must be reinforced to maintain the full strength of the unpunctured floor.

NOTE: Items a-c do not apply to Type A1. For Type A1 buses, the floor must provide adequate and firm support for seat legs and must have a minimum ½ inch marine grade or pressure-treated plywood, securely mounted to the floor. Basic floor construction of Type A1 buses must be the manufacturer’s standard, meeting applicable FMVSS.

- d. The floor covering must be resistant to ultraviolet light, ozone, and moisture and have a minimum tensile strength of 1,200 pounds per square inch (psi) and a minimum elongation of 100 percent. Floor covering must be abrasion-resistant and slip-resistant and have a minimum coefficient of friction of 0.85 as measured under ASTM D1894 or 0.65 as measured under ASTM D2047.
- e. The floor covering from the top step landing area to the emergency door (or rear seat on Type D rear engine buses) must be ribbed aisle, non-skid, wear-resistant, fire-resistant elastomer. Elastomer floor covering must meet Federal Specification ZZ-M-71d.
- f. The landing area at the top of the steps must be ribbed elastomer, which must extend to the ribbed aisle floor cover. The leading horizontal edge, or nosing, must be white or yellow ribbed elastomer or other contrasting color and must have an integral 90 degree turn-down with a square leading edge matching the step treads.
- g. All joints or seams in the floor covering must be covered with non-ferrous metal, minimum 1 inch wide, and the driver's compartment, except at the cowl, must have a special, approved molding. Alternate materials may be used if they provide equivalent durability. The molding must be securely attached to prevent a tripping hazard.
- h. Manufacturers may use seamless one-piece floor rubber with an integral ribbed aisle meeting the requirements in d. and e. Aisle molding is not required when the bus is equipped with one-piece floor rubber.
- i. All holes in the chassis firewall and around the transmission cover and engine housing must be adequately sealed.
- j. A commercially available truck bed liner material meeting the requirements in d. and e. may be substituted for the required flooring material.

FUEL FILLER OPENING

An opening of adequate size and design must be provided over fuel filler. Also see **LETTERING AND TRIM**.

GRAB HANDLE AT ENTRANCE

A suitable grab handle or rail must be provided at the front entrance, securely mounted inside of the body. Grab handles must be made of round stainless steel, 1 inch outside diameter (OD). The grab handle and mounting must be designed to minimize the possibility of students' clothing or personal items becoming lodged or caught upon exiting the bus, in order to reduce the risk of injury or fatality to passengers from being dragged outside the bus.

INSULATION AND SEALING OF JOINTS

The overlap of the edge of the exterior roof and side panels, and also the top edge of rub rails, must be sealed to prevent moisture, dust, and other contaminants from entering the joints and the bus.

LETTERING AND TRIM

Trim on the three rub rails below the beltline and all lettering must be black (except for stop signs). Entrance door frames, pilaster panels, and other trim panels may be painted black if approved by the Department. The letters of the words “SCHOOL BUS” on the top front and rear section of the bus body must be 8 inches high and correspond to the Series B, Standard Alphabet (see the National School Transportation Specifications and Procedures). “(Name of District) DISTRICT SCHOOLS,” on each side of the bus body at the beltline must be in 6 inch minimum letters. Private and charter schools may alternately affix the name of the school in the aforementioned format and location. Bus numbers must be in 6 inch minimum height and on each side and on the front bumper and rear of the bus body. “EMERGENCY DOOR” must be in 2 inch letters at the top or directly above the door, visible inside and outside of bus. Lettering to indicate the fuel type must be located on the body adjacent to the fuel filler opening using minimum 1 inch letters. The words “STOP WHEN RED LIGHTS FLASH” must be displayed on the back of all buses in 6 inch black letters. Also see the lettering requirements for emergency exits, including roof hatches and push-out windows, under **EMERGENCY EXITS**. Districts may add an American flag decal to the exterior of the bus. If used, it must be no more than 6 inches by 10 inches and be located in front of the district name on the beltline of the bus. Also see United States Public Law 4USC7.

The front stop signal arm (both sides of arm) and rear stop arm (rear side only) must have a red background with a reflectorized white border; the letters "STOP" must be in 6 inch white reflectorized letters. Both sides of the front stop arm and the rear side of the rear stop arm must have reflectorized red sheeting of high intensity material. The front side of the rear stop arm must be painted red.

NOTE: Buses must include the lettering and trim specified above, and are limited to lettering, trim, symbols, markings, and coloration specified in the National School Transportation Specifications and Procedures, Revised 2010.

LICENSE HOLDER

A license holder must be included on the left rear outside of the body, with a suitable method for mounting the license tag.

LOCKUP DEVICES

Any emergency door equipped with a locking device must have an ignition interlock, which prevents starting the engine when the door is locked, meeting requirements of FMVSS 217. Emergency exit windows must not be operable (under normal conditions) from outside the bus and must not be equipped with any locking device.

MIRROR SYSTEM

a. **Interior Mirror:** Must provide adequate viewing of the entire length and width of the interior of the bus and be at least 6 inches by 30 inches. The mirror must meet the following requirements:

- 1) Meet or exceed American National Standards Institutes (ANSI) Z97.1 requirements for safety glazing in mobile environments and be bonded to the mirror housing.
- 2) Include a heavy-duty, single-piece mounting bracket that ensures stability.
- 3) Housing must be low-gloss black.
- 4) Incorporate a single knob (thumbwheel) adjustment to allow the driver to reposition the mirror without the use of tools.
- 5) Have a soft gasket type frame that is bonded to the housing.

NOTE: Interior mirror on Type A1 buses must be a minimum of 50 square inches and meet the above requirements.

b. **Exterior Mirrors:** Each school bus must be equipped with a system of exterior mirrors complying with FMVSS 111 and meeting the following requirements:

- 1) **Cross/Side-View Mirror System:** This mirror system must incorporate the following features and requirements:
 - a) Only one mirror is to be installed at each front corner of the bus.
 - b) Mirrors must not reflect excessive glare from the bus headlights or the sun into the driver's eyes. Mirrors must be a ¼ sphere or shaded ½ sphere design.
 - c) Stainless steel fasteners or fasteners coated using the dacromat or magnagard process must be used in the construction of the mirror assembly and to hold the brackets to the body.
 - d) Mirror stabilizer brackets on all Type C composite hoods must use through-the-fender rubber or nylon mounts with stainless steel caps to reduce mirror vibration and erosion of the hood material.
- 2) **Rear Vision Mirror System:** A rear vision mirror system must be provided that incorporates the following features and requirements:
 - a) The system must consist of one flat and one convex mirror lens per side. Each mirror set must be mounted on a single breakaway arm with a positive detent or lock.
 - b) Each of the four required mirrors in the rear vision mirror system must be electrically operated and remotely controlled from the driver's location.
 - c) For types A2, C, and D buses, the convex mirrors must have a minimum of 38 square inches and the flat rear view mirrors must have a minimum of 61 square inches of mirror surface. For Type A1 buses, the convex mirrors must have a minimum 28 square inches and flat rear view mirrors must have a minimum of 61 square inches of mirror surface.

- d) Stainless steel fasteners or fasteners coated using the dacromat or magnagard process must be used in the construction of the mirror assembly and to hold the brackets to the body.
- 3) Overall exterior mirror system (cross/side-view and rear vision mirrors) must incorporate the following features and requirements:
- a) Mirrors must be isolated from vibration.
 - b) Certification of compliance of the system with FMVSS 111 must be provided as required by the Department of Education. Also see **GENERAL INFORMATION AND WARRANTY PROVISIONS**.

NOISE REDUCTION PACKAGE

A noise reduction package is required. The package must include full insulation of the ceiling, walls, and front and rear of the bus (including body bows), plus minimum ½ inch marine grade or pressure-treated plywood securely mounted to the floor. Insulation material must be fire-resistant and of a type that will not harbor dampness, and must be approved by Underwriters Laboratories, Inc. For all front engine units, this package must include full width perforated interior ceiling panels to deaden engine noise, extending from the front header panel to at least the first passenger seating position. For rear engine units, this package must include sound deadening insulation between the engine compartment and the passenger compartment and full width perforated interior ceiling panels extending from the rear header panel forward to at least the front of the engine compartment.

PAINT AND FINISH

All National School Bus Yellow paint must meet the National School Transportation Specifications and Procedures for color and have a finished gloss rating of at least 85 at 60°F and a distinctness of image (DOI) rating of an average of at least 50 measured using the same method specified for gloss under **GENERAL INFORMATION AND WARRANTY PROVISIONS**. Paint must be applied for a total dry thickness of at least 1.8 mils over all painted surfaces. School bus roofs must be painted white in color, and must meet the gloss and DOI ratings. White paint may extend to the leading and trailing edge of the roof caps, and may extend down to the drip rails. Trim, lettering, and bumpers must be black except that bumpers must be striped in accordance with National School Transportation Specifications and Procedures or these specifications. Also see **GENERAL INFORMATION AND WARRANTY PROVISIONS** for warranty requirements, **LETTERING AND TRIM**, and **REFLECTIVE MARKINGS**.

PANELING, INTERIOR

- a. Interior panel fastenings must minimize vibrations and rumble. A cove molding, which may be an extension of the body panels, must be installed covering the wall-to-floor joint beginning at the windshield post on the left side of the bus and extending along the walls around the corners to the service door on the right side. Molding must be securely fastened so that dirt will not readily work under it.
- b. The interior paneled area immediately below the window line must be aluminum-coated steel.

REFLECTIVE MARKING PACKAGE

There must be installed a reflective marking package as specified in the National School Transportation Specifications and Procedures, Revised 2010. Striping must be installed longitudinally the length of the body at the vertical location immediately below the seat level rub rails but high enough so as to clear wheel wells, whenever possible. Short breaks in the striping at rivet locations are acceptable. Reflective markings are also required for all emergency exits as specified in FMVSS 217.

RUB RAILS

- a. There must be a rub rail on each side of the bus approximately at seat level, which must extend from the entrance doorpost around the bus body (except for emergency door) to the point of curvature near the cowl on the left side.

- b. There must be rub rails located approximately at the floor line, and the bottom of the outer skirt, which must cover the same longitudinal area as the upper rub rail, except at wheel housings, but extend only to the right and left corners.
- c. Rub rails must be applied outside of body panels. Pressed-in or snap-in rub rails do not satisfy this requirement.

SEATING, MODESTY PANELS (CRASH BARRIERS), LAP BELTS, AND WEBBING CUTTERS

- a. Passenger seats must be mounted facing forward and provide a minimum of 12.8 inches of seat width per passenger seating position. The aisle must be 12 inches minimum. This plan of body seating must be used to determine seating capacity. See **BODY DATA PLATE**.
- b. Seat spacing must meet the requirements of Federal Motor Vehicle Safety Standard 222. The first three seats on each side of all types C and D buses, and the first seat on each side of all Type A buses, must be equipped with FMVSS 225-compliant child safety seat anchorage points. All 39 inch FMVSS 225-compliant passenger seats must be equipped with two sets of anchorage points per bench seat. All passenger seats compliant with FMVSS 225 with a seat width of less than 36 inches must be equipped with one set of anchorage points per bench seat.
- c. All passenger seats compliant with FMVSS 225 must be spaced to provide the maximum knee room permitted by FMVSS 222. The rest of the passenger seats must provide for a minimum of 25 inches of knee room. Seat measurements are to be made at the center of the reference point of the seat. In making this measurement from the front of the seat cushion to the back of the seat or barrier in front, the upholstery may be placed against the padding both forward and rear, but the padding may not be compressed.

NOTE: Nonstandard seating options may reduce knee room in the first three rows of seating. Types C and D buses over 39 feet in length may have a minimum of 24 inches of knee room behind the third row.

- d. Seat padding must be secured to the frame so that it will not snag. Screws and bolts used in seat back construction must not be exposed.
- e. Barriers and passenger seats, including the seat back and the entire bottom cushion (including underside), must be covered with vinyl-coated material. All passenger seat assemblies and barriers must meet the requirements of the 2010 National School Transportation Specifications and Procedures, School Bus Seat Upholstery Fire Block Test. Upholstery material for all passenger seats and barriers must meet the following color standard +/- four delta E:

	<u>III/ob</u>	<u>X</u>	<u>Y</u>	<u>Z</u>		<u>x</u>	<u>y</u>
1	D65 Daylight	7.21	7.92	12.52		2606	2963
2	2	7.51	7.30	4.07		3978	3865
3	Rom Light	7.33	7.37	8.15		3207	3226

- f. Buses must have an FMVSS-compliant padded barrier in front of the forwardmost passenger seat on each side of the bus. Also see Section V for barrier requirements for buses equipped with wheelchair lifts. Barriers at the entrance side and the driver's side must have a full-width, aluminized steel panel below the padded section extending down to the floor, except as specified under heater/defroster specifications (see **ELECTRICAL EQUIPMENT AND WIRING**).
- g. All Type A school buses sold through the State of Florida school bus bid must be equipped with Type II, 3-point seat belts in all passenger seating positions. These belt systems must meet the requirements of National School Transportation Specifications and Procedures, Revised 2010.
- h. All types C and D buses must be equipped with lap belts in all passenger seating positions, meeting the following requirements:
 - 1) All belts and anchorages must comply with FMVSS 209 and 210.
 - 2) Belts must be manufacturer's standard style lap belts. The nonadjustable, buckle end of each belt must be the aisle-side connection point on each passenger seat.
 - 3) Each two-part belt must be separately color-coded to aid in proper connection.
 - 4) Any belt system with parts that can be manually disassembled without the use of tools and any system that is subject to easy vandalism shall not be approved for use in Florida school buses.
 - 5) Retractable seat belts are permissible at the purchaser's option. If this system is specified, the retractors must be emergency locking type, and the retractors must be mounted below the seat bight.

- 6) All federal requirements supersede any of these requirements that are in conflict.
 - 7) School districts may install restraining systems that differ from these requirements as necessary to accommodate pre-school age children and children with special needs. Such systems must comply with FMVSS 209, 210, and 213, as applicable, and must be approved by the body manufacturer.
- i. All buses must also be equipped with a durable webbing cutter having a full width handgrip and a protected, replaceable blade. The required belt cutter must be mounted in a location accessible to the driver in the seated position, and be easily detachable.

SERVICE DOOR

- a. The service door must be a split or jackknife type located at the right front of the bus. Doors must be securely hinged with approved heavy-duty hinges with a brass or rust-resistant rod adequately fastened to the adjoined member. Doors must have a 1 1/2 inch minimum safety gap sealed with a safety flap of approved quality. The door must extend to the bottom step and be fitted with suitable weather strip to keep water from entering the step well.
- b. An air-operated entrance door must be provided on all buses equipped with air brakes. This system must have a manually operated override to enable the driver to manually open the door in the event of loss of power. Air-powered entrance doors must operate in accordance with the following table:

Ignition Switch Position	Door Switch Position	Emergency Dump Switch Position	Door Position / Status	Step Well Light Condition
Off	Any	On	Neutral	Off
Off	Any	Off	Neutral	Off
On	Closed	Off	Closed/Active	Off
On	Opened	Off	Open/Active	On
On	Closed	On	Neutral	Off
On	Opened	On	Neutral	On

- c. When the key switch is in the “off” position, the air door system must not create a battery draw. All air door systems must provide a rebuildable air cylinder and must operate reliably in all weather and temperature conditions. All air-powered door systems must include a method of manually adjusting the opening and closing speed and force of the doors.
- d. Hydraulic brake buses must have a manually controlled entrance door. A double-bearing, epoxy-coated, mechanical control must be mounted within comfortable reach of driver on a firm and substantial support and lock in the off-center position. On models with service doors opening outward, there must be installed an approved safety latch. The control must have a smooth machined handle and the rod to the door must be epoxy-coated.
- e. The service door must have a minimum horizontal opening of 24 inches and a minimum vertical opening of 68 inches. Immediately above the door opening there must be secured to the body panel a high-density foam rubber pad, a minimum of 3 inches in width, or an approved equal safety cushion.
- f. Doors must be designed and weather strips mounted so that there is no binding or tendency for stripping to dislodge during door operation. One or two glassed-in openings must be provided in each door half with glass of same grade as specified for side windows and mounted in rubber. The bottom of the lower glass panel must not be more than 30 inches from the ground when the bus is unloaded. The top of the upper glass panel must not be more than 6 inches from the top of the door.

SIZES OF BODIES

The height of the body from the top of the finished floor to the underside of the ceiling, at the center of the body, must be a minimum of 72 inches.

STEP WELL

A step well of at least three steps must be built in the right front assembly, enclosed with doors extending to the bottom step. Each step must be covered with abrasion-resistant “Pebble-Top” elastomer, the base of which must be at least 3/16 inches thick, with an overall thickness of 5/16 inch bonded to a durable polymer base and otherwise constructed to provide

substantial support, including the leading horizontal edge, which must be “Pebble-Top” type, and white or a color that contrasts with the step tread by at least 70 percent. The polymer backing must have an integral 90-degree turndown with a square leading edge for slip resistance. The lower (first) step height must be between 10 and 16 inches above the ground for all types A1, A2, C, and D buses. Each step must be the full width of the step well at the point where the step is located. Half steps or partial steps are not acceptable.

NOTE: Two steps are acceptable on Type A1 buses.

STRUCTURAL DESIGN and TESTING

- a. All types A, C, and D bodies must meet the requirements of FMVSS 221 and the requirements of the 2010 National School Transportation Specifications and Procedures, Side Intrusion Test.
- b. Each manufacturer of types A, C, or D bodies must certify that representative configurations of its buses produced to meet these specifications comply with the testing and requirements of the Colorado Racking Load Test. See **Colorado Racking Load Test** in Appendix C.
- c. Each manufacturer of types A, C, or D bodies must certify that representative configurations of its buses produced to meet these specifications comply with the testing and requirements of the Kentucky Pole Test. See **Kentucky Pole Test** in Appendix C.
- d. All bus bodies must be constructed to be in square, and level. There must be no more than 1 inch of difference from side to side at the front and rear of the bus body (not counting any chassis lean or twist). All bodies must be mounted such that all designed body contact points are in contact with the chassis frame. All bodies must be centered on the chassis within plus or minus ½ inch.

NOTE: Type A1 buses may be constructed with exterior paneling and roof caps of material other than steel, meeting all body manufacturer requirements and applicable FMVSS. Body structural design must comply with all other applicable requirements above.

SUN SHIELD

A dual sun shield system must be provided, consisting of two independently mounted sun shields. One must be mounted above the windshield and the other above the driver’s window. Each visor must have a tinted Plexiglass sun shield, minimum 6 inches by 24 inches, and have rounded bull-nosed perimeter edges.

NOTE: The manufacturer’s standard sun visor is acceptable on Type A1 buses.

VANDAL BOX, SIDE MOUNTED

There must be installed on all types C and D buses an equipment compartment on the ceiling above the driver’s side window, measuring approximately 2,750 cubic inches. The compartment must have a door with a positive latch and a keyed-alike lock with warning buzzer to warn the driver that the door is locked if the ignition switch is turned on.

WINDOWS

- a. All types A, C, and D buses must have tinted glass that provides the maximum tinting allowed by federal and American National Standards Institute (ANSI) standards for the windshield, the driver's side window(s), and the service door glass. Tinted glass in all windows rear of the driver's compartment must have a light transmission of approximately 28 percent.
- b. An adjustable split sash window with safety glass must be mounted in the side of the bus body between each framing post. Permanent marks showing the grade of glass must be visible.
- c. Movable windows must be controlled by an approved lock having a finger-touch opener, providing for ease of operation and with no sharp projections. Window latches must be replaceable or rebuildable without disassembling the complete window frame or removing the window from the body. In addition, individual window latches or repair parts must be available and part numbers included in the required body parts catalog. Window seals and visors or drip molding must be installed and provide ample protection from leakage.

- d. For ventilation, the driver's window must be adjustable and must be equipped with a positive latch that can be secured from the inside of bus.
- e. There must be installed in the rear door two windows, one upper and one lower, installed in a waterproof manner. The use of adhesives in place of the required rubber may be approved at the discretion of the Department. Total glass area in the emergency door must be a minimum of 750 square inches. Glass must be the same type as for side windows.
- f. Rear side windows located at each side of the emergency door must be installed in a waterproof manner. The use of adhesives in place of the required rubber may be approved at the discretion of the Department. Glass area must be large enough to provide desirable vision to the rear and must be of the same quality and grade as side windows.

WINDSHIELD

The front body section in the area of the windshield must provide for corner vision. Glass must be laminated safety polished plate with dark tint at top, installed in a waterproof manner, and slanted to reduce glare. Glass must meet current SAE specifications and Federal Motor Vehicle Safety Standards. Light tint may be used in all Type D buses in lieu of dark tint at the top.

WINDSHIELD STEPS AND HANDLES

A step and appropriate grab handle must be installed on each front corner of the body to facilitate cleaning the windshield. The handle must be stainless steel, chrome plated, or non-ferrous metal, or may be made of non-metallic material of sufficient structural and mounting strength and resistant to weathering and deterioration and must provide for secure mounting and adequate hand hold.

NOTE: Steps and handles are not required on Type A1 buses.

WINDSHIELD WIPERS AND WASHERS

- a. Electric windshield wipers must be standard on all buses. All wipers by design and installation must provide desirable vision for drivers. Blades and arms must be of sufficient length to clear the windshield glass in the driver's direct view. One switch must control both wipers, and the switch must be located within easy reach from driver's seat, preferably on the turn signal stalk. The system must incorporate a variable delay wipe feature to allow drivers to adjust the speed and frequency of the wipers. The wiper system must be designed to move the blades away from the driver's direct view when in the parked position.
- b. Windshield washers must be electrically operated. The washer reservoir must be made of hard plastic or other approved material and have a capacity of at least ½ gallon. Flexible plastic bags are not acceptable.

NOTE: The manufacturer's standard windshield wipers are acceptable on Type A1 buses.

TYPE D FRONT ENGINE BODY EXCEPTIONS

- a. The distance between the barrier at the rear of the entrance step well and the engine cover must be a minimum of 13 inches.
- b. A step, in lieu of stirrup steps, is permitted in or on the front bumper on both sides.
- c. The engine cover must provide an adequate seal to the bus floor area to keep engine fumes from entering the passenger compartment and must be insulated to retard transfer of heat and engine noise. The engine cover must be hinged and equipped with a prop rod or other device so that it can be held securely in the fully open position to allow access to the engine.

TYPE D REAR ENGINE BODY EXCEPTIONS

- a. The engine compartment must be constructed to permit servicing of the engine, having one or two doors opening at the rear and louvered, with removable panels on each side of engine compartment. The engine compartment must be sealed at top and front to retard heat transfer and prevent engine fumes from entering the passenger compartment. Provisions must be made for easy removal of the engine through the rear compartment.
- b. Mud flaps must be installed at the rear of the dual wheels.
- c. A step, in lieu of stirrup steps, is permitted in or on the front bumper on both sides.
- d. Type D Rear Engine buses are exempted from the requirement for an additional electrical compartment for air conditioner circuitry, provided the air conditioner control boards are installed in the rear package shelf area in a covered box.
- e. There must be an engine access panel underneath the rear seat of all rear engine buses designed to provide access to the engine.

SPECIFICATIONS FOR OPTIONAL BODY EQUIPMENT TYPES A1, A2, C, AND D BUSES

3-POINT SEAT BELTS AND 3-POINT SEAT BELT SEATS

There shall be an approved option for 3-point seat belts in two and three passenger 3-point seat belt seats, as approved by the Department of Education.

AUTOMATIC VEHICLE LOCATION AND STUDENT TRACKING SYSTEM

There shall be an approved option for a system that uses the Global Positioning System (GPS) to determine and wirelessly report the location of the bus in approximately real time to the transportation administration. The system may also include an additional feature that will identify individual students as they board or disembark from the bus and report the locations and times.

BAGGAGE COMPARTMENTS

There shall be an approved option for baggage compartments on all bodies when available. This body option must include a lock and be keyed alike with any other body option requiring use of a key.

BATTERY DISCONNECT SWITCH LABELING

There shall be an approved option for a label to be placed on the exterior of the bus on the cover of the compartment housing the battery disconnect switch. The label background must be white with red one-inch letters with the wording "MAIN BATTERY DISCONNECT."

BUS LOCKUP SYSTEM

There shall be an approved optional whereby a bus can be locked at the emergency as well as the entrance door. An ignition interlock is required for the emergency door to prevent starting the bus if the emergency door or rear window (on RE units) is locked. This body option must be keyed alike with any other body option requiring use of a key.

DRIVER'S SEAT WITH INTEGRATED SEAT BELT

There shall be an approved option for a driver's seat with a seat belt integrated into the seat back, and meeting the requirements of **DRIVER'S SEAT AND SEAT BELT** in this section.

ELECTRIC POWERED DOOR FOR TYPE A

There shall be an approved option for an electric-powered entrance door, where available, on Type A school buses only.

EXTERIOR LIGHT MONITOR

A system of monitoring exterior lights on the front and rear of the bus from the driver's seated position is approved as an option. Such systems must include:

- 1) Student Warning Lamps, both RED and AMBER, front and rear.
- 2) Tail Lamps
- 3) Backup Lamps
- 4) Rear Turn Signal Lamps
- 5) Stop Lamps

A system that monitors only electrical circuits and does not indicate whether the bulb is operational is not acceptable.

FUEL SUPPLY LOCK

A lock with two keys may be installed in the fuel supply service door of the body skirt. This body option must be keyed alike with any other body option requiring use of a key.

HIGH HEADROOM BODIES

There shall be an approved option for bus bodies with approximately 77 inches of headroom.

INFANT SEATING

There shall be an approved option for passenger seating designed to safely transport newborns, infants, or toddlers and meeting all applicable Federal Motor Vehicle Safety Standards as follows:

- 1) C.E. White Child Restraint Seat
- 2) Other systems as approved by the Department of Education

FULL BODY PERFORATED ROOF PANELS

There shall be an approved option for perforated sound deadening roof panels covering the full length of the bus.

POWDER-COATED WINDOW FRAMES

There shall be an approved option for electrostatically powder-coated black window frames on all types of buses to reduce friction and improve ease of operation of passenger side windows.

PUBLIC ADDRESS SYSTEM (P.A.), RADIO

There shall be an approved option for a public address system/AM/FM stereo radio with four speakers inside the bus and one heavy-duty weatherproof P.A. speaker outside the bus. This option must have controls to permit the driver to select inside or outside speakers, mounted in the driver's compartment so that all controls are readily accessible to the driver from the normal seated position. Interior speakers must be flush-mounted. Outside speaker must be mounted under the hood or in another protected location at the front of the bus. An AM/FM stereo radio with four speakers may be offered separately. No internal speakers other than those used for the driver's communication system may be installed within four feet of the back of the driver's seat when the seat is in its rearmost upright position.

REAR HEATER

There shall be an approved option for an additional heater mounted to provide heat in the rear of the body. This option must be installed under a passenger seat or must otherwise be protected to eliminate damage to the unit and injury to the students. This system must have a minimum 80,000 BTU rating for types C and D buses. On Type A buses, this system must have a minimum 50,000 BTU rating.

RED LIGHT ABOVE EMERGENCY DOOR

There shall be an approved option for a small red light to be mounted above the emergency door on the interior of the bus that is activated when the clearance lights are on.

STAINLESS STEEL MIRROR BRACKETS

There shall be an approved option for all exterior mirror mounting brackets and fasteners to be constructed of stainless steel.

STRAIGHT FLOOR / FLAT FLOOR

There shall be an approved option on any size bus when available for an unobstructed straight floor design (i.e., no wheel wells and no step-up at the rear of the driver's compartment). Minimum headroom of any bus equipped with this option must remain 72 inches as per standard body specifications.

There shall be an approved option on any size bus, when available, for an unobstructed flat floor design in the passenger compartment. If this option uses a raised floor that is stepped up behind the driver's area, the forward edge of the aisle must have a white stripe and be labeled "Step Up" as viewed upon entering the aisle and a "Step Down" label must be visible upon exiting the aisle. Minimum headroom of any bus equipped with this option must remain 72 inches as per standard body specifications. The bus must be equipped with 39-inch seats except for locations where lift bus specifications require a 30-inch aisle.

TRACK SEATING

There shall be an approved option for a track-mounted seating system using button track (L track), and a wheelchair securement system meeting Florida Specifications, but mounting into the track-seating track. The overhead track for the shoulder harness attachment must extend the full length of the passenger compartment on both sides. The bus must be equipped with 39-inch seats except when lift bus specifications require a 30-inch aisle. All floor tracking must be anodized aluminum or other material of equal strength that will resist corrosion in Florida's environment.

This option must include additional options as follows:

- 1) Purchase of individual track seating seats
- 2) Delete a seat, add a wheelchair position with wheelchair tie-downs
- 3) Delete a wheelchair position (tie-downs), and add a standard seat

SECTION IV
BODY SPECIFICATIONS
EXCEPTIONAL CHILD BUSES
TYPES A, C, AND D BUSES

MINIMUM BODY SPECIFICATIONS EXCEPTIONAL CHILD BUSES TYPES A, C, and D

1.0 GENERAL REQUIREMENTS FOR EXCEPTIONAL CHILD BUSES

Exceptional child bus body structure and equipment must conform to the regular bus body specifications in Section III and must meet the additional requirements of this section (listed below) regarding modifications necessary for installation of special equipment. Proper bracing must be added as specified in the body standards.

All school buses equipped with wheelchair lifts must meet the requirements of this section. Additionally, all buses equipped with wheelchair lifts must meet or exceed the requirements of Federal Motor Vehicle Safety Standards (FMVSS) 403 and 404.

A power-up, gravity-down lift must be made available based on local district needs on all types of wheelchair-lift equipped bodies. All wheelchair lifts must meet the requirements of FMVSS 403 and 404 and the Americans with Disabilities Act (ADA), and all requirements listed herein. Where they differ from ADA, the requirements listed herein prevail. Other ADA requirements for non-lift equipment are not applicable.

National School Transportation Specifications and Procedures, Revised 2010, are also applicable, including the dynamic testing requirements for mobile seating devices and occupant securement systems. Body manufacturer may be required to provide certification that exceptional child buses and equipment meet the additional requirements of the National Specifications pertaining to buses for students with special needs.

2.0 TECHNICAL REQUIREMENTS

The wheelchair lift must meet the technical requirements below.

2.1 GENERAL LIFT AND/OR BODY REQUIREMENTS

2.1.1 Weight

The weight of the lift must not adversely affect the legal axle loading, the maneuverability, structural integrity, or the safe operation of the vehicle in which it is installed.

2.1.2 Operation Constraints

2.1.2.1 The lift must operate when the bus is on level ground and on road grades up to 7 percent or 4 degrees.

2.1.2.2 The lift must operate when the bus is on level ground and when the bus is at an angle of plus or minus 8.7 percent or 5 degrees due to road crowns, depressions, or curbs.

2.1.3 Location of Lift and Door Requirements

2.1.3.1 Whenever possible, the option must be provided to the local purchaser to have the lift located either in front of or behind the rear wheels, on the right side of the bus.

2.1.3.2 If the lift is located forward of the rear wheels, it must be located away from the regular service entrance so any fully opened, forward-mounted door will not obstruct the conventional service entrance.

2.1.3.3 Door posts, headers, and floor sections around this special opening must be reinforced to provide strength and support equivalent to adjacent side wall and floor construction of an unaltered model.

2.1.3.4 A drip molding must be installed above the opening to effectively divert water away from entrance.

- 2.1.3.5 All doors must open outwardly.
- 2.1.3.6 All doors must be weather-sealed. The design must provide a positive means of holding the door, or doors, in open position during lift operation. Friction catches are not acceptable. This specification must not be achieved by means of a hinge-mounted pin or other device that would result in extra leverage on the door hinge point(s).
- 2.1.3.7 When manually operated dual doors are provided, the rear door must have at least a one-point fastening arrangement to the header. The forward-mounted door must be constructed so that a flange on the door overlaps the edge of the rear door when closed. This door must have at least a 3-point fastening device with one point to the header, one to the floor line of the body, and the other to the rear door. This locking device must afford maximum safety when doors are in the closed position. When a single door is used, the locking device must meet the requirements for the emergency door lock. Door hinge(s) must be adequately heavy-duty to prevent sagging of the door over the useful life of the bus. A single door may be used to enclose a clear door opening of no more than 50 inches in width. All lift entrances must have a clear, finished door opening height of at least 56 inches.
- 2.1.3.8. Door materials, panels, and structural strength must be equivalent to the conventional service and emergency doors. Color, rub rail extensions, lettering, and other exterior features must match adjacent sections of the body.
- 2.1.3.9. Each door must have a serviceable glass window set to the lower line of adjacent sash.
- 2.1.4. Padding and Protective Covering
 - 2.1.4.1. Pinching movements, shear areas, or places where clothing or other objects could be caught or damaged must be covered or in other ways protected to prevent passenger injury when lift is in operation.
 - 2.1.4.2. The outermost stationary frame structure of the lift exposed to the passenger compartment must be padded with high-density foam down to within 3 inches of the floor to minimize injury in normal use and in case of an accident.
- 2.2 Platform Requirements
 - 2.2.1. Protrusions and Openings
 - 2.2.1.1. The lift platform must not have any openings greater than 3/4 inch in width, except for a hand hold not exceeding 1½ inch by 4 inches located midway between the edge barriers.
 - 2.2.2. Platform Lighting
 - 2.2.2.1. There must be a flush-mounted, dome light located on the inside ceiling of the bus above the lift opening. The light must be controlled by a labeled switch located on or adjacent to the lift.
- 2.3 Structural Requirements

The structural elements of the wheelchair lift include those that support working loads and attach the lift to the bus. They do not include mechanical and hydraulic components associated with operation and control of the lift.

 - 2.3.1. Lift Capacity

The wheelchair lift must have a lift capacity of 800 pounds uniform load.
 - 2.3.2. Structural Safety Factor

The structural safety factor must be at least 3, based on the ultimate strength of the construction material.

2.3.3. Useful Life

When used and maintained in accordance with the manufacturer's recommended procedures, a wheelchair lift structure must be designed to have a useful life equal to the useful life of the vehicle in which it is used.

2.3.4. Interface with the Vehicle

- 2.3.4.1. Installation of the wheelchair lift must not reduce or in any way compromise the structural integrity of the vehicle and must have a structural safety factor as specified in Structural Safety Factor, Section 2.3.2.
- 2.3.4.2. Attachment of the wheelchair lift, including any modification of the vehicle, must not cause an imbalance of the vehicle that will adversely affect vehicle handling characteristics.
- 2.3.4.3. No part of the installed and stowed lift must extend laterally beyond the normal width of the vehicle.
- 2.3.4.4. The lift must not contact the door and/or door frame while in the stowed position or during deployment and normal operation.
- 2.3.4.5. When the drive motor and hydraulic pump are located inside the bus, they must be installed to avoid interference with the movement of wheelchairs through the bus aisle. The unit must be enclosed to prevent transported students from coming in contact with it and must be readily accessible to service personnel for routine service and for maintenance. When the hydraulic pump and drive motor are installed below the floor level, they must be enclosed in a box accessible through a door installed in the body skirt.
- 2.3.4.6. Fold-out lifts using full height stanchions must be installed so that a portion of main stanchion assembly(ies) or bracket(s) (if applicable) is secured to body sidewall by means of through-the-body, minimum 5/16 inches diameter, corrosion-resistant grade 8 steel bolts and self-locking, corrosion-resistant nuts (two bolts per stanchion assembly are required). Parallelogram lifts must provide for extra support or bracing under the floor where attached.
- 2.3.4.7. All lift mountings must be secured with nuts, bolts, and lock washers. Lag bolts must not be used in the mounting of the lift.

2.4 Mechanical and Hydraulic

Mechanical and hydraulic components include all parts of the lift drive or control systems that support the platform load during normal operation of the wheelchair lift.

2.4.1. Mechanical and Hydraulic Safety Factors

Mechanical and hydraulic components include all parts of the lift drive or control system that are subject to wear and degradation due to the operation of the lift, and include working parts, such as cables, pulleys, shafts, and chains that can be expected to wear and upon which the lift depends for support of the load.

- 2.4.1.1. The mechanical component safety factor must be at least 6 based on the ultimate strength of the material.
- 2.4.1.2. Hydraulic components must comply with all applicable Society of Automotive Engineers Standards. These standards include, but are not limited to, the following:

- SAE J190 – Power Steering Pressure Hose
- SAE J191 – Power Steering Pressure Hose - Low Volumetric
- SAE J514APR80 – Hydraulic Tubing Fittings
- SAE J516JUN84 – Hydraulic Hose Fittings
- SAE J517JUN85 – Hydraulic Hose

All other components that contain working fluid must have a minimum burst pressure of at least 3 times normal design working pressure.

3.0 WARRANTY

A statement of warranty must be provided with each lift assuring the quality of materials and workmanship of the product for at least 24 months from the date of acceptance by the final consumer. The warranty must provide 100 percent coverage for parts. Also see **GENERAL INFORMATION AND WARRANTY PROVISIONS**.

4.0 MAINTENANCE, TRAINING, AND SERVICE

4.1 Documents

A comprehensive operator's, maintenance, and parts manual(s) must be provided or available on the Internet from the manufacturer's website for the lift with each bus. Parts manuals must be designed so that all replaceable parts are illustrated by line drawings and such parts are numbered on the illustration, with a part description on a separate list under the corresponding part number. Part descriptions should be annotated appropriately with the part number, a proper description (part name), and the quantity required for the application listed in the drawings. A service manual or the manufacturer's website must also include an overall lift diagram with component plumbing, locations, and identities indicated for diagnostic purposes.

4.2 Maintenance and Inspection

Scheduled maintenance tasks must be related and must be grouped in maximum bus mileage intervals. Routine scheduled maintenance, such as lubrication and adjustments, must not be required at intervals of less than 6,000 bus miles or 1,000 up and down lift cycles, whichever comes first, except for routine servicing performed during monthly inspections. Higher levels of scheduled maintenance tasks must occur at even multiples of the lower level task schedules based on vehicle mileage.

4.3 Maintenance Accessibility

All systems or components serviced as part of the periodic maintenance of the lift, the failure of which may cause a safety hazard or a road call, must be readily accessible for service and inspection. To the extent practicable, removal or physical movement of components unrelated to the specific maintenance and/or repair tasks involved should be unnecessary. Relative accessibility of components, measured in time required to gain access, should be inversely proportional to frequency of maintenance and repair of the components.

4.4 Training

The successful body manufacturer must be responsible for providing or arranging wheelchair lift service training as needed. This training must include at a minimum one-day training seminars on overall features, operation, preventive maintenance, diagnosis, and rebuild of wheelchair lifts offered through the bid. The seminars are to be conducted free of charge at district garage locations, arranged by the Department of Education and the successful bidder. At least one seminar on each given lift model must be conducted per five school districts purchasing a bus or buses equipped with that lift.

5.0 WHEELCHAIR/OCCUPANT SECUREMENT SYSTEM

5.1 General Requirements for Wheelchair/Occupant Securement System

5.1.1 System must be designed to accommodate positioning and securement of wheelchairs or other passenger-carrying devices in a forward-facing orientation, and must be designed to allow maximum flexibility in front-to-rear positioning of different numbers and sizes of passenger carrying devices.

5.1.2 Each designated wheelchair space (for the purpose of determining seating plans and required space allowances) must be a minimum of 50 inches longitudinally by 30 inches laterally. Each 50 inch section of required tie-down track may consist of two sections of track with neither section less than 16 inches long, and must extend the full length of the wheelchair position with no gaps.

5.1.3 No stanchions or other obstructing devices may be installed on or above the floor in the wheelchair areas.

- 5.1.4 The overall system is required to meet the requirements of FMVSS 302 on Flammability of Interior Materials.
 - 5.1.5 Occupant securement straps must be black or other dark color and wheelchair securement straps must be gray, beige, or other light color to distinguish the separate functions.
 - 5.1.6 In addition to the webbing cutter required in Section III, each specially equipped school bus that is set up to accommodate wheelchairs or other assistive or restraint devices with webbing attached must contain an additional webbing cutter properly secured in a location to be determined by the purchaser.
- 5.2 Technical Requirements for Wheelchair/Occupant Securement System
- 5.2.1 Wheelchair securement system must have 4-point tie-downs, incorporating 4 flexible, adjustable straps to include the following: Tie-down straps and occupant securement must be Sure-Lok kit numbers FF612-4C-7, FF612S-4C-7, or AL712S-4C-7, or Q'Straint kit number Q-8106-L, Q-8206-L or Q-8306-L, or equal approved by the Department.
 - 5.2.1.1 The 4 straps must each be retractor type and must be interchangeable.
 - 5.2.1.2 Each strap must be equipped with a positive spring-lock type end fitting on floor end.
 - 5.2.1.3 The system must have multiple floor-mounted attachment points (longitudinal) to the bus body or to attachment hardware for the wheelchair securement straps. Attachment point hardware must be equivalent to Sure-Lok or Q'Straint anodized flanged series L button track. To meet this requirement, four parallel sections of track must be longitudinally mounted to the bus floor. The sections must be installed in accordance with the wheelchair and occupant securement system manufacturer's requirements to comply with FMVSS 207 and 208 strength testing. This track spacing must be adjusted as necessary in order that a 30-inch and 39-inch track-mounted seat will fit into this track system. Each 50-inch section of required tie-down track may consist of two sections of track with neither section less than 16 inches long, and must extend the full length of the wheelchair position with no gaps. There may be a short break in the outer track to accommodate a fuel filler neck if required. This tracking system must be inset flush with the bus floor. Trim pieces must be added as necessary to cover all exposed flooring edges.
 - 5.2.1.4 The securement system for the wheelchair must be designed to meet the strength requirements specified in FMVSS 207 and, additionally, if occupant restraints are to be attached to wheelchair securement straps, to meet the requirements for seat belt anchorage strength specified in FMVSS 210. The specified wheelchair used to establish and test for these strength requirements must be a Fortress 655 FS Standard Adult or equivalent (with batteries).
 - 5.2.1.5 All floor tracking must be anodized aluminum or other material of equal or better strength that will resist corrosion.
 - 5.2.2 The occupant securement system must meet the following requirements and must include the following equipment and features:
 - 5.2.2.1 Occupant Securement System – See “Technical Requirements for Wheelchair/Occupant Securement System, Section 5.2.1.”
 - 5.2.2.2 The system must be equipped with a single-point, push-button quick disconnect for the lap belt sections and the lower end of the upper torso strap. The lap belt (if attached directly to the floor) and the upper end of the shoulder strap must have multiple attachment points (longitudinal) to the bus body or attachment hardware. Attachment points are to be spaced at increments not to exceed 4 inches center to center. The attachment point hardware for the lap belt (if applicable) must be equivalent to Sure-Lok or Q'Straint Series L button track. Floor track requirements in “Technical Requirements for Wheelchair/Occupant Securement System, Section 5.2.1.3” are also applicable to this section. Attachment point hardware for shoulder strap must be equivalent to Sure-Lok or Q'Straint Series L track (button track). Each 50 inch section of required tie-down track may consist of two sections of track with neither section less than 16 inches long, and must

extend the full length of the wheelchair position with no gaps and must be positioned above the passenger windows.

- 5.2.2.3 Body attachment hardware on occupant straps must incorporate positive spring lock end fittings or other means of providing positive securement and quick attachment or release.
- 5.2.2.4 The upper torso belt and each portion of lap belt must be adjustable and must accommodate the size and height range of occupants specified in FMVSS 209.
- 5.2.2.5 The occupant securement system must be designed to meet the requirements of FMVSS 209 and 210 (also see “Technical Requirements for Wheelchair/Occupant Securement System, Section 5.2.1.4”). **Any reinforcement of the body header area necessary to meet these anchorage requirements for the occupant securement shoulder straps must be provided the entire length of the passenger area on both sides of the bus to facilitate retrofitting of occupant securement systems by districts as needs change.**

6.0 CRASH BARRIERS with MODESTY PANEL

- 6.1 There must be a padded modesty panel (crash barrier) located immediately rearward of the lift if there are wheelchair spaces or regular seating located rearward of the lift and on the same side of the bus.
- 6.2 There must be a padded crash barrier with a modesty panel meeting FMVSS and Florida spacing requirements located forward of all passenger seats that do not have another seat properly spaced in front of them. There must be a padded crash barrier or seat in front of any wheelchair position unless it is contiguous with and behind another wheelchair position. The forwardmost barrier on both sides of the bus must have a full width aluminized courtesy panel extending to the floor. If the right front of the passenger area immediately behind the stepwell is not equipped with a barrier due to placement of the wheelchair lift in that location, it must be equipped with a padded stanchion from floor to ceiling with an aluminized modesty panel.

7.0 AISLE

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

8.0 SERVICE DOOR (REGULAR) ENTRANCE

- 8.1 Stainless grab rails must be provided on each side of this entrance and must be placed in such a manner as to afford easy accessibility to small children entering or leaving the bus. The lower end of the rails must be no higher than 8 inches from the bottom step. Exception: Type A1 buses require only one grab rail.
- 8.2 When in the open position, service doors must not obscure any portion of the grab rails.

9.0 SEATING ARRANGEMENTS

Flexibility in seating and spacing to accommodate special devices is permitted due to the constant changing of passenger requirements.

NOTE: Because of the wide variation in type, size, construction, and design of wheelchair lifts and wheelchair locking positions, the Department of Education reserves the right to inspect any wheelchair lift bus offered for sale to Florida district school boards and to reject any unit found in the Department’s discretion to be unsafe, inadequate, or not suitable for use in transporting students with disabilities.

10.0 UNIVERSAL HANDICAPPED SYMBOL FOR BUSES EQUIPPED WITH WHEELCHAIR LIFTS

All buses with wheelchair lifts must have two universal handicapped stickers. Each sticker must be reflective white on blue, at least 6 inches by 6 inches, displaying the universally recognized symbol for vehicles transporting persons with disabilities. One sticker must be located on the center of the front bumper and the other sticker at the right rear of the bus below the 4-inch brake/tail light. The rear sticker must be located below the emergency window on Type D rear engine buses.

11.0 WHEELCHAIR SECUREMENT AREA LIGHTING (OPTIONAL)

Additional floor-level lighting designed to fully illuminate the wheelchair securement areas may be provided. The lighting must be controlled by the dome light switch.

SECTION V

AIR CONDITIONER SPECIFICATIONS

TYPES A, C, AND D BUSES

SCHOOL BUS AIR CONDITIONER SPECIFICATIONS

TYPES A, C, AND D BUSES

The following specifications are applicable to all types of Florida school buses equipped with an air conditioner system and are in addition to all requirements for equipment in Sections I, II, III, and IV of this specifications document. This section is divided into three subsections. Subsection I covers Performance Specifications; Subsection II covers specific equipment requirements for Systems A and B; and Subsection III covers other requirements applicable to all buses equipped with air conditioners (A/C). This specification consists of requirements for two separate designs, System A and System B (containing lighter components designed for a lighter duty cycle). Both systems must meet the performance requirements listed below.

I. PERFORMANCE SPECIFICATIONS

A. TEST PROCEDURES and REQUIREMENTS

The installed air conditioner system must cool the interior of the bus as outlined below, measured at a minimum of three points, located 4 feet above the floor at the longitudinal centerline of the bus. The three points must be:

- a. 2 feet rearward from the front bulkhead
- b. At the midpoint of the body, and,
- c. 2 feet forward of the emergency door, or, for Type D rear engine buses, 2 feet forward of the rearmost end of the aisle

There must be at least one Department representative and one manufacturer representative in the bus during the performance test. The test must be performed under actual summer conditions in Florida, which consist of temperatures above 85°F, humidity above 50 percent with normal sun loading of the bus and the engine operating at 1,250 ± 50 revolutions per minute (RPM). After a minimum of one hour of heat soaking, with the passenger windows open, the system must be turned on and must provide a minimum 20°F temperature drop in a 20 minute time limit and maintain that temperature for at least 10 more minutes. If the outside ambient temperature is below 90°F, then the temperature inside the bus must be reduced to 70°F. If the interior of the bus has been cooled prior to the start of the heat soak process, then the heat soak must be extended to 1½ hours. This testing method must be the required minimum testing protocol.

Exceptions:

- a. Type D rear engine buses equipped with the System A transit duty compressors specified in item II.A.1.h. below must provide a minimum 25°F temperature drop in the 20 minute time limit and maintain that temperature for at least 10 more minutes. If the outside ambient temperature is below 95°F, then the temperature inside the bus must be reduced to 70°F.
- b. Type D front engine buses *not* equipped with the System A transit duty compressors specified in item II.A.1.h. below must provide a minimum 15°F temperature drop in the 20-minute time limit and maintain that temperature for at least 10 more minutes. If the outside ambient temperature is below 90°F, then the temperature inside the bus must be reduced to 75°F.

Additionally, and at the Department's discretion, this test may be performed by: 1) placing the bus in a room (such as a paint booth) where ambient temperature can be maintained at 110°F; 2) heat soaking the bus, which is at ambient booth temperature of 110°F with windows open for at least 1 hour; and, 3) closing the windows, turning on the air conditioner with the engine operating at fast idle, and cooling the interior of the bus by 30 degrees or more within a maximum of 20 minutes and maintaining that temperature for at least 10 more minutes while maintaining 110°F outside temperature. If the interior of the bus has been cooled prior to the start of the heat soak process, then the heat soak must be extended to 1½ hours.

Exceptions:

- a. For Type D rear engine buses equipped with the System A transit duty compressors specified in item II.A.1.h. below, when testing using the paint booth method (if approved by the Department), the test specification must be that the interior of the bus is cooled by 35 degrees or more within a maximum of 20 minutes and that temperature is maintained for at least 10 more minutes, while maintaining 110°F outside temperature.

- b. For Type D front engine buses *not* equipped with the System A transit duty compressors specified in item II.A.1.h. below, when testing using the paint booth method (if approved by the Department), the test specification must be that the interior of the bus is cooled by 15 degrees or more within a maximum of 20 minutes and that temperature is maintained for at least 10 more minutes, while maintaining 110°F outside temperature.

The manufacturer must provide facilities for Department of Education personnel and/or a purchasing school district representative to confirm that a pilot model of each bus design meets the performance requirements.

B. A/C SYSTEM PERFORMANCE SPECIFICATIONS SUMMARY

APPLICABLE BUSES with AIR CONDITIONING	PARKING LOT TEST		HOT BOX TEST
	90°F or above AMBIENT	Below 90°F AMBIENT	
ALL TYPES (<u>except</u> Type D RE with full transit compressor; <u>except</u> Type D FE)	20°F PULL DOWN	70°F INSIDE	110°F – 80°F
TYPE D REAR ENGINE with FULL TRANSIT COMPRESSOR	25°F PULL DOWN	70°F INSIDE (if below <u>95°F</u> ambient)	110°F – 75°F
TYPE D FRONT ENGINE	15°F PULL DOWN	75°F INSIDE	110°F – 95°F
<ul style="list-style-type: none"> • FAST IDLE (1250 RPM ± 50) • 1½ HOUR HEAT SOAK • 20 MINUTES PULL DOWN / 10 MINUTES MAINTAIN 			

The manufacturer must provide facilities for Department of Education personnel and/or a purchasing school district representative to confirm that a pilot model of each bus design meets the performance requirements.

II. EQUIPMENT REQUIREMENTS

A. SYSTEM A EQUIPMENT REQUIREMENTS

1. Power Source and Compressor(s):

- a. Types A2, C, and D front engine buses must have at least two compressors, two evaporators, and two condensers plumbed and wired separately in order to provide maximum redundancy. Type D rear engine buses must have only one compressor and may have one or two evaporators and condensers.
- b. Compressor(s) must be chassis engine-driven or electric motor driven. All compressors must have the correct lubricating oil specified on a permanent tag attached to the compressor in a visible location.
- c. Any engine-driven compressor used on 47 passenger and larger units must have a minimum design life of at least 8,000 hours and a minimum displacement of 13 cubic inches. For segregated dash air systems, a third compressor with a minimum displacement of 10 cubic inches (TM 16 or equivalent) is allowed. For buses

with a capacity of fewer than 47 passengers, a compressor minimum displacement of 10 cubic inches (TM 16 or equivalent) is allowed.

- d. The system must be equipped with both a high pressure and a low-pressure switch to prevent compressor operation when system pressures are above or below recommended safe levels.
- e. Compressor(s) must be mounted in the safest area possible. Compressors must not be mounted below the chassis frame rails.
- f. Compressors with less than 23 cubic inches displacement must be driven by a multi-groove, poly-vee type belt and must include a self-tensioning idler pulley to maintain proper belt tension.
- g. Electro-magnetic compressor clutches must have an anti-feedback device and must be wired to receive at least 12 volts at all times when engaged.
- h. Type D rear engine buses must have a transit duty compressor of at least four cylinders, 24 cubic inches design and displacement, with at least a 30,000 hours design life. The compressor must be equipped with unloader valves to maximize efficiency. The compressor must be equipped with a sight glass to check oil levels, and manual refrigerant shut-off service valves for service. The transit compressor may be driven by a poly-vee or a double-vee belt.
- i. Any system may use an electrically powered compressor in lieu of the aforementioned requirements.
- j. All units must have an hour meter for each system attached to the rear system compressor clutch activation circuit to accurately record the hours of operation.

2. Condenser(s), Evaporator(s), and Blowers:

- a. Condenser(s) must be equipped with copper coils and aluminum fins, or an aluminum-coiled microchannel design. Type A1 buses may use the standard equipment aluminum-coiled condenser provided by the chassis manufacturer.
- b. Roof-mounted condenser(s) are required on types A2, C, and D buses. Condenser assembly(ies) must include permanent magnet, ball bearing, sealed motors for cooling fans, and the case must be constructed of aluminum, fiberglass, or other noncorrosive material as specified for standard body sheet metal. Cases must be impact-resistant.
- c. Type D rear engine buses must be equipped with roof-mounted evaporators and condensers, in a single assembly, located and designed for ease of service. The single assembly system must be connected to full-length ducts on the left and right interior of the bus designed for even distribution of cooled air. Additionally, manufacturers may offer an option for a modular unit with roof-mounted condensers and inside ceiling-mounted evaporators. All service connections must be inside the bus for easy access by technicians.
- d. The system must be equipped with a coated receiver tank, and high-pressure side (discharge) line check valves in order to prevent any oil return via slugging to the system's compressor. The unit's fans are to be constructed of high-impact grade material and are to be equipped with permanent magnet, weatherproof, sealed motors. All electrical connections are to be weatherproof.
- e. Type A1 buses must be equipped as follows:
 - 1) Minimum of two evaporators required (one front and one rear). The rear unit must be mounted to the ceiling or mounted to the bulkhead above the emergency exit.
 - 2) The evaporator mounted to the rear ceiling or bulkhead must blow air forward; front evaporator must blow air toward the rear.
 - 3) Evaporator cases and/or ducting systems must be equipped with diffusers that are adjustable.
- f. Types A2, C, and Type D front engine buses must include three evaporator/blower assemblies. The front area evaporator must direct air to the passengers in the front of the bus. In addition, the main evaporator assembly must be mounted at the rear of the bus, designed to blow air forward. These buses must also be equipped with a driver's in-dash evaporator/blower and ducting to channel cold air to the driver, or a separate

evaporator/blower system in the driver's area to channel air to the driver only. Side-mounted evaporator assemblies and/or ducting may be used on any unit; however, a driver's unit is still required.

B. SYSTEM B EQUIPMENT REQUIREMENTS

1. Power Source and Compressor(s):

- a. Types A2, C, and D buses must have at least two compressors, two evaporators, and two condensers plumbed and wired separately in order to provide maximum redundancy.
- b. Compressor(s) must be chassis engine-driven. All compressors must have the correct lubricating oil, as specified on a permanent tag attached to the compressor in a visible location.
- c. Any engine-driven compressor used on 47 passenger and larger units must have a minimum design life of at least 8,000 hours and a minimum displacement of 13 cubic inches. For buses with a capacity of fewer than 47 passengers, compressors with a minimum displacement of 10 cubic inches (TM 16 or equivalent) are allowed.
- d. The system must be equipped with both a high-pressure and a low-pressure switch to prevent compressor operation when system pressures are above or below recommended and safe levels.
- e. Compressor(s) must be mounted in the safest area possible. Compressors must not be mounted below the chassis frame rails.

2. Condenser(s), Evaporator(s), and Blowers:

- a. Condenser(s) must be equipped with copper coils and aluminum fins, or an aluminum-coiled microchannel design. Type A1 buses may use the standard equipment aluminum-coiled condenser provided by the chassis manufacturer.
- b. Body skirt-mounted condenser(s) are acceptable on types A2, C, and D buses. Condenser assembly(ies) must include permanent magnet, ball bearing sealed motors for cooling fans, and the case must be constructed of aluminum or other noncorrosive material as specified for standard body sheet metal. All condensers mounted under the bus body must have ventilation from the exterior of the bus body via a grate in the body side skirt. Condensers must have ducting or shrouding from the condenser to the grating at the body side to ensure the condensers do not recirculate the hot air leaving the condenser.
- c. The system must be equipped with a sight glass (at least one for each part of a split system) that is accessible and directly visible for checking the level of the refrigerant.
- d. Condensers must be mounted to isolate them from vibration and excessive road shock. If condensers are skirt-mounted, then they must be located forward of rear wheels on the left side of the bus whenever possible.
- e. Condensers must be protected by splash shields. Buses with body-skirt-mounted condensers are required to have mud flaps on all wheels and extra protection as necessary to ensure mud and road debris are directed away from the condensers.
- f. Types A1, A2 and C buses with a capacity of 47 passengers or fewer must be equipped as follows:
 - 1) Minimum of two evaporators required (one front and one rear). Rear unit must be ceiling or bulkhead-mounted above emergency exit.
 - 2) Rear ceiling or bulkhead-mounted evaporator must be designed and installed to ensure that air blows forward. The front evaporator must blow toward the rear.
 - 3) Evaporator cases and/or ducting systems must be equipped with adjustable diffusers.
- g. Types C and D 65-passenger and larger bus systems must include three evaporator/blower assemblies. The front area evaporator must direct air to the passengers in the front of the bus. In addition, the main evaporator assembly must be mounted at the rear of the bus designed to blow air forward. These buses must also be equipped with a driver's in-dash evaporator/blower and ducting to channel cold air to the driver, or a separate evaporator/blower system in the driver's area to channel air to the driver only. Side-mounted evaporator assemblies and/or ducting may be used on any unit.

III. SYSTEM REQUIREMENTS FOR ALL BUSES

1. Evaporators and Ducting:

- a. Evaporator cases, lines, and ducting (as equipped) must be designed such that all condensation is effectively drained to the exterior of the bus below floor level under all conditions of vehicle movement without leakage on any interior portion of bus.
- b. Any evaporator or ducting system must be designed and installed to be free of dangerous projections or sharp edges. Installation must not reduce compliance with any Federal Motor Vehicle Safety Standard (FMVSS) applicable to the standard bus, including FMVSS 217, 220, 221, and 222. Any ductwork must be installed so that exposed edges face the front of the bus and do not present sharp edges.
- c. Any evaporators used must be copper-cored; aluminum fins are acceptable, except that the front evaporator, if provided by the Type A1 chassis manufacturer, may be aluminum-cored.
- d. Air intake for any evaporator assembly(ies), except for the front evaporator of Type A1 buses, must be equipped with replaceable air filter(s) accessible without disassembly of evaporator case. If the evaporator case must be removed to service the filter, then the cover must be removable without the use of tools.
- e. On buses equipped with wheelchair lifts, evaporators and ducting (if used) must be placed high enough that they will not obstruct existing or potential occupant securement shoulder strap upper attachment points. This clearance must be provided along entire length of the passenger area on both sides of the bus interior to allow for potential retrofitting of new wheelchair positions and occupant securement devices throughout the bus.
- f. No portion of the air conditioner system may block the driver's view through any window except that vertical covering in the rear corners of the bus interior for hoses and/or wiring may intrude on the rear quarter window by no more than two inches.

2. Controls, Wiring, Hoses, and Miscellaneous Hardware:

- a. All system operating controls, including on-off switch(es), blower switch(es), and thermostat control(s) must be accessible to the driver in a seated position.
- b. Blowers must be a minimum of two speeds or may be variable speed.
- c. No driver control switch or variable potentiometer may have an operating amperage above three amperes (amps). Manufacturers must use relays, transistors, or other load switching devices to ensure that control switches do not exceed three amps draw. When necessary, manufacturers must include feedback protection in circuits that may cause feedback to another system.
- d. The system must be equipped with at least one manually resettable circuit breaker per side to provide overload protection for the main power circuit feeding the evaporator blowers, condenser fans, and other components. The system control circuits must also have overload protection, consisting of manually resettable circuit breakers. All wiring must be copper, conform to current standards of the Society of Automotive Engineers, be coded by color or be hot stamped every three inches, and be insulated. All joints must be soldered or joined by equally effective fasteners. All wires of 4 gauge or thicker and any accessory wire connected directly to the battery must have soldered ends, and the ends must be protected with heat-shrink tubing. Air conditioner wiring and connectors, including any battery cables routed by the body manufacturer or A/C installer, must be routed and protected to eliminate the possibility of wiring and connectors becoming abraded, pierced by fasteners, shorted, or otherwise damaged during manufacture and use.
- e. All wiring, hoses, and lines must be grommeted, routed, loomed with convoluted loom, and supported to reduce wear resulting from heat, chafing, vibration, and other factors. All holes through the body for routing of A/C hoses or electrical connections must be sealed in a permanent and airtight manner.

- f. All types C and D buses equipped with air conditioners must also be equipped with a fast idle system that will increase the engine idle speed while the engine and air conditioner are operating and the transmission is in neutral. This system must provide a fast idle speed of 1,250 plus or minus 50 RPM.
- g. All flexible refrigerant hoses and fittings must be the Quick Click or E-Z Clip or approved equal system of hoses and end fittings. All refrigerant hoses must meet SAE J2064 (D, E, or F) requirements for refrigerant hoses.
- h. The total system must be thermostatically controlled, with thermostats located at the evaporator assembly wired to the remote thermostat control at the driver's location.
- i. Refrigerant must be R 134a.

3. Body:

- a. All Type C and Type D front-engine buses equipped with air conditioners must also be equipped with a compartment mounted next to the battery box with external access for mounting circuit breakers and control circuitry for the air conditioner.
- b. Type D rear-engine buses are exempted from the requirement for an additional electrical compartment for air conditioner circuitry provided the air conditioner control boards are installed in the rear package shelf area in a covered box.

4. Warranty and Serviceability:

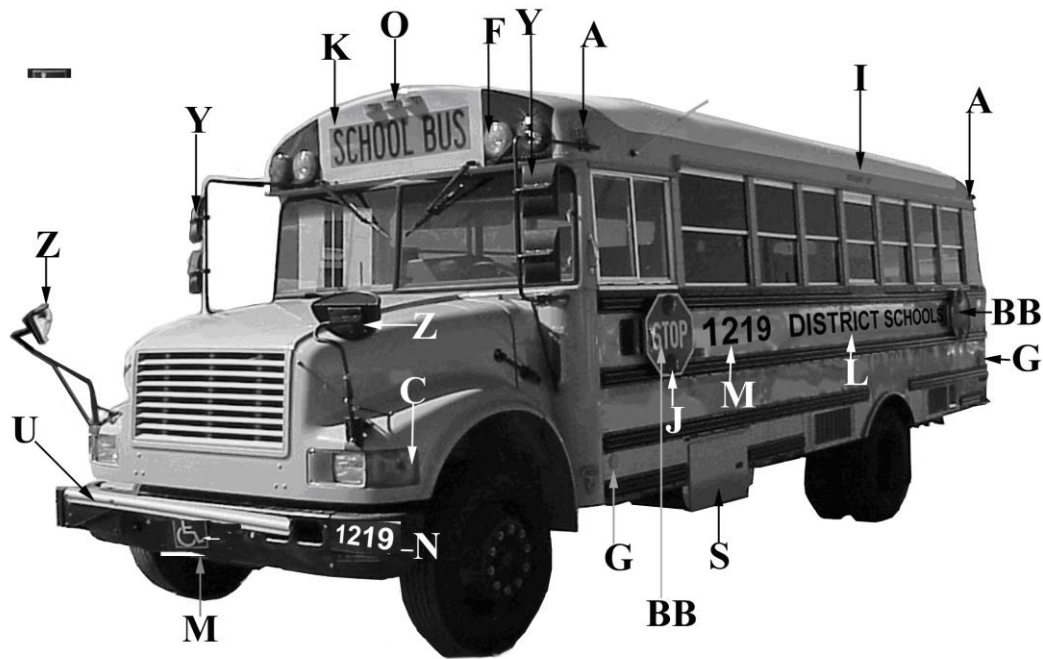
- a. Warranty - Air conditioner compressor applications must be approved in writing by the chassis engine manufacturer, stating that the installation will not void or reduce the engine manufacturer's warranty or extended service coverage liabilities in any way. **Also see GENERAL INFORMATION AND WARRANTY PROVISIONS and Appendix B.**
- b. Serviceability – All components requiring periodic servicing must be readily accessible for servicing including, but not limited to, the following:
 - 1) Refrigerant service ports (high and low pressure).
 - 2) Sight glass(es), which must be directly visible.
 - 3) Filter/drier and/or accumulator, which must be on all systems and be a minimum of 16 cubic inches. The drier is to be comprised of a bead-type desiccant compatible with R134a, and must have a screen filter.
 - 4) Expansion device(s).
 - 5) Drive belts - for replacement and adjustment.
 - 6) Any manually resettable circuit breakers.
 - 7) Evaporator air filters – removable and serviceable without the use of tools.
 - 8) All major component serial numbers - must be readily visible.
- c. Parts and Service Manuals - A comprehensive operator's, maintenance, and parts manual(s) must be provided for the entire system, or available via Internet access from the manufacturer's website for each A/C system purchased. Parts manuals must be designed so that all replaceable parts are illustrated by line drawings and such parts are numbered on the illustration, with a part description on a separate list under the corresponding part number. Part descriptions should be annotated appropriately with the part number, a proper description (part name), and the quantity required for the application listed in the drawings. The service manual or manufacturer's website must also include an overall A/C system diagram with component plumbing, locations, and identities indicated for diagnostic purposes.
- d. Parts and Tools Availability - All system parts and required special service tools must be readily available, and a list of suppliers must be provided to each school district shop purchasing that brand of air conditioner.
- e. Suspension Capacity and Ground Clearance - Ground clearance at the lowest point of the air-conditioning system must be no less than the ground clearance of the bus at the step well. Any special chassis gross axle weight rating (GAWR) requirements to maintain ground clearance or to ensure adequate suspension capacity must be indicated by the body manufacturer for each configuration of air-conditioned bus. Standard GAWRs

are included in the chassis sections of this document; any of the aforementioned special GAWR requirements for air-conditioned buses must be provided to the Department of Education before bids on those buses will be considered.

- f. Installed air conditioner system must not reduce compliance of the finished bus with any Federal Motor Vehicle Safety Standard, including FMVSS 217, 220, 221, 222, and 301.
- g. Air conditioner system manufacturer must provide information and data as needed to assist the Department of Education in establishing chassis engine performance requirements and in determining chassis electrical components or specifications that may be needed to accommodate the additional electrical demands imposed by the air-conditioning system.
- h. All air conditioner systems used on types A2, C, and D school buses must be rated in BTUs using the International Mobile Air Conditioning Association (IMACA), Incorporated Recommended Procedure 250 for vehicle air conditioner systems. Ratings must be based on the procedures and conditions listed in Procedure 250 for rating condition "CITY." The following types A2, C, and D school bus sizes must have the following minimum BTU ratings for installed air conditioner systems:
 - 1) 29 – 47 capacity -78,000 BTUs
 - 2) 48 – 66 capacity -106,000 BTUs
 - 3) 67 – 89 capacity -120,000 BTUs
 - 4) These ratings must not be construed to be recommended ratings, nor do these ratings relieve the manufacturer of the responsibility to meet the air conditioner performance requirements previously listed in this section.

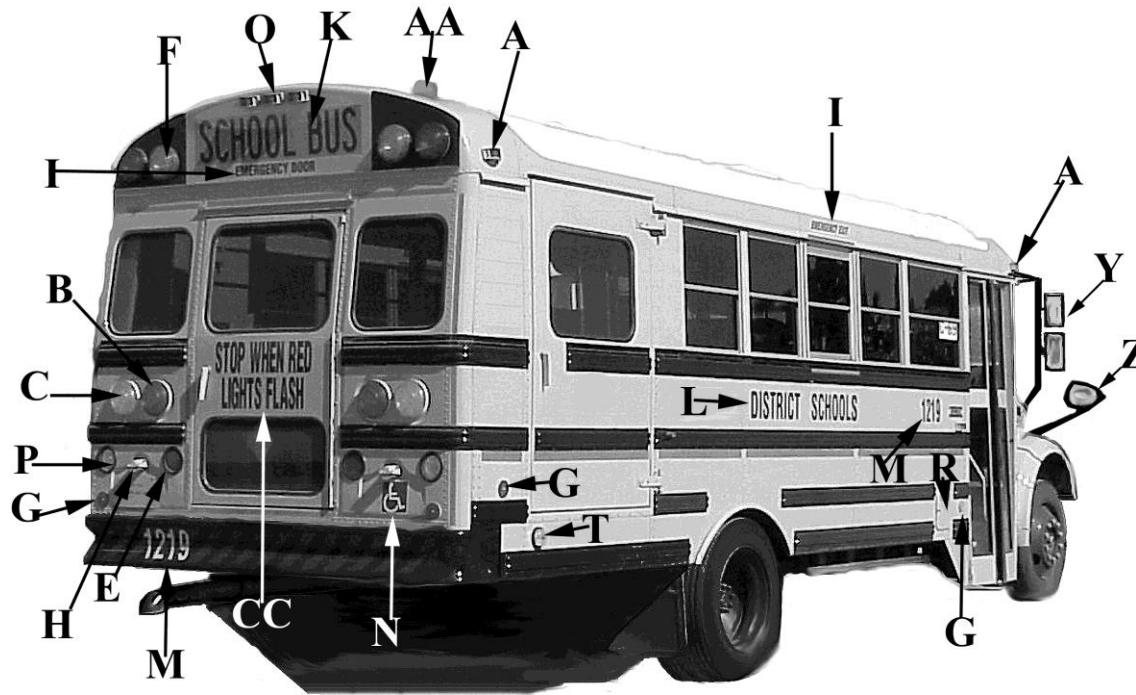
APPENDIX A

**MINIMUM LETTERING
AND LIGHTING**



MINIMUM LETTERING AND LIGHTING REQUIREMENTS

A	Clearance Lights	L	(Name of District) District Schools, Each Side, Belt Line
BB	Octagonal Stop Arm	M	Universal Handicapped Symbol, Wheelchair Lift Equipped Buses
C	Front Turn Signals, (amber lenses)	N	Bus Numbers
F	Pupil Warning Lights, Side By Side Amber and Red, Flat Back Design Quartz Halogen Bulb	O	Identification Lamps
G	Reflectors	S	Battery Box
I	Emergency Exit	U	Pupil Crossing Arm
J	Double-Faced Flashing Red Lights	Y	“Euro-Style” Rear View Mirror System (not as pictured)
K	SCHOOL BUS, Front And Rear, 8 inch letters on retroflective yellow background	Z	Cross/Side View Mirror System



MINIMUM LETTERING AND LIGHTING REQUIREMENTS

A	Clearance Lights	M	Bus Numbers
B	Seven-inch LED Brake/Tail Lights	N	Universal Handicapped Symbol, Wheelchair Lift Equipped Buses
C	Seven-inch LED Turn Signals (amber lenses)	O	Identification Lamps
E	Four-inch LED Stop / Tail Lights	P	LED Back-up Lights
F	Pupil Warning Lights, Side By Side Amber and Red, Flat Back Design Quartz Halogen Bulb	R	Fuel Door
G	Reflectors	T	Wheelchair Lift Landing Light
H	License Plate Lamp	Y	“Euro-Style” Rear View Mirror System (not as pictured)
I	Emergency Exit Signs	Z	Cross/Side View Mirror System
K	SCHOOL BUS, Front and Rear, 8 inch letters on retroreflective yellow background	AA	Roof-mounted White Flashing Strobe Light
L	(Name of District) District Schools (each side, belt line)	CC	Rear Door Lettering

APPENDIX B

**WARRANTABLE AIR CONDITIONER
SYSTEM COMPONENTS**

Warrantable Air-Conditioner System Components

Control System(s)	Air-Conditioning System Control Assembly(ies)
	Air-Conditioning System Control: Switch(es), Wiring, Relay(s), Resistor(s), Rheostat(s), Cable(s), Lever(s), Knob(s), and Illumination Components
Refrigerant Compressor	Assembly
	Refrigerant Compressor Mounting Bracket(s) and Hardware
	Refrigerant Compressor Pulley/Clutch Plate Assembly
	Refrigerant Compressor Clutch Coil Assembly
	Refrigerant Compressor Clutch Coil Control Wiring and Connector(s)
	Refrigerant Compressor Drive Belt(s), Pulley(s), and Hardware
	Refrigerant Compressor Drive Belt Tensioner Assembly and Hardware
	Refrigerant Compressor Drive Belt Idler Assembly and Hardware
Expansion Valve	Assembly
	Expansion Valve O-Ring(s)
	Expansion Valve Inlet Screen
Orifice Tube	Assembly
	Orifice Valve O-Ring(s)
Refrigerant Line Filter	Assembly
	Refrigerant Line Filter O-Ring(s)
Evaporator Assembly	Assembly
	Evaporator Air Duct Assembly(ies)
	Evaporator Air Duct Register Assembly(ies)
	Evaporator Fan Motor Assembly(ies)
	Evaporator Fan Motor(s) Wiring, Connectors, and Switch(es)
	Evaporator Electrical/Electronic Components and Wiring
	Evaporator Fan Mount(s) Brackets and Hardware
	Evaporator Core Assembly
	Evaporator O-Rings
	Evaporator Drain Assembly
Condenser	Assembly
	Condenser Housing Assembly and Mounting Hardware
	Condenser Fan Motor(s)
	Condenser Fan Motor(s) Wiring, Connectors, and Switch(es)
	Condenser Electrical/Electronic Components and Wiring
	Condenser Fan Mount(s) Brackets and Hardware
	Condenser Core Assembly
	Condenser O-Ring(s)
Receiver	Assembly
	Receiver Dryer O-Ring(s)
Accumulator	Assembly
	Accumulator O-Ring(s)
Switch, Refrigerant, Low Pressure	Assembly
	Switch, Low Pressure, O-Rings
	Switch, Mounting Port, Schrader Valve
	Switch, Low Pressure, Wiring, and Connectors

Switch, Refrigerant, High Pressure	Assembly
	Switch, High Pressure, O-Rings
	Switch, Mounting Port, Schrader Valve
	Switch, High Pressure, Wiring, and Connectors
Service Port(s)	Schrader Valve(s)
	Cap(s)
	Cap Seal(s)
A/C System Wiring Harness	Assembly
	A/C System Wiring Harness, Wiring, Terminals, Connector(s), Electrical Overload Protection Component(s), Securement Components, and Anti-Chafing Components.
Refrigerant Hoses	Assemblies
	Refrigerant Hose
	Refrigerant Hose Fittings
	Refrigerant Hose Fitting O-Rings
	Refrigerant Hose Securement Components and Anti-Chafing Components
	Refrigerant Hose Heat Shield(s)
	Refrigerant Hose Fitting Clamp(s)

APPENDIX C

COLORADO RACKING LOAD TEST
and
KENTUCKY POLE TEST PROCEDURES

COLORADO RACKING LOAD TEST

The Colorado Racking Test shall be required on or before the acceptance date of the first bus of the respective configuration.

TEST PROCEDURE

In addition to complying with the test procedures described in FMVSS 220, the body manufacturers shall record and report the downward vertical movement of the force at 0, 25, 50, 75, and 100% of the maximum force (both loading and unloading). The expected force deflection curve is illustrated schematically in Figure 1a. Low load nonlinearities may indicate joint deformation; high load nonlinearities may indicate yielding in structural members.

A second load cycle shall be performed following the procedure given in the first paragraph. The expected force-deflection curve is illustrated schematically in Figure 1b. Any hysteresis following the initial shakedown will be revealed by this second cycle.

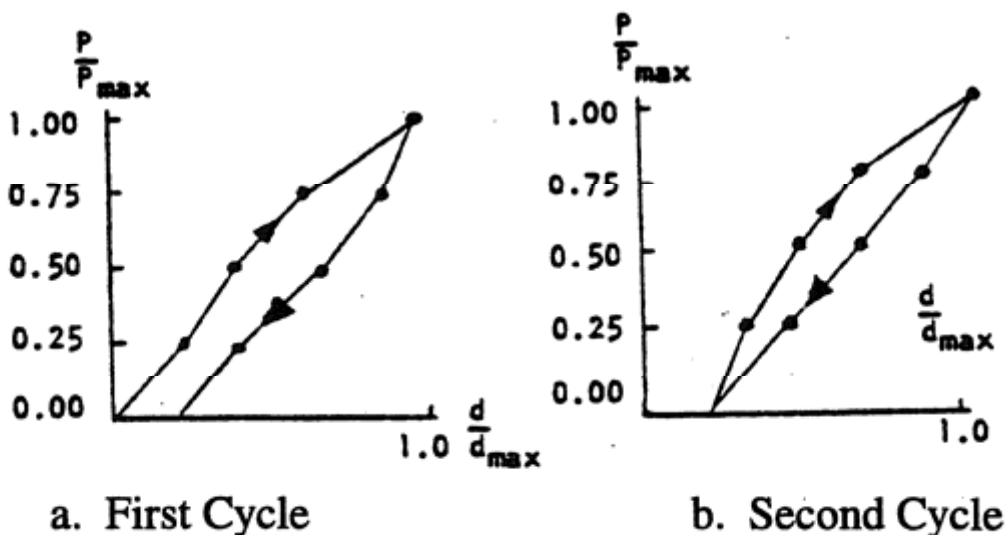


Figure 1. Static Load Test Load-Deflection Curves

A diagonal (racking) load test must be performed on types A, B, C, and D school buses to assure adequate shear stiffness and strength of the bus body. Details of the test are provided below:

A two cycle loading sequence shall be conducted following the described procedure.

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

- (1) The diagonal movement of the force at any point on the application plate shall not exceed 5 $\frac{1}{8}$ inches; and
- (2) Each emergency exit of the vehicle provided in accordance with FMVSS 217 shall be capable of operation as specified in that standard during the full application of the force and after release of the force.

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

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

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

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

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

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

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

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

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

(1) Temperature: The ambient temperature is between 32 degrees F and 90 degrees F.

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

(d) An alternative method of testing for the racking load test shall be as follows:
The racking load shall be applied along a line connecting the most distant points on a transverse cross section of the bus interior. It produces a shear distortion of the cross section as shown in figure 2.

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

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

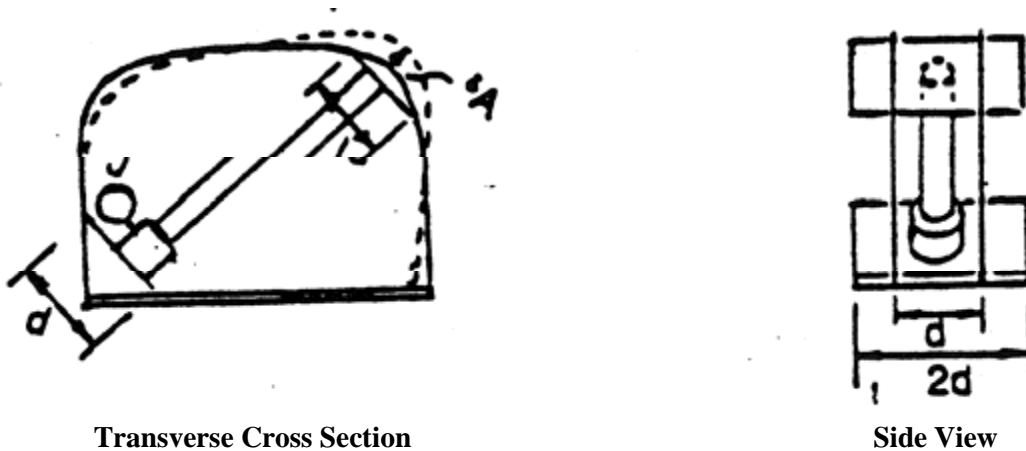
$J = 2P$ J - maximum jack load for two-frame test assembly
P = load/frame

where $P = DVW$ divided by N
 DVW - dynamic vehicle weight
 N - total number of bus body frames

and $DVW = DF \times GVW$
 DF - dynamic factor, not less than 1.5
 GVW - gross vehicle weight

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

When a complete bus body is rack-loaded, the total load DVW must be distributed uniformly along the bus body. This may be accomplished by mounting a series of hydraulic jacks along the length of the bus interior. Seats may be removed to facilitate jack mounting. The rack load will be considered to be uniformly distributed when the variation in the hydraulic jack readings is less than 10 percent. A maximum load is the sum of all jack readings and shall equal DVW.



Transverse Cross Section

Side View

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

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

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

The maximum deflection in line with the jack (A, maximum) shall not exceed 4 inches.

Manufacturer shall specify which testing method was used and submit appropriate certification information.

KENTUCKY POLE TEST

The Kentucky Pole Test shall be required on or before the acceptance date of the first bus of the respective configuration.

TEST PROCEDURE

The body shall be impacted at any point along the roof line on the outside surface, using an 8 inch diameter cylinder, 48 inches long, at a 30 to 45 degree angle, 1 to 3 inches above the top window line. The cylinder shall impact the roofline with the 48 inches dimension in a vertical plane with a force not to exceed 10 inches maximum to 8 inches minimum penetration of the body panels into the passenger compartment after impact.

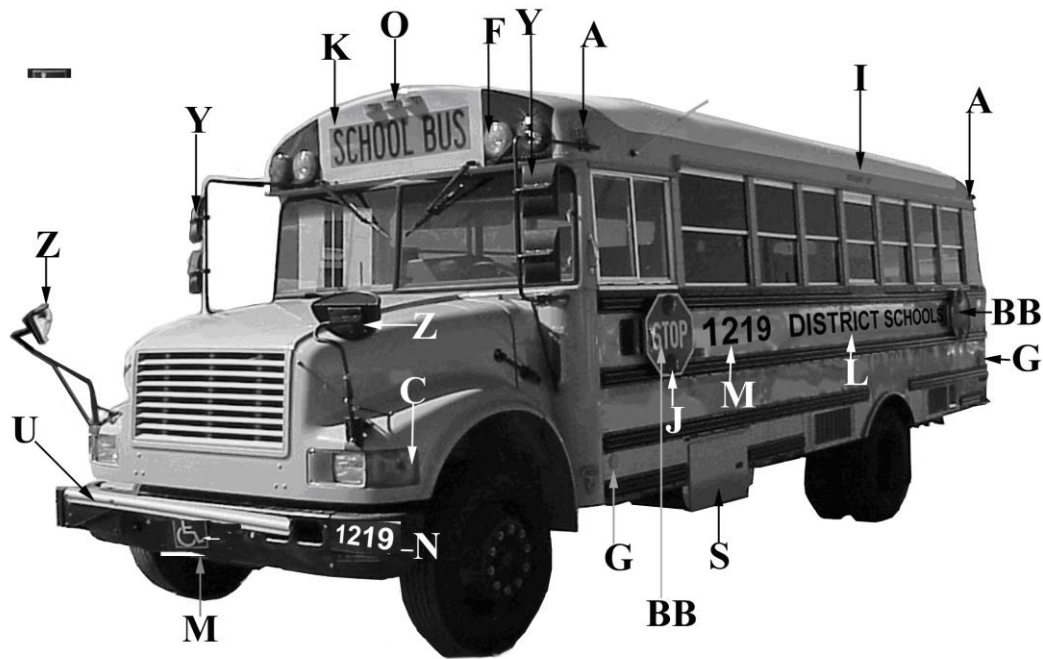
The manufacturer shall submit appropriate certification information.



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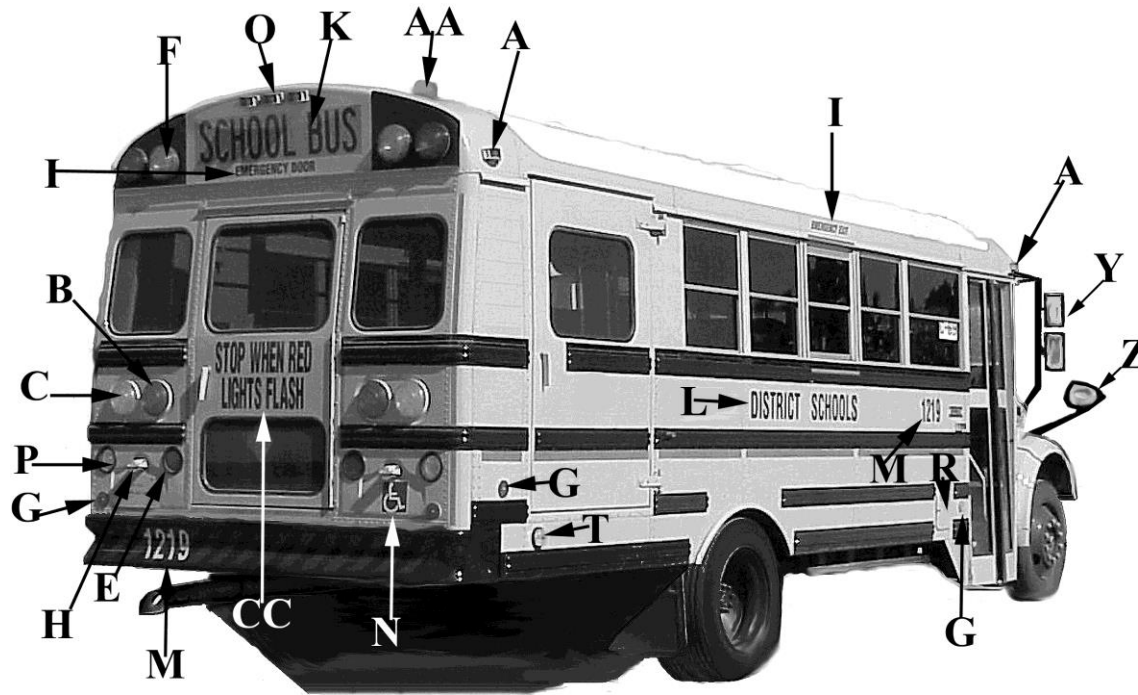
APPENDIX A

**MINIMUM LETTERING
AND LIGHTING**



MINIMUM LETTERING AND LIGHTING REQUIREMENTS

A	Clearance Lights	L	(Name of District) District Schools, Each Side, Belt Line
BB	Octagonal Stop Arm	M	Universal Handicapped Symbol, Wheelchair Lift Equipped Buses
C	Front Turn Signals, (amber lenses)	N	Bus Numbers
F	Pupil Warning Lights, Side By Side Amber and Red, Flat Back Design Quartz Halogen Bulb	O	Identification Lamps
G	Reflectors	S	Battery Box
I	Emergency Exit	U	Pupil Crossing Arm
J	Double-Faced Flashing Red Lights	Y	"Euro-Style" Rear View Mirror System (not as pictured)
K	SCHOOL BUS, Front And Rear, 8 inch letters on retroflective yellow background	Z	Cross/Side View Mirror System



MINIMUM LETTERING AND LIGHTING REQUIREMENTS

A	Clearance Lights	M	Bus Numbers
B	Seven-inch LED Brake/Tail Lights	N	Universal Handicapped Symbol, Wheelchair Lift Equipped Buses
C	Seven-inch LED Turn Signals (amber lenses)	O	Identification Lamps
E	Four-inch LED Stop / Tail Lights	P	LED Back-up Lights
F	Pupil Warning Lights, Side By Side Amber and Red, Flat Back Design Quartz Halogen Bulb	R	Fuel Door
G	Reflectors	T	Wheelchair Lift Landing Light
H	License Plate Lamp	Y	“Euro-Style” Rear View Mirror System (not as pictured)
I	Emergency Exit Signs	Z	Cross/Side View Mirror System
K	SCHOOL BUS, Front and Rear, 8 inch letters on retroreflective yellow background	AA	Roof-mounted White Flashing Strobe Light
L	(Name of District) District Schools (each side, belt line)	CC	Rear Door Lettering

APPENDIX B

**WARRANTABLE AIR CONDITIONER
SYSTEM COMPONENTS**

Warrantable Air-Conditioner System Components

Control System(s)	Air-Conditioning System Control Assembly(ies)
	Air-Conditioning System Control: Switch(es), Wiring, Relay(s), Resistor(s), Rheostat(s), Cable(s), Lever(s), Knob(s), and Illumination Components
Refrigerant Compressor	Assembly
	Refrigerant Compressor Mounting Bracket(s) and Hardware
	Refrigerant Compressor Pulley/Clutch Plate Assembly
	Refrigerant Compressor Clutch Coil Assembly
	Refrigerant Compressor Clutch Coil Control Wiring and Connector(s)
	Refrigerant Compressor Drive Belt(s), Pulley(s), and Hardware
	Refrigerant Compressor Drive Belt Tensioner Assembly and Hardware
	Refrigerant Compressor Drive Belt Idler Assembly and Hardware
Expansion Valve	Assembly
	Expansion Valve O-Ring(s)
	Expansion Valve Inlet Screen
Orifice Tube	Assembly
	Orifice Valve O-Ring(s)
Refrigerant Line Filter	Assembly
	Refrigerant Line Filter O-Ring(s)
Evaporator Assembly	Assembly
	Evaporator Air Duct Assembly(ies)
	Evaporator Air Duct Register Assembly(ies)
	Evaporator Fan Motor Assembly(ies)
	Evaporator Fan Motor(s) Wiring, Connectors, and Switch(es)
	Evaporator Electrical/Electronic Components and Wiring
	Evaporator Fan Mount(s) Brackets and Hardware
	Evaporator Core Assembly
	Evaporator O-Rings
	Evaporator Drain Assembly
Condenser	Assembly
	Condenser Housing Assembly and Mounting Hardware
	Condenser Fan Motor(s)
	Condenser Fan Motor(s) Wiring, Connectors, and Switch(es)
	Condenser Electrical/Electronic Components and Wiring
	Condenser Fan Mount(s) Brackets and Hardware
	Condenser Core Assembly
	Condenser O-Ring(s)
Receiver	Assembly
	Receiver Dryer O-Ring(s)
Accumulator	Assembly
	Accumulator O-Ring(s)
Switch, Refrigerant, Low Pressure	Assembly
	Switch, Low Pressure, O-Rings
	Switch, Mounting Port, Schrader Valve
	Switch, Low Pressure, Wiring, and Connectors

Switch, Refrigerant, High Pressure	Assembly
	Switch, High Pressure, O-Rings
	Switch, Mounting Port, Schrader Valve
	Switch, High Pressure, Wiring, and Connectors
Service Port(s)	Schrader Valve(s)
	Cap(s)
	Cap Seal(s)
A/C System Wiring Harness	Assembly
	A/C System Wiring Harness, Wiring, Terminals, Connector(s), Electrical Overload Protection Component(s), Securement Components, and Anti-Chafing Components.
Refrigerant Hoses	Assemblies
	Refrigerant Hose
	Refrigerant Hose Fittings
	Refrigerant Hose Fitting O-Rings
	Refrigerant Hose Securement Components and Anti-Chafing Components
	Refrigerant Hose Heat Shield(s)
	Refrigerant Hose Fitting Clamp(s)

APPENDIX C

COLORADO RACKING LOAD TEST
and
KENTUCKY POLE TEST PROCEDURES

COLORADO RACKING LOAD TEST

The Colorado Racking Test shall be required on or before the acceptance date of the first bus of the respective configuration.

TEST PROCEDURE

In addition to complying with the test procedures described in FMVSS 220, the body manufacturers shall record and report the downward vertical movement of the force at 0, 25, 50, 75, and 100% of the maximum force (both loading and unloading). The expected force deflection curve is illustrated schematically in Figure 1a. Low load nonlinearities may indicate joint deformation; high load nonlinearities may indicate yielding in structural members.

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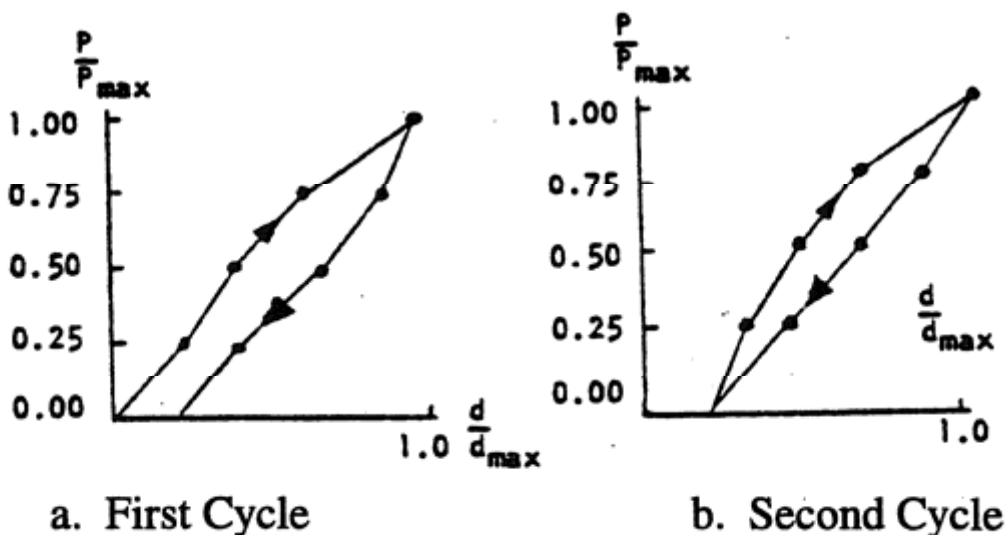


Figure 1. Static Load Test Load-Deflection Curves

A diagonal (racking) load test must be performed on types A, B, C, and D school buses to assure adequate shear stiffness and strength of the bus body. Details of the test are provided below:

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

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

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

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

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

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

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

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

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

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

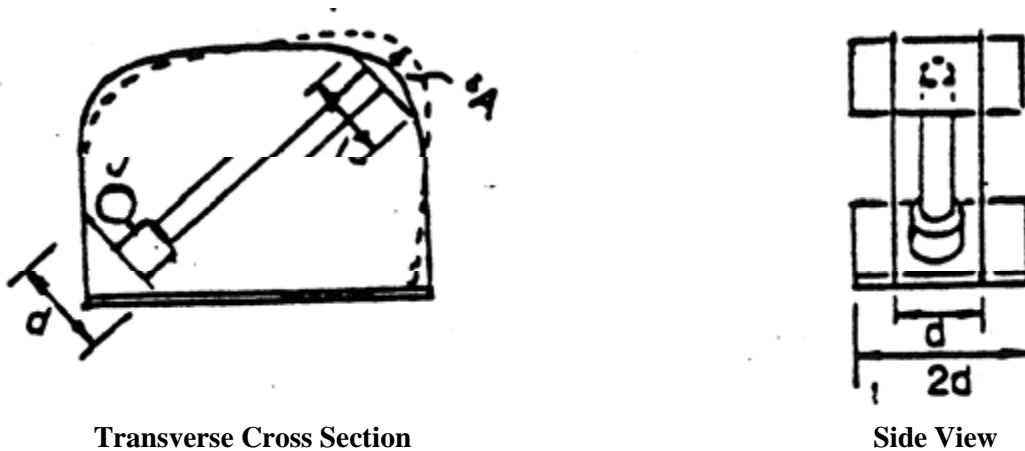
$J = 2P$ J - maximum jack load for two-frame test assembly
P = load/frame

where $P = DVW$ divided by N
DVW - dynamic vehicle weight
N - total number of bus body frames

and $DVW = DF \times GVW$
DF - dynamic factor, not less than 1.5
GVW - gross vehicle weight

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

When a complete bus body is rack-loaded, the total load DVW must be distributed uniformly along the bus body. This may be accomplished by mounting a series of hydraulic jacks along the length of the bus interior. Seats may be removed to facilitate jack mounting. The rack load will be considered to be uniformly distributed when the variation in the hydraulic jack readings is less than 10 percent. A maximum load is the sum of all jack readings and shall equal DVW.



Transverse Cross Section

Side View

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

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

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The maximum deflection in line with the jack (A, maximum) shall not exceed 4 inches.

Manufacturer shall specify which testing method was used and submit appropriate certification information.

KENTUCKY POLE TEST

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TEST PROCEDURE

The body shall be impacted at any point along the roof line on the outside surface, using an 8 inch diameter cylinder, 48 inches long, at a 30 to 45 degree angle, 1 to 3 inches above the top window line. The cylinder shall impact the roofline with the 48 inches dimension in a vertical plane with a force not to exceed 10 inches maximum to 8 inches minimum penetration of the body panels into the passenger compartment after impact.

The manufacturer shall submit appropriate certification information.



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