

**Amendment 1
2022
SOUTH CAROLINA
MINIMUM SPECIFICATIONS for
SCHOOL BUSES**

Type C

**These specifications cover all Type C
Platforms**

February 16, 2022

**South Carolina Department of Education
Office of Transportation**

Minimum Approved Chassis Requirements

Minimum Pupil Load	77 75 passenger
Wheel base (approximate inches)	258-279
Front Axle Capacity (lbs.)	10,000
Rear Axle Capacity (lbs.)	21,000

Transmission Speeds Forward 5

Brakes

All chassis shall be equipped with air disc brakes.

- Front Air/Disc
- Rear Air/Disc

Air Conditioning

All chassis shall be equipped with Air Conditioning.

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DETAIL MINIMUM REQUIREMENTS – TYPE C
CONVENTIONAL SCHOOL BUS CHASSIS

AIR CONDITIONING - Air conditioning shall be provided as **standard** on all configurations of type C South Carolina school buses.

The Air conditioning shall be capable of reducing school bus interior air temperature by 20 degrees F within a 20-minute time frame. Test results shall be provided upon request. All buses shall be equipped with one (1) inside roof-mounted free blow type unit mounted in passenger compartment and one (1) flush mounted unit in rear bulkhead or inside roof mounted free blow type on side in rear portion of passenger compartment (in approved location) with a driver controlled thermostat for each unit.

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

Metal, convolute or ABS plastic protective covering shall shield all refrigerant lines located in rear wheel well area. All refrigerant lines/hoses in A/C system shall be hard line, automotive style, assembled using automotive style hose and/line end fittings. BurgaFlex style hose and fittings are approved.

Minimum Air Conditioning System Equipment Requirements:

- a. Type C buses must have at least two compressors, two evaporators, and two condensers plumbed and wired separately in order to provide maximum redundancy.
- b. Compressor(s) must be chassis engine-driven. All compressors must have the correct lubricating oil specified on a permanent tag attached to the compressor in a visible location.
- c. The system must be equipped with both a high pressure and a low-pressure switch to prevent compressor operation when system pressures are above or below recommended safe levels.
- e. Electro-magnetic compressor clutches must have an anti-feedback device and must be wired to receive at least 12 volts at all times when engaged.
- h. Parts and Tools Availability - All system parts and required special service tools must be readily available, and a list of suppliers must be provided to the SCDE.
- i. Parts and Service Manuals - A comprehensive operator's, maintenance, and parts manual(s) must be provided for the entire system, or available via Internet access from the manufacturer's website for each A/C system purchased. Parts manuals must be designed so that all replaceable parts are illustrated by line drawings and such parts are numbered on the illustration, with a part description on a separate list

under the corresponding part number. Part descriptions should be annotated appropriately with the part number, a proper description (part name), and the quantity required for the application listed in the drawings. The service manual or manufacturer's website must also include an overall A/C system diagram with component plumbing, locations, and identities indicated for diagnostic purposes.

- j. Serviceability – All components requiring periodic servicing must be readily accessible for servicing including, but not limited to, the following:
1. Refrigerant service ports (high and low pressure).
 2. Sight glass(es), which must be directly visible.
 3. Filter/drier and/or accumulator, which must be on all systems and be a minimum of 16 cubic inches. The drier is to be comprised of a bead-type desiccant compatible with R134a, and must have a screen filter.
 4. Expansion device(s).
 5. Drive belts - for replacement and adjustment.
 6. Any replaceable fuses.
 7. Evaporator air filters – removable and serviceable without the use of tools.
 8. All major component serial numbers - must be readily visible.

NOTE: ProAir, TransAir, Rifled, ACC & MCC are acceptable manufacturers.

All air conditioner systems used on Regular Type C school buses must be rated in BTUs using the International Mobile Air Conditioning Association (IMACA), Incorporated Recommended Procedure 250 for vehicle air conditioner systems. Ratings must be based on the procedures and conditions listed in Procedure 250 for rating condition "CITY." All regular type C school bus sizes must have the following minimum BTU ratings for installed air conditioner systems:

- 120,000 BTU minimum
- Two compressors
- Two condensers

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

AISLE - There shall be a minimum of twelve inches (12") of unobstructed aisle to the emergency doors.

ALARMS

1. **BACK-UP WARNING ALARM** - An automatic audible alarm shall be installed behind the rear axle and shall comply with the Society of Automotive Engineering Standard (SAE 994b). The alarm shall be activated when the transmission is placed in reverse gear only.

2. **PASSENGER ADVISORY SYSTEM** (“Child reminder system”) - Each school bus shall be equipped with a passenger advisory system that is armed when the red lights are turned on at first passenger stop. If the driver attempts to exit the bus prior to deactivation procedures, the horn shall sound immediately. The proper procedure for deactivation is by placing the ignition key in the “OFF” position and then pressing a button located on the rear bulkhead on driver’s side of bus prior to opening passenger door to exit. The deactivation device shall be tamper-proof such that it cannot be disabled by students or other passengers. Explicit instructions for operating this system shall be installed above entrance door or front bulkhead. Instructions shall be on a plastic type material that will adhere to the applied surface.

ALTERNATOR - Electrical current shall be generated by use of an alternator of the heavy-duty 12-volt type with a built- in rectifier. Minimum output rating shall be at least 220 amperes. Voltage shall be controlled by a transistorized regulator of adequate capacity and matched to operate properly with alternator furnished.

Alternator to be equipped with a SAEJ180 two legged mount or acceptable easily accessible high position equivalent mount. All chassis on order are to be equipped with the same brand name. Serpentine belts shall be furnished to drive alternator and fan. Chassis/body grounding of electrical system shall be provided by the use of suitable grounding straps grounding the body to the frame, the engine to the frame and the batteries to the frame.

***NOTE:** Chassis manufacturer shall install a readily accessible terminal so that body and chassis electrical load can be recorded through the chassis ammeter and/or voltmeter. Chassis terminal shall have a minimum of 220-ampere capacity.*

All wiring shall be required to meet Society of Automotive Engineering (SAE) Codes.

ASSIST RAIL - Two ADA compliant safety assist handles or rails shall be provided at the front entrance, located on the right and left, securely mounted inside of body and should extend to bottom step to be within approximately 28 inches of ground.

AXLES

FRONT AXLE - The front axle shall have gross weight capacity at the ground according to the chassis manufacturer's rating, equal to or exceeding that portion of the total load which is supported by the front axle. (See Minimum Requirement page). Include cast iron hub assemblies with unitized oil bath seals and a synthetic/blended lube meeting or exceeding manufactures requirements

***NOTE:** Wheel alignment is to be checked and corrected AFTER body installation and before delivery, and to include caster, camber, toe-in, and rear axle tracking.*

REAR AXLE - The rear axle shall be of full-floating type and have a gross weight capacity at ground according to the chassis manufacturer's rating equal to or exceeding that portion of the total load which is supported by the rear axle, except minimum as specified on Minimum Requirements

page. Axle shall be equipped with a magnetic fill plug, magnetic drain plug and filled to recommended level with a synthetic/blended lube meeting or exceeding manufactures requirements

REAR AXLE RATIO - Rear axle ratio to be determined by chassis manufacturer with concurrence from the manufacturers of the engine, transmission, and rear axle for optimum operating conditions (fuel consumption and power/torque curves), at 45 MPH and achieving a top speed of 60 MPH. Final approval of axle ratios shall be given by the SCDE
Rear axle housing to include tag or stamp indicating ratio and fluid requirement.

NOTE: AT ANY TIME DURING THE WARRANTY PERIOD THAT A REAR AXLE IS DETERMINED TO BE THE CAUSE OF NOISE, (SOUND PRESSURE RADIATED TO THE INTERIOR OF A SCHOOL BUS), THE CHASSIS MANUFACTURER SHALL BE RESPONSIBLE FOR MAKING REPAIRS. THIS IS TO BE MEASURED AT A REFERENCE POINT OF ONE-INCH (1”) FROM THE EAR OF ANY SEATED PERSON. IF THAT LEVEL EXCEEDS 85 DECIBELS, THE CHASSIS MANUFACTURER SHALL MAKE REPAIRS TO REDUCE THE NOISE LEVEL OF THE REAR AXLE TO ACCEPTABLE LIMITS.

BATTERIES - Battery case is to be sealed maintenance free. Chassis must be equipped with two BCI Group 31 batteries with a total of no less than 1850 CCA. Battery cables shall be long enough to allow full extension of battery tray. Battery cables to be one gauge or heavier, color-coded red-positive / black-ground and easily identified positive and negative. Battery ground cable shall be of the round covered type. Battery must be grounded to the rear of the engine or frame. If grounded to frame, frame must be grounded to engine with same size cable.

All battery cables shall be routed to the left frame rail without crossing over the top of any frame member. Routing and clamping of conductors shall be pre-engineered to point of termination outside left frame rail. Both battery cables shall attach to the battery post or battery terminals with a bolted connector. Buses shall be equipped with an all-weather battery disconnect switch to isolate batteries, located in battery box or approved location.

NOTE: ANY WIRES PASSING THROUGH THE FRAME RAILS SHALL BE PROTECTED BY WIRE LOOM OR BRACKETED CLAMP, OR GROMMETED TO PREVENT CHAFING. ROUTING SHALL BE APPROVED AT THE PILOT INSPECTION.

BATTERY CARRIER - The body shall have a battery carrier with a pull-out roller bearing sliding tray located under the body floor with a lockable access door through the left body skirt panel. (All locks keyed the same.) Carrier must be protected against water and dirt and shall have a drain shield over top of door. Inside of carrier shall be primed and painted with coating to prevent rust. Batteries are to be secured with bracket type hold-down (no rubber or nylon straps) to pull-out roller bearing sliding tray for easy servicing and sliding tray is to be provided with locking device to securely hold it in place in the battery carrier. Battery box shall be approximately 14 inches high x 25 inches wide x 16 inches deep. Battery box shall be capable of accommodating two (2) BCI Group 31 batteries with a total of no less than 1850 CCA. Battery door shall be lockable and keyed the same as any other lockable access panels and have metal pin-style hinge. The battery compartment door shall be identified with the word BATTERY in 2-inch Black lettering.

BRAKES

Wheel-End – Air Brakes wheel end groups (front/rear) shall be of Air Disc configuration and meet FMVSS 121. All brake lining is to be premium grade asbestos free material of FF friction rating. No dust shields required.

Anti-Lock Braking System (ABS) - Bendix or Meritor four channel ABS or equivalent. Front and rear wheel speeds are to be sensed separately.

Electronic Stability Control (ESC) – Automatic Electronic Stability Control is required on all configurations.

Collision Mitigation System – Passive Collision Avoidance system is required on all Type C configurations. System shall include the following minimum specifications:

- *Forward collision warning (Audible and Visual)*
- *Lane departure warning (Audible and Visual)*
- *Following distance or Headway warning (Audible and Visual)*

Parking brakes - Parking brake system shall be air operated and constructed to meet the following requirements:

1. Parking brake shall hold vehicle stationary or limit traction of braked wheels on 20 percent grade under any condition of legal loading when on surface free from snow, ice and loose material.
2. When applied, the actuation of the parking brake shall be immediate, and parking brake shall remain in applied position with capability set forth in above, despite exhaustion of source of energy used for application or despite leakage of any kind.
3. Air brakes shall have parking brakes of the spring applied and air release type. The control shall be dash mounted, electronically activated, and clearly marked yellow. All air brakes shall be equipped with service brake interlock.

AIR COMPRESSOR - may be either belt-driven or gear-driven, and is to be at least 13.2 CFM. Air compressor and air intake is to be routed through engine air cleaner system.

AIR DRYER - Bendix AD-9, AD-IP or approved equivalent air dryer shall be installed on all air brake systems. The dryer shall be equipped with a functional internal heater and automatic exhaust valve. The location of the dryer shall be such that the assembly is easily accessible for service and maintenance. All plumbing from air compressor to input of air dryer shall be routed for direct entry into air dryer utilizing soft flow bends and eliminating all sumps in the air lines.

AIR TANK DRAIN CONTROL - Electronic drain valve system controlled from driver's compartment, one electronic drain valve controlling all three air tanks. Schrader valve is required

to be located in an accessible location in the engine compartment or on wet tank in order to recharge air brake system for towing. (Location to be approved at pilot model.)

BODY - Body shall meet all applicable FMVSS requirements. If requested, this test information shall be furnished to the State for review.

SIDE INTRUSION - All Type C bodies must meet the requirements of the latest published Transportation Specifications and Procedures, Side Intrusion Test.

COLORADO RACKING TEST - Each manufacturer of type C bodies must certify that representative configurations of its buses produced to meet these specifications comply with the testing and requirements of the Colorado Racking Load Test.

KENTUCKY POLE TEST - Each manufacturer of type C bodies must certify that representative configurations of its buses produced to meet these specifications comply with the testing and requirements of the Kentucky Pole Test.

BROOM HOLDER - A broom securement device shall be mounted in front of, or on the front side of the crash barrier, behind the driver seat or in alternate approved location. Final mounting location to be approved at the pilot.

BUMPERS

1. The front bumper shall be of heavy duty, straight or wrap around/curved design and constructed of 3/16 + or - .005 inch in thickness steel. Bumper shall be reinforced, if necessary, to allow jacking and minimal end deflection. Demonstration may be required at pilot model inspection. Deflections which in the State's judgment are found to be excessive will result in rejection of the bumper.
2. The rear bumper shall be of pressed steel channel at least 3/16 + or - .005 inch in thickness and minimum 8 inches (high). The bumper shall be attached to the chassis frame in such a manner as to be easily removed and be so braced as to develop the full strength of the bumper section. This is also to include rear or side impact and shall be so attached as to prevent hitching of rides. Rear bumper shall extend beyond the rear most part of the body surface at least one inch, measured at the floor line.

CRASH BARRIER - Crash barrier shall meet FMVSS 222 & 302 and shall be constructed and covered as per seat backs with blue seat material. Crash barrier material shall be fire block type meeting same requirements as all other installed seat upholstery. Crash barrier on right and left side of bus shall have a modesty panel between the stanchion bars of crash barrier from floor level to bottom of crash barrier.

CROSSING CONTROL ARM - An air-operated polycarbonate crossing control arm shall be mounted on the right end of front bumper and operated through stop arm switch in conjunction with a switch mounted on front door control. Arm shall extend approximately 5 ½ feet when in operation. Crossing arm is to have an independent solenoid valve and regulator (Specialty Model

28000 series air operated or Specialty 8100 series). An electro-magnetic mount (or other approved retention mechanism; NOTE: approval must be requested no later than 10 days before bid opening) shall be installed on the left side of the front bumper that secures the crossing arm stationary when the ignition switch is in the on position. Arm shall not exceed 90 degrees when fully deployed and be parallel to ground. Magnetic mount shall be Specialty Model 8101 or equivalent.

DOORS

ENTRANCE DOOR - The entrance door shall be located at the front of the bus and on the driver's right. Entrance door shall be air operated on all chassis, panic free, outward opening under control of driver and so designed as to prevent accidental opening. The door switch is to be mounted to the left of the driver seat adjacent to the warning light switch. Door control mechanism shall be located overhead of door and concealed behind a removable panel and be secured with easily removed fasteners. Door shall seal against a stationary rubber and bottom step edge. Door shall have an emergency release properly identified and located inside the body in compliance with the latest published NCST standards. When activated, it releases pressure on the entrance door mechanism so that it may be pushed open if the driver's control is in the closed position. Entrance door shall be made of steel or aluminum.

It shall be securely hinged with approved piano type hinges, two-point steel pins, bronze bushing and/or bearing hinges or pivots. It shall be fastened to the adjoining member and shall be provided with suitable weather stripping top and bottom to prevent leaks. Minimum vertical clearance shall be 73 inches. An exterior handle for operating outward opening doors is required. A suitable safety pad shall be installed on interior of door header. Front and rear entrance door leafs to be sealed where door shafts extend into body to prevent dust and contamination from entering door actuator area. A decal shall be affixed adjacent to the emergency release valve giving instructions on the safe operation of the release valve. The location of the decals is to be approved upon inspection of pilot model. (Decal to include explicit instructions for the operation of door release valve in an emergency and normal situation.)

EMERGENCY DOOR - An emergency door shall be located in the center of the rear of the body. It shall have a minimum horizontal clearance of 24 inches and a minimum vertical clearance of 48 inches. Door shall be hinged on the right side (when facing bus from rear) with an approved type of hinge meeting FMVSS 217 requirements. It shall open outward and shall be designed to open from both inside and outside of bus. Door should be equipped with a metal or approved strap doorstop, which shall limit its opening to a minimum of 95 degrees. A suitable safety pad shall be installed on interior of door header that will provide padding for vertical and horizontal surfaces. The words "EMERGENCY DOOR" shall be lettered on or above door on inside. Rear emergency door and side emergency door (if required by FMVSS 217) must be equipped with a hold open device which complies with FMVSS 217.

The emergency door is to be equipped with a gear and rack-fastening device or equivalent. Rack shall be 1-¼ inches by 5 ½ inches by 3/8-inch steel and shall be designed for 1 ¼ inch of travel in locking. Rod for operating lock should be a minimum of ½ inch by 4 ¾ inches long with non-detachable handles.

DRIVELINE - The torque capacity of the driveline assembly shall be equal to the maximum engine torque as developed through the first transmission gear. All bearings shall have an inner race so that failure of bearing shall not damage drive shaft. Each propeller shaft shall be equipped with a protective metal guard to prevent whipping through floor or dropping to ground if broken. Driveline guard is to be 7/16-inch round U-bolt or minimum 1-inch x1/4-inch flat bar.

ELECTRICAL SYSTEM

NOTE: Multiplexing/Electronic System Control Technology shall be acceptable in lieu of fuses or other electronic controls.

AUXILIARY EQUIPMENT CONNECTION POINT – A single integrated connection point for the installation of auxiliary equipment shall be installed to provide outputs for systems such as; Key off/Key on and warning light activation. The connection point will be accessible from inside the front bulkhead area or drivers electrical compartment/panel. Eight (8) each, fused 20-amp minimum accessory connections, with four (4) functioning as accessory and two (4) functioning as continuous hot, and so labeled. Location to be approved at the pilot inspection.

WIRING (BODY) - All wiring shall conform to the standards of the Society of Automotive Engineers. It shall be color and number coded, insulated and protected by covering with fire suppressant cover. All fuse blocks shall have circuit identification decals.

Wiring should be in circuits as follows: dome and stepwell lights, flasher lights and stop arm lights, emergency door buzzer, windshield wipers, heaters and defroster, and turn signal system. The body wiring shall be enclosed with a removable cover extending from front to rear of body. All electrical connections between body and chassis should be made at the connection furnished on the chassis. Wires will not be spliced into existing chassis wiring.

GROUNDING - All grounding on the bus shall be in accordance with ALL applicable SAE standards and shall furthermore be consistent with best industry practice. For each grounding terminal, there shall be a SINGLE particular grounding terminal type specified in the manufacturer's authorized production drawings for the vehicle, and all units delivered to the State shall be furnished with the particular terminal type so specified, for each and every grounding connection throughout the vehicle. There shall be no case on the vehicle where a particular grounding terminal type is not specified in the production drawings, or where two vehicles of same model number use different grounding terminal types for the same connection.

Grounding fastener means which are permitted include bolts, welded lugs, and self-tapping screws, but each type shall be fully and permanently suitable for use in the location installed and for the number and gauges of wires served. In instances where welding is used to secure the fastener means to the vehicle frame or body component, the weld must be such that it will not fail in any expected service condition for the useful life of the vehicle. The voltage difference between any two grounding points shall be in accordance with SAE standards. For high current grounds which exceed 30 Amp loads, a cable or ground strap terminal must be bolted directly to the frame rail in pre-drilled mounting holes. During the pilot model inspection, the contractor shall make accessible any and all grounding connections which the State wishes to inspect and/or test.

WIRING DIAGRAM - A complete schematic diagram covering all wiring in the bus is required to be furnished and delivered to each SCDE school bus garage statewide. The diagram may be provided in either hard copy or digital form (including online). The same diagram may be requested by the State and will be required to be delivered (at no charge) within 3 days of the initial request to the requestor.

DRIVER'S FAN - A 12-volt electric fan shall be installed in the driver's vicinity or a suitable automotive style ventilating system providing air conditioning and heat through ducted vents in the driver's compartment shall be provided. (Drivers fan may be eliminated if dashboard air conditioning is provided). The driver's fan shall have a separate switch with high, low and off positions. The fan shall have a metal housing, mounting bracket, fan guard, and blade. Fan shall be fully adjustable and not block view of right side rear view mirror.

CONTROL PANEL - To the left of the driver, there shall be installed an enclosed electrical accessory panel that can be easily removed for servicing. Inside the panel shall be located all relays, switches (including heater and defroster), junction block, fuses, flasher units, and door buzzer. The accessory panel should be grounded to cowl of chassis by use of 10-gauge wire. All electrical connections inside panel to be constructed so as to eliminate heat buildup in wires. Control panel shall have heavy duty, rocker type or equivalent switches that are identified using international symbols.

LIGHTING

NOTE: All lighting systems shall meet or exceed all applicable FMVSS requirements and latest published National Congress on Pupil Transportation. All LEDs must be sealed units with no weep holes. Exterior lens screws on all exterior lamps shall be stainless steel.

HEADLAMPS and TURN SIGNALS - Each chassis shall be equipped with a minimum of two LED headlamps and two LED turn signal lights. Turn signals shall be wired to operate as hazard warning lights as well.

All lights shall be of the proper intensity and adjustment to meet the most current Specifications and Procedures. There shall be provided on the inside firewall or electrical panel left of driver chassis, terminals for the connection of the body tail lights, stop lights, backup light and license well light. Turn signal lights and headlamps shall not operate unless the ignition switch is in the ACC or ON position. Alternately, the bus may be equipped to extinguish the head lamps when the ignition switch is switched to the OFF position.

DAYTIME RUNNING LIGHTS - All buses shall be equipped with DRL (low beam headlamps) tail lights, parking lights, and marker lights that are wired to automatically operate anytime that the engine is running. These lights shall not turn off by applying the parking brakes.

CLEARANCE/MARKER LIGHTS - Combination clearance/marker lights shall be installed per specifications. Lamps are preferred to be LED PIN/ Flush Mounted style with sealed electrical plugs. Lamp model to be approved at pilot model inspection.

INTERIOR LIGHTING - Shall consist of a minimum of eight (8) flush mounted LED dome lamps. A four inch (4”), white, LED stepwell light shall be wired into the chassis headlight circuit in such manner that it can operate only if chassis lights are “ON”, the entrance door is open, and the ignition switch is in the "ON" position.

EIGHT LIGHT WARNING SYSTEMS LED – Each school bus shall be equipped with a sequential, eight-way LED warning light system. The switch to operate flasher lights is to be located in the control panel in the closest location to the end adjacent to the air door switch. (Location to be approved at pilot model inspection). Any light activation switch must have cancellation capability so that the amber lights may be deactivated without opening the door. The flasher light activation switch is to be red in color. System shall be configured to strobe all lights. An Override switch is required that will operate the red warning lights, crossing gate, and stop arm. When switch is activated, the red warning lights shall strobe flash, the Crossing and Stop arm shall extend, lights on stop arm shall strobe flash, regardless of door position.

NOTE: Deactivation of eight-light system must occur by closing of entrance door.

NOTE: Exterior warning light lenses shall be covered with black hoods.

STOP ARMS (Fully illuminated) – Each school bus shall be equipped with (2) two air operated, fully illuminated, strobe flashing, stop signals (FISA). These signals shall be located on the left (Drivers) side with the assemblies installed with the rear stop arm location on buses as close as is practical to the left rear corner of the body and equipped with two (2) flashing strobe lights each, at least 4 inches in diameter, red in color, and double faced. In addition, each stop arm shall be of the fully illuminated (FISA) design using LED lighting. The blade for the stop arms shall be, octagonal in shape, shall be at least 18 inches in diameter, and shall be visible with Reflective sheeting.

The word “STOP” shall be placed on both sides of the front blade and only the rear side of the rear blade in letters 6 inches high. The stop arm air supply is to have an independent solenoid valve, Regulator, and Pressure release per stop arm. Air supply line is to be metal or nylon with suitable fittings. Assembly shall be installed as recommended by stop arm manufacturer.

TURN SIGNALS LED – Each school bus shall be equipped with two- (2) amber LED (light emitting diode), surface mounted, 7-inch round (or, if in a shape other than round, 38 square inch) directional turn signals. Rear directional turn signals shall be wired to hazard warning switch. In addition to the rear directional turn signals, LED (light emitting diode) side directional lights shall be installed on the body to work in conjunction with the directional turn signals.

STOP/TAIL LIGHTS LED – All buses shall be equipped with four LED (4) combination stop/tail lights.

Each school bus shall be equipped with two (2) red LED (light emitting diode), surface mounted, 7 inch round (or, if in a shape other than round, 38 square inch), combination brake/tail lights.

Each school bus shall be equipped with two (2) red LED (light emitting diode), recessed, 4 inch round brake/tail lights (or, if in a shape other than round, 12 square inch). Lights shall be placed on the rear of the body between the belt line and the floor. The stop lamps shall be activated by

the service brakes and tail lamps by the parking lamp circuit.

STROBE LIGHT – Buses shall be equipped with a white, flashing strobe light to be installed on the roof not to exceed one-third (1/3) the body length forward from the rear of the roof edge. The light shall have a single clear lens emitting light three hundred and sixty degrees (360°) around its vertical axis and may not extend above the roof more than the maximum legal height of the bus.

BACK-UP LIGHTS LED – Each school bus shall be equipped with two (2) white LED (light emitting diode), back-up lights, Back-up lights shall be activated in reverse gear only or whenever the rear emergency door is open. Lights should be mounted in a location to provide the best illumination for the driver when backing the vehicle. The LED light may be either circular or rectangular, provided the lighted surface area of each light is minimum 12.5 square inches.

There shall be an external LED lighting system to illuminate the area behind the rear wheels. The system shall illuminate with the back-up lights activated. The illumination must cover a rectangular area on both sides of the vehicle behind the rear wheels beginning twenty-nine (29) inches aft of the center point of the rear axle. This area shall extend outward from the vehicle sides twenty four (24) inches and rearward thirty (30) inches.

LICENSE PLATE LIGHTS LED – Each school bus shall be equipped with an LED license plate light. The light is required on the left side over the SC State license plate. A light is not required over the safety message plate. (Right side)

RELAYS - There shall be provided two constant service, heavy-duty master relays (Essex or Tyco) or an integrated power distribution board that provides the same function as the heavy-duty master relays. These are to be actuated by the ignition switch and through which all electrical accessories except the turn signal units are to be wired. Wiring from the chassis to the relays and from the relays to the fuse block shall be number 10-gauge wire. One master relay or integrated power distribution board to supply current for the dome lights, stepwell light, windshield wipers, and emergency door buzzer.

NOISE CANCELLATION CONTROL - There shall also be a manual noise abatement switch installed in the control panel, labeled and alternately colored, and wired into the activation circuit for the master body circuit relay. This shall be an on/off type switch that deactivates all body equipment that produces noise, including, at least the heaters, air conditioners, fans, and defrosters. This switch shall not deactivate safety systems such as windshield wipers or lighting systems. The other master relay to supply current for the flashing stoplights, stop arm lights, strobe lights and flashers.

EMERGENCY DOOR BUZZER - On the rear/side emergency door post at the emergency door lock there shall be installed a switch which is actuated by a maximum of ¼ -inch travel of the lock bolt. The switch shall be covered and wired to an approved buzzer and panel light system, which meets FMVSS 217. The buzzer and panel light shall be activated to warn the driver when the emergency door is not properly fastened.

EMERGENCY EQUIPMENT - All emergency equipment shall be securely mounted in the driver's area. The overhead compartment will be utilized for all items except the Seat Belt Cutter and Fire Extinguisher. This compartment shall be of sufficient size to allow storage and easy removal of all emergency equipment. The approved location shall not interfere with the driver fan. Outside lid of box is to be lettered in 2" red vinyl lettering with the following "EMERGENCY EQUIPMENT".

This compartment shall be finished on the inside and shall allow for mounting the first aid kit and body fluid kit in an upright position. This compartment shall be boxed on the ends to prevent objects from sliding and/or falling to the left or right of the opening.

This compartment shall be covered by a door appropriately lettered, hinged at the top, and adequately secured (non-locking). The compartment shall provide a device for retaining the door in an open position during inspection or removal of emergency equipment.

1. **BODY FLUID CLEAN-UP KIT** - All buses shall be equipped with a removable, moisture proof and dust proof body fluid clean-up kit meeting the requirements of the 2015 National School Transportation Specifications and Procedures.
2. **FIRST AID KIT** - All buses shall be equipped with a removable, moisture proof and dust proof first aid kit meeting the requirements of the most current published National School Transportation Specifications and Procedures.
3. **TRAUMATIC BLEEDING CONTROL KIT** – All buses shall be equipped with a removable, moisture proof traumatic bleeding control kit.
 - a. Preferred Kit: Tactical Medical #TMSBCK-CG
 - b. Other approved brands: Stop The Bleed #84-0006, Red Cross #764000
 - c. **The Traumatic Bleeding control kit minimum contents are:**
 - **Set of Instructions**
 - **Tourniquet**
 - **Trauma Bandage**
 - **Compression Gauze**
 - **Pair of Nitrile gloves**
 - **Permanent Marker**
 - **Surgical scissors**
4. **FIRE EXTINGUISHER** - All buses shall be equipped with a dry chemical, compressed air type fire extinguisher bearing Under Writer's Laboratories, Inc. rating of not less than 2A-10BC (5 lbs). The extinguisher shall be equipped with a pressure gauge and a flexible rubber hose. The fire extinguisher will be new and fully charged at the time of delivery. Extinguishers not fully charged will be rejected and must be replaced.
5. **SEAT BELT CUTTER** - A seat belt cutter shall be provided on all buses and shall be mounted in an area that will provide easy access to the driver while in a seated position. This cutter shall incorporate stainless steel blades and shall be designed to eliminate the possibility of the operator or others being cut during use.

6. **WARNING DEVICES** - All buses shall be equipped with three (3) reflectorized triangles, road-warning devices. These devices must meet FMVSS 125 requirements, shall be secured in a box and the box shall be secured in the compartment.

HOSE AND HOSE CLAMPS - All hoses shall be silicone or Ethylene Propylene Diene Monomer (EPDM) and all engine coolant hoses that require clamp connections of one-inch diameter and larger on the engine or associated components shall be equipped with constant torque clamps, spring-equipped (Breeze or equivalent). Any unused, temporary plugs shall be converted to permanent plugs prior to delivery.

All Engine ECM program parameters and password consisting of 0000 shall be discussed and established at the Post Award Meeting to be held within 14 days after award. End user shall have access to all Engine ECM programming. The electronically controlled engine is to be programmed to establish the maximum road speed stated on order. Note: 60 mph on all school bus chassis.

EXHAUST SYSTEM - A total exhaust system, exhaust pipe, muffler and tail pipe through bumper shall be furnished by the chassis manufacturer and pre-engineered to terminate no less than flush with rear bumper or shall not extend more than two inches beyond rear bumper meeting national standards (must meet FMVSS). Tail pipe shall be minimum 16-gauge 409 stainless steel aft of DPF and shall not be reduced in size after it leaves the after-treatment device. The chassis manufacturer shall provide sufficient tail pipe length to allow body mounting without extension.

***NOTE:** At any point, the exhaust system is 12 inches or less from the fuel tank, the fuel tank shall be properly insulated with metal shield. No adhesive shields allowed. Exhaust system components located within 4 inches of any non-metallic part shall be properly shielded to prevent heat transfer. All connections shall be slip joint connections (no butt connections) using offset band clamps compression clamp, or Marmon compression joint.*

***NOTE:** After-treatment device shall be constructed of stainless steel materials that meet federal emission guidelines. Exhaust pipe, after-treatment device and tail pipe shall be of the heavy-duty type and of sufficient size to minimize backpressure.*

FLOOR COVERING - The floor under seat area and drivers compartment shall be covered with black, smooth finish rubber covering or elastomer covering, at least 1/8" thick. The aisle and entrance area shall be covered with black, ribbed pattern rubber or elastomer covering at least 3/16" thick. The frontal area around the driver compartment is to be covered with black sound abatement. The adhesive for laminating the cover to the floor shall be water – resistant type of trowel or spray consistency. A molding strip shall be applied over the edges and joints of the covering. If the chassis is equipped with transmission cover, the cover shall be placed on top of floor board and securely fastened and sealed.

FRAME - Each frame side member shall be of one-piece construction (minimum 50,000 psi). Cross members and components attached to frame shall be installed with grade 8 fasteners. Frame shall be doubled from a point forward of front spring hanger, on rear axle, to a point equal to leading edge of rear air bag on side where torsion bar meets frame rail.

Any notched areas of a frame rail shall be reinforced utilizing frame liners sufficient in size and strength to insure compliance with the minimum section modulus requirements. There shall be no extra holes drilled in the frame rails.

The frame and all attached components shall be thoroughly coated with paint (black). Precautions shall be taken to insure that color coded items (air supply tubing, wiring, etcetera's) are not painted.

Routing of all brake lines and/or electrical wiring shall be located within the frame rail flanges.

NOTE: ANY WIRES OR BRAKE LINES PASSING THROUGH THE FRAME RAILS SHALL BE PROTECTED BY WIRE LOOM OR BRACKETED CLAMP, OR GROMMETED TO PREVENT CHAFING.

FUEL TANK – The fuel tank shall conform to FMVSS 301 in construction and mounting. Fuel system to have a fuel filter and water separator that includes a water sensor and primer pump.

Fuel filter/water separator is to be located between fuel tank and engine and mounted on the firewall, frame rail or engine, prior to any fuel pump. Tank to be equipped with a minimum of one internal baffles.

Diesel Fuel Tank capacity on all type C capacity buses must be at least 100 gallons with aluminized interior. Tank shall be equipped for at least a 93-95% draw. Note: One (1) tank with a 100-gallon capacity is to be provided on all chassis. Multiple tanks are not acceptable.

Tank to be located immediately behind the entrance door such that fueling takes place just to the rear of the entrance door in order to maximize fueling flow and convenience of remote fueling. Access shall be provided through a removable cover that provides access to fuel sending unit. Fuel tank may also be mounted between the chassis frame rails.

Fill tube shall be designed as to prevent fuel splash-back at any time during the fueling operation, such that there is no risk of damage to asphalt in fueling areas by fuel exiting from the filler neck. Unless otherwise notified by the SCDE, the contractor must demonstrate to the State's satisfaction during the pilot model, by means of an actual fuel fill operation, the ability of the installed fuel tank to accept fuel at the simultaneous conditions specified above. If the installed fuel tank and filling system fails to meet the above requirements in full (including splash-back restriction) during the pilot model demonstration, or in any demonstration thereafter, the bus will be considered unacceptable, and the contractor is expected to make immediate, permanent, and appropriate modifications to the tank location and/or filler tube configuration, or to other factors as may be necessary, in all affected buses.

FUEL FILLER OPENING COVER - A latch able door is to be installed over fuel filler opening on side of body. The door must be held in the open and closed positions with a spring device. A suitable panel in the body floor shall provide access to the fuel sending unit and fuel lines.

GUARD RAILS - In addition to the side stringer and required rub rail, there shall be applied to the outside of the body, three guard rails. These members to be corrugated so as to provide maximum stiffness and shall be 16-gauge or heavier. Pressed-in guardrails will not meet these

requirements. Guardrails shall be located at the following approximate locations: floor level, seat level, and window sill level.

The seat level and window level rails shall begin at the entrance door posts on the right side of the body and, except for the rear emergency door, extend around the rear of the body to left windshield post. Where design problems cause difficulty in installing one of the above guard rails, the floor level rail may be extended in its place or an additional stringer installed. Floor level guardrails are to begin at the entrance doorposts on the right side of the body and, except for the wheel house and gas filler and lift door area, extend to the right rear body post, and to the left windshield post. Except for the wheelhouse, they are to extend to the left rear body post, except where design does not permit installation. The guardrails are to be vented and attached at least twice to each post within their lengths. Splices, if any, are to be located at posts by lapping the full width of the supporting part of the posts. Guardrails shall be installed utilizing Pan Head Carbon Steel Screws/stainless steel sheet metal screws, High strength blind or Drive rivets in all attaching positions. All guard rails shall be painted gloss black.

***NOTE:** In the event that continuous guard rails are not possible as stated above, reinforcement shall be installed inside the bus body to compensate for the absence of rails.*

HEATING AND VENTILATION - All body heaters will be supplied with a replaceable filter. On buses equipped with elevated driver seat platform, and if the air intake for the heater faces the rear of the bus, there shall be a steel kick plate barrier to protect the filter from damage. The barrier shall be designed to allow sufficient air intake to the heater and be designed for easy filter removal with quick-release fastener(s) on cover and without deforming filter. A heavy duty, fresh air, heater shall be provided which uses the hot engine water as a heat source. The heat exchanger shall be of the coil type and capable of withstanding an internal pressure of 175 psi for 3 minutes. Along the windshield sill, there shall be installed a metal or plastic ducting having a capacity of not less than 150 cubic feet of air per minute. The duct shall have sufficient louvers or adjustable diffusers to direct a strong flow of properly heated air over the entire windshield surface. Windshield will have an equal volume of airflow provided to each side (left and right). **Conditioned air shall be switched on automatically whenever the defroster is active.**

******NOTE:** Vehicle engine shall be capable of producing and maintaining 170-degree water within 12 minutes of normal operation at 25 degrees Fahrenheit ambient air temperature, or otherwise an auxiliary heating device shall be installed to fulfill this requirement in its entirety.*

All buses shall have additional plumbed heater(s) in rear of bus meeting the below requirements. The heaters shall have the capability of providing evenly distributed heat, creating a temperature rise to 50 deg. F. inside the body shell in 20 minutes when soaked in an ambient temperature of 0 deg. F. for 15 hours.

The Bus Body Heating System Test as defined in Appendix B of the most current published National School Transportation Specifications and Procedures is the heater performance test to be used. Minimum of 80,000 BTUs.

1. Heater is to be located aft of wheel well under seat/or if two heaters required, then one mounted midship under the seat/one mounted aft of the wheel well. A switched heavy duty transfer (Booster) pump is required. This pump shall be activated when either the front heater switch or separate rear heater(s) switch(es) is/are turned on.
2. All fittings and installation shall be above the floor level of the body and contained in a track designed to prevent steam or water from contacting passengers in the event of a leak, fitting separation, or other malfunction.
3. Heater hose shall conform to SAE specifications J20R3 class D1 (EPDM) or SAE J203R Class A (silicone). Brass, copper elbows or rigid plastic sleeves shall be used in the water hose when it is necessary to make a 90-degree or greater bend in the lines. Rustproof adapters shall be installed in water hose connections to the engine.
4. All engine coolant hoses that require clamp connections of one-inch diameter and larger on the engine or associated components shall be equipped with constant torque clamps, spring-equipped (Breeze or equivalent)
5. Brass or copper elbows shall be used where coolant hoses must turn or change direction sharply. A brass or copper tube assembly shall be provided at any point where the hoses must pass through the floor, body panels, and/or bulkhead.
6. All hoses routed on the inside of the bus shall be covered by approved panels and shall be secured at points not to exceed three feet (3') in distance. There shall be no exposed hoses in the interior compartment of the bus.
7. Heater location for flat floor units or lift equipped buses shall be aft of lift and on same side as lift. Front heater on all models shall be in manufacturer's standard location, to be approved at pilot.

HORNS - shall conform to SAE Standard J-377.

INSTRUMENTS/GAUGES AND INSTRUMENT PANEL - The instrument panel shall be designed to eliminate glare on the gauges when operating the bus in bright sunlight.

IGNITION - Chassis shall be equipped with a keyed ignition switch. All buses purchased under a single order shall have the ignition switch keyed alike. A minimum of two (2) spare keys shall be provided with each bus.

All instruments and gauges shall be mounted in such a manner that each is visible to the driver while in a normal seated position. The following instruments and gauges are required (lights in lieu of gauges are not acceptable):

1. **AIR PRESSURE GAUGE(S)** - Shall include warning light and buzzer to indicate low air pressure. Single gauge with two (2) needles of contrasting colors is acceptable.

2. **COOLANT TEMPERATURE GAUGE** - Shall include a warning light and buzzer to indicate high water temperature based on engine manufacturer's recommendation. Water temperature sensor shall be located on the engine.
3. **ENGINE SERVICE LIGHT** – A dash-mounted light shall be provided to indicate if the electronic engine control module detects a malfunction.
4. **FUEL LEVEL GAUGE**
5. **HIGH BEAM HEADLAMP INDICATOR** - Must have replaceable bulb or be LED lighted.
6. **INSTRUCTIONS** - Any special operating instructions for engine or transmission shall be displayed in an approved location on the dash panel.
7. **LOW COOLANT WARNING** - Shall include a warning light and buzzer to indicate low coolant levels in the de-aeration tank.
8. **ODOMETER** - Shall indicate a minimum of six (6) digits not including tenths (1/10) of a mile and shall be readable with ignition switch in the "OFF" position. Additionally, tenths (1/10) of a mile must be displayed on either the Odometer or Trip Odometer.
9. **OIL PRESSURE GAUGE** - Shall include a warning light and buzzer to indicate low oil pressure based on engine manufacturer's recommendation. If mechanical oil pressure gauge is provided, all inside plumbing shall utilize stainless steel braided hose.
10. **SPEEDOMETER, ELECTRONIC**
11. **TACHOMETER/ENGINE HOURMETER** - Hourmeter shall be wired to operate only when engine is running and may be readable with ignition switch in the "OFF" position. Meters installed in the instrument panel information system are approved, however must meet the above requirements.
12. **TURN SIGNAL INDICATORS, LEFT/RIGHT** – Must have individually replaceable bulbs or be LED lighted.
13. **VOLTMETER** - Shall have a graduated scale capable of indicating up to sixteen volts (16v), shall indicate battery voltage, and shall be off when the ignition switch is in the off position.
14. **DIESEL EXHAUST FLUID (DEF) LEVEL GAUGE** (if diesel engine)

NOTE: Warning light and buzzer for oil pressure, coolant temperature and low coolant may be combined.

INSULATION MATERIAL AND LOCATION - The inside of the skirting from the floor to its bottom edge shall be completely coated with an undercoating material conforming to the Federal Specifications No. TT-C-520-1 (or latest amendment). Underside of wheel housing shall be coated with same material.

The space between the exterior and interior perforated roof panels shall be completely covered with a minimum 1-½ -inch thick layer of fiberglass or acceptable equivalent. Insulation must be installed above the perforated roof panels in such a manner as to prevent any insulation from filtering through the perforations into the passenger compartment. The space from the bottom of the side windows to the floor level shall be completely covered with a minimum 1-½ inch thick layer of fiberglass insulation or acceptable equivalent.

The rear wall of bus from the bottom of rear windows to the floor level shall be completely covered with a minimum 1-½ inch thick layer of fiberglass insulation or acceptable equivalent. The firewall area of the bus shall also be insulated against engine noise, heat loss and fire penetration in the event of an engine fire.

All interior lining shall be secured to meet FMVSS 221.

INTERIOR PANELS

SHEET METAL LINING - The roof section of the body is to be lined entirely with a minimum of 20-gauge perforated sheet steel. Lining panels to have a minimum of at least 2 inches of un-perforated steel for attaching to roof bows. Panels must be designed and fastened to minimize vibration and to be installed for easy removal. Panels from the windowsill to seat rail or to floor shall be 22 to 24-gauge metal textured and embossed stainless, aluminized, or clear-coated galvanized steel sheet.

MOLDINGS - At the junction of the interior paneling and the floor, there shall be installed a galvanized, aluminum or other corrosion resistant molding.

NOTE: All interior lining shall be secured to meet FMVSS 221.

LETTERING - All lettering to be painted or high quality automotive type vinyl and shall be black unless specified otherwise herein.

1. **EMERGENCY EXITS** - The words "EMERGENCY EXIT" shall be applied in two inch (2") letters directly above each emergency exit on both the inside and outside of the bus. Instructions to operate emergency exits shall be permanently affixed to the inside of the emergency exit. Instructions shall be clear and concise for the operation of the emergency exit handles
2. **FRONT & REAR** - The words "SCHOOL BUS" shall be applied in eight inch (8") letters with a one inch (1") minimum stroke. These shall be located in one line and between the flashing lights with "SCHOOL BUS" being placed on a retro reflective background approximately ten inches by thirty-six inches (10"x36").

3. **FUEL DOOR** - Fuel capacity and type shall be permanently labeled adjacent to the fuel filler opening.
4. **INTERIOR** - The words "RATED SEATING CAPACITY, _____ PASSENGERS" shall be applied in two inch (2") letters near the ceiling, at front of bus, above the windshield and visible to all passengers. The stated capacity is to reflect the equipped capacity of the bus based on 13 inches of "rump room" for each installed passenger seat (meaning a 39" width school bus seat will be counted as 3 passengers.) The driver is not to be considered a passenger for this calculation.
5. **INTERIOR** - The words "EMERGENCY EQUIPMENT" in two inch (2") red letters shall be applied on the overhead compartment in the driver's area used for storing emergency equipment. Individual emergency equipment items shall be listed using one inch (1") red lettering.
6. **INTERIOR** – Each seat shall have number/letter designations applied overhead using two inch (2") lettering. The number designations shall be by row starting with number one (1) at the front. The letter designations shall be L for left side and R for right side as viewed from a forward facing position.
7. **NUMBERING** - The SCDE shall provide a listing of an eight (8) digit identification number to the contractor for each bus constructed. These numbers shall be applied using four inch (4") digits, except as noted, in the following locations:
 - a) Left Side - below driver's window and centered between the top two (2) guard rails
 - b) Right Side - just aft of the service door and centered between the top two (2) guard rails
 - c) Rear – Centered horizontally below the rear window, and
 - d) Inside – above service door (2" lettering)
 - e) Top – Complete 8 digit number using two foot (2') lettering
8. **SIDES** - The words "**SOUTH CAROLINA PUBLIC SCHOOLS**" in six-inch (6") letters shall be applied directly under windows and centered front to rear.

LOGOS, MANUFACTURER'S - No manufacturer's logos or names may be placed on the bus exterior except a small nameplate and model ID may be installed in an approved area(s).

MIRRORS/SUNVISOR/CAMERA SYSTEM

CROSSOVER MIRROR SYSTEM - There shall be installed on each front fender of the chassis one heated mirror. These mirrors shall be mounted on the front corners of the hood assembly. These mirror brackets shall

have sufficient supports (steel plate or approved equivalent) located on the inside of the hood to prevent the fasteners from pulling through the hood assembly (Rosco Hawk-Eye Model 2365H, Mini-Eye 3365 or Eye-Max LP).

***NOTE:** The heating elements in rearview and crossover mirrors must all be controlled by a single momentary switch incorporated with a 15-20-minute timer located left of driver.*

EXTERIOR/INTERIOR CAMERA SYSTEM – Bus shall be equipped with an electronic rearview and exterior camera system capable of providing the following minimum capabilities.

1. Back-up camera operates whenever the vehicle is switched into reverse gear. The video image should be presented using a portion of the driver’s interior mirror not to exceed 30% of the mirror’s surface.

***NOTE:** Camera system may also be permitted to operate whenever the rear emergency door is open, but is not required to do so.*

2. Exterior cameras located at positions in order to give the driver a full 360-degree view whenever the red pupil warning lights are activated. The video image should be presented using a portion of the driver’s interior mirror not to exceed 30% of the mirror surface.

INTERIOR MIRROR - There shall be securely installed on the windshield header a 6”x30” driver-adjustable rearview located as to give the driver a clear view of the interior of the bus and the road behind. Interior mirror must be mounted securely enough to prevent mirror vibration over the life of the bus. Securement to be approved at pilot model. Manufacturer and model number shall be attached to mirror. See “exterior camera system” listed above for additional information.

REAR VIEW MIRROR SYSTEM - There shall be installed on each side distortion-free glass mirrors. Mirrors shall be mounted on both the left and right side of the bus in an anodized or etched aluminum frame. Mirrors shall be fully adjustable so as to give the driver a clear view of the rear wheels of the bus and be mounted in accordance with FMVSS 111. The rear vision mirror system shall be capable of providing a view along the right and left sides of the vehicle which will provide the driver a view of the rear tires at ground level, and a minimum distance of 200 feet to the rear of the vehicle. Mirror system shall be Mirror Lite Super Double Nickels, Rosco “Euro-Style” or Open View ES Mirror System, heated and remotely adjustable (all models), with remote controls. Both mirror heads must be of similar size and viewing area. Switch must be rocker type – no joystick.

***NOTE:** The mirror manufacturer and model number shall be stamped or permanent vinyl tag attached to mirror housing.*

SUN VISOR - There shall be installed on the windshield header an interior sun visor which is double bracketed, adjustable, and not less than 6 inches x 24 inches in size. Visor is to be mounted in a manner that will not interfere with opening and closing of the overhead storage compartments and centered with steering wheel and driver seat.

PAINT - The entire interior paneling of the bus, except the sections of aluminized steel and /or clear coated metal, shall be painted. Paint color to be approved. All other interior items such as the heater, instrument control panel, seat frames, chassis cowl and modesty panel may be painted a compatible color. One prime coat and finish coat shall be required.

EXTERIOR PAINT - The exterior of the complete school bus body shall be painted with National School Bus Yellow polyurethane per Federal Standard No. 595a. The same brand of paint must be used on the body and chassis. The applied primer and polyurethane shall yield a dry film thickness of 2 to 3 mils. A 1 ½-inch thick black border shall be painted around the flashing stoplights with approved type polyurethane or high grade black vinyl overlay. School bus rub rails shall be painted gloss black. Roof panels down to within five inches (5") of the window drip rails shall be painted gloss white.

Add one (1) full length reflective yellow stripe minimum 1-3/4" width, position reflective strip below floor level guard rail.

PAINT COLOR TABLE

Black, Gloss	Bumpers, guard rails, blank license plates, and chassis.
Gray	Wheels
Interior	Manufacturer's Standard at time of production (except aluminized or Galvalume panels)
White	The roof of the school bus shall be painted White and shall be manufacturer's standard design except that the front and rear roof caps shall remain National School bus Yellow.
Yellow	(National School Bus Yellow) Exterior paneling and hood
Black (*)	8 digit SCDE numbers (sides and rear)
Other	Seat frames may be manufacturer's standard color

(*) See propane and electric

FLOOR AND STRUCTURAL METAL PAINT - The underside of the floor, including the chassis metal fenders and cowl and all other exposed structural metals used in the body, shall be painted with black enamel or undercoated. Air brake control valves and brake lines are color-coded and are not to be undercoated.

RADIATOR - The radiator shall be of heavy-duty construction with welded headers. The radiator core shall be a welded tube to header joint for increased life. Radiator core shall not be soldered. Radiators of heavy-duty aluminum construction are considered to be an acceptable alternative. Vehicle shall be equipped with an expansion and de-aeration tank with overflow vent hose to route coolant away from the engine. The radiator shall be of sufficient size to adequately cool the engine and transmission under all operating conditions and shall have a valve for drainage. The cooling fan, mechanically belt driven, shall be equipped with an ambient-air-temperature-controlled fan clutch or an engine-water-temperature-controlled fan clutch to facilitate ease of operation and maintenance and meet or exceed OEM requirements.

REFLECTORS - There shall be installed on the bus body (2) amber and (4) red reflectors that meet FMVSS 108 requirements. The lenses are to be 3 inches in diameter and made from acrylic plastic with six reflecting angles. Frame (if used) is to be polished aluminum or zinc plated steel. Note: 3M Diamond Grade, DOT 988 approved reflectors may be used in lieu of Petersen 472.

REGISTRATION CARD HOLDER - A vinyl type holder approximately four inches by five inches (4" x 5"), having a transparent front shall be securely mounted for use in displaying vehicle registration and insurance cards. This holder shall be riveted over the driver's window or on front bulkhead in an area approved by SCDE.

RECOVERY ATTACHMENT POINTS (Tow Hooks)- Four heavy-duty tow hooks shall be furnished and factory installed. Two on each frame rail at front in an approved manner. Two located just forward of rear bumper and are to be attached to the chassis rails independent of the rear bumper and capable of towing/recovering the fully loaded vehicle.

SAFETY ROOF HATCHES - All buses shall be equipped with two roof hatch-type emergency exits: one to be located in the front 1/3 of the body and one to be located in the rear 1/3 of the body. Hatches must meet the following:

1. Shall comply with all requirements of FMVSS 217 for emergency exits.
2. Simple release handles shall be provided permitting operation as emergency exit(s), accessible inside and outside the vehicle.
3. All emergency exits shall be marked with instructions for proper use and all emergency exits must be outlined with reflective tape which meets FMVSS 217.
4. Hatch to be supported on all four sides by structural bracing.
5. Hinged low profile roof escape hatch shall include an internal and external release mechanism and a buzzer (audible warning tone not allowed) which alerts the driver when the hatch is open. Hatch to be secured with adhesive to eliminate leaking.

SEATING - Seats shall be forward facing and be spaced with the maximum knee room available within standard body lengths. (Minimum spacing shall be 27") All seats should be 39" or 30" wide, 15 inches deep, and 24" high to be measured from Seat Reference Point (SRP) as per FMVSS222. The seat width shall be 39" unless otherwise required by the need for minimum aisle clearance depending on interior configuration. Seats are to be arranged in rows of two with a minimum 12-inch center aisle. All seat upholstery material to be of the type known as fire-block meeting the requirements of FMVSS 302.

Seat frames on all model buses shall be of the convertible type (ie Syn-tec model SC3, IMMI, BTI, NextGen, SBR or approved equivalent) allowing for the addition of student restraint, Lap/Shoulder and Integrated Child Seat configurations without removal of the frame and meet the requirements of FMVSS 210.

Each seat shall have number/letter designations applied overhead using two inch (2") lettering. The number designations shall be by row starting with number one (1) at the front. The letter designations shall be L for left side and R for right side as viewed from a forward facing position.

CHILD SAFETY RESTRAINT SYSTEMS (CSRS)

All Type C School buses shall be equipped with Integrated Child Restraint Seats that meet FMVSS 210, 213, 222, 225 and 302 (Fire Block Test). All CSRS attachment hardware and anchorage systems must meet FMVSS 210, Seat Belt Anchorage or FMVSS 225, Tether Anchorage and Child Restraint Anchorage Systems. (CE White Model #CR11-39, IMMI Safeguard Model #ICS-39 or NextGen) Seat upholstery material shall meet FMVSS 302 and shall match seat upholstery material used on all other passenger seats.



Seat frames on all model buses shall be of the convertible type (ie Syn-tec model SC3, IMMI, BTI, NextGen or approved equivalent) allowing for the addition of student restraint, Lap/Shoulder and Integrated Child Seat configurations without removal of the frame and meet the requirements of FMVSS 210.

***NOTE:** CSRS compliant seats shall be installed in the following standard locations;*

All bus configurations require -1st row on one side and 2 rows on other side (total 6 seating positions.)

SEAT CUSHION PAD - The top of the seat crown should be approximately 16 inches above the floor. The cushion material should be a minimum thickness of 3 ½-inches front 2 inches rear. The cushion shall have a ½-inch thick mounting board and shall be secured to the seat frame to meet the cushion retention requirements of FMVSS 222. Seat cushion is to be covered with an approved (fire block type) upholstery fabric to include underside of seat cushion. The cushion pad is to be secured by a positive locking mechanism that requires the removal of a securing device before latch mechanism will unseat from frame.

SEAT BACK PAD – All seat backs shall have reinforcing material equivalent to 24-gauge metal between the front and rear padding and it shall be properly fastened to the seat frame. The back pad and cover shall meet requirements FMVSS 302 and 222. The seat back is to be covered with (fire block type) upholstery fabric.

DRIVER’S SEAT – The driver’s seat shall be of a high-back air suspension type with a minimum seat back adjustment of fifteen (15) degrees and a head restraint accommodating sizes through ninety-five (95) percentile adult male (as defined in FMVSS 208). The driver’s seat shall be covered with black fire-block material. The driver’s seat shall have minimum distance between the steering wheel and the seat back not less than eleven inches (11”), with a minimum aft adjustment of six inches (6”). The driver’s seat shall provide for fore-and-aft and up and down adjustment and shall be contoured with adequate support on the sides. The seat shall be designed to provide lumbar support and positioned on the centerline of the steering wheel.

Seat shall be identified by permanently attached, approved durable tag containing seat manufacturer, model number, serial number and build date.

DRIVERS SEAT BELT – Shall be equipped with 3-point lap and shoulder harness. The amount of usable belt, as measured from the top point of the seat back, through the sliding buckle, to the point on the left side of the seat cushion where it joins the seat back (that is, near the drivers left hip) shall be at least 100”. The ability to quick-release driver seat latch with weight applied is required.

NOTE: Driver’s Seat belt webbing shall be highly visible (orange) and comply with FMVSS 209

FIRE BLOCK UPHOLSTERY FABRIC - The upholstery material used to cover all seat cushions and backs shall conform to and meet the recommendations of the 2015 National Standards relating to seat upholstery fire block test. Seat color is to be blue.

SERIAL NUMBER LABEL – A metal label shall be furnished showing the Vehicle Identification Number, and permanently affixed on the firewall or dash panel visible from left front corner of bus in a position for maximum visibility and legibility (exact location to be approved). Letters and numerals shall be of the cut or embossed type. The serial letters and numerals should be a minimum of 4MM in height.

SHEET METAL SKIN - All paneling above the top of the floor except the cowl panel, wheel housing, and body hoods shall be 20-gauge or heavier. The cowl panel, if provided, shall be of 12-gauge or heavier metal, or cowl panel may be 14-gauge metal with 12-gauge framing.

Side lower skirt edge shall be at a horizontal line from the center of the front spindle to the center of the rear axle plus or minus 2 inches.

External wheel housing opening shall be equipped with a steel or rubber fenderette that extends past outermost portion of tire.

SHOCK ABSORBERS - Chassis shall be equipped with heavy-duty, double-acting hydraulic front and rear shock absorbers compatible with rated axle capacity. The shocks shall be mounted to a bracket affixed to the frame with rivets or minimum of grade eight bolts.

SPLASHGUARDS – Each school bus shall be equipped with rubber front and rear splashguards to prevent debris from being thrown under the bus body. Width to be approved at pilot model inspection.

SPRINGS – Chassis spring assemblies shall be of ample resiliency under all load conditions to meet FMVSS requirements mandating that suspension systems be rated to meet or exceed the expected vehicle load.

Rear Suspension (Air Ride) - All configurations of buses shall be equipped with rear air-ride suspension.

STEERING - The steering gear shall be designed to assure safe and accurate performance of the vehicle under any and all conditions. Steering shall have full time power assist with an integral type steering gear (external hydraulic assist cylinder not acceptable). The mechanism must

provide for easy adjustment for lost motion. The upper and lower kingpin shall have roller bearings or bronze bushings.

The Steering column shall be equipped with tilt and telescopic functions and shall provide for easy adjustment. If these functions are not hand actuated, the controls must be positioned to alleviate accidental operation. Tie rod ends, drag links and kingpins shall be equipped with Zerk type grease fittings unless permanently sealed.

STEPWELL - A stepwell, having three steps, shall be built into the front assembly and completely enclosed with doors extending to bottom step. Each step shall be 14-gauge steel construction and covered with ribbed rubber or elastomer material as per the 2015 National Standards.

On the first riser from the bottom, there shall be installed (1) metal plate measuring 20" W X 5" H. The plate shall be centered on the riser and will be used to affix a decal. Entrance step shall extend below skirt line to such depth as necessary to make the distance to the ground from the bottom of the step no less than 10 inches and no more than 14 inches. Installation of the above plate will not be required if the riser is metal and suitable for affixing a decal.

TRANSMISSION - Transmission shall be fully automatic or automated manual, electronically controlled and have a minimum of five (5) forward ratios, neutral, and reverse, filled with synthetic, approved fluid. The transmission shifter shall be manufacturer's standard. Within the range selected, ratio changes shall be effected automatically at full engine power if desired. It shall have an illuminated range indicator. Control shall be located to the right of the steering column (dash mounting preferred). Load-based shift scheduling or comparable electronic shift scheduling is required.

VEHICLE DATA PLATE - On the inside of the bus, there shall be installed (1) on metal component of header, above the driver and to the left of the visor mounting bracket or (2) on ceiling, directly above the driver's head, a single manufacturer's name plate which can be easily read, on which shall be shown the name of the body manufacturer, the name of the chassis manufacturer, the serial number of body, the serial number of the chassis, seating capacity, GVWR, date body built, date chassis built, actual bus height, length, and weight, and actual tire size installed on bus. Actual weight does not refer to G.V.W.R., but instead shall mean the actual weight of the completed bus full of fuel, in accordance with tank size furnished) and fluids.

NOTE: Plate to be metal with all information embossed (for fireproofing).

WINDOWS AND WINDSHIELD

NOTE: Percentage of light transmission shall be as specified below. "Light transmission" means the amount of natural light transmitted through the glass:

TINTING - All Type C buses must have tinted glass that provides the maximum compliant tinting of the windshield, the driver's side window(s), and the service door glass. Tinted glass in all

windows rear of the driver's compartment must have a light transmission of approximately 28 percent.

SIDE WINDOWS - There shall be installed on each side of the body an adjustable split sash window between each framing post. Bottom sash shall be stationary with a minimum clear vertical opening of not less than 12 inches. The 12-inch clear vertical opening would be accomplished by lowering the top sash. A finger touch type opener shall control window opening.

Window visors/drip rail are to be provided for all side windows. All side passenger windows shall be tinted glass as per requirements in "TINTING" Section.

EMERGENCY WINDOWS -The minimum number of push out windows (emergency) side windows should be (2) two per side, (4) Four total per bus and must be installed in order to meet FMVSS 217. All push out windows must be marked with yellow reflective tape which complies with FMVSS 217 and be of the side-hinged design, (hinged to the front) Instructions to operate emergency exit windows shall be permanently affixed to the inside of the window glass. Instructions shall be clear and concise for the operation of the emergency window.

The words "EMERGENCY EXIT" to be lettered on inside and outside at top of windows

ENTRANCE DOOR WINDOWS - There shall be installed in each section of the entrance door one or two glasses.

DRIVER'S WINDOW - There shall be installed to the left of the driver a window with a sliding sash, easily operated from the driver's seat, and which is to include a metal locking device. Adjoining the ventilator sash, there shall be a window, which will permit easy exit in case of emergency. Glass used in driver's window is to be installed in sash of the same quality as side windows.

REAR WINDOWS - There shall be installed at the rear of the body on each side of the emergency door, a window set solid in a suitable and waterproof manner-to be tinted same as side passenger windows.

GLASS - All glass used in the body shall be of the laminated or tempered safety type conforming to requirements of the American Safety Code for Safety Glazing Materials. All glass should be legibly and permanently marked with safety code.

WINDSHIELD - The windshield shall be polished plate glass, AS1. The windshield glass shall be shaded with heavy tint on the upper portion.

WINDOW AND DOOR GLASS – All window and door glass shall be laminated or tempered. Glass used in entrance door and driver's side window shall be AS2, all other glass shall be AS3.

WINDSHIELD STEPS - There shall be installed on each side of the body on the lower section of the cowl, a folding windshield step and a suitably located handle for easy cleaning of windshield. Handle may be either chrome-plated, black poly material, or painted National School Bus Yellow.

WHEELS AND TIRES

WHEELS - The chassis shall be equipped with six (6) wheels and rims of the ten-stud hub piloted disc wheel design. All rims are to have a width of 8.25 inches. All wheels shall be fully painted with a hardened epoxy type paint or powder coated to provide a uniform color.

TIRES - The chassis shall be equipped with six (6) machine-balanced tires. Tires shall be of the tubeless type with full steel belted radial construction (sidewall and tread area). Tires furnished shall be listed in the tire manufacturer's current published catalog and price list. All tires shall be 295/75R x 22.5 in size. Approved Brands shall be Michelin, Bridgestone, Continental, Goodyear, Hankook and Cooper.

All tires/rim assemblies shall be dynamically balanced. Any tire not balance correctable with less than twenty (20) ounces of weight shall be replaced. All tires shall be evaluated during pre-delivery service road test. Any tire deemed out of balance during road test shall be corrected.

*****End of Type C Specifications*****

It shall be understood that South Carolina School buses must meet or exceed all Federal Motor Vehicle Safety Standards (FMVSS) applicable to School Buses.