Florida School Bus Specifications

Revised 2004

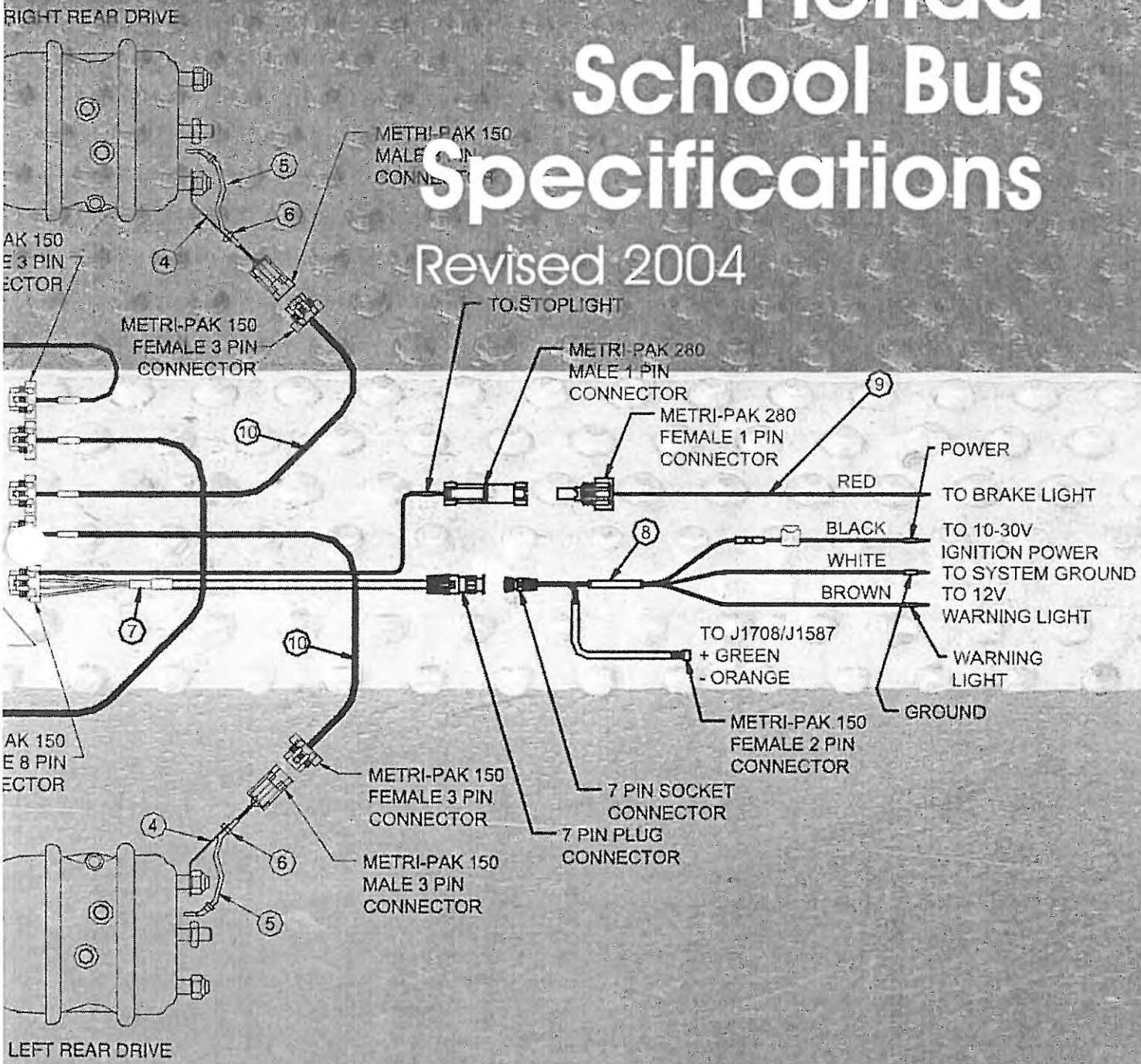


TABLE OF CONTENTS

Page

Specifications Revisions 5

Foreword 9

General Information and Warranty Provisions 11

Section I — **CHASSIS SPECIFICATIONS for Type A1 (19-29 capacity) and A2 (30-47 capacity)** I-1
CHASSIS OPTIONAL EQUIPMENT for Type A I-10

Section II — **CHASSIS SPECIFICATIONS for Type B, C, and D** II-1
CHASSIS OPTIONAL EQUIPMENT for Type B, C, and D II-12

Section III — **BODY SPECIFICATIONS for Type A, B, C, and D** III-1
EXCEPTIONS for Type B and D III-23
BODY OPTIONAL EQUIPMENT for Type A, B, C, and D III-24

Section IV — **EXCEPTIONAL CHILD BUS SPECIFICATIONS for Type A, B, C, and D** IV-1

Section V — **AIR CONDITIONING SPECIFICATIONS for Type A, B, C, and D** V-1

APPENDIX A ..... **MINIMUM LETTERING AND LIGHTING**

APPENDIX B ..... **MINIMUM AIR CONDITIONING WARRANTY ITEMS**

2004 Florida School Bus Specifications Revisions

Section	Change
TOC	Parts availability for 10 years.
TOC	Variances from specifications added.
I, II	Allison transmission model numbers updated.
I, II	Fuel filtration / water separation changes.
II	Rear axle seals and brake components warranty requirements changed.
II	Firewall insulation clarified.
II	Fuel tanks on right hand frame rail or center mounted. Filler on right hand side.
II	Multiplexed systems do not require manual circuit breakers, if DOE approved.
II	Optional MorRyde suspension.
II	Optional Transynd.
II	Optional alternate tire brands and designs.
II	Rear bumper strength clarified.
III	Seat belt D-ring adjustment range specified.
III	Allowance for multiplex electrical system added.
III	Back-up lights size clarified.
III	Fuses, circuit breakers clarified.
III	Brake lights size clarified.
III	Clearance / ID lights inset into body clarified.
III	Control panel lighting modified.
III	Driver's post-trip passenger check system required.
III	Heater / defroster specifications clarified.
III	Noise abatement switch changed to on-off type.
III	Pupil warning lights size clarified.
III	"Approximately" added to 72" length specification for pupil cross arm.
III	Front and rear turn signal lamps size clarified.
III	Emergency window requirements changed.
III	Floor covering requirements revised.
III	Landing area and stepwell nosing design specified.
III	District-installed truck bed liner material may be retrofitted.
III	Interior mirror requirements changed.

Section	Change
III	Cross-view mirror, ¼ or ½ sphere design.
III	Coverage area of white roof paint clarified.
III	Specificity of roof panel design omitted.
III	Step well non-slip and design features clarified.
III	Structural adhesives in lieu of fasteners.
III	Dual driver's sun shield system changed.
III	Vandal box requirement added to Types B and D.
III	Windshield requirements changed.
III	Underseat engine access panel required on Type D rear engine.
III, V	Air conditioning electrical box clarified.
III	Option added for Motion Masters driver seat dampening system.
III	Option added for student location and tracking system.
III	Option added for roof-mounted heavy duty air conditioning.
III	Option added for 3-point belts.

This is not intended to be an all-inclusive list of changes, but is provided as a guide to the major revisions in this edition of Florida School Bus Specifications. Please review the manual carefully for all changes.

This page intentionally left blank.

FOREWORD

Florida School Bus Specifications are adopted as authorized under Section 1006.25, Florida Statutes (F.S.), and Rule 6A-3.0291, 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 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-3.0291, F.A.C., shall:

   a. Meet or exceed the minimum requirements of these specifications; and,

   b. Meet all applicable Federal Motor Vehicle Safety Standards; and,

   c. Meet or exceed the 2000 National School Transportation Specifications and Procedures (also referred to herein as the 2000 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 shall be 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 shall certify to the Commissioner of Education, Florida Department of Education, in the form of a letter, that all school buses offered for sale to or use by the public school systems 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 in Florida shall 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:**

   State Definition: In Section 1006.25, F.S.: a "school bus" is defined as a "motor vehicle regularly used for the transportation of prekindergarten 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 school board..."

   Federal Definition: 49 CFR ss 571.3 reads: ". . . '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 or bus constructed utilizing a cutaway front-section vehicle with a left side driver's door. This definition includes two classifications:

   Type A1, with a Gross Vehicle Weight Rating (GVWR) of 14,500 pounds or less. Type A1 school buses shall meet specifications listed herein and shall be configured as 19–29 capacity units with dual rear wheels.

   Type A2, with a GVWR greater than 14,500 pounds. Type A2 school buses shall meet specifications listed herein and shall be configured as 30–47 capacity units with dual rear wheels.

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

   Type B1, with a GVWR less than or equal to 14,500 pounds.

   Type B2, with a GVWR greater than 14,500 pounds.

   Type C: A Type C school bus is constructed utilizing a chassis with a hood and front fender assembly. The entrance door is behind the front wheels; also known as a conventional school bus.

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

8. Warranties and Parts Availability: New Vehicles

All warranties listed herein shall 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 shall allow revision of warranty start date for each vehicle to the actual inservice date by the school district. Appropriate forms to update chassis warranty shall be included in the owner-operator's packet supplied with the chassis and shall be conveyed along with the body warranty by the body builder to the district upon delivery of the completed unit. Above requirements shall apply to the basic warranties, all component warranties, and any extended warranties offered or required. Manufacturers offering school bus chassis or bodies for sale in the state of Florida shall make available replacement parts for said buses for a period of not less than 10 years.

a. Chassis Warranties

(1) Chassis warranty shall be manufacturer's standard, and minimum 12,000 miles or 12 months.

(2) Diesel engines (including flywheel, flex plate, and harmonic balancer) on Type A2, Type B, Type C, and Type D units shall be warranted for 60 months/unlimited mileage, 100 percent parts and labor.

(3) The chassis or component supplier for all Type A2, B, C, and D chassis shall warranty or provide extended service coverage for the following items, including removal and replacement, for 5 years, unlimited mileage, 100 percent parts and labor: drive shafts and U-joints, differential, rear axles, and rear wheel bearings, but not including gaskets and seals covered under the basic 12 month/12,000 miles chassis warranty. Type C and D buses shall be required to provide a 5 year, unlimited mileage, 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, fuel tanks, front axle I-beams, and rear axle housings shall be warranted for a period of 10 years, unlimited mileage, 100 percent parts and labor. Automatic transmissions shall be warranted for 3 years, 50,000 miles, 100 percent parts and labor, for all Type A, B, C, and D school buses.

(4) All bus chassis electrical components, including wiring, switches, alternators, computers, and controllers, shall 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.

(5) Paint finish coats to chassis hood, fenders, and cowl shall 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:

Adhesion:

During the 60 month warranty period, paint and priming compounds shall not fail to adhere to the bus with normal use and care.

Color Retention:

During the first 36 months from the inservice date, the color coat shall 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 shall not shift color more than 8 ΔE from the centroid as specified in SBMTC-008.

Gloss:

During the first 36 months from the inservice date, the gloss reading shall not fall below 60 at 60°. During the 60 month warranty period, the gloss reading shall not drop below 30 at 60°.

All measurements shall be the average of 12 readings taken at various points on the bus, but no reading shall be more than 3 points under the stated minimum. All readings shall be taken after the bus is thoroughly washed to remove road film and dust.

b. Body Warranties

(1) Body warranty shall be manufacturer's standard, minimum 12 months.

(2) Wheelchair lifts on any bus so equipped shall be warranted for 2 years from the updated in-service date of the vehicle. The warranty shall provide 100 percent coverage for parts.

(3) The total air conditioning system on any bus so equipped shall be warranted for 2 years, 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 shall include at least the items listed in Appendix B. Chassis engine-driven air conditioning 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) Required white flashing (roof-mounted) strobe light shall be warranted for 100 percent parts and labor coverage as follows: 12 months for flash tube; 18 months for remainder of light.

(5) Stop signal arm material shall be warranted for 10 years against cracking, delamination, bubbles, wrinkles, or significant color changes (such as fading of red background). Warranty shall include full replacement cost of material (not including labor).

(6) All mirror assemblies (including mounting bracketry) shall be warranted (100 percent parts replacement coverage) for 5 years against rust and corrosion and against any reduction in clarity of view due to discoloration or other deterioration of the lens.

(7) All bus body electrical wiring and switches shall 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.

(8) Paint finish coats to body, hood, and cowl shall 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:

Adhesion:

During the 60 month warranty period, paint and priming compounds shall not fail to adhere to the bus with normal use and care.

Color Retention:

During the first 36 months from the inservice date, the color coat shall not shift colors more than 4 ΔE from the centroid, as specified in SBMTC-008.

During the 60 month warranty period, the color coat shall not shift color more than 8 ΔE from the centroid, as specified in SBMTC-008.

Gloss:

During the first 36 months from the inservice date, the gloss reading shall not fall below 60 at 60°. During the 60 month warranty period, the gloss reading shall not drop below 30 at 60°.

All measurements shall be the average of 12 readings taken at various points on the bus but no reading shall be more than 3 points under the stated minimum. All readings shall be taken after the bus is thoroughly washed to remove road film and dust.

(9) All emergency exit roof hatches shall be warranted (100 percent parts and labor) for 5 years, unlimited mileage against defects in material and workmanship and against leakage.

(10) Driver's seat and pedestal shall be warranted (100 percent parts and labor) for the life of the school bus against structural failure of any primary support.

(11) All passenger seat back cushions and seat frame assemblies shall be warranted for 5 years, unlimited mileage, 100 percent parts and labor. This warranty shall not apply to vandalism of any exposed foam.

(12) All powered entrance doors and operating and control systems shall be warranted for a period of 5 years, unlimited mileage, 100 percent parts and labor.

(13) All reflective markings shall be warranted for 5 years, unlimited mileage, 100 percent parts and labor.

9. **Changes or Clarification of Specifications:**

Florida School Bus Specifications may be amended pursuant to the provisions of Rule 6A-3.0291, F.A.C.

The School Transportation Management Section with approval of the Florida Association for Pupil Transportation, 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 to provide for advances in technology.

Should a clarification or interpretation of these Florida School Bus Specifications be requested, inquiries should be directed to **Administrator, School Transportation Management Section, Florida Department of Education, 325 West Gaines Street, Suite 1114, 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 TYPE A1 (19-29 capacity) and A2 (30-47 capacity)
SCHOOL BUS BODIES

1. ALTERNATOR

Type A1, 120 amp minimum rating, 50 amp minimum output at manufacturer's recommended engine idle speed; dual belts or poly-vee type belt, maximum ratio 2.5 to 1; sealed ball or roller bearings, meeting National Specifications.

All Type A2 chassis shall be equipped with an alternator producing at least 160 amperes current output hot rated.

2. BATTERY (IES)

Total of 1,200 CCA minimum at 0°F, 12 volt for all Type A1 buses. Total of 1,250 CCA minimum at 0°F, 12 volt; temporary frame mount location for all Type A2 buses.

3. BRAKE, PARKING

On hydraulic brake model A2 chassis an Orschelin type control, or approved equal, mounted in easy access of the driver is required. On air brake models a dash-mounted control valve to spring-set the parking brake on the rear wheels is required. On Type A1 chassis, manufacturer's standard is acceptable.

4. BRAKES, SERVICE

a. Hydraulic Brakes: Hydraulic brake models shall have power assist and shall meet National Specifications for School Buses, Revised 2000, and all applicable Federal Motor Vehicle Safety Standards. Brake lining material shall not contain asbestos. Type A1 and A2 buses equipped with hydraulic brakes shall be equipped with manufacturer's standard antilock brake system.

b. Air Brakes: Air brake models shall meet National Specifications, Revised 2000, and all applicable Federal Motor Vehicle Safety Standards. Air brake models shall be equipped with a desiccant dryer with an automatic purge and drain cycle and a heating element. Drum-type air brakes on the rear axle of 47 capacity chassis must have minimum 7 inch wide linings. Drum-type air brake lining thickness must be a minimum (except taper) of 3/4 inch on the rear axle and 3/8 inch on the front axle for all capacity chassis. All drum-type air brakes shall be cam-actuated. All slack adjusters (as equipped) shall be automatic adjustment type. All air brake models (drum, disc-drum, or air disc) must be equipped with spring-set parking brakes on the rear wheels. All brake drums shall be outboard mounted; i.e., drums shall be removable without removal of the axle hub. Brake lining material shall not contain asbestos. A minimum 12 CFM, engine oil-fed air compressor is required on all air brake models. Clean air to the air compressor shall be supplied from "clean" side of engine air cleaner or air system. Compressor shall not be equipped with separate, compressor-mounted air filter. Air brake system design shall provide for anti-compounding of service and emergency brakes, spring brake modulation upon application of front service brakes in event of loss of air pressure to rear service brakes, and brake S-cam rotation in same direction as forward wheel rotation. Rear axle of all buses with air brakes shall 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 or the bidder must provide warranty of rear axle seals and brake components as noted in the Chassis Warranties section. Buses equipped with air brakes shall be equipped with a 4 channel Antilock Braking System with independent controls for each wheel position and diagnostic LEDs built into the control modules.

5. **BUMPER, FRONT**

Type A1

Channel design, minimum 6 inches, full width.

Type A2

Must be black, full width channel type, minimum 8 inches, of sufficient structural and mounting strength to ensure that front of vehicle may be lifted by means of an air bumper-type jack, without permanent deformation of the bumper, bracketry, or chassis frame rail(s).

6. **BUMPER, REAR**

Type A1 and A2

Supplied by body manufacturer. See Section III.

7. **COMPONENT ACCESSORY DRIVE**

Components such as alternator, air compressor, and power steering shall deliver to rated requirements without drive slippage at maximum load.

8. **DIFFERENTIAL RATIO**

Shall be compatible with engine and provide for 60 MPH in highest gear. Also see **ENGINE PERFORMANCE, Page I-5 and Page II-5.**

9. **DRIVESHAFT GUARDS AND SHIELDS**

Required. At least 1 per driveshaft section.

10. **ENGINE EQUIPMENT**

a. Dry type air cleaner: Required. An air filter restriction indicator is required on diesel engines in Type A2 buses.

b. Oil filter(s): Engine shall be equipped with full-flow, spin-on or cartridge-type oil filter(s), with filter header(s) mounted directly to engine.

c. Engine coolant recovery or deaeration system: Required on all chassis. Type A2 diesel engines must include means for visually checking coolant level without removing deaeration tank cap or releasing pressure from cooling system.

d. Warning system consisting of light and buzzer: Required on diesel powered Type A2 chassis to notify driver of low engine oil pressure and/or coolant overheating.

e. Fuel Filtration / Water Separation: Required on all Type A2 diesel engines. The system shall remove all contamination capable of adversely affecting the fuel system from the fuel prior to entry into the engine. The system shall be designed to remove contaminates normally found in Florida, including dirt, water, and algae. The system shall be designed with the capacity necessary to last 15,000 miles or more between filter changes. Manufacturers who do not meet this requirement shall be required to provide fuel filters free of charge to districts until they have, retrofitted systems that will meet this requirement on all units produced with an inadequate system. Engines damaged due to inadequate filtration shall be repaired by the manufacturer at no cost to the district. System shall have a clear sight bowl, or be equipped with a water-in-fuel light to notify technicians of the presence of water. System must provide a valve for draining trapped water from the system.

f. Engine oil pressure gauge: Required. It shall provide accurate, easily discernible readings across the entire operating range from hot idle to full oil pressure. Gauge on engines with idle oil pressure, which, under normal conditions, is low shall provide a clear distinction between no oil pressure and engine idle oil pressure. Gauge shall be directly visible to driver in normal seated position and shall not be mounted near center of dash where body door control or associated hardware could block its visibility.

g. Governor: Required on all diesel engines. Shall permit controlled engine RPM up to manufacturer's recommended maximum for engine used.

h. Ignition switch: Controls running and shutdown of engine. Running of engine shall require electrical current provided by the ignition switch in the "start" and "run" positions. Engine shutdown shall result when current is cut off (ignition switch "off" position).

i. Engine throttle control: The force required to operate the throttle shall not exceed 16 pounds through the full range of accelerator pedal travel.

j. Silicone (or approved equivalent) radiator and other engine coolant hoses: Supplied by chassis manufacturer (not including heater hoses). Silicone hose, if used, shall require the use of stainless steel shoe-type hose clamps or constant-torque clamps. Hoses shall have markings, coloring, or other visible means of distinguishing this hose from the standard hoses.

11. <u>ENGINE PERFORMANCE REQUIREMENTS FOR TYPE A2 BUSES</u>

a. Each bus shall be furnished with a powertrain that meets or exceeds the following minimum criteria when tested at the 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.

b. Powertrain shall provide acceleration performance as specified in (3) below. Test conditions are as follows:

(1) As generated by an Allison SCAAN with the following parameters used:

(a) Vocation file number 2610.

(b) At gross vehicle weight for the specific bus size as listed in this manual.

(c) Tire size must be tire size listed herein for the specific size of bus.

(d) 6 total tires in contact with the road.

(e) Total driveline reduction factor used for the SCAAN must equal the reduction supplied in the completed chassis.

(f) Driveline efficiency 96.13 percent.

(g) Road surface factor 1.200.

(h) Vehicle height and width 10 feet X 8 feet.

(i) Air resistance coefficient 0.55.

(2) As measured with the actual completed vehicle (i.e. with body installed, unloaded except for the driver and 1 passenger). The vehicle shall be in Drive; engine at idle, service brakes applied, emergency brakes released, and all accessories on and operating. Measurement of acceleration time shall begin at the moment the throttle is applied (the throttle is to be immediately and rapidly depressed to full throttle).

NOTE: Chassis manufacturer should use the heaviest chassis/body combination meeting these specifications for the specific size bus to determine required powertrain componentry. 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.

(3) Minimum acceleration time (from zero mph), under conditions specified above, shall be as follows (measured in seconds):

TEST METHOD	0-10 MPH	0-20 MPH	0-30 MPH	0-40 MPH	0-50 MPH
1) SCAAN	2.9	8.1	16.8	30.1	53.8
2) ACTUAL	3.4	6.2	12.0	20.0	32.2

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

12. **EXHAUST SYSTEM**

Type A1

Shall be corrosion resistant and exhaust shall exit behind rear wheels and left of the left frame rail. Exception: Dual exhaust acceptable on diesel Type A1 chassis.

Type A2

Corrosion resistant muffler; exhaust pipe must extend 5 inches beyond chassis frame on stripped chassis. Must exit to left of left frame rail and behind rear wheels. Chassis manufacturer shall ensure that exhaust design allows exit location left of left frame rail to be maintained after any modifications to frame length by chassis or body manufacturer.

13. **FRAME SIDE MEMBERS**

1-piece construction.

14. **FRONT AXLE WHEEL SEALS**

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

15. **FUEL TANK**

Spout located for ease in servicing. Gauge shall be compatible with tank capacity and shall meet requirements of Federal Motor Vehicle Safety Standard 301. See Chassis Specifications Chart in this Section for minimum tank capacities by size.

16. **HEADLIGHTS**

Must meet SAE and Federal Standards and shall use a quartz halogen bulb. All units must be equipped with Daytime Running Lights (DRL) meeting the following requirements:

With the ignition switch off the headlights will operate normally and the DRL system will not operate.

With the ignition switch on, or in the accessory position, and the engine not running, the daytime running lights shall not operate.

With the ignition switch on and the engine running, and with the headlight switch off, the DRL system must operate, providing 50 percent to 85 percent of normal operating voltage to the headlights.

In all cases, the headlight switch must override the DRL system when in the on position.

17. **HORNS**

Dual, 120 decibels (see National Specifications).

18. **IGNITION SYSTEM**

All Type A2 ignition systems shall be keyed alike. All buses of like chassis manufacturer shall have 1 key regardless of type supplied to the state of Florida.

19. **INSULATION**

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

20. **LINE-SETT TICKET**

Manufacturer shall include with delivery of vehicle a line-sett ticket to accurately reflect the following: a) all chassis components; b) GAWR of both front and rear axles; and c) GVWR.

21. **ODOMETER**

Type A1: Accrued mileage, 6 digits, including tenths of miles (99,999.9 mile odometer).

Type A2: Accrued mileage, 7 digits, including tenths of miles (999,999.9 mile odometer).

22. **PAINT AND FINISH**

Prior to the application of the finish coats to chassis hood, fenders, and cowl, all surfaces shall be cleaned of grease, foreign matter, excessive caulking and sealing material, and treated as per paint manufacturer's recommendation for proper paint adhesion. School bus yellow paint shall meet SBMTC-008 for color and shall 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 WARRANTIES. Paint shall be applied for a total dry thickness of at least 1.8 mils over all painted surfaces. Trim, lettering, and bumper shall be black except that bumper may be striped with reflective material in accordance with National Specifications or these specifications. Rims for all Type A1 buses shall be manufacturers standard. Rims for all Type A2 buses with hub piloted wheels shall be powder coated, National School Bus Yellow at the rim manufacturer. All Type A2 stud-piloted rims shall be painted black. Lead-free paint shall be used on all interior and exterior surfaces of the body and chassis. Also see **WARRANTIES, page 12** for warranty requirements.

23. **SHOCK ABSORBERS**

Front and rear, double acting; adequate size for axle load.

24. **SPRINGS, FRONT**

Type A2: Double-wrap stationary end (see **Chassis Specifications Chart, page I-9**).

25. **SPRINGS, REAR**

Type A2: Progressive type (see **Chassis Specifications Chart, page I-9**).

26. **STEERING**

Shall have factory installed power steering, integral type. A factory installed tilt steering wheel/column is required.

27. **TIRES AND RIMS**

Chassis shall be equipped with radial tubeless tires. Type A1 buses shall have dual rear wheels (see **Chassis Specifications Chart, page I-9**). Type A2 buses shall use hub piloted disc wheels. Tires and rims shall conform to current standards of Tire and Rim Association.

28. **TRANSMISSION, AUTOMATIC**

Automatic transmission required on all chassis. Heavy duty, minimum 4-speed forward on all units. On Type A2, 30 capacity and larger, 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.

29. **TURN SIGNALS**

Dash indicator light, self-canceling switch with lead wires on steering column for body manufacturer's attachment.

30. **VOLTAGE CONTROL**

Regulator: solid state components (transistorized) readily accessible for service. Voltmeter required: graduated scale.

31. **WARRANTIES**

See required chassis warranties, page 12.

32. **WIRING HARNESS**

100 amps load and complete wiring for tail and stop lights; color-coded circuits. Fuse box door, if equipped, shall have a positive latch.

Chassis Specifications Chart
Type A1 and A2 Buses

Maximum Design (Passenger) Capacity		19	23	29	30	36	42	47
Type		A1	A1	A1	A2	A2	A2	A2
GAWR (Pounds)	Front	4,300	4,300	4,300	4,300	6,000	6,000	8,000
	Rear	9,000	9,000	9,000	9,860	15,500	15,500	15,500
GVWR (Pounds)		12,500	12,500	12,500	14,500	21,500	21,500	21,500
Minimum Engine Size for Diesel Engines		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	Tires*	LT225/75R16, LR. D	LT225/75R16, LR. D	LT225/75R16 LR. D	225/70R19.5 LR. F	225/70R19.5 LR. F	225/70R19.5 LR. F	225/70R19.5 LR. 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

1. AIR-SPRUNG REAR SUSPENSION SYSTEM

   Option for air-ride or approved equivalent air-sprung rear suspension system, where available from chassis manufacturer. Shall have rear GAWR greater than or equal to standard specifications requirements for the type and capacity of chassis on which it is installed. Rear shock absorbers also required with this option, as on standard suspension systems.

2. FRONT BUMPER FLEXIBLE ENDS

   Option for front bumper with flexible end caps meeting all other requirements of these specifications for front bumper.

3. HIGHER OUTPUT ALTERNATOR

   Option for an alternator having a minimum of 270 amps hot rated output.

4. LOW PROFILE RADIAL TIRES

   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.

5. SPARE DISC WHEEL

   Option must be same size and type as original rims.

6. TOW HOOKS

   2 heavy-duty tow hooks, installed by manufacturer, 1 on each frame rail at front of bus in an approved manner.

7. STRAIGHT FLOOR CHASSIS

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

8. AUTOMATIC TRANSMISSION WARRANTY

   Option for extension of transmission warranty to 5 years, unlimited mileage, 100 percent parts and labor.

SECTION II

TYPE B, C, AND D CHASSIS

SPECIFICATIONS

BASIC MINIMUM SPECIFICATIONS
FOR SCHOOL BUS CHASSIS
FOR MOUNTING TYPE B, C, and D SCHOOL BUS BODIES

1. ALTERNATOR

160 amps minimum; 50 amps minimum output at manufacturer's recommended engine idle speed; dual belts or poly-vee type belt, maximum ratio 3.0 to 1; sealed ball or roller bearings, meeting National Specifications. Direct gear driven alternator is an approved equal.

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

All chassis on which air conditioning is to be installed shall be equipped with a minimum 200 amp alternator.

2. BATTERY(IES)

Diesel: Total of 1,250 CCA minimum at 0°F, 12 volt; temporary frame mount location and mounted in a slide-out tray in body skirt for Type B and D.

3. BRAKE, PARKING

On hydraulic brake models an Orscheln type control, or approved equal, mounted in easy access of the driver is required. On air brake models, a dash-mounted control valve to spring-set the parking brake on the rear wheels is required.

NOTE: All chassis, 47 capacity and larger, on which a wheelchair lift body is to be mounted, shall be equipped with a park brake operating by means of rear wheel brake shoe or pad mechanical actuation.

4. BRAKES, SERVICE

a. Hydraulic Brakes, Type B, C, and D Front Engine: Acceptable only on 29-35 capacity Type B, 29-41 capacity Type C, and 41 capacity Type D front engine; must have approved power assist and meet all applicable requirements of National Specifications, Revised 2000, and applicable Federal Motor Vehicle Safety Standards. Brake lining material shall not contain asbestos. Type B, C, and D buses equipped with hydraulic brakes shall be equipped with the manufacturer's standard antilock brake system.

b. Air Brakes, Type B, C, and D: Air brakes are required on all Type B buses larger than 35 capacity, Type C and D front engine buses larger than 41 capacity, and all Type D rear engine buses. Air brake models shall meet National Specifications, Revised 2000, and all applicable Federal Motor Vehicle Safety Standards.

A minimum 12 CFM, engine oil-fed air compressor is required on all air brake models. Clean air to the air compressor shall be supplied from "clean" side of engine air cleaner or air system. Compressor shall not be equipped with separate, compressor-mounted air filter. Air brake models shall be equipped with a desiccant air dryer with an automatic purge and drain cycle and a heating element. Air brake system design shall provide for anti-compounding of service and emergency brakes, and spring brake modulation upon application of front service brakes in event of loss of air pressure to rear service brakes. All Synflex™ hoses used in the air brake system shall be color coded. Antilock Braking System with independent controls for each wheel position and diagnostic LEDs built into the control modules is required on all units.

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 shall be cam-actuated and brake S-cam rotation must be in same direction as forward wheel rotation. All slack adjusters (as equipped) shall be automatic adjustment type. All brake drums shall be outboard mounted; i.e., drums shall be removable without removal of the axle hub. Rear axle of all Type B and C buses with air brakes shall 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 or the bidder shall provide warranty of rear axle seals and brake components as noted in the Chassis Warranties section. All air brake chambers less than Type 20 shall have at least a 2.5 inch stroke. All air brake chambers of Type 20 or greater shall have at least a 3.0 inch stroke. All spring brake chambers shall be equipped with a spring brake caging device.

Brake lining material shall not contain asbestos. Minimum lining thickness on air-actuated drum brakes must be 3/8 inch front and 3/4 inch rear (except taper on brake blocks). All air brake equipped chassis must have a minimum rear brake shoe width of 7 inches.

NOTE: See **Chassis Specifications Charts, pages II-9 through II-11,** for minimum lining area requirements applicable to hydraulic or air brake chassis equipped with 4 wheel drum brakes.

5. **BUMPER, FRONT**

Must be black, full width, channel type, minimum 8 inches, of sufficient structural and mounting strength to ensure that front of vehicle may be lifted by means of an air bumper-type jack, without permanent deformation of the bumper, bracketry, or chassis frame rail(s).

6. **COMPONENT ACCESSORY DRIVE**

Components, such as alternator, air compressor, and power steering, shall deliver to rated requirements without drive slippage at maximum load.

7. **DIFFERENTIAL RATIO**

Shall be compatible with engine and provide for 60 mph in highest gear. Also see **ENGINE PERFORMANCE, page II-5,** and **TRANSMISSION, AUTOMATIC, page II-8**.

8. **DRIVESHAFT GUARDS AND SHIELDS**

Required. At least 1 per driveshaft section.

9. **ENGINE EQUIPMENT**

a. Configuration: Diesel engines shall be available in at least 1 of the following 2 configurations:

(1) Parent bore type block; inline 6 cylinder design; minimum 7 liters displacement.

(2) Wet sleeve type block; inline 6 cylinder design; minimum 7 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) **Dry type air** cleaner: Required. An air filter restriction indicator is required on diesel engines.

(2) **Oil filter(s): Engine** shall be equipped with full-flow, spin-on, or cartridge-type oil filter(s), with filter header(s) mounted directly to engine.

(3) **Engine coolant recovery or deaeration** system: Required on all chassis. Diesel engines must include some means for visually checking coolant level without removing deaeration tank cap or releasing pressure from cooling system.

(4) **Warning system consisting of light and buzzer:** Required on diesel-powered chassis to notify driver of low engine oil pressure and/or coolant overheating.

(5) **Fuel Filtration/Water Separation:** Required on diesel-engines. The system shall remove all contamination capable of adversely affecting the fuel system from the fuel prior to entry into the engine. The system shall be designed to remove contaminates **normally** found in Florida, including dirt, water, and algae. The system shall be designed with the capacity necessary to last 15,000 miles or more between filter changes. Manufacturers who do not meet this requirement shall be required to provide fuel filters free of charge to districts until they have retrofitted systems that will meet this requirement on all units produced with an inadequate system. Engine or fuel system damage due to inadequate filtration shall be repaired by the manufacturer at no cost to the district. System shall have a clear sight bowl, or be equipped with water-in-fuel light to notify technicians of the presence of water. System must provide a valve for draining trapped water from the system.

(6) **Oil pressure and coolant temperature gauge:** Oil pressure gauge shall 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, shall provide a **clear** distinction between no oil pressure and engine idle oil pressure. Gauges shall be directly visible to driver in normal seated position and shall not be mounted near center of dash where body door control or associated hardware could block visibility.

(7) **Governor: Shall permit** controlled **engine** RPM up to manufacturer's recommended maximum for engine used.

(8) **Ignition switch: Controls** running and shutdown of engine. Running of engine shall require electrical current provided by the ignition switch in the "start" and "run" positions. Engine shutdown shall result when current is cut off (ignition switch "off" position).

(9) **Engine throttle control:** The force **required** to operate the throttle shall not exceed 16 pounds through the full range of accelerator pedal travel.

(10) **Silicone (or approved equivalent) radiator and other engine coolant hoses:** Required. Supplied by chassis manufacturer (not including heater hoses). Silicone hose, if used, shall require the use of stainless steel shoe-type hose clamps or constant-torque clamps. Hoses shall have markings, coloring, or other visible means of distinguishing this hose from the standard hoses.

10. <u>ENGINE PERFORMANCE REQUIREMENTS</u>

a. Each bus shall be furnished with a powertrain that meets or exceeds the following minimum criteria when tested at the 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.

b. Powertrain shall provide acceleration performance as specified in (3) below. Test conditions are as follows:

(1) As generated by an Allison SCAAN with the following parameters used:

(a) Vocation file number 2610.

(b) At gross vehicle weight for the specific bus size as listed in this manual.

(c) Tire size must be tire size listed herein for the specific size of bus.

(d) 6 total tires in contact with the road.

(e) Total driveline reduction factor used for the SCAAN must equal the reduction supplied in the complete chassis.

(f) Driveline efficiency 96.13 percent.

(g) Road surface factor 1.200.

(h) Vehicle height and width 10 feet X 8 feet.

(i) Air resistance coefficient 0.55.

(2) As measured with the actual completed vehicle (i.e. with body installed, unloaded except for the driver and 1 passenger). The vehicle shall be in drive, engine at idle, service brakes applied, emergency brakes released and all accessories on and operating. Measurement of acceleration time shall begin at the moment the throttle is applied (the throttle is to be immediately and rapidly depressed to full throttle).

NOTE: Chassis manufacturer should use the heaviest chassis/body combination meeting these specifications for the specific size bus to determine required powertrain componentry. 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.

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

29-77 Capacity Type B, C, and D:

TEST METHOD	0-10 MPH	0-20 MPH	0-30 MPH	0-40 MPH	0-50 MPH
(1) SCAAN	2.9	8.1	16.8	30.1	53.8
(2) 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
(1) SCAAN	2.9	8.1	16.8	30.1	53.8
(2) ACTUAL	3.7	7.1	12.0	20.0	32.2

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

11. EXHAUST SYSTEM

Corrosion resistant muffler and tailpipe; must exit to left of left frame rail and behind rear wheels. Tailpipe must extend 5 inches beyond chassis frame on Type B and C stripped chassis (see 2000 National Specifications). Chassis manufacturer shall ensure that exhaust design allows exit location left of left frame rail to be maintained after any modifications to frame length by chassis or body manufacturer.

12. FRAME SIDE MEMBERS

1-piece construction between front and rear spring hangers. All frame rails shall be minimum 50,000 psi tensile strength. Extension of frame length on chassis is permissible only when such alterations are not for purposes of extending or reducing wheelbase.

13. FRONT AXLE LUBRICATION

All buses shall have oil-lubricated front axle hubs providing externally visible check of lubricant level.

14. FUEL TANK

Fuel tank and fuel system shall meet requirements of FMVSS 301. Filler spout shall be located for ease in servicing. Fuel gauge compatible with tank capacity shall be supplied. Tank may be located on the right chassis rail or between the frame rails. Filler neck shall be located on the right side of the bus. See **Chassis Specifications Charts, pages II-9 through II-11,** for required fuel tank capacity.

15. HEADLIGHTS

Must meet SAE and Federal Standards and shall use a quartz halogen bulb. All units must be equipped with Daytime Running Lights (DRL) meeting the following requirements:

a. With the ignition switch off the headlights will operate normally, and the DRL system will not operate.

b. With the ignition switch on or in the accessory position, and with the engine not running, the daytime running lights shall not operate.

c. With the ignition switch on and the engine running and with the headlight switch off, the DRL system must operate, providing at least 50 percent of normal operating voltage to the headlights.

d. In all cases the headlight switch must override the DRL system when in the on position.

16. **HOOD**

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

17. **HORNS**

Dual, 120 decibels (see National Specifications).

18. **IGNITION SYSTEM**

All ignition switches shall be keyed alike. All buses of like chassis manufacturer shall have 1 key regardless of type supplied to the state of Florida.

19. **INSULATION**

Type B and C chassis shall 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 engine cover (doghouse. Type D Front Engine buses shall include complete heat and noise insulation of the doghouse area.

20. **LINE-SETT TICKET**

Manufacturer shall include with delivery of vehicle a line-sett ticket to accurately reflect the following: a) all chassis components; b) GAWR of both front and rear axles; and, c) GVWR.

21. **ODOMETER**

Accrued mileage, 7 digits, including tenths of miles (999,999.9 mile odometer).

22. **PAINT AND FINISH, TYPE B, C, and D CHASSIS**

Prior to the application of the finish coats to chassis hood, fenders, and cowl, all surfaces shall be cleaned of grease, foreign matter, excessive caulking and sealing material and treated as per paint manufacturer's recommendation for proper paint adhesion. School bus yellow paint shall meet SBMTC-008 for color and shall 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 **WARRANTIES.** Paint shall be applied for a total dry thickness of at least 1.8 mils over all painted surfaces. Trim, lettering, and bumper shall be black except that bumper may be striped with reflective material in accordance with National Specifications or these specifications. Rims for all Type B, C, and D buses with hub-piloted wheels (required on Type B, C, and D buses built pursuant to these specifications) shall be powder coated at the wheel manufacturer, National School Bus Yellow. All stud-piloted rims shall be painted black. Lug nuts shall not be painted. Lead-free paint shall be used on all interior and exterior surfaces of the body and chassis. Also see **WARRANTIES, page 12,** for warranty requirements.

23. **RADIATOR FILLER TUBE**

Located for ease of service from engine compartment on Type B, Type C, and Type D rear engine. Shall be located for ease of service from outside of bus on Type D front engine.

24. **SHOCK ABSORBERS**

Front and rear, double acting; adequate size for axle load.

25. **SPRINGS, FRONT, TYPE C**

Double-wrap stationary end (see **Chassis Specifications Charts, pages II-9 through II-11,** for spring weight rating requirements).

26. SPRINGS, REAR, TYPE C

Progressive type (see Chassis Specifications Charts, pages II-9 through II-11, for spring weight rating requirements).

27. STEERING

Integral type power steering required. A tilt steering wheel/column is required.

28. TIRES AND RIMS

Chassis shall be equipped with radial tubeless tires mounted on hub-piloted disc wheels. All wheels shall be 2 hand-hole wheels. Tires and rims shall conform to current standards of Tire and Rim Association (see **Chassis Specifications Charts, pages II-9 through II-11,** for sizes). See **PAINT AND FINISH, page II-7,** for wheel color information.

29. TRANSMISSION, AUTOMATIC

An automatic transmission is required on all chassis as specified:

a. Type B 29-35 capacity, Allison PTS 2100, 5 speed or approved equal.

b. Type B 47-71 capacity front engine, Allison PTS 2500, 5 speed or approved equal.

c. Type C 29-71 capacity, Allison PTS 2500, 5 speed or approved equal.

d. Type B and C 77 capacity, Allison PTS 3000, 5 speed or approved equal.

e. Type D 41-71 capacity front engine, Allison PTS 2500, 5 speed or approved equal.

f. Type D 78-89 capacity front engine, Allison PTS 3000, 5 speed or approved equal.

g. Type D 60-72 capacity rear engine, Allison PTS 2500, 5 speed or approved equal.

h. 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.

Allison PTS 3000 series transmissions shall have at least 5 speeds enabled for front engine Type D and 6 speeds for rear engine Type D. Type D front engine chassis with PTS 3000 series transmissions shall have a 6.0:1 or higher rear end ratio; Type D rear engine chassis with PTS 3000 series transmissions shall have a 6.5:1 or higher rear end ratio. Push button shifting control shall be used on PTS 3000 transmissions. PTS 3000 series transmissions shall include a transmission fluid filter externally accessible without removal of the transmission oil pan.

30. TURN SIGNALS

Dash indicator lights and self-canceling switch with lead wires on steering column for body manufacturer's attachment shall be installed by the chassis manufacturer. Type B and C buses shall have front turn signal assemblies installed by the chassis manufacturer integrated into the headlight assembly or, if not available, fender mounted turn signal lights.

31. VOLTAGE CONTROL

A voltage regulator shall be required, equipped with solid state components (transistorized) and readily accessible. A voltmeter with a graduated scale is also required.

32. WARRANTIES

See required chassis warranties on page 12.

33. WIRING HARNESS

100 amp load and complete wiring for tail and stop lights; color-coded circuits. Fuse box door, if equipped, shall have a positive latch. All chassis circuits above 5 amps shall be protected by manually resettable circuit breakers except as otherwise required by FMVSS. Buses using a multiplexed electrical systems may meet the intent of these specifications without the use of specified equipment, subject to approval by the Department.

TYPE C DIESEL CHASSIS

Maximum Design (Passenger) Capacity	**29**	**47**	**53**	**59**	**65**	**71**	**77**
Minimum Gross Axle Weight Rating (pounds)							
A. Front	6,000	7,000	7,800	9,000	9,000	10,000	10,000
B. Rear	12,400	14,200	16,160	19,000	19,000	19,000	21,000
Cowl to axle, minimum (inches)	123	162	194	211	229	250	250
Approximate wheelbase (inches)	150	190	218	239	254	254 or 276	276
Front axle pound minimum	6,000	7,000	8,000	10,000	10,000	10,000	10,000
Rear axle pound minimum	13,000	15,000	17,000	19,000	19,000	19,000	21,000
Each Front spring at ground	3,000	3,500	4,000	4,500	4,500	5,000	5,000
Each Rear spring at ground, progressive springs	6,500	7,500	8,500	9,500	9,500	9,500	10,500
Service brake-drum brake only (minimum total square inch)							
Hydraulic	440	NA	NA	NA	NA	NA	NA
Full Air	663	663	663	663	663	663	663
Minimum Tire Size: Tubeless-Radial Ply*	10R-22.5-F	11R-22.5-G	11R-22.5-G	11R-22.5-G	11R-22.5-G	11R-22.5-G	11R-22.5-G
Minimum Wheel Rim Size	7.5	8.25	8.25	8.25	8.25	8.25	8.25
Hub-piloted disc wheels for tubeless radial tires	6 stud	10 stud	10 stud	10 stud	10 stud	10 stud	10 stud
Allison Transmission Series (# of Forward Gears)	PTS 2100 (5)	PTS 2100 (5)	PTS 2100 (5)	PTS 2500 (5)	PTS 2500 (5)	PTS 2500 (5)	PTS 3000 (5)
Fuel Tank Minimum Size (gallons)	30	60	60	60	60	60	60

*** 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.**

TYPE B AND D FRONT ENGINE CHASSIS SPECIFICATIONS CHARTS

TYPE B MODIFIED FORWARD CONTROL

Maximum Design (Passenger) Capacity	29	35	47	59	65	71	77
Minimum Gross Axle Weight Rating (pounds)							
Front	6,000	6,000	7,500	10,000	10,000	10,000	10,000
Rear	10,500	10,500	15,000	19,000	19,000	19,000	21,000
Gross Vehicle Weight Rating	16,500	16,500	22,500	29,000	29,000	29,000	31,000
Service brake-drum brake only (minimum total square inch)	663	663	663	663	663	663	663
Tires – Minimum Size Acceptable (Tubeless Radials Required)*	225/70R19.5E	225/70R19.5E	11R-22.5-G	11R-22.5-G	11R-22.5-G	11R-22.5-G	11R-22.5-G
Hub Piloted Disc Wheels -Minimum Rim Width (inches)	6.75	6.75	8.25	8.25	8.25	8.25	8.25
Approximate Wheelbase (inches)	138	152	190	235	254	254 – 276	254 – 276
Minimum Size Fuel Tank (gallons) (Meeting Requirements of FMVSS.301)	30	30	60	60	60	60	60
Allison Transmission Series (# of Forward Gears)	PTS 2100 (5)	PTS 2100 (5)	PTS 2100 (5)	PTS 2500 (5)	PTS 2500 (5)	PTS 2500 (5)	PTS 3000 (5)

TYPE D FORWARD CONTROL FRONT ENGINE

Maximum Design (Passenger) Capacity (Cap.)	41-53	59-71	77	83	89
Minimum Gross Axle Weight Rating (pounds)					
Front	10,800	10,800	12,000	12,000	12,000
Rear	17,000	17,000	19,000	21,000	23,000
Gross Vehicle Weight Rating	27,800	27,800	31,000	33,000	35,000
Service brake-drum brake only (minimum total Square inch)	663	663	750	750	750
Tires – Minimum Size Acceptable (Tubeless Radials Required)*	10R-22.5F	11R-22.5G	11R-22.5G	11R-22.5-G	11R-22.5-G
Hub Piloted Disc Wheels -Minimum Rim Width (inches)	7.5	8.25	8.25	8.25	8.25
Approximate Wheelbase (inches)	131 – 161	159 – 201	212 – 217	227 – 237	245 – 254
Minimum Size Fuel Tank (gallons) Meeting Requirements of FMVSS.301	45 (41-47 cap.) 60 (53-cap.)	60	60	60	60
Allison Transmission Series (# of Forward Gears)	PTS 2500 (5)	PTS 2500 (5)	PTS 3000 (5)	PTS 3000 (5)	PTS 3000 (5)

NOTES: 1) Automatic transmission is required on all chassis. See TRANSMISSION, AUTOMATIC, page II-8, for required specifications.

2) Maximum overall length of vehicle shall not exceed 45 feet, bumper to bumper.

3) *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	**60**	**66**	**72**	**78**	**84**	**90**
Minimum Gross Axle Weight Rating (pounds):						
A. Front	11,000	11,000	11,000	12,000	12,000	12,000
B. Rear	19,000	19,000	19,000	21,000	23,000	23,000
Gross Vehicle Weight Rating	30,000	30,000	30,000	33,000	35,000	35,000
Service brake-drum brake only (minimum total square inch)	663	663	663	750	750	750
Tires – Minimum Size Acceptable (Tubeless Radials Required)*	11R-22.5-G	11R-22.5-G	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	8.25	8.25	8.25	8.25	8.25	8.25
Approximate Wheelbase (inches)	165 – 184	181 – 228	209 – 242	238 – 256	260 – 284	260 – 284
Minimum Size Fuel Tank (gallons) (Meeting Requirements of FMVSS. 301)	60 gal.	60 gal.	60 gal.	60 gal.	60 gal.	60 gal.
Allison Transmission Series (# of Forward Gears)	PTS 2500 (5)	PTS 2500 (5)	PTS 2500 (5)	PTS 3000 (6)	PTS 3000 (6)	PTS 3000 (6)

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

*** Shall 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 TYPE B, C, AND D BUSES

1. **AIR BRAKES**

   Option for all sizes and types where hydraulic brakes are standard.

2. **AIR-SPRUNG REAR SUSPENSION SYSTEM**

   Option for air-ride or approved equivalent air-sprung rear suspension system, where available from chassis manufacturer. Shall have rear GAWR greater than or equal to standard specifications requirements for the type and capacity of chassis on which it is installed. Rear shock absorbers also required with this option, as on standard suspension systems.

3. **ALTERNATOR, HIGHER OUTPUT**

   Option for alternators having a minimum of 200 and 270 amps hot rated output.

4. **FRONT BUMPER FLEXIBLE ENDS**

   Option for front bumper with flexible end caps meeting all other requirements of these specifications for front bumper.

5. **LOW PROFILE RADIAL TIRES**

   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.

6. **LARGER CAPACITY FUEL TANK**

   Option for larger fuel tank, mounted on the right side or between the frame rails, where available.

7. **SPARE DISC WHEEL**

   Option must be same size, type, and color as original rims.

8. **TOW HOOKS**

   2 heavy-duty tow hooks, installed by manufacturer, 1 on each frame rail at front of bus in an approved manner. Manufacturer may also offer rear mounted tow hooks meeting the above requirements.

9. **STRAIGHT FLOOR CHASSIS**

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

10. **AUTOMATIC TRANSMISSION WARRANTY**

    Option for extension of transmission warranty to 5 years, unlimited mileage, 100 percent parts and labor.

11. **MORRYDE SUSPENSION SYSTEM**

    Option for MorRyde front and/or rear suspension in lieu of standard spring suspension where available. Shall have GAWR's greater than or equal to standard specifications requirements for the type and capacity of chassis on which it is installed. Shock absorbers also required with this option, as on standard suspension systems.

12. **TRANSMISSION FLUID**

Option to have original fill of the transmission with Transynd or approved equal transmission fluid.

13. **TIRES**

Option for alternate brand, size, and tread design of tires where available, but meeting GAWR requirements and Tire and Rim Association Standards.

SECTION III

BODY SPECIFICATIONS

TYPE A1, A2, B, C, AND D BUSES

MINIMUM FLORIDA SCHOOL BUS BODY SPECIFICATIONS

The specifications set forth in this section are descriptive of Types A1 (19-29 capacity with dual rear wheels), A2 (30-47 capacity) B, C, and D school buses. Special exceptions for Types B and 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 pupils and for economical transportation as required by Florida Statutes and Federal Motor Vehicle Safety Standards. The National School Transportation Specifications and Procedures, 2000 Revised Edition, are applicable for items not specified in this document, 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.**

1. BATTERY SLIDE-OUT TRAY

A left side mounted slide-out tray and battery box is required for the batteries on all Type A, B, C, and D bodies. Access to the batteries shall be through a door in the left side of the body. Battery cables shall be long enough to allow the battery tray to be fully extended.

All Type B, C, and D bodies equipped with air conditioning shall also be equipped with a compartment mounted next to the battery box with external access, for mounting circuit breakers and control circuitry for this option.

2. BODY DATA PLATE

A durable body data plate shall be mounted inside the body in a clearly visible location. Body data plate information shall include (in part) a listing of the "Maximum Design Capacity" and the "Equipped Capacity" of the body. Maximum Design Capacity shall be the maximum number of passengers the bus (body shell size) can carry; based on 12.8 inch minimum seat width per passenger with the minimum knee room (seat spacing) required under **SEATING AND MODESTY PANELS, page III-18.** Equipped Capacity shall 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.

3. BODY FLUID CLEANUP KIT

Each bus shall be equipped with a disposable, sealed body fluid cleanup kit in a disposable container with the following items:

- an EPA registered liquid germicide (tuberculicidal) disinfectant
- a fully disposable wiping cloth
- a water resistant spatula
- step-by-step directions
- absorbent material with odor counteractant
- 2 pairs gloves (Nitrile)
- 1 package towelettes
- a discard bag (non-labeled paper bag with plastic liner and a twist tie). This bag shall be approximately 4 inch x 6 inch x 14 inch, and be of a non-safety color (i.e., not red, orange, or yellow.)

The kit shall be mounted by a method that will retain it under a load equivalent to 20 times the weight of the kit and shall be removable without the use of tools. The kit shall be accessible to the driver. The kit container shall be sealed with a breakable, nonreusable seal.

4. BUMPER, REAR

Rear bumper shall be of pressed steel channel at least 3/16 inch thick; 8 inch high and flanged 2 inches at top and bottom or otherwise designed to furnish equal flexural strength. It shall be of wraparound design and securely fastened to each chassis rail and braced diagonally from each end of bumper to chassis rail with heavy braces to permit fully loaded bus to be pushed without permanent distortion to bumper, chassis, or body. The bumper shall also have the structure and strength necessary to allow the unloaded vehicle to be lifted with a bumper jack without deformation or damage. Contour of bumper shall fit contour of body in a manner to prevent hitching to or riding on bumper. An appropriate seal shall be applied between bumper and body panel, unless the gap between bumper and body panel is 1/8 inch or less.

5. DRIVER'S DOCUMENT COMPARTMENT

On Type B, C, and D buses a pouch on the front side of the driver's side crash barrier with minimum dimensions of 17 inch x 12 inch x 4 inch is required. This pouch shall be located to the left side of the barrier for Type B and C, and to the right side of the barrier for Type D, accessible to the driver from the seated position. It shall 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.

6. DRIVER'S SEAT AND SEAT BELT

a. All Type A2, B, C, and D school buses shall have a driver's seat equipped with a 1-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 shall 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 shall be made of soil and wear resistant cloth material, nylon, or equivalent. Remainder of seat may be of a different material. Seat shall be centered behind the steering wheel with backrest a minimum distance of 11 inches behind the steering wheel. Seat shall be securely mounted to ensure minimal flexing of the seat and the floor panel(s).

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

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

(2) Seat cushion shall be minimum 19 1/2 inches wide, shall be fully contoured for maximum comfort, and shall have a minimum of 4 adjustment positions to allow changes in seat bottom angle.

(3) Backrest shall include adjustable lumbar support.

(4) The seat shall 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. Reduction of this requirement to no less than 4 inches fore and aft travel due to barrier placement on 89 capacity buses is acceptable.

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

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

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

(8) Air suspension seats shall be dampened by dual shock absorbers acting independently.

(9) The seat shall comply with all applicable Federal Motor Vehicle Safety Standards.

c. All other buses shall have a driver's seat equipped with a hydraulic and/or spring suspension base and have a minimum seat cushion width of 19 inches, and meet the other requirements listed herein for air suspension seats.

d. Chassis manufacturer's standard driver's seat is acceptable for Type A1 buses.

e. Overall seat design shall be approved by the Department of Education. Also, see **WARRANTIES, page 12**.

f. Buses shall be equipped with a Type 2 lap belt/shoulder harness seat belt assembly for the driver. The design shall incorporate a fixed female push-button type latch on the right side at seat level, and a male locking bar tongue on the left retracting side. The assembly shall be equipped with a single, dual sensitive Emergency Locking Retractor (ELR) for the lap and shoulder belt. This system shall be designed to minimize cinching down on suspension type seats. The lap portion of the belt shall be anchored or guided at the seat frame by a metal loop or other such device attached to the right side of the seat to prevent the driver from sliding sideways out of the seat. There shall be minimum 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. Shoulder belt tension shall be no greater than is necessary to provide reliable retraction of the belt and removal of excess slack. The seat belt assembly and anchorage shall meet applicable Federal Motor Vehicle Safety Standards.

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

7.

ELECTRICAL EQUIPMENT AND WIRING

All wiring shall conform to current standards of the Society of Automotive Engineers, be coded by color, and be insulated. All joints shall be soldered or joined by equally effective fasteners. All wires of 4 gauge or larger and any accessory wire connected directly to the battery shall have soldered ends, and the ends shall be protected with heat shrink tubing. Body wiring and connectors, including any battery cables routed by the body manufacturer, shall be routed and/or protected so as to eliminate possibility of wiring and connectors becoming abraded, pierced by fasteners, shorted, or otherwise damaged during manufacture and use. A complete body wiring diagram showing location of wires and code of circuits for buses meeting Florida Specifications shall be installed in each body. Additionally, for all school bus body optional electronic components installed in the bus, the body manufacturer shall provide each district with at least 1 comprehensive parts and repair manual. Buses using a multiplexed electrical systems may meet the intent of these specifications without the use of specified equipment subject to approval by the Department. Electrical components specified below shall be provided and wiring shall be in circuits as follows:

a. ACCESS PANEL, ELECTRICAL

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

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

b. BACK UP LIGHTS; BACKUP ALARM and STICKER

(1) There shall be 2 back-up lights of 4 inch diameter, or 12.5 square inch, on the rear of all bodies meeting the following requirements:

(a) Light Emitting Diode (LED) type light.

(b) Universal type sealed electrical plug connector.

(c) Inset into the bus body (flush mounted).

(2) Body manufacturer shall provide a backup alarm on each bus to provide audible warning that the bus is in reverse gear. Alarm shall meet requirements of SAE J994, and shall have a variable volume feature that allows the alarm to vary from 87 dBA to 112 dBA sound level, staying at least 5 dBA above the ambient noise level. All buses shall have a sticker affixed to the dash in full view of the driver indicating that the bus is equipped with a backup alarm.

c. BRAKE/TAIL LAMPS, LARGE

(1) Buses shall be equipped with 2 combination brake/tail lamps of a minimum of 7 inches in diameter or 38 sqare inch mounted as high and spaced as far apart laterally as practical, below window line, but not less than 3 feet measured from center of lamps.

(2) Brake/tail lamps shall be Light Emitting Diode (LED) type lights.

(3) Lamps shall use a universal type sealed plug connector.

(4) Lamps shall meet current SAE requirements and be installed in compliance with Federal Motor Vehicle Safety Standards.

d. BRAKE/TAIL LAMPS, SMALL

Bus shall be equipped with 2 combination brake/tail lamps of 4 inch diameter or 12.5 square inch, meeting Federal Motor Vehicle Safety Standards. Light intensity shall at least equal Class A type turn signal units. These lights shall be LED type lights with smooth exterior lens surfaces. They shall use a universal type sealed plug connector and be inset into the bus body.

e. CIRCUIT BREAKERS

All body electrical circuits of more than 5 amps shall be equipped with manual resetting circuit breakers except as otherwise required by FMVSS. Circuits of 5 amps or less may be fused. The main body electrical circuit shall be protected by a manually resettable circuit breaker or fusible link.

f. **CLEARANCE AND IDENTIFICATION LIGHTS**

(1) Clearance lights shall be mounted at the 4 body corners, upper section, amber front, and red rear. Intermediate amber units required on all units over 30 feet. Clearance lights shall be activated by headlight switch.

(2) Identification lights shall be mounted 3 amber fronts, 3 red rears, grouped in a horizontal row. Lamp centers shall be spaced not less than 6 or more than 12 inches apart, mounted as close as practical to the vertical centerline. Identification lights shall be activated by headlight switch.

(3) All clearance and identification lights shall meet current SAE requirements and Federal Motor Vehicle Safety Standards and shall:

(a) Be sealed type lights with vibration and shock absorbing bulb mounting.

(b) Be surface mounted with Lexan™ or other polycarbonate material guard to prevent breakage. Lights inset into the body do not require guards.

(c) Use a universal type sealed electrical plug connector.

g. **CONTROL PANEL LIGHTING**

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

h. **POST-TRIP PASSENGER CHECK SYSTEM**

(1) **System Requirements:**

Bus shall be equipped with a system to require the driver to walk to the interior rearmost of the bus after each trip to deactivate the system and to ensure that no passengers are left on the bus. The system shall interconnect with the entrance door, and immediately activate if the door is opened when the system is armed.

System shall be armed any time the bus is in service transporting students. This may be accomplished through use of any reasonable method, such as speed above 20 MPH or 10 minutes of operation with the door closed. The system should not normally arm during shop maintenance.

The system may not be disarmed until the vehicle ignition switch has been switched to the off position. The system shall not be activated if the ignition switch is placed in the accessory position or if the bus is restarted.

The system must turn on the interior lights when the ignition switch is turned to the off position. The lights shall remain on for 60 seconds after system deactivation.

The system shall not have a bypass.

The system shall sound the vehicle horn and flash the headlights if the driver fails to deactivate the system within 60 seconds of turning the ignition off.

(2) **System Definitions:**

Armed = The state when the system is functioning and is ready to alarm.
Disarmed = The system is off and inactive
Activated = The state during which the horn is blowing and the lights are flashing.
Deactivated = The state achieved when the driver walks to the rear of the bus and opens the emergency door.

(3) **System Functionality:**

(a) The system must be fully automatic in function and shall not provide for manual bypass or override capability under any circumstances.

(b) From bus sitting still with ignition key in the "off" position:

(i) Ignition key switched to "accessory" position, system remains disarmed.

(ii) Ignition key switched to "on" position (engine remaining off), system remains disarmed.

(iii) Ignition key switched to "on" position (engine running) and bus operated under 20 MPH, system remains disarmed.

(iv) Ignition key switched to "on" position (engine running) and bus operated over 20 MPH (or other reasonable operational trigger mechanism), system is armed.

(c) From bus having been operated over 20 MPH, no longer moving, entrance door (and driver's door, if equipped) closed, ignition key in the "on" position (engine running), and system armed:

(i) Ignition key switched to "off" position (engine off), interior dome lights are immediately illuminated.

(ii) Ignition key switched to "off" position (engine off) and ignition key switched back to "on" position (engine off or restarted) within 60 seconds, interior dome lights are extinguished and the system remains armed but flashing light and horn alarms are not activated.

(iii) Ignition key switched to "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.

(iv) Ignition key switched to "off" position (engine off), interior dome lights illuminated and driver takes no action for 60 seconds, flashing light and horn alarms are activated.

(v) Ignition key switched to "off" position (engine off), interior dome lights illuminated and driver walks to the rear of the bus and disarms system within 60 seconds, system is disarmed and no flashing light and horn alarms are activated.

(d) Once flashing light and horn alarms are activated, they can be deactivated only by disarming the system at the rear of the bus.

(e) Interior dome lights are extinguished 60 seconds after system is disarmed.

i. **DEFOGGER FAN**

A 6 inch defogger fan, in addition to defrosters utilizing hot air from bus heater, shall 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 type fan with directable louvers is approved by the Department in lieu of the 6 inch fan.

j. **EMERGENCY DOOR BUZZER**

Emergency door (and window) buzzer shall be connected to accessory side of ignition switch.

k. **HEATER/DEFROSTER**

(1) There shall be a heater mounted in the front of the bus. A supplemental heater, minimum 80,000 BTU rating, may be installed in any buses. The heat exchanger (core) of any heater shall be constructed to withstand a minimum static test pressure of 300 PSIG without rupture or leakage. All heaters shall meet the following requirements:

(a) School bus heating systems shall meet the following performance standards:

(i) Provide evenly distributed heat throughout the bus body.

(ii) Provide defrosting for windshield and entrance door.

(b) Heaters shall have capabilities of providing evenly distributed heat creating a temperature rise to 50° F inside body shell when soaked in ambient temperature of 0° F for 15 hours.

(c) Heater performance shall be measured as follows:

(i) Temperature measurement taken 39 inches inward from side walls, 39 inches inward from windshield and rear door, and 36 inches above floor. Heat shall be evenly distributed through the aisle area.

(ii) 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.

(iii) Maximum current draw for heaters including defrosters shall not exceed 45 amperes.

(d) Defrosters – Shall be included in the total electrical load for heaters and meet the following criteria:

(i) Shall be able to defrost total windshield area in a reasonable period of time under all normal driving conditions.

(ii) Shall be directional to provide driver capability of defrosting in drive view area first.

(iii) Defroster system shall have capability of mixing minimum 50 percent outside fresh air with defrosting air.

(iv) Defroster system shall meet SAE Standard J381-J382 performance requirement.

(2) All heater hoses shall be constructed of silicone rubber or equal approved by the Department of Education. If silicone hoses are used, shoe type hose clamps must be used. Heater lines on the interior of the bus shall be shielded to prevent scalding of the driver or passengers. The modesty panels shall 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 which retains, to the extent practical, required full width aluminized steel panel extending down to floor. Also see **SEATING AND MODESTY PANELS, page III-18.**

(3) A ¼ turn ballcock type coolant flow regulating valve for the heater shall 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 type coolant flow regulating shut-off valves, installed in the pressure and return lines as close to the engine as possible.

(4) The windshield defroster and defogging system shall provide defogging of the entire windshield, driver's side window, and entrance door glasses by utilizing hot air taken from the heater core. Bodies which 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 which utilizes hot air from the heater. 1 electrical switch shall be provided to simultaneously turn "on" or "off" any fan(s) providing hot air for defogging of windshield, driver's side window, and entrance door glass.

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

l. **INTERIOR LIGHTS**

There shall be installed at least 4 recessed flush mounted interior lights in the passenger compartment of the bus, operated by 1 control panel-mounted switch. If more than 6 lights are used, then an additional switch may be added to control these lights. There shall also be 2 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 control panel mounted switch. Lenses for all interior lights shall be Lexan™ or other polycarbonate material.

m. **LICENSE PLATE LAMP**

This lamp may be combined with 1 of the combination brake/tail lamps above.

n. **MASTER SWITCH FOR BODY ELECTRICAL CIRCUITS AND NOISE ABATEMENT SWITCH**

All bodies shall 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 shall 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 shall be an on/off type switch that deactivates all body equipment that produces noise, including, at least, the radio, heaters, air conditioners, fans, and defrosters. This switch shall not deactivate safety systems such as windshield wipers or lighting systems.

o. PUPIL WARNING LIGHTS, STOP ARMS, PUPIL CROSSING ARM, AND SYSTEM CONTROLS AND OPERATION

(1) **Pupil Warning Lights**

Pupil warning lights shall be dual mounted side by side on all corners of bus roof caps. Mounting shall be as high as practical on top and as near outer edge of bus as curvature permits. Lamps shall be securely mounted. Black background 1¼ inches to 3 inches wide shall be painted around lights. Lamps installed on outside shall be red; inner shall be amber. Lamps shall be clearly visible in bright sunlight for a minimum of 500 feet. Additionally, pupil warning lights shall:

(a) Have light assemblies of a flat back design. Note: Cutouts in roof caps shall be no larger than necessary to accommodate pupil warning light wire. A flush mounted design is acceptable.

(b) Use replaceable quartz halogen bulbs.

(c) Be 7 inches in diameter or 38 square inch minimum.

(2) **System Controls**- system must be equipped with the following driver actuated controls:

(a) Master switch – provides means for deactivating entire system, as would be required when opening the door at a railroad grade crossing.

(b) Control switch - 3 positions: **OFF, AMBER,** and **RED.** Switch may be rocker, pull-type or other switch providing 3 positions. This switch shall be separated from the master switch by at least 1 inch, and shall be colored red.

(c) Service door-actuated switch.

(d) Controls must provide for the following combinations of switch positions and conditions of pupil warning lights, stop arm(s), stop arm lights, and audible alarm as indicated on the chart below.

NOTE: System may not be designed in such a way that the operator is required to actuate controls in a particular sequence to achieve the desired combination of conditions. EXAMPLE: If the driver places the 3 position switch in the AMBER position, with the master switch ON it must not be required that the 3 position switch be moved to RED or that the service door be opened, in order to de-activate AMBER. In this example, the driver must be able to de-activate AMBER 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 Pupil 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 PUPIL WARNING and PILOT LIGHTS	RED PUPIL 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

(3) **Pupil Crossing Arm:** Required, meeting following:

(a) Air operated on all air brake equipped buses. Electrically operated on all hydraulic brake buses.

(b) Mounted to the far right side of the front bumper and shall open to an angle perpendicular to the bus.

(c) All components and connections shall be weatherproofed.

(d) Easily removable with hand tools for towing of the bus.

(e) Shall meet or exceed SAE Standard J 1133.

(f) Constructed of noncorrosive or nonferrous material or treated as per the body sheet metal standard.

(g) No sharp edges or projections that could cause hazard or injury to students.

(h) 4-point mounting to the front bumper.

(i) The crossing arm shall extend approximately 72 inches from the front bumper when in the "extended" position, and shall be constructed of a yellow polycarbonate material or may be constructed of noncorrosive tubing painted yellow. Approximate dimensions of the arm shall be 65 inches X 3 inches X 1 inch.

(j) Shall be extended simultaneously with stop arm(s) by means of stop arm control and shall retract within 8 seconds of deactivation.

(k) Shall include 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 shall also reduce the tendency of the arm to rattle and vibrate when not in use.

(l) An electrically operated crossing arm may be used on air brake equipped buses only if it is a behind-the-bumper design and no air operated arm is available. This alternative must include a 5 year, 100 percent parts and labor warranty on the entire crossing arm assembly and requires prior approval of the Department.

(4) **Stop Arm Signals**

For all buses, 47 capacity and larger, there shall be installed on left outside of body 2 approved octagonal design stop-signal arms, each equipped with 2 double face alternately flashing strobe-type lights for signaling a pupil stop. All buses less than 47 capacity shall be equipped with 1 stop arm as described. Bodies to be mounted on diesel powered chassis with hydraulic brakes shall be equipped with electrically actuated stop arm(s). Air powered stop arms shall be standard on all air brake equipped buses. Rear stop arm location on dual stop arm equipped buses shall be on left side of bus, as close as is practical to left rear corner of body. Light lens of all stop arms shall be RED. Air lines must not be readily accessible to students inside or outside the vehicle. Air lines must be made of copper, steel, or nonmetallic materials meeting SAE Standard J848d, and fittings shall be brass. Stop signal arms shall meet the applicable requirements of SAE J1133. For controls, see above item. Stop arms and student crossing arms shall retract within 6 seconds of deactivation. For color, see **LETTERING AND TRIM, page III-15.**

p. **REFLECTORS**

2 amber reflectors shall be mounted on the sides of the bus body near front even if chassis incorporates amber reflectors at or near the front of the chassis cowl area, and 2 red on rear side panels, 2 red on rear panels, and 2 intermediate amber on buses over 30 feet.

q. **STEP WELL LIGHT**

Step well light shall illuminate the bus entrance and be adequately protected. Step well light shall be activated automatically when door is opened and clearance lights are on. Clearance lights shall be activated by headlight switch when the ignition switch is on. See **SERVICE DOOR, page III-19,** for further operational requirements.

r. **STROBE LIGHT, WHITE FLASHING**

Each bus shall be equipped with a white flashing strobe light meeting the following requirements (also see WARRANTIES, page 12):

(1) Shall have self-contained power supply.

(2) Construction: Base shall be Lexan™ or other polycarbonate or corrosion resistant metallic material. Lens shall be clear Lexan™ or other polycarbonate material of equal or better strength, resilience, and durability. Unit shall be sealed to protect against intrusion of dust and moisture. All external fasteners including mounting screws shall be stainless steel. Unit shall have mounting gasket to isolate the light assembly from vibration.

(3) Electrical characteristics: Shall have a flash energy of minimum 8 joules. Shall have 80 (plus or minus 10) single or double flashes per minute. Shall have integral fuse or circuit breaker protection and reverse polarity protection. Maximum current draw shall be 2 amperes at 12 volts.

(4) Dimensions and location: Overall height of unit shall be approximately 4 inches to 6 inches, with lens diameter approximately 4 inches to 6 inches. Mounting location is to be centered (laterally) on roof of bus, approximately 48 inches (longitudinally) from rear edge of rear roof cap.

(5) SAE Specifications: Shall meet SAE J575 and J1318.

(6) Body circuitry: Shall include a separate, clearly labeled driver's panel mounted switch, with a clearly labeled pilot light.

s. **TURN SIGNAL LAMPS**

Front, turn signal lamps shall be furnished by chassis manufacturer on Type A1, A2, B, and C buses. If turn signal lights are not built into the front end assembly front turn signals must be added by the body builder. Front turn signal lamps on Type D bodies shall 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 shall 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 shall also be equipped with an amber turn signal light in a protective rim on each side of the bus (same light as used for clearance lights), 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 shall have 2 turn signal lights (same light as used for clearance lights) mounted in protective rims on each side of the bus. The rearmost side turn signals on buses over 30 feet shall be mounted rearward of the rear axle.

Rear turn signal lights shall:

(1) Be Light Emitting Diode (LED) type lights.

(2) Use a universal type sealed plug connector.

(3) Meet current SAE requirements and be installed in compliance with Federal Motor Vehicle Safety Standards.

(4) Be 7 inch diameter or at least 38 square inches

t. **TWO-WAY RADIO**

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

u. **VIDEO CAMERA MONITORING SYSTEMS**

Districts may install video cameras in buses provided the system:

(1) Is installed securely in an area at the front of 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) Have no sharp edges or projections.

8. EMERGENCY EXITS

a. Emergency door on all Type A, B, C, and front engine Type D buses shall be located at center of rear of bus and have minimum horizontal opening of 24 inches and vertical opening of 48 inches. Emergency door shall be hinged on right-hand side using hinge(s) with a brass or rust resistant rod. Doorstop and hold-open device shall meet the requirements of the National Specifications, Revised 2000, Emergency Exits. Inside of door header shall be padded with energy absorbing material a minimum of 3 inches wide.

b. The emergency door shall be designed to open from inside and outside of bus and shall have a fastening device, which may be quickly released but designed for protection against accidental release. Control from driver's seat shall not be permitted. Outside control shall consist of nondetachable opening device designed to prevent hitching to but to permit opening when necessary.

c. Emergency door shall be equipped with slide bar, cam-operated latching device, having a minimum stroke of 1 inch. Emergency door latch shall be equipped with suitable electric plunger type switch connected with buzzers as required by FMVSS. Switch shall be enclosed in a metal case, or durable case of other material, with rounded, protected edges. Wires leading from switch shall be concealed in bus body. Switch shall be so installed that plunger contacts farthest edge of slide bar in such a manner that any movement of slide bar will immediately close switch circuit and activate buzzer. Door latch shall be equipped with interior handle that extends approximately to center of emergency door. It shall lift up to release.

d. Emergency door controls, labeling, and warning device shall meet requirements of FMVSS 217. There shall 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 shall be red on a white background and lettering shall be minimum ½ inch.

e. Each bus shall also be equipped with push-out type emergency exit side windows that comply with FMVSS 217 and National School Transportation Specifications and Procedures, Revised 2000, when used with the roof hatch(es) specified below. These windows shall be of similar design to standard side windows, except for the following:

   (1) Window assembly shall be hinged on the forward side and include a latching device for securing in the normal (non-emergency) position and to allow emergency opening.

   (2) Each window shall be equipped with a switch to activate a buzzer when the emergency opening latch is released.

   (3) The lettering "EMERGENCY EXIT" shall be located on or above the window, inside and outside the bus.

   (4) Shall not be placed next to any of the forward-most seats required to be spaced at 28.5 inches of knee room.

   (5) Emergency windows shall be installed in the following numbers on standard 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

   (6) Wheelchair lift equipped buses shall have the minimum number of emergency exit windows required by FMVSS # 217.

f. Buses 35 capacity and smaller shall be equipped with 1 roof hatch-type emergency exit/ventilator. Buses over 35 capacity shall be equipped with 2 roof hatch-type emergency exit/ventilators. Specifications for roof hatch(es) shall be as follows (also see **WARRANTIES, page 12):**

   (1) Shall comply with all requirements of FMVSS 217 for emergency exits.

   (2) Hinge(s) shall be located on forward and rearward side of hatch.

   (3) Shall be equipped with an outside release to allow opening emergency exit from outside bus.

   (4) Shall be labeled "Emergency Exit" inside and out and shall be labeled with instructions for release inside and out.

   (5) Shall provide a "partially open" position along full width of hatch adequate to allow air to enter or exit and thereby ventilate bus by opening either the front or rear of the hatch. Hatch shall allow for partial opening on any of its 4 sides and on all 4 sides simultaneously.

g. All school bus bodies built under these specifications shall meet the requirements of FMVSS 217 and National Specifications, Revised 2000, related to emergency exits.

9. EMERGENCY ROADSIDE REFLECTORS

There shall be 3 reflector-type warning devices, meeting the requirements of FMVSS 125, mounted in a location accessible to driver in front section of bus and stored in a container. The container shall be sealed with a breakable, nonreusable seal.

10. FIRE EXTINGUISHER

a. A dry chemical-type fire extinguisher with a gauge and designed to restrain tampering shall be mounted in a place accessible to driver, preferably near service door.

b. Fire extinguisher shall bear label of Underwriters' Laboratories, Inc. showing rating of not less than 2A-10BC.

10. FIRST-AID KIT

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

b. Number of units and contents shall 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

11. FLOOR AND FLOOR COVERING

a. Floor shall be of prime commercial quality steel of at least 14 gauge or other metal at least equivalent in strength to 14 gauge steel. Floor shall be level from front to back and from side to side except for wheelhousings, toeboard, and driver's seat platform areas.

b. (1) Floor Sills - There shall be 1 main body sill at each side post and 2 intermediate body sills on approximately 10 inch centers. All sills shall be of equal height not to exceed 3 inches. All sills shall extend the width of body floor except where structural members or features restrict area. Main body sill shall be equivalent to or heavier than 10 gauge and each intermediate sill shall be equivalent to or greater than 16 gauge, or each of all body sills shall be equivalent to or heavier than 14 gauge. All sills shall be permanently attached to floor.

(2) Connections between sides and floor system shall be capable of distributing loads from vertical posts to all floor sills.

c. Driver's compartment plate on conventional body shall be removable, installed on level with bus floor. All components requiring servicing must be readily accessible. Openings in bus floor to meet this requirement shall be reinforced to maintain full strength of unpunctured floor.

d. Body floor shall have an access hole for removal and repair of fuel tank sending unit.

e. All Type B, C, and D body manufacturers shall provide an access cover in the body floor adequate to allow removal of the fuel pump without lowering the fuel tank. This requirement applies to all chassis equipped with an in-tank electric fuel pump.

NOTE: **Items a-e above do not apply to Type A1.** For Type A1 the floor shall provide adequate and firm support for seat legs and shall have a minimum 1/2 inch pressure-treated plywood securely attached to floor. Plywood shall be all veneer APA rated sheathing marked EXP1 or EXT. Preservative treatment shall be minimum 0.40 pounds of chromated copper arsenate per cubic foot of plywood. Marine grade plywood may be supplied as an alternative if approved by the Department of Education. Basic floor construction of Type A1 buses shall be manufacturer's standard, meeting applicable FMVSS.

f. Floor in underseat area, including tops of wheelhousings and toeboard, shall be covered with smooth surfaced elastomer covering, or approved equal, having a minimum thickness of .125 inch. Floor covering shall be flame resistant and shall have a rating of SE/NBR (self-extinguishing/no burn rate) when tested in accordance with FMVSS 302. Floor covering shall be ultra-violet, ozone, and moisture resistant and have a minimum tensile strength of 1200 psi and a minimum elongation of 100 percent. Floor covering shall be abrasion resistant and slip resistant and have a minimum coefficient of friction of 0.85 as measured under ASTM D 1894 or 0.65 as measured under ASTM D 2047.

g. Covering from top step landing area to emergency door (or rear seat on Type D rear engine buses) shall be ribbed aisle-type fire-resistant elastomer, non-skid, wear-resistant. Minimum overall thickness shall be .1875 inch measured from top of ribs. Elastomer floor covering shall meet Federal Specification ZZ-M-71d.

h. Floor covering must be permanently bonded to floor and resist cracking when subjected to sudden changes in temperature. Adhesive material used shall be waterproof and of the type recommended by manufacturer of floor covering material.

i. Landing area at top of steps shall be ribbed elastomer, which shall extend to the ribbed aisle floor cover. The leading horizontal edge, or nosing, shall be white ribbed elastomer or other contrasting color and shall have an integral 90 degree turn down with a square leading edge matching the step treads.

j. All joints or seams in the floor covering shall be covered with non-ferrous metal, minimum 1 inch wide and .095 inch thick, weight .09 per linear foot, providing driver's compartment, except at cowl, shall have a special approved molding. Alternate materials may be used if they provide equivalent durability to the above requirement. Molding shall be securely attached to prevent a tripping hazard.

k. All holes in the chassis firewall and around transmission cover and engine housing shall be adequately sealed.

l. Districts may replace the above-required flooring material with a commercially available truck bed liner material having equivalent or better physical properties to the required flooring material.

12. FUEL FILLER OPENING

An opening of adequate size and design shall be provided over fuel filler. Also see **LETTERING AND TRIM, page III-15.**

13. GRAB HANDLE AT ENTRANCE

A suitable grab handle or rail shall be provided at the front entrance, securely mounted inside of body. Grab handles shall be made of round stainless steel, 1 inch OD, tubing minimum of 18 gauge or stainless architectural tubing minimum .018 inch thickness over 18 gauge steel insert. Grab handle and mounting shall 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.

HEATER / DEFROSTER

See **ELECTRICAL EQUIPMENT AND WIRING, page III-5.**

14. INSPECTION

Purchase of school buses or bus bodies under this specification shall include the right to inspection of the product before, during, and after manufacture by any appropriate state agency or county agency of the state of Florida.

15. INSULATION AND SEALING OF JOINTS

a. Thermal insulation material, if provided, shall be of a type that will not harbor dampness, shall be fire-resistant, and must be approved by Underwriter's Laboratories, Inc.

b. Overlapping of edge of exterior roof and side panels and also the top edge of rub rails shall be sealed to prevent moisture, dust and other contaminants from entering the joint and the bus.

16. LETTERING AND TRIM

Trim on 3 rub rails below belt-line and all lettering shall be black (except for stop signs). Entrance door frames, pilaster panels and other trim panels may be painted black if approved by the Department. Letters of words SCHOOL BUS on top front and rear section of bus body shall be 8 inches high and correspond to Series B, Standard Alphabet (see National Specifications). (Name of District) DISTRICT SCHOOLS, on each side of bus body at belt-line shall be in 6 inch minimum letters. Private and charter schools may alternately affix the name of the school in the aforementioned format and location. Numbers shall be in 6 inch minimum height and on each side and on front bumper and rear of bus body. EMERGENCY DOOR shall be in 2 inch letters at top or directly above door, visible inside and outside of bus. Lettering to indicate fuel type shall be located on body adjacent to fuel filler opening using minimum 1 inch letters. The words "STOP WHEN RED LIGHTS FLASH" shall be displayed on the back of all buses in 6 inch black letters. Also see lettering requirements for roof hatches and push out windows under **EMERGENCY EXITS, page III-12**. Districts may add an American flag decal to the exterior of the bus. If used it shall be no more than 6 inches x 10 inches and be located in front of the district name on the belt line of the bus. Also see United States Public Law 4USC7.

Front stop signal arm (both sides of arm) and rear stop arm (rear side only) shall have red background with a reflectorized white border and the letters STOP shall be in 6 inch white reflectorized letters. Both sides of the front stop arms and the rear side of the rear stop arm shall have reflectorized red sheeting of high intensity-type material. Material shall be warranted for 10 years against cracking, delamination, bubbles, wrinkles, or significant color changes (such as fading of red background); warranty shall include full replacement of material (not including labor). The front side of the rear stop arm shall be painted red in color. Also see **WARRANTIES, page 12.**

NOTE: Buses shall include the lettering and trim specified above, and may include, but shall be limited to, lettering, trim, symbols, markings, and coloration specified in the National School Transportation Specifications and Procedures, Revised 2000.

17. LICENSE HOLDER

License holder shall be on left rear outside of body with suitable method for mounting license tag.

18. LOCKUP DEVICES

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

19. MIRROR SYSTEM

a. **Interior Mirror:** Shall provide adequate viewing of the entire length and width of the interior of the bus and be at least 6 inches X 30 inches. Mirror shall include the following characteristics:

(1) Shall utilize a 1/8 inch thick tempered safety glass mirror lens that meets or exceeds ANSI Z97.1 requirements for safety glazing in mobile environments and is bonded to the mirror housing.

(2) Shall include a heavy duty single piece mounting bracket that fastens both to the front and bottom of the header panel in order to ensure stability.

(3) Housing shall be constructed of aluminum and shall be powder coated low gloss black.

(4) Shall incorporate a single knob (thumbwheel) adjustment to allow the driver to reposition the mirror without the use of tools.

(5) Shall have a soft gasket type frame that is bonded to the housing.

NOTE: Interior mirror on Type A1 shall be minimum 50 square inches and meet the above requirements.

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

(1) Cross/side-view Mirror System: The cross/side-view mirror system shall provide the driver with indirect vision of an area at ground level from the front bumper forward, and the entire width of the bus, to a point where the driver can see by direct vision. The system shall also provide the driver with indirect vision of the area at ground level around the left and right front corners of the bus to include the tires and service entrance on all types of buses to a point where it overlaps with the rear vision mirror system. This mirror system shall incorporate the following features or requirements:

(a) Only 1 mirror shall be installed at each front corner of the bus.

(b) Mirrors shall not reflect excessive glare from the bus headlights or the sun into driver's eyes. Mirrors shall be a ¼ sphere or shaded ½ sphere design.

(c) Any fasteners used in the construction of the mirror and mounting brackets shall be stainless steel.

(2) Rear Vision Mirror System: A rear vision mirror system shall be provided which incorporates the following features and requirements:

(a) System shall consist of 1 aerodynamic mirror head, containing 1 flat and 1 convex mirror lens per side. Each mirror set shall be mounted on a single breakaway arm with positive detent or lock. The arm shall be mounted such that it holds the mirror from the top when possible. Type A1 buses may be exempted from this requirement if no such bracketry is available.

(b) Each of the 4 required mirrors in the rear vision mirror system shall be electrically operated remote control rear view mirrors.

(c) For Type A2, B, C, and D buses, the convex mirrors shall be minimum 38 square inches and flat rear view mirrors minimum of 61 square inches of mirror surface. For Type A1 buses, the convex mirrors shall be minimum 28 square inches and flat rear view mirrors minimum of 61 square inches of mirror surface.

(d) Any fasteners used in the construction of the mirror and mounting brackets shall be stainless steel.

(3) Overall exterior mirror system (cross/side-view and rear vision mirrors) shall incorporate the following features and requirements:

(a) Mirrors shall be isolated from vibration.

(b) Certification of compliance of the system with FMVSS 111 shall be provided as required by the Department of Education. Also see **WARRANTIES, page 12.**

20. PAINT AND FINISH

a. Prior to the application of the finish coats to body, hood, and cowl, all surfaces shall be cleaned of grease, foreign matter, excessive body caulking, and sealing material and treated as per paint manufacturer's recommendation for proper paint adhesion. National School Bus Yellow paint shall meet National Specifications for color and shall 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 **WARRANTIES, page 12**. Paint shall be applied for a total dry thickness of at least 1.8 mils over all painted surfaces. School bus roofs shall be painted white in color, and shall meet the above 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 shall be black except that bumpers may be striped in accordance with National Specifications or these specifications. Lead-free paint shall be used on all interior and exterior surfaces of the body and chassis. Also see **WARRANTIES, page 12** for warranty requirements, **STRUCTURAL DESIGN, page III-20** for required metal preparation, **LETTERING AND TRIM, page III-15,** and **REFLECTIVE MARKINGS, page III-17.**

b. The interior of the bus body shall be painted with light gray paint meeting the following color specifications:

L* = 77.37
a* = - 1.17
b* = - .69

21. PANELING, EXTERIOR

a. Exterior paneling includes all sheet metal skin forming exterior surface of body.

b. Exterior paneling should be of 20 gauge steel minimum thickness and shall be attached to bow frames and strainers to act as an integral part of structural frame. All joints shall be designed and constructed to provide maximum structural integrity and elimination of water and dust intrusion. There shall be no sharp edges that could cause injury to persons around the outside of the bus.

All joints of roof panels shall be lapped the full width of supporting members and shall be attached along each side of supporting member to form a watertight joint. Also see **STRUCTURAL DESIGN, page III-20,** and **INSULATION AND SEALING OF JOINTS, page I-7**.

22. PANELING, INTERIOR

a. Interior of body shall be lined with panels securely fastened to adjoining parts in an acceptable manner. If ceiling is constructed so as to contain lapped joints, exposed edges shall be beaded, hemmed, flanged or treated to minimize sharp edges. Fastenings shall minimize vibrations and rumble and be installed to facilitate removal. A cove molding, which may be an extension of body panels, shall be installed covering wall to floor joint beginning at windshield post on left side of bus and extending along walls around corners to service door on right side. Molding shall be securely fastened so that dirt will not readily work under it.

b. Interior paneled area immediately below window line shall be aluminum-coated steel. Exposed edges of interior paneling shall be beaded, hemmed, flanged, or treated to eliminate sharp edges.

23. PUBLICATIONS

Each Florida school board that is delivered 1 or more bus bodies shall be furnished a parts catalog and a parts price list. 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 number. Part descriptions should be annotated appropriately with the part number, a proper description (part name), and the quantity required for the application illustrated on the drawing.

PUPIL WARNING LIGHTS AND PUPIL CROSSING ARM

See **ELECTRICAL EQUIPMENT AND WIRING, page III-5.**

24. REFLECTIVE MARKING PACKAGE

There shall be installed a reflective marking package as specified in the National Specifications for School Buses, Revised 2000. This package shall include markings for the front, rear, both sides, and front and rear bumpers. Striping on sides of bus shall be 2 inches wide meeting the ASTM D-4956-90 Type 5 reflective sheeting standard. Front and rear bumper striping shall cover as much of the height and width of the bumper as is practical, minimum 8 inches in height. Striping shall be installed longitudinally the length of the body at the vertical location immediately below the seat level rubrails 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.

25. RUB RAILS

a. There shall be 1 rub rail on each side of bus approximately at seat level, which shall extend from entrance doorpost around bus body (except for emergency door) to point of curvature near cowl on left side.

b. There shall be rub rails located approximately at the floor line and bottom of outer skirt which shall cover same longitudinal area as upper rub rail, except at wheelhousings, and shall extend only to radii of right and left corners.

c. Rub rails shall be attached twice at each body post and at all other upright structural members.

d. Rub rails shall be 4 inches or more in width, shall be of 16 gauge steel, and shall be constructed in corrugated or ribbed fashion.

e. Rub rails shall be applied outside of body panels. Pressed-in or snap-in rub rails do not satisfy this requirement.

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

a. Seats shall be mounted forward-facing and provide a minimum of 12.8 inches of seat width per passenger seating position. The aisle shall be 12 inches minimum. This plan of body seating shall determine seating capacity.

b. Seat spacing shall meet the requirements of Federal Motor Vehicle Safety Standard 222. The first 3 seats on each side of all Type B, C, and D buses, and the first seat on each side of all Type A buses shall be spaced at 28.5 inches of knee room. The rest of the passenger seats shall provide for a minimum of 25 inches knee room at each seat with a measurement to be made at the center of the reference point. In making this measurement from back of seat cushion to back of seat or barrier in front, upholstery may be placed against padding both forward and rear, but padding may not be compressed. All seats set at 28.5 inches seat spacing shall have FMVSS 210 and/or 225 compliant anchorage points, as approved by the Department.

NOTE: Type D school bus bodies over 39 feet in length may provide for a minimum of 24 inches knee room in seats behind the third row.

c. All passenger seat bottoms shall be securely attached to the seat frame with devices that allow the seat bottom to pivot forward without becoming detached from the frame. This device shall be constructed of a gauge of metal that resists deformation. The seat bottom shall also have a latch at the rear that is operable without tools. These devices shall have rounded or protected edges.

d. Seat padding shall be secured to the frame in a non-snag manner. Screws and bolts used in seat back construction shall not be exposed.

e. Modesty panels and passenger seats, including seat back and entire bottom cushion (including underside), shall be covered with vinyl-coated material. All passenger seat assemblies and modesty panels shall meet the requirements of the 2000 National Specifications, School Bus Seat Upholstery Fire Block Test. Upholstery material for all passenger seats and barriers shall meet the following color standard +/- four delta E:

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

f. Buses shall have an FMVSS type padded barrier in front of the forwardmost passenger seat on each side of the bus. Also see Section V for barrier requirements for wheelchair lift equipped buses. Modesty panels at entrance side and driver's side shall 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, page III-5.**

g. If required by Florida Statutes, all buses ordered starting January 1, 2001, shall 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 shall be manufacturer's standard style lap belts. The nonadjustable buckle end of each belt shall be the aisle-side connection point on each passenger seat.

(3) Each 2-part belt shall be separately color coded to aid in proper connection.

(4) The nonadjustable buckle end of the belt shall extend from the seat bight at least 12 inches, and the male end shall extend at least 38 inches.

(5) 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.

(6) Retractable seat belts are permissible at the purchaser's option. If this system is specified, the retractors shall be emergency locking type, and the retractors must be mounted below the seat bight.

(7) All federal requirements shall supercede any of these requirements that are in conflict.

(8) 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 shall comply with FMVSS 209, 210, and 213 as applicable, and shall be approved by the body manufacturer.

h. All buses shall also be equipped with a durable webbing cutter having a full width handgrip and a protected, replaceable blade. The required belt cutter shall be mounted in a location accessible only to the driver in an easily detachable manner.

27. SERVICE DOOR

a. Service door shall be a split type or jackknife type located at right front of bus. Doors shall be securely hinged with approved heavy-duty hinges with brass or rust resistant rod adequately fastened to adjoined member. Doors shall have a 1 1/2 inch minimum safety gap sealed with a safety flap of approved quality. Door shall extend to bottom step and be fitted with suitable weather-strip to restrain water entering step well.

b. An air operated entrance door shall be provided on all air brake equipped buses. This system shall 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 shall operate in accordance with the following table:

Ignition Switch Position	Door Switch Position	Emergency Dump Switch Position	Door Position / Status	Stepwell 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

Additionally, when the key switch is in the off position this 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.

c. Hydraulic brake buses shall have a manually controlled entrance door. A double-bearing epoxy-coated mechanical control shall be mounted within comfortable reach of driver on a firm and substantial support and lock in off-center position. On models with service doors opening outward, there shall be installed an approved safety latch. Control shall have a smooth machined handle and the rod to the door shall be epoxy-coated

d. Service door shall have minimum horizontal opening of 24 inches and minimum vertical opening of 68 inches. Immediately above the door opening there shall be secured to body panel a high-density foam rubber pad, minimum 3 inches width, or approved equal safety cushion.

e. Doors shall be so designed and weather-strips mounted so that there is no binding or tendency for stripping to dislodge during door operation. 1 or 2 glassed-in openings shall be provided in each door half with glass of same grade as specified on side windows and mounted in rubber. Bottom of lower glass panel shall not be more than 30 inches from ground when bus is unloaded. Top of upper glass panel shall not be more than 3 inches from top of door.

28. SIZES OF BODIES

The maximum overall length of any bus shall be 45 feet; maximum overall outside width of all bodies shall be 102 inches. Height of body from top of finished floor to underside of ceiling, at center of body, shall be a minimum of 72 inches.

29. STEP WELL

A step well of at least 3 steps shall be built in the right front assembly enclosed with doors extending to bottom step. Each step shall be covered with abrasion resistant "Pebble-Top" type elastomer, the base of which shall be at least 3/16 inch thick, with an overall thickness of 5/16 inch bonded to durable polymer base and otherwise constructed to provide substantial support, including the leading horizontal edge which shall be Pebble Top type, white or a color that contrasts with the step tread by at least 70 percent. The polymer backing shall have an integral 90-degree turn down with a square leading edge for slip resistance. The lower (first) step height shall be between 10 and 14 inches above the ground for all Type A1, A2, B, and C buses. Type D buses shall have a first step height 12 to 16 inches from the ground. 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: 2 steps acceptable on Type A1 buses.

STOP ARMS

See ELECTRICAL EQUIPMENT AND WIRING, page III-5.

30. STRUCTURAL DESIGN

a. Details of design shall have a direct relationship to specifications for grades of steel in the latest edition for the design of Light Grade Cold-Formed Steel Structural Members of the American Iron and Steel Institute. Material used in the body frame structure shall conform to chemical and mechanical requirements of the listed specifications or other published specifications, including tensile and yield points, which establish properties and suitability of the steel for school bus body test code and safety requirements. All Type A, B, C, and D bodies shall meet the requirements of FMVSS 221 and the requirements of the 2000 National Specifications, Side Intrusion Test.

b. All welds used in construction of body shall conform to latest applicable specifications of the American Welding Society.

c. Welds, rivets, or high-strength bolts may be used in connecting parts of the structural body. Additional methods of body construction, such as structural adhesive, may be approved at the discretion of the Department. All bolts shall have provision to prevent loosening under vibratory loads. All bolts, nuts, washers, and screws used throughout the body shall be cadmium or zinc plated, or thoroughly treated in an approved manner for prevention of rust.

d. All metal used in construction of bus body shall be zinc or aluminum coated before construction, provided that for metals 12 gauge or less in thickness, either zinc or aluminum coating shall be mill-applied for these components: (a) service door panels, (b) emergency door panels, (c) guard rails, (d) all exterior body panels, (e) wheelhousings, (f) body posts and roof bows, (g) side strainers, (h) roof strainers, (i) window caps, (j) window visors where used, (k) all floor section panels and floor sills; excluded are door handles, interior decorative parts, and other interior plated parts. All metal parts that will be painted shall be chemically cleaned, etched, zinc-phosphate-coated, and zinc-chromate or epoxy-primed, or conditioned by equivalent process. Any areas from which primer is removed for any purpose, such as sanding, grinding, welds, etc., must be thoroughly cleaned and treated as specified and primer applied. Rivets used in assembly shall be zinc-phosphate treated unless coated with rust prevention material and primed as specified. In providing for these requirements, particular attention shall be given to lapped surfaces, welded connections or structural members, cut edges, metal in which holes are punched or drilled, closed or box sections not vented or drained, and surfaces subjected to abrasion during vehicle operation.

e. As evidence that above requirements have been met, samples of materials used in construction of the bus body, when subjected to 1,000 hour salt spray test as provided for in latest revision of ASTM, Designation: B 117, "Standard Method of Salt Spray (Fog) Testing," shall not lose, after rubbing to remove corrosion, more than 10 percent of material by weight.

f. The front end assembly shall be sufficiently heavy to withstand vibrations transmitted to it through chassis cowl. Windshield or corner posts must be of sturdy construction, designed so that they will not be so wide as to unnecessarily obstruct driver's view. Body shall be fastened to chassis cowl in an approved waterproof manner.

g. All bus bodies shall be constructed in square and level. There shall be no more than 1 inch of difference from side to side and front to rear of the bus body (not counting any chassis lean or twist). All bodies shall be mounted such that all designed body contact points are in contact with the chassis frame. All bodies shall be centered on the chassis but shall be no more than 1/2 inch off of dead center.

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 shall comply with all other applicable requirements above.

31. SUN SHIELD

A dual sun shield system shall be provided, consisting of 2 independently mounted sun visors. 1 shall be mounted above the windshield and the other above the driver's window. Each visor shall include the following design characteristics:

a. Shall have a tinted Plexiglass sun shield, minimum 6 inches X 24 inches, and have rounded bull nosed perimeter edges and radius corners.

b. Shall utilize a black anodized aluminum mounting system that includes 2 universal pivot joints, a 12 inch tube arm with internal pivots, a 17 inch horizontal knob-tensioned slide with nylon bearings, and a 4-bolt header mounting bracket. All pivot joints shall have adjustable tensioning provided by hex screw and include bearing washers for long life. The mounting system shall provide for universal adjustability.

NOTE: Manufacturer's standard sun visor acceptable on Type A1 buses.

32. TAILPIPE

For all Type A, B, C, and D buses, the body manufacturer shall install a tailpipe or extension with a turndown to direct exhaust downward away from the bus floor. The turndown shall extend beyond the exterior surface of the rear bumper, but may not extend more than 2 inches beyond it.

33. TESTING OF BODY

Load test of body shall meet the requirements of Federal Motor Vehicle Safety Standard 220.

34. UNDERCOATING

Entire underside of body including floor members, wheelhousings, and side panels below floor level shall be coated with fire-resistant asphalt base, rubber base, or other undercoating material, applied by spray method to seal, deaden sound, insulate, and prevent oxidation. Any undercoating material used shall be asbestos- free.

35. VANDAL BOX, SIDE MOUNTED

There shall be installed on all Type B, C, and D buses an equipment compartment on the ceiling above the driver's side window, measuring approximately 33" X 10" X 9" or providing equivalent space to the aforementioned size compartment. The compartment shall 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.

36. VENTILATION

Body shall be equipped with an effective exhaust type ventilation system, noncloseable type installed in low pressure area of roof, capable of ejecting foul air under all operating conditions. System shall be adequately weatherproof and dustproof.

37. WARRANTIES

Bids submitted under this specification shall include a warranty covering materials and workmanship for a period of at least 1 year. See component warranties under **Warranties, page 12.**

38. WHEELHOUSINGS

Wheel housings shall be constructed of 18 gauge or heavier steel and be rigidly reinforced, shall be attached to floor and side panels in such manner as to prevent water or dust from entering body, and shall be designed for easy removal of tires. For materials, see **STRUCTURAL DESIGN, page III-20**; for covering, see **FLOOR AND FLOOR COVERING, page III-13**.

39. WINDOWS

a. Tinted glass which provides maximum tinting allowed by Federal and ANSI standards for the windshield, driver's side window(s) and service door glass and which also includes tinted glass in all windows rear of the driver's compartment with a light transmission of approximately 28 percent shall be required on all Type A, B, C, and D school buses.

b. An adjustable split sash window shall be mounted in side of bus body between each framing post. Safety glass shall be set in an acceptable manner in a sturdy extruded or die formed frame to provide adequate support for glass. Permanent mark showing grade of glass shall be visible and glass shall be a minimum of 1/8 inch thick.

c. A minimum clear vertical opening of not less than 9 inches shall be provided by lowering top sash. Bottom sash shall be stationary. Movable window shall be controlled by approved lock having finger-touch opener providing for ease of operation and shall have no injury prone 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 shall be installed and unit shall provide ample protection from leakage in hardest rain.

d. For ventilation purposes, the driver's window shall be adjustable and shall be equipped with a positive latch that can be secured from the inside of bus.

e. There shall be installed, in rear door, 2 windows, 1 upper, 1 lower, set in rubber 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 emergency door shall be a minimum of 750 square inches. Glass shall be same type as for side windows.

f. Rear side windows located at each side of emergency door shall be set in rubber in waterproof manner. The use of adhesives in place of the required rubber may be approved at the discretion of the Department. Glass area shall be large enough to provide desirable vision to rear and shall be of same quality and grade as for side windows.

g. Galvanized steel or aluminum, each designed to near equal stiffness, as determined by inspection to give adequate support to glass, shall be used for window frames.

h. Districts may use Lexan™ or equivalent in locations other than the windshield when replacing OEM glass, except where prohibited by FMVSS.

40. WINDSHIELD

Front body section in area of windshield shall provide for corner vision and be fitted with curved glass, 3 or 4-piece flat glass, or 2-piece flat glass as approved by the Department of Education. Glass shall be laminated safety polished plate with dark tint at top, set in rubber in a waterproof manner and slanted to reduce glare. The use of adhesives in place of the required rubber may be approved at the discretion of the Department. Glass shall meet current SAE specifications and Federal Motor Vehicle Safety Standards. Light tint may be used in Modified Forward Control Type B and all Type D buses in lieu of dark tint at top.

41. WINDSHIELD STEPS AND HANDLES

A step and appropriate grab handle shall be installed on each front corner of body to facilitate cleaning of windshield. The handle shall 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 shall provide for secure mounting and adequate hand hold. Handle shall be contoured and formed to provide a comfortable and safe grip.

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

42. WINDSHIELD WIPERS AND WASHERS

a. Electrical windshield wipers shall be standard on all buses. All wipers by design and installation shall provide desirable vision for drivers. Heavy-duty motor(s) shall be provided and equipped with blades of sufficient length and heavy-duty arms to clear windshield glass in driver's direct view. 1 switch shall control both wipers, and the switch shall be located within easy reach from driver's seat, preferably on the turn signal stalk. The system shall incorporate a variable delay wipe feature to allow drivers to adjust the speed and frequency of the wipers. Wiper system shall be designed to move blades away from driver's direct view when in stop position.

b. Windshield washers shall be electrically operated. The washer reservoir shall be made of hard plastic or other approved material and have a capacity of at least 1/2 gallon. Flexible plastic bags are not acceptable.

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

WIRING

See **ELECTRICAL EQUIPMENT AND WIRING, page III-5.**

TYPE B MODIFIED FORWARD CONTROL, AND TYPE D FRONT ENGINE BODY EXCEPTIONS

1. The distance between barrier at rear of entrance step well and engine cover shall be a minimum of 13 inches.

2. A step, in lieu of stirrup steps, is permitted in or on the front bumper, both sides.

3. Engine cover shall be made of metal or an approved equal and shall provide adequate seal to the bus floor area to keep engine fumes from entering the passenger compartment and shall be insulated to retard transfer of heat and engine noise. Engine cover shall 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

1. Engine compartment shall be constructed to permit servicing of engine, having 1 or 2 doors opening at rear and louvered, removable panels on each side of engine compartment. Engine compartment must be sealed at top and front to retard heat transfer and prevent engine fumes from entering passenger compartment. Provisions shall be made for easy removal of engine through rear compartment.

2. Mud flaps shall be installed at rear of dual wheels.

3. Engine air intake, meeting chassis manufacturer's approval, shall be installed in approved manner to outside of body.

4. A step, in lieu of stirrup steps, is permitted in or on the front bumper, both sides.

5. Front end construction of body shall be designed to prevent distortion and vibration. Forward outer panel shall be substantial for mounting headlamps and turn signals. Provisions shall be made for servicing steering gear.

6. Bus body shall have an emergency door located on left side of bus body, hinged in front, supplemented by a rear emergency window over motor, hinged at top. There shall be an open access of at least 12 inches in width from the center aisle to the side emergency door. There shall 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 shall be red on a white background and lettering shall be minimum ½ inch. A flip seat meeting FMVSS 222 is acceptable. Any flip seat must be free of sharp projections on the underside of the seat bottom. The underside of flip up seat bottoms must be padded and covered to remove the possibility of injury during use. Emergency door and windows shall meet FMVSS 217. Emergency window over engine compartment shall be minimum of 16 inch X 54 inch. This window must be capable of being unlatched and opened to the hold-open position by an elementary age student. Emergency Exit Windows and Roof Hatches shall meet the same requirements listed previously for all other buses under **"EMERGENCY EXITS, page III-12."**

7. Rub rails may terminate at the engine compartment.

8. Exhaust system tailpipe must exit behind the rear axle, and to the rear of the passenger compartment, but does not have to exit under or behind the rear bumper.

9. Type D Rear Engine buses are exempted from the requirement for an additional electrical compartment for air conditioner circuitry provided the air conditioning control boards are installed in the rear package shelf area in a covered box.

10. There shall 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 TYPE A1, A2, B, C, AND D BUSES

1. BAGGAGE COMPARTMENTS

Option on all bodies where available. This body option shall include a lock, and be keyed-alike with any other body option requiring use of a key.

2. DIESEL NOISE REDUCTION PACKAGE

Option for a diesel noise reduction package, which shall include full insulation of ceiling, walls, and front and rear of bus (including body bows), plus minimum ½ inch pressure treated plywood covering the floor. Plywood shall be all veneer APA rated sheathing marked EXP1 or EXT. Preservative treatment shall be minimum 0.40 pounds of chromated copper arsenate per cubic foot of plywood. 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 shall 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.

2. FLIP-UP SEAT

Option for a flip-up type seat in the first passenger seating position behind the driver.

4. 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 shall include:

a. Pupil Warning Lamps, both **RED and AMBER**, front and rear.

b. Tail Lamps

c. Back-up Lamps

d. Rear Turn Signal Lamps

e. Stop Lamps

A system that monitors only electrical circuits and does not indicate whether the bulb is operational is not acceptable. See **PUBLICATIONS, page III-17** for parts manual requirement for optional components.

5. STRAIGHT FLOOR/ FLAT FLOOR

a. Option on any size bus where 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 shall remain 72 inches as per standard body specifications.

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

6. **FUEL SUPPLY LOCK**

A lock with 2 keys may be installed in the fuel supply service door of the body skirt. This body option shall be keyed alike, with any other body option requiring use of a key.

7. **REAR HEATER**

Option for an additional heater mounted to provide heat in the rear of the body. This option shall be installed under a passenger seat or shall be otherwise protected to eliminate damage to the unit and injury to the students. Shall have a minimum 80,000 BTU rating.

8. **BUS LOCK-UP SYSTEM**

Optional whereby a bus can be locked at emergency as well as entrance door. Ignition interlock required for emergency door to prevent starting bus if emergency door is locked. This body option shall be keyed alike with any other body option requiring use of a key.

9. **PUBLIC ADDRESS SYSTEM (P.A.), RADIO**

Option for a public address system/AM/FM stereo radio with 4 speakers inside the bus and 1 heavy duty weatherproof P.A. type speaker outside the bus with 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 shall be flush mounted. Outside speaker shall be mounted under the hood or in another protected location at the front of the bus. See **PUBLICATIONS, page III-17** for parts manual requirements for optional components. AM/FM stereo radio with 4 speakers may be offered separately. Internally mounted speakers must not be located in the driver's area.

10. **RED LIGHT ABOVE EMERGENCY DOOR**

Option for a small red light to be mounted above the emergency door on the interior of the bus, activated whenever the clearance lights are on.

11. **POWDER- COATED WINDOW FRAMES**

Option for electrostatically powder-coated window frames on all types of buses to reduce friction and improve ease of operation of passenger side windows.

12. **HIGH HEADROOM BODIES**

Option for bus bodies with nominal 77 inch headroom.

13. **TAILPIPE THROUGH BUMPER**

Option, where available, for a tailpipe through the bumper, in lieu of the standard tailpipe. This tailpipe shall not require a turndown, and shall extend at least to exterior surface of rear bumper, but no more than 2 inches beyond it.

14. **TRACK SEATING**

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

15. **MOTION MASTERS DRIVER'S SEAT DAMPENING SYSTEM**

Option to add the Motion Master dampening system to any suspension type driver's seat where available.

16. **INFANT SEATING**

Option for passenger seating designed to safely transport newborns, infants, or toddlers and meeting all applicable Federal Motor Vehicle Safety Standards as follows:

a. C.E. White Child Restraint Seat.

b. Other systems as approved by the Department of Education.

17. **POWERED ROOF VENTS**

Option for powered roof vent incorporated into each emergency roof exit/vent. These vents shall flow at least 650 cfm of air and be designed such that rain will not leak in at any time. This option shall also include an additional 6 inch fan mounted in the windshield area, operated by a separate switch.

18. **SCHOOL BUS LOCATION AND TRACKING SYSTEM**

Option for system that will use the Global Positioning System (GPS) to wirelessly report the real-time location of the bus to Transportation Administration. The system may also include systems that will identify individual students and report the locations and times they boarded and disembarked the bus.

19. **ROOF MOUNTED HEAVY DUTY AIR CONDITIONING**

Temporary option for roof mounted heavy duty, transit style air conditioning system. On rear engine buses this option shall include the transit style (o5K) compressor. On all other buses this option may include roof mounted condensers, evaporators or both. This system must exceed in all respects the current air conditioning option.

20. **3-POINT SEAT BELTS AND 3-POINT SEAT BELT SEATS**

Option for 3-point seat belts in 2 and 3 passenger 3-point seat belt seats, as approved by the Department of Education.

SECTION IV

BODY SPECIFICATIONS

EXCEPTIONAL CHILD BUSES

TYPES A, B, C, AND D BUSES

MINIMUM BODY SPECIFICATIONS, EXCEPTIONAL CHILD BUSES TYPE A, B, C, and D

1.0 GENERAL REQUIREMENTS FOR EXCEPTIONAL CHILD BUSES

Exceptional child bus body structure and equipment shall 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 shall be added as specified in the body standards.

All school buses equipped with wheelchair lifts shall meet the requirements of this section.

A power-up, gravity down lift shall be made available based on local district needs on all type wheelchair-lift equipped bodies. All wheelchair lifts shall meet the requirements of the Americans with Disabilities Act (except where requirements herein exceed ADA), plus all requirements listed herein. Other ADA requirements for non-lift equipment are not applicable.

National School Transportation Specifications and Procedures, Revised 2000, shall also be applicable, including dynamic testing requirements for mobile seating device 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 special needs students.

2.0 TECHNICAL REQUIREMENTS

The wheelchair lift shall meet the technical requirements below.

2.1 GENERAL LIFT AND/OR BODY REQUIREMENTS

2.1.1 Weight

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

2.1.2.2 The lift shall 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 curb geographics.

2.1.3 Boarding Direction

See ADA requirements contained in 49CFR, Part 38.

2.1.4 Location of Lift and Door Requirements

2.1.4.1 Whenever possible, the option shall 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.

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

2.1.4.3 Door posts, headers, and floor sections around this special opening shall be reinforced to provide strength and support equivalent to adjacent sidewall and floor construction of an unaltered model.

2.1.4.4 A drip molding shall be installed above opening to effectively spill water away from entrance.

2.1.4.5 All doors must open outwardly.

2.1.4.6 All doors shall be weather sealed. Design shall provide positive means of holding door, or doors, in open position during lift operation. Friction type catches are not acceptable. This specification shall 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).

2.1.4.7 When manually operated dual doors are provided, rear door shall have at least a 1-point fastening arrangement to header. The forward mounted door shall be constructed so that a flange on the door overlaps the edge of rear door when closed and have at least 3- point fastening devices. 1 shall be to the header, 1 to the floor line of the body, and the other shall be into the rear door. These locking devices shall afford maximum safety when doors are in the closed position. When single door is used, locking device shall meet requirements for emergency door lock. Door hinge(s) shall be adequately heavy duty to prevent sagging of door over the useful life of the bus. A single door may be used to enclose a clear door opening of no more than 43 inches in width. All lift entrances shall have a clear, finished door opening height of at least 56 inches.

2.1.4.8. Door materials, panels, and structural strength shall be equivalent to the conventional service and emergency doors. Color, rub rail extensions, lettering, and other exterior features shall match adjacent sections of the body.

2.1.4.9. Each door shall have a glass window set in rubber compatible with and set to the lower line of adjacent sash.

2.1.5. Padding and Protective Covering

2.1.5.1. Pinching movements, shear areas, or places where clothing or other objects could be caught or damaged shall be covered or in other ways protected to prevent passenger injury when lift is in operation.

2.1.5.2. The outermost stationary frame structure of the lift exposed to the passenger compartment shall 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. Dimensions

2.2.1.1. Platform Width: Minimum 32 inches; See ADA requirements contained in 49CFR, Part 38.

2.2.1.2. The minimum clear length of the lift platform as measured between the outer barrier and the inner edge or roll stop shall be 40 inches. For further requirements, also see ADA requirements contained in 49CFR, Part 38.

2.2.2. Protrusions and Openings

2.2.2.1. Protrusions: See ADA requirements contained in 49CFR, Part 38.

2.2.2.2. The lift platform shall not have any openings greater than 3/4 inch in width, except for a hand hold not exceeding 1½ inch X 4 inch located midway between the edge barriers.

2.2.3. Gap

When a lift is at the floor loading and unloading position, there shall be no gap between the vehicle floor and the lift platform. This condition shall be achieved by means of a bridge plate or similar device.

2.2.4. Platform Deflection

The lift platform shall not deflect more than 3 degrees in any direction when tested in accordance with Durability Tests, Section 3.1.3.

2.2.5. Surface and Construction

The platform surface shall be constructed of material having sufficient structural strength, and which provides for visibility through the lift platform when the lift platform is in its stowed position. Lift platform surface shall be slip resistant. No metal screws are to be used in fabrication of platform assembly.

2.2.6. Edge Guards, Outer Barrier, and Inner Roll Stop

2.2.6.1. Platform Edge Guards: See ADA requirements contained in 49CFR, Part 38.

2.2.6.2. Outer Barrier: The design of the folded barrier shall allow easy loading and unloading of the wheelchair and occupant by the operator. See ADA requirements contained in 49CFR, Part 38.

2.2.6.3. Inner Roll Stop: See ADA requirements contained in 49CFR, Part 38.

2.2.7. Handrails

See ADA requirements contained in 49CFR, Part 38.

2.2.8. Platform Lighting

2.2.8.1. The bus body shall have a light providing sufficient illumination (at least 1 foot candle) of the lift platform at ground level to provide safe loading and unloading.

2.2.8.2. There shall also be a flush-mounted dome-type light located on the inside ceiling of the bus above the lift opening. Both of the above lights shall 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 shall have a lift capacity of 800 pounds uniform load.

2.3.2. Structural Safety Factor

The structural safety factor shall 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 manufacturer recommended procedures, a wheelchair lift structure shall be designed to have a useful life equal to the useful life of the vehicle on which it is used.

2.3.4. Interface with the Vehicle

2.3.4.1. Installation of the wheelchair lift shall not reduce or in any way compromise the structural integrity of the vehicle and shall 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, shall 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 shall extend laterally beyond the normal width of the vehicle.

2.3.4.4. The lift shall 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 shall be installed in such a manner so as not to interfere with the movement of wheelchairs through the bus aisle. The unit shall be enclosed to prevent transported students from coming in contact with it and shall be readily accessible to service personnel for routine service and for maintenance. When hydraulic pump and drive motor are installed below the floor level, they shall be enclosed in a box accessible through a door installed in the body skirt.

2.3.4.6. Fold-out type lifts utilizing 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 steel grade 8 bolts and self-locking, corrosion resistant nuts (2 bolts per stanchion assembly required). Parallelogram type lifts must provide for extra support or bracing under the floor where attached.

2.3.4.7. All lift mountings shall be secured with nuts, bolts, and lock washers. Lag bolts shall 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 which 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 shall be at least 6 based on the ultimate strength of the material.

2.4.1.2. Hydraulic components shall comply with all applicable Society of Automotive Engineers Standards. These Standards include, but are not limited to, the following:

SAE J 190 - Power Steering Pressure Hose - Wire Braided
SAE J 191 - Power Steering Pressure Hose - Low Volumetric
SAE J 514APR80 - Hydraulic Tubing Fittings
SAE J516JUN84 - Hydraulic Hose Fittings
SAE J517JUN85 - Hydraulic Hose

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

2.4.2. Platform Free-fall Limits

See ADA requirements contained in 49CFR, Part 38.

2.5 Control Systems

2.5.1. Control Unit

2.5.1.1. The control unit shall be a console or box with combination operating and function switches.

2.5.1.2. The control unit location shall allow the lift operator to have an unobstructed view of the platform during lift operation and shall allow the lift operator to be on or off the vehicle during lift operation.

2.5.1.3. The control unit shall be located in a position that minimizes its damage during use of the lift. The control unit wiring loom shall be designed and installed to minimize the possibility of the wiring becoming entangled in the lift mechanism.

2.5.1.4. The control console shall have simple instructions on it that direct the operator in the lift operating procedures.

2.5.2. Control Functions

The complete wheelchair lift shall be fully automatic, including folding and unfolding of the platform.

The lift control system shall have at least 4 designated operating functions as defined:

2.5.2.1 Up - raises lift platform, while maintaining an operating position.

2.5.2.2 Down - lowers lift platform, while maintaining an operating position.

2.5.2.3 Fold - moves lift platform from an operating position to a stowed position.

2.5.2.4 Unfold - moves lift platform from a stowed position to an operating position.

2.5.3. Control Operating and Function Switches

2.5.3.1. The control system shall consist of integrated operating and function switches, such that selection of any function also operates that function.

2.5.3.2. The function integrated switches shall be labeled with the functions defined in Control Functions, Section 2.5.2. Labeling shall be engraved or otherwise made equally durable.

2.5.3.3. The integrated operating and function switches shall require continuous force to operate the lift; and release of the switches shall stop lift motion.

2.5.3.4. The integrated operating and function switches or inherent lift design shall not allow the operation of more than 1 function at a time.

2.5.4. Jacking Prevention

The control system or inherent lift design shall prevent the operation of the lift from jacking the vehicle and causing damage to the vehicle or the lift.

2.5.5. Interlocks and Safety Features

2.5.5.1. A door switch or interlock shall be provided to prevent operation of the lift if the lift door is closed and latched. In addition, a red warning light located in the driver's area, easily visible from the driver's position must be provided and shall be continuously illuminated or flashing if the lift door is not fully closed and latched and the ignition switch is on.

2.5.5.2. An inherent design feature of the lift shall prevent stowing or folding of the lift when the platform is occupied.

2.5.6. Wiring and Motor Requirements

2.5.6.1. Wiring shall be in accordance with SAE Recommended Practice SAE J1292 OCT. 81 and referenced Standards, except when good engineering practice dictates special conductor insulation.

2.5.6.2. Any power-up, power-down electrohydraulic lift shall be equipped with a permanent magnet type motor.

2.5.6.3. There shall be a ground strap installed on each lift pump motor from the motor to an adequate vehicle body or chassis ground point.

2.5.7. Lift Operational Requirements

See ADA requirements contained in 49CFR, Part 38.

2.6 Manual Operation

The lift shall be provided with a manual back-up system. The manual back-up system shall include provisions for simple operation of each of the following functions under actual field conditions by a minimum fifth percentile adult female, in the event of emergency or power failure:

2.6.1 Rapid unfolding of the lift platform from the stowed position to floor level.

2.6.2 Lowering of lift from floor level to ground level (under rated load).

2.6.3 Raising of lift from ground level to floor level (under rated load).

2.6.4 Folding of lift platform from floor level to stored position.

No tools other than those provided and stored on the lift shall be required for manual operation. Releasing of the lift platform for manual unfolding and resecurement after manual folding shall be easily accomplished when the platform is in any stowed or partially stowed position during which failure could occur.

All instructions necessary to operate the manual backup system shall be provided in locations visible during manual operation and shall be clearly labeled. The lift platform outer edge barrier must be operable during manual operation of the lift.

3.0 TESTING, CERTIFICATION, INSPECTION, AND WARRANTIES

3.1 Design Tests

The tests defined in Design Tests, Section 3.1 and any additional testing specified in ADA requirements, shall be performed on 1 representative production unit of the wheelchair lift model purchased.

Unless otherwise specified, the lift shall meet the requirements given in Technical Requirements, Section 2.0, when attached to a fixture that simulates a bus installation and when supplied by electric, hydraulic, air, or other power source of output equal to that normally available on the bus. Only 1 representative production unit is required to be tested for certification, with all tests of Durability Tests, Section 3.1 conducted on the same unit without any repairs or maintenance during the test other than that permitted by Maintenance During Tests, Section 3.1.10.

3.1.1. Durability Tests

The following tests shall be performed without failure in the order given.

3.1.1.1. Vertical Cycling Tests. The lift platform shall be operated up and then down through its maximum vertical operating range for 15,600 cycles with a load of 800 pounds for the first 600 cycles and 600 pounds for the remaining cycles. The ambient temperature for the first half of the cycles in each of these tests shall be at least 110°F. The tests may be continuous or separated into groups of not less than 10 cycles with nonoperating periods of not more than 1 minute between each cycle in the group. The platform shall raise and lower smoothly throughout the test with vertical and horizontal accelerations not exceeding 0.3 g.

3.1.1.2. Deployment Cycling Test. The lift platform of an automatic lift shall be folded and unfolded for 10,000 cycles. The ambient temperature for the first half of the cycles shall be at least 110°F. The tests may be continuous or separated into groups and may have nonoperating periods between cycles as specified in Vertical Cycling Tests, Section 3.1.1.1.

3.1.1.3. Combination Vertical and Deployment Cycling Test. The tests in Vertical Cycling Tests, Section 3.1.1.1. and Deployment Cycling Test, Section 3.1.1.2., may be combined into a single test that meets the minimum requirement of both tests.

3.1.2. Low Temperature Operation Test

After 16 hours of exposure to a temperature not higher than 20°F, the wheelchair lift shall be operated unloaded through 10 or more cycles of unfolding, lowering, raising, and folding and through 10 or more cycles of raising and lowering with an 800 pound load. Each cycle shall be separated by at least a 30 minute cooling period at a temperature not higher than 20°F. The lift shall meet all performance requirements while operating at the exposure temperature.

3.1.3. A static load of 600 pounds shall be applied through the centroid of a test pallet placed at the centroid of the platform. The platform shall be raised and lowered with this weight. During the lift operation the platform shall not deflect more than 3 degrees in any direction from the loaded position and its unloaded position.

3.1.4. Self-Damage Tests

The controls shall be held in operating position for 5 seconds after the unloaded lift meets resistance to its travel under each control position with any limit switch disabled. The test shall be performed twice at each lift position of unfold, fold, full up at floor level, and full down at ground level.

3.1.5. Power and Equipment Failure Test

A failure of power, chain cable, hydraulic hose, or air hose that allows the lift to deploy or the platform to lower shall be simulated. The wheelchair lift shall comply with Platform Free-fall Limits, Section 2.4.2., during this test.

3.1.6. Reserved

3.1.7 Static Load Test

A static load of 2,400 pounds shall be applied through the centroid of a test pallet placed at the centroid of the platform when the platform is positioned at its raised position. The length and width dimensions of the test pallet shall be 24 inches X 24 inches to correspond to the approximate outer dimensions of a wheelchair "footprint." The load shall remain on the platform not less than 2 minutes. After the load is removed, an inspection shall be made to determine if fracture has occurred.

3.1.8. Vehicle Interface Test

This test shall be or shall have been conducted on a lift installed in a representative vehicle model. A static load of 1,200 pounds shall be applied through the centroid of a test pallet placed at the centroid of the platform when the platform is positioned at its raised position. The length and width dimensions of the test pallet should be 24 inches X 24 inches. The load shall remain on the platform not less than 2 minutes.

3.1.9. Visual Inspection

At the conclusion of any test described in Design Tests, Section 3.1 except Static Load Test, Section 3.1.7. with all loads removed, the parts of the wheelchair lift or bus body, if applicable, shall show no condition of fracture, permanent deformation, wear that would exceed manufacturer's tolerances, perceptible impairment, or other deterioration that would be dangerous.

3.1.10. Maintenance During Tests

During the Durability Tests of Section 3.1.1., the inspection, lubrication, maintenance, and replacement of parts (other than bulbs and fuses) may be performed only as specified in the manufacturer's maintenance manual for the lift and at intervals no more frequent than specified in the manual. Maintenance specified for certain time intervals shall be performed during the vertical cycling and deployment cycling tests at a number of cycles that is in the same proportion to the total cycles as the maintenance period is to 36 months. Certification of durability testing by the lift manufacturer shall include a record of all maintenance performed and parts replaced, including the number of cycles and time at which each maintenance operation and parts replacement was performed.

3.1.11. Testing Certification

The wheelchair lift manufacturer and bus body manufacturer, as applicable, shall provide written certification of compliance with the tests specified in Design Tests, Section 3.1. Certification shall be submitted to the Florida Department of Education.

3.2 Installation Certification

The body manufacturer shall submit with the bid written certification that the lift will be installed according to lift manufacturer's specifications and these specifications.

3.3 Warranty

A statement of warranty shall be provided with each lift assuring the quality of materials and workmanship of the product for at least 2 years from the date of acceptance by the final consumer. The warranty shall provide 100 percent coverage for parts. Also see **WARRANTIES, page 12.**

4.0 MAINTENANCE, TRAINING, AND SERVICE

4.1 Documents

A comprehensive operator's, maintenance, and parts manual(s) shall be provided 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 drawing.

Any maintenance actions that, if done improperly, could result in an unsafe condition must be identified and clearly emphasized in the maintenance manual. All components which must be isolated or identified for ease of troubleshooting and diagnosis, such as electrical wiring and components or hydraulic lines, hoses, or valves, must be clearly identified in the service manual as to their specific functions and relation to other parts.

4.2 Maintenance and Inspection

Scheduled maintenance tasks shall be related and shall be grouped in maximum bus mileage intervals. Routine scheduled maintenance actions, such as lubrication and adjustments, shall 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 shall occur at even multiples of the vehicle mileage for lower level tasks.

4.3 Maintenance Accessibility

All systems or components serviced as part of the periodic maintenance of the lift, whose failure may cause a safety hazard or a road call, shall 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 shall be responsible for providing or arranging wheelchair lift service training as needed. This training shall include minimum 1 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 to be arranged by the Department of Education and the successful bidder. At least 1 seminar on each given lift model shall be conducted per 5 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 shall be designed to accommodate positioning and securement of wheelchairs or other passenger-carrying devices in a forward-facing orientation, and shall 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) shall be minimum 50 inches longitudinally X 30 inches laterally. Each section of required tie down track shall be unbroken, and the full length of the wheelchair position.

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 shall be required to meet the requirements of FMVSS 302 on Flammability of Interior Materials.

5.1.5 No sheet metal screws or lag bolts shall be used in the wheelchair/occupant securement system or body attachment points.

5.1.6 Occupant securement straps shall be black or other dark color and wheelchair securement straps shall be gray, beige, or other lighter color to distinguish the separate functions.

5.2 Technical Requirements for Wheelchair/Occupant Securement System

5.2.1 Wheelchair securement system shall have 4-point tiedowns, incorporating 4 flexible, adjustable straps to include the following: Tie down straps and occupant securement shall be Sure-Lok kit numbers FF612-4C-7 or FF612S-4C-7 or Q'Straint kit number Q-8106-L or Q-8206-L or equal approved by the Department.

5.2.1.1 The 4 straps shall each be retractor type and shall be interchangeable.

5.2.1.2 Each strap shall be equipped with a positive spring-lock type end fitting on floor end.

5.2.1.3 The system shall have multiple floor-mounted attachment points (longitudinally) to bus body or to attachment hardware for wheelchair securement straps. Attachment point hardware shall be equivalent to Sure-Lok or Q'Straint anodized flanged series L button track. To meet this requirement, 4 parallel sections of track shall be longitudinally mounted to the bus floor. The sections shall be located at approximately 4 inches, 13 inches, 24 inches, and 33 inches, respectively, from the body sidewalls, measured perpendicularly from the body interior sidewall to the center of each track. This track spacing must be adjusted as necessary in order that a 30 inch and 39 track seating seat will fit into this track system. Each track section shall be 1 continuous piece the length of the wheelchair position. There may be a short break in the outer track to accommodate a fuel filler neck if required. This tracking system shall be inset into the required plywood floor (see Diesel Noise Reduction Package, Section 11.0) such that it is flush with the bus floor. Trim pieces shall be added as necessary to cover all exposed flooring edges. Also see Diesel Noise Reduction Package, Section 11.0, for requirements for plywood floors.

5.2.1.4 The securement system for the wheelchair shall be designed to meet the strength requirements specified in FMVSS 207 and, additionally, if occupant restraints are to be attached to wheelchair securement straps, the requirements for seat belt anchorage strength specified in FMVSS 210. The specified wheelchair used to establish and test for these strength requirements shall be a Fortress 655 FS Standard Adult or equivalent (with batteries).

5.2.1.5 All floor tracking shall be anodized aluminum, or other material of equal or better strength that will resist corrosion in Florida's environment.

5.2.2 Occupant securement system shall meet the following requirements and shall 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 System shall be equipped with a single-point, push-button quick-disconnect for the lap belt sections and the lower end of the upper torso strap. Lap belt (if attached directly to floor) and upper end of shoulder strap shall have multiple attachment points (longitudinally) to bus body or attachment hardware. Attachment points are to be spaced at increments not to exceed 4 inches center-to-center. Attachment point hardware for lap belt (if applicable) shall 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 shall be equivalent to Sure-Lok or Q'Straint Series L track (button track). This track shall be 1 unbroken section running the full length (50 inches) of the wheelchair position and positioned above the passenger windows.

5.2.2.3 Body attachment hardware on occupant straps shall incorporate positive spring lock-type end fittings or other means of providing positive securement and quick attachment or release.

5.2.2.4 Upper torso belt and each portion of lap belt shall be adjustable and shall accommodate the size and height range of occupants specified in FMVSS 209.

5.2.2.5 Occupant securement system shall 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 body header area necessary to meet these anchorage requirements for occupant securement shoulder strap shall 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 MODESTY PANELS (CRASH BARRIERS)

6.1 There shall 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 shall be a padded modesty panel (crash barrier) 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 shall be a padded crash barrier or seat in front of any wheelchair position unless it is contiguous with and behind another wheelchair position. The forward-most barrier on both sides of the bus shall 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 shall be equipped with a padded stanchion from floor to ceiling with an aluminized modesty panel.

7.0 AISLE

The aisle leading from the wheelchair position to the emergency door shall be wide enough to allow a wheelchair to be moved between the 2 rows of seats in the event an emergency evacuation of the bus is necessary. The minimum required aisle width is 30 inches for buses with outside width of more than 90 inches and 28 inches for buses with outside width of 90 inches or less. 39 inch seats are acceptable forward of the wheelchair and lift positions.

8.0 SERVICE DOOR (REGULAR) ENTRANCE

8.1 Stainless grab rails shall be provided on each side of this entrance and shall be placed in such a manner as to afford easy accessibility to small children entering or leaving the bus. These rails shall extend low enough in the stepwell for an average 3 to 4 year old student to reach them while standing at ground level. Exception: Type A1 buses require only 1 grab rail.

8.2 When in open position, service doors shall not obscure any portion of grab rails.

9.0 SEATING ARRANGEMENTS

Flexibility in seating and spacing to accommodate special devices shall be 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 to be unsafe, inadequate, or not suitable for use in transportation of students with disabilities.

10.0 UNIVERSAL HANDICAPPED SYMBOL FOR BUSES EQUIPPED WITH WHEELCHAIR LIFTS

All buses with wheelchair lifts shall have 2 universal handicapped stickers. Each sticker shall be reflective white on blue, minimum 6 inch X 6 inch displaying the universally recognized symbol for vehicles transporting persons with disabilities. 1 sticker shall be located on the left (driver's) side of the front bumper and the other sticker at the right rear of the bus below the 4 inch brake/tail light. Rear sticker shall be located below the emergency window on Type D rear engine buses.

11.0 DIESEL NOISE REDUCTION PACKAGE

All wheelchair lift equipped buses shall include a diesel noise reduction package, as standard equipment, which shall meet all requirements of the Diesel Noise Reduction Package option listed in Section III, page III-24.

SECTION V

AIR CONDITIONING SPECIFICATIONS

TYPES A, B, C, AND D BUSES

SCHOOL BUS AIR CONDITIONING SPECIFICATIONS

TYPES A, B, C, AND D BUSES

The following specifications are applicable to all types of Florida school buses equipped with air conditioning and are in addition to all requirements for equipment in Sections I, II, and III. This section is divided into 3 parts. Part 1 covers Performance Specifications; Part 2 covers specific Equipment Requirements; Part 3 covers other requirements applicable to all buses.

1. PERFORMANCE SPECIFICATIONS

The installed air conditioning system shall cool the interior of the bus to 80°F measured at a minimum of 3 points, located 4 feet above the floor at the longitudinal centerline of the bus. The 3 points shall be 1) near the driver's location, 2) at the mid point of the body, and, 3) 2 feet forward of the emergency door or, for Type D rear engine buses, 2 feet forward of the end of the aisle.

The test conditions under which the above performance must be achieved shall consist of 1) placing the bus in a room (such as a paint booth) where ambient temperature can be maintained at 100°F, 2) heat soaking the bus at 100°F with windows open for at least 1 hour, and, 3) closing windows, turning on the air conditioner with engine at chassis manufacturer's recommended low idle speed, and cooling the interior of the bus to 80°F or lower within a maximum of 20 minutes while maintaining 100°F outside temperature.

Alternately, and at the Department's discretion, this test may 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 engine at manufacturer's recommended low idle speed. After a minimum of 1 hour of heat soaking, the system shall be turned on and must provide a minimum 20° temperature drop in the 20 minute time limit and maintain that temperature for at least 10 more minutes.

The manufacturer shall 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 above performance requirements.

2. EQUIPMENT REQUIREMENTS

NOTE: All units 47-capacity and larger shall consist of a dual (split) type system to provide redundancy of the air conditioning system. Such systems shall be totally separated so that failure in 1 part of the system will not affect the other side of the system, including separate systems for refrigerant condensers, evaporators, and electrical control.

a. Power Source and Compressor(s):

(1) Compressor(s) shall be chassis engine-driven.

(2) System shall 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.

(3) Compressor(s) shall be mounted in the safest area possible. Compressors shall not be mounted below the chassis frame rails. Size and other aspects are not specified since bus shall meet performance requirements outlined previously. Exception: Compressors on Modified Type B buses may be mounted below the frame rails provided they are protected by a durable metal skid plate.

b. Condenser(s):

(1) Condenser(s) shall be equipped with copper coils and aluminum or copper fins, except that any aluminum-coiled condenser provided by chassis manufacturer on Type A1 bus is acceptable.

(2) Body skirt-mounted condenser(s) are required on Type A2, B, C, and D buses. Condenser assembly(ies) shall include permanent magnet, ball bearing sealed motors for cooling fans, and case constructed of aluminum or other metal treated as specified for standard body sheet metal. All condensers mounted under the bus body shall have ventilation from the exterior of the bus body via a grate in the body side skirt.

(3) System shall be equipped with a sight glass (or at least 1 for each part of a split system) which is accessible and directly visible for checking the level of the refrigerant.

(4) Condenser(s) shall be mounted to isolate condenser(s) from vibration or excessive road shock. If condenser(s) is skirt-mounted, it shall be located forward of rear wheels on the left side of the bus whenever possible and shall be protected by splash shields or mudguards. If a condenser is mounted within 3 feet of the rear of any wheel, the bus is required to have mud flaps on both of those wheels and extra protection as necessary to ensure mud and road debris is directed away from the condenser.

c. Evaporators and Ducting:

(1) Type A1 buses shall be equipped as follows:

(a) Minimum of 2 evaporators required (1 front and 1 rear). Rear unit shall be ceiling or bulkhead mounted above emergency exit.

(b) Rear ceiling or bulkhead mounted evaporator shall provide that air blows forward; front evaporator shall blow toward rear.

(c) Evaporator cases and/or ducting systems shall be equipped with diffusers which are adjustable.

(2) Type A2, B, C, and D buses shall include an evaporator/blower assembly in the driver's area to direct air to the driver and passengers in addition to the main evaporator assemblies mounted at the rear of the bus. Side-mounted evaporator assemblies and/or ducting may be used on any unit. Location of front evaporator must provide for air directed at the school bus driver.

(3) For all buses:

(a) Evaporator cases, lines, and ducting (as equipped) shall 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 shall be designed and installed to be free of injury-prone projections or sharp edges. Installation shall not reduce compliance with any Federal Motor Vehicle Safety Standard (FMVSS) applicable to the standard bus, including FMVSS's 217, 220, 221, and 222. Any ductwork shall 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 or copper fins acceptable), except that front evaporator, if provided by Type A1 chassis manufacturer, may be aluminum cored.

(d) Air intake for any evaporator assembly(ies), except for front evaporator of Type A1, shall be equipped with replaceable air filter(s) accessible without disassembly of evaporator case.

(e) On wheelchair lift equipped buses, evaporator and ducting (if used) shall be placed high enough that they will not obstruct existing or potential occupant securement shoulder strap upper attachment points. This clearance shall 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 conditioning system may block the driver's view through any window.

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

(1) All system operating controls, including on-off switch(es), blower switch(es), and thermostat control(s) shall be accessible to driver in seated position.

(2) Blowers shall be a minimum of 2 speeds.

(3) Wiring shall be copper with color-coded insulation and shall be in a loom.

(4) System shall be equipped with at least 1 manually resettable circuit breaker per side to provide overload protection for the main power circuit feeding the evaporator blowers, condenser fans, etc.; system control circuits shall also have overload protection, but may be fused.

(5) All wiring, hoses, and lines shall be grommeted, routed, and supported to reduce wear resulting from heat, chafing, vibration, and other factors.

(6) All Type B, C, and D buses equipped with air conditioning shall also be equipped with a high idle system that will increase engine idle speed while the engine and air conditioning are operating and the transmission is in neutral. This system shall be disabled during performance testing as outlined in performance specifications.

(7) All flexible refrigerant hoses and fittings shall be the Quick Click or E-Z Clip system of hoses and end fittings.

(8) The total system shall be thermostatically controlled, with thermostats located at the evaporator assembly tied to remote thermostat control at the driver's location.

(9) Refrigerant shall be R134A.

e. Body and Insulation:

(1) Bodies of air conditioned buses shall be equipped with a diesel noise reduction package as standard equipment. See **DIESEL NOISE REDUCTION PACKAGE** in Section III, page III-24, for equipment specifications.

(2) All Type B, C, and D front engine bodies equipped with air conditioning shall also be equipped with a compartment mounted next to the battery box with external access for mounting circuit breakers and control circuitry for this option.

(3) Type D rear engine buses are exempted from the requirement for an additional electrical compartment for air conditioner circuitry provided the air conditioning control boards are installed in the rear package shelf area in a covered box.

3. **OTHER REQUIREMENTS APPLICABLE TO ALL TYPE A, B, C, AND D AIR-CONDITIONED BUSES:**

a. Warranty - Air conditioning 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 Warranties, Page 12, 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) - must be directly visible.

(3) Receiver-dryer (as equipped) - accessible for replacement; must not use sweat-type fittings.

(4) Expansion valve(s).

(5) Drive belts - for replacement and adjustment.

(6) System fuses and circuit breakers.

(7) Evaporator air filters - serviceable.

(8) All major component serial numbers - must be readily visible.

c. Parts and Service Manuals - shall be provided for entire system, including, but not limited to, compressor(s), wiring (includes wiring diagram) evaporators, condensers, controls, hoses, and lines. Parts catalog shall include a price list and 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 number. Part descriptions should be annotated appropriately with the part number, a proper description (part name), and the quantity required for the application illustrated on the drawings. Service manual shall 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 shall be provided with each air conditioned bus delivered.

e. Suspension Capacity and Ground Clearance - ground clearance at the lowest point of the air conditioning system shall be no less than the ground clearance of the bus at the step well. Any special chassis gross axle weight rating (GAWR) requirements required 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 contained in the chassis sections of Florida School Bus Specifications; any of the above-mentioned 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 conditioning system shall not reduce compliance of the finished bus with any Federal Motor Vehicle Safety Standard, including FMVSS 217, 220, 221, 222, and 301.

g. Air conditioning system manufacturer shall 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 which may be needed to accommodate the additional electrical demands imposed by the air conditioning system.

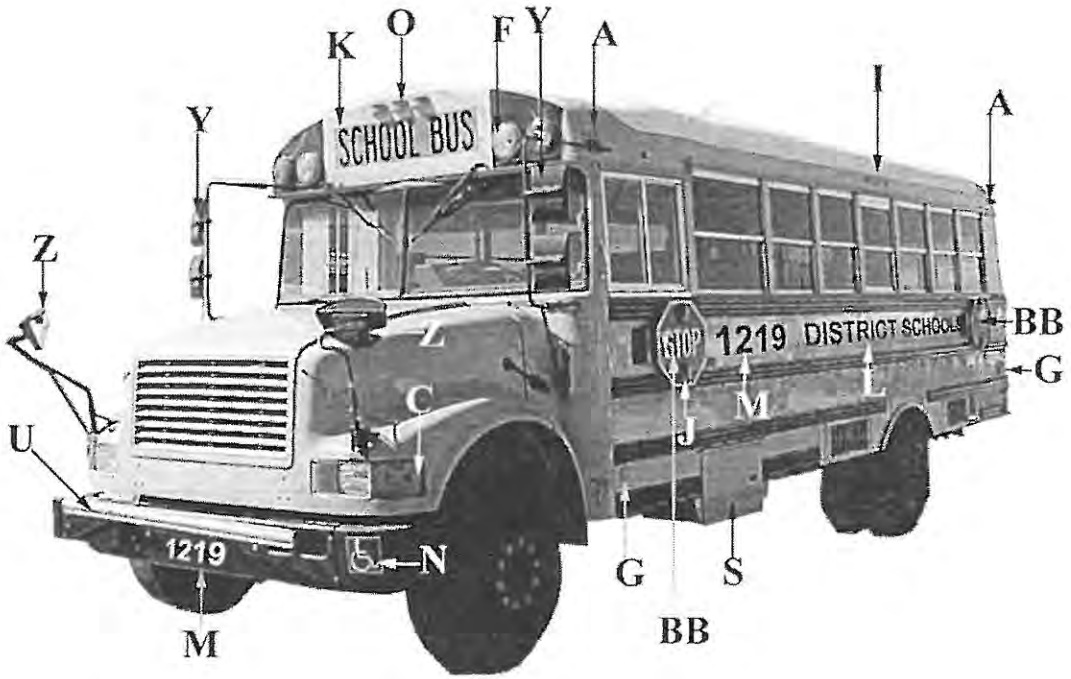
h. All air conditioning systems used on Type A2, B, C, and D Florida school buses shall be rated in BTUs using the International Mobile Air Conditioning Association, Incorporated (IMACA) Recommended Procedure 250 for vehicle air conditioning systems. Ratings shall be based on the procedures and conditions listed in Procedure 250 for rating condition "CITY." The following Type A2, B, C, and D school bus sizes shall have the following minimum BTU ratings for installed air conditioning systems:

29 – 47 capacity - 78,000 BTUs
48 – 66 capacity - 106,000 BTUs
67 – 89 capacity - 120,000 BTUs

These ratings shall not be construed to be recommended ratings, nor do these ratings relieve the manufacturer of the responsibility to meet the air conditioning performance requirements previously listed in this section.

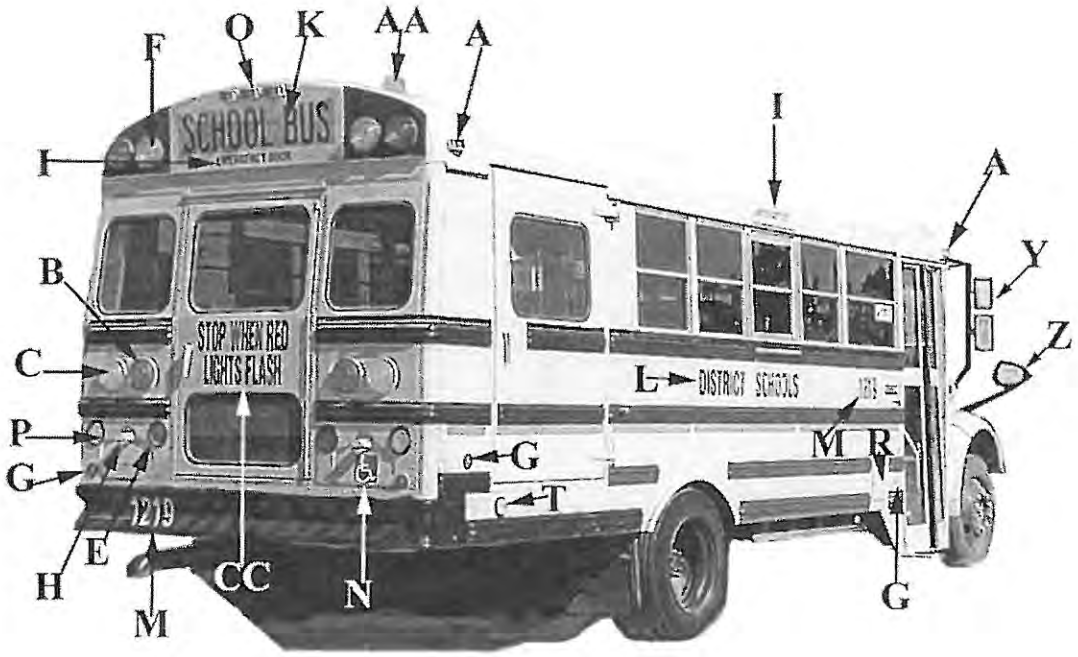
APPENDIX A

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	Bus Numbers
C	Front Turn Signals, (amber lenses)	N	Universal Handicapped Symbol, Wheelchair Lift Equipped Buses
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	4 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 retrorflective 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 CONDITIONING SYSTEM ITEMS

Warrantable Air-Conditioning System Component List:

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)

DEPARTMENT OF EDUCATION
JIM HORNE, COMMISSIONER
www.fldoe.org