

## CHANGES FOR 1995

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## **FOREWORD**

The Florida Minimum Specifications for School Buses, herein presented, were adopted by the Florida State Board of Education and became effective according to the provisions of Section 120.54, Florida Statutes.

The specifications for school buses, outlined in this document, are the official school bus specifications for Florida as authorized by Section 234.051, Florida Statutes, and are in effect until revised.



# FLORIDA MINIMUM SPECIFICATIONS

## General Information and 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 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 1990 National Standards for school buses 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.
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.

**NOTE:** Under the authority of Section 316.615, Florida Statutes, certain capacity size school buses owned, operated or leased by nonpublic school systems in Florida are required to meet the specifications prescribed herein.

5. **Definition of School Bus:**

**State Definition:** In Section 234.051, Florida Statutes: 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..."

6. **Type School Buses:**

Type "A" - A Type "A" school bus is a conversion or body constructed upon a van-type compact truck or a front-section vehicle, with a gross weight rating of 10,000 pounds or less, designed for carrying more than ten persons.

Type "B" - A Type "B" school bus is a conversion or body constructed and installed upon a van or front-section vehicle chassis, or stripped chassis, with a vehicle weight rating of more than 10,000 pounds, designed for carrying more than ten persons. Part of the engine is beneath and/or behind the windshield and beside the driver's seat. The entrance door is behind the front wheels.

Type "C" - A Type "C" school bus is a body installed upon a flat back cowl chassis with a gross vehicle weight rating of more than 10,000 pounds, designed for carrying more than ten persons. All of the engine is in front of the windshield and the entrance door is behind the front wheels.

Type "D" - A Type "D" school bus is a body installed upon a chassis, with the engine mounted in the front, midship, or rear, with a gross vehicle weight rating of more than 10,000 pounds, designed for carrying more than ten persons. The engine may be behind the windshield and beside the driver's seat; it may be at the rear of the bus, behind the rear wheels, or midship between the front and rear axles. The entrance door is ahead of the front wheels.

7. **Warranties: New Vehicles**

All warranties listed herein shall apply to all school buses manufactured after the effective date of these specifications and owned, operated, rented, contracted, or leased to any public school board in the state of Florida and any other such school bus sold through the state pool 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.

a. **Chassis**

- (1) Chassis warranty shall be manufacturer's standard, or minimum 12,000 miles or 12 months.
- (2) Diesel engines (including flywheel, flexplate and harmonic balancer) on Type B, Type C, and Type D units shall be warranted for 60 months/unlimited mileage, 100% parts and labor.
- (3) The chassis or component supplier for all Type "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% parts and labor: automatic transmission, drive shafts and U-joints, differential, rear axle housing, rear axles, and rear wheel bearings, but not including gaskets and seals covered under the basic 12 month/12,000 miles chassis warranty.
- (4) Paint finish coats to chassis hood, fenders, and cowl shall be warranted for 60 months (no mileage limit), 100% 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 four  $\Delta E$  from the centroid of the national standard.

During the 60 month warranty period the color coat shall not shift color more than eight  $\Delta E$  from the centroid of the national standard.

**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 three points under the stated minimum. All readings shall be taken after the bus is thoroughly washed to remove road film and dust.

b. Body

- (1) Body warranty shall be manufacturer's standard, minimum 12 months.
- (2) Wheelchair lifts on any bus so equipped shall be warranted for two 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 two years, including parts (excluding fluids and filters used in normal preventive maintenance) and labor with no warranty limitation on number of operating hours. 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 ten 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) Exterior mirror assemblies (including mounting bracketry) shall be warranted (100 percent parts replacement coverage) for five 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% 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 (no mileage limit), 100% 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 four  $\Delta E$  from the centroid of the national standard.

During the 60 month warranty period the color coat shall not shift color more than eight  $\Delta E$  from the centroid of the national standard.

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 three 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 % parts and labor) for five years, unlimited mileage against defects in material and workmanship and against leakage.
- (10) Driver's seat and pedestal shall be warranted (100% 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 five years, unlimited mileage, 100% parts and labor. This warranty shall not apply to vandalism of any exposed foam.

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

Any part of these specifications may be changed at any time upon adoption by the Florida State Board of Education.

Should a clarification or interpretation of these Florida School Bus Specifications be requested, inquiries should be directed to the **Administrator, School Transportation Management Section, Florida Department of Education, Suite 824, Florida Education Center, Tallahassee, Florida 32399- 0400.**

**SECTION I**

**CHASSIS SPECIFICATIONS**

**CONVENTIONAL SCHOOL BUSES**

**TYPE "C"**



**BASIC MINIMUM SPECIFICATIONS  
FOR GASOLINE AND DIESEL SCHOOL BUS CHASSIS  
FOR MOUNTING TYPE "C" CONVENTIONAL SCHOOL BUS BODIES**

1. **ALTERNATOR :**

100 amp. minimum rating; 50 amp. minimum output at manufacturer's recommended engine idle speed; dual belts or polyvee type belt, maximum ratio 2.5 to 1; sealed ball or roller bearings, meeting National Standards. 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.

2. **BATTERY(IES):**

**Gasoline** - One 475-cold cranking amps (CCA) minimum at 0°F, 12-volt; temporary frame mount location.  
**Diesel** - total of 1250 CCA minimum at 0°F, 12-volt; temporary frame mount location.

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:** Acceptable on chassis under 59-capacity only. Hydraulic brake models shall have power assist and shall meet National Standards for School Buses, Revised 1990, and all applicable Federal Motor Vehicle Safety Standards. Brake lining material shall not contain asbestos.
- b. **Air Brakes:** Acceptable on chassis under 59-capacity; required on chassis 59-capacity and larger. Air brake models shall meet National Standards for School Buses, Revised 1990, 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 59-capacity and larger 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 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.

**NOTE:** See pp. 16-17 for minimum lining area requirements applicable to hydraulic or air brake chassis equipped with four-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:**

To 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.**"

8. **DRIVESHAFT GUARDS AND SHIELDS:**

Required.

9. **ENGINE EQUIPMENT:**

Additional engine items required:

- a. Dry type air cleaner. An air filter restriction indicator is required on diesel engines.
- b. Oil filter(s): Engine shall be equipped with full-flow, spin-on, cartridge-type oil filter(s), with filter header(s) mounted directly to engine block.
- c. 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.
- d. A warning system consisting of light and buzzer required on diesel-powered chassis to notify driver of low engine oil pressure and/or coolant overheating.
- e. A fuel/water separator is required on all diesel engines. It shall be of a design and installation compatible with chassis/engine application to ensure trouble-free performance when properly maintained. The fuel/water separator filter may serve as the first (primary) engine fuel filter if approved by the engine manufacturer, or may be in addition to and ahead of the standard primary and secondary fuel filters on the engine. In no case shall the fuel/water separator assembly serve as the only fuel filter for the engine. In addition fuel/water separator shall meet the following requirements:
  - (1) Must be completely accessible for manufacturer's recommended servicing, with emphasis on underhood mounting location.
  - (2) Must have a clear drain (sight) bowl with a drain valve to allow detection and draining of accumulated water.
  - (3) Must contain a replaceable pleated paper element fuel filter of proper design to protect against premature fuel flow restriction or excessive passage of contaminants.
- f. An engine oil pressure gauge is required. It 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. 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: Shall permit controlled engine RPM up to manufacturer's recommended maximum for engine used.
- h. Ignition switch - controlled running and shutdown shall be provided. 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.

10. **ENGINE PERFORMANCE REQUIREMENTS**

a. Each bus shall be furnished with an engine 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%.
- (2) Gradeability of 5% at 25 miles per hour.
- (3) Gradeability of 1.5% at 50 miles per hour.
- (4) Top speed of 60 mph minimum.

b. Engine 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) Six 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%.
- (g) Road surface factor 1.200.
- (h) Vehicle height and width 10' X 8'.
- (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 one 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, which 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.

11. **EXHAUST SYSTEM:**

Corrosion resistant muffler; must extend 5 inches beyond chassis frame on stripped chassis. (See 1990 National Standards.) 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.

12. **FRAME SIDE MEMBERS:**

One piece construction

13. **FUEL TANK:**

30 gallon on 29 passenger unit; single 60 gallon required 47 capacity and larger chassis, spout located for ease in servicing. Gauge compatible with tank capacity meeting requirements of Federal Motor Vehicle Safety Standard 301.

14. **HEADLIGHTS:**

Must meet SAE. and Federal Standards and shall use a quartz halogen bulb.

15. **HORNS:**

Dual, 120 decibels. (See National Standards.)

16. **IGNITION SYSTEM:**

Electronic ignition system required on all gasoline engine-powered chassis.

17. **INSULATION:**

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.

18. **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

19. **ODOMETER:**

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

20. **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 National Standards 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 Standards or these specifications. Lead-free paint shall be used on all interior and exterior surfaces of the body and chassis. Also see WARRANTIES for warranty requirements.

21. **SHOCK ABSORBERS:**

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



22. **SPRINGS, FRONT:**

Double-wrap stationary end. (See requirements, pp. 16-17.)

23. **SPRINGS, REAR:**

Progressive type. (See requirements, pp. 16-17.)

24. **STEERING:**

Chassis 29-65 capacity shall have factory installed power steering, integral type. A factory installed tilt steering wheel/column is required.

25. **TIRES AND RIMS:**

Chassis shall be equipped with radial tubeless tires mounted on stud piloted disc wheels. Tires and rims shall conform to current standards of Tire and Rim Association. (See pages 16-17 for size.)

26. **TRANSMISSION, AUTOMATIC:**

**Automatic Transmission Required on all chassis.** Minimum 4-speed forward 29-65 capacity, Allison AT 545 or approved equal. An external filter in the transmission oil cooler return line is required.

27. **TURN SIGNALS:**

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

28. **VOLTAGE CONTROL:**

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

29. **WARRANTIES:**

See pages 6-7 for required Type "C" chassis warranties.

30. **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.

## TYPE "C" GASOLINE CHASSIS

**Maximum Design  
(Passenger) Capacity**

29

47

53

59

65

**EXCEPTION:** GMC or Chevrolet 350 cid gasoline engine not approved for Type "C" chassis.

Minimum GAWR

A. Front	5,000	5,500	7,000	7,500	7,500
B. Rear	10,500	14,200	16,160	17,500	17,500
Cowl to axle, minimum	123"	162"	194"	211"	229"
Approximate wheel base	150"	190"	218"	239"	257"
Front Suspension (axle) lb. min.	5,000	5,500	7,000	7,500	7,500
Rear (axle) lb. min.	11,000	15,000	17,000	17,500	17,500
Ea. front spring at ground	2,500	2,750	3,500	4,000	4,000
Ea. rear spring at ground (progressive spring)	5,250	7,500	8,500	8,750	8,750
Service brake-drum brake only (min. total sq. inch):					
Hydraulic	440	440	500	---	---
Full Air (7" shoe on rear axle of 59 & 65 Cap.)	---	---	---	663	663
Min. Tire Size: Tubeless-Radial Ply*	9R-22.5-F	9R-22.5-F	10R-22.5-F	10R-22.5-F	10R-22.5-F
Min. Wheel Rim Size:	6.75"	6.75"	7.50"	7.50"	7.50"
Stud-piloted Disc Wheels for Tubeless Radials	(6-hole)	(6-hole)	(10-hole)	(10-hole)	(10-hole)

\* Low-profile tubeless radial tires of size and load range meeting Tire and Rim Association Standards for the required GAWR's 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.

## TYPE "C" DIESEL CHASSIS

<u>Maximum Design (Passenger) Capacity</u>	<u>29</u>	<u>47</u>	<u>53</u>	<u>59</u>	<u>65</u>
Minimum GAWR					
A. Front	6,000	7,000	7,800	10,000	10,000
B. Rear	12,400	14,200	16,160	17,500	17,500
Cowl to axle, minimum	123"	162"	194"	211"	229"
Approximate wheel base	150"	190"	218"	239"	257"
Front Suspension (axle) lb. min.	6,000	7,000	8,000	10,000	10,000
Rear (axle) lb. min.	13,000	15,000	17,000	17,500	17,500
Ea. front spring at ground	3,000	3,500	4,000	4,500	4,500
Ea. rear spring at ground (progressive spring)	6,500	7,500	8,500	8,750	8,750
Service brake-drum brake only(min. total sq. inch):					
Hydraulic	440	440	500	---	---
Full Air (7" shoe rear axle of 59 & 65 Cap.)	---	---	---	663	663
Min. Tire Size: Tubeless-Radial Ply*	9R-22.5-F	9R-22.5-F	10R-22.5-F	10R-22.5-F	10R-22.5-F
Min. Wheel Rim Size: Stud -piloted Disc Wheels	6.75"	6.75"	7.50"	7.50"	7.50"
for Tubeless Radials	(6-hole)	(6-hole)	(10-hole)	(10-hole)	(10-hole)

\* Low-profile tubeless radial tires of size and load range meeting Tire and Rim Association Standards for the required GAWR's 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.

## SPECIFICATIONS FOR OPTIONAL CHASSIS EQUIPMENT IN TYPE "C" BUSES

1. **AIR BRAKES:**

Option for units under 59 capacity where available.

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. **AIR STARTER:**

Option for a lube free, vane type air starter with remote mounted relay valve, activated by the ignition switch.

4. **FRONT BUMPER FLEXIBLE ENDS:**

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

5. **HIGHER OUTPUT ALTERNATOR:**

Option for an alternator having a minimum of 75 amperes output at chassis manufacturer's recommended engine idle speed while maintaining chassis manufacturer's recommended regulated voltage and meeting all other requirements of the standard alternator.

6. **KEYED-ALIKE IGNITION SWITCHES:**

Option for ignition switches to be keyed alike from the manufacturer, i.e., any key from a purchased group of vehicles will operate any of the vehicles

7. **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 GAWR's.

8. **OIL-LUBRICATED FRONT HUBS:**

Option for oil-lubricated front axle hubs providing externally visible check of lubricant level.

9. **REAR SUSPENSION/TIRES OPTION:**

Option for rear suspension and tires with minimum 19,000 lb. GAWR on 59- and 65-capacity chassis. Tires supplied with this option to meet 19,000 lb. GAWR shall include front and rear tires of similar size and load rating.

10. **SHIFTER WITH PARK BRAKE POSITION:**

Option for a gear shift selector equipped with a Park Brake position above Reverse. Park Brake position shall be labeled "P" or "PB" and shall cause vehicle rear wheel park brakes to actuate. Shifter shall be equipped with a detent which must be released in order to change into the Park Brake position, or other means to prevent accidental shifting into the Park Brake position while vehicle is in motion.

11. **SILICONE HOSE:**

Option for a package including 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.

12. **SPARE DISC WHEEL:**

Option must be same size and type as original rims.

13. **TOW HOOKS:**

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

14. **ANTILOCK BRAKES**

Option for a four channel Antilock Braking System with independent controls for each wheel position and diagnostic LED s built into the control modules.

15. **STRAIGHT FLOOR CHASSIS**

Option for Type "C" 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.



**SECTION II**

**CHASSIS SPECIFICATIONS**

**TYPE "B" and "D" BUSES**





**A. BASIC MINIMUM SPECIFICATIONS TYPE "B" and "D"**  
**FRONT ENGINE SCHOOL BUS CHASSIS**

1. **ALTERNATOR:**

100 amp. minimum rating, 50 amp. minimum output at manufacturer's recommended engine idle speed; dual belt or polyvee belt drive maximum ratio 2.5:1; ball or roller bearings on drive and slip ring ends meeting National Standards. 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.

**NOTE:** Single belt approved if and only if one drive pulley and one driven pulley with no added pulleys are included and the combined belt wrap of the drive and driven pulley is 360 degrees. Direct gear driven alternator is an approved equal.

2. **BATTERY(IES):**

- a. **Gasoline** powered: shall have a minimum of one 12 volt battery, with a minimum of 475 cold cranking amps at 0 F., mounted in a slide-out tray in body skirt.
- b. **Diesel** powered : shall have a total of 1,250 cold cranking amps minimum at 0 degrees F. Batteries must be mounted in slide-out tray in body skirt.

3. **BRAKES, PARKING:**

Hydraulic brake models, Orscheln type control, or approved equal, foot operated or hand operated; air brake models, dash-mounted control valve to spring-set parking brakes on rear wheels:

**NOTE:** All 47 capacity Type "B" and "D" and larger chassis on which wheelchair lift-equipped bodies will 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. **Air Brakes:** All Type "B" and "D" models over 35-capacity shall be equipped with air brakes. Air brakes are acceptable 35 capacity and less. 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 and meet applicable requirements of National Standards for School Bus Chassis, 1990 edition, and applicable Federal Motor Vehicle Safety Standards. An approved desiccant dryer with automatic purge and drain cycle and a heating element is required on all air brake models. Drum brakes shall be cam-actuated. All slack adjusters (as equipped) shall be automatic adjustment type. 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 brake drums shall be outboard mounted; i.e.; drums shall be removable without removal of the axle hub. Air brake models must have minimum 12 CFM compressor, engine oil-fed. 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. All Type "B" units over 35-capacity, and 47-71 capacity Type "D" units with air-actuated drum brakes, must have a minimum rear brake shoe width of 7 inches. All Type "D" (transit) units over 71 capacity with air-actuated, four-wheel drum brakes must have a minimum total lining area of 750 square inches. Brake lining material shall not contain asbestos. 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, for Type "B" buses equipped with air brakes, brake S-cam rotation in same direction as forward wheel rotation. Rear axle of all Type "B" buses with air brakes shall be equipped with grease guards to divert oil or grease leaks away from brake linings in the event of a rear wheel seal leak.

- b. **Hydraulic Brakes:** Acceptable only on 29-35 capacity, Type "B" and 41 capacity Type "D"; must have approved power assist and meet all applicable requirements of National Standards for School Bus Chassis, 1990 edition, and applicable Federal Motor Vehicle Safety Standards. Brake lining material shall not contain asbestos.

**NOTE:** See page 28 for minimum lining area requirements for Type "B" chassis with four-wheel drum hydraulic or air 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 air bumper-type jack without permanent deformation of the bumper, bracketry, or chassis frame rail(s).

6. **DRIVELINE GUARDS:**

Required to prevent driveshaft from falling to ground if broken.

7. **ENGINE EQUIPMENT, REQUIRED:**

- a. Air cleaner, dry type. An air filter restriction indicator is required on diesel engines.
- b. Oil filter(s): Engine shall be equipped with full-flow, spin-on cartridge-type oil filter(s), with filter header(s) mounted directly to engine block.
- c. Governor shall permit controlled engine RPM up to manufacturer's recommended maximum for engine used.
- d. 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.
- e. Engine warning system consisting of buzzer and light required on all diesel-powered chassis to notify driver of low engine oil pressure and/or coolant overheating condition.
- f. 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.
- g. A fuel/water separator is required on all diesel engines. It shall be of a design and installation compatible with chassis/engine application to ensure trouble-free performance when properly maintained. The fuel/water separator filter may serve as the first (primary) engine fuel filter, if approved by engine manufacturer, or may be in addition to and ahead of the standard primary and secondary fuel filters on the engine. In no case shall the fuel/water separator assembly serve as the only fuel filter for the engine. In addition fuel/water separator shall meet the following requirements:
  - (1) Must be completely accessible for manufacturer's recommended servicing, with emphasis on underhood mounting location.
  - (2) Must have a clear drain (sight) bowl with a drain valve to allow detection and draining of accumulated water.
  - (3) Must contain a replaceable pleated paper element fuel filter of proper design to protect against premature fuel flow restriction or excessive passage of contaminants.
- h. Ignition switch - controlled running and shut down shall be provided. Running of engine shall require electrical current provided by the ignition switch in the "start" and "run" positions. Engine shutdown shall result when the 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.

8. **ENGINE PERFORMANCE REQUIREMENTS:**

- a. Each bus shall be furnished with an engine 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 compressors(s), if equipped) on and operating:
  - (1) Startability of 20%.
  - (2) Gradeability of 5% at 25 miles per hour.
  - (3) Gradeability of 1.5% at 50 miles per hour.
  - (4) Top speed of 60 mph minimum.
- b. Engine 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) Six 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%.
    - (g) Road surface factor 1.200.
    - (h) Vehicle height and width 10' X 8'.
    - (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 one 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).
  - (3) Minimum acceleration time (from zero mph), under conditions specified above, shall be as follows (measured in seconds):

**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, which are beyond the control of the chassis manufacturer may be taken into account.

**47-72 Capacity**

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" Buses**

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

c. Engine manufacturers may offer other additional engine configurations and horsepower ratings that exceed these requirements as optional equipment.

9. **EXHAUST:**

Corrosion resistant muffler and tailpipe. Must exit to left of left frame rail and behind rear wheels.

10. **FRAME SIDE MEMBERS:**

One piece construction, between front and rear spring hangers. Extension of frame length is permissible only when such alterations are not for purposes of extending or reducing wheelbase.

11. **FUEL TANK:**

Meeting requirements of FMVSS. 301. (See pages 28-29 for size tank required.)

12. **HEADLIGHTS:**

Must meet SAE. and Federal Standards and shall use a quartz halogen bulb.

13. **HORNS:**

120 decibels, dual. (See National Standards.)

14. **IGNITION SYSTEM:**

Electronic ignition system required on gasoline engines.

15. **LINE-SETT TICKET:**

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

16. **ODOMETER:**

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

17. **RADIATOR FILLER TUBE:**

Located for ease of service from outside of bus.

18. **SHOCK ABSORBERS:**

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

19. **STEERING:**

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

20. **TIRES AND RIMS:**

Chassis shall be equipped with radial tubeless tires mounted on stud piloted disc wheels. Tires and rims shall conform to current standards of Tire and Rim Association (see pages 28-29 for size).

21. **TRANSMISSION, AUTOMATIC:**

- a. Type "B" 29-35 capacity: Allison AT-542 or equivalent.
- b. Type "B" 47-71 capacity: Allison AT-545 or equivalent.
- c. Type "D" 41-71 capacity: Allison AT-545 or equivalent.
- d. Type "D" 78-89 capacity: Allison MT-643 or equivalent.
- e. All transmissions must include an external spin-on type, vertically mounted, transmission fluid filter in the transmission oil cooler return line.

22. **TURN SIGNALS:**

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

23. **VOLTAGE CONTROL:**

Regulator: Must have solid state components (transistorized) and be readily accessible. Voltmeter required: graduated scale on 29-89 capacity units.

24. **WARRANTIES:**

See pages 6-7 for required Type "B" and "D" chassis warranties.

25. **WIRING HARNESS:**

100 amp. capacity; color-coded circuits. Fuse box door, if equipped, shall have a positive latch.

## TYPE "B"

### MODIFIED FORWARD CONTROL BUS SIZES

	Type "B" Body Mounted on Modified Conventional Chassis						
	29	35	47	59	65	71	77
<b>MAXIMUM DESIGN (Passenger) Capacity</b>	5 yr./ Unl. miles	5 yr./ Unl. miles	5 yr./ Unl. Miles	5 yr./ Unl. Miles	5 yr./ Unl. Miles	5 yr./ Unl. Miles	5 yr./ Unl. miles
Diesel Engine Warranty:							
Gross Axle Weight Rating (lbs.)	6,000 10,500	6,000 10,500	7,500 15,000	10,000 19,000	10,000 19,000	10,000 19,000	10,000 19,000
Gross Vehicle Weight Rating (lbs.)	16,500	16,500	22,500	28,000	28,000	28,000	28,000
Tires:	22.5/70R19.5E	22.5/70R19.5E	9R-22.5-F	10R-22.5-G	10R-22.5-G	10R-22.5-G	10R-22.5G
Approximate Wheelbase:	138"	152"	190"	235"	254"	254-274"	274"
Minimum Fuel Tank:	30 gal.	30 gal.	60 gal.	60 gal.	60 gal.	60 gal.	60 gal
Alternator:	100 amp.	100 amp.	100 amp.	100 amp.	100 amp.	100 amp.	100 amp.
Minimum Rim Width: Disc Wheels for Tubeless Radials	6.75"	6.75"	6.75"	7.5"	7.5"	7.5"	7.5"
Service Brake - Drum Brake only (minimum total sq. in (7-inch shoe on rear axle)	----- -----	----- -----	----- -----	----- 663	----- 663	----- 663	----- 663

Automatic transmission is required on all chassis. See TRANSMISSION, AUTOMATIC for required specifications.

\*Low-profile tubeless radial tires of size and load range meeting Tire and Rim Association Standards for the required GAWR's may be approved in lieu of conventional tubeless radial tires.

**TYPE "D" FORWARD CONTROL**

**FRONT ENGINE BUS SIZES**

<b>MAXIMUM DESIGN (PASSENGER) CAPACITY</b>	<b><u>41-53 Diesel</u></b>	<b><u>59-71 Diesel</u></b>	<b><u>78 Gas</u></b>	<b><u>78 Diesel</u></b>	<b><u>83 Gas</u></b>	<b><u>83 Diesel</u></b>	<b><u>89 Capacity Gas and Diesel</u></b>
Diesel Engine Warranty: 5 years/Unlimited mileage, all diesels.							
Minimum Gross Axle Weight Rating: Front	10,800	10,800	12,000	12,000	12,000	12,000	12,000
Rear	17,000	17,000	18,500	19,000	18,500	21,000	21,000
Tires - Minimum Size Acceptable (Tubeless Radials Required)*	11R-22.5F	11R-22.5 F	11R-22.5-G	11R-22.5-H	11R-22.5-G	11R-22.5-H	11R-22.5-H
Stud Piloted Disc Wheels - Minimum Rim Width	7.5 in.	7.5 in.	8.25 in.	8.25 in.	8.25 in.	8.25 in.	8.25 in.
Approx. Wheelbase (inches)	132-161	159-201	212-217	212-217	227-237	227-237	245
Minimum Size Fuel Tank (Meeting Requirements of FMVSS. 301)	60 gal.(53-cap.) 45 gal.(41-47 cap.)	60 gal.	60 gal.	60 gal.	60 gal.	60 gal.	60 gal.

1) Automatic transmission is required on all chassis. See **TRANSMISSION, AUTOMATIC** for required specifications.

**NOTES:** 1) Maximum overall length of vehicle shall not exceed 40 feet, bumper to bumper.

2) \*Low-profile tubeless radial tires of size and load range meeting Tire and Rim Association Standards for the required GAWR's may be approved in lieu of standard conventional tubeless radial tires.

## **B. BASIC MINIMUM SPECIFICATIONS TYPE "D" REAR ENGINE SCHOOL BUS CHASSIS**

### **1. ALTERNATOR:**

100 amp. minimum rating, 50 amp. minimum output at manufacturer's recommended engine idle speed; dual belt or polyvee belt drive maximum ratio 2.5:1; ball or roller bearings on drive and slip ring ends meeting National Standards. 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.

**NOTE:** Single belt approved if and only if one drive pulley and one driven pulley with no added pulleys are included and the combined belt wrap of the drive and driven pulley is 360 degrees. Direct gear driven alternator is an approved equal.

### **2. BATTERY(IES):**

- a. Gasoline powered units shall have 12 volt, minimum 475 cold cranking amps. at 0° F. Mounted in engine compartment or slide-out tray in body skirt.
- b. Diesel, Type "D" rear-engine units, shall have a minimum of 1,250 cold cranking amps at 0° F with batteries mounted in engine compartment or slide-out tray in body skirt.

### **3. BRAKE, PARKING:**

Dash mounted control valve to spring-set parking brakes on rear wheels.

### **4. BRAKES, SERVICE:**

All rear engine Type "D" chassis must be equipped with air brakes (four-wheel drum, combination disc/drum, or air-disc), meeting all applicable requirements of National Standards for School Bus Chassis, 1990 edition, and Federal Motor Vehicle Safety Standards. All such chassis must be equipped with a spring-set parking brake on the rear wheels. Drum brakes shall be cam-actuated. An approved desiccant dryer with automatic purge and drain cycle and a heating element is required. All slack adjusters (as equipped) shall be automatic adjustment type. Minimum lining thickness on air-actuated drum brakes must be 3/8 inch front and 3/4 inch rear (except taper). All brake drums shall be outboard mounted; i.e.; drums shall be removable without removal of the axle hub. Air compressor shall be minimum 12 CFM and engine oil-fed. 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 filter. All rear engine Type "D" chassis over 78 capacity with air-actuated, four-wheel drum brakes must have a minimum total lining area of 750 square inches. Brake lining material shall not contain asbestos. 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.

### **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 rails.

### **6. DRIVELINE GUARDS:**

Required to prevent driveshaft from falling to ground if broken.

### **7. ENGINE EQUIPMENT REQUIRED:**

- a. Air cleaner, dry type. An air filter restriction indicator is required.
- b. Oil filter(s): Engine shall be equipped with full-flow, spin-on cartridge-type oil filter(s), with filter header(s) mounted directly to engine block.
- c. Governor shall permit controlled engine RPM up to manufacturer's recommended maximum for engine used.



- d. 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.
- e. Engine warning system consisting of buzzer and light required on diesel powered chassis to notify driver of low engine oil pressure and/or coolant overheating condition.
- f. 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.
- g. A fuel/water separator is required on all diesel engines. It shall be of a design and installation compatible with chassis/engine application to ensure trouble-free performance when properly maintained. The fuel/water separator filter may serve as the first (primary) engine fuel filter, if approved by engine manufacturer, or may be in addition to and ahead of the standard primary and secondary fuel filters on the engine. In no case shall the fuel/water separator assembly serve as the only fuel filter on the engine. In addition, fuel/water separator shall meet the following requirements:
  - (1) Must be completely accessible for manufacturer's recommended servicing, with emphasis on underhood mounting location.
  - (2) Must have a clear drain (sight) bowl with a drain valve to allow detection and draining of accumulated water.
  - (3) Must contain a replaceable pleated paper element fuel filter of proper design to protect against premature fuel flow restriction or excessive passage of contaminants.
- h. Ignition switch - controlled running and shut down shall be provided. Running of engine shall require electrical current provided by the ignition switch in the "start" and "run" positions. Engine shutdown shall result when the 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.

**ENGINE PERFORMANCE REQUIREMENTS:**

- a. Each bus shall be furnished with an engine 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%.
  - (2) Gradeability of 5% at 25 miles per hour.
  - (3) Gradeability of 1.5% at 50 miles per hour.
  - (4) Top speed of 60 mph minimum.
- b. Engine 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 the bus.
    - (d) Six 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%.
  - (g) Road surface factor 1.200.
  - (h) Vehicle height and width 10' X 8'.
  - (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 one 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, which 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):

**60-72 Capacity Rear Engine Buses**

TEST METHOD	0-10 MPH	0-MPH20	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" Rear Engine Buses**

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.

9. **EXHAUST:**

Corrosion resistant muffler and tailpipe. Must exit to left of left frame rail and behind rear wheels.

10. **FRAME SIDE MEMBERS:**

One piece construction, between front and rear spring hangers. extension of frame length is permissible only when such alterations are not for purposes of extending or reducing wheelbase.

11. **FUEL TANK:**

Meeting requirements of FMVSS. 301. Minimum capacity 60 gallons.

12. **HEADLIGHTS:**

Shall meet SAE specifications and shall use a quartz halogen bulb.

13. **HORNS:**

120 decibels, dual. (See National Standards.)

14. **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
- c) GVWR

15. **ODOMETER:**

Accrued mileage, seven digits, including tenths (999,999.9 mile odometer).

16. **RADIATOR FILLER TUBE:**

Located for ease in service from engine compartment.

17. **SHOCK ABSORBERS:**

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

18. **STEERING:**

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

19. **TIRES AND RIMS:**

Chassis shall be equipped with radial tubeless tires mounted on stud piloted disc wheels. Tires and rims shall conform to current standards of Tire and Rim Association. (See page 35 for size.)

20. **TRANSMISSION, AUTOMATIC:**

- a Type "D" 60-72 capacity: Allison AT-545 or equivalent.
  - 1) Transmissions must include an external spin-on type, vertically mounted, transmission fluid filter in the transmission cooler line
- b Type "D" 78-89 capacity: Allison MD-3060, 6 speed automatic or equivalent.
  - 1) MD-3060 transmissions shall have all six speeds enabled and shall have a 6.5:1 or higher rear end ratio. Push button shifting control shall be used.
  - 2) These transmissions must include a transmission fluid filter externally accessible without removal of the transmission oil pan.

21. **TURN SIGNALS:**

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

22. **VOLTAGE CONTROL:**

Regulator: Must have solid state components (transistorized) and be readily accessible. Voltmeter: required; graduated scale.

23. **WARRANTIES:**

See pages 6-7 for required Type "D" chassis warranties.

24. **WIRING:**

100 amp. capacity; color-coded circuits. Fuse box door (if equipped) shall have a positive latch.

## TYPE "D" REAR ENGINE BUS SIZES

MAXIMUM DESIGN (PASSENGER) CAPACITY	<u>60</u>	<u>66</u>	<u>72</u>	<u>78</u>	<u>83-89</u>
Minimum Gross Axle Weight Rating (lbs.):					
A. Front	11,000	11,000	11,000	11,000	12,000
B. Rear	19,000	19,000	19,000	19,000	23,000
Tires - Minimum Size acceptable (Tubeless Radials Req.)	10R-22.5-G	10R-22.5-G	10R-22.5-G	10R-22.5-G	11R-22.5-H
Stud-Piloted Disc Wheels-10 Stud Minimum Rim Width	7.5 in.	7.5 in.	7.5 in.	7.5 in.	8.25 in.
Approximate Wheelbase	165-184"	181-228"	209-242"	238-256"	267-284"
Minimum Size Fuel Tank (Meeting Req. of FMVSS. 301)60 gal.	60 gal.	60 gal.	60 gal.	60 gal.	60 gal.

NOTE: Maximum length of vehicle shall not exceed 40 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 GAWR's may be approved in lieu of standard conventional tubeless radial tires.**

## SPECIFICATIONS FOR OPTIONAL CHASSIS EQUIPMENT IN TYPE "B" AND "D" BUSES

1. **AIR BRAKES:**

Option for air brakes on Type "B" 35 capacity and lower and 41 capacity Type "D" where available.

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. **AIR STARTER:**

Option for a lube free, vane type air starter with remote mounted relay valve, activated by the ignition switch.

4. **ALTERNATOR (HIGHER OUTPUT):**

Option on all Type "B" and "D" chassis for an alternator having a minimum of 75 amp. output at chassis manufacturer's recommended idle speed while maintaining chassis manufacturer's recommended regulated voltage and meeting all other requirements of the standard alternator.

5. **COLD WEATHER START ASSIST:**

Option for diesel-powered chassis.

6. **FRONT BUMPER FLEXIBLE ENDS:**

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

7. **KEYED-ALIKE IGNITION SWITCHES:**

Option for ignition switches to be keyed alike from the manufacturer, i.e., any key from a purchased group of vehicles will operate any of the vehicles.

8. **LOW PROFILE TUBELESS 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 GAWR's.

9. **OIL-LUBRICATED FRONT HUBS:**

Option for oil-lubricated front axle hubs providing externally visible check of lubricant level.

10. **SHIFTER WITH PARK BRAKE POSITION:**

Option for a gear shift selector equipped with a Park Brake position above Reverse. Park Brake position shall be labeled "P" or "PB" and shall cause vehicle rear wheel park brakes to actuate. Shifter shall be equipped with a detent which must be released in order to change into the Park Brake position, or other means to prevent accidental shifting into the Park Brake position while the vehicle is in motion.

11. **SILICONE HOSE:**

Option for a package including 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 must have markings, coloring, or other visible means of distinguishing this type of hose from the standard hose.

12. **SPARE WHEEL:**

Option on all Type "B" and "D" buses. must be of same size as original rims.

13. **TOW HOOKS:**

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

14. **ANTILOCK BRAKES:**

Option for a four channel Antilock Braking System with independent controls for each wheel position and diagnostic LEDs built into the control modules.

15. **STRAIGHT FLOOR CHASSIS:**

Option for Type "B" or "D" 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.





## **SECTION III**

### **BODY SPECIFICATIONS**

#### **TYPE "B", "C" and "D" BUSES**



## MINIMUM FLORIDA SCHOOL BUS BODY SPECIFICATIONS

The specifications set forth are descriptive of Types "B," "C" and "D" school buses. Special exceptions for Types "B" and "D" bodies are on page 59. 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 Standards for School Buses, 1990 Revised Edition, are applicable for items not specified in this document, storage compartment excepted. References to bus capacity within these specifications are for Maximum Design Capacity as defined below under **BODY DATA PLATE**.

### **BATTERY SLIDE-OUT TRAY**

A body skirt-mounted slide-out tray and battery box is required for the battery(ies) on all Type "B", "C", and front-engine Type "D" buses.

### **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**. Equipped Capacity shall be the actual passenger capacity of the finished body, as equipped by the manufacturer, based on:

1. The number of total passengers the installed bench seats are designed to carry, and;
2. The number of wheelchair positions installed (based on wheelchair space dimensions contained in Section VI of these specifications).

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

### **BODY FASTENERS**

All external body fasteners used to attach componentry to the exterior of the bus shall be constructed of stainless steel or other noncorrodeable material approved by the Department of Education.

### **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: a. an EPA registered germicide (tuberculicidal) disinfectant, b. a fully disposable wiping cloth, c. a water resistant spatula, d. step-by-step directions, e. absorbent material with odor counteractant, f. two pairs gloves (latex), g. one package towelettes, h. a discard bag (non-labeled paper bag with plastic liner and a twist tie). This bag shall be approximately 4"x 6"x 14", 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.

### **BUMPER, REAR**

Rear bumper shall be of pressed steel channel at least 3/16 inch thick, 8 inch high ribbed face and flanged two (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. 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" or less.

## **DRIVER'S DOCUMENT COMPARTMENT**

Buses shall be equipped with a 17" x 12" x 4" document compartment with a hinged lid and a positive latching device, accessible to the driver from the seated position.

Note: In order to allow sufficient time for manufacturers to comply with this specification the following alternative specification may be used for buses purchased from the 1995 bid.:

A pouch on the front side of the driver's side crash barrier of the size previously listed will be allowed. This pouch shall be located to the left side of the barrier 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.

## **DRIVER'S SEAT AND SEAT BELT**

1. All Type "B", "C", & "D" school buses shall have a driver's seat equipped with a one-piece high back designed to minimize the potential for head and neck injuries in rear impacts, providing minimum obstruction to the driver's view of passengers, and meeting applicable requirements of Federal Motor Vehicle Safety Standard 222. The height of the seat back 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).
2. All air brake equipped school buses shall be equipped with an air suspension driver's seat meeting the following additional requirements:
  - a. The air control for height adjustment shall be within easy reach of the driver in the seated position.
  - b. Seat cushion shall be minimum 19 1/2 inches wide, shall be fully contoured for maximum comfort, and shall have a minimum of four adjustment positions to allow changes in seat bottom angle.
  - c. Back rest shall include adjustable lumbar support.
  - d. 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 will be acceptable.
  - e. The seat shall have a minimum 4 inches up and down travel.
  - f. Seat back shall include adjustability of tilt angle.
  - g. All adjustments shall be by fingertip controls without the use of tools.
  - h. The seat shall comply with all applicable Federal Motor Safety Standards.
3. Overall seat design shall be approved by the Department of Education. Also see **WARRANTIES**.
4. 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 air sprung and standard 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. . 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.

## 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 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 on the bus, the body manufacturer shall provide each district with at least one comprehensive parts and repair manual. Electrical componentry specified below shall be provided and wiring shall be in circuits as follows:

### 1. BACK UP LIGHTS, and BACKUP ALARM AND STICKER:

a. There shall be two four inch back up lights on the rear of all bodies meeting the following requirements:

- (1) Sealed type light with vibration and shock absorbing bulb mounting.
- (2) Universal type sealed electrical plug connector.
- (3) Inset into the bus body (flush mounted).

b. 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, including 97 dBA sound 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.

### 2. BRAKE/ TAIL LAMPS, 7 INCH:

- a. Buses shall be equipped with two combination brake/ tail lamps of a minimum of 7 inches in diameter mounted as high and spaced as far apart laterally as practical, below window line, but not less than three (3) feet measured from center of lamps.
- b. Brake/ tail lamps shall be sealed type lights with vibration and shock absorbing bulb mounting.
- c. Each lamp shall have a smooth exterior lens surface.
- d. Lamps shall use a universal type sealed plug connector.
- e. Lamps shall meet current SAE requirements and be installed in compliance with Federal Motor Vehicle Safety Standards.

### 3. BRAKE/ TAIL LAMPS, 4 INCH:

Bus shall be equipped with two combination brake/ tail lamps of four inch diameter meeting Federal 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.

### 4. CIRCUIT BREAKERS :

All body electrical circuits which require overload protection shall be equipped with automatic resetting circuit breakers.

### 5. CLEARANCE AND IDENTIFICATION LIGHTS:

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

b. Identification lights shall be mounted three (3) amber front, three (3) red rear, grouped in a horizontal row. Lamp centers spaced not less than six (6) or more than twelve (12) inches apart, mounted as close as practical to the vertical centerline (Federal Standards). Identification lights shall be activated by headlight switch.

c. All clearance and identification lights shall meet current SAE requirements and Federal Motor Vehicle Safety Standards and shall:

- (1). Be sealed type lights with vibration and shock absorbing bulb mounting.
- (2). Be surface mounted with Lexan or other polycarbonate material guard to prevent breakage.
- (3). Use a universal type sealed electrical plug connector

6. **DEFOGGER FAN:**

One 6-inch defogger fan, in addition to defrosters utilizing hot air from bus heater, shall be installed.

7. **EMERGENCY DOOR BUZZER:**

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

8. **HEATER/DEFROSTER:**

a. There shall be installed a heater of heavy-duty hot water circulating bus type, with minimum of 90,000 BTU rating. Heater shall have a per-hour capacity specified at a temperature differential of 150° F between the hot water and ambient air temperature. The heater shall be mounted in front of bus. A supplemental heater, minimum 80,000 BTU rating may be installed in larger 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. Heater lines on the interior of the bus shall be shielded to prevent scalding of the driver or passengers. The modesty panel behind the driver shall not obstruct heat flow from the driver's area to the passenger area; 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.**

b. A gate-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. Also required are shut-off valves installed in the pressure and return lines at the engine.

c. 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. One 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.

9. **INTERIOR LIGHTS:**

There shall be installed at least four recessed flush mounted interior lights in the passenger compartment of the bus, operated by one control panel-mounted switch. There shall also be two recessed flush mounted interior lights mounted in the driver's area of the bus (to the left and right of the centerline of the bus) operated by a separate control panel mounted switch. Lenses for all interior lights shall be Lexan or other polycarbonate material.

10. **LICENSE PLATE LAMP:**

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

11. **MASTER SWITCH for BODY ELECTRICAL CIRCUITS**

All bodies shall be equipped with an electrical circuit master switch that will cut body circuits "ON" and "OFF" by means of a solenoid (relay) controlled by the ignition switch.

12. **PUPIL WARNING LIGHTS, STOP ARMS, PUPIL CROSSING ARM, AND SYSTEM CONTROLS AND OPERATION:**

**a. Pupil Warning Lights**

(1) Minimum pupil warning light requirements shall be dual, mounted side by side on all corners of bus roof. 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 three (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.
- (b) Use replaceable quartz halogen bulbs.
- (c) Be seven inches in diameter.

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

- (1) Master switch - provides means for deactivating entire system, as would be required when opening the door at a railroad grade crossing.
- (2) Control switch - three positions: **OFF, AMBER,** and **RED.** Switch may be rocker, pull-type or other switch providing three positions.
- (3) Service door-actuated switch.
- (4) 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 three-position switch in the **"AMBER"** position, with the master switch **"ON"** it must not be required that the three- position switch be moved to **"RED"** or that the service door be opened, in order to 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

**c. Pupil Crossing Arm:** Required, meeting following:

- (1) Air operated on all air brake equipped buses. Electrically operated on all hydraulic brake buses.
- (2) Mounted to the right side of the front bumper and shall not open more than 90 degrees.
- (3) All components and connections shall be weatherproofed.
- (4) Easily removable for towing of the bus.
- (5) Shall meet or exceed SAE Standard J 1133.
- (6) Constructed of noncorrosive or nonferrous material or treated as per the body sheet metal standard.
- (7) No sharp edges or projections that could cause hazard or injury to students.
- (8) Four-point mounting to the front bumper.
- (9) The crossing arm shall extend 72" from the front bumper when in the "extended" position, and shall be constructed of a yellow polycarbonate material. Approximate dimensions of the arm shall be 65" x 3" x 1".
- (10) Shall be extended simultaneously with stop arm(s) by means of stop arm control.

**d. Stop Arm Signals:**

For all buses, 47 capacity and larger, there shall be installed on left outside of body two approved octagonal design air, vacuum, or electrically actuated stop-signal arms, each equipped with two double face alternately flashing lights for signaling a pupil stop. All buses less than 47 capacity shall be equipped with one stop arm as described. Bodies to be mounted on diesel powered chassis with hydraulic brakes shall be equipped with electrically actuated stop arm(s). 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. Vacuum or air lines, if used, must not be readily accessible to students inside or outside the vehicle. Vacuum 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. For color, see LETTERING AND TRIM.

**NOTE:** Body manufacturer utilizing an engine manifold vacuum source to power the stop arms must install a 1000 cu. in. vacuum tank with appropriate check valve.

13. **REFLECTORS:**

Two amber reflectors shall be mounted on side of bus near front and two red on rear side panels, two red on rear panels, and two intermediate amber on buses over 30 feet.

14. **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.

15. **STROBE LIGHT, WHITE FLASHING:**

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

- a. Shall have self-contained powerpack.
- b. 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.



- c. 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 two amperes at 12 volts.
- d. Dimensions and location: Overall height of unit shall be approximately 4" to 6", with lens diameter approximately 4" to 6". Mounting location is to be centered (laterally) on roof of bus, approximately 48" (longitudinally) from rear edge of rear roof cap.
- e. SAE Specifications: Shall meet SAE J575 and J1318.
- f. Warranty: 100% parts and labor coverage; 12 months for flash tube, 18 months for remainder of light.
- g. Body circuitry: Shall include a separate, clearly labeled driver's panel mounted switch, with a clearly labeled pilot light. Body shall include fuse or circuit breaker protection for strobe light wiring.

16. **TURN SIGNAL LAMPS:**

Front, turn signal lamps shall be furnished by chassis manufacturer on Type "C" buses. Lenses of rear turn signal lights shall be, amber in color, seven (7) inches in diameter, Class A, mounted as far apart laterally as practical on the same horizontal centerline as the 7 inch brake/ tail lamps, and be visible throughout 180 degrees. Front turn signal lamps on Type "B" and "D" bodies shall be of same type as for rear. Type "B" and "C" buses shall be additionally equipped with an amber turn signal light in a protective rim on each side of the bus, mounted rearward of the service door on the right side and rearward of the front stop arm on the left side. Type "D" buses shall have two turn signals mounted in protective rims on each side of the bus. Front (where required) and rear 7 inch turn signal lights shall:

- a. Be a sealed type light.
- b. Have a smooth exterior lens surface.
- c. Use a universal type sealed electrical plug connector.

17. **TWO-WAY RADIO:**

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

18. **VIDEO CAMERA MONITORING SYSTEMS:**

Districts may install video cameras in buses provided the system:

- a. Is installed securely in an area at the front of the bus;
- b. Is outside the Federal head impact zone, (FMVSS 222);
- c. Is located in an area not likely to cause student injury;
- d. Has no sharp edges or projections.

**EMERGENCY EXITS**

- 1. Emergency door on all conventional and forward control 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. Door stop and hold-open device shall meet the requirements of the 1990 National Standards for School Buses, "Emergency Exits". Inside of door header shall be padded with energy absorbing material a minimum of three (3) inches wide.
- 2. The emergency door shall be designed to be opened 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.

3. Emergency door shall be equipped with slide bar, cam-operated latching device, having a minimum stroke of one (1) inch. Emergency door latch shall be equipped with suitable electric plunger type switch connected with buzzers as required by Federal Standards. Switch shall be enclosed in metal case, and 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.
4. Emergency door controls, labeling and warning device shall meet requirements of FMVSS 217.
5. Each bus shall also be equipped with a minimum of two push-out type emergency exit side windows or the total number of emergency exit windows required to comply with FMVSS 217 when used with the roof hatch(es) specified below. These windows shall be of similar design to standard side windows, except for the following:
  - a. 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.
  - b. Each window shall be equipped with a switch to activate a buzzer when the emergency opening latch is released.
  - c. One window is to be mounted on each side of the bus body, approximately at the midpoint.
  - d. The lettering "EMERGENCY EXIT" shall be located on or above the window, inside and outside the bus.
  - e. Emergency windows shall meet applicable requirements of FMVSS 217.
6. Buses 35 capacity and smaller shall be equipped with one roof hatch-type emergency exit/ventilator. Buses over 35 capacity shall be equipped with two roof hatch-type emergency exit/ventilators. Specifications for roof hatch(es) shall be as follows (also see WARRANTIES):
  - a. Shall comply with all requirements of FMVSS 217 for emergency exits.
  - b. Hinge(s) shall be located on forward side of hatch.
  - c. Shall be equipped with an outside release to allow opening emergency exit from outside bus.
  - d. Shall be labeled "Emergency Exit" inside and out and shall be labeled with instructions for release inside and out.
  - e. Shall provide a "partially open" position along full width of hatch adequate to allow air to enter or exit and thereby ventilate bus.
7. All school bus bodies built under these specifications shall meet the latest requirements of Federal Motor Vehicle Safety Standard #217, published in the Federal Register. Such compliance shall be effective upon adoption of these specifications, irrespective of the effective date contained within the Federal requirements.

#### **EMERGENCY ROADSIDE REFLECTORS**

Three (3) reflector-type warning devices, meeting the requirements of FMVSS 125, shall be 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.

#### **FIRE EXTINGUISHER**

1. 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.
2. Fire extinguisher shall bear label of Underwriters' Laboratories, Inc. showing rating of not less than 2A-10BC.

**FIRST-AID KIT**

1. Bus shall carry 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.
2. Number of units and contents shall be as follows:

1-inch bandage compress (e.g., Band-Aids).....	2 pkgs.
40-inch triangular bandage with two safety pins.....	1 pkg.
4" X 4" sterile gauze pads .....	2 pkgs. of 6 each
2-inch rolled curlax bandage each in length .....	2 rolls six feet
1-inch roll adhesive tape in length.....	1 roll 2½ yards
Eye dressing packet.....	2 pkgs.

**FLOOR AND FLOOR COVERING**

1. 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.
2. a. Floor Sills - There shall be one main body sill at each side post and two (2) intermediate body sills on approximately 10-inch centers. All sills shall be of equal height not to exceed three (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.
- b. Connections between sides and floor system shall be capable of distributing loads from vertical posts to all floor sills.
3. 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 so as to maintain full strength of unpunctured floor.
4. Body floor shall have an access hole for removal and repair of fuel tank sending unit.
5. 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.
6. Floor in underseat area, including tops of wheelhousings and toeboard, shall be covered with smooth surfaced fire-resistant rubber covering, or approved equal, having a minimum thickness of .125 inch.
7. Covering from toestep landing area to emergency door (or rear seat on Type "D" rear engine buses) shall be ribbed aisle- type fire-resistant rubber, non-skid, wear-resistant. Minimum overall thickness shall be .1875 inch measured from top of ribs. Rubber floor covering shall meet Federal Specification ZZ-M-71d.
8. 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 also of the type recommended by manufacturer of floor covering material.
9. Landing area at top of steps shall be ribbed rubber which shall extend to and join the ribbed aisle cover at an angle and its leading edge (curbed fillets excepted) white or a light color.
10. All joints or seams in the floor covering shall be covered with non-ferrous metal, minimum one (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. Attaching screws shall be countersunk.
11. Holes around transmission cover shall be adequately sealed.

## **FUEL FILLER OPENING**

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

## **GRAB HANDLE AT ENTRANCE**

A suitable grab handle or rail shall be provided at the front entrance, securely mounted inside of body. The grab handle lower end shall be as close as practical to the bottom step to be within reach of small children upon entering bus. Grab handles shall be made of round stainless steel, one (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.

## **HEATER/DEFROSTER**

See **ELECTRICAL EQUIPMENT AND WIRING**

## **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.

## **INSULATION AND SEALING OF JOINTS**

1. 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.
2. Overlapping of edge of exterior roof and side panels and also the top edge of rub rails shall be sealed with nonhardening resilient material.

## **LETTERING AND TRIM**

Trim on three (3) rub rails below belt-line and all lettering shall be black (except for stop signs). Letters of words SCHOOL BUS on top front and rear section of bus body shall be eight (8) inches high and correspond to Series B, Standard Alphabet. (See National Standards.) (Name of District) DISTRICT SCHOOLS, on each side of bus body at belt-line shall be in six (6) inch minimum letters. Numbers to be furnished by county shall be in six (6) inch minimum height and on each side and on rear of bus body. EMERGENCY DOOR shall be in two (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. Also see lettering requirements for roof hatches and pushout windows under **EMERGENCY EXITS**.

Front stop signal arm (both sides) and rear stop arm (rear side only) shall have red background with a reflectorized white border and the letters STOP shall be in six (6) inch white reflectorized letters. Both sides of both stop arms shall have reflectorized red sheeting of high intensity-type material. Material shall be warranted for ten 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). Also see **WARRANTIES**.

**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 1995 National Standards for School Buses and Operations, adopted May, 1995.

## **LICENSE HOLDER**

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

## **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.

## MIRROR SYSTEM

1. **Interior Mirror:** Interior mirror shall be either clear-view laminated glass or clear-view glass bonded to a backing which retains the glass in the event of breakage. Mirror shall be a minimum of 6" X 30". Mirror shall have rounded corners and protected edges.
2. **Exterior Mirrors:** Each school bus shall be equipped with a system of exterior mirrors complying with FMVSS 111 and meeting the following requirements:
  - a. **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:
    - (1) Only one mirror shall be installed at each front corner of the bus.
    - (2) No portion of either mirror shall extend more than 12" forward of the forward-most point of bus.
    - (3) Mirrors shall not reflect excessive glare from the bus headlights into driver's eyes.
    - (4) Any fasteners used in the construction of the mirror and mounting bracketry shall be stainless steel. Also see BODY FASTENERS
    - (5) Lens of each mirror shall be replaceable without use of adhesives.
    - (6) Driver's view of mirrors through windshield shall be unobstructed.
  - b. **Rear Vision Mirror System:** A rear vision mirror system shall be provided which incorporates the following features and requirements:
    - (1) A convex rear vision mirror of minimum 70 square inches in size shall be mounted on each side of the bus. Each mirror shall provide the driver a view of the ground below the body skirt from at least ten feet forward of the rear wheels back to the outside edge of the rear tires and to the side extending at least twelve feet perpendicular to the side of the bus at a point 20 feet to the rear of the front bumper. Reduction in apparent image size in convex rear vision mirrors shall be no greater than is necessary to show the view described.
    - (2) A flat rear vision mirror of minimum 70 square inches in size shall be mounted above the convex rear vision mirror on each side of the bus to provide the driver a view along the left and right sides a minimum of 200 feet to the rear of the bus.
    - (3) Rear vision mirrors shall be mounted to be viewed through the windshield with no obstructions, except that left side mirrors on Type "B", and "D" buses may be viewed through driver's side window.
  - c. **Overall exterior mirror system (cross/side-view and rear vision mirrors) shall incorporate the following features and requirements:**
    - (1) Mirrors shall be isolated from vibration.
    - (2) Mirrors shall be adjustable without use of tools.
    - (3) Mirror assemblies (including mounting bracketry) shall be warranted (100% parts replacement coverage) for five years against rust and corrosion, and against any reduction in clarity of view due to discoloration or other deterioration of the lens.
  - d. Certification of the indirect view provided by the mirror system and of the driver's direct view of the ground shall be provided as required by the Department of Education. Also see WARRANTIES.

## MOUNTING OF BODY

Body shall be assembled in body company's standard production facilities. Bid price shall include mounting body upon chassis furnished by bidder. Body shall be securely attached to each chassis side rail at each main body cross beam. All attaching bolts shall not be less than 7/16 inch in diameter meeting SAE requirements. Nuts shall be secured with lock washers or shall be self-locking.

## PAINT AND FINISH

1. 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. School bus yellow paint shall meet National Standards 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 bumpers shall be black except that bumpers may be striped in accordance with National Standards or these specifications. Lead-free paint shall be used on all interior and exterior surfaces of the body and chassis. Also see WARRANTIES for warranty requirements and STRUCTURAL DESIGN for required metal preparation, and LETTERING AND TRIM and REFLECTIVE MARKINGS for other requirements.
2. The interior of the bus body shall be painted with light gray paint meeting the following color specifications:

$$L^* = 77.37$$

$$a^* = - 1.17$$

$$b^* = - .69$$

## PANELING, EXTERIOR

1. Exterior paneling includes all sheet metal skin forming exterior surface of body.
2. Exterior paneling should be of 20-gauge steel minimum thickness and shall be attached to bow frames and strainers so as to act as an integral part of structural frame. Roof panel design may include two (2) types:
  - a. Panels extending full width of top and joined to window headers on each side of bus body and each of main roof bows;
  - b. Panel section of a length sufficient to extend across three (3) or more main roof bows and joined to window header and supported by and joined to a longitudinal strainer of special design.

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 and INSULATION AND SEALING OF JOINTS.

## PANELING, INTERIOR

1. 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.
2. 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.

## PUBLICATIONS

Each Florida school board that is delivered one 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.**

**REFLECTIVE MARKING PACKAGE:**

There shall be installed a reflective marking package as specified in the 1990 National Standards for School Buses. This package shall include markings for the front, rear, both sides, and front and rear bumpers. Striping on sides of bus shall be two inches wide meeting the ASTM D-4956-90 Type 5 reflective sheeting standard. 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.

**RUB RAILS**

1. There shall be one rub rail on each side of bus approximately at seat level which shall extend from entrance door post around bus body (except for emergency door) to point of curvature near cowl on left side.
2. 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 wheel housings, and shall extend only to radii of right and left corners.
3. Rub rails shall be attached twice at each body post and at all other upright structural members.
4. Rub rails shall be four (4) inches or more in width, shall be of 16-gauge steel, and shall be constructed in corrugated or ribbed fashion.
5. Rub rails shall be applied outside of body panels. Pressed-in or snap-in rub rails do not satisfy this requirement.

**SEATING AND MODESTY PANELS (CRASH BARRIERS)**

1. 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.
2. Seat spacing shall meet the requirements of Federal Motor Vehicle Safety Standard 222 and 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. Exception: Type "D" school bus bodies over 39-feet in length may provide for a minimum of 24-inches knee room.
3. All passenger seat bottoms shall be attached to the seat frame with a device that allows 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.
4. 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.
5. 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 1990 National Standards School Bus Seat Upholstery Fire Block Test. Upholstery material for all passenger seats and barriers shall meet the following color standard +/- four delta E:

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

6. 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.**)

## **SERVICE DOOR**

1. Service door shall be a double-wall split type or jackknife type located at right front of bus. A double-bearing chromium-plated or 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 also be chromium-plated or epoxy-coated. An air operated entrance door may be provided with a manual operated override to enable the driver to manually open the door in the event of loss of power on Type "D" units. 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 two (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.

2. 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 three (3) inch width, or approved equal safety cushion.

3. Doors shall be so designed and weather-strips mounted so that there is no binding or tendency for stripping to dislodge during door operation. Two (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 35 inches from ground when bus is unloaded. Top of upper glass panel shall not be more than six (6) inches from top to door.

## **SIZES OF BODIES**

The maximum overall length of any bus shall be 40 feet; maximum overall outside width of all bodies shall be 96 inches. Height of body from top of finished floor to underside of ceiling, at center of body, shall be a minimum of 72 inches.

## **STEP WELL**

A step well of at least three (3) steps shall be built in the right front assembly enclosed with doors extending to bottom step. Each step shall be covered with ribbed rubber, 3/16 inch thick, bonded to metal base and otherwise constructed so as to provide substantial support, including the leading edge which shall be white or a light color. The lower (first) step height shall be between 10 and 14 inches above the ground for all Type "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.

## **STOP ARMS**

See **ELECTRICAL EQUIPMENT AND WIRING.**

## **STRUCTURAL DESIGN**

1. 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.
2. All welds used in construction of body shall conform to latest applicable specifications of the American Welding Society.
3. Welds, rivets, or high-strength bolts may be used in connecting parts of the structural body. All bolts shall have provision to prevent loosening under vibratory loads. All bolts, nuts, washers, and screws used throughout the body shall be approved size, cadmium or zinc plated, or thoroughly treated in an approved manner for prevention of rust.



4. 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) wheelhousing, (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 also 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.

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.

5. Upper body structure shall consist of frames extending from floor on one side to floor on opposite side, at each window post, which may be composed of posts and roof bows or a continuous bow frame and members running from front to rear of body known as strainers.
6. Design shall provide for: (a) a formed longitudinal member having a combined function of supporting floor plates, providing impact resistance, and of supporting exterior ends of seats; or (b) a longitudinal member located about seat line, securely fastened to body posts, and a continuous separate member of a strength equal to a 1¼ X 1¼ X 1/8 inch angle securely attached for support of seats.
7. A roof bow shall be located at least at each post to form a bow frame and spaced on approximately 27-inch centers, excepting they may be spaced a maximum of 36½ inches, provided sufficient supports are installed to maintain integrity of roof structure. Roof bows shall not be buckled or distorted out of cross section during bending processes to curved shape. Bow frames may be formed as one (1) piece or may be joined at window header by connections developing full strength of cross section. Each post shall be securely connected to floor beams directly through gussets or indirectly through side rails.
8. 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.
9. Rear Corner Reinforcements: Rear corner framing of bus body between floor and window sill and between emergency door post and rear side post shall consist of at least three (3) structural members applied horizontally or vertically or in another combination to provide additional impact and penetration resistance equal to that provided by frame members.
10. Side Strainers: There shall be three (3) or more side strainers or longitudinal members to connect vertical structural members and to provide impact and penetration resistance in the event of contact with other vehicles or objects. Such strainers shall be formed (not in flat strip) from metal of at least 16-gauge and 3 inches wide.

Strainer at roof line or window header shall extend all around the bus.

Side strainer shall be installed in area near bottom of seat frame and shall extend completely around bus body except for door openings and body cowl panel. Side strainers specified above shall be fastened to each vertical structural member in any one or any combination of the following methods as long as stress continuity of members is maintained.

- a. Installed between vertical members.
- b. Installed behind panels but attached to vertical members.
- c. Installed outside exterior panels.

Fastening method employed shall be such that strength of strainers is fully utilized.

Strainer immediately below windows shall extend around body except for door openings and shall be securely joined to vertical members. This strainer shall be secured longitudinally to outside of body posts for length of body and have the bending and penetration characteristics of a rub rail (see below) and may be formed as a channel, lipped channel, box or hat section if installed on vertical members behind panels or as a rub rail if applied outside of body panels. No portion of side strainer or longitudinal member, except at seat level, is to occupy same vertical position as required for rub rails.

### **SUN SHIELD**

A tinted, transparent plastic adjustable sun shield, minimum 6" X 24", shall be installed and have substantial mounting so that it will remain in position.

### **TAILPIPE**

For all Type "B", "C" and "D" diesels, 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 two inches beyond it.

### **TESTING OF BODY**

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

### **UNDERCOATING**

Entire underside of body including floor members, wheel housings, 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.

### **VANDAL BOX, SIDE MOUNTED**

There shall be installed on all Type "C" buses an equipment compartment on the ceiling above the driver's side window measuring approximately 33" x 10" x 9". The compartment shall have a door with a positive latch.

### **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.

### **WARRANTIES**

Bids submitted under this specification shall include a warranty covering materials and workmanship for a period of at least one year. See pages 7-8 for further provisions, including specific component warranties.

### **WIRING**

See ELECTRICAL EQUIPMENT AND WIRING.

### **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; for covering, see FLOOR AND FLOOR COVERING.

### **WINDOWS**

1. 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.

A minimum clear vertical opening of not less than nine (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 minimum of injury prone projections. Window latches must be replaceable or rebuildable without disassembling the complete window frame or removing the window from the body. Also, 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.

2. For ventilation purposes, the driver's window shall be adjustable and shall be equipped with a positive latch which can be secured from the inside of bus.
3. There shall be installed, in rear door, two (2) windows (one (1) upper, one (1) lower) set in rubber in a waterproof manner. Total glass area in emergency door shall be a minimum of 750 square inches. Glass shall be same type as for side windows.
4. Rear side windows located at each side of emergency door shall be set in rubber in waterproof manner. Glass area shall be large enough to provide desirable vision to rear and shall be of same quality and grade as for side windows.
5. 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.
6. Districts may use Lexan (TM) or equivalent in locations other than the windshield when replacing OEM glass.

#### **WINDSHIELD**

Front body section in area of windshield shall provide for corner vision and be fitted with curved glass, four-piece flat glass or two-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. 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.

#### **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 four point mounting and adequate hand hold. Handle shall be contoured and formed so as to provide a comfortable and safe grip.

#### **WINDSHIELD WIPERS AND WASHERS**

1. Electrical windshield wipers shall be standard on all buses. All wipers by design and installation shall provide desirable vision for drivers. Two heavy-duty motors shall be provided and equipped with blades of sufficient length and heavy-duty arms to clear windshield glass in driver's direct view. One switch shall control both wipers and switch shall be located within easy reach from driver's seat. Wiper system shall be designed to move blades away from driver's direct view when in stop position.
2. 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 one-half gallon. Flexible plastic bags are not acceptable.

**TYPE "B" MODIFIED FORWARD CONTROL AND "D" FORWARD CONTROL 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 so as to permit servicing of engine, having one or two 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. Emergency exits - 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. 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 and 220. Emergency window over engine compartment shall be minimum of 16" X 54". A minimum of two push-out type emergency exit side windows or the total number of emergency exit windows required to comply with FMVSS 217 when used with the roof hatches specified below shall be installed in the same approximate locations and meeting the same requirements listed previously for conventional buses under **"EMERGENCY EXITS."** Two roof hatch type emergency exit/ventilators meeting previously listed requirements shall be installed. All school bus bodies built under these specifications shall meet the latest requirements of Federal Motor Vehicle Safety Standard #217, published in the Federal Register. Such compliance shall be effective upon adoption of these specifications, irrespective of the effective date contained within the Federal requirements.
7. Odometer/Speedometer shall be front-wheel drive or if electrical, it may be driven from the rear axle.
8. Rub rails may terminate at the engine compartment.

## SPECIFICATIONS FOR OPTIONAL BODY EQUIPMENT TYPE "B," "C" & "D" BUSES

1. **BAGGAGE COMPARTMENTS:**

Option on all bodies where available. This body option shall 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 1/2" 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.

3. **DRIVER'S AIR SEAT:**

Option on hydraulic brake buses for an air suspension type driver's seat meeting all requirements of the standard driver's air suspension seat.

4. **DRIVER'S SIDE WINDOW VISOR:**

Option for a tinted, transparent plastic adjustable sun shield, minimum 6"x 24", to be installed over the driver-side window with substantial mounting so that it will remain in the position to which it has been adjusted.

5. **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 or not the bulb is operational is not acceptable. See **PUBLICATIONS** for parts manual requirement for optional components.

6. **STRAIGHT FLOOR/ FLAT FLOOR:**

- a. Option on any size bus where available for an unobstructed straight floor design (i.e., no wheelwells, and no step-up at the rear of the passenger compartment). Minimum headroom of any bus equipped with this option shall remain 72" as per standard body specifications.. This option shall contain additional options 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" seats except where lift bus specifications require a 30" aisle.
- 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" as per standard body specifications. This option shall contain additional options 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" seats except where lift bus specifications require a 30" aisle.

7. **FUEL SUPPLY LOCK:**

A lock with two 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.

8. **REAR HEATER:**

Option for an additional heater mounted so as to provide heat in the rear of the body. Shall have a minimum 80,000 BTU rating.

9. **SILICONE HOSE:**

Option for silicone (or approved equivalent) heater hoses supplied by body manufacturer. Silicone hose, if used, shall require the use of stainless steel, shoe-type hose clamps or constant torque clamps. Option requirements are for hoses to front heater only. Hoses shall have markings, coloring, or other visible means of distinguishing this hose from the standard hose.

10. **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.

11. **PUBLIC ADDRESS SYSTEM:**

Option for a public address system/AM/FM stereo radio with four speakers inside the bus and one 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. Outside speaker shall be mounted under the hood or in another protected location at the front of the bus. See **PUBLICATIONS** for parts manual requirements for optional components. AM/FM stereo radio with four speakers may be offered separately.

12. **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.

13. **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.

14. **HIGH HEADROOM BODIES:**

Option for bus bodies with nominal 77" headroom.

15. **3-2 SEATING:**

Option for 3-2 seating in lieu of standard 3-3 seating. Option shall include 45" wide seats on left side of aisle and 30" to 33" seats on right side of aisle, providing a minimum 12" wide aisle. Maximum Design (passenger) Capacity shall be identified on body data plate based on standard 3-3 seating arrangement. Equipped Capacity shall be identified on body data plate based on installed 3-2 seating. All other requirements of standard seating (except seat width) shall be complied with when this option is provided.

16. **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 two inches beyond it.

17. **TINTED GLASS IN WINDOWS:**

Option for 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.

18. **VANDAL BOX :**

- a. An optional vandal box for safe storage of fire extinguisher, first-aid kit, and warning devices may be specified provided it is equipped with a warning buzzer to warn the driver the box is locked if the ignition switch is in the "on" position. This body option shall be keyed-alike with any other body option requiring use of a key.
- b. On Type "C" buses there shall be an option for a keyed alike lock with integral buzzer on the standard equipment side vandal box.

19. **WHITE PAINTED ROOF:**

Option for white painted roof on all types of buses to comply with applicable Federal Standards and National Minimum Standards. White paint shall cover roof but may not extend beyond drip rail on side of vehicle; front and rear caps must remain yellow. Paint shall meet the requirements listed in the **PAINT AND FINISH**, and **WARRANTIES** sections of this manual, except for color. Any paint used to satisfy the requirements of this option shall be lead-free.

20. **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. Thomas Built Buses, "MOM" seat.
- c. Other systems as approved by the Department of Education.

21. **EMERGENCY EVACUATION RAMP**

Option for an emergency evacuation ramp meeting the following specifications:

- a. Ramp shall be constructed of lightweight materials with a minimum 21,000 psi yield strength.
- b. Must maintain a 600 pound working load with a 4 to 1 safety factor.
- c. Shall be equipped with a side rail at least 1 inch high to reduce the likelihood of wheelchairs sliding over the edge.
- d. Shall be enclosed or otherwise protected from road debris when stowed.
- e. Ramp shall be at least 24 inches wide (inside side rails) and shall have a nonskid surface for the full length and width of the ramp.
- f. Ramp shall be easily deployable by one average person, with an average initial deploying force of not more than 35 pounds and shall extend from the floor level of the bus to the ground when extended.
- g. Ramp shall be accessible with the rear door open.





## **SECTION IV**

### **CHASSIS SPECIFICATIONS, TYPE "A" BUSES**



## SCHOOL BUS CHASSIS SPECIFICATIONS FOR TYPE "A" SCHOOL BUSES

The design and construction of the bus shall provide for the safety and comfort of transported students and for economical transportation. Manufacturers and dealers offering Type "A" school buses for sale in Florida for the purpose of transporting public school students shall certify in writing to the Commissioner of Education that any school bus sold in Florida will meet all applicable Federal Motor Vehicle Safety Standards effective on the date the vehicle is manufactured and all Florida Department of Education School Bus Specifications effective at the time the bid prices were established.

The National Standards for School Buses, 1990 Revised Edition, is applicable for items not specified in this document; storage compartment for snow chains and tools excepted. Any purchase of school buses under this specification shall include the right to inspection of the product during and after manufacture by any district or state agency making purchases or the Department of Education.

The specifications in this part apply to school buses with a rated seated capacity of approximately 16 to 20 passengers. Vehicles with single rear wheels are limited to a maximum of 16 seating capacity. Vehicles with dual rear wheels are limited to a maximum of 23-capacity.

### MINIMUM CHASSIS SPECIFICATIONS FOR ALL TYPE "A" BUSES

1. **ALTERNATOR:**

Minimum 60 amp. is required.

2. **BATTERY(IES):**

Battery shall be 12 volt, minimum 455 cold cranking amps. at 0° F, and mounted under the hood in a manner to provide easy access for servicing. Diesel shall require dual 455 cold cranking amps minimum.

3. **BRAKES:**

Shall be power assisted, self-adjusting, dual hydraulic, meeting FMVSS. 105.

4. **BUMPERS:**

Front bumper of 19 capacity and front and rear bumper of 16 capacity shall be channel design, minimum 6 inches full width. For rear bumper requirements for 19 capacity Type "A" buses, see Section V, Part A.

5. **DIFFERENTIAL RATIO:**

Shall be compatible with engine and transmission used.

6. **DRIVE SHAFT GUARD:**

Required to prevent drive shaft from dropping to the ground.

7. **ENGINE:**

- a. Minimum engine size acceptable 292 cid/4.8 liter, governed.
- b. Engine coolant recovery or deaeration system required on all chassis.
- c. Equipped with full-flow, cartridge type, spin-on oil filter(s) with filter header(s) mounted directly to engine block.
- d. Ignition switch - controlled running and shutdown of engine shall be provided. Running of engine shall be maintained by electrical current provided by the ignition switch in the "Start" and "Run" positions. Engine shutdown shall result when the current is cut off (ignition switch in "Off" position).

8. **EXHAUST:**

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 "A" chassis.

9. **FUEL TANK:**

Shall have a minimum 30-gallon capacity.

10. **GROSS VEHICLE WEIGHT RATING:**

16 capacity, GVWR. minimum shall be 8200 pounds; 19 + Capacity, GVWR. maximum shall be 10,000 pounds. Applies to gasoline-powered chassis. For diesel GVWR., see "Diesel Engine Option," this section.

11. **HEATER:**

Deluxe fresh air type heater and defroster required.

12. **HORNS:**

Dual horns minimum of 120 decibels are required.

13. **HUBCAPS:**

Manufacturer's standard is acceptable.

14. **IGNITION SYSTEM:**

Electronic ignition system required on all gasoline engine powered chassis.

15. **LIGHTS:**

Headlights, brake lights, back-up lights and turn signals shall meet requirements of FMVSS. 108. Four-way hazard flashers must not be tied into the brake lamp circuit in such a way as to prevent driver from using flashers while also depressing the brake pedal. Headlight bulbs shall be quartz halogen.

16. **PAINTING:**

Bus exterior shall be school bus yellow including fenders and hood. These surfaces shall be painted with lead-free paint.

17. **SHOCK ABSORBERS:**

Shall be adequate, front and rear, for axle size.

18. **STEERING:**

Power steering required. A tilt steering wheel/column is required.

19. **TIRES:**

Shall be radial ply tubeless meeting Tire and Rim Association standards and adequate size and load rating for applicable GAWR's. Low-profile tubeless radial tires of size and load range meeting Tire and Rim Association Standards for the required GAWR's may be approved in lieu of conventional radial tubeless tires.

20. **TRANSMISSION:**

Shall be (3) forward speed, automatic.

21. **VACUUM CONNECTION:**

Required in engine manifold for stop sign attachment (gasoline engines).

22. **WHEELBASE:**

Minimum 123 inches.

23. **WINDSHIELD WIPERS:**

Wipers and washer shall be electric powered and meet Federal Standards.

24. **WIRING:**

Shall meet SAE. requirements.

## OPTIONAL CHASSIS EQUIPMENT SPECIFICATIONS, TYPE "A" BUSES

### 1. DIESEL ENGINE OPTION:

16 capacity single rear wheels and 19 capacity, dual rear wheels:

- a. GVWR. minimum 8,200 pounds and maximum of 10,000 pound GVWR.
- b. Minimum tire size - radial ply tubeless tires meeting Tire and Rim Association standards and adequate size and load rating for applicable GAWR's.
- c. Minimum engine size - 135 net horse power.
- d. Minimum SAE. Gross Torque, 240 lb-ft.
- e. Minimum displacement (liters) 4.8L.
- f. Maximum (full-load) governed engine speed of 3,600 RPM.
- g. Differential ratio - compatible with engine and transmission.
- h. Batteries - Dual minimum 12 volt, 455 cold cranking amps at 0°F.
- i. Fuel/Water Separator (required) - Shall be of a design and installation compatible with chassis/engine application to ensure trouble-free performance when properly maintained. In addition, fuel/water separator shall meet the following requirements:
  - (1) Must be completely accessible for manufacturer's recommended servicing, with emphasis on underhood mounting location.
  - (2) Must have a clear drain (sight) bowl with a drain valve to allow detection and draining of accumulated water.
  - (3) Must contain a replaceable pleated paper element fuel filter of proper design to protect against premature fuel flow restriction or excessive passage of contaminants.

### 2. SPARE RADIAL PLY TUBELESS TIRE AND WHEEL:

Option for radial tubeless tire and wheel of same size as original equipment tire/wheel.

### 3. TOW HOOKS:

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

### 4. ANTILOCK BRAKES:

Option for four wheel antilock brake system installed by the chassis manufacturer.

**SECTION V**  
**BODY SPECIFICATIONS**  
**TYPE "A" BUS**





## MINIMUM FLORIDA SCHOOL BUS BODY SPECIFICATIONS FOR TYPE "A" BUSES

The specifications set forth are descriptive of the Type "A" school bus. 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 the National Highway Traffic Safety Administration. The National Standards for School Buses, 1990 Revised Edition, is applicable for items not specified in this document, storage compartment excepted. This section is divided into three parts: **Part A** (Body Specifications for 19 capacity Type "A" Buses with Dual Rear Wheels); **Part B** (Body Specifications for 16 capacity Type "A" Buses with Single Rear Wheels); **Part C** (Optional Equipment Specifications for all Type "A" 16 and 19 capacity Buses). The separate 16 and 19 capacity Type "A" bus body specifications are for the purpose of distinguishing between the "van conversion," 16 capacity buses, and the 19 capacity buses with bodies similar to regular school bus bodies.

### 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 state agency or county agency of the State of Florida.

### PUBLICATIONS

Each Florida school board that is delivered one 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.

### WARRANTY

Bids submitted under this specification shall include a warranty covering materials and workmanship for a period of 12 months.

## PART A

### Body Specifications for 19 Capacity Type "A" Buses with Dual Rear Wheels

#### **BATTERY ACCESSIBILITY**

Body manufacturer shall provide easy accessibility for maintenance of both batteries on diesel-equipped chassis via either an underhood or body slide out tray location. The factory location underneath the drivers seat is unacceptable.

#### **BODY FASTENERS:**

All external body fasteners used to attach componentry to the exterior of the bus shall be constructed of stainless steel or other noncorrodeable material approved by the Department of Education.

#### **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: a. an EPA registered germicide (tuberculicidal) disinfectant, b. a fully disposable wiping cloth, c. a water resistant spatula, d. step-by-step directions, e. absorbent material with odor counteractant, f. two pairs gloves (latex), g. one package towelettes h. a discard bag (non-labeled paper bag with plastic liner and a twist tie). This bag shall be approximately 4"x 6"x 14", 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.

#### **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**. Equipped Capacity shall be the actual passenger capacity of the finished body, as equipped by the manufacturer, based on:

1. The number of total passengers the installed bench seats are designed to carry, and;
2. The number of wheelchair positions installed (based on wheelchair space dimensions contained in Section VI of these specifications).

An example of the format to be used for Equipped Capacity is "8 + 1 WC", meaning 8 regular passenger seating positions plus one wheelchair positions.

#### **BUMPER, REAR**

Rear bumper shall be of pressed steel channel at least 3/16 inch thick, 8 inch high ribbed face and flanged two (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. 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 gap between bumper and body is 1/8" or less.

#### **DRIVER'S DOCUMENT COMPARTMENT**

Buses shall be equipped with a 17" x 12" x 4" document compartment with a hinged lid and a positive latching device, accessible to the driver from the seated position.

Note: In order to allow sufficient time for manufacturers to comply with this specification the following alternative specification may be used if necessary for buses purchased from the 1995 bid.: A pouch on the front side of the driver's side crash barrier of the size previously listed will be allowed. This pouch shall be located to the left side of the barrier, accessible to the driver from the seated position, be made of the same material as the covering on the barrier, and have a lid or cover with a latching device such as Velcro or snaps.

## **DRIVER'S SEAT AND SEAT BELT**

Chassis manufacturer's standard driver's seat is acceptable. Driver's seat belt assembly shall be Type 2, meeting applicable FMVSS for school buses under 10,000 pounds GVWR.

## **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. 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 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 on the bus, the body manufacturer shall provide each district with at least one comprehensive parts and repair manual. Electrical componentry specified below shall be provided and wiring shall be in circuits as follows:

### **1. BACK UP LIGHTS, and BACKUP ALARM AND STICKER:**

a. There shall be two four inch back up lights on the rear meeting the following requirements:

- (1) Sealed type light with vibration and shock absorbing bulb mounting.
- (2) Universal type sealed electrical plug connector.
- (3) Inset into the bus body (flush mounted).

b. 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, including 97 dBA sound 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.

### **2. BRAKE/ TAIL LAMPS, 7 INCH:**

- a. Buses shall be equipped with two combination brake/ tail lamps of a minimum of 7 inches in diameter mounted as high and spaced as far apart laterally as practical, below window line, but not less than three (3) feet measured from center of lamps.
- b. Brake/ tail lamps shall be sealed type lights with vibration and shock absorbing bulb mounting.
- c. Each lamp shall have a smooth exterior lens surface.
- d. Lamps shall use a universal type sealed plug connector.
- e. Lamps shall meet current SAE requirements and be installed in compliance with Federal Motor Vehicle Safety Standards.

### **3. BRAKE/ TAIL LAMPS, 4 INCH:**

Bus shall be equipped with two combination brake/ tail lamps of four inch diameter meeting Federal 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.

### **4. CIRCUIT BREAKERS:**

All body electrical circuits which require overload protection shall be equipped with automatic resetting circuit breakers.

5. **CLEARANCE AND IDENTIFICATION LIGHTS:**

- a. Clearance lights shall be mounted at the four (4) body corners, upper section-amber front, red rear. Clearance lights shall be activated by headlight switch.
- b. Identification lights shall be mounted three (3) amber front, three (3) red rear, grouped in a horizontal row. Lamp centers spaced not less than six (6) or more than twelve (12) inches apart, mounted as close as practical to the vertical centerline (Federal Standards). Identification lights shall be activated by headlight switch.
- c. All clearance and identification lights shall meet current SAE requirements and Federal Motor Vehicle Safety Standards and shall:
  - (1). Be sealed type lights with vibration and shock absorbing bulb mounting.
  - (2). Be surface mounted with Lexan or other polycarbonate material guard to prevent breakage.
  - (3). Use a universal type sealed electrical plug connector

6. **DEFOGGER FAN:**

One 6-inch defogger fan, in addition to defrosters utilizing hot air from bus heater, shall be installed.

7. **EMERGENCY DOOR BUZZER:**

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

8. **FOUR-WAY HAZARD FLASHERS:**

Must not be tied into the brake lamp circuit in order to allow drivers to use the flashers while also depressing the brake pedal.

9. **HEATER/ DEFROSTER:**

Deluxe fresh air type heater and defroster required.

10. **INTERIOR LIGHTS:**

There shall be installed at least four recessed flush mounted interior lights in the passenger compartment of the bus , operated by one control panel-mounted switch. There shall also be two recessed flush mounted interior lights mounted in the driver's area of the bus (to the left and right of the centerline of the bus) operated by a separate control panel mounted switch. Lenses for all interior lights shall be Lexan or other polycarbonate material.

11. **LICENSE PLATE LAMP:**

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

12. **MASTER SWITCH for BODY ELECTRICAL CIRCUITS**

All bodies shall be equipped with an electrical circuit master switch that will cut body circuits "ON" and "OFF" by means of a solenoid (relay) controlled by the ignition switch.

13. **PUPIL WARNING LIGHTS, STOP ARM, PUPIL CROSSING ARM, AND SYSTEM CONTROLS AND OPERATION:**

**a. Pupil Warning Lights**

- (1) Minimum pupil warning light requirements shall be dual, mounted side by side on all corners of bus roof. 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 three (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.
- (b) Use replaceable quartz halogen bulbs.
- (c) Be seven inches in diameter.

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

- (1) Master switch - provides means for deactivating entire system, as would be required when opening the door at a railroad grade crossing.
- (2) Control switch - three positions: **OFF**, **AMBER**, and **RED**. Switch may be rocker, pull-type or other switch providing three positions.
- (3) Service door-actuated switch.
- (4) 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 three-position switch in the **"AMBER"** position, with the master switch **"ON"** it must not be required that the three- position switch be moved to **"RED"** or that the service door be opened, in order to 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, 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 ARM, 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

**c. Pupil Crossing Arm:** Required, meeting following:

- (1) Electrically operated on all hydraulic brake buses.
- (2) Mounted to the right side of the front bumper and shall not open more than 90 degrees.
- (3) All components and connections shall be weatherproofed.
- (4) Easily removable for towing of the bus.
- (5) Shall meet or exceed SAE Standard J 1133.
- (6) Constructed of noncorrosive or nonferrous material or treated as per the body sheet metal standard.
- (7) No sharp edges or projections that could cause hazard or injury to students.

- (8) Four-point mounting to the front bumper.
- (9) The crossing arm shall extend 72" from the front bumper when in the "extended" position, and shall be constructed of a yellow polycarbonate material. Approximate dimensions of the arm shall be 65"x 3"x 1".
- (10) Shall be extended simultaneously with stop arm by means of stop arm control.

**d. Stop Arm Signal:**

There shall be installed on left outside of body an approved octagonal design vacuum or electrically actuated stop-signal arm, equipped with two double face alternately flashing lights for signaling a pupil stop. Bodies to be mounted on diesel powered chassis with hydraulic brakes shall be equipped with electrically actuated stop arm. Light lenses of stop arm shall be RED. Vacuum lines, if used, must not be readily accessible to students inside or outside the vehicle. Vacuum lines must be made of copper, steel or nonmetallic materials meeting SAE Standard J848d, and fittings shall be brass. Stop signal arm shall meet the applicable requirements of SAE J1133. For controls, see above item. For color, see LETTERING AND TRIM.

**NOTE:** Body manufacturer utilizing an engine manifold vacuum source to power the stop arms must install a 1000 cu. in. vacuum tank with appropriate check valve.

**14. REFLECTORS:**

Two amber reflectors mounted on side of bus near front, two red on rear side panels, and one red on each of the two rear panels shall be installed.

**15. 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.

**16. STROBE LIGHT, WHITE FLASHING:**

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

- a. Shall have self-contained powerpack.
- b. 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.
- c. 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 two amperes at 12 volts.
- d. Dimensions and location: Overall height of unit shall be approximately 4" to 6", with lens diameter approximately 4" to 6". Mounting location is to be centered (laterally) on roof of bus, approximately 48" (longitudinally) from rear edge of rear roof cap.
- e. SAE Specifications: Shall meet SAE J575 and J1318.
- f. Warranty: 100% parts and labor coverage; 12 months for flash tube, 18 months for remainder of light.
- g. Body circuitry: Shall include a separate, clearly labeled driver's panel mounted switch, with a clearly labeled pilot light. Body shall include fuse or circuit breaker protection for strobe light wiring.

17. **TURN SIGNAL LAMPS:**

On front, turn signal lamps shall be furnished by chassis manufacturer. On rear, lens shall be amber in color, seven (7) inches in diameter, Class A, mounted as far apart, laterally, as practical on the same horizontal centerline as the brake stop lamps, and be visible throughout 180 degrees. Rear 7" turn signal lights shall:

- a. Be a sealed type light.
- b. Have a smooth exterior lens surface.
- c. Use a universal type sealed electrical plug connector.

18. **TWO-WAY RADIO:**

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

19. **VIDEO CAMERA MONITORING SYSTEMS:**

Districts may install video cameras in buses provided the system:

- a. Is installed securely in an area at the front of the bus;
- b. Is outside the Federal head impact zone, (FMVSS 222);
- c. Is located in an area not likely to cause student injury;
- d. Has no sharp edges or projections.

**EMERGENCY EXITS**

1. Emergency door on 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. Door stop and hold-open device shall meet the requirements of the 1990 National Standards for School Buses, "**EMERGENCY EXITS.**" Inside of door header shall be padded with energy absorbing material a minimum of three (3) inches wide.
2. The emergency door shall be so designed to be opened 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.
3. Emergency door shall be equipped with slide bar, cam-operated latching device, having a minimum stroke of one (1) inch. Emergency door latch shall be equipped with suitable electric plunger type switch connected with buzzers as required by Federal Standards. Switch shall be enclosed in metal case, and 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.
4. Emergency door controls, labeling and warning device shall meet requirements of FMVSS 217.
5. Each bus shall be equipped with two push-out type emergency exit side windows. These windows shall be of similar design to standard side windows, except for the following:
  - a. 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.
  - b. Each window shall be equipped with a switch to activate a buzzer when the emergency opening latch is released.
  - c. One window is to be mounted on each side of the bus body, approximately at the midpoint.

- d. The lettering "EMERGENCY EXIT" shall be located on or above the window, inside and outside the bus.
  - e. Emergency windows shall meet applicable requirements of FMVSS 217
6. Type "A" buses shall be equipped with one roof hatch type emergency exit/ventilator, specified as follows (also see **WARRANTIES**):
- a. Shall comply with all requirements of FMVSS 217 for emergency exits.
  - b. Hinge(s) shall be located on forward side of hatch.
  - c. Shall be equipped with an outside release to allow opening emergency exit from outside bus.
  - d. Shall be labeled "Emergency Exit" inside and out and shall be labeled with instructions for release inside and out.
  - e. Shall provide a "partially open" position along full width of hatch adequate to allow air to enter or exit and thereby ventilate bus.
7. All school bus bodies shall meet the latest requirements of Federal Motor Vehicle Safety Standard #217 published in the Federal Register. Such compliance shall be effective upon adoption of these specifications, irrespective of the effective date contained within the Federal requirements.

**EMERGENCY ROADSIDE REFLECTORS**

Three (3) reflector-type warning devices, meeting the requirements of FMVSS 125, shall be 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.

**FIRE EXTINGUISHER**

- 1. A dry chemical-type fire extinguisher with gauge and designed to restrain tampering shall be mounted in a place accessible to driver, preferably near service door.
- 2. Fire extinguisher shall bear label of Underwriters' Laboratories, Inc. showing rating of not less than 2A-10BC.

**FIRST-AID KIT**

1. Bus shall carry 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.

2. Number of units and contents shall be as follows:

1-inch bandage compress (e.g., Band-Aids)	.....	2 pkgs.
40-inch triangular bandage with two safety pins	.....	1 pkg.
4" X 4" sterile gauze pads	.....	2 p k g s . o f 6 e a c h
2-inch rolled curlex bandage each in length	.....	2 rolls six feet
1-inch roll adhesive tape in length	.....	1 roll 2½ yards
Eye dressing packet	.....	2 p k g s .

**FLOOR AND FLOOR COVERING**

- 1. Bus body floor shall be of prime commercial quality steel or other metal. Floor shall be level from front to back and from side to side except for wheelhousings.
- 2. The floor shall provide adequate and firm support for seat legs and shall have a minimum one-half 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.



3. Floor in under seat area, including tops of wheel housings and toeboard, shall be covered with smooth surfaced fire-resistant rubber covering, or approved equal, having a minimum thickness of .125 inch.
4. Covering from toestep landing area to emergency door shall be ribbed aisle- type fire-resistant rubber, non-skid, wear-resistant. Minimum overall thickness shall be .1875 inch measured from top of ribs. Rubber floor covering shall meet Federal Specification ZZ-M-71d.
5. 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 also of the type recommended by manufacturer of floor covering material.
6. Landing area at top of steps shall be ribbed rubber which shall extend to and join the ribbed aisle cover at an angle and its leading edge (curbed fillets excepted) white or a light color.
7. All joints or seams in the floor covering shall be covered with non-ferrous metal, minimum one (1) inch wide and .095 inch thick, weight .09 per linear foot. Attaching screws shall be countersunk.
8. Holes around engine housing shall be adequately sealed.

#### **FUEL FILLER OPENING**

An opening of adequate size and design shall be provided over fuel filler. Lettering adjacent to the fuel filler opening shall indicate fuel type required.

#### **GRAB HANDLE AT ENTRANCE**

A suitable grab handle or rail shall be provided at the front entrance, securely mounted inside of body. Lower end shall be mounted as low as possible to be within reach of small children upon entering bus. Grab handles shall be made of round stainless steel, one (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.

#### **INSULATION AND SEALING OF JOINTS**

1. Overlapping of edge of exterior roof and side panels and also the top edge of rub rails shall be sealed with nonhardening resilient material.
2. Thermal insulation, if provided, shall be fire-resistant and of a type that will not harbor dampness, and shall be approved by Underwriter's Laboratories, Inc.

#### **LETTERING AND TRIM**

Letters and trim on three (3) rub rails below belt-line shall be black (except for stop sign). Letters of words SCHOOL BUS on top front and rear section of bus body shall be eight (8) inches high and correspond to Series B, Standard Alphabet. (See National Standards.) (Name of District) DISTRICT SCHOOLS, on each side of bus body at belt-line shall be in four (4) inch minimum letters. Numbers to be furnished by county shall be in four (4) inch minimum height and on each side and on rear of bus body. EMERGENCY DOOR shall be in two (2) inch letters at top or directly above door, visible inside and outside of bus. Lettering to indicate fuel type shall be located adjacent to fuel filler opening.

Stop signal arm shall be have red background with a reflectorized white border and the letters STOP shall be in six (6) inch white reflectorized letters. Reflective sheeting shall be high intensity-type material, to be warranted for ten 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). Also see **WARRANTIES**.

**NOTE:** Buses shall include the lettering and trim specified above, and may include, but shall be limited to, the lettering, trim, symbols, markings, and colorization specified in the 1995 National Standards for School Buses and Operations.

#### **LICENSE HOLDER**

License holder shall be manufacturer's standard.

## 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.

## MIRROR SYSTEM

1. **Interior Mirror:** Shall be a minimum of 50 square inches.
2. **Exterior Mirrors:** Each school bus shall be equipped with a system of exterior mirrors complying with FMVSS 111 and meeting the following requirements:
  - a. **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:
    - (1) Only one mirror shall be installed at each front corner of the bus.
    - (2) No portion of either mirror shall extend more than 12" forward of the forward most point of bus.
    - (3) Mirrors shall not reflect excessive glare from the bus headlights into driver's eyes.
    - (4) Any fasteners used in the construction of the mirror and mounting bracketry shall be stainless steel. Also see BODY FASTENERS
    - (5) Lens of each mirror shall be replaceable without use of adhesives.
    - (6) Driver's view of mirrors through windshield shall be unobstructed.
  - b. Overall exterior mirror system (cross/side-view and rear vision mirrors) shall incorporate the following features and requirements:
    - (1) Mirrors shall be isolated from vibration.
    - (2) Mirrors shall be adjustable without use of tools.
    - (3) Mirror assemblies (including mounting bracketry) shall be warranted (100% parts replacement coverage) for five years against rust and corrosion, and against any reduction in clarity of view due to discoloration or other deterioration of the lens.
  - c. **Rear Vision Mirror System:** A rear vision mirror system shall be provided which incorporates the following features and requirements:
    - (1) A convex rear vision mirror of minimum 70 square inches in size shall be mounted on each side of the bus. Each mirror shall provide the driver a view of the ground below the body skirt from at least ten feet forward of the rear wheels back to the outside edge of the rear tires and to the side extending at least twelve feet perpendicular to the side of the bus at a point 20 feet to the rear of the front bumper. Reduction in apparent image size in convex rear vision mirrors shall be no greater than is necessary to show the view described.
    - (2) A flat rear vision mirror of minimum 70 square inches in size shall be mounted above the convex rear vision mirror on each side of the bus to provide the driver a view along the left and right sides a minimum of 200 feet to the rear of the bus.
    - (3) Rear vision mirrors shall be mounted to be viewed through the windshield with no obstructions, except that left side mirrors on Type "A" buses may be viewed through driver's side window.
  - d. Certification of the indirect view provided by the mirror system and of the driver's direct view of the ground shall be provided as required by the Department of Education. Also see WARRANTIES.

## **MOUNTING OF BODY**

Body shall be assembled in body company's standard production facilities. Body shall be securely attached to each chassis side rail. All attaching bolts shall not be less than 7/16 inch in diameter meeting SAE requirements. Nuts shall be secured with lock washers or shall be self-locking.

## **PAINT AND FINISH**

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. School bus yellow paint shall meet National Standards for color and shall have a finished gloss rating of at least 85 at 60° and a distinctness of image rating of at least an average of 50 when measured in accordance with the procedures specified for gloss in **WARRANTIES**. Paint shall be applied for a total dry thickness of at least 1.8 mils over all painted surfaces. Trim, lettering, and bumpers shall be black except that bumpers may be striped in accordance with National Standards or these specifications. Lead-free paint shall be used on all interior and exterior surfaces of the body and chassis. See the section on **WARRANTIES** for warranty requirements and **STRUCTURAL DESIGN** for required metal preparation. Also see **LETTERING AND TRIM and REFLECTIVE MARKINGS**.

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

$$L^* = 77.37$$

$$a^* = - 1.17$$

$$b^* = -.69$$

## **PANELING, EXTERIOR**

1. Exterior paneling includes all sheet metal skin forming exterior surface of body, excluding front cab section sheet metal supplied by chassis manufacturer.
2. Exterior paneling should be of 20-gauge steel minimum thickness and shall be attached to bow frames and strainers so as to act as an integral part of structural frame. Roof panel design may include two (2) types:
  - (1) panels extending full width of top and joined to window headers on each side of bus body and each of main roof bows;
  - (2) panel section of a length sufficient to extend across three (3) or more main roof bows and joined to window header and supported by and joined to a longitudinal strainer of special design.

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. (See **STRUCTURAL DESIGN**; also **INSULATION AND SEALING OF JOINTS**.)

## **PANELING, INTERIOR**

1. 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 behind chassis cab 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.
2. 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.

## **REFLECTIVE MARKINGS:**

There shall be installed a reflective marking package as specified in the 1990 National Standards for School Buses. This package shall include markings for the front, rear, both sides and front and rear bumpers. Striping on sides of bus shall be two inches wide meeting the ASTM D-4956-90 Type 5 reflective sheeting standard. 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.

## RUB RAILS

1. There shall be one rub rail on each side of bus approximately at seat level which shall extend from entrance door post around bus body (except for emergency door) to point of curvature near rear of cab section on left side.
2. 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 wheel housings, and shall extend only to radii of right and left corners.
3. Rub rails shall be attached twice at each body post and at all other upright structural members.
4. Rub rails shall be four (4) inches or more in width, shall be of 16-gauge steel, and shall be constructed in corrugated or ribbed fashion.
5. Rub rails shall be applied outside of body panels. Pressed-in or snap-in rub rails do not satisfy this requirement.

## SEATING AND MODESTY PANELS (CRASH BARRIERS)

1. 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.
2. Seat spacing shall meet the requirements of FMVSS 222 and provide a minimum of 25 inches of 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.
3. All passenger seat bottoms shall be attached to the seat frame with a device that allows 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.
4. The padding shall be secured to the frame in a non-sag manner. Screws and bolts used in seat back construction shall not be exposed.
5. Nineteen capacity Type "A" buses shall be equipped with a DOT-type padded barrier modesty panel on the driver's side and the service door side. Modesty panels at entrance side and driver's side shall have a full-width, aluminized steel panel below the padding and extending down to the floor.
6. Modesty panels and passenger seats, including seat backs 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 1990 National Standards School Bus Seat Upholstery Fire Block Test. All passenger seats and barriers shall be covered with upholstery material meeting the following color standard +/- four delta E:

<u>III/ob</u>	<u>X</u>	<u>Y</u>	<u>Z</u>	<u>x</u>	<u>v</u>
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

## SERVICE DOOR

1. Service door shall be a double-wall split type or jackknife type located at right front of bus. A double-bearing chromium-plated or 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 also be chromium-plated or epoxy-coated. 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 two (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.
2. 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 three (3) inch width, or approved equal safety cushion.

3. Doors shall be so designed and weather-strips mounted so that there is no binding or tendency for stripping to dislodge during door operation. Two (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 35 inches from ground when bus is unloaded. Top of upper glass panel shall not be more than six (6) inches from top to door.

### **SIZES OF BODIES**

Maximum overall outside width of body shall be 96 inches. Height of body from top of finished floor to underside of ceiling, at center of body, shall be a minimum of 72 inches.

### **STEP WELL**

A step well of at least two (2) steps shall be built in right front assembly enclosed with doors extending to bottom step. Each step shall be covered with ribbed rubber, 3/16 inch thick, bonded to metal base and otherwise constructed so as to provide substantial support, including the leading edge which shall be white or a light color. Entrance to step shall extend below floor line about 14 inches from the ground.

### **STRUCTURAL DESIGN**

**NOTE:** These specifications for design and grade of steel apply to the school bus body supplied by the body manufacturer.

1. 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 19 Capacity Type "A" school bus bodies shall meet the requirements of Federal Motor Vehicle Safety Standard #221.
2. All welds used in construction of body shall conform to latest applicable specifications of the American Welding Society.
3. Welds, rivets, or high-strength bolts may be used in connecting parts of the structural body. All bolts shall have provision to prevent loosening under vibratory loads. All bolts, nuts, washers, and screws used throughout the body shall be approved size, cadmium or zinc plated, or thoroughly treated in an approved manner for prevention of rust.
4. 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) wheelhousing, (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, 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 also 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.

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 ASST. 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.

5. Upper body structure shall consist of frames extending from floor to one (1) side to floor on opposite side, at each window post, which may be composed of posts and roof bows or a continuous bow frame and members running from front to rear of body known as strainers.

6. Design shall provide for:
  - a. A formed longitudinal member having a combined function of supporting floor plates, providing impact resistance, and of supporting exterior ends of seats; or,
  - b. A longitudinal member located about seat line, securely fastened to body posts, and a continuous separate member of a strength equal to a 1¼ X 1¼ X 1/8 inch angle securely attached for support of seats.
7. A roof bow shall be located at least at each post to form a bow frame and spaced on approximately 27-inch centers, excepting they may be spaced a maximum of 36½ inches, provided sufficient supports are installed to maintain integrity of roof structure. Roof bows shall not be buckled or distorted out of cross section during bending processes to curved shape. Bow frames may be formed as one (1) piece or may be joined at window header by connections developing full strength of cross section. Each post shall be securely connected to floor beams directly through gussets or indirectly through side rails.
8. The front end assembly shall be sufficiently heavy to withstand vibrations transmitted to it through chassis. 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 in an approved waterproof manner.
9. Rear Corner Reinforcements: Rear corner framing of bus body between floor and window sill and between emergency door post and rear side post shall consist of at least three (3) structural members applied horizontally or vertically or in another combination to provide additional impact and penetration resistance equal to that provided by frame members.
10. Side Strainers: There shall be three (3) or more side strainers or longitudinal members to connect vertical structural members and to provide impact and penetration resistance in the event of contact with other vehicles or objects. Such strainers shall be formed (not in flat strip) from metal of at least 16-gauge and 3 inches wide.

Strainer at roof line or window header shall extend all around the bus.

Side strainer shall be installed in area near bottom of seat frame and shall extend completely around bus body except for door openings. Side strainers specified above shall be fastened to each vertical structural member in any one or any combination of the following methods as long as stress continuity of members is maintained.

- a. Installed between vertical members.
- b. Installed behind panels but attached to vertical members.
- c. Installed outside exterior panels.

Fastening method employed shall be such that strength of strainers is fully utilized.

Strainer immediately below windows shall extend around body except for door openings and shall be securely joined to vertical members. This strainer shall be secured longitudinally to outside of body posts for length of body and have the bending and penetration characteristics of a rub rail (see below) and may be formed as a channel, lipped channel, box or hat section if installed on vertical members behind panels or as a rub rail if applied outside of body panels. No portion of side strainer or longitudinal member, except at seat level, is to occupy same vertical position as required for rub rails.

### **SUN SHIELD**

Manufacturer's standard visor or sun shield is acceptable.

### **TESTING OF BODY**

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

### **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.

## **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.

## **WHEELHOUSINGS**

Rear 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**; for covering, see **FLOOR AND FLOOR COVERING**.

## **WINDOWS**

1. 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.

A minimum clear vertical opening of not less than nine (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 a minimum of injury prone projections. Window latches must be replaceable or rebuildable without disassembling the complete window frame or removing the window from the body. Also, 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.

2. For ventilation purposes, the driver's window shall be adjustable.
3. There shall be installed, in rear door, two (2) windows (one (1) upper, one (1) lower) set in rubber in a waterproof manner. Total glass area in emergency door shall be a minimum of 750 square inches. Glass shall be same type as for side windows.

Rear side windows located at each side of emergency door shall be set in rubber in waterproof manner. Glass area shall be large enough to provide desirable vision to rear and shall be of same quality and grade as for side windows.

4. 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.
5. Districts may use Lexan (TM) or equivalent in locations other than the windshield when replacing OEM glass.

## **WINDSHIELD**

Windshield shall provide for corner vision and be fitted with curved glass, four-piece flat glass or two-piece flat glass as approved by the Department of Education. Glass shall be laminated safety polished plate, set in rubber in a waterproof manner and slanted to reduce glare. Glass shall meet current SAE specifications and Federal Motor Vehicle Safety Standards.

## **WINDSHIELD WIPERS AND WASHER**

Windshield wipers and washer shall be electric powered and meet Federal Standards.

## PART B

### Body Specifications for 16 Capacity Type "A" Buses with Single Rear Wheels

#### **BACKUP ALARM AND STICKER**

The body manufacturer shall provide a backup alarm on each bus to provide audible warning that the bus is in reverse gear. Alarm shall meet the requirements of SAE J994, including 97 dBA sound 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.

#### **BATTERY ACCESSIBILITY**

Body manufacturer shall provide easy accessibility for maintenance of both batteries on diesel-equipped chassis.

#### **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**. Equipped Capacity shall be the actual passenger capacity of the finished body, as equipped by the manufacturer, based on:

1. The number of total passengers the installed bench seats are designed to carry, and;
2. the number of wheelchair positions installed (based on wheelchair space dimensions contained in Section VI of these specifications).

An example of the format to be used for Equipped Capacity is "8 + 1 WC", meaning 8 regular passenger seating positions plus one wheelchair position.

#### **BODY FASTENERS:**

All External body fasteners used to attach componentry to the exterior of the bus shall be constructed of stainless steel or other noncorrodeable material approved by the Department of Education.

#### **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: a. an EPA registered germicide (tuberculicidal) disinfectant, b. a fully disposable wiping cloth, c. a water resistant spatula, d. step-by-step directions, e. absorbent material with odor counteractant, f. two pairs gloves (latex), g. one package towelettes, h. a discard bag (non-labeled paper bag with plastic liner and a twist tie). This bag shall be approximately 4"x 6"x 14", 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.

#### **EMERGENCY EXITS**

1. The emergency door shall be located at rear of vehicle with door control both inside and outside of vehicle. The door shall be equipped with an audible signal mounted so as to warn the driver if the door control is released while the ignition switch is in the "ON" position. Signal shall meet requirements of FMVSS 217. Emergency door shall have at least one window to give driver a view of area behind bus through inside rear view mirror. The emergency door window(s) shall be non-opening type. For lettering requirements, see **LETTERING** in this part.
2. Each bus shall be equipped with two push-out type emergency exit side windows. These windows shall be of similar design to standard side windows, except for the following:
  - a. Window assembly shall be hinged on the front and include a latching device for securing in the normal (non-emergency) position and to allow emergency opening.



- b. Each window shall be equipped with a switch to activate a buzzer when the emergency opening latch is released.
  - c. One window is to be mounted on each side of the bus body, approximately at the midpoint.
  - d. The lettering "EMERGENCY EXIT" shall be located on or above the window, inside and outside the bus.
  - e. Emergency windows shall meet applicable requirements of FMVSS 217.
3. Type "A" buses shall be equipped with one roof hatch-type emergency exit/ventilator, specified as follows:
- a. Shall comply with all requirements of FMVSS 217 for emergency exits.
  - b. Hinge(s) shall be located on forward side of hatch.
  - c. Shall be equipped with an outside release to allow opening emergency exit from outside bus.
  - d. Shall be labeled "Emergency Exit" inside and out and shall be labeled with instructions for release inside and out.
  - e. Shall provide a "partially open" position along full width of hatch adequate to allow air to enter or exit and thereby ventilate bus.
4. All school bus bodies built under these specifications shall meet the latest requirements of Federal Motor Vehicle Safety Standard #217, published in the Federal Register. Such compliance shall be effective upon adoption of these specifications, irrespective of the effective date contained within the Federal requirements.

**EMERGENCY ROADSIDE REFLECTORS**

The vehicle shall be equipped with warning devices meeting FMVSS 125. The container shall be sealed with a breakable, nonreusable seal.

**FEDERAL STANDARDS**

Completed bus must meet all applicable Federal Motor Vehicle Safety Standards (FMVSS), including FMVSS 220 for school bus rollover protection.

**FIRE EXTINGUISHER**

- 1. A dry chemical-type fire extinguisher with gauge and designed to restrain tampering shall be mounted in a place accessible to driver, preferably near service door.
- 2. Fire extinguisher shall bear label of Underwriters' Laboratories, Inc. showing rating of not less than 2A-10BC.

**FIRST-AID KIT**

- 1. Bus shall carry 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.
- 2. Number of units and contents shall be as follows:

1-inch bandage compress (e.g., Band-Aids).....	2 pkgs.
40-inch triangular bandage with two safety pins.....	1 pkg.
4" X 4" sterile gauze pads.....	2 pkgs. of 6 each
2-inch rolled curlex bandage each in length.....	2 rolls six feet
1-inch roll adhesive tape in length.....	1 roll 2½ yards
Eye dressing packet.....	2 pkgs.

## **FLOOR AND FLOOR COVERING**

Floor design shall provide adequate and firm support for seat legs and shall have a minimum of one-half inch pressure-treated plywood securely attached to 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.

The floor covering of under seat area, driver's compartment, and aisle between the passenger seats shall be covered with fire resistant rubber or approved equal, applied to a leveled floor surface. Landing area at top of step shall be ribbed rubber which shall extend to and join the ribbed aisle cover at an angle and its leading edge shall be white or a light color (curbed fillets excepted).

## **HEIGHT OF INTERIOR**

Interior height from the floor to the ceiling shall be a minimum of 60 inches.

## **LETTERING**

All lettering shall be black as follows:

1. **(Name of District) DISTRICT SCHOOLS**, each side minimum 6-inch letters.
2. **"EMERGENCY DOOR,"** 2-inch black letters inside and outside at or near top of emergency door.
3. **BUS NUMBER** (to be furnished by purchaser) front, rear and each side of bus - minimum 4 inches.
4. **"SCHOOL BUS,"** 8-inch letters front and rear roof caps, Series B, Standard Alphabet (See National Standards).
5. Stop Arm Lettering, see "Stop Arm Signal," this part.
6. Lettering to indicate fuel type shall be located adjacent to fuel filler.

**NOTE:** Busses shall include the lettering and trim specified above, and may include, but shall be limited to, the lettering, trim, symbols, markings, and colorization specified in the 1995 National Standards for School Buses and Operations adopted May, 1995.

## **LICENSE HOLDER**

License holder shall be manufacturer's standard.

## **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.

## **MIRROR SYSTEM**

1. **EXTERIOR MIRRORS:** Each school bus shall be equipped with a system of exterior mirrors complying with FMVSS 111 and meeting the following requirements:
  - a. **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:
    - (1) Only one mirror shall be installed at each front corner of the bus.
    - (2) No portion of either mirror shall extend more than 12" forward of the forward-most point of bus.
    - (3) Mirrors shall not reflect excessive glare from the bus headlights into driver's eyes.

- (4) Any fasteners used in the construction of the mirror and mounting bracketry shall be stainless steel. Also see **BODY FASTENERS**.
  - (5) Lens of each mirror shall be replaceable without use of adhesives.
  - (6) Driver's view of mirrors through windshield shall be unobstructed.
- b. Rear Vision Mirror System: A rear vision mirror system shall be provided which incorporates the following features and requirements:
- (1) A convex rear vision mirror of minimum 70 square inches in size shall be mounted on each side of the bus. Each mirror shall provide the driver a view of the ground below the body skirt from at least ten feet forward of the rear wheels back to the outside edge of the rear tires and to the side extending at least twelve feet perpendicular to the side of the bus at a point 20 feet to the rear of the front bumper. Reduction in apparent image size in convex rear vision mirrors shall be no greater than is necessary to show the view described above.
  - (2) A flat rear vision mirror of minimum 70 square inches in size shall be mounted on each side of the bus above the convex rear vision mirror to provide the driver a view along the left and right sides a minimum of 200 feet to the rear of the bus.
  - (3) Rear vision mirrors shall be mounted to be viewed through the windshield with no obstructions, except that left side mirrors on Type "A" buses may be viewed through driver's side window.
- c. Overall exterior mirror system (cross/side-view and rear vision mirrors) shall incorporate the following features and requirements:
- (1) Mirrors shall be isolated from vibration.
  - (2) Mirrors shall be adjustable without use of tools.
  - (3) Mirror assemblies (including mounting bracketry) shall be warranted (100% parts replacement coverage) for five years against rust and corrosion, and against any reduction in clarity of view due to discoloration or other deterioration of the lens.
- d. Certification of the indirect view provided by the mirror system and of the driver's direct view of the ground shall be provided as required by the Department of Education. Also see **WARRANTIES**.

2. Interior Mirror: Shall be a minimum of 50 square inches.

### **PAINING**

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. School bus yellow paint shall meet National Standards 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 50 when measured in accordance with the procedures for gloss listed in **WARRANTIES**. Paint shall be applied for a total dry thickness of at least 1.8 mils over all painted surfaces. Trim, lettering, and bumpers shall be black except that bumpers may be striped in accordance with National Standards or these specifications. Lead-free paint shall be used on all interior and exterior surfaces of the body and chassis. See the section on **WARRANTIES** for warranty requirements and **STRUCTURAL DESIGN** for required metal preparation. Also see **LETTERING** and **REFLECTIVE MARKINGS**

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

$$L^* = 77.37$$

$$a^* = - 1.17$$

$$b^* = -.69$$

### **PANELING, INTERIOR**

Interior roof and wall panels shall be lined and free of sharp projections likely to cause injury to pupils.

**PUPIL WARNING LIGHTS, STOP ARM, PUPIL CROSSING ARM, AND SYSTEM CONTROLS AND OPERATION:**

**a. Pupil Warning Lights**

- (1) Minimum pupil warning light requirements shall be dual, mounted side by side on all corners of bus roof. 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 three (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.
  - (b) Use replaceable quartz halogen bulbs.
  - (c) Be seven inches in diameter.

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

- (1) Master switch - provides means for deactivating entire system, as would be required when opening the door at a railroad grade crossing.
- (2) Control switch - three positions: **OFF, AMBER,** and **RED.** Switch may be rocker, pull-type or other switch providing three positions.
- (3) Service door-actuated switch.
- (4) 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 three-position switch in the **"AMBER"** position, with the master switch **"ON"** it must not be required that the three- position switch be moved to **"RED"** or that the service door be opened, in order to 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, 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 ARM, 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

**c. Pupil Crossing Arm:** Required, meeting following:

- (1) Electrically operated on all hydraulic brake buses.
- (2) Mounted to the right side of the front bumper and shall not open more than 90 degrees.

- (3) All components and connections shall be weatherproofed.
- (4) Easily removable for towing of the bus.
- (5) Shall meet or exceed SAE Standard J 1133.
- (6) Constructed of noncorrosive or nonferrous material or treated as per the body sheet metal standard.
- (7) No sharp edges or projections that could cause hazard or injury to students.
- (8) Four-point mounting to the front bumper.
- (9) The crossing arm shall extend 72" from the front bumper when in the "extended" position, and shall be constructed of a yellow polycarbonate material. Approximate dimensions of the arm shall be 65" x 3" x 1".
- (10) Shall be extended simultaneously with stop arm by means of stop arm control.

**d. Stop Arm Signal:**

There shall be installed on left outside of body an approved octagonal design vacuum or electrically actuated stop-signal arm, equipped with two double face alternately flashing lights for signaling a pupil stop. Bodies to be mounted on diesel powered chassis with hydraulic brakes shall be equipped with electrically actuated stop arm. Light lenses of stop arm shall be RED. Vacuum lines, if used, must not be readily accessible to students inside or outside the vehicle. Vacuum lines must be made of copper, steel or nonmetallic materials meeting SAE Standard J848d, and fittings shall be brass. Stop signal arm shall meet the applicable requirements of SAE J1133. For controls, see above item. For color, see LETTERING AND TRIM.

**NOTE:** Body manufacturer utilizing an engine manifold vacuum source to power the stop arms must install a 1000 cu. in. vacuum tank with appropriate check valve.

**RUB RAILS**

Rub rails shall be applied on each side of bus. Upper rub rail shall be located at seat cushion level and extend from front edge of front door and service door to each rear corner of bus, installed in sections to permit operation of doors. Lower rub rail shall be located at floor level and shall cover the same longitudinal area as upper guard rail, except wheelhousings. Rub rails shall be a minimum of 4 inches wide, shall be of 16 gauge steel formed to provide maximum strength and shall be fastened with bolts, rivets or huck bolts at each body member transversed and to outside body skin minimum of two fasteners per foot of rub rail. Upper edge of rub rails shall be sealed to prevent water from entering behind rails and lower edge shall be vented minimum once each two feet.

**DRIVER'S SEAT AND SEAT BELT**

Chassis manufacturer's standard driver's seat is acceptable. Driver's seat belt assembly shall be Type 2 meeting all applicable FMVSS for school buses under 10,000 pounds GVWR

**REFLECTIVE MARKING PACKAGE:**

There shall be installed a reflective marking package as specified in the 1990 National Standards for School Buses. This package shall include markings for the front, rear, both sides and front and rear bumper. Striping on sides of bus shall be two inches wide meeting the ASTM D-4956-90 Type 5 reflective sheeting standard. 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.

**SEATING**

1. School bus type seats, forward facing shall be provided and installed to provide a minimum of 12-inch aisle. Seat frames and seat backs above cushion level shall be padded with energy absorbing materials. Seating must meet requirements of FMVSS 222.

2. All passenger seat bottoms shall be attached to the seat frame with a device that allows 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.
3. Modesty panels (if equipped) 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 1990 National Standards School Bus Seat Upholstery Fire Block Test. Modesty panels (if equipped) shall have a full-width aluminized steel panel below the padding and extending down to the floor.
4. All passenger seats and barriers shall be covered with upholstery material meeting the following color standard +/- four delta E:

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

### **SERVICE DOOR CONTROL**

The right front door across the vehicle from the driver's position shall be secured by an over-center locking-type device controlled by the driver. School bus service door control and rod shall be chromium-plated or epoxy-coated.

### **STEP WELL LAMP**

Step well light shall illuminate the bus entrance and be adequately protected. It shall be activated automatically when the door is opened and clearance lights are on.

### **STROBE LIGHT, WHITE FLASHING:**

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

- a. Shall have self-contained powerpack.
- b. Construction: Base shall be Lexan or corrosion resistant metallic or polycarbonate material. Lens shall be clear Lexan or other polycarbonate materials of equal or better strength, resilience, and longevity. 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.
- c. 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 two amperes at 12 volts.
- d. Dimensions and location: Overall height of unit shall be approximately 4" to 6", with lens diameter approximately 4" to 6". Mounting location is to be centered (laterally) on roof of bus, approximately 48" (longitudinally) from rear edge of rear roof cap.
- e. SAE Specifications: Shall meet SAE J575 and J1318.
- f. Warranty: 100% parts and labor coverage; 12 months for flash tube, 18 months for remainder of light.
- g. Body circuitry: Shall include a separate, clearly labeled driver's panel mounted switch, with a clearly labeled pilot light. Body shall include fuse or circuit breaker protection for strobe light wiring.

### **STRUCTURAL DESIGN**

Construction shall be of prime commercial quality steel or material with strength equivalent to steel. Modifications and additions in construction of the completed unit shall conform with any specifications prescribed by the chassis manufacturer regarding gross axle weight ratings (GAWR), overall gross vehicle weight (GVW), or other areas in which Federal Standards and certification requirements may apply.

### **SUN SHIELD**

Sun visor or shield shall be manufacturer's standard.

### **TWO-WAY RADIO**

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

### **UNDERCOATING**

The entire underside of body and front fenders shall be undercoated with fire resistant undercoating material applied by spray method. Any undercoating material used shall be asbestos free.

### **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. has no sharp edges or projections.

### **WINDOWS AND GLAZING**

There shall be a minimum of four split-sash school bus type windows on each side of bus. Window glass, except windshield, shall be safety glass, AS-2 or better grade.

Districts may use Lexan (TM) or equivalent in locations other than the windshield when replacing OEM glass.

### **WIRING**

Wiring shall meet SAE requirements. 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. Also see **WARRANTIES**. Additionally, for all school bus body optional electronic components installed on the bus, the body manufacturer shall provide each district purchasing one or more such items with at least one comprehensive parts and repair manual. Bodies shall be equipped with an electrical circuit master switch that will cut body circuits "ON" and "OFF" by means of a solenoid (relay) controlled by the ignition switch.

## PART C

### Optional Body Equipment Specifications, for 16 and 19 Capacity Type "A" Buses

1. **3-2 SEATING:**

Option for 3-2 seating in lieu of standard 3-3 seating. Option shall include 45" wide seats on left side of aisle and 30" to 33" seats on right side of aisle, providing a minimum 12" wide aisle. Maximum Design (passenger) Capacity shall be identified on body data plate based on standard 3-3 seating arrangement. Equipped Capacity shall be identified on body data plate based on installed 3-2 seating. All other requirements of standard seating (except seat width) shall be complied with when this option is provided. Also see **BODY DATA PLATE.**

2. **AM/FM RADIO:**

Shall have two speakers, one flush mounted in passenger compartment and one in driver compartment. See **PUBLICATIONS** for parts manual requirements for optional components.

3. **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). Insulation material must be fire resistant and of a type that will not harbor dampness, and must be approved by Underwriters Laboratories, Inc.. 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.

4. **DRIVER'S WINDOW VISOR:**

Option for a tinted, transparent plastic adjustable sun shield, minimum 6"x 24", to be installed over the driver-side window with substantial mounting so that it will remain in the position to which it has been adjusted.

5. **FLAT FLOOR:**

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" as per standard body specifications. This option shall contain additional options 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" seats shall be used except where lift bus specifications require a 30" aisle.

6. **POWDER- COATED WINDOW FRAMES:**

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

7. **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. Thomas Built Buses, "MOM" seat.
- c. Other systems as approved by the Department of Education.



8. **TINTED GLASS:**

Option for tinted glass which provides maximum tinting allowed by Federal and ANSI standards for the windshield, driver's side window, and service door glass and which also includes tinted glass in all windows rear of driver's compartment with a light transmission of approximately 28 percent.

9. **WHITE PAINTED ROOF:**

Option for white painted roof on all types of buses to comply with applicable Federal Standards and National Standards. White paint shall cover roof but may not extend beyond drip rail on side of vehicle; front and rear caps must remain yellow. Paint shall meet the requirements listed in the **PAIN T AND FINISH**, and **WARRANTY** sections of this manual except for color. Paint used to meet the requirements of this option shall be lead-free.

10. **DRIVER'S AIR SEAT:**

Option for an air suspension type driver's seat meeting all requirements of the standard driver's seat for hydraulic brake buses

11. **EMERGENCY EVACUATION RAMP**

Option for an emergency evacuation ramp meeting the following specifications:

- a. Ramp shall be constructed of lightweight materials with a minimum 21,000 psi yield strength.
- b. Must maintain a 600 pound working load with a 4 to 1 safety factor.
- c. Shall be equipped with a side rail at least 1 inch high to reduce the likelihood of wheelchairs sliding over the edge.
- d. Shall be enclosed or otherwise protected from road debris when stowed.
- e. Ramp shall be at least 24 inches wide (inside side rails) and shall have a nonskid surface for the full length and width of the ramp.
- f. Ramp shall be deployable by one average person, with an average initial deploying force of not more than 35 pounds and shall extend from the floor level of the bus to the ground when extended.
- g. Ramp shall be accessible with the rear door open.



SECTION VI

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 Sections III and V 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 (VI).

A power-up, power-down and 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 Standards for School Buses, Revised 1990, shall also be applicable, including dynamic testing requirements for mobile seating device/occupant securement systems. Body manufacturer may be required to provide certification that exceptional child buses and equipment meet the additional requirements of the National Standards pertaining to buses for special needs students.

## 2.0 TECHNICAL REQUIREMENTS

The wheelchair lift shall meet the technical requirements of Section 2.0.

### 2.1 GENERAL LIFT AND/OR BODY REQUIREMENTS

#### 2.1.1 Weight

The weight of the lift shall not adversely affect the legal axle loadings, 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 seven (7) percent or four (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 five (5) degrees due to road crowns, depressions, or curb geographics.

#### 2.1.3 Boarding Direction

See ADA s. 1192.23(11).

#### 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 side wall and floor construction of an unaltered model.

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

2.1.4.5 All doors must open outwardly.

- 2.1.4.6 All doors shall be weather sealed and so constructed that a flange on the forward door overlaps the edge of rear post or door when closed. 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 which 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 one-point fastening arrangement to header. The forward mounted door shall have at least three-point fastening devices. One shall be to the header, one to the floor line of the body, and the other shall be into the rear door. These locking devices shall afford maximum safety when 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" 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, fabric-covered foam down to within 3" 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: See ADA s. 1192.23(6).
- 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 s. 1192.23(6).

### 2.2.2. Protrusions and Openings

- 2.2.2.1. Protrusions: See ADA s. 1192.23(6).
- 2.2.2.2. The lift platform shall not have any openings greater than \_ inch in width, except for a hand hold not exceeding 1½" X 4" 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 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 s. 1192.23(5).

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. Also see ADA s. 1192.23(5).

2.2.6.3. Inner Roll Stop: See ADA s. 1192.23(5).

### 2.2.7. Handrails

See ADA s. 1192.23(13).

### 2.2.8. Platform Lighting

2.2.8.1. The bus body shall have a light providing sufficient illumination (at least one 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 three (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 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 must be installed so that portion of main stanchion assembly(ies) or bracket(s) (if applicable) are 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 (two bolts per stanchion assembly required).

## 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 six (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 three (3) times normal design working pressure.

### 2.4.2. Platform Free-fall Limits

See ADA s. 1192.23(4).

## 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 four designated operating functions as defined:

- 1) Up - raises lift platform, while maintaining an operating position
- 2) Down - lowers lift platform, while maintaining an operating position
- 3) Fold - moves lift platform from an operating position to a stowed position
- 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 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 one 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 adjacent to the lift but easily visible from the driver's position, must be provided and shall be illuminated if the lift door is not fully closed and latched.

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's.

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

## 2.5.7. Lift Operational Requirements

See ADA s. 1192.23(10).

## 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:

- 1) Rapid unfolding of the lift platform from the stowed position to floor level.
- 2) Lowering of lift from floor level to ground level (under rated load.)
- 3) Raising of lift from ground level to floor level (under rated load.)
- 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 Section 3.1 and any additional testing specified in ADA requirements shall be performed on one representative production unit of the wheelchair lift model purchased.

Unless otherwise specified, the lift shall meet the requirements given in 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 one representative production unit is required to be tested for certification, with all tests of Section 3.1 conducted on the same unit without any repairs or maintenance during the test other than that permitted by 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 one 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 Section 3.1.1.1.
- 3.1.1.3. Combination Vertical and Deployment Cycling Test. The tests in Sections 3.1.1.1. and 3.1.1.2. may be combined into a single test that meets the minimum requirement so 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 three 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 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 by 24 inches to correspond to the approximate outer dimensions of a wheelchair "footprint." The load shall remain on the platform not less than two (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 by 24 inches. The load shall remain on the platform not less than two (2) minutes.

3.1.9. Visual Inspection

At the conclusion of any test described in Section 3.1 except 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 Section 3.1, Design Tests. 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 two years from the date of acceptance by the final consumer. The warranty shall provide 100 percent coverage for parts. Also see WARRANTIES.

### 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 one-day training seminars on overall features, operation, preventive maintenance, diagnosis, and rebuild of wheelchair lifts offered through the bid. The seminars are to be conducted free of charge at district garage locations to be arranged by the Department of Education and the successful bidder. At least one seminar on each given lift model shall be conducted per five school districts purchasing a bus or buses equipped with that lift.

## 5.0 WHEELCHAIR/OCCUPANT SECUREMENT SYSTEM

- 5.1 General Requirements for Wheelchair/Occupant Securement System (Also see 7.0 PASSENGER SECUREMENT AND WEBBING CUTTER.)
  - 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 by 30 inches laterally.
  - 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 four-point tiedowns, incorporating four flexible, adjustable straps to include the following:
    - 5.2.1.1 The four straps shall each be equipped with over-center locking adjusters and shall be interchangeable.
    - 5.2.1.2 Each strap shall be equipped with a positive spring-lock type end fitting on floor end and a snap-ring plus captivated D-ring on the chair end (so strap can be lopped around chair frame without metal-to-metal contact).
    - 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 points are to be spaced at increments not to exceed four inches, center-to-center. Attachment point hardware shall be equivalent to Kinedyne Series A vertical track. To meet this requirement, four parallel sections of track shall be longitudinally mounted to the bus floor. The sections shall be located at approximately 4", 13", 24", and 33", respectively, from the body sidewalls, measured perpendicularly from the body interior sidewall to the center of each track. Each track section shall be one continuous piece the length of the wheelchair position. Any exposed track segment end, if not flush with the floor or against the body rear interior wall, shall be fitted with protective, beveled end caps or other means of reducing the tripping hazard. Series L (button track) may be used in conjunction with the track seating option in lieu of Series A.
    - 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).
  - 5.2.2 *Occupant securement system* shall meet the following requirements and shall include the following equipment and features:
    - 5.2.2.1 Occupant securement system shall consist of a single-strap upper torso restraint integrated in a Type 2 three-point design with a lap belt assembly.

- 5.2.2.2 Lap belt shall be secured directly or indirectly to the body floor or body attachment points independent of the wheelchair structure. If lap belt is not secured directly to floor, it shall be attached to rear chair tiedowns which are secured to floor (see 5.2.1.4).
- 5.2.2.3 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.
- 5.2.2.4 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 four inches center-to-center. Attachment point hardware for lap belt (if applicable) shall be equivalent to Kinedyne Series A vertical track. Floor track requirements in Section 5.2.1.3 are also applicable to this section. Attachment point hardware for shoulder strap shall be equivalent to Kinedyne Series L track (button track).
- 5.2.2.5 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.
- 5.2.2.6 Upper torso belt and each portion of lap belt shall be adjustable and shall accommodate the size range of occupants specified in FMVSS 209.
- 5.2.2.7 Occupant securement system shall be designed to meet the requirements of FMVSS 209 and 210 (also see 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) approximately 8 inches in front of the forward edge of the seat cushion of all passenger seats that do not have another seat approximately 27 inches 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 PASSENGER SECUREMENT DEVICES AND WEBBING CUTTER**

- 7.1 Seat frames shall be equipped with attachment points for one set of securement devices per passenger position. To meet this requirement, seats shall be designed to conform to requirements in FMVSS 210, for potential retrofitting by districts of passenger securement devices conforming to FMVSS 209 or for retrofitting of other securement devices.
- 7.2 When securements are specified, each seat shall be equipped with one color-coded set per passenger position.
- 7.3 All buses equipped with attachment points for securement devices and/or wheelchair securement systems shall also be equipped with a durable webbing cutter having a full width handgrip and a protected, replaceable blade.

## **8.0 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 two 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. Thirty-nine inch seats are acceptable forward of the wheelchair and lift positions.

## **9.0 SERVICE DOOR (REGULAR) ENTRANCE**

- 9.1 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, including mounting the lower end of each grab rail as low as possible. Exception: 16 capacity and 19 capacity Type "A" require only one grab rail.
- 9.2 When in open position, service doors shall not obscure any portion of grab rails.

## **10.0 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 physically handicapped students.

## **11.0 UNIVERSAL HANDICAPPED SYMBOL FOR BUSES EQUIPPED WITH WHEELCHAIR LIFTS**

All buses with wheelchair lifts shall have two universal handicapped stickers. Each sticker shall be reflective white on blue, minimum 6" X 6" displaying the universally recognized symbol for vehicles transporting persons with disabilities. One shall be located on the left (driver's) side of the front bumper and the other one at the center of the rear emergency door immediately below the upper emergency door glass on a 19- passenger Type "A", all Type "B", "C" and front-engine Type "D" buses. Rear stickers shall be located below the emergency window on Type "D" pushers, or on one of the rear doors on the 16-passenger Type "A" buses.





**SECTION VII**

**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. This section is divided into three parts. Part I covers Performance Specifications; Part II covers specific Equipment Requirements; Part III covers other requirements applicable to all buses.

### 1. Performance Specifications

The installed air conditioning system shall cool the interior of the bus to 80 degrees Fahrenheit measured at a minimum of three points, located four feet above the floor at the longitudinal centerline of the bus. The three points shall be 1) near the driver's location, 2) at the mid point of the body, and, 3) two feet forward of the emergency door, or, for Type "D" rear engine buses, two 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 degrees Fahrenheit, 2) heat soaking the bus at 100 degrees Fahrenheit with windows open for at least one hour, and 3) closing windows, turning on the air conditioner with engine at chassis manufacturer's recommended idle speed, and cooling the interior of the bus to 80 degrees Fahrenheit or lower within a maximum of 30 minutes while maintaining 100 degrees Fahrenheit 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 degrees Fahrenheit and humidity above 50 percent with normal sun loading of the bus. A minimum 20 degree temperature drop will be required in the 30 minute time limit.

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 such that failure in one 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 (Type "A" only) is acceptable.
- (2) Body skirt-mounted condenser(s) are required on Type "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.
- (3) System shall be equipped with a sight glass (or at least one 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 rubber mounted or otherwise mounted so as to isolate condenser(s) from vibration or excessive road shock. If condenser(s) are skirt-mounted, they shall be located forward of rear wheels whenever possible and shall be protected by splash shields or mud guards.
- c. Evaporators and Ducting
- (1) Type "A" buses shall be equipped as follows:
    - (a) Minimum of two evaporators required (one front and one 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 "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 units of more than 32 feet in length if necessary to meet performance criteria.
  - (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 so as 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 "A" chassis manufacturer, may be aluminum cored.
    - (d) Air intake for any evaporator assembly(ies) except for front evaporator of Type A shall be equipped with replaceable air filter(s) accessible without disassembly of evaporator case.
    - (e) On Exceptional Child 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.
- 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 two speeds.
  - (3) Wiring shall be copper with color-coded insulation and shall be in a loom.
  - (4) System shall be equipped with at least one manually resettable circuit breaker per side to provide overload protection for the main power circuit feeding the evaporator blowers, condenser fans, 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 so as to reduce wear resulting from heat, chafing, vibration, and other factors.
- (6) All flexible refrigerant hoses shall be double-braided; all slip-on type hose-to-fitting connections shall be equipped with stainless steel hose clamps.
- (7) The total system shall be thermostatically controlled at the driver's location.
- (8) Refrigerant shall be either R12 or R134A.

e. Body and Insulation

- (1) Body shall be equipped with the diesel noise reduction package. See pages 60 and 96 for minimum specifications. Exception: Body bows of 16 capacity Type "A" need not be insulated.
- (2) All glass (windshield, service and emergency doors, side and rear windows) shall be equipped with maximum tinting allowed by Federal or ANSI standards for the respective locations, except that windows rear of the driver's compartment shall have approximately 28% light transmission.
- (3) Roof shall be painted white over an area between the roof caps and down to the top window line on each side. White paint shall be polyurethane enamel or approved equivalent.

3. Other Requirements (Applicable to all Type "A", "B", "C", and "D" Air- conditioned Buses):

- a. Warranty - the total system shall be fully warranted for two years, including parts and labor with no warranty limitation on number of operating hours. Parts to be warranted shall include, but not be limited to, compressor mounting bracketry and hardware and any belts which directly or indirectly drive the compressor(s). 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.
- 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 servicing or 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.

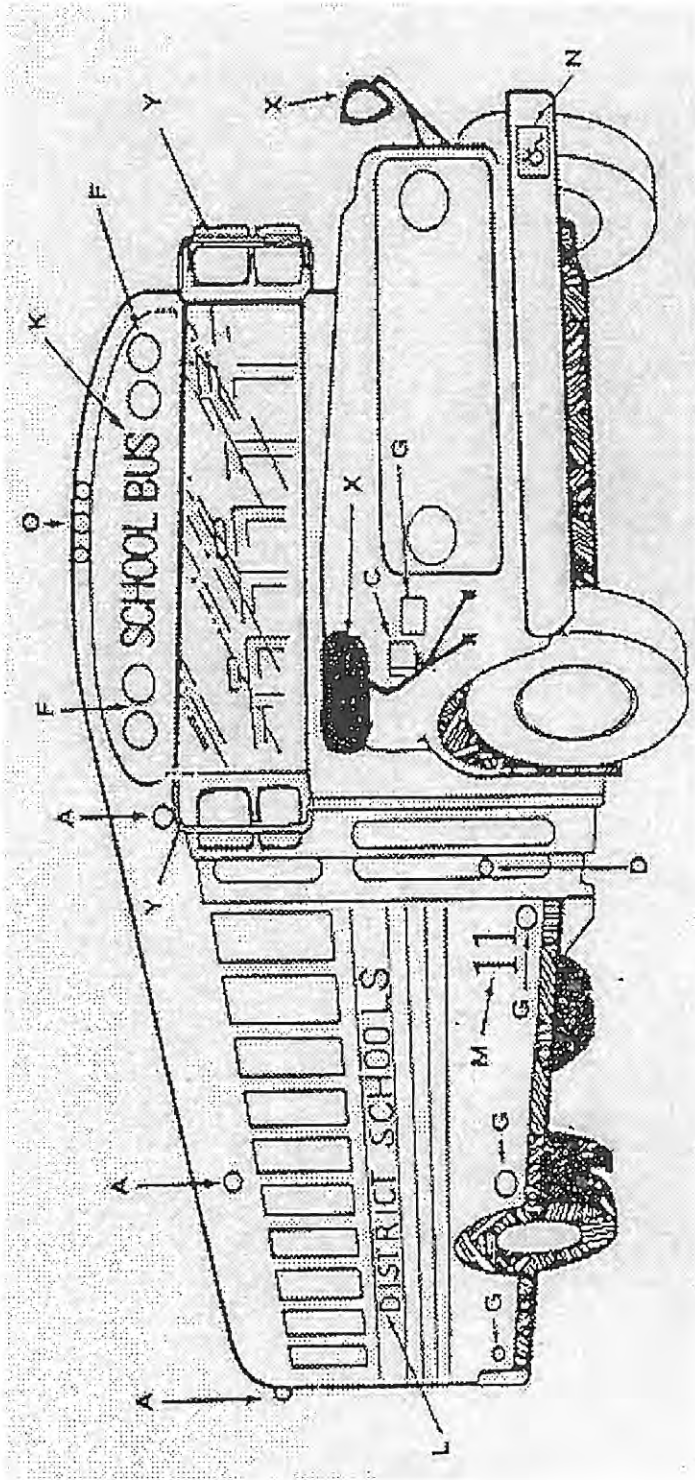
- d. Parts and Tools Availability - all system parts and required special service tools must be readily available, and a list of suppliers shall be provided with each air conditioned bus delivered.
- e. Suspension Capacity and Ground Clearance - ground clearance at the lowest point of the air conditioning 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 insure adequate suspension capacity must be indicated by the body manufacturer for each configuration of air conditioned bus. Standard GAWR's 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's 217, 220, 221, 222, and 301.
- g. Electrical Requirements - 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.

## APPENDIX

### OUTLINE OF MINIMUM LETTERING AND LIGHTING REQUIREMENTS FOR BOTH CONVENTIONAL AND TRANSIT BODIES

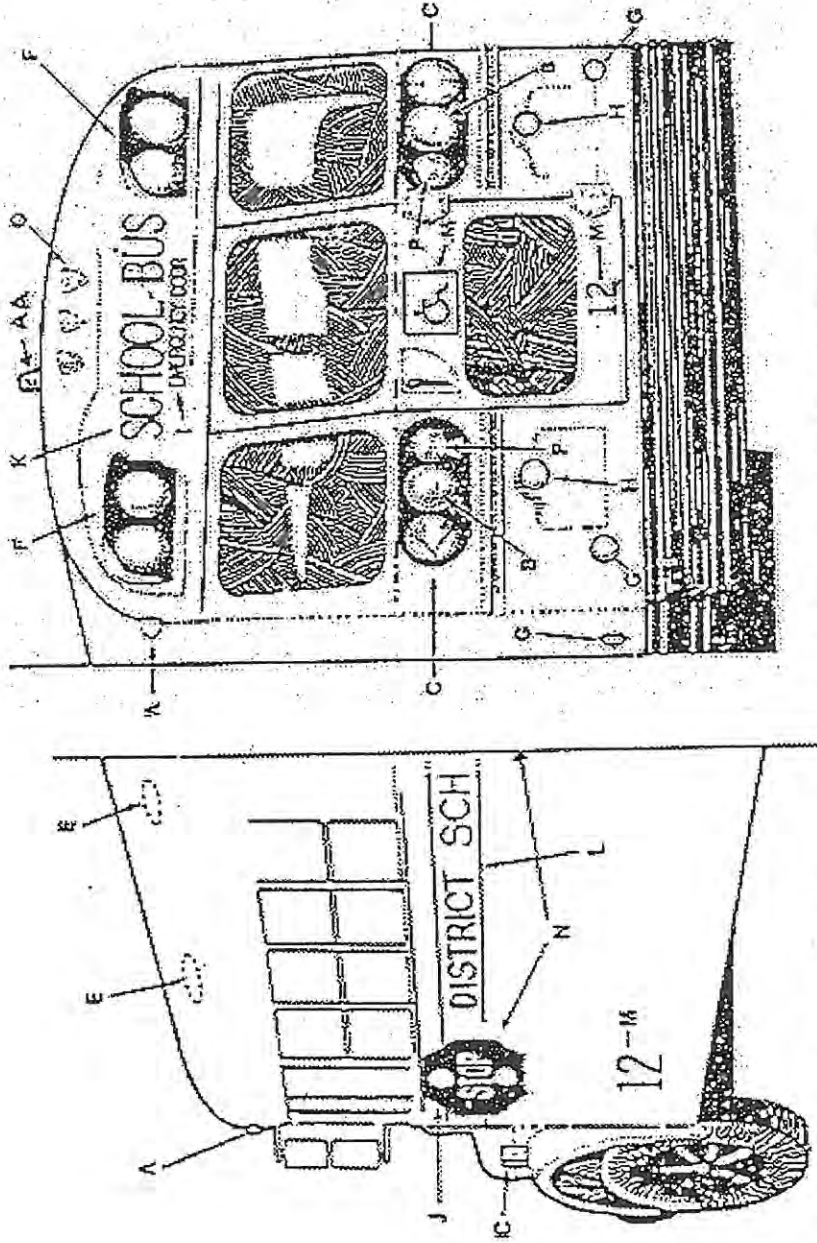






### MINIMUM LETTERING AND LIGHTING REQUIREMENTS

A.	Clearance lights	L.	NAME OF DISTRICT SCHOOL - each side, belt line, 6-inch minimum letters
C.	Front directional signals (double faced, fender-mounted)	M.	NUMBERS - to be furnished by county; 6 inch numbers on each side and rear
D.	Stepwell light (located inside service door)	N.	(Universal Handicapped Symbol for lift buses)
E.	Adequate interior lights (not shown)	O.	Identification lamps
F.	Warning lights - dual (side by side)	X.	Convex cross-view/side mirrors
G.	Reflectors, one near front and one near side panel (one intermediate on 30 foot or larger)	Y.	External rearview mirrors
K.	SCHOOL BUS - front and rear, 8-inch letters, series B Standard Alphabet (See National Standards)		



### MINIMUM LETTERING AND LIGHTING REQUIREMENTS

- A. Clearance lights
- B. (Two) combination brake/tail lamps
- C. Back directional signals (front double-faced, fender-mounted)
- E. Adequate interior lights
- F. Warning lights-dual (side by side)
- G. Reflectors (red)
- H. Two tail lamps (One lamp must illuminate license plate.)
- I. EMERGENCY DOOR - 2-inch letters inside and outside at top or directly above door
- J. Double-face flashing red lights connected to roof mounted flashing red lights
- K. SCHOOL BUS - front and rear, 8-inch letters, Series B Standard Alphabet (See National Standards.)
- L. NAME OF DISTRICT SCHOOL - each side, belt line, 4-inch minimum letters
- M. NUMBERS - to be furnished by county; 4-inch numbers on each side and rear (Universal Handicapped Symbol for lift buses.)
- N. Vacuum, air or electrically actuated octagonal front and rear stop arms, red background, 6-inch white reflective letters, border white reflective
- O. Identification lamps
- P. Back-up lights
- AA. Strobe light